



## Health, Safety and Environmental Management Pathway: **Motor Vehicle**

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### Problem-based Scenario Outline

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School Site: Patterson High School      Baltimore, MD

#### Pathway Knowledge and Skills and Performance Elements

##### **\*Transportation Operations:**

P01.1 Manage route and schedules to move people/goods to meet customer requirements

01.1.1, 01.1.2, 01.1.3, 01.1.4, 01.1.5, 01.1.6, 01.1.7

P01.2 Improve the performance of transportation to meet customer and business requirements

01.2.1

P01.3 Maintain the compliance of transportation operations with company policies and government laws and regulations

01.3.1, 01.3.3

##### **Performance Elements (required and Additional):**

- Obtain Federal Highway Administration history and mission statement
- Determine the regulatory codes for jurisdiction of bridge design
- Obtain history of Woodrow Wilson Bridge construction
- Explain how to analyze traffic congestion
- Explain traffic and transportation planning

**Title: Public Safety and Service on the Woodrow Wilson Bridge**

**Completion Time: 6 weeks**

**Problem Statement:** You are members of traffic management operations team for the Federal Highway Administration. Numerous complaints, as well as historical data, indicate patterns of traffic congestion on the Woodrow Wilson Bridge during peak and non-peak hours. You are to determine the causes(s) for the congested traffic, suggest and defend alternative solutions to alleviate the problem.

##### **Occupations and Related Job Titles (*Examples*):**

- Data Analyst
- Traffic Engineering
- Civil Engineering
- Community Planner
- Environmentalist

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**Business/Industry/Government Partner(s):**

Federal Highway Administration  
Maryland Division

Maryland State Highway Administration

Morgan State University  
National Transportation Center

Baltimore City Community College

Department of Public Works  
Transportation Safety Branch

**Student Product:** Written/Oral Report and Mock Plan

**Process:** Students will work individually and in workgroups. Mentor Guide readings, computer Internet and site visits will introduce student to the history of road building in the United States and the complexities of government regulation. Additionally, the tools and procedures utilized by traffic engineers and or planners to identify traffic congestion and produce solutions will be simulated and applied by students to develop strategies to eliminate congestion on the Woodrow Wilson Bridge. Students will complete projects in the time allotted.

**Required Materials and Resources:**

- Computers
  - ◆ Word processing and presentation software
- Traffic Survey Logs
- Environmental Studies
- Land Use Plans
- Codes and Laws
- Bridge Maintenance Logs
- Capital Improvement Plans

**School Cost and Resource Requirements (including costs to work sites):**

- Transportation (Bus) to work sites
- Computers Internet and CD ROM.
- Copier

- Transparencies Traffic Survey Logs
- Environmental Studies
- Land Use Plans
- Codes and Laws
- Bridge Maintenance Logs
- Capital Improvement Plans

**School Cost and Resource Requirements (including costs to work sites):**

- Transportation (Bus) to work sites
- Computers Internet and CD ROM.
- Copier
- Transparencies
- Estimated total Cost =?

**Suggested Assessment Approaches:** Student exercises, problems, quizzes and reports.

**Cluster Foundation Knowledge and Skills:**

**\*F2 Communications**

- F2.1 Read technical materials with understanding and fluency  
2.1.1, 2.1.2, 2.1.3
- F2.2 Compose written materials containing technical information  
2.2.1, 2.2.2
- F2.4 Present information Orally in formal and informal situations  
2.4.1, 2.4.2

**\*F3 Problem Solving and Critical Thinking**

- F3.1 Formulate and evaluate ideas, proposals, and solutions to problems  
3.1.1
- F3.2 Use structured problem-solving methods to improve the performance of organizational and technological systems  
3.2.1

**\*F4 Information Technology**

- F4.1 Use computers to process information  
4.1.2, 4.1.4
- F4.2 Use electronic communications networks  
4.2.2

**\*F5 Systems**

- F5.1 Demonstrate knowledge of TDL organizations and the TDL industry  
5.1.1, 5.1.2, 5.1.3, 5.1.4
- F5.2 Manage and improve organizational systems  
5.2., 5.2.3, 5.2.4

## **\*F6 Safety, health, and Environment**

F6.1 Demonstrate knowledge of safety, health and environment  
6.1.3, 6.1.4

## **\*F7 Leadership and Teamwork**

F7.1 Collaborate effectively in projects and work activities  
7.1.1

## **\*F10 Technical Skills**

F10.1 Demonstrate knowledge of technological systems  
10.1, 10.2, 10.3

## **Related Academic Skills**

### **Maryland Department of Education Content Standards:**

#### **Reading (Evaluation of Information Text)**

**1.12.6 (2)** Critique process, validity, and logic of arguments advanced in public documents

#### **Writing (Persuasive)**

**3.12.7 (1)** Write to persuade an intended audience by selecting a form that structures ideas, supports logic, clarifies and defends positions with precise evidence, and establishes a strategy to take action.

#### **Speaking (Oral Presentations)**

**6.12.2.9 (3)** Speak in a variety of situations choosing an organizational pattern appropriate to convey a message or theme.

#### **Scientific Inquiry (Connecting Technologies)**

**1.12.7** Collect, organize and display data in multiple ways that fit the context using appropriate instruments to effectively convey the information (e.g., calculators, spreadsheets, data bases and graphing programs).

**1.12.13** Critical Thinking - analyze the adequacy of the supporting evidence used to form conclusions, devise a plan, or solve a practical problem.

#### **Social Studies Skills (Geography, Economics, and Political Systems)**

**4.3.12.7** Evaluate the importance of transportation and communication as factors contributing to economic development.

**5.1.12.3** Evaluate how government must weigh anticipated marginal cost and marginal benefits of alternatives when making decisions

about issues of limited economic resources.

**6.1.12.1** Analyze the relationship between governmental authority and individual liberty.

**6.3.12.5** Describe the purposes and functions of independent regulatory agencies.

### **Mathematics (knowledge of Algebra, Patterns and Functions)**

**1.12.1b** Represent patterns, and/or functional relationships in a table, as a graph, and/or by mathematical expression.

**4.12.3a** Make informed decisions and predictions based upon the results of simulations and data from research.

**4.12.4** Use the measures of central tendency and/or variability (mean, median, mode, range, interquartile range, and quartile) to make informed decisions.

### **Module Plan**

## **MODULE 1: Overview of Risk Management Health and Safety**

### **Module Objectives:**

- To explain transportation risk management.
- To determine transportation relationship to economics and health.
- To explain transportation modality.

### **Performance Elements: (Reference Book)**

- F2.1.1, 2.1.2, 2.1.3
- F2.2.1, 2.2.2
- F2.4.1, 2.4.2
- F5.1.3, 5.1.4
- F5.2.4
- F6.1.1, 6.1.2

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6, 4.3.12.7

**Approaches:** Written/Oral

## **MODULE 2: History and Mission of Federal Highway Administration (FHWA)**

### **Module Objectives:**

- To compare public roads between the years 1800 – 2003.
- To explain role of FHWA.
- To compare Federal and State role.

**Performance Elements: (Reference Book)**

- F2.1.1, 2.1.2, 2.1.3
- F6.1.3, 6.1.4
- F5.1.1, 5.1.2, 5.1.3, 5.1.4
- F6.1.3, 6.1.4
- F7.1.1

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6, 3.12.7, 6.1.12.1, 6.3.12.5

**Approaches:** Written/Oral

**Module 3: Bridge Jurisdiction, Design and Codes**

**Module Objectives:**

- To examine standards for designing bridges.
- To explain Federal and State Codes.
- To understand complex issue of jurisdiction.

**Performance Elements; (Reference Book)**

- F2.1.2, 2.1.2, 2.1.3
- F2.1.1, 2.1.2
- F2.4.1, 2.4.2
- F5.1.1, 5.1.2, 5.1.3, 5.1.4
- F6.1.3, 6.1.4
- F7.1.1

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6, 3.12.7, 6.1.12.1, 6.3.12.5

**Approaches:** Written/Oral

**Module 4: Woodrow Wilson Bridge History**

**Module Objectives:**

- To explain public and political policy issues.
- To compare the Woodrow Wilson Bridge plan before and after 2000.
- To understand the concept of cost (benefit, effectiveness, and efficiency).

**Performance Elements: (Reference Book)**

- F2.1.1, 2.1.2, 2.1.3
- F2.2.1, 2.2.2
- F3.1.1

- F4.2.2
- F5.1.1, 5.1.2, 5.1.3, 5.1.4
- F7.1.1

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6, 1.12.1(b), 3.12.7, 4.3.12.7, 5.1.12.3, 6.1.12.1

**Approaches:** Written/Oral

## **Module 5: Congestion, Mitigation and Management**

### **Module Objectives:**

- To understand science of traffic flow.
- To apply the tools to measure traffic volume and congestion thresholds.

### **Performance Elements: (Reference Book)**

- F2.1.1, 2.1.2, 2.1.3
- F2.2.1, 2.2.2
- F2.4.1, 2.4.2
- F3.1.1, 3.1.2
- F4.2.2
- F6.1.3, 6.1.4
- F7.1.1
- F10.1, 10.2, 10.3

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6(2), 4.12.3a

**Approaches:** Written/Oral

## **Module 6: Data Collection**

### **Module Objectives:**

- To understand usage of data for planning.
- To understand the planning process and land usage.
- To understand Capital Improvement.

### **Performance Elements: (Reference Book)**

- F3.1.1, 3.2.1
- F4.1.2, 4.1.4,
- F4.2.2
- F6.1.3, 6.1.4
- F7.1.1

- F10.1, 10.2, 10.3

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6(2), 3.12.7(1), 1.12.13, 6.1.12.1

**Approaches:** Written/Oral

## **Module 7: Student Work Session**

### **Module Objectives:**

- To simulate traffic operations management team.
- To select site locations to apply methods.
- To summarize and draw conclusion for Woodrow Wilson Bridge study.

### **Performance Elements: (Reference Book)**

- F2.1.1, 2.2.2
- F3.1.1, 3.2.1
- F4.1.2, 4.1.4, 4.2.2
- F5.1.1, 5.1.2, 5.1.3, 5.1.4
- F5.2.1, 5.2.2, 5.2.3, 5.2.4
- F6.1.3, 6.1.4,
- F7.1.1
- F10.1, 10.2, 10.3

**Assessment Knowledge and Skills:** See Reference Book

**Related Academics (State Standards):** 1.12.6(2), 3.12.7(1), 4.12.1(b), 6.12.2.9(3)

**Approaches:** Written/Oral