



Temporary Traffic Control for Building and Maintaining Single and Multi-Lane Roundabouts

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American Traffic Safety
Services Association



U.S. Department of Transportation
Federal Highway Administration



Temporary Traffic Control for Building and Maintaining Single and Multi-Lane Roundabouts

Purpose and Background

Although roundabouts have recently gained popularity and use in the United States, minimal guidance is available for constructing roundabouts or installing, maintaining, and removing temporary traffic control devices in work zones where roundabouts are constructed. This document provides considerations and typical applications to assist field staff in setting up temporary traffic control for both new construction and maintenance activities.

The information contained in this document has been compiled from a number of source documents from State agencies and research organizations including: Virginia (1), Oregon (2), Washington (3), and Wisconsin (4) as well as the Transportation Research Board (5).



Roundabouts located at Interstate 70 and Edwards Access Road in Edwards, CO
(Photo courtesy of Felsburg Holt & Ullevig; photography: Terry Shapiro)

The one-way flow operational characteristics and roadway geometry of roundabouts make them different from most other intersections negotiated by drivers. Temporary traffic control during maintenance and construction activities must provide clear guidance to drivers, who in some cases are unfamiliar with roundabout operations.

The traffic control guidelines outlined in this document can be used during various maintenance and construction activities such as pavement repair, striping, signing, delineation, landscaping, and intersection repair as well as during the construction of new roundabouts. The Manual on Uniform Traffic Control Devices (MUTCD) (6), as well as State and local standards for guidance should be applied in reference to sign spacing, taper lengths, use of shadow vehicles (i.e., a



vehicle used to protect workers from impact from errant vehicles) and other general temporary traffic control provisions.

Each intersection, adjacent road network, set of user needs and project construction method is unique. Temporary traffic control plans should reflect the diversity of considerations at intersections where roundabout construction and maintenance operations take place.

Temporary Traffic Control Guidance Applicable for Construction of Roundabouts

Roundabouts can be constructed under three types of traffic conditions (5, pp. 10-4):



(Photo courtesy of NCDOT)

- With all of the traffic diverted away from the work area;
 - With some of the traffic diverted;
- or
- Under full traffic.

Generally, diverting or detouring traffic away from the intersection is most desirable (5, pp. 10-4). However, this may not always be possible, in such cases; strategies to manage traffic operating through the work zone must be developed.

Construction With All Traffic Diverted

During the construction of a new roundabout, closures and detours should be used at the intersection when possible. By diverting traffic to other roadways, recognizable benefits include:

- shorter construction duration,
- lowered construction costs, and
- increase in worker and motorist safety.

However, re-routing traffic creates concerns of its own, such as:

- increased congestion on detour routes;
- drivers who are unfamiliar with the area may have difficulty navigating the detour if adequate signing is missing;



- physical characteristics of the alternate route (such as pavement design and turn radii) may not be adequate for heavy or large vehicles;
- impacts to businesses and homes along either the detour route or the road being re-routed; and
- the ability for emergency response to have access to locations along the closed route.

The benefits and concerns should be discussed with stakeholders such as public works departments, emergency responders, businesses, and adjacent property owners when deciding what traffic detour options to consider.

Construction With Some Traffic Diverted

In cases where it is not possible to detour all the traffic, certain intersection approaches may need to be strategically kept open to traffic during construction. For example, minor roadway approaches may be closed and major street traffic maintained on the existing roadway or a temporary roadway built as part of construction staging (5, pp. 10-5). Other considerations for this hybrid approach may include:

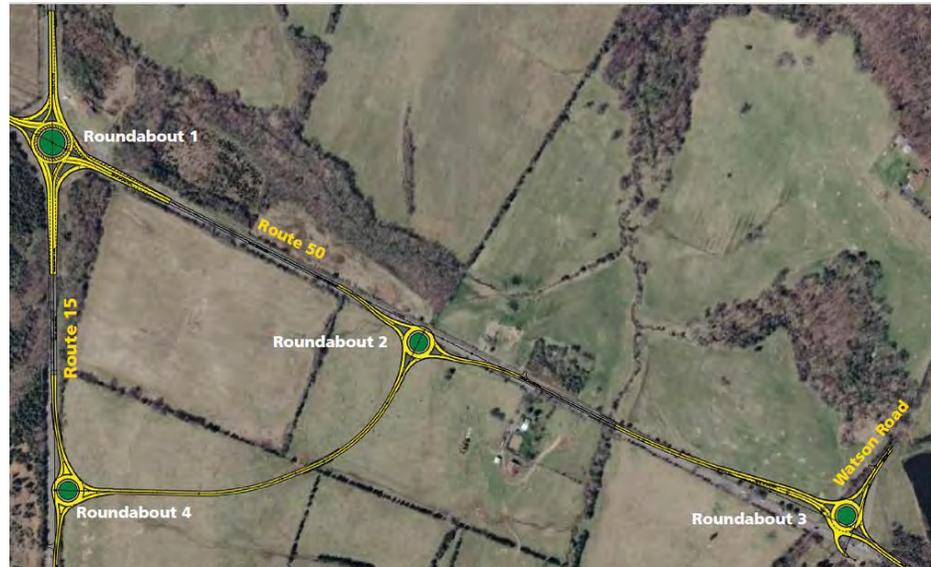
- the presence of emergency services near the vicinity of the roundabout which requires immediate access to the intersection;
- the need for accessibility of nearby roadway networks, whether for convenience or circulation;
- the existence of limited alternate routes for diverting traffic; or
- the diversion of traffic would result in significant increase in travel time.

A project in Winnebago County, Wisconsin involved shifting traffic on Route 45 to the east and west sides of the roundabout construction at Lake Buttes Des Morts Drive during successive phases. While the east approach of Lake Buttes Des Morts Drive was closed to traffic, the motorists on Route 45 were shifted to the west through the intersection. In the next phase of construction, the west supplementary approach was closed and Route 45 traffic was moved to the east. The intersection was open to Route 45 traffic at all times. Appendix A includes construction staging and traffic control plans.



(Photo from Virginia DOT website)

In Gilbert's Corner, VA, four new roundabouts were to be constructed – one at Gilbert's Corner (intersection of Route 50 and Route 15), one at the intersection of Route 50 and Watson Road, one at the intersection of Route 50 and a new connector road, and one at the intersection of Route 15 and a new connector road.



Roundabouts along Routes 15 and 50 were constructed first. During Phase 1 construction of the roundabout at the intersection of Routes 15/50, westbound traffic continued along Route 50 while construction of the southern half of the roundabout took place. In Phase 2, Route 50 traffic was diverted via a connector road to Route 15 while construction of the northern half of the roundabout took place. Construction staging and traffic control plans are included in Appendix B.

Construction Under Full Traffic

Prior to commencing work that would change traffic patterns, installation of certain peripheral items could expedite the opening of the roundabout and provide additional safety during construction (5, pp. 10-9). This could include permanent signing, lighting, and pavement markings. Once work commences, it is desirable for it to be completed as soon as possible to minimize time when the public is faced with an unfinished layout, or where traffic patterns may not be obvious (5, pp 10-9).

The following list presents a possible sequence for staging construction under full traffic constructions:

- install lighting.
- install and cover the permanent roundabout signing until construction of splitter islands and central island. *Traffic is expected to follow the new roundabout path upon commencement of central island installation, which requires proposed signing to be in place and uncovered.*
- construct outside widening, as needed.
- reconstruct or resurface approaches, if needed.



- construct splitter islands first, and delineate the central island. At this time, it is necessary to uncover permanent signing and operate the intersection as a roundabout.
- complete the central island.
- prepare final grade and apply paving course for the circulating roadway and entry/exit.

An example of construction under full traffic occurred at the Raymond Avenue and Collegetown Avenue roundabout in the Town of Poughkeepsie, Dutchess County, NY. During Phase I, a temporary right turn lane was constructed on the eastbound approach to Collegetown Avenue while the western portion of the roundabout underwent construction. In Phase II, temporary roadways were constructed on the northbound and westbound approaches to Raymond Avenue as crews constructed the eastern portion of the roundabout. Construction staging and traffic control plans are shown in Appendix C.

Temporary Traffic Control Guidance Applicable for Existing Single-lane and Multi-lane Roundabouts

Pavement repair, striping operations, maintenance of the truck apron, repairs to a splitter island, as well as other activities can require the establishment of a work zone within a roundabout. Appendix D contains four example temporary traffic control plan applications for roundabouts:

- Typical Application 1a, 1b, 1c – Single-Lane Roundabouts: Partial Closure;
- Typical Application 2 – Single-Lane Roundabouts: Partial Closure with Detour;
- Typical Application 3 – Multi-Lane Roundabouts: Inside Lane Closure;
- Typical Application 4 – Multi-Lane Roundabouts: Outside Lane Closure.

Typical Applications 1a, 1b, and 1c illustrate how traffic control may be established when one quadrant of the roundabout is closed to traffic. The examples show how reverse flow through the roundabout may occur with use of flagging operations. Typical Application 2 demonstrates the use of a detour in lieu of reversing the flow through the roundabout when one quadrant is closed to traffic. Typical Application 3 shows how to set up temporary traffic control when work is being performed on the inside lane of a multi-lane roundabout. On a multi-lane approach, a lane drop is used to divert traffic to the inside lane before entering the roundabout. Typical Application 4 illustrates the temporary traffic control needed to perform work within a quadrant of a multi-lane roundabout. In this case, the inside lane is closed throughout the entire roundabout and the outside lane is closed in one quadrant. Traffic is diverted to a single lane before entering the roundabout and reverse flow is used under flagging operations.

These applications can be modified for more than four approaches by replicating each additional approach to reflect similar signing and channelization device spacing, as well as by designing taper and buffer lengths and sight distance spacing to conform to the MUTCD (6) and State or local standards.



Each roundabout is unique and the traffic control must be developed that considers the conditions and location of the temporary work zone operations. A detour could better serve traffic by minimizing delay and increasing safety and should always be considered where appropriate. For work within the existing roundabout but outside of the driving lane, such as work on a shoulder or within the truck apron or island, flagging operations may not be needed. A single ROAD WORK AHEAD sign per approach may be used in lieu of a more robust temporary traffic control package. Reference to the MUTCD ([6](#)), State or local guidelines may be necessary to adhere to other relevant traffic control applications.



(Photo courtesy of WSDOT)

Staging Considerations

When leaving the roundabout in an uncompleted state overnight, it is important to construct the splitter islands before constructing the central island. The splitter islands help to delineate opposing flow and guide motorists to enter the roundabout in counterclockwise fashion. Temporary traffic signals may also be an option, depending on construction staging, open approaches, available paths, and work occurring within the intersection.

Other Considerations ([5](#), pp. 10-9):

1. Any portion of the roundabout that is not completed should be marked, delineated, and signed in such a way as to clearly outline the intended travel path. Remove or cover pavement markings that conflict with the intended travel path.
2. Consider adding temporary overhead lighting if the roundabout will be used by traffic.
3. Since roundabouts have directional traffic flow, reversing the traffic flow at any point during construction is discouraged due to driver expectation. Although reversing traffic flow is not advisable, circumstances may dictate the need, and should only be allowed as part of flagging operations or temporary signal during stage construction. Reverse flow should be considered for short term closures (i.e. several hours) and discouraged for long term closures (i.e. several days or weeks).
4. If unable to divert traffic away from construction, night work could relieve some of the impacts on peak-hour traffic.
5. Flagging may be used on the approaches and the exits to allow contractors to continue work.



Flagging Operations

In many cases, a flagging operation is required as a means of controlling traffic in a roundabout work zone scenario. Considerations for both single-lane and multi-lane roundabout applications include:

- flagging operations should be modified, as needed, to meet the changing needs of the work zone as the work area shifts.
- flaggers should only control one lane of travel at any time within the roundabout or its approaches; each approach should have its own flagger and sign package. For information on reducing multilane approaches to a single lane prior to the roundabout, refer to Typical Applications 3 and 4.
- flaggers at each approach should communicate by radio or other method and release only one approach through the roundabout at a given time.
- a supplemental flagger may be used within the circulatory roadway to help direct traffic.
- on approaches where traffic flow will be split during flagging operations, two pilot vehicles may be used to guide traffic through the roundabout. Care should be taken such that split traffic doesn't interfere with other queued or moving traffic.

Use of Shadow Vehicles

The use of a shadow vehicle (i.e., a vehicle used to protect workers from the impact of errant vehicles) is sometimes required for both single-lane and multi-lane applications, and could be considered for use in all applications, just as shadow vehicles are used for applications other than roundabouts. For more information, refer to the MUTCD, *Roadside Design Guide* and applicable State or local guidance.

Pedestrian and Bicycle Considerations

Care should be taken to ensure that, at a minimum, existing pedestrian traffic is managed according to work zone and American's with Disabilities Act (ADA) standards for pedestrians set forth by the following references. If bicycle facilities exist at the roundabout, existing guidance for accessibility within work zones should be applied. Alternate routes for pedestrians and bicycles should be established if existing routes are temporarily interrupted. Alternate routes should be signed in advance and should be free of hazards and obstructions. For pedestrian and ADA legislation and guidance, refer to:

- (Draft) Public Rights-of-Way Accessibility Guidelines (PROWAG)
- American's With Disabilities Accessibility Guidelines (ADAAG)
- FHWA- Office of Safety, Pedestrian and Bicycle Safety
http://safety.fhwa.dot.gov/ped_bike/legis_guide/
- Checklist for Accommodating Pedestrians in Traffic Control Areas
<http://tti.tamu.edu/documents/0-5237-P1.pdf>
- United States Access Board ADA Standards
<http://www.access-board.gov/ada/index.htm>



- MUTCD (6)Section 6D.01
<http://www.mutcd.fhwa.dot.gov/pdfs/2009/part6.pdf>
- Applicable State laws

Consider providing brochures on how to drive, walk and bicycle through the roundabout. Consider the use of other public education tools such as public information meetings, press releases, project newsletters, portable changeable message signs, web site, and the news media. (4) The use of public information and education is encouraged when roundabouts are first introduced into a community or the roundabout is situated where a unique group of users are present. For example, if the roundabout is located near a school, senior housing, or tourist attraction, information could be provided that tailors a message to a specific group of users.

References

Information for these guidelines was adapted from:

1. **Virginia DOT. *Work Area Protection Manual, 2011 Edition*.** This manual contains Virginia's version of Part 6 of the 2009 MUTCD and promotes a uniform standard of traffic control associated with special events, incident management, and work area protection along the highways of Virginia. The Standard, Guidance, Option, and Support material described in this edition of Part 6 to the 2009 MUTCD provide the transportation professional with the information needed to make appropriate decisions regarding the use of traffic control devices on streets, highways, bikeways, and private roads open to public travel.
2. **Oregon DOT. *Oregon Temporary Traffic Control Handbook for Operations of Three Days or Less*. 2011.** This handbook provides a reference for the principles and standards for temporary traffic control zones in place continuously for three days or less on public roads in Oregon. It is based on the principles set forth in Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and is an Oregon Supplement to the 2003 MUTCD. This handbook is applicable to all public roads in Oregon.
3. **Washington State DOT. *Work Zone Traffic Control Guidelines*. 2009.** These guidelines serve as an additional resource that compliments Part VI of the Manual on Uniform Traffic Control Devices (MUTCD). The traffic control devices and distances shown in this booklet reflect desired minimums for Washington State routes. The traffic control guidelines provided are intended to reduce field personnel's exposure to the hazards of traffic and offer road users consistent and positive guidance through work zone areas.
4. **Wisconsin DOT. *Roundabout Guide*. February 2011, update.** This resource compares the different types and features of roundabouts, and provides information on how to determine if a roundabout is appropriate for specific situations. The document provides roundabout design criteria; multimodal, access control, and system considerations; and



guidance on operational aspects such as signing, pavement marking, and temporary traffic control used in work zones.

5. **Transportation Research Board. *NCHRP Report 672 Roundabouts: An Informational Guide. 2nd Edition. 2010.*** This report explores the planning, design, construction, maintenance, and operation of roundabouts. The guide also addresses issues that may be useful in helping to explain the trade-offs associated with roundabouts.
6. **Federal Highway Administration. *Manual on Uniform Traffic Control Devices. 2009 Edition.*** The MUTCD defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic.
7. **AASHTO. *Roadside Design Guide. 4th Edition, 2011.*** The guide is intended to be used as a resource document from which individual highway agencies can develop standards and policies. It includes a synthesis of current information and operating practices related to roadside safety and focuses on safety treatments that can minimize the likelihood of serious injuries when a motorist leaves the roadway.

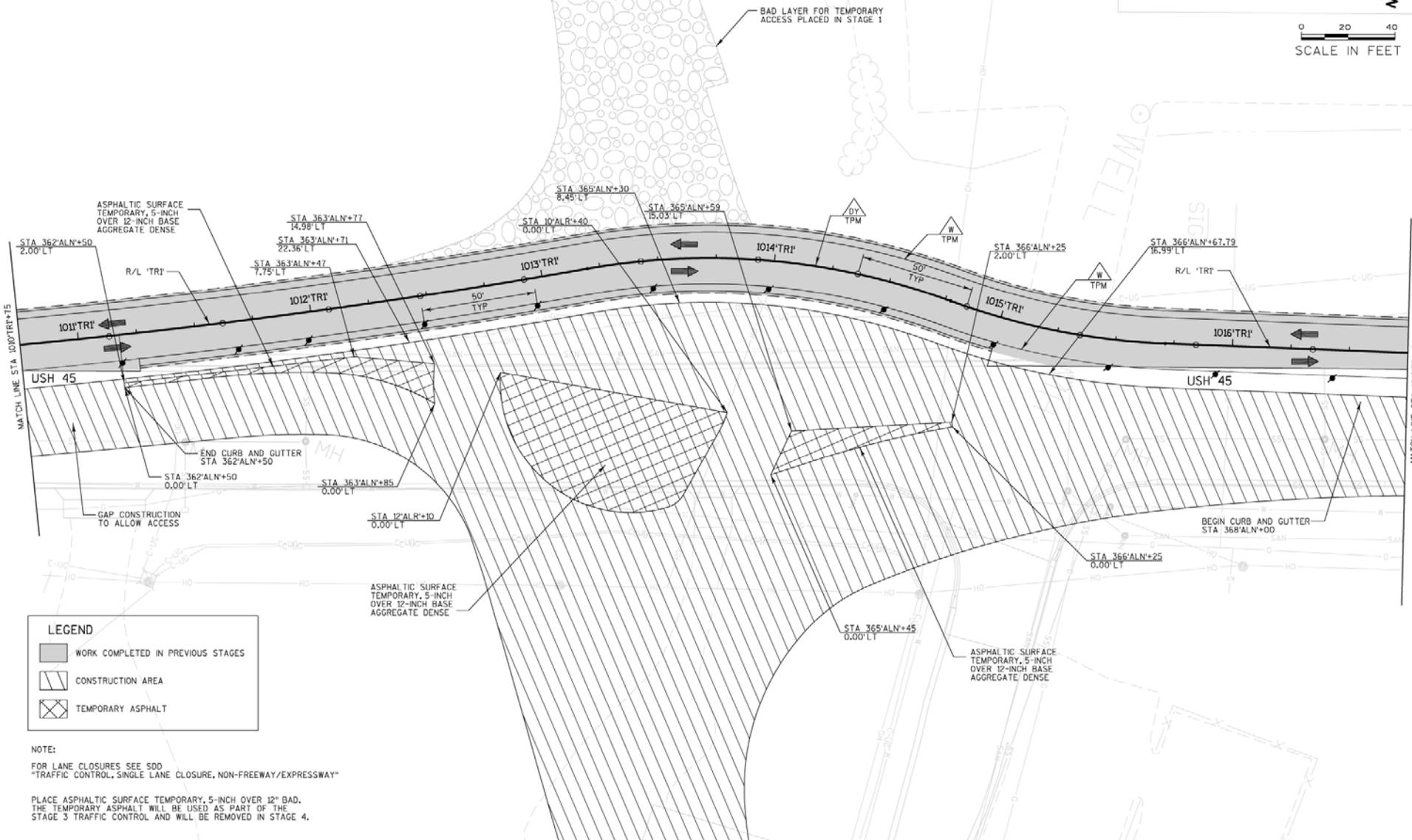
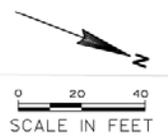


Appendix A

Winnebago County, WI

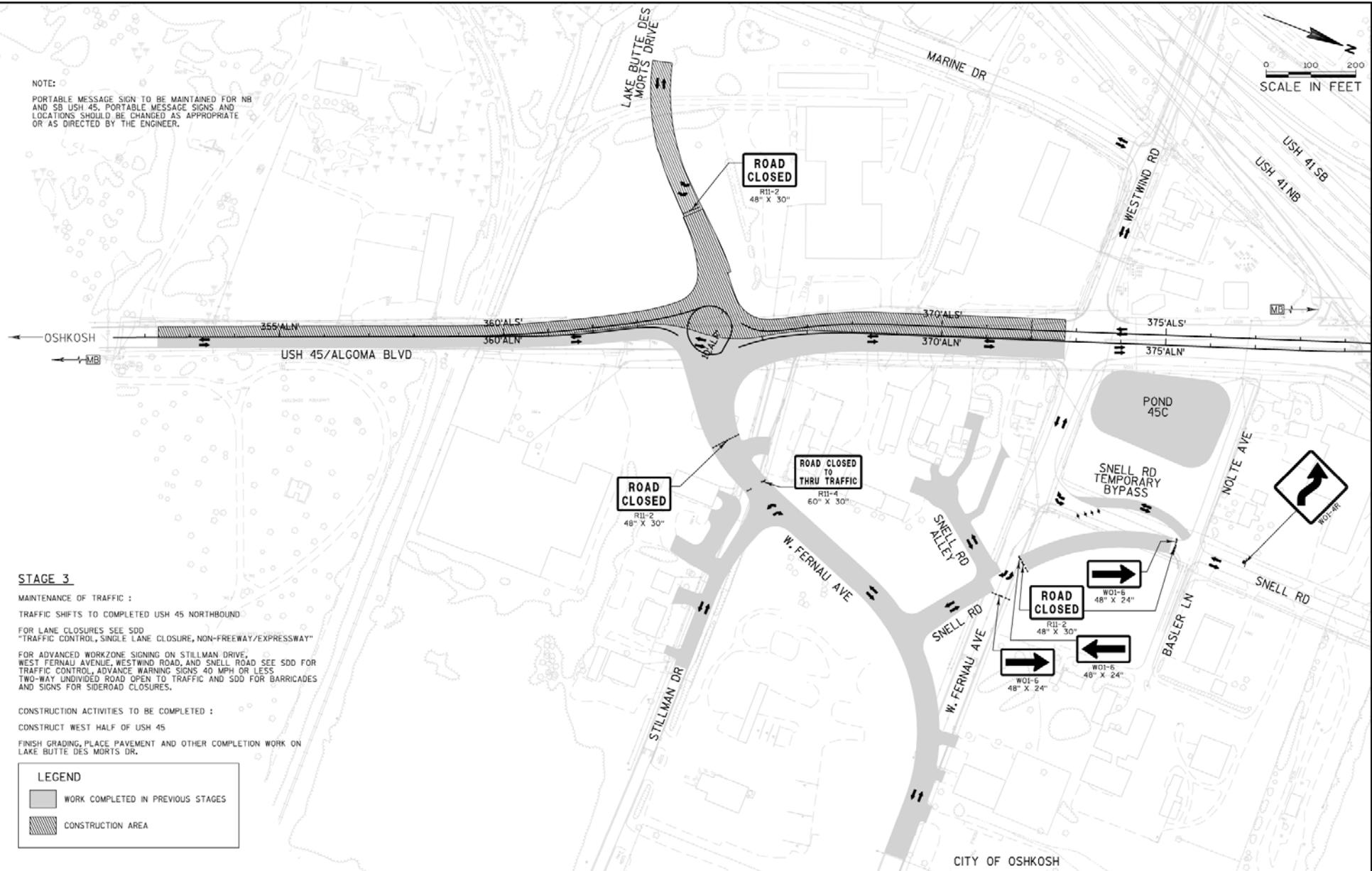
Roundabout Construction Staging and Traffic Control Plan for Construction Where Some Traffic was Diverted

This appendix contains construction staging and traffic control plans for a project in Winnebago County, Wisconsin that involved shifting traffic on Route 45 to the east and west sides of the roundabout construction at Lake Buttes Des Morts Drive during successive phases. While the east approach of Lake Buttes Des Morts Drive was closed to traffic, the motorists on Route 45 were shifted to the west through the intersection. In the next phase of construction, the west supplementary approach was closed and Route 45 traffic was moved to the east. The intersection was open to Route 45 traffic at all times. This example shows the construction of a roundabout where some traffic was diverted.



NOTE:
 FOR LANE CLOSURES SEE SDD
 "TRAFFIC CONTROL, SINGLE LANE CLOSURE, NON-FREEWAY/EXPRESSWAY"
 PLACE ASPHALTIC SURFACE TEMPORARY, 5-INCH OVER 12" BAD.
 THE TEMPORARY ASPHALT WILL BE USED AS PART OF THE
 STAGE 3 TRAFFIC CONTROL AND WILL BE REMOVED IN STAGE 4.

NOTE:
 PORTABLE MESSAGE SIGN TO BE MAINTAINED FOR NB AND SB USH 45. PORTABLE MESSAGE SIGNS AND LOCATIONS SHOULD BE CHANGED AS APPROPRIATE OR AS DIRECTED BY THE ENGINEER.



STAGE 3

MAINTENANCE OF TRAFFIC :
 TRAFFIC SHIFTS TO COMPLETED USH 45 NORTHBOUND

FOR LANE CLOSURES SEE SDD:
 "TRAFFIC CONTROL, SINGLE LANE CLOSURE, NON-FREEWAY/EXPRESSWAY"

FOR ADVANCED WORKZONE SIGNING ON STILLMAN DRIVE, WEST FERNAU AVENUE, WESTWIND ROAD, AND SNELL ROAD SEE SDD FOR TRAFFIC CONTROL, ADVANCE WARNING SIGNS 40 MPH OR LESS, TWO-WAY UNDIVIDED ROAD OPEN TO TRAFFIC AND SDD FOR BARRICADES AND SIGNS FOR SIDEROAD CLOSURES.

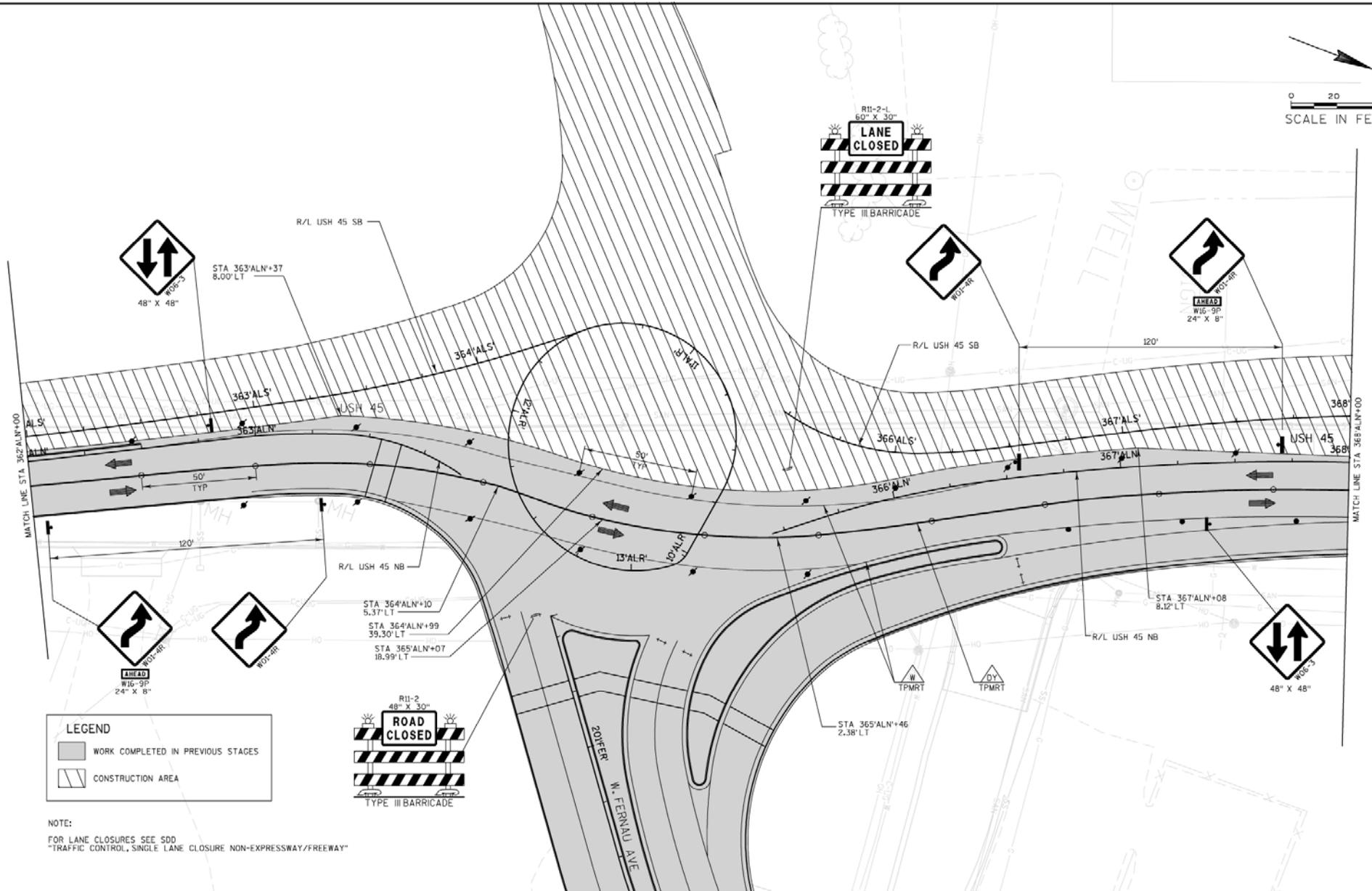
CONSTRUCTION ACTIVITIES TO BE COMPLETED :
 CONSTRUCT WEST HALF OF USH 45
 FINISH GRADING, PLACE PAVEMENT AND OTHER COMPLETION WORK ON LAKE BUTTE DES MORTS DR.

LEGEND

- WORK COMPLETED IN PREVIOUS STAGES
- CONSTRUCTION AREA

PROJECT NO: 1120-11-73	HWY: USH 41	COUNTY: WINNEBAGO	TRAFFIC CONTROL - OVERVIEW STAGE 3	SHEET	E
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FILE NAME : ch_1173_026300_03.dgn PLOT DATE : 28-JAN-2009 PLOT BY : j.lperoni PLOT NAME : PLOT SCALE : 200.000000:1.000000 WISDOT/CADD SHEET 42



LEGEND

- WORK COMPLETED IN PREVIOUS STAGES
- CONSTRUCTION AREA

NOTE:
 FOR LANE CLOSURES SEE SDD
 TRAFFIC CONTROL, SINGLE LANE CLOSURE NON-EXPRESSWAY/FREEWAY

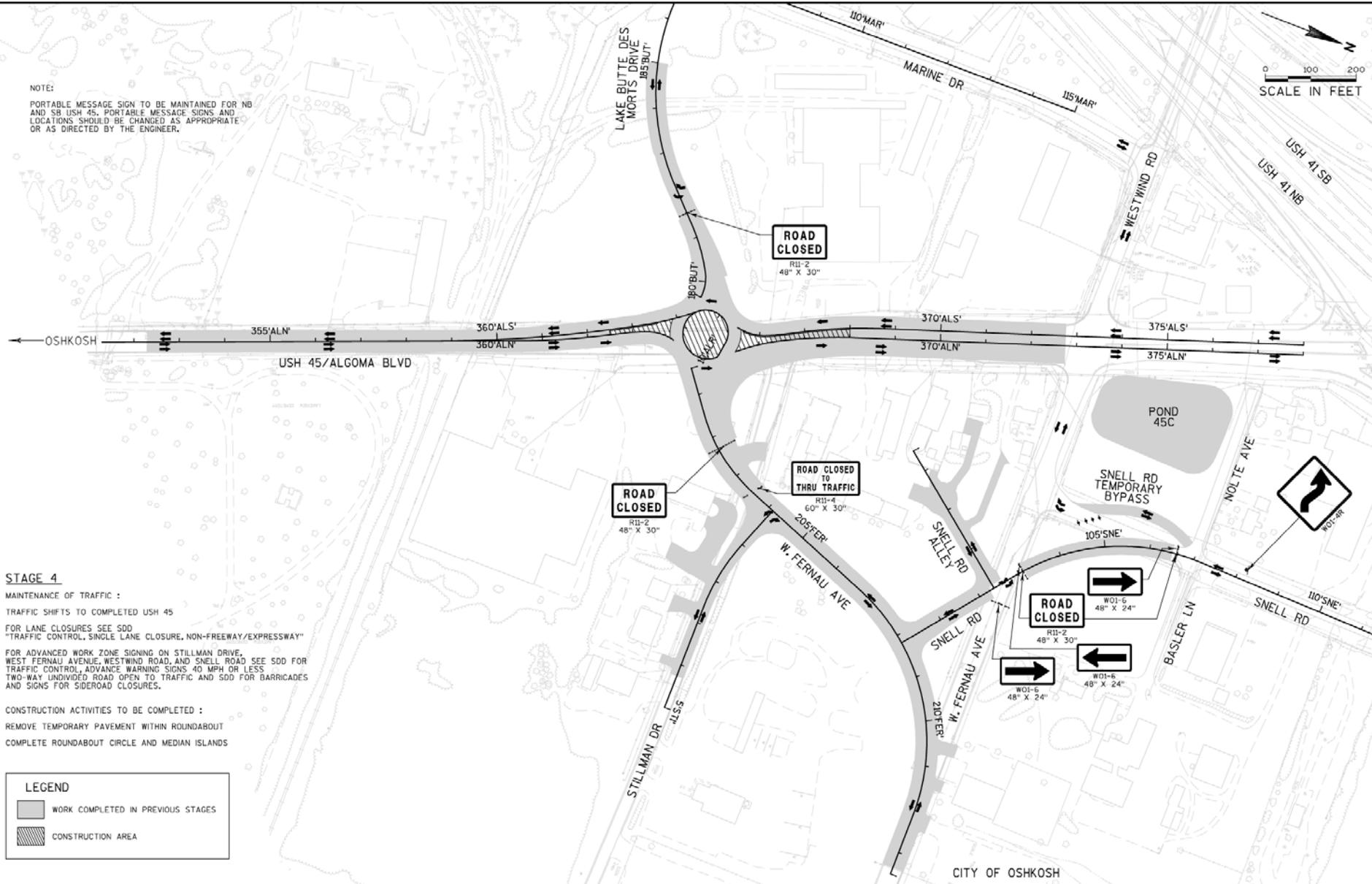


PROJECT NO: 1120-11-73	HWY: USH 41	COUNTY: WINNEBAGO	TRAFFIC CONTROL - USH 45 STAGE 3	SHEET	E
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FILE NAME : ch_1173_026303_s3.dgn PLOT DATE : 28-JAN-2009 PLOT BY : jplern1 PLOT NAME : PLOT SCALE : 40.000000:1.000000 WISDOT/CADD SHEET 42

NOTE:

PORTABLE MESSAGE SIGN TO BE MAINTAINED FOR NB AND SB USH 45. PORTABLE MESSAGE SIGNS AND LOCATIONS SHOULD BE CHANGED AS APPROPRIATE OR AS DIRECTED BY THE ENGINEER.



STAGE 4

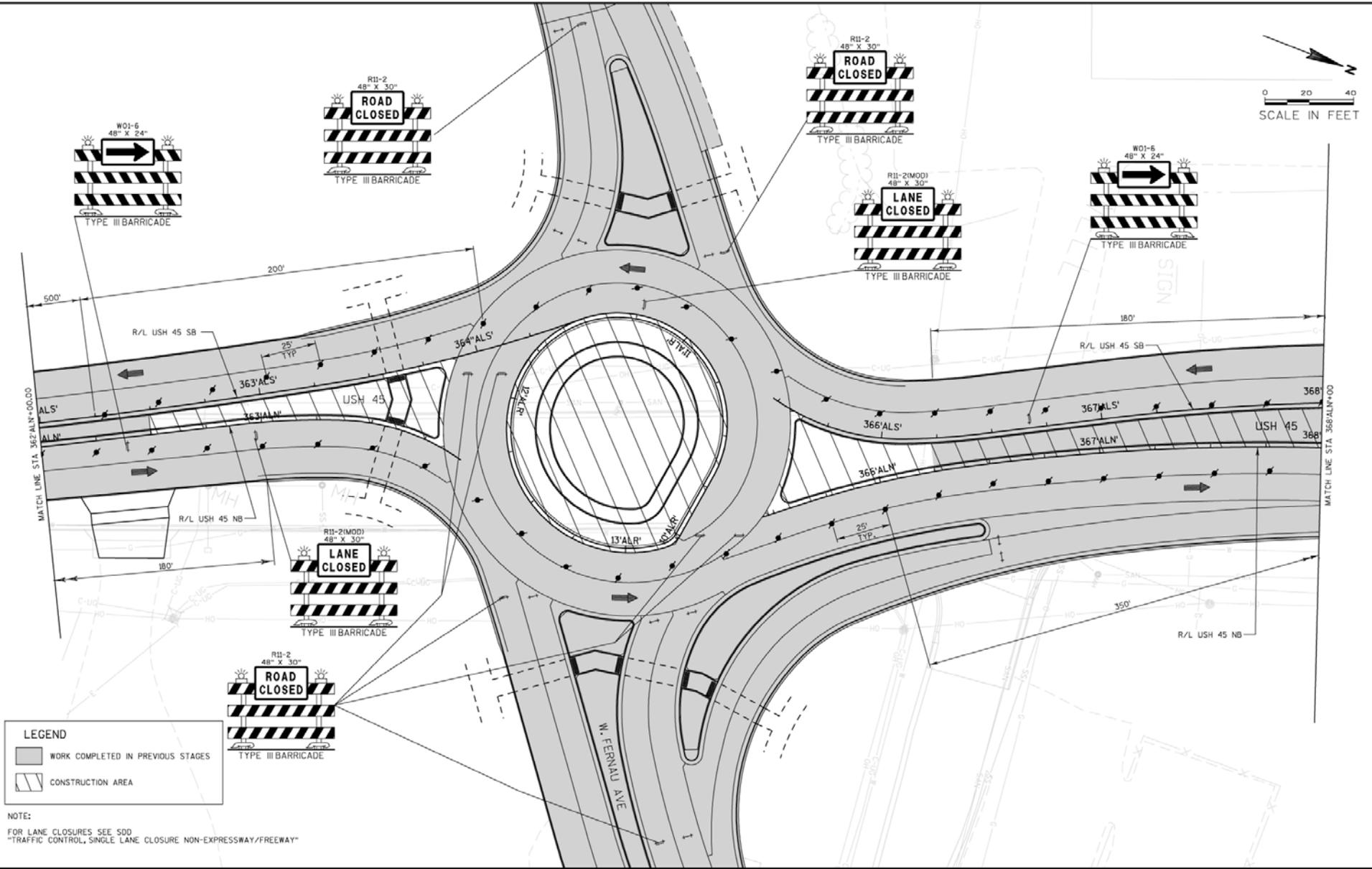
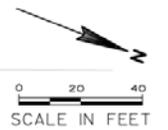
MAINTENANCE OF TRAFFIC :
TRAFFIC SHIFTS TO COMPLETED USH 45
FOR LANE CLOSURES SEE SDD
"TRAFFIC CONTROL, SINGLE LANE CLOSURE, NON-FREEWAY/EXPRESSWAY"
FOR ADVANCED WORK ZONE SIGNING ON STILLMAN DRIVE, WEST FERNAU AVENUE, WESTWIND ROAD, AND SNELL ROAD SEE SDD FOR TRAFFIC CONTROL, ADVANCE WARNING SIGNS 40 MPH OR LESS. TWO-WAY UNDIVIDED ROAD OPEN TO TRAFFIC AND SDD FOR BARRICADES AND SIGNS FOR SIDEROAD CLOSURES.
CONSTRUCTION ACTIVITIES TO BE COMPLETED :
REMOVE TEMPORARY PAVEMENT WITHIN ROUNDABOUT
COMPLETE ROUNDABOUT CIRCLE AND MEDIAN ISLANDS

LEGEND

-  WORK COMPLETED IN PREVIOUS STAGES
-  CONSTRUCTION AREA

PROJECT NO: 1120-11-73	HWY: USH 41	COUNTY: WINNEBAGO	TRAFFIC CONTROL - OVERVIEW STAGE 4	SHEET	E
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FILE NAME : ch_1173_026400_e4.dgn PLOT DATE : 28-JAN-2009 PLOT BY : jpleron1 PLOT NAME : PLOT SCALE : 200.000000:1.000000 WISDOT/CADD SHEET 42



LEGEND

- WORK COMPLETED IN PREVIOUS STAGES
- CONSTRUCTION AREA

NOTE:
 FOR LANE CLOSURES SEE SDD
 TRAFFIC CONTROL, SINGLE LANE CLOSURE NON-EXPRESSWAY/FREEWAY

PROJECT NO: 1120-11-75	HWY: USH 41	COUNTY: WINNEBAGO	TRAFFIC CONTROL - USH 45 STAGE 4	SHEET	E
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Appendix B

Gilbert's Corner, VA

Roundabout Construction Staging and Traffic Control Plan for Construction Where Some Traffic was Diverted

This appendix contains construction staging and traffic control plans for a new roundabout that was constructed in Gilbert's Corner, Virginia and is an example of where a roundabout was built with traffic detoured. The roundabout was constructed at the intersection of Route 50 and Route 15. During the first phase of roundabout construction (noted as Phase 3 in the plans), eastbound and westbound traffic continued along Route 50 while construction of the southern half of the roundabout took place. Also during this phase, traffic on Route 15 was detoured. In the second phase of roundabout construction at this intersection (noted as Phase 4 in the plans), Route 50 traffic was diverted via a connector road to Route 15 while construction of the eastern half of the roundabout took place. In the final phase of roundabout construction (noted as Phase 5 in the plans), the roundabout was opened to full traffic as the splitter islands and truck apron were completed.

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

ROUTE	STATE	FEDERAL PROJECT	DATE		SHEET NO.
			ROUTE	PROJECT	
	VA		50	0050-053-119, RW-201 C-501	10(3)



MAINTENANCE OF CONSTRUCTION - PHASE 3

THIS PHASE OF CONSTRUCTION IS TO PROVIDE FOR THE CONSTRUCTION OF THE SOUTH SECTION OF ROUNDABOUT 1, ROUNDABOUT 4, AND THE PORTION OF RT.15 BETWEEN ROUNDABOUTS 1 AND 4. THIS PHASE WILL ALSO CONSTRUCT THE RT.15 SOUTHBOUND RIGHT TURN LANE AND ISLAND AS SHOWN.

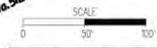
CONTRACTOR TO INSTALL LIFTS OF ASPHALT TO ALLOW MATCHING WITH ULTIMATE GRADES.

CONTRACTOR TO BUILD CONCRETE APRON WITHOUT INSIDE OR OUTSIDE CURB IN THIS AREA. TEMPORARY ASPHALT SHALL BE PLACED TO ALLOW SMOOTH TRANSITION FOR DRIVABLE SURFACE.

JOHN S MOSBY HWY (US ROUTE 50)

JAMES MONROE HWY (US ROUTE 15)

- Legend**
- ← Denotes Traffic Direction
 - [Cross-hatched] Denotes Construction Area
 - [Diagonal lines] Denotes 'Off Peak' Construction Area
 - [Dashed lines] Denotes Traffic on New and/or Temporary Pavement
 - [Stippled] Denotes Mill and Overlay
 - [Solid grey] Denotes Current Travel Path
 - [CB symbol] Denotes Concrete Construction Barrier
 - [• symbol] Denotes Temporary Construction Barrier
 - [CE symbol] Denotes Construction Entrance



PHASE 3

PLAN NO.	PROJECT	FILE NO.	SHEET NO.
	0050-053-119		10(3)

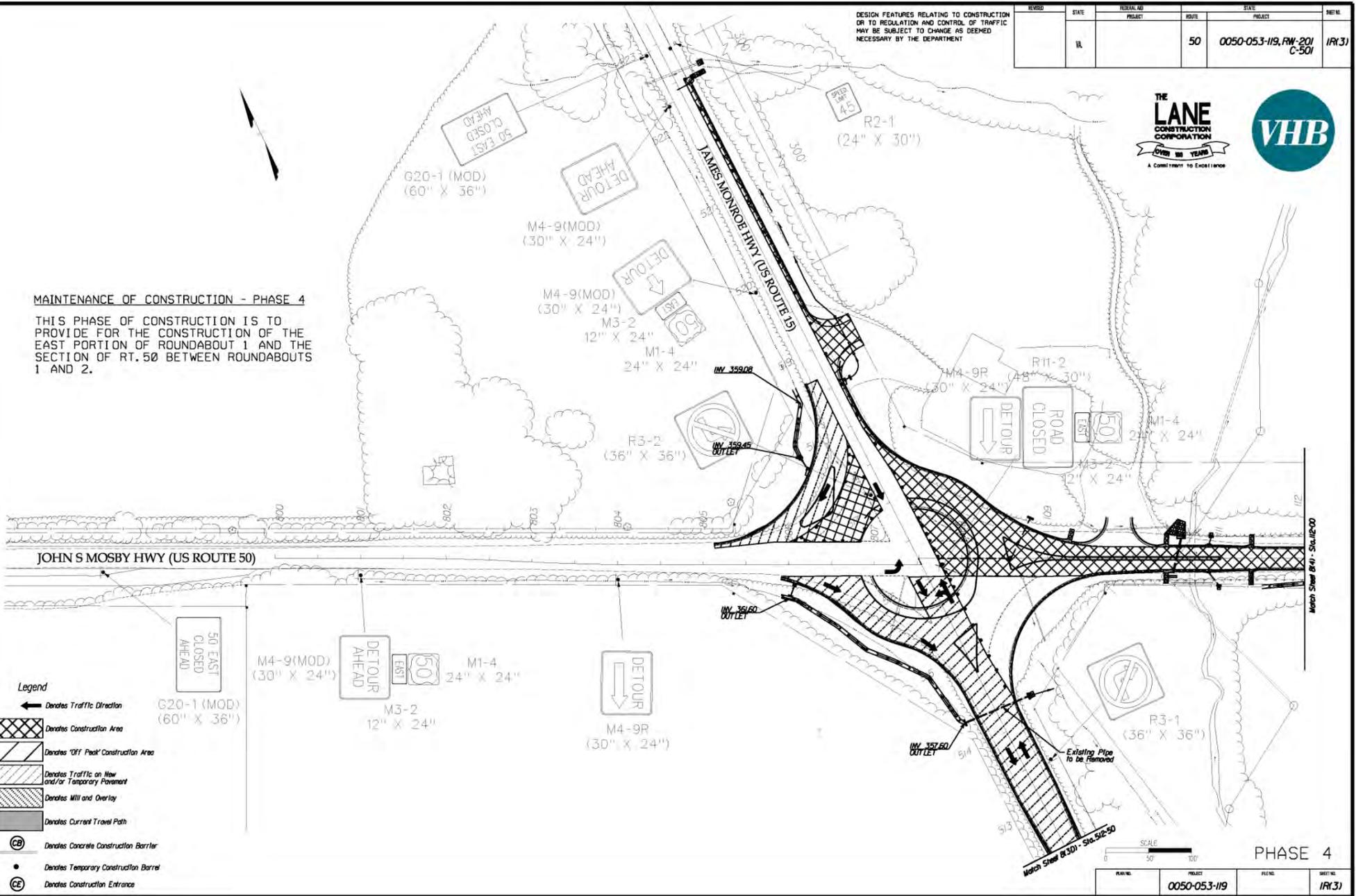
RT15/MS/2019

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

NUMBER	STATE	FEDERAL NO.	ROUTE	STATE	PROJECT	SHEET NO.
	VA		50		0050-053-119, RW-201 C-501	1(R/3)



MAINTENANCE OF CONSTRUCTION - PHASE 4
 THIS PHASE OF CONSTRUCTION IS TO PROVIDE FOR THE CONSTRUCTION OF THE EAST PORTION OF ROUNDABOUT 1 AND THE SECTION OF RT. 50 BETWEEN ROUNDABOUTS 1 AND 2.



- Legend**
- ← Detour Traffic Direction
 - [Cross-hatched] Detour Construction Area
 - [Diagonal lines] Detour 'Off Peak' Construction Area
 - [Horizontal lines] Detour Traffic on New Lane/Temporary Pavement
 - [Vertical lines] Detour Mill and Overlay
 - [Solid grey] Detour Current Travel Path
 - [CB symbol] Detour Concrete Construction Barrier
 - [• symbol] Detour Temporary Construction Barrel
 - [CE symbol] Detour Construction Entrance



PHASE 4

PLAN NO.	PROJECT	FILE NO.	SHEET NO.
	0050-053-119		1(R/3)

8/11/2016 10:56 AM

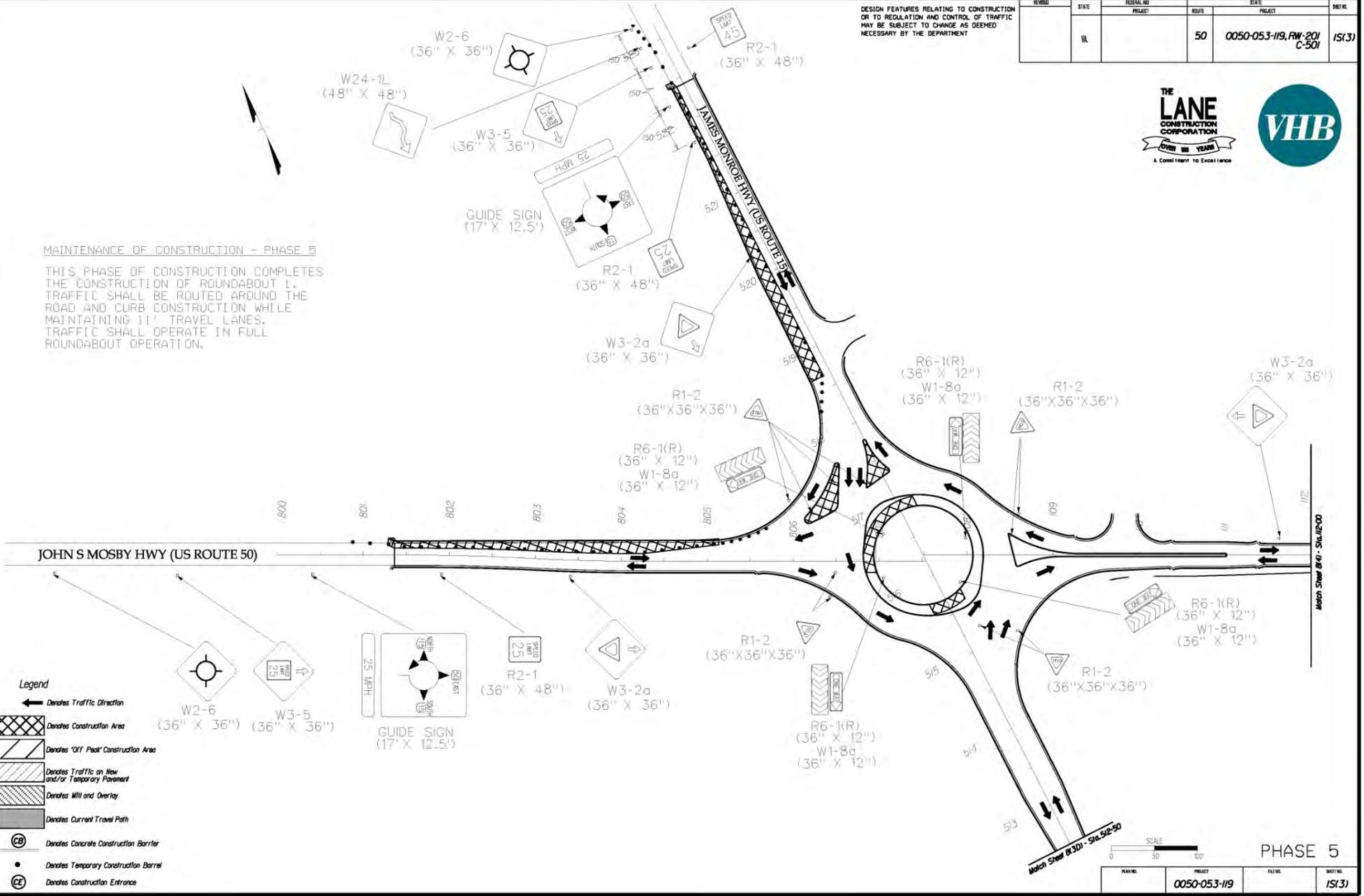
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

ROUTE	STATE	FEDERAL AID PROJECT	STATE PROJECT		SHEET NO.
			ROUTE	PROJECT	
	VA		50	0050-053-119, RW-201 C-501	15(3)



MAINTENANCE OF CONSTRUCTION - PHASE 5

THIS PHASE OF CONSTRUCTION COMPLETES THE CONSTRUCTION OF ROUNDABOUT 1. TRAFFIC SHALL BE ROUTED AROUND THE ROAD AND CURB CONSTRUCTION WHILE MAINTAINING 11' TRAVEL LANES. TRAFFIC SHALL OPERATE IN FULL ROUNDABOUT OPERATION.



Legend

- ← Denotes Traffic Direction
- Denotes Construction Area
- Denotes "Off Peak" Construction Area
- Denotes Traffic on New and/or Temporary Pavement
- Denotes Mill and Overlay
- Denotes Current Travel Path
- Denotes Concrete Construction Barrier
- Denotes Temporary Construction Barrel
- Denotes Construction Entrance



PHASE 5

DATE	PROJECT	FILED	SHEET NO.
	0050-053-119		15(3)

9/15/2016

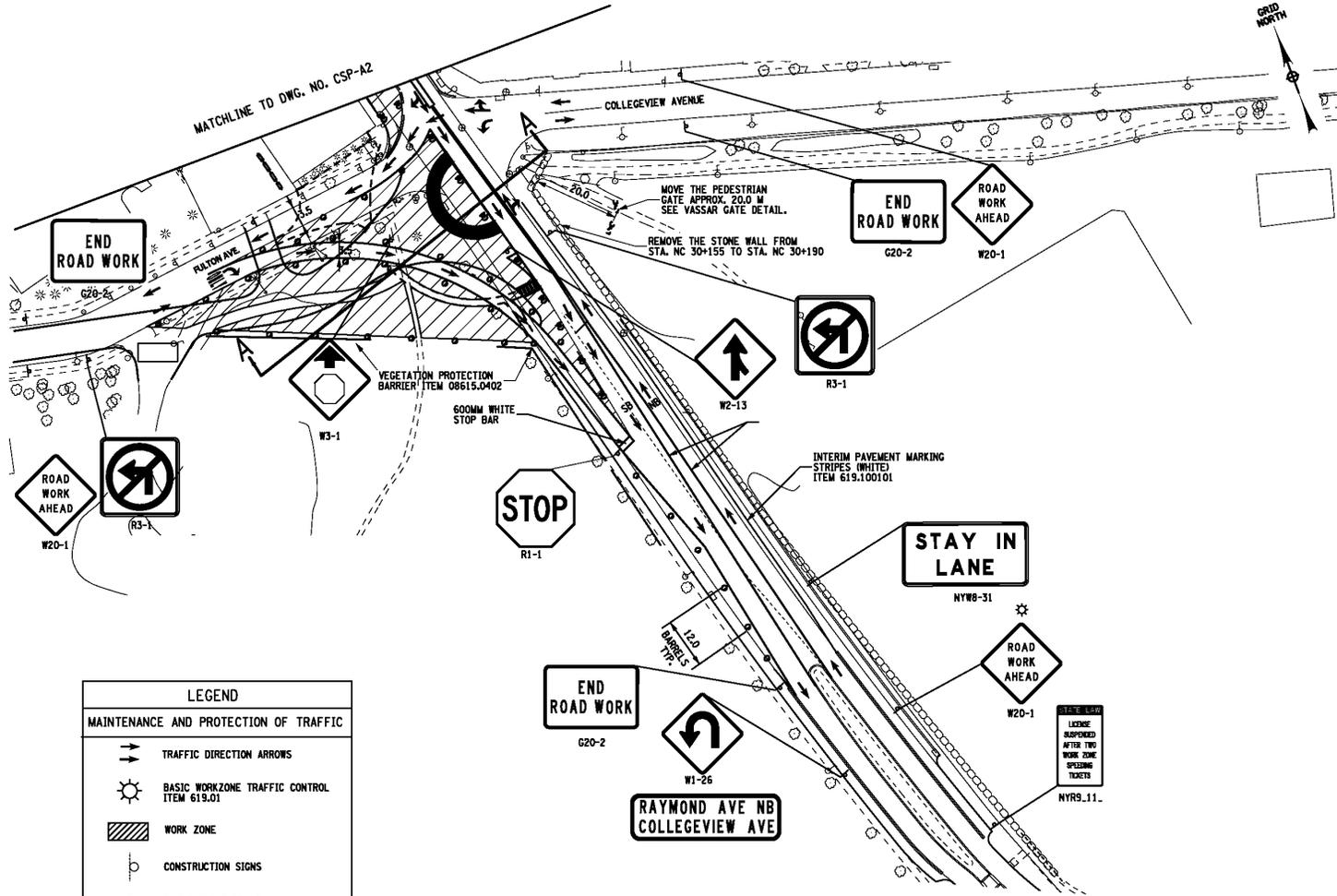


Appendix C

Poughkeepsie, Dutchess County, NY

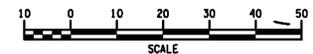
Roundabout Construction Staging and Traffic Control Plan for Construction Under Full Traffic

This appendix contains construction staging and traffic control plans for the Raymond Avenue and Collegeview Avenue roundabout in the Town of Poughkeepsie, Dutchess County, NY and is an example of construction under full traffic. During Phase I, a temporary right turn lane was constructed on the eastbound approach to Collegeview Avenue while the western portion of the roundabout underwent construction. In Phase II, temporary roadways were constructed on the northbound and westbound approaches to Raymond Avenue as crews constructed the eastern portion of the roundabout.

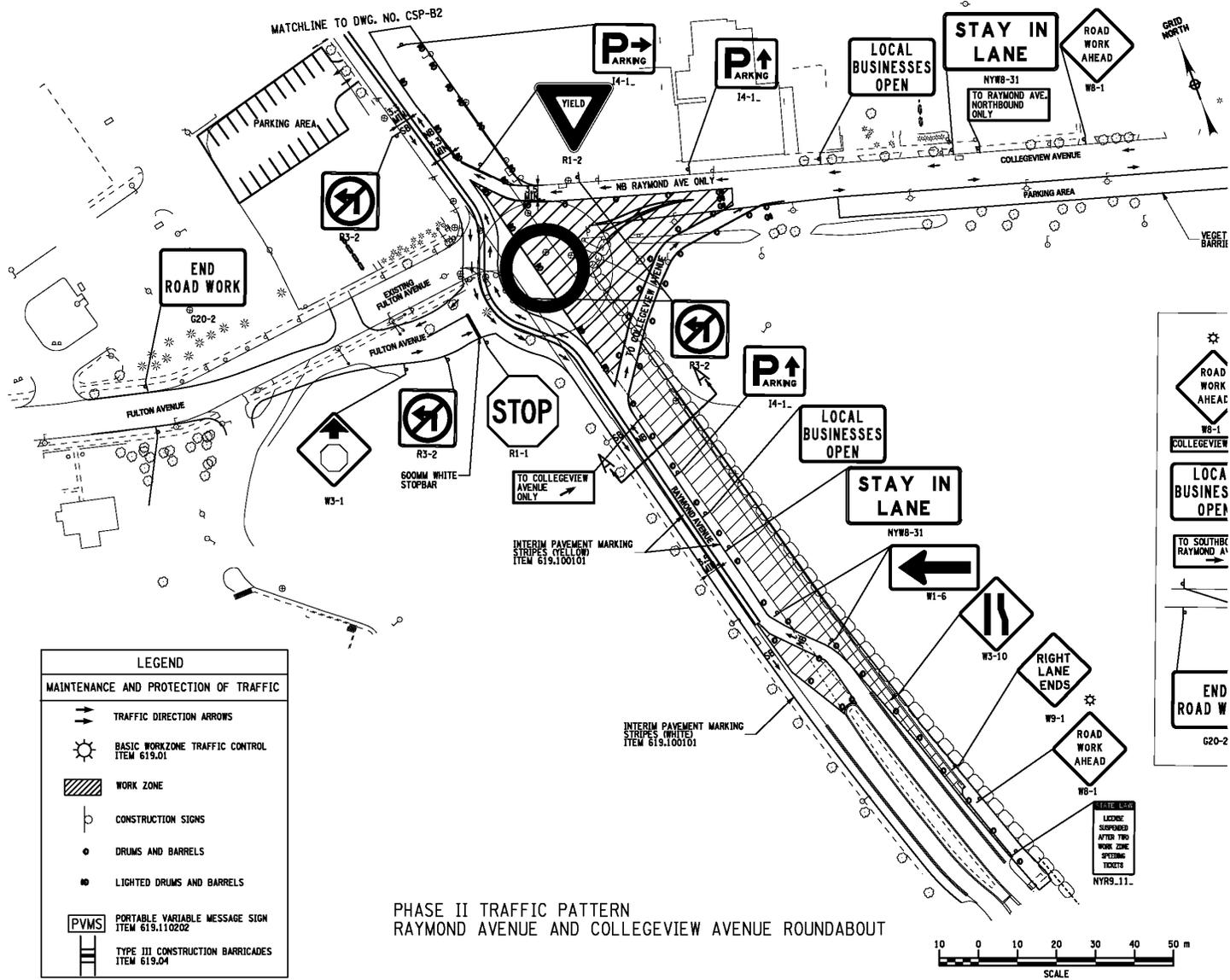


LEGEND	
MAINTENANCE AND PROTECTION OF TRAFFIC	
	TRAFFIC DIRECTION ARROWS
	BASIC WORKZONE TRAFFIC CONTROL ITEM 619.01
	WORK ZONE
	CONSTRUCTION SIGNS
	DRUMS AND BARRELS
	LIGHTED DRUMS AND BARRELS
	PORTABLE VARIABLE MESSAGE SIGN ITEM 619.110202
	TYPE III CONSTRUCTION BARRICADES ITEM 619.04

PHASE 1 TRAFFIC PATTERN
RAYMOND AVENUE AND COLLEGEVIEW AVENUE ROUNDABOUT



Phase I Traffic Pattern Raymond Avenue and Collegeview Avenue Roundabout



PHASE II TRAFFIC PATTERN
RAYMOND AVENUE AND COLLEGEVIEW AVENUE ROUNDABOUT

Phase II Traffic Pattern Raymond Avenue and Colledgeview Avenue Roundabout



Appendix D

Roundabout Temporary Traffic Control Typical Applications for Maintenance Operations

This appendix contains examples of typical applications for how maintenance operations are performed within existing roundabouts. Each typical application details whether the application is for partial closure of a single- or multi-lane roundabout, and specifies which lane is closed. The typical applications give considerations for temporary traffic control use and originate from State practices, as indicated in each example.



Typical Application 1a Single-Lane Roundabouts: Partial Closure

(Source: Virginia DOT (1). Work Area Protection Manual, 2011 Edition, Figure TTC-31.0)





Notes:

1. Each roundabout is unique and the traffic control must be developed to meet the specific conditions of the location and the work operation. A detour could possibly better serve traffic movement and must be considered as an alternative to the flagger operation.
2. Flaggers shall control traffic flow on all approaches of the one-lane roundabout.
3. A lead flagger shall be designated and radio communication shall be used by the flaggers.
4. Only one quadrant of traffic shall be released at a time.
5. At night, flagger stations shall be illuminated. Street lights and vehicle headlights shall not be used to illuminate the flagger station.
6. Flashing warning lights and/or flags may be used to call attention to the advance warning signs in accordance with MUTCD (6), State or local standards or guidelines.
7. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity amber rotating, flashing, oscillating, or strobe lights. Vehicle hazard warning signals can be used to supplement high-intensity amber rotating, flashing, oscillating, or strobe lights.
8. A portable changeable message sign (PCMS) should be considered as part of the traffic control plan to provide clear guidance to motorists on all approaches of the roundabout, especially approaches that must reverse traffic flow.
9. Care should be exercised when establishing the limits of the work zone to ensure maximum possible sight distance to the flagger station. Generally speaking, motorists should have a clear line of sight from the graphic flagger symbol sign to the flagger.
10. When designing the traffic control and installing the channelizing devices for work activities at roundabouts, accommodations for the turning radius of tractor trailer vehicles and other large vehicles should be considered and the work zone designed accordingly.
11. Periodic adjustments to the channelizing devices may be allowed in an active work zone to accommodate the turning movements of tractor trailer vehicles and other large vehicles.
12. A supplemental flagger may be used in the roundabout island to help direct traffic and may be required on the approaches in advance warning of the flagging operation to slow traffic prior to reaching the flagger station or queued traffic.
13. On the approaches where traffic flow will be split, two pilot vehicles may be used to guide traffic through the roundabout.
14. Flagging operations may not be necessary when working on the shoulders or in the island of the roundabout. If a driving lane(s) width of at least 10 feet (or more depending on the design vehicle) can be maintained while shoulder work on an approach is being conducted, the driving lane(s) may remain open to traffic. ROAD WORK AHEAD, SHOULDER WORK AHEAD and/or SHOULDER CLOSED signs should be used where applicable, along with lane or shoulder tapers and work area delineation.



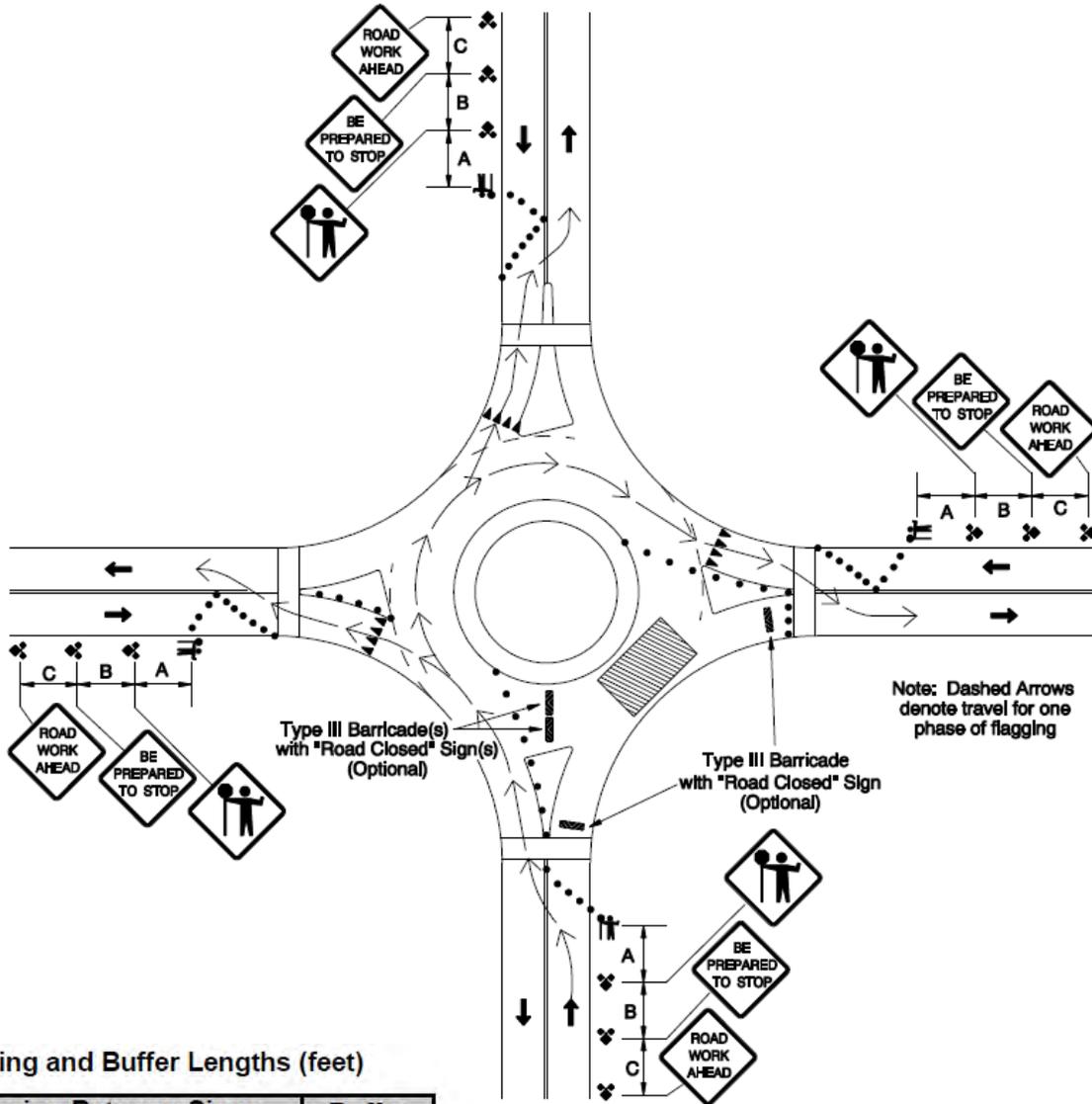
15. In cases where pavement marking are no longer applicable to the traffic pattern of the roundabout, selecting between removal and covering before new traffic patterns are open to traffic requires careful deliberation.

Reference: (1, pp. 6H-70)



Typical Application 1b Single-Lane Roundabouts: Partial Closure

(Source: Oregon DOT (2). Temporary Traffic Control Handbook for Operations of Three Days or Less, Diagram 640)



Sign Spacing and Buffer Lengths (feet)

Posted Speed	Spacing Between Signs			Buffer Space
	A	B	C	
20				50
25	100	100	100	75
30				100
35	350	350	350	125
40				150
45	500	500	500	180
50				210
55				250



Notes

1. Each roundabout is unique and the traffic control must be developed to meet the specific conditions of the location and the work operation.
2. Use truck-mounted flashing warning lights on work and protection vehicles.
3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs in accordance with MUTCD (6), State or local standards or guidelines.
4. A portable changeable message sign (PCMS) should be considered as part of the traffic control plan to provide clear guidance to motorist on all approaches of the roundabout, especially approaches that must reverse traffic flow.
5. If any of the road approaches cannot access the intersection due to the work space, a detour may be required. Road closure approval and the detour route should be provided by the road jurisdiction. For short closures of 20 minutes or less, traffic may be held in place.
6. For work within the roundabout island, initial advance warning signs are required on each approach leg. If the work and all work vehicles are off of the travel lanes and island apron, a single sign per approach is all that is required.
7. If the central island apron will be impacted by the work or equipment, treat it as a shoulder closure for the length of work. But, consider diverting truck traffic due to large vehicle off-tracking.
8. For multi-lane roundabouts, if work can be done without closing both travel lanes, flaggers may not be needed. Appropriate signs for the lane closure at each entry are required.
9. Cones may not be needed along the splitter islands on the approaches if these are raised islands. In such cases, the flagger may have to move far enough ahead on the approach of the splitter island so that traffic can maneuver into the roundabout.
10. If work occurs in an approach leg, a minimum of two flaggers shall be used to control traffic. High approach volumes may require additional flaggers for the remaining legs. The ROAD WORK AHEAD, BE PREPARED TO STOP and Flagger Symbol signs are required in advance of each leg as shown.
11. Flagging operations may not be necessary when working on the shoulders or in the island of the roundabout. If a driving lane(s) width of at least 10 feet (or more depending on the design vehicle) can be maintained while shoulder work on an approach is being conducted, the driving lane(s) may remain open to traffic. ROAD WORK AHEAD, SHOULDER WORK AHEAD and/or SHOULDER CLOSED signs should be used where applicable, along with lane or shoulder tapers and work area delineation.
12. In multi-lane roundabouts, merge traffic into one through lane prior to work.
13. Periodic adjustments to the channelizing devices may be allowed in an active work zone to accommodate the turning movements of tractor trailer vehicles and other large vehicles.

Reference: (2, pp. 122)



Typical Application 1c

Single-Lane Roundabouts: Partial Closure

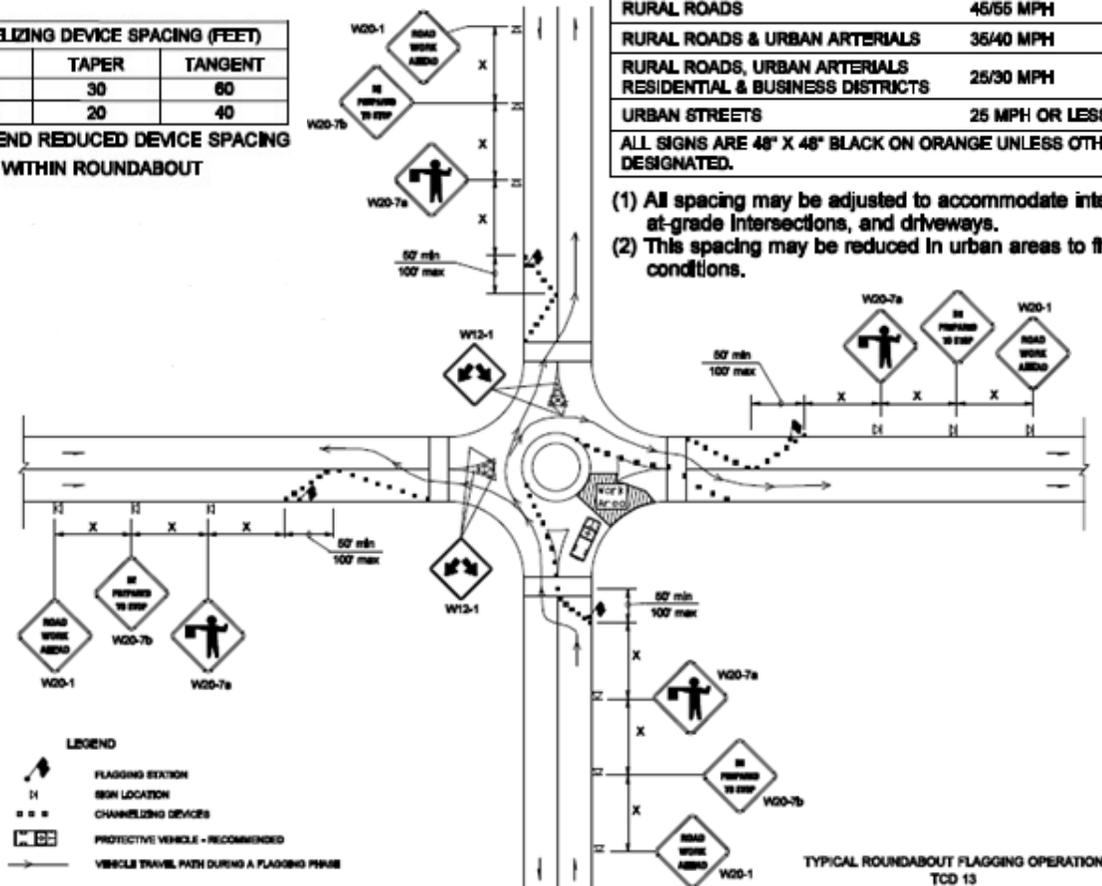
(Source: Washington DOT (3). Work Zone Traffic Control Guidelines, TCD 13)

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35 / 45	30	60
25 / 30	20	40

RECOMMEND REDUCED DEVICE SPACING WITHIN ROUNDABOUT

SIGN SPACING = X (FEET) (1)		
RURAL ROADS	45/55 MPH	500±
RURAL ROADS & URBAN ARTERIALS	35/40 MPH	350±
RURAL ROADS, URBAN ARTERIALS RESIDENTIAL & BUSINESS DISTRICTS	25/30 MPH	200± (2)
URBAN STREETS	25 MPH OR LESS	100± (2)

- (1) All spacing may be adjusted to accommodate interchange ramps, at-grade intersections, and driveways.
- (2) This spacing may be reduced in urban areas to fit roadway conditions.



LEGEND

1. Night work requires additional roadway lighting at flagging stations, refer to WSDOT Standard Specifications for additional details.
2. Protective vehicle recommended - may be a work vehicle.
3. Each roundabout location is unique and the traffic control must be developed to meet the specific conditions of the location and the work operation.
4. If the work and all work vehicles are off of the travel lanes and island apron, a single Road Work Ahead sign per approach is all that is required. Refer to additional guidance in this manual for further information.
5. Consider an additional flagger in center island to assist traffic movement through roundabout or additional signing as appropriate.



Notes

1. This example provides general guidance on the signing and device requirements for maintenance work in and around a roundabout location.
2. Each roundabout location is unique and a site specific traffic control plan should be developed for the work operation.
3. For work within the roundabout, initial advance warning signs are required for each approach leg.
4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs in accordance with MUTCD (6), State or local standards or guidelines.
5. Flagging operations may not be necessary when working on the shoulders or in the island of the roundabout. If a driving lane(s) width of at least 10 feet (or more depending on the design vehicle) can be maintained while shoulder work on an approach is being conducted, the driving lane(s) may remain open to traffic. ROAD WORK AHEAD, SHOULDER WORK AHEAD and/or SHOULDER CLOSED signs should be used where applicable, along with lane or shoulder tapers and work area delineation.
6. If any of the road approaches to the roundabout cannot access the intersection due to work operations, then either flagging or possibly a detour is required.
7. A portable changeable message sign (PCMS) should be considered as part of the traffic control plan to provide clear guidance to motorist on all approaches of the roundabout, especially approaches that must reverse traffic flow.
8. If the central island apron will be impacted by the work or equipment, treat it as a shoulder closure for the length of work and consider diverting truck traffic due to large vehicle wheel tracking.
9. For multi-lane roundabouts, if work can be done without closing both travel lanes, flaggers may not be needed. Appropriate signs for lane closure at each entry are required.
10. Periodic adjustments to the channelizing devices may be allowed in an active work zone to accommodate the turning movements of tractor trailer vehicles and other large vehicles.

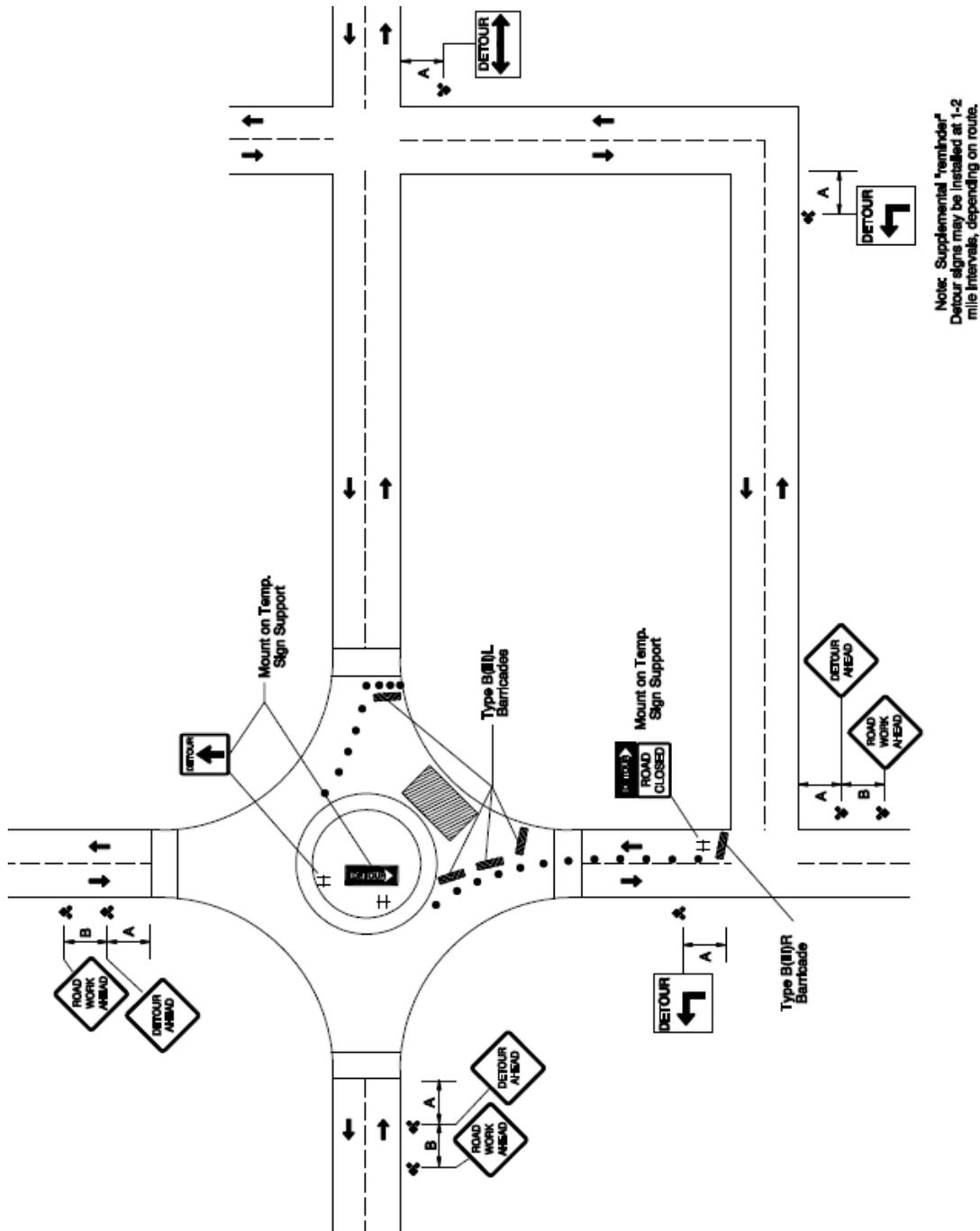
Reference: (3, pp. 1-19)



Typical Application 2

Single-Lane Roundabouts: Partial Closure with Detour

(Source: Oregon DOT (2). 2011 Oregon Temporary Traffic Control Handbook for Operations of Three Days or Less)





Notes

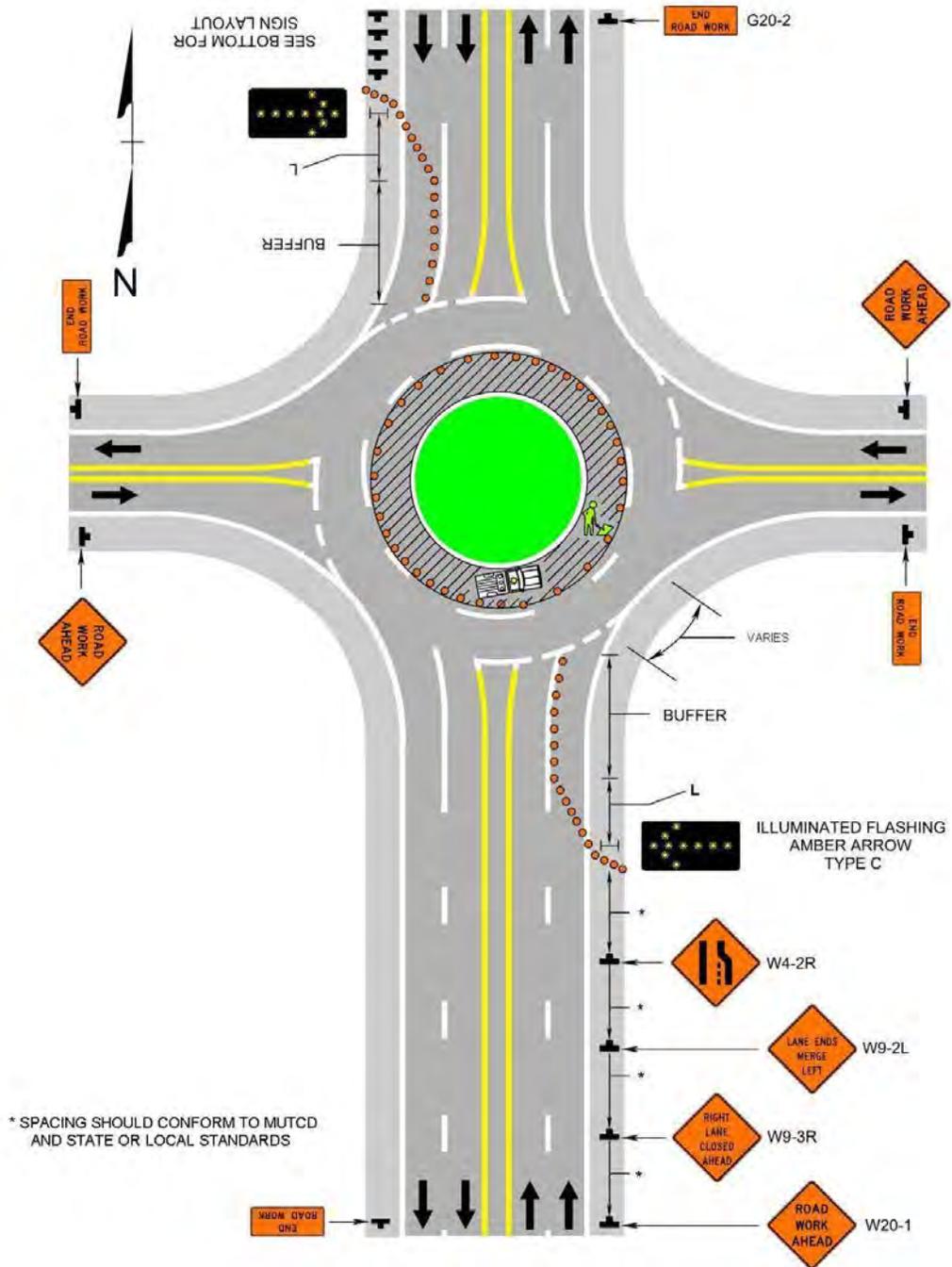
1. On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn. Supplemental detour signing can be used along the detour route for driver confirmation.
2. Detour signs may be located on the far side of intersections.
3. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white on green or black on orange. When used, the Street Name sign shall be placed above the Detour Sign.
4. The STREET CLOSED legend may be used in place of ROAD CLOSED.
5. Additional DO NOT ENTER signs may be used at intersections with intervening streets.
6. Warning lights may be used on Type 3 Barricades.
7. Flashing warning lights and/or flags may be used to call attention to the advance warning signs in accordance with MUTCD (6), State or local standards or guidelines.
8. A portable changeable message sign (PCMS) should be considered as part of the traffic control plan to provide clear guidance to motorist on all approaches of the roundabout.

Reference: (6, pp. 670,672)



Typical Application 3 Multi-Lane Roundabouts: Inside Lane Closure

(Source: Virginia DOT (1). Work Area Protection Manual, 2011 Edition, Figure TTC-32.0)





Notes

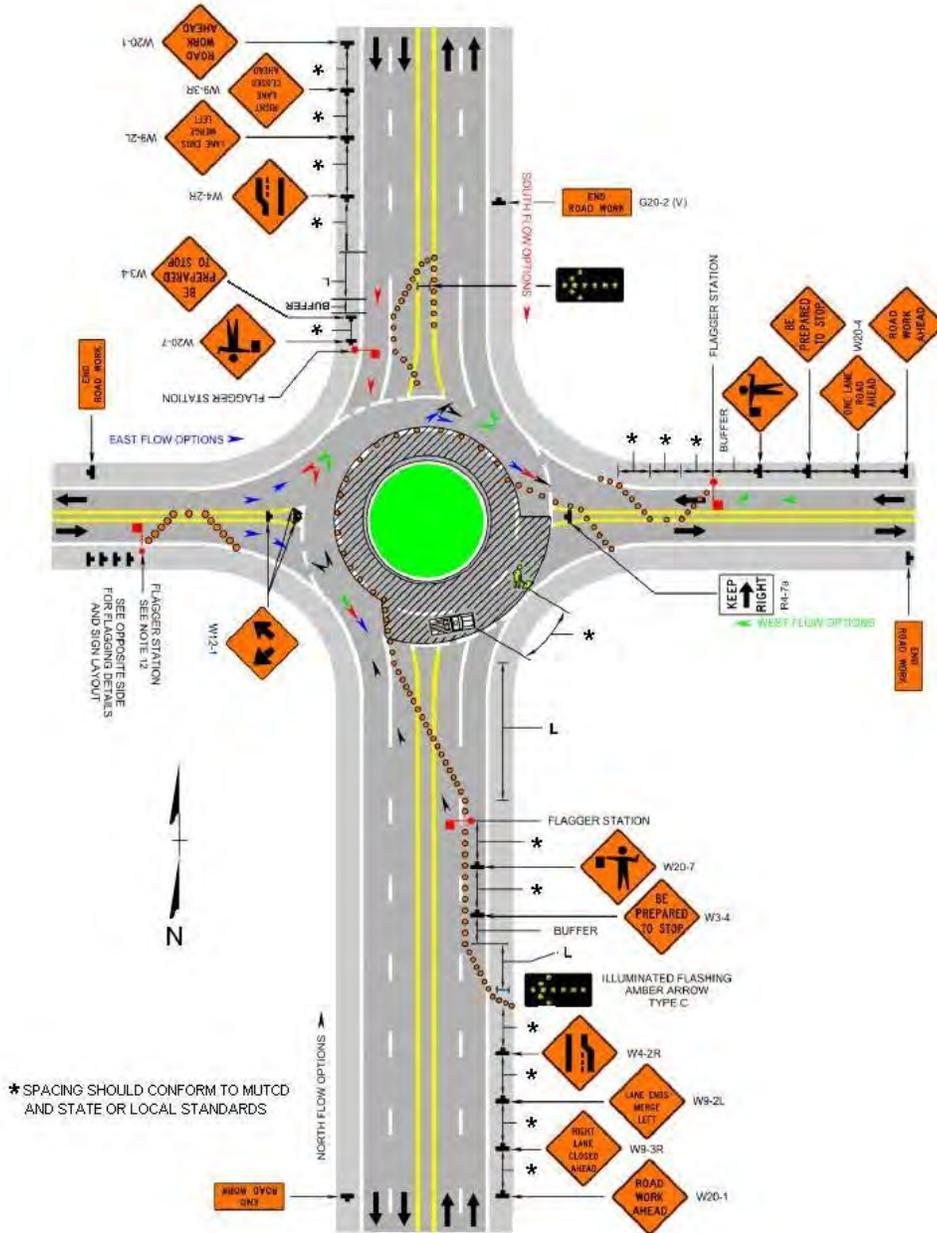
1. Each roundabout is unique and the traffic control must be developed to meet the specific conditions of the location and the work operation. A detour could possibly better serve traffic movement and must be considered as an alternative to the flagger operation.
2. Lane drop to center of roadway reflects standard lane drop practice and requires merging drivers to the left, similar to freeway on-ramps.
3. Flaggers should only control one lane of travel at any time within the roundabout or its approaches; each approach should have its own flagger and advanced warning signage.
4. Additional entry lanes should be closed prior to entering the roundabout.
5. On divided highways having a median wider than 8', right and left sign assemblies should be used for advanced warning signage placed prior to roundabout approach.
6. In cases where pavement marking are no longer applicable to the traffic pattern of the roundabout, selecting between removal and covering before new traffic patterns are open to traffic requires careful deliberation.
7. On divided highways having a median wider than 8', right and left sign assemblies shall be required.
8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity amber rotating, flashing, oscillating, or strobe lights. Vehicle hazard warning signals can be used to supplement high-intensity amber rotating, flashing, oscillating, or strobe lights.
9. Flashing warning lights and/or flags may be used to call attention to the advance warning signs in accordance with MUTCD (6), State or local standards or guidelines.
10. Generally speaking, motorists should have a clear line of sight from the graphic flagger symbol sign to the flagger.
11. When designing the traffic control and installing the channelizing devices for work activities at roundabouts, accommodations for the turning radius of tractor trailer vehicles and other large vehicles should be considered and the work zone designed accordingly.
12. Periodic adjustments to the channelizing devices may be allowed in an active work zone to accommodate the turning movements of tractor trailer vehicles and other large vehicles.
13. A portable changeable message sign (PCMS) should be considered as part of the traffic control plan to provide clear guidance to motorist on all approaches of the roundabout, especially approaches that must reverse traffic flow.

Reference: (1, pp. 6H-72)



Typical Application 4 Multi-Lane Roundabouts: Outside Lane Closure

(Source: Virginia DOT (1). Work Area Protection Manual, 2011 Edition, Figure TTC-33.0)





Notes

1. Each roundabout is unique and the traffic control must be developed to meet the specific conditions of the location and the work operation. A detour could possibly better serve traffic movement and must be considered as an alternative to the flagger operation.
2. Multi-lane approaches to the roundabout shall be reduced to one lane and a flagger shall control traffic flow on each approach of the roundabout.
3. A lead flagger shall be designated and radio communication shall be used by the flaggers.
4. Only one quadrant of traffic shall be released at a time.
5. At night, flagger stations shall be illuminated, except in emergencies. Street lights and vehicle headlights shall not be used to illuminate the flagger station.
6. Flashing warning lights and/or flags may be used to call attention to the advance warning signs in accordance with MUTCD (6), State or local standards or guidelines.
7. On divided highways having a median wider than 8', right and left sign assemblies shall be required.
8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity amber rotating, flashing, oscillating, or strobe lights. Vehicle hazard warning signals can be used to supplement high-intensity amber rotating, flashing, oscillating, or strobe lights.
9. A portable changeable message sign (PCMS) should be considered as part of the traffic control plan to provide clear guidance to motorists on all approaches of the roundabout, especially approaches that must reverse traffic flow.
10. When designing the traffic control and installing the channelizing devices for work activities at roundabouts, accommodations for the turning radius of tractor trailer vehicles and other large vehicles should be considered and the work zone designed accordingly.
11. Periodic adjustments to the channelizing devices may be allowed in an active work zone to accommodate the turning movements of tractor trailer vehicles and other large vehicles.
12. A supplemental flagger may be used in the roundabout island to help direct traffic and may be required on the approaches in advance warning of the flagging operation to slow traffic prior to reaching the flagger station or queued traffic.
13. On the approaches where traffic flow will be split, two pilot vehicles may be used to guide traffic through the roundabout.
14. In cases where pavement marking are no longer applicable to the traffic pattern of the roundabout, selecting between removal and covering before new traffic patterns are open to traffic requires careful deliberation.

Reference: (1, pp. 6H-74)



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Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the Federal Highway Administration.



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