“Where do we find the information that tells us how to set up a Mobile Work Zone Operation for a 2-lane roadway?”

The Ohio Manual of Uniform Traffic Control Devices (OMUTCD) provides standards and guidelines for the use of traffic signs, pavement markings, traffic signals, and other traffic control devices in our state. The Manual applies to all roads open to public travel in Ohio. The OMUTCD is organized into nine parts, and the part that applies to setting up roadway work zones is Part 6 – Temporary Traffic Control. Part 6 is also reprinted in a publication called the Temporary Traffic Control Manual (TTCM). Both of these manuals are pictured below. You may order these manuals from the ODOT Office of Contracts (800-459-3778), or view them online on the Ohio Department of Transportation’s website.

“Where, exactly, in the OMUTCD or the Temporary Traffic Control Manual can we find the information pertaining to the setup of a Mobile Operation on a 2-lane roadway?”

The Temporary Traffic Control Manual contains a lot of information about Mobile Work Zones, along with several Typical Applications that describe how to set up different types of work zones on different types of roadways. In fact, there are 46 separate Typical Applications found in the manual. The particular Typical Application that we are interested in for this subject is Typical Application 17 (or 6H-17), and it is titled Mobile Operations on a Two-Lane Road. It is located on pages 760-761 in the manual, which are reprinted in this RON document as follows.
The first page of 6H-17 contains notes that discuss the Standards, Guidance, Option, and Support for this particular operation. In the Standards section, it points out the requirements that MUST be met. For instance, one of the Standards states that “Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.” The Guidance portion discusses conditions that may arise and how to handle them appropriately. For instance, it says “Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.” The Option section talks about other devices that may be added to supplement the devices to provide additional reaction time or delineation. In this case, one of the options is to add a truck-mounted attenuator to the shadow vehicle or on the work vehicle. The Support section usually points out what Part 6 provides for this operation. For instance, here it defines what a shadow vehicle is used for.

### Notes for Figure 6H-17—Typical Application 17

**Mobile Operations on a Two-Lane Road**

**Standard:**
1. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.
2. Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.
3. If an arrow board is used, it shall be used in the caution mode.

**Guidance:**
4. Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.
5. Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.
6. The shadow vehicle should also be equipped with two high-intensity flashing lights mounted on the rear, adjacent to the sign.

**Option:**
7. The distance between the work and shadow vehicles may vary according to terrain, paint drying time, and other factors.
8. Additional shadow vehicles to warn and reduce the speed of oncoming or opposing vehicular traffic may be used. Law enforcement vehicles may be used for this purpose.
9. A truck-mounted attenuator may be used on the shadow vehicle or on the work vehicle.
10. If the work and shadow vehicles cannot pull over to allow vehicular traffic to pass frequently, a DO NOT PASS sign may be placed on the rear of the vehicle blocking the lane.

**Support:**
11. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead.

**Standard:**
12. Vehicle hazard warning signals shall not be used instead of the vehicle’s high-intensity rotating, flashing, oscillating, or strobe lights.
Figure 6H-17. Mobile Operations on a Two-Lane Road (TA-17)

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 17
The second page of this Typical Application contains an illustration which shows how the Mobile Operation is normally set up. It also points out some traffic control devices and safety devices that are optional for this operation. These devices help make the operation safer than the state minimum requirements. Section 6F.86 of the manual discusses these optional devices.

**Section 6F.86 Crash Cushions**

**Support:**
Crash cushions (also called Truck-Mounted Attenuators, or TMA’s) are systems that mitigate the effects of errant vehicles that strike obstacles, either by smoothly decelerating the vehicle to a stop when hit head-on, or by redirecting the errant vehicle. The two types of crash cushions that are used in TTC zones are stationary crash cushions and truck-mounted attenuators. Crash cushions in TTC zones help protect the drivers from the exposed ends of barriers, fixed objects, shadow vehicles, and other obstacles. Specific information on the use of crash cushions can be found in AASHTO’s “Roadside Design Guide” (see Section 1A.11).

**Standard:**
Crash cushions shall be crashworthy. They shall also be designed for each application to stop or redirect errant vehicles under prescribed conditions. Crash cushions shall be periodically inspected to verify that they have not been hit or damaged. Damaged crash cushions shall be promptly repaired or replaced to maintain their crashworthiness.

**Support:**
Stationary crash cushions are used in the same manner as permanent highway installations to protect drivers from the exposed ends of barriers, fixed objects, and other obstacles.

**Standard:**
Stationary crash cushions shall be designed for the specific application intended.

**Truck-mounted attenuators** shall be energy-absorbing devices attached to the rear of shadow trailers or trucks. If used, the shadow vehicle with the attenuator shall be located in advance of the work area, workers, or equipment to reduce the severity of rear-end crashes from errant vehicles.

**Support:**
Trucks or trailers are often used as shadow vehicles to protect workers or work equipment from errant vehicles. These shadow vehicles are normally equipped with flashing arrows, changeable message signs, and/or high-intensity rotating, flashing, oscillating, or strobe lights located properly in advance of the workers and/or equipment that they are protecting. However, these shadow vehicles might themselves cause
injuries to occupants of the errant vehicles if they are not equipped with truck-mounted attenuators (crash cushions).

**Guidance:**
The shadow truck should be positioned a sufficient distance in advance of the workers or equipment being protected so that there will be sufficient distance, but not so much so that errant vehicles will travel around the shadow truck and strike the protected workers and/or equipment.

**Support:**
Chapter 9 of AASHTO’s “Roadside Design Guide” (see Section 1A.11) contains additional information regarding the use of shadow vehicles.

**Guidance:**
If used, the truck-mounted attenuator should be used in accordance with the manufacturer’s specifications.

Here is what the manual says about *Work Duration*, including discussion of Mobile Operations.

**Section 6G.02 Work Duration**

**Support:**
Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location.

**Standard:**
The five categories of work duration and their time at a location shall be:

- **A.** Long-term stationary is work that occupies a location more than 3 days.
- **B.** Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.
- **C.** Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period.
- **D.** Short duration is work that occupies a location up to 1 hour.
- **E.** Mobile is work that moves intermittently or continuously.

**Support:**
At long-term stationary TTC zones, there is ample time to install and realize benefits from the full range of TTC procedures and devices that are available for use. Generally, larger channelizing devices, temporary roadways, and temporary traffic barriers are used.

**Standard:**
Since long-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in long-term stationary TTC zones.
Guidance:
Inappropriate markings in long-term stationary TTC zones should be removed and replaced with temporary markings.

Support:
In intermediate-term stationary TTC zones, it might not be feasible or practical to use procedures or devices that would be desirable for long-term stationary TTC zones, such as altered pavement markings, temporary traffic barriers, and temporary roadways. The increased time to place and remove these devices in some cases could significantly lengthen the project, thus increasing exposure time.

Standard:
Since intermediate-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in intermediate-term stationary TTC zones.

Support:
Most maintenance and utility operations are short-term stationary work.

As compared to stationary operations, mobile and short-duration operations are activities that might involve different treatments. Devices having greater mobility might be necessary such as signs mounted on trucks. Devices that are larger, more imposing, or more visible can be used effectively and economically. The mobility of the TTC zone is important.

Guidance:
Safety in short-duration or mobile operations should not be compromised by using fewer devices simply because the operation will frequently change its location.

Option:
Appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe lights may be used in place of signs and channelizing devices for short-duration or mobile operations. These vehicles may be augmented with signs or arrow boards.

Support:
During short-duration work, it often takes longer to set up and remove the TTC zone than to perform the work. Workers face hazards in setting up and taking down the TTC zone. Also, since the work time is short, delays affecting road users are significantly increased when additional devices are installed and removed.

Option:
Considering these factors, simplified control procedures may be warranted for short-duration work. A reduction in the number of devices may be offset by the use of other more dominant devices such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles.
Support:
Mobile operations often involve frequent short stops for activities such as litter cleanup, pothole patching, or utility operations, and are similar to short-duration operations.

**Guidance:**
*Warning signs and high-intensity rotating, flashing, oscillating, or strobe lights should be used on the vehicles that are participating in the mobile work.*

Option:
Flags and/or channelizing devices may additionally be used and moved periodically to keep them near the mobile work area.

Flaggers may be used for mobile operations that often involve frequent short stops.

(Note: Make sure you consider the Flaggers’ safety if you decide to use Flaggers as part of your mobile operation. Oncoming motorists need to be advised that Flaggers are controlling traffic, and therefore Flagger signs should be used. Refer to Section 6F.31 of the OMUTCD regarding use of Flagger signs.)

Support:
Mobile operations also include work activities where workers and equipment move along the road without stopping, usually at slow speeds. The advance warning area moves with the work area.

**Guidance:**
*When mobile operations are being performed, a shadow vehicle equipped with an arrow board or a sign should follow the work vehicle, especially when vehicular traffic speeds or volumes are high. Where feasible, warning signs should be placed along the roadway and moved periodically as work progresses. Under high-volume conditions, consideration should be given to scheduling mobile operations work during off-peak hours. If there are mobile operations on a high-speed travel lane of a multi-lane divided highway, arrow boards should be used.*

**Standard:**
*Mobile operations shall have appropriate devices on the equipment (that is, high-intensity rotating, flashing, oscillating, or strobe lights, signs, or special lighting), or shall use a separate vehicle with appropriate warning devices.*

Option:
For mobile operations that move at speeds of less than 3 mph, mobile signs or stationary signing that is periodically retrieved and repositioned in the advance warning area may be used.

**Plan Ahead Before You Hit the Road!**
Before you take your mobile operation out on the road, make sure you are totally aware of the roadway conditions before you leave the garage. You need to
know certain details of the 2-lane roadway. For instance, is there a berm or a shoulder for your crew to pull over onto to let traffic pass by? Are there hills and curves on this stretch of roadway that might be hazardous? One way to find out the answers to these questions is to get on your computer and go to Google Maps. Google Maps allows you to pinpoint the exact area where you will be working. It also gives you the options of looking at an **aerial view of the roadway and also a “street view” of the roadway**. If your work location is on a 55 MPH, 2-lane rural roadway, with hills and curves, you may want to consider setting up a Flagging Operation (such as shown in Typical Application 10, *Lane Closure on a Two-Lane Road Using Flaggers* – see next two pages) instead of a Mobile Operation. This is because the Flagging Operation in this particular situation is safer, being that it allows the motorists more time and distance to know that you are working in the roadway (three advance warning signs in each direction and the Flaggers). This is one reason why Google Maps is such a valuable decision-making tool.

**Summary of Mobile Work Zone Operations for 2-lane Roadways**

1. The O MUTCD’s Typical Application 17, on pages 760-761, is the basis for the design and operation of your Mobile Work Zone. It contains the standards which you must address in order to conduct this operation properly. It also contains a Guidance section, an Option section, a Support section, and also an illustration (Figure 6H-17); all of which help you to finalize the details of this operation.
2. Section 6F.86 of the OMUTCD discusses the option of adding Crash Cushions (Truck-Mounted Attenuators) to your mobile operation, which makes it safer than the State minimum requirements. This section also points out some considerations for the shadow vehicle in the Guidance and Support paragraphs.
3. Section 6G.02 of the OMUTCD discusses Work Duration and also the need for warning signs, arrow boards (placed on “caution” mode), and the high-intensity rotating, flashing, oscillating, or strobe lights.
4. **PLAN AHEAD!!!**

Questions about Temporary Traffic Control may be directed to the following personnel from the Ohio Department of Transportation (ODOT): Raymond Brushart, LTAP Safety Circuit Rider – 614-387-0523; Duane Soisson, P.E., Traffic Control Design Section Administrator – 614-466-3649; and Traffic Standards/Publications staff from the Office of Roadway Engineering. Assistance may also be available from Traffic Engineering staff at the ODOT District Office in your area. Townships and other local agencies are also encouraged to work with their County Engineer’s office regarding roadway and traffic issues.
**DISCLAIMER:** This RON Technical Update is provided for purposes of general information only. This is not a primary technical or legal authority, and should not be relied upon as such. Interested persons should refer to the source documents referenced herein. Please note also that information contained in this document could become outdated or obsolete over time.

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**Notes for Figure 6H-10—Typical Application 10**

**Lane Closure on a Two-Lane Road Using Flaggers**

**Option:**
1. For low-volume situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger, positioned to be visible to road users approaching from both directions, may be used (see Chapter 6E).
2. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration operations.
3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A BE PREPARED TO STOP sign may be added to the sign series.

**Guidance:**
4. The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.

**Standard:**
5. At night, flagger stations shall be illuminated, except in emergencies.

**Guidance:**
6. When used, the BE PREPARED TO STOP sign should be located between the Flagger sign and the ONE LANE ROAD sign.
7. When a grade crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the grade crossing, the TTC zone should be extended so that the transition area precedes the grade crossing.
8. When a grade crossing equipped with active warning devices exists within the activity area, provisions should be made for keeping flaggers informed as to the activation status of these warning devices.
9. When a grade crossing exists within the activity area, drivers operating on the left-hand side of the normal center line should be provided with comparable warning devices as for drivers operating on the right-hand side of the normal center line.
10. Early coordination with the railroad company or light rail transit agency should occur before work starts.

**Option:**
11. A flagger or a uniformed law enforcement officer may be used at the grade crossing to minimize the probability that vehicles are stopped within 15 feet of the grade crossing, measured from both sides of the outside rails.
Figure 6H-10. Lane Closure on a Two-Lane Road Using Flaggers (TA-10)

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.