TEO Work Zone Safety Committee (TEOWZSC) Meeting
January 18-19, 2007 Minutes

Committee Members Present (✓):

✓ Oliver Kendall, District 4
✓ Mike Engh, Metro
✓ Sue Lorentz, Metro
✓ Ken Nelson, CO Maintenance
✓ Ken Wenkel, District 7
✓ Dave Buss, District 3
✓ Kevin Schmidt, District 3

✓ Jeff Rieder, District 6
✓ Todd Larson, District 2
✓ Allan Rice, District 8
✓ Craig Mittelstadt, CO Construction
✓ Jon Jackels, CO Traffic
✓ Marv Sohlo, CO Traffic
✓ Bill Servatius, CO Construction

Note: Committee members, please review the minutes and report corrections to Marv Sohlo

TOPICS FROM THE OCTOBER 2006 SWZSC MEETING:

TEOWZSC ACTION ITEM: Marv will report the following discussions/actions at the next Statewide Work Zone Safety Committee (SWZSC) Meeting.

Speed Reduction in Work Zones
State Patrol expressed their opinion that work zone speed limit reductions should be extended farther out in advance of a reduced work zone speed limit, as a means to mitigate rear-end crashes. Testing with Intelligent Variable Speed Limits have been conducted on the I-494 Wakota Project and was successful in regulating speeds entering the work zone and increasing capacity.

SWZSC ACTION ITEM: Although the SWZS Committee will promote additional research on the variable speed limit concept, the TEO TTC Committee review guidelines for posting WZ Speed Limits.

TEOWZSC ACTIONS: The committee agreed that transitional speed limits are useful in some situations (such as stepping down the limit prior to the work zone) and should be considered as a viable tool for reducing speed limits when appropriate. The committee recommends further research into variable speed limits as an ITS solution to mitigate rear-end crashes in work zones.

TEOWZSC ACTION ITEM: Marv will recommend the inclusion of additional research/testing on variable speed limits in advance of work zones in the future Research Request Proposals.

WZ Queues extending beyond Advance Signing
State Patrol observed that the spacing distance for advance warning signs, primarily in the Metro area, are under estimating the actual queue lengths encountered. Many times the queues extend upstream beyond the first “Road Work Ahead” signs. It was mentioned that advance “smart signs” may be useful for reducing the surprise of unexpected queues which display the estimated distance to congestion.

SWZSC ACTION ITEM: The TEO TTC Committee will address guidelines for extending warning sign distances. It appears that an adjustment related to volume may be required.

TEOWZSC ACTIONS: The committee suggested that Best Practices for congestion signing be developed. We currently have several options such as “real-time” messages on PCMS, or advance guide signs spaced before the project (such as “Watch for Slow Traffic – next 8 miles”, 4, 6 and 2 miles, etc.). The signing has optional messages depending upon the anticipated traffic conditions (occasional congestion vs. routine backups), and a Best Practices document could provide guidelines on the situations.
TEOWZSC ACTION ITEM: Marv will work with members of the committee and draft the document for committee review.

Business Signing on Projects
Mike Engh discussed the need to review and update guidelines for Business Signing in work zones.
SWZSC ACTION ITEM: TEO TTC Committee will review and revise these guidelines.

TEOWZSC ACTIONS: Mike Engh corrected the status of the Action Item and reported that a typical sign has been designed by John Benson for business access signing and that the new sign is in the latest version of the Standard Signs Manual which may be found on the web at:
TEOWSZC ACTION ITEM: no further action needed

Sign Covering
The standard for covering existing signs during construction are out-of-date.
SWZSC ACTION ITEM: TEO TTC Committee will develop new standards for covering of signs.

TEOWZSC ACTIONS: It was reported to the committee that new language for the Traffic Engineering Manual (TEM) Chapter 8 has already attempted to address this issue. The new proposed language is as follows and the existing drawing for covering signs may either be removed, replaced or modified in the manual depending upon further work with the Signing Engineer:

8-5.02.06 Sign Panel Overlays (DRAFT LANGUAGE)
When it is necessary to cover an inplace sign, care must be taken to preserve the inplace sign. Coverings for overhead signs should be a rigid substrate (such as sheet aluminum or plywood) and installed according to the sheeting manufacturer's instructions.

The committee agreed that only the conflicting portion of a overhead sign needs to be covered (versus the entire panel), but that the existing sign should sustain minimal, if any, damage.

TEOWSZC ACTION ITEM: Marv will work with Mike Weiss and John Benson to modify the TEM language and drawings, and a final draft will be sent to the committee for comments. NOTE: the approved text and drawings are attached to these minutes.

IWZ “Solutions” to Mainstream into the Work Zone
The committee listed many possible Intelligent Work Zone (IWZ) initiatives that have been developed and tested or are currently being researched. The committee listed the following initiatives to be considered in future projects and guidelines on when and where they should be utilized is needed:

- Flashing Speed Limit Sign when traffic is in excess of the limit or High Speed Alerts for individual vehicles.
- Truck Detection – Warn traffic when a truck is merging into their traffic lane.
- Over-sized Vehicle detection (height/width) and Warning.
- Dynamic Merge Systems with enhancements such as Stopped Traffic Warning.
- Variable Speed Limits based upon speeds measured downstream near the work zone.
- Delay/Travel Time made available for traffic such that they can plan alternate routes.
- Real-Time HAR Systems for travel time for broader delivery of the message for earlier route planning.
- Flagging Alert Systems (intrusion alarms, etc)

Other systems that are not necessarily IWZ:
- Additional enforcement.
- Speed Display Trailers with enforcement.
- Pavement Markings that slow traffic (shark’s teeth, etc).
- Temporary rumble strips.
- Fines Double in WZ signing.
SWZSC ACTION ITEM: TEO TTC Committee will develop draft guidelines for implementation of these techniques and technologies.

TEOWZSC ACTION: It was discussed that several of these guidelines have been written already and are currently available on the OTSO work zone website.

TEOWZSC ACTION ITEM: Marv will continue to develop additional guidelines for various techniques and technologies and the committee will review and critique the drafts as they are available. Marv will request reports and other support documentation from various sources and compile Best Practices where possible. Jon will add the list of ITS work zone practices to the traffic control impact mitigation measures that will be included in the Mobility & Safety in Work Zones Final Rule.

CONTINUED AND NEW TOPICS:

Cross-over Designs

Previous Action Item: Dave Buss or Jon Jackels will work together to research a previous memo developed and published in District 3 regarding cross-over design. Jon will work on determining whether a standard for cross-over design can be developed.

TEOWZSC ACTION ITEM: The final draft design guidelines for cross-overs have been attached to these minutes (or emailed as a separate attachment) for review for final comments. Jon will send this committee’s final recommendations to the Design Advisory Committee for consideration.

“YOUR SPEED” Signs in Work Zones

Previous Action Item: Draft a Tech Memo for “YOUR SPEED” signs in the work zone.

UPDATE: The draft Tech Memo was drafted but stalled in May of 2006 as Wash. Co studied the signs.

NEEDED ACTION: We need the committee’s comments on the DRAFT. What needs to be in the memo and what-NOT?

TEOWZSC ACTIONS: After review and discussion of the May 2006 draft of the Tech Memo, the committee recommended the following:

- A Flashing Display is allowed but not mandatory.
- All Displays shall be amber color on black background and allow any others to be grandfathered for 10 years.
- The static portion of the sign shall be black on orange and allow any others to be grandfathered for 10 years.
- The static sign message should be “YOUR SPEED” and use the appropriate font for the sign panel size (such as 8E for a 48x60 panel).
- The committee suggested that the layout for “roadway conditions” be eliminated since it is a rare occurrence that the sign would be utilized in that manner.

TEOWZSC ACTION ITEM: Marv will redraft the Tech Memo and submit it for the standard review process and approvals.

Field Manual and Posters

The new 2007 Field Manual has been printed and distributed to the Districts and for usage in various courses. A Quick Reference Guide Poster has been developed as part of a 3 poster set. At the time of the meeting, it is assumed that the Northland Chapter of ATSSA will be printing these posters (a reduced sized small was provided to committee members) and distributing them to local, state, and private TTC partners. They will be either free or at cost.

TEOWZSC ACTION ITEM: Review the Quick Reference poster and make comments to Marv for any possible changes that should be made. Marv will work with Northland ATSSA on arrangements for printing the posters and distribution procedures.

WZ Related Training
Ken reported that Kathy Schafer, Sue Lorentz and himself are scheduled for providing Field Manual training to the District Maintenance personnel and various local government crews. Approximate anticipated numbers are 500 in the Metro, and 1100 outstate that should receive the training this year. Craig will also be providing training to District Construction and Traffic staff and anticipates another 300 people will be trained through his class.

**TEOWZSC ACTION ITEM:** Jon requested that the instructors provide a count on participants of the classes for our records in the Traffic Office.

### Federal Final Rule – “Mobility & Safety in Work Zones”

Jon provided a status report on the Final Rule development within Minnesota. Jon led a discussion on various review processes within the districts and who currently does a “Process Review?”. Jon explained the difference between a “process review” and “current field reviews” and proposed “safety audits”.

**TEOWSZC ACTIONS:**

- It was agreed that Safety Audits for Work Zones (or any other roadway) should only be requested by the DTE.
- Process reviews will be a useful tool for developing a smooth work zone impact mitigation process, but each district will probably have their own variation on a process.
- Field reviews for construction projects are currently being conducted by Bill, but it was recommended that Marv work with Ken Nelson to review maintenance projects in a similar manner.

**TEOWZSC ACTION ITEM:** Jon will keep the committee up-to-date with future status reports.

### Federal Proposed Rule – “Worker Protection in Work Zones”

Jon updated the committee on the proposed course of action. Mn/DOT agrees with other states and AASHTO that the rule as written is overly restrictive and needs serious modification if it proceeds any further. The largest problem is the rule’s arbitrary ruling on the use of PCB for protection of workers which appears to have no credibility.

**TEOWZSC ACTION ITEM:** Jon will keep the committee up-to-date with future status reports.

### Guideline for Temporary Lane Closure Systems (In 2 Lane-2 Way Work Zones)

A draft document was presented to the committee which proposed a guideline for establishing the best practice of lane closure on 2 lane – 2 way roadways. The document summarized the field manual layouts, notes and various MUTCD sections such that all the material could be found in one document. The guideline alternatives ranged from “No Traffic Control” to various “Portable Signals” systems. It was noted that all the alternatives and devices are previously defined and approved, except for the portable signal systems. It was recommended that before this document can be distributed, that the portable signal guidelines need to be established in a standard or policy within Mn/DOT (such as in the TEM or MMUTCD). It was pointed out that, since the document was primarily written for a means to define when various portable signal systems may be utilized, it would not be beneficial to issue the document without the section on signals.

**TEOWZSC ACTION ITEM:** Marv will work with the signals section of OTSO to have standards drafted for inclusion in the TEM. The guideline will be not be published until substantiating standards are developed for portable signal systems.

### FUTURE MEETING

Jon Jackels suggested that the next meeting be in the Twin Cities area such that the committee may schedule a visit with ADDCO and/or Traffic Technologies to discuss ITS in work zones.

**TEOWZSC ACTION ITEM:** Jon and Marv will develop possible meeting alternatives for a future meeting.
Introduction
It is often desirable to divert one direction of traffic on a high-speed multi-lane divided highway unto the other roadway resulting in two-lane two-way operation (TLTWO). This typically occurs during total reconstruction or construction of an unbonded concrete overlay, however, it is not limited to these operations.

Problem
Typical traffic control layouts and schemes have been available for many years and are used during development of every TLTWO employed by Mn/DOT.

There are no statewide standards or guidelines for the design of the median cross-over at each end of the TLTWO on these projects. This results in various designs with different operating speeds, advisory speeds and other design variations, often on the same highway during the same construction season, only in a different district. The consequence is that we present different conditions to drivers for the same situation, violating their expectations which may result in erratic or incorrect driving and ultimately a crash.

Background / Discussion
This was discussed with the Design Advisory Committee (DAC) on September 14, 2005. It was agreed at this meeting that a statewide guideline for the design of these cross-overs would be advantageous. A draft guideline was distributed for comments in April, 2006, and comments received have been incorporated into these guidelines.

Guidelines for Cross-over Design
In general, cross-overs for TLTWO should be designed using the following guidance:

<table>
<thead>
<tr>
<th>Design Feature</th>
<th>Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Speed</td>
<td>No more than 10 mph below existing posted speed limit.</td>
</tr>
<tr>
<td>Lane Width (min)</td>
<td>12 foot</td>
</tr>
<tr>
<td>Shoulder Width (min)</td>
<td>3 foot each side</td>
</tr>
<tr>
<td>Grade (max)</td>
<td>2%</td>
</tr>
<tr>
<td>Surface Type</td>
<td>Bituminous</td>
</tr>
<tr>
<td>Inslope (min)</td>
<td>1:4</td>
</tr>
</tbody>
</table>

Cross-overs should be designed for a design speed equal to or no more than 10 mph below posted speed on the facility unless a lower standard is required by unusual site conditions. Where lower design parameters are deemed necessary, additional traffic control devices and lighting should be considered and employed.

The cross-over advisory speed limit signing should correspond to ball banking data recorded for the completed cross-over section.
Minnesota Traffic Engineering Manual

8-5.02.06 Temporary Sign Covering
When it is necessary to cover an in place sign, care must be taken to preserve the in place sign since some coverings may cause permanent damage to the sign face sheeting. Avoid the use of ropes, wire fasteners or strapping that may abrade the sign sheeting surface. Do not apply tape to the sign sheeting surface because sunlight will cause it to bond permanently. Pre-mask or application tape must be removed prior to exposure to sunlight. Do not use paper or plastic covers as heat and moisture entrapment can cause permanent damage to the reflective sheeting on the sign face.

On smaller signs such as Type C or D, porous cloth covers (such as burlap) that are folded over the sign edges and secured to the back of the sign have been used successfully for limited periods. The cloth shall be opaque and nighttime viewing is recommended to assess if the cover adequately blocks light from headlights. See Figure 8.2C in the appendix for more details on these sign covers.

Sign panel overlays for covering larger signs and/or overhead signs should be rigid panel (such as sheet aluminum or plywood). The installation shall allow adequate air flow between the overlay panel and the sign, by providing a minimum spacing of 1/8" inch (1" maximum). The spacers shall be a material that will not harm the sign sheeting face (such as plastic or rubber). Refer to Figure 8.2A & 8.2B in the appendix for more details on the recommended sign panel overlay method for overhead or ground mounted extruded signs.

OVERLAY ASSEMBLY STEPS:

1) DRILL 1/4" HOLES ON THE SHEET ALUMINUM OVERLAYS IN ACCORDANCE WITH THE HOLE SPACING ON THE DIAGRAM. OUTSIDE HOLES SHALL NOT BE SPACED MORE THAN 24" APART.

2) DRILL 1/4" HOLES ON THE SHEET ALUMINUM OVERLAYS IN ACCORDANCE WITH THE HOLE SPACING ON THE DIAGRAM. OUTSIDE HOLES SHALL NOT BE SPACED MORE THAN 24" APART.

3) POSITION THE FIRST OVERLAY PANEL’S BOTTOM EDGE FLUSH WITH THE BOTTOM OF THE INPLACE EXTRUDED SIGN PANEL AND THE OVERLAY PANEL’S LOWER LEFT EDGE FLUSH WITH THE LOWER LEFT EDGE OF THE BOTTOM INPLACE EXTRUDED PANEL SECTION.

4) DRILL ALL OF THE OUTSIDE HOLES THROUGH THE INPLACE EXTRUDED SIGN PANEL AND ATTACH THE OVERLAY PANEL WITH 1/2" POP RIVETS (SPACERS THICKER THAN 1/8" WILL REQUIRE LONGER POP RIVETS) MEETING THE REQUIREMENTS ON Mn/DOT 3352.A7a.

5) DRILL ALL OF THE INNER HOLES THROUGH THE INPLACE EXTRUDED SIGN PANEL AND ATTACH WITH RIVETS AS SPECIFIED IN STEP 4 ABOVE.

6) ABUT THE NEXT OVERLAY PANEL TO THE FIRST ATTACHED OVERLAY PANEL AND PERFORM THE SAME WORKS SPECIFIED IN STEPS 4 AND 5 ABOVE.

7) INSTALL EACH ADDITIONAL OVERLAY PANEL AS SPECIFIED IN STEP 6 ABOVE.

NOTES:

1) IF THE TOP EXTRUDED PANEL IS 6" HIGH, THIS VERTICAL SPACE IS 6'.

2) THE CENTER RIVETS SHALL BE SPACED AT 1/2 OF THE PANEL'S WIDTH.

3) IF THE SHEET ALUMINUM PANEL IS GREATER THAN 48" WIDE, THE RIVET SPACING SHALL BE NO GREATER THAN 24". IF THE SHEET ALUMINUM PANEL IS LESS THAN 24" WIDE THERE SHALL BE NO INNER HOLES.

Text Ref.: 8-5.02.06

March 1, 2007

TEMPORARY CONSTRUCTION SIGN PANEL OVERLAY COVERING A COMPLETE EXTRUDED SIGN PANEL

FIGURE 8.2A
OVERLAY ASSEMBLY STEPS:

1. DRILL 1/4” HOLES ON THE SHEET ALUMINUM OVERLAYS IN ACCORDANCE WITH THE HOLE SPACING ON THE DIAGRAM. THE HOLES SHALL NOT BE SPACED MORE THAN 24” APART.

2. ATTACH PLASTIC SPACER(S) (1/8" MIN. THICKNESS, 3/8” I.D., AND 7/8” O.D.) WITH DOUBLE-FACED TAPE, CENTERED BEHIND EACH DRILLED HOLE.

3. POSITION THE OVERLAY PANEL ON THE INPLACE EXTRUDED SIGN PANEL MAKING SURE THAT THE MOUNTING HOLES IN THE OVERLAY PANEL DO NOT LINE UP WITH ANY HORIZONTAL EXTRUDED ALUMINUM PANEL JOINTS.


5. DRILL ALL THE INNER HOLES THROUGH THE INPLACE EXTRUDED SIGN PANEL AND ATTACH WITH RIVETS AS SPECIFIED IN STEP 4 ABOVE.

NOTES:

1. VERTICAL SPACING FOR THE MOUNTING HOLES IS 50% OF THE PANEL HEIGHT. IF THE PANEL IS LESS THAN 24” HIGH, THERE SHALL BE NO INNER HOLES.

2. HORIZONTAL SPACING FOR THE MOUNTING HOLES SHALL NOT BE LESS THAN 15” NOR MORE THAN 24”.

Text Ref.: 8-5.02.06
A RIGID OPAQUE PANEL OVERLAY SUCH AS SHEET ALUMINUM OR PLYWOOD PANEL

THE OVERLAY PANEL SHOULD BE APPROXIMATELY THE SAME SIZE AS THE SIGN PANEL SUCH THAT THE SIGN MESSAGE IS COMPLETELY COVERED

HOOKS OR PREFORMED STRAPS EXTEND OVER TOP EDGE(S) OF SIGN PANEL

A SPACER IS REQUIRED TO PROVIDE AIR FLOW GAP BETWEEN THE SIGN FACE AND THE OVERLAY PANEL

SPACERS SHOULD ALLOW BETWEEN 1/8" TO 1" GAP AND BE A MATERIAL THAT WILL NOT HARM THE SIGN SHEETING FACE (SUCH AS PLASTIC OR RUBBER)

ALL FASTENERS (SUCH AS BOLTS, RIVETS, HOOKS OR SCREWS) SHALL NOT TOUCH THE SIGN SHEETING FACE

THE OVERLAY PANEL SHALL BE ATTACHED TO THE SIGN STRUCTURE SUCH THAT IT WILL NOT MOVE DUE TO WIND

A FLEXIBLE POROUS OPAQUE COVER SUCH AS A CLOTH SHEET OR BAG (AS SHOWN). AIR MUST BE ABLE TO FLOW THROUGH THE CLOTH MATERIAL.

ALL FLEXIBLE COVERS SHALL BE ANCHORED TO THE STRUCTURE SUCH THAT IT WILL NOT BE EFFECTED BY WIND AND NOT HARM THE SIGN SHEETING FACE

SHEET TYPE COVERS SHOULD BE WRAPPED AROUND THE EDGES OF THE SIGN PANEL AND TIED TOGETHER ON THE BACK SIDE (NOT SHOWN ON THIS FIGURE)

THE OPEN END OF BAG TYPE COVERS SHOULD BE CLOSED (SUCH AS SHOWN) TO PREVENT REMOVAL BY WIND

NIGHTTIME VIEWING IS REQUIRED TO ASSESS WHETHER THE COVER ADEQUATELY BLOCKS LIGHT FROM HEADLIGHTS

INPLACE SIGN PANEL

OPAQUE RIGID OVERLAY

OPAQUE POROUS COVER

Text Ref.: 8-5.02.06

March 1, 2007

TEMPORARY CONSTRUCTION SIGN PANEL OVERLAY COVERING TYPE C OR D SIGN PANELS

FIGURE 8.2C