

North Carolina Department of Transportation



WORK ZONE SAFETY & MOBILITY PROCESS REVIEW December 2015

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Work Zone Safety & Mobility Process Review North Carolina Department of Transportation

Table of contents

Executive Summary.....	3
Purpose and Objective.....	3
Approach.....	3
Results and Recommendations.....	3
Conclusion.....	8
References.....	9
FHWA Work Zone Safety & Mobility Final Rule.....	9
FHWA Temporary Traffic Control Devices Final Rule.....	9
NCDOT Work Zone Safety & Mobility Policy.....	9
NCDOT Maintenance / Utility Traffic Control Guidelines.....	9
NCDOT WZTCS – Work Zone Safety Audits Annual Summary Report.....	9

EXECUTIVE SUMMARY

The North Carolina Department of Transportation (NCDOT) is committed to providing safe work zones for all workers and road users while minimizing traffic congestion and adverse impacts on road users and local communities. In response to changes to the Federal Highway Administration's Work Zone Safety and Mobility Rule 23 CFR 630 Subpart J, NCDOT developed its Work Zone Safety and Mobility Policy in 2007. We continue working to fulfill the intent of this policy which is to support the systematic consideration and management of work zone impacts related to safety, mobility, operations, and training.

This report is an update to the Process Review that was submitted to FHWA in February 2013. Since then, NCDOT has continued to implement those effective strategies but sees more consistent application is needed to fulfill all of the goals and intent of the Rulemaking and NCDOT's Safety and Mobility Policy. In addition, NCDOT continues to enhance some pre-existing process elements while still working on improving others such as the collection and usage of work zone data.

PURPOSE AND OBJECTIVE

In 2007, the North Carolina Department of Transportation (NCDOT) committed to systematic consideration and management of work zone impacts related to safety, mobility, operations, and training through the Work Zone Safety & Mobility Policy. The purpose of this review is to assess the effectiveness of the current practices to manage work zone impacts and determine where improvements can be made. In addition, the process review will ensure compliance and adherence to FHWA's work Zone Safety and Mobility Rule.

APPROACH

A process review meeting was held in November 2015 with various staff members and the State Traffic Management Engineer to review the results of the 2013 report and to discuss recent updates and/or improvements.

RESULTS AND RECOMMENDATIONS

The process review meeting reviewed the results of the 2013 report and evaluated whether any improvements and new innovations have resulted in safer or better mobility in our work zones. The highlights of the successes along with areas for improvement are described below, along with recommendations to overcome these challenges.

Successful Practices

Safety & Traffic Operations Meetings. Safety & Traffic Operation Meetings continue to be utilized on most of the Category I Significant projects. To date, the I-85 corridor in the Mecklenburg/Cabarrus/Rowan county area has been using these since project inception. These are being held on a monthly basis and are being planned and executed by the Division Incident

Management Engineer. Law enforcement, emergency services, construction staff, traffic engineering staff, contractor staff, public information officers and the TMP design team meet together to discuss recent traffic issues including WZ crashes, upcoming schedule, traffic shifts, lane and road closures, incident response issues, etc. In addition, they discuss specific solutions to these traffic related issues to improve the congestion and traffic operations in and around the project. Although no WZ crash studies have been performed on projects within the I-85 corridor, preliminary studies on the I-40 corridor have shown a reduction in crash rate on projects regularly holding these Safety & Traffic Operations Meetings. That is a crash rate at or below the pre-work zone crash rate. We expect this technique to continue and expand to all of the upcoming Category I Significant Projects.

IMPACT Let List Meetings. These meetings are scheduled on a quarterly basis and continue to provide valuable information to the public information staff members. The participants of the meeting include WZTC, responsible for the development and/or oversight of the Transportation Management Plans (TMP's) and the Traffic Systems Operations Unit, statewide coordination of incident management and intelligent transportation systems efforts. Each project on the 12 Month Let List whether it's a traditional design/bid/build or a Design/Build project is categorized as High, Medium or Low Impact based on either the impact to traffic while the project is under construction and/or upon its completion will have a huge impact on traffic mobility. We also use the results of this meeting to select candidate projects for our "HAWKS" program. This program utilizes off-duty State Highway Patrol Officers to monitor and patrol selected work zones. This is described in more detail below.

HAWKS (Helping All Work Zones Keep Safe). HAWKS is a joint initiative between NCDOT and North Carolina State Highway Patrol (NCSHP) to utilize off-duty law enforcement officers to monitor and patrol work zones. This initiative provides dedicated enforcement in a specific work zone to improve safety and mobility. NCDOT prioritizes the work zones using crash rates, existing congestion, average speeds, and roadway tier classification (statewide, regional, sub regional) as the scored criteria. Projects with the higher scores are selected for the program and notifications are sent to the Resident Engineer and the State Highway Patrol Office for staffing and scheduling assignments.

Work Zone Speed Limit Reductions. The Work Zone Traffic Control Section has revised our position on the application of speed limit reductions in the work zone. Specifically, we are recommending the use of the "temporary" speed limit reductions in most cases during lane closures and during other traffic control techniques when the project meets the criteria. The project must meet the criteria before the project is ordinance and the speed limit reduced. Primarily, we are targeting interstates with speed limits 60MPH and higher and reducing the speed limits with portable changeable message signs (or portable signs) during specific activities. Once the activities are completed, the speed limits are returned to the existing pre-work zone level.

Longer term speed limit reductions in work zones have separate criteria and are used when highway geometrics have been altered and/or usable shoulders have been eliminated. When these types of conditions exist, the speed limits are reduced on standard regulatory speed limit signs and the black on orange “WORK ZONE” G20-5a panels are added to the top of the speed limit signs. If a project qualifies for the long term speed reduction, it automatically qualifies for the “\$250 speeding fine”.

In both cases, the intent is that speed limits should only be reduced when it’s apparent a reduction is necessary which is precisely the guidance given in the MUTCD. In practice however, we have found the contractor tendency is to install speed reduction and \$250 speed penalty signage at the time construction begins leaving same in place throughout the duration of the contract. This tendency has sent mixed messages to the motorist which views the speed reduction as a speed trap to generate revenue versus an actual need. To combat this tendency we have put into place the following methodology:

Unless a significant change in geometry and/or other design features warrant less than the existing speed limit, the existing speed limit shall remain in place. To emphasize the presence of the work zone, the work zone panels are to be attached to the speed limit signs with the \$250 speeding fine mounted below. This approach lets the motorist know that a higher fine will be imposed when exceeding the posted speed limit within those limits. If the need for the speed reduction is necessary the contractor will be instructed to install the appropriate signage. The speed reduction signs are to be removed as soon as the need is no longer required. We feel this process will be better perceived by the motoring public resulting in better speed compliance when the need is apparent. This will help ensure a safe and uniform speed throughout the affected area of the work zone.

\$250 Work Zone speeding fine. This practice has been used in North Carolina for over 20years. The NC general statute for \$250 speeding fine was revised to allow the penalty to be used in sections of a work zone where the actual work is taking place. Previously, the wording of the law required the penalty to be applied for the entire work zone. The public was frustrated that fines were levied in areas where no work is taking place particularly with long Interstate resurfacing projects. To date, we have experienced little concerns from the law enforcement community and frustrated drivers. The lesson learned is to use this technique “judiciously” and the compliance rates will dramatically improve as well as law enforcements willingness to enforce this fine.

Work Zone Supervisor. North Carolina requires a Work Zone Supervisor for each company that performs work within our Right of Way. We also require it for each Division within NCDOT. Contractors and NCDOT Divisions are allowed to determine how many Work Zone Supervisors they need based on their work load, but they must have at least one. The requirements are based on years of experience (work zone experience and supervisory experience) as well as the successful completion of an approved Work Zone Supervisor course. Once a person is qualified as a Work Zone Supervisor, they have two major responsibilities: 1) be available to work crews

to assist and answer work zone set up questions, 2) they are also responsible for making sure all their employees have adequate work zone training to safely carry out their tasks.

On Category I Significant projects, we require a Work Zone Supervisor to be staffed directly to the project. A project special provision is added to the contract that stipulates the duties and responsibilities of this requirement. The purpose of this position is to provide NCDOT with a point of contact that is responsible for safety and mobility in the work zone. This position is also responsible for ensuring coordination between projects in the same network, monitoring queues, and coordinating with traffic management centers. This practice has provided better communication between the traffic management centers and project personnel.

Work Zone Traffic Analysis Research. The WZTC has been working under contract with the Institute for Transportation Research and Education (ITRE) at North Carolina State University to develop work zone software to evaluate the impacts of work zones on the highway network. The initial study is complete and has produced analytic software called “FREEVAL-WZ.” It was first utilized during the summer of 2013 on the I-40/I-440 project in Raleigh. Once the project is complete the results will be compared to actual data collected in the work zone. We anticipate the use of this tool to expand to all level 1 and 2 projects in the next two years. In addition, ITRE is developing software similar to FREEVAL-WZ to evaluate work zone impacts on urban arterials. This project (Artval) should be complete by the end of 2015 and be available for testing in 2016. When completed, the user should be able to analyze work zone impacts at both intersections and midblock areas.

Work Zone Training Requirements. Currently the NCDOT Work Zone Training Requirements are categorized into four categories. 1) Flagger Training – all flaggers must complete an approved flagger training class every 4 years. 2) Work Zone Supervisor Training discussed earlier, 3) Work Zone Training for Law Enforcement Officers, 4) Work Zone Designer Training. The first 3 aspects of the program have been implemented but we are still working with our partners to develop training requirements for all personnel that are involved in the design of Transportation Management Plans. Currently our only requirement is that all TMP’s must be sealed by a licensed professional engineer unless only NCDOT Standard Drawings are used. We expect to have design requirements in place within the next 12 to 24 months.

Maintenance / Utility Traffic Control Guidelines. This manual was created and made available online to provide information and guidance to all persons working inside the Highway Right of Way in North Carolina. The manual is intended to blend information contained in the MUTCD with that in the NCDOT Standard Drawings to provide the basic knowledge workers should be familiar with before they perform tasks within our highways. It is anticipated that all employers provide and discuss this information with each employee on a regular basis. Certification is not required at this knowledge level. To date the manual has been well received by both the industry and internal NCDOT maintenance staff.

Work Zone Traffic Control Design Manual. NCDOT WZTCS has been revising its Traffic Control Design Manual. The manual is being developed to provide a traffic control design resource for Transportation Management Plan designers. Not only should it foster uniformity and

consistency in TMP development statewide it will also, be instrumental in the implementation of the Work Zone Designer Training mentioned earlier. We anticipate availability online of the manual in 2016.

Work Zone Reviews. The Work Zone Traffic Control Section implemented procedures and or guidelines for the review of work zones in 2013 (WZ Safety Audits). We also established a work zone “scoring” system that objectively evaluates the work zones by scored categories and an overall score. This information is provided to the Contractor, Division personnel and the NCDOT Construction Office. We use this information to determine if there is any correlation between work zone crashes and the type of work, entity performing the work, and the possibility of training requirements.

Work Zone Review Annual Summary Reports. Data derived from the Work Zone Reviews are compiled and summarized annually indicating the results or findings of field safety audits. These reports help assist us in determining whether NCDOT Standards and Practices are being implemented in the field consistently, uniformly and are effective at providing a satisfactory level of safety, traffic flow and construction efficiency. In addition, they reveal techniques or technologies needed to improve overall safety, traffic flow and construction efficiency or identify current standard practices that may need updating based on observations and/or feedback. These reports are available online in the following location:

<https://connect.ncdot.gov/projects/WZTC/Pages/Manuals-Guidelines.aspx>

Mobility Measurements on Secondary System (icones). Currently, the Department owns 7 iCone devices which are portable speed measuring devices that both collect and store speed data for mobility assessment. These devices are being utilized to measure the mobility of NCDOT work zones within our secondary road system. Information collected on several field tests are still being analyzed to date.

Areas for Improvement

1. **Work Zone Data.** Work zone data collection and usage is still an area where improvements can be made. The availability of speed data is becoming more and more accessible through the INRIX program and we’ll soon be able to evaluate mobility of the work zone through this data. We expect the work zones along the interstate and high speed freeways to be analyzed and have a performance rating established within the next 12 to 24 months. We currently have developed the mobility criteria and will “validate” these criteria on targeted interstate projects in 2016. It’s our anticipation the mobility criteria will be ready for full implementation in 2017.

We are also receiving more work zone crash information than in previous years. Although allowing us to review these reports and make determinations on whether the work zone may or may not have had an impact in the crash due to limited staff and time we only concentrate on work zone related crashes involving a fatality at this time. We review other work zone crashes on a project by project basis. As technology improves and government silos are

reduced, this information will allow us to be timelier in the assessment of the crash reports, but also may help drive the content and audience of our work zone training.

2. **Process Review.** NCDOT is still committed to conduct a bi-annual Process Review to assess performance of existing processes and procedures and make changes that bring about improvements. NCDOT will be using data from the FHWA Work Zone Self-Assessment Program, Safety Audits, and the annual Windshield Review during the process review. Recent organizational changes and budget constraints have had an impact on the needed resources to conduct these reviews. However, NCDOT is working on a recommendation to develop a procedure for conducting process reviews and make it an integral part of the business process.

3. **Work Zone ITS (on all contracting).** We're in the process of developing a statewide "On Call" WZ ITS contract for 2016. This effort will focus on utilizing multiple Traffic Control companies and NCDOT Regional Traffic Engineering Staff to identify and deploy systems in the field.

4. **Work Zone Crashes & Fatal Data.** From reviewing WZ crash data over the past 16 years, NC's WZ crashes are increasing, but, the WZ fatal crashes are decreasing.
 - 16 year avg. = 4,185 WZ Crashes
 - 16 year avg. = 24 WZ Fatal Crashes
 - 2015 = 4,760 WZ Crashes
 - 2015 = 16 Fatal WZ CrashesWe will continue to monitor this data and hopefully with the use of more WZ ITS, we can drive these numbers downward in future years.

CONCLUSION

NCDOT is determined to promote an agency culture committed to the Work Zone Safety and Mobility Policy. Although progress has been made in getting the requirements of the Rulemaking and North Carolina's Mobility and Safety Policy implemented, there are still some areas needing improvement. These areas include: 1) completing the Work Zone Training Program by establishing work zone training requirements for TMP designers, 2) expand the use of feedback for analyzed traffic data back into the training and design processes and procedures project level process and procedures). Although crash and speed data continue to become easier to obtain with improvements in technology, recent cuts in staffing make it increasingly challenging to dedicate personnel to evaluate this data and create a plan of action based on the results of such analysis. In order to fully implement the policy we may have to rely more on the private sector and outsource more of this work. We have already privatized most of the work zone training (Flagger and WZ Supervisor training) and may need to do the same for evaluating crash and speed data and even auditing existing work zones. Whether the work is outsourced or remains with existing personnel, the NCDOT is committed to providing safe work zones for all workers and road users while minimizing traffic congestion and adverse impacts on road users and local communities.

It's important to note that the contracting method of project delivery is shifting towards a Design Build Program in lieu of the Design/Bid/Build method. In so doing, the Design Build method brings forth challenges with Lump Sum Pay Items as deficiencies have been seen related to Pavement Markings, Delineation, and Signing associated with those projects. This tendency indicates that we may need to adjust how transportation management is addressed in these type of contracts to ensure strategies, procedures, and standards aren't compromised.

REFERENCES

FHWA Work Zone Safety & Mobility Final Rule

Effective October 12, 2007

Available At http://ops.fhwa.dot.gov/wz/resources/final_rule.htm

FHWA Temporary Traffic Control Devices Final Rule

Effective October 4, 2008

Available At <http://ops.fhwa.dot.gov/wz/resources/policy.htm>

NCDOT Work Zone Safety & Mobility Policy

Effective October 12, 2007

Available At https://connect.ncdot.gov/projects/WZTC/Documents/WZSafety_and_Mobility.pdf

NCDOT Maintenance / Utility Traffic Control Guidelines

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