



# Roadway Work Zones

## Module Purpose

The purpose of this module is to familiarize participants with the unique hazards of roadway work zone construction. Emphasis is placed on increased hazards to workers when construction is carried out adjacent to the public and motorists. The module highlights the Manual on Uniform Traffic Control Devices (MUTCD), including traffic control plans.

## Time

90 minutes (9:45 - 11:15 am)  
(A 10-minute break follows this module)

## Objectives

Show slides 2.1 - 2.2



Upon completion of this module, participants will be able to:

- Recognize the changing nature and increase in highway construction (under traffic) resulting from TEA-21
- Identify two categories of hazards in roadway work zones
  - hazards presented by motorists
  - hazards presented by construction vehicles and equipment
- Recognize the key characteristics of roadway work zone hazards
- Recognize how the relationship between OSHA and the Federal and state DOTs (transportation departments) affects worker safety
- Obtain a basic understanding of the MUTCD and traffic control principles

## Materials and Resources

PowerPoint Slides: Module 2  
Activities: Appendices 2A and 2B  
*MUTCD, Millennial Edition*  
White board or flip chart



## Module 2: Roadway Work Zones

### Instructional Strategy and Course Content

#### Facilitator Notes

##### Lecture



1. What is "TEA-21" and why is it important?  
*Show Slide 2.3.*



2. What makes work zones different? *Show Slides 2.4 – 2.8.*



#### Lesson

##### 1. What is "TEA-21" and why is it important?

In 1998 Congress passed and the President signed the "Transportation Equity Act for the 21<sup>st</sup> Century" or "TEA-21." This landmark legislation allocates approximately \$218 billion for roadway construction, repair and maintenance through the end of 2003.

The legislation is significant not only for the amount of construction it will create, but also for the TYPE and LOCATION of the construction. The type and location of the construction directly impacts the safety and health of construction workers and motorists.

What distinguishes TEA-21 from past major funding bills for U.S. infrastructure construction is that the majority of this construction will not occur in "green" or undisturbed locations. Rather, most of the new construction will take place on existing interstates and roadways. More motorists will be exposed to construction, and more workers will be exposed to the hazards of working adjacent to traffic.

The possibility of increased worker and motorist incidents is alarming to those involved in traffic and construction safety. According to data compiled by the Bureau of Labor Statistics, roadway construction is one of the most hazardous occupations in the nation. Accident and fatality rates for heavy and highway contractors top the list of construction rates, while construction rates generally exceed the rates for other U.S. industries. Over the past 10 years an average of 760 people are killed each year in roadway work zone incidents—approximately 120 of those are workers. On average, work zone incidents are responsible for nearly 39,000 injuries at a societal cost of over \$3 billion.

The hazardous conditions of roadway construction may be compounded by motorist frustration or "road rage" as FHWA estimates that construction work zones may occur as frequently as every 40 – 50 miles on the interstates.

##### 2. What makes work zones different?

In general, construction is a hazardous industry. It involves heavy materials, large trucks and equipment, awkward work positions, inhospitable work conditions, and non-stationary work sites. In roadway construction, these conditions are compounded by hazards of working literally inches from speeding traffic.

Because work is being done increasingly on existing roadways, state departments of transportation and other municipalities are under pressure from the motoring public to ensure that work zones minimally

impact their commutes. As a result, more work is being done at night, work schedules are compressed, and the size of work zones is compressed. These factors all increase the hazards for roadway construction workers.

According to a NIOSH study, of those roadway workers who are killed by vehicles, about half are killed by vehicles that breach the barricades and strike workers, while the other half are killed by construction trucks and equipment operating within the work zone.

The unique interaction of construction activity and traffic in work zones has also caused interaction between the jurisdiction of two federal agencies: OSHA and FHWA. As noted previously, FHWA does not exercise jurisdiction over the safety of workers. Nevertheless, its activities impact worker safety, particularly through FHWA's development and distribution of the *Manual on Uniform Traffic Control Devices* or "MUTCD." For the purposes of this course, virtually all relevant sections of the MUTCD are contained in Part VI.

3. What is the MUTCD? Show Slides 2.9.



### 3. What is the MUTCD?

The MUTCD was developed by the U.S. Department of Transportation - Federal Highway Administration to create uniform traffic control during roadway construction, maintenance, and utility operations. The MUTCD contains minimum standards applicable to all streets and highways open to the public. State and local regulations may exceed the minimum standards contained in the MUTCD. Because each site is unique and presents its own set of challenges to the motorist, it is important that the design and implementation of traffic control is uniform and familiar to drivers to allow them to move their vehicles safely and efficiently through the work zone.

The changing nature of work zone activity necessitates frequent inspection and adjustment of the traffic control devices. Care must be given to ensure that signs, signals, pavement markings, channelizing devices, etc. are maintained in good condition and deployed properly to guide traffic with minimal confusion.

Proper work zone traffic control and deployment of traffic control devices requires training and understanding beyond the scope of this program. The intent of this module is to familiarize participants with the basic principles behind traffic control, the purpose of the MUTCD, and the interplay between traffic control and worker safety.

While the primary focus of the MUTCD is not aimed at worker safety, it provides guidelines on the key elements of traffic safety that should be considered in any operation to assure worker safety. These elements are:

Activity

**? Questions ?**

**Question and Answer**

Using a flipchart or white board, write the class responses to the following questions:

What is the purpose of the MUTCD? Do participants' local jurisdictions (states) have additional requirements beyond the minimums contained in the MUTCD? *Discuss.*  
Slide 2.10.

4. What is a work zone? *Show slides 2.11 – 2.12.*



- Training – All workers shall be trained in how to work next to traffic, commensurate with their responsibilities;
- Worker Clothing – Workers exposed to traffic should be attired in bright, highly visible clothing similar to that of flaggers;
- Barriers – Barriers should be placed along the work space, as appropriate, based upon site-specific factors
- Speed Reduction – In highly vulnerable situations, consideration should be given to reducing the speed of traffic through regulatory speed zoning, funneling, use of police, lane reduction, or flaggers;
- Use of Police – In highly vulnerable work situations, particularly those of relatively short duration, police may be effective to heighten motorist attention to the work zone;
- Lighting – For nighttime work, appropriate lighting of the work area and approaches may allow the driver to more safely navigate through it;
- Special Devices – Judicious use of special warning and control devices may be helpful for certain difficult work area situations. These include rumble strips, changeable message signs, hazard identification beacons, flags and warning lights. Flagger activated audible warning devices may be used to alert workers to the approach of erratic vehicles.
- Public Information – Improved driver performance may be realized through a well prepared and complete public relations effort;
- Road Closure – If alternate routes are available to handle detoured traffic, the road may be closed temporarily during the times of greatest worker hazard.

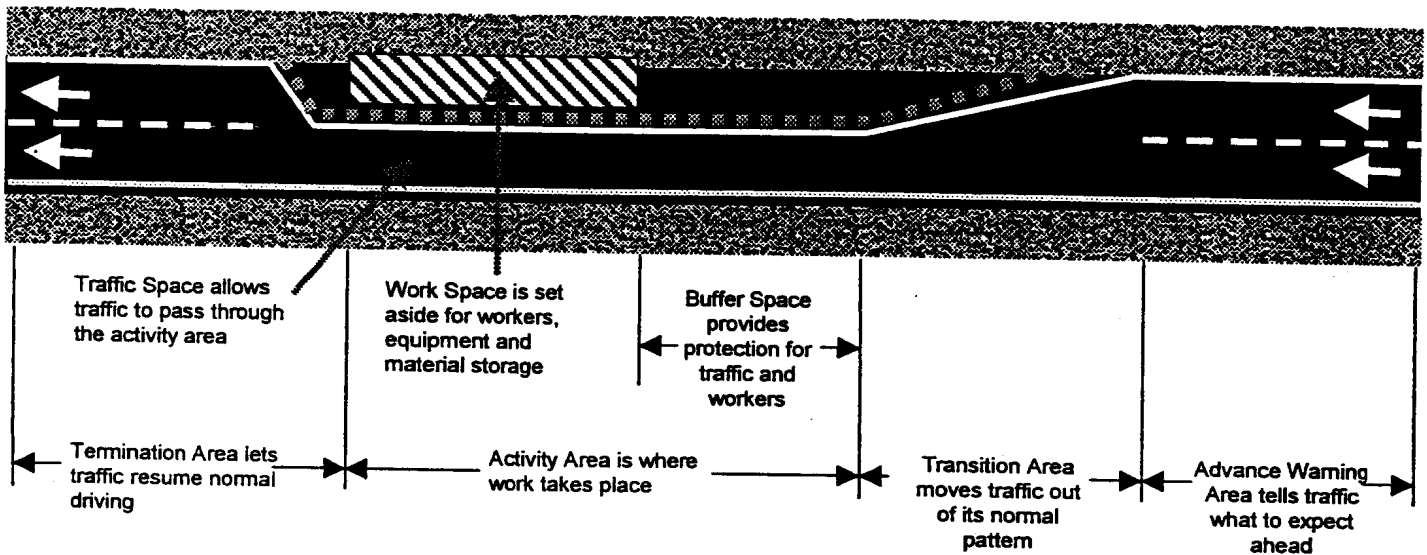
Like other provisions of work area safety set forth in the MUTCD, the various traffic control techniques must be applied by qualified persons after appropriate engineering studies and with sound engineering judgement and common sense.

**4. What is a work zone?**

FHWA continues to work with the industry and other agencies to develop a uniform definition of a work zone. For the purposes of this course, we will limit our discussion of the work zone to the:

- Advanced Warning Area
- Transition Area
- Activity Area (Work Space, Traffic Space and Buffer Space), and
- Termination Area

**Figure 2-1  
Component Parts of a Temporary Traffic Control Zone**



**Facilitator Notes**

5. What is a Traffic Control Plan? *Show slide 2.13.*



6. What are Traffic Control Devices? *Show slides 2.14 – 2.20.*



**Lesson**

**5. What is a Traffic Control Plan?**

A Traffic Control Plan or “TCP” describes the traffic controls to be used for moving vehicle and pedestrian traffic through a temporary traffic control zone or “work zone.” The plan may be very detailed, or it may merely reference typical drawings contained in the MUTCD, standard approved highway agency drawings and manuals, or specific drawings contained in the contract documents. The degree of detail in the TCP depends entirely on the complexity of the situation. TCPs should be prepared by persons knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed.

**6. What are Traffic Control Devices?**

Traffic control devices include signs, portable changeable message signs, arrow displays, high-level warning devices (flag tree), pavement markings, channelizing devices (e.g. cones, barrels, tubular markers), lighting devices, and other devices such as impact attenuators, portable barriers, rumble strips and traffic lane dividers.

For these devices to be effective, they must be deployed, inspected and properly maintained to ensure they function as intended. Just as important as proper deployment, the devices must be taken down and/or covered when they are not needed. Failure to remove devices when work is not present will lead to motorist complacency and failure to respond to the warnings. In using temporary traffic control devices, remember the DIMRR steps:

- Deploy
- Inspect
- Maintain

Maintenance. Show slides 2.21 – 2.25



- Revise
- Remove

**Preventing/Controlling/Abating Sign Hazards**—To properly maintain signs, a system must be implemented to:

- inspect regularly
- keep signs clean
- replace signs when necessary
- check lighting
- position signs properly, and
- only display signs when applicable

**Preventing/Controlling/Abating Pavement Marking Hazards**—Pavement markings are a key element in directing traffic, especially when the traffic pattern is changed to guide traffic through a work zone. To ensure that markings operate as designed, a program must be implemented to:

- ensure that desired pavement markings are clearly visible
- completely remove old marking materials

**Preventing/Controlling/Abating Channelizing Device Hazards**—Like pavement markings, channelizing devices operate as guides to change traffic patterns past work zones. When deployed properly, they provide substantial assistance to motorists by guiding them through the work zone. To ensure proper function of the channelizing device, a program must be implemented to:

- post warning signs
- regularly inspect devices for visibility
- maintain devices in proper spacing and alignment

7. Are there other traffic control methods? Show slides 2.26 – 2.29.



**7. Are there other traffic control methods?**

Another common method for traffic control is the use of a flagger. Because flaggers are responsible for public safety and make the greatest number of public contacts of all highway workers, they must be trained in accordance with state or local requirements. FHWA recommends the following minimal qualifications:

- Sense of responsibility for the safety of the public and workers
- Training in safety traffic control practices
- Average intelligence
- Good physical condition, including sight and hearing
- Mental alertness and the ability to react in an emergency
- Courteous but firm manner
- Neat appearance

**Responsibilities**—The primary responsibilities of a flagger are:

- guiding traffic through or around the work zone
- protecting the work crew and equipment from traffic

## Facilitator Notes

## Lesson

- protecting the motorist and pedestrian from construction-related hazards
- **Flagging Situations**—Flaggers need to control traffic when:
  - construction vehicles and equipment must cross or work in uncontrolled traffic lanes
  - two-way traffic can pass in only one direction at a time
  - the pathway through the work zone is too confusing for motorists to navigate without assistance
  - there is a mobile work zone

**Preventing/Controlling/Abating Flagger Hazards**—As an interface between traffic and the work zone, flaggers play a key role in maintaining work zone safety. At the same time, by virtue of their job and location, flaggers are extremely vulnerable to traffic hazards. To minimize exposure to harm, a flagger must:

- always face oncoming traffic
- stand in the proper location
- remain attentive
- communicate effectively with workers and motorists
- wear clothing and equipment that meet requisite standards
- obtain proper training
- stay in communication with flaggers who control traffic approaching the work zone from other directions

### Case Study



8. Flagger Incident:  
*Slides 2.30 – 2.39; see  
Appendix 2-A*

### Group Activity



9. Temporary Traffic Control Zones: *Slides 2.40 – 2.49; see Appendix 2-B*

10. Elicit additional questions and summarize. *Slide 2.50.*

11. Transition to prepare participants for Module 3.



### 8. Case Study—Flagger Incident on Feeder Road

Instructor will explain a real case study involving two flaggers on a busy interstate feeder road. After reviewing the scenario, class will discuss actions that the employer and workers might have taken to avoid the situation.

### 9. Group Activity—Setting Up Temporary Traffic Control Zones (Work Zones)

The instructor will divide the class into four groups. Each group will be given a typical roadway construction scenario. The class will have 15 minutes to set-up traffic control methods and devices, in accordance with practices outlined in the MUTCD Part VI.

10. Question and summary period.

11. Transition to Module 3.

## Flagger Fatality Case Study

**Objective:** This case study reviews an actual incident where a flagger was killed in a construction work zone. Facilitator should explain what happened in this incident using the Power Point slides and then solicit class participation to determine actions the employer/workers can take to avoid similar incidents.

**Materials:**

- Power Point Slides 2.30 – 2.39.
- Flip chart, markers and easel or white board or chalkboard

**Time:** 10 minutes

**Note:** Instructor should become as familiar as possible with the incident so as to be able to answer student's questions. See full report following this page.

**Instructor is encouraged to substitute a personal experience, of a similar nature, for this incident. This case study is to be used if instructor does not have a similar experience and/or the instructor does not have appropriate slides, diagrams or information to share his/her experience with the class.**

DATE: 12-21-99

TO: Director, National Institute for Occupational Safety and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: Flagger Struck From Behind and Killed by a Truck Intruding Into a Highway Construction Work Zone - Wisconsin.

#### SUMMARY

On October 18, 1999, a 33-year-old female highway construction laborer (the victim) was struck and killed by a truck while flagging traffic. The victim was struck from behind by a 10-ton straight-side produce truck. Prior to the incident, the victim (Flagger 1) was on the south side of the highway facing west with her flag, preparing to stop all eastbound traffic on the highway. Another flagger (Flagger 2) was on the north side of the highway, approximately 50 feet east of the victim, and was stopping westbound traffic. Flagger 2 signaled the westbound produce truck to stop and the truck had almost come to a complete stop when a westbound tractor-trailer approached at approximately 55 miles per hour and struck the produce truck in the right rear. The produce truck was struck with such force that it was momentarily airborne and the driver could not control his vehicle; the produce truck was propelled across the eastbound lane directly into the path of the victim, who was still facing west with her back to the oncoming truck. Flagger 2, on the north side of the road, was able to jump clear of the impacting trucks. He was unable to see or warn the victim. Fire rescue personnel arrived within minutes, followed by the arrival of an aeromedical helicopter. The victim was pronounced dead at the scene. The driver of the tractor-trailer was also injured and transported by helicopter to a trauma center. The driver of the produce truck was uninjured. Investigators concluded that, to help prevent similar occurrences, employers/highway construction contractors should:

- consider the use of additional warning signs and traffic control devices to supplement the minimum signs recommended by the Manual on Uniform Traffic Control Devices (MUTCD)
- provide and require use of hand-held or other portable radio communications equipment by flaggers at all times

Additionally, NIOSH recommends that:

- state highway authorities should consider the use of law enforcement officers in cruisers at each end of large highway construction work zones and the use of radar surveillance for traffic speed control
- state highway authorities reduce speed limits in construction work zones on high-traffic-density highways to a maximum of 45 mph

#### INTRODUCTION

On October 18, 1999, a 33-year-old female laborer who was working for a construction contractor at a highway construction haul crossing was struck from behind by a truck and killed. On November 1, 1999, officials of the Wisconsin Division of Public Health notified the Division of Safety Research (DSR) of the fatality. On November 9, 1999, two DSR Occupational Safety and Health Specialists accompanied by two staff members of the Wisconsin Division of Public Health went to the incident site to conduct an investigation. The incident was reviewed with the OSHA Compliance Officer who had made a preliminary investigation. Additionally, a post-incident videotape of the incident scene, as well as a number of photographs of the site taken by the OSHA Compliance Officer, were reviewed. A review of the incident was also conducted with the construction contractor's safety manager and with the project engineer contracted by the state with oversight responsibility for the project. The incident was also reviewed with

the County Sheriff's Department, and copies of the investigating officer's reports as well as additional photographs were reviewed.

The construction contractor was well established in the state, with 50 years of highway construction experience. The company employs approximately 280 employees. There were 11 employees working at the work site on the date of the incident. The contracting company has a safety officer and a labor/management safety committee. Monthly safety meetings are held. The company has written safe-work procedures for each task. Employees are provided with on-the-job training; this training specifically addresses hazards associated with the dangers and potential for injuries related to highway-construction work and traffic management flagging operations. Training records are maintained by the company. There is no formal measurement of training effectiveness. The victim had 6 years experience with the company and had over 6 months experience as a flagger. She was working as a construction laborer; however, on the day of the incident she was given the assignment to flag traffic. She was working a normal day shift when the incident occurred. The state does not have a mandatory flagger-certification program.

## **INVESTIGATION**

The incident occurred on a two-lane state highway that runs east and west, connecting two interstate highways. The State Highway Department had contracted with the construction contractor to expand the highway to four lanes. The road is a high-traffic-density highway and traffic is especially intense during rush hours. There is a high volume of commercial truck traffic on the road, in part because it is a connecting link between the two interstate highways. As part of the contract agreement, the construction contractor was not to impede traffic flow on the highway by reducing posted speed limits.

The total length of the highway construction zone was about 8 miles. Signs marking the highway construction zones were at the beginning and end of the zone. A "Be Prepared to Stop" warning sign was placed 900 feet east of the crossing and a Flagger symbol warning sign was posted 294 feet east of the incident site, warning oncoming motorists of the highway work zone ahead, and that flag operations were in effect (Figure 1). Photo 1 shows the actual signs as seen by the motorists as they approached the crossing from the east heading westward. There were also similar signs posted to the west for east-bound traffic. The signs marking the highway work zone and flagging operation met the standards and guidelines recommended in Part VI of the Manual on Uniform Traffic Control Devices (MUTCD). The posted state speed limit on the section of highway where the incident occurred is 55 miles per hour. It was mid-day and the weather was clear and road conditions were dry. The victim (Flagger1) was working at the south side of a clay-topped road crossing used by earthmovers to move fill from one side of the highway to the other. The road crossing was covered daily with a clay pad, which was built up to approximately 6 to 9 inches in height. The pad was used on the highway surface to protect the surface from damage that could be caused when the earthmovers crossed the highway from the north and south. It was removed at the close of business each day. The incident occurred on the fourth day of construction activity at this specific site.

The victim was facing west, preparing to stop eastbound traffic. Another flagger (Flagger 2) was positioned on the north side of the highway directing the westbound traffic to stop. The visibility was good and the crossing could easily be seen by vehicular traffic approaching from both east and west. Flagger personnel were wearing reflective vests and hard hats. They were using flag/stop/slow signs and were communicating verbally and by visual signals. There was a barrier (type II, 36 inches high by 2 feet wide, having 2 orange and white striped boards mounted horizontally on a saw horse type stand) located at the victim's location (Figure 2).

On the day of the incident the flaggers had been stopping traffic as necessary to allow the earthmovers to use the crossing, starting at approximately 8:00 a.m. At approximately 2:15 p.m., a straight-side produce truck (Photo 2) was moving westbound, slowing to a stop as directed by Flagger 2. The victim was facing west, away from this traffic, preparing to stop eastbound traffic. A westbound vehicle, a tractor trailer (Photo 3), was approaching the crossing at an estimated 55 miles per hour (Figure 3).

The tractor trailer, weighing approximately 22 tons, struck the produce truck, weighing approximately 10 tons, in the right rear. Flagger 2 was jumping clear and could not see or warn Flagger 1 (Figure 4).

The produce truck was struck with great force and it was propelled over the clay pad at the crossing; the produce truck momentarily became airborne and out of control, moving southwest across the eastbound lane of the highway (Figure 5). This vehicle hit the victim in the back, dragging her approximately 30 feet in a westerly direction along the south side of the highway.

The victim received massive internal trauma and external injuries and was pronounced dead at the scene. The deceased victim was transported to a nearby medical center by emergency response personnel. The driver of the tractor-trailer was seriously injured. It took rescue personnel 2 hours to remove the tractor-trailer driver from the cab of his truck. He was then transported to a medical center by an aeromedical evacuation helicopter. The driver of the produce truck was not injured.

The impact with the tractor-trailer moved the produce truck approximately 202 feet across the highway where it came to rest in a field in a westward direction parallel to the highway. The tractor-trailer moved approximately 100 feet after impact and came to rest in a westward position in a ditch along the north side of the highway (Figure 6).

### **CAUSE OF DEATH**

The Medical Examiner's report stated the cause of death to be exsanguination due to massive internal trauma and external violence.

### **RECOMMENDATIONS/DISCUSSION**

**Recommendation #1:** Employers/highway construction contractors should consider the use of additional warning signs and traffic control devices to supplement the minimum signs recommended by the Manual on Uniform Traffic Control Devices (MUTCD).

**Discussion:** The MUTCD sets forth the basic principles that govern the design and usage of traffic control signs and devices. The signs in use throughout the highway construction work zone met the minimum standards and guidelines recommended in the MUTCD for a two-lane work zone with a haul crossing.

In a police interview in the hospital, the tractor trailer driver stated he was aware he was in a highway construction work zone, that he saw the produce truck stopped ahead of him, and that he also saw the flagger (Flagger 2) moving toward the rear of the stopped truck. He stated that he did not know the speed he was traveling at the time of the incident, but that he was moving with the flow of traffic. The use of supplemental signs and warning devices such as rumble strips may have given the tractor trailer driver advanced warning and he may have been able to use better judgment to slow his vehicle and avoid the impact with the produce truck.

The use of supplemental or large electrified signs and warning lights may increase awareness and vigilance as motorists approach a crossing where flaggers are actively stopping traffic. There was no construction activity during the DSR Investigator's post-incident visit to the crossing site. However, there was some construction activity on another road near the incident site. It was noted that large electrified warning signs were deployed as an added precaution at this site. Rumble strips may also alert motorists of hazards ahead. As outlined in the MUTCD, rumble strips provide a vibratory and an audible warning that augment visual stimuli. The first rumble strip should be placed before the other advanced warning signs and devices. Rumble strips may be fixed permanent or portable devices. Supplemental signs showing distances in feet to the work zone ahead, distances in feet to the flagger's position, and a truck crossing sign may aid in keeping motorists aware of the potential hazards and of the need to stop if necessary. The clay pad at the crossing should have been seen as a bump hazard, especially for traffic moving at the posted speed limit of 55 mph. The addition of a bump sign, properly placed, may have acted as an added warning for motorists to slow down (Figure 7).

**Recommendation #2:** Employers/highway construction contractors provide and require use of hand-held or other portable radio communications equipment by flaggers at all times.

**Discussion:** The use of hand-held radios is common in flagging operations and often is mandated by the distance between flagger positions. Additionally, there is other radio communication equipment on the

market, such as the radios used by law enforcement departments. This equipment can be mounted over the shoulders allowing the individual to communicate while keeping his or her hands free for other actions. On the day of the incident the flaggers were in close proximity to one another, approximately 50 feet apart. They were using visual and verbal signals to one another. Due to noise from vehicle traffic and the earthmovers, it is doubtful that effective verbal communication was maintained between the flaggers. It may have been possible for Flagger 2 to warn the victim of the approaching tractor-trailer, had the flaggers been in radio contact with each other.

**Recommendation #3:** State and county authorities consider the use of law enforcement officers in cruisers at each end of large highway construction work zones and the use of radar surveillance for traffic speed control.

**Discussion:** It is a common practice in many states, counties, and municipalities to have increased law enforcement visibility and radar speed-control surveillance at both ends of large highway- construction- work zones. The presence of law enforcement and use of radar surveillance during active construction work periods would help to maintain traffic speeds at or below the posted speed limit.

**Recommendation #4:** State Highway Authorities consider speed limits in construction work zones on high-traffic-density highways to a maximum of 45 mph.

**Discussion:** Highway-construction-work zones are high-hazard areas. Many states have adopted policies for reducing posted speed limits in highway-construction-work-zones. Under normal circumstances the MUTCD recommends that reduced speed zoning should be avoided as much as practical. However, in highly vulnerable situations that threaten the highway construction worker such as flagging operations on a two-lane high-traffic-density road, incremental speed zone reductions may be warranted. A reduced speed of 45 mph still keeps traffic-flow moving; however, reducing the speed limits increases the reaction times for both motorists and construction workers. Many highway-construction-work zones have even lower speed limits in place based on the hazards that are present for both the motorists and the site workers.

It should also be noted that in addition to posting speed reductions, many states, including Wisconsin, have legislated that traffic fines be doubled for speed violations in highway-construction-work zones. States have taken this added measure in the hope that motorists will heed posted highway-construction-work zone warning signs, traffic-control devices, and the safety of construction workers in the zone.

#### REFERENCES

1. Manual on Uniform Traffic Control Devices (MUTCD), 1988 Edition, Revision 3, September 3, 1993, Revision No. 4, issued January 4, 1995 and Errata No. 1, issued April 11, 1995, (15M-11-96), Part VI. Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations, U.S. Department of Transportation Federal Highway Administration, printed by American Traffic Safety Services Association, Fredericksburg, VA.

#### INVESTIGATOR INFORMATION

This investigation was conducted by Greg J. Smith and Virgil J. Casini, Occupational Safety and Health Specialists, Fatality Assessment and Control Evaluation Team, Surveillance and Field Investigations Branch, Division of Safety Research; and by Jeanette M. Tierney and Sue Garman, FACE Field Investigators, Wisconsin Division of Public Health.

## Setting Up Temporary Traffic Control Zones

**Objective:** This activity was created to allow students to work in groups to develop a basic understanding of temporary traffic control zones (work zones). Upon completion of this activity, participants should be able to recognize traffic control situations for their work zone activities, and use the MUTCD (or relevant state counterpart), as a reference to understand how temporary traffic control devices should be deployed. Remind students that this instruction does not qualify them to set up temporary traffic control zones—more detailed, specific training may be required. This training is designed to make them aware of the fundamental principles behind traffic control, and to be aware of the safety implications behind proper work zone design and set-up.

Instructor should explain that the *Typical Applications* contained in the MUTCD are recommended minimal practices, and each site may need additional signage and/or devices to ensure well-marked, safe work zones. The instructor should also remind students that the MUTCD is a national guideline and their state or local government jurisdictions may have other manuals that are more specific to their work.

**Materials:**

- Power Point Slides 2.40 – 2.48.
- Orange and black felt-tipped pens (or cut-outs of temporary traffic control signage and devices)
- At least one copy of Part VI of the MUTCD for each group.
- A flip chart, markers (or paper) for each work group

**Time:** 30 minutes

**Activity:** Divide the students into four groups. Instruct the students that they will be given a drawing of a work zone. Working in groups and using the MUTCD as a reference, the students are to draw the appropriate traffic control signs and devices, and indicate the proper distances for their placement, to make their specific site comply with the guidelines set forth in the MUTCD.

Each group will be given approximately 15 minutes to complete the assignment. After 15 minutes, the groups should select a spokesperson to explain their scenario to the class and defend their design of the work zone.

The entire class should be encouraged to question the reasoning behind the presenting group's work zone design.

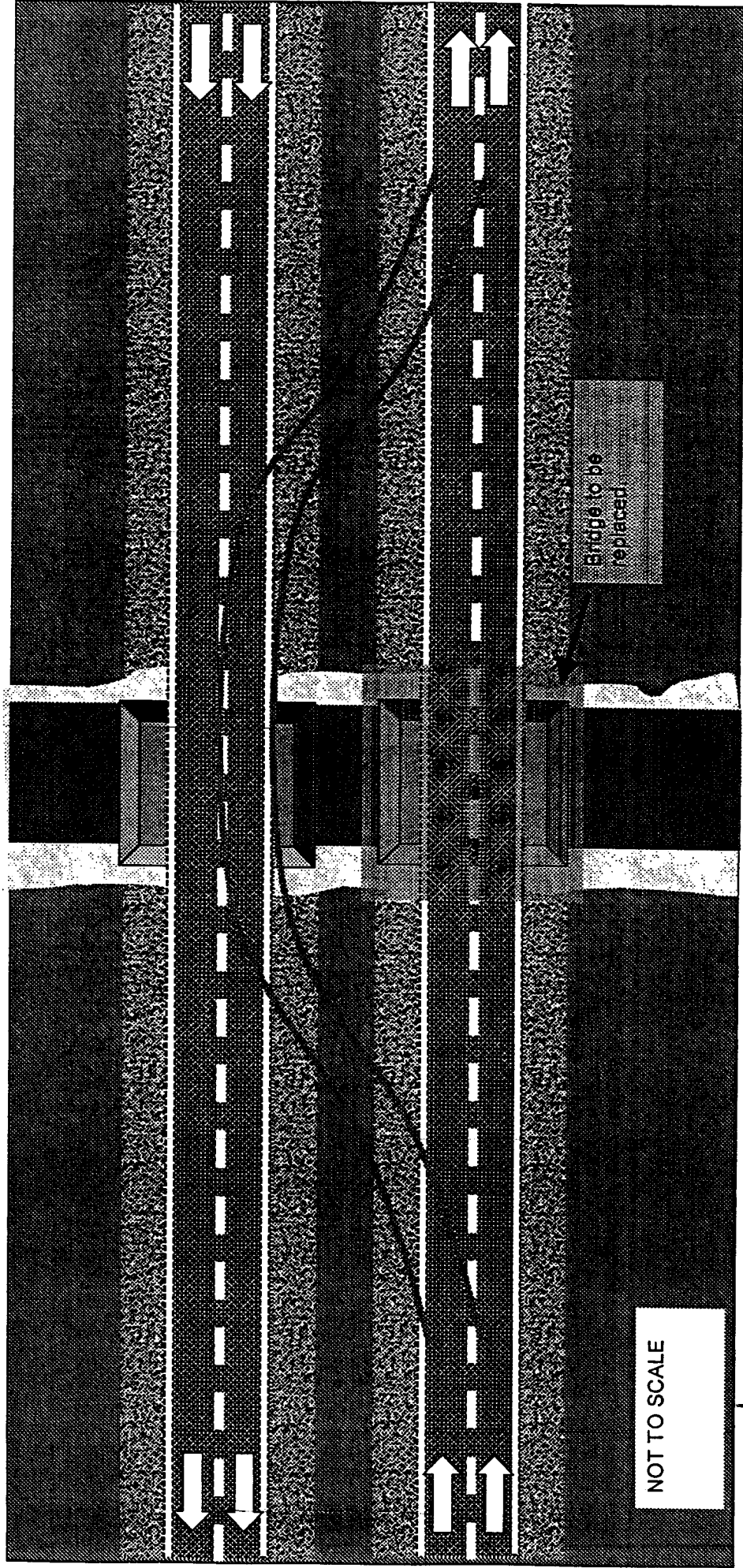
# **Case Scenarios**

**1 - 4**

**Problem 1**

Route 360 – Rural principal arterial rolling highway, non-federal aid. Crosses the Rapids River dividing Washington and Jefferson counties.  
ADT (1995) = 4,105  
Design Speed = 55 MPH, Posted speed limit 55 MPH  
MSS = 45 MPH

- Project:** Replace existing bridge over Rapids River (EBL) and rebuild curve east of bridge for approximately 800 feet.
- Problem:** Show the approximate traffic control devices for a temporary crossover around the area shown below. Assume an operating speed of 55 MPH.



## Problem 2

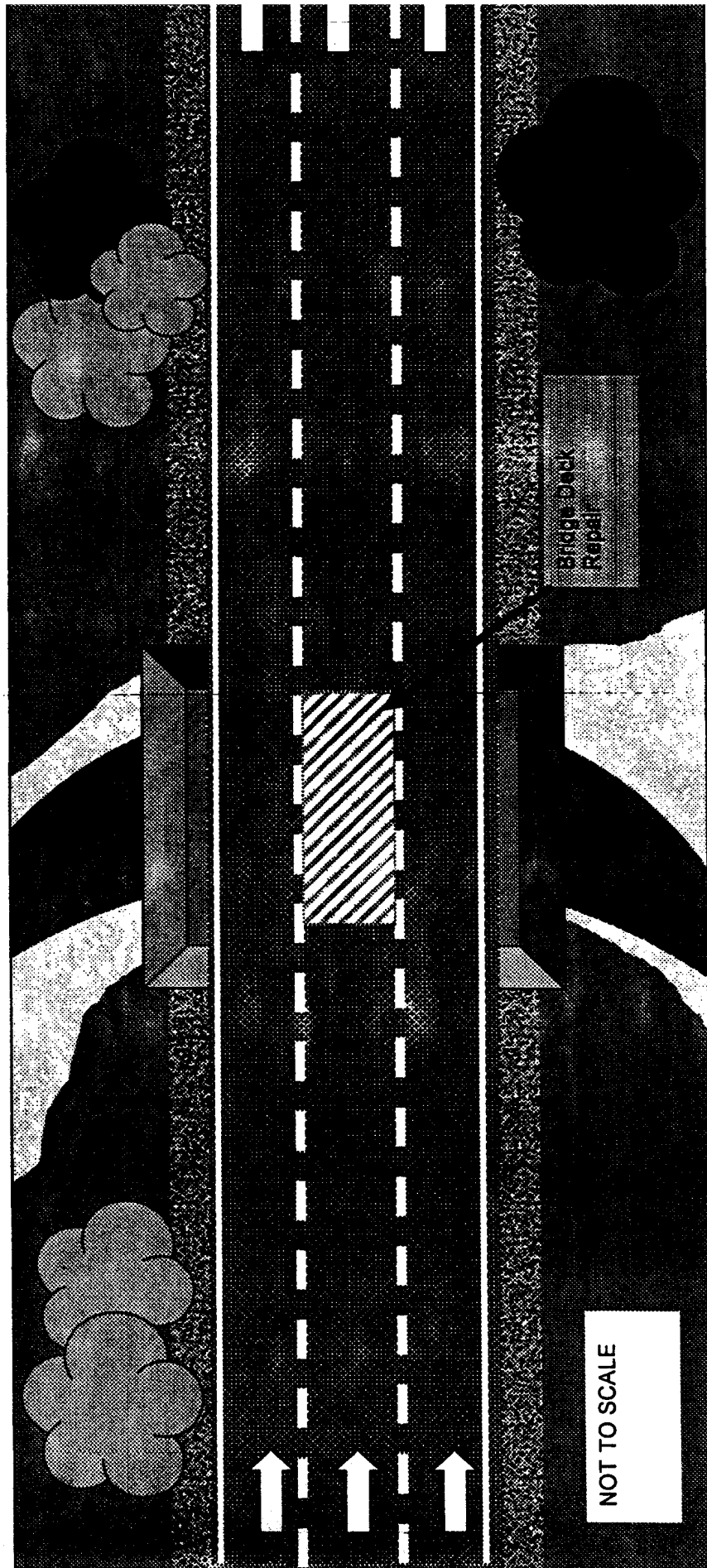
Limited Access Highway (Freeway)

ADT (1995) = 60,000

Posted speed limit = 55 MPH

**Project:** Repair bridge deck of center lane. Construction time is planned for two weeks.

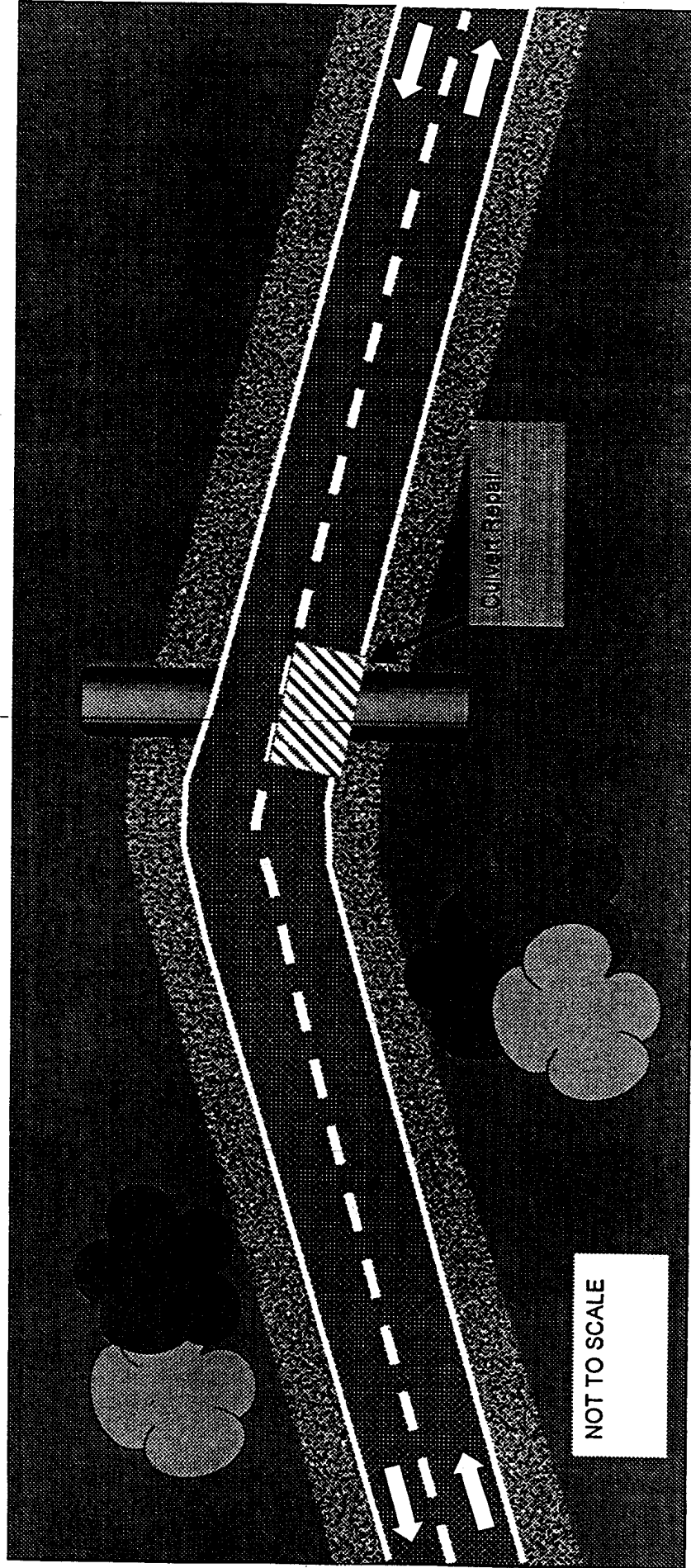
**Problem:** Show the approximate traffic control devices where the center lane is closed for bridge deck repair. Assume an operating speed of 60 MPH.



### Problem 3

Rural Local Road  
ADT (1995) = 4,000  
Posted speed limit = 45 MPH

- Project:** Repair culvert by and under east bound lane. Construction time is planned for three (3) days.
- Problem:** Show the approximate traffic control devices in both directions for closing one lane of traffic for culvert repairs. Assume an operating speed of 45 MPH.

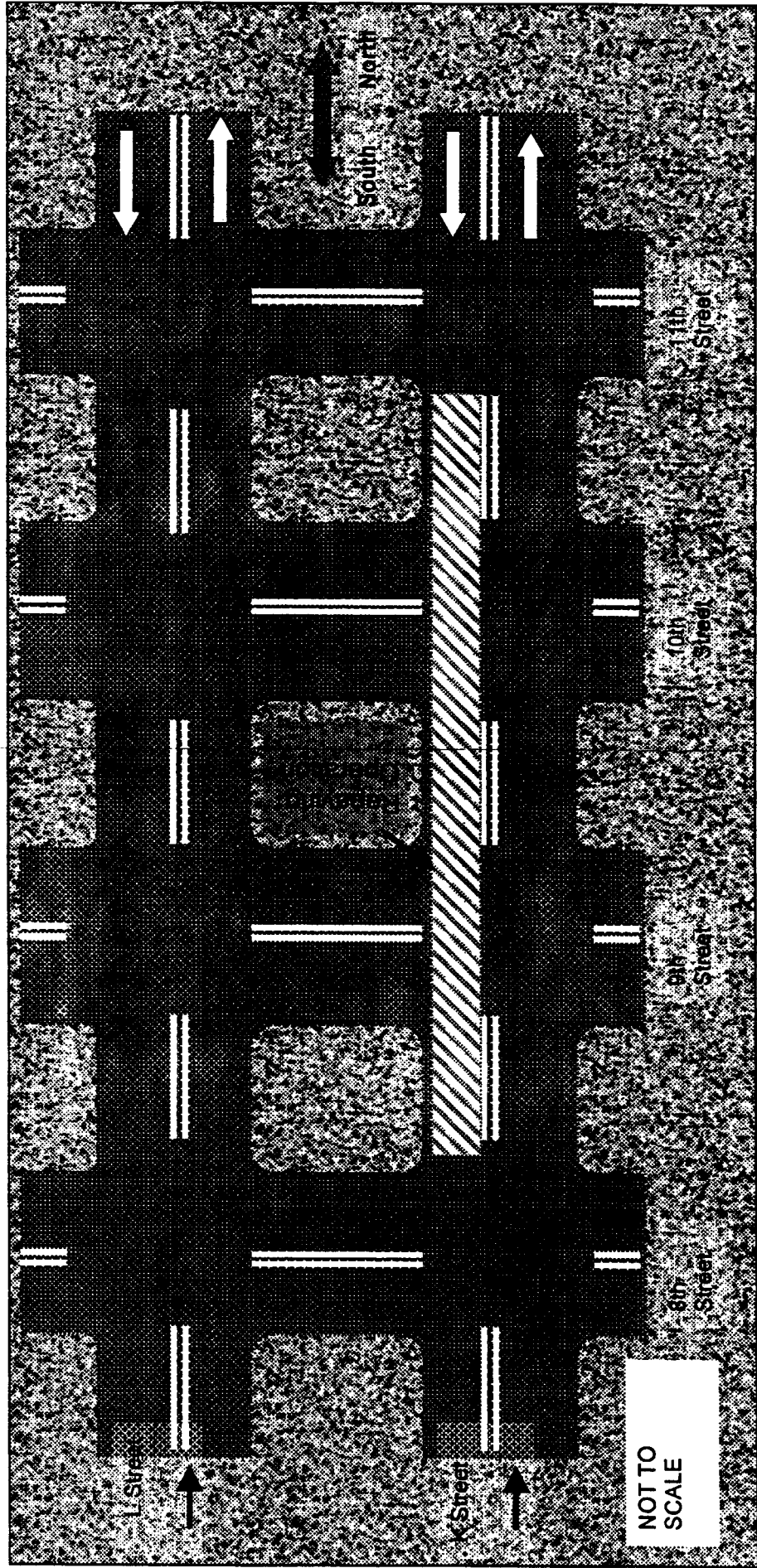


### Problem 4

Repaving after utility work in high-traffic downtown area.  
ADT (1995) =10,000  
Posted speed limit = 25 MPH

**Project:** Utility work has just been completed in the southbound lanes on K Street, between 8<sup>th</sup> and 11<sup>th</sup> Streets. Your company has been hired to repave the road on K Street.

**Problem:** Show the approximate traffic control devices in both directions for closing the southbound lane of K Street between 8<sup>th</sup> and 11<sup>th</sup>. You are only allowed to detour traffic and work between the hours of 9:30 am and 3:00 p.m. Assume an operating speed of 25 MPH.



Answer: Scenario #1

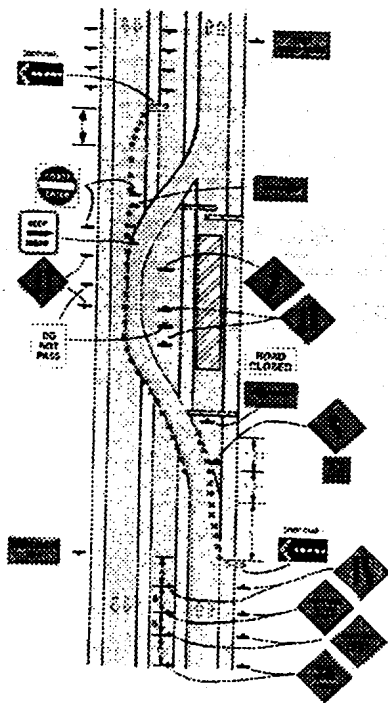


Figure TA-39. Median crossover on freeway.

Answer: Scenario #2  
(Acceptable)

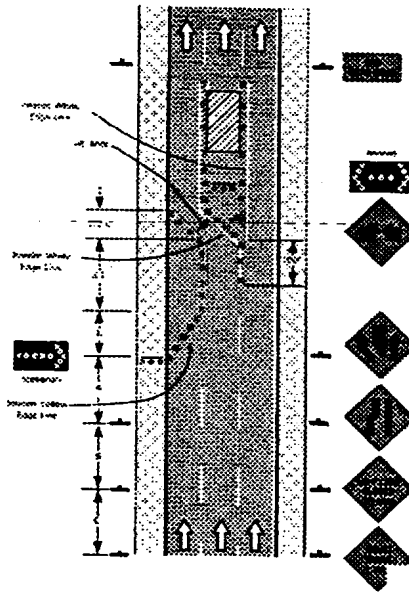


Figure TA-38. Insert lane closure on freeway.

Answer: Scenario #3

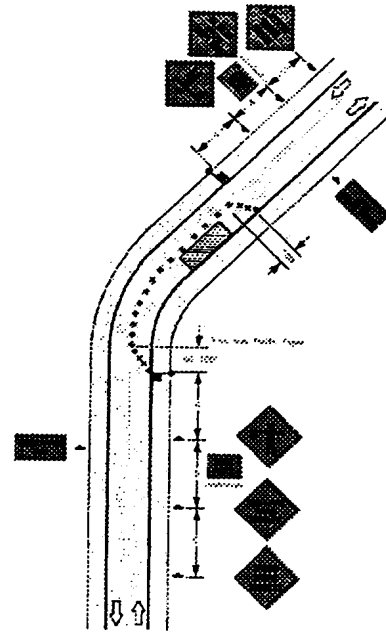


Figure TA-10. Lane closure for one lane two way traffic control.

Answer: Scenario #2  
(Better)

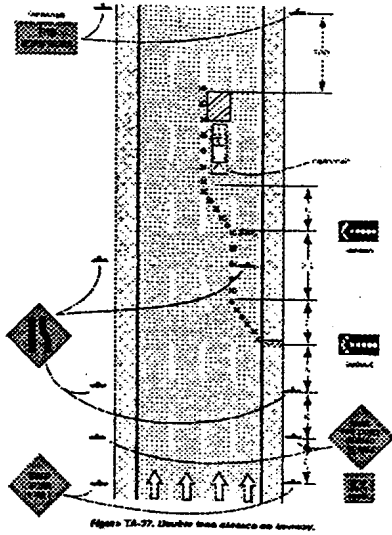


Figure TA-37. Double lane closure on freeway.

Answer: Scenario #4

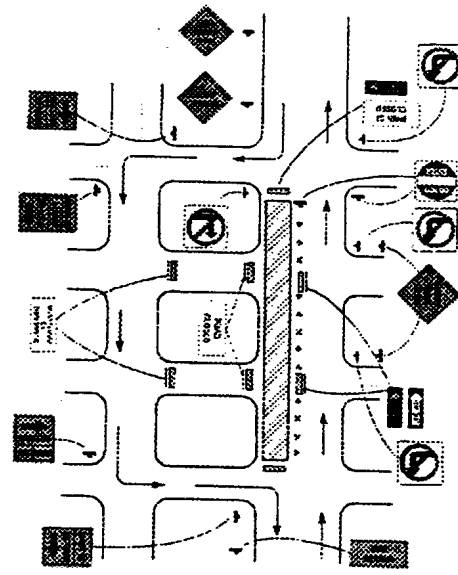


Figure TA-18. Detour for one travel direction.