- Feed-Back on the Process -

Improving the Process for Providing Mobility and Safety in Work Zones

2014 Summary Report

Introduction

MnDOT conducted a review of our "Process for Providing Mobility and Safety in Work Zones". The review meetings provided an opportunity for district to feed back issues to a Team which was there to discuss the various processes the district utilizes to deliver an efficient ground transportation system through the pre-design (scoping), design, construction and maintenance operations.

Minnesota has always been on the cutting edge and leading the way in the nation to provide the safest work zones for the traveling public and the workers on the project. We have always strived to maintain traffic flow through the project and provide access to the local businesses and residents using the safest and yet practical methods available. As part of MnDOT's Policy on Mobility and Safety in Work Zones (MS-WZ), which can be found in Technical Memorandum No. 12-03-T-02, dated February 6, 2012, and found at: http://dotapp7.dot.state.mn.us/edms/download?docId=1156501 MnDOT has documented its "Process for Providing Mobility and Safety in Work Zones" through its statewide level of commitment to the following processes and procedures:

- The usage of various active committees to continuously monitor issues within the state's roadway construction industry, design standards, and maintenance operations to improve on our standards, practices and procedures. These committees include:
  - Statewide Work Zone Safety (WZS) Committee
  - Traffic Engineering Organization Temporary Traffic Control (TEO TTC) Committee
  - Special Provisions Review Committee
  - Resident Engineers WZS Advisory Committee
  - Maintenance WZS Committee
- Continuous monitoring of statewide crash data for various trends, patterns and issues that may be mitigated through changes in standards or practices and we implement the safety initiatives.
- Field review of active projects to maintain quality standards and adherence to TTC standards in both construction and maintenance operations.
- Developing and conducting TTC training programs for public and private workers in design standards and proper field deployment of the standards.
- MnDOT has a very active research program with many projects focused on work zone safety. These are conducted through both the Research Services Unit and the Maintenance Research Unit.

The policy states that the Districts provide the analysis on individual projects to mitigate mobility issues and safety conflicts. To provide additional guidance to the districts for reviewing projects early in the scoping process and providing for mitigation measures early in the planning and budgeting process, the policy included checklists of typical issues and mitigation measures. The districts are responsible for following

the established standards and documenting when exceptions must be made to the standards. The level of anticipated detail was summarized based upon the impact of the work zone on traffic mobility and safety. Upon the adoption of the policy, MnDOT created a review of our "Process for Providing Mobility and Safety in Work Zones". The Feedback Discussions within the district are a major part of the process review. A Team was formed of representatives from the Office of Traffic, Safety and Technology, the Office of Maintenance, the Office of Construction and Innovative Contracting, and from the FHWA. The team visited three of the 8 MnDOT districts last year, the Metro District this year, and proposes to review four Districts during 2015.

A district visit would typically meet with representatives from the functional areas involved in the work zone process including Traffic, Design, Maintenance, Construction, Permits, Public Affairs, and Pre-design or scoping. The meetings began with an introduction to explain the purpose of the meeting and then became an open forum for participants to bring any issue up for discussion. All topics of concern to the participants were encouraged. When the participants did not have their own concerns, they were prompted with the discussion topics we focused on in previous years. Those were: TMP's, WZ field reviews, Training, and crash reporting.

Being the largest MnDOT District, Metro provided unique challenges to the typical format of a Feedback visit. Metro is very large in size, with many personnel, dispersed facilities, and often specialized units and equipment, some operating 24/7. Since the overall goal of a balanced safety and mobility effort is safe and efficient work zones, it was decided to use a peer review process to obtain data for the feedback on the WZ Process Report.

The Peer Review process would utilize several vehicles and representatives not associated with a particular project. Including participants from other districts would also add to the objectivity of the data collection. Since Metro is so large, the project visits were planned for 3 days, one each for maintenance, construction, and permits & cooperative agreement projects.

The peer review visits were planned for early October. Unfortunately, on October 1st, severe weather resulted in the planned Metro Maintenance operations being canceled. October 2nd had improved weather and 3 major construction projects were reviewed. Similarly, on the 3rd, 3 non-traditional projects were visited. This report is a summary of the work zone mobility and/or safety issues and best practices discovered during the peer review visits. It summarizes the peer review visits to the various projects. Several issues (as noted) are beyond the influence of these committees and will be passed to the appropriate groups for their action. Beyond issues, the report documents several "Best Practices" which the Team felt should be highlighted such that other districts may give consideration to incorporating them into their operations or may spur thoughts for additional improvements.

Metro Maintenance:

As mentioned above, the review team's good faith effort to perform a peer review of Metro Maintenance was frustrated by inclement weather. As Metro District is so large and complex, Metro Maintenance is similarly large, specialized, and has extensive operations. Nearly any emergency road or bridge repair needed may be accomplished by Metro Maintenance and their well-trained, professional crew members using state of the art equipment and materials.

All Maintenance operations in the field require some degree of traffic control. The specialty crews and sub-areas typically provide their own traffic control using a limited number of layouts from the Field Manual. When a closure or detour is required, Maintenance relies on both Oakdale and Golden Valley Traffic Services to set, maintain, and remove the traffic control. Traffic Control needs for Program Delivery sections such as Soils, Surveys, and Electrical Services let to the creation of a specialty crew within Golden Valley Traffic Services referred to as Traffic Control for Others. This specific crew does the highest volume of stationary traffic control set-ups in Metro Maintenance. Much of the information in this section comes from discussions with Metro Maintenance's Traffic Services.

OTST hosted a National ATSSA training class on Positive Protection Strategies in Work Zones in December. Several members of GV Traffic Services attended and contributed to the discussion of Positive Protection Strategies. They seldom use traffic barriers but make extensive use of truck and trailer mounted attenuators. They use these devices to protect the cone setters and within the work area to shield workers from traffic.

Several members of the review team assist the CO Office of Materials and Road Research with data collection on a NTPEP pavement marking test area on TH 35E north of Hugo. Golden Valley Traffic Services provides the traffic control for these operations. It is dangerous work with data readings required right out on centerline. GV Traffic Services has always provided a safe work zone with all the required signs and devices. The large dump trucks with TMA's were an enhancement that provided an extra safety margin to the operation. They even made use of a new device, the sequential warning flasher. It is a series of flashing lights attached to the devices in the lane closure taper. While it did work to get the motorists attention, it was not very bright on sunny days. It was thought to be a better enhancement to night-time lane closures.

With OTST being located in a Metro District facility, there is much interaction with Metro Maintenance. They participate on several committees including: Statewide Work Zone Safety, TEO TTC, and Statewide Maintenance TTC. Information is then shared at the Metro Maintenance Supervisor meetings.

Construction Projects:

TH 35E MnPASS and Cayuga Bridge replacement:

These are two projects that abut each other. Traffic is on temporary alignments and cooperation is required and achieved in maintenance of traffic. The public will perceive these as one MnDOT job. It has been ongoing for some time and will be inplace at least another construction season.

A significant amount of Portable Precast Concrete Barrier (PPCB) is used on these projects. It separates traffic, provides positive protection to workers, and protects the motorist from blunt ends and drop-offs. Sometimes, very deep drop-offs are protected by PPCB without much buffer or deflection space. Construction has been comfortable with about 2 feet of buffer but would like more guidance to defend their decisions.

Signage could be improved. With some exit only lanes and major roadway branches, it is necessary to communicate to the driver which lane to be in. Shift areas are especially difficult and for significant, long term projects, possibly some temporary OH signs could be used. D6 noted that they are considering this for an upcoming project and have some temp foundation plans from structures.

Some exit signing seemed undersized for the roadway type. Since plans are reviewed by Metro and project signing was identified in the specification, this might be an enforcement issue for the inspectors. Exit numbers are important to include on temporary signs on the interstate since some destinations are identified that way.

Temporary Pavement Markings are a challenge. On this route there are many lane shifts and alignments that do not follow the pavement joints. Lane designation can be confusing at times. Pavement markings seem to deteriorate rapidly on temporary alignments and on rough pavements. Maybe contrast markings or more use of Temporary Raised Pavement Markers (TRPM's) could be used. Black mask works well, but temporary tape can be difficult to maintain on long term projects.

The Transportation Management Plan (TMP) helped improve mobility on TH 35E. Even with a full, comprehensive TMP that included traffic modeling, some field adjustments were needed. In places with enough room, traffic flow was improved where possible. For example, TH 35E entrance ramps included parallel acceleration lanes.

The Maintenance of Traffic (MOT) on Design Build projects seems harder to manage. It provides flexibility to the contractor but there is less information available in the plan set for review prior to letting.

While Metro is trying to achieve more consistency in Temporary Traffic Control among projects, some inconsistencies were noted. Detour signing for closed ramps was sometimes undersized, missing, or confusing. Signing on OH signs at closed ramps followed different strategies. Metro has typically used an "Exit Only" plaque on the OH

covering the distance or arrow. Other OH signs used a one line “Exit Only” Plaque mounted diagonally across the sign. Some extra effort and coordination between projects may be necessary to show the motorist consistent TTC.

TH 52 Lafayette Bridge:

Another large, multiyear project, the Lafayette Bridge replacement involved an intensive, involved Work Zone Process to reach its current state. A particularly long stage involved a crossover from the new span to the existing structure. To match the different grades and provide for drainage, a more severe and sharp crossover than usual was used. It was signed for a low speed, but even then, large trucks could not make the shift without taking up both lanes. Thus, a truck restriction was instituted for North-bound trucks. Extraordinary enforcement was used to discourage prohibited trucks. Oversized, redundant signing was installed and even with these additional measures, the State Patrol was kept busy writing tickets. The review team discussed this and suggested an IWZ solution could have been tried. Other systems can detect over height loads, maybe it could be adapted to detect over length loads and advise them to take alternate routes.

Some pavement markings were worn and difficult to see. Glare screen was used somewhat inconsistently. Metro is aware of this and plans to better manage its use in the future mainly to separate opposing directions of travel. Median barrier delineators are another item that are difficult to maintain. It seemed like many were missing or the spacing was too great.

The project did go above and beyond by providing construction signing in the median mounted to the concrete barrier. Since it overhung the barrier a little, reflectors were used on the backside to warn vehicles of its location. The group thought this to be a best practice that other projects could make use of.

TH 7 at Louisiana Ave:

The interchange traffic control is being rebuilt into a series of roundabouts. Traffic is being maintained on partially complete roadways. Some shifts are complicated by some big box retailers who generate a lot of traffic flow at certain times. Delineation could have been better and some of the tube-type delineators used were missing. A lane shift thru the intersection of a large retailer’s driveway was offset and difficult to follow. A possible solution would be to add more delineation of other types such as drums and TRPM’s.

<u>Permits and Cooperative Agreement Projects:</u>

TH 13 and Dakota County Road 5 – Dakota County:

This project to construct a new interchange was more than 50% complete and appeared to be a big improvement over the old, often congested intersection. The review team noticed a couple issues not related to TTC which are worth noting here.

Noise walls were added as is often done on these urban jobs, but due to Right of Way (ROW) constraints, it ended up close to the mainline TH 13 eastbound lanes. There was also a blunt end apparent on the TH 13 EB ramp to CASH 5. Both these issues belong to design to determine a solution and were referred to the district representatives to forward.

Temporary bypasses consisted of a two-lane two-way operation. In the current stage the review team inspected, there was ample space on the right side of East bound TH 13 that could have possibly been used for an additional lane. This could have helped with the AM peak hour congestion that one team member experienced daily.

Business signing was intense with individual names used rather than a destination. There were quite a few businesses so they could have reduced some signing by clustering them somehow. This is obviously not an easy goal. Business signing was mainly provided on the county roads and did not present a clutter or distraction for the TH 13 mainline traffic.

TH 55 & Winnetka in Golden Valley – Centerpoint Energy:

This was a major permit job affecting the state highway, the county road, and business access. A traffic signal was affected by or being replaced by the work and was changed to an all way stop for the construction period. This caused some reoccurring backups and limited mobility in the area. Some traffic movements and access was restricted with detours to accommodate motorists. The detours were typically the generic “detour” signing without street name plaques. With several detours in the area, this can be confusing. Pedestrian access could have been better accomplished. What was there did not appear to be fully accessible.

St. Clair ramp to TH 35E SB – Xcel Energy:

An electrical project affected the St Clair ramp at TH 35E. There was not much traffic control in place when the group toured the area. Some discussion involved how to show a closure on guide signs. Some detour signing appeared to be knocked down and was not being adequately maintained.

Peer Review Process findings:

The participants in the peer review met at a later date to debrief. There was general agreement that field reviews are valuable. There was discussion of how to include Maintenance in the outreach for feedback on our WZ Process. Kevin, Sue, Sheila, and Bob will work on this. Some lessons learned were noted and discussed further.

Most of the projects visited began with the Resident Engineer discussing the project and some of the challenges that were encountered. They were very open with the shortcomings and shared instances where things just didn’t work out according to plan. This was thought to be valuable to the team members and some areas of the project were more appreciated knowing the difficulties that were overcome.

It was somewhat difficult to take notes. Four persons in a vehicle was nice for the discussion and the observations noted by different people. The video was helpful to review afterwards. The form was also helpful to note items to discuss after the drive through. The comment field was used more than the checkbox. Training on what and how to fill out the form might be helpful prior to use. Possibly one note taker per vehicle who would write down all the comments would be enough.

If this process is to be used again, a suggestion was to consider a mix of smaller projects in addition to the large, multistage jobs that were toured. A debrief after each project would be helpful, as would an hour at the end of the day while the information is still fresh.

Findings and Best Practices

Following are a few of the best practices discovered in the three districts we visited:

- Construction is interested in more guidance for using PPCB to protect deep drop-offs. They have felt comfortable with about 2 feet of deflection space but would like some written guidance. OCIC is currently working on this and since the Traffic Engineering Manual (TEM) is being updated now, it could include some guidance too.
- D6 will share with Metro, some plans for temporary foundations for temporary OH sign supports they acquired from structures. These would be useful in guiding motorists through multi-lane areas that have exit only lanes and major freeway branches.
- Some extra effort and coordination between adjacent projects may be necessary to show the motorist consistent TTC.
- IWZ solutions remain underutilized in solving some difficult TTC management problems such as over length loads. OTST will update the IWZ toolbox and the review team will continue to advocate for the consideration of IWZ solutions.
- On multilane bypasses, signing on both sides is a best practice. Placing reflectorized sheeting on the backside can help warn opposing traffic of its location.
- More effort needs to be given to maintaining accessible pedestrian access routes.
- Maintenance research programs are a good way to evaluate new products, enhancements, and procedures.

The members of the Feedback Discussion Team wish to thank everyone who participated in the discussions for their valuable insight into the issues related to mobility and safety in work zones, as well as their willingness to share best practices and ideas with the team members and look forward to future discussions to guide MnDOT's work zone traffic control and mobility efforts.

This report was prepared by the Office of Traffic, Safety & Technology and reviewed by the Feedback Discussion Team. Copies have been distributed to Division Directors, District Engineers, and Directors of Offices and/or Chairs of Committees mentioned within the document.

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