

**INDIANA DEPARTMENT OF
TRANSPORTATION**

POLICIES, PROCESSES, and PROCEDURES
for WORK ZONE SAFETY and MOBILITY

(Pursuant to 23 CFR 630 Subpart J & K)

2015



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This document has been prepared by and is managed by the Work Zone Safety Section at the INDOT Traffic Management Center. Current information concerning the Work Zone Safety Section can be found at: <http://www.in.gov/indot/2356.htm>

MISSION STATEMENT

The Indiana Department of Transportation will plan, build, maintain, and operate a superior transportation system enhancing safety, mobility and economic growth.

OBJECTIVE

Construction and maintenance work must be performed in order to provide the best surface transportation system possible. However, this work can also result in crashes and congestion on Indiana highways. The Indiana Department of Transportation (INDOT) is committed to reducing the frequency and severity of crashes and the overall amount of congestion in all highway work zones. Therefore, it is essential that reasonable countermeasures that improve safety for motorists and workers while reducing traffic delays in work zones be considered prior to work commencing. It is equally essential that an active work zone's performance be monitored so that adjustments can be made as needed.

Because of this, INDOT has developed the Policies, Processes, and Procedures for Work Zone Safety and Mobility to assist designers and other INDOT personnel in an effort to achieve these stated objectives in accordance with the requirements of paragraph 630.1006 of 23 CRF 630 Subpart J as well as paragraph 630.1106 of 23 CRF 630 Subpart K.

POLICIES

Strategies and devices used in INDOT work zones should be based on the project's and highway's characteristics and factors. These strategies and devices must conform to the AASHTO Roadside Design Guide as well as the Indiana Manual on Uniform Traffic Control Devices (IMUTCD), available at: <http://www.in.gov/dot/div/contracts/design/mutcd/mutcd.html>. Additionally, contracted and permitted work must meet the requirements of INDOT's Standard Specifications, Standard Drawings, and Construction Memorandums available at: www.in.gov/dot/div/contracts/standards/. All maintenance activity performed by INDOT forces must meet the requirements of INDOT's Work Zone Traffic Control Guidelines, available at: www.in.gov/indot/files/WorkZoneTCH.pdf.

Interstate Work Zones

Beyond complying with the policies outlined above, all interstate work, whether contracted or in-house, must be conducted within the constraints of the current version of the Interstate Highways Congestion Policy (IHCP). The goal of the IHCP is to reduce queuing and congestion around interstate work zones and to diminish the frequency of the high speed rear-end crashes that can occur at the back of a queue.

The IHCP provides preapproved lane closure schedules for every segment of interstate in Indiana. For example, some segments are deemed to be so sensitive that no lanes should be closed without approval from INDOT's executive staff while other segments have low enough traffic volumes that single lane closures are allowed at any time. For most segments, a single lane may be closed during certain times of the day or days of the week. An approved IHCP Exception is needed prior to closing lanes outside these preapproved times. Other operations which cause congestion on an interstate, such as shoulder work, may also require an approved

IHCP Exception. The current version of the IHCP contains guidance on which activities require an exception.

A queue is defined in the IHCP as the length of pavement occupied by a line or lines of closely spaced vehicles travelling below 30 mph. It is measured from the point of restriction towards oncoming traffic. While INDOT strives to eliminate all queuing in work zones, the pre-approved closure schedules are based on the threshold queuing values. Although all projects should strive to meet these threshold values, they are not always possible to achieve. If a lane closure will result in unavoidable queuing which is outside policy limits, various countermeasures to mitigate the queuing should be considered.

The IHCP guidelines used to evaluate the viability of interstate continuous or multiple day closures are listed below:

- 1) No queues of any length should be permitted to exceed 6 continuous hours or 12 hours in any calendar day.
- 2) Queues greater than 0.5 miles in length should not be permitted to exceed 4 continuous hours.
- 3) Queues greater than 1.0 mile in length should not be permitted to exceed 2 continuous hours.
- 4) Queues greater than 1.5 miles in length should not be permitted.

For projects with daily, non-continuous lane closures the policy recommends that the following additional guidance also be followed:

- 1) If queues can be eliminated by adjusting the hours worked while still completing the project in a reasonable time frame then the adjustment should be made.
- 2) Whenever possible the closure should not begin during an hour which will generate a queue.
- 3) If the last hour planned for work is the first one in which a queue will be generated then the schedule should be adjusted away from closing during that hour.
- 4) Where queues are expected, additional advanced work zone warning signage should be specified for placement at the distances noted in the IMUTCD ahead of the anticipated queue.

Variations from the preapproved closure schedules are only allowed when it can be shown that there are no viable alternatives or that other alternatives are distinctly inferior. As traffic counts are updated periodically, the preapproved levels of each segment will be updated accordingly to reflect the changes in demand.

The current version of the IHCP is available at:

<https://secure.in.gov/indot/3383.htm>

Significant Project Definition and Identification

A significant project is one that, alone or in combination with other concurrent projects in the vicinity, is anticipated to cause sustained work zone impacts greater than what is considered acceptable based on INDOT policy and/or engineering judgment. All projects will be identified as either significant or non-significant in relation to work zone impacts to traffic.

Any project on an interstate route that is in a Traffic Management Area (TMA) county and occupies a location for more than three days with intermittent or continuous lane closures is, by 23 CFR630 Subpart J, deemed to be a significant project. Current Indiana TMAs and their associated counties are:

- Cincinnati (OKI).....*all of Dearborn County*
- Evansville.....*all of Vanderburgh and Warrick Counties.*
- Louisville.....*all of Clark and Floyd Counties*
- Fort Wayne.....*all of Allen, Huntington, and Whitley Counties*
- Gary (NIRPC).....*all of Lake, La Porte, and Porter Counties*
- Indianapolis.....*all of Marion, Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, and Shelby Counties*
- South Bend/Elkhart...*all of St Joseph and Elkhart Counties*

Additionally, a project, regardless of route type, may be deemed significant based on the considerations listed below:

1. Where the project scope of work consists of major reconstruction or new construction [e.g., partial reconstruction (4R) (freeway)]. *Refer to the Indiana Design Manual available at: http://www.in.gov/indot/design_manual/index.htm;*
2. Where there are high traffic volumes (e.g. 12,000 AADT for two lane highways and 30,000 AADT for multilane highways);
3. Where the project is in an urban or suburban area;
4. Where there may be significant detrimental impacts on mobility for either through or local trips in the corridor;
5. Where the facility's capacity will be significantly reduced (e.g., through lane, ramp, or interchange closures);
6. Where alternate routing will be necessary (e.g., detour routing for hazardous materials);
7. Where there will be significant impacts on local communities and businesses (e.g., emergency vehicles, school buses);
8. Where timing and seasonal impacts may be significant; or
9. Where there will be significant grade changes.

The designer will determine if the project is significant during the design phase. When changes to the project scope cause a project to be deemed significant in accordance with the items above, the project manager must be notified as soon as possible.

All work deemed to be significant will have a written Traffic Management Plan (TMP) developed. This TMP will include a Temporary Traffic Control Plan (TTCP), a Transportation Operations Plan (TOP), and a Public Information Plan (PIP). Projects which are not deemed to be significant are

only required to include a TTCP but are encouraged to include all three elements. After a project is identified as being significant, a TMP team will be formed. The TMP team is responsible for developing the Traffic Management Plan for the project. Typically, the team will consist of a representative from each entity that will be involved in the implementation of the project. This team is multidisciplinary and generally is comprised of representatives from any or all of the following:

- Division of Traffic Engineering
- Office of Environmental Services, Environment Assessment Team
- Office of Highway Design and Technical Support
- District Office of Traffic
- District Office of Design
- District Construction Team
- Standards Committee
- Federal Highway Administration (FHWA)
- Local Government Agency
- Asset Management Division
- Office of Communications
- Others as deemed necessary (e.g. State Police, Hospitals, Work Zone Safety Section, District Safety or Central Office Safety, Public Safety Operations, etc.)

Input received from businesses and other private stakeholders potentially affected by the work zone should also be considered.

The TMP team stays involved with the project from inception through final acceptance. A final TMP meeting should be held to review the implementation of the TMP, changes that were made throughout the project, and what was learned that can be applied on other projects. Additionally, a final report should be prepared by the TMP team. The TMP process is discussed in greater detail under the “Project Level Procedures” section of this document and in the current version of the Indiana Design Manual (IDM) that can be found at:

http://www.in.gov/indot/design_manual/index.htm.

Where a series of proposed projects are along the same corridor or along corridors of close proximity, a single TMP covering all projects should be used. If circumstances are such that a single TMP is not feasible, then the individual TMPs should be coordinated.

If it is determined that it is not desirable to implement a formal TMP on an interstate project that is automatically identified as significant, then a request for an exception to the requirement for a formal TMP must be made in writing to the FHWA. Exceptions for general classifications of automatically identified projects (e.g. mowing) may also be requested from the FHWA. Requests for TMP exceptions for all other projects determined to be significant must be submitted to the Director of Highway Design & Technical Support (HDTSD) for review. The HDTSD will forward satisfactory requests to the Deputy Commissioner of Engineering and Asset Management (DCEAM), who will either approve or deny them.

Significant, Non-Interstate Work Zones

A formal TMP will be developed for all non-interstate work deemed to be significant. TMP procedures for non-interstate projects are the same as those for interstate projects.

Permit Policies in Work Zones

It is the State of Indiana's policy to permit oversized vehicles across routes that are not restricted by construction activity. Oversized vehicles are, in certain instances, required to have police escorts. If a work zone is encountered along the permit route, law enforcement informs the Indiana Department of Revenue for rerouting. When it is necessary to allow a permitted load through a work zone, the load will not be allowed to make the transit of the work zone during peak demand times or concurrently with special events.

Local, Federal-Aid Projects

Agreements for all local, federal-aid projects administered by INDOT will stipulate conformance to this policy through appropriate language within the agreement.

STATE LEVEL PROCESSES & PROCEDURES

Work Zone Assessment & Management

Projects are analyzed with the criteria for significant projects during the design phase. The analysis of some of the criteria is intuitive (e.g. criteria 1 – work consisting of new construction), while others require some research (e.g. criteria 2 – high traffic volumes). Some of this analysis may be subjective and, as a result, the reconsideration of the project impacts and the refinement of the TMP at later stages of plan development may be required.

For projects that are deemed significant, analysis of the impact to traffic is performed promptly after the identification is made. For interstate/freeway projects, this analysis is generally in the form of estimating queuing/delay, but often includes operational analysis of ramps, intersections, and alternative/detour routes. Non-interstate/non-freeway projects may also require analysis of corridor, intersection, and/or signal operational levels. Subsequent analysis should be performed when there is a change to the scope or plans that may alter the mobility and safety of the project. In turn, this analysis may affect the scope of work, the level of detail in the plans, or how construction is phased.

The Work Zone Safety Section of the Operations Division's Traffic Management Center (TMC) is involved with the planning and design phases as well as the construction phase of projects. The Work Zone Safety Section strives to improve safety and mobility in and around work zones for both motorists and workers. In part, this is done by performing project level field reviews of active work zones. During these reviews, the condition and placement of temporary traffic control (TTC) devices is noted, and specific items that need attention are reported. Additionally, the section tracks work zone compliance trends for work zone TTC setups based on what is documented during the field reviews. The Work Zone Safety Section's website can be found at:

<http://www.in.gov/indot/2356.htm>

The section recommends ways to increase traffic mobility through work zones that are performing or predicted to perform below expected levels. Examples of methods for supporting maximum work zone mobility include, but are not limited to: end-of-queue warning systems, temporary rumble strips, lane discipline signage (DO NOT PASS and TRUCKS USE [RIGHT or LEFT] LANE), dynamic speed monitoring displays ("Your speed is" signage), the use of alternate routes, travel time signage, and expected delay signage.

The section also maintains the Interstate Highway Congestion Policy (IHCP), the Policies, Processes and Procedures on Work Zone Safety and Mobility (this policy), the Work Zone Traffic Control Guidelines, and provides technical assistance regarding other work zone safety policies and standards.

The Work Zone Safety Section provides training courses on best practices in work zones. Some of the courses cover the proper use of TTC devices and others cover how to apply the IHCP. In the past, this training has been provided to INDOT construction personnel and designers. In the future, this training will also be provided to additional personnel.

The Work Zone Safety Section notes any queuing and delay observed during the course of the routine reviews. These observations will support the IHCP and can lead to changes in the construction plan if the queue is deemed to be unacceptable.

The TMC and the Technical Services Divisions in the districts address traffic operational issues in work zones. In many areas, the TMC maintains Intelligent Transportation System (ITS) infrastructure, which may be utilized as part of the TMP. The district Technical Services Division may request temporary adjustments to signal timings, channelization, and regulatory conditions such as speed limits and passing zones as needed to optimize traffic flow.

Incident Management

An Incident Management Plan (IMP) that is separate from the TOP may be necessary for a project on an interstate route where the AADT exceeds 50,000. Projects that have the greatest impact to travelers can engage the Public Safety Operations (PSO) Division of the TMC to assist with implementing an IMP when it is a part of the TMP. The PSO Division acts as liaison between INDOT Construction, the Indiana State Police, other law enforcement agencies, fire agencies and emergency medical services regarding incident and emergency response activities.

The PSO Division also provides a coordinated incident management response effort and the formulation of a multi-agency Incident Management Response Task Force. This task force consists of the agencies which will be affected by the project. It is intended to improve communications between emergency responders and to provide for implementation of coordinated plans, activities, and operational procedures between the affected agencies.

Uniformed Law Enforcement in Work Zones

A uniformed law enforcement officer in a police vehicle can provide a safety benefit to certain work zones. The INDOT PSO Division provides for marked vehicles, unmarked vehicles, motorcycles, and pickup trucks to be used, as necessary, within selected INDOT work zones to gain motorist compliance and insure public safety. Such law enforcement presence is not a substitute for the temporary traffic control devices required by Part 6 of the IMUTCD.

The contractor may hire an off duty officer to assist with traffic control in the work zone, or INDOT may retain off duty officers from the Indiana State Police to assist with the traffic control in the work zone on selected projects. This effort is coordinated by the INDOT PSO Division and is limited by fund availability.

Work Zone Data

INDOT collects data on work zone crashes and work zone mobility.

Crash data is obtained from the statewide Automated Reporting Information Exchange System (ARIES). The data collected for the construction period can be compared to historical data, when work was not taking place, at the same location and for the same months. This comparison is sometimes used to assess overall impact of the work zone on the traffic and the effectiveness of the work zone.

Work zone mobility data is collected by the Traffic Management Division to validate and update the IHCP and determine the need to consider project specific adjustments. This data can also be collected from other sources such as ITS hardware or GPS data. The GPS data that is collected is processed by a web tool which has been designed by staff at the TMC that can be found at:

<http://liveview.trafficwise.org/>

Field reviews performed at the project level by the Work Zone Safety Section yield observations on work zone operational characteristics and work zone traffic control device condition. These observations are synthesized into a year-end summary noting general tendencies, problem areas, and ideas for improvements. Findings are presented in an annual report distributed to the Executive Staff as well as the Production (Design), Construction, and Traffic Management offices. Presentations covering this information are also made to district construction personnel at their annual conferences.

Training

INDOT specifications currently require each contractor to identify a Certified Worksite Traffic Supervisor on each project that utilizes TTC. This certification is provided by the American Traffic Safety Services Association (ATSSA) or another approved source that has been determined to equal or exceed the detail of the ATSSA training. It is the practice of the Work Zone Safety Section that each section member receives this type of training periodically.

INDOT maintenance staff is required to receive training on flagging and work zone traffic control which is provided by the District Safety Directors. INDOT requires this training to be given to all new maintenance employees. Additionally, all maintenance employees attend refresher courses on a periodic basis.

INDOT has provided work zone training from in-house and national sources to designers and construction personnel. The Work Zone Safety Section provides in-house training to INDOT construction personnel as well as other groups/organizations. The Public Safety Operations Division provides Incident Management Awareness Training for contractor, sub-contractor supervisors, contract wrecker personnel, and other key personnel involved in major projects. These training courses are updated periodically.

Public Outreach

Public outreach is the method of utilizing a variety of measures to inform the public of work zone conditions. When the public is informed of work zone conditions in advance they may drive with more care within the work zone, or choose to use an different route altogether. At a statewide level, there are numerous processes to achieve a high level of Public Outreach. These include:

- Posting all news releases to the agency website and social media outlets. (This is done by the Communications Offices in central office and in the districts.)
- The INDOT TrafficWise website (<http://pws.trafficwise.org/pws/>) which offers a real-time snapshot of road restrictions and travel conditions.
- District customer service representatives who respond to inquiries.
- A toll free customer service line (866-849-1368, EXT 0) that is available to the public.
- The INDOT CARs Program website (<http://indot.carsprogram.org/main.jsf>) which provides the public, and permit applicants, information on road restrictions.

Additionally, the Customer Service Office tracks responses to inquiries to constantly improve service and response time.

INDOT presents and discusses work zone safety related concepts, practices and materials in public forums. At times this is done on INDOT's initiative and other times it is done by request. These efforts are generally performed by either the Communications Offices or the Work Zone Safety Section.

INDOT participates in the annual National Work Zone Safety Awareness Week. Organized events and press releases by the Central and District Communications Offices result in media exposure throughout the state. In recent years the Governor and Lieutenant Governor of Indiana, the Director of the Indiana Division of the FHWA, Indiana State Police, and family members of workers killed in work zone crashes have participated in the events.

Process Review

A process review will be conducted during odd-numbered years. A review team comprised of staff from a cross-section of INDOT offices will be formed and may include representatives from Planning, Production (Design), Operations, Construction, Traffic, Districts, Capital Program Management, and Communications. The Indiana Division of the FHWA will be invited to participate in the review. The findings will be used to develop a report, containing recommendations for improving INDOT work zone policies and procedures, which will be presented to INDOT's Executive Staff and the FHWA division office.

PROJECT LEVEL PROCEDURES

Transportation Management Plans

Determining the need for a Transportation Management Plan (TMP) normally is done at the start of the design phase for contracted work. This reduces the chance that a designer will have to rework all or part of the plans, particularly the maintenance of traffic (MOT) details.

TMPs for significant projects will include these three elements:

- **Temporary Traffic Control Plan (TTCP).** Since highway construction disrupts the normal flow of traffic and poses safety hazards, work zone traffic control should be considered on each highway construction project. The objective of the TTCP is to provide an implementation strategy that will minimize the adverse effects of traffic disruption on motorists, pedestrians, bicyclists, or workers. It is the designer's responsibility to ensure that an adequate TTCP is developed. The TTCP for contracted activities consists of the project specific MOT plans, contract provisions, INDOT Standard Drawings, and INDOT Standard Specifications. These documents create the basis for bidding, define how the contractor is to phase construction, and detail all the required elements of the physical work zone.

Selection of the appropriate work zone type represents one of the most significant elements of a traffic control strategy. Where appropriate, exposure control measures such as full road closures, ramp closures, median crossovers, working at off peak times, and accelerated construction techniques should be considered while selecting the work zone type to avoid or minimize worker exposure to motorized traffic and the exposure of traffic to work activities. When selecting an exposure control measure, adequate consideration should be given to the potential impacts on mobility. The appropriate work zone type should be identified at an early stage in the design process to significantly reduce the amount of time spent on analysis.

In addition to the selection of the work type, appropriate consideration should be given to other traffic control measures aimed at reducing work zone crashes and the risks and consequences of motorized traffic intrusion into the work space. Other traffic control measures to be considered include, but are not limited to, portable changeable message signs, high-level warning devices, longitudinal and lateral buffer spaces, temporary rumble strips, and channelizing device spacing reduction.

The Work Vehicle Traffic Control Plan (WVTCP) is a tool that the Project Engineer / Supervisor (PE/S) can use to coordinate and control the flow of construction vehicles, equipment, and workers within the work area. For many routes and work zone types, the WVTCP may need to address the safe access and egress of work vehicles and construction delivery vehicles to and from the work area. Access and egress of work vehicles and construction delivery vehicles must be discussed with and approved by the PE/S.

Contractors may suggest changes to the TTCP to facilitate construction while maintaining work zone safety and similar levels of mobility. If a contractor believes that changes to the TTCP can result in improved traffic flow or smoother work operations, a written request may be submitted to the PE/S detailing the reason(s) for the request and the suggested modifications. An engineered drawing should be included to clarify what would be changed and how it will affect the traffic flow. The PE/S, along with the Area Engineer (AE), will review the submittal and determine if it is in the best interest of all stakeholders, including construction personnel, to allow the requested changes.

If it is concluded that the TTCP change is viable, then Project Personnel shall determine whether the contract pay items are affected. The time of the TTCP closure/restriction and any other important concerns should also be discussed. The proposal may be approved at the District level or may need input and/or approval from the Construction Management Division. After these steps are complete, a change order may be necessary.

The TTCP for maintenance activities is detailed in INDOT's Work Zone Traffic Control Guidelines. This document was developed as a simplified set of guidelines that meet or exceed the requirements of the IMUTCD for the use of INDOT field personnel.

- **Transportation Operations Plan (TOP).** The TOP is a set of strategies that will be used to minimize the impact of the work zone. It includes measures to adjust operations on roadways impacted by the work zone. The TOP must include the proposed methodology for monitoring and measuring mobility during the active work zone phase. This monitoring and measuring is needed so that the effectiveness of the TOP over time can be determined and adjustments can be made if necessary. TOPs for INDOT projects are developed with input from several sources including, but not limited to, Project Management, Construction, Highway Design and Technical Support, the TMC, and local stakeholders. Coordination across jurisdictional lines is emphasized. The TOP for significant projects also includes queuing/delay analysis.
- **Public Information Plan (PIP).** PIPs are intended to create an organized and systematic process to communicate work zone information to the traveling public and stakeholders. The PIP will include information to be communicated, communication strategies, and methods of delivery. Work on the PIP must be closely coordinated with INDOT Office of Communications, either at the district level or Central Office, in order to develop strategies and formulate messages that are consistent with the expected effects of the work zone. Public involvement and information meetings may be held and project specific websites may be developed for work zones with major impacts on the motoring public. Social Media may be used to provide updates on projects. The methods used to distribute information are typically determined during stage one of design as part of the formal TMP process.

As part of the PIP for many projects, INDOT distributes media advisories and press releases that give advance notice of road restrictions and closures. This is generally done by the district Office of Communications for any contract or maintenance activity that involves a lane closure. Moving operations are advertised at the discretion of

district communications. The TMC, through the Advanced Traffic Management Systems (ATMS), utilizes Dynamic Message Signs (DMS) to communicate road restriction information to the public.

The TMP for projects not deemed to be significant must include a TTCP and may include the other elements.

Plans, Specifications, & Estimates (PS&Es)

Generally, the PS&Es provide for method based bidding rather than performance based bidding. In method based bidding, the particulars of the TTCP and any other TMP element executed through the contract are detailed and specified so that the bidders are left without any ambiguity as to what they are bidding. This is in contrast to performance based bidding where the prospective contractors must devise their own strategies to meet the outlined performance goals. Each project's PS&Es shall include the appropriate pay item provisions for implementing the TMP.

For TTC on INDOT contracts, several pay items may be included. Please refer to Section 801 of the current INDOT Standard Specifications for a complete list of standard TTC pay items. It is available at:

<http://www.in.gov/dot/div/contracts/standards/book/index.html>

Special Contract Measures

Incentive/Disincentive clauses are used when either the District or a Local Agency needs to open the road, or a section of it, to traffic as early as possible. This is often due to the severity of a project's impacts to the public or because of an upcoming event in the area which will result in a large increase in traffic volumes. FHWA concurrence must be obtained before this type of clause can be included in the contract. The request must include a calculation of the traffic volume using the roadway and the user costs associated with the restriction or closure. Typically, INDOT's Contracts Section requests this analysis from the Construction Management Division Field Engineer who oversees the district where the project is located. Contracts with an incentive must also have a disincentive for the closure/restriction not being removed by the date stated in the contract. That disincentive dollar amount must be equal to the incentive amount stated in the contract. Chapter 503 of the Indiana Design Manual contains further information on Incentive/Disincentive clauses and on A + B Bidding which can also be used to encourage shorter closure times.

Permit Procedures in Work Zones

TTCPs for permit work not only include INDOT standard drawings and specifications, but a specially developed detail for utility and drive work (Appendix A).

Positive Protection Devices

The designer shall consider a traffic-control method, such as a detour, which does not require the use of positive protection, minimizes the hazard exposure, or maximizes the separation of workers and traffic. However, positive protection is often required depending on the traffic control method selected. At a minimum, the designer will consider positive protection in situations where workers are placed at increased risk from motorized traffic and where positive protection devices offer the highest potential for increased safety for workers and road users. The use of positive protection should be considered in accordance with the method described in the Indiana Design Manual.

Device Quality Guidelines

Temporary traffic control devices shall be maintained continuously to ensure visibility and to protect the public. The American Traffic Safety Services Association (ATSSA) brochure titled "Quality Standards for Work Zone Traffic Control Devices" is used as a guide to determine if temporary traffic control devices are Acceptable, Marginal, or Unacceptable except as described in INDOT Standard Specification 801.03. Upon initial setup and at all phase changes, all individual devices shall be of the Acceptable classification. Any device which is not completely covered or removed when the message does not apply or when directed will be considered Unacceptable.

The Traffic Control Device Report (commonly called the sign and barricade report) is used to ensure that the traffic control devices are looked at daily. The contractor completes this report weekly and submits it to the PE/S.

Work Zone Field Reviews

The Work Zone Safety Section performs field reviews of active work zones. A project of any size, type, or complexity may be subject to a review. These reviews are typically broken into two types; Technical Compliance Reviews and Operational Reviews. The reviews are performed by a member of the Work Zone Safety Section. The general procedures for a technical compliance review are outlined in Appendix B.

Technical Compliance Reviews focus on the placement of the TTC devices and their condition. These reviews identify three tiers for the issues. Tier 1 issues are those which most directly affect worker or motorist safety. Tier 2 issues are those which affect mobility through the work zone. Tier 3 issues consist of technical errors that do not significantly affect either safety or mobility, but may detract from the goal of providing consistent and clear messages to the motorist. If applicable, the reviewer may revisit the project to determine if the Tier 1 issues identified during the initial review have been corrected. Additional follow-ups may also be appropriate to track the effectiveness of changes proposed to address Tier 2 issues.

Operational Reviews focus on the mobility performance of the work zone but may also contain all the aspects of a Technical Compliance Review. Items such as traffic speed, queue length/frequency, work zone traffic capacity, and traffic confusion are taken into consideration during these reviews. This is the typical review type for work zones located on high speed facilities.

Work Zone Crash Reviews

When a work zone related fatal crash occurs, the Work Zone Safety Section performs an investigation into the circumstances leading up to the crash that may include visits to the worksite, reviewing police crash reports, interviewing the INDOT construction staff and contractor, and collaborating with the District Safety Director. This investigation is not to decide which party is at fault in the crash, but is to determine if any of the circumstances surrounding the incident could be changed in the future to decrease the likelihood of similar crashes occurring. When the investigation is complete, a report containing information about the crash, a review of the MOT/TTC on the project, and any recommended changes, either specific to the work zone where the crash occurred or applicable statewide, is prepared and distributed to the PE/S, the district, and multiple divisions within Central Office.

Additionally, work zones which experience a large number of crashes or an obvious pattern of crashes may also be investigated to determine if anything could be changed to decrease the chances of such crashes occurring in the future. This investigation will be in collaboration with the PE/S and will likely include an analysis of ARIES crash data and a visit to the work zone. This will result in a short report detailing the results of the investigation and any recommendations that were made.

Work Zone Mobility

The Work Zone Safety Section works to improve mobility by recommending solutions for projects in the construction phase that are experiencing mobility issues. This can also be done at the request of the PE/S or the AE. The presence of reoccurring queues, which are in excess of predictions, is an example of a mobility issue.

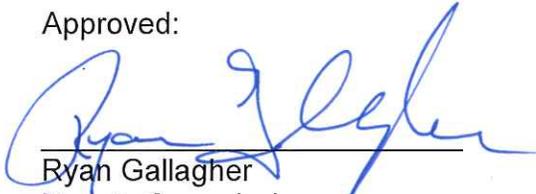
On such projects, the section reviews the work zone during periods of lowest performance and/or highest queue and seeks to determine the cause of the performance issues. The reviewer then attempts to identify changes that could be made which would help achieve the desired level of performance. The recommended changes may include methods that are typically considered during design. Adding end-of-queue warning systems, revising pavement markings, placing additional TTC devices, or low cost approaches such as relocating or realigning existing devices to improve perception and clarity are examples of changes that may be recommended. If performance improvements are not feasible the reviewer proposes mitigation measures to better alert motorists of queues or to encourage them to use alternate routes.

After the changes have been made, the mobility performance of the work zone is monitored to determine the effectiveness of the changes. Data can be collected remotely or the site can be revisited to determine the success of the changes. Further refinements may need to be made to improve performance or the work zone based on these findings. The information collected in these reviews will be shared with other divisions to improve future MOT design and implementation.

APPROVAL

Transmitted herewith are the Policies, Processes, and Procedures for Work Zone Safety and Mobility for the Indiana Department of Transportation. This replaces the previous document of the same name which was approved on October 4, 2007 and shall be effective immediately upon signature.

Approved:



Ryan Gallagher
Deputy Commissioner,
Operations and District Support

11/24/15
Date

APPENDIX A TEMPORARY TRAFFIC CONTROL DETAIL FOR PERMITS

Indiana Department of Transportation Permit Section Traffic Control Quick Reference Guide

Work on Paved Shoulders ≥8ft. or Parking Lanes

Notes:

- SHOULDER CLOSED signs should be used on limited-access highways with the appropriate MUTCD sign.
- UTILITY WORK-AHEAD signs may be used instead of the SHOULDER WORK-AHEAD sign.
- ROAD WORK-AHEAD sign.
- 24mph speed limit, shadow vehicle optional.

Paved Shoulder ≥8ft. Closed on Divided Roadway

Notes:

- SHOULDER CLOSED signs should be used on limited-access highways with the appropriate MUTCD sign.
- UTILITY WORK-AHEAD signs may be used instead of the ROAD WORK-AHEAD sign.
- ROAD WORK-AHEAD sign.
- 24mph speed limit, shadow vehicle optional.

Lane Closure on a Two-Lane Road (Two Flagger Operation)

Notes:

- When a side road intersects the roadway within the work zone, the side road, and a ROAD WORK-AHEAD sign shall be placed on each side road approach.
- For side roads in urban areas, the sign spacing may be reduced.
- 24mph speed limit, shadow vehicle optional.

Lane Closure on a Divided Roadway or One Way Street

Notes:

- When a side road intersects the roadway within the work zone, the side road, and a ROAD WORK-AHEAD sign shall be placed on each side road approach.
- For side roads in urban areas, the sign spacing may be reduced.
- 24mph speed limit, shadow vehicle optional.

Legend

- Channelizing Device
- Portable Sign Support
- Work Area
- Arrow Board Display
- Arrow Board Display Symbol
- Warning Sign
- Flagger Symbol
- Shadow Vehicle With Flashing Light

Flagger Standards and Procedures

If flaggers are used they must be properly trained and equipped at all times.

Only 24" Diameter Stop/Slow paddles are allowed while flagging on State Right-Of-Way

- Stripes on barricade rails slope downward at an angle of 45 degrees toward the direction traffic is to pass.
- Barricade rail lengths are less than 36 inches, then 4 inch wide stripes may be used.
- The sides of barricades facing traffic shall have retroreflective rail faces.
- For flagging devices shall meet MASH/TO Manual for Assessing Safety Hardware (MASH) Requirements.

On Tapers: The distance in feet equal to the speed limit in mph. Alongside the work area: The distance in feet equal to 2.0 times the speed limit in mph.

Alternatively, the spacing for straight-a-ways may be as follows:

- 20 to 40 mph: 1 cone for every 40' (every other skip)
- 40 to 55 mph: 1 cone for every 80' (every other skip)
- 60 mph & above: 1 cone for every 120' (every 3 skips)

Acceptable Channelizing Devices

Distances shown are approximate. Sign spacing should be adjusted for curves, hills, intersections, driveways, etc., to improve sign visibility.

Sign Spacing (feet)	25-30 mph	35-40 mph	45-55 mph	Multilane Divided Freeway 50 mph or higher	Expressway/Freeway
A	100	350	500	1000	1000
B	100	350	500	1600	1600
C	100	350	500	2640	2640

OPTIONAL SKIPS BASED TAPERS (For a 12 Ft Wide Closure)

Speed (MPH)	Shoulder Tapers			Shifting Tapers			Merging Tapers					
	L	RS	CS	L	RS	CS	L	RS	CS			
20	80	2	20	5	80	2	20	5	100	4	20	9
25	80	2	20	5	80	2	20	5	100	4	20	9
30	80	2	20	5	120	3	20	7	200	5	20	11
35	120	3	20	7	160	4	20	9	280	7	20	15
40	120	3	40	4	160	4	40	5	320	8	40	9
45	200	5	40	6	280	7	40	8	500	14	40	16
50	200	5	40	6	320	8	40	9	600	15	40	17
55	240	6	40	7	360	9	40	10	680	17	40	18
60	240	6	60	5	360	9	60	7	720	18	60	13
65	280	7	60	6	400	10	60	8	800	20	60	15
70	280	7	60	6	440	11	60	9	840	21	60	15

2-Way & Downstream Tapers are always 100% 5:20:7

L = Length (ft) RS = Number of Skips CS = Cone Spacing (ft) #C = Number of Cones

Guidelines for Buffer Lengths and Distance of Flagger Station in Advance of the Workspace

Speed (mph)	MUTCD Based Buffer Length (ft)	Optional Skips Based Buffer Length (ft)	Number of Skips
20	115	120	3
25	155	160	4
30	200	200	5
35	250	280	7
40	305	320	8
45	360	360	9
50	425	440	11
55	495	520	13
60	570	600	15
65	645	680	17
70	730	760	19

Roll-ahead Distances

Speed	Stationary	Mobile
≤ 45 mph	100 ft	150 ft
50 - 55 mph	150 ft	200 ft
60 - 65 mph	200 ft	275 ft
70 mph	225 ft	325 ft

DISCLAIMER: ... The purpose of this document is to present guidelines for work zone traffic control. This covers the basic requirements set forth in Part VI of the Indiana Manual on Uniform Traffic Control Devices (MUTCD) as it pertains to Right-Of-Way Permit work. Any changes or additions of traffic control of protection can be requested per the INDOT District Permit Sections. This document MUST accompany the Right-Of-Way Permit Application.

Created By INDOT, Work Zone Safety Section, June 2011.
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APPENDIX B

WORK ZONE SAFETY TECHNICAL COMPLIANCE REVIEW PROCEDURES

The following are the general procedures followed by the Work Zone Safety Section to review an active project:

1. A date and time for the review is coordinated with the PE/S.
 - a. The contractor, District Construction Director (DCD), AE, and Field Engineer are invited to attend.
 - b. It is requested that the PE/S have copies of the following documents on hand when the reviewer arrives at the field office;
 - i. Previous 4 weeks of Sign and Barricade Reports,
 - ii. Official Actions issued for the project,
 - iii. Worksite Speed Limit Assembly Authorizations and their activation logs,
 - iv. The certificate for the Certified Worksite Traffic Supervisor (CWTS.)
2. The plans are studied in the days prior to the field review to familiarize the reviewer with the project, and to identify potential areas of concern.
3. Upon arriving at the project field office on the day of the review, the reviewer conducts a brief meeting to review the documents requested above and to discuss any changes made to the MOT after construction had begun.
4. The reviewer and the PE/S then travel through the project and document the condition and placement of TTC devices with a video camera and a digital camera.
 - a. Since project personnel are the most knowledgeable about the project, the PE/S or their representative drives the vehicle so the reviewer is able to observe all TTC devices and is free to operate the video camera, take pictures, and look at the project in detail.
 - b. Audio notes are taken by commenting on the conditions while the video camera is recording. The PE/S is encouraged to comment as well.
5. Upon completion of the field review, a discussion of the issues seen is conducted. Any Tier 1 issues are noted and the need to correct them as soon as possible is emphasized.
6. A preliminary report is given to the PE/S immediately after the review. The preliminary report includes pictures of and a checklist of the deficiencies identified. The checklist will note if the deficiency is Tier 1, 2, or 3.
7. The video and pictures of the project are reviewed in the office, and a final report is sent out within 3 business days of the review. This report is sent to the PE/S and it includes the previously identified issues, a discussion of any other items discovered, and a final checklist.
8. The PE/S should notify the reviewer if any actions are taken to address the issues identified. If issues are not addressed, an explanation should be written by the PE/S on why they chose a different course of action.