West Virginia Turnpike Incident Management EMERGENCY TRAFFIC CONTROL PLAN

Submitted To:

West Virginia Department of Transportation Division of Highways



Submitted By:



HNTB Corporation December 21, 2011

Contents

FIGURE 1 - Overall Turnpike Map	. 1
Overview	4
Introduction	. 1
FIGURE 2 – WV Turnpike Traffic Volumes	. 1
Purpose	. 1
Exclusions	. 2
Evaluation	. 2
Incident Related Event	2
Weather Related Event	3
Procedure	. 4
Traffic Abatement	. 4
Speed Reduction	. 4
FIGURE 3 – Advisory Speed Limits	6
FIGURE 4 – TRAFFIC INCIDENT FLOW CHART	. 7
Traffic Abatement Facilities	. 8
FIGURE 5 SECTION 1 TRAFFIC ABATEMENT FACILITIES FLOW CHART	L1
FIGURE 6 - SECTION 1 ABATEMENT FACILITY MAP	12
FIGURE 7 SECTION 2 TRAFFIC ABATEMENT FACILITIES FLOW CHART	L3
FIGURE 8 - SECTION 2 ABATEMENT FACILITY MAP	L4
FIGURE 9 SECTION 3 TRAFFIC ABATEMENT FACILITIES FLOW CHART	15
FIGURE 10 - SECTION 3 ABATEMENT FACILITY MAP	16



Detour Routes	17
Requirements of Detour Routes	17
Approved Detour Routes	17
DETOUR –A MAP	20
DETOUR –B MAP	21
DETOUR –C MAP	22
DETOUR -D MAP	23
DETOUR –E MAP	24
Recommended Detour Facility Additions and Upgrades	25
Operational Aspects	25
FIGURE-11 Existing Intersection Traffic Signal Disposition	28
Physical Aspects	29
Recommended Revisions to the Turnpike Detour Manual	30
Detour Signage	31
Permanent Detour Signs	31
Dynamic Message Signs	33
Operation	33
Resources	33
Training	34
Roles of Parkways Personnel	34
Section Foreman	34
State Trooper Supervisor	35
Maintenance Crew	35
Turnpike Control Center (TCC)	35
Legislation	35



Example Legislation	36
Contacts	36



List of Abbreviations

MP	Mile Post
PCMS	Portable Changeable Message Sign
SOP	Standard Operating Procedure
DMS	Dynamic Message Signs
TAZ	Traffic Abatement Zone
TCC	Turnpike Control Center
TMC	DOH Transportation Management Center
TPK	WV Turnpike
WV	West Virginia
WVDOH	West Virginia Division of Highways
AUTHORITY	West Virginia Parkways Authority



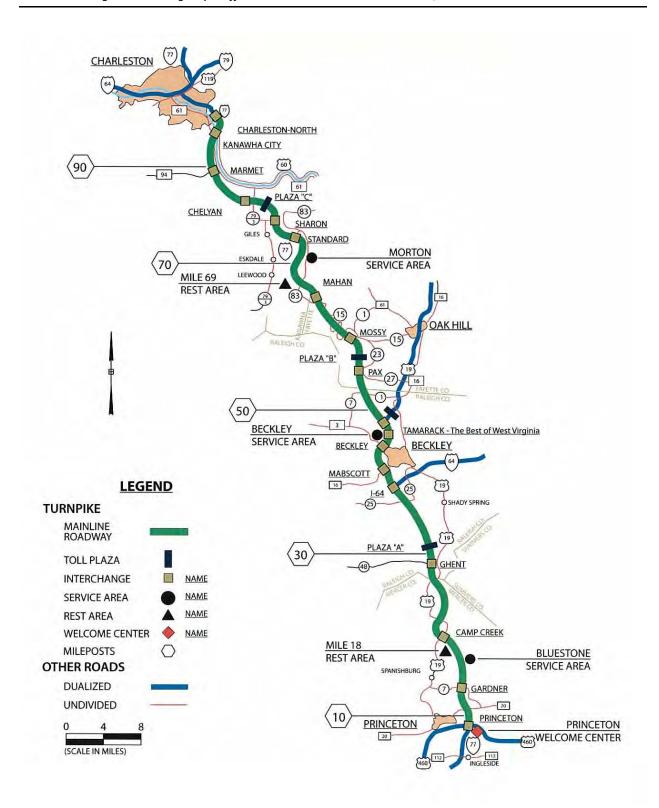


FIGURE 1 - Overall Turnpike Map



Overview

Introduction

The West Virginia Turnpike is an 88-mile section of controlled access interstate highway that serves as the main route between Charleston and Princeton. The Turnpike is a high traffic volume route (**See Figure 2**) which traverses mountainous terrain that is often rural and inaccessible by alternate routes. These conditions present unique challenges regarding the need for temporary detours both in the event of an accident or when inclement weather renders the road impassible.

AVERAGE DAILY TRAFFIC (ADT)			
STATS LISTED SOUTH TO NORTH			
MILE MARKER	LOCATION	ADT	
9-28	Princeton to Ghent	32,000	
28-40	Ghent to I-64	31,000	
40-42	I-64 to Mabscott	45,000	
42-44	Mabscott to Harper Rd	44,500	
44-48	Harper Rd to N. Beckley	44,000	
48-60	N. Beckley to Mossy	30,000	
60-74	Mossy to Standard	33,000	
74-78	Standard to Sharon	32,000	
78-85	Sharon to Chelyan	35,300	
85-90	Chelyan to Marmet	41,000	
90-95	Marmet to Kanawha City	49,400	
95-96	Kanawha City to Belle	56,800	

FIGURE 2 - WV Turnpike Traffic Volumes

Purpose

The purpose of this report is to establish a protocol and procedure to maintain traffic movements in the event of an incident or severe weather, as well as to identify acceptable detour routes and traffic control measures. This report also outlines duties of individuals and agencies during an event and examines Chapter 17 of the current WV code titled <u>Traffic Regulations and Laws of the Road</u>, for the purpose of identifying recommended topics of future legislation.



Exclusions

Guidance on the display of specific Dynamic Message Sign (DMS) text is excluded from this report; however, it is recommended that the Turnpike Control Center (TCC) establish standardized Turnpike detour and traffic delay messages for review and approval by the West Virginia Division of Highways Traffic Engineering Division.

Evaluation

While most accidents are handled within the first hour, occasionally a situation develops which requires all lanes in one, or both, directions to be closed for an extended period of time. These extended closures warrant the use of detours to maintain traffic movement. On rare occasions, traffic caught behind the incident will be directed to a traffic abatement facility (See page 8) where vehicles will make U-turns and proceed to an alternate route (See Figures 5 through 10 and Detour Maps A-E). Ideally, if an incident causes traffic to be stopped for more than two (2) hours in a given direction, the determination will be made whether or not to utilize the abatement facilities to route motorists to the nearest approved detour. The procedure for evaluating an incident with regard to maintaining traffic movement and utilizing the abatement facilities is outlined below.

Incident Related Event

The first person to arrive at the scene of an incident will most likely be a state trooper or Parkways courtesy patrol personnel. The responder will notify TCC which will then notify the proper authorities of the incident. The TCC is integrated with the Traffic Management Center (TMC), so the TMC will be notified immediately of incident. Upon their arrival, the Turnpike Foreman and State Trooper Supervisor (Sergeant or higher) will assess the incident and make an initial determination of the severity of the incident and determine if all lanes in one direction will need to be closed and for what duration. If the duration of closure is estimated at less than 2 hours, traffic abatement will not be implemented. If a full directional closure of more than 2 hours is anticipated, the TCC and TMC are notified of the expected duration of closure. At this point the TCC is also notified to begin the Turnpike employee callout procedure. Figure 4 (Page 7) shows work flow from the first on the scene to the reopening of all lanes.

If the Foreman and State Trooper Supervisor change their decision to use a traffic abatement facility, and determine the additional time required to open at least one lane does not warrant traffic abatement, they will make the decision to hold traffic in the obstructed lanes until the incident is cleared. If the determination to not abate traffic is made at this point, the called out Turnpike workers will be allowed to return home.



Weather Related Event

Snow and ice storms that occur during winter months require a formal evaluation process in order for proper precautionary measures to take place. During such winter months, the Authority's Director of Operations, the Director of Maintenance and Staff, and the TMC participate in a weekly conference call with National Weather Service and Department of Homeland Security. In addition to the weekly phone discussions, calls are initiated on an as-needed basis prior to anticipated major storms.

The information gleaned from these regular conversations is used to provide proper direction to Authority maintenance personnel. During a routine expected snow event, the maintenance employees are split into both day and night crews so that staff is available around the clock to maintain the roadways and provide assistance with clearing of accidents. The split-shift schedule is maintained as needed to mitigate refreezing of ice and/or snow on the roadways.

In the event that six inches or more of snow are predicted for a 12 hour period, the Authority enacts an "enhanced" maintenance team. In addition to the usual team, management level personnel will staff a command post in Beckley, WV to assist in directing maintenance crews to those areas experiencing the greatest need. Another element of the "enhanced" approach is the staging of wrecker service vehicles at strategic placements along the Turnpike in an attempt to reduce response time and associated motorist delay. There is a written agreement in place between the Authority and the primary and secondary wrecker services as outlined in the "West Virginia Parkways Authority Wrecker and Towing Services Standard Operating Procedure". The final element of the "enhanced" maintenance team is the deployment of Turnpike maintenance personnel in pick-up trucks during the actual weather event to provide accident reconnaissance and to assist in retrieval of vehicles that have left the roadway due to adverse conditions.

With time being of the essence in reducing motorists' delay during a weather event, the use of technology is crucial to efficient operation of the planning and response teams. As such, the Authority actively uses Twitter to disseminate up-to-date road condition and accident information to patrons. Another use of technology to manage activities in response to an unanticipated weather event is the use of the "One Call" programmable system that provides an automated contact and solicits a response from Authority maintenance team members. Similarly, the Authority has adopted an interoperable radio communication system that possesses statewide coverage and is capable of inter-agency communication. This system is vital to the efficient sharing of accident response requests and to the timely notification of local authorities of weather related trouble spots or road closures and delays.

The Authority incorporates several items of its Intelligent Transportation System (ITS) to aid in managing weather related events as well. Closed-circuit cameras mounted in proximity to the toll barriers are used to monitor traffic and roadway conditions. In the event that a slowdown or inclement conditions are observed, information, such as recommended speed reduction, is disseminated to motorists through the Dynamic Message Signs (DMS) which are controlled via the Turnpike Control Center at the Turnpike headquarters. This system allows for real-time observation, dissemination of current direction and guidance, and is confirmable via a CAD system. The CAD system allows any involved agency, such as the



WV State Office of Emergency Services, or county or metro 911 centers, to view what is being displayed on a given DMS at any time. The systematic use of these ITS components allow the Authority to move patrons through the Turnpike corridor during periods of inclement weather as safely and efficiently as possible.

Procedure

Traffic Abatement

If the Foreman and State Police Supervisor determine that traffic abatement is required, the Foreman will contact the TCC to provide an update and inform the center of the decision to use the traffic abatement facilities. The TCC will then relay the information to the designated parties (**See Figure 4**, **Page 7**) and post a message to the DMS indicating a road closure. The TCC will also relay the information to the TMC which will post information to DMS signs prior to the Turnpike with estimated closure durations.

The Foreman will then instruct the maintenance employees to begin setting traffic control at exit interchanges and at cross-over and/or the removable concrete median barrier gate nearest the incident if required. Once traffic control devices are in place and traffic is turning at the exit interchanges prior to the incident, the facilities (i.e. barrier gates or median cross-overs) may be utilized (See pages 8 and 9 for explanation of traffic abatement facilities). Maintenance employees will intermittently stop traffic in the opposing direction to allow vehicles that have been waiting behind the incident to make U-turns through the facilities and proceed in the opposite direction. To prevent excessive back-up in the opposing direction, traffic shall be stopped for no more than 30 minutes at a time. Traffic in the opposing direction shall be allowed to proceed long enough to return to free-flow between stoppages. The TCC is to be periodically updated on the situation until it has been fully resolved.

Once the stopped traffic has been cleared, the emergency agencies and maintenance crews will continue to work to resolve the incident while detour routing is still in place. After all obstructions have been removed and traffic can proceed safely through the incident site, traffic control will be removed from the abatement facilities, and the lanes will be re-opened to traffic. The Foreman will then notify TCC that the incident has been cleared and the TCC will relay the information to the designated parties, including the TMC, and the detour messages will be removed from the DMS.

Speed Reduction

In order to reduce the secondary effects of traffic incidents and emergencies, such as additional accidents, and to protect emergency responders, proper control of traffic through the incident management area must be established. An essential part of effective incident response and traffic management is the establishment of reduced speeds of motorists within the incident area. Initiation of a speed reduction advisory on any portion of the Turnpike will be directed by the Section Foreman, State Trooper Supervisor, and the TCC. Speed reductions may become feasible due to several conditions including the following:



- Traffic Incident Not Requiring Traffic Abatement For minor or intermediate incidents or emergencies not requiring traffic abatement, recommended speed reductions may be implemented through use of the existing DMSs and by displaying reduced speed requirements on Portable Changeable Message Signs (PCMS) as needed.
- Traffic Incident Requiring Traffic Abatement For major incidents or emergencies requiring traffic abatement efforts, speed reduction guidance should be limited to PCMS displays.
 The DMS displays should be reserved for abatement messages such as detour route or travel delay information.
- Reduced visibility During periods of fog and heavy precipitation, overhead DMS can be utilized to alert drivers of upcoming conditions as well as advise a speed that is 10 mph lower than the posted speed limit. In the event of fog or heavy precipitation at night, the advisory speed should be 15 mph below the posted speed limit.
- Hazardous Road Conditions When inclement weather results in adverse road conditions, such as snow or ice covering, speed reduction advisories may be implemented. Appropriate speed messages may be displayed on DMS, but only when coordinated with the weather advisory information. If travel conditions on isolated sections of the roadway warrant speed reductions, then PCMS may be installed to relay the relevant speed message. Care must be taken to locate PCMS installations such that they do not interfere with plowing or surface treatment operations. PCMS may be placed prior to any weather event expected to result in hazardous road conditions and at locations that are historically most effected by weather systems.

Speed reduction advisories should only be implemented prior to areas of adverse conditions or when restrictive features are present. However, frequent changes in speed limit should be avoided. The Section Foreman and State Police Supervisor should coordinate with adjacent sections to ensure that consistent speed reduction implementations are made throughout the corridor. See **Figure 3 on Page 6** for advisory speed limit guidelines.



CONDITION	SCENARIO	POSTED ADVISORY SPEED
1	DECREASED VISIBILITY (DUE TO FOG OR HEAVY PRECIPITATION)	-10 MPH (FROM POSTED SPEED LIMIT)
2	TRAFFIC SLOWED DUE TO INCIDENT	50 MPH *
3	TRAFFIC STOPPED DUE TO INCIDENT	45 MPH *
4	NIGHT (WHEN IN CONJUNCTION WITH CONDITIONS 1,2, OR 3)	-5 MPH (ADDITIONAL REDUCTION)
5	WEATHER RELATED HAZARDOUS ROAD CONDITIONS	AS DETERMINED BY THE STATE TROOPERS AND THE TCC 35 MPH MINIMUM

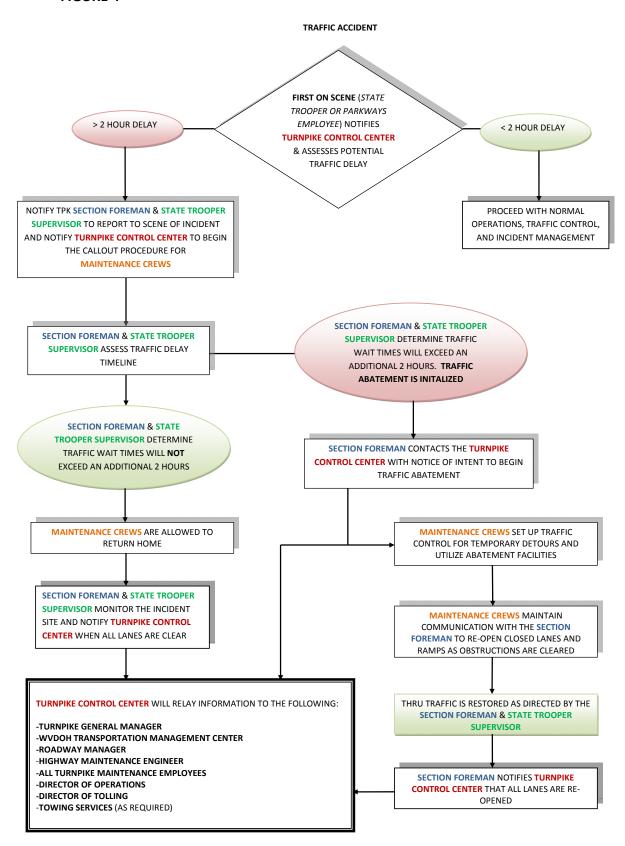
^{*} Approach Traffic

FIGURE 3 - Advisory Speed Guidelines



TRAFFIC INCIDENT FLOW CHART

FIGURE 4



Traffic Abatement Facilities

A. Removable Concrete Median Barrier Gates

Median barrier gates are used in sections of roadway that have concrete barriers intended to provide protection to vehicles traveling in opposing directions. The removable concrete median barrier gates consist of a steel guardrail system set in to an opening in the median barrier and provide the same protection to motorists as



Typical Removable Concrete Median Barrier Gate

the concrete median barrier. However, in the event that an incident blocks traffic in one or both directions, the median barrier gate can be temporarily moved, creating an opening in the median barrier and allowing traffic to make a U-turn through the opening. The pavement has also been widened adjacent to the median barrier gates to facilitate truck U-turn movements. After the U-turn is made, traffic can then continue in the opposite direction, following detours to an alternate route.

The removable concrete median barrier gates can only be opened by authorized Parkways Personnel, and only after adequate detours are in place. Flaggers will need to be present, and traffic control devices such as cones or barrels must be set up prior to the gates being opened. Traffic traveling in the opposing direction of the stopped traffic will need to be held by a flagger periodically to allow for U-turn movements of the stopped vehicles.

B. Exit Interchanges



Typical Exit Interchange

Most existing Turnpike exits can be utilized in a similar manner as the removable concrete median barrier gates during a traffic incident, allowing traffic to turn and proceed in the opposite direction. The motorists traveling in the direction of the incident would be directed off at the nearest exit ramp and directed to the entrance ramp for travel in the opposite direction. Traffic control devices are required to channel vehicles off the exit ramp and back on the Turnpike traveling in the opposite direction.

Using existing exits as a means to turn traffic is preferred over



removable concrete median barrier gates because it requires a smaller crew to establish the turnaround and traffic moving in the opposite direction does not need to be stopped. All exits except exit # 42 and # 85 can be used for turning traffic.

C. Emergency Cross-Overs

Emergency cross-overs, which are generally used by law enforcement and emergency vehicles, can be utilized similar to removable concrete median barrier gates to allow motorists to make U-turns and proceed in the opposite direction to the nearest approved detour. The cross-overs, however, are longer and allow for a more gradual and consequently more comfortable 180 degree turn. Also, the cross-overs require only one lane in the opposing direction be closed while it is being used to clear traffic caught behind the



Typical median cross-over

incident. The maintenance employees will channel opposing traffic away from the left most lane (the lane adjacent to the cross over). This lane will serve as an acceleration lane for turning traffic. Emergency cross-overs listed in this report are those which are paved and are capable of accommodating truck turning movements.

D. Toll Barriers

Toll barrier plazas A (Ghent), B (Pax), and C (Chelyan), at MP 30, 56, and 83 respectively are widened areas of the Turnpike with staffed toll booths on each lane. These areas are also suitable for turning traffic in the event of a road closure in a method similar to removable concrete median barrier gates. Maintenance crews will establish a turning movement prior to the toll barrier by placing cones in a 180 degree arc that provides a radius sufficient for large

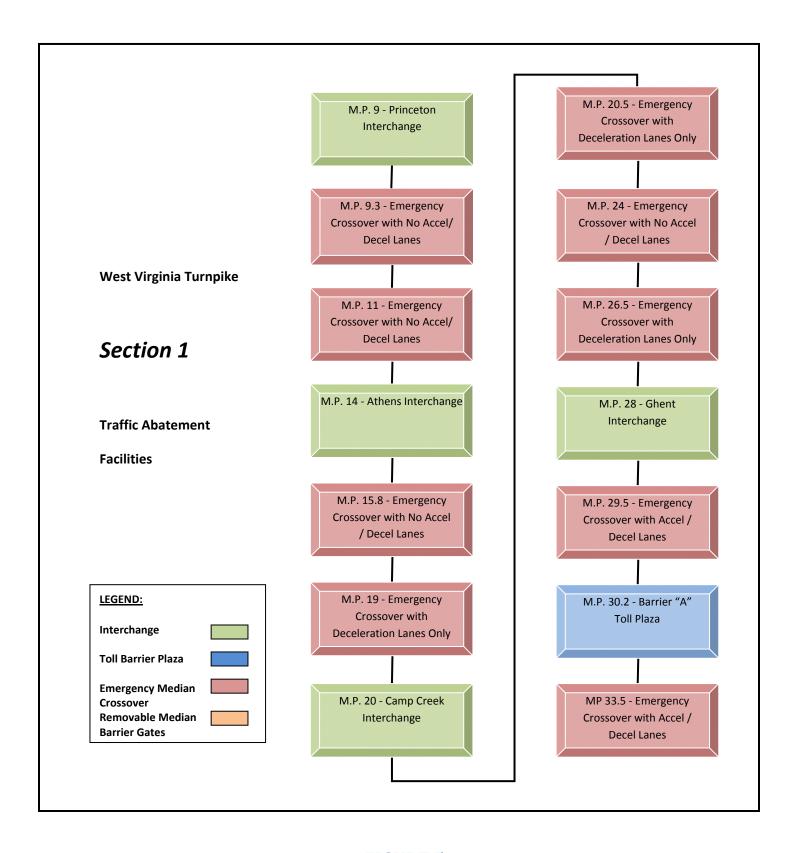


trucks to turn. The cones will direct the turning traffic to the left most lane in the opposite

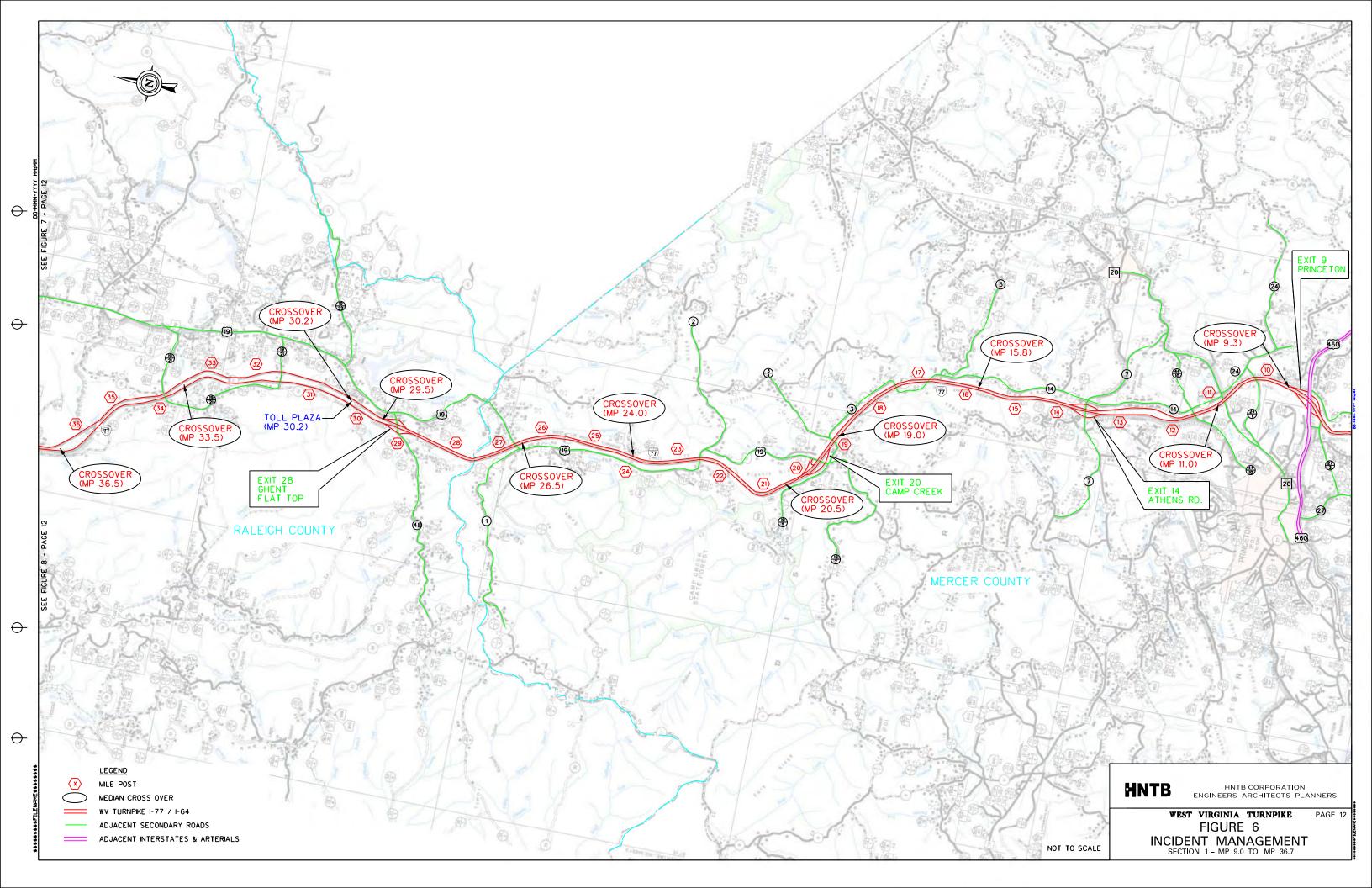


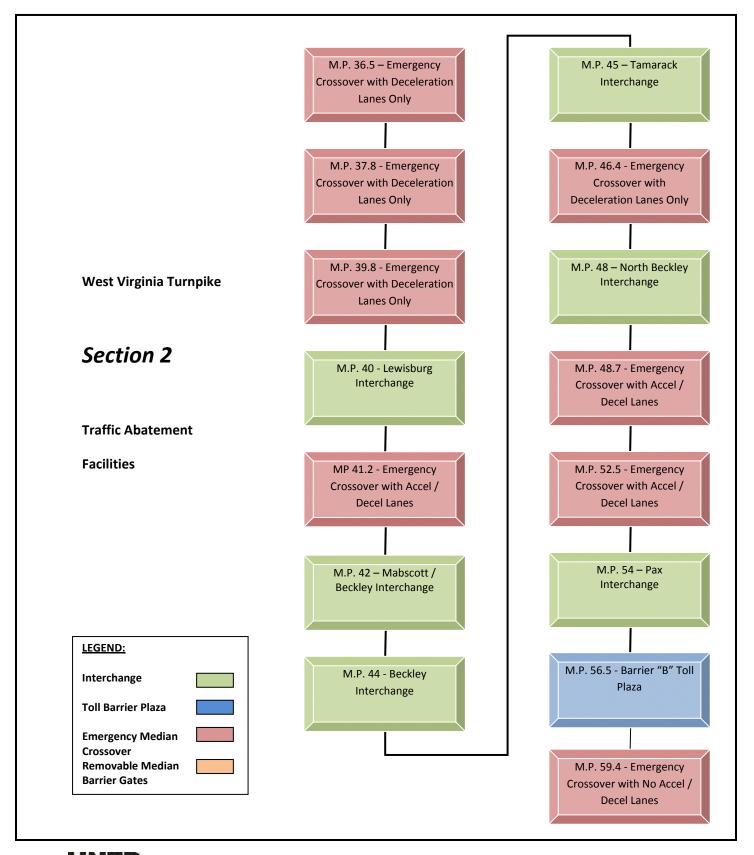
direction. From here motorists will be directed to proceed to the nearest approved detour. In the event of a closure in the area of a toll plaza, traffic will be turned at exit interchanges prior to or immediately after the toll barrier, as well as at the barrier itself.



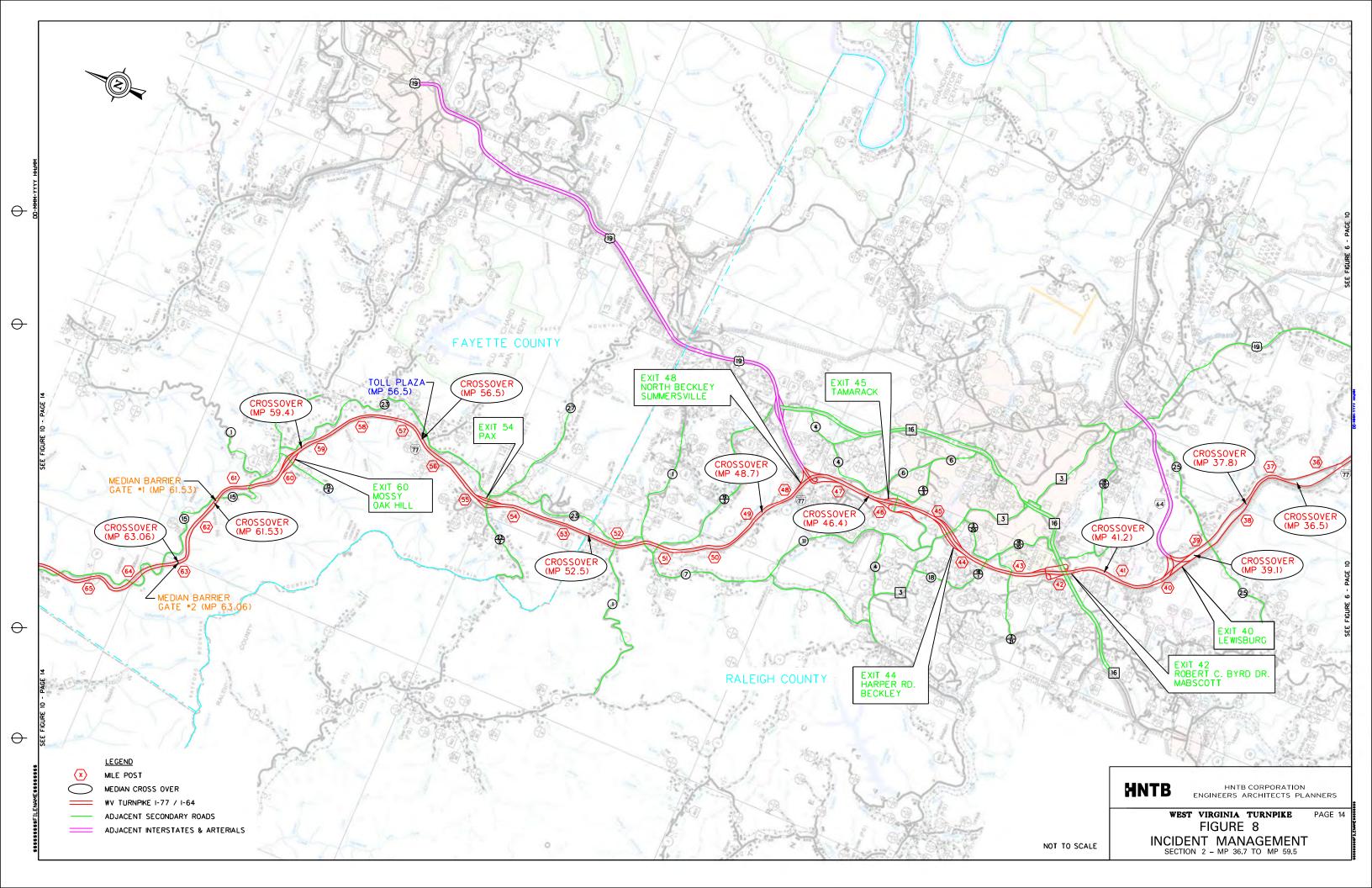


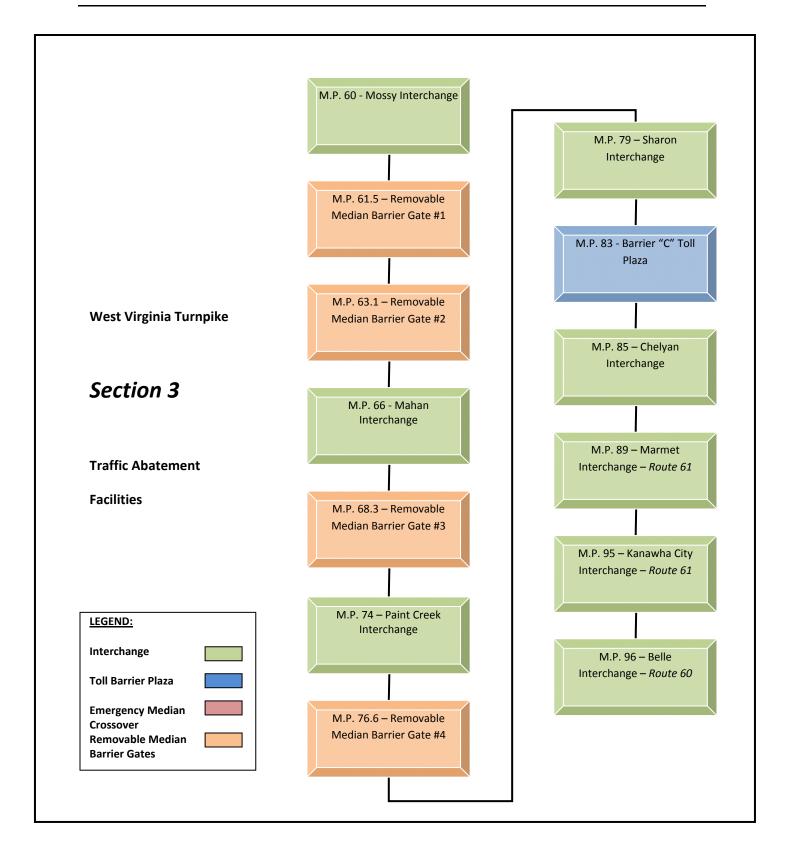




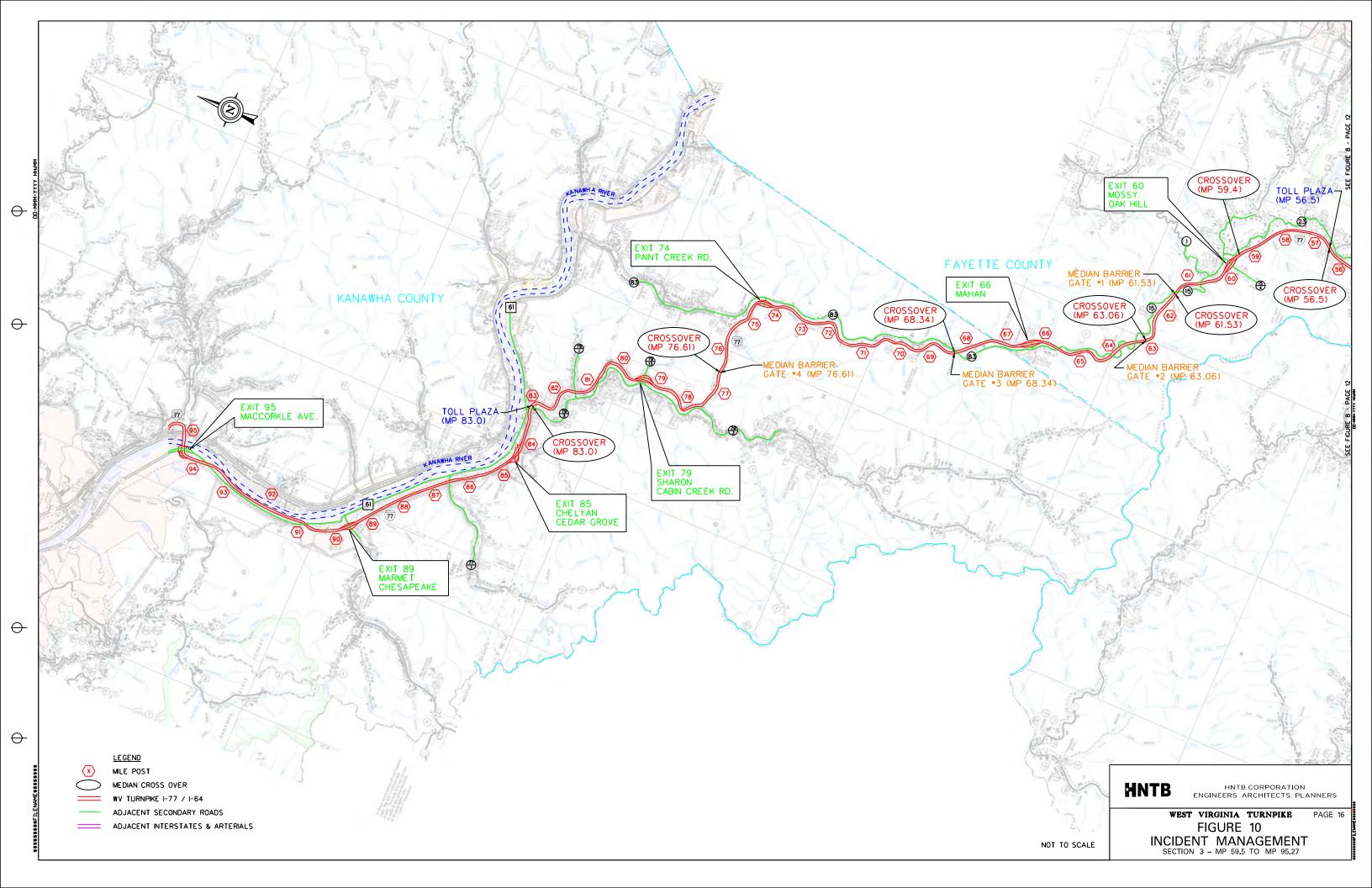












Detour Routes

Requirements of Detour Routes

The criteria for emergency detour routes for Turnpike traffic is based on the West Virginia Department of Transportation's Manual on Temporary Traffic Control for Streets and Highways, as well as common engineering practice. The detour routes shall redirect traffic around the incident and continue to provide an alternate route until motorists are returned to the original highway. For the routes to be considered, the roadways must be paved and have lane widths of 11' or greater. The Turnpike has large volumes of truck traffic and detour routes must be able to accommodate tractor trailers. The vertical clearance requirement for trucks on the Turnpike is 14' 6"; therefore, detours must meet this requirement as well, or be signed such that the available vertical clearance is easily identified prior to vehicles committing to the detour. Detour routes are required to have curves that will allow passage of 73.5' long tractor trailer combinations and grades not exceeding 8%.

Desirable characteristics of a Turnpike emergency detour include paved shoulders, food and lodging facilities and fueling/service stations. Many alternate routes have been considered, but most do not fulfill the requirements for an interstate detour route.

Approved Detour Routes

Detour A (I-77 Exit 59 to Exit 48)

If **I-77** southbound is closed between exits 85 and 48, traffic will need to be notified of the closure and if required, detoured at Charleston onto **I-79** traveling northbound. Detoured drivers will proceed north on **I-79** to exit 57 and will then be directed to **US-19** where they will travel south to Beckley. From there, drivers can take the exit 48 entrance ramp to **I-77** and proceed south.

Motorists traveling east on **I-64** will take exit 59 onto **I-77** north and will be directed onto **I-79** north at exit 104 (I-77) interchange. From here, they will proceed with the detour outlined above.

If the northbound lanes of **I-77** are closed between exits 85 and 44, drivers will be directed to take exit 48 and continue north on **US-19** to the exit 57, **I-77/US-19** interchange. From there, drivers will proceed south on **I-79** to the exit 104 interchange. Drivers will then have the option to proceed north or south on **I-77**.

Detour B (I-77 Exit 96 to Exit 85)

US-60 will serve as the detour route to bypass the I-77 between Marmet and Chelyan. In the case of a south bound incident, motorists will be detoured off **I-77** at exit 96 and proceed on **US-60** to Chelyan. Drivers will then be directed across the Chelyan Bridge and onto the **I-77** entrance ramp at exit 85 (if the incident is in the northbound lanes, drivers will follow the reverse of the route).



Detour B *Alternate* (I-77 Exit 95 to Exit 85)

In the event that **US-60** becomes obstructed, or is impassible, Detour B *Alternate* may be established along **WV-61** between Kanawha City and Chelyan. In the event of a closure in the southbound lanes between exit 95 and exit 89, southbound drivers will take exit 95 and proceed south on **WV-61** to the exit 89 entrance ramp at Marmet. If the closure is in the southbound lanes between exit 89 and 85, southbound drivers will be directed to the mile post 89 exit ramp and will proceed south on **WV-61** to the exit 85 interchange at Chelyan. From here motorists will proceed south on **I-77**. If required, motorists may remain on **WV-61** southbound from the exit 95 interchange to the exit 85 interchange. (If the incident is in the northbound lanes, drivers will follow the reverse of the route).

Detour C (I-77 Exit 48 to Exit 40)

In the event of a road closure between exits 48 and 40, traffic will be detoured to **US-19** and **I-64** to bypass the closure. For a southbound closure, **I-77** motorists will be directed to take the North Beckley Exit, and proceed north on **US-19** to the intersection with **WV-16/US-19**. Traffic will proceed south on **US-19**, which is named Robert C Byrd Drive but changes to Eisenhower Drive, to the interchange with **I-64**. Motorists will then be directed to proceed west on **I-64** until they are reconnected with **I-77**. (If the incident is in the northbound lanes, drivers will follow the reverse of the route).

Detour D (I-77 Exit 40 to Exit 28)

In the event of a road closure between exits 40 and 28, traffic will be detoured along **US-19** and **I-64** to bypass the closure. For a southbound closure, **I-77** motorists will be directed to take Exit 40 which is the **I-64** eastbound exit. Drivers will proceed east on **I-64** to exit 125A and then proceed south on **WV-307** named Airport Road to the intersection with **US-19**. Drivers will then follow **US-19** south to the **I-77** intersection at Ghent. (If the incident is in the northbound lanes, drivers will follow the reverse of the route).

Detour D *Alternate* (I-77 Exit 40 to Exit 28)

The following may be used as an alternate to Detour D. It may be utilized for local traffic, passenger vehicle traffic, or in the event that both directions of I-77 are closed between exits 40 and 28, it may serve as the directional detour for I-77 southbound, while detoured I-77 northbound utilizes the Airport Road route.

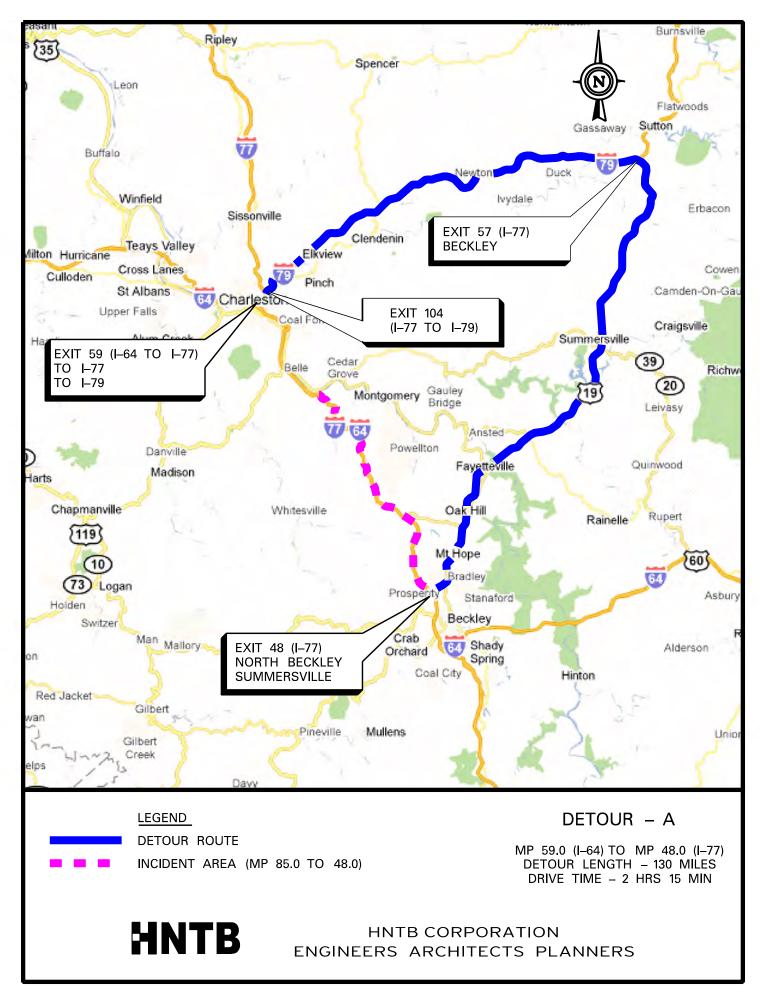
In the event of a road closure between exits 40 and 28, traffic will be detoured along **US-19** and **I-64** to bypass the closure. For a southbound closure, **I-77** motorists will be directed to take Exit 40 which is the **I-64** east bound exit. Drivers will proceed east on **I-64** to exit 124 and then proceed north to the intersection with **US-19**. From this point traffic will be directed south on **US-19**, and will follow **US-19** to the **I-77** intersection at Ghent. (If the incident is in the northbound lanes, drivers will follow the reverse of the route).

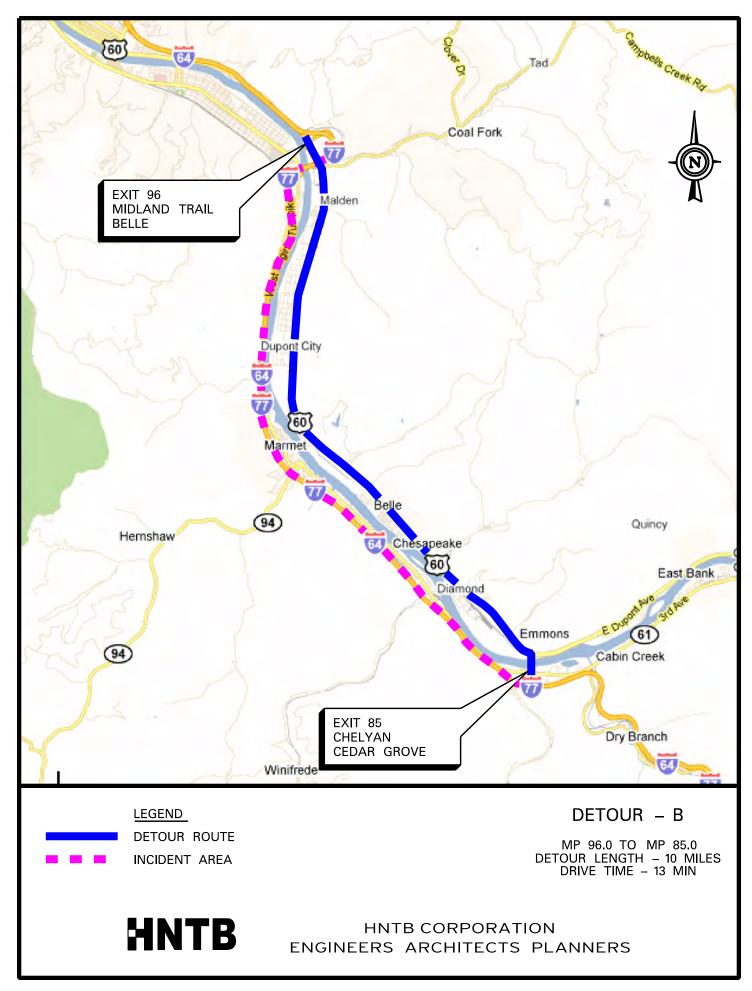


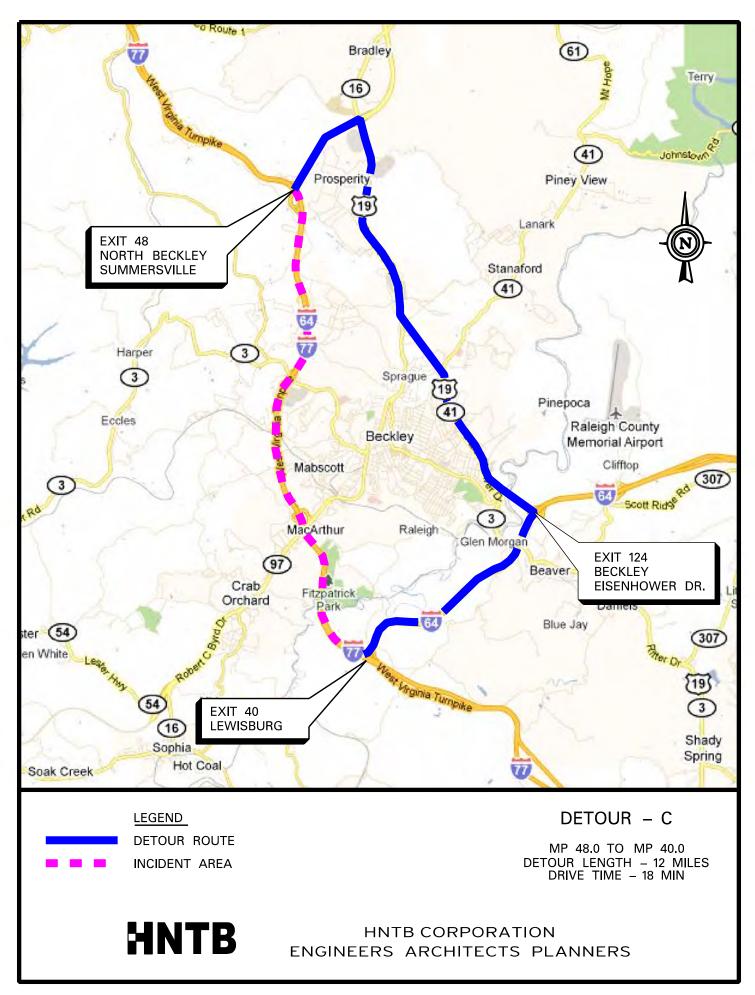
Detour E (I-77 Exit 40 to Exit 9)

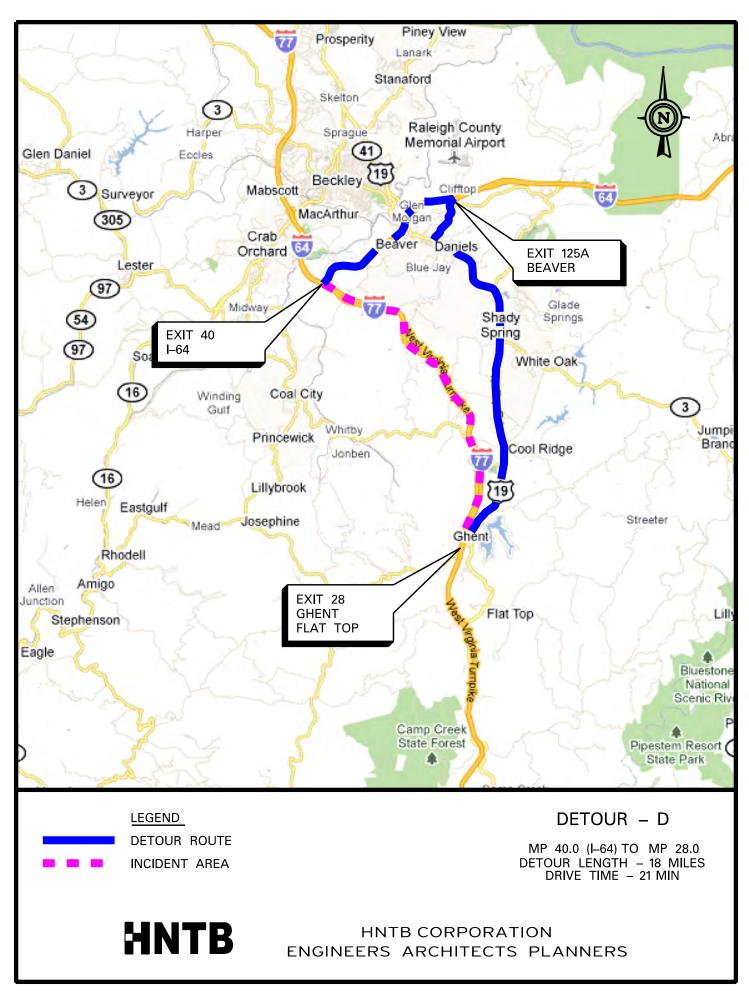
In the event of a road closure between exits 28 and 9, traffic will be detoured along I-64, US-219, and US-460 to bypass the closure. For a southbound closure, I-77 motorists will be directed to take Exit 40 which is the I-64 east bound exit. Drivers will proceed east on I-64 to exit 169 and then proceed south on US-219 approximately 46 miles to the intersection with US-460. Motorists will be directed west on US-460 and will continue on US-460 to the intersection with I-77. (If the incident is in the northbound lanes, drivers will follow the reverse of the route).

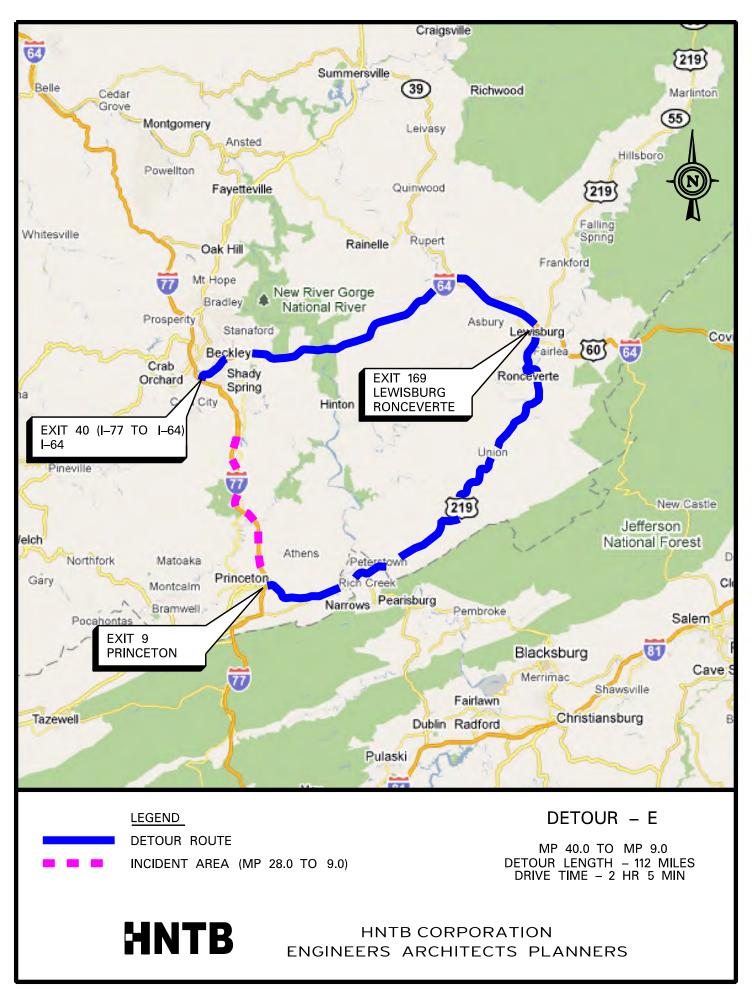












Recommended Detour Facility Additions and Upgrades

The detour routes as outlined above have been determined to be the most feasible alternative routes for use in incident management. However, there are modifications, both from an operational and a physical point of view, that would contribute to the safety and efficiency provided by these routes. Operational modifications may involve either short-term modifications or implementation of long-term changes. Upgrades to the physical aspects of temporary detour routes involve elements ranging from maintenance obligations to permanent geometric improvements and facility additions. Suggestions for operational modifications and physical upgrades are provided below.

Operational Aspects

Short-Term – To provide more efficient movement of motorists, especially through downtown or central business district areas, law enforcement control of intersections may be provided. It is imperative that coordination be maintained amongst all jurisdictions along the detour route. Lack of coordination could lead to a scenario where an efficient movement is established at one location only to create a bottleneck further along the route.

Interagency communication between all parties involved must be established to ensure the highest possible level of service. The TMC will provide notification of the incident and will give periodic updates regarding the status of the closure to the agencies along the detour routes. The TCC will contact the TMC as needed with updates from the state troopers and maintenance personnel. The county and municipal authorities should coordinate efforts through a dispatch center or directly through portable devices to ensure traffic is moving along the detour routes as efficiently as possible.





Long-Term – In the event that an incident occurs that requires the use of an alternate route detour with a long duration, timing on existing signal systems may be modified to better accommodate the influx of additional traffic into the system. As with law enforcement control of intersections, the maximum benefit will only be gained through a coordinated re-timing effort amongst the various agencies affected. Signal timing and sequencing may be adjusted to accommodate higher volumes of through traffic even though there is likely to be some trade-off in the level of service experienced on those roadways intersecting the detour route. It is likely that the local traffic will be able to use familiarity and experience to choose the route that will cause them the least amount of delay due to the increased detour traffic.



There are two types of traffic signals encountered throughout the detour routes. Those that are part of a closed-loop system and those that are stand alone. Traffic signals on closed-loop systems can be monitored and timing plans can be adjusted remotely. Timing adjustments to intersections not in a closed-loop system require adjustments to be made on site (see Figure 11, Page 27). Traffic signals can also be placed on flash by law enforcement until the incident is resolved. Mainline approaches would flash yellow and the side street would flash red.

To ensure minimum traffic disruption at intersections during a detour, modifications to the existing traffic signals should be considered. The recommended modifications are as follows:

- Traffic Pattern Coordination alternate traffic pattern programming should be developed based on the expected traffic increase due to specific incidents. In the event of an incident, the temporary traffic signal patterns could be implemented remotely and terminated once the incident is over. (This plan is only applicable to traffic signals operating in a closed-loop system).
- Manual Operation Police Push Buttons should be considered in selected traffic signals that will allow law enforcement officials to manually cycle the traffic signal. Most of the existing installations are capable of manual operation but are not equipped with the police push buttons. Also, law enforcement would require keys to the controller cabinet and instruction on how to operate the traffic signal manually and restore it back to normal operation.
- Normal Operation Isolated traffic signals (not operating in coordination with a system) will automatically adjust mainline green time based on traffic demand. The maximum green thresholds for mainline phases are usually set between 50 and 80 seconds. These values could be increased for phases that would be impacted by detoured traffic. This would allow the mainline phases to hold green up to that limit if traffic volumes call for it. However, this



modification comes with a risk of extended durations of signal phases in the event of a secondary route traffic detection failure.

In urban areas having multi-lane facilities, a combination of temporary traffic control and adjusted signal timing may be used to redistribute direction lanes such that more lanes are available for the primary direction of travel along a one-direction detour. For example, a typical four-lane roadway that normally accommodates two northbound and two southbound lanes may be temporarily reconfigured to provide one northbound and three southbound lanes assuming the primary movement is to the south.

Suspension of roadwork activities should be considered along roadways that comprise a long-term detour route. Efforts should be made to postpone work activities so that there is no additional restriction on roadway capacity or efficiency. In the event that ongoing roadwork is of such a nature that it is not possible to fully suspend operations, consideration must be given to performing those tasks which result in the greatest impact to motorists during off-peak hours.

Finally, enforcement of existing parking restrictions, or implementation of more stringent restrictions, especially in downtown areas, along temporary detours, should be considered. Elimination of on-street parking in areas that cause potential conflicts with turning movements of large trucks and buses will result in more efficient movement of motorists. A more comprehensive approach is to eliminate on-street parking in congested urban areas entirely. This method will not only provide additional clearance for turning movements at intersections, but will also provide additional lane-width clearance for large trucks and busses – especially if a two-way detour is initiated. Additionally, throughput speed will be higher with the additional lateral clearances than with the restricted clearance resulting from parked vehicles adjacent to a corridor. Positioning wrecker service vehicles along the detour route is also recommended to help enforce parking restrictions, and to ensure quick response to immobilized vehicles along the detour route.



FIGURE-11
Existing Intersection Traffic Signal Disposition

INTERSECTION	CLOSED LOOP	SYSTEM
	DETOUR A	
LIC 10 AT MADI E FORK	DETOUR A	
US 19 AT MAPLE FORK US 19 AT APPALACHIAN DRIVE	NO NO	
	NO NO	
US 19 AT LAURAL CREEK RD.	NO NO	
US 19 AT FAYETTEVILLE WAL-MART US 19 AT WV 16 COURT ST.	NO YES	SOLO
US 19 AT WV 18 COURT ST.	NO NO	3010
US 19 AT WV 41 (MT. NEB0) US 19 AT WV 39	NO NO	
	NO NO	
US 19 AT WV 41 (IRISH CORNER)	NO NO	
US 19 AT PROFESSIONAL PARK	NO	CLINANAEDCVALLE
US 19 AT PROFESSIONAL PARK	YES	SUMMERSVILLE
US 19 AT WAL-MART	YES	SUMMERSVILLE
US 19 AT WV 41 (MCDONALDS)	YES	SUMMERSVILLE
US 19 AT NICHOLAS CO. H.S.	NO	
	DETOUR B	
WV 61 AT WV 61 CONNECTOR	NO	
WV 61 CONNECTOR AT WV 61 SPUR	NO	
US 60 AT WV 61 SPUR	NO	
US 60 AT WITCHER CREEK	NO	
US 60 QUINCY CENTER	NO	
US 60 AT WARRIOR WAY	NO	
US 60 AT CAMPBELLS CREEK	NO	
OS GOTTI GIAMI BELLO GILLER		
DETOUR C		
US 19 AT NEW JERSEY AVE.	NO	
US 19 AT YMCA DRIVE	NO	
US 19 AT S. FAYETTE ST.	NO	
US 19 AT JOHNSTOWN ROAD	NO	
US 19 AT WV 41 (STANAFORD ROAD)	YES	EISENHOWER DRIVE
US 19 AT MCCULLOCH (LOWES)	YES	EISENHOWER DRIVE
US 19 AT WAL-MART	YES	EISENHOWER DRIVE



US 19 AT R.C. BYRD (WV 16)	YES	EISENHOWER DRIVE
US 19 AT BECKLEY PLAZA	YES	EISENHOWER DRIVE
US 19 AT INDUSTRIAL DRIVE	YES	EISENHOWER DRIVE
US 19 AT RALEIGH MALL	YES	EISENHOWER DRIVE
US 19 AT PROSPERITY ROAD	NO	
US 19 AT PROSPERITY CRANBERRY SCHOOL	NO	
US 19 AT CROSSROADS MALL	NO	
US 19 AT WV 16 RAMP (BRADLEY)	NO	
	DETOUR D	
US 19 AT WV 3 (SHADY SPRINGS)	NO	
US 19 AT WV 307 (BEAVER)	NO	
	DETOUR E	
US 219 AT GREENBRIER MALL	NO	
US 219 AT HOLT LANE	NO	
US 219 AT FOSTER STREET	YES	LEWISBURG CBD
US 219 AT US 60	YES	LEWISBURG CBD
US 219 AT WAL-MART	YES	LEWISBURG I/C
US 219 AT COLEMEN DRIVE	YES	LEWISBURG I/C
US 219 AT I-64 WB RAMP	YES	LEWISBURG I/C

Physical Aspects

While the detour routes identified in this plan are determined to be the roadways most capable of handling the rerouted traffic, there are several areas in which further improvement should be made to ensure successful traffic movement during a turnpike closure.

Additional detour facilities are recommended to increase traffic abatement capabilities and consequently better accommodate the West Virginia Turnpike Patrons. This study has identified an area around mile post 69.5 as a potential location for an additional removable concrete median barrier gate. This area is located at the tangent section of roadway north of the Morton Rest Area. There are also locations where a short detour connector road could be installed to provide emergency access to secondary roads. There is an opportunity to add this type of improvement to the top of Flat Top Mountain around MP 26. Here an existing access to a material storage area could be improved to accommodate traffic detouring from the Turnpike onto US-19.

Median cross-overs, as previously discussed, are critical traffic abatement facilities for use in incident management along the Turnpike. While all the cross-overs listed are paved and capable of carrying



traffic under temporary detour conditions, there is room for improvement. Many cross-overs could benefit from the addition of acceleration and deceleration lanes. During an incident management scenario, this additional pavement width would also improve turning movements onto and off of the cross-overs. Secondly, more comprehensive delineation at median cross-overs would provide better guidance to motorists considering that these abatement facilities would potentially be put to use in less than desirable weather conditions. Yellow flexible plastic delineator posts should be installed per WVDOH Standard 661.2.5-"Delineators" at each median cross-over to delineate a clear path for motorists.

With respect to the alternative detour routes, all intersections lacking adequate turning movements to accommodate large trucks (as well as all other traffic typically traveling the interstate) should be considered high priority when developing statewide roadway improvement plans. Similarly, all areas along the detour routes containing deteriorated asphalt surface conditions should be considered as priority for repair and upgrade in the annual paving program. Placing emphasis on the upgrade and upkeep of these detour routes will allow for the safest and most efficient movement of motorists under incident management situations.

Along the same lines, the roadways designated as detour routes for incident management must be granted priority status in terms of snow removal and roadway treatment. Not only will this emphasis improve the efficiency as far as through-put speed in general, but it will also serve to reduce the potential for secondary crashes and subsequent traffic delays on detour routes. During weather related events, careful coordination must be conducted by all agencies to ensure that proposed detour routes are in proper condition for safe travel prior to traffic being diverted onto them. Once Turnpike traffic is occupying the secondary roadway system, snow and ice removal will become more difficult. If feasible, the Parkways Authority will assist the DOH with snow removal on the WV Turnpike detour routes, such as US-19, US-60 and I-64.

The detour routes established within this plan are the most feasible of the options available for diversion of traffic during an incident or weather event. However, there are operational and physical characteristics that must be given attention in order for the incident management plan to function at the highest level possible. Some of these modifications require little effort to implement, such as the short-term operational changes, while others will require assistance from program planning at the state level to be implemented.

Recommended Revisions to the Turnpike Detour Manual

It is recommended that the Turnpike Detour Manual be updated to reflect only the approved detours outlined in this report. Likewise, all turnpike closure and detour guidance including facilities, policies, etc., should be incorporated into the revised detour manual. The Turnpike Detour Manual should also refer to this document regarding road closure protocols and the roles of the various Parkways Personnel as related to emergency traffic control.

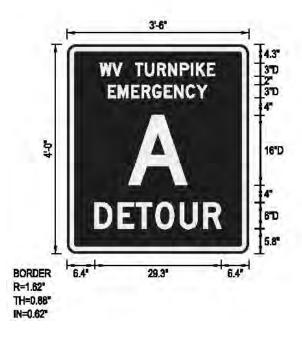


Detour Signage

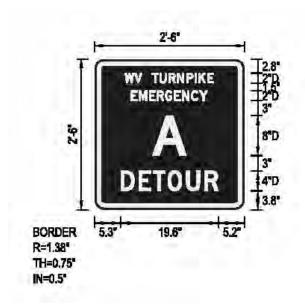
Permanent Detour Signs

To lessen the occurrence of secondary incidents resulting from an incident causing a roadway blockage, effective signing must be in place to guide motorists away from the major conflict point and onto one of the predetermined alternative routes. The sole reason for installation of the trailblazer assemblies is to provide guidance to motorists who are being directed to use a route that they may be unfamiliar with or that is more complicated than the intended route to their destination. As such, the detour signing must command attention of the motorists and convey clear direction as to what action they are to take and when/where it should be taken. To achieve the most desirable results, it is imperative that the permanently installed detour signing abide by the general requirements of the Manual on Uniform Traffic Control Devices (MUTCD). More specifically, consideration must be given to providing an appropriate color scheme (see recommended color scheme below), establishing proper placement along a given route, and ensuring correct installation in regards to mounting height and lateral offset.

The legend and border of the sign panels used to delineate the temporary detour route should be white, and should be placed on a black background. This color combination is easily recognizable and does not introduce potential confusion due to other warning, guidance, or regulatory signs. The letter designation indicating the route should be displayed in the center of the panel with the word "DETOUR" displayed just below the letter designation. Additionally, a directional arrow panel similar to type M6-1, M6-2, or M6-3 described in the Manual on Uniform Traffic Control Devices is to be placed below the detour sign designation and must abide by conventional signing practice as to which arrow shape is to be used on a specific assembly. See **Sign Exhibits** below for a suggested panel layout:







Secondary Route Sign Exhibit - Suggested Sign Panel Layout

The permanent detour signs must be installed at key locations along the route. There are two critical aspects to consider when identifying the appropriate installation locations:

- Specific locations at which a motorist must make a decision to leave one roadway and begin travel on another to continue on the intended detour route or pass through an intersection with another roadway and remain on their current path to complete the detour. These decision points are located at intersections with major crossroads at which detour signing must be established to provide advance notice of the required action as well as directional guidance at the intersection point. Installation spacing for both the advance notice and directional guidance should follow specifications established by the MUTCD.
- Confirmation signing must be erected both immediately following decision points as well as at regular intervals in between these points. As with conventional signing practice, it is critical to provide motorists with confirmation that they have taken an action that meets their intended results. Similarly, periodic confirmation must be established along the detour route in areas where major intersections are sparsely located. Confirmation signs should be placed concurrent with existing route confirmation signs, potentially as part of the same assembly. Additional signs may be needed in areas of high congestion such as downtowns and central business districts.

Installation of permanent detour signing should be done as a joint venture between the Division of Highways and the Parkways Authority. Additionally, the Authority will conduct quarterly checks of all permanent detour signs and provide repair or replacement services as needed.



Dynamic Message Signs

In regard to incident management, the primary function of the dynamic message signs (DMS) is to provide advanced warning and up-to-date information regarding a roadway closure or anticipated motorist delay as well as speed limit advisories. DMSs may also be used to provide alternate route detour information. In order to convey clear direction and effective messages, the guidelines for message generation contained in Chapter 2L of the 2009 MUTCD must be adhered to. The figure below shows an example of such use of a DMS.



DMS Messaging for Detour Guidance

The general operational considerations as prescribed in the Traffic Abatement portion of this report apply to DMS use for alternate route information dissemination as well. As with all DMS operation, coordination with bordering agencies (specifically the WVDOH and VDOT) must be ensured to provide the most effective advance warning of the alternate routes and specific route guidance. This is currently being accomplished through the integration of the TCC and the WVDOH TMC, and the TMC's communication with VDOT.

Operation

Resources

The Turnpike Management has identified a need for approximately (16) maintenance employees to be present to execute a removable concrete median barrier gate opening and (12) to be present for all other types of abatement facilities. Included in the (16) employees are individuals setting up warning and detour signs, closing exits, and setting up traffic control at the barrier gates, as well as physically opening the gate. Maintenance employees will also need to be available for flagging in the area of the



removable concrete median barrier gates; both for traffic that has been stopped due to the incident and for stopping traffic in the opposite direction. The Turnpike has also conveyed an equipment need of one (1) end-loader, two (2) pick-up trucks, cones and barricades for traffic control, and temporary warning and detour signs for accident clean-up and preparation of abatement facilities. A number of PCMS will also be required to provide situational guidance to motorists, especially while implementing a temporary speed reduction.

In addition to WV Turnpike employees, the WV State Police will be asked to assist in the traffic diversion and traffic control. The state troopers will also maintain an open shoulder throughout the duration of the closures to permit emergency vehicles, tow services, and maintenance crews to access the incident area. Permanent signs indicating that shoulders shall remain clear during an incident should be added to all Turnpike entrance ramps.

Training

It is recommended that maintenance crews be trained annually on the implementation of Turnpike closures, and specifically on traffic control measures for abatement facilities and the mechanics of opening and closing the removable concrete median barrier gates. The training should include set-up of traffic control at each type of abatement facility. The training should also include hands-on removal and reinstallation of the barrier gates by the maintenance crews, and should be held at different barrier gate sites from year to year. The Turnpike General Engineering Consultant will mark traffic control locations at removable concrete median barrier gates prior to training. It is recommended that training occur prior to the winter season, when an incident is most likely to occur.

It is also recommended that an annual training session be held on interagency coordination in the event of a Turnpike closure. This training should include the WV Parkways Authority (decision makers and maintenance employees), WVDOH (TMC Operators, Traffic Engineering Staff, and Maintenance Personnel), Federal Highway Administration, and other state and local agencies deemed appropriate. This training should cover the Standard Operating Procedure (SOP) of a Turnpike closure and traffic abatement, and should outline the roles of each agency during the event. Also, during this training session, a mock scenario should be presented and the various agencies should be asked to describe their response and provide a timeline of their actions. These training exercises should include various types of accidents (hazard materials, lost loads, etc.). These discussions should be mediated by an appointed authority with the WVDOH and will be documented and published and distributed to the participants.

Roles of Parkways Personnel

Section Foreman

The Section Foreman, along with the State Police, is responsible for identifying road closures with potential durations greater than two hours, and relaying information regarding delays or closures to the TCC. The Foreman will coordinate the efforts of the maintenance crews to establish temporary detours, set-up traffic control devices, and prepare abatement facilities for use. The Foreman will continue to



provide updates to the TCC regarding the status of the closures. In the event that the Section Foreman is unavailable, the Roadway Manager will assume the duties of the Section Foreman.

State Trooper Supervisor

The State Trooper Supervisor (Sergeant or higher), along with the Section Foreman, will assess the closure duration and if it is warranted, make the decision to abate the stopped traffic. The Trooper will also assist in traffic directing measures during the closure and detour, and keep the shoulders open to allow emergency crews, towing services, and turnpike maintenance crews to access the scene of the incident.

Maintenance Crew

The Maintenance Crew reports to Section Foreman for assignments during the call-out procedure and provides updates of progress to the Foreman during the operations. The maintenance crews will set up detour and road closure signs, place temporary cones, flag traffic, as well as manually open the barrier gates as directed by the Foreman. The maintenance crews will also assist in the cleanup of debris and the repair of any roadside safety features damaged during an incident.

Turnpike Control Center (TCC)

The TCC relays information regarding the status of the road closure to the various Parkways employees, the WVDOH, and the towing services. The TCC also implements the maintenance crew call-out procedure when directed. In addition to notifying WV Parkways employees, the TCC will also notify motorists of the incident and provide information regarding closure durations and detour routes through the DMS(s).

Legislation

Policies addressing obstruction of traffic following an accident, typically referred to as "Quick Clear", or "Steer and Clear", have been adopted by many states in recent years as a way of preventing additional accidents and maintaining traffic movement through the accident site. The 2009 edition of the Manual of Uniform Traffic Control Devices provides the following guidance on this topic: Chapter 6I.04 "When a minor traffic incident blocks a travel lane, it should be removed from that lane to the shoulder as quickly as possible". These policies are typically applicable to non-injury or minor-injury accidents. This edition also provides a standard sign (R16-4) directing drivers to move vehicles from travel lanes in the event of a fender bender.

The current <u>WV Code 17C-4 "Accidents"</u> addresses unnecessary vehicular obstruction following an accident. Code 17C-4-2 states "The driver of any vehicle involved in a crash resulting only in damage to a vehicle which is driven or attended by any person shall immediately stop such vehicle at the scene of such crash or as close thereto as possible... Every such stop shall be made without obstructing traffic more than necessary". While the direction is to not obstruct



traffic more than necessary, there is no emphasis on the timing of removing the obstruction. It is recommended that the code be amended to include language indicating that maintaining traffic flow is a priority and obstructions shall be removed as soon as possible. The code should also be revised to provide direction to first responders as well as drivers. Language should be clear that public safety is paramount and adjacent traffic shall remain unobstructed to the extent possible in an effort to prevent secondary accidents resulting from stopped traffic. It is also recommended that the WVDOT propose legislation to keep roadway shoulders clear of parked vehicles during an emergency, to allow emergency vehicles access to accident sites.

Example Legislation

The state of Florida has written into law the following with regard to clearing disabled vehicles:

Florida Statute 316.071, entitled "Disabled vehicles obstructing traffic"

Whenever a vehicle is disabled on any street or highway within the state or for any reason obstructs the regular flow of traffic, the driver shall move the vehicle so as to not obstruct the regular flow of traffic or, if he or she cannot move the vehicle alone, solicit help and move the vehicle so as not to obstruct the regular flow of traffic. Any person failing to comply with the provisions of this section shall be cited for a nonmoving violation, punishable as provided in chapter 318.

A similar law could be modified to include any vehicle involved in a collision, and could be extended to accident first responders, making maintenance of traffic flow one of their top priorities.

Contacts

WV Homeland Security and Emergency Management Agency

Bldg. 1, Rm. EB-80 Fax: 304-344-4538

1900 Kanawha Blvd, East Charleston, WV 25305

Email: <u>igianato@wvdmaps.gov</u> (Jimmy Gianato, Director)

Web: http://www.wvdhsem.gov/

WV State Police - Troop 7 Command (Kanawha County) 304-926-1900P.O. Box 1469

Fax: 304-926-1909

Charleston, WV 25325-1469

Web: http://www.wvstatepolice.com/

WV State Police – Beckley Troop 6 (Raleigh County)
304-256-6700
Fax: 304-256-6983

Beckley, WV 25801-5349

Web: http://www.wvstatepolice.com/



304-558-5380

WV Transportation Management Center

Bldg 5 Rm 362 1900 Kanawha Blvd East Charleston, WV 25305 Web: <u>jim.e.lambert@wv.gov</u> (Jim Lambert, Manager)

WV Parkways Authority 304-926-1900

304-558-3028

Fax: 304-926-1909

Fax: 304-558-3246

P.O. Box 1469 Charleston, WV 25325-1469 Email:

gbarr@wvturnpike.com Web: http://www.wvturnpike.com

WV Parkways Authority Directory

Mark Miller, Section-1 Foreman Office: 304-787-4519

Curtis Redden, Section-2 Foreman Office: 304-256-6927

James Embrey, Section-3 Foreman Office: 304-595-4542

Jim Meadows, Highway Production Manager
Office: 304-256-6680

Dave Pugh, Roadway Manager Office: 304-256-6680

Les Ball, Highway Maint. Program Manager
Office: 304-256-6680

HNTB

Ron Hamilton, Maintenance Engineer Office: 304-256-6680

Carl Williams, Safety Officer Office: 304-256-6890

Greg Barr, General Manager Office: 304-926-1900 (Ext 302)

Tyrone Gore, Director of Operations Office: 304-926-1900 (Ext 310)

Turnpike Control Center Office: 304-926-1908

WV Department of Transportation 304-558-0444 Office of Secretary of Transportation Fax: 304-558-1004 Bldg. 5, Rm. A-109 1900 Kanawha Blvd, East Charleston, WV 25305 Email: dot.secretary@wv.gov Web: http://www.transportation.wv.gov/Pages/default.aspx

WVDOH District Directory

District 1 (Kanawha County) – John McBrayer, District Manager 304-558-3001

District 9 (Fayette County) – Don Beals, Acting District Manager 304-647-7450

District 10 (*Raleigh and Mercer Counties*) – Thomas Camden, Acting District Manager 304-487-5228

District 7 (*Barbour, Braxton, Gilmer, Lewis, Upshur, & Webster Counties*) – Ron Hooton, District Engineer 304-269-0400



KANAWHA COUNTY	
Kanawha County Emergency Communication Center	304-348-8111
Kanawha County Emergency Services Directory	
Kanawha County Medical Transport	304-342-1107
Kanawha County Ambulance and Fire Services	304-357-0191
Kanawha County Sheriff's Department	304-357-0200
WV State Emergency Spill Notification	800-642-3074
FAYETTE COUNTY	
Fayette County Office of Emergency Services	304-574-1610
Fayette County Emergency Services Directory	
EMS Business Office General Ambulance	304-465-8700
Fayette County Dispatch Center	304-574-1610
Fayette County Sheriff - Fayetteville	304-574-4304
WV State Emergency Spill Notification	800-642-3074
RALEIGH COUNTY	
Raleigh County Emergency Operations Center	304-255-0911
Raleigh County Emergency Services Directory	
General Ambulance Service	304-252-5800
Raleigh County Dispatch Center	304-255-9121
Raleigh County Sheriff	304-255-9300
WV State Emergency Spill Notification	800-642-3074



MERCER COUNTY Mercer County Emergency Communication Center 304-425-8911 Mercer County Emergency Services Directory Princeton Rescue Mercer County Sheriff 304-425-3914 Mercer County Sheriff 304-487-8364 WV State Emergency Spill Notification 800-642-3074

CITY OF BECKLEY

Beckley Fire Department	304-256-1780
Kevin B. Taylor, Fire Chief	Fax: 304-256-1792

310 Third Avenue Beckley, WV 25801

Email: ktaylor@beckleyfire.com

Beckley City Police DepartmentTimothy P. Deems, Chief of Police

304-256-1710
Fax: 304-256-1736

340 Prince Street Beckley, WV 25801

Email: tdeems@beckleypd.com

Jan-Care Ambulance Service 304-255-1588

117 South Fayette Street Beckley, WV 25801

WVPA GENERAL ENGINEERING CONSULTANT

HNTB Corporation#3 Mission Way
Scott Depot, WV 25560 **304-757-0888**Fax: 304-757-6639

