

UNIT 6 - CONSTRUCTION AND MAINTENANCE OPERATIONS

ASSIGNMENT

Read and study part VI of the MUTCD, the North Carolina Supplement to the MUTCD, and 1101.01 thru 1145.01 of the Roadway Standard Drawings. Answer review questions. Take and pass the written test. (*The successful completion of this unit does not exempt anyone from taking and passing the requirements of the Basic Work Zone Safety Course and/or the Intermediate Work Zone Safety Course if these courses are needed to satisfy the requirements of a specific skill block.*)

KEY POINTS

Effective temporary traffic control enhances traffic safety and efficiency, regardless of whether street construction, maintenance, utility work, or roadway incidents are taking place in the work space.

Effective temporary traffic control must provide for the safety of the workers, road users, and pedestrians, while at the same time, provide for the efficient completion of whatever activity suspended normal use of the roadway.

Rural highways are normally characterized by lower traffic volumes, higher speeds, fewer turning conflicts, and fewer conflicts with pedestrians. Urban highways are characterized by wide ranges in traffic volumes, relatively low speeds, narrower roadway lanes, frequent intersections, significant pedestrian traffic, and more roadside obstacles.

A traffic control zone consists of the following five parts (*The MUTCD lists only four parts because it includes the buffer area with the work area*):

- 1) Advanced warning area
- 2) Transition area
- 3) Buffer area (optional)
- 4) Work area
- 5) Termination area

The buffer space, *which is optional*, separates traffic flow from the work activity or a potentially hazardous area and provides recovery space for an errant vehicle. Neither work activity nor storage of equipment, vehicles, or material should occur in this space.

Tapers are a common important element of a temporary traffic control zone. The taper length is based on formulas using the speed of the traffic and the width of the offset (or lane width).

At *detours*, traffic is directed onto another roadway to bypass the temporary traffic control zone. At *diversions*, traffic is directed onto a temporary roadway or alignment placed in or next to the right-of-way; for example, median crossovers or lane shifts.

As used in temporary traffic control zones, a traffic control device is a sign, portable changeable message sign, arrow display, signal, pavement marking, or other device placed on or adjacent to a highway to regulate, warn, or guide traffic.

Warning signs used for incident management shall have a black legend on an orange background. However, in emergencies, warning signs with yellow backgrounds may be used if orange signs are not readily available. Because of their importance, these signs shall have a standard size of 48 inches by 48 inches.

As a general rule, signs should be located on the right-hand side of the roadway. When special emphasis is needed, signs may be placed on both the left and right sides of the roadway. Signs may be mounted on portable supports placed within the roadway itself. Signs, although ordinarily mounted on posts, may also be mounted on or above barricades.

An arrow display is a sign with a matrix of elements that is intended to provide *additional* warning and directional information to assist in merging and controlling traffic through or around a temporary traffic control zone.

An arrow display *shall not* be used on a two-lane, two-way roadway for temporary one-lane operation or on a multilane roadway to laterally shift *all lanes* of traffic, because unnecessary lane changing may result.

Sequential arrow displays, left or right sequential chevron displays, or straight line caution displays shall not be used (*Section 1115-3 of the Standard Specifications for Roads and Structures*).

The function of channelizing devices is to warn and alert drivers of conditions created by work activities in or near the traveled way, to protect workers in the temporary traffic control zone, and to guide drivers and pedestrians safely.

Spacing of channelizing devices should not exceed a distance in feet equal to the speed limit when used for taper channelization, and a distance in feet of twice the speed when used for tangent channelization (*A good rule of thumb is to place a channelizing device on every other skip line which equates to a spacing of about 80 feet*).

Cones and tubular markers used on freeways, other high-speed highways, or on *all highways* during nighttime conditions shall have a minimum height of 28 inches and shall be retroreflective. For all other conditions, cones and tubular markers shall have a minimum height of 18 inches.

Vertical panels may be used to channel traffic, divide opposing lanes of traffic, divide traffic lanes, or in place of barricades where space is limited.

Drums are most commonly used to channelize or delineate traffic flow but they may also be used singly or in groups to mark specific locations. Drums are highly visible and have good target value, given the appearance of being formidable obstacles and, therefore, command the respect of drivers.

Drums shall be constructed of lightweight, flexible, and deformable materials, and have a minimum height of 36 inches and a minimum width of 18 inches. **STEEL DRUMS SHALL NOT BE USED AND BALLAST SHALL NOT BE PLACED ON TOP OF THE DRUM.**

A barricade is a portable or fixed device having from one to three rails with appropriate markings that is used to control traffic by closing, restricting, or delineating all or a portion of the right-of-way. Barricades include three types: Type I, Type II, and Type III.

Type I or Type II barricades are intended for use in situations where traffic is maintained through the temporary traffic control zone, and Type III barricades are intended for use when a roadway is closed.

Adequate pavement markings shall be maintained along paved streets and highways in temporary traffic control zones.

Since temporary traffic control activities often create conditions on or near the traveled way that are particularly unexpected at night, when driver's visibility is sharply reduced, it is often desirable and necessary to supplement signs, barriers, and channelizing devices with lighting devices. In no case, shall floodlighting be permitted to create a disabling glare for drivers.

Work duration, which includes the following five categories, is a major factor in determining the number and types of devices used in temporary traffic control zones.

- 1) Long-term stationary; work that occupies a location more than three days.
- 2) Intermediate-term stationary; work that occupies a location from overnight to three days.
- 3) Short-term stationary; daytime work that occupies a location from one to 12 hours.
- 4) Short, duration; work that occupies a location up to one hour.
- 5) Mobile; work that moves intermittently or continuously.

REVIEW QUESTIONS

- 1) What does effective temporary traffic control enhance?

- 2) What are the five parts of a traffic control work zone, and which part is optional?

1. _____
2. _____
3. _____
4. _____
5. _____

- 3) What formula is used to calculate the taper length when the speed limit is 40 mph or less?

- 4) The use of downstream tapers is optional.

TRUE FALSE

- 5) Warning signs used for incident management have a black legend on an orange background. Can warning signs with a yellow background be used, and if the answer is yes, under what conditions can they be used?

YES NO

Conditions? _____

- 6) What is the standard size of a warning sign that is used in temporary traffic control zone?

_____ inches by _____ inches

- 7) When a PCMS (portable changeable message sign) is in the operating mode, what is the minimum height required from the bottom of the message panel to the roadway?

_____ feet

- 8) What is the maximum number of displays that should be used during any message cycle?

9) Under what two conditions is it not appropriate to use an arrow display?

1. _____
2. _____

10) Can sequential arrow displays, left or right sequential chevron displays, or straight line caution displays be used?

YES NO

11) What is the maximum spacing distance for a channelization device used for tapers?

12) What is the maximum spacing distance for a channelization device used for tangent channelization?

13) What is the minimum height of a cone used on freeways?

_____ inches

14) Steel drums can be used if that is the only type available.

TRUE FALSE

15) Barricades consist of the following three types; Type I, Type II, and Type III.

TRUE FALSE

16) When are Type I or Type II barricades used?

17) When are Type III barricades used?

18) Should adequate pavement markings be maintained along paved streets and highways in temporary traffic control zones?

YES NO

19) Can flashers be used for delineation? Why or why not?

YES NO

20) What are rumble strips used for?

21) What are the five categories of work duration and their time frames?

ANSWERS TO REVIEW QUESTIONS

- 1) It enhances traffic safety and efficiency, regardless of whether street construction, maintenance, utility work, or roadway incidents are taking place in the work space. (*Page 11 of Part VI of the MUTCD*)
- 2) Advance warning area, transition area, buffer area (optional), work area, and termination area (*Page 17 thru 22 of Part VI of the MUTCD*)
- 3) $L = WS^2/60$ (*Page 23 of Part VI of the MUTCD*)
- 4) True (*Page 23 of Part VI of the MUTCD*)
- 5) Yes; In emergencies, if orange signs are not readily available (*Page 43 of Part VI of the MUTCD*)
- 6) 48 inches by 48 inches (*Page 44 of Part VI of the MUTCD*)
- 7) 7 feet (*Page 56 of Part VI of the MUTCD*)
- 8) Two (*Page 58 of Part VI of the MUTCD*)
- 9) It shall not be used on a two-lane, two-way roadway for temporary one-lane operation and it shall not be used on a multi-lane roadway to laterally shift all lanes of traffic, because unnecessary lane changing may result. (*Page 60 of Part VI of the MUTCD*)
- 10) No (*Section # 1115-3, page 706 or the Standard Specifications for Roads and Structures*)
- 11) The spacing should not exceed a distance in feet equal to the speed limit. (*Page 61 of Part VI of the MUTCD*)
- 12) The spacing should not exceed a distance in feet equal to twice the speed limit. (*Page 61 of Part VI of the MUTCD*)
- 13) 28 inches (*Page 62 of Part VI of the MUTCD*)
- 14) False (*Page 64 of Part VI of the MUTCD*)
- 15) True (*Page 65 of Part VI of the MUTCD*)
- 16) They are intended for use in situations where traffic is maintained through the temporary traffic control zone. (*Page 65 and 66 of Part VI of the MUTCD*)
- 17) They are used at a road closure and may extend completely across a roadway or from curb to curb. (*Page 66 of Part VI of the MUTCD*)
- 18) Yes (*Page 68 of Part VI of the MUTCD*)
- 19) No; Because they tend to obscure the desired vehicle path. (*Page 73 of Part VI of the MUTCD*)
- 20) Rumble strips may be used to alert drivers of unusual or unexpected traffic conditions or geometrics, or to bring the driver's attention to other warning devices. (*Page 76 of Part VI of the MUTCD*)
- 21) Long-term stationary; more than 3 days, Intermediate-term stationary; overnight to 3 days, Short-term stationary; one to 12 hours, Short, Duration; up to one hour, and Mobile; work the moves intermittently or continuously. (*Page 79 of Part VI of the MUTCD*)