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INTRODUCTION & OVERVIEW

In order to keep our highway systems running safely and efficiently maintenance, repair, or even reconstruction of these facilities are a necessity. These activities generally require alterations to existing traffic control operations so that safe driving operations may continue while the needed work is performed. These work zone environments provide a challenge in terms of both safety and mobility for many state, local, and other agencies that perform construction and/or maintenance work on public highways. The challenge is further exacerbated by the deteriorating condition of the aging highway system. Unless they have received advanced warning, road users are generally unaware of the upcoming changes in their travel environment until these work zones are visible to them. As such, it is imperative that temporary traffic control plans are used to assist road users by providing appropriate visual cues and guidance. The work zone traffic control must be implemented with standard treatments to consistently satisfy the expectations of the traveling public.

In 2005, the federal government enacted the Safe, Accountable, Flexible, and Efficient Transportation Act: A Legacy for Users (SAFETEA-LU) which established the FHWA Work Zone Safety Grant Program to address this specific issue. The original four year program, which began in 2006, included $20 million in funds for nonprofit organizations to provide training, tools, and guidance related to work zone safety. Under this 2006 grant, the Wayne State University – Transportation Research Group developed utility work zone guidelines, training materials, and a temporary traffic control plan software tool. The legislation was subsequently renewed so that additional grants were awarded in 2011, including a second grant to the WSU-TRG to expand upon the training materials, guidelines, and software tools previously developed.

As a part of its 2011 grant activities, the WSU-TRG developed an automated Temporary Traffic Control Plan (TTCP) design software program aimed at improving the consistency and effectiveness of these temporary traffic control plans. While work zone fatalities are declining across the country from 1,186 in 2002 to 609 in 2012, work zone safety remains a national priority (1). The TTCP tool is specifically designed to assist planning and design personnel involved in the work zone development and implementation processes. The software has been developed following the guidelines and methodology included in the Manual of Uniform Traffic Control Devices (MUTCD) and relevant state-of-the-art research and practice. It will provide guidance for most typical work zone environments, from short-term or mobile work zones to long-term freeway lane closures. The TTCP software includes temporary traffic control plans with supplementary notes that are relevant to the work zone conditions and compliant to the MUTCD guidelines. A summary of state-specific standard plans is also available within the software where applicable.

In order to efficiently utilize the software, the user should have an understanding of the existing roadway conditions for the site of interest. This includes the type of work being performed, type of highway, the setting (i.e., urban vs. rural), speed limit, estimate of traffic volumes, and relevant geometric characteristics. The user will then be directed to an appropriate temporary traffic control plan.
for the specific site via a logic-based flow chart included in the software. This process requires the user to answer a set of questions about the site in order to move through the flow chart until an appropriate traffic control plan is determined and displayed. The user is then prompted to enter additional site-specific information, such as speed limit or roadway dimensions, in order to determine the appropriate location of signage and other traffic control and channelizing devices. The final output will include a schematic diagram of the appropriate work zone traffic control plan, supplementary notes, and dimensions for the physical layout and locations of temporary traffic control devices which are calculated based upon formulas included in the MUTCD.

It should be noted that the software includes three main types of temporary traffic control plans. First, the full set of plans from the federal version of the 2009 MUTCD is incorporated where its use is appropriate given the conditions entered by the user. However, in order to cover the myriad of potential site conditions that may arise for specific work zones situations, additional plans were created. This resulted in the development of “Example” temporary traffic control plans that take into account the site conditions not currently covered in the 46 typical applications provided in the 2009 MUTCD. These plans were designed by the WSU-TRG and reviewed by the Federal Highway Administration (FHWA) as well as other experienced work zone design professionals in order to ensure that their use is safe, appropriate, and MUTCD-compliant. These plans are denoted as “Example” within the software to inform the user that they do not originate from the MUTCD. In addition, supplementary notes have been included with these “Example” plans, with relevant textual guidance as per the MUTCD, as well as any additional notes that were required. Many states have also developed their own temporary traffic control plans based on various roadway environments and types of work, as well as other State-Specific criteria. These are included in a separate module where the user can select any state and view the specific plans to see if any are applicable to the scenario under consideration. Where appropriate, state-level plans should be used in-lieu of typical applications or “Example” TTCPs in order to meet state and local regulations.

Finally, as a part of the 2006 FHWA Work Zone Safety Grant, the WSU-TRG developed similar “Example” temporary traffic control plans specific to utility work zones. The utility work zone plans originally developed as a part of the 2006 work zone safety grant were also ultimately implemented into web-based selection software akin to the TTCP software outlined within this manual. These plans have been subsequently reformatted to be incorporated into the new software, allowing users to identify “Example” plans specifically designed for utility work zones in addition to the other scenarios available.
TTCP Software Modules

The TTCP Selection Software is separated into eight distinct modules. These modules are separated by the typical roadway or work characteristics encountered by various types of highway professionals. Within the Main Module in the software, the user will be directed to the module most appropriate for the given work and roadway characteristics.

State Work Zone Module

The State-Specific Work Zone Module provides a comprehensive list of the temporary traffic control plans developed by each individual state. This module should be checked first to determine if there is an appropriate state-level plan for the given roadway and work characteristics.

Utility Work Zone Module

The Utility Work Zone Module includes temporary traffic control plans developed specifically for scenarios involving utility work. These plans, developed by the WSU-TRG, are similar to typical applications within the MUTCD, slightly modified traffic control devices geared towards utility operations.
Intersection Work Zone Module

The Intersection Work Zone Module includes temporary traffic control plans for differing work scenarios in the vicinity of highway intersections.

Mobile Work Zone Module

The Mobile Work Zone Module includes temporary traffic control plans for moving highway operations. This includes operations such as paint striping, debris cleaning, or other maintenance activities which move continuously or intermittently.

Work Zone Detour Module

The Work Zone Detour Module includes temporary traffic control plans which provide associated detours for various work zone scenarios.

Freeway Work Zone Module

The Freeway Work Zone Module includes temporary traffic control plans specific for operations taking place on the freeway.

Two Lane Work Zone Module

The Two Lane Work Zone Module includes temporary traffic control plans specific for operations taking place on two lane highways.

Multi-Lane Work Zone Module

The Multi-Lane Work Zone Module includes temporary traffic control plans specific for operations taking place on multi-lane highways.
System Requirements
The web-based software tool can be utilized with a personal computer or laptop, as well as on mobile devices such as smart phones or tablets, provided that the computer or mobile device has an active internet connection. The software has been developed such that it is compatible with the following operating systems:

- Microsoft Windows XP, Vista, 7, & 8
- Apple OS X Lion
- Apple iOS for Mobile Devices
- Android OS for Mobile Devices
- Microsoft Windows Mobile

Web Browsers for TTCP Software
The software has been developed and tested for use with the following web browsers:

- Mozilla Firefox
- Google Chrome
- Microsoft Internet Explorer
- Apple Safari

While the software will perform adequately for the noted browsers, it has been optimized for Google Chrome and Mozilla Firefox. Instructions to download (free) and install the latest version of either browser are available at:

Mozilla Firefox


Google Chrome


Contact Information
For any additional information about the Temporary Traffic Control Plan Selection Software, this User’s Guide, any of the other 2011 FHWA Work Zone Safety Grant products, please contact:

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Professor, Wayne State University
Transportation Research Group
SOFTWARE PROCEDURAL GUIDE

In order to utilize the software, the user should obtain various site-specific details related to the highway infrastructure. Then to access the web-based software, the user should enter the following link into the web browser:

http://workzone.eng.wayne.edu/

This will direct the user to the WSU-TRG’s 2011 Work Zone Safety Grant website, which includes links to the TTCP Selection Software as well as guidelines for various types of work zones. In addition, a searchable compendium of work zone safety documents is also available on this home page as shown below. Any future notes about updates to the TTCP Software or other products from the 2011 Work Zone Safety Grant will be provided on this home page.

The user can enter the software by first clicking on the “TTCP Software” link on the navigation bar of the home page.

Clicking the “WZ Home” button, which appears on every page within the products developed as a part of the 2011 FHWA Work Zone Safety Grant, will direct the user to the Work Zone Safety Home Page.
Once the “**TTCP Software**” link has been clicked, the user will be directed to the TTCP Software home page.

Once the “Launch TTCP Software” button has been clicked, the user will be directed to the **Main Module**. The **Main Module** serves as the start page, where the decision tree is displayed and the user may either skip to the desired module if it is already known, or begin answering questions related to the work site in order to move through the flow chart and reach the appropriate module.

If the user is already familiar with the software and prefers to skip to the appropriate module for which the temporary traffic control plan is desired, the flow chart link for that module can be clicked directly.
If the user is unaware of the appropriate module for their situation or is new to the software, the user should progress through the flow chart by clicking the “Start” button. This will prompt the user to answer a series of questions in order to be directed to the appropriate module and, ultimately, to the temporary traffic control plan for their site.

A “Yes” answer to this question will direct the user to the Utility Work Zone Module, while a “No” answer will continue the user to the next question (shown in the screen shot below).

For the purposes of explaining the use of the TTCP Software, it is assumed that the Intersection Work Zone Module will be selected. The user will be directed to a new flow chart specific to work zones that are located in the vicinity of an intersection. In order to navigate through this module, the user can click...
the “Intersection Work Zone Module” object that will prompt the user to a series of relevant questions in order to determine the appropriate plan. In addition, if the user is familiar with the software or knows which plan is most appropriate for their site, clicking the flow chart object that most accurately describes it will direct the user to the desired temporary traffic control plan.

Clicking the “Main Module” button will send the user back to the Main Module from any point in the software.

Clicking flow chart objects will act as a shortcut, directing the user to the appropriate question within the software.

Clicking a flow chart object will act as a shortcut to direct the user to a specific question or module. For the purposes of this procedural guide, it will be assumed that the user has clicked the “Is the work occurring on the shoulder or the roadside?” flow chart object (indicated in purple above). The user will then be directed to the following question within the software:

Clicking the “Intersection Module” button will return the user to the beginning of the Intersection Module.

A “Yes” answer to this question will direct the user to plan 6H-27A as indicated in the flow chart, while a “No” answer will continue the user through the module.
Selecting a “Yes” answer to the “Is the work occurring on the shoulder or the roadside?” question will request information about roadway characteristics that will determine the proper layout of the temporary traffic control plan. This could include whether the site is in an urban or rural environment, the posted speed limit, the width of the closure, as well as any other factors that are relevant to site specific geometric and traffic characteristics.

It should be noted that the set of questions will be slightly different depending on the temporary traffic control plan being selected. The answers provided by the user will determine the physical layout, including dimensions, of the temporary traffic control devices identified by the TTCP Software. It is critical that the user answer these questions accurately to obtain the most appropriate plan and dimensions.

Once the “Enter” button is clicked, the temporary traffic control plan for that site will be displayed. This will include a diagram of the selected plan and dimensions for the layout of traffic control devices will be displayed. In addition, links to the supplementary notes, a legend of the signs and symbols, and a printer friendly version are also included.
Clicking the “Notes” button will display a set of supplementary notes appropriate for the selected plan.

Clicking the “Legend/Symbols” button will direct the user to a page identifying signage and symbols used.

Clicking the “Print” button will bring the user to the print screen in their browser in order to print the plan.

Clicking the “Zoom” button will allow the user to pan through the image magnified.

The bottom left corner of each diagram will include the plan number as a reference. A plan number with a suffix (i.e. 27A) indicates an “Example” plan.

A table that includes necessary dimensions referenced in the diagram will also be displayed, either on the right for PCs or below for mobile devices.

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>FEET</th>
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<td>Maximum Taper Channelizing Device Spacing</td>
<td>80</td>
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<tr>
<td>Suggested Taper Channelizing Device Spacing</td>
<td>25</td>
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</tbody>
</table>
It should be noted that there are two primary types of plans included within the TTCP Software. This includes the 46 typical applications provided in the 2009 federal MUTCD, as well as “Example” plans developed by the WSU-TRG to supplement these typical applications. The “Example” plans developed by the WSU-TRG add to the number of “typical” roadway situations on which maintenance or construction activities may occur. The combination of these two types of plans allows for the TTCP Software to provide a customized plan for professionals to use as a base for a safe and efficient temporary traffic control plan.
SELECTION OF APPROPRIATE TEMPORARY TRAFFIC CONTROL PLAN

This portion of the TTCP User’s Guide provides guidance on the selection of the appropriate traffic control plan using the TTCP Selection Software developed by the WSU-TRG. For each module within the software, which is specific to work zones in differing roadway environments, a detailed explanation of the selection process is provided. While some modules may vary (such as the module regarding state specific plans), this process will generally involve progressing through the flow chart and answering questions from the drop down options based on relevant characteristics about that potential work site. Once the appropriate plan is selected via the flow chart logic, the user will be presented with a set of site specific questions that assist in determining the physical layout of the temporary traffic control devices. Finally, the user will be presented with a temporary traffic control plan that is appropriate for use and complaint to the 2009 version of the federal MUTCD. It will include a diagram of the TTCP, as well as supplementary notes and appropriate dimensions of the physical layout of temporary traffic control devices.

State-Specific Module
The State-Specific Zone Module is slightly different than any other module in the TTCP Selection Software. While other modules in the software will determine and display temporary traffic control plans from either the federal MUTCD or “Example” plans developed by the WSU-TRG, the State-Specific Module provides a comprehensive list of TTCPs designed by each state department of transportation. It should be noted that the plans included in this module are only TTCPs over and above what is available in the federal or State-Specific version of the MUTCD. These plans are generally applicable for specific types of road work being performed as well as certain roadway conditions or geometric characteristics. A user who is unfamiliar with the software or the State-Specific plans that are applicable for the work zone situation under consideration may check this module. It should be noted that the State-Specific Module provides a snapshot of the available plans from each state, with the associated date of the snapshot included once each state is selected.

Clicking “Go to state work zone module” or selecting “Yes” to the question in the flow chart will direct the user to the State-Specific Work Zone Module.
Once the user has selected the **State-Specific Work Zone Module**, the menu shown below will appear in the software. From this page, the user may select the state in which the proposed work zone will be located via the drop down menu.

Once the user has selected the state of interest, a second drop down menu will appear in the software. This menu will include a list of categories for which State-Specific temporary traffic control plans are available. Selecting the “**All Standard Plans**” option will result in the user being shown all of the standard plans available for the selected state.
After the category and state of interest have been selected via the drop down menus, the user will be shown the complete list of standard plans available. This list will be displayed in alphabetical order by the name of the standard plan as given by the state agency. It should be noted that if the “Set of Standard Plans” category has been selected, the first entry in the list will be a complete set of all the standard plans for that state (labeled “All Temporary Traffic Control Plans”). Clicking the title of any standard plans in the list will direct the user to an Adobe PDF document of the specified plan.

Clicking the “State Plans” button will direct the user back to the state selection menu

Clicking the “Maryland DOT’s Standards” button will direct the user to the official Standards Plans website for the state

Clicking any of the titles from the list of available standard plans will direct the user to an Adobe PDF document of the selected plan

In order to return to the software from an Adobe PDF document, the user must utilize the “Back” button on their web-browser which will direct them back to the State-Specific Module
**Roundabout Module**

Temporary traffic control for work zones within or in the vicinity of a roundabout present a different set of challenges compared to conventional intersections or roadway segments. As there are no typical applications for roundabout work zones in the 2009 version of the MUTCD, the addition of a Roundabout Module in the software required the development of many new “Example” temporary traffic control plans by the WSU-TRG. These plans were developed by WSU-TRG to achieve safety and mobility in the work zone that is compliant to the MUTCD, and were subsequently reviewed by the FHWA and other professionals. The Roundabout Module can be accessed from the Intersection Module since it appears early in the overall TTCP software flow chart.

The first question in the Roundabout Module relates to the geometry; as roundabouts generally contain either single-lane or multi-lane inner circles with single or multi-lane approaches. The user may either click the object that identifies the appropriate answer directly or may answer this question via the series of questions identified by the flow chart logic. This is shown in the screen shot below:
Assume that the user has selected a single-lane inner circle roundabout; the user will then be prompted to answer a series of questions regarding the characteristics of the work zone and the geometry of the roundabout in order to determine the appropriate temporary traffic control plan. As can be seen in the excerpt from the Roundabout Module flow chart shown on the right, one of four “Example” temporary traffic control plans will be displayed based on the user input. The first criterion for single-lane roundabouts is the type of road, which is either urban or rural based on the location of the proposed work site. The next criterion is the posted speed limit of the approaches adjacent to the roundabout which will be used in calculating the proper location of temporary traffic control devices. The software will also require the width of the lanes and shoulders within this work zone in order to determine the proper TTCP. Finally, there are several questions related to the characteristics of the work being performed, including the width of the closure, the location of the work (either within the roundabout or on an approach), and whether the work is interfering with sidewalks or crosswalks. A screen shot of the questions for single-lane roundabouts is shown below:

Using the drop down menus the user should select the most appropriate answer for their work site.

Once all the questions have been answered, clicking the “Enter” button will display the temporary traffic control plan determined to be most appropriate for this site.
The following diagram is the final output for a single-lane roundabout with selected answers:

![Diagram of a single-lane roundabout]

A table of dimensions for temporary traffic control will appear to the right of the diagram for PCs and below the diagram for mobile devices.

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>FEET</th>
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<tbody>
<tr>
<td>A (Distance Between Signs)</td>
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<td>70</td>
</tr>
<tr>
<td>Suggested Tangent Channelizing Device Spacing</td>
<td>25</td>
</tr>
</tbody>
</table>
In a similar manner, “Example” plans could be selected for a multi-lane roundabout. As multi-lane roundabouts may be entirely comprised of multi-lane approaches or have a combination of multi-lane and single-lane approaches, the TTCP selection software determines the appropriate plan based on the geometric conditions as shown below:

Assuming that the work is taking place within a multi-lane roundabout with exclusively multi-lane approaches, the user will then be required to determine the location of the work being performed.

Once the user has selected that the work is taking place within a roundabout which contains all multi-lane approaches, the user will be required to determine the location of the work. The user can either directly click the “Where is the work occurring?” question object or progress to this point through the flow chart logic.

The user can select that the work activity is either taking place within in the inner circulating lane, the outside circulating lane, or within one of the approaches. The software will determine the appropriate temporary traffic control plan based on location of the work being performed.
Assuming that the work is taking place within the inner circulating lane, the user will then be prompted to answer a series of questions via drop down menus about the work site and the adjacent roadway in order to determine the location of the appropriate temporary traffic control devices. The user will then be shown the appropriate temporary traffic control plan within the software.
**Freeway Module**

Temporary traffic control plans for freeways have been previously addressed by the MUTCD. However, the manual does not cover all situations that can arise when implementing temporary traffic control on freeways. Therefore, the WSU-TRG developed additional “Example” plans to supplement what is already available in the 2009 national MUTCD. These plans, along with the typical applications provided by the MUTCD, are available in the Freeway Module of the TTCP Software. This module functions in a similar manner to the Roundabout and Intersection Modules detailed previously. The Freeway Module can be accessed from the Main Module.

The first question within the Freeway Module relates to whether there are entrance and exit ramps in the vicinity of the work zone. If the work activities are affecting entrance or exit ramp operations, additional temporary traffic control measures are required. Selecting “Yes” to this question in the flow chart logic or clicking the “Go to entrance/exit ramp work zone module” will direct the user to the Entrance/Exit Work Zone Module. This module includes both typical applications from the MUTCD related to freeway entrance and exit ramps as well as “Example” plans developed by the WSU-TRG to supplement these typical applications.
Assuming the work site will not affect entrance or exit ramp operations, the user will be prompted for a series of questions relating to the location of the work on the freeway. This will direct the user to the most appropriate temporary traffic control plan for their specific freeway work site.

Assuming that the user selects “Shoulder only”, they will be directed along the flow chart decision tree to temporary traffic control plans specifically relating to freeway work taking place only in the shoulder. Once it is determined that work is taking place on the shoulder only, the user will be required to specify if the work is taking place on the left, right, or both shoulders. This will result in the software displaying the appropriate plan for the selected scenario. This can be performed either by proceeding through the flow chart logic from the Main Module, or simply clicking the “Left, right or both shoulders?” question object within the Freeway Module.

Clicking the “Left, right or both shoulders?” question object will direct the user to a question page where the user can select the appropriate location of work.
Assuming that the user selects that the work is taking place in the left shoulder only, they will be prompted for information relating to characteristics of the work area and the adjacent roadway.

![Diagram of a left shoulder closure on a freeway](image)

The user will then be shown the appropriate plan, along with the locations for the temporary traffic control devices specified within the plans.

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<tr>
<td>Suggested Tangent Channelizing Device Spacing</td>
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</tbody>
</table>

The bottom left corner of each diagram will include the plan number as a reference.

The software will also display a table that includes necessary dimensions referenced in the diagram – it will be located either be on the right for PCs or below for mobile devices.
Multi-Lane Module

Temporary traffic control plans for multi-lane highways have been previously addressed by the MUTCD. However, the manual does not cover the assortment of situations that can arise when implementing temporary traffic control on these roadways. Therefore, the WSU-TRG developed additional “Example” plans to supplement what is already available in the 2009 national MUTCD. These plans, along with the typical applications provided by the MUTCD, are available in the Multi-Lane Module of the TTCP Software. This module functions in a similar manner to the Roundabout and Intersection Modules detailed previously. The Multi-Lane Module can be accessed from the Main Module, after selecting what type of roadway the work is taking place on.

The first question within the Multi-Lane Module asks the user if the work is being performed on a divided or undivided highway. As divided or undivided highways present significantly different scenarios, this selection effectively directs the user to most appropriate set of temporary traffic control plans. The user will then be directed along the flow chart logic, prompted with questions relating to the location and duration of work being performed, as well as other characteristics of the proposed work site.

Clicking the “Go to Multi-Lane Module” object or selecting “Multi-Lane” from the “What type of work is taking place?” question will direct the user to the Multi-Lane Module.
Assuming the roadway in question is divided, the software will then ask about the location and the duration of the work being performed. The user may directly click the appropriate question in the flow chart logic if it is known, or simply progress through the prompted questions in order to reach the correct plan.

Asuming that there is a closure of the right lane, the software will then prompt the user to determine if the work is expected to be long, intermediate, or short in duration. This will direct the user to the appropriate plan. For assistance in determing the appropriate work duration for the intended use of TTCPs, please refer to the MUTCD.

Once the user reaches this point via the questions in the flow chart logic, or simply clicking the “Is this a long, intermediate or short term project?” question object, they will be prompted to determine the duration of the work being performed.
Assuming that the user has determined that the proposed work is going to be long term in duration, the software will then ask the user to provide information relating to the work and the adjacent roadway.

The user will then be shown the appropriate plan, along with the locations for the temporary traffic control devices specified within the plans.

<table>
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</table>

**Figure 6H-34. Lane Closure with Temporary Traffic Barrier**

The software will also display a table that includes necessary dimensions referenced in the diagram – it will be located either on the right for PCs or below for mobile devices.
Utility Module

One area in which the typical applications provided by the MUTCD do not provide sufficient coverage is utility work zone operations. These types of work zones are generally shorter in duration as this work is usually completed in a timely manner to provide essential services to the public. Therefore, while the temporary traffic control used in these situations must conform to the requirements of the MUTCD, it is often impractical for a utility company to generate a detailed, site specific temporary traffic control plan. As such, as part of the 2006 Work Zone Safety Grant, the WSU-TRG developed several additional “Example” plans to supplement the MUTCD. While these plans generally include a reduced number of traffic control devices as compared to long or intermediate term operations, these plans are still compliant to the MUTCD and allow for utility companies to preserve safety and mobility while efficiently providing necessary services.

The first two questions in the Utility Module relate to whether the work is taking place either at night or along a freeway. The “Example” plans developed by the WSU-TRG as a part of the 2006 FHWA Work Zone Safety grant do not cover operations taking place at night. Users who are involved with utility work being performed at night should refer to the MUTCD for further details to assist in developing a safe and efficient temporary traffic control plan. Further, utility operations taking place along freeways were not specifically addressed, and due to the high speeds on these types of highways, it is suggested to refer to the Freeway Module for temporary traffic control plans.
The next question in the flow chart logic relates to a common operation in many communities, tree cutting or trimming operations. Specific plans are available for tree cutting or tree trimming operations. These include shoulder closures on a two-lane road as well as operations which require a lane closure on a multi-lane roadway.

The user may reach this portion of the software by advancing through the flow chart logic or simply clicking the “Is this a tree cutting or trimming operation?” question object. Selecting “Yes” will direct the user to plans specific to tree cutting or trimming operations.

Assuming that the work does not involve tree cutting or trimming operations, the user will then be prompted for the location where the utility work is being performed.

The user can either navigate the questions in the flow chart logic or simply click the “What is the location of the utility work?” question object in order to select the location of the work being performed.

Clicking either the “Beyond shoulder” object or the “Go to beyond shoulder module” object, as well as selecting “Beyond Shoulder” to the “What is the location of the utility work?” question will direct the user to the Beyond Shoulder Utility Module.

2
Assuming that the work is taking place beyond the shoulder, the user will then be directed to the **Beyond Shoulder Utility Module**. This module provides plans specific to utility work taking place beyond the shoulder of a highway only. The first question in the **Beyond Shoulder Utility Sub-Module** relates to the location of the work vehicle on the roadway, as this will be a determining factor for selecting the appropriate temporary traffic control for that work site. Assuming that the work vehicle is not parked on the shoulder, the user will then be directed to the appropriate plan for those conditions.

The user may either click the "Is a work vehicle parked on the shoulder?" question object, or progress through the flow chart logic to reach this point of the software.

Clicking the "Print" button will bring the user to the print screen in their browser in order to print.

Clicking the "Zoom" button will allow the user to pan through the image magnified.

Clicking the "Legend/Symbols" button will direct the user to a page identifying signage and symbols used.
In addition to the scenario shown above, there are many typical situations which may be encountered by utility work crews in the field. The TTCP Selection Software attempts to cover the majority of those typical situations, providing temporary traffic control plans appropriate for use by utility crews that are still compliant to the intent of the MUTCD. To illustrate this point, let’s assume that the user is looking for temporary traffic control plans where the work is being performed on the roadway, as opposed to beyond the shoulder in the previous example.

Selecting the “On Roadway” from the “What is the location of the utility work?” question object will direct the user to the On Roadway Utility Module which provides temporary traffic control plans appropriate for use when the utility work being performed is taking place within the roadway.

The first question in the On Roadway Utility Sub-Module asks if the entire roadway is closed due to the utility work, which requires a unique temporary traffic control plan. Assuming that the utility work being performed will not require that the entire roadway be closed, the software will direct the user through the rest of the flow chart logic for this module.

Once it is determined that the utility work being performed does not require that the entire road be closed, the next question asks if the work being performed is located within or nearby an intersection. Selecting “Yes” to the “Is the utility work on or near an intersection?” question object will direct the user to temporary traffic control plans specific for utility work within the vicinity of an intersection. Selecting “No” to this question will direct the user along the flow chart logic, where additional information will be requested in order to determine the appropriate temporary traffic control plan.
Assuming that the utility work being performed is taking place within or nearby an intersection, the user must identify the portion of the roadway which is being affected by the operation. This could include work being performed on the near side of the intersection, the far side of the intersection, or at the center of the intersection. Let’s say that the work is being performed on the right lane on the near side of the intersection, the software will seek additional input about the work site in order to determine the optimal layout of traffic control devices before displaying the appropriate plan.

**Figure H. Right Lane Closure on Near Side of Intersection**
Likewise, let’s assume that the user selects that the utility work taking place is affecting the center of the intersection. After providing additional details about the adjacent roadway, the software will display the appropriate plan along with the optimal dimensions for the placement of temporary traffic control devices.

**Figure L. Closure in Center of Intersection**

The software will also display a table that includes necessary dimensions referenced in the diagram – It will be located either be on the right for PCs or below for mobile devices.

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>FEET</th>
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<tbody>
<tr>
<td>A (Distance Between Signs)</td>
<td>350</td>
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<tr>
<td>L (Taper Length)</td>
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<tr>
<td>Maximum Taper Channelizing Device Spacing</td>
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<tr>
<td>Suggested Taper Channelizing Device Spacing</td>
<td>15</td>
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<tr>
<td>Maximum Tangent Channelizing Device Spacing</td>
<td>80</td>
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<tr>
<td>Suggested Tangent Channelizing Device Spacing</td>
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While the previous examples provide temporary traffic control plans for utility work zones within the vicinity of an intersection, there are a variety of other situations which involves utility work on a roadway. In such cases, the user will be directed through the rest of the flow chart logic within the On Roadway Utility Sub-Module.
If the work is not taking place near an intersection, the software will direct the user through additional flow chart logic in order to determine the appropriate temporary traffic control plan. The next question in the flow chart logic asks if the utility work is taking place in the middle of the roadway. Assuming that the work is not taking place in the middle of the roadway, the user will be directed further down the flow chart logic.

The user can reach this point in the software by either progressing through the flow chart logic or simply clicking the “Is the adjacent road two-lane?” question object. A “No” answer will refer the user to the appropriate plan, while a “Yes” answer will direct the user further along the flow chart logic.

Let’s say that the adjacent roadway has more than two lanes and, therefore, requires a plan suited for multi-lane highways. The software will then display the appropriate plan, once the user has entered some additional relevant information about the adjacent roadway.

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Instead, let’s assume that the adjacent roadway is a two-lane road. The next question relates to the visibility near the lane closure and if the visibility is restricted, a specific temporary traffic control plan is required that will incorporate additional traffic control devices in order to mitigate the sight distance hazard. Assuming that there are no visibility restrictions near the work activity, the next question relates to the traffic conditions present near the work zone. As roadways that experience higher volumes and speeds may require more rigorous temporary traffic control, a specific plan is required for this situation. Let’s say that the user selects that the adjacent roadway is not low volume and low speed, after obtaining further information about the work site via the drop down menus, the software will display the appropriate plan.

**Figure F. Utility Work on Shoulder with Minor Encroachment (High Traffic Volume and/or High Speed)**

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While the previous examples detail temporary traffic control plans for work taking place on the side of a roadway, utility work often requires working within the middle of the roadway. As such, there are two plans within the software to address this specific issue.

The user may enter this series of questions by clicking on the “Is the work taking place on a multi-lane roadway?” question object or continuing through the previous flow chart logic. Selecting “Yes” will direct the user to a temporary traffic control plan designed for utility work taking place in the middle of a multi-lane roadway, while “No” will direct the user to a plan designed for utility work in the middle of a two-lane roadway.

In such instances, the software will display an appropriate plan related to utility work taking place in the middle of a two-lane highway or multi-lane highway.

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<td>Suggested Tangent Channelizing Device Spacing</td>
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ADDITIONAL CONSIDERATIONS
While this guide details the use of the Temporary Traffic Control Plan Selection Software, the typical applications and “Example” plans provided within the software should only be used as a basis for a safe and efficient temporary traffic control plan. In addition to utilizing the plans identified by the site specific conditions provided within the software, the user should also investigate several additional issues, including:

- Local standards and ordinances;
- Compliance with a State-Specific MUTCD or standard plans;
- Region specific considerations which may require alterations to the typical applications from the MUTCD or the “Example” plans provided within the software; and
- Site specific conditions not specifically covered within the MUTCD or the TTCP Selection Software.

REFERENCES