

## NATIONAL HURRICANE PROGRAM

# Maryland Western Shore Hurricane Evacuation Study Transportation Tools Workshop

Training Guide  
Version 1.0

April 2010



**FEMA**





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# National Hurricane Program

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### **Purpose**

This course provides training on and resources for personnel who require a basic understanding of the Maryland Western Shore Hurricane Evacuation Study (HES), Abbreviated Transportation Model (ATM) and how the ATM relates to HURREVAC.

### **Who Should Attend**

This course introduces the Maryland Western Shore (MD W Shore) ATM and provides training to its use and integration into HURREVAC. The course describes the HES process, the development of the ATM, its features and uses and how its results may be used to support evacuation planning. It also demonstrates how model results can be integrated into HURREVAC.

The target audience includes federal, state and local officials involved in hurricane evacuation planning and response activities in Maryland.

### **Course Objectives**

The course objective is to enable participants to demonstrate a basic understanding of the use of the MD W Shore ATM and how its results may be used in HURREVAC. Upon completion, course participants should be able to train other users in the use of the ATM.

### **Training Content**

The 6 hour training workshop is comprised of the following lessons:

- Unit 1: Course Overview
- Unit 2: Hurricane Evacuation Study Process
- Unit 3: Basic Features of the MD W Shore ATM
- Unit 4: Data Entry Modules                      Demonstration I
- Unit 5: Data Results Modules                      Demonstration II
- Unit 6: HURREVAC Integration                      Exercise I
- Unit 7: Course Summary                              Exercise II

The table below presents the recommended training agenda.

Morning Session 9:00 – 12:00	Unit 1: Course Overview	30 minutes
	Unit 2: Hurricane Evacuation Study Process	45 Minutes
	Unit 3: Basic Features of the MD W Shore ATM	45 Minutes
	Unit 4: Data Entry Modules Demonstration I	1 Hour
Afternoon Session 1:00 – 4:00	Unit 5: Data Results Modules Demonstration II	1 Hour, 15 minutes
	Exercise I	
	Unit 6: HURREVAC Integration	1 Hour, 15 minutes
	Exercise II	
	Unit 7: Course Summary Evaluation Procedures	30 Minutes

### Course Materials

Listed below are the materials that you will need in order to conduct this course:

Training Guide: Obtain one copy of the Training Guide for each participant.

PowerPoint Files: Course visuals are presented in PowerPoint format. The presentation materials follow and support the Training Guide.

MD W Shore HES ATM: A copy of the MD W Shore HES ATM is needed in order to demonstrate its use and to support the training exercises. All participants should make a copy of the MD W Shore HES ATM file on their hard drives for use in the training session

HURREVAC: Access to HURREVAC is needed to demonstrate how the outputs from the ATM may be integrated into HURREVAC and to allow participants to undertake an exercise with HURREVAC.

Course Evaluation Forms: The course will be evaluated utilizing a web-based evaluation tool or traditional methods. Participants will be instructed on how to complete the evaluation.

## **Course Equipment**

Computer and Projection Devise: Arrangements need to be made to ensure that the instructors have a computer that can run PowerPoint, the MD W Shore HES ATM and HURREVAC.

Workstations: All participants should have access to a personal computer with the ATM and HURREVAC installed in order to work through the training program's demonstrations and exercises.

The following glossary of terms has been compiled. It references many of the terms used in this training workshop as well as other terms related to evacuation planning.

### A

- Alluvial Soils:** Fine-grained sediment, especially of mud or clay particles at the bottom of a river or lake.
- ARC:** American Red Cross
- ASOS:** Automated Surface Observing System (NWS & FAA)
- ATM:** Abbreviated Transportation Model
- Average Error Affected List:** Lists those counties and/or parishes affected by the currently displayed Average Error Swath. These are the areas that the storm center could cross, given the average forecast error.
- Average Error Swath:** Represents where the storm could actually end up during the 72 hour forecast period, and is an important consideration when attempting to assess the risk to an area. Technically, according to NHC, there is approximately 60% confidence that the storm will track within the swath.

### B

- Bathymetry:** The measurement of the depth of large bodies of water, for example, lakes, oceans, and seas.
- Behavioral Analysis:** Determines the expected response of the population threatened by various hurricane events in terms of the percentage expected to evacuate, probable destinations of evacuees, public shelter use, and utilization of available vehicles.

### C

- CD:** Compact Disk
- CHART:** Coordinated Highways Action Response Team
- Clearance Time:** The time required to clear the roadways of all evacuating vehicles. It is expressed in hours before the arrival of sustained 34-knot winds, necessary for an evacuation. Clearance times are based on five variables: 1) hurricane category; 2) expected evacuee response; 3) tourist occupancy situation (where applicable); 4) background traffic; and 5) traffic control measures.
- CPHC:** Central Pacific Hurricane Center
- Critical Facilities:** Facilities that may need assistance of special consideration and planning if they are to be evacuated.
- CVI:** Coastal Vulnerability Index

## D

- DAE:** Disaster Assistance Employee (FEMA)
- Decision Arc Method:** Assists officials in making evacuation decisions prior to the time at which the radius of sustained 34-knot winds touches the appropriate Decision Arc (Decision Point). For example, with a clearance time of 15 hours, and a hurricane forward speed of 10 knots, the evacuation should be initiated before the sustained 34-knot winds get within 150 nautical miles (15 hours x 10 knots = 150 nautical miles) of the area being evacuated.
- Decision Arcs:** Clearance times converted to distance by accounting for the forward speed of the hurricane.
- DHS:** Department of Homeland Security

## E

- EOC:** Emergency Operations Center
- Evacuation:** People leaving their residence to go from a perceived dangerous place to a perceived safer place.
- Evacuation Timing:** Appropriate start and end times of an evacuation based on storm and traffic conditions.
- Evacuation Zone:** Designated by local officials and based on the surge inundation maps used in the transportation model. Surge inundation areas are divided up into zones for modeling purposes and evacuation notice dissemination.

## F

- Fathom:** A unit of length equal to 1.83 m (6 ft), used mainly in nautical contexts for measuring the depth of water.
- FEMA:** Federal Emergency Management Agency
- FHWA:** Federal Highway Administration
- FIRM:** Flood Insurance Rate Map

## G

- Geology:** The study of the structure of the Earth or another planet, in particular its rocks, soil, and minerals, and its history and origins.
- GIS:** Geographic Information Systems
- GOES:** Geostationary Operational Environmental Satellite

## H

- HAR:** Highway Advisory Radio
- HAZUS:** Hazards United States (Software Program)
- HES:** Hurricane Evacuation Study
- HESE:** Hurricane Evacuation Shelter Evaluation
- HLT:** Hurricane Liaison Team
- HURREVAC/HURREVAC 2000:** HURRICANE EVACUATION TRACKING AND ANALYSIS SOFTWARE

## I

- ICCOH:** Intergovernmental Coordination Committee on Hurricanes
- IFLOWS:** Integrated Flood Observing and Warning System
- Inland Wind Model:** Applies a simple two parameter decay equation to the hurricane wind field at landfall to estimate the maximum sustained surface wind as a storm moves inland. This model can be used for operational forecasting of the maximum winds of land falling tropical cyclones. It can also be used to estimate the maximum inland penetration of hurricane force winds (or any wind threshold) for a given initial storm intensity and forward storm motion.
- ITS:** Intelligent Transportation Systems

## J

## K

## L

- LIDAR:** Light Detection And Ranging technology used for determining land elevation.
- Loam Soils:** According to the proportions of sand, silt, and clay, soils are broadly classified into several arbitrarily defined textural groups. The texture of a soil greatly affects its productivity. Soils with a high percentage of sand are usually incapable of storing sufficient water to provide the best plant growth and lose large amounts of plant-nutrient minerals by leaching to the subsoil. Soils containing a larger percentage of finer particles, for example, the clays and loams are excellent reservoirs for water and contain readily available mineral materials.

## M

- MEMA:** Maryland Emergency Management Agency
- MEOW:** Maximum Envelope of Water; stores the maximum water surface elevation in each SLOSH grid cell for all the hurricane tracks in one direction for a particular forward speed, and storm intensity.
- MEOW Affected List:** Lists those counties and/or parishes affected by the currently displayed Decay Model MEOW. These lists are typically long, since this is a hypothetical list for all those sufficiently close to the coast to be affected, no matter where the storm strikes.
- MH:** Mobile/Manufactured Home
- Meteorology:** The scientific study of the Earth's atmosphere, especially its patterns of climate and weather.
- MLLW:** Mean Low Low Water
- MOMs:** Maximums of Maximums; represents the maximum water surface elevation for each SLOSH grid cell regardless of approach direction, forward speed or track.
- MTA:** Maryland Transportation Authority

## N

<b>NAD:</b>	North American Datum
<b>NAVD:</b>	North American Vertical Datum
<b>NAWAS:</b>	National Warning System
<b>NFIP:</b>	National Flood Insurance Program
<b>NGVD:</b>	National Geodetic Vertical Datum
<b>NHC:</b>	National Hurricane Center
<b>NHMPP:</b>	National Hurricane Mitigation and Preparedness Program
<b>NOAA:</b>	National Oceanographic and Atmospheric Administration
<b>NHP:</b>	National Hurricane Program
<b>NOS:</b>	National Oceanographic Service
<b>NWS:</b>	National Weather Service

## O

**Overlay Mode:** Allows the user to show several advisories for the same storm on the screen at once.

## P

<b>PBS&amp;J:</b>	Post, Buckley, Schuh and Jernigan
<b>PIO:</b>	Public Information Officer
<b>PSN:</b>	People with Special Needs
<b>Pre-landfall Hazard Distance:</b>	The distance from the radius of tropical storm winds of an approaching hurricane to each jurisdiction.
<b>Public Shelter Demand:</b>	The number of evacuees expected to seek public shelter.

## Q

## R

<b>RAWS:</b>	Remote Automated Weather Stations
<b>RMW:</b>	Radius of Maximum Winds
<b>ROC:</b>	Regional Operation Center
<b>ROLR:</b>	Refuge of Last Resort

## S

<b>Saffir-Simpson Hurricane Scale:</b>	Scale developed to describe the potential storm surge generated by hurricanes: <b>Category 1.</b> Winds of 74 to 95 miles per hour <b>Category 2.</b> Winds of 96 to 110 miles per hour <b>Category 3.</b> Winds of 111 to 130 miles per hour <b>Category 4.</b> Winds of 131 to 155 miles per hour <b>Category 5.</b> Winds greater than 155 miles per hour
<b>SCO:</b>	State Coordinating Officer
<b>Shelter Analysis:</b>	Presents an inventory of public shelter facilities, capacities of the shelters, vulnerability of shelters to storm surge flooding, and shelter demand for each county.

- Shoals:** An area of shallow water in a larger body of water.
- SHP:** State Highway Patrol
- SLOSH Model:** Acronym meaning Sea, Lake and Overland Surges (SLOSH) from hurricanes. SLOSH provides heights of storm surge for various combinations of hurricane strength, forward speed of storm, and direction of storm. SLOSH model is used for real-time forecasting of surges from approaching hurricanes within selected Gulf and Atlantic coastal basins.
- SMA:** Standard Metropolitan Area (from U.S. Census)
- SOC:** Statewide Operations Center
- Storm Category:** **Category 1.** Winds of 74 to 95 miles per hour  
**Category 2.** Winds of 96 to 110 miles per hour  
**Category 3.** Winds of 111 to 130 miles per hour  
**Category 4.** Winds of 131 to 155 miles per hour  
**Category 5.** Winds greater than 155 miles per hour
- Storm Surge:** The abnormal rise in water level caused by wind and pressure forces of a hurricane. Storm surge produces most of the flood damage and drowning associated with tropical systems - highest surges from a hurricane usually occur on the northeast quadrant of the storm's track.

## T

- TDR:** Technical Data Report (part of Hurricane Evacuation Study)
- TMC:** Traffic Management Center
- TPC:** Tropical Prediction Center
- Topography/Topographic Features:** Features on the surface of land, including natural features such as mountains and rivers and constructed features such as highways and railroads.
- Traffic Analysis Zone (TAZ):** Small sub-areas of the evacuation zone used by the transportation model to determine how many vehicles will use each roadway.
- Transportation Analysis:** To determine the time required to evacuate the threatened population (clearance times) under a variety of hurricane situations and to evaluate traffic control measures that could improve the flow of evacuating traffic.
- Tropical Cyclones:** Defined by the National Weather Service as non-frontal, low-pressure synoptic scale (large-scale) systems that develop over tropical or subtropical waters and have a definite organized circulation.
- Tropical depressions are < 33 knots (38 mph).
  - Tropical storms are 34 to 63 knots (39-73 mph).
  - Hurricanes are > 64 k
- Geographical areas affected by tropical cyclones are referred to as tropical cyclone basins knots (74 mph) Atlantic tropical cyclone basin is one of six in the world and includes much of the North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.
- Official Atlantic hurricane season begins on June 1 and extends through November 30 of each year.
- TWC:** The Weather Channel

## U

- USACE:** United States Army Corps of Engineers
- USGS:** United States Geological Survey
- UTC:** Coordinated Universal Time (Greenwich Mean Time)

## V

- Vulnerability Analysis:** Identifies those areas, populations, and facilities that are vulnerable to specific hazards under a variety of hurricane threats.
- Vulnerable Population:** Persons residing within the evacuation zones subject to storm surges, and the residents of mobile homes, which may be threatened by hurricane force winds.

## W

- Wave Setup:** An increase in the mean water level on a beach due to the effects of waves running up the beach and breaking. Under some conditions the set-up can be large enough to contribute to local flooding and overtopping of sea defenses.
- WFO:** Weather Forecast Office
- Wind Swath:** A display of the NHC or CPHC projected swath of winds for the current advisory you have displayed. The colors follow the pattern for winds elsewhere in the program: blue for 34 knot (40 mph) or greater, yellow for 50 knot (58 mph) or greater, and red for 64 knot (74 mph) or greater. Note that there is no further distinction of winds beyond 64 knots since the NHC or CPHC does not project but the 3 wind groups noted above in their advisory.

## X

## Y

## Z



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## **Unit 1: Course Overview**

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**Objectives**

At the end of this unit, the participants should be able to describe the purpose of this course.

**Scope**

- Unit Introduction
- Course Objectives
- Student Introductions
- Expectations: Student and Instructor
- Course Structure
- Course Logistics
- Successful Course Completion

**Methodology**

The instructors will welcome the students to the course and introduce themselves and acknowledge their hosts (State / FEMA / USACE). Following instructor and host introductions, each participant will introduce themselves to the rest of the group. After introductions, the instructors will facilitate a discussion about what the group expects to gain from the course.

The instructors will provide guidelines on “housekeeping” issues; emergency exits, special access accommodations, the location of facilities and behavior they expect from each participant. The instructors will also overview the course structure and logistics. Finally they will explain what is required for successful course completion. The instructors will then transition to Unit 2, which will provide an overview of the Hurricane Evacuation Study (HES) process.

**Time Plan**

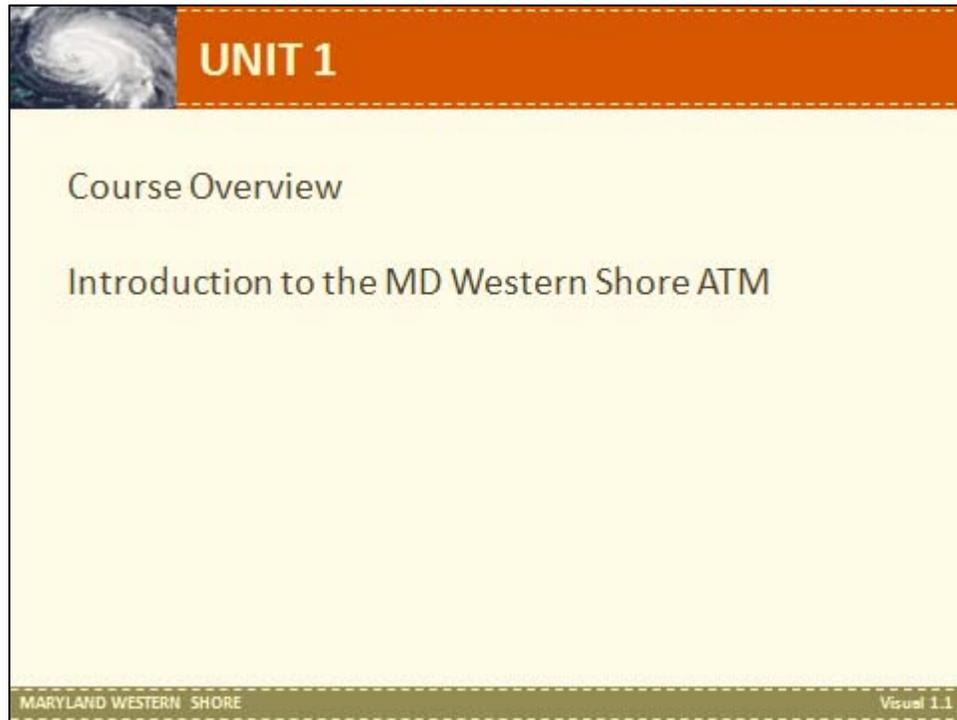
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Course Objective	5 minutes
Introductions and Expectations	15 minutes
Course Structure and Logistics	5 minutes
Summary	5 minutes
<b>Total Time</b>	<b>30 minutes</b>

**Topic: Unit Introduction**

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**Visual 1.1**



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**Instructors Notes**

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Welcome participants to the course.

Tell the participants that this course will introduce them to the MD W Shore HES ATM and its functionality.

Introduce yourself by providing:

- Your name and organization
- A brief statement of your experience

**Visual 1.2**

**COURSE OBJECTIVES**

Demonstrate a basic understanding of the use of the MD Western Shore ATM

Understand how model outputs or results may be used in HURREVAC

Upon course completion, participants should be able to train other users in the use of the ATM

MARYLAND WESTERN SHORE Visual 1.2

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**Instructors Notes**

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Tell the participants that the objective for this course is to enable participants to demonstrate a basic understanding of the use of the MD W Shore ATM and how its results may be used in HURREVAC.

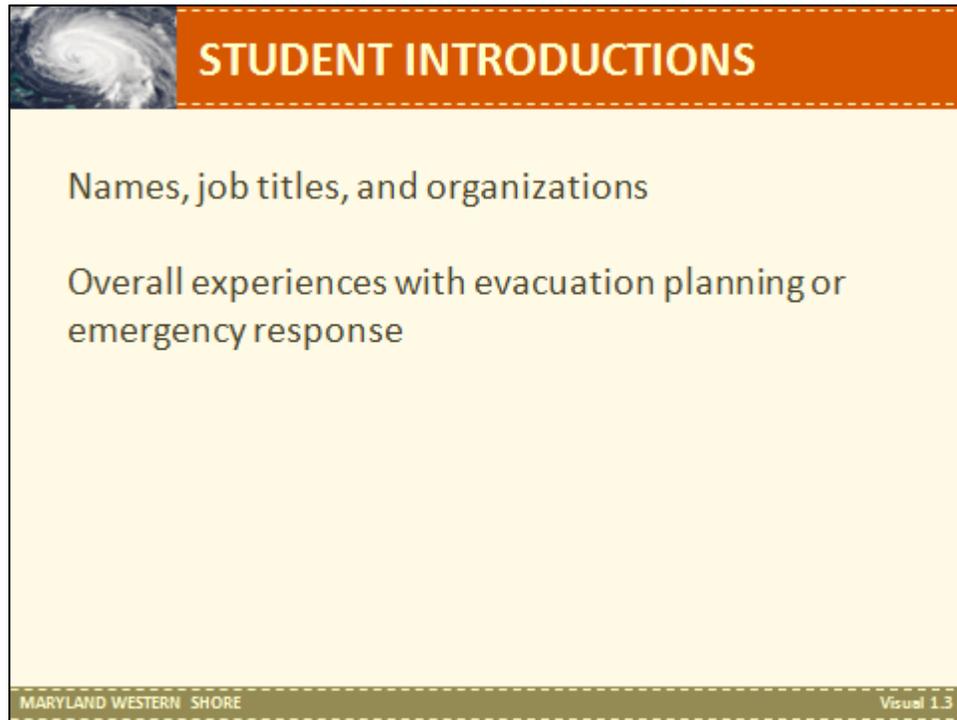
Tell the participants the course describes the HES process, the development of the ATM, its features and uses and how its results may be used to support evacuation planning. It also demonstrates how model results inform and integrate into HURREVAC.

Tell the participants that upon completion, course participants should be able to train other users in the use of the ATM.

**Topic: Student Introductions**

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**Visual 1.3**



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**Instructors Notes**

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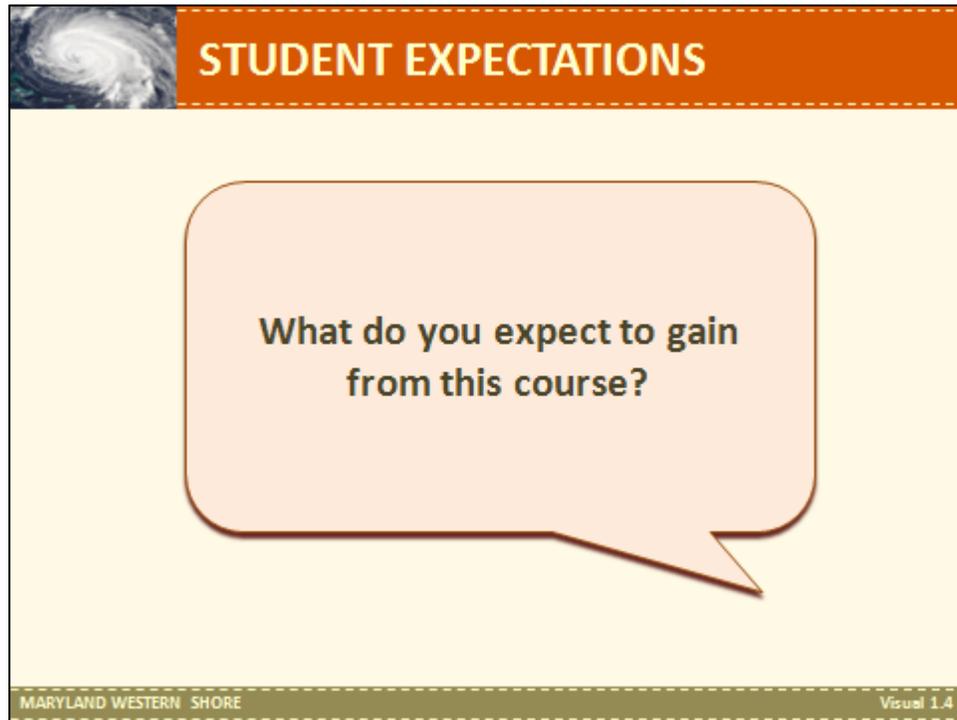
Ask the students to introduce themselves by providing:

- Their names, job titles, and organizations
- A brief account of their overall experiences with evacuation planning or emergency response

**Topic: Student Expectations**

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**Visual 1.4**



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**Instructors Notes**

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Ask the participants the following question:

**What do you expect to gain from this course?**

Allow the group time to respond

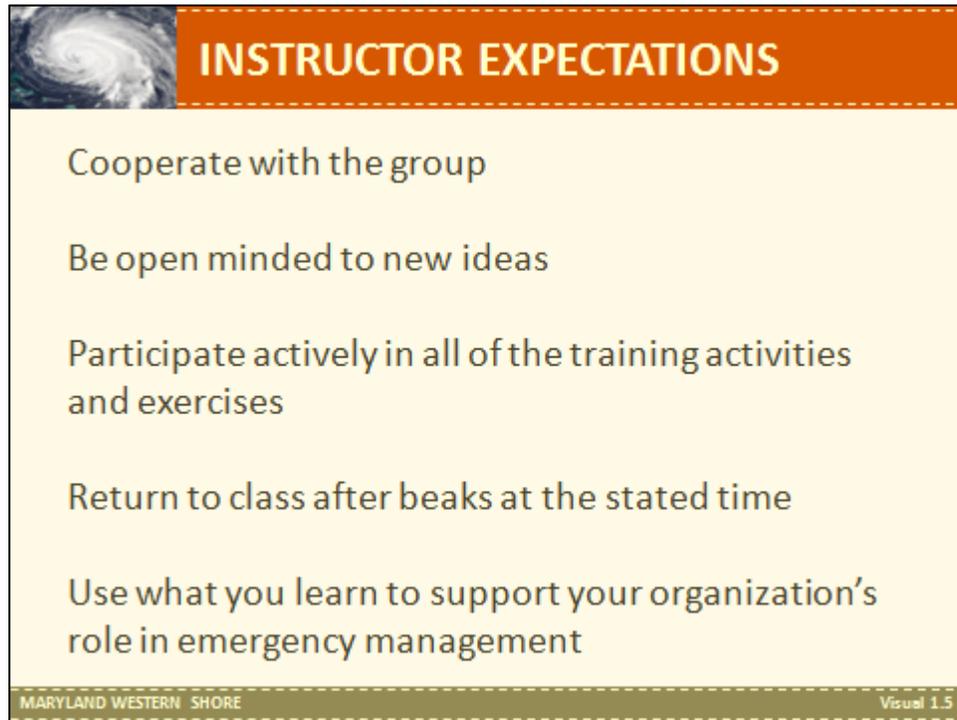
Record the responses on chart paper

If possible, hang the list of responses in the training room. Revisit the list at the end of the course to ensure that participants have met their learning objectives.

**Topic: Instructor Expectations**

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**Visual 1.5**



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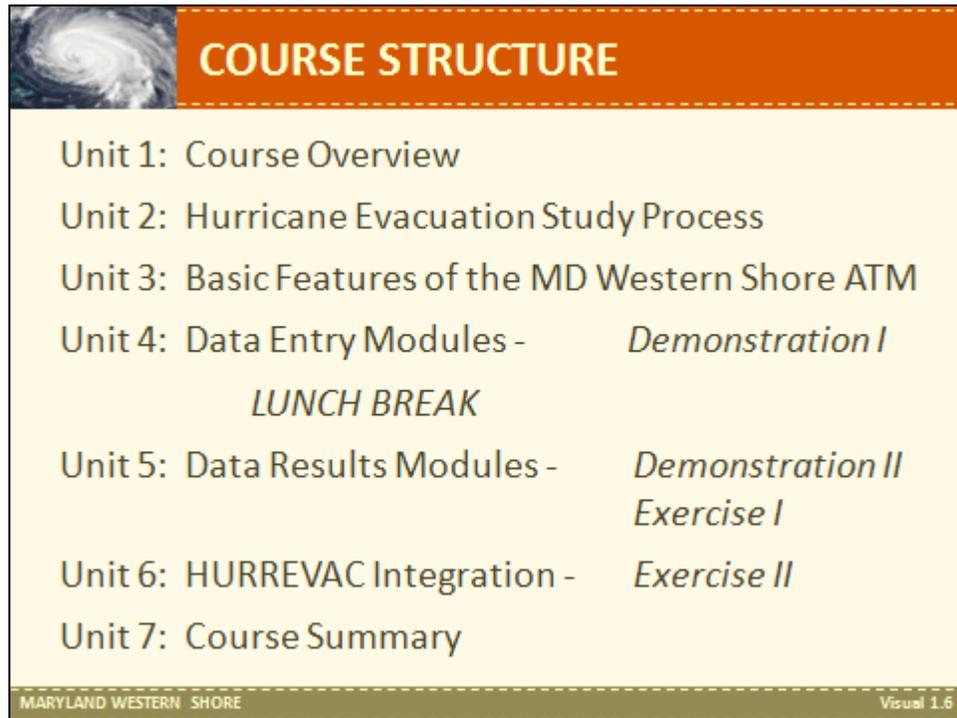
**Instructors Notes**

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Explain the instructor's expectations for the course. You expect that everyone will:

- Cooperate with the group
- Be open minded to new ideas
- Participate actively in all of the training activities and exercises
- Return to class after breaks at the stated time
- Use what you learn in the course to support your organization's role in emergency management

Visual 1.6



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### Instructors Notes

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Tell the participants that the course is divided into the following eight units:

- Unit 1: Course Overview
- Unit 2: Hurricane Evacuation Study Process
- Unit 3: Basic Features of the MD W Shore ATM
- Unit 4: Data Entry Modules *Demonstration I*
- Unit 5: Data Results Modules *Demonstration II*  
*Exercise I*
  
- Unit 6: HURREVAC Integration *Exercise II*
- Unit 7: Course Summary

Let the participants know that Unit 4 and 5 include an instructor led demonstration of the ATM features and that Unit 5 and 6 both include participant exercises.

**Visual 1.7**

**COURSE LOGISTICS**

Course agenda

Sign in sheet

Housekeeping issues:

- Breaks
- Emergency exits / special access requirements
- Cell phone policy
- Facilities
- Other concerns

MARYLAND WESTERN SHORE Visual 1.7

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**Instructors Notes**

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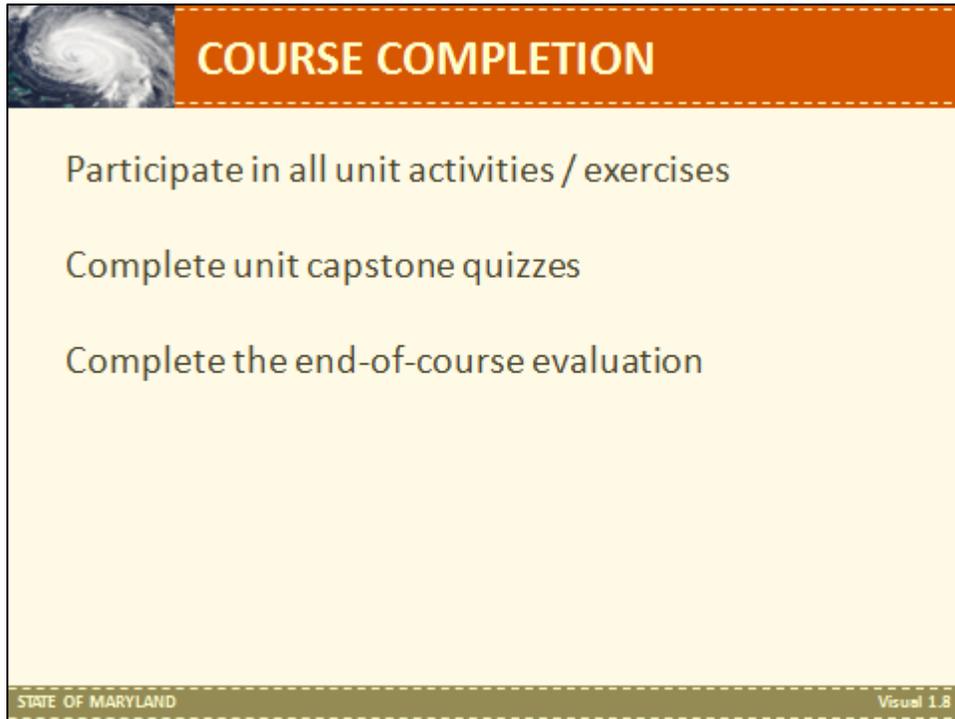
Review the following information with the group:

- Course agenda
- Sign in sheet

Review the following housekeeping issues:

- Breaks
- Emergency exits / special access requirements
- Cell phone policy
- Facilities
- Other concerns

**Visual 1.8**



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**Instructors Notes**

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Tell the participants that in order to successfully complete this course, they must:

- Participate in all unit activities / exercises
- Complete unit capstone quizzes
- Complete the end-of-course evaluation

Participants should coordinate with NHP staff on obtaining course evaluation results

Explain that the next unit will provide an overview of the hurricane evacuation study process

Refer the participants to the glossary of terms. Encourage participants to refer to this glossary throughout the training session.

**Maryland Western Shore  
Hurricane Evacuation Study  
Transportation Tools Workshop**

**April 2010**

**Morning Session 9:00 – 12:00**

- Unit 1: Course Overview (30 minutes)
- Unit 2: Hurricane Evacuation Study Process (45 Minutes)
- Unit 3: Basic Features of the MD W Shore ATM (45 Minutes)
- Unit 4: Data Entry Modules / Demonstration I (1 Hour)

**Afternoon Session 1:00 – 4:00**

- Unit 5: Data Results Modules / Demonstration II / Exercise I (1 Hour, 15 Minutes)
- Unit 6: HURREVAC Integration / Exercise II (1 Hour, 15 Minutes)
- Unit 7: Course Summary / Evaluation Procedures (30 Minutes)

Breaks of 10 minutes will be provided after Unit 2 in the morning and Unit 5 in the afternoon.



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## **Unit 2: Hurricane Evacuation Study (HES) Process**

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**Objectives**

At the end of this unit, the participants should be able to:

Understand the background and components of the Maryland Western Shore Hurricane Evacuation Study

Identify the seven main steps in the evacuation planning process

Define evacuation clearance time and understand its components

**Scope**

- Unit Introduction
- Unit Objectives
- MD W Shore HES Background and Components
- Evacuation Planning Process
- Clearance Times
- Unit Capstone Quiz
- Summary

**Methodology**

The instructors will introduce the unit by displaying a visual outlining the unit objectives.

After reviewing the unit objectives, the instructors will go through the slides for each unit topic. At the end of each unit topic, the instructors will ask the participants if they have any questions.

After covering the MD W Shore HES background and components, evacuation planning process and clearance time topics, the instructors will administer the unit capstone quiz.

After the quiz has been completed, the instructors will go over the correct answers and discuss and questions that the participants may have. After answering these questions, the instructors will summarize the key points from the unit and transition to Unit 3.

**Time Plan**

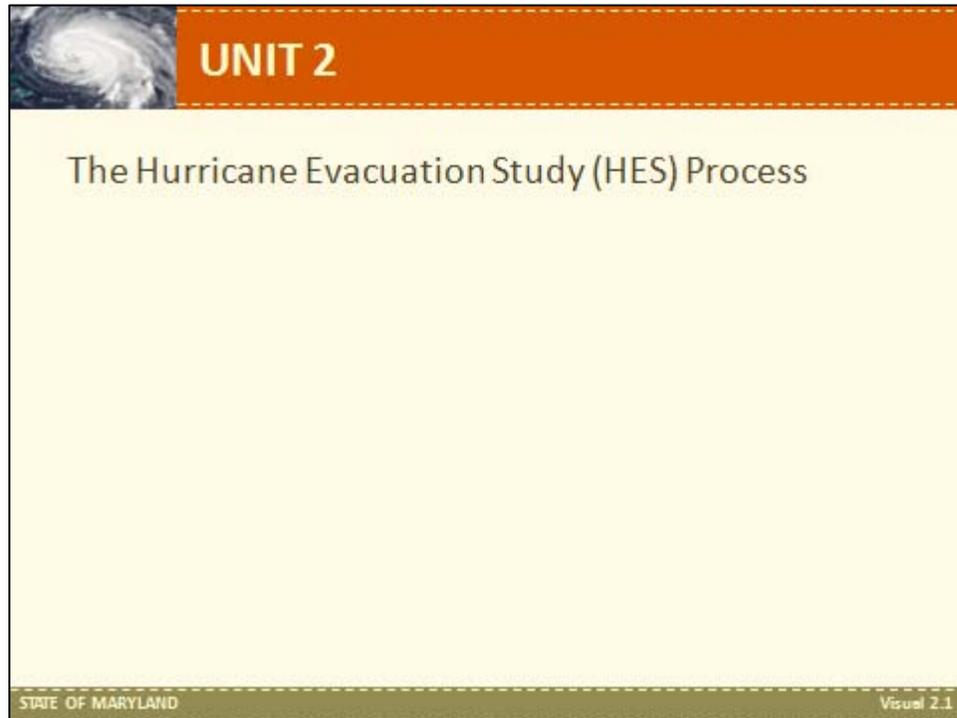
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Unit Objectives	5 minutes
MD W Shore HES Background and Components	5 minutes
Evacuation Planning Process	15 minutes
Clearance Time	10 minutes
Unit Capstone Quiz	5 minutes
Summary	5 minutes
<b>Total Time</b>	<b>45 minutes</b>

**Topic: Unit Introduction**

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**Visual 2.1**



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**Instructors Notes**

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Explain that Unit 2 provides a general overview of the hurricane evacuation planning process in Maryland. The next visual will outline the objectives for this unit.

**Opening Activities:**

Ask for a show of hands of individuals who have been involved in the state hurricane evacuation planning process. Ask for the participants to keep their hands raised if they were part of the other study efforts, such as the 2007 Delmarva Study. Discuss how staffing turnover impacts the ability of emergency managers to be aware of and use existing data and tools.

Ask the participants to discuss what has changed the most since the prior study. Discuss the impact on changes in demographics, the roadway network, the understanding of risk and other issues raised by the participants may have on evacuation planning.

Ask participants about recent storm events including both tropical storms / hurricanes and winter storms, if any. If relevant, ask for a volunteer from the participants to describe how existing HES data and tools were used to support emergency management in these events.

## Topic: Unit Objectives

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### Visual 2.2

**UNIT OBJECTIVES**

Understand the background and components of the Maryland Western Shore Hurricane Evacuation Study

Identify the steps in the evacuation planning process

- Step 1: Establish Evacuation Zones
- Step 2: Establish Evacuation Roadway Network
- Step 3: Collect Demographic and Behavioral Data
- Step 4: Generate Evacuation Statistics (includes shelter demand and capacity)
- Step 5: Distribute Evacuation Trips
- Step 6: Identify Vehicles by Roadway Segment
- Step 7: Calculate Clearance Times

Define evacuation clearance time and understand its components

Definition, Tropical Storm Force Winds Trigger, Mobilization Time, Travel Time, Queuing Delay Time

MARYLAND WESTERN SHORE Visual 2.2

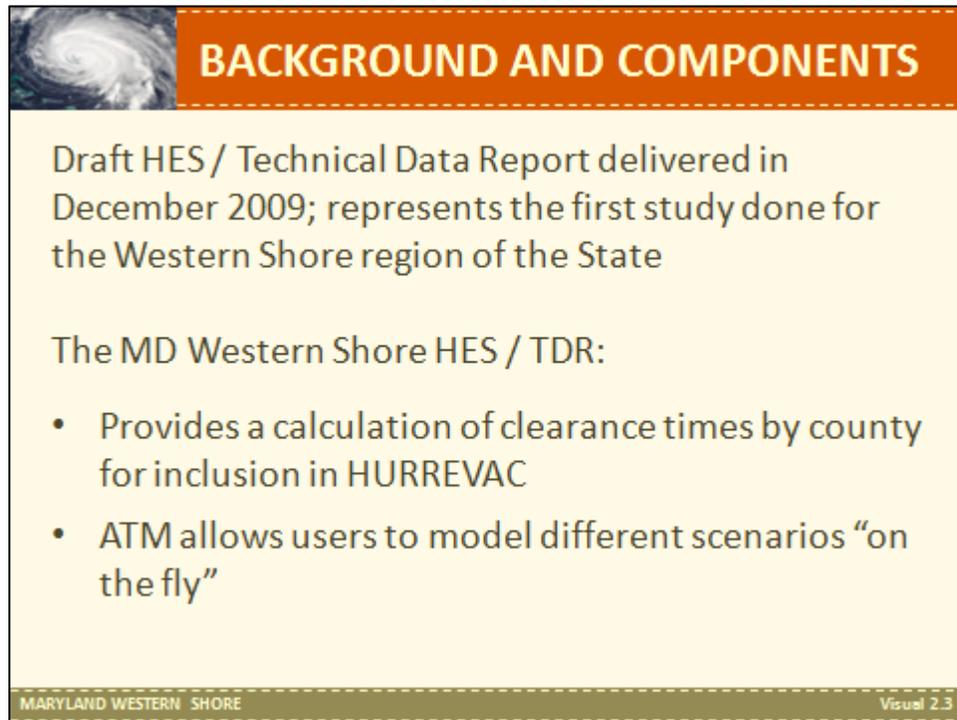
### Instructors Notes

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Review the unit objectives with the group. Tell the participants that by the end of this unit, they should be able to:

- Understand the background and components of the Maryland Western Shore Hurricane Evacuation Study
- Identify the seven main steps in the evacuation planning process
  - Step 1: Establish Evacuation Zones
  - Step 2: Establish Evacuation Roadway Network
  - Step 3: Collect Demographic and Behavioral Data
  - Step 4: Generate Evacuation Statistics
  - Step 5: Distribute Evacuation Trips
  - Step 6: Identify Vehicles by Roadway Segment
  - Step 7: Calculate Clearance Times
- Define evacuation clearance time and understand its components
  - Definition and Tropical Storm Force Winds Trigger
  - Mobilization Time
  - Travel Time
  - Queuing Delay Time

**Visual 2.3**



**BACKGROUND AND COMPONENTS**

Draft HES / Technical Data Report delivered in December 2009; represents the first study done for the Western Shore region of the State

The MD Western Shore HES / TDR:

- Provides a calculation of clearance times by county for inclusion in HURREVAC
- ATM allows users to model different scenarios “on the fly”

MARYLAND WESTERN SHORE Visual 2.3

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**Instructors Notes**

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In order for participants to understand the background and components of the Maryland Western Shore Hurricane Evacuation Study, go over the following points:

- The most recent HES was submitted as a draft in December.

Acknowledge any participant who participated in the current study process.

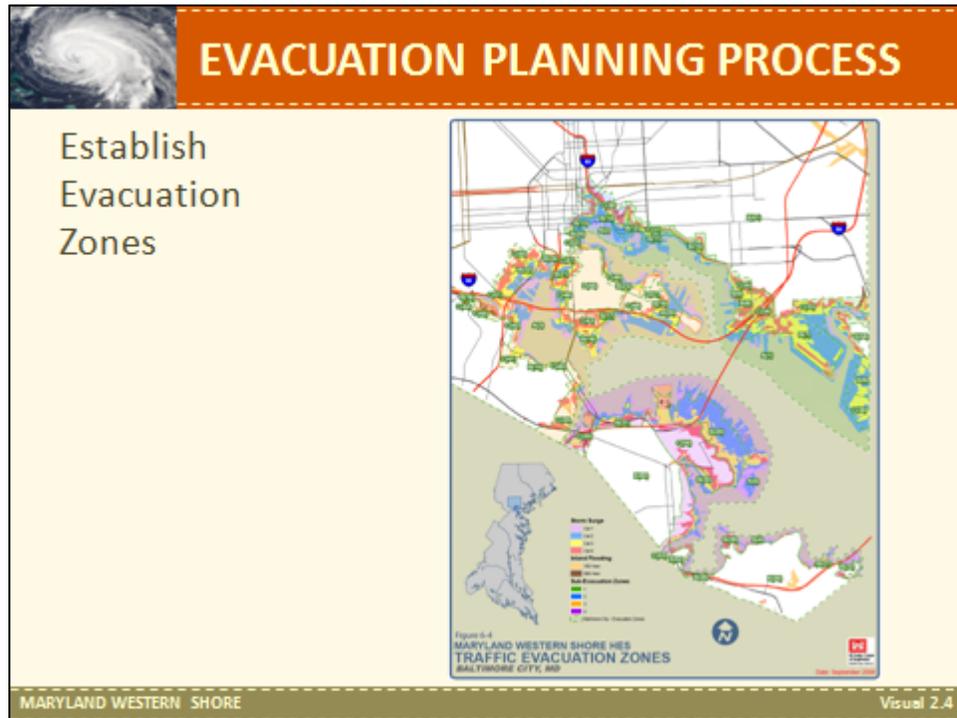
- The MD W Shore HES provides a calculation of clearance times by county for inclusion in HURREVAC
- The HES ATM allows users to model different scenarios “on the fly”
- The HES ATM includes a Shelter Demand and Capacity Module to help emergency managers plan for regional shelter needs

Remind participants that they will be able to work with the ATM and HURREVAC during this training.

## Topic: Evacuation Planning Process

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### Visual 2.4



### Instructors Notes

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Participants will be introduced to the first step in the hurricane evacuation study planning process –

#### Step 1: Establish Evacuation Zones

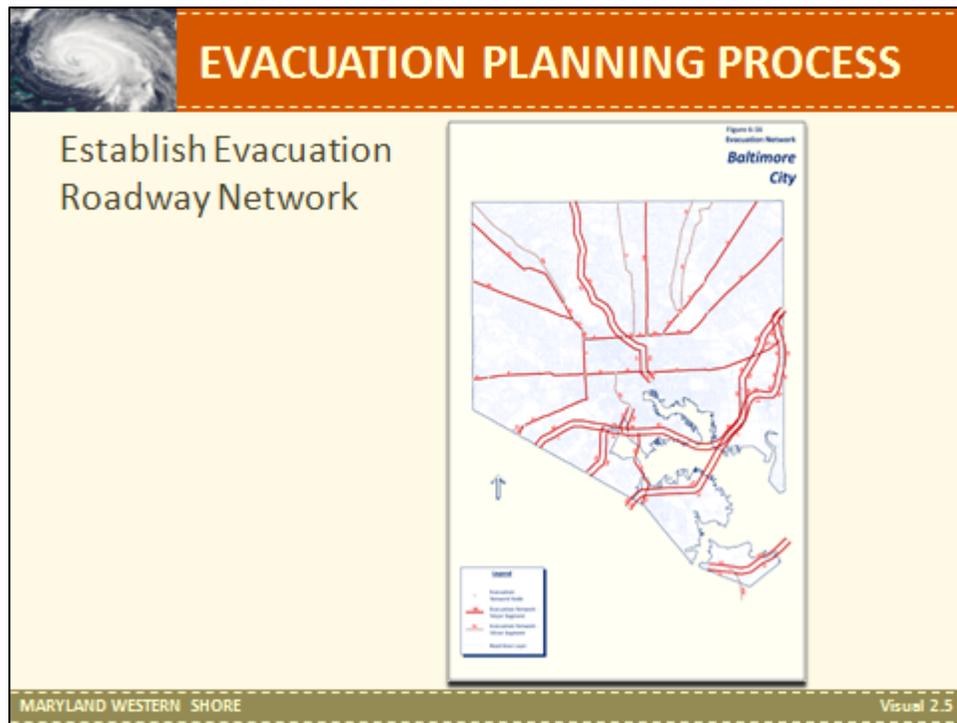
Instructors will go over the image and highlight the following:

- Zones should be risk based, easy to communicate and politically acceptable
- MD's zones are based on surge inundation maps developed by the USACE – Baltimore District
- State and local governments had input into the zone designation process
- Numbered traffic evacuation zones form the building blocks of the evacuation modeling process

## Topic: Evacuation Planning Process

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### Visual 2.5



### Instructors Notes

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Participants will be introduced to the second step in the evacuation planning process –

Step 2: Establish Evacuation Roadway Network

Instructors will go over the image and highlight the following:

- Evacuee behavior is non-stochastic (not random) and not optimized; people tend to “follow the leader” along main routes
- The evacuation roadway network includes primary out routes
- State and local governments had input into the evacuation roadway network process
- The roadway network is divided into segments and nodes or bottlenecks
- The directional service volume of each segment is recorded
- Segments that may be used for contraflow are identified

**Visual 2.6**

**EVACUATION PLANNING PROCESS**

Collect Demographic Data

- Population data was obtained from the US Census and Maryland Property View parcel data
- Tourist data was obtained by the Army Corps of Engineers in coordination with the State and local governments

Collect Behavioral Data

- A behavioral study was undertaken as part of the HES process

MARYLAND WESTERN SHORE Visual 2.6

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**Instructors Notes**

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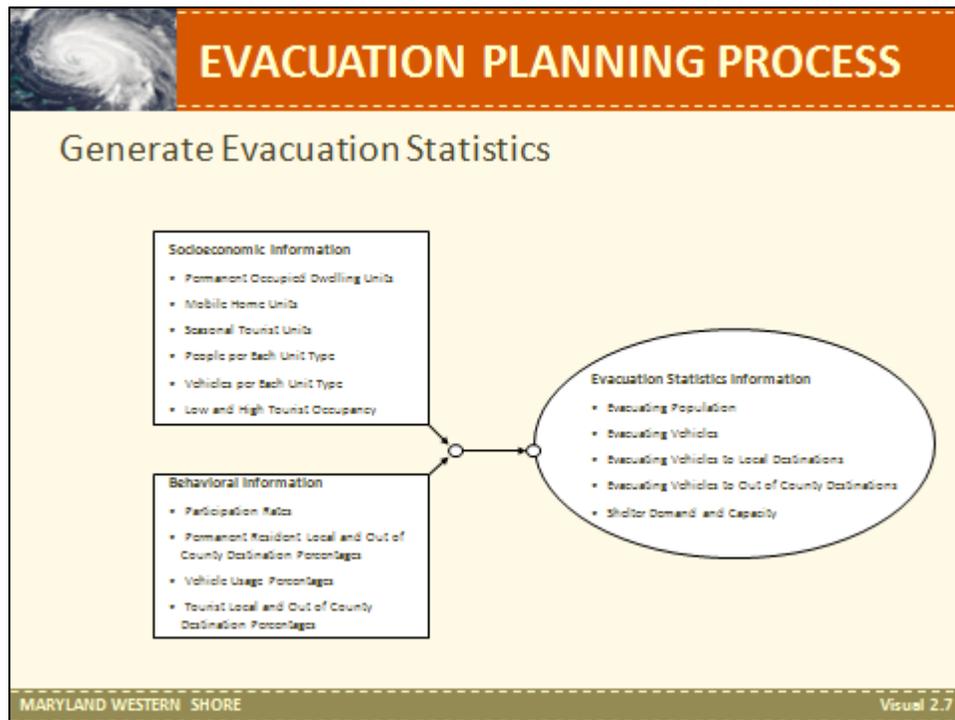
Participants will be introduced to the third step in the evacuation planning process –

Step 3: Collect Demographic and Behavioral Data

Instructors will go over the following:

- Population data was obtained from the US Census and Maryland Property View, parcel data
- Tourist data was obtained by the Army Corps of Engineers in coordination with the State and local governments
- A separate behavioral study was conducted for the current MD W Shore HES region.
- Users can modify and update all demographic data used in the ATM

**Visual 2.7**



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### **Instructors Notes**

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Participants will be introduced to the fourth step in the evacuation planning process –

#### **Step 4: Generating Evacuating Statistics**

Instructors will go over the following:

- Discuss the components of the socioeconomic data
  - Permanent / mobile home / tourist units
  - People and vehicles per unit and tourist occupancy
- Discuss the components of the behavioral data
  - Participation rates (failure to comply / shadow evacuation)
  - Local versus out-of county destinations for permanent residents and tourists
- Describe the evacuation statistics
  - Evacuating populations and vehicle numbers
  - Vehicles to local versus out-of county destinations
- Introduce the Shelter Demand and Capacity Module

**Visual 2.8**

**EVACUATION PLANNING PROCESS**

Distribute Evacuation Trips

- Destination routing informed by state tourist data

Identify Evacuating Vehicles By Roadway Segment

- Vehicles routed through to peripheral destinations

Calculate Clearance Times

- High / low tourist occupancy; fast, medium and slow response time

MARYLAND WESTERN SHORE Visual 2.8

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**Instructors Notes**

---

Participants will be introduced to the fifth, sixth and seventh step in the evacuation planning process –

Step 5: Distribute Evacuation Trips

Step 6: Identify Evacuating Vehicles by Roadway Segment

Step 7: Calculate Clearance Times

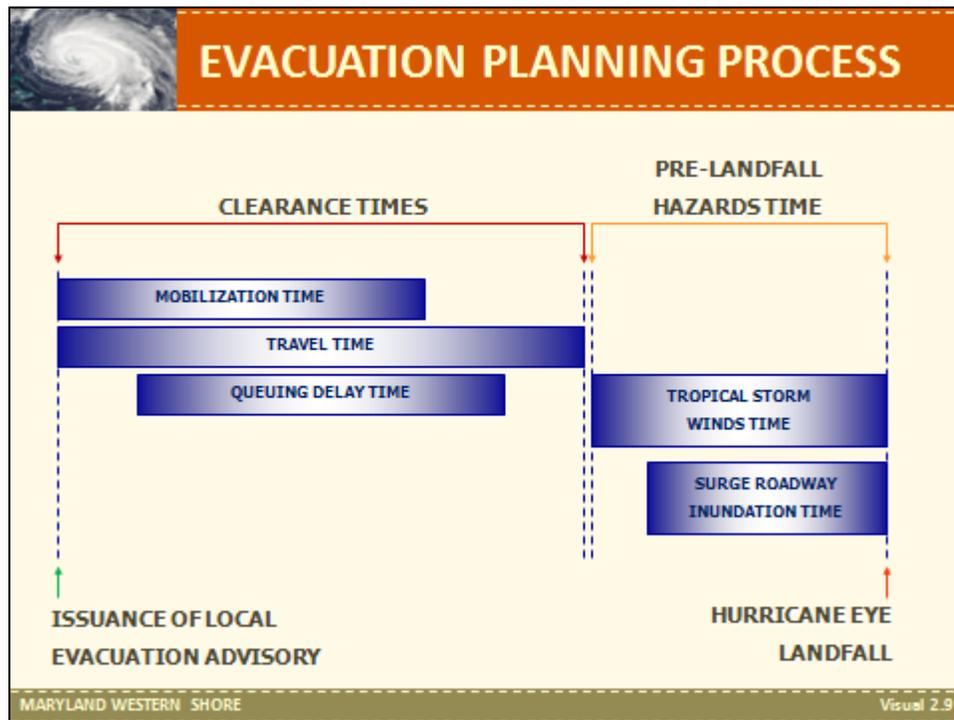
Instructors will go over the following:

- Distribution of evacuation trips
  - Destination routing informed by statewide tourist data
- Vehicles by roadway segment
  - Vehicles are routed through to a peripheral destination
- Calculate clearance times
  - High and low tourist occupancy, fast medium and slow response time
  - Contraflow benefits / segment service volume variations identified

**Topic: Evacuation Planning Process**

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**Visual 2.9**



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**Instructors Notes**

Participants will be introduced to the concept of Clearance Time and will be able to define the term.

Clearance time is the time it takes for the first person leaves their home until the last person reaches their destination. Clearance times are based upon all evacuation movements completing prior to the onset of tropical storm force (39 mph) winds.

Instructors will go over the following components of clearance time:

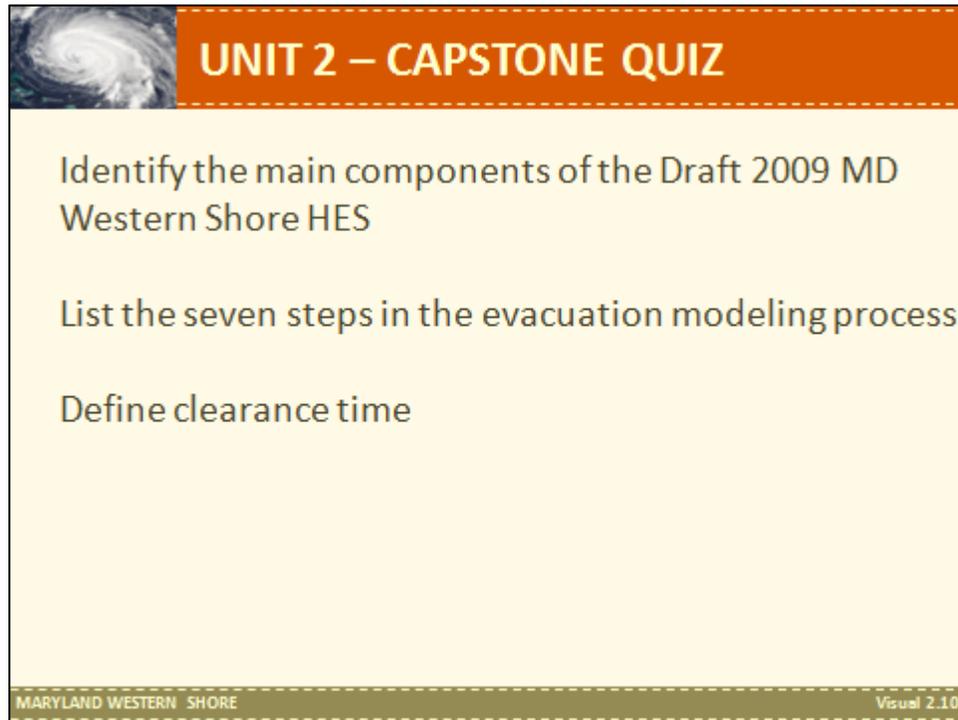
- Mobilization time
- Travel time
- Queuing delay time

After the hurricane clearance time there is a pre-landfall hazards time that anticipates the onset of tropical storm force winds and storm surge-caused roadway impacts.

**Topic: Unit Capstone Quiz**

---

**Visual 2.10**

A presentation slide with a yellow background and a blue header. The header contains a satellite image of a hurricane on the left and the text "UNIT 2 – CAPSTONE QUIZ" in white on a blue background. The main body of the slide lists three objectives in black text. At the bottom, there is a thin blue bar with the text "MARYLAND WESTERN SHORE" on the left and "Visual 2.10" on the right.

**UNIT 2 – CAPSTONE QUIZ**

Identify the main components of the Draft 2009 MD Western Shore HES

List the seven steps in the evacuation modeling process

Define clearance time

MARYLAND WESTERN SHORE Visual 2.10

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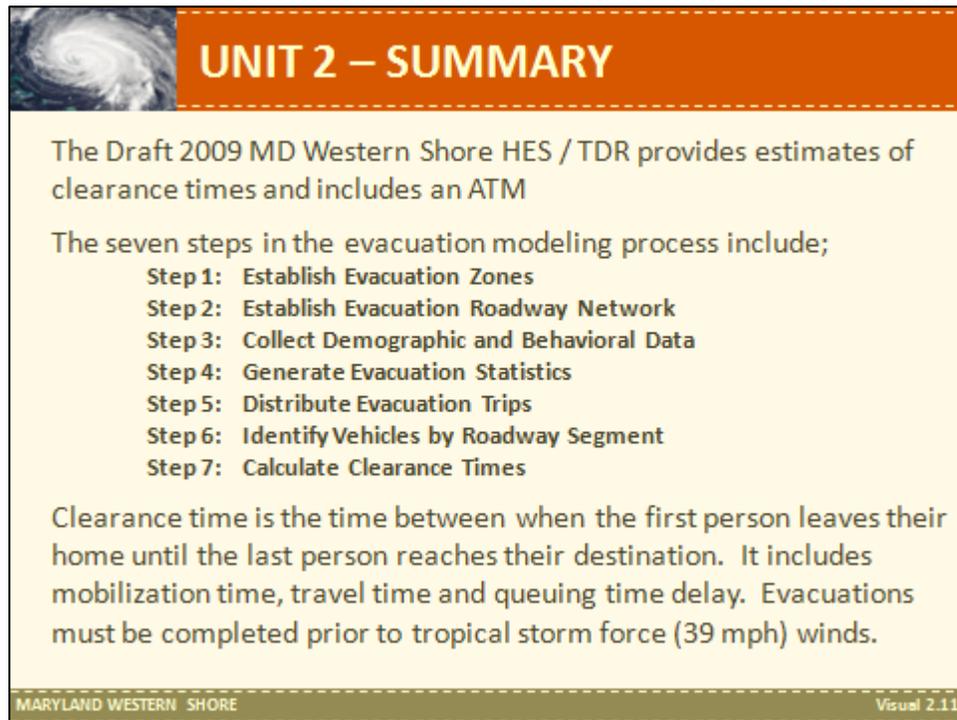
**Instructors Notes**

---

Ask participants if they can now:

- Identify the main components of the Draft 2009 MD W Shore HES
- List the seven steps in the evacuation modeling process
- Define clearance time

Visual 2.11

The slide features a satellite image of a hurricane in the top left corner. The title "UNIT 2 – SUMMARY" is displayed in white text on an orange background. The main content is on a light yellow background with a dashed orange border. It includes a paragraph about the 2009 MD Western Shore HES/TDR, a list of seven evacuation modeling steps, and a definition of clearance time. The footer contains "MARYLAND WESTERN SHORE" and "Visual 2.11".

**UNIT 2 – SUMMARY**

The Draft 2009 MD Western Shore HES / TDR provides estimates of clearance times and includes an ATM

The seven steps in the evacuation modeling process include;

- Step 1: Establish Evacuation Zones
- Step 2: Establish Evacuation Roadway Network
- Step 3: Collect Demographic and Behavioral Data
- Step 4: Generate Evacuation Statistics
- Step 5: Distribute Evacuation Trips
- Step 6: Identify Vehicles by Roadway Segment
- Step 7: Calculate Clearance Times

Clearance time is the time between when the first person leaves their home until the last person reaches their destination. It includes mobilization time, travel time and queuing time delay. Evacuations must be completed prior to tropical storm force (39 mph) winds.

MARYLAND WESTERN SHORE Visual 2.11

---

**Instructors Notes**

---

Summarize this unit by reminding the group that:

- The MD W Shore HES provides estimates of clearance times, an analysis of shelter demand and capacity, and includes a fully functional ATM
- The seven steps in the evacuation modeling process include; Step 1: Establish Evacuation Zones, Step 2: Establish Evacuation Roadway Network, Step 3: Collect Demographic and Behavioral Data, Step 4: Generate Evacuation Statistics, Step 5: Distribute Evacuation Trips, Step 6: Identify Vehicles by Roadway Segment, and Step 7: Calculate Clearance Times
- Clearance time is the time between when the first person leaves their home until the last person reaches their destination. It includes mobilization time, travel time and queuing time delay. Clearance times are based upon all evacuation movements completing prior to the onset of tropical storm force (39 mph) winds

**Ask if anyone has any questions about anything covered in this unit**

Transition to the next unit by explaining that Unit 3 will cover the basic features of the ATM.

**Announce a 10 minute break**

---

**Unit 3: Basic Features of  
the MD Western Shore  
ATM**

---

**Objectives**

At the end of this unit, the participants should be able to:

- Understand the structure and content of the ATM
- Open the ATM and navigate through the spreadsheet modules
- Understand how to interpret the clearance times worksheet

**Scope**

- Unit Introduction
- Unit Objectives
- ATM Structure
- ATM Content
- Clearance Times Worksheet
- Unit Capstone Quiz
- Summary

**Methodology**

The instructors will introduce the unit by displaying a visual outlining the unit objectives.

After reviewing the unit objectives, the instructors will go through the slides for each unit topic. At the end of each unit topic, the instructors will ask the participants if they have any questions.

After covering the ATM structure, content and discussing how to interpret the clearance times worksheet, the instructors will administer the unit capstone quiz.

After the quiz has been completed, the instructors will go over the correct answers and discuss and questions that the participants may have. After answering these questions, the instructors will summarize the key points from the unit and transition to Unit 4.

**Time Plan**

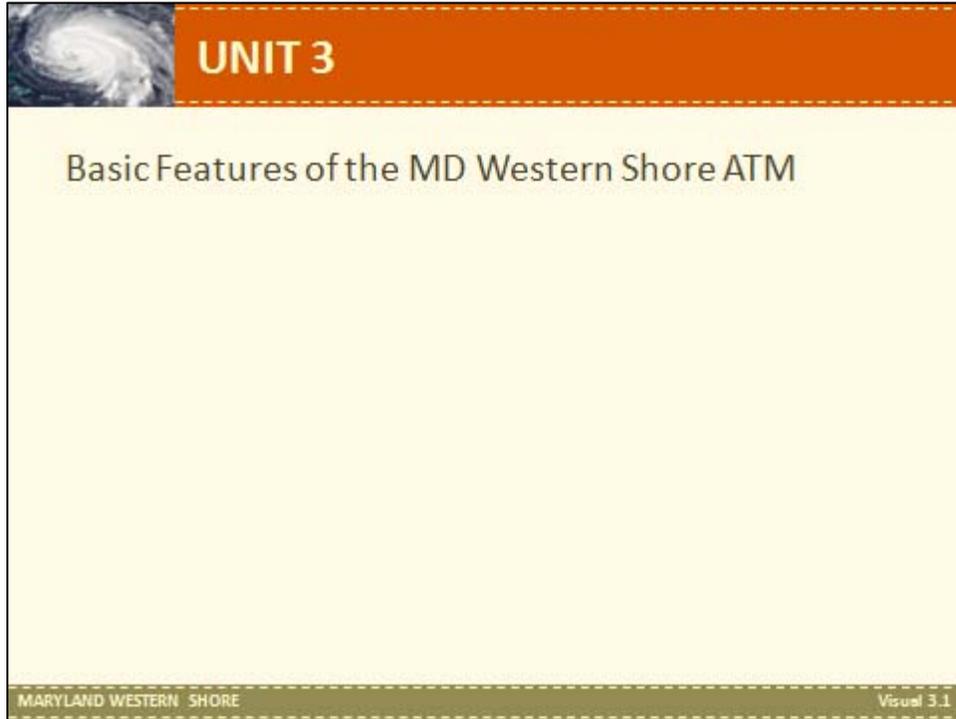
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Unit Objectives	5 minutes
ATM Structure	10 minutes
ATM Content	10 minutes
Clearance Time Worksheet	10 minutes
Unit Capstone Quiz	5 minutes
Summary	5 minutes
<b>Total Time</b>	<b>45 minutes</b>

**Topic: Unit Introduction**

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**Visual 3.1**



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**Instructors Notes**

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Explain that Unit 3 provides an overview of the basic features of the MD W Shore HES ATM. The next visual will outline the objectives for this unit.

Ask for a show of hands of any participant who has previously opened and navigated this or another ATM. Ask for the participants to keep their hands raised if they used the ATM to check clearance times at specific bottlenecks or regional focal points. Ask if any participants modified input data used in the ATM to tests alternate evacuation scenarios.

Discuss how the ATM is open source and is constructed in a readily available software platform – Microsoft Excel.

**Visual 3.2**

**UNIT OBJECTIVES**

Understand the structure and content of the ATM

- Microsoft Excel-based
- Includes 36 separate worksheets

Open the ATM and navigate through the spreadsheet modules

Understand how to interpret the clearance times worksheet

- Identifying focal points clearance times by scenario
- How county clearance times are determined

MARYLAND WESTERN SHORE Visual 3.2

---

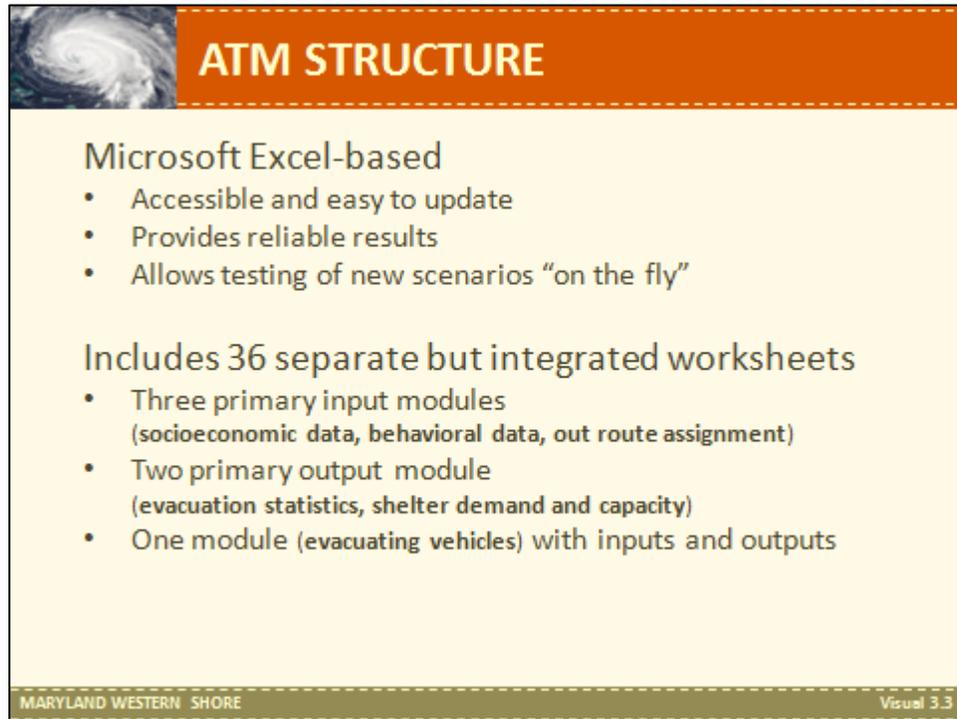
**Instructors Notes**

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Review the unit objectives with the group. Tell the participants that by the end of this unit, they should be able to:

- Understand the structure and content of the ATM
  - Microsoft excel-based
  - Includes 36 separate worksheets
- Open the ATM and navigate through the spreadsheet modules
- Understand how to interpret the clearance times worksheet
  - Identifying focal points clearance times by scenario
  - How county clearance times are determined

**Visual 3.3**

A presentation slide titled "ATM STRUCTURE" with a satellite image of a hurricane in the top left corner. The slide lists features of a Microsoft Excel-based model and its structure. The text is on a light yellow background with a dashed orange border. At the bottom, it says "MARYLAND WESTERN SHORE" and "Visual 3.3".

**ATM STRUCTURE**

Microsoft Excel-based

- Accessible and easy to update
- Provides reliable results
- Allows testing of new scenarios “on the fly”

Includes 36 separate but integrated worksheets

- Three primary input modules  
(socioeconomic data, behavioral data, out route assignment)
- Two primary output module  
(evacuation statistics, shelter demand and capacity)
- One module (evacuating vehicles) with inputs and outputs

MARYLAND WESTERN SHORE Visual 3.3

---

**Instructors Notes**

---

In order for participants to understand the structure the Maryland Western Shore ATM, go over the following points:

- The model is Excel-based
  - Accessible platform
  - Provides reliable results
  - Easy to update
  - Allows testing of new scenarios “on the fly” with negligible processing time
- Includes 36 separate worksheets in six primary modules
  - Three primary input modules; socioeconomic data module, behavioral data module, out route assignment module.
  - two primary output module (evacuation statistics module, shelter demand and capacity module)
  - One module (evacuating vehicles module) with inputs and outputs

Visual 3.4

**ATM CONTENT**

Open the ATM by double clicking on the Excel file icon  
Immediately save a copy as “MD ATM Navigation Test”

Use the arrows at the bottom of the screen to open the “Anne Arundel Socio” worksheet

Navigate to the upper right hand corner of the worksheet

Raise hands to ask questions during the navigation

The instructor-guided navigation will commence

MARYLAND WESTERN SHORE Visual 3.4

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### Instructors Notes

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Participants will be directed to open the ATM. The instructors shall minimize the slide presentation and open the ATM or open the ATM projected on a different screen.

After a brief pause, the instructors will ask if anyone has any difficulty opening the ATM. After confirming that every participant has opened the ATM and is on the home screen, proceed with a guided navigation through the ATM.

Participants should be prompted to save a copy of the MD W Shore ATM file using the name “MD W Shore ATM Navigation Test” to ensure that the source file remains uncorrupted. The instructors should be mindful to move slowly through the initial navigation to ensure that participants can follow and repeat the navigation on their own. Participants should be reminded that they will continue to work with individual worksheets in other units.

The instructors will navigate through each worksheet, showing which worksheets pertain to the various modules; socioeconomic data, behavioral data, out route assignment, evacuation statistics, shelter demand and capacity and evacuating vehicles.

**Topic: Clearance Time Worksheet**

**Visual 3.5**

**CLEARANCE TIME WORKSHEET**

Using the worksheet tabs, navigate to the Clearance Times worksheet which is labeled, "Clearance Tms"

Navigate to the upper right hand corner of the worksheet

**MEDIUM RESPONSE TIME**

Regional Bottlenecks	Description/Location	MEDIUM RESPONSE TIME							
		Cap 1		Cap 2		Cap 3		Cap 4	
		Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy
Anne Arundel County	US 100/Annapolis Parkway/ATM Cell	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Baltimore County	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Baltimore City	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Calvert County	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Charles County	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Harford	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Prince George's County	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
St. Mary's County	US 100/US 101/US 102	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	US 100/US 101/US 102/US 103/US 104/US 105	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Background Traffic adjustment column inset for illustration purposes

MARYLAND WESTERN SHORE

Visual 3.5

**Instructors Notes**

Participants will keep the ATM open and navigate to the Clearance Time worksheet. The instructors shall keep the slide presentation minimized or, if possible, advance the slides with the PowerPoint presentation projected on a different screen.

The instructors will show that the Clearance Time worksheet provides clearance times for a range of scenarios at specific bottleneck location or along critical roadway segments. The instructors will reiterate that this is a function of the number of evacuating vehicles and roadway segment capacity characteristics.

The instructors will ask the participants how they would use these data to estimate a county-specific clearance time, such as is included in HURREVAC.

The instructors will discuss the impact of regional bottlenecks on county clearance times and illustrate the concept of the governing bottleneck.

**Topic: Results Worksheet**

Visual 3.6



The Clearance Times Table

COUNTY AND CITY CLEARANCE TIME BY SCENARIO									
Maryland Western Shore ATM 2006									
Clearance Times WITHOUT DelMarVa Traffic									
Speed of Public Response	Cat 1		Cat 2		Cat 3		Cat 4		
	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	
Anne Arundel County	Slow	7.8	7.9	8.4	8.9	9.8	10.8	10.1	10.8
	Medium	6.8	6.4	6.9	7.5	8.2	8.1	8.6	9.4
	Fast	4.3	4.7	5.2	5.8	6.6	7.4	7.9	7.7
Baltimore County	Slow	10.2	10.8	10.8	10.7	10.8	11.2	11.8	11.8
	Medium	8.1	8.3	8.3	8.8	8.7	9.0	9.2	9.8
	Fast	6.1	6.3	6.1	6.4	6.2	6.6	7.0	7.3
Baltimore City	Slow	8.7	9.3	9.0	9.8	9.6	10.1	10.1	10.7
	Medium	6.6	7.3	7.1	7.8	7.6	8.2	8.2	8.8
	Fast	4.6	5.0	4.9	5.4	5.3	5.9	5.9	6.6
Calvert County	Slow	8.9	7.8	7.8	8.8	8.8	8.9	9.7	11.1
	Medium	6.8	6.2	6.1	7.1	7.1	8.4	8.3	9.8
	Fast	3.8	4.5	4.4	5.4	5.4	6.8	6.8	8.0
Charles County	Slow	6.0	6.8	6.4	6.3	6.1	7.4	6.8	8.8
	Medium	3.8	4.8	4.3	5.2	5.8	6.3	6.7	8.8
	Fast	2.8	3.2	3.0	3.9	3.8	5.0	4.4	6.7
Harford County	Slow	4.8	4.8	4.8	4.7	4.7	4.8	4.9	5.0
	Medium	3.4	3.5	3.5	3.6	3.6	3.7	3.8	3.9
	Fast	2.2	2.3	2.3	2.3	2.4	2.5	2.6	2.6
Prince George's County	Slow	9.7	10.3	10.0	10.9	10.8	11.8	11.1	12.3
	Medium	7.4	8.0	7.7	8.8	8.3	8.6	8.8	10.1
	Fast	4.7	5.4	5.1	6.0	5.7	6.9	6.2	7.4
St. Mary's County	Slow	4.2	4.8	4.4	4.8	4.7	5.3	4.9	5.8
	Medium	3.3	3.7	3.6	4.0	3.8	4.4	4.0	4.7
	Fast	2.3	2.7	2.6	3.0	2.8	3.4	3.1	3.7

MARYLAND WESTERN SHORE Visual 3.6

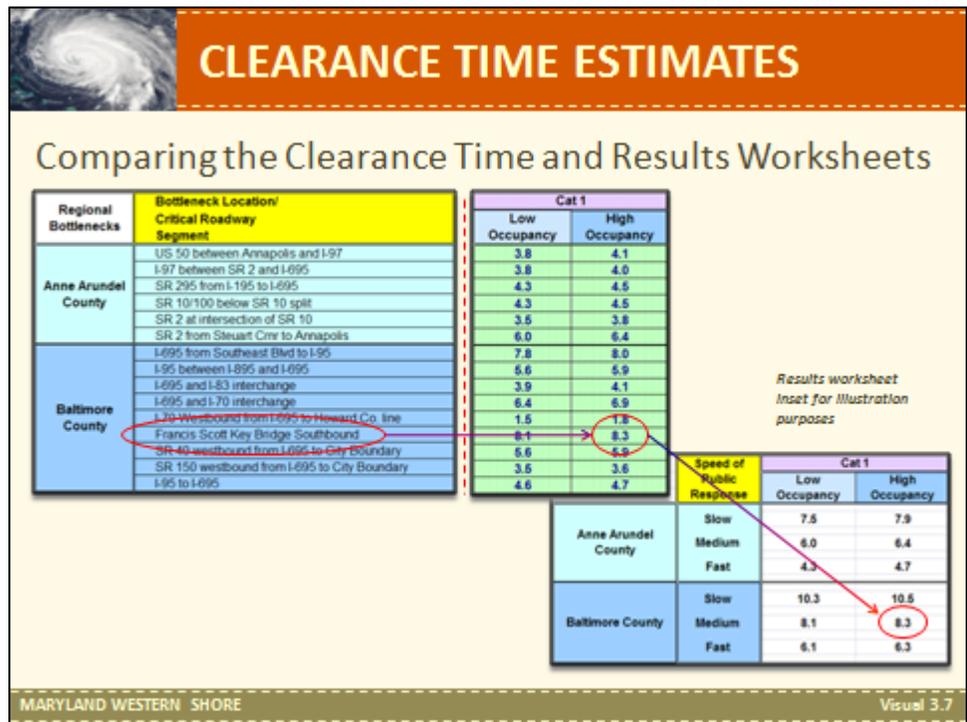
**Instructors Notes**

Participants should keep the ATM open on the Clearance Time worksheet. The instructors shall advance the PowerPoint presentation to show the Clearance Time table on the Results worksheet.

The instructors will explain how to read the Clearance Time table and the process through which the information on the Results worksheet is provided to Sea Island Software to update the clearance times in HURREVAC.

**Topic: Clearance Time Estimates**

**Visual 3.7**



**Instructors Notes**

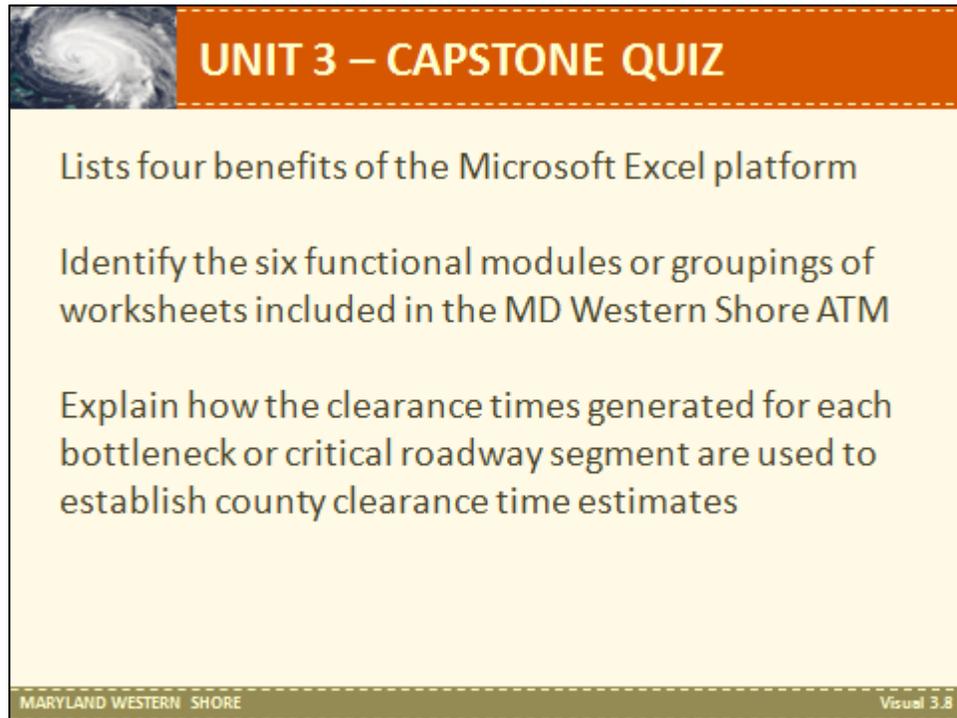
Participants should keep the ATM open on the Clearance Time worksheet. The instructors shall advance the PowerPoint presentation to show a comparison between the Clearance Time worksheet and the Results worksheet

The instructors will read through the clearance times Results worksheet to explain which critical bottlenecks were used to determine county clearance times.

**Topic: Unit Capstone Quiz**

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**Visual 3.8**

A presentation slide titled "UNIT 3 – CAPSTONE QUIZ". The slide has a yellow background with a blue header bar containing the title. A small satellite image of a hurricane is in the top left corner. The slide lists three topics for the quiz. At the bottom, there is a footer with "MARYLAND WESTERN SHORE" on the left and "Visual 3.8" on the right.

**UNIT 3 – CAPSTONE QUIZ**

Lists four benefits of the Microsoft Excel platform

Identify the six functional modules or groupings of worksheets included in the MD Western Shore ATM

Explain how the clearance times generated for each bottleneck or critical roadway segment are used to establish county clearance time estimates

MARYLAND WESTERN SHORE Visual 3.8

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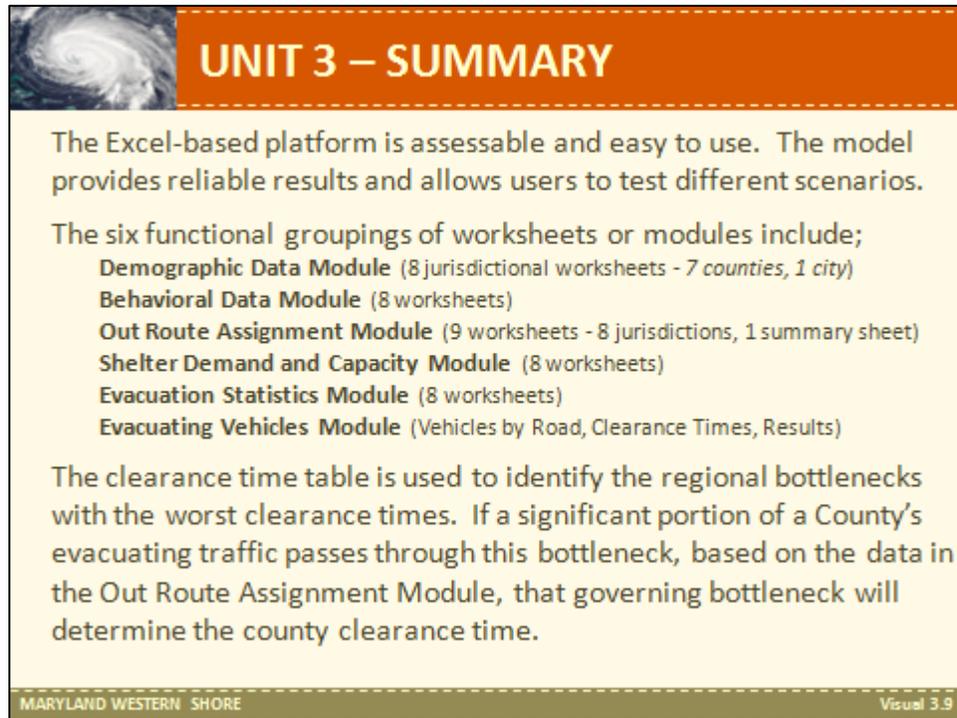
**Instructors Notes**

---

Ask participants if they can now:

- Lists four benefits of the Microsoft Excel platform
- Identify the six functional modules or groupings of worksheets included in the MD W Shore ATM
- Explain how the clearance times generated for each bottleneck or critical roadway segment are used to establish county clearance time estimates.

Visual 3.9

A presentation slide titled "UNIT 3 – SUMMARY" with an orange header and a satellite image of a hurricane. The slide contains text about an Excel-based platform, a list of six functional groupings of worksheets, and a paragraph about clearance time tables. The footer includes "MARYLAND WESTERN SHORE" and "Visual 3.9".

**UNIT 3 – SUMMARY**

The Excel-based platform is assessable and easy to use. The model provides reliable results and allows users to test different scenarios.

The six functional groupings of worksheets or modules include;

- Demographic Data Module** (8 jurisdictional worksheets - 7 counties, 1 city)
- Behavioral Data Module** (8 worksheets)
- Out Route Assignment Module** (9 worksheets - 8 jurisdictions, 1 summary sheet)
- Shelter Demand and Capacity Module** (8 worksheets)
- Evacuation Statistics Module** (8 worksheets)
- Evacuating Vehicles Module** (Vehicles by Road, Clearance Times, Results)

The clearance time table is used to identify the regional bottlenecks with the worst clearance times. If a significant portion of a County's evacuating traffic passes through this bottleneck, based on the data in the Out Route Assignment Module, that governing bottleneck will determine the county clearance time.

MARYLAND WESTERN SHORE Visual 3.9

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**Instructors Notes**

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Summarize this unit by reminding the group that:

- The Microsoft Excel platform is accessible (everyone has a copy), provides reliable results, is easy to update, and allows testing of new scenarios “on the fly” with negligible processing time
- The six functional modules or groupings of worksheets in the ATM include modules addressing socioeconomic data, behavioral data, out route assignment, evacuation statistics, evacuating vehicles and consequence management
- The clearance time table is used to identify the regional bottlenecks with the worst clearance times. If a significant portion of a County's evacuating traffic passes through this bottleneck, based on the data in the Out Route Assignment Module, that governing bottleneck will determine the county clearance time

**Ask if anyone has any questions about anything covered in this unit**

Transition to the next unit by explaining that Unit 4 will cover the primary data entry modules and will also include an instructor guided demonstration of the ATM's functionality.



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## **Unit 4: Data Entry Modules**

### **DEMONSTRATION I**

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### Objectives

At the end of this unit, the participants should be able to:

- Understand the structure of the three primary data entry modules
- Identify the data entry features in the Evacuating Vehicles Module / Clearance Times worksheet
- Demonstrate proficiency in adding data to various worksheets

### Scope

- Unit Introduction
- Unit Objectives
- Socioeconomic Data Module
- Behavioral Data Module
- Out-Route Assignment Module
- Evacuating Vehicle Module and Clearance Time Worksheet
- DEMONSTRATION I
- Unit Capstone Quiz
- Summary

### Methodology

The instructors will introduce the unit by displaying a visual outlining the unit objectives.

After reviewing the unit objectives, the instructors will go through the slides for each unit topic. At the end of each unit topic, the instructors will ask the participants if they have any questions.

After providing an overview of each of the specific data entry modules, the instructors will ask the participants to undertake a demonstration to illustrate their proficiency in adding data to various worksheets. The instructors will set up the scenario and ask each of the listed questions. The instructors will encourage the participants to get started answering the questions, but will walk the class through using the ATM to answer each question.

The instructors will encourage the class to ask questions during the demonstration to ensure they understand how to use the ATM. Once the demonstration has been completed, the results of the changes will be discussed. After this discussion is completed, the instructors will administer the unit capstone quiz.

After the quiz has been completed, the instructors will go over the correct answers and discuss and questions that the participants may have. After answering these questions, the instructors will summarize the key points from the unit and transition to Unit 5.

## Time Plan

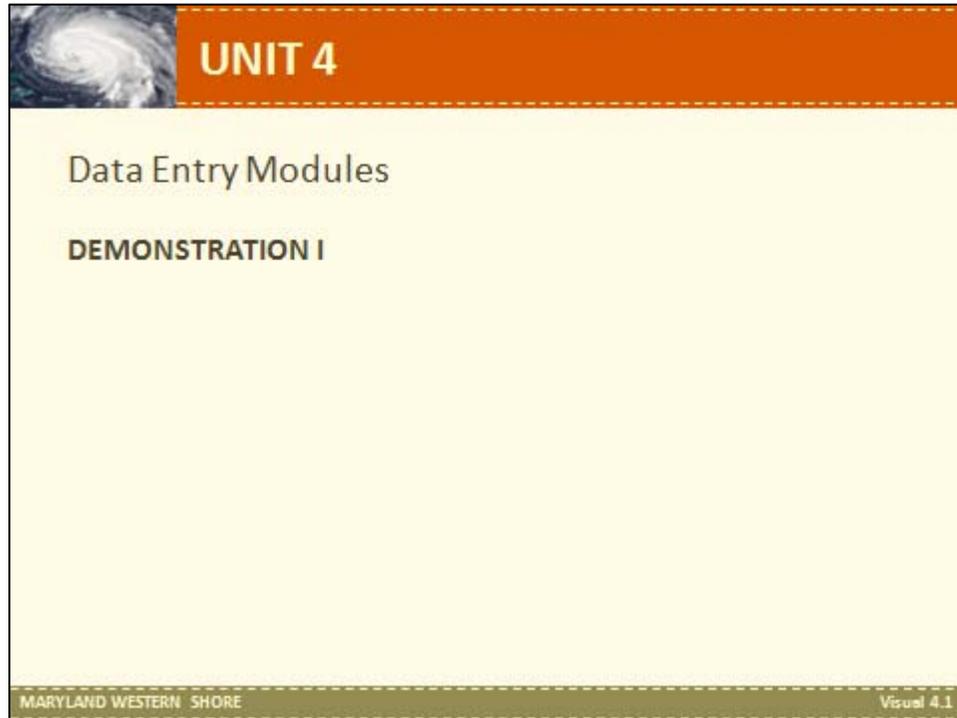
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Unit Objectives	5 minutes
Socioeconomic Data Module	10 minutes
Behavioral Data Module	5 minutes
Out-Route Assignment Module	10 minutes
Evacuating Vehicles Module and Clearance Time Worksheet	5 minutes
DEMONSTRATION I	15 minutes
Unit Capstone Quiz	5 minutes
Summary	5 minutes
<b>Total Time</b>	<b>1 hour</b>

**Topic: Unit Introduction**

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**Visual 4.1**



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**Instructors Notes**

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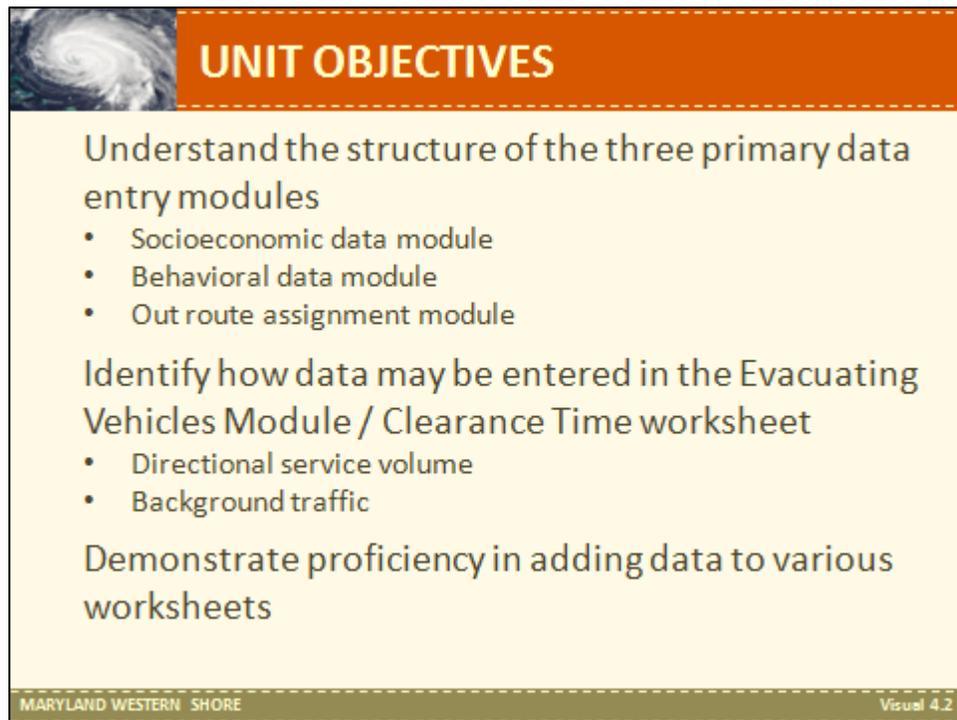
Explain that Unit 4 provides a more in-depth review of the data entry modules of the ATM and provides participants with an opportunity to demonstrate their ability to add data to different worksheets. The next visual will outline the objectives for this unit.

Ask the following questions and ask the participants to raise their hands if they feel that the question might apply to them:

- Do you think that the number of homes or seasonal units in your jurisdiction may have increased in the past decade?
- Do you think that the average number people per tourist unit in specific zones might be higher than county averages?
- Are you concerned about shadow evacuation or over evacuation from certain zones?
- Are you concerned that construction could reduce the capacity along certain segments of the evacuation network?

Discuss how the demonstration will allow the participants to modify the model inputs to reflect changes in these areas.

**Visual 4.2**

A presentation slide titled "UNIT OBJECTIVES" with a satellite image of a hurricane in the top left corner. The slide lists three main objectives: understanding the structure of three primary data entry modules, identifying data entry methods for the Evacuating Vehicles Module / Clearance Time worksheet, and demonstrating proficiency in adding data to various worksheets. The slide footer includes "MARYLAND WESTERN SHORE" and "Visual 4.2".

**UNIT OBJECTIVES**

Understand the structure of the three primary data entry modules

- Socioeconomic data module
- Behavioral data module
- Out route assignment module

Identify how data may be entered in the Evacuating Vehicles Module / Clearance Time worksheet

- Directional service volume
- Background traffic

Demonstrate proficiency in adding data to various worksheets

MARYLAND WESTERN SHORE Visual 4.2

---

**Instructors Notes**

Review the unit objectives with the group. Tell the participants that by the end of this unit, they should be able to:

- Understand the structure of the three primary data entry modules
  - Socioeconomic data module
  - Behavioral data module
  - Out route assignment module
- Identify how the data may be entered into the Evacuating Vehicles Module / Clearance Times worksheet
  - Directional service volume
  - Background traffic
- Demonstrate proficiency in adding data to various worksheets

**Topic: Socioeconomic Data Module**

**Visual 4.3**

**SOCIOECONOMIC DATA MODULE**

Save a copy of the ATM as “MD ATM Demonstration I”  
 Navigate to the “Baltimore Socio” worksheet

**Baltimore County SOCIOECONOMIC DATA**  
 Maryland Western Shore ATM 2008

Evacuation Zone	Permanent		Mobile		Seasonal /		People Per		
	Occupied Units	New Permanent Occ Units	Home Units	New Mobile Home Units	Tourist Units	New Tourist Units	Permanent Unit	Mobile Home Unit	Seasonal / Tourist Unit
1	0	0	0	0	0	0	2.13	2.13	3.00
	0	0	0	0	0	0	2.13	2.13	3.00
	0	0	0	0	0	0	2.13	2.13	3.00
	0	0	0	0	0	0	2.13	2.13	3.00
	0	0	0	0	0	0	2.13	2.13	3.00

Vehicles Per			Tourist Occupancy	
Permanent Unit	Mobile Home Unit	Seasonal / Tourist Unit	Low	High
0.03	0.03	1.95	30%	90%
0.03	0.03	1.95	30%	90%
0.03	0.03	1.95	30%	90%
0.03	0.03	1.95	30%	90%
0.03	0.03	1.95	30%	90%

*The ATM users may adjust any variable within this worksheet*

MARYLAND WESTERN SHORE Visual 4.3

**Instructors Notes**

Participants should still have their ATMs open from Unit 3. The instructors shall minimize the slide presentation and open the ATM or open the ATM projected on a different screen. Participants should be prompted to save another copy of the MD W Shore ATM file using the name “MD W Shore ATM Demonstration I” to ensure that the source file remains uncorrupted.

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Socioeconomic Data Module:

This ATM includes a separate socioeconomic data worksheet for Anne Arundel County, Baltimore County, Baltimore City, Calvert County, Charles County, Harford County, Prince George's County and St. Mary's County. These eight pages are part of the Socioeconomic Data Module. The Socioeconomic Data Module is a primary data entry module. Rows are established for each of the named and numbered evacuation zones in the counties or city covered by the worksheet. These sets of rows are subdivided by the storm intensity scenario,

including storm Category 1, 2, 3, 4 and Inland Areas. The worksheet's columns contain data sets that address housing units, people per unit, vehicles per unit, and seasonal tourist occupancy levels.

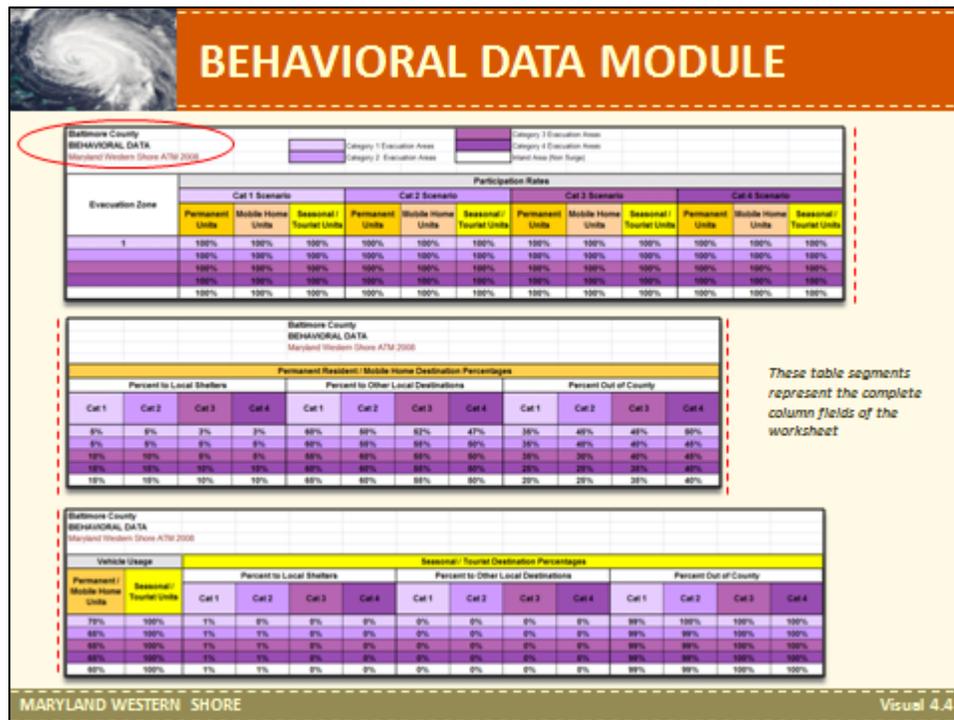
The ATM is designed so that data in the columns may be changed to account for changing local conditions. Any data changed by users will drive the calculations in the Evacuation Statistics module. The specific data columns in each worksheet include:

- Permanent Occupied Units
- Mobile Home Units
- Seasonal / Tourist Units
- People Per Permanent Unit
- People Per Mobile Home Unit
- People Per Seasonal Tourist Units
- Vehicles Per Permanent Unit
- Vehicles Per Mobile Home Unit
- Vehicles Per Seasonal Tourist Units
- Low Occupancy Tourist
- High Occupancy Tourist

After confirming that every participant has opened the ATM and is on the home screen, proceed with a guided navigation of the Socioeconomic Data Module identifying where new data may be entered.

**Topic: Behavioral Data Module**

**Visual 4.4**



**Instructors Notes**

The instructor will direct participants to open the Baltimore County behavioral worksheet. The worksheet is labeled “Baltimore Behav” on the worksheet tab.

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Behavioral Data Module:

This ATM includes a separate socioeconomic data worksheet for Anne Arundel County, Baltimore County, Baltimore City, Calvert County, Charles County, Harford County, Prince George's County and St. Mary's County. These eight pages are part of the Behavioral Data Module. The Behavioral Data Module is a primary data entry module.

Rows are established for each of the named and numbered evacuation zones in the region covered by the worksheet. These sets of rows are subdivided by the storm intensity scenario, including storm Category 1, 2, 3, 4 and Inland Areas. The worksheets contain data columns that address participation rates, permanent resident / mobile home destination percentages,

vehicle usage, and seasonal / tourist destination percentages. The ATM is designed so that the data in the columns may be changed to account for changing local conditions. The specific data columns in each worksheet include:

#### Participation Rates

- Category 1 Participation Rates – Permanent Units
- Category 1 Participation Rates – Mobile Home Units
- Category 1 Participation Rates – Seasonal / Tourist Units
- Category 2 Participation Rates – Permanent Units
- Category 2 Participation Rates – Mobile Home Units
- Category 2 Participation Rates – Seasonal / Tourist Units
- Category 3 Participation Rates – Permanent Units
- Category 3 Participation Rates – Mobile Home Units
- Category 3 Participation Rates – Seasonal / Tourist Units
- Category 4 Participation Rates – Permanent Units
- Category 4 Participation Rates – Mobile Home Units
- Category 4 Participation Rates – Seasonal / Tourist Units

#### Permanent Resident / Mobile Home Destination Percentages

- Category 1 Percent to Local Shelter
- Category 2 Percent to Local Shelter
- Category 3 Percent to Local Shelter
- Category 4 Percent to Local Shelter
- Category 1 Percent to Other Local Destination
- Category 2 Percent to Other Local Destination
- Category 3 Percent to Other Local Destination
- Category 4 Percent to Other Local Destination
- Category 1 Percent Out of County
- Category 2 Percent Out of County
- Category 3 Percent Out of County
- Category 4 Percent Out of County

#### Vehicle Usage

- Vehicle Usage Percent Permanent / Mobile Home Units
- Vehicle Usage Percent Seasonal / Tourist Units

#### Tourist Destination Percentages

- Category 1 Percent to Local Shelter
- Category 2 Percent to Local Shelter
- Category 3 Percent to Local Shelter
- Category 4 Percent to Local Shelter

- Category 1 to Local Destination
- Category 2 to Local Destination
- Category 3 to Local Destination
- Category 4 to Local Destination
- Category 1 Out of County
- Category 2 Out of County
- Category 3 Out of County
- Category 4 Out of County

Data in any of these columns may be user defined. It should be noted that all of these data are rates and users should not adjust any one variable below 0% or above 100%. In addition, when adjusting either permanent resident or tourist destination percentages, the sum of the user defined local destinations and out of county destination for each category of storm must equal 100%. While the model will accept changes that do not sum to 100%, the results of the model will be rendered invalid. Policy changes resulting from modifications to the behavioral assumptions are discouraged without discussion and concurrence between local and state emergency management officials.

After confirming that every participant has opened the appropriate worksheet, proceed with a guided navigation of the Behavioral Data Module identifying where new data may be entered.

**Topic: Out Route Assignment Module**

**Visual 4.5**

**OUT ROUTE ASSIGNMENT MODULE**

*Left Half*

Baltimore County OUT-ROUTES TO OTHER COUNTIES Maryland Western Shore ATM 2008							
Baltimore	I-95 To I-97	SR 295 SB	I-695 Outer	I-95 To I-95	US 1 SB	I-95 SB	
1	0%	0%	0%	0%	0%	0%	
2	0%	0%	0%	0%	0%	0%	
3	0%	15%	0%	0%	0%	15%	
4	0%	0%	0%	0%	0%	0%	
5	0%	0%	0%	15%	0%	20%	
6	0%	0%	0%	0%	0%	0%	
7	0%	0%	0%	15%	0%	20%	
8	0%	0%	0%	0%	0%	15%	
9	0%	0%	0%	0%	0%	0%	
95	0%	0%	0%	0%	0%	15%	

*Right Half*

US 1 Southbound								I-95 Southbound							
Cat 1		Cat 2		Cat 3		Cat 4		Cat 1		Cat 2		Cat 3		Cat 4	
Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	4	17	11	24	17	23	14	24	19	50	33	78	52	96
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	8	21	11	29	21	45	33	59
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	20	52	27	72	44	112	84	121
0	0	0	0	0	0	0	0	10	24	14	36	23	54	32	63
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	7	19	10	26	16	39	22	46

MARYLAND WESTERN SHORE Visual 4.5

**Instructors Notes**

The instructor will direct participants to navigate to the Out Route Assignment Module, Baltimore County worksheet, which is labeled “Baltimore Evac Trips” on the worksheet tab.

In order for participants to understand the structure of the Maryland Western Shore ATM, the instructor will provide the following description of the Out Route Assignment Module:

The ATM Out Route Assignment Module is comprised of nine worksheets. One for each of the study area jurisdictions, including Anne Arundel County, Baltimore County, Baltimore City, Calvert County, Charles County, Harford County, Prince George's County and St. Mary's County, as well as a Regional Trips summary worksheet. The jurisdictional worksheets include two components in one worksheet. The left half of the worksheet includes a data entry table to calculate the percent of total vehicles exiting the State/Region/County by a specific route. Rows are established for each of the numbered evacuation zones for the eight evacuation jurisdictions in the study area. The jurisdictional worksheets include data columns corresponding to the major out route possibilities for each jurisdiction. The user can adjust these out route

percentages to test different scenarios or alternate public information strategies regarding suggested route usage.

Extensive research into tourist data helped guide the designation of the out route percentages. Routed traffic volumes for roadway segments on an evacuation path are formula driven based on the allocation percentages. While data in any of these columns may be user defined, it is strongly recommended that users take care in testing alternative scenarios since the default routing was based on extensive research and reviewed by a range of stakeholders.

It should be noted that all of these data are percentages and users should not adjust any one variable below 0% or above 100%. While the model will accept changes that do not sum to 100%, the results of the model will be rendered invalid.

Changes made in out routing percentages are reflected in the right half of the worksheet which includes a series of data output columns. The output columns identify the number of vehicles utilizing the roadway during high and low tourist occupancy scenarios in Category 1, 2, 3 and 4 storm events.

Changes made in out routing percentages are also reflected in the three worksheet that make up the Evacuating Vehicles Module; the Evacuating Vehicles by Bottleneck/Critical Roadway Segment worksheet and the Clearance Times worksheet, and the Results worksheet.

After confirming that every participant has opened the appropriate worksheet, proceed with a guided navigation of the Out Route Assignment Module identifying where new data may be entered, emphasizing that it is suggested that only the green labeled numbers be adjusted by everyday model users. More sophisticated reassignments of out routing are possible, but care must be taken to ensure that all traffic is accounted for.

**Topic: Evacuating Vehicles Module and Clearance Time Worksheet**

Visual 4.6

Regional Bottlenecks	Bottleneck Location Critical Roadway Segment	Evac Dir Svc Vol (Veh/Hr)	Evacuation Service Volume During Event				Background Traffic (AADT) Peak Hour	Travel Time To County Line (Hours)
			1st Quarter	2nd Quarter	3rd Quarter	4th Quarter		
Anne Arundel County	I-97 between Annapolis and I-97	5410	5410	5085	4869	5410	5,880	0.12
	I-97 between SR 2 and I-95	5410	5410	5085	4869	5410	5,240	0.05
	SR 2/95 from I-95 to I-695	3440	3440	3234	3096	3440	4,565	0.01
	SR 10/150 below SR 10 split	2980	2980	2901	2982	2980	3,220	0.22
	SR 2 at intersection of SR 10	1810	1810	1701	1629	1810	1,875	0.22
Baltimore County	SR 2 from Stewart Cir to Annapolis	1710	1710	1607	1629	1710	2,240	0.83
	I-695 from Southeast Blvd to I-95	5410	5410	5085	4869	5410	7,250	0.60
	I-95 between I-695 and I-695	5410	5410	5085	4869	5410	8,320	0.60
	I-695 and I-63 interchange	9340	9340	8790	8406	9340	10,365	0.40
	I-695 and I-70 interchange	5410	5410	5085	4869	5410	9,550	0.65
	I-70 Westbound from I-695 to Howard Cir. line	5410	5410	5085	4869	5410	1,240	0.42
	Francis Scott Key Bridge Southbound	3440	3440	3234	3096	3440	6,700	0.72
SR 40 westbound from I-695 to City Boundary	1860	1860	1748	1674	1860	2,340	0.00	
SR 110 westbound from I-695 to City Boundary	1860	1860	1748	1674	1860	1,870	0.00	
I-95 to I-695	7380	7380	6937	6642	7380	8,795	0.82	

**Instructors Notes**

The instructor will direct participants to navigate to the Evacuating Vehicles Module, which is located on a single worksheet. The worksheet is labeled “Vehicles by Rd” on the worksheet tab.

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Evacuating Vehicles Module:

The ATM’s Evacuating Vehicles by Focal Point/Critical Roadway Segment worksheet is primarily a data results module. While its full structure will be explained in Unit 5, it includes tables that represent the bottlenecks or critical roadway segments reviewed in the study. Data catalogued in this worksheet includes the bottleneck location or name of the critical roadway segment and the number of vehicles utilizing the roadway during different scenarios; low and high tourist occupancy in Category 1, 2, 3 and 4 storm events.

After confirming that every participant has opened the appropriate worksheet, proceed with a guided navigation of the Evacuating Vehicles Module.

After reviewing the Evacuating Vehicles Module, direct the participants to open the Clearance Time Worksheet, which they worked with previously in Unit 3. Provide the following discussion:

The ATM's Clearance Times worksheet includes both inputs and outputs. The worksheet includes columns that allows for modifications to background traffic response time factor, or how many hours it takes the background traffic to clear in the event of an evacuation. It also includes a column that allows users to adjust directional service volume levels on specific roadway segments to test reverse lane operations or other roadway capacity modification scenarios. These data may be modified to test delays associated with roadway repairs or other factors.

After confirming that every participant has opened the appropriate worksheet, proceed with a guided navigation of the Clearance Times worksheet identifying where new data may be entered.

Visual 4.7

**DEMONSTRATION I**

This instructor-led demonstration should take 15 minutes to complete

Participants will build skills in entering data into the ATM and reading the results

Instructors will walk through the demonstration using the ATM to answer each question

Participants are encouraged to ask questions during the demonstration

*Remember - Work from the copy of the ATM saved as "MD ATM Demonstration I"*

MARYLAND WESTERN SHORE Visual 4.7

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### Instructors Notes

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The instructor will inform the participants that the demonstration is an opportunity to illustrate their skill in entering data into the ATM. It should be noted that this is not an exercise or a test, but rather a skill building opportunity.

**Remember, this is an instructor led demonstration that should only take 15 minutes to complete.** Note: If the participants were to be provided the demonstration questions in the form of an exercise, it would take much longer to complete.

The instructors will set up the scenario and ask each of the listed questions. The instructors will encourage the participants to get started answering the questions, but will walk the class through using the ATM to answer each question. The instructors will encourage the class to ask questions during the demonstration to ensure they understand how to use the ATM.

Participants should be reminded that they should be working in a file saved as "MD W Shore ATM Demonstration I" to ensure that the source file remains uncorrupted. After entering the

data into Demonstration I, they will be able to compare their Clearance Times worksheet to that from the unedited version of the ATM.

The instructor will read the following scenario to the participants and ask them to modify data in their ATM accordingly.

#### DEMONSTRATION I:

You are an emergency manager interested in updating plans for Baltimore County, Maryland. Time has passed since the last time the ATM was used and you have concerns regarding changed local conditions. You understand that the County's critical roadway segment is at the Francis Scott Key Bridge Southbound. You are interested in whether these changing conditions may affect the clearance times.

Address the following by modifying your ATM.

**The instructors will actively, but slowly work through solving the questions on a copy of the ATM projected for the class. The instructors will let the participants know that if they need assistance, they should please ask for help.**

- 1) In recent months there has been significant and marked increase in commercial development in your County. A series of convention-focused hotel units have been built. These buildings have contributed to additional units in the following zones:
  - a. 1000 additional tourist units in zone 4 in category 1
  - b. 1200 additional tourist units in zone 6 in category 1
- 2) Due to a new factory opening and resultant job opportunities, the following zones have seen growth in permanent dwelling units:
  - a. Zone 19, 300 new units in each of the category 1 - 4 and the inland areas
  - b. Zone 20, 500 new units in both the category 1 and 2 zones
- 3) You have obtained new data that suggests that the vehicle per tourist unit estimate of 1.05 is low. It should be changed to be 2.0 across the board.
- 4) Due to road construction, the directional service volume at I-70 Westbound from I-695 to the Howard County line has been reduced by half. Construction at the Francis Scott Key Bridge has also reduced the service volume there to 2830 vehicles.
- 5) Due to a major political convention, the background traffic levels need to be increased by 1,000 vehicles at all of the County's bottlenecks.

It is Wednesday, June 23. You are concerned primarily about what the impacts of a moderate level Category 2 storm might be. Based on these changes, answer the following questions:

Question 1: What is the new clearance time for this scenario at the Francis Scott Key Bridge? Has it gone up?

Question 2: How do things look at I-70 Westbound from I-695 to the Howard County line?

Question 3: Has the clearance time for the City of Baltimore been affected?

**The instructors will distribute a printout of the two Clearance Times worksheets and provide the answers to the questions, as listed below:**

Answer 1: The new clearance time is **11.7** hours, up from **8.6** hours

Answer 2: The clearance time at I-70 Westbound from I-695 to the Howard County line has gone up from **2.0** hours to **5.2** hours

Answer 3: Yes, the clearance time for the City of Baltimore has gone up slightly from **7.6** hours to **7.8** hours

Answer 4: Due to the primarily to the construction at the bottleneck, and somewhat due to an increased number of vehicles leaving Long Beach Island, the clearance time at the GSP, Exit 63 increases tremendously, from **29.5** hours to **60.2** hours.

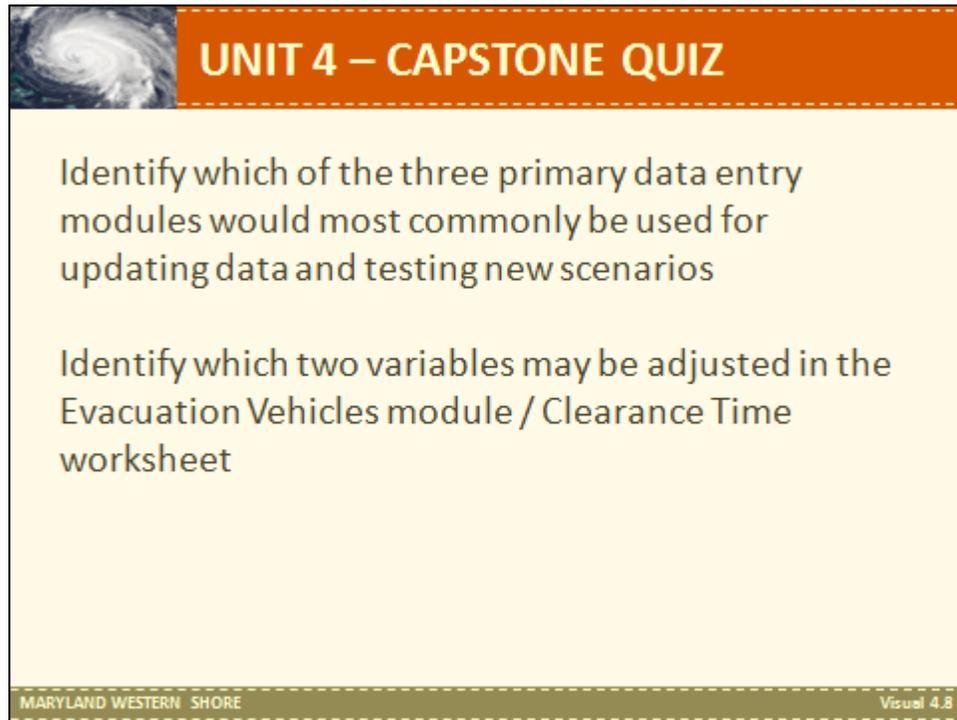
**The instructors will elicit a discussion on the demonstration upon its completion.**

One of the issues the instructors should highlight is the impact that reduced service volumes may have on clearance times. Reductions could be caused by construction, of which state and local governments may have some control over the timing of, or emergencies such as traffic accidents, inland flooding, or other factors.

**Topic: Unit Capstone Quiz**

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**Visual 4.8**

A presentation slide titled "UNIT 4 – CAPSTONE QUIZ". The slide has a yellow background with a blue header bar containing the title. On the left side of the header bar is a small image of a hurricane. The main body of the slide contains two paragraphs of text. At the bottom of the slide, there is a footer with the text "MARYLAND WESTERN SHORE" on the left and "Visual 4.8" on the right.

**UNIT 4 – CAPSTONE QUIZ**

Identify which of the three primary data entry modules would most commonly be used for updating data and testing new scenarios

Identify which two variables may be adjusted in the Evacuation Vehicles module / Clearance Time worksheet

MARYLAND WESTERN SHORE Visual 4.8

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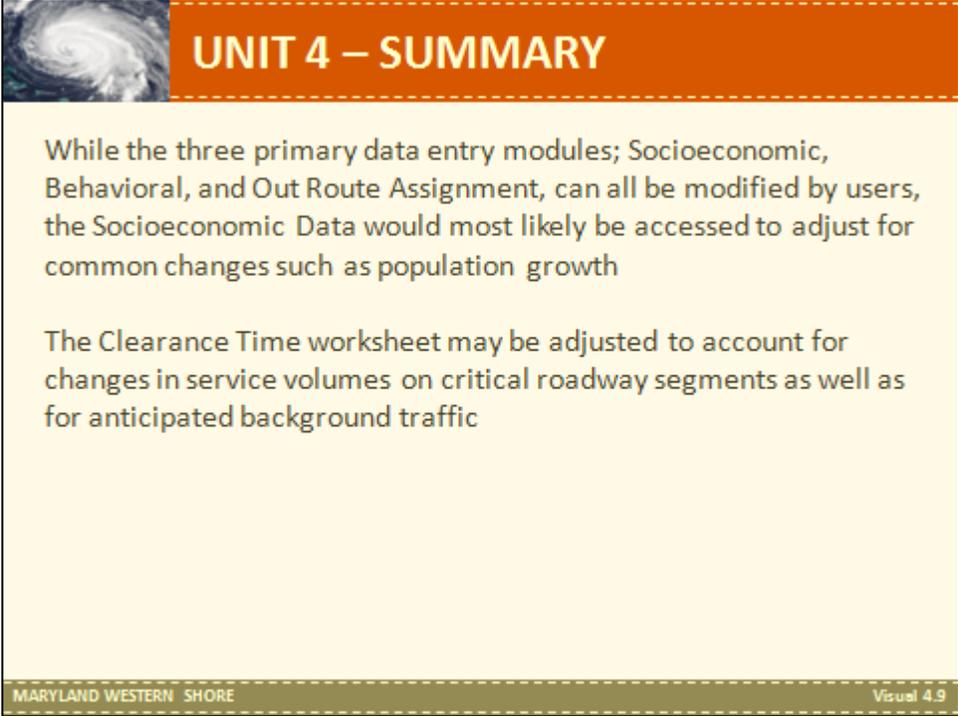
**Instructors Notes**

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Ask participants if they can now:

- Identify which of the three primary data entry modules is best suited for updating data and testing new scenarios
- Identify which 2 variables can be adjusted in the Evacuating Vehicles Module / Clearance Times worksheet

Visual 4.9

A presentation slide titled "UNIT 4 – SUMMARY" with an orange header and a light yellow body. The slide contains two paragraphs of text. The first paragraph states that while three primary data entry modules (Socioeconomic, Behavioral, and Out Route Assignment) can be modified by users, the Socioeconomic Data module is most likely accessed to adjust for common changes like population growth. The second paragraph states that the Clearance Time worksheet may be adjusted for changes in service volumes on critical roadway segments and for anticipated background traffic. The slide includes a small satellite image of a hurricane in the top left corner, the text "MARYLAND WESTERN SHORE" in the bottom left, and "Visual 4.9" in the bottom right.

**UNIT 4 – SUMMARY**

While the three primary data entry modules; Socioeconomic, Behavioral, and Out Route Assignment, can all be modified by users, the Socioeconomic Data would most likely be accessed to adjust for common changes such as population growth

The Clearance Time worksheet may be adjusted to account for changes in service volumes on critical roadway segments as well as for anticipated background traffic

MARYLAND WESTERN SHORE Visual 4.9

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**Instructors Notes**

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Summarize this unit by reminding the group that:

- While the three primary data entry modules; Socioeconomic, Behavioral, and Out Route Assignment, can all be modified by users, the Socioeconomic Data module includes an easy to edit table to adjust for common changes such as population growth
- The Clearance Time worksheet may be adjusted to adjust for changes in service volumes on critical roadway segments as well as for changes in anticipated background traffic

**Ask if anyone has any questions about anything covered in this unit**

Transition to the next unit by explaining that Unit 5 will cover the primary data results modules and will include another instructor guided demonstration of the ATM's functionality.

**Announce the break for lunch**



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**Unit 5: Data Results  
Modules**

**DEMONSTRATION II**

**EXERCISE I**

---

### Objectives

At the end of this unit, the participants should be able to:

- Understand the structure of the two primary data results modules
- Interpret the data results portion of the Out Route Assignments module
- Understand the connection between the Clearance Times worksheet and the HES's Clearance Times table
- Demonstrate proficiency in identifying and interpreting data from various worksheets

### Scope

- Unit Introduction
- Unit Objectives
- Evacuation Statistics Module
- Evacuating Vehicles Module
- Out Route Assignment Results
- Clearance Times Table Interpretation
- DEMONSTRATION II
- EXERCISE I
- Unit Capstone Quiz
- Summary

### Methodology

The instructors will introduce the unit by displaying a visual outlining the unit objectives.

After reviewing the unit objectives, the instructors will go through the slides for each unit topic. At the end of each unit topic, the instructors will ask the participants if they have any questions.

After providing a demonstration of each of the specific data results modules, the instructors will ask the participants to undertake a demonstration to illustrate their proficiency in interpreting data from various worksheets. The instructors will make themselves available to assist participants in data entry.

Once the demonstration has been completed, the answers and interpretations will be discussed. After this discussion is completed, the instructors will administer the unit capstone quiz.

After the quiz has been completed, the instructors will go over the correct answers and discuss and questions that the participants may have. After answering these questions, the instructors will summarize the key points from the unit and transition to Unit 6.

## Time Plan

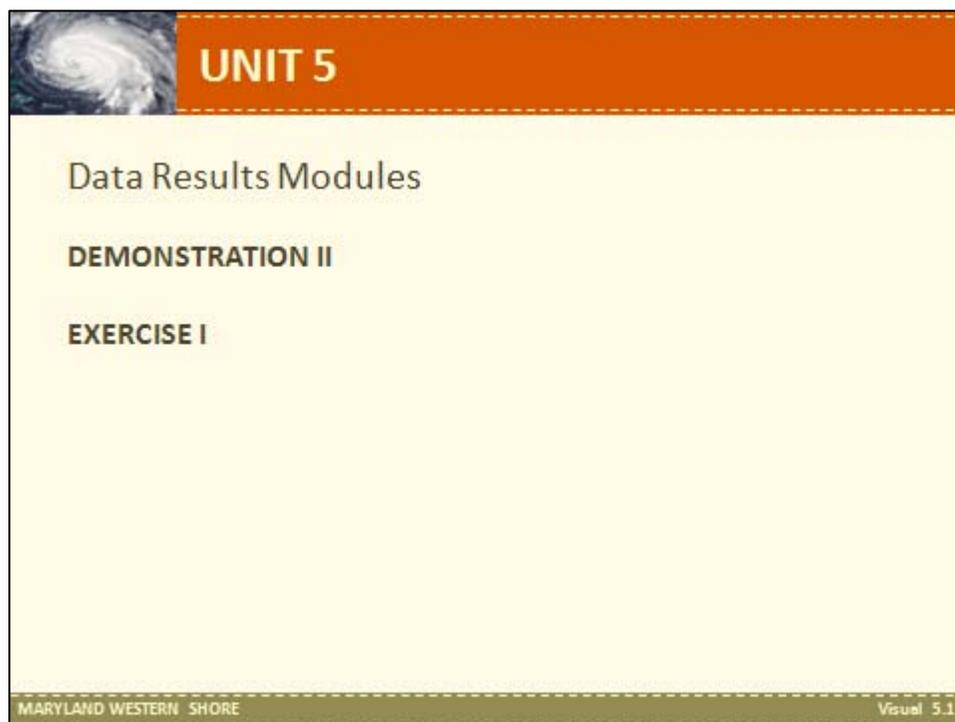
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Unit Objectives	5 minutes
Evacuation Statistics Module	5 minutes
Evacuating Vehicles Module	10 minutes
Out Route Assignment Module	5 minutes
Clearance Time Worksheet	10 minutes
DEMONSTRATION II	10 minutes
EXERCISE I	20 minutes
Unit Capstone Quiz	5 minutes
Summary	5 minutes
<b>Total Time</b>	<b>1 Hour, 15 Minutes</b>

**Topic: Unit Introduction**

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**Visual 5.1**



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**Instructors Notes**

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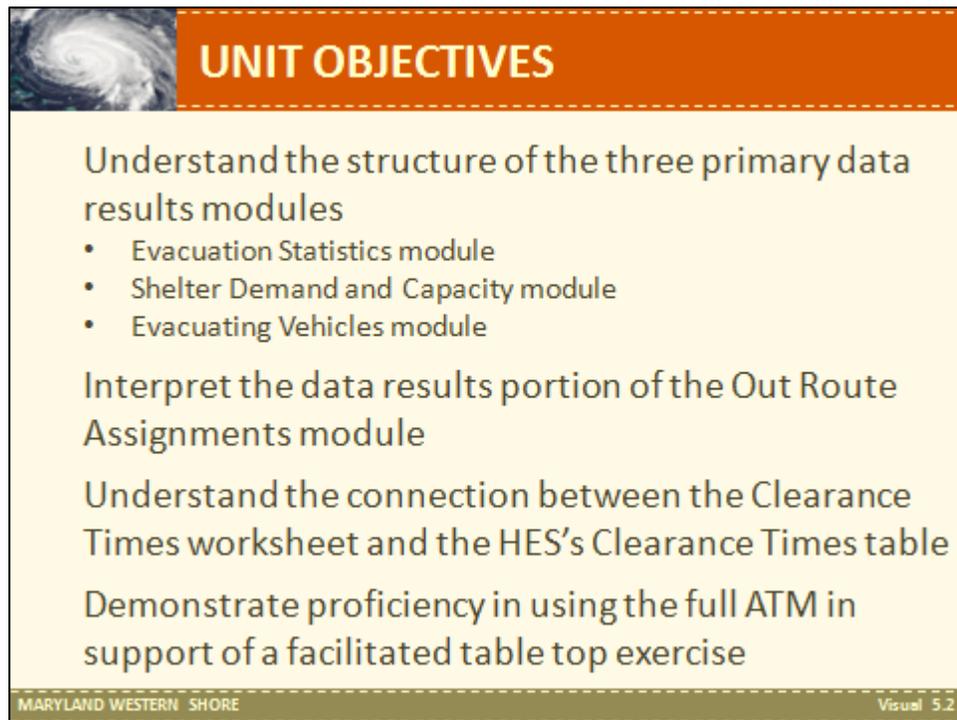
Explain that Unit 5 provides a more in-depth review of the data results modules of the ATM and provides participants with an opportunity to demonstrate their ability to identify and interpret data from different worksheets. The next visual will outline the objectives for this unit.

Ask the following questions and ask the participants to raise their hands if they feel that the question might apply to them:

- Do tourism levels in your county differ in August compared to February?
- About what percentage do these levels vary by?
- Do you know what the most congested bottleneck or critical roadway segment is in your county?
- What bottleneck or intersection do you think determines the Clearance Time for your county?
- Could this determining bottleneck be outside of the county?

Discuss how the demonstration will allow the participants to better identify and interpret the model results as it relates to these and other questions.

**Visual 5.2**

A presentation slide titled "UNIT OBJECTIVES" with a hurricane image in the top left corner. The slide lists four main objectives: understanding three primary data results modules (Evacuation Statistics, Shelter Demand and Capacity, and Evacuating Vehicles), interpreting data from the Out Route Assignments module, understanding the connection between Clearance Times worksheets and the HES's Clearance Times table, and demonstrating proficiency in using the full ATM for a table top exercise. The slide footer includes "MARYLAND WESTERN SHORE" and "Visual 5.2".

**UNIT OBJECTIVES**

Understand the structure of the three primary data results modules

- Evacuation Statistics module
- Shelter Demand and Capacity module
- Evacuating Vehicles module

Interpret the data results portion of the Out Route Assignments module

Understand the connection between the Clearance Times worksheet and the HES's Clearance Times table

Demonstrate proficiency in using the full ATM in support of a facilitated table top exercise

MARYLAND WESTERN SHORE Visual 5.2

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**Instructors Notes**

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Review the unit objectives with the group. Tell the participants that by the end of this unit, they should be able to:

- Understand the structure of the two primary data results modules
  - Evacuation Statistics module
  - Shelter Demand and Capacity module
  - Evacuating Vehicles module
- Identify the results components of the Out Route Assignment module
- Understand the connection between the Clearance Times worksheet and the HES's Clearance Times table
- Demonstrate proficiency in identifying and interpreting data from various worksheets

**Topic: Evacuation Statistics Module**

**Visual 5.3**

**EVACUATION STATISTICS MODULE**

Save a copy of the ATM as "MD ATM Demonstration II"  
 Navigate to "St. Mary's EvacStats" worksheet

St. Mary's County  
 EVACUATION PEOPLE AND VEHICLE STATISTICS  
 Worksheet Sheet 47/6/2008

Category 1 Evacuation Area  
 Category 2 Evacuation Area  
 Category 3 Evacuation Area  
 Category 4 Evacuation Area  
 Evac Area (Use Range)

Evac Area	Evacuating People								Evacuating People to Local Shelters							
	Cat 1		Cat 2		Cat 3		Cat 4		Cat 1		Cat 2		Cat 3		Cat 4	
	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy
1	455	481	455	481	455	481	455	481	19	20	19	19	11	11	11	11
2	16	16	16	16	16	16	16	16	1	1	1	1	0	0	0	0
3	16	16	16	16	16	16	16	16	1	1	1	1	0	0	0	0
4	1,139	1,152	1,139	1,152	1,139	1,152	1,139	1,152	128	128	128	128	62	62	62	62

Evac Area	Evacuating Vehicles								Evacuating Vehicles to Local Shelters							
	Cat 1		Cat 2		Cat 3		Cat 4		Cat 1		Cat 2		Cat 3		Cat 4	
	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy
1	208	224	208	224	208	224	208	224	10	10	10	10	6	6	6	6
2	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0
3	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0
4	614	728	722	899	1,029	1,482	1,182	1,687	62	64	68	68	62	62	68	68

Evac Area	Evac Vehicles to Other Local Destinations								Evac Vehicles to Out of County Locations							
	Cat 1		Cat 2		Cat 3		Cat 4		Cat 1		Cat 2		Cat 3		Cat 4	
	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy
1	117	117	117	117	117	117	117	117	18	18	18	18	117	117	117	117
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	268	268	322	322	449	449	476	476	187	207	285	279	498	522	593	1,017

Evac Area	Tourist Vehicles to Out of County Locations							
	Cat 1		Cat 2		Cat 3		Cat 4	
	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy
1	10	29	10	29	10	29	10	29
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	105	215	147	441	212	636	212	636

These table segments represent the complete column fields of the worksheet

MARYLAND WESTERN SHORE

Visual 5.3

**Instructors Notes**

The instructors shall minimize the slide presentation and open the ATM or open the ATM projected on a different screen. Participants should be prompted to save another copy of the MD W Shore ATM file using the name "MD W Shore ATM Demonstration II" to ensure that the source file remains uncorrupted.

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Evacuation Statistics Module:

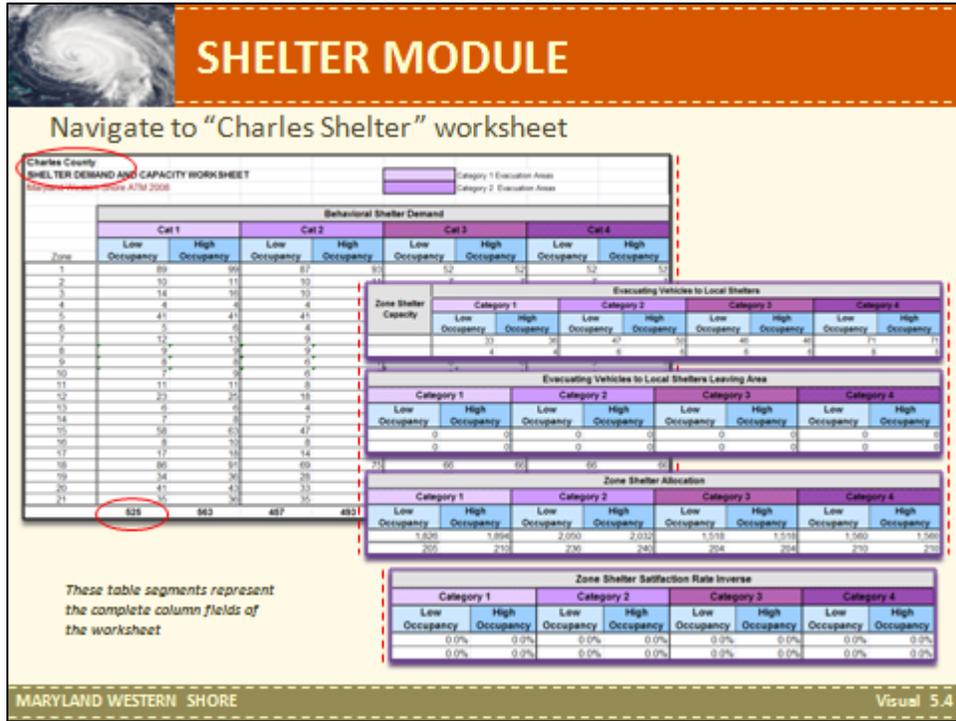
This ATM includes a separate evacuation statistics results sheet for Anne Arundel County, Baltimore County, Baltimore City, Calvert County, Charles County, Harford County, Prince George's County and St. Mary's County. These eight worksheets form the Evacuation Statistics Module. The Evacuation Statistics Module is a formula driven, data output module based on the data entered into the Socioeconomic Data Module and the Behavioral Data Module. Rows are established for each of the named and numbered evacuation zones in the region covered by the

worksheet. These sets of rows are subdivided by the storm intensity scenario, including storm Category 1, 2, 3, 4 and Inland Areas. The worksheets contain data columns that address evacuating people and evacuating vehicles. Additional detail is provided on vehicles and people travelling to local shelters, other local destinations and to out of county destinations.

Direct participants to navigate to the worksheet entitled “St. Mary’s EvacStats”. After confirming that every participant has opened the ATM and is on the home screen, proceed with a guided navigation of the Evacuation Statistics Module, identifying each data field.

**Topic: Shelter Demand and Capacity Module**

**Visual 5.4**



**Instructors Notes**

The instructors shall minimize the slide presentation and open the ATM or open the ATM projected on a different screen. Participants should be reminded that they should still be in the file named "MD W Shore ATM Demonstration II".

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Shelter Demand and Capacity Module:

This ATM includes a separate shelter demand and capacity results sheet for Anne Arundel County, Baltimore County, Baltimore City, Calvert County, Charles County, Harford County, Prince George's County and St. Mary's County. These eight worksheets form the Shelter Demand and Capacity Module. The Shelter Demand and Capacity Module is a formula driven, data output module based on the data entered into the Socioeconomic Data Module and the Behavioral Data Module. Rows are established for each of the numbered evacuation zones in the region covered by the worksheet. The rows also include summary data on available

shelters by numbered zone. The worksheets contain data columns that provide information on behavioral shelter demand, evacuating vehicles to local shelters, evacuating vehicles to local shelters leaving the area, zone shelter allocation, and zone shelter satisfaction rate inverse for four categories of storms (category 1 -4) in a high and low tourist occupancy.

Direct participants to navigate to the worksheet entitled "Charles Shelter". After confirming that every participant has opened the ATM and is on the home screen, proceed with a guided navigation of the Shelter Demand and Capacity Module, identifying each data field.

**Topic: Evacuating Vehicles Module**

**Visual 5.5**

**EVACUATING VEHICLES BY BOTTLENECK/CRITICAL ROADWAY SEGMENT**  
Maryland Western Shore ATM 2008

Regional Bottlenecks/Critical Roadway Segment	EVACUATING VEHICLES BY SCENARIO								Bottleneck Location/Segment	
	Cat 1		Cat 2		Cat 3		Cat 4			
	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ		
<b>Anne Arundel County</b>										
US 10 between Annapolis and I-95	2,221	3,848	4,389	6,276	6,978	8,840	9,714	11,744	US 10 between Annapolis and I-95	
I-95 between SR 2 and I-95	1,987	3,024	1,863	2,346	3,266	5,136	4,484	6,206	I-95 between SR 2 and I-95	
US 201 from I-95 to I-95	447	1,132	634	1,860	1,933	2,416	1,300	2,683	US 201 from I-95 to I-95	
US 10/100 between SR 10 split	683	1,126	1,803	2,206	2,903	3,726	4,216	5,180	US 10/100 between SR 10 split	
SR 2 at intersection of SR 10	767	1,166	1,439	1,814	2,476	3,212	3,366	4,843	SR 2 at intersection of SR 10	
US 2 from Stewart Cove to Annapolis	1,792	2,448	3,298	4,178	4,488	6,617	6,974	7,184	US 2 from Stewart Cove to Annapolis	
I-95 from Southwest Blvd to I-95	16,378	16,434	16,614	17,118	16,232	18,666	16,911	21,843	I-95 from Southwest Blvd to I-95	
I-95 between I-95 and I-95	1,379	2,667	2,640	4,638	3,467	5,541	6,978	7,763	I-95 between I-95 and I-95	
I-95 and I-83 interchange	1,881	2,876	1,730	2,429	2,722	4,876	4,281	6,438	I-95 and I-83 interchange	
I-95 and I-70 interchange	1,819	3,892	3,889	6,416	4,683	8,881	6,867	9,877	I-95 and I-70 interchange	
I-70 southbound from I-95 to Howard Co. line	4,128	3,821	2,764	4,827	3,978	5,281	6,688	7,998	I-70 southbound from I-95 to Howard Co. line	
Francis Scott Key Bridge Southbound	4,389	6,167	4,871	6,827	6,298	7,281	8,368	9,321	Francis Scott Key Bridge Southbound	
US 40 southbound from I-95 to City Boundary	3,916	3,498	3,890	4,886	4,642	5,162	6,146	6,298	US 40 southbound from I-95 to City Boundary	
SR 102 southbound from I-95 to City Boundary	1,477	1,779	1,868	1,988	2,071	2,423	1,428	2,762	SR 102 southbound from I-95 to City Boundary	
SR 10 to I-95	288	1,021	846	1,432	911	2,388	1,248	2,648	SR 10 to I-95	
<b>Baltimore County</b>										
Interchange of I-95 and I-83 (at I-70)	1,888	2,801	2,338	4,319	3,988	6,793	4,878	7,873	Interchange of I-95 and I-83 (at I-70)	
Interchange of I-95 and I-83 (at I-70)	1,264	3,727	1,866	3,886	3,181	5,860	4,622	7,292	Interchange of I-95 and I-83 (at I-70)	
US 40 between I-95 and I-83 (at I-70)	1,366	1,984	1,887	3,479	3,108	5,187	3,223	4,873	US 40 between I-95 and I-83 (at I-70)	
US 40 between I-95 and I-83 (at I-70) - Baltimore County	888	1,290	899	1,701	1,320	2,206	1,962	2,838	US 40 between I-95 and I-83 (at I-70) - Baltimore County	
<b>Baltimore City</b>										
US 24 north of Washington	1,960	3,224	3,223	4,792	4,729	7,812	6,717	9,822	US 24 north of Washington	
US 4 northbound to Anne Arundel Co. line	1,888	2,174	1,778	2,279	2,763	4,828	3,788	5,823	US 4 northbound to Anne Arundel Co. line	
US 2 northbound to Anne Arundel Co. line	374	628	616	871	845	1,433	1,307	1,796	US 2 northbound to Anne Arundel Co. line	
<b>Calvert County</b>										
US 207 at intersection of SR 5	1,827	3,122	2,810	4,887	3,718	6,706	4,981	7,827	US 207 at intersection of SR 5	
US 1 northbound at intersection of US 201	1,148	2,148	1,866	3,467	3,126	5,817	4,328	6,206	US 1 northbound at intersection of US 201	
US 210 at intersection of SR 228 (on PG Co.)	801	1,061	782	1,844	1,224	2,288	1,828	3,790	US 210 at intersection of SR 228 (on PG Co.)	
US 201 bridge over Potomac River to Virginia	821	1,608	1,497	2,822	2,482	3,879	3,292	4,890	US 201 bridge over Potomac River to Virginia	
<b>Charles County</b>										
US 22 from Aqueduct Bridge to I-95	148	374	319	678	379	684	385	456	US 22 from Aqueduct Bridge to I-95	
US 24 between US 40 and I-95	122	228	228	373	428	621	620	728	US 24 between US 40 and I-95	
US 1 between SR 22 and SR 143	283	381	326	586	617	780	818	1,076	US 1 between SR 22 and SR 143	
US northbound from SR 111 to Carroll Co.	288	680	421	895	738	1,416	978	1,687	US northbound from SR 111 to Carroll Co.	
US southbound from SR 112 to Baltimore Co.	828	2,187	1,429	3,148	2,189	5,087	3,308	6,871	US southbound from SR 112 to Baltimore Co.	
<b>Harford County</b>										
US 10 between US 201 and I-95/895	1,232	2,828	2,288	3,882	3,882	6,842	6,808	7,791	US 10 between US 201 and I-95/895	
US 1 to I-95/895	683	1,426	968	2,838	1,647	3,116	2,448	3,526	US 1 to I-95/895	
US 1 to I-95/895	1,890	3,292	2,420	4,818	3,887	6,840	6,221	8,308	US 1 to I-95/895	
US 4 to I-95/895	1,834	3,015	3,102	4,920	6,043	7,816	6,348	8,828	US 4 to I-95/895	
US 4 between SR 112 and I-95	1,828	3,663	2,424	4,378	4,116	6,568	6,813	8,488	US 4 between SR 112 and I-95	
SR 1 to I-95/895 interchange	2,316	3,274	3,873	7,736	6,112	11,918	8,483	14,288	SR 1 to I-95/895 interchange	
US 1 from Newmarket	1,812	3,077	1,783	3,191	3,888	4,888	1,817	5,784	US 1 from Newmarket	
Intersection of SR 4 and SR 228	491	1,024	791	1,828	1,206	2,288	1,676	2,709	Intersection of SR 4 and SR 228	
<b>Prince George's County</b>										
West Potomac Lane Main Bridge (I-95 SR 1301)	11,756	44,268	21,775	60,816	26,741	80,218	48,742	80,224	West Potomac Lane Main Bridge (I-95 SR 1301)	
Figures from DelBeama & T&E										

MARYLAND WESTERN SHORE Visual 5.5

**Instructors Notes**

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Evacuating Vehicles Module:

First presented in Unit 4, we will provide more detail on the full structure of the ATM's Evacuating Vehicles Module. The ATM's Evacuating Vehicles by Focal Point/Critical Roadway Segment worksheet is primarily a data results module. It includes tables that represent the bottlenecks or critical roadway segments reviewed in the study. Data catalogued in this worksheet includes the bottleneck location or name of the critical roadway segment segregated by jurisdiction. The worksheet columns identify the number of vehicles utilizing the roadway during both low and high tourist occupancy scenarios in Category 1, 2, 3 and 4 storm events.

After confirming that every participant has opened the ATM and is on the home screen, proceed with a guided navigation of the Evacuating Vehicles Module, identifying each data field.

**Topic: Out Route Assignment Module**

**Visual 5.6**

**OUT ROUTE ASSIGNMENT MODULE**

*Left Half*

Baltimore County OUT-ROUTES TO OTHER COUNTIES Maryland Western Shore ATM 2008							
Baltimore	I-95 To I-97	SR 295 SB	I-695 Outer	I-895 To I-95	US 1 SB	I-95 SB	
1	0%	0%	0%	0%	0%	0%	
2	0%	0%	0%	0%	0%	0%	
3	0%	15%	0%	0%	0%	15%	
4	0%	0%	0%	0%	0%	0%	
5	0%	0%	0%	15%	0%	20%	
6	0%	0%	0%	0%	0%	0%	
7	0%	0%	0%	15%	0%	20%	
8	0%	0%	0%	0%	0%	15%	
9	0%	0%	0%	0%	0%	0%	
95	0%	0%	0%	0%	0%	15%	

*Right Half*

US 1 Southbound								I-95 Southbound							
Cat 1		Cat 2		Cat 3		Cat 4		Cat 1		Cat 2		Cat 3		Cat 4	
Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ	Low Occ	High Occ
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	4	17	11	24	17	23	14	24	19	50	33	78	52	96
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	8	21	11	29	21	45	33	59
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	26	52	27	72	44	112	84	132
0	0	0	0	0	0	0	0	10	24	14	36	23	54	32	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	7	19	10	26	16	39	22	46

MARYLAND WESTERN SHORE Visual 5.6

**Instructors Notes**

The instructor will note that, like with the Evacuating Vehicles module, the participant will be working with a worksheet they first investigated in Unit 4 – the Out Route Assignment Module.

The instructor will direct participants to navigate to the Out Route Assignment Module, Baltimore County worksheet, which is labeled “Baltimore Evac Trips” on the worksheet tab. In order for participants to understand the structure of the Maryland Western Shore ATM, the instructor will provide the following description of the Out Route Assignment Module:

The ATM Out Route Assignment Module is comprised of nine worksheets. One for each of the study area jurisdictions, including Anne Arundel County, Baltimore County, Baltimore City, Calvert County, Charles County, Harford County, Prince George's County and St. Mary's County, as well as a Regional Trips summary worksheet. The jurisdictional worksheets include two components in one worksheet. The left half of the worksheet includes a data entry table to calculate the percent of total vehicles exiting the State/Region/County by a specific route. Rows

are established for each of the numbered evacuation zones for the eight evacuation jurisdictions in the study area. The jurisdictional worksheets include data columns corresponding to the major out route possibilities for each jurisdiction. The user can adjust these out route percentages to test different scenarios or alternate public information strategies regarding suggested route usage.

After confirming that every participant has navigated to the Out Route Assignment Module, Baltimore County worksheet, proceed with a guided navigation of the Out Route Assignment Module, with special focus on interpreting the results from the right hand portion of the worksheet.

**Topic: Clearance Times Worksheet**

**Visual 5.7**

**Worst Segment and Clearance Time Characteristics**  
(Red Circle)

**MEDIUM RESPONSE TIME**  
(Green Vertical Bar)

*Identify the worst segment clearance time to help determine the County Clearance Time*  
(Red Circle)

Regional Bottlenecks	Critical Roadway Segment	MEDIUM RESPONSE TIME							
		Cat 1		Cat 2		Cat 3		Cat 4	
		Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy	Low Occupancy	High Occupancy
Anne Arundel County	US 21 between Arundel and I-97	3.8	4.1	4.2	4.6	4.7	5.1	5.1	5.7
	I-97 between SR 2 and I-95	3.8	4.0	4.0	4.3	4.3	4.6	4.6	4.8
	SR 201 from I-95 to I-97	4.3	4.8	4.3	4.6	4.6	4.9	4.8	4.9
	SR 170 from SR 170 to SR 170	4.3	4.8	4.7	4.6	4.6	5.0	5.0	5.0
	SR 2 at intersection of SR 170	3.5	3.8	3.8	4.2	4.0	4.0	4.0	4.0
Baltimore County	SR 170 from Stewart City to Annapolis	6.0	6.4	6.6	7.0	6.3	6.1	6.6	6.6
	I-95 from Southwood Blvd to I-83	7.8	8.0	7.8	8.1	8.0	8.3	8.7	8.8
	I-95 between SR 497 and I-95	6.6	6.9	6.8	6.2	6.0	6.6	6.3	6.9
	I-83 and I-97 interchange	3.9	4.1	4.0	4.2	4.1	4.0	4.3	4.6
	I-95 and I-70 interchange	6.4	6.9	6.7	7.2	7.0	7.7	7.4	8.1
Baltimore City	US 101 westbound from I-83 to City Boundary	2.8	3.1	3.0	3.0	2.9	2.8	2.8	2.8
	US 101 westbound from I-83 to City Boundary	6.6	7.1	6.8	6.8	6.8	6.9	7.2	7.8
	US 101 eastbound from I-83 to City Boundary	2.8	3.0	3.0	3.0	2.9	2.8	2.8	2.8
	I-83 and I-83 interchange	4.6	4.7	4.6	4.7	4.6	4.6	4.7	4.8
	Interchange of I-83 and I-83 at I-77	4.3	4.6	4.6	4.6	4.6	4.6	4.7	4.8
Calvert County	SR 4 northbound to Anne Arundel Co. line	6.8	6.2	6.1	7.1	7.1	8.0	8.3	8.8
	SR 2 southbound to Anne Arundel Co. line	4.1	4.0	4.0	4.8	4.3	4.7	4.8	4.8
	SR 2 northbound to Anne Arundel Co. line	4.3	4.7	4.6	5.3	5.2	6.0	6.0	6.8
	SR 4 southbound to Anne Arundel Co. line	6.8	4.6	4.6	6.0	4.7	5.0	5.1	5.9
	SR 4 southbound at intersection of US 301	3.8	4.8	4.3	5.3	5.8	6.3	5.7	6.9
Charles County	SR 21 at intersection of SR 210 (CAV) Co 1	3.8	3.8	3.8	3.2	3.1	3.6	3.2	3.7
	SR 21 bridge over Potomac River to Virginia	1.3	1.6	1.6	1.6	1.6	1.7	1.7	1.8
	SR 21 from Annapolis Blvd to US 40	3.9	3.9	3.9	3.8	3.8	3.1	3.9	3.2
	SR 21 between US 40 and I-95	3.3	3.4	3.4	3.4	3.4	3.6	3.6	3.7
	I-95 between SR 21 and SR 142	3.4	3.4	3.4	3.4	3.4	3.6	3.6	3.6
Harford County	I-95 northbound from SR 105 to Carol Co	3.7	3.7	3.7	3.8	3.8	3.9	3.9	3.9
	I-95 northbound from SR 105 to Baltimore Co	3.7	3.7	3.7	3.8	3.8	3.9	3.9	3.9
	US 50 between US 301 and US 405	3.6	3.6	3.7	3.8	3.8	3.9	3.9	3.8
	SR 210 to I-95/405	3.7	4.0	3.9	4.3	4.1	4.7	4.6	5.0
	SR 210 to I-95/405	3.4	4.0	3.7	4.4	4.1	4.6	4.6	5.1
Prince George's County	SR 4 to I-95/405	3.8	3.9	3.9	3.3	3.3	3.8	3.8	4.1
	I-95/405 between SR 210 and I-295	3.0	3.0	3.0	4.2	4.0	4.6	4.2	4.8
	I-95 and I-495 interchange	6.3	6.7	6.6	6.6	6.6	6.6	6.1	6.1
	SR 180 from Newmarket and Highgate	3.4	3.6	3.6	3.4	3.4	3.6	3.6	4.3
	Interchange of SR 4 and SR 210	3.3	3.7	3.6	4.0	3.9	4.0	4.0	4.7

**Instructors Notes**

The instructor will note that, like with the previous two modules, the participant will be working with a worksheet they first investigated previously, in this case in Unit 3 – the Clearance Times worksheet. The instructor will direct participants to navigate to the Clearance Times worksheet, which is labeled “Clearance Tms” on the worksheet tab.

In order for participants to understand the structure the Maryland Western Shore ATM, the instructor will provide the following description of the Clearance Times worksheet:

First presented in Unit 4, we will provide more detail on the full structure of the ATM’s Clearance Times worksheet. The ATM’s Clearance Times worksheets rows are structured similarly to the Evacuating Vehicles by Bottleneck/Critical Roadway Segment worksheet. Rows include each of the critical roadway segments, segregated by jurisdiction. The worksheet includes a primary data entry table, as well as four data results tables.

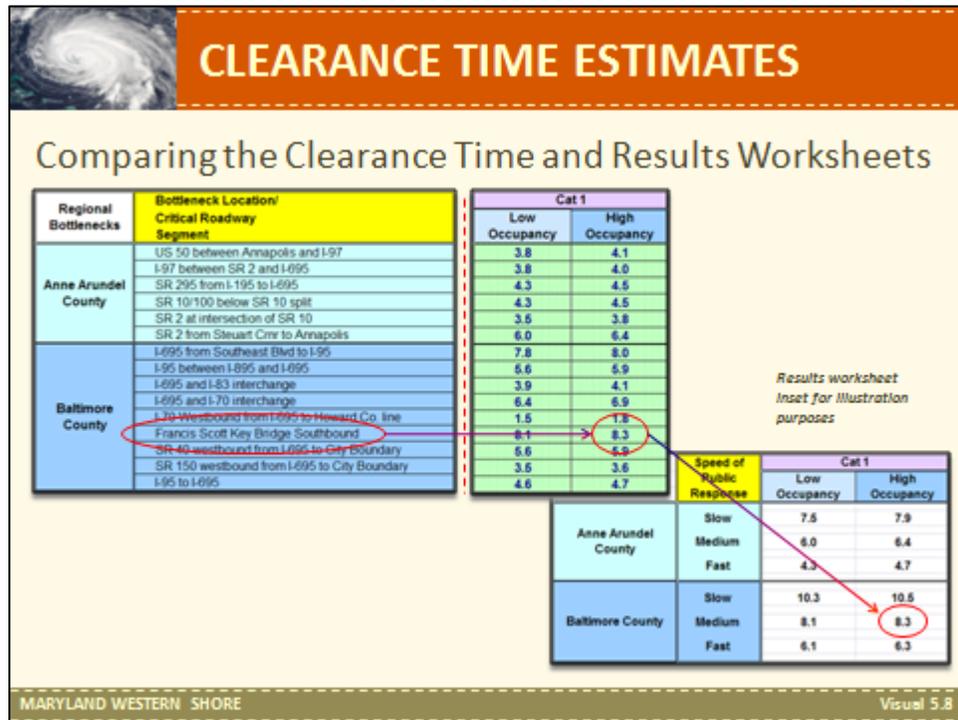
The data entry table is the first table on the left when the worksheet is opened. It includes data columns that address the following information for each of the bottlenecks; evacuation direction service volume, the specific evacuation service volume during each of the four event quarters, the background traffic, and travel time to county line. The data in the columns for evacuation direction service volume and background traffic can be adjusted to test different scenarios.

The worksheet includes four additional tables that calculate hurricane evacuation clearance times at each of the focal points during both high and low tourist occupancy scenarios in Category 1, 2, 3 and 4 storm events. There is a separate table for slow, medium and rapid response rates, as well as a table that factors in the effects of traffic evacuating from Delmarva.

After confirming that every participant has opened the ATM and is on the home screen, proceed with a guided navigation of the Clearance Time worksheet, with special focus on the data entry features as well as identifying the clearance times at specific bottlenecks and along key routes.

**Topic: Clearance Time Estimates**

**Visual 5.8**



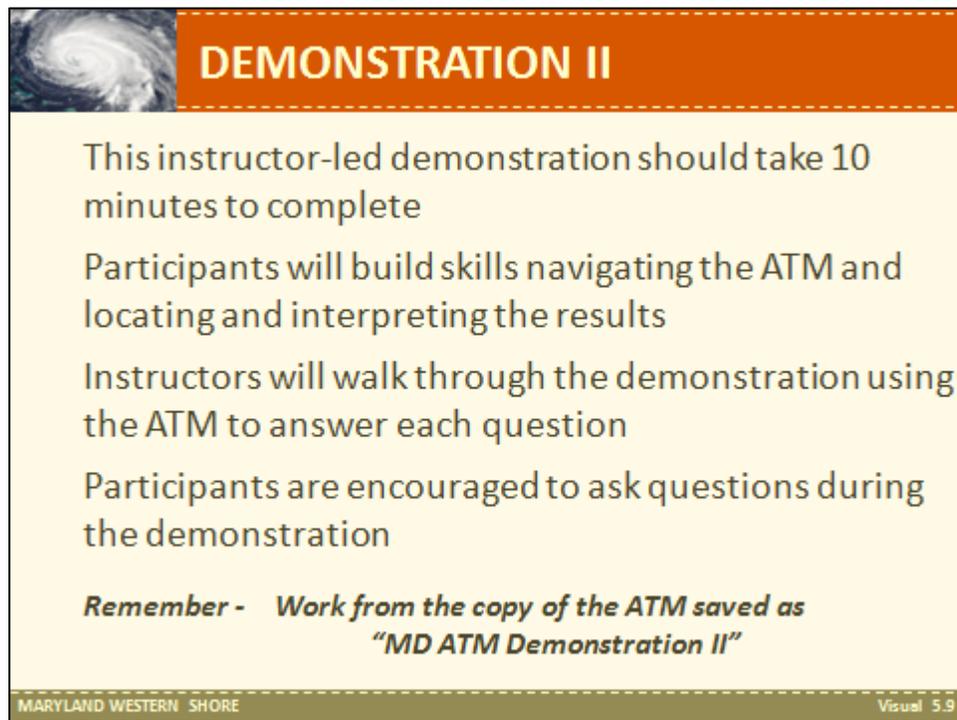
**Instructors Notes**

The instructor will tell the participants that the ATM provides clearance times at specific bottlenecks, but that determining a County clearance time, such as those that are used in HURREVAC, requires interpretation. Participants shall be reminded that a County clearance time is based on the least efficient critical roadway segment along which a significant portion of the County's evacuating traffic must pass.

In order for participants to understand how the Clearance Time Worksheet informs the Clearance Time table, the instructors will go over the Results worksheet. The Results worksheet summarizes the Maryland Western Shore Clearance times. Two tables are included, one with and one without Delmarva traffic. Each table provides clearance times for each of the eight study area jurisdictions in a range of different scenarios; slow, medium and fast response rate; high and low tourist occupancy; category 1 - 4 storm events.

The instructor will toggle between the Clearance Time worksheet and the Results worksheet to show where the county times originated. The instructors will demonstrate how to review the clearance times for different counties under varying scenarios.

Visual 5.9



**DEMONSTRATION II**

This instructor-led demonstration should take 10 minutes to complete

Participants will build skills navigating the ATM and locating and interpreting the results

Instructors will walk through the demonstration using the ATM to answer each question

Participants are encouraged to ask questions during the demonstration

*Remember - Work from the copy of the ATM saved as "MD ATM Demonstration II"*

MARYLAND WESTERN SHORE Visual 5.9

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### Instructors Notes

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The instructor will inform the participants that the demonstration is an opportunity to illustrate their skill in navigating the ATM and finding and interpreting key data. It should be noted that this is not an exercise or a test, but rather a skill building opportunity.

**Remember, this is an instructor led demonstration that should only take 10 minutes to complete.** Note: If the participants were to be provided the demonstration questions in the form of an exercise, it would take much longer to complete.

The instructors will set up the scenario and ask each of the listed questions. The instructors will encourage the participants to get started answering the questions, but will walk the class through using the ATM to answer each question. The instructors will encourage the class to ask questions during the demonstration to ensure they understand how to use the ATM.

Participants should be reminded that they should have opened the ATM and be working in a file version saved as "MD W Shore ATM Demonstration II" to ensure that the source file remains uncorrupted. Even though no new data will be entered in this demonstration, it is recommended that users save and rename a working copy of the master version of the ATM every time it is used.

The instructor will read the following scenario to the participants and ask them to modify data in their ATM accordingly.

#### DEMONSTRATION II:

You are an emergency manager with responsibilities that include or extend to Charles County, Maryland. While you use HURREVAC, you are interested in checking some of your evacuation statistics as well as the anticipated traffic volumes along different evacuation routes that individuals departing from your county may use.

Answer the following question by navigating through and interpreting the data in your ATM.

**The instructors will actively, but slowly work through solving the questions on a copy of the ATM projected for the class. The instructors will let the participants know that if they need assistance, they should please ask for help.**

The instructors will introduce the first two questions, which will require the participants to use both the Socioeconomic Data and Evacuation Statistics modules.

Question 1: For evacuation zone 8 in a category 3 event;

- a. What is the default tourist occupancy rate in February?
- b. What is the default tourist occupancy rate in July?
- c. Which worksheet would need to be changed in order to adjust these defaults?

Question 2: In a category 3 storm, what is number of evacuating vehicles;

- a. Countywide, in February?
- b. Countywide, in July?
- c. That may be expected to evacuate to a local shelter in July?
- d. That may be expected to evacuate to another local destination in July?

The instructor will cover the next three questions, letting the participants know that they will be asked to interpret the results in the ATM.

Due to the limited number of southbound out-routes, evacuating traffic from Charles County must rely heavily on the use of the bridge at 301 Southbound over the Potomac. As part of a hazards analysis you are conducting, you have listed this bridge as a critical regional transportation facility. You would like to better understand how the bridge might influence your local evacuation planning.

Based on this description of events, answer the following questions:

Question 3: Identify the total number of evacuating vehicles expected to travel on through the listed bottleneck during a Category 3 storm occurring in July;

- a. At US 301 between SR 5 and Waldorf
- b. At the US 301 bridge over the Potomac river to VA

Question 4: In the same storm scenario (Category 3, high tourist occupancy) what is the clearance time;

- a. At US 301 between SR 5 and Waldorf
- b. At the US 301 bridge over the Potomac river to VA

Question 5: In the same storm scenario, understanding that the bottlenecks listed may not represent the final destinations of evacuees from Charles County,

- a. Which of these bottlenecks exhibits the highest clearance time?
- b. What is the estimated County clearance time, assuming a medium response rate, for Charles County?
- c. What is the estimated County clearance time, assuming a rapid response rate, for Charles County?

#### **The instructors will provide the answers to the questions**

Answer 1: The default tourist occupancy rates are **30%** for February, which is low occupancy, and **90%** for July, which is high occupancy. These defaults may be changed on the Cape May County Socioeconomic Data worksheet.

Answer 2: In a category 3 intensity storm, the number of evacuating vehicles expected countywide in February is **4,857**. In July (during high tourist occupancy) **7,542** vehicles would be expected. During high season (July) **347** vehicles may be expected to evacuate to a local shelter, while **1,780** vehicles may be expected to evacuate to another local destination.

Answer 3: In a category 3 intensity storm at high tourist occupancy, **6,705** vehicles are expected to pass through the bottleneck at US 301 between SR 5 and Waldorf, while **3,879** vehicles are expected to pass through the bottleneck the US 301 bridge over the Potomac river to VA.

Answer 4: In a category 3 intensity storm at high tourist occupancy, the clearance time at the bottleneck at US 301 between SR 5 and Waldorf is **5.8** hours, while the clearance time at the bottleneck at the US 301 bridge over the Potomac river to VA is **2.5** hours.

Answer 5: The bottleneck at US 301 between SR 5 and Waldorf has the higher clearance time of **5.8** hours. Given a medium response rate, the clearance time for Charles County would be **6.3** hours, based on the bottleneck at SR 5 westbound at 301. The clearance time with a rapid response would be **5.0** hours.

**The instructors will elicit a discussion on the demonstration upon its completion.**

One of the issues the instructors should highlight is how specific bottlenecks anywhere in the evacuation roadway network may determine a County clearance time.



The instructor will read the following scenario to the participants.

**EXERCISE I:**

You are an emergency manager with the Maryland Office of Emergency Management. It is August 1, 2010. While it has been a somewhat active season, with 5 named storms so far, none have actively threatened the Eastern United States. Your EOC has not been activated yet this hurricane season in response to any of these threats.

**Part 1:** This part of the exercise will test your ability to use the ATM to find and record data.

**Inject:** It is August 6. A wave that formed off of Africa at the beginning of the month has solidified and has reached tropical storm intensity. It has been named TS Ferdinand. Various early models show the storm track making landfall anywhere between Knott's Island, North Carolina and Sandy Hook, New Jersey.

In order to begin incident action planning, you have been asked to begin to compile some basic information about evacuees and routes.

Answer the following questions by navigating through and interpreting the data in your ATM.

Question 1.1:

**What is the default rate for high tourist occupancy for Anne Arundel, Baltimore, Calvert and Charles counties?**

*Answer 1.1: Refer to the Socioeconomic Data worksheets to identify that the default rate for the four counties is 90%.*

Question 1.2:

**What is the number of potential evacuees from each of those four counties?**

*Answer 1.2: Refer to the Evacuation Statistics worksheets to identify the potential number of evacuees as follows:*

	<u>Cat 1</u>	<u>Cat 2</u>	<u>Cat 3</u>	<u>Cat 4</u>
<b>Anne Arundel</b>	46,389	73,808	115,767	139,156
<b>Baltimore</b>	182,189	191,890	211,192	285,549
<b>Calvert</b>	8,675	12,840	18,695	23,473
<b>Charles</b>	10,419	13,909	19,582	24,176

Question 1.3:

**In order to plan possible traffic diversion measures, what are the clearance times on I-95 at the following bottlenecks?**

*Answer 1.3: Refer to the Clearance Times worksheet to identify clearance times at the critical roadway segments, as follows:*

	<u>Cat 1</u>	<u>Cat 2</u>	<u>Cat 3</u>	<u>Cat 4</u>
<b>Between I-895 and I-695</b>	5.9	6.2	6.6	6.9
<b>At the interchange of I-95 and I-895 at Exit 57</b>	4.6	5.0	5.5	5.6
<b>I-95 N from SR 155 to Cecil Co.</b>	2.7	2.8	2.9	2.9
<b>I-95 at I-95/495 interchange</b>	5.7	6.0	6.6	7.0

**Part 2: This part of the exercise will test your ability to modify input data in the ATM and interpret the results.**

**Inject:** After providing the information to your superiors, you were alerted to some changed conditions. You are concerned that these conditions may impact the clearance time calculations and want to modify the ATM to quantify the impacts.

You will be asked to address the changed conditions by making specific changes in the ATM. Answer the following questions by navigating your ATM, modifying data as required, and interpreting the results.

Based on updated local tourism information, the average vehicles per unit for Calvert County should be 1.82 vehicles per unit.

Building official's data recorded several new developments in Charles County, (evacuation area 9). Based on your information, there should be an additional 500 permanent units in the category 1 zone, 100 units added in the category 2 zone and 1,000 units added to the category 3 zone.

Because so many evacuees will utilize I-95, you contacted your traffic operations specialists and found out that there is some minor construction at the bottleneck

at I-95 between I-895 and I-695. You feel that to be prudent you should reflect that this facility is operating at a service volume of 4000 vehicles.

Question 2.1

**What impact, if any, do these changes cause to clearance times at the following bottlenecks?**

*Answer 2.1: Refer to the Clearance Time worksheet. You will need to compare an unmodified ATM with one that includes the changes made above. The figures below are old v. new*

	<u>Cat 1</u>	<u>Cat 2</u>	<u>Cat 3</u>	<u>Cat 4</u>
<b>Between I-895 and I-695</b>	5.9 v. 7.8	6.2 v. 8.1	6.6 v. 8.7	6.9 v. 9.1
<b>At the interchange of I-95 and I-895 at Exit 57</b>	4.6 no change	5.0 no change	5.5 no change	5.6 no change
<b>I-95 N from SR 155 to Cecil Co.</b>	2.7 no change	2.8 no change	2.9 no change	2.9 no change
<b>I-95 at I-95/495 interchange</b>	5.7 no change	6.0 v. 6.1	6.6 v. 6.7	7.0 no change

Question 2.2

**Which bottleneck demonstrates the greatest increase in clearance times as a result of these changes?**

*Answer 2.2: I-95 between I-895 and I-695*

Question 2.3

**What impacts would these changes have on the County Clearance times for Baltimore County? What about Charles County?**

Answer 2.3: Refer to the Clearance Time worksheet. There is no impact on Baltimore County Clearance Times. Charles County Clearance times go up very slightly, based on impacts at the determining bottleneck.

	<u>Cat 1</u>	<u>Cat 2</u>	<u>Cat 3</u>	<u>Cat 4</u>
SR 5 at 301	0.5 hours	0.7 hours	1.5 hours	1.5 hours

**Part 3:** This part of the exercise will test your ability to find and interpret data in the ATM.

**Inject:** It is August 11. Ferdinand has maintained its storm track and has been consistently intensifying. The storm is now clocking 165 mph winds. While the models predict that the storm remains up to a week away from any potential landfall, your office is monitoring the storm closely.

Because this storm could result in a mandatory evacuation in your state, you are interested in finding out more information about route details and sheltering capacity along a potentially congested evacuation route.

Answer the following questions by navigating through and interpreting the data in your ATM.

**Remember, these questions relate to a Category 4 intensity storm.**

Question 3.1

**What is the clearance time for Anne Arundel County, medium response?**

**What is the determining bottleneck?**

Answer 3.1: The clearance time for Anne Arundel County is 9.4 hours. The determining bottleneck is SR 2 from Steuart Corner to Annapolis.

Question 3.2

**You anticipate that if your region calls an evacuation order, so will the Delmarva counties, which would add significant traffic into Anne Arundel County. What is the clearance time, medium response, for the County once Delmarva traffic impacts are factored in?**

**How does this compare to the clearance time without this additional traffic factored in?**

**With the Delmarva traffic factored in, what is the critical bottleneck for determining the County clearance time?**

Answer 3.2: If Delmarva traffic is factored in, the new clearance time is 20.7 hours. This is 11.3 hours longer than without the Delmarva impacts factored in.

*The new critical bottleneck for determining the county clearance times in US 50 between Annapolis and I-97.*

**Part 4:** This part of the exercise will test your ability to interpret the ATM results and its basic assumptions

**Inject:** It is August 15. Ferdinand has shifted slightly north-northwest and appears on track to make landfall in your state. While the storm has weakened to a category 4, it is still a very significant major hurricane. The models predict that the storm could make landfall in two to three days. Your EOC is fully activated.

It is likely that you Governor will call for a mandatory evacuation. You are concerned that the evacuation order may come late and that tourists may not comply since the weather at the shore has been perfect.

Answer the following questions by working with and interpreting the data in your ATM

Question 4.1

**After consulting the ATM you noted that the total number of evacuating people from Anne Arundel County in this event would be approximately 139,000. The county has a population of over 510,000. Why is the evacuating population so much lower than the total population. In a Category 4 storm, shouldn't the entire population evacuate? Why or why not?**

**There are a number of bridges that will be shut down once surface winds reach 55 mph. How will this affect clearance times on routes that include these bridges?**

*Answer 4.1: A) The evacuating population includes those individuals – both residents and tourists – located within a predicted area of inundation. Only those individuals subject to potential flooding should evacuate. Others should stay off the evacuation network and seek to shelter in place.*

*B) Closing bridges to evacuating traffic once surface winds reach 55 mph may be a prudent public safety measure. It will have no impact on evacuation clearance times, which are predicated upon all evacuation movements being completed prior to the onset of tropical storm force winds.*

Question 4.2

**As you predicted, a mandatory evacuation was called. It appears as though the storm may make landfall within the next 24 hours. There has been considerable rainfall. Some planners have discussed using the SLOSH model output for a Category 4 hurricane to account for the rainfall associated with this expected Category 3.**

**Could the ATM be used to determine clearance times in this case? If so, how?**

*Answer 4.3: Yes. Users would simply refer to Category 4 clearance times in the model.*

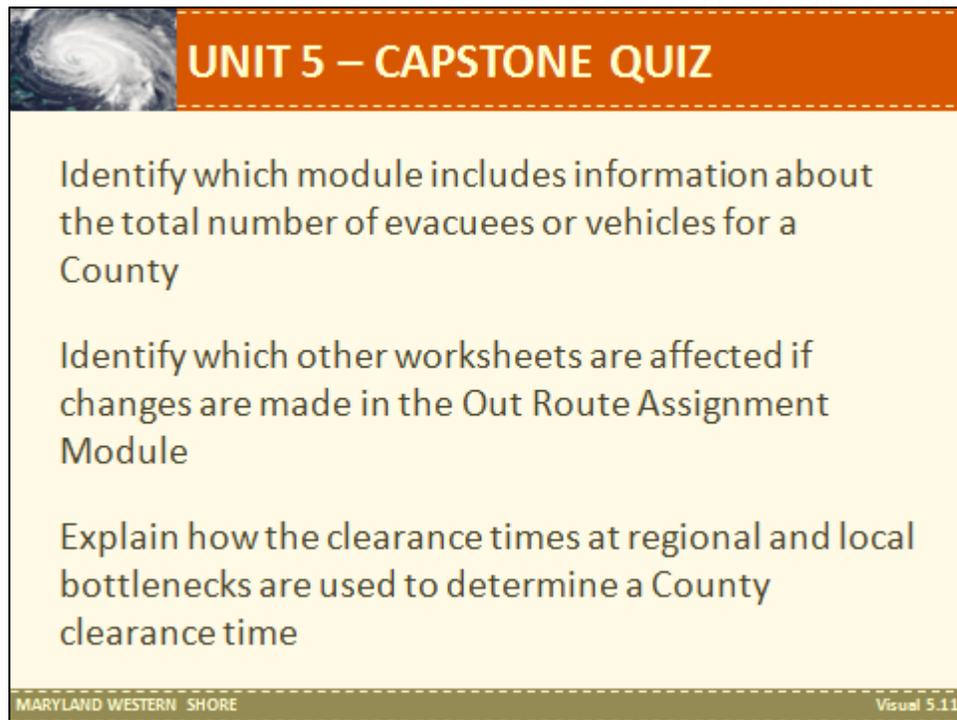
#### EXERCISE CONCLUSION

The instructors will go over the answers to the questions posed by the exercise and answer any additional questions the participants may have.

**Topic: Unit Capstone Quiz**

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**Visual 5.11**

A presentation slide titled "UNIT 5 – CAPSTONE QUIZ". The slide has a yellow background with a blue header bar containing a satellite image of a hurricane and the title text. The main content area lists three quiz questions. At the bottom, there is a footer with "MARYLAND WESTERN SHORE" on the left and "Visual 5.11" on the right.

**UNIT 5 – CAPSTONE QUIZ**

Identify which module includes information about the total number of evacuees or vehicles for a County

Identify which other worksheets are affected if changes are made in the Out Route Assignment Module

Explain how the clearance times at regional and local bottlenecks are used to determine a County clearance time

MARYLAND WESTERN SHORE Visual 5.11

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**Instructors Notes**

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Ask participants if they can now:

- Identify which module includes information about the total number of evacuees or vehicles for a County
- Identify which other worksheets are affected if changes are made in the Out Route Assignment Module
- Explain how the clearance times at regional and local bottlenecks are used to determine a County clearance time

**Visual 5.12**

**UNIT 5 – SUMMARY**

The Evacuation Statistics module includes summary information on the total number of evacuating people and vehicles for a County

Changes made in the Out Route Assignment Module also reflected in the three worksheet that make up the Evacuating Vehicles Module; the Evacuating Vehicles by Bottleneck/Critical Roadway Segment, the Clearance Time, and the Results worksheet.

The least efficient (worst) clearance time at regional or local bottlenecks along a county's primary evacuation routes determines its clearance time.

MARYLAND WESTERN SHORE Visual 5.12

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**Instructors Notes**

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Summarize this unit by reminding the group that:

- The Evacuation Statistics module includes summary information on the total number of evacuating people and vehicles for a County
- Changes made in the Out Route Assignment Module also reflected in the two worksheet that make up the Evacuating Vehicles Module; the Evacuating Vehicles by Bottleneck/Critical Roadway Segment worksheet and the Clearance Times worksheet.
- The least efficient (worst) clearance time at regional or local bottlenecks along a county's primary evacuation routes determines its clearance time.

**Ask if anyone has any questions about anything covered in this unit**

Transition to the next unit by explaining that Unit 6 will cover the integrating the results of the ATM into HURREVAC. Note that it will also include an exercise to test the participants' ability to identify how to make adjustments within HURREVAC.

**Announce a 10 minute break**

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**Unit 6: Using ATM clearance time results in  
HURREVAC**

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**Objectives**

At the end of this unit, the participants should be able to:

Integrate results from the ATM into the HURREVAC Program to determine the timing of initiating hurricane evacuations in relation to forecast tropical storm wind arrival times.

**Scope**

- Unit Introduction
- Unit Objectives
- Direct to Point (DTP) Evacuation Timing Assumptions
- Closest Point of Approach (CPA) Evacuation Timing Assumptions
- Decision Arc Evacuation Timing Assumptions
- EXERCISE VII
- Unit Capstone Quiz
- Summary

**Methodology**

The instructors will introduce the unit by displaying a visual outlining the unit objectives.

After reviewing the unit objectives, the instructors will go through the slides for each unit topic. At the end of each unit topic, the instructors will ask the participants if they have any questions.

After covering the DTP and CPA evacuation timing methodologies as well as Decision Arcs, the instructors will introduce Exercise II, which will test the participants' ability to integrate results from the ATM into HURREVAC.

Since this is an exercise, rather than a demonstration, the participants will be expected to navigate the ATM to answer the proposed questions on their own. The instructors will monitor the participant progress and will provide direct instruction to individual participants if they encounter difficulties navigating the ATM or working through specific elements of the exercise.

Once the exercise has been completed, the answers and interpretations will be reviewed. After this review is completed, the instructors will administer the unit capstone quiz.

After the quiz has been completed, the instructors will go over the correct answers and discuss and questions that the participants may have. After answering these questions, the instructors will summarize the key points from the unit and transition to Unit 7.

## Time Plan

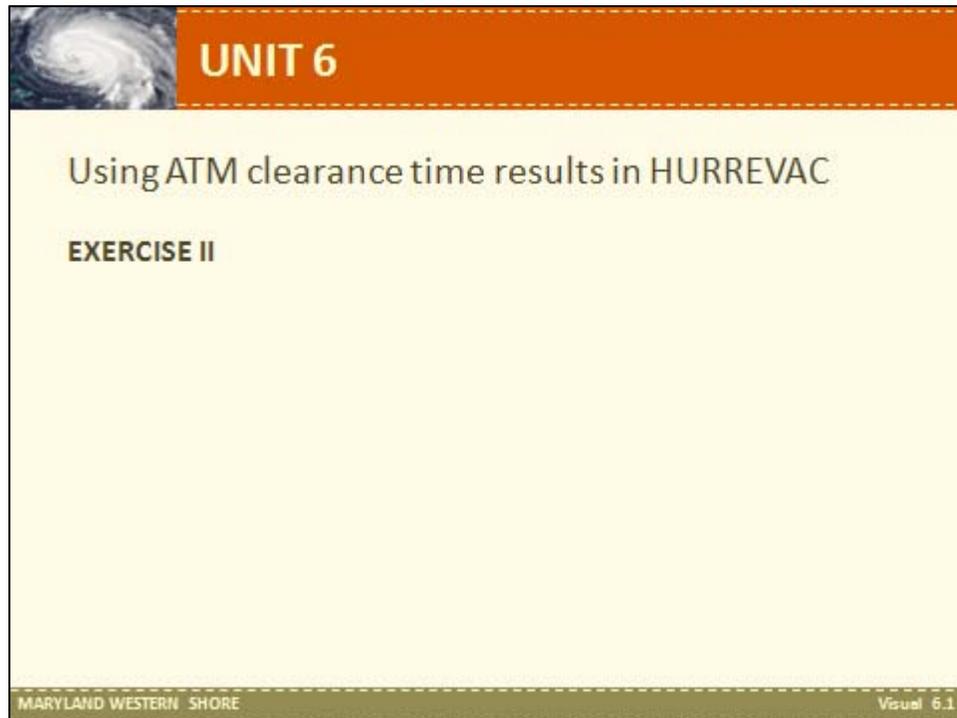
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Unit Objectives	5 minutes
Direct to Point (DTP) Evacuation Timing Assumptions	5 minutes
Closest Point of Approach (CPA) Evacuation Timing Assumptions	5 minutes
Decision Arc Evacuation Timing Assumptions	10 minutes
EXERCISE II	10 minutes
Unit Capstone Quiz	5 minutes
Summary	5 minutes
<b>Total Time</b>	<b>45 minutes</b>

**Topic: Unit Introduction**

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**Visual 6.1**



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**Instructors Notes**

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Explain that Unit 6 provides a discussion of how to use the clearance time data from the ATM to develop evacuation timing decisions using HURREVAC. The next visual will outline the objectives for this unit.

**Opening Activities:**

Ask for a show of hands of individuals who have used HURREVAC to make evacuation decisions in response to an approaching tropical cyclone. Discuss how the clearance time results from the ATM can be used to establish the amount of time needed to conduct an evacuation before the arrival time of tropical storm force winds.

To begin the unit, ask the participants to raise their hands in response to the following questions:

- What factors may have an influence on which clearance times are used in determining the time to start an evacuation with HURREVAC?
- What situational occurrences might require the addition or subtraction of time from the ATM clearance times when determining evacuation start times?
- What are the different methods to calculate the time remaining before the arrival of tropical storm force winds?

Explain that the exercise will allow the participants to work with the ATM and the Consequence Management module as it relates to these and other questions.

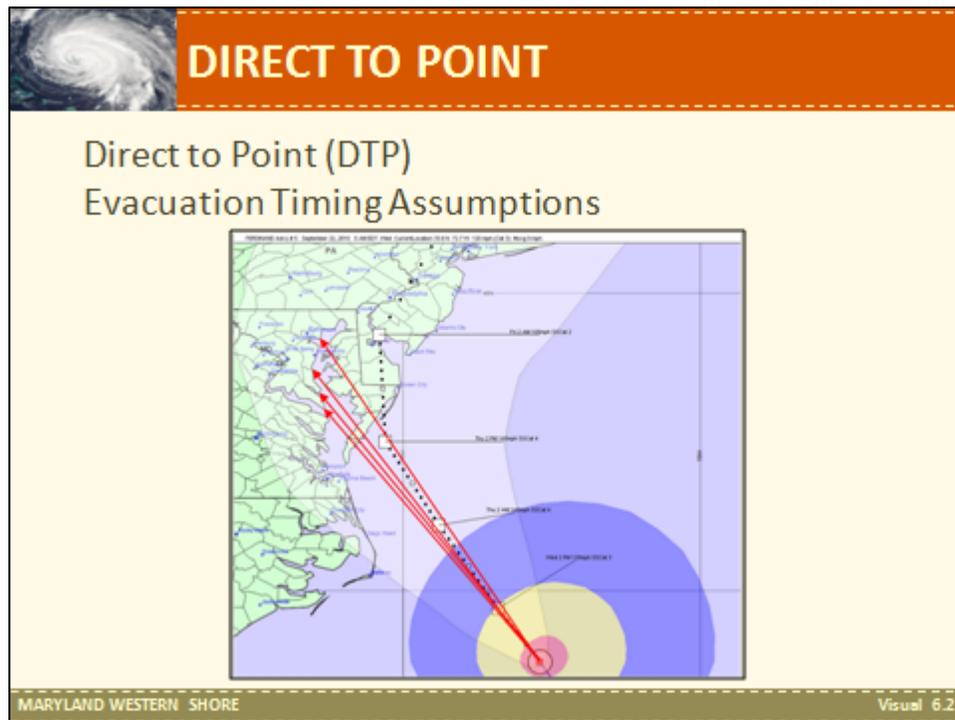
Review the unit objectives with the group. Tell the participants that by the end of this unit, they should be able to:

- Determine in HURREVAC the time remaining before the forecast arrival of tropical storm force winds
- Calculate when to start an evacuation using the ATM clearance time figures versus the forecast arrival time of tropical storm force winds using a direct to point assumption for the storm's approach.
- Establish the time to start an evacuation using the ATM clearance time figures based on a closest point of approach assumption for the storm's forecast track.
- Understand how to use HURREVAC to determine whether additional time will be required from the calculated start time to safely complete an evacuation.
- Use the various decision making tools in HURREVAC to establish possible evacuation start times given different assumptions relative to storm scenario and situational factors.

## Topic: Direct to Point (DTP) Evacuation Timing Assumptions

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### Visual 6.2



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### Instructors Notes

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Using the above slide (Visual 6.2) the instructor will explain the assumptions that characterize the direct to point methodology for calculating evacuation start times. Explain that the direct to point assumption for the approach timing of the hurricane is the most appropriate for communities inside or nearby the average forecast error cone. The direct to point methodology:

- Is the most appropriate approach assumption for any community inside the average forecast error cone and the associated wind ranges.
- Assumes that a tropical cyclone will move in a direct path to the jurisdiction of interest, rather than along the forecast track provided in the advisory.
- Maintains that the hourly forecast forward speed of the tropical cyclone will remain consistent with the advisory data.

- Gives the least amount to the jurisdiction of interest to prepare and execute an evacuation plan before the forecast arrival of tropical storm force winds.

Open HURREVAC 2010, also directing the class participants to do the same, and using the following steps demonstrate how to use the Evacuation Timing function.

- Using Hurricane Ferdinand from the **Exercise** folder in the **Archives** tab, make that storm active by clicking on the storm file name itself.
- Turn on **Hourly Wind Ranges** and **120-Hour Error Swath** using the selections in the **Storm Features** heading in the **Report Menu**.
- Using the **Tool Bar** on the left side of the **Storm Map** click the **ADV** button with the down pointing arrow until Advisory #1 is displayed and allow the class to look at the image.
- In most cases the clearance times in HURREVAC are taken directly from the modeling done by the ATM and therefore those numbers should be the same for any scenario.
- In order to relate the clearance time against the time remaining before the forecast arrival of tropical storm force winds for a jurisdiction, click on the small plus by the heading **Evacuation Timing** under the bolded **Reports** category in the **Reports Menu**.
- Select by clicking directly on the word **single location** under the **Evacuation Timing** header within the **Reports Menu**, a menu box will appear with a list of all the reports available in HURREVAC and click on the **OK** button in the lower right hand corner.
- Another box will open up to allow the user to select a different scenario from the one established as the default by the program based on the advisory forecast intensity at CPA. Highlight the Anne Arundel County standard clearance time line, if is not already selected, by clicking on the heading itself inside the window and then click **Continue**.
- The single point Evacuation Timing table should replace the Map on the HURREVAC display and display the following table:

Explain to the class how to interpret the table, highlighting:

- Each hour over the 72-hour forecast period for advisory 1 is separated out, counting backward from the current advisory time to the 72-hour forecast location of the storm.
- The hours in green identify on the table the period, along the DTP straight line, which evacuations should be occurring based on the clearance time for that scenario.
- The hours shown in light blue, yellow and red in the table correspond to the time periods when tropical storm, 58 mile per hour and hurricane force or greater winds respectively could be prevalent in the selected jurisdiction, based on a direct line approach from the advisory's initial position to the community's closest point to the storm.

- The hours of daylight and darkness, along the right hand side, during which the evacuation may have to occur.

Using the same advisory, select **all locations** from the **Evacuation Timing** under the **Reports** header in the **Reports Menu**.

Explain to the class how to interpret the table, highlighting:

- Every county's direct to point clearance time is calculated and displayed on this table.
- **Decide** column is the hour which each county must begin its evacuation based on the scenario listed in the column **Cat/Occ/Re**, the clearance time in column labeled **Dur** and the straight line arrival time of tropical storm force winds in the column with the **>34kt(39)** heading.
- The Closest Point of Approach for each county (the nearest distance in each jurisdiction to the actual forecast track) and not the direct to point track, to the storm.

If while using the ATM, the user changes the hourly directional service volume, or some other important variable, which significantly alters the clearance time, the decision time can be recalculated by HURREVAC. Demonstrate and direct the class to:

- Expand the **Utilities** header in the **Reports Menu** and selecting **Set Evac Options**.
- Once the **Set Evac Options** window opens highlight the clearance time row for Monmouth County, choose 3 hours as the **Optional Safety Buffer** and click in the **Use** radio button beside the safety buffer window.
- Then click on **Apply To Selected** and **OK** to close the **Set Evac Options** window.
- Click on the small plus by the heading **Evacuation Timing** under the bolded **Reports** category in the **Reports Menu**.
- Select by clicking directly on the word **single location** under the **Evacuation Timing** header within the **Reports Menu**, a menu box will appear with a list of all the reports available in HURREVAC and click on the **OK** button in the lower right hand corner.
- Another box will open up to allow the user to select a different scenario from the one established as the default by the program based on the advisory forecast intensity at CPA. Highlight the Anne Arundel County with DelMarVa clearance time line, if is not already selected, by clicking on the heading itself inside the window and then click **Continue**.
- The single point Evacuation Timing table should replace the Map on the HURREVAC display and display the table.

Explain to the class how the difference from the earlier table by highlighting:

- Although the community and scenario are exactly the same, the duration time in the table shown in green is three hours longer from 17 to 20 hours.
- As a result of the additional buffer time added, the decision time has now been moved from 12 PM, 31 hours in the future, to 9 AM, which is in 28 hours from the time the advisory was issued.

Expand on the point by saying that if the ATM calculates that an additional three hours is needed to clear the ultimate constricting bottleneck in Anne Arundel County as a result of construction at that critical segment, this would be the means by which the DTP clearance timing could be expanded accordingly.

The maximum evacuation clearance buffer time allowed by HURREVAC is an additional 6 hours.

Another method to insert an ATM derived clearance time is to use the timeline function also included in HURREVAC. If a scenario or clearance time calculated by the ATM does not coincide with a clearance times established in the program, the user can use the DTP table to make evacuation decisions based on those figures.

Using HURREVAC, demonstrate and direct the class participants on how the program can be changed to use a different clearance time figure than the ones already included:

- Click on the **Reset** button along the top of the HURREVAC screen and when the **HURREVAC Setup Form** window opens click on the **Timeline** tab.
- Click on the 34 knot radio button to indicate the threshold to be used to make the determination.
- Enter the new clearance time from the ATM, - 10, into the **Time Offset** window of the **HURREVAC Setup Form**.
- In the **Action to be taken** window of the same form, type in the text ATM Clearance.
- Click on the **Add to List** button and then **Save** to lock the entry into the Timeline.

When the HURREVAC Setup Form closes, using advisory #1 show the procedure for using the timeline for evacuation decision making.

- Click on the **Reports** heading in the **Reports Menu** and click on the **single location** selection underneath.
- Click on the **OK** button at the lower right hand corner of the **Analysis / Reports** window and click on the Anne Arundel County Standard Scenario line in the **Selection and Evacuation Type** window.

- When the **Direct Hit** timing window opens, click on the **Timeline** button and the ATM clearance time entered in the **Timeline** tab of the **HURREVAC Setup Form** will appear at the 10 hour increment of the hour by hour timeline.

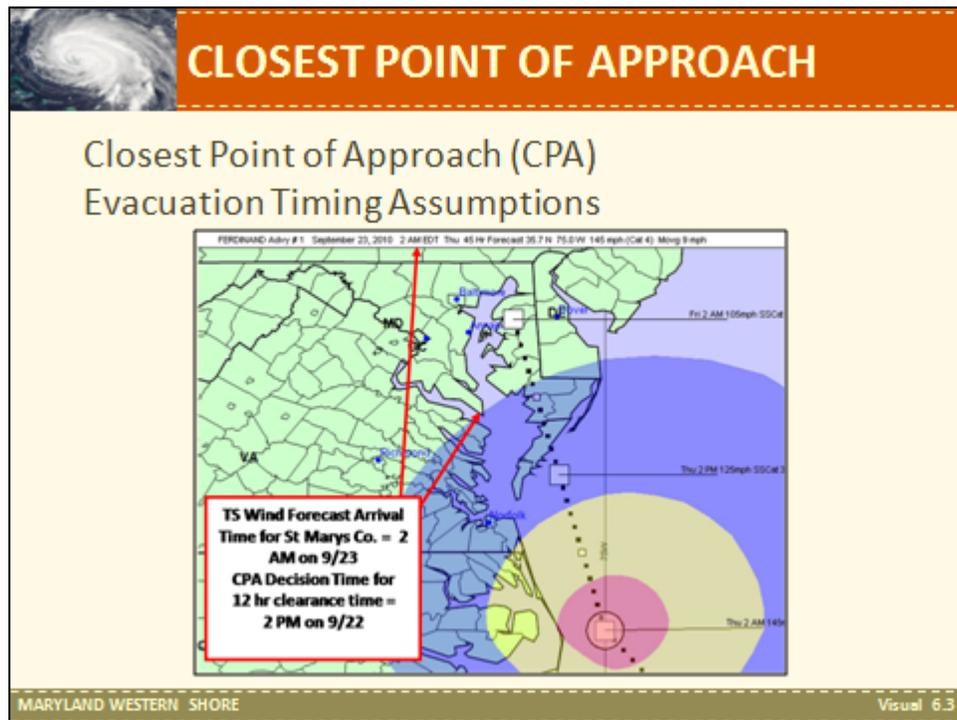
Point out the 10 hour timeline insert, in white, into the green clearance time portion of the timeline.

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**Topic: Closest Point of Approach (CPA) Evacuation Timing Assumptions**

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Visual 6.3



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**Instructors Notes**

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Using the above slide, the instructor will inform the participants that there is another way to look at the evacuation timing picture. That assumption is the storm will indeed follow the forecast track and that the arrival time of tropical storm force winds will coincide exactly with the data in the advisory. This assumption relative to evacuation timing is called the Closest Point of Approach.

HURREVAC has a function which allows the user to move the storm at hourly increments along the forecast track of a particular advisory. Therefore to see what time the tropical storm force winds are forecast to arrive at a community, all one has to do is advance the storm along the forecast track until the forward edge of the blue filled tropical storm wind range ellipse touches the coast or boundary of the jurisdiction.

Once the forecast arrival time of tropical storm force winds has been determined, the user can back off the ATM clearance time. As an example, if the forecast arrival time is 2 AM and the

ATM clearance time for the situation is 12 hours, then the evacuation should begin at 2 PM the previous day.

In HURREVAC, the user can back the storm off the time that the tropical storm wind ellipse touches the jurisdiction counting the number of hours needed to conduct an evacuation, or the clearance time, from the ATM. This procedure allows the program to do the math in determining the time to begin an evacuation

This method is cumbersome, especially in the case of clearance times that span many hours to multiple days. Fortunately, the HURREVAC program includes a process to simplify determining the evacuation start time using the Closest Point of Approach assumption.

With the above slide indicate the major problem with using the CPA for evacuation timing decisions is:

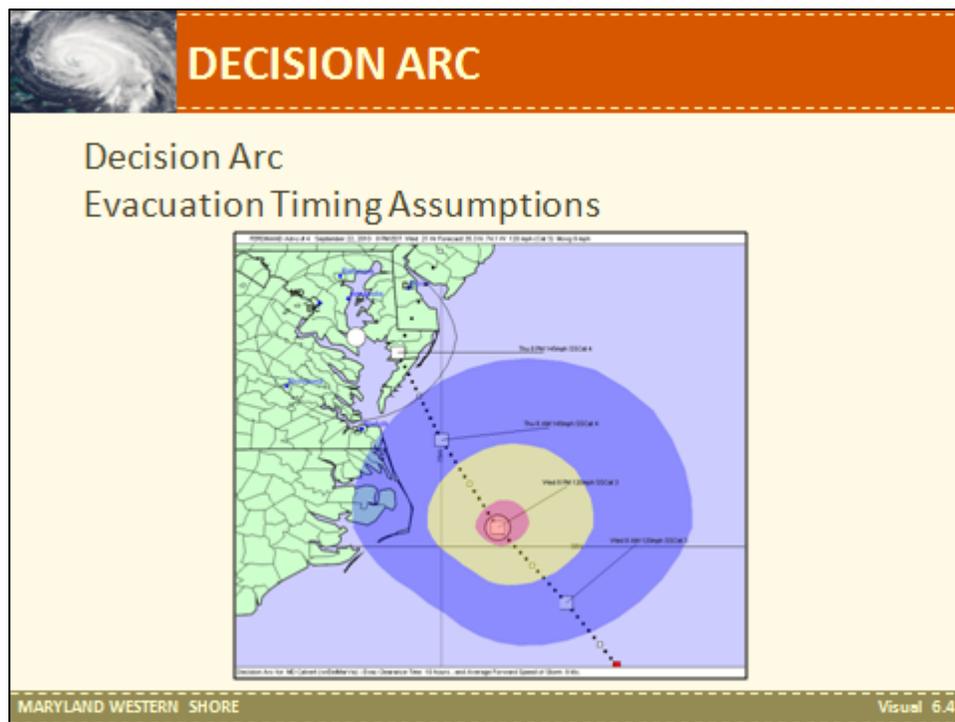
- The further a jurisdiction is away from the forecast track, the less accurate the potential arrival time of tropical storm force winds. The greater the distance of the closest point of approach from a community, the greater the inaccuracy relative to when the winds could arrive at a community.
- Hurricanes with relatively small, or irregularly shaped, tropical storm wind ellipses may not touch a community at all, especially if those locations are on the periphery of the average forecast error cone or just outside it. The storm could easily make landfall at any community within the average forecast error cone, but still may not be forecast to receive tropical storm force winds if the storm were to stay on the forecast track.
- Usually the CPA decision time will be after the DTP time, except in cases where those two assumptions are very close together. Therefore, the greater the CPA distance for a community, the larger the disparity between the decision times developed by the two methodologies.

Next, indicate that an easier method exists for calculating the evacuation start decision time using the CPA approach described here. This function in HURREVAC uses the evacuation clearance times from the ATM to determine when an evacuation should begin.

## Topic: Decision Arc Evacuation Timing Assumptions

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### Visual 6.4



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### Instructors Notes

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With Visual 6.4, begin by explaining that the Decision Arc method for determining when to start an evacuation is based on the premise that, unlike the DTP assumption above, the storm will remain on the forecast track as it approaches a community.

This methodology for determining the evacuation start time uses the clearance time and the forward speed of the storm to determine how far out from landfall the decision must be made in order to insure that all vehicles are allowed to get through the most constricted bottleneck in the community.

The clearance time is multiplied by the forward speed of the storm to determine the radius of the Decision Arc.

Use this simplified example:

Clearance Time = 10 Hours

Forward Speed of the Storm = 10 MPH

Decision Arc Radius = 100 Miles from the closest point of the community to the eye of the storm

This means that for each of the 10 hours needed to clear the most critical evacuation bottleneck in the community, the hurricane eye will get closer by ten miles.

Once the Decision Arc radius is determined using the simple equation above, HURREVAC will display that circle from the closest point of a community to the eye of the hurricane. The user will then advance the storm along the forecast track hour by hour until the forward edge of the tropical storm wind ellipse touches the Decision Arc. That instance determines at what time the evacuation must begin in order to complete the evacuation in the allotted clearance time.

In the HURREVAC 2010 program, direct the class to employ the following steps in displaying and using the Decision Arc for determining when to begin an evacuation.

- Using Ferdinand advisory #4, and the map still displaying the average forecast error cone and initial position wind ranges, click on the **Utilities** function in the **Reports Menu**.
- Click on the small box next to the header **Decision Arc** to expand that selection.
- Click in the **Decision Arc Toggle** box to turn the function on.
- Select **Arc Setup** by clicking directly on the word, and the **Select Location and Evacuation Type** window will appear in the middle of the **Storm Map**.
- If not already selected, scroll and click on the row labeled MD Calvert w/DelMarVa Evacuation Times.
- Click on the **Continue** button and the window will disappear and the **Decision Arc** will display on the **Storm Map**.

Pause to allow the class participants an opportunity to see the Decision Arc displayed in HURREVAC.

- Click repeatedly on the **Move Storm Ahead 1 Hr** button on the **Tool Bar** to move the hurricane eye and forecast windfields along the forecast track in hourly increments.
- Stop advancing the storm when the outside edge of the tropical storm wind range touches or is about to make contact with the Decision Arc circle.

Direct the class participants to look at the information banner at the top of the Storm Map and highlight the following.

- The date and time of the storm with the eye at the displayed location along the forecast track (Wednesday, September 22, 2010 at 8 PM).
- That it is the 21 hour forecast position.
- That the storm is forecast to be a category 3, but forecast to intensify to cat 4.
- The forward speed of the storm is 9 MPH.

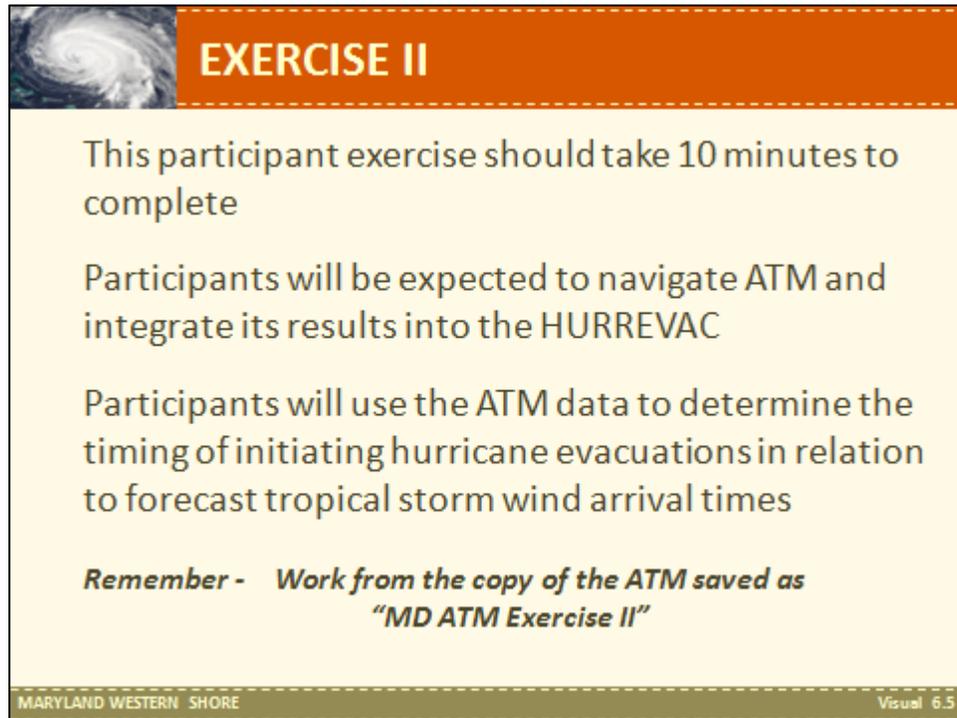
Direct the class participants to look at the information banner at the bottom of the Storm Map and highlight the following:

- That the evacuation clearance time for Calvert County with DelMarVa traffic was used.
- The clearance time used to calculate the radius of the Decision Arc was 10 hours.
- The forecast forward speed of the hurricane used for the Decision Arc is 8 knots.

Point out that HURREVAC uses the highest hourly forward speed from the initial position to the closest point of approach to the community in computing the Decision Arc radius. So if the hurricane is forecast to speed up before landfall, the higher number will be used to determine the Decision Arc radius.

Also point out that as the storm moves in relation to the community, HURREVAC will automatically shift the reference point to a different location in the community to ensure it uses the CPA as the center of the Decision Arc circle.

**Visual 6.5**



**EXERCISE II**

This participant exercise should take 10 minutes to complete

Participants will be expected to navigate ATM and integrate its results into the HURREVAC

Participants will use the ATM data to determine the timing of initiating hurricane evacuations in relation to forecast tropical storm wind arrival times

*Remember - Work from the copy of the ATM saved as "MD ATM Exercise II"*

MARYLAND WESTERN SHORE Visual 6.5

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**Instructors Notes**

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The instructor will inform the participants that this exercise is an opportunity for them to fully demonstrate their skill in using HURREVAC to develop evacuation decision times based on the clearance times provided by the ATM.

**This is an exercise, not a demonstration and the full 10 minutes will be required to complete the essential elements. Participants will be expected to navigate HURREVAC to answer the proposed questions on their own.**

The instructors will monitor the participant progress and will provide direct instruction to individual participants if they encounter difficulties navigating the ATM or working through specific elements of the exercise.

Remind participants that they should have opened HURREVAC and loaded Hurricane Ferdinand from the Archives folder as the active storm.

The instructor will read the following scenario to the participants.

**Part 1:** This part of the exercise will test your ability to use HURREVAC to determine when your community must begin an evacuation in order to ensure all vehicles have cleared the most critical bottleneck before the forecast arrival of tropical storm force winds.

**Inject:** It is September 21 at 11 PM and an advisory has just been issued. Hurricane Ferdinand is approaching the shores of the Mid-Atlantic States as a category 3 hurricane. The forecast has the hurricane intensifying to a category 4 before it makes landfall with sustained winds increasing from 120 to 145 MPH before landfall.

You are an emergency manager with the Maryland Emergency Management Agency. The entire Maryland coastline is in the average forecast error cone and some of your communities are getting close to having to make their decisions to initiate their evacuations.

In order to assist the communities along the coast with their evacuation decisions you have been asked to determine what time evacuations need to be started for all communities in the average forecast error cone.

Answer the following questions by navigating through the HURREVAC program and interpreting the results for the 11 PM, September 21<sup>st</sup> advisory.

Question 1.1:

**Which county from the Western Shore will need to start their evacuation first, based on the default forecast intensity selected by HURREVAC for the DTP assumption, and at what time?**

*Answer 1.1: Refer to the **all locations** table from the **Evacuation Timing** selection in the **Reports Menu**, using the **Buffer Time** function in the **Select Evacuation Options** window to find Anne Arundel County with DelMarVa traffic must evacuate first.*

Question 1.2:

**Based on the DTP clearance time table how much time does the ATM indicate will be needed to safely evacuate all the community's vulnerable residents, and at what date and time should the evacuation begin for that community?**

*Answer 1.2: In the same table, Calvert's ATM clearance time is 20 hours which means the evacuation should be started no later than 10 AM, Sept 22, 2010.*

Question 1.3:

**What other county on the Maryland Western Shore is next in having to make its decision to evacuate, based on the ATM clearance times in HURREVAC, and at what time should they begin?**

*Answer 1.3: In the same table, Calvert appears as the next county needing to decide whether to evacuate and their decision time is 6 PM on the same day as Anne Arundel County's.*

**Part 2: This part of the exercise will test your ability to modify input the clearance time data in HURREVAC in accordance with new data from the ATM and interpret the results.**

**Inject:** After providing the information to your superiors, you were informed that some construction issues on US 50 westbound will have a negative impact on the critical link for Anne Arundel County, and hence its clearance times. After running the ATM you discover that an additional 4 hours above the regular Cat 4 default clearance time will be needed to conduct the evacuation.

Question 2.1

**Given the additional time needed to conduct the evacuation for Cape May County, at what time should the evacuation start?**

*Answer 2.1: Using the **Utilities/Set Evac Options** menu, add six hours to the default scenario clearance time using the **Safety Buffer**, then refer to the **Evacuation Timing/all locations** table from the **Reports Menu** to find **Cape May** must evacuate starting at 7 AM.*

Question 2.2

**How many hours from the current advisory issuance period does Cape May County have to complete setting up and make the decision to evacuate?**

*Answer 2.2: Using the **Evacuation Timing/single location** table from the **Reports Menu** you can graphically see that only eight hours remain before the evacuation must start.*

**Part 3: This part of the exercise will test your ability to use the HURREVAC Timeline function to determine evacuation start times from new clearance time data developed by the ATM, rather than pre-loaded clearance times.**

**Inject:** As the emergency management director of Baltimore County, you are looking at the 5 AM Hurricane Ferdinand advisory issued on September 22<sup>nd</sup>. Using the ATM, you calculate that very low participation rates among your coastal and mobile residents will reduce your cat 4 clearance times in HURREVAC to 7 hours, rather than 10 hours.

Answer the following questions by navigating through and interpreting the data in HURREVAC using the DTP evacuation timing decision support tables.

### Question 3

**At what time should the evacuation begin for Baltimore County based on the current advisory and new evacuation scenario of 7 hours and is this a good time to initiate an evacuation?**

*Answer 3: Using the **Evacuation Timing/single location** table from the **Reports Menu** and the **Timeline** function, Baltimore Co. should begin their evacuation no later than 2 AM on September 23rd, which is a very poor time to begin evacuating. If the evacuation started at this time, most vulnerable residents and visitors would be asleep and news and notification of the evacuation order would be too late to make the evening or nightly news. Recommend that the clearance time be initiated in the early evening hours so that a portion of the evacuation can take place during daylight hours.*

**Part 4: This part of the exercise will test your ability to conduct the same clearance time analysis for another advisory and using other evacuation scenarios.**

**Inject:** At 5 PM on September 22nd the National Hurricane Center has just issued another advisory which includes further adjustments to the forecast track. While serving in the Maryland State EOC you receive a call from the Harford County emergency management director seeking advice on when they should consider starting their evacuations. The director also informs you that they are considering evacuating to a category three because the storm would probably degrade as it traverses the DelMarVa Peninsula.

Answer the following questions by navigating through and interpreting the data in HURREVAC using the DTP evacuation timing decision support tables.

### Question 4.1

**At what time should the evacuation begin for Harford County based on the current advisory and a cat 3, medium response, medium tourist occupancy scenario and how many hours in the future should the evacuation begin?**

*Answer 4.1: Using the **Evacuation Timing/single location** table from the **Reports Menu**, Harford Co. should begin their evacuation no later than 5 AM the next morning, on September 23rd, or in 12 hours.*

### Question 4.2

**Would this be a good time to start an evacuation?**

**What would be your recommendation to the Hudson County EM director relative to when the community might consider issuing an evacuation order?**

*Answer 4.2: It is an advantageous time to begin an evacuation in that it gives local officials the opportunity to notify and mobilize vulnerable populations to start evacuating before people have begun their normal workday routine. Nonetheless, it would be very beneficial to forewarn potential evacuees as soon as possible and prepare them for the possibility an evacuation first thing in the morning.*

**Part 5: This part of the exercise will test your ability to use the CPA approach in HURREVAC to determine the forecast arrival time of tropical storm force winds for evacuation decision making.**

**Inject:** It is 11 PM on September 22nd and the outer bands of Ferdinand are just off the coast of Chincoteague, VA. The NHC is confident at this point that the storm will make landfall in the vicinity of Delaware Bay and will re-curve toward the northeast before it reaches the Chesapeake Bay. At that time the director of Charles County emergency management office calls to discuss his primary concerns regarding the protective actions for the mobile home population in his community and the fact that the participation rate in the category 1 evacuation areas could be very low.

He asks for your advice on when he should begin to conduct his evacuation in his county given the variables input into the ATM relative to the situation. Their new clearance time is only 4 hours, significantly less than their posted clearance times. He wants to know if he has enough time to conduct the evacuation between the 5 AM advisory the next morning and the forecast arrival of tropical storm force winds,

Answer the following questions by working with and interpreting the data in HURREVAC.

**Question 5**

**With a newly computed 4 hour clearance time from the ATM, when should they begin their limited evacuation based on the forecast track of the storm?**

*Answer 4: Using the **Storm Map** in HURREVAC, advance the storm along the forecast track until the tropical storm wind ellipse touches the nearest edge of Charles County at 9 AM on September 23, 2010; when the storm is backed up 4 hours from that point the resulting time will be 5 AM or in 6 hours.*

Part 6:       **This part of the exercise will test your ability to use the Decision Arc method in determining when to begin an evacuation based on a CPA assumption and clearance time data from the ATM.**

Inject:        It is still just after the 11 PM on September 22nd and you have just hung up the phone with Charles County. Baltimore City, given the NHC confidence in the recurve track forecast, has decided to conduct a limited evacuation involving just the cat 2 evacuation zones and mobile homes. The Baltimore City emergency management director is seeking advice on when he can start a limited evacuation of the cat 2 zones.

This situation when plugged into the ATM revealed that the clearance time will be 8 hours or synonymous with a cat 2 scenario, medium tourist occupancy and public response.

Answer the following questions by working with and interpreting the data in HURREVAC.

Question 6

**With newly computed data from the ATM which matches the clearance time for a category 2 scenario with medium tourist occupancy, as well as medium public response rates when should they begin their evacuation based on the forecast track of the storm?**

*Answer 6:     Using the **Decision Arc** function in HURREVAC, advance the storm along the forecast track until the tropical storm wind ellipse touches the nearest edge of the City of Baltimore's Decision Arc. For the 11 PM Advisory for September 22<sup>nd</sup>, the tropical storm wind ellipse and the decision arc touch at about 3 AM the next morning, September 23<sup>rd</sup>*

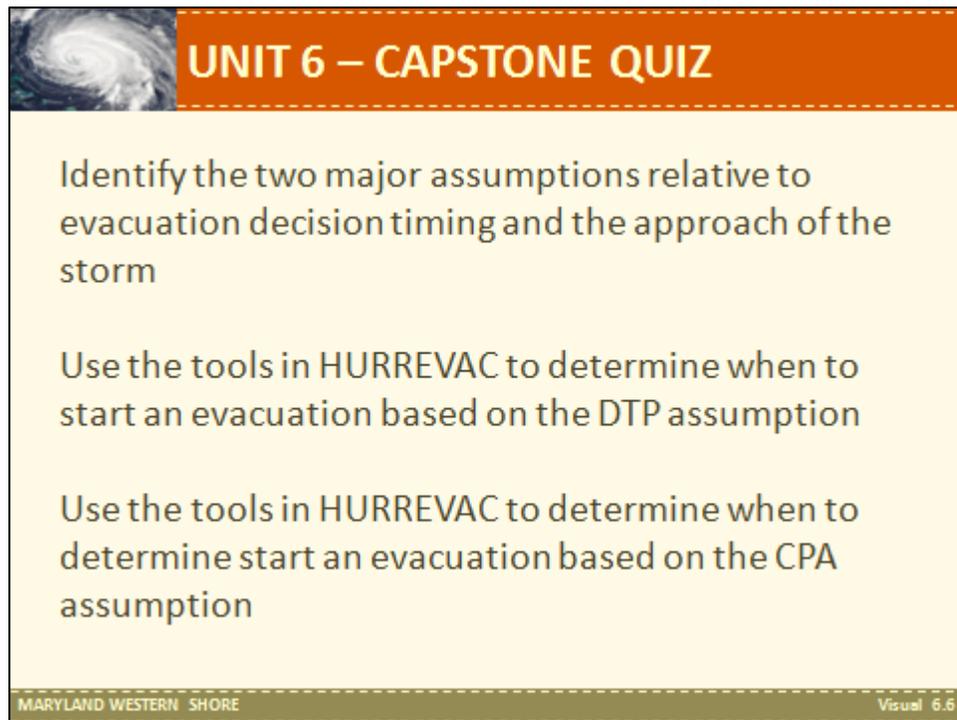
## EXERCISE CONCLUSION

The instructors will go over the answers to the questions posed by the exercise and answer any additional questions the participants may have.

**Topic: Unit Capstone Quiz**

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**Visual 6.6**

A presentation slide titled "UNIT 6 – CAPSTONE QUIZ". The slide has a yellow background with a blue header bar containing a satellite image of a hurricane and the title. The main content area lists three bullet points: "Identify the two major assumptions relative to evacuation decision timing and the approach of the storm", "Use the tools in HURREVAC to determine when to start an evacuation based on the DTP assumption", and "Use the tools in HURREVAC to determine when to start an evacuation based on the CPA assumption". The footer contains "MARYLAND WESTERN SHORE" on the left and "Visual 6.6" on the right.

**UNIT 6 – CAPSTONE QUIZ**

- Identify the two major assumptions relative to evacuation decision timing and the approach of the storm
- Use the tools in HURREVAC to determine when to start an evacuation based on the DTP assumption
- Use the tools in HURREVAC to determine when to start an evacuation based on the CPA assumption

MARYLAND WESTERN SHORE Visual 6.6

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**Instructors Notes**

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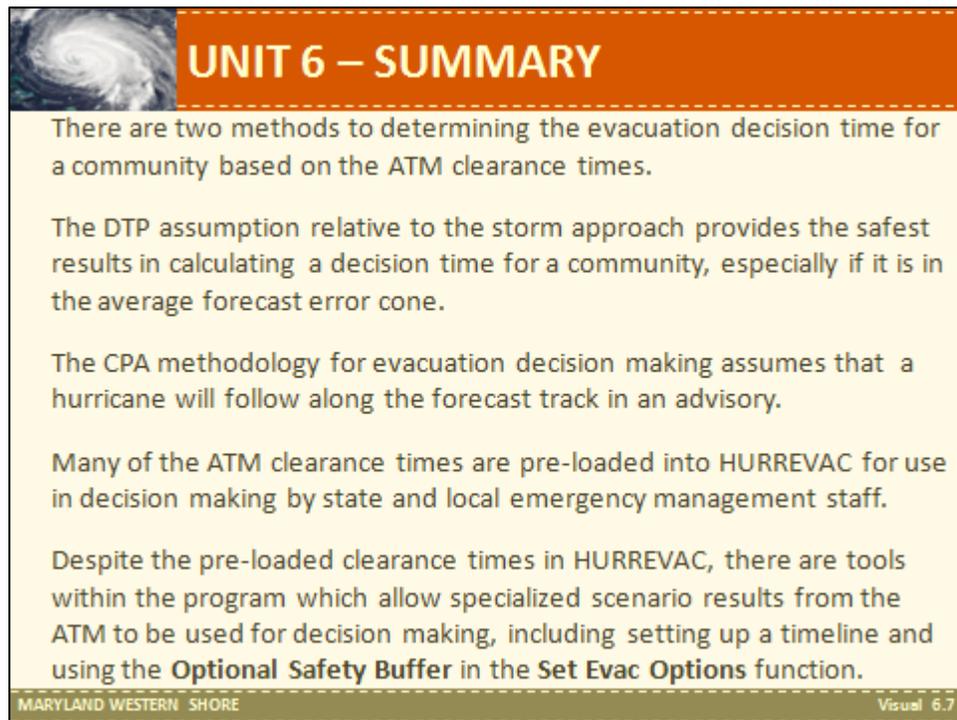
Ask participants if they can now:

Identify the two major assumptions relative to evacuation decision timing and the approach of the storm.

Use the tools in HURREVAC to determine when to start an evacuation based on the DTP assumption.

Use the tools in HURREVAC to determine when to start an evacuation based on the CPA assumption.

Visual 6.7



The slide features a satellite image of a hurricane in the top left corner. The title "UNIT 6 – SUMMARY" is displayed in white text on an orange background. The main content is presented in a light yellow box with a dashed orange border. At the bottom of the slide, there is a dark orange footer containing the text "MARYLAND WESTERN SHORE" on the left and "Visual 6.7" on the right.

**UNIT 6 – SUMMARY**

There are two methods to determining the evacuation decision time for a community based on the ATM clearance times.

The DTP assumption relative to the storm approach provides the safest results in calculating a decision time for a community, especially if it is in the average forecast error cone.

The CPA methodology for evacuation decision making assumes that a hurricane will follow along the forecast track in an advisory.

Many of the ATM clearance times are pre-loaded into HURREVAC for use in decision making by state and local emergency management staff.

Despite the pre-loaded clearance times in HURREVAC, there are tools within the program which allow specialized scenario results from the ATM to be used for decision making, including setting up a timeline and using the **Optional Safety Buffer** in the **Set Evac Options** function.

MARYLAND WESTERN SHORE Visual 6.7

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**Instructors Notes**

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Summarize this unit by reminding the group that:

- There are two methods to determining the evacuation decision time for a community based on the ATM clearance times.
- The DTP assumption relative to the storm approach provides the safest results in calculating a decision time for a community, especially if it is in the average forecast error cone.
- The CPA methodology for evacuation decision making assumes that a hurricane will follow along the forecast track in an advisory.
- Many of the ATM clearance times are pre-loaded into HURREVAC for use in decision making by state and local emergency management staff.
- Despite the pre-loaded clearance times in HURREVAC, there are tools within the program which allow specialized scenario results from the ATM to be used for decision making, including setting up a timeline and using the **Optional Safety Buffer** in the **Set Evac Options** function.



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## **Unit 7: Course Summary**

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**Objectives**

- Review Course materials
- Ensure that participants have a basic understanding of the use of the MD W SHORE ATM
- Ensure that participants understand how ATM results may be used in HURREVAC
- Provide opportunities for participant feedback

**Scope**

- Review of Unit Summaries
- Participant Observations
- Course Evaluation Procedures
- Closing Elements

**Methodology**

The instructors will start off the unit by stating the overall course objectives listed above. It is important to remind the participants that they are now trained in the use of the ATM, how its results integrate into HURREVAC. Inform them that they should now have sufficient training to train other users on the basic features of the ATM.

The instructor will move into the presentation by going through a review slide for each unit in the course. At the end of each unit topic, the instructors will ask the participants if they have any questions.

After covering the unit review, the instructors will open up the presentation to participant feedback including general observations and questions. After the participants have been given an opportunity to provide input, the instructors will move onto covering the formal course evaluation procedures

Once the course evaluation procedures have been presented, the instructors will go over some final review points and housekeeping issues before closing out the course.

**Time Plan**

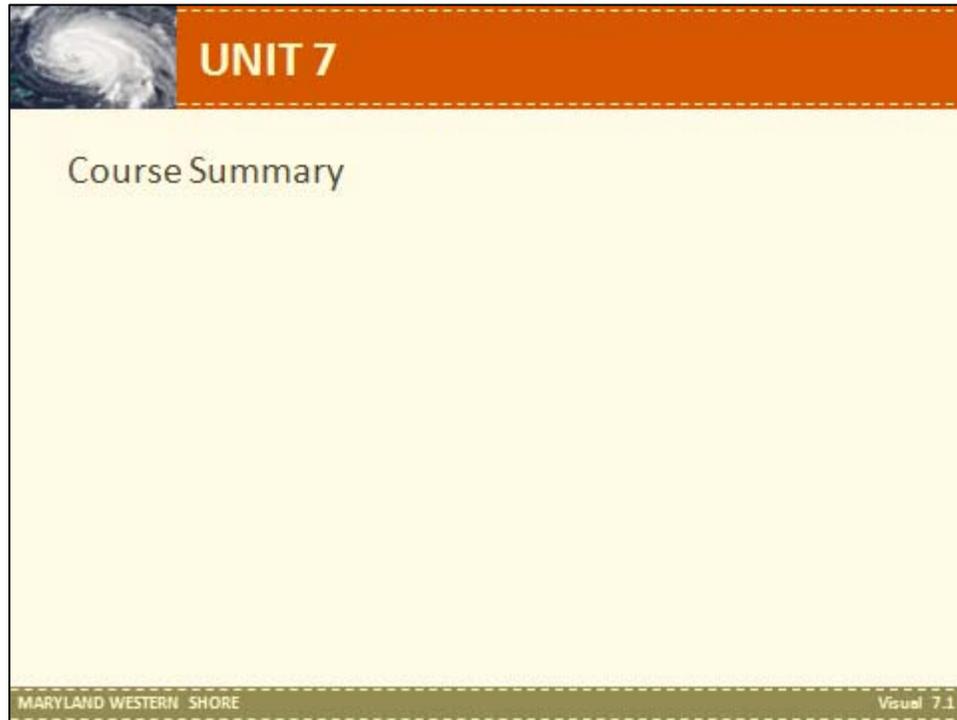
A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

<b>Topic</b>	<b>Time</b>
Review of Unit Summaries	10 minutes
Participant Observations	10 minutes
Course Evaluation Procedures	5 minutes
Closing Elements	5 minutes
<b>Total Time</b>	<b>30 minutes</b>

**Topic:       Review of Unit Summary**

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**Visual 7.1**



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**Instructors Notes**

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The instructors will inform the participants that in this final unit they will have the opportunity to review summary information presented in the main units of the transportation tools workshop.

The instructors will read through the following list of units that will be recapped

- Unit 2: Hurricane Evacuation Study Process
- Unit 3: Basic Features of the MD W SHORE ATM
- Unit 4: Data Entry Modules
- Unit 5: Data Results Modules
- Unit 6: HURREVAC Integration

The instructors will let the participants know they will have the opportunity to ask questions after each unit summary, as well as at the close of the presentation.

The instructors will let also the participants know they will have the opportunity to discuss the HES Tools as well as the course. Inform them that they will be asked to participate in a formal evaluation.

**Visual 7.2**

**REVIEW OF UNITS – UNIT 2**

The Draft 2009 MD Western Shore HES / TDR provides estimates of clearance times and includes an ATM

The seven steps in the evacuation modeling process include;

- Step 1: Establish Evacuation Zones
- Step 2: Establish Evacuation Roadway Network
- Step 3: Collect Demographic and Behavioral Data
- Step 4: Generate Evacuation Statistics
- Step 5: Distribute Evacuation Trips
- Step 6: Identify Vehicles by Roadway Segment
- Step 7: Calculate Clearance Times

Clearance time is the time between when the first person leaves their home until the last person reaches their destination. It includes mobilization time, travel time and queuing time delay. Evacuations must be completed prior to tropical storm force (39 mph) winds

MARYLAND WESTERN SHORE Visual 7.2

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**Instructors Notes**

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Review the following main points:

- The MD W Shore HES provides estimates of clearance times, an analysis of shelter demand and capacity, and includes a fully functional ATM
- The seven steps in the evacuation modeling process include; Step 1: Establish Evacuation Zones, Step 2: Establish Evacuation Roadway Network, Step 3: Collect Demographic and Behavioral Data, Step 4: Generate Evacuation Statistics, Step 5: Distribute Evacuation Trips, Step 6: Identify Vehicles by Roadway Segment, and Step 7: Calculate Clearance Times
- Clearance time is the time between when the first person leaves their home until the last person reaches their destination. It includes mobilization time, travel time and queuing time delay. Clearance times are based upon all evacuation movements completing prior to the onset of tropical storm force (39 mph) winds

## Topic: Review of Units – Unit 3

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### Visual 7.3

**REVIEW OF UNITS – UNIT 3**

The Excel-based platform is assessable and easy to use. The model provides reliable results and allows users to test different scenarios.

The six functional groupings of worksheets or modules include;

- Demographic Data Module** (8 jurisdictional worksheets - 7 counties, 1 city)
- Behavioral Data Module** (8 worksheets)
- Out Route Assignment Module** (9 worksheets - 8 jurisdictions, 1 summary sheet)
- Shelter Demand and Capacity Module** (8 worksheets)
- Evacuation Statistics Module** (8 worksheets)
- Evacuating Vehicles Module** (Vehicles by Road, Clearance Times, Results)

The clearance time table is consulted to identify the regional bottlenecks with the worst clearance times. If a significant portion of a County's evacuating traffic passes through this bottleneck, based on the data in the Out Route Assignment Module, that governing bottleneck will determine the county clearance time

MARYLAND WESTERN SHORE Visual 7.3

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### Instructors Notes

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Review the following main points:

- The Microsoft Excel platform is accessible (everyone has a copy), provides reliable results, is easy to update, and allows testing of new scenarios “on the fly” with negligible processing time
- The six functional modules or groupings of worksheets in the ATM include modules addressing socioeconomic data, behavioral data, out route assignment, evacuation statistics, evacuating vehicles and consequence management
- The clearance time table is consulted to identify the regional bottlenecks with the worst clearance times. If a significant portion of a County's evacuating traffic passes through this bottleneck, based on the data in the Out Route Assignment Module, that governing bottleneck will determine the county clearance time

**Visual 7.4**

**REVIEW OF UNITS – UNIT 4**

While the three primary data entry modules; Socioeconomic, Behavioral, and Out Route Assignment, can all be modified by users, the Socioeconomic Data would most likely be accessed to adjust for common changes such as population growth

The Clearance Time worksheet may be adjusted to account for changes in service volumes on critical roadway segments as well as for anticipated background traffic

MARYLAND WESTERN SHORE Visual 7.4

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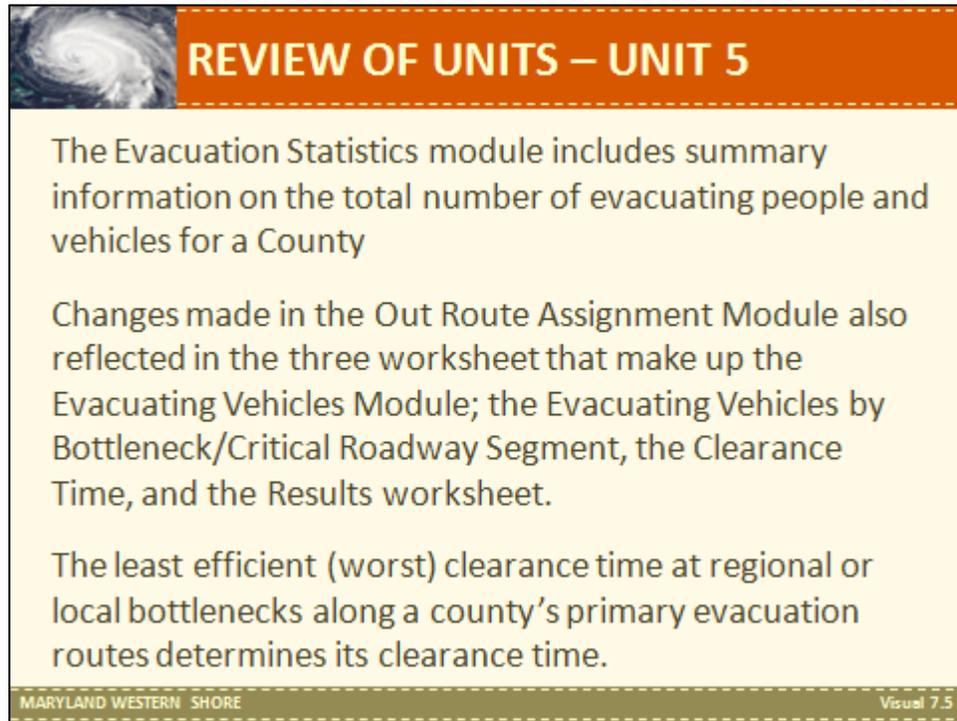
**Instructors Notes**

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Review the following main points:

- While the three primary data entry modules; Socioeconomic, Behavioral, and Out Route Assignment, can all be modified by users, the Socioeconomic Data module includes an easy to edit table to adjust for common changes such as population growth
- The Clearance Time worksheet may be adjusted to adjust for changes in service volumes on critical roadway segments as well as for changes in anticipated background traffic

**Visual 7.5**



**REVIEW OF UNITS – UNIT 5**

The Evacuation Statistics module includes summary information on the total number of evacuating people and vehicles for a County

Changes made in the Out Route Assignment Module also reflected in the three worksheet that make up the Evacuating Vehicles Module; the Evacuating Vehicles by Bottleneck/Critical Roadway Segment, the Clearance Time, and the Results worksheet.

The least efficient (worst) clearance time at regional or local bottlenecks along a county's primary evacuation routes determines its clearance time.

MARYLAND WESTERN SHORE Visual 7.5

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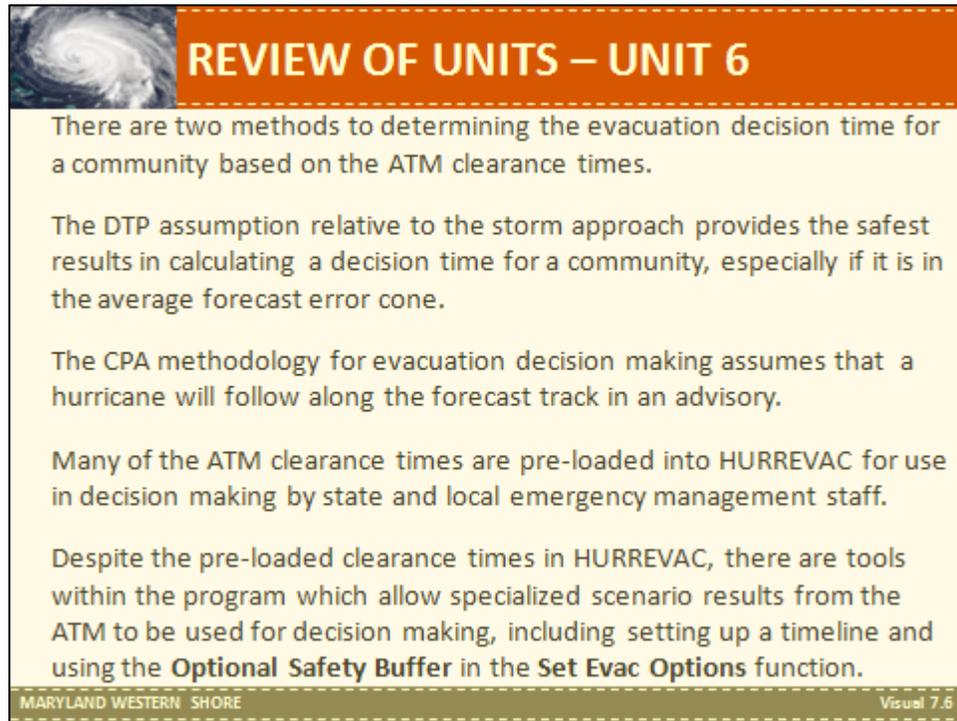
**Instructors Notes**

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Review the following main points:

- The Evacuation Statistics module includes summary information on the total number of evacuating people and vehicles for a County
- Changes made in the Out Route Assignment Module also reflected in the two worksheet that make up the Evacuating Vehicles Module; the Evacuating Vehicles by Bottleneck/Critical Roadway Segment worksheet and the Clearance Times worksheet.
- The least efficient (worst) clearance time at regional or local bottlenecks along a county's primary evacuation routes determines its clearance time.

**Visual 7.6**



**REVIEW OF UNITS – UNIT 6**

There are two methods to determining the evacuation decision time for a community based on the ATM clearance times.

The DTP assumption relative to the storm approach provides the safest results in calculating a decision time for a community, especially if it is in the average forecast error cone.

The CPA methodology for evacuation decision making assumes that a hurricane will follow along the forecast track in an advisory.

Many of the ATM clearance times are pre-loaded into HURREVAC for use in decision making by state and local emergency management staff.

Despite the pre-loaded clearance times in HURREVAC, there are tools within the program which allow specialized scenario results from the ATM to be used for decision making, including setting up a timeline and using the **Optional Safety Buffer** in the **Set Evac Options** function.

MARYLAND WESTERN SHORE Visual 7.6

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**Instructors Notes**

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Review the following main points:

- There are two methods to determining the evacuation decision time for a community based on the ATM clearance times.
- The DTP assumption relative to the storm approach provides the safest results in calculating a decision time for a community, especially if it is in the average forecast error cone.
- The CPA methodology for evacuation decision making assumes that a hurricane will follow along the forecast track in an advisory.
- Many of the ATM clearance times are pre-loaded into HURREVAC for use in decision making by state and local emergency management staff.
- Despite the pre-loaded clearance times in HURREVAC, there are tools within the program which allow specialized scenario results from the ATM to be used for decision making, including setting up a timeline and using the **Optional Safety Buffer** in the **Set Evac Options** function.

**Visual 7.7**



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**Instructors Notes**

Let the participants know that they will be completing a formal, web-based survey of the course in a few minutes. Inform them that they are being provided with an opportunity now to provide immediate feedback and to ask any remaining questions that they may have.

Instructors should guide the participants through the following questions:

- Did the course meet your objectives?
- Was the course structure well?
- Do you feel prepared to use the ATM?
- Do you understand how the results of the ATM integrate into HURREVAC?
- Can you train others in the use of the ATM?

**Visual 7.8**

**COURSE EVALUATION**

- Participant observations and feedback will be collected for inclusion in a Workshop Evaluation Report
- The course will be evaluated using the web-based evaluation tool, Survey Monkey
- Participants will be provided with a web link to complete the evaluation on line
- Instructors will prepare an evaluation report including a list of attendees, description of obstacle, keys to success and a compilation of evaluation survey results

MARYLAND WESTERN SHORE Visual 7.8

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**Instructors Notes**

The instructors will let the participants know that in order for their needs to continue to be met and for the ATM products and training to improve, it is essential that they take part in the course evaluation,

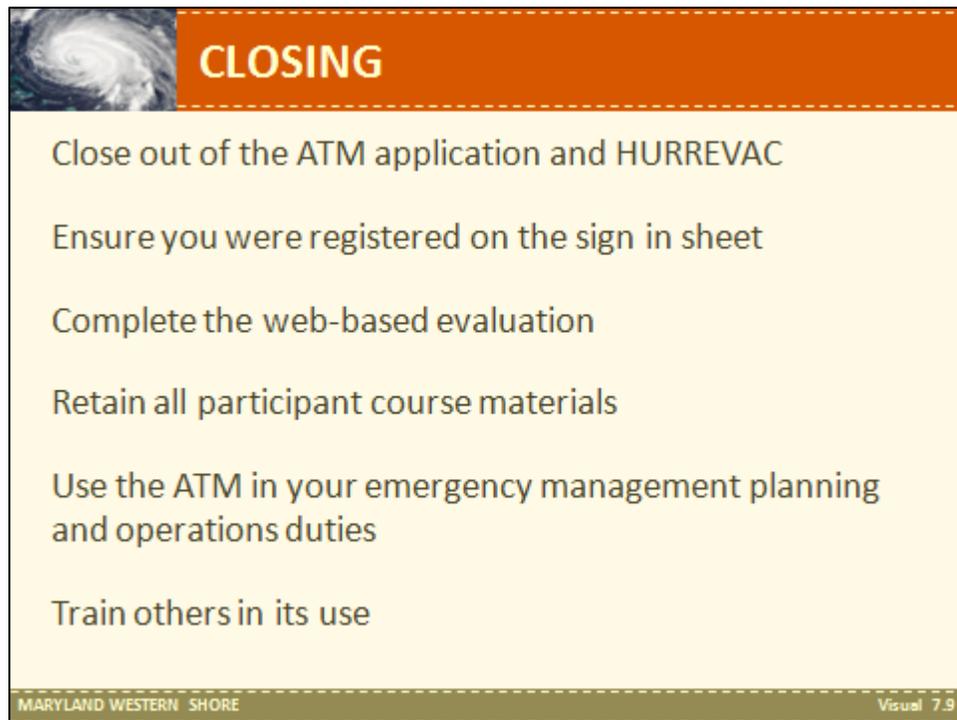
The instructors will let the participants know that their informal, verbal observations and feedback will be collected for inclusion in a Workshop Evaluation Report

The instructors will tell the participants that the course will be evaluated using the web-based evaluation tool, Survey Monkey, and that they will be provided with a web link to complete the evaluation on line.

The instructors will let the participants know that they will be preparing an evaluation report, which will include a list of attendees, description of obstacle, keys to success and a compilation of evaluation survey results.

**If the training room is web enabled, the participants will be directed to go online and complete the course evaluation survey.**

**Visual 7.9**



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**Instructors Notes**

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The instructors will go over the following housekeeping issues with the participants, reminding them to:

- Close out of the ATM application and HURREVAC
- Ensure you were registered on the sign in sheet
- Complete the web-based evaluation if not already done
- Retain all participant course materials

The instructors will urge the participants to:

- Use the ATM in your emergency management planning and operations duties
- Train others in its use

**The instructors will close by thanking the participants, the State, and the National Hurricane Program partners.**