

# INDIANA DEPARTMENT OF TRANSPORTATION POLICIES, PROCESSES & PROCEDURES ON WORK ZONE SAFETY & MOBILITY Pursuant to 23CFR 630 Subpart J



INDIANA DEPARTMENT OF TRANSPORTATION  
*Driving Indiana's Economic Growth*

October 2007

# INDIANA DEPARTMENT OF TRANSPORTATION

## POLICIES, PROCESSES & PROCEDURES ON WORK ZONE SAFETY & MOBILITY

Pursuant to 23 CFR630 Subpart J

*October 2007*

### 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 to provide the best surface transportation system possible and will continue to be a source of congestion and crashes on Indiana highways. The Indiana Department of Transportation (INDOT) is committed to reducing the amount of delay and the frequency and severity of crashes in all highway work zones. Therefore, it is essential that all reasonable countermeasures to improve safety and eliminate or reduce traffic delays in work zones be considered prior to work activity. It is equally essential that work zone performance be monitored and adjusted as needed. The policies and principles documented herein also apply to local, federal-aid projects.

## POLICIES

All INDOT work zones must conform to Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD). Additionally contracted and permitted work must meet the requirements of the Standard Specifications and Drawings- Section 800 maintenance of traffic (visit [www.in.gov/dot/business/design/index.html](http://www.in.gov/dot/business/design/index.html)). In-house maintenance activity must meet INDOT's Work Zone Safety Manual which may be downloaded from: [www.in.gov/dot/pubs/pdf/WZSFinal\\_5COMPLETE.pdf](http://www.in.gov/dot/pubs/pdf/WZSFinal_5COMPLETE.pdf) .

### Interstate Work Zones

Beyond complying with the MUTCD, INDOT specifications and standards all interstate work, whether contracted or in house, must satisfy the Interstate Lane Closure Policy (ILCP). As a means of decreasing the likelihood and severity of crashes and reducing queuing and delay, the ILCP provides pre-approved lane closure schedules for each and every segment of interstate. By this policy some segments are deemed to be so sensitive that even a single lane can be closed only when authorized by the INDOT's upper management. For other segments a lane or multiple lanes may not be closed except during certain times of the day and/or days of the week. Such segments require an approved waiver to extend lane closures outside the specified times. Other segments have enough surplus capacity that single lane closures are allowed at any time without special approval.

While INDOT strives to eliminate queuing in work zones, the pre-approved closure schedules are based on threshold queuing values which were chosen realizing that this is not always possible to achieve. As a result, the ILCP stipulates that queuing, defined in the ILCP as a line of vehicles traveling at a speed of 10 mph or less, in excess of 1.5 miles is unacceptable for any length of time, queues between 1 and 1.5 miles are

acceptable only for short times (up to two hours) and queues of less than 1 mile are acceptable for any length of time.

Variations from the pre-approved closure schedules are only allowed when it is shown there are no viable alternatives to performing the work or that the other alternatives are distinctly inferior. As traffic demand changes over time the ILCP will be updated accordingly. See Appendix A for the current version and updates may be viewed at [www.in.gov/dot/div/contracts/standards/memos/0308-pc.pdf](http://www.in.gov/dot/div/contracts/standards/memos/0308-pc.pdf)

### **Significant Project Definition and Identification**

A significant project is one that, alone or in combination with other concurrent projects nearby, is anticipated to cause sustained work zone impacts greater than what is considered tolerable 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.

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 considered to be significant. Current Indiana TMAs and their associated counties are:

- Cincinnati *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 *all of Lake, La Porte and Porter Counties*
- Indianapolis *all of Marion as well as Boone, Hamilton, Hancock, Hendricks, Johnson, Madison and Shelby Counties*
- South Bend *all of St Joseph and Elkhart Counties.*

Additionally, a project, regardless of route type, will be considered significant if it meets both characteristics 1 and 2. A project may also be considered significant if it meets either characteristic 1 or 2 and has one or more of the other characteristics as follows:

1. The project scope of work consists of major reconstruction or new construction (e.g., complete reconstruction (freeway), partial reconstruction (4R) (freeway), reconstruction (4R) (non-freeway), 3R projects (freeways) and 3R projects (non-freeways). Refer to Indiana Design Manual 40-6.01 for additional information;
2. High traffic volumes (12,000 AADT for a two lane facility or 30,000 for a four or more lane facility);
3. Urban areas;
4. Where there may be significant detrimental impacts on mobility for either through or local trips in the corridor (a significant delay would be ten minutes or greater of added travel time);
5. Ramp closures of seven days or more;
6. Where reasonable adjacent alternate is not available (a reasonable alternate would add less than ten minutes additional travel time at the prevailing speed limit);
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

The identification of significant projects generally occurs at the implementation of the design stage but may be later if it is realized that a project meets any of the criteria.

All work deemed to be significant will receive formal Traffic Management Planning (TMP) consideration from the planning stages of the project through construction. After a project is identified as being significant a TMP team is formed. This team is multidisciplinary and generally is comprised of staff from any or all of the following offices:

- Planning
- Production (Design)
- Construction
- District Traffic
- District Production
- Highway Operations (including the Permits Section)
- Traffic Management (Intelligent Transportation Systems)
- Public Safety Operations
- Indiana State Police
- Federal Highway Administration (FHWA)
- Local Agencies
- Communications

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

The TMP team stays involved with the project from the initial concept to the final acceptance of construction. The TMP process is fully discussed in Chapter 81 of the Design Manual (<http://www.in.gov/dot/div/contracts/standards/dm>)

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 prohibit a single TMP, the individual TMPs should be coordinated.

For interstate projects automatically identified as significant (in a TMA county with 3 days of closure), exceptions to the requirement of a formal TMP must be requested in writing from the Federal Highway Administration (FHWA) if a formal TMP is not implemented. Exceptions for general classification of automatically identified projects (e.g. mowing) may also be requested from the FHWA. Formal TMP exceptions for all other significant projects must be submitted to the Director of the Highway Operations Division for review and will be forwarded to the Deputy Commissioner of Highway Management for approval.

### **Significant, Off-Interstate Work Zones**

All non-interstate work deemed to be significant will also receive formal TMP consideration from the beginning of design through construction. TMP procedures given in the Design Manual apply to off-interstate as well as interstate projects.

### **Permit Policies in Work Zones**

It is INDOT's policy to permit oversized vehicles across routes that are not restricted by construction activity. As a result oversized vehicles are, in certain instances, required to have police escorts so traffic can be managed. If a work zone is encountered along the permit route, law enforcement informs the Permits Section of the Highway Operations Division for rerouting.

When it is necessary to allow a permitted load through a work zone, travel will not be allowed during rush hours or special events. This supports INDOT's goal of risk reduction by reducing the potential for traffic crashes and is consistent with our efforts to eliminate queue and delay.

## **Local, Federal-Aid Projects**

Agreements for all local, federal-aid projects administered by INDOT will stipulate conformance to this set of policies and practices.

## STATE LEVEL PROCESSES & PROCEDURES

### Work Zone Assessment & Management

Projects are analyzed with the criteria for significant projects at the initial stage of plan development. The analysis of some of the criteria is intuitively obvious (e.g. criteria one- work consisting of new construction), while others require some research and information gathering (e.g. criteria 2- high traffic volumes). Some of this analysis will be speculative or subjective and reconsideration of the project impacts and 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, during the initial implementation of the design stage. For interstate/freeway projects, this is generally in the form of estimating queuing/delay, but may include operational analysis of ramps, intersections and alternative/detour routes. Non-interstate/freeway projects may also require analysis of corridor, intersection and/or signal operational levels. Subsequent analysis is performed when changes to the scope or plans require. In turn, these analyses may help drive the decision making on the project scope of work itself, the detailing in the plans or how construction is to be phased or conducted.

After construction starts, the focus of work zone assessment shifts from the Production (design) office to the Construction offices, the Work Zone Safety Section in the Highway Operations office and the Traffic Management Business Unit.

The Work Zone Safety Section is responsible for overseeing general conditions and trends and formulating improvements to policies and standards. In part, this is done by performing project level field reviews of active work zones and noting the conditions and specific items that need attention or that are particularly well done. This section

also tracks work zone crash trends for this purpose, maintains the Interstate Lane Closure Policy (ILCP) and provides technical support for queuing/delay modeling.

For interstate projects with lane or shoulder restricting activities, queue measurements will be taken at least twice during construction by the construction engineer (see Appendix B). Additionally, the Work Zone Safety Section notes any queuing and delay observed during the course of the routine reviews. These observations will support the ILCP and can lead to changes in the construction plan if the queue is deemed to be unacceptable.

The Traffic Management Business Unit and the district traffic offices address traffic operational issues in work zones. The district traffic offices may make or require temporary adjustments signal timings and channelization as needed to optimize traffic flow.

### **Incident Management**

Projects that have the greatest impact to travelers will involve the Public Safety Operations (PSO) Division of the Traffic Management Business Unit to provide assistance in identifying innovative methods of risk avoidance and consider methods to reduce or avoid traffic incidents during construction. Because the best incident management plan is to avoid the incidents in the first place, the Public Safety Operations Division coordinates activities and incident response plans of the various agencies involved. This division acts as liaison between INDOT, the Indiana State Police, other law enforcement agencies, fire agencies and emergency medical services regarding incident response and emergency response activities. This division also works closely with the Traffic Management Centers.

The PSO Division also oversees a *Coordinated Incident Management Response Plan* and the formulation of a multi-agency Incident Management Response Task Force consisting of the affected agencies. This improves communications between the emergency responders and provides an opportunity for implementing coordinated plans, activities and operational procedures between agencies for a coordinated response to incidents.

In those areas where a Traffic Management Center (TMC) may be of value through the ITS infrastructure, the TMC Division will also be involved. They will work with the Public Safety Operations Division to promote safety and to reduce incidents, congestion and delay in work zones.

INDOT has established a procedure requesting the various law enforcement agencies that patrol work zones to directly report crashes to the appropriate staff at the district of jurisdiction. These reports are then forwarded to the Work Zone Safety Section. This section and the construction engineering staff review the reports and consider possible corrective measures.

### **Work Zone Data**

INDOT collects work zone crash data, queue and delay measurements and evaluates general work zone conditions. The crash data is obtained from the statewide Automated Reporting Information Exchange System (ARIES). The data is collected for the construction period and compared to a non-construction period at the location of the work. A comparison of the two sets of data is used to formulate conclusions about work zone safety and needs for improvement to policy and standards and is used to identify potential risks for incidents, travel delays or increased congestion.

The work zone mobility data that is collected will be used to validate and update the Interstate Lane Closure Policy as well as determining the need to consider project specific adjustments.

Field reviews performed at the project level by the Work Zone Safety Section yield observations on work zone 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 are also made to the district construction, area and project engineers at their annual conferences.

## Training

INDOT specifications currently require each contractor to identify a Certified Traffic Control Supervisor on each project that utilizes temporary traffic control. Generally this training is provided by American Traffic Safety Services Association (ATSSA) or a similar source. It is the policy of the Work Zone Safety Section that each staff member receive this type of training also.

INDOT maintenance staff is required to have training in flagging and work zone traffic control. This is given through the Highway Technician (HT) training program. INDOT will require this training to be updated on a periodic basis.

It is INDOTs' plan to expand our work zone training requirements to include design, traffic and traffic operations, as well as construction staff since all of these offices contribute to the effort towards improved work zone safety and mobility. To this end, training in queue/delay estimating, flagger operation and work zone management,

design, operation and inspection will be required. Periodic updating of this training will be included (see appendix C for additional details).

In the case of significant projects requiring special traffic analysis or extraordinary TTC planning, INDOT's consultant selection process is adjusted to require additional qualifications for this type of work.

The Public Safety Operations Division will provide Incident Management Awareness Training for project supervisors, contractor supervisors, sub-contractor supervisors, contract wrecker personnel and other key personnel involved in major projects.

### **Public Outreach**

Public outreach to mitigate work zone problems includes a number of efforts. The statewide level processes include posting all news releases to the agency Web site for public accessibility. This is done by the central and district communications offices. INDOT's Web site is updated by the Communications Offices to distribute road restriction information with a searchable road restriction database. Each district office is staffed with a customer service representative to answer customer calls. A toll free customer service line (866-849-1DOT) is provided to answer customer calls eight hours a day, five days a week. The Customer Service Office tracks responses to inquiries to constantly improve service and response time.

The Permits Section maintains a web site ([www.in.gov/dot/div/traffic/detour](http://www.in.gov/dot/div/traffic/detour)) to provide permit applicants with information on road restrictions work zones and trip planning.

INDOT presents and discusses work zone safety related concepts, practices and materials with the public directly in public forums such as driver's education classes,

civic club meetings, regularly scheduled radio programs, public meetings and professional seminars. At times this is done on INDOT's initiative other times it by request. These efforts are generally performed by the communications offices and the Work Zone Safety Section.

INDOT participates in the National Work Zone Safety Awareness Week annually. Organized events and press releases by the Central and District Communications Offices (public relations) results in exposure not only from the Indianapolis based media but gives every area of the state a chance to hear the message. In recent years the Governor of Indiana has been involved.

Also, INDOT has established a process where law enforcement agencies direct copies of work zone related crash reports and information to the designated contact point in the appropriate district office upon completion of the report. That contact person then notifies the project engineer/supervisor so that corrective measures may be considered and taken. Law enforcement participation is requested through a formal letter jointly signed by the Superintendent of the Indiana State Police and the Commissioner of INDOT. Participation by the local police agencies is voluntary. The PSO Division works with the Work Zone Safety Section and acts as a liaison between the Indiana State Police and INDOT.

### **Process Review**

Randomly selected reviews will be done every two years in conjunction with the FHWA divisional office. Review team will be comprised of staff from a cross-section of INDOT offices typically including planning, production (design), operations, construction, traffic and communications. The review findings will be used to improve and further develop INDOT work zone policy and procedure and will be reported to the FHWA division office.

## PROJECT LEVEL PROCEDURES

### Traffic Management Plans

Determining the extent of a Traffic Management Plan (TMP) normally is done at the beginning of the plan development for contracted work. This reduces the chance that a designer will have to re-work all or part of their plan, particularly the maintenance of traffic details, and provides for a more accurate project budget.

Formal TMP's for significant projects will include these three elements:

- **Temporary Traffic Control Plan (TTCP).** The TTCP consists of the project specific maintenance of traffic plans, contract provisions, standard drawings and 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. The TTCP for significant projects also includes queuing/delay analysis.

While every designer intends on their plan being utilized, contractors do retain the ability to adapt or re-work the TTCP to facilitate construction and improve work zone safety and mobility. If a contractor feels that the TTCP in his contract documents for a certain phase of work can be improved or changed to help traffic flow better or to help the work operation run more smoothly, a written request to the Project Engineer (PE/PS) must be made stating the problem and showing the suggested changes on a drawing so it is easy to determine what is being changed and how it will affect the traffic flow. The PE/PS will then work with the District Construction Area Engineer to review the submittal and determine if it is in the best interest of the state to make the suggested changes.

If it is decided the TTCP change is viable, then a determination is made of how the change affects the various pay items of the contract, the time of the TTCP closure/restriction and any other important concerns. The proposal may be approved in the District or may need input or approval from the Construction Management Division. After these steps have been accomplished, a change order is made to document the change in the planned TTCP and address any costs (increases or decreases) associated with the approval of the contractor's requested TTCP change.

The TTCP for maintenance activities are given in INDOT's Work Zone Safety Manual. This document is developed from the Manual on Uniform Traffic Control Devices and exceeds the MUTCD's minimum requirements in certain applications.

- **Transportation Operations Plan (TOP).** The TOP are the measures taken, whether by contract or by state/local staff, to adjust the affected roadway(s) for the new conditions and the resulting changes in traffic patterns. The TOPs for INDOT projects are generally made and executed by District Traffic, Traffic Management Systems (ITS), the Local Agency or a combination thereof. Coordination across jurisdictional lines is emphasized.
- **Public Information Plan (PIP).** The PIP is developed and executed by the central or district Communications Office who consults with the designer, operations, district traffic and construction in order to develop strategies and formulate messages that are consistent and complete with the expected effects of the work zone. Public involvement and information meetings are held and project specific Web-site are developed for work zones with a major impact on the motoring public. The need to distribute information in this way is typically determined during the design stage of project development as part of the formal TMP process.

As part of the PIP for significant and many non-significant projects INDOT distributes media advisories and press releases giving advance notice of road restrictions and closures. This is generally done at the district communications office for any contract or maintenance activity that involves lane closures. Moving operations are advertised when the communications office feels the potential impacts necessitate so. The Traffic Management Office through the Advanced Traffic Management Systems (ATMS) operated by the Indianapolis and Gary Traffic Management Centers utilize Dynamic Message Boards and AM radio station (530 or 1610) to communicate road restriction information.

The TMP for non-significant projects will include a TTCP and may include the other elements.

### Plans, Specifications & Estimates

Generally the plans, specifications and estimates provide for method 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 have to devise their own plan to meet the performance goals to be obtained.

For INDOT contracts, any or all of these typical pay items may be included:

- ***Maintenance of traffic, lsum***

This item includes temporary traffic control devices such as drums, cones, and tubular markers as well as the installation and

monitoring of the work zone. The type, number and position of the devices are given in the plans and/or standards

- *Construction Signs, ea*
- *Flashing Arrow Signs, ea*
- *Barricades, ea*
- *Temporary Pavement Marking Lines, lft*
- *Temporary Barrier Wall, lft*
- *Portable Changeable Message Signs, ea*
- *Work Site Speed Limit Assemblies, ea*
- *Temporary Crossover, ea*

See Appendix D for a complete list of standard temporary traffic control pay items

### Special Contract Measures

Incentive/Disincentive clauses are used when either the District or a Local Agency have a need to open the road, or a section of it, to traffic as early as possible due to the severity of the projects' impacts to the public or before a certain date because of a large traffic generating event taking place in the area. 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 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 81 of the Design Manual (<http://www.in.gov/dot/div/contracts/standards/dm>) 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 E).

## Work Zone Field Reviews

One of the duties of the Work Zone Safety Section is performing field reviews of active work zones. While this effort is concentrated on interstate work zones that restrict lanes/shoulders, other types of work zones are also checked including local bridge and road contracts. It is INDOT's practice to work with the local FHWA division to determine what type of activity might warrant extra attention.

The reviews are done in teams of three consisting of a driver, note keeper and a video operator/narrator. The team will familiarize itself with the plans ahead of conducting the field review, then drive the work zone two to three times or until a complete record is made. Occasionally, the construction staff will be interviewed for their insights and comments. Appendix F contains the full work zone review procedure and the work zone review checklist (which is used as an aid to note taking).

The findings are reported to the appropriate district construction office. The district construction office must then decide if any changes to the work zone are needed. The team will directly contact the project construction staff if there is a situation that needs to be addressed immediately. When in an Advanced Traffic Management Systems area, this information is also provided to INDOT's Public Safety Operations Division and the Traffic Management Centers Division for use in future incident management planning and coordination. A sample of a report to the district construction office is given in Appendix G.

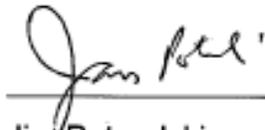
## Work Zone Crash Reviews

When a work zone experiences a significant work zone crash or a high occurrence of vehicular crashes the work zone safety section performs an investigation that includes visiting the sight, reviewing police crash reports, interviewing the construction staff/contractor and collaborating with the district safety office. When the investigation is complete a report containing recommended changes to the work zone is sent to the construction office. See Appendix H for an example.

## IMPLEMENTATION PROCESS & DATES

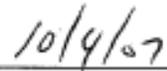
Most of these policies are well established and have been in effect and utilized for some time. All projects not to the design hearing stage of plan development by January 1, 2008 or those let after June 1, 2008 will require a significant project determination and either a formal TMP or an approved variance if applicable. The training plan will be implemented beginning with Design and Operation of Work Zone Traffic Control this fall. Queue measuring and reporting by INDOT construction staff will begin on January 1, 2008.

Approved:



Jim Poturalski

Deputy Commissioner, Highway Management



Date

**POLICIES, PROCESSES & PROCEDURES ON  
WORK ZONE SAFETY & MOBILITY**

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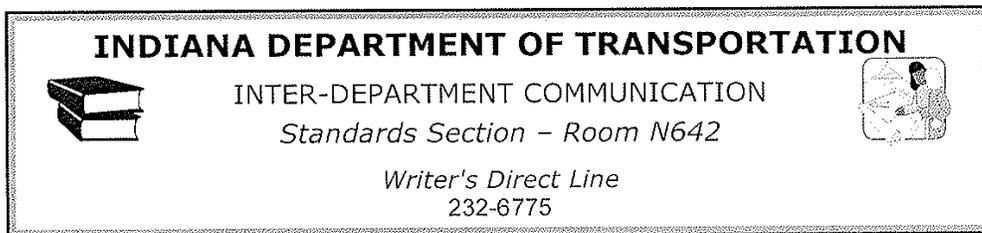
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## APPENDIX A



July 2, 2003

**DESIGN MEMORANDUM No. 03-08**  
**POLICY CHANGE**

**TO:** All Design, Operations, District Personnel, and Consultants

**FROM:** /s/ Anthony L. Uremovich  
Anthony L. Uremovich  
Acting Design Policy Engineer  
Contracts and Construction Division

**SUBJECT:** Interstate Highways Lane-Closure Policy

**EFFECTIVE:** January 21, 2004, Letting

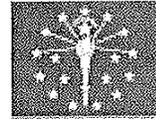
The Department's Interstate Task Force has developed a Lane Closure Policy for Indiana's Interstate Highways which has been approved by the Chief Engineer and the Deputy Commissioner of Highway Operations. The Policy is attached hereto. The designer should determine lane closures for projects on Interstate highways in accordance with the Policy.

Attachments  
alu

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# INDIANA DEPARTMENT OF TRANSPORTATION



## INTERSTATE HIGHWAYS LANE CLOSURE POLICY

### *I. POLICY STATEMENT:*

The Indiana Department of Transportation is committed to the continuous movement of traffic through all work zones by the elimination or reduction of delays. It is our goal to minimize the impacts on the traveling public resulting from the implementation of the work zone. Therefore, Districts and Central Office Divisions shall analyze the projected effect of construction of projects on traffic flow and take the steps necessary to prevent traffic delays to the extent possible.

Compliance with this policy will benefit the traveling public, the construction industry and the business community by reducing work zone crashes and travel time. Because of its impact on project development, the determination and analysis of options for maintenance of traffic must occur at the beginning of the planning process as described herein.

In order to satisfy customer demands to eliminate or reduce delays, the Indiana Department of Transportation will be required to accept some increases in project costs. The cost increases in order to comply with the policy may include permanent lane additions and/or bridge widening or the use of accelerated construction methods and materials. The cost increases associated with this policy and the corresponding impacts to District programs and goals will be evaluated on a project by project basis. The corresponding benefit will be the elimination or reduction of delays and road user costs.

This policy outlines the procedures to be followed and the parties responsible for its fulfillment. The Indiana Department of Transportation can waive mandatory conditions contained in the policy upon approval by the Chief Engineer or Deputy Commissioner of Highway Operations based on sound engineering judgment.

### *II. SCOPE:*

This policy applies to all individuals, except for INDOT District Operations, Traffic and Subdistrict personnel, involved in planning, designing and performing work on Indiana's Interstate highways.

### ***III. BACKGROUND AND PURPOSE:***

Construction and maintenance work continues to be a source of congestion on Indiana's Interstate highways. It is essential that all reasonable countermeasures to eliminate or reduce traffic delays in freeway work zones have been considered prior to implementation of the work zone.

The intent of this policy is to consolidate past work zone practices with new requirements to eliminate or reduce traffic delay caused by work zones. Guidelines will be established for developing and implementing a Traffic Management Plan for work zones. These plans will enhance our accountability and ensure that all options have been considered. Central to these plans is managing the capacity to maintain traffic flow. Ultimately this will enhance customer satisfaction while traveling through work zones.

### ***IV. POLICY COMPLIANCE PROCESS:***

#### **A. GENERAL:**

The attached maps define the allowable times a lane(s) may be closed on Indiana's Interstate System. This Policy is based on the threshold of lane restrictions which may generate up to a 1.0 mile queue or 10 minute road user delay and applies to all contracted expansion, preventive and planned maintenance activities, except for work activities denoted in INDOT's Work Management System as Performance Standards, performed by INDOT personnel.

At the times when an Interstate Highway is designated as an alternate / detour route for another Interstate Route (i.e. I-465 for Hyperfix6570 in 2003), then the allowable times for lane closures does not apply. Only work designated as "Emergency" can be performed during this time.

#### **1. Map:**

For illustration of this policy, the two attached maps have been created. The first map (Sheet 1) illustrates when and at what times restrictions can be present along the rural portions of Indiana's Interstate System. The second map (Sheet 2) illustrates allowed lane closures for the Interstate Systems in four urbanized areas (Calumet Area, Fort Wayne, Indianapolis and Falls City Area).

#### **2. Time Descriptions:**

- a. Anytime: Unlimited lane closures.
- b. Weekend or Night-time Only: Unlimited lane closures between Friday 9:00 p.m. through Monday 6:00 a.m. and weekdays 9:00 p.m. to 6:00 a.m. Along routes with significant commuter traffic.

- c. Weekday or Night-time Only: Unlimited lane closures except from Friday 6:00 a.m. to Sunday 9:00 p.m. Pertains to routes which experience significant increases in traffic during the weekends.
- d. Night-time: Any day 9:00 p.m. to 6:00 a.m. Generally along routes with heavy traffic where queues > 1.0 mile can be expected during the daylight hours.
- e. Executive Approval: Only along the heaviest (Average Annual Daily Traffic (AADT) > 50,000 vehicles/day) traveled rural four lane routes. Except for conditions designated as an "Emergency", an approved request by the Chief Engineer (Design Division developed projects) or Deputy Chief of Highway Operations (District developed projects) is required before any lane closure takes place.
- f. Minimum 2 Lanes / Direction: Generally along six lane urban interstate with AADT < 100,000 vehicles / day. A minimum of two lanes per direction shall be open at all times.
- g. Minimum 3 lanes / Direction: Along urban routes with eight lanes or greater. A minimum of three lanes per direction shall be open at all times.

**B. NON-MAP COMPLIANT:**

1. Procedure:

If an operation is to restrict or extend lane closures outside of the listed allowable times illustrated on the map, the designer/planner shall complete a quantitative analysis and a traffic management plan with the request for an exception. For all repairs deemed emergency, see Section "Emergency Repairs".

- a. The Central Office Engineering Assessment Section, Design Division or District Development shall analyze the impact on the motoring public of any proposed lane closure not permitted by the map.
- b. For contract work, the analysis shall occur during the planning process after the pavement recommendation has been formulated and/or bridge work has been determined. In all cases, analysis for contract projects shall occur before scoping of the final design begins.
- c. For Design-Build projects the Traffic Management Plan will be completed, approved and reflected in the scope of services.
- d. Analysis of permit or force account work zone impacts shall occur prior to the implementation of any lane restrictions.

2. Analysis:

A quantitative analysis shall be performed to determine queues that will be generated any time a lane closure is proposed outside of the listed allowable times illustrated on the map.

a. Projected queue less than thresholds:

The final development process may commence. Documentation of the analysis must be retained on file. Any work zone strategy chosen that will result in impacts less than the allowable delay thresholds but increases the project cost by 20% or \$1,000,000 shall be submitted to the Chief Engineer for approval.

b. Projected queue exceeds thresholds:

An exception request shall be submitted to the Chief Engineer or Deputy Commissioner of Highway Operations. The exception request will identify the alternative selected as the preferred option and the reasoning for the selection. The exception request will also address the impact on the current INSTIP program if the request is denied.

3. Traffic Management Plan (TMP):

The TMP will be completed for the strategy selected and shall incorporate the following additional elements as applicable:

- a. Consideration of stakeholders' needs during the decision-making process
- b. Incident management strategies
- c. Public relations campaign
- d. Identification of alternate routes

C. EMERGENCY REPAIRS:

All repairs deemed an emergency which occur outside of the listed allowable times require no prior approval before a lane closure action is taken. Such repairs include, but are not limited to, pavement or bridge deck failures, bridge structure impact damage, roadside appurtenances and slope stability. Notification of the closure shall satisfy current departmental procedures.

D. ROUTINE DISTRICT MAINTENANCE:

Some non-contractual routine maintenance activities, such as crack sealing, pavement markings, rpm restoration, etc. are performed on a recurring basis by the District Maintenance forces. These activities are exempt from this policy and are addressed under a separate District Maintenance Interstate Lane Closure Policy developed by the Districts and Operation Support Division.

E. PROJECTS IN CONSTRUCTION:

Implementation of the TMP on all construction contracts will include the following functions:

1. Work zone setup shall be verified by the Engineer for conformance with the approved TMP as well as INDOT standards, INDOT Design Manual and the Manual of Uniform Traffic Control Devices.
2. Work zone queues shall be monitored by the Worksite Traffic Supervisor (Indiana Standard Specifications Sec. 801.03) for the specified contract and compared against the expected queues generated by the computer model. Unless the new work zone or construction phase causes extremely long queues, the queue measurements should be made about one week after a project or phase change begins in order to allow drivers to become accustomed to navigating the new conditions. Copies of all monitoring results shall be submitted to the District Construction Engineer, Contracts and Construction Division Field Engineer and Design Division Specialty Projects Group Manager.
3. If the TMP generates queues measured by the Worksite Traffic Supervisor after one week exceeding the expected queue length, the District Construction Engineer shall be informed of the situation and of proposed corrective action. The cause for the discrepancy between the expected queues generated by the computer model and the actual conditions will be determined by the Contracts and Construction Division.
4. A contractor may submit an alternate TMP for consideration prior to the start of work. Construction changes can not be implemented until the alternate plan is approved by the District Director.
5. A Queue Analysis shall be completed as prescribed below and submitted with the revised TMP to the District Construction Engineer, Contracts and Construction Division Field Engineer and Design Division Specialty Projects Group Manager.
6. Revised Maintenance of Traffic plans will be verified for conformance with the approved TMP by the Engineer.

## ***V. QUEUE ANALYSIS:***

The criteria used to determine the impact of proposed work zones shall be queue length. QuickZone, Qewz-92, Synchro/Simtraffic, Corsim or similar programs may be used to model the expected queues that will be generated. Multiple stages of construction shall be analyzed for each of the maintenance of traffic phases. The speed limit used in the computer models should be the posted legal construction zone speed limit. Volume data supplied by INDOT for input into the models should be current (not older than three years), should account for seasonal traffic surges that may occur during construction, and should reflect current regional traffic patterns. Traffic volumes should be expanded to construction year levels through the use of growth factors. In urban areas where congestion occurs under normal unrestricted conditions, the queue length shall be considered.

Use of a microscopic model (Synchro/Simtraffic, Corsim, etc.) is encouraged for modeling of work zone queues. The effect of significant ramp merges on queues should be included in the model.

A vehicle will be considered part of a queue if its average operating speed is approximately 10 mph or less. Discretion is required during both the analysis portion and field evaluation of the implemented work zone in determining what constitutes a queue. In general a condition that causes driver frustration due to stop and go operations should be considered a queue.

The following thresholds shall be used for the evaluation of project queue lengths as determined by the computer model:

1. For queues less than 1.0 mile, the work zone impacts are acceptable.
2. For queues greater than 1.0 mile and less than 1.5 miles, the work zone impacts are acceptable if the queue exceeds 1.0 miles for two hours or less. Where queues are expected, additional advanced work zone warning signing should be specified.
3. For queues longer than 1.0 mile for more than two hours or longer than 1.5 miles for any period of time, the work zone impacts are unacceptable. Alternate strategies shall be considered per the provisions of this policy.

Transmitted, herewith, is the Interstate Lane Closure Policy for the Indiana Department of Transportation. This policy shall be incorporated into the daily operations and maintenance activities and into active projects immediately. All active projects / contracts which have a Ready for Contract (RFC) date on or before the approval date of this policy are exempt.

Interstate Highway Lane Closure Policy  
June 2003

Approved: /s/ Richard K. Smutzer  
Richard K. Smutzer,  
Chief Engineer

6-12-03  
Date

Approved: /s/ Timothy J. Jeffers  
Timothy J. Jeffers,  
Deputy Commissioner of Highway Operations

6-23-03  
Date

[F:\Des\0308-Pol.doc]

(DATE) \_\_\_\_\_

**MEMORANDUM**

TO: \*\*\* \_\_\_\_\_  
Chief Engineer or  
Deputy Commissioner of Highway Operations

THRU: \*\*\* \_\_\_\_\_  
Chief, Design Division or District Director  
  
\*\*\* \_\_\_\_\_  
Design Development Section Manager Or  
District Development Engineer (if applicable)  
  
\*\*\* \_\_\_\_\_  
Design Review Consultant (if applicable)

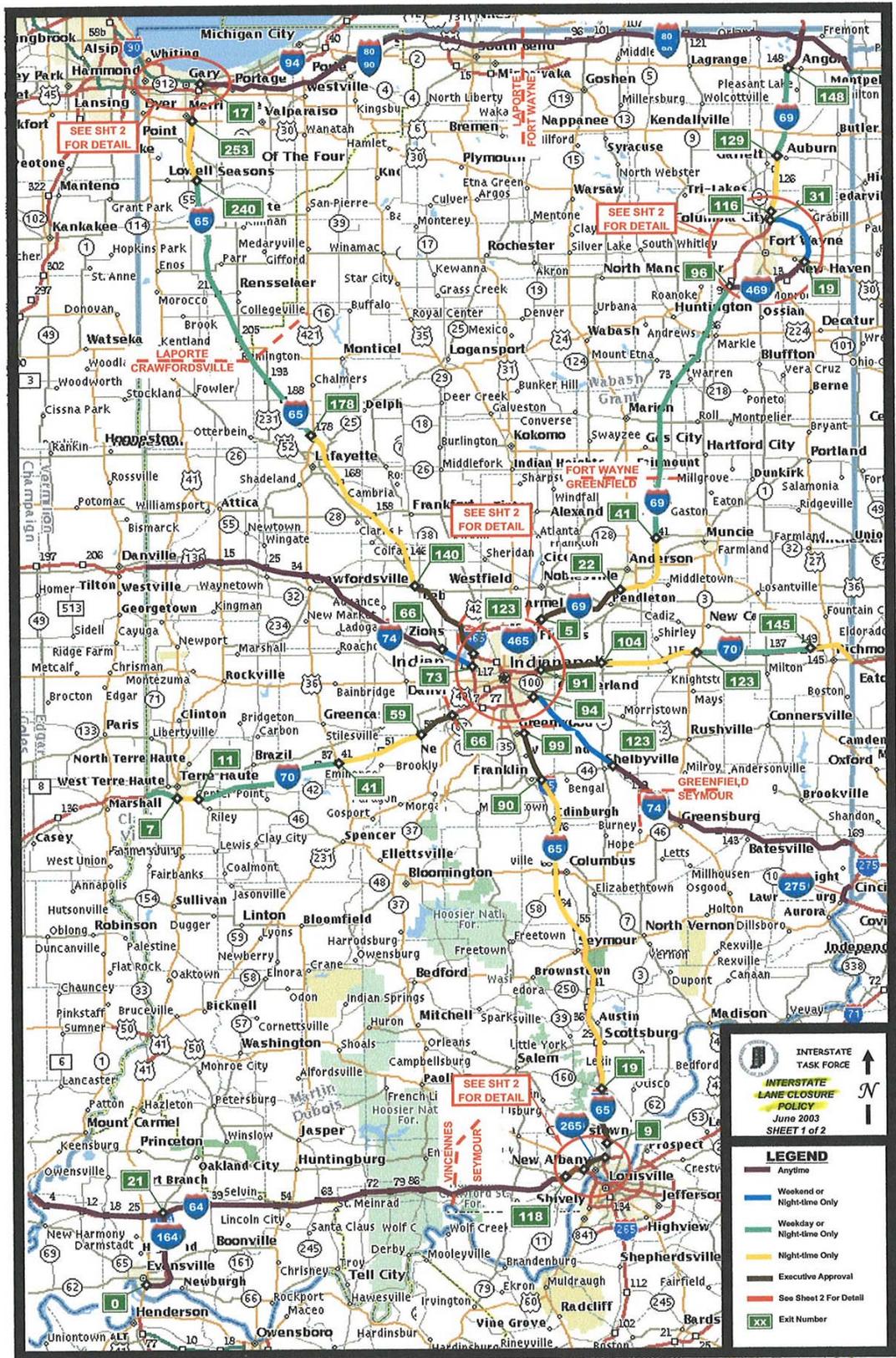
FROM: \*\*\* \_\_\_\_\_  
Project Manager

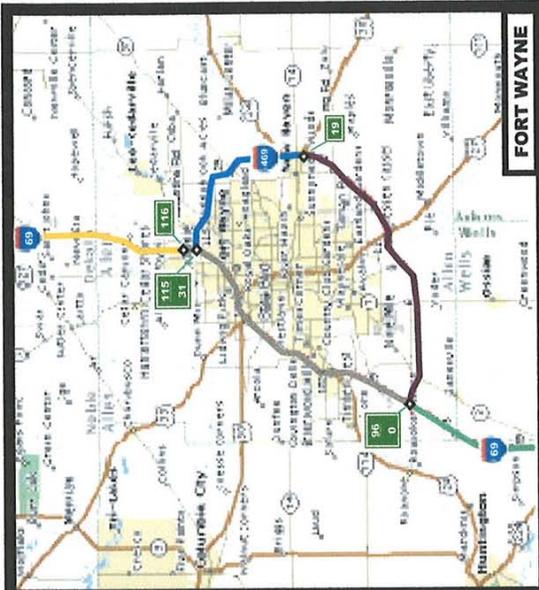
RE: Interstate Lane Closure Exception Request  
\*\*\*  
\*\*\*  
Route No.: \_\_\_\_\_  
Structure: \_\_\_\_\_  
PE Project No.: \_\_\_\_\_  
Des. No.: \_\_\_\_\_

Transmitted, herewith, is an Interstate Lane Closure Exception request for the above referenced project. The documentation has been reviewed for procedure compliance with the approved Policy. Based on the attached analysis and justification, we believe that the exception is justified and recommends approval.

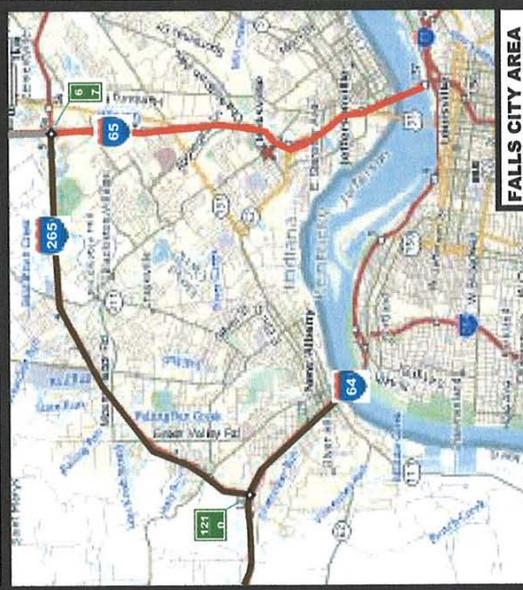
Concur: \_\_\_\_\_ Date \_\_\_\_\_  
Chief Engineer or  
Deputy Commissioner of Highway Operations

cc: CPG Manager/CPG Group/Review Consultant  
Specialty Project Group Manager  
District Construction Engineer  
District Development Engineer  
FHWA Field Engineer  
File





**FORT WAYNE**



**FALLS CITY AREA**



**CALUMET AREA**



**INDIANAPOLIS**

INTERSTATE  
LANE CLOSURE  
POLICY  
JUNE 2003  
SHEET 2 of 2

INTERSTATE  
TASK FORCE



- LEGEND - URBANIZED AREAS**
- Anytime
  - Weekend or Night-time Only
  - Weekday or Night-time Only
  - Night-time Only
  - Min. 2 Lanes / Direction All Times
  - Executive Approval
  - Min. 3 Lanes / Direction All Times
  - XX Ext Number

## APPENDIX B

### MEASUREMENT OF WORK ZONE QUEUE LENGTH AND DELAY

The Federal Highway Administration requires the Department to monitor and report traffic queue lengths and delays in interstate work zones during restrictions due to construction or maintenance operations. The queue length and delay measurements are also used by the Department to update the Interstate Lane Closure Policy to better reflect actual traffic conditions during restrictions. It is the responsibility of the PE/S to ensure that adequate measurements are taken and reported. The following are guidelines for performing work zone queue length and delay measurements. If further clarification or guidance is needed, the PE/S should contact the District Traffic Engineer.

#### Definitions

##### **Delay**

The amount of time, to the nearest minute, spent traveling at an average speed of 10 mph or less through a work zone. Delay begins at the moment travel speed becomes 10 mph or less and ends at the moment normal travel speed is permanently, not intermittently, resumed.

##### **Point of Restriction**

The first point in a work zone at which the entire roadway is no longer open to normal traffic, including lanes, shoulders and ramps. This is typically the position of the flashing arrow sign for a lane closure or the point where a shoulder or ramp is closed.

##### **Queue**

A line or lines of traffic in which the average speed is reduced to 10 mph or less due to a restriction. This includes intermittent, “stop and go” periods above 10 mph.

##### **Queue Length**

Length, to the nearest 0.1 mile increment, from the point that a queue develops to the point of restriction.

##### **Segment**

The interstate between 2 consecutive interchanges.

#### Requirements

Queue length and delay measurements are to be made on interstate projects when lane, shoulder or ramp restrictions will be in place in at least 1 direction for a total of at least 10 days. For purposes of taking measurements, the 10 days of restriction do not need to be consecutive and any portion of a day is counted as a whole day. In order to allow traffic to settle in to a given traffic maintenance pattern, measurements generally should not be taken until 3 to 5 days after:

- an initial traffic maintenance setup,
- a change in traffic maintenance phase,
- a shift of traffic maintenance from one highway segment to another,
- a change in traffic maintenance setup in response to excessive queue lengths, or
- a significant change in the traffic maintenance setup.

Likewise, the PE/S generally shouldn't wait more than 7 to 10 days after any of the above occurrences to take and record queue length and delay measurements.

Measurements are required to be reported at least twice during the highest traffic volume period when restrictions are in place. If a restriction is in place for at least 7 consecutive days, at least 1 measurement should be made during the highest volume period on a weekend day. The District Traffic Engineer can provide assistance in determining the highest traffic volume periods in which to take measurements.

### **Measurements**

The best method of taking queue length and delay measurements is to drive through the work zone during the identified high traffic volume period. At the point where speed is reduced to 10 mph or below, basically stop and go traffic, note the odometer reading and the time. Continue through the zone to the point of restriction and again note the odometer reading. Continue through the zone until speed in excess of 10 mph can be maintained and note the time.

### **Reports**

A Work Zone Queue and Delay Report should be completed each time a set of measurements is taken. The original should be submitted to the District Traffic Engineer and a copy kept for the PE/S's records.

**INDOT  
WORK ZONE QUEUE & DELAY REPORT FORM**

**Contract No:** \_\_\_\_\_

**Route & Project Limits/Location:** \_\_\_\_\_

**County:** \_\_\_\_\_ **District:** \_\_\_\_\_

**Occasion:** \_\_\_\_\_

*(see note 1)*

**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

**Measurement 1:**

**Direction of Travel:** \_\_\_\_\_ **Time:** \_\_\_\_:\_\_\_\_ am/pm

**Location of Queue** *(see note 2):* \_\_\_\_\_

**Queue Length:** \_\_\_\_\_ miles **Delay:** \_\_\_\_\_ minutes

**Measurement 2:**

**Direction of Travel:** \_\_\_\_\_ **Time:** \_\_\_\_:\_\_\_\_ am/pm

**Location of Queue** *(see note 2):* \_\_\_\_\_

**Queue Length:** \_\_\_\_\_ miles **Delay:** \_\_\_\_\_ minutes

**Comments:** \_\_\_\_\_

\_\_\_\_\_

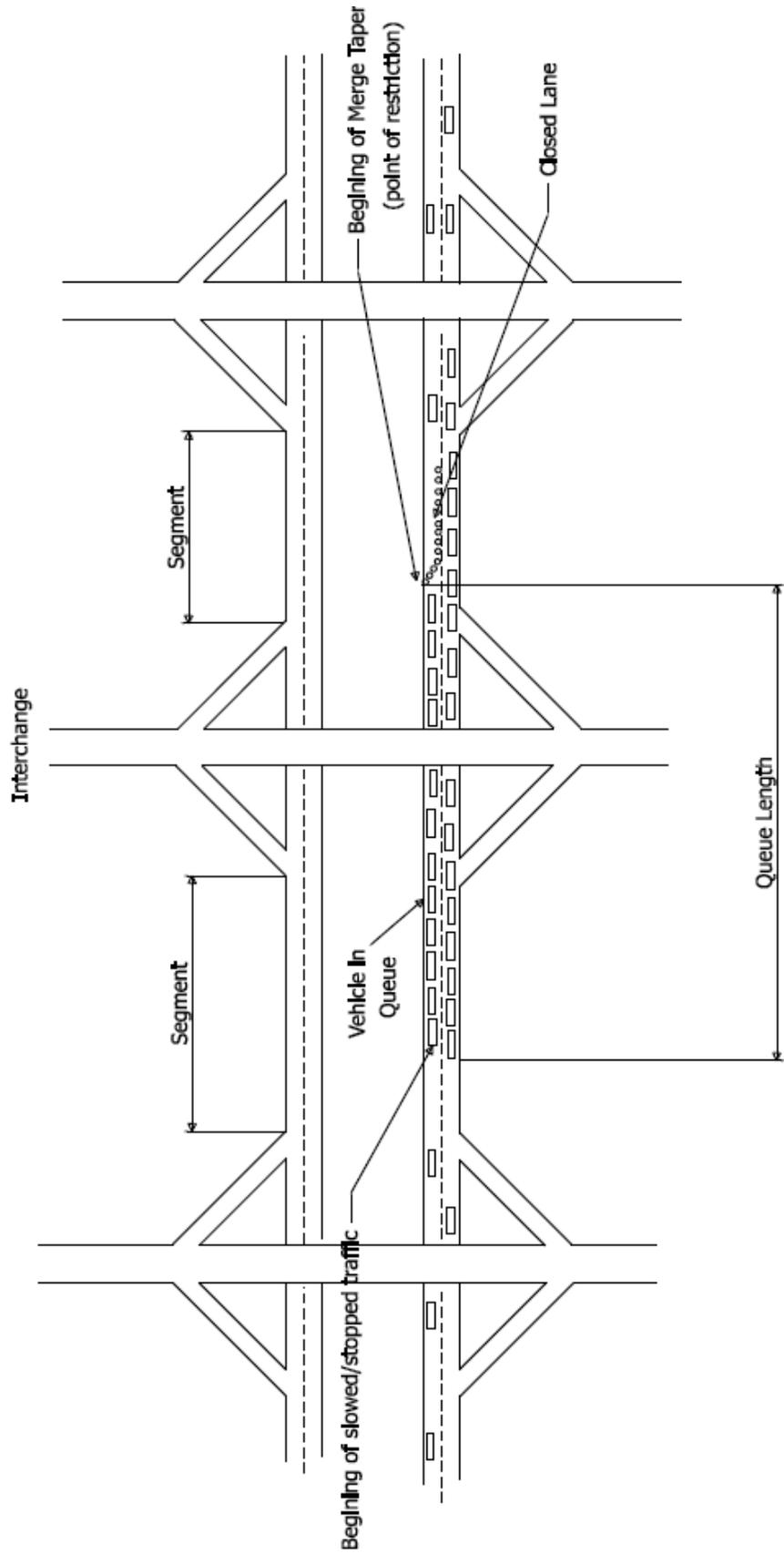
\_\_\_\_\_  
**Signed, Project Engineer/Project Supervisor**

\_\_\_\_\_  
**Report Date**

**NOTES:**

1. Occasion refers to the event (e.g. start of construction, phase change, location change) that is prompting the measurements.
2. Location of Queue refers to the location that the queue begins, for instance “the left lane merge taper for the crossover at station 123 + 50”

# Work Zone Queue Measurement Diagram



## APPENDIX C

### INDOT'S WORK ZONE SAFETY & MOBILITY TRAINING PLAN

INDOT's plan to expand our work zone training requirements will include design, traffic and traffic operations, as well as construction staff since all of these offices contribute to the effort towards improved work zone safety and mobility. To this end the following training is required:

- Queue Estimating (INDOT provided)

INDOT will begin training our design staff in the use of QUEWZ98 which models work zone mobility. This program has been the standard tool used for this purpose.

- Advanced Work Zone Management  
(Course # FHWA-NHI-380072)

This training will assist in the TMP process and will be required for central office and district design, traffic controls systems, construction management, district traffic as well as the work zone safety section. All of these offices are involved in the TMP process on a regular basis. The in-house design groups may limit this training to two rather than all of the engineers/engineer assistants, who will serve as specialists in this area.

- Design and Operation of Work Zone Traffic Control  
(Course # FHWA-NHI-380003/380003A)

This training will assist in the Temporary Traffic Control Plan (TTCP) preparation and implementation process. It will be required for central office and district in-house design, construction management, district traffic as well as the work zone safety section. All of these offices are involved in the TTCP process on a regular basis. The in-house design

groups may limit this training to two rather than all of the engineers/engineer assistants, who will serve as specialists in this area.

- **Construction Zone Safety Inspection**  
(Course # FHWA-NHI-380063/380063A)  
This training will assist in the inspection of TTCPs. It will be required for district construction (project engineers and supervisors) as well as the work zone safety section.
  
- **Certified Worksite Traffic Technician (ATSSA course)**  
This training will assist in implementing the TTCP and making corrections/adjustments as necessary. It will be required for construction management, district construction (project engineers and supervisors) as well as the work zone safety section.
  
- **Flagger Inspection Training (ATSSA course)**  
This training will assist those who oversee or evaluate flagging operations and will be required for district construction (project engineers and supervisors) as well as the work zone safety section.

## APPENDIX D

### Standard Temporary Traffic Control Pay Items

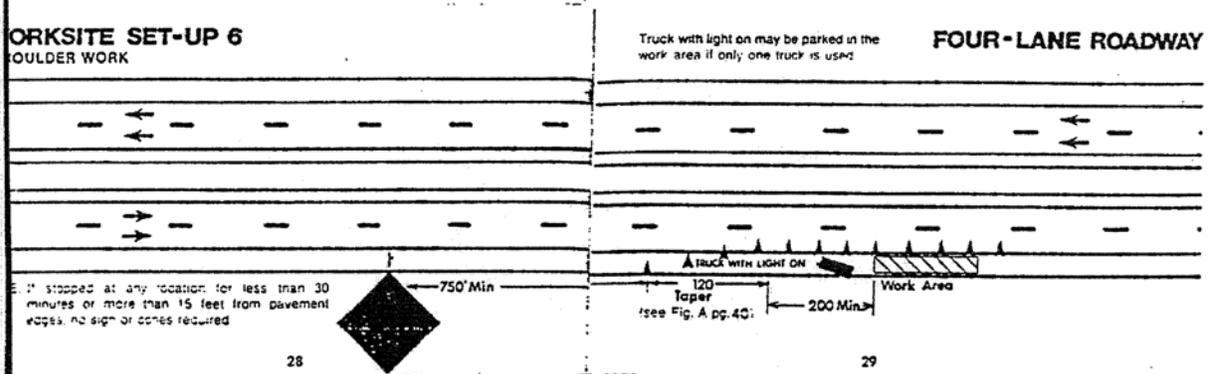
Pay Item	Pay Unit Symbol
Barricade, _____ type	LFT (m)
Barricade, III, Permanent	LFT (m)
Barrier, Direction Indicator	EACH
Construction Sign, _____ type	EACH
Detour Route Marker Assembly	EACH
Detour Route Marker Assembly, Multiple Routes	EACH
Drum, Permanent	EACH
Energy Absorbing Terminal, CZ, TL - _____ test level	EACH
Flashing Arrow Sign	DAY
Maintaining Traffic	LS
Patroller	DAY
Road Closure Sign Assembly	EACH
Road Closure Sign Assembly, Permanent	EACH
Temporary Buzz Strips	LFT (m)
Temporary Traffic Barrier, _____ type	LFT (m)
Temporary Traffic Barrier, Anchored, _____ type	LFT (m)
Temporary Crossover, _____ type	EACH
Temporary Crossover, _____, Refurbish type	EACH
Temporary Crossover Drainage Pipe	LFT (m)
Temporary Changeable Message Sign	EACH
Temporary Illumination	LS
Temporary Panel Signs	SFT (m <sup>2</sup> )
Temporary Panel Sign Supports	LFT (m)
Temporary Pavement Marking, _____ in. (mm) width	LFT (m)
Temporary Pavement Marking, Removable, _____ in. (mm) width	LFT (m)
Temporary Pavement Message Marking, _____ description	EACH
Temporary Pavement Message Marking, Removable, _____ description	EACH
Temporary Raised Pavement Marker, _____ grade	EACH
Temporary Traffic Signal	LS
Temporary Traffic Signal with Detectors	LS
Temporary Transverse Pavement Marking, _____ in. (mm) width	LFT (m)
Temporary Transverse Pavement Marking, Removable, _____ in. (mm) width	LFT (m)
Temporary Worksite Speed Limit Sign Assembly	EACH
Tubular Marker, Permanent	EACH



## Shoulder Closure for Multi-Lane Bridges

If, on a multi-lane road, work will be conducted on the shoulder or within 15 ft. of the edge of pavement and this work will not obstruct any of the travelled lanes, then the following guidelines apply.

- Blaze orange outer garmet required, - hard hats recommended
- Warning lights / flashers on
- "MEN WORKING" or "SHOULDER WORK" - 1,070 ft. ahead of work area
- Cone taper beginning 320 ft. ahead of work area, extending 120 ft., 20 ft. spacing (7 cones)
- For help with cone placement - paint lines are 10 ft. long with 30 ft. spaces between
- Additional cones from end of taper to far end of work area, 40 ft. spacing
- Provisions must be made to assure that pedestrians can safely pass the work area



## Worksite Set-ups

When preparing to conduct work at a bridge or along a roadway, field personnel should first view the characteristics of the site and determine which worksite category (e.g. shoulder closure for two-lane roads, lane closure for two-lane roads,...etc.) best represents the observed conditions. They should then follow the guidelines presented below for that category of worksite.

**NOTE:** Due to requirements established by INDOT and policies set by the Indiana District, our personnel are not to close lanes or shoulders along Interstate highways.

**NOTE:** No signs or cones are required when:

- parked and working on the shoulder at any location for less than 30 minutes. (For roadways which are marked with white lines, the “shoulder” is the improved surface outside of the white line. A sidewalk next to the roadway should be treated as part of the shoulder. Along roadways which are not marked with white lines, the “shoulder” begins where the edge of the lane of travel ends.)
- parked and working more than 15 ft. from the edge of pavement. (The “edge of pavement” is the edge of the improved surface. Along a paved road, this is where the pavement ends and the non-paved surface begins. Along a “dirt” or “gravel” road, the “edge of pavement” is where the improved surface ends and the natural surface begins.)

EXHIBIT 'A'

**BRIDGE AND ROADSIDE TRAFFIC  
CONTROL PROCEDURES**

**INDIANA DISTRICT  
U.S. GEOLOGICAL SURVEY**

July 25, 1994

## Introduction

The policy of the Indiana District, for field work conducted along roadways or from bridges, is to adhere to the standards established by the Indiana Department of Transportation (INDOT). Through the Indiana Manual on Uniform Traffic Control Devices (MUTCD) and the Worksite Traffic Control Manual (WTCM), INDOT has provided guidelines for the placement of temporary, daytime traffic control devices at work sites. This memorandum attempts to summarize those parts of the MUTCD and the WTCM which are most relevant to our work.

It should be recognized that every condition potentially encountered in the field cannot be anticipated, nor can one set of traffic control procedures cover all situations. All distances and guidelines presented herein represent minimums established by INDOT. In many cases, field conditions will dictate that these recommendations be altered to adequately provide for the safety of our personnel and the motorists who travel near our work sites. Therefore, it will be the responsibility of field personnel to use their own good judgment when implementing this plan so that the required elements of safety and legality are met.

## Roadside Safety During Periods of Limited Visibility

When working during periods of darkness or low visibility (e.g. fog, rain, snow, dusk, dawn,...) extra precautions must be taken to assure that motorists see all traffic control devices. Therefore, during periods of limited visibility, all safety and traffic control equipment must be reflectorized. Specific guidelines for the reflectorization of these devices are presented in the MUTCD

### Flagging Stations

Flaggers are to be used when it is necessary to occasionally stop traffic and/or reduce traffic speed to protect a work crew. All flaggers must receive proper and specific training before being assigned to a flagging station. Figure 1 presents general instructions for those individuals who will be acting as flaggers.

Flagging stations are to be located far enough in advance of the work site so that approaching traffic can reduce their speed before entering the work zone. Typically, a flagging station should be located 200 to 300 ft. ahead of the work zone; however, speed limits and physical characteristics of a site may call for an alteration of this distance (e.g. in urban areas, when speeds are low and cross streets are closely spaced, this distance may be decreased).

Flaggers are required to wear a **blaze orange safety vest and a hard hat**. A flagger should stand on the shoulder next to the lane of traffic he/she is controlling or in the closed lane. At some work sites he/she may need to stand on the shoulder opposite the work site to operate effectively. Under **NO** circumstances should he/she stand in the lane being used by moving traffic. Flaggers should be clearly visible to approaching traffic at all times. Therefore, they should stand alone, never permitting a group of workers to stand around them. At all times they should have a safe escape route planned.

## **APPENDIX F INDOT WORK ZONE INSPECTION PROCEDURE**

### GUIDELINES FOR ON-SITE INSPECTIONS & INTERVIEWS

#### INTRODUCTION

The goal of the work zone inspections procedure is to provide an understanding of:

- The effectiveness and practicality of policies and standards
- The accuracy and completeness of contract plans, special provisions and pay items with regard to policy and standards.
- Compliance with contract plans and specifications.

To this end it is necessary to gain as much information and insight from the construction site and at times the construction/contracting personnel. These guidelines address this element of the procedure.

#### RECOMMENDED STEPS

- Before going on the inspection
  1. Determine the inspection date and team. The project engineer should be consulted as to when traffic restricting activities will be occurring. A minimum staff of two is required for the team
  2. The team members should review the plans and special provisions against the Design Manual, standards and lane closure policy (when applicable). Make note of where there is variation or discrepancy.
  3. Customize the inspection checklist per the plans and specs. This will facilitate the drive through process.
  4. Gather all materials and equipment that will be required for the drive through. This will include:
    - Plans for each work zone. Half sized sets are preferable.
    - Contract Proposal for each work zone
    - Customized Inspection Checklist for each work zone
    - Copies of applicable standards and design manual sections

- Digital Camcorder (with a DVD for each work zone)
- Digital Camera
- Vest, hat and steel toed boots/shoes
- Reserved motor pool car

Other items that may be needed are:

- A copy of the Indiana Lane Closure Policy
- Lap-top computer

5. Contact the project engineer if there is a pre-determined need to interview construction/contractor staff during the on-site inspection.
- During the on-site inspection:
    6. At least three drive throughs should be taken if the inspection team is limited to two. The initial drive through should be used to familiarize and get general impressions. The posted work zone speed should be followed.
    7. The second time through video should be taken.
 

Make sure to start the video in time to pick up advanced signing and to get the whole width (cross section) of the work zone.

It is best to supply some commentary of where you are (which work zone, which direction) and what you are encountering.
    8. The third time through should be used to fill-out the checklist and to take notes. This may be done during the second time through if there is a third team member
 

Additional drive throughs may be taken, time permitting, when necessary to finish the checklist and gather any other observations.
    9. There may be a need to look more closely at or take pictures of the work zone set-up and traffic control devices. If it is necessary to stop and possibly walk the work zone make sure that all safety practices are followed:
 

The car should be parked ideally in a designated parking area; if there is no parking area then it should be parked as far off the traveled pavement as possible with the emergency lights activated.

Proper protective safety gear should be worn.

Stay alert to traffic and to contractor activity.

10. Interview the construction staff/contractor personnel if desired.

Field staff/crew should be assured that the interviews are performed to gain understanding and collect information that could not otherwise be obtained- not to criticize.

11. If significant and/or potential safety problems are encountered the project engineer or the contractor's traffic control designee should be notified either at the site during the inspection or as soon as possible after returning to the office.

- After the inspection

12. The checklist, other notes, video and still photographs should be reviewed and filed on record promptly so that final documentation of the inspection may be as thorough as possible.

While the checklist summarizes field compliance with plans and contract specifications, any information or feedback relevant to the accuracy/completeness of the plans and specifications (compared to policy and standards) or to the effectiveness/practicality of policies and standards should also be documented and submitted through the appropriate channels.

**INDOT WORK ZONE INSPECTION**

**DRIVE THROUGH CHECKLIST**

General Information

Contract No:

Work Site Location: \_\_\_\_\_  
(route & limits or intersecting route or bridge)

\_\_\_\_\_  
(county & district)

Type of Work: \_\_\_\_\_

Drive Through Date: \_\_\_\_\_ Time: \_\_\_\_\_

Drive Through Rendition:            *First*            *Second*            *Third*

Team Members: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Construction Phase: *I*    *II*    *III*    *IV*    Other: \_\_\_\_\_

Video Taken:            *Yes*            *No*

Photographs Taken: *Yes*            *No*

## DRIVE THROUGH CHECKLIST

### Contract Requirements:

Lane Closure Policy requirements (*interstate projects only*)

Number of lanes maintained:

minimum required by policy: 1      2      3      4

as shown in the plans: 1      2      3      4

as constructed: 1      2      3      4

Time of week closures allowed:

by policy:      *weekday*      *weekend*      *either*      *never*

by contract:      *weekday*      *weekend*      *either*      *never*

as constructed:      *weekday*      *weekend*      *either*      *never*

Time of day closures allowed:

by policy:      *daytime*      *nighttime*      *either*      *never*

by contract:      *daytime*      *nighttime*      *either*      *never*

as constructed:      *daytime*      *nighttime*      *either*      *never*

If there is deviation from the policy has a waiver been approved?

Yes                  No                  *Not Applied for*

Is there a contractor appointed traffic control supervisor?    Yes    No

Other contract requirements:

\_\_\_\_\_ met?    Yes    No

\_\_\_\_\_ met?    Yes    No

## DRIVE THROUGH CHECKLIST

### Work Zone Conditions:

Contractor activity:	<i>Working</i>	<i>Not Working</i>	
Does the contractor appear to have adequate staging area?	Yes		No
Are contractor staff, equipment and material protected from traffic?	Yes		No
Does the contractor appear to have safe ingress/egress?	Yes		No

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Does the work zone drive comfortably at the posted speed?	Yes	No
Are drivers:		
obeying the posted speed?	Yes	No
merging correctly/safely?	Yes	No
<i>following too closely?</i>	Yes	No
making excessive/illegal lane changes?	Yes	No
exhibiting signs of road rage?	Yes	No
hitting their brakes?	Yes	No
<i>appear distracted by construction activities?</i>	Yes	No

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### Delay or Queuing encountered:

Delay (minutes):	<i>none</i>	<i>5 or less</i>	<i>10</i>	<i>15</i>	<i>20</i>	<i>30</i>	<i>60 or more</i>
Queue (miles):	<i>none</i>	<i>0.2 or less</i>	<i>0.5</i>	<i>1.0</i>	<i>1.5</i>	<i>2</i>	<i>3 or greater</i>
Reason for delay/queue:	<i>traffic volumes</i>		<i>accident</i>		<i>contractor activity</i>		
	<i>police activity</i>		<i>other</i> _____				

**DRIVE THROUGH CHECKLIST**

Work Zone Conditions (continued)

Were any accidents encountered?    Yes    No    if yes please elaborate \_\_\_\_\_

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For **nighttime** drive throughs only

- |  |     |    |
|--|-----|----|
| Is work area lighting causing a glare problem for traffic? | Yes | No |
| Are work vehicle lights causing glare?                     | Yes | No |
| Are work vehicles visible?                                 | Yes | No |
| Is existing roadway lighting maintained?                   | Yes | No |

## DRIVE THROUGH CHECKLIST

### Work Zone Geometrics

Number of lanes maintained (open):

northbound:	1	2	3	4	n/a
southbound:	1	2	3	4	n/a
eastbound:	1	2	3	4	n/a
westbound:	1	2	3	4	n/a

Lane width:

minimum(s) required by policy/standards: \_\_\_\_\_

northbound:	by plans _____	observed _____
southbound:	by plans _____	observed _____
eastbound:	by plans _____	observed _____
westbound:	by plans _____	observed _____

Inside shoulder width:

minimum(s) required by policy/standards: \_\_\_\_\_

northbound:	by plans _____	observed _____
southbound:	by plans _____	observed _____
eastbound:	by plans _____	observed _____
westbound:	by plans _____	observed _____

Outside shoulder width:

minimum(s) required by policy/standards: \_\_\_\_\_

northbound:	by plans _____	observed _____
southbound:	by plans _____	observed _____
eastbound:	by plans _____	observed _____
westbound:	by plans _____	observed _____

## DRIVE THROUGH CHECKLIST

### Work Zone Geometrics (continued)

Lane merge taper location:

Do the plans show an appropriate taper location?	Yes	No	n/a
northbound taper at the plan location?	Yes	No	
southbound taper at the plan location?	Yes	No	
eastbound taper at the plan location?	Yes	No	
westbound taper at the plan location?	Yes	No	

Lane merge taper length:

minimum(s) required by policy/standards: \_\_\_\_\_

northbound:	by plans _____	observed _____
southbound:	by plans _____	observed _____
eastbound:	by plans _____	observed _____
westbound:	by plans _____	observed _____

Lane shift taper location:

Do the plans show an appropriate taper location?	Yes	No	n/a
northbound taper at the plan location?	Yes	No	
southbound taper at the plan location?	Yes	No	
eastbound taper at the plan location?	Yes	No	
westbound taper at the plan location?	Yes	No	

Lane shift taper length:

minimum(s) required by policy/standards: \_\_\_\_\_

northbound:	by plans _____	observed _____
southbound:	by plans _____	observed _____
eastbound:	by plans _____	observed _____
westbound:	by plans _____	observed _____

## DRIVE THROUGH CHECKLIST

### Work Zone Geometrics (continued)

Does the maintenance of traffic plan include crossovers?                      Yes    No    n/a

    If Yes then,

        Are the planned crossover locations appropriate?                      Yes    No

        Are the crossovers at the planned location?                      Yes    No

        Are the planned crossover adequately designed?                      Yes    No

        Are the crossovers built per the plans?                      Yes    No

        Is the left lane merged?                      Yes    No

        Are the crossovers negotiated comfortably?                      Yes    No

Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For **non-freeway** drive throughs only:

    Should the plan include provisions turn lanes?                      Yes    No

    Are turn lanes included in the plans?                      Yes    No    n/a

    Are turn lanes provided?                      Yes    No    n/a

    Do the plans show adequate turn lane lengths?                      Yes    No    n/a

    Is adequate turn lane length provided?                      Yes    No    n/a

Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## DRIVE THROUGH CHECKLIST

### Work Zone Positive Protection Devices

Should concrete barrier be specified?                      Yes    No  
*median*                      *outside shoulder*                      *elsewhere* \_\_\_\_\_

Is concrete barrier wall specified in the plans?                      Yes    No  
*median*                      *outside shoulder*                      *elsewhere* \_\_\_\_\_

Is barrier provided as shown in plans?                      Yes    No                      *n/a*

If Yes then

Is it the proper type?                      Yes    No  
What end protection is specified in the plans?                      *flared*                      *attenuated*  
How are the ends protected?                      *flared*                      *attenuated*  
Are the walls properly offset?                      Yes    No  
Are the walls properly delineated?                      Yes    No

Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## DRIVE THROUGH CHECKLIST

### Work Zone Channelization Devices

Devices required by policy:

*Barricades*    *Drums*    *Cones*    *Tubular Markers*    *Other*\_\_\_\_\_

Are devices detailed in plans/standards and shown in proper application?

Barricades	Yes	No
Drums	Yes	No
Cones	Yes	No
Tubular Markers	Yes	No
Other _____	Yes	No

Are devices used in proper application?

Barricades	Yes	No
Drums	Yes	No
Cones	Yes	No
Tubular Markers	Yes	No
Other _____	Yes	No

Are devices in good condition (sufficient reflectivity for nighttime work)?

Barricades	Yes	No
Drums	Yes	No
Cones	Yes	No
Tubular Markers	Yes	No
Other _____	Yes	No

Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## DRIVE THROUGH CHECKLIST

### Pavement Markings

Temporary markings required:

Center Line	Yes	No
Lane Line	Yes	No
Edge Line	Yes	No
Other _____	Yes	No

For non-freeway projects:

Stop Bar	Yes	No
Message Markings	Yes	No
Other _____	Yes	No

Are the required markings included in the plans?    Yes                    No

Are the correct type, color & width used?

Center Line	Yes	No	n/a
Lane Line	Yes	No	n/a
Edge Line	Yes	No	n/a
Other _____	Yes	No	

For non-freeway projects:

Stop Bar	Yes	No	n/a
Message Markings	Yes	No	n/a
Other _____	Yes	No	

Comments \_\_\_\_\_

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## DRIVE THROUGH CHECKLIST

The maintenance of traffic signing is:      detailed in plans      by standard only

Legend	Sign	Code	Standard Signing for a Crossover			Properly Located	Out of Position	At site	
			Correctly Shown	By Plans Incorrectly Located	Omitted			Left Side Absent	Right Side Absent
Crossover direction- Approaching the work zone									
ROAD CONSTRUCTION AHEAD		XW20-1							
LEFT LANE CLOSED AHEAD		XW20-5(L)							
LANE ENDS MERGE RIGHT		XW9-2-A(R)							
SYMBOLIC LANE ENDS MERGE RIGHT		XW4-2-A(R)							
SYMBOLIC LANE SHIFT LEFT w/ADVISORY		XW1-4-B(L)							
SPEED PLAQUE		w/ XW13-1-A							
LARGE ARROW LEFT		XW1-6							n/a
At the work zone									
SYMBOLIC TWO WAY TRAFFIC		XW6-3-B							n/a
DO NOT PASS		R4-1-B							n/a
Exiting the work zone									
SYMBOLIC LANE SHIFT RIGHT		XW1-4-B(R)							n/a
w/ADVISORY SPEED PLAQUE		w/ XW13-1-A							
DO NOT ENTER		R5-1-B							n/a
LARGE ARROW RIGHT		XW1-6							n/a
END CONSTRUCTION		XG20-2							n/a
Non-crossed over direction- Approaching the work zone									
ROAD CONSTRUCTION AHEAD		XW20-1							
LEFT LANE CLOSED AHEAD		XW20-5(L)							
LANE ENDS MERGE RIGHT		XW9-2-A(R)							
SYMBOLIC LANE ENDS MERGE RIGHT		XW4-2-A(R)							
At the work zone									
SYMBOLIC TWO WAY TRAFFIC		XW6-3 -B							n/a
DO NOT PASS		R4-1-B							n/a
Exiting the work zone									
END CONSTRUCTION		XG20-2							n/a

## DRIVE THROUGH CHECKLIST

The maintenance of traffic signing is:      detailed in plans      by standard only

### Standard Signing for a Freeway Lane Closure

Legend	Sign	Code	By Plans			Properly Located	At site		
			Correctly Shown	Incorrectly Located	Omitted		Out of Position	Left Side Absent	Right Side Absent
<b>Right Lane Closed- Approaching work zone</b>									
ROAD CONSTRUCTION AHEAD		XW20-1							
LEFT LANE CLOSED AHEAD		XW20-5(L)							
LANE ENDS MERGE RIGHT		XW9-2-A(R)							
SYMBOLIC LANE ENDS MERGE RIGHT		XW4-2-A(R)							
FLASHING ARROW SIGN (arrow to right)									n/a
Exiting the work zone									
END CONSTRUCTION		XG20-2							n/a
<b>Center Lane Closed- Approaching work zone</b>									
ROAD CONSTRUCTION AHEAD		XW20-1							
LEFT LANE CLOSED AHEAD		XW20-5(L)							
LANE ENDS MERGE RIGHT		XW9-2-A(R)							
SYMBOLIC LANE ENDS MERGE RIGHT		XW4-2-A(R)							
FLASHING ARROW SIGN (arrow to right)									n/a
CENTER LANE CLOSED AHEAD		XW20-5(C)							
At the work zone									
FLASHING ARROW SIGN (double arrow)									Center lane
Exiting the work zone									
END CONSTRUCTION		XG20-2							
<b>Left Lane Closed- Approaching work zone</b>									
ROAD CONSTRUCTION AHEAD		XW20-1							
LEFT LANE CLOSED AHEAD		XW20-5(L)							
LANE ENDS MERGE RIGHT		XW9-2-A(R)							
SYMBOLIC LANE ENDS MERGE RIGHT		XW4-2-A(R)							
FLASHING ARROW SIGN (arrow to right)									n/a
Exiting the work zone									
END CONSTRUCTION		XG20-2							

## DRIVE THROUGH CHECKLIST

The maintenance of traffic signing is:      detailed in plans      by standard only

Legend	Sign	Code	Standard Signing for a Freeway Closure			Properly Located	At site		
			Correctly Shown	By Plans Incorrectly Located	Omitted		Out of Position	Left Side Absent	Right Side Absent
Approaching Work Zone									
ROAD CONSTRUCTION AHEAD		XW20-1							
ROAD CLOSED AHEAD		XW20-3							
DETOUR AHEAD		XW20-2							
LEFT LANE CLOSED AHEAD		XW20-5(L)							
LANE ENDS MERGE RIGHT		XW9-2-A(R)							
SYMBOLIC LANE ENDS MERGE RIGHT		XW4-2-A(R)							
FLASHING ARROW SIGN (arrow to right)									n/a
SYMBOLIC CURVE TO RIGHT WARNING w/ ADVISORY SPEED PLAQUE		XW1-2-B(R) w/ XW13-1-A							
ROAD CLOSED (w/ type B Lights) and RURAL DETOUR ARROW RIGHT		XW4-2-A(R) & XM4-10(R)							n/a
For a Rural Detour									
ADVANCE TURN DETOUR RMA									
DIRECTIONAL DETOUR RMA									
CONFIRMING DETOUR RMA									
END DETOUR RMA									
For an Urban Detour									
ADVANCE TURN DETOUR RMA									n/a
DIRECTIONAL DETOUR RMA									n/a
CONFIRMING DETOUR RMA									n/a
END DETOUR RMA									n/a
END CONSTRUCTION		XG20-2							

## DRIVE THROUGH CHECKLIST

The maintenance of traffic signing is:      detailed in plans      by standard only

### Standard Signing for Work at an Intersection

Legend	Sign	Code	By Plans			Properly Located	At site		
			Correctly Shown	Incorrectly Located	Omitted		Out of Position	Left Side Absent	Right Side Absent
Divided Highway-Approaching work zone									
ROAD CONSTRUCTION AHEAD		XW21-4-A							
Non-Divided Highway- Approaching work zone									
ROAD CONSTRUCTION AHEAD		XW20-1							n/a

### Standard Signing for Work on a 3 lane (5 lane?) Route

Legend	Sign	Code	By Plans			Properly Located	At site		
			Correctly Shown	Incorrectly Located	Omitted		Out of Position	Left Side Absent	Right Side Absent
Lane Merged direction									
ROAD CONSTRUCTION AHEAD		XW20-1							n/a
RIGHT LANE CLOSED 1000 FT		XW-20-5(R)							n/a
SYMBOLIC NO LEFT TURN		R3-2a-A							n/a
SYMBOLIC LANE ENDS MERGE LEFT		XW4-2-A(R)							n/a
END CONSTRUCTION		XG20-2							n/a
Unmerged direction									
ROAD CONSTRUCTION AHEAD		XW20-1							n/a
SYMBOLIC NO LEFT TURN		R3-2a-A							n/a
END CONSTRUCTION		XG20-2							n/a

### Standard Signing for Work on an Undivided Route

Legend	Sign	Code	By Plans			Properly Located	At site		
			Correctly Shown	Incorrectly Located	Omitted		Out of Position	Left Side Absent	Right Side Absent
Divided Highway-Approaching work zone									
ROAD CONSTRUCTION AHEAD		XW21-4-A							
ONE LANE ROAD AHEAD		XW20-4							
SYMBOLIC FLAGGER AHEAD		XW20-a-A							

## DRIVE THROUGH CHECKLIST

The maintenance of traffic signing is:

detailed in plans

by standard only

Legend	Sign	Standard Signing for Shoulder Work			Properly Located	Out of Position	At site	
		Code	Correctly Shown	By Plans Incorrectly Located			Omitted	Left Side Absent
		Divided Highway-Approaching work zone						
SHOULDER CONSTRUCTION AHEAD END CONSTRUCTION		XW21-5-A						
		XG20-2						
		Non-Divided Highway						
SHOULDER CONSTRUCTION AHEAD END CONSTRUCTION		XW21-5-A						n/a
		XG20-2						n/a

## DRIVE THROUGH CHECKLIST

### Work Zone Signing (continued)

Is there a need for supplemental construction signing?	Yes	No
If yes do the plans make provisions for this signing?	Yes	No
If yes, are the signs installed per the plans?	Yes	No

If not please elaborate

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The construction signs:	are the appropriate size	Yes	No
	are visible/ in good condition	Yes	No
	have good reflectivity	Yes	No
The signs are mounted:	at the correct heights	Yes	No
	on acceptable supports	Yes	No
	at a proper offset	Yes	No
The signs are spaced:	<i>adequately</i>	<i>too closely</i>	

Comments

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## DRIVE THROUGH CHECKLIST

### Work Zone Speed Limit Sign Assemblies

Are work zone speed limit assemblies needed?	Yes	No
If yes are they specified in the plans/special provisions?	Yes	No
If yes are they provided at the site?	Yes	No
If yes are they posted with the proper speed (45 mph or 10 mph less than the permanent speed)?	Yes	No
Are reduced speed ahead assemblies used if speed reduction is greater than 10 mph?	Yes	No
If yes are they well located (next to the permanent speed limit signs if in the same vicinity)?	Yes	No
If yes are they activated only when there is construction activity?	Yes	No

### Changeable Message Signs

Are changeable message signs included in the contract?	Yes	No
If yes have they been provided?	Yes	No
If yes are they located in an appropriate location?	Yes	No
If yes are they visible, legible and in good working order?	Yes	No
Are the messages appropriate?	Yes	No

### Detours and Alternative Routes

Does the plan include ramp closings?	Yes	No
Are detour or alternative routes needed?	Yes	No
If yes have details been included in the plans?	Yes	No
If yes are the routes viable/logical?	Yes	No
If yes have provisions been made for required improvements to the routes?	Yes	No
If yes have those improvements been made?	Yes	No

## DRIVE THROUGH CHECKLIST

### Summary/Potential Questions for Construction/Contractor Staff

Does the work zone meet the requirements of the plans and specifications?      Yes    No

Comments

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Has the contractor exceeded requirements or provided innovations?      Yes    No

Comments

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Are there any potential safety problems that should be addressed?      Yes    No

If yes please elaborate

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Have constructability challenges been presented due to the MOT plan?      Yes    No

If yes please elaborate

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**DRIVE THROUGH CHECKLIST**

Summary/Potential Questions for Construction/Contractor Staff

Does the work zone meet the requirements of the plans and specifications?      Yes    No

Comments

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Has the contractor exceeded requirements or provided innovations?      Yes    No

Comments

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Are there any potential safety problems that should be addressed?      Yes    No

If yes please elaborate

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Have constructability challenges been presented due to the MOT plan?      Yes    No

If yes please elaborate

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## DRIVE THROUGH CHECKLIST

### Summary

Does the MOT plan provide sufficient guidance and detail? Yes No

Comments

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Do the plans exceed requirements or provide innovative/creative solutions? Yes No

Comments

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Are there opportunities for improvement to the standards, specifications or policy? Yes No

Comments

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## APPENDIX G



# INDIANA DEPARTMENT OF TRANSPORTATION

*Driving Indiana's Economic Growth*

## Memorandum

Friday, June 29, 2007

**TO:** Jim Keefer, Construction Engineer  
Fort Wayne District

**THRU:** Carl Tuttle, Manager *Carl S. Tuttle*  
Office of Traffic Engineering

**THRU:** John P. McCarty, Supervisor *J.P. McCarty*  
Work Zone Safety Section

**FROM:** Warner Moses *WM*  
Work Zone Engineer

**SUBJECT:** Work Zone Review Summary  
Contract IR-28937, I-69 Added Travel Lanes, in Allen County

Our office conducted a field review of the above noted contract June 19, 2007.

At the time of the review, the contractor was working. There were no lane restrictions on I-69. The posted speed limit was 55MPH. Overall, the work zone appeared to be set up well.

Our observations are as follows.

1. All advanced warning signs were appropriately placed.
  - There were Changeable Message signs( CMS's ) with messages (two) that displayed clear and to the point information.
2. The NB Concrete ( median ) Barrier Walls were properly offset and their ends were flared for protective measure according to the standard guide lines.

The work zone layout overall drove and functioned very well.

This summary is being provided to the Construction Engineer only for your benefit.

If you have any questions or would like to discuss any of these items in greater detail, please contact Pat McCarty at (317) 234-5114 or Warner Moses at (317) 232-6765.

Thank you,

CTT/JPM/WM

cc: file

## APPENDIX H



# INDIANA DEPARTMENT OF TRANSPORTATION

*Driving Indiana's Economic Growth*

## Memorandum

Tuesday, July 03, 2007

TO: Ross Andrews, Construction Engineer  
LaPorte District

THRU: Carl Tuttle, Manager *Carl T. Tuttle*  
Office of Traffic Engineering

THRU: Pat McCarty, Supervisor *Pat McCarty*  
Work Zone Safety Section

FROM: Abby Lalko *All*  
Work Zone Safety Engineer

SUBJECT: Work Zone Crash Site Review Summary  
Contract IR-28685, I-65 and I-80 Interchange in Lake County

A crash site investigation was performed as part of the field review conducted for Contract IR-28685 (I-65 and I-80 Interchange in Lake County) on June 19, 2007. The investigation was initiated because the particular work zone was experiencing a lot of accidents. The most common accident type was rear-ending accidents, and the majority of the accidents were within two specific stretches of I-80 and I-65 respectively. This summary is intended to supplement the findings of Tim Marker, who provided his findings for comparison purposes prior to our site visit.

Any conditions or issues that were identified on the review as potentially unsafe, and ideas for making the work zone safer, are listed below.

- Drivers were speeding through the work zone. The contract is already part of the Indiana State Police (ISP) special patrols, but a discussion with the ISP to set up critical patrol areas or to request a greater presence in the work zone may be beneficial. If the funding could be found within the contract monies, an additional option would be to increase the amount of time that the ISP patrol the project, possibly up to 24 hour patrols.
- For high volume/high speed interstate locations like this, larger "SLOWED OR STOPPED TRAFFIC AHEAD" warning signs, perhaps panel signs, would be more beneficial. These signs are especially important because of the high number of rear-end

crashes. Either as an alternative or in addition to larger signs, rumble strips placed in front of “SLOWED OR STOPPED TRAFFIC AHEAD” signs may increase motorists’ awareness of the signs and of the traffic conditions.

- Tim Marker suggested adding changeable message signs (CMS) before and after the Broadway interchange on I-80 eastbound stating “BE PREPARED TO STOP”. This is a good suggestion – message boards may stand out to the public more than the standard construction signs.
- The ATMS Dynamic Message Sign located between 2 – 5 miles south of the work zone on I-65 northbound was not displaying a message. The utilization of this DMS and the DMS’s on I-80 for construction messages, when they are not needed for real-time condition updates, would be an effective way to display extra construction information and/or warnings.
- Poor driver behavior within the work zone on I-65 northbound (for example quick lane changes/swerving) might be reduced with additional lane assignment guidance, for example with a second CMS placed south of the Ridge Rd. exit displaying information for drivers exiting on I-80 eastbound.
  - Tim Marker suggested that the CMS on I-65 northbound providing information for those exiting onto I-80 eastbound be placed further to the south. At the time of our review, the CMS was located just south of the ramp where Ridge Rd. traffic enters I-65 northbound in the right lane. It is unclear whether the CMS had been moved to this location, or if this was where it was originally placed. This location may be an issue as drivers need to focus on entering traffic and could therefore miss the message. There are also a lot of signs on this particular stretch of I-65 northbound, making it hard for the driver to focus on any one sign for very long. Moving this board further to the south or adding an additional board to the south may encourage drivers to switch lanes earlier.
- The lane assignment signs on I-65 northbound for the I-80 westbound and eastbound exits after the Ridge Rd. exit are not directly over the correct lanes. Centering these signs over the appropriate lanes may reduce confusion and allow motorists to merge sooner and more safely.

In addition, adding guidance to the overhead signs south of the Ridge Rd. exit for those exiting onto Ridge Road, I-80 westbound, or I-80 eastbound from I-65 northbound may help drivers choose the correct lane earlier (for example EXIT FIRST RIGHT could be added under the Ridge Road overhead guidance information, EXIT SECOND RIGHT could be added to supplement the I-80 westbound guidance, and USE CENTER LANE could be added for I-80 eastbound traffic).

This summary is being provided to the Construction Engineer only for your benefit.

If you have any questions or would like to discuss any of these items in greater detail, please contact Pat McCarty at (317) 234-5114 or Abby Lalko at (317) 234-5112.

Thank you.

CTT/JPM/ALL

cc: file