

2021 DeIDOT Lessons Learned Workshop

Temporary Traffic Control / Maintenance of Traffic

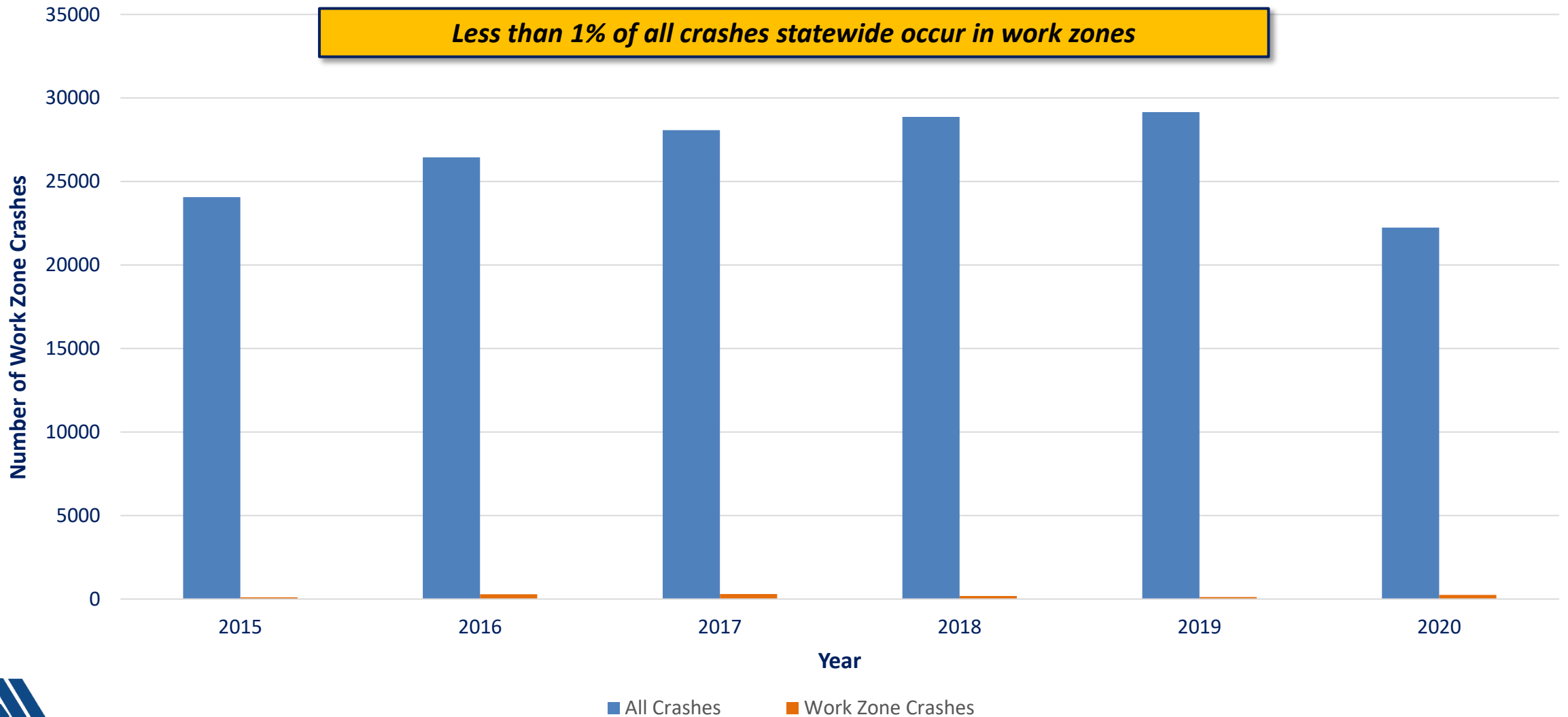


Agenda

- Work Zone Crashes in Delaware
- Safety Programs Section Staff & Responsibilities
- Design Considerations
- Inspection Considerations
- MASH Update
- Approved Products List
- Smart Work Zones

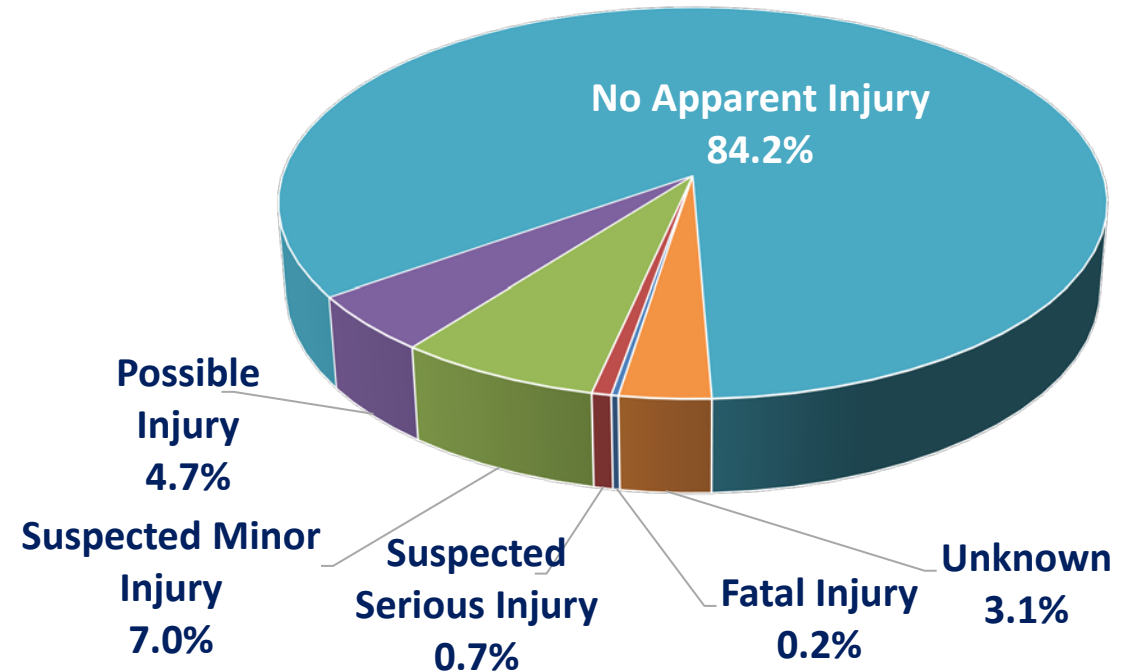


Delaware Statewide Crash Statistics



Delaware Work Zone Crash Statistics

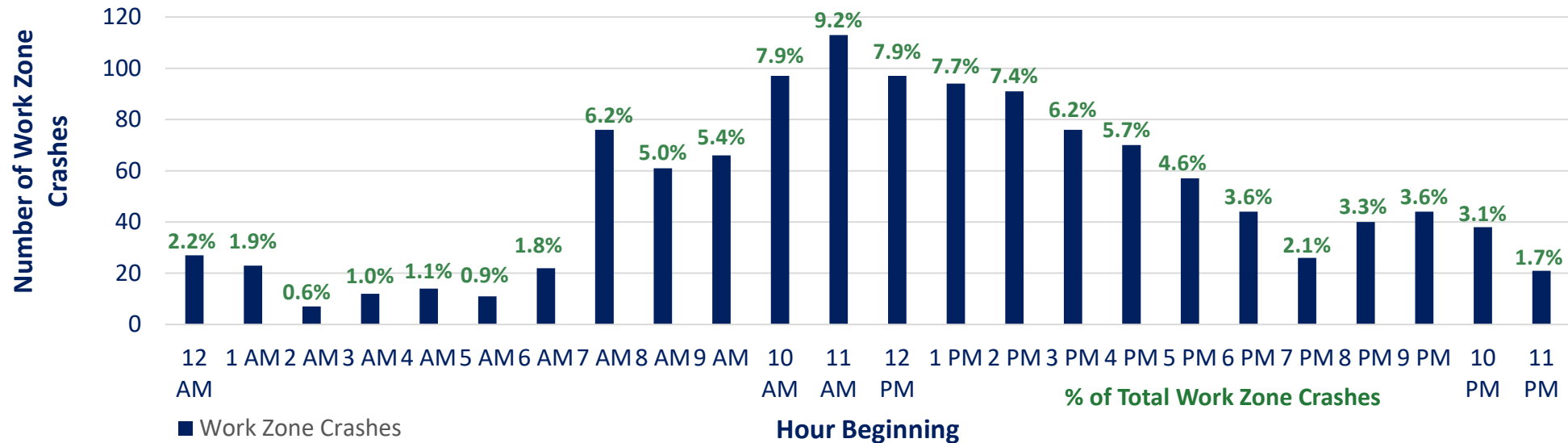
- Jan. 1, 2015 – Dec. 7, 2020
- Source: DeIDOT's CARS Program
- All crash severities
 - Property Damage Only
 - Injury
 - Fatal
- Overall crash statistics
 - 1,227 work zone crashes
 - 8 fatalities
 - 22 serious injuries
 - 229 minor injuries
 - 155 possible injuries
 - 953 crashes with property damage only



Delaware Work Zone Crashes by Time of Day

	12A	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12P	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P	Totals
Sunday	5	3	2	2	1	1		6	1	3	7	16	13	13	11	13	9	7	10	4	7	8	4	5	151
Monday	2	2	1		1	2	2	15	10	10	5	13	11	13	11	6	7	5	5	5	3	9	4	2	144
Tuesday	4	4	2	4	2	5	6	11	12	13	22	23	15	12	17	17	10	8	7	3	8	8	6	2	221
Wednesday	5	3	1	3	2	2	4	17	16	14	20	12	11	17	18	14	7	7	8	3	12	8	9	3	216
Thursday	4	4		1	3	1	3	10	9	15	18	16	18	13	10	10	16	12	5	4	7	8	8	5	200
Friday	3	3	1	1	4		6	15	9	3	14	18	18	19	19	9	17	11	7	5	2	2	4	2	192
Saturday	4	4		1	1		1	2	4	8	11	15	11	7	5	7	4	7	2	2	1	1	3	2	103
Totals	27	23	7	12	14	11	22	76	61	66	97	113	97	94	91	76	70	57	44	26	40	44	38	21	1227

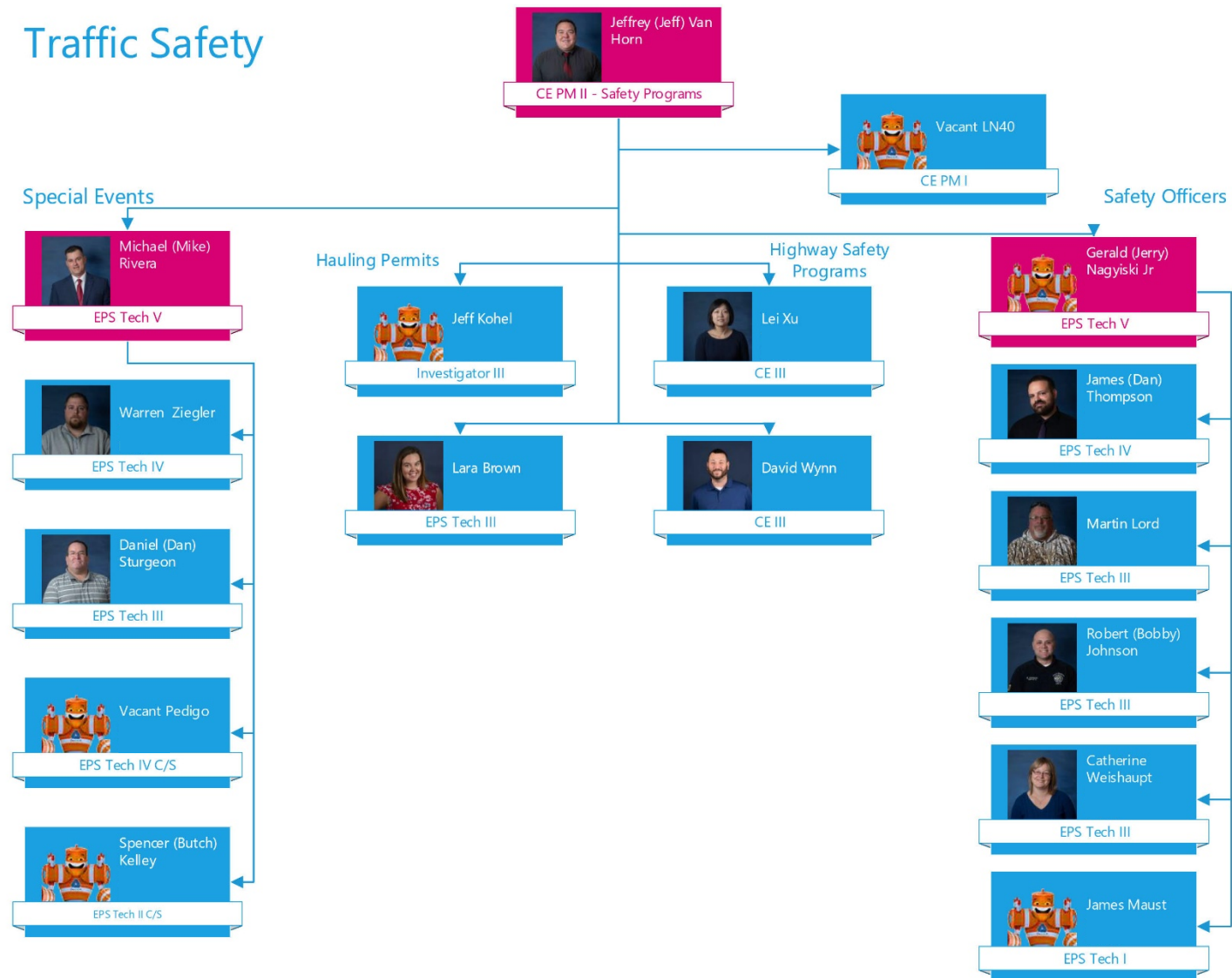
Lower Frequency Higher Frequency XX Number of Work Zone Crashes



Delaware Work Zone Crash Trends

85% of work zone crashes occurred in New Castle County
78% of work zone crashes resulted in Property Damage Only
68% of work zone crashes occurred within the Activity Area of the work zone
62% of work zone crashes occurred May through October during prime construction season
49% of work zone crashes were rear-end crashes
42% of work zone crashes occurred in a work zone with a lane closure
36% of work zone crashes occurred weekdays between 9AM and 3PM
11% of single vehicle crashes involved a vehicle striking work zone/maintenance equipment
9% of vehicles involved in a work zone crash were truck/semi-trailer combinations (tractor-trailers)
1% of people in work zone crashes were fatally or seriously injured

Safety Section Staff & Responsibilities

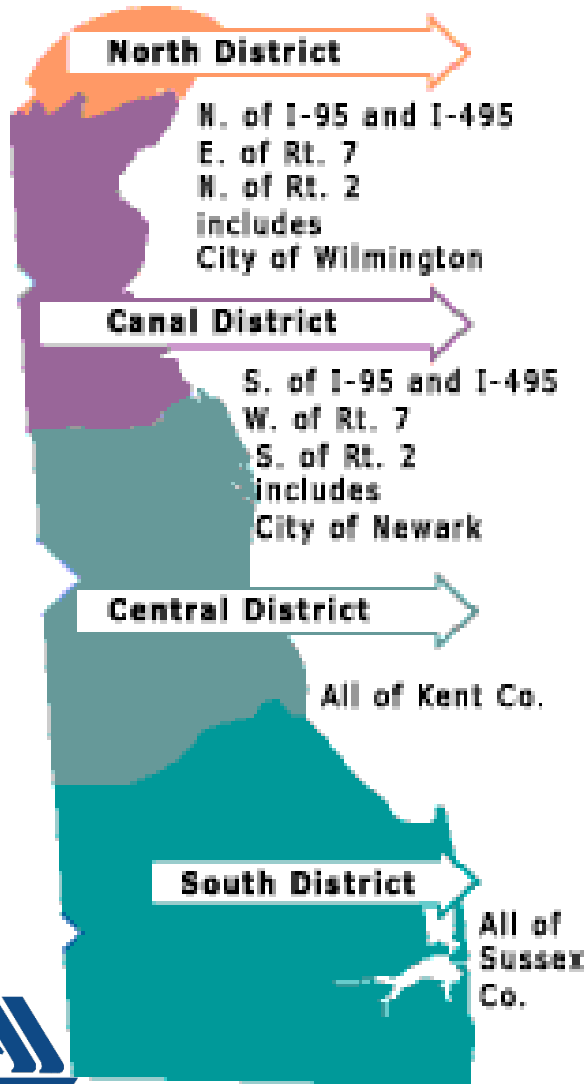


Safety Section Contact Information

District Safety Officers

Engineering Contacts

Statewide Contacts



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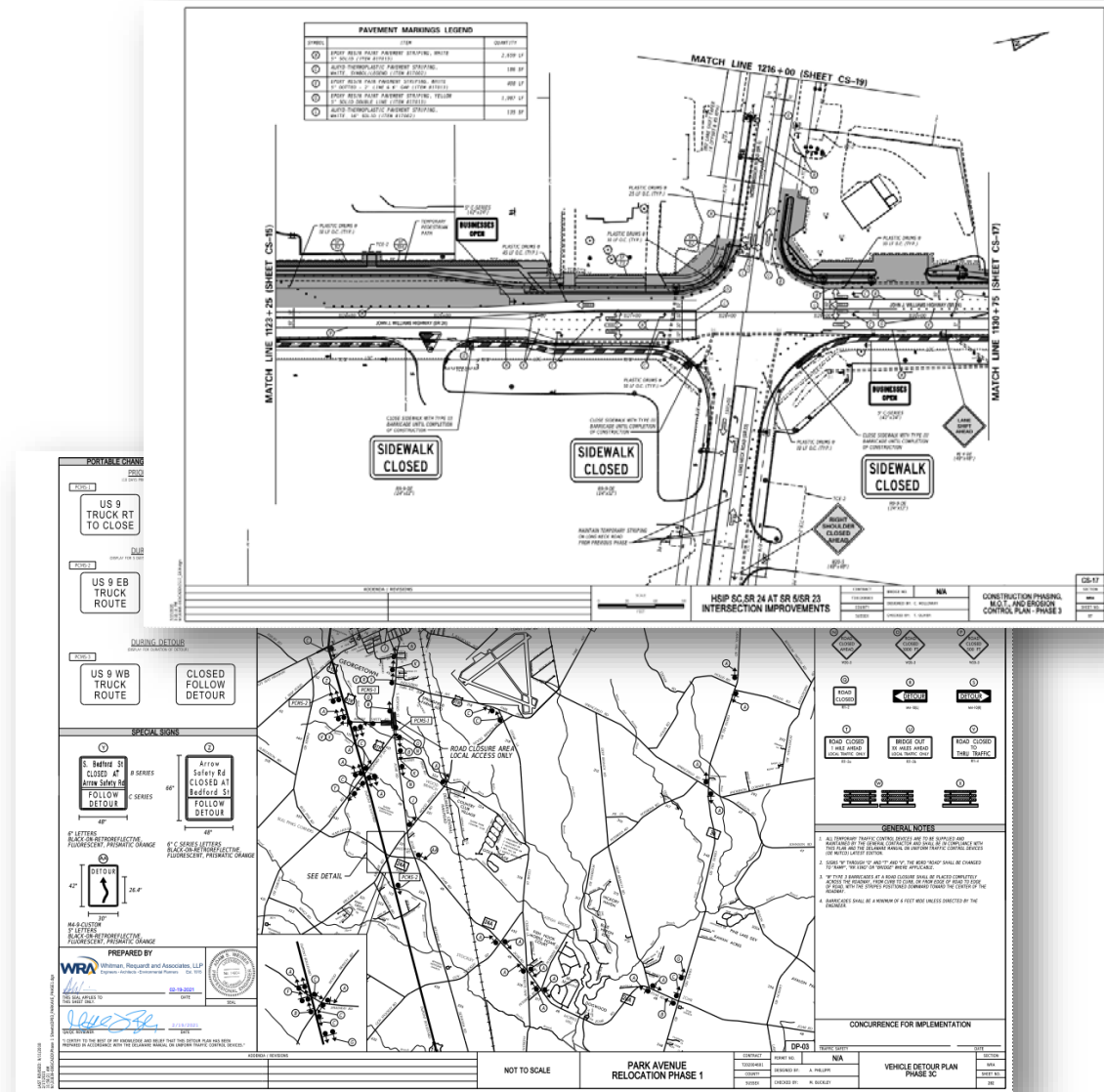
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Statewide Safety Officer
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Design Considerations

- General Items
 - Plan review issues
 - Plan review comments not being addressed
 - Between formal Department-wide reviews
 - During interim reviews when specifically asking for Safety's input
 - Coordination with Safety related to major changes in phasing during design
 - Reach out early and often to minimize back and forth commenting
 - Detour plan submittals
 - Reviewed separately from MOT plans
 - Submit detour plans directly to David Wynn or Lei Xu at semi-final for review
 - Submit detour plans directly to David Wynn or Lei Xu at final for signature
 - In-house projects – submit request to David Wynn or Lei Xu prior to semi-final to prepare detour plans



Design Considerations

- General Items

- Lane closure restrictions

- Provide a lane closure matrix for each roadway impacted
- Lane closure matrix specifies allowable lane closure hours for:
 - Travel lane closures
 - » Flagging operations
 - » Single lane closures
 - » Double + lane closures
 - Turn lane closures
 - Road closures
- Provide separate notes for road closures occurring at a specific time of year, duration, etc.
- Do not include road user costs

WORK HOUR RESTRICTIONS

TABLE A: SEPTEMBER 16 THROUGH APRIL 30

SR 24 (NON-SUMMER) / SR 5 / SR 23 ALLOWABLE CLOSURE HOURS FOR TRAVEL LANES AND TURN LANES AT SIGNALIZED INTERSECTIONS

	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
SUNDAY																								
MONDAY																								
TUESDAY																								
WEDNESDAY																								
THURSDAY																								
FRIDAY																								
SATURDAY																								

ONE THROUGH LANE CLOSED (FLAGGER OPERATIONS), AS NECESSARY
 ALL LANES OPEN

TABLE B: MAY 1 THROUGH SEPTEMBER 15

SR 24 (SUMMER PEAK) ALLOWABLE CLOSURE HOURS FOR TRAVEL LANES AND TURN LANES AT SIGNALIZED INTERSECTIONS

	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
SUNDAY																								
MONDAY																								
TUESDAY																								
WEDNESDAY																								
THURSDAY																								
FRIDAY																								
SATURDAY																								

ONE THROUGH LANE CLOSED (FLAGGER OPERATIONS), AS NECESSARY
 ALL LANES OPEN

195 SB - ALLOWABLE TEMPORARY TRAVEL LANE CLOSURES TIMES

	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
SUNDAY	3	3	3	3	3	3	2	2	2	1	1	1							1	1	1	2	3	3
MONDAY	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1			1	2	2	2	3	3
TUESDAY	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1			1	2	2	2	3	3
WEDNESDAY	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1			1	2	2	2	3	3
THURSDAY	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1			1	2	2	2	3	3
FRIDAY	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1			1	2	2	2	3	3
SATURDAY	3	3	3	3	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3

1 ONE THROUGH LANE AND/OR TURN LANE PERMITTED TO BE CLOSED
 2 TWO THROUGH LANES PERMITTED TO BE CLOSED
 3 THREE THROUGH LANES PERMITTED TO BE CLOSED
 NO TRAVEL OR TURN LANE CLOSURES PERMITTED



Design Considerations

- General Items
 - Transportation Management Plans
 - At preliminary, request TMP determination from Safety
 - Send request to David Wynn or Lei Xu and Jeff Van Horn
 - Submit draft TMP at semi-final
 - Submit final TMP for signature at final, or prior to PS&E
 - Contractor TMP requirements **MUST** be noted in MOT plans or via special provision
 - TMP document typically not included in bid documents
 - Lane Closure Hour Restriction Checklist
 - Required for all projects per Policy Implement C-09
 - Checklist signed prior to PS&E
 - Start coordination early, especially for high profile projects

TRANSPORTATION MANAGEMENT PLAN

PLANTATION ROAD IMPROVEMENTS (T202011201)



PREPARED FOR:



Contract Work Hour Restrictions Checklist

Exhibit 1

PREPARED BY:
Associates, LLP
Birmingham, DE 19805

Project Title	SR1 and SR16 Grade Separated Intersection	
Contract Number	T201800301	
Federal Aid Project Number	ESTP-2014(51)	
Project Schedule		
Anticipated PS&E Date	January 2, 2018	
Anticipated Advertisement Date	April 2, 2018	
Anticipated Start of Construction	October 1, 2018	
Anticipated Construction Duration	130 Days	
Maintenance of Traffic/Safety Considerations		
Maintenance of Traffic Breakout Sheet Needed? (For All-Inclusive MOT Only)	<input type="radio"/> Yes <input type="radio"/> No	
Work hour/lane closure restriction table	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Road closures/detours	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Pedestrian/bicyclist MOT/detours	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Holiday/event/seasonal restrictions	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Traffic Officers Needed? Est. Calendar Days?	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Portable Changeable Message Boards Needed? New traffic pattern notifications	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
ATSSA supervisor requirement	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
TMP monitoring (e.g., signal timing adjustments along detour routes)	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Coordination required with adjacent project(s) work zones	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Property owner/business notifications	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Contractor Performance Requirements		
Disincentive Spec (Damages based on User Cost Delay)	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Incentive Spec (Incentive payment for meeting schedule milestone dates)	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.
Interim Milestone Dates	<input type="radio"/> Yes <input type="radio"/> No	if yes, provide details.



Design Considerations

- General Items
 - Road User Costs
 - REQUIRED for all lane closures and/or detours
 - Lane closures
 - Daily lane closures – RUC calculated for LATE opening (15 min. cost basis)
 - Static lane closures – RUC calculated for LATE opening based on phase duration or other milestone (daily cost basis)
 - Detour RUCs calculated similarly
 - Calculated costs reviewed with designer, Safety, Construction and Contract Administration
 - RUCs noted in General Notices for bidding purposes



FAILURE TO OPEN PROJECT TO UNRESTRICTED ROADWAY TRAFFIC ON TIME

Interim Road User Costs (RUC) for delays in opening lanes on SR 24, will be enforced according to Tables 1 and 2 below. For purposes of this section, "lane" is referred to as a travel lane, turn lane or commercial entrance. If a travel lane, turn lane and/or commercial entrance are closed at the same time during the same daily operation, one RUC will apply to that operation.

Table 1 – SR 24

Time All Lanes Reopened After End of Allowable Lane Closure Hours	Road User Cost
1 st 15 min. period	\$750
2 nd 15 min. period	\$1,500
3 rd 15 min. period	\$2,250
4 th 15 min. period	\$3,000
5 th 15 min. period	\$3,750
6 th 15 min. period	\$4,500
7 th 15 min. period	\$5,250
8 th 15 min. period	\$6,000

After the first two hours beyond the allowable lane closure hour limit, Road User Costs will accrue at \$1,500 per hour, or portion thereof, up to a day total of \$15,000.

DISINCENTIVES FOR CONSTRUCTION PHASES

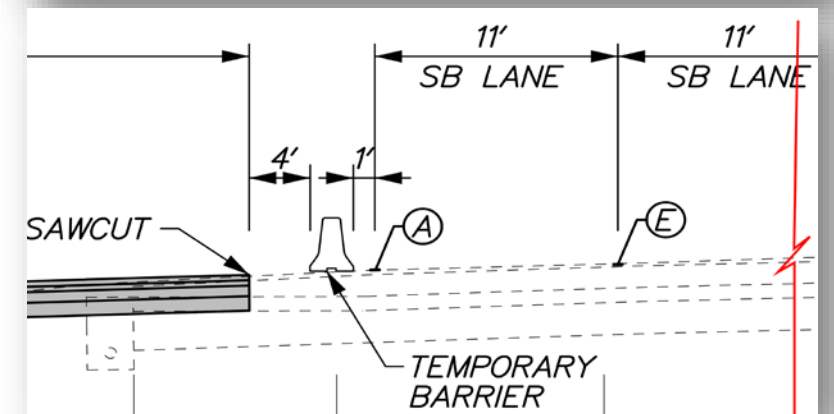
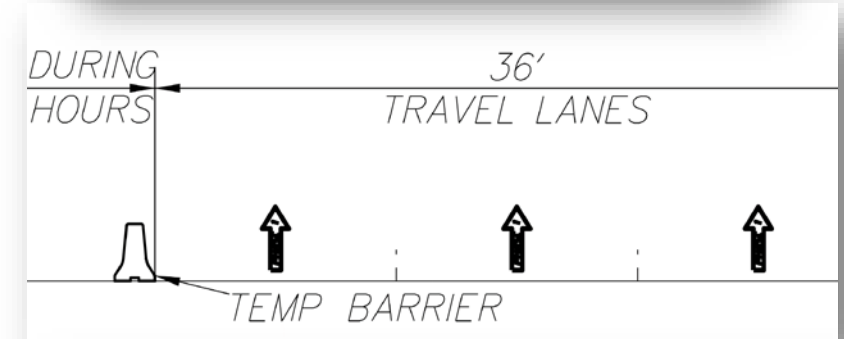
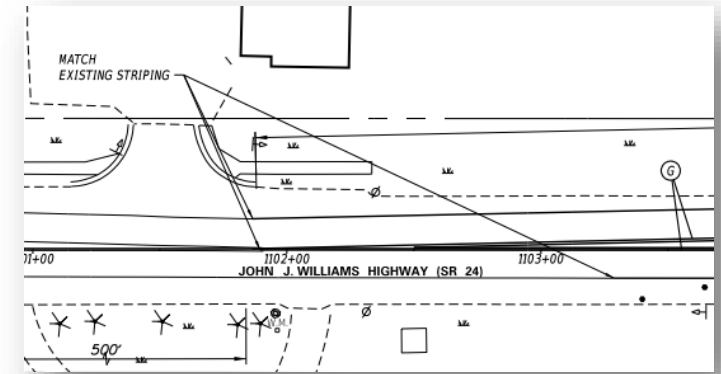
The Maintenance of Traffic (MOT) shown on the plans for Phases 4 and 5 of this Contract will result in significant congestion, delay, and/or operational constraints to the traveling public. Phases 4 and 5 require the simultaneous closure of the right-turn lanes on SR 23 and SR 5 at the SR 24 intersection. These closures will result in significant congestion and delay. Phase 4 has been allotted 27 Calendar Days and Phase 5 has been allotted 22 Calendar Days equaling a total of 49 Calendar Days for both phases. If time extensions for Phase 4 and Phase 5 are approved by the Engineer, the approved additional time will be added to the total of 49 Calendar Days and the Disincentive will be applied if the right-turn lanes remain closed beyond the approved time extensions. **Failure to complete the Phase 4 and Phase 5 work within a total of 49 Calendar Days, plus any approved time extensions applicable to the right-turn lane closures, will result in a Disincentive in the amount of Three Thousand Dollars (\$3,000.00) per Calendar Day for each Calendar Day the right-turn lanes on SR 23 and SR 5 are closed in excess of 49 Calendar Days, plus any approved time extensions applicable to right-turn lane closures.** If the Contractor elects to perform Phase 4 and 5 work concurrently with Phases 2 and 3 as permitted in the Plans, the right-turn lanes on SR 23 and SR 5 may only be closed for a maximum of 49 Calendar Days at which point the Disincentive will be applied. The amount of disincentives shall be deducted from any money due the Contractor, not as a penalty, but as a Liquidated Damage assessed to recover the cost of inconvenience to the public, added cost of engineering and supervision, and the other extra expenditures of public funds caused by the Contractor's failure to complete the Work within an allotted time. Damages in excess of any monies due or retained percentage shall be paid to the Department by the Contractor.

Design Consideration

- Maintenance of Traffic Plans
 - Label all roads, provide stationing, north arrows, etc.
 - MOT Notes
 - Use current pay item numbers within notes, still seeing projects with pay items from 2001 spec
 - Use current approved MOT notes
 - Should not see “TRAFFIC CONTROL MANUAL”, but see “DE MUTCD”
 - If using Traffic Officers, provide traffic officer notes from approved MOT notes document
 - “Permanent” Warning Sign Plan
 - Advance warning signs
 - Begin/End higher fines zone signage
 - Divided highways – double post signs (show two sign symbols to indicate double posting)

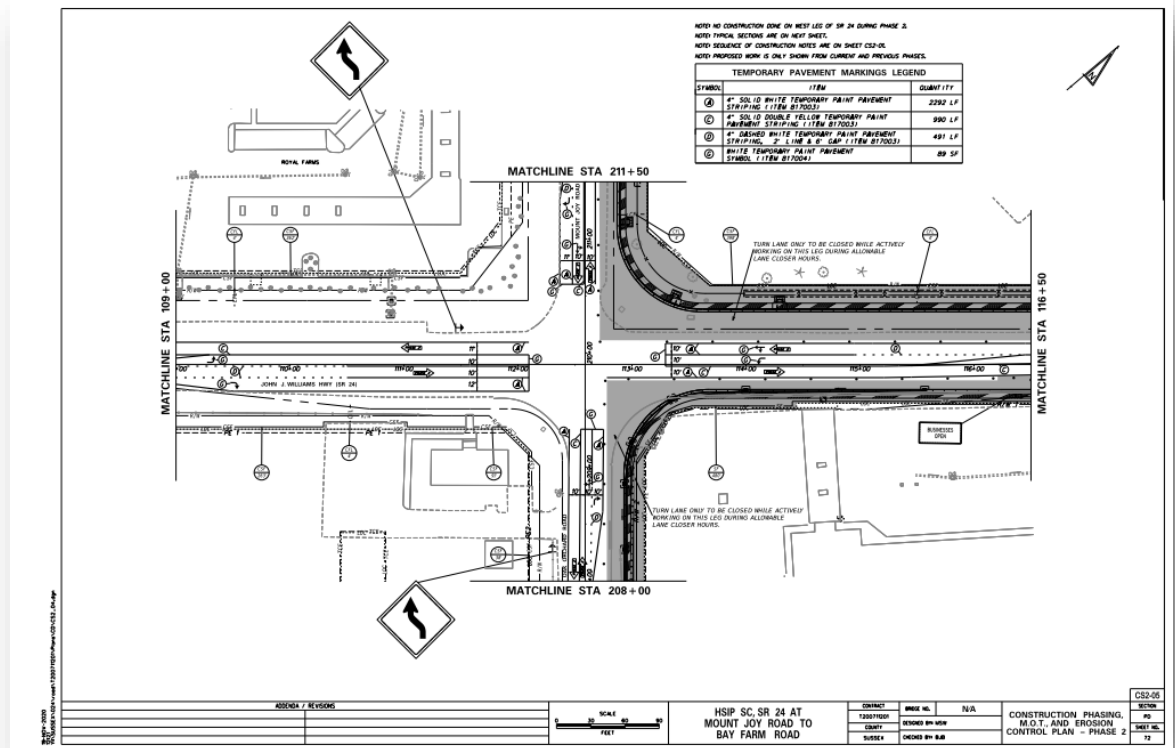
Design Considerations

- MOT/Phasing Plans
 - Pavement markings
 - Depict/callout striping to be placed and removed
 - Show existing striping where temporary ties into existing and label
 - Durations > 30 days, consider “permanent” striping items to minimize repainting and maintenance needs
 - Temporary Barrier
 - Length of Need calculations
 - Pinned vs. unpinned
 - Barrier offsets
 - Typical sections – provide anytime barrier is used
 - TMAs
 - Ensure appropriate quantity based on work operations and anticipated number of crews
 - May need multiple TMAs each day
 - TMAs are required for installing/removing all TTC when a TMA is required by the DE MUTCD



Design Considerations

- Work at intersections
 - Right-turning paths need to be considered when working around channelizing islands
 - Temporary truck detours may be needed
 - Sequence intersection work to minimize MOT
 - Review Intersection TTC memo on DE MUTCD webpage
 - Consider turning restrictions and side street restrictions to reduce conflict points during active intersection work
 - Temporary signal plans and temporary timesheets may be required
- Pedestrian MOT
 - Still required and we're seeing good plan information
 - Sequence work to account for continued use of pedestrian signals at signalized pedestrian crossings



Inspection Consideration

- General Compliance
 - Safety vests – yes, I had to remind everyone!
 - Coordination with adjacent projects / work zones
 - Signing overlaps
 - Avoid overlapping MOT
 - Workers entering unprotected lanes of freeways

Section 6D.03 Worker Safety Considerations

02A (DE Revision) Workers should not enter unprotected travel lanes of interstates, freeways, or expressways during planned activities, including crossing the roadway to access the median or shoulder on the opposite side from the protected work area.

- Quality of TTC Devices
 - Marginal or better based on ATSSA Quality Guidelines Brochure (Section 801 of Std. Spec.)
- Taper lengths
 - Lengths based on Tables 6C-3 and 6C-4 of DE MUTCD



Inspection Considerations

- Work Zone Signage

- Sign Storage

Section 6F.03 Sign Placement

Standard:

19 (DE Revision) When portable signs are no longer in use, the signs and their supports shall be removed or placed behind positive protection.



Inspection Considerations

- Work Zone Signage
 - Sign Placement
 - Use the correct sign
 - Place signs in accordance with DE MUTCD, Section 6F.03, the Plans and appropriate Typical Applications
 - Ensure sign stands are oriented correctly.
 - Hi-Pro sign stands, short side of base is installed towards approaching traffic
 - Make sure signs are visible to motorists
 - Do not block sidewalks with signage
 - Sign Covering
 - Cover entire face of sign when sign is not needed for work operation or for detour
 - Use approved sign cover (see Std. Specification Section 810)



Inspection Considerations

- TMA Usage
 - See DE MUTCD for TMA requirements, Section 6F.86, paragraph 05-08.
 - When required, use for appropriate operations INCLUDING placement and removal of temporary traffic control devices INCLUDING:
 - Setting and removing advance warning signs from the “permanent” warning sign plan
 - Setting and removing daily temporary warning signs for daily MOT setups
 - Setting and removing detour signs
 - Setting and removing cones, drums, barricades, etc. within work zone
 - Work shall not occur from the TMA vehicle
 - See typical applications of DE MUTCD for information on TMA placement for various setups
 - Section 6G.23 for standards and guidance for installing and removing TTC
 - SAFETY is paramount for the workers and traveling public



MASH and Temporary Traffic Control

- 2009 MASH
 - Anticipated manufacturers would develop MASH-compliant devices
 - No sunset requirements of NCHRP 350 devices
 - Safety benefits not realized
- 2016 MASH
 - FHWA/AASHTO Joint Implementation Agreement
 - Sunset dates of NCHRP-350 roadside hardware
 - 12/31/2017: W-beam barriers and cast-in-place concrete barriers
 - 6/30/2018: W-beam terminals
 - 12/31/2018: Cable barriers, cable barrier terminals and crash cushions
 - 12/31/2019: Bridge rails, transitions, all other longitudinal barriers, all other terminals, sign supports and all other breakaway hardware
 - Specific requirements for work zone devices dependent on normal service life



Memorandum

Subject: **INFORMATION:** AASHTO/FHWA
Joint Implementation Agreement for
Manual for Assessing Safety Hardware
(MASH)

Date: JAN -7 2016

From: *Thomas Everett*
Thomas Everett
Director, Office of Program
Administration

In Reply Refer To:
HSST

Michael S. Griffith *Michael S. Griffith*
Director, Office of Safety Technologies

To: Division Administrators
Directors of Field Services
Federal Lands Highway Division Directors

Purpose

The purpose of this memorandum is to share information regarding the American Association of State Highway and Transportation Officials (AASHTO)/FHWA Joint Implementation Agreement for the AASHTO Manual for Assessing Safety Hardware (MASH). Recently, the agreement was successfully balloted by AASHTO's Standing Committee on Highways and approved by FHWA.

Information

On November 12th, 2015, FHWA issued a memorandum (http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/policy_memo/mo111215/) indicating that all modifications to NCHRP 350-tested devices will require testing under MASH in order to receive a Federal-aid eligibility letter from FHWA. In addition, a Federal Register Notice (<https://www.federalregister.gov/articles/2015/11/13/2015-28753/manual-for-assessing-safety-hardware-mash-transition>) was also issued regarding this action. This action provided a significant step forward to the implementation of MASH.

Through the AASHTO/FHWA partnership, the agreement was executed to define actions needed for full implementation of MASH over the course of several years. Per the agreement, the implementation of the forthcoming edition (anticipated Spring 2016) of the AASHTO Manual for Assessing Safety Hardware (MASH) will be as follows:

- The AASHTO Technical Committee on Roadside Safety will continue to be responsible for developing and maintaining the evaluation criteria as adopted by

MASH and Temporary Traffic Control

- Work Zone Devices

- Devices manufactured after December 31, 2019 must have been successfully tested to the 2016 edition of MASH
- Devices manufactured on or before December 31, 2019 and successfully tested to NCHRP Report 350 or the 2009 edition of MASH, may continue to be used throughout their normal service lives
- Includes:
 - Sign stands
 - Barricades
 - Channelizing Devices
 - Portable barrier
 - TMAs
- Delaware specific sunset dates provided on Approved Products Lists for Temporary Traffic Control Devices

Device	Delaware Specific Sunset Date
Temporary Sign Stand	January 1, 2023
Permanent Sign Stand	January 1, 2025
Type III Barricades	January 1, 2025
TMAs	January 1, 2025
Temporary Impact Attenuators/Sand Crash Cushion Arrays	January 1, 2025
Temporary PCC Safety Barrier	January 1, 2025

Approved Products List

- Approved Products Lists for TTC devices developed in 2018
 - Continuously updated with new approved devices as they are submitted by vendors
 - Updates forthcoming to be consistent with 2020 Standard Spec
 - APLs for:
 - Permanent Sign Stands
 - Temporary Sign Stands
 - Type III Barricades
 - Truck/Trailer Mounted Attenuators
 - Temporary Impact Attenuators/Sand Crash Cushion Arrays
 - Temporary PCC Safety Barrier
 - Vendor product submittal process and form currently under development
 - Intent is to eliminate the need for the dreaded “NCHRP 350” packet
 - See Section 801 of 2020 Standard Specs
 - https://delDOT.gov/Business/prodlists/pdfs/APL_TTCDevices.pdf?cache=1614262858608

Delaware Department of Transportation Approved Products List Truck/Trailer Mounted Attenuators						
Product Name	Manufacturer	Test Level	Testing Criteria	Application	Support Vehicle Weight	FHWA Eligibility Code
Vorteq Trailer TMA with Integral Arrowboard	Energy Absorption Systems, Inc.	TL-3	NCHRP 350	Trailer	9,920 lbs. MIN	CC-104A
Alpha 100K TMA @ TL-3		TL-3	NCHRP 350	Truck Mounted	16,090 lbs. MIN	CC-39
TL-3 U-Mad TMA with Sign Board	Barrier Systems	TL-3	NCHRP 350	Truck Mounted	19,000 lbs. MIN 20,000 lbs. MAX	CC-103A
U-MAD Trailer Mounted Attenuator	Impact Absorption	TL-3	NCHRP 350	Trailer	18,850 lbs. MIN 20,830 lbs. MAX	CC-99
Trailer TMA-100	Gregory	TL-3	NCHRP 350	Trailer	19,840 lbs. MIN	CC-90A
TTMA-200	Gregory	TL-3	MASH	Trailer	10,000 lbs. MIN	CC-152
Safe-Stop 180 Trailer TMA	Trinity Highway	TL-3	NCHRP 350	Trailer	19,000 lbs. MIN	CC-78D
Safe-Stop 180 TMA		TL-3	NCHRP 350	Truck Mounted	19,000 lbs. MIN	CC-78A
MPS 350 TMA @ TL-3		TL-3	NCHRP 350	Truck Mounted	15,000 lbs. MIN	CC-34B
SS180M TMA	Trinity Highway	TL-3	MASH	Truck Mounted	13,500 lbs. MIN	CC-159
SMT		TL-3	MASH	Trailer	12,000 lbs. MIN	CC-160
Scorpion Attenuator Trailer	Traffix Devices, Inc.	TL-3	NCHRP 350	Trailer	10,000 lbs. MIN	CC-65B
TMA Scorpion C 10,000 Model C and Model C-90		TL-3	NCHRP 350	Truck Mounted	19,840 lbs. MIN	CC-65
MASH Traffix Scorpion II		TL-3	MASH	Truck Mounted	15,000 lbs. MIN	CC-132
Scorpion II Trailer Attenuator		TL-3	MASH	Trailer	12,000 lbs. MIN	CC-13B
U-MAD 100 K Truck Mounted Attenuator	Albert W. Unrath, Inc.	TL-3	NCHRP 350	Truck Mounted	18,988 lbs. MAX	CC-64
Verdegro BLADE TMA	Verdegro Holding BV	TL-3	MASH	Truck Mounted	16,010 lbs. MIN	CC-136

NOTES:
 1. Truck/Trailer Mounted Attenuators not listed above shall not be used on any DelDOT construction or maintenance contract without prior written approval from the DelDOT Safety Programs Manager, who is responsible for the above Approved Products List (APL).
 2. DelDOT's sunset date for NCHRP 350 tested Truck/Trailer Mounted Attenuators is January 1, 2025. Contracts that are Advertised on or after January 1, 2025 shall be required to have MASH tested Truck/Trailer Mounted Attenuators.



Smart Work Zones

- Smart Work Zones have been deployed on select projects since 2010
 - First “Smart Work Zone” was the I-95 Toll Plaza project with remote programmable message boards controlled by the TMC
 - Queue Detection System used on I-95 with the I-95/SR 141 Ramps G&F Project
 - Remote programmable PCMS used on SR 1 Frederica GSI
 - Smart work zones planned for SR 24
 - Open end, task order based contract to be utilized
 - System provided by and maintained by vendor with minimal Department involvement
 - Devices linked to TMC, website, etc.
 - DeIDOT owned modems in devices
 - Mega Smart Work Zone currently active for I-95 Corridor Rehabilitation
 - Contractor provided message boards with DeIDOT modems
 - Consultant developed logic for messaging plans
 - Use of existing TMC systems to integrate devices and logic into an automatically managed plan, minimal human interaction



I-95 Corridor Rehab. Smart Work Zone

- 2:52 PM, Feb. 23, 2021 – I-95 SB @ US 202 (looking south)

I-95 Corridor Rehab. Smart Work Zone

- 2:53 PM, Feb. 23, 2021 – I-95SB @ Delaware Avenue (looking north towards BRB)

Corridor Details - OpenTMS | exaccqVision Web Client Advance

tmcvideo.deldot.gov/advanced.web#eyJsljowLCJpdGVtcyl6W3sicCl6MCwicyl6IjEILCJpIj0zMTYwNTc2LCJ0IjoiY2FtZXJhbn1dLCJzYiI6MSwibSI6MX0=

Size: + 100 - Quality: + 7 -

exaccqVision

Live Cameras

- NCAM068 - I-495 @ Bellevue Rd
- NCAM075 - I-495 @ US 13 (Exit-1)
- NCAM076 - DE 48 @ DE 141
- NCAM077 - Centerville Road @ Boxwood Rd
- NCAM078 - I-95 @ Marsh Rd
- NCAM080 - I-95 @ Harvey Rd - (Video Loss)
- NCAM087 - DE 141 @ DE 2 / Kirkwood Hwy
- NCAM088 - DE 141 @ DE 100 / Montchanin Rd
- NCAM089 - DE 1 @ US 13 (Blackbird, North of DE 71 / H&H
- NCAM113 - DE 141 @ DE 34
- NCAM117 - I-95 NB @ DE 141
- NCAM118 - I-95 @ I 495 Interchange
- NCAM138 - 9th Street @ Adams Street (N)
- NCAM153 - MLK @ S. Justison Street / DE 48
- NCAM154 - I-95 @ MLK (NB Ramp)
- NCAM161 - US 202 @ Righters Parkway
- NCAM176 - US 40 @ PORTER RD
- NCAM178 - SR 4 and SR 72
- NCAM183 - E MAIN ST (SR 273) @ THE GREEN
- NCAM185 - E Main St and Pomeroy Lane
- NCAM189 - SR 896 @ PORTER ROAD
- NCAM227 - Augustine Cutoff at 18th St
- NCAM218 - Baynard Blvd at 16th St at Washington St
- NCAM219 - Heald St / Christina Ave - (Video Loss)
- NCAM221 - 12th St / Market St - (Video Loss)
- NCAM180 - US-13 / New Sweden Rd
- NCAM200 - DE-48 (Lancaster Ave) / Broom St
- NCAM201 - 2nd St / King St
- NCAM212 - King St / 16th St
- NCAM213 - 11th St / Walnut St
- NCAM214 - 10th St / King St
- NCAM001 - I-95 NB / DE-141 Off Ramp
- NCAM160 - DE-273 / Airport Rd - (Video Loss)
- NCAM167 - DE-52 / N Adams St (I-95)**
- NCAM168 - E 4th St / N Walnut St
- Exaccq-Public-Server-3
- KCAM001 - SR 1 at Milford Neck Rd
- KCAM002 - SR 15 @ NORTH ST

Cameras | Groups | Maps | Views

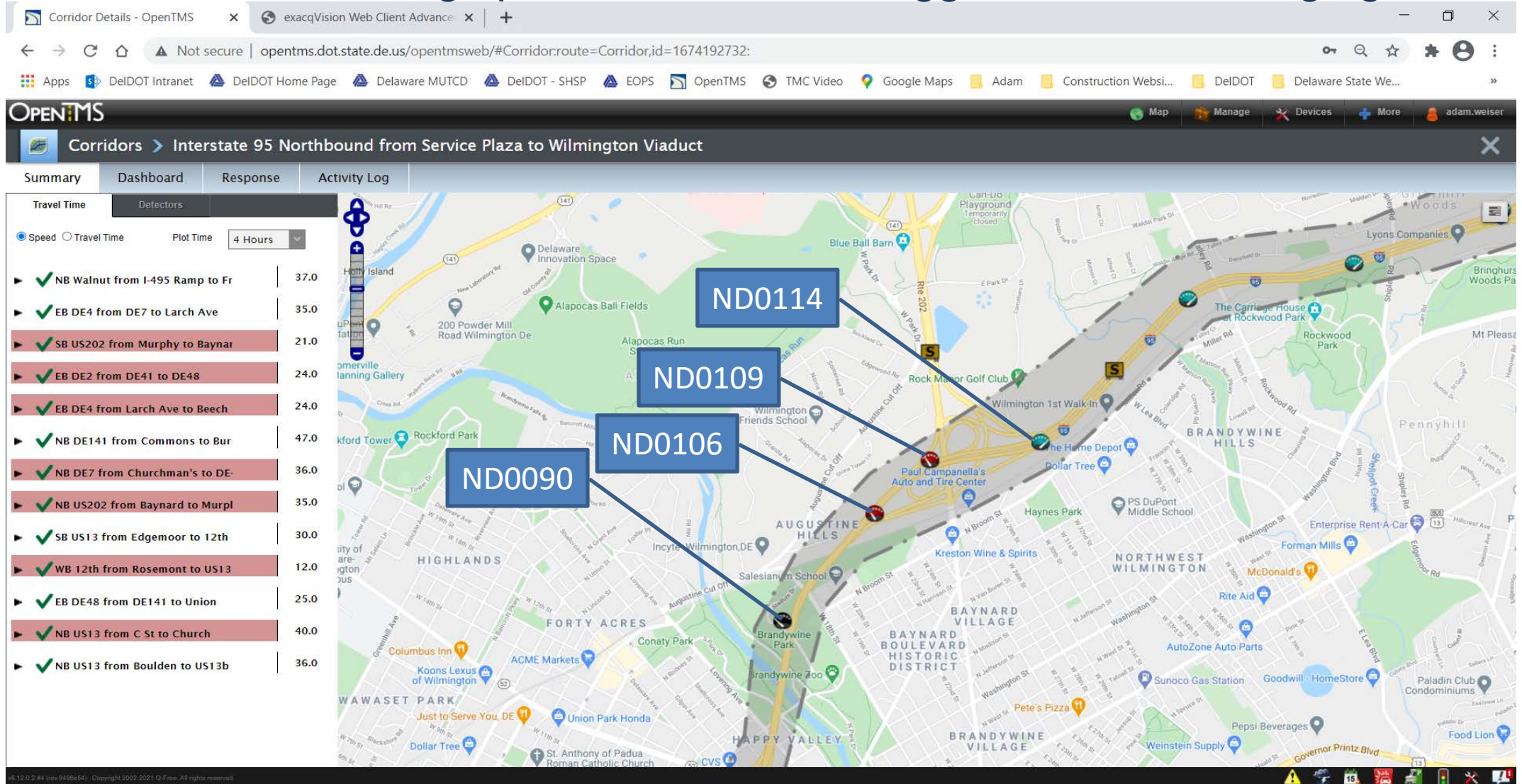
NCAM167 - DE-52 / N Adams St (I-95) 02:53:11 PM (GMT-5:00) 02/23/2021

2.60 fps



I-95 Corridor Rehab. Smart Work Zone

- Fixed detection showing speeds <35 MPH – triggers Tier 1 messaging



I-95 Corridor Rehab. Smart Work Zone

- System Activity Log

Corridor Details - OpenTMS | exacqVision Web Client Advance

Not secure | opentms.dot.state.de.us/opentmsweb/#Corridor:route=Corridor,id=1674192732:Activity%20Log

Apps | DelDOT Intranet | DelDOT Home Page | Delaware MUTCD | DelDOT - SHSP | EOPS | OpenTMS | TMC Video | Google Maps | Adam | Construction Websi... | DelDOT | Delaware State We...

Map | Manage | Devices | More | adam.weiser

Corridors > Interstate 95 Northbound from Service Plaza to Wilmington Viaduct

Summary | Dashboard | Response | Activity Log

Start Time: MM / DD / YYYY | HH : MM | End Time: MM / DD / YYYY | HH : MM | Retrieve

Date/Time	Username	Activity	Event Info
02/23/2021 14:50:09	System	Updating Sign[Fixed NVMS007 - I495 & 12th St (SB)]	TRAFFICTOWILMUSE12TH STEXIT 3
02/23/2021 14:50:09	System	Updating Sign[Fixed NVMS004 - I-95 at DE & PA Line (SB)]	95 SOUTHDELAYSAAHEADUSEI-495 S
02/23/2021 14:50:09	System	Updating Sign[PVMS9514]	TRAFFICTOWILMUSESR 3
02/23/2021 14:50:09	System	Updating Sign[PVMS9511]	95 SOUTHDELAYSAAHEADUSEEXIT 8
02/23/2021 14:50:09	System	Updating Sign[PVMS9513]	TRAFFICTOWILMUSESR 141 S
02/23/2021 14:50:09	System	Updating Sign[PVMS9512]	TRAFFICTOWILMUSEUS 202
02/23/2021 14:45:03	System	Activating Sign[Fixed NVMS004 - I-95 at DE & PA Line (SB)]	95 SOUTHDELAYSAAHEADUSEI-495 S
02/23/2021 14:45:03	System	Activating Sign[Fixed NVMS007 - I495 & 12th St (SB)]	TRAFFICTOWILMUSE12TH STEXIT 3
02/23/2021 14:45:02	System	Activating Sign[PVMS9514]	TRAFFICTOWILMUSESR 3
02/23/2021 14:45:01	System	Activating Sign[PVMS9511]	95 SOUTHDELAYSAAHEADUSEEXIT 8
02/23/2021 14:45:01	System	Activating Sign[PVMS9513]	TRAFFICTOWILMUSESR 141 S
02/23/2021 14:45:01	System	Activating Sign[PVMS9512]	TRAFFICTOWILMUSEUS 202
02/23/2021 07:56:29	System	Updating Sign[PVMS9512]	TRAFFICTOWILMUSEUS 202

1-50 of over 50

ADD ACTIVITY LOG

+ Add Log Entry | Update | Clear | Remove

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I-95 Corridor Rehab. Smart Work Zone

- Activated VMS – Based on Plan Logic

The screenshot shows the 'Signs' page in the OpenTMS system. The table lists various VMS messages with columns for communication status, name, road, direction, mile marker, data received, and priority. To the right of the table, several VMS sign displays are shown, each with a specific message in yellow text on a black background.

Comm	Name	Road	Dir	MM	Data Received	Priority	Sign Message
N	PVMS9503	I-95	N	7.3	02/23/2021 14:47:23		95 SOUTH DELAYS AHEAD
N	PVMS9504	DE 7	N	7.5	02/23/2021 14:53:11		USE EXIT 8
N	PVMS9505	DE 141	N	3.9	02/23/2021 14:47:24		TRAFFIC TO WILM
N	PVMS9506	I-95	N	11.4	02/23/2021 14:47:23		USE US 202
	PVMS9507	Special Event	O	7.4	02/23/2021 14:47:23		TRAFFIC TO WILM
N	PVMS9508	DE 1	N	98	02/23/2021 14:47:23		USE SR 141 S
N	PVMS9509	US 13	N	0.9	02/23/2021 14:47:23		TRAFFIC TO WILM
N	PVMS9510	DE 141	N	5.5	02/23/2021 14:47:23		TRAFFIC TO WILM
S	PVMS9511	I-95	S	17.7	02/23/2021 14:47:28	5	95 SOUTH DELAYS AHEAD
S	PVMS9512	US 202	S	1.4	02/23/2021 14:47:23	5	TRAFFIC TO WILM
S	PVMS9513	US 202	S	2.5	02/23/2021 14:44:47	5	TRAFFIC TO WILM
S	PVMS9514	I-95	S	1.6	02/23/2021 14:47:23	5	95 SOUTH LN CLSD EXIT 8
S	PVMS9515	I-95	S	19.5	02/23/2021 14:47:23	7	TRAFFIC TO WILM
S	PVMS9516	I-495	S	7.1	02/23/2021 14:47:23	7	TO CENTER CITY



Thank you

Questions???

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