

# Welcome



MDOT/ACEC-Design Basic Training:  
*Work Zone Safety*


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*If you have any questions after today's training, please contact us at:*

**MDOT-DesignBasicTraining@michigan.gov**

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## Work Zone Safety



**Chris Brookes**  
Work Zone Delivery Engineer

**Chuck Bergmann**  
Work Zone Technician

**CHRIS BROOKES**  
517-242-6486

**CHUCK BERGMANN**  
517-388-5228

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### MDOT Design Basic Training Wiki Page

[mdotwiki.state.mi.us/design/index.php/Category:Design\\_Basic\\_Training#Presentations](https://mdotwiki.state.mi.us/design/index.php/Category:Design_Basic_Training#Presentations)

**2021 WORK ZONE SAFETY**

The 2021 Work Zone Safety training session has been rescheduled to March 23, 2021 via Microsoft Teams LIVE. There will not be any in person attendance. Course will be taught by Chris Brookes and Chuck Bergmann. The session link to JOIN will be sent via email to the Region Engineers, Office Administrators, Bureau Directors and ACEC 4 to 5 weeks before the session. MDOT persons, please contact your supervisor and work with your Region/Office/Bureau Administrator to get approved for the class and to receive the class link. ACEC persons, please work with ACEC to receive class link. For questions, please contact MDOT Design Basic Training @.

**Agenda**  
Work Zone Safety - agenda coming soon

**CEH Attendance Records**  
Teams LIVE automatically records attendee information when you join. Retain the attendance logs and the agenda for CEH credits. Attendance Records will be posted approximately 2 weeks after session

**Survey**  
Work Zone Safety Survey coming soon


*\*We will also include the above Wiki Page link in today's chat\**

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## Contractor Liability

These materials are intended to assist employers, workers, and others as they strive to improve work zone safety. All of the pictures, video and information in the following presentation are to be utilized for training purposes only. Any individuals or companies named or shown can not be retroactively perused based upon information gained during this presentation as it is being utilized for training and education purposes.

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It's still just once a year isn't it?

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## House Keeping

- Use the chat box for questions
  - There is a tape delay and you are behind.
- This is NOT being recorded.

Due to the quarantine...  
I'll only be telling inside jokes.



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## Expected Format

- I do have a dog, his bark collar is charged but he still doesn't like Amazon
  - (My wife orders a lot on Amazon)



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8

**amazon smile**  
Shop on Amazon. Smile to Amazon Smile.

**How you can support scholarships at no cost to you**

It's Easy to Donate:

1. Visit [smile.amazon.com/ch/62-1384292](https://smile.amazon.com/ch/62-1384292) and login to your regular Amazon account.
2. The Foundation will be set as your default donation organization.
3. Purchase thousands of items from smile.amazon.com, and a donation is sent to The Foundation.

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## Work Zone Safety

- ▶ The MMUTCD, Part 6 states:
  - ▶ The primary function of TTC is to provide for the reasonably safe and efficient movement of road users through or around TTC zones while reasonably protecting workers, responders to traffic incidents, and equipment.

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## Traffic Control Devices



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## Reference Materials



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[www.michigan.gov/mdotworkzones](http://www.michigan.gov/mdotworkzones)

**Work Zone Mobility**  
 The Work Zone Safety and Mobility (WZSM) Final Rule was published on September 9, 2004, in the Federal Register. All state and local government agencies that receive federal-aid funding are required to be compliant with the provisions of the final rule.

The Work Zone Final Rule updates and broadens the former regulation at 23 CFR 630 Subpart J to address and emphasize current issues affecting work zone safety and mobility. The changes to the CFR will encourage broader consideration of the safety and mobility impacts of work zones across project planning, development, and the implementation of strategies that help manage these impacts during project delivery.

MDOT created a WZSM Policy effective September 1, 2007. Subsequently, a WZSM Manual was created and published in May 2009.

The WZSM policy for local agencies and utilities/permited activities became effective on January 1, 2009. The local agency policy applies to projects administered by MDOT's Local Agency Program Unit.

**Work Zone Safety and Mobility Contacts**  
 Lindsey Renner, Work Zone Management Unit Manager, 517-202-5356  
 Chris Brooks, Work Zone Delivery Engineer, 517-242-6486

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### Work Zone "Defined"

- ▶ "Work zone" means a portion of a street or highway that meets any of the following:
  - Is between a "work zone begins" sign and an "end road work" sign.
  - For construction, maintenance, or utility work activities conducted by a work crew and more than 1 moving vehicle, is between a "begin work convoy" sign and an "end work convoy" sign.

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### Work Zone "Defined"

- ▶ (c) For construction, maintenance, surveying, or utility work activities conducted by a work crew and 1 moving or stationary vehicle exhibiting a rotating beacon or strobe light, is between the following points:
  - A point that is 150 feet behind the rear of the vehicle or that is the point from which the beacon or strobe light is first visible on the street or highway behind the vehicle, whichever is closer to the vehicle.
  - A point that is 150 feet in front of the front of the vehicle or that is the point from which the beacon or strobe light is first visible on the street or highway in front of the vehicle, whichever is closer to the vehicle.

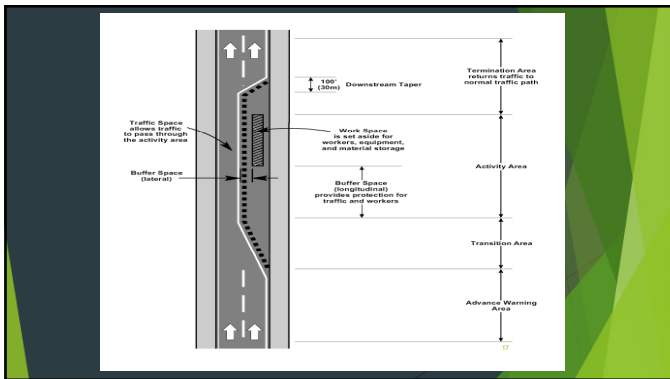
15

### Four Components

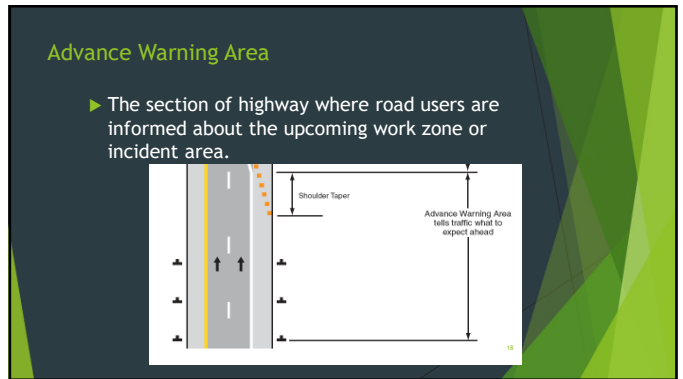
- ▶ What are the four components of a work zone?
  - ▶ Advance Warning
  - ▶ Transition
  - ▶ Activity
  - ▶ Termination



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### Transition Area

- ▶ Redirects motorists out of their normal path.
- ▶ Channelizing devices are required.

Transition Area moves traffic out of its normal path

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### Activity Area

- ▶ This is where the work takes place.
- ▶ Closed to traffic and set aside for workers.
- ▶ the portion which is used route traffic through the activity (work) area.
- ▶ Includes motorized and non-motorized

Activity Area is where work takes place

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### Termination Area

- ▶ Used to return traffic to its normal path and speed.
- ▶ Speed limit sign
- ▶ "END ROAD WORK" sign, placed after the speed limit sign, if a "WORK ZONE BEGINS" sign is used to define the work zone.

Termination Area lets traffic resume normal operations



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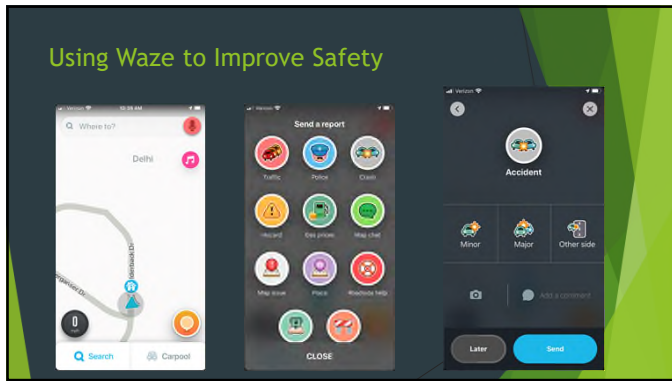
### SMART ARROW BOARDS

22

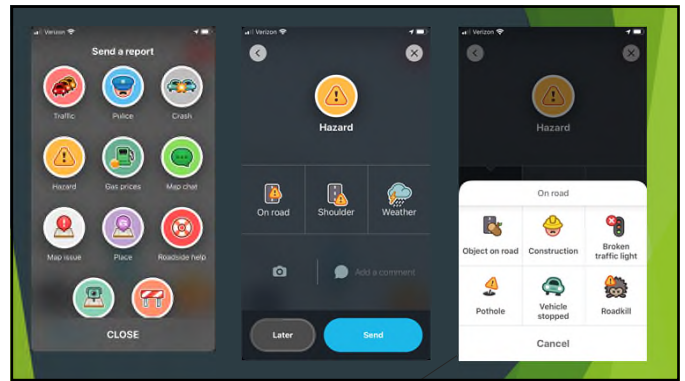
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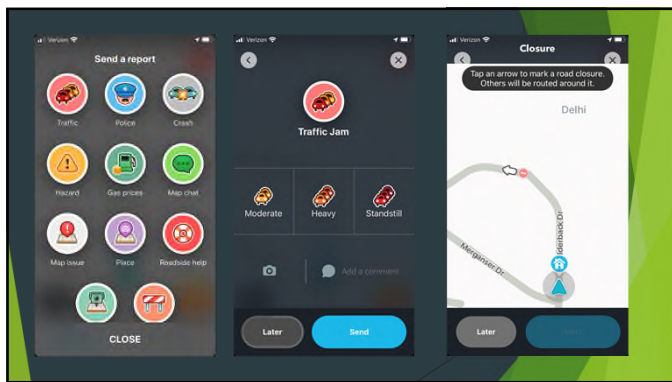




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**Hazard Beacon**

**Technical Features**

- Vehicle Info**
  - Digitally connects any fleet vehicle.
  - Transmits vehicle ID and location.
- Position**
  - Once activated, Transmits GPS location and CW status. Status posted to S.M.L. within minutes.
  - Information is transferred to navigation systems (e.g. Waze) and available for automatic in-dash systems.
  - Transmits location if the vehicle moves more than 100 ft.
- Hazard & Signal Modes**
  - Connects to the Hazard Lights and other peripherals and reports the following modes:
    - Hazard Lights
    - Chatterbox (Flashes and on/off)
    - Arrow Beacon: Determines position of Arrow board (lightboard)
    - Strobe position: Determines if a beam is up/down.

**Technical Specifications**

Size: 8in x 4in x 2in	Temp range: 20C to 180C
Weight: 420g (26.5 grams)	Power: 12VDC power and fuses

iCone [www.hazardsbeacon.com](http://www.hazardsbeacon.com) • 515-425-6900

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**Hazard Beacon**

**Your ConnectedTech™ Hazard Beacon**

**#1 - Mount with sky visibility**  
The Hazard Beacon is the ideal solution for accurate navigation and other applications. Therefore the best way to do it is to mount it on the sky. The sky is the best place to see the Beacon. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky.

**#2 - Wire to power and flasher power**  
Most Hazard Beacons will come with an IP-67 rated connector. The cable will plug into the vehicle's 12VDC power and ground. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky.

**#3 - Support**  
Questions can be answered by visiting the iCone support site [www.hazardsbeacon.com](http://www.hazardsbeacon.com)

**#4 - Register your Hazard Beacon!**  
To activate the Beacon, you must register your Beacon. Register your Beacon by visiting [www.hazardsbeacon.com](http://www.hazardsbeacon.com)

**#5 - In the field**  
When the Beacon is activated, it will flash the Beacon. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky.

**#6 - On the map**  
Your ConnectedTech™ Hazard Beacon can be viewed on [www.hazardsbeacon.com](http://www.hazardsbeacon.com) for location and status. All of our "iCone" devices can be viewed on the map.

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**PUT IT TO THE TEST**

Connect your 75th Anniversary vehicle to the Beacon and see how it works. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky. The Beacon is the best way to see the sky.

**OUR ASSETS**

- 4-20mA (4-20mA)
- 12VDC (12VDC)
- 12VDC (12VDC)
- 12VDC (12VDC)

**APPLICATIONS**

- 12VDC (12VDC)
- 12VDC (12VDC)
- 12VDC (12VDC)
- 12VDC (12VDC)

planet [Email: Mike@planet.com](mailto:Email: Mike@planet.com) • 800-766-7666

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### Temporary Signal Count Down Timer

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### Temporary Signal on US-2

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### Device Spacing

- ▶ The spacing between cones, tubular markers, vertical panels, drums, and barricades on Roadways with a posted speed limit of 45 MPH or greater should be placed at 50' when used for taper channelization, and a distance of 100' when used for tangent channelization.
- ▶ The spacing between cones, tubular markers, vertical panels, drums, and barricades on Roadways with a posted speed limit of less than 45 MPH should not exceed a distance in feet equal to 1.0 times the work zone speed limit in mph when used for taper channelization, and a distance in feet equal to 2.0 times the work zone speed limit in mph when used for tangent channelization.

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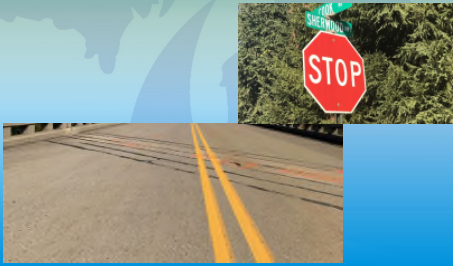
### 2020 5 - Worker Fatalities

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### 26-year-old Macomb County worker killed in I-94 hit and run

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### Anlaan worker struck & killed on Sherwood Highway in Eaton County




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### DAN's Excavating

- Worker on Sweeper was struck and killed on 23 Mile Rd in Macomb County



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### Two C&D Hughes workers killed by suspected drunk driver

- Suspect was arraigned in Washtenaw County District Court on November 9th on 2 Counts of Operating While Intoxicated Causing Death. Each count carries up to 15 years in prison if convicted.




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### 2021 National Work Zone Awareness Week

April 26<sup>th</sup> -30<sup>th</sup>

Event Date April 27th, 2021 - TBD



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### April 28<sup>th</sup> National Orange Day!



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### Work Zone Safety Task Force (WZSTF) Accomplishments

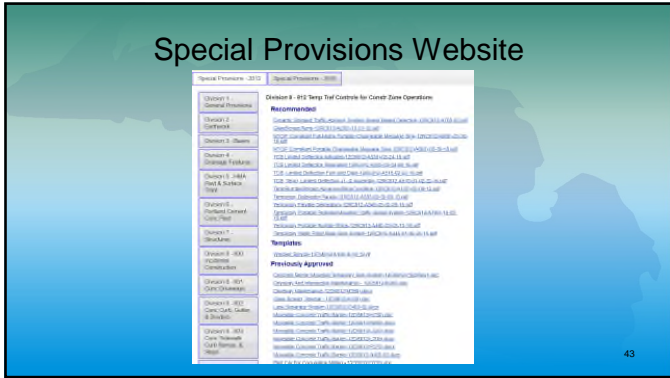
- Safety Perception Survey
- Work Zone Safety Collaboration SP
- Work Zone Safety Moments Memo
- Inclusion of safety language in Reconstruction Boilerplate document
- Pre-bid industry construction liability review
- Temporary Speed Radar Trailers SP
- Temporary Orange Rumble Strips
- Temporary Rumble Strips (orange)
- Updates to SP site
- Creation of document for WZSMM that lists activities and appropriate considerations.



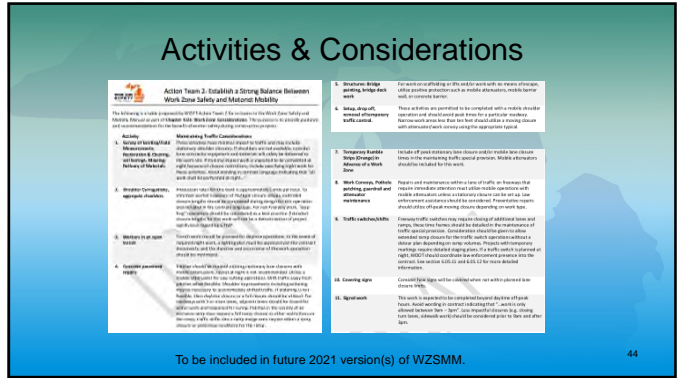
42

42





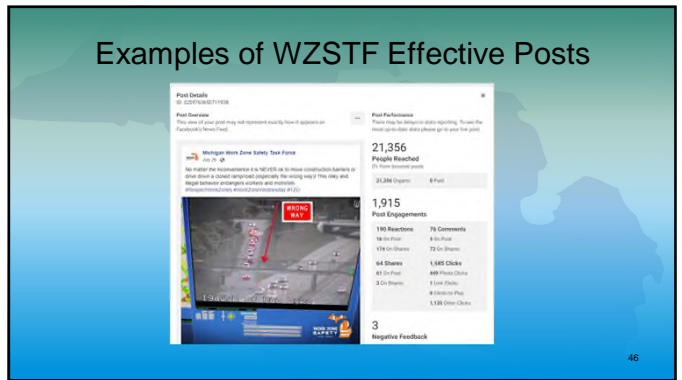
43



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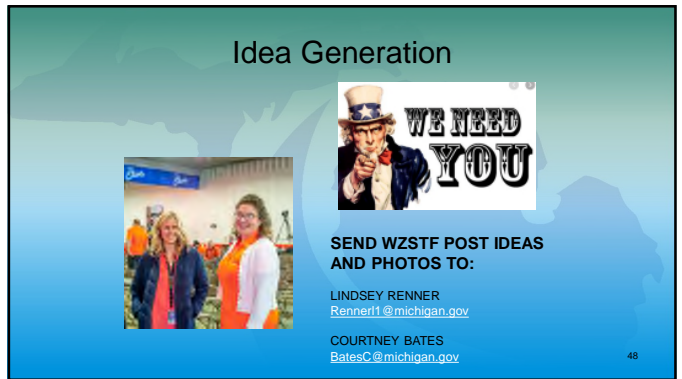
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## MOT Boiler Plate

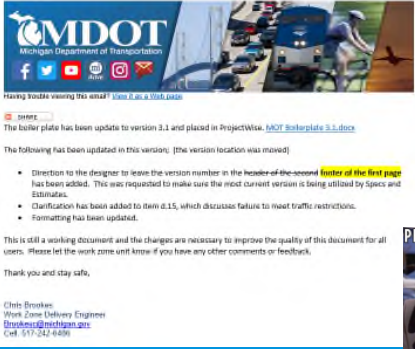
- Notifications sent out on 11/10/2020 at 8:27 AM and an update at 11:14 AM
- Did you see it?
  - (I know if you open it....)

Delivery Metrics - Details	
2,287	Total Sent
2,187 (96%)	Delivered
0 (0%)	Pending
100 (4%)	Bounced
0 (0%)	Unsubscribed

Bulletin Analytics	
1,458	Total Opens
656 (30%)	Unique Opens
29	Total Clicks
23 (1%)	Unique Clicks
14	# of Links



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The boiler plate has been update to version 3.1 and placed in ProjectWise. [MOT Boilerplate 3.1.docx](#)


The following has been updated in this version: (the version location was moved)

- Direction to the designer to leave the version number in the header of the second footer of the first page has been added. This was requested to make sure the most current version is being utilized by Specs and Estimates.
- Clarification has been added to item 6.15, which discusses failure to meet traffic restrictions.
- Formatting has been updated.

This is still a working document and the changes are necessary to improve the quality of this document for all users. Please let the work zone unit know if you have any other comments or feedback.

Thank you and stay safe,


Chris Brooks  
Work Zone Delivery Engineer  
BrooksC@mdot.mn.gov  
Cell: (517) 243-6299



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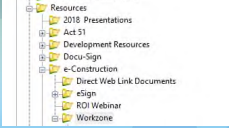
## MOT Boiler Plate

- Version 2.1 is still for projects letting with 2012 Spec Book
  - This version will be removed
- Version 3.1 is only for projects with 2020 Spec Book
- Please make sure you are using the updated files S&E is still getting version 1 type MOT submittals.
- There is now a footer on the 1<sup>st</sup> page to help track version numbers




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## MOT Boiler Plate Location



- [MOT Boilerplate 3.1.docx](#)
- [MOT Boilerplate 3.1 Instructions page.pdf](#)

I finally remember what Zoom meetings remind me of.



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## MOT Boiler Plate Instructions

2. Remove non-applicable sections.
 

A **red** highlight indicates that a section is optional or that it might need to be deleted based on the instructions. When a section is deleted, subsections should be deleted as well. The major sections that can be deleted are highlighted in red. Do not remove sections without red highlighting. Tables 2, 3, 4, and their corresponding restrictions can be removed if they're not applicable.

The comments in red highlighter are the use statements for major sections. Focus on those first.
3. Fill in information at the **YELLOW** highlights.
 

The **YELLOW** highlights indicate areas where information needs to be input by the designer. Fill these in with the applicable information.



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## MOT Boiler Plate Instructions

6. Format the document.
 

The document should be renumbered and re-lettered appropriately. Remove the highlighting, directions to the designer, and all unused tables before turning the MOT in to specs and estimates. To un-highlight all of the text, select all the text using Ctrl+A, press the highlight button, press Ctrl+A again, and then highlight button again. To remove the directions to designer, right click on each comment, and click "delete comment."
7. Keep giving us feedback.
 

The MOT Boilerplate is still very much a new product and is something that is being improved upon and changed. Please let us know how you're using the document and what is working and what isn't. Please contact Jake and Chris in the Work Zone Management Unit: [sanzelen@mdot.mn.gov](mailto:sanzelen@mdot.mn.gov) and [brooksc@mdot.mn.gov](mailto:brooksc@mdot.mn.gov).

  - No comments we assume everything is working and clear
  - We do keep a list of minor comments so please share those



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### MOT Boiler Plate – Coming soon

- MITA has requested that MOT's have sign quantities included
  - These are planned as for reference only
  - A draft table will be created
    - Please share any examples or suggestions on how this could be handled

Sign	Legend/Characteristics	Qty	Type	PC
W20-1	"ROAD WORK AHEAD"	2	B	
R5-18B	"INJURY / FELL A WORKER 5' 200"	2	B	
W20-10	"REDUCED SPEED ZONE AHEAD"	2	B	
R5-18c	WORK ZONE BEGINS	2	B	
R5-1	SPEED LIMIT	4	B	
G20-2	"NO ROAD WORK"	2	B	
W20-4	"ONE LANE ROAD AHEAD"	2	B	
W14	"BE PREPARED TO STOP"	2	B	
W20-7a	Traffic regulator symbol	2	B	
W20-9b	"RIGHT LANE CLOSED 1/2 MILE"	2	B	

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### MOT Typicals

- Updated Typicals are live and posted on the web. [Work Zone Typicals](#)
- New typical can be used now but required with August 2021 letting.
  - This should line up with the 2020 spec book.
- There is a PDF link to download all the maintenance and survey typicals

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### MOT Typicals

- Looking into modifying the layout to make it easier to find items.
- Current helpful new items
  - [0-Construction Typicals Signage Calculation Sheet.xlsx](#)
  - [0- Maintenance Traffic Control Typicals.pdf](#)
  - [0-Surveying Traffic Control Typicals.pdf](#)
  - [00-Traffic Control Typicals - Complete Set.pdf](#)

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### Sign Calculation Sheet

- Has a master list of the signs and codes.
- 278 signs

Sign	Legend/Characteristics	Qty	Type	PC
W20-1	"ROAD WORK AHEAD"	2	B	
R5-18B	"INJURY / FELL A WORKER 5' 200"	2	B	
W20-10	"REDUCED SPEED ZONE AHEAD"	2	B	
R5-18c	WORK ZONE BEGINS	2	B	
R5-1	SPEED LIMIT	4	B	
G20-2	"NO ROAD WORK"	2	B	
W20-4	"ONE LANE ROAD AHEAD"	2	B	
W14	"BE PREPARED TO STOP"	2	B	
W20-7a	Traffic regulator symbol	2	B	
W20-9b	"RIGHT LANE CLOSED 1/2 MILE"	2	B	

- Has a tab for every typical
- When you excel, people start to spreadsheet
  - That's a PowerPoint
  - Very interesting outlook

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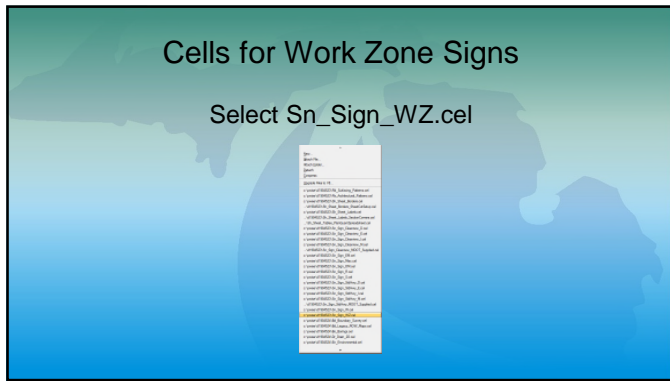
### 103-GEN-SIGN

- A Sign Glossary with the names and codes
  - Please let us know if we missed any
  - 4 pages of signs and codes

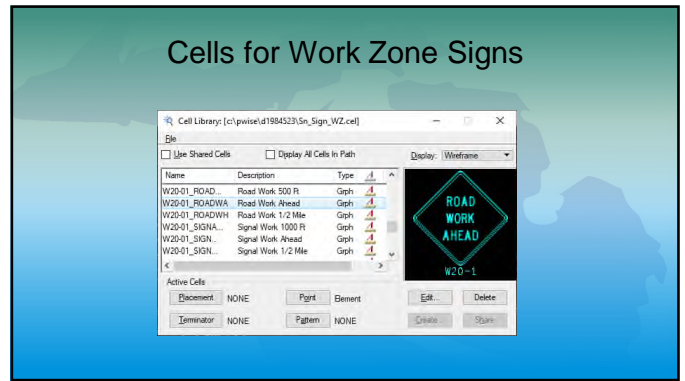
59

### Cells for Work Zone Signs

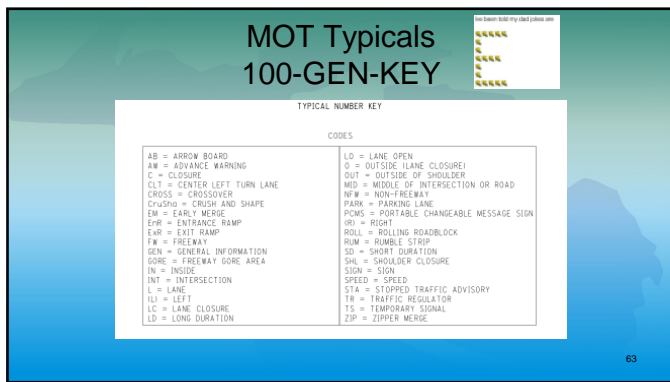
60



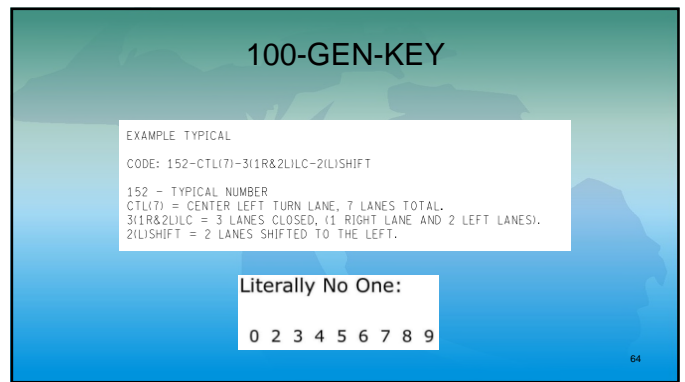
61



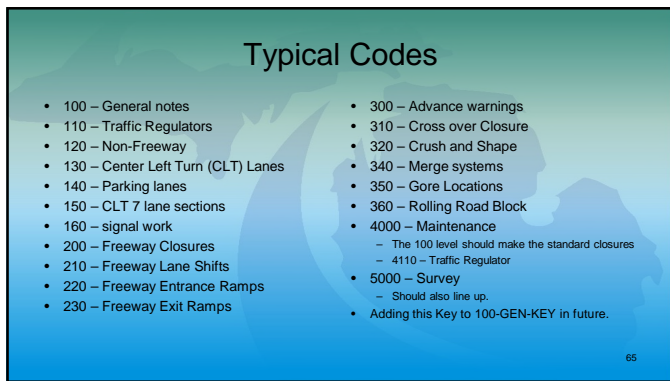
62



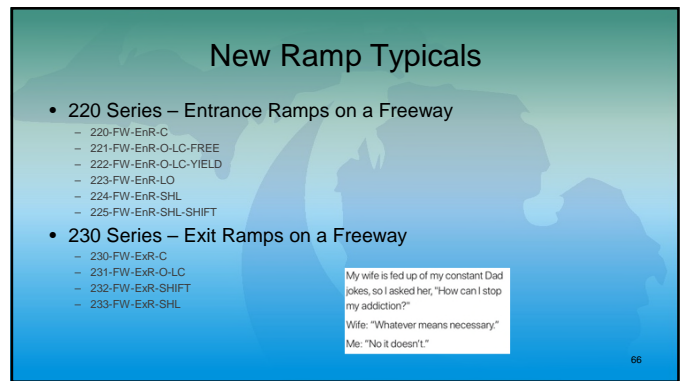
63



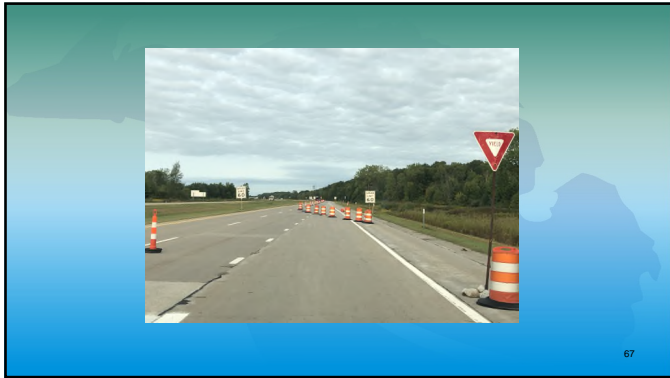
64



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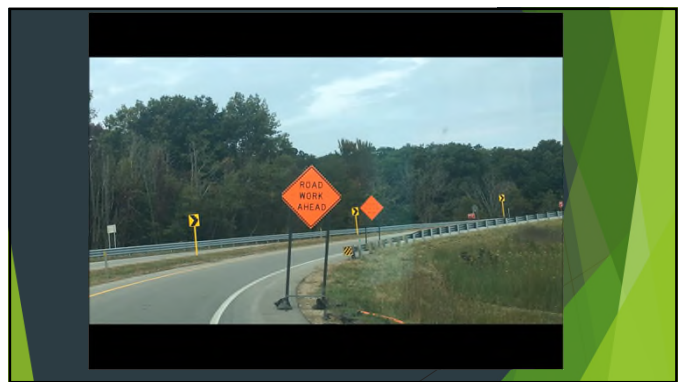


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### Ramps

- ▶ Placing a stop or yield condition for freeway entrance ramps should be avoided by supplying a merge area that is similar to the pre-work zone distance, during the project life. Consider temporarily closing the ramp to complete the necessary work.
- ▶ If there must be a shortened gap requiring a stop or yield condition in the ramp area, minimize the amount of time the gap is shortened; expedite the work, try to avoid peak traffic times, and restore the ramp to a merge condition as soon as possible.

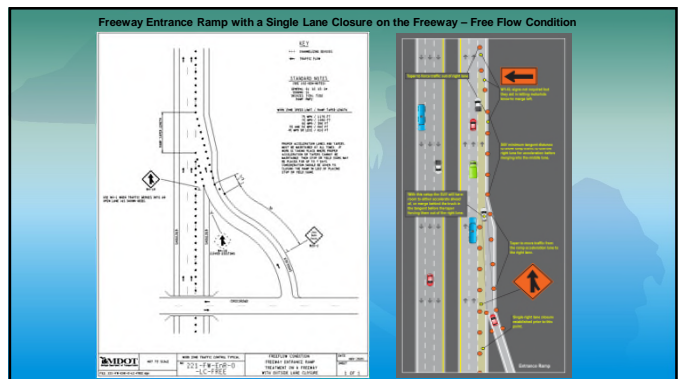
69



70

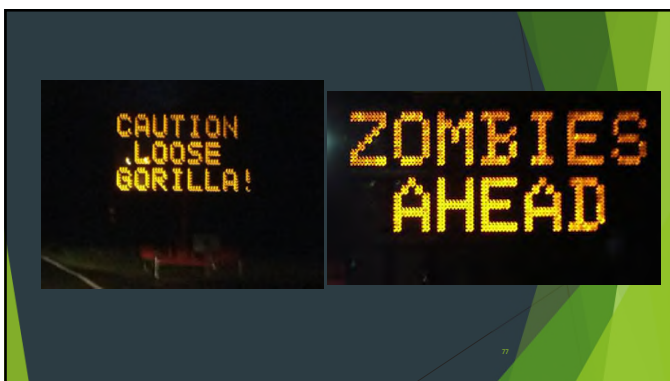
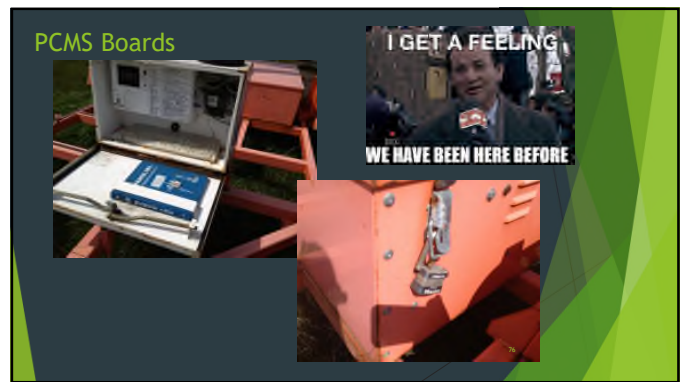
### Ramp Treatments

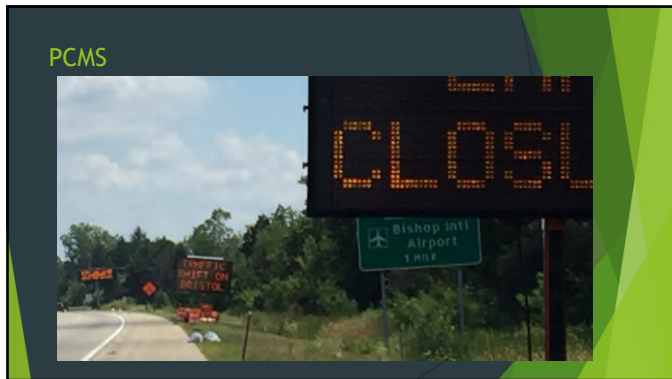
71



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A slide titled 'WZSMM' featuring a video frame of a man with the text 'I GET A FEELING' and 'WE HAVE BEEN HERE BEFORE'. The main content is 'APPENDIX F PORTABLE CHANGEABLE MESSAGE SIGN GUIDELINES'. It includes a definition of PCMS and a list of application guidelines for PCMS.

**APPENDIX F**  
**PORTABLE CHANGEABLE MESSAGE SIGN GUIDELINES**

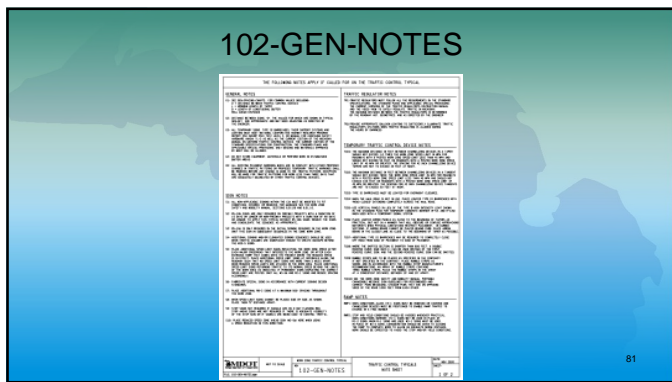
Portable Changeable Message Signs (PCMS) are used to provide motorists real-time traffic safety and advance guidance information that allows motorists to make an informed decision when approaching a work zone. This includes scheduled and unscheduled events that significantly impact traffic on the roadway.

**APPLICATION GUIDELINES FOR PCMS**

PCMS provide a variety of functions including:

- Ramp, lane, and road closures
- Traffic pattern changes (i.e. temporary closures & with restrictions)
- Moving Work Crews
- Roadwork Scheduling Advisories
- Traffic Management and alternate routing
- Warning of Advance Road Conditions
- Traffic Operations Control
- Real-time Travel Time Messages
- Incident Management

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A slide titled '102-GEN-NOTES' with a list of note categories and a cartoon illustration of a signpost.

- Notes have been moved to one location
- Separated into groups
  - General Notes (G1)
  - Sign Notes (S1)
  - Traffic Regulator Note (TR1)
  - Temporary Traffic Control Device Notes (TCD1)
  - Ramp Notes (RMP1)
  - Signal Notes (SIG1)
  - Maintenance and Survey Notes (MS1)

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A slide titled 'Notes and Key' with a list of instructions and a key for symbols used in the notes.

- Notes will be listed in one location
- All the symbols on the key should always reference the same item.
- Comments and feedback welcome!

**KEY**

- \*\*\* CHANNELIZING DEVICES
- SPHT LIGHTED ARROW PANEL
- ▲ TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S5
- PLACE SIGN AS INDICATED IN NOTE S2

**STANDARD NOTES**

THE 102-GEN-NOTES

GENERAL: S1, S2, S3, S4, S5  
 SIGNALING: S1, S2, S3, S5  
 DEVICES: TCD1, TCD2, TCD3

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A slide titled 'Speed Limits' with diagrams of speed limit layouts and a list of typical configurations.

- The following typicals address speed limit layouts
  - 105-GEN-SPEED-FW
  - 106-GEN-SPEED-NFW
  - 107-GEN-SPEED
- Arrow board placement
  - 104-GEB-AB

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### 20SP-812D-01 TEMPORARY PORTABLE RUMBLE STRIPS



PHIL?  
PHIL CONNORS?

Use on all Trunkline Regulating projects with existing speed limits 45mph or higher where traffic regulating will be in place longer than 4 hours. Optional use for local agency and all other Trunkline projects.




CONFORMS TO THE SURFACE OF THE ROAD  
NO GLUE OR ADHESIVES REQUIRED

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### 20SP-812D-01 TEMPORARY PORTABLE RUMBLE STRIPS





It may be so useless, I tried to look up lighters and all they had was 12,345 matches.

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### Work Zone FUSPs 2020 Spec Book

- 20SP-812E-01 Temporary Pedestrian Type II Barricade
  - New FUSP based of 2012 pay item
    - Just approved, in uploading process
- 20SP-812F-01 TEMPORARY PEDESTRIAN TYPE II CHANNELIZER
  - New FUSP based of 2012 pay item
- 20SP-812G-01 TEMPORARY PEDESTRIAN PATH
  - New FUSP based of 2012 pay item
- 20SP-812H-01 TEMPORARY PEDESTRIAN RAMP
  - New FUSP based of 2012 pay item




NED!  
NED RYERSON!

93

### Rebuilding Michigan

- 20SP-812I-01 REBUILDING MICHIGAN SIGNS
  - 12SP-812JJ-02
    - Use on all projects with Rebuilding Michigan funding, or any projects designated as backfill projects as part of Rebuilding Michigan. Do not use in Local Agency projects.



94

### Rebuilding Michigan Progress Dashboard


Google: MDOT Rebuilding Michigan  
Link to map is towards bottom of the page

Total Projects	Road: Completed/In Progress	Bridge: Completed/In Progress
46	10	5



95

### Version 1.0



I-496  
I-69 To Lansing Rd

REBUILDING MICHIGAN

Next 4 Miles Funded By Rebuilding Michi

96



### Rebuilding Michigan

97

### 6.06.09.B Temporary Speed Radar Trailers

- 20SP-812J Pending approval
- 12SP-812HH-01 TEMPORARY SPEED RADAR TRAILER - Use in all freeway projects where the existing speed limit is 55 mph or higher and a speed reduction is required during construction for longer than 3 days. Optional use for local agency and all other trunkline projects.

98

### 812.03.D.14

- Temporary Rumble Strips (Orange).
  - a. Temporary Rumble Strips (Orange) in Advance of a Stop Condition
    - See picture for layout
  - b. Temporary Rumble Strips (Orange) in Advance of a Work Zone
    - See Spec book for layout

99

### Temporary Rumble Strips (Orange) in advance of a work zone

- 12SP-812II-01 – Standard Pay item for 2020
  - 2012 use statement: Use in all freeway projects where a lane closure or crossover shift will be in the same location for 14 consecutive days or longer. Optional use for local agency and all other Trunk line Projects.

100

101


### Work Zone FUSPs 2020 Spec Book

- 20SP-812E-01 Temporary Pedestrian Type II Barricade
  - New FUSP based of 2012 pay item
    - Just approved, in uploading process
- 20SP-812F-01 TEMPORARY PEDESTRIAN TYPE II CHANNELIZER
  - New FUSP based of 2012 pay item
- 20SP-812G-01 TEMPORARY PEDESTRIAN PATH
  - New FUSP based of 2012 pay item
- 20SP-812H-01 TEMPORARY PEDESTRIAN RAMP
  - New FUSP based of 2012 pay item

102

### Temporary Pedestrian Type II Barricade

- Use to close non-motorized facilities in an ADA compliant manner.
- Cannot be used to channelize, or separate motorized traffic, or to close motorized facilities.
- One barricade is defined as a 4' section.
- Several devices available from different manufacturers.



Pay Item	Pay Unit
Pedestrian Type II Barricade, Temp.....	Each

103

### Temporary Pedestrian Type II Channelizer

- Use to channelize non-motorized traffic when a high level of protection is not needed.
- Cannot be used to separate pedestrians and motorized traffic.
- Paid separately from Pedestrian Type II Barricade.
- Various devices are available.






Pay Item	Pay Unit
Pedestrian Type II Channelizer, Temp.....	Foot

104

### Temporary Pedestrian Ramp

- Used when slopes on temporary paths are greater than 1:12, or to route pedestrians over a vertical obstacle.
- Detectable edging and handrails are not always required.
- All dimensional constraints spelled out in the Special Provision.





Pay Item	Pay Unit
Pedestrian Ramp, Temp.....	Each

105


### Temporary Pedestrian Path

- Encompasses all temporary pedestrian/non-motorized facility construction.
- Minimum width 4 feet.
- Cross-slope maximum of 2%
- Longitudinal slope maximum of 1:12, anything greater requires a temporary ramp, paid separately.
- Suitable materials to construct the path include asphalt materials, Oriented Strand Board (OSB), plywood, dimensional lumber, reclaimed, or other as approved by the Engineer.
- **Compacted soils, aggregate and sand are prohibited.**





Pay Item	Pay Unit
Pedestrian Path, Temporary.....	Foot

106



I told you. I wake up every day, right here, right in Dunxutawney, and it's always February 2nd.

107




Keep complaining  
and the quarantine  
will last longer  
without realizing  
the  
certain things that  
can do this all 2020.

108



### Estimation on Quantities

- These are paid for when delivered to the jobsite
- Furn – Doesn't get paid until items are used



109

109

110

110




111

111




112

112






113

113

### Understanding The Motorist

- ▶ The Motorist may also have physical limitations or reduced skills:
  - ▶ Poor vision
  - ▶ Reduced reaction time
  - ▶ Medications
  - ▶ Distracted driving

114

114



### Entrance ramp upstream of closure



115

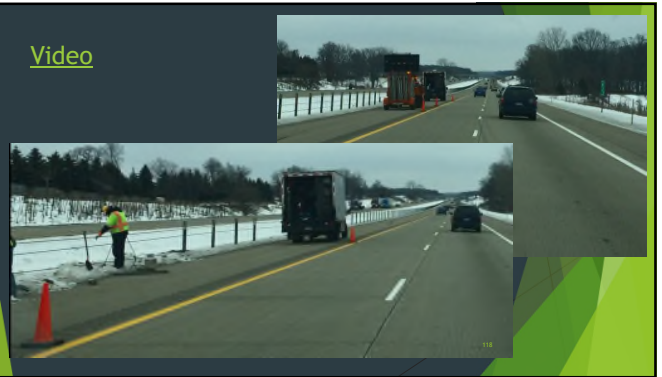


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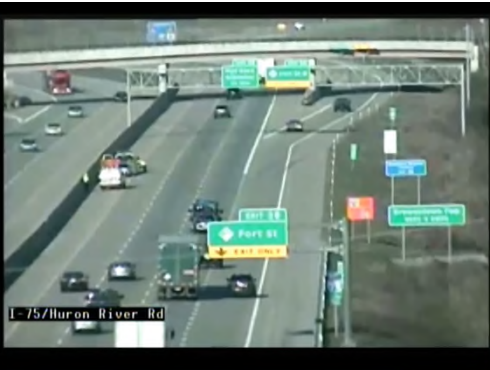


117

### Video



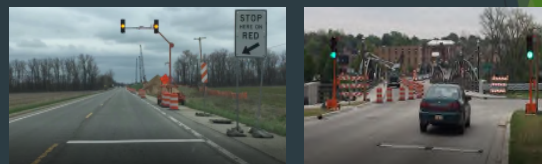
118



119

### Temporary Signals

- ▶ 30 days - recommended post mounting
- ▶ Trailer Mounted vs Pedestal-Mounted
  - ▶ Signal Not in use 72 hours flash allowed, longer suggest removing

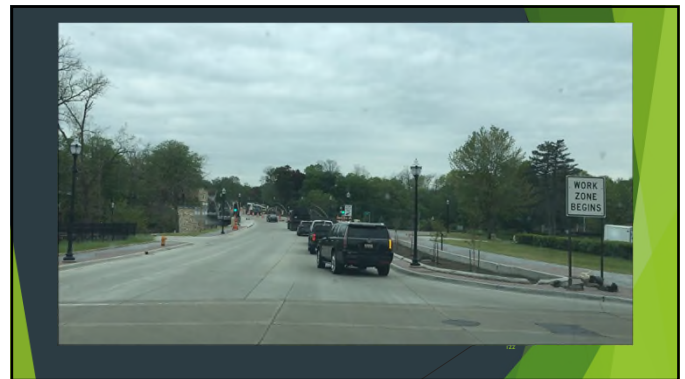


120





121

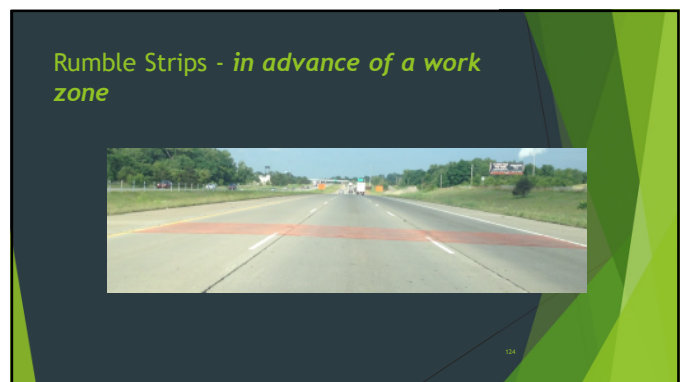


122

**Rumble strips**

- ▶ *Transverse Rumble Strips - Freeway - in advance of a work zone*
  - ▶ **TEMPORARY RUMBLE STRIPS (ORANGE) IN ADVANCE OF A WORK ZONE** should be utilized
- ▶ *Transverse Rumble Strips - Non- Freeway - In advance of a stop condition*
  - ▶ **TEMPORARY RUMBLE STRIPS (ORANGE) IN ADVANCE OF A STOP CONDITION** Should be utilized
- ▶ *Transverse Rumble Strips - Non- Freeway - Portable*
  - ▶ **Temporary Portable Rumble Strips** should be utilized

123



124

**Rumble Strips - In advance of a stop condition**

125

**Temporary Portable Rumble Strips**

- ▶ Used for Non-Freeway Only
- ▶ Recommended Use
  - ▶ Traffic Regulator Operations
  - ▶ Limited Sight Distance
  - ▶ Additional Advanced Warning
  - ▶ Advance of Predicted Queue
- ▶ Proprietary Product with Approved Special Provision
  - ▶ **Temporary Portable Rumble Strips**

**CONFORMS TO THE SURFACE OF THE ROAD  
NO GLUE OR ADHESIVES REQUIRED**

126

**Temporary Portable Rumble Strips**

- ▶ Reduces overall deployment and removal time
- ▶ Eliminates need to find extra space on crowded service vehicles

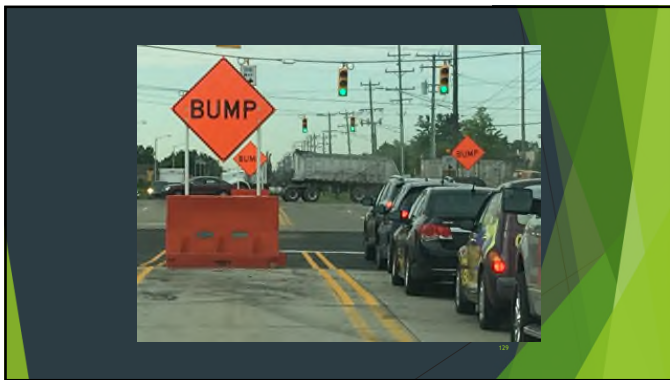
**I GET A FEELING**  
**WE HAVE BEEN HERE BEFORE**

127

Keep complaining about the quarantine

You just bought yourself another month. You were kidding, right? I can do this all 2020.

128



129



130

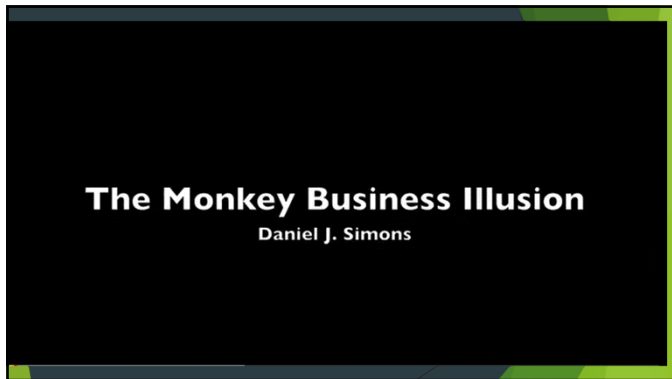
**Perspective**

**Perspective: Depends where you are looking from.....**

131



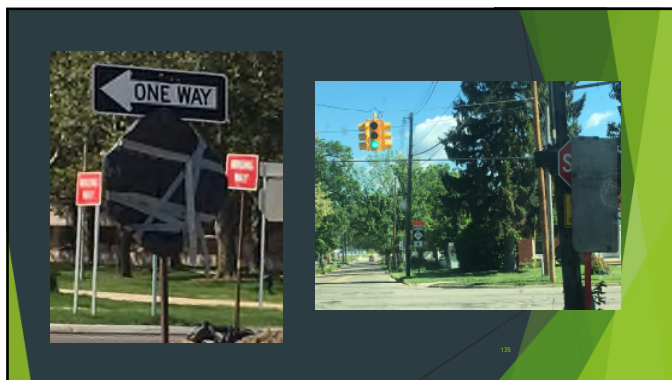
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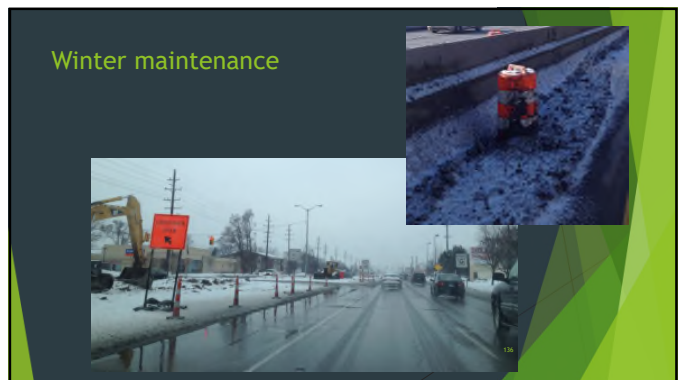
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134



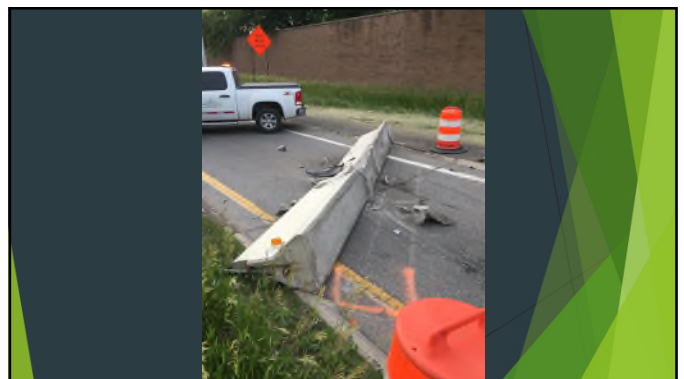
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136

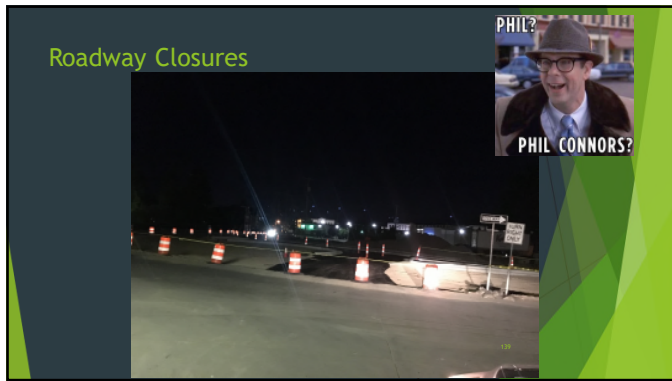


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138

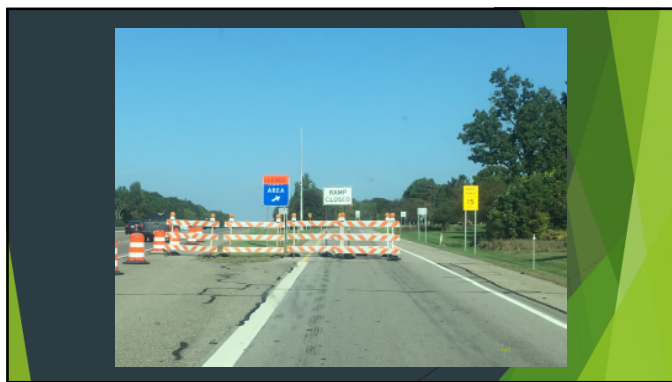




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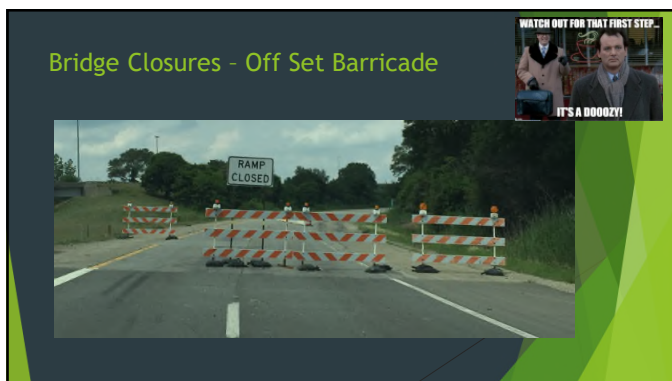
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142



143

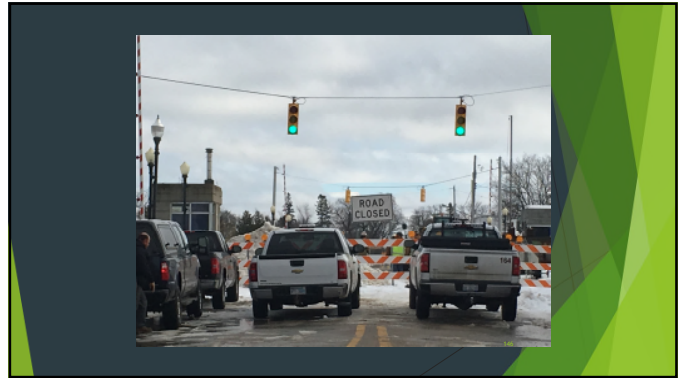


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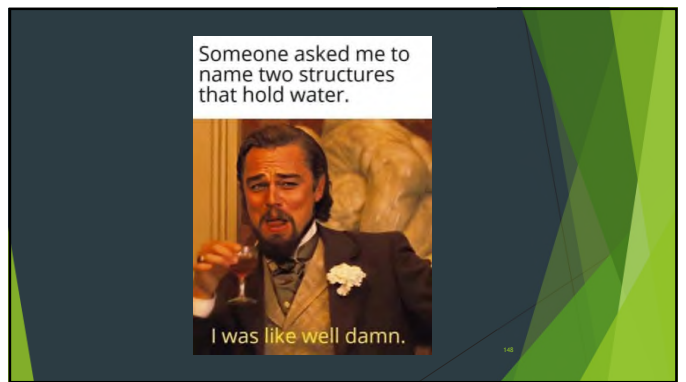
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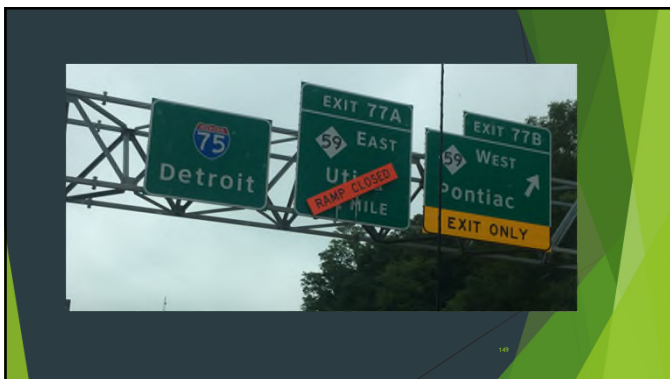
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147



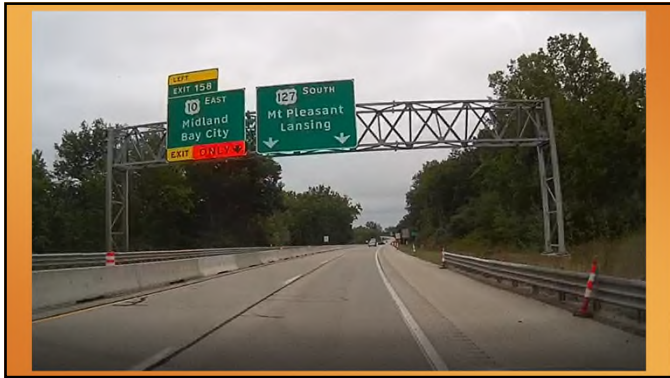
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149



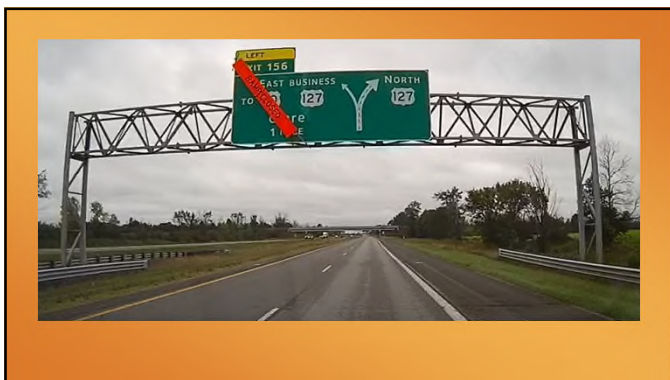
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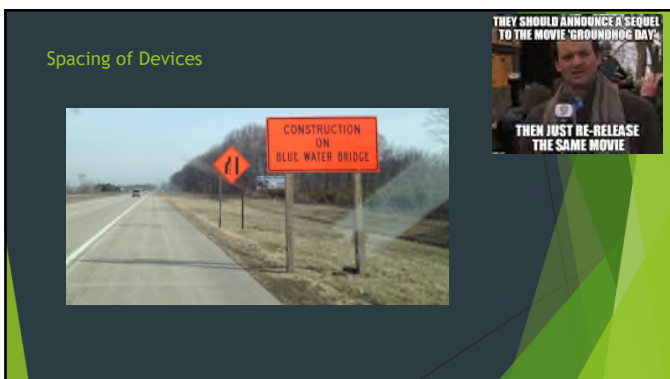
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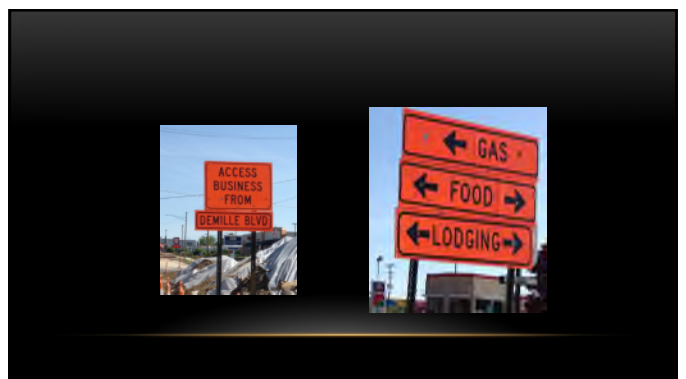
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155



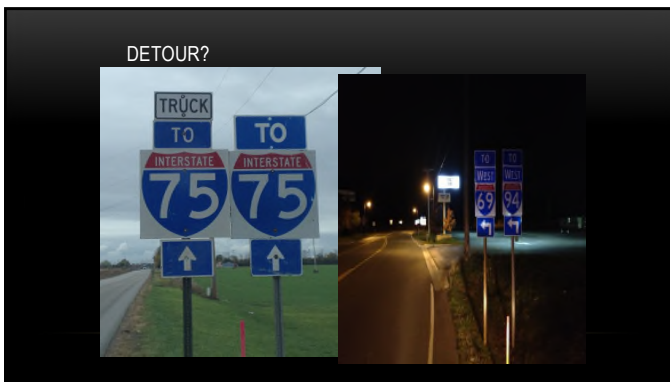
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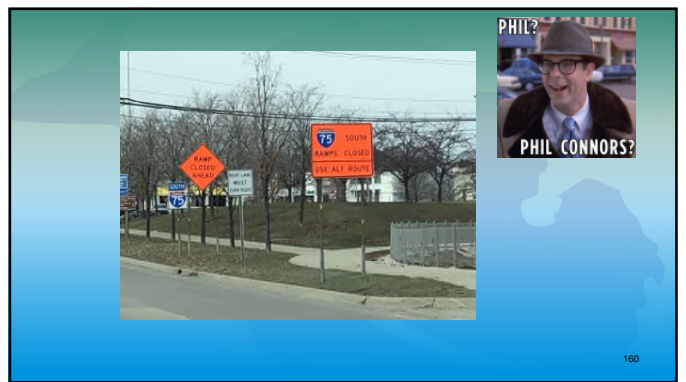
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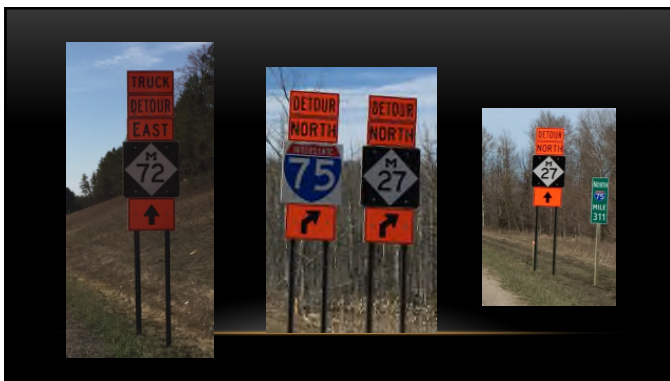
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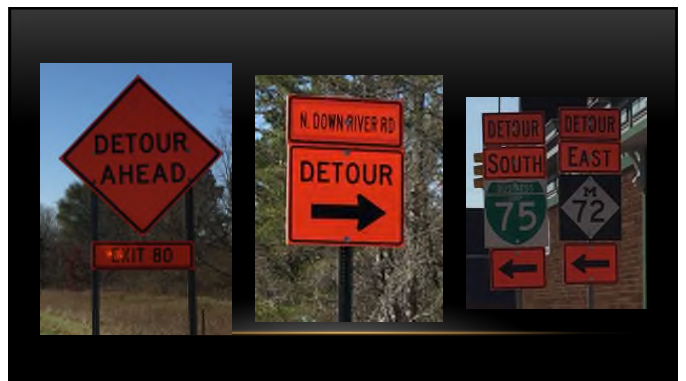
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160



161

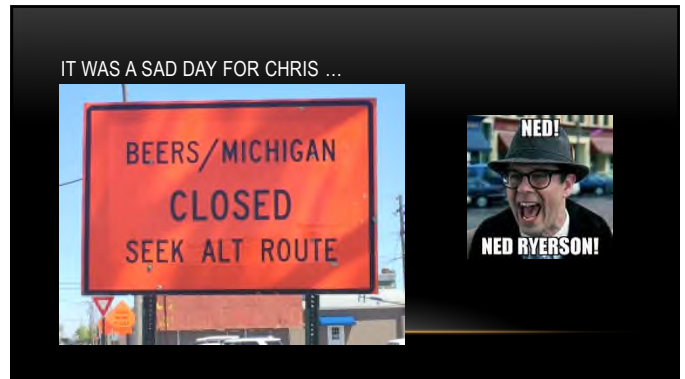


162





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164

**TABLE 6-5: NON-TRUNK LINE DETOUR SIGNING DESIGN GUIDELINES**

Detour Duration	Non-Trunk Line Detour	
	Signing	Example (all road name signs to be paid for as Sign Type 4 Special)
< 24 hours	<ul style="list-style-type: none"> <li>M4-9 (R) (L) - Detour Sign with appropriate directional arrow at each decision point.</li> <li>Or portable changeable message boards (6.04.04 Section C)</li> </ul>	
24-72 hours	<ul style="list-style-type: none"> <li>M4-9 (R) (L) - Detour Sign with Road Name Plaque and appropriate directional arrow at each decision point.</li> <li>Or portable changeable message board (6.04.04 Section C)</li> </ul>	
> 72 hours	<ul style="list-style-type: none"> <li>M4-9 (R) (L) (U) - Detour Sign with Road Name Plaque and appropriate directional arrow at each decision point near right and far left corners of the intersection.</li> <li>M4-9 (UL) (UR) - to be placed in advance of each turn.</li> <li>An "up" pull through arrow should be required after each major intersection, and should be considered after each turn decision point.</li> </ul>	

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**TABLE 6-6: TRUNK LINE DETOUR DESIGN GUIDELINES**

Detour Duration	Trunk Line Detours	
	Signing	Example
< 72 hours	<ul style="list-style-type: none"> <li>M4-8 Detour Plaque</li> <li>M3-1, M3-2, M3-3, M3-4 Cardinal Directional Sign</li> <li>M1-1, M1-2, M1-3, M1-4, M1-6 Route Marker Sign</li> <li>M6-1(R/L), M6-2(R/L) Directional arrow at each turn or exit.</li> <li>A PCMS may be used for simple detours (6.04.04 Section C)</li> </ul>	
> 72 hours	<ul style="list-style-type: none"> <li>M4-8 Detour Plaque</li> <li>M3-1, M3-2, M3-3, M3-4 Cardinal Directional Sign</li> <li>M1-1, M1-2, M1-3, M1-4, M1-6 Route Marker Sign with directional plaque must be placed in advance and at each turn.</li> <li>M5-1, M5-2, M5-3, M5-1, M5-2, M5-3 Directional Arrow at each turn or exit.</li> <li>An "up" pull through arrow is recommended after each major interchange and after each turn or exit.</li> </ul>	

166

**TABLE 6-7 DETOUR SIGNING PLACEMENT GUIDELINES**

Detour Signing Placement Guidelines			
Roadway	Turning Detour Signing	Advance Turn Detour Signing	Pull Thru Detour Arrow Signing
Non-Freeway	50 feet (min) before intersection spring point	500 feet (min) before intersection spring point	500 feet (max) after intersection
Freeway	100 feet (min) before exit lane taper	1/2 Mile (min) before exit lane taper	500 feet (max) after lane merge taper
Ramps	50 feet (min) before spring point	500 feet (min) before spring point	N/A

167

**Hand Digging For Temporary Signs**

*This is why you always call before you dig!*

- Does not need to be included in all projects
- If you have conflicts within the CIA you can include a quantity
- Consider including if you are placing lead in or detour signs in a location with a lot of known utilities

168

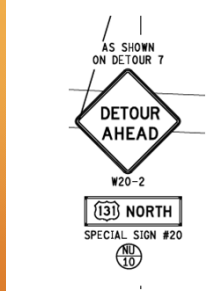
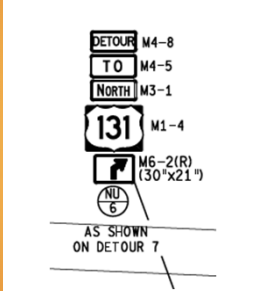
### Work Zone Manual Updates – Temporary Sign Guide

169

- Guide is being developed to help with the design of work zone signs
  - 9 sqft on a single post
    - Detour Route Clusters
  - 20 sqft on U-Channel
    - Sizes of supplemental plaques
  - Greater than 20 sqft requires wood posts
  - Letter Size and Font is covered



169

170



171





172



173

### Sign Color

- Same Project two different signs designs
- Also locations with out signs

174





175



176



177



178

**APPENDIX K**  
**TEMPORARY SIGN DESIGN GUIDELINES**  
(Added 12/3/2020)

**Overview**  
This document is to be followed when using SignCad to design temporary special signs for use during construction. The guidelines and examples listed below are intended to maximize the size of the legend, while keeping the sign size small enough to meet space limitations and post size requirements. Signs designed must meet all current crash testing requirements.

**Letter Sizes:**

Non-Freeway		Freeway	
Maximum	7'D	Maximum	8'D
	7'C		7'D
	6'D	Minimum	7'D
	6'C		7'C
Minimum	5'D		
	5'C		

179



180

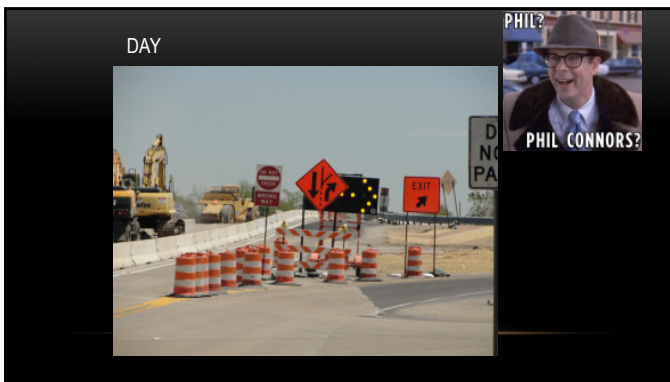




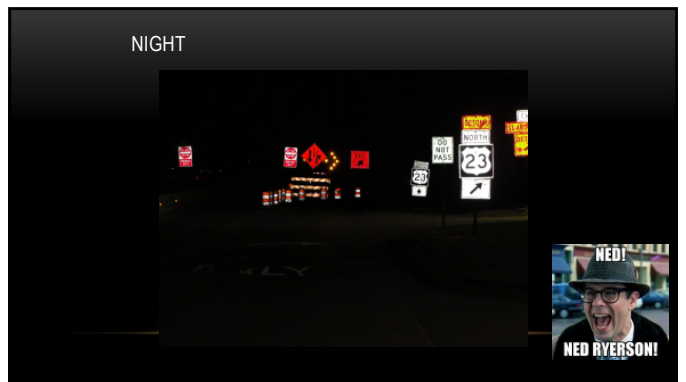
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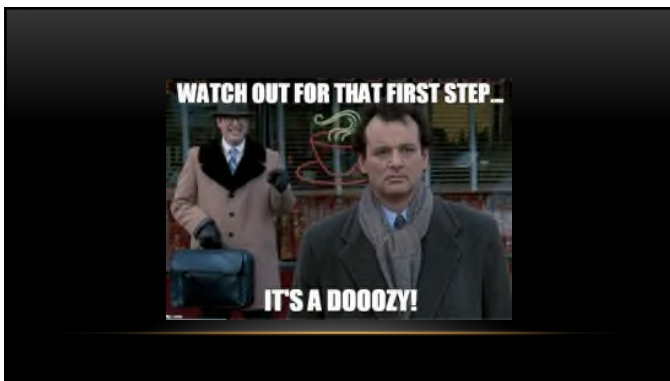
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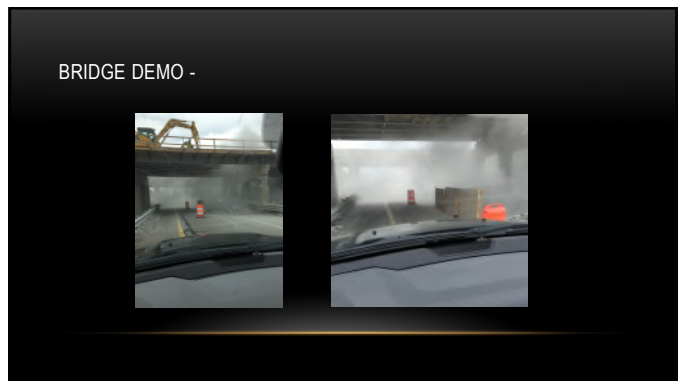
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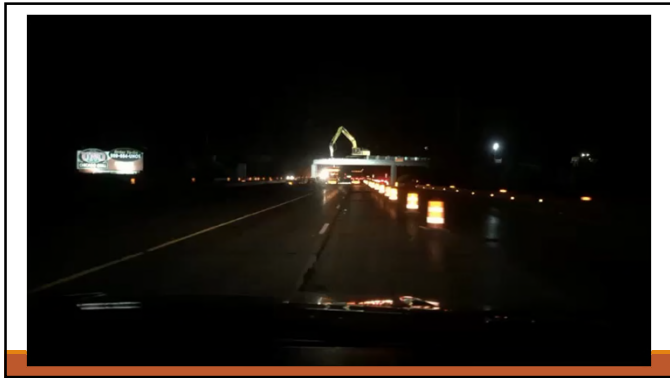
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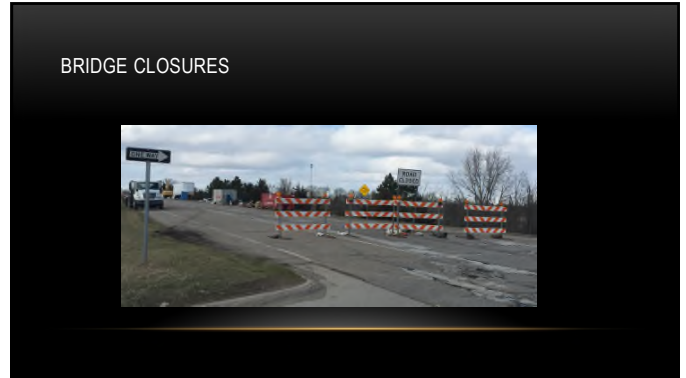
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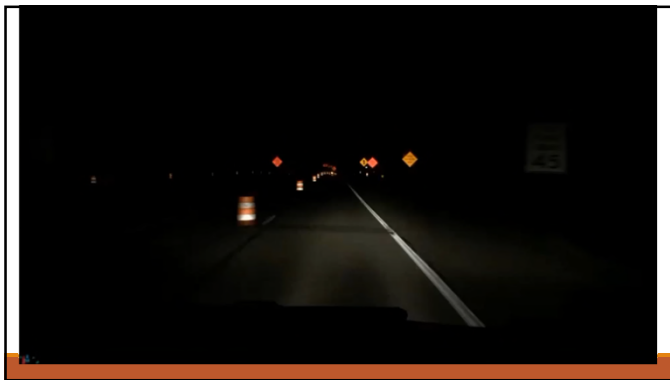
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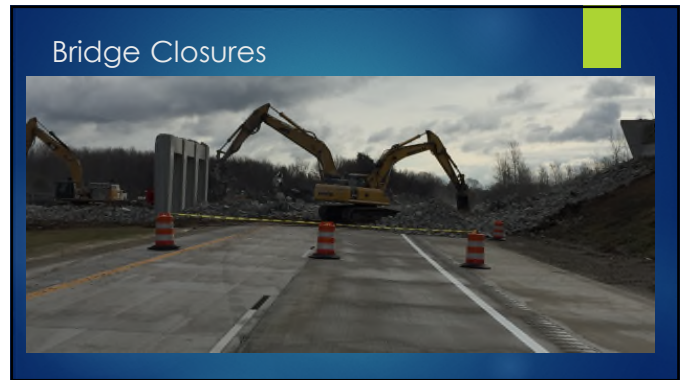
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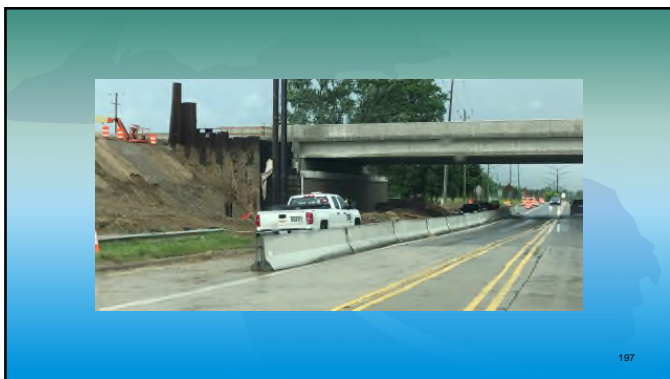
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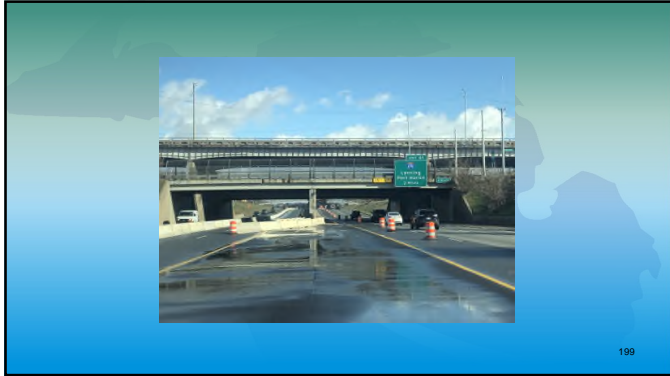
197

**812.03.D.11**  
**Temporary Concrete Barrier Ending**

- Temporary barrier endings subject to approach traffic and not terminated behind guardrail must be attenuated or, if applicable shielded with a temporary concrete barrier sloped end section.

198

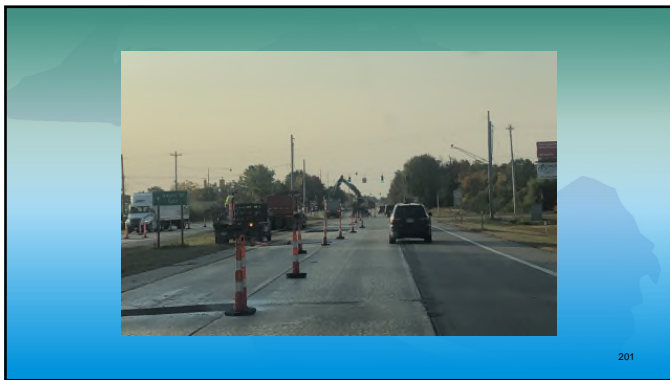




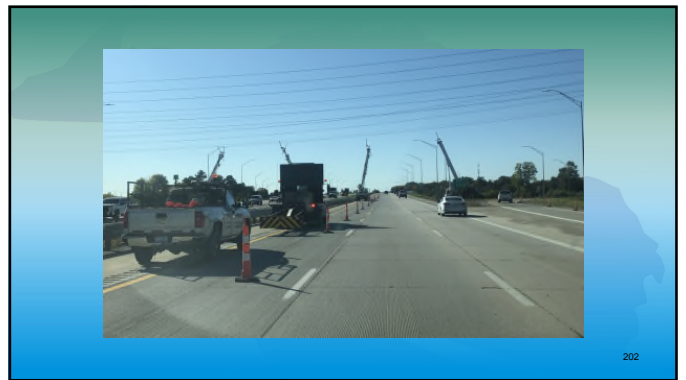
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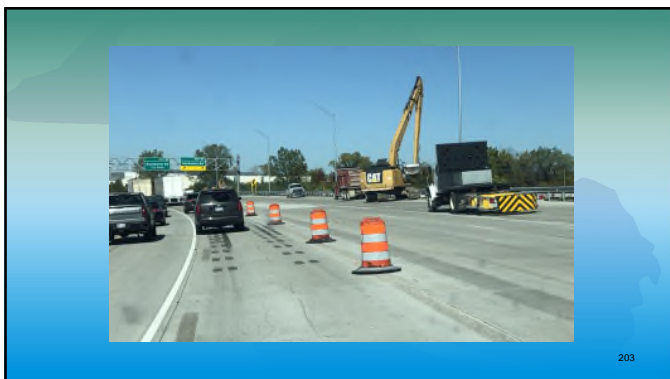
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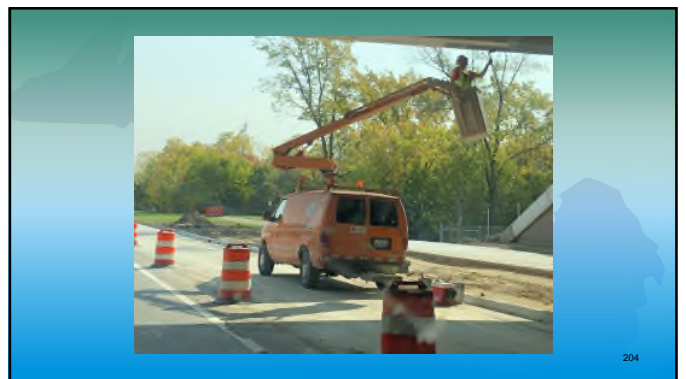
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202

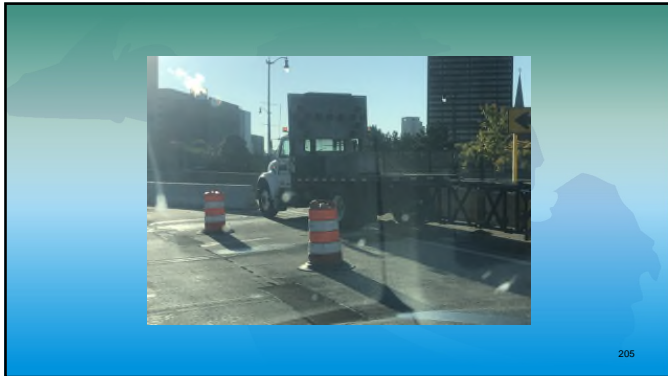


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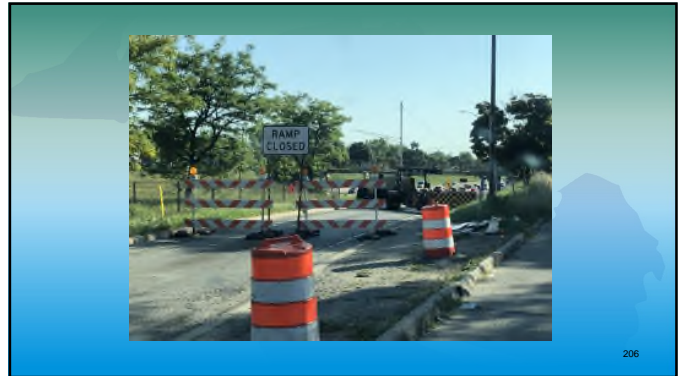


204





205



206

## Spec Book

- We will go over changes related to work zones specifically sections 812 and 922
  - New Pay Item
  - FUSP included
  - Modifications
- This may not include every change but major changes are captured.
- Color Key – Added Removed Modified



207

## 812.03.D.1 (added)

- Signs must not be fabricated with vertical seams. Horizontal seams are not to cross through the sign legend.
- If erecting signs behind a curb, or within 6 feet of a pedestrian walkway, mount signs at a bottom height of at least 7 feet above ground. If the sign is located in a closed section of a walkway the bottom height must be at least 5 feet.

208

## 812.03.D.1 (removed)

- Place and operate one Type A warning light, equipped with a one-way lens, on 4 feet by 4 feet diamond warning signs when required for that device by the FHWA Work Zone Acceptance letter.
- Do not store signs against cable barrier.



209

## 812.03.d.1.a & b

- a. Type B, Temporary, Prismatic, Special.
- b. Concrete Barrier-Mounted Temporary Sign System.
- Additional details added in each section.



210

## 812.03.D.3

- Mount construction signs on portable sign support standards only if signs are to remain in place for **14 days** or less, or as allowed by the Engineer if fixed supports are not possible.

Day 7 at home and the dog is looking at me like, "See? This is why I chew the furniture."

211

211

## 812.03.D.3.a

- Reflective Panel for temporary sign supports.**
- When used, match the sheeting of the reflective panel to the material type and background color of the sheeting of the sign mounted on the post, except for YIELD and DO NOT ENTER signs where the reflective strip will be red.
- More in this section.



212

212

## 812.03.D.6

## 42-inch Channelizing Devices

- Do not attach lights.**
- Taper and tangent**

The devices must be placed such that spacing does not exceed the maximum values described in Table 812-1.

Work Zone Speed Limit	Taper	Tangent
≤ 35 mph	1 (S)	2 (S)
≤ 45 mph	50 feet	100 feet

Notes: S = Work Zone Speed Limit (mph)  
Place the devices at a maximum distance of 50 feet apart in tapered sections, and a maximum of 25 feet apart in tangents. These spacing requirements apply for all speed limits during nighttime operations.

213

213

812.03.D.6.b  
(changed)

- Temporary Tubular Markers
  - 2012 section was nighttime use of 42-inch devices



214

214

## 812.03.D.7

- Added Temporary Delineators
  - 2012 (arrow boards)
- Everything after this section will most likely have a new number.
  - Double check references, also maybe a reason something is off in the future.

215

215

812.03.D.8  
Arrowboards

- Place a shoulder closure taper in advance of the lighted arrows placed on the shoulders.
- The lighted arrow board must not be in travel mode when stored within 30 feet of the traffic lanes.

216

216

### 812.03.D.9 Type III

- Stripes on the retro-reflective sheeting must be placed in accordance with MMUTCD 2009 edition figure 6F-7.

217

217

### 812.03.D.10.a

#### Temporary Concrete Barrier

- a. Glare Screen Temporary
  - i. Temporary Glare Screen Base
  - ii. Temporary Glare Screen Blades



218

218

### 812.03.D.11

#### Temporary Concrete Barrier Ending

- Temporary barrier endings subject to approach traffic and not terminated behind guardrail must be attenuated or, if applicable shielded with a temporary concrete barrier sloped end section.

219

219

### 812.03.D.13

#### Pavement Marking Cover

- Prior to installing the pavement marking cover, air blow or brush the pavement surface to remove surface dust and dirt.
- Apply and tamp the marking cover in accordance with the manufacturer's recommendations.
- Pavement Marking Cover is prohibited from use between November 1 and April 14 due to temperature and weather limitations as defined by manufacturer's recommendations.

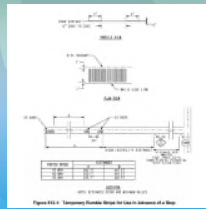
220

220

### 812.03.D.14

#### Temporary Rumble Strips (Orange).

- a. Temporary Rumble Strips (Orange) in Advance of a Stop Condition
  - See picture for layout
- b. Temporary Rumble Strips (Orange) in Advance of a Work Zone
  - See Spec book for layout



221

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### 812.03.D.16

#### Temporary Portable Traffic Signal (PTS) System

- Delineate each trailer using three plastic drums or 42 inch channelizing devices.
- When work operations are suspended and traffic lanes are to be opened for less than 72 hours, the temporary signal may remain in place in flash mode. Remove the temporary signal from the roadway if it will be non-functional for longer than 72 hours.

222

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### 812.03.D.17 Portable Changeable Message Signs

- Portable changeable message signs (PCMS) include the following 2 types of devices (each paid for separately):
  - NTCIP-Compliant Portable Changeable Message Sign.
  - Portable Changeable Message Sign.
- Requirements are detailed in the Spec book.
- ATMS has been removed as a current option.

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### 812.03.H Lighting for Night Work

- This section was replaced based on approved FUSPs
- Provided lighting systems must meet the requirements set forth in MIOSHA Rule 408.40133 Illumination, MIOSHA Rule 408.42223 (7) Traffic Control, section 706, and the contract.
- It is suggested to review this entire section when on a project at night.

224

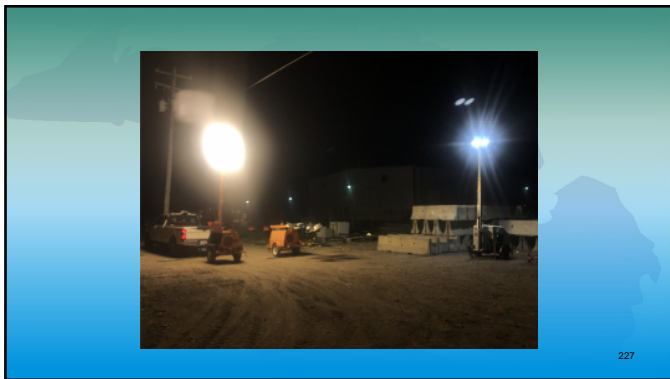
224



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HALO SL Specifications:	HALO SL Features:
Model: HALO SL	Lighting fixture for night work
Material: 6061-T6 Aluminum	Lighting fixture for night work
Weight: 15.5 lbs (7.0 kg)	Lighting fixture for night work
Height: 48" (121.9 cm)	Lighting fixture for night work
Beam Spread: 120°	Lighting fixture for night work
Power: 100W	Lighting fixture for night work
Battery Weight: 10 lbs (4.5 kg)	Lighting fixture for night work
Battery Type: Lithium-Ion	Lighting fixture for night work
Battery Life: 12 hours	Lighting fixture for night work
Power Source: 12V DC	Lighting fixture for night work
Power Consumption: 100W	Lighting fixture for night work
Power Input: 12V DC	Lighting fixture for night work
Power Output: 100W	Lighting fixture for night work
Power Efficiency: 100%	Lighting fixture for night work
Power Protection: Overload protection	Lighting fixture for night work
Power Safety: Safety lock & break function	Lighting fixture for night work

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### 812.04 Measurement and Payment

- There are new pay items

– Sign, Type B, Temp, Prismatic, Special, Furn	Square Foot
– Sign, Type B, Temp, Prismatic, Special, Oper	Square Foot
– Sign, Portable, Changeable Message, NTCP-Compliant, Furn	Each
– Sign, Portable, Changeable Message, NTCP-Compliant, Oper	Each
– Plastic Drum, High Intensity Fluorescent, Furn	Each
– Plastic Drum, High Intensity Fluorescent, Oper	Each
– Channelizing Device, 42 inch, Fluorescent, Furn	Each
– Channelizing Device, 42 inch, Fluorescent, Oper	Each
– Temp Rumble Strips (Orange), Stop Condition	Foot
– Temp Rumble Strips (Orange), advance of a work zone	Foot
– Glare Screen, Temp	Foot
– Glare Screen, Temp, Relocated	Foot
– Glare Screen, Temp, Complete Section, Replaced	Each
– Delineator, Flexible, Temp, Furn	Each
– Delineator, Flexible, Temp, Oper	Each
– Delineator, Panels, Temp, Furn	Each
– Delineator, Panels, Temp, Oper	Each
– Tubular Marker	Each
– Tubular Marker, Replacement	Each
– Conc Barrier-Mounted Temp Sign System, Furn	Each
– Conc Barrier-Mounted Temp Sign System, Oper	Each
– Reflective Panel for Temp Sign Support, Furn	Each
– Reflective Panel for Temp Sign Support, Oper	Each


**PHIL?**  
  
**PHIL CONNORS?**

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### 812.04 Measurement and Payment

Pavt Mkg, Wet Reflective, Type R, Tape, ___ inch, (color), Temp	Foot
Pavt Mkg, Wet Reflective, Type NR, Paint, ___ inch, (color), Temp	Foot
Pavt Mkg, Wet Reflective, Type NR, Tape, ___ inch, (color), Temp	Foot
Pavt Mkg, Wet Reflective, Type R, Tape, ___ inch, Crosswalk	Foot
Pavt Mkg, Wet Reflective, Type R, Tape, 12 inch, Cross Hatching, (color)	Foot
Pavt Mkg, Wet Reflective, Type R, Tape, ___ inch, Stop Bar	Foot
Pavt Mkg, Wet Reflective, Type R, Tape, (legend)	Each
Pavt Mkg, Wet Reflective, Type R, Tape, (symbol)	Each
Pavt Mkg, Type NR, Paint, ___ inch, Crosswalk	Foot
Pavt Mkg, Type NR, Paint, 12 inch, Cross Hatching, (color)	Foot
Pavt Mkg, Type NR, Paint, ___ inch, Stop Bar	Foot
Pavt Mkg, Type NR, Paint, (legend)	Each
Pavt Mkg, Type NR, Paint, (symbol)	Each
Pavt Mkg, Longit, Water Blasting, 6 inch or less Width, Rem	Foot
Pavt Mkg, Longit, Water Blasting, Greater than 6 inch Width, Rem	Foot
Raised Pavt Marker, Temp, Type ___ (color), Monodirectional	Each
Raised Pavt Marker, Temp, Type ___ (color), Bidirectional	Each
Pavt Mkg, Longit, 6 inch or Less Width, Rem	Foot
Pavt Mkg, Longit, Greater than 6 inch Width, Rem	Foot
Pavt Mkg Cover, Type R, (color)	Foot

**NED!**  
  
**NED FVYERSON!**

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COME ON, BUDDY. CASE WESTERN HIGH!

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### 812.04.C & D

- C. The Engineer will measure Sign, Type \_\_\_, Temp, Prismatic, Furn as the total cumulative area of the maximum number of each sign legend that is in use during the course of the project unless previously paid. The unit price for Sign, Type \_\_\_, Temp, Prismatic, Furn includes the cost of portable or driven sign supports.
- D. The Engineer will measure Sign, Type \_\_\_, Temp, Prismatic, Oper as the total cumulative area of the maximum number of each sign legend that is in use during the course of the project unless previously paid.

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### Payment for Staging


- Max in Use?
- How is the project staged?
  - Going from A to B how many signs on driven post total will there be?
  - Do you have a best practice for determining the amount?

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### 812.04.D

- Sign, Type B, Temp, Prismatic, Special, Oper
  - When sign overlays, including different route markers, are used to modify portions of Type B, Temporary, Prismatic, Special signs, only the overlay will be paid for as additional square footage of Sign, Type B, Temp, Prismatic, Special, Furn.

**WATCH OUT FOR THAT FIRST STEP.**  
  
**IT'S A DOOOZ!**

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## 812.04.G Sign Cover

- The unit price for Sign Cover, Type I includes the cost of providing shop drawings, fabricating, furnishing, installing, and removing a Type 1 sign cover.
- **Relocating Sign Covers was removed**

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## 812.04.I Sign, Portable, Changeable Message

- **1.** Sign, Portable, Changeable Message, Furn
- **2.** Sign, Portable, Changeable Message, Operated.



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## 812.04.J

Sign, Portable, Changeable Message, NTCIP-Compliant

- **1.** Sign, Portable, Changeable Message, NTCIP-Compliant, Furn
- **2.** Sign, Portable, Changeable Message, NTCIP-Compliant, Oper
- J was **Plastic Drums Lighted** which have been removed

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## Other New Sections

- **812.04.V - Temp Rumble Strips (Orange), Stop Condition and Temp Rumble Strips (Orange), Advance of a Work Zone**
- **812.04.X Delineator, Temporary**
  - 1. Delineator, Flexible, Temp, Furn and Delineator, Panels, Temp, Furn
  - 2. Delineator, Flexible, Temp, Oper and Delineator, Panels, Temp, Oper

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## Other New Sections con.

- **812.04.Y Glare Screen Temp**
  - Glare Screen, Temp, Relocated
  - Glare Screen, Temp, Complete Section, Replace
- **812.04.Z Tubular Marker**
- **812.04.AA Tubular Marker, Replacement**
- **812.04.BB Concrete Barrier Mounted Temporary Sign System**
  - 1. Conc Barrier-Mtd Temp Sign System, Furn
  - 2. Conc Barrier-Mtd Temp Sign System, Oper.

Why haven't Aliens visited our Solar System yet? ...

They looked at the reviews... Only 1 star.

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## Other New Sections con.

- **812.04.CC Reflective Panel for Temporary Sign Support**
  - 1. Reflective Panel for Temp Sign Support, Furn
  - 2. Reflective Panel for Temp Sign Support, Oper



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## 922.02 Temporary Signs

- 922.02.A.1 Portable Sign Systems
- The July Draft Version is being Updated**
- Will be the same as the 2012 version.

**Don't blame others  
for the road you're  
on. That's your own  
asphalt.**

😂😂😂

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## 922.02.D Sign Covers

- Covers must be opaque during all light and weather conditions and must cover the entire front of sign panels.
- The Engineer will not require the Contractor to cover the entire sign panel on overhead signs and large guide signs greater than 60 square feet, but the Contractor must cover conflicting information.**

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## 922.03 Channelizing Devices


- The fluorescent orange sheeting must have a Daytime Luminance factor that meets or exceeds 20 based on Table 2 of ASTM D4956 - Daytime Luminance Factor (Y%)A. The white sheeting must have a Daytime Luminance factor that meets or exceeds 27 based on Table 2 of ASTM D4956 - Daytime Luminance Factor (Y%)A. Provide certification from the manufacturer that devices meet NCHRP 350/MASH requirements.**
- Requirements have been updated and moved up to the entire section to avoid re-stating like in 2012.

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## 922.03.B Drums

- Drums must be composed of a low-density polyethylene plastic. Do not use high density polyethylene for plastic drums. The drum striping design must meet the requirements of WZD-125.
- ReflectORIZED sheeting on drums must consist of 6-inch stripes meeting the requirements of ASTM D 4956, for flexible Type III high intensity reflectORIZED sheeting**



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## 922.03.C 42-Inch Channelizing Device

- 922.03.C Drums with lights**
- 922.03.C
  - Have a base at least 8 inches in diameter and taper to at least a 4-inch diameter at the top, regardless of orientation;
  - Be predominantly orange;
  - Include ballast meeting the manufacturer's specifications as necessary to keep them upright; and
  - Sheeting pattern must consist of four 6-inch alternating orange and white bands with no more than 2 inches between the bands, with the top band being orange and spaced no greater than 4 inches from the top of the device.

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### 922.03.D Temporary Tubular Markers

1. Consist of a vertical tube (post) with alternating white and orange reflective sheeting, a flexible boot to provide impact rebound and prevent excessive whiplash, and a base.
2. Fabricated from material that can be struck without causing damage to the impacting vehicle and are resistant to the following: impact, ultraviolet light, ozone, and hydrocarbons, and must remain resistant at air temperatures from -20 degrees F to +120 degrees F.
3. Provide for easy and quick removal of the post from the base and boot members.
4. Exhibit good workmanship, free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.
5. Must be predominantly orange and must be not less than 42 inches high and 2 inches wide facing road users. Have a minimum width of 2 inches throughout the entire post and be a minimum of 42 inches above the ground surface when assembled, unless otherwise approved by the Engineer.
6. Be capable of withstanding a minimum of 15 impacts at a speed of 50 mph into the traffic face of the post and remain serviceable.
7. Meet the crashworthy requirements of NCHRP 350 or MASH (AASHTO Manual for Assessing Safety Hardware).
8. Markers must have four, 4 inch to 6 inch wide alternating orange and white stripes with the top stripe being orange. The bands must be made of ASTM Type III Flexible High Intensity Sheeting, placed a maximum of 2 inches from the top.

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### 922.03.E Type III Barricades

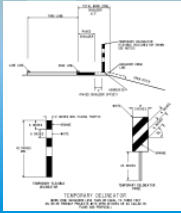
- Type III barricades consist of three horizontal reflectorized rails, supports, and warning lights. **Type III barricades must have both sides of the rails reflectorized with Type IV high-intensity sheeting.** Type III barricades must meet WZD-125.



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### 922.03.F Temporary Delineators

- 922.03.F.1 Temporary Delineator Panels.
- 922.03.F.2 Temporary Flexible Delineators.
- WZD-126-A



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### 922.07.C Portable Message Signs

- 922.07.C.1 Message Board.
  - a. Measure at least 75 inches high by 114 inches long and be capable of displaying at least 3 lines of text, with at least 8 characters on each line. The display may be a line-matrix, or character-matrix design;
  - b. **Be either disk matrix, or LED, or both disk matrix and LED, capable of displaying three message lines with character height of 18 inches with 8 characters per line and a pixel matrix that is 5 pixels wide and 7 pixels high;**
  - d. **The PCMS will be pre-loaded with at least an 18 inch standard font;**
  - e. The PCMS will display:
    - i. All upper case letters;
    - ii. Up to three lines of text per sign; and
    - iii. All numerals 0 to 9.
- **Also see sections f, g, h, i, j**

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### 922.07.C

4. Power Supply. Power supply to the PCMS must be a maintenance-free battery with one of the following backup systems:
  - a. Generator with electric start, capable of continuous operation without refueling for 72 hours;
  - b. Solar, with a built-in 115 VAC battery charger, capable of displaying a message for a minimum of 18 consecutive days without sun in 18 °F weather conditions.
  - c. The power source will be able to continuously display a message of at least 24 characters, 24 hours per day, 7 days per week, for the duration that the PCMS is deployed in the field.
5. Trailer.
  - a. The PCMS trailer must be painted highway orange.
  - b. Delineate the trailer with a 2-inch by 36-inch strip, or an equivalent area, of reflectorized red and white conspicuity tape, installed on each of the four sides of the trailer. Locate these stripes at each corner of the trailer.
  - c. The trailer must conform to the Michigan Vehicle Code with a non-skid upper surface.
  - d. The PCMS must be mounted to the trailer with a message board support that moves up, down, and rotates 360 degrees, with a safety lock to prevent the message board from lowering once in the raised position. The support must be equipped with a hydraulic system that includes a manual pump with manual release for use as a backup for the electric hydraulic pump.
  - e. The bottom of the sign panel must be at least 7 feet above the roadway in urban areas, and 5 feet above the roadway in rural areas when in operating mode.

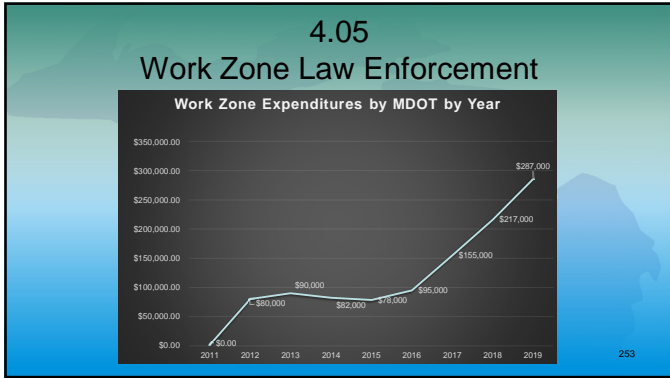
251

### 922.11 Traffic Regulator Equipment

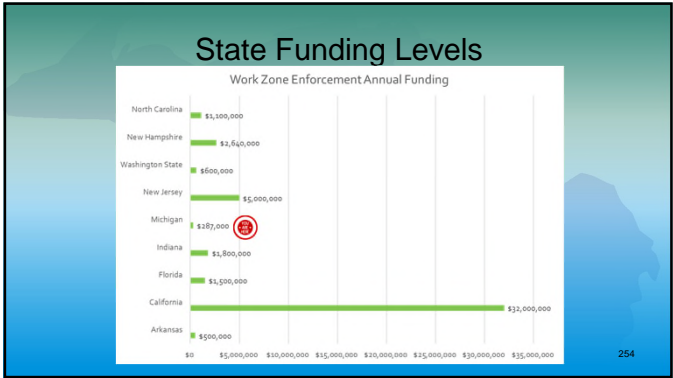
- 922.11.B. **Traffic Regulator's High-Visibility Safety Apparel.** Traffic regulators **must wear high visibility safety apparel as specified in the MMUTCD.**
  - Changed from listed requirements
- 922.11.D. Two-Way **Hand-held Radio System.** Provide a two-way **hand-held** radio system with power to send and receive signals over the length of the intended flagging operations. Provide a backup system on standby, readily available to the regulators. **The hand-held radio system must not be attached to a vehicle.**

Does anyone else think aliens ride past Earth and lock their doors?

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## OH COME ON

- Why does Michigan have less?
  - No earmarked funding for Work Zone Enforcement
    - Give 'Em A Brake Funding expired in 2010
    - California DOT has a \$97 million annual contract with California Highway Patrol for this service
  - No ticketing revenue structure to gain funding
  - Project funds usually include this pay item in other states
  - Limited number of officers to provide this service



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### When to Use Work Zone Enforcement (WZE)


- Workers next to high-speed traffic without barrier
- Traffic control set-up or removal activities
- Changes in traffic control patterns that could lend user confusion or high risk to workers
- Existing Traffic Conditions and crash histories that indicate a potential for safety and congestion impacts
- High-speed roadways when unexpected or sudden traffic queuing is anticipated

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### How to Budget WZE

\*\*Using a rate of \$100/hour for each individual officer/squad car\*\*


- Assume 6 hours of enforcement for every traffic shift and stage change
- Assume 6 hours of enforcement for every squad car used on each shift containing Full Stops
- Assume 9 hours of enforcement for every squad car used on each shift that nightwork is performed (without positive protection)
- Assume 3 hours of enforcement for every other day that High Worker exposure activities are taking place



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### Design Considerations for WZE

- Ensure that there are adequate locations to pull over and cite motorists if you are embarking on ACTIVE enforcement
  - 1000' is not enough (consult your local PD)
- Ensure that turn-arounds/breaks in barrier are available frequently
  - 5 miles between breaks/turn-arounds does not give the LEO's enough opportunity to go after speeding motorists
- Report your findings to me at CFS so that I can provide best practices for design considerations
- WORK WITH CONSTRUCTION TO INCLUDE EARLY CONVERSATION WITH LAW ENFORCEMENT, ENSURE THAT THEY INVITE THEM TO PRE-CONSTRUCTION MEETING.



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## Panel Discussions Lessons Learned


- **Police Presence > Ticketing**
  - Contractor and Construction staff alike find that police presence is more valuable than active ticketing. An officer responding to tickets will often catch those with warrants or other jailable offenses, having to leave the jobsite to incarcerate the offender, removing them from the work zone.
- **Discuss \$ for Police Activities Early (at Scoping)**
- **Don't forget about Highway Safety Improvement Project Funds, which are applicable to high-speed roadways (Contact Heidi Spangler at MDOT)**



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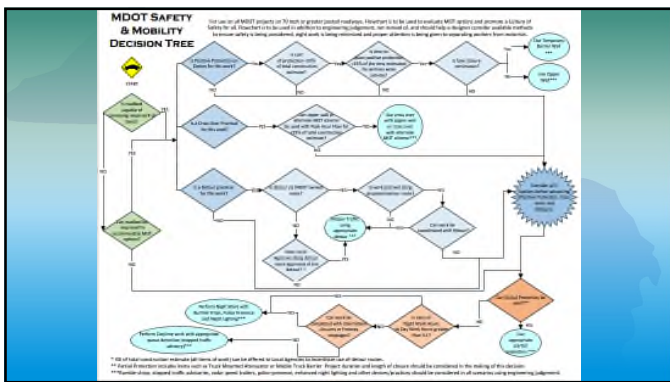
## New Form



- Requirement for agreement existed in MDOT Employee Guidance Document 10202 and standardized
- Separated into Local Agency PD and MSP forms, Forms number 1449 and 0565
- See e-construction guidelines in Construction Manual for projectwise storage location
- MSP will be requiring form 1449
  - If funds are HSIP, be sure to use the HSIP JN as well as the project JN
- Form creation is a function of the MDOT Construction Engineer
- This form aids us in ensuring payment is made to appropriate job numbers

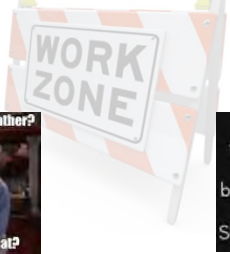
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## Questions?



**Did you want to talk about the weather?**

**Or were you just making chitchat?**

**I told my wife how thankful I was to have someone I enjoyed being quarantined with. She said "must be nice."**

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### MDOT Design Basic Training Wiki Page

[mdotwiki.state.mi.us/design/index.php/Category:Design\\_Basic\\_Training#Presentations](https://mdotwiki.state.mi.us/design/index.php/Category:Design_Basic_Training#Presentations)

**2021 WORK ZONE SAFETY**

The 2021 Work Zone Safety training session has been rescheduled to March 25, 2021 via Microsoft Teams LIVE. There will not be any in-person attendance. Course will be taught by Chris Brookes and Chuck Bergmann. The session link to JOIN will be sent via email to the Region Engineers, Office Administrators, Bureau Directors and ACEC 4 to 6 weeks before the session. MDOT persons, please contact your supervisor and work with your Region Office/Bureau Administrator to get approved for the class and to receive the class link. ACEC persons, please work with ACEC to receive class link. For questions, please contact MDOT Design Basic Training @.

**Agenda**  
Work Zone Safety - agenda coming soon

**CEH Attendance Records**  
Teams LIVE automatically records attendee information when you join. Retain the attendance logs and the agenda for CEH credits. Attendance Records will be posted approximately 2 weeks after session.

**Survey**  
Work Zone Safety Survey coming soon

\*We will also include the above Wiki Page link in today's chat\*

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*If you have any questions after today's training, please contact us at:*

## MDOT-DesignBasicTraining@michigan.gov



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*Thank you for your  
participation  
and  
a special thank you to our  
Presenters*