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Submittal No.: 05c: Traffic Control Plan Revised

Date: July 14, 2016

**Vermont Department of Transportation**  
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**Description:** Proposal/Contract Number: Windsor-Hartford IM BPNT (13)  
Letting Date: 10/09/15; Award Date: 11/02/15  
Project Description: Bridge Painting of Eleven Bridges  
In the Towns of Windsor & Hartford, Windsor County, VT  
Contract Amount: \$8,671,323.00; Completion Date: 10/12/18

Contractor: **MONOKO, LLC**

Reviewed & Approved By: *Keri Monokandilos*  
Keri Monokandilos, Manager

Date: **07/14/2016**

Engineer: Paul Perry IV, Resident Engineer  
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Revision:

Please see review  
comments in green.

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PB AMERICAS, INC.	
BY:	<i>R. Beggs</i>
DATE:	<i>7/22/16</i>

# TRAFFIC CONTROL PLAN

FOR

Vermont Agency of Transportation

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## WINDSOR – HARDFORD IM BPNT (13)

(State of Vermont, Agency of Transportation

Interstate 91)

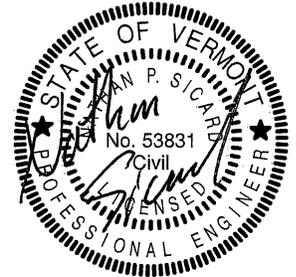
FOR

Monoko, LLC

1037 Peninsula Avenue, Tarpon Springs, FL 34689-2125  
monokollc@aol.com

June, 2016

Prepared by:



Rev. 7/13/16

**R E S**

**RUGGLES ENGINEERING SERVICES INC.**

Ruggles Engineering Services, 4580 Memorial Drive, St. Johnsbury, VT 05819

[www.rugglesengineeringservices.com](http://www.rugglesengineeringservices.com)



Appendix A –Supporting Information

Flagger Hand Signals

Breakaway Sign Post Requirements

Typical Ground Mounded Sign

Typical Energy Absorption Attenuator Barrels

Appendix B – VTrans Standard Sheets with Modifications

T-1 – Traffic Control General Notes.

Contract Traffic Control Notes

Appendix C – Night Lighting

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## SECTION 1 – GENERAL INFORMATION

### 1.1 Purpose:

The purpose of this Traffic Control Plan is to present site specific construction methods for work zone traffic control. This work shall consist of furnishing, installing, maintaining and removing traffic control devices necessary to provide reasonable protection & advanced warning for motorists and construction workers. The road surface will be maintained and will be free of defect or imperfections that would inhibit safe travel. This plan must be used with daily supervision and decision making. The plan preparer is not onsite and cannot dictate the implementation.

Traffic control devices include but are not necessarily limited to signs, markings, barricades, channeling and hand signaling devices and flaggers.

This plan is intended to comply with the Traffic Control Plan Requirements and the VTrans Work Zone Safety & Mobility Guidance Document, Appendix “A” Temporary Traffic Control Devices. All traffic control devices shall conform to the requirements of Part VI of the 2009 edition of the MUTCD, Rev. 2 (Manual on Uniform Traffic Control Devices) and comply with the NCHRP 350 guidelines and the requirements of this Traffic Control Plan. This plan will be used in conjunction with the Contract Plans, Special Provisions and Notice To Bidders.

A copy of this section of the manual and this Traffic Control Plan will be available at the construction site through the Key Personnel listed in section 1.5. All subcontractors working on this project along with our project superintendent, paving foreman and sign foreman will be provided with a copy of this Traffic Control Plan in addition to the field office copy.

### 1.2 Description of Project:

The project includes cleaning, lead paint removal and repainting the existing steel superstructure members and associated incidental work on Interstate 91 bridges in the Towns of Windsor and Hartford Vermont. The project will require a site specific traffic control plan for advanced warning, temporary and long term lane closures for work space and equipment storage.

#### **2016 Bridge Painting**

Bridges 34N and 34S, MM 57.40, (I-91 over Town Highway No. 5) in Windsor, Bridges 41N and 41 S, MM 69.68, (I-91 Bridges over Ramp C I-89 to I-91 Interchange) in Hartford, Bridges 45N and 45S, MM 72.01, (I-91 bridges over Bugbee St. in Hartford).

#### **2017 Bridge Painting (to be added in 2017)**

Bridge 41 C, MM 69.51, (I-89SB Ramp C Over I-89 to I-91NB) in Hartford, Bridges 42N and 42S, MM 69.81 (I-91 over I-89 N. and S.), Bridges 44N and 44S, MM 70.94 14, New England Central Railroad and the White River.

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## SECTION 2 – SITE SPECIFIC REQUIREMENTS

### 2.1 Work Zone Limitations

#### a. Work Restrictions

The work on this project will be performed during Monday thru Saturday. The Resident Engineer will be notified in advanced regarding Sunday work.

#### b. Permanent Signs

Permanent signs will be in place before the project starts. Permanent signs will be installed as shown on the figures in section 3.

#### c. Lane Width

Travel lanes will be a minimum of 12 feet wide on I-91, unless otherwise noted. Ramp C northbound and Bugbee road (under bridges 45N/45S) will be reduced to 10 feet when notification is given to the DMV.

#### d. Traffic Impact

Construction phasing and sequencing will be used to minimize traffic impacts.

##### i. Delay Time

Delay will occur in the reduced speed zones on I-91.

Delay will also occur as one lane traffic on Hunt Road and Bugbee Road.

##### ii. Portable Changeable Message Signs (PCMS)

PCMS Boards will be used as required in the Contract to provide advanced warning. All sign locations shall be laid out prior to installation as shown on this Plan with final approval from the Onsite Engineer. Signs have been relocated from the Contract Plan recommendations based on site specific conditions.

Only Bridge 34N will use a permanent closure for equipment mobilization on the top of the bridge. The site will require an advanced warning PCMS Board.

No PCMS Board is proposed for the Ramp C impacts due to the multiple traffic patterns on I-89 South.

No other PCMS Boards are proposed for the 2016 season.

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**e. Speed Reduction**

Speed reductions on I-91 will follow the T-11 standard. Speed reductions on other roads will follow the site specific plan.

Bridges 34N and 34S: Speed Limit 65. Reduction to 55MPH during permanent closure for the northbound Bridge 34N.  
Hunt Road: Speed Limit 35. No Reduction no permanent closure.

Bridges 41N and 41S: Speed Limit 55. No reduction, temporary shoulder closure only. Closure to be on ramp from I-89 SB to I-91 NB. Advisory ramp speed 40MPH at the I-89 Exit, Ramp advisory speed decreases to 30mph at the I-91 South and I-91 North junction, no additional reduction.

Bridge 45N and 45S: Speed Limit 65MPH Southbound, 55MPH Northbound.  
Bugbee Road: 45 MPH, Closure 35 MPH. 45 MPH signs are posted at each end of Bugbee road which is approximately 1500 feet each side of the project. These signs will be covered since the Advisory Speed Limit Ahead signs would need to be approximately located in the same areas.

**f. Lane Closure**

Lane closures will include temporary daily closures and long term closures (overnight and greater than 3 days). Daily mobile lane closures will use cones or barrels. Signs will be on portable stands with at least 1 foot clearance from the highway surface. Signs not applicable to current work area conditions will be laid down as required by VTrans or removed as needed.

Permanent lane closures on divided highway interstate lanes will be on I-91 northbound for Bridge 34N only. Shifted lanes will be required on I-89 ramp C to I-91 northbound and Bugbee Road (Hartford Town Highway).

Interstate work zone lane closures will utilize Standard T-11 and T-12 (as modified for each site). Right lane closures will also incorporate a modified standard T-23 when ramps are within the work area. Generally left lane closures or shoulder closures will be used as to eliminate the need for T-23. Long term lane closures will use the modified T-13. UTO's will be used ahead of the work zone buffer area during the daily closures with temporary signs.

**g. Ramp Closures (Reduced width)**

The northbound ramp from I-89 south to I-91 north will be require a reduced width for the permanent closures. Ramp lane widths will be reduced to 10 feet. A 12 foot lane width will be maintained for the temporary closures. Ramp work will utilize mobile/portable work zone signs, barrels, attenuators, drums and cones.

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**h. Roadway Surface Conditions**

The road surface maintained and open to traffic shall be free of defect or imperfections that would inhibit safe travel.

**i. Equipment and Waste Storage**

Equipment during the long term closures will be located behind barrier

Waste storage will be located behind the barrier wall or guardrails.

**j. Detours**

There are no detours planned on this project.

**k. Signage**

- Permanent signs will be located along approach areas as shown on the site specific plans in Section 3. Signs will not be placed such that they are obscured by existing signs or objects.

The height of permanent signs will be as shown on Permanent Sign detail in Appendix A, the bottom of the sign will be no less than 7 feet above the adjacent grade or sidewalk.

Sign locations will not be placed such that they would interfere with existing signs.

- Portable signs will be placed on the edge of the roadway and a minimum of 1 foot above the travel way. The signs will not be placed which would obstruct the ADA use of the sidewalks. Portable (Daily) signs are expected to be the most effective method to warn motorists of the nearby work and workers.
- Vegetation that interferes with the visibility of the signs will be removed and disposed of as needed.
- When signs are placed behind Guardrails, the sign face will be above the top of the rail.
- Permanent signs will be mounted on two steel posts, complying with NCHRP 350 and manufacturers installation procedures. The steel post installation procedure requires a lap splice breakaway system. The installation details have been included in Appendix A. In addition to the post installation methods, the top of the steel posts will not protrude above the signs when installed.
- Portable signs will be mounted on steel easels labeled NCHRP 350 and 2009

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MUTCD compliant. The easels maybe tethered using a sand bag resting on the ground. Examples of portable signs for the project as shown on Appendix A.

- Signs meeting the NCHRP Report 350 will continue to be used however newer sign hardware may be certified from the AASHTO Manual for Assessing Safety Hardware (MASH).

## 2.2 Nighttime Traffic Control

### A. General

This section has been developed to allow for night time work. This section details how the work will be performed in accordance with the Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction (NCHRP Report 476). This plan has also been developed to comply with the Illumination Guidelines for Nighttime Highway Work. Generally this nighttime traffic control includes specific sections of the NCHRP Report 476.

The use of this plan and the referenced guidelines is to address the special problems that night work presents which are not covered in the Manual on Uniform Traffic Control Devices (MUTCD). The most obvious problem is that nighttime brings a reduction in visibility for both workers and drivers. The loss of visibility for workers results in the need for supplemental lighting that satisfies the visibility requirements of workers. The loss of visibility for drivers results not only from the absence of daylight and the inefficiency of headlighting, but also from the negative effects of glare and work zone lighting.

Workers will also be required to comply with ANSI/ISEA 107-2015 which breaks down apparel into types and performance classes.

### B. Night Time Traffic Control Design

#### i. Advanced Warning Signs

Because drivers are often less alert and are more likely to be impaired at night, the use of advanced warning signs in advance of roadway closures and detours is understood as very important.

#### ii. Warning Lights for Closure

The closure area will be illuminated with flood lighting since the closure work area.

#### iii. Worker Protection During Setup and Takedown

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Workers will have full body high vis, ANSI 107-2004 Class 3 approved clothing and flashing lights on all work vehicles if setup and takedown occurs during the night hours. Flaggers will remain within areas that are illuminated from overhead light towers. Flaggers will also wear full body Class 3 clothing. It is not intended for flaggers to be used for a nighttime setup or takedown unless special circumstances arise that necessitate the event. All setup and takedowns will be during daylight hours.

UTO's will be required to follow ANSI/ISEA 207-2006 and 207-2011 requirements for public safety workers. The responsibility of the UTO's safety will be the responsibility of the officer's commanding officer. UTO's will remain upstream of the last advancing warning sign when work the work activity area is less than one mile from the merging taper. If the work area moves beyond the merging taper, such as moving operations, the UTO will remain at least 400 feet upstream of the work area or work vehicles.

iv. Lighting

Work vehicles will be adequately visible and identifiable at night. Individual rotating or flashing lights will be used when available as they are preferred to flashing light bars. The rotating and flashing lights perform better in terms of conveying distance information and closure rates. Warning lights will be in operation whenever needed, but turned off when not needed to reduce the potential for driver confusion and to maintain the credibility of the lights when needed. In addition to the rotating or flashing beacons, the four-way emergency flashers will be activated on vehicles when appropriate to provide additional warning and closure rate information to other drivers or to make parked vehicles visible when in an exposed location. To minimize distraction and driver confusion, warning lights and four-way flashers on all work vehicles, including passenger cars and light trucks used by project staff, will be turned off whenever the vehicle is moving at normal speeds in the traffic stream for substantial distances. Likewise, warning lights will be turned off when the vehicle is parked out of the traffic stream in a position where it is protected from traffic and other work vehicles.

v. Reflective Tape

Dump trucks and other large trucks will have reflective tape on the rear of Rollers and other equipment will have reflective tape on the front, rear and

vi. Worker Protection

Highway construction and maintenance work are recognized as high-risk activities for workers and those risks are generally greater at night. Workers will use short sleeve shirts. Class III shirts will meet the Class I and Class II requirements and provide additional visibility around equipment. These workers are not intended to be working within the traffic zones of the highway. If an employee needs to enter the open highway, the worker needs to be fitted with Supplemental Class E high-vis garments such as pants, bib overalls, shorts or gaiters as long they are worn with a Performance Class II or Class II garment. The overall ensemble must be Performance Class III. The onsite responsible person will be responsible for worker safety will ultimately select the

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appropriate class of garment as conditions arise. Informal on-site training, “tailgate safety programs” will be used to address safety issues for workers.

Only flaggers for traffic control who will be near travel lanes will use “whole body” Hi-Vis, ANSI 107-2004 Class 3 approved. Flaggers are not anticipated during the night time detours. Control of the detoured lanes will be controlled by UTO’s at the intersections. UTO’s will be required to follow ANSI/ISEA 207-2006 requirements. The responsibility of the UTO’s safety will be the responsibility of the officer’s commanding officer. The placement of the officer’s vehicle may be appropriate behind the closed lane but the vehicle will be placed at the discretion of the officer.

vii. Lighting Requirements

Research has shown that lighting is one of the most important factors to nighttime construction. The smaller the object to be seen is and the less contrast the object has with its background, the more light is needed for adequate visibility.

Lighting will follow the guidelines in the NCHRP Report 498 Illumination Guidelines for Nighttime Highway Work. The three basic levels of lighting are Level I, Level II and Level III. Level I will provide a minimum of 5 foot candles, Level II will provide a minimum of 10 foot-candles and Level III will provide a minimum of 20 foot candles.

a. Construction Equipment:

Level II illumination will be used around construction equipment. Floodlights on the equipment will provide Level II illumination around the equipment.

b. Glare Control:

At a minimum, the following will be met to avoid objectionable glare on roadways open to traffic.

- Portable light towers will be aimed parallel or perpendicular to the roadway.
- Portable light towers will not be aimed more than 60 degrees above the vertical (straight down).
- None of the Portable light towers will provide intensity greater than 20,000 candela at an angle of 72 degrees above the vertical.
- Mounting of shields may be used if glare is unacceptable.

c. Portable Light Tower Specifications

Portable light tower specifications have been included in the appendix which include acceptable fuel capacity and electrical requirements.

C. Implementation and Operation of Nighttime Traffic Control

Implementation and Operation of the Nighttime Traffic Control Plan will crew staffing planning, worker training, project site patrol, material availability and takedown procedures, overhead power line review, emergency and communication planning, administrative and technical oversight and supervision, trial run procedures, operational procedures and operational adjustments and shifts.

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i. Work Crew Staffing and Planning

The full time supervisor will be responsible for managing adequate levels of staffing and night lighting.

ii. Worker Training

Worker training will include making workers on nighttime projects aware of the special risks inherent to nighttime work, along with safeguards and procedures to be followed to compensate for the risks.

iii. Project Site Patrol

Proper maintenance of traffic control devices is most critical at night. Devices are more likely to be subject to damage and disruption by impaired drivers. Staff will patrol the project at night to ensure that all devices and safety features are in good working order, making adjustments and changes as needed.

iv. Setup and Takedown Procedures.

Traffic control measure setup and takedown will be performed as safely and efficiently as possible. Adequate time will be provided for setup so the nighttime constraints are not exceeded.

Shadow vehicles may be used during setup and takedown of lane closure and channelizing devices. The use of shadow vehicles is important since nighttime work reduces visibility, includes impaired and unfamiliar drivers and high speeds result in higher accident rates and increased severity than daytime work.

The sequence of the steps for setup and removal is critical to ensure that traffic and workers are provided the greatest level of protection as the operation progresses. The following sequence will be typical for the project.

1. Activate night lighting systems when work hours extend into the early evening.
2. Place all portable lighting units at closure points, ramps, end of work area. Lights will be placed to reduce glare.
3. Removing temporary setups will proceed in the reverse order of the setup.

v. Material Availability

All materials needed for the night work will be preplanned.

vi. Emergency and Contingency Planning

Spare Parts

Spare parts, spare lighting equipment and replacement traffic control items will be available for all traffic control items and other safety features that are critical at night. These will include lamps and batteries.

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b. Emergency Flares

Emergency Flares will be available onsite for the use in slowing and controlling traffic in emergency situations where the normal traffic control cannot be quickly adjusted to meet unplanned situations.

vii. Operational Procedures

The following operational procedures are typical for the project and are generally in accordance with the NCHRP Report 476. These procedures may change in the field by the onsite supervisor or superintendent.

a. Setting Channelizing Devices

The setting of channelizing devices presents a substantial risk to workers and the public. Devices will be set in a manner that reduces exposure of workers to intruding vehicles and to the risk of falling from work vehicles. Under no circumstances will workers be allowed to ride on the tailgate or open body of the work truck. Workers setting devices from vehicles will be adequately protected from falling. A shadow vehicle with an energy attenuator may be used if high traffic volumes are present.

b. Inspection

Following both setup and takedown, the traffic control supervisor will drive through all affected portions of the job to ensure that all devices are properly in place (for setup) or that normal operations are fully restored (for removal).

c. Operation Adjustments and Shifts

As work progresses operational adjustments and shifts to the temporary TCP may occur.

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## 2.3 Flaggers and UTO's utilized in the Work Zones

### Flaggers:

- a. Flaggers will be used for temporary closure work under Bridges 34N and 34S on Hunt Road. Flaggers may also be used for traffic calming signaling during the installation of temporary barriers for the permanent closures and for closures on Bugbee St. for work under bridges 45N and 45S.
- b. Whenever flaggers are used the FLAGGER AHEAD sign or symbol will be incorporated in the work zone sign package for proper advance notice of the presence of the flagger. Sufficient certified flaggers will be available onsite to provide for continuous flagging operations during break periods as needed. These flaggers will be informed in advance of the traffic plan and their responsibilities during the daily construction on the project. Any changes throughout the day during construction will be relayed to the flaggers to provide a safe working environment for the construction personnel and the traveling public.
- c. Additional flaggers may be utilized as per the Resident Engineer.
- d. All flaggers will have a supervisor and they will have two way radio communications. See **Appendix A** for hand signals in case of radio failure & for emergencies only.

### Uniform Traffic Officers (UTO)

- b. UTO's will be utilized in the work zones to provide Blue Light presence including;
  - Ahead (upstream) of the travel lane or passing lane operations for daily closures.
  - Ahead of the Interchange ramp work for daily closures.
- c. UTO's will remain upstream of the last advancing warning sign when work the work activity area is less than one mile from the merging taper. If the work area moves beyond the merging taper, such as moving operations, the UTO will remain at least 400 feet upstream of the work area or work vehicles.

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Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>R. Beggs</i>
DATE:	<i>7/22/16</i>

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**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

2.4 Key Personnel and Contact Info\*:

**Monoko, LLC**

**Onsite Superintendent (responsible person)**

Stanley Monokandilos ..... (727) 247-6933  
Michael Monokandilos ..... (727) 510-8722  
Emmanuel Patatoukos ..... (727) 412-6000  
John Tziourtziotis ..... (727) 698-2614  
Drosso Monokandilos ..... (727) 480-2733

**Manager**

Keri Monokandilos (Office) ..... (727) 940-3244  
Keri Monokandilos (Cell) ..... (727) 808-1118

**Plan Preparer:**

**Ruggles Engineering Services, Inc. St. Johnsbury, VT 05819**

Nathan P. Sicard, P.E. (802) 748-5898, nate.res@myfairpoint.net

\*FOR NON-WORKING HOUR ISSUES OR EMERGENCIES SEE EMERGENCY CONTACT INFO.

The Project Superintendent listed above have the authority to correct issues and to shut down the project if the traffic control items are not in place or not up to the standards as set forth in the MUTCD manual or as dictated in the plan. He will be responsible for reviewing work zone signs during periods of time that work is progressing on the project.

Any significant changes needed for the traffic control plan will be provided to Plan Preparer, prior to forwarding to VTrans for approval. This plan does not account for unknown miscellaneous projects within or adjacent to the work area which might affect the implementation of this traffic control plan.

SUBMITTAL REVIEW	
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<input type="checkbox"/>	REJECTED - SEE REMARKS
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2.5 Emergency Contact Information – IM PBNT (13)

*The following is a list of contact numbers for notifying the Resident & local emergency officials, and local government officials whenever significant traffic impacts are anticipated or an emergency occurs.*

**EMERGENCY PHONE NUMBERS:**

**FIRE – POLICE – AMBULANCE .....911**

- Stanley Monokandilos, Project Superintendent (Monoko) ..... (727) 247-6933
- Michael Monokandilos ..... (727) 510-8722
- Emmanuel Patatoukos ..... (727) 412-6000
- John Tziourtziotis ..... (727) 698-2614
- Drosso Monokandilos ..... (727) 480-2733
  
- Town of Hartford (Interim Town Manager) ..... (802) 295-2785  
[pmacqueen@hartford-vt.org](mailto:pmacqueen@hartford-vt.org)
- Hartford Emergency Communication Center ..... (802) 295-9425  
[ssmith@hartford-vt.org](mailto:ssmith@hartford-vt.org)
- Town of Windsor (Town Manager) ..... (802) 674-6786  
[tmars@windsorvt.org](mailto:tmars@windsorvt.org)
- Town of Windsor (Police, Non Emergency) ..... (802) 295-9425  
[bill.sampson@vermont.gov](mailto:bill.sampson@vermont.gov)
- VTrans District 4, White River Jct. .... (802) 295-8888  
[tammy.ellis@vermont.gov](mailto:tammy.ellis@vermont.gov)
- State Police Barracks, Royalton ..... (802) 234-9933  
[William.Jenkins@vermont.gov](mailto:William.Jenkins@vermont.gov)
- New Hampshire State Police Troop D ..... (603) 271-1162
- Lebanon PD ..... (603) 448-1212

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**CONFORMANCE**  
 BY: Mark Sargent DATE: 07/25/2016

SUBMITTAL REVIEW	
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<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>L. Benjamin</i>
DATE:	<i>7/22/16</i>

## SECTION 3 – CONSTRUCTION PHASING AND SEQUENCING

### 3.1 GENERAL:

Construction phasing or sequencing that reasonably minimizes traffic impacts and provides a safe work area will be used. The phasing of the traffic control plan will be coordinated with the Project Schedule. Although no issues or conflicts are expected, weekly meetings will be held as required to discuss any issues that may arise, to resolve any conflicts on this portion of the project and to ensure the least possible disruption to the traveling public as possible.

Construction workers will follow this plan and all supplemental safety plans for working in traffic.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>L. Beggs</i>
DATE:	<i>7/22/16</i>

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and Checked for

**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

### 3.2 PHASE 1 – Bridges No. 34N and 34S

Phase 1 will include mobilization, maintenance of traffic (temporary lane closures for equipment), installation of containment system, cleaning, sand blasting, painting and demobilization.

a. Permanent Signs

Phase 1 will include the installation of Permanent Project Approach Signing. Signs will be installed on I-91 and Hunt Road. Signs will be installed as described in the following Figures. Prior to the permanent closures on I-91, PCMS boards will be installed to warn motorists of the upcoming work.

See the following figures for permanent signage locations:

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>L. Beggs</i>
DATE:	<i>7/22/16</i>

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and Checked for

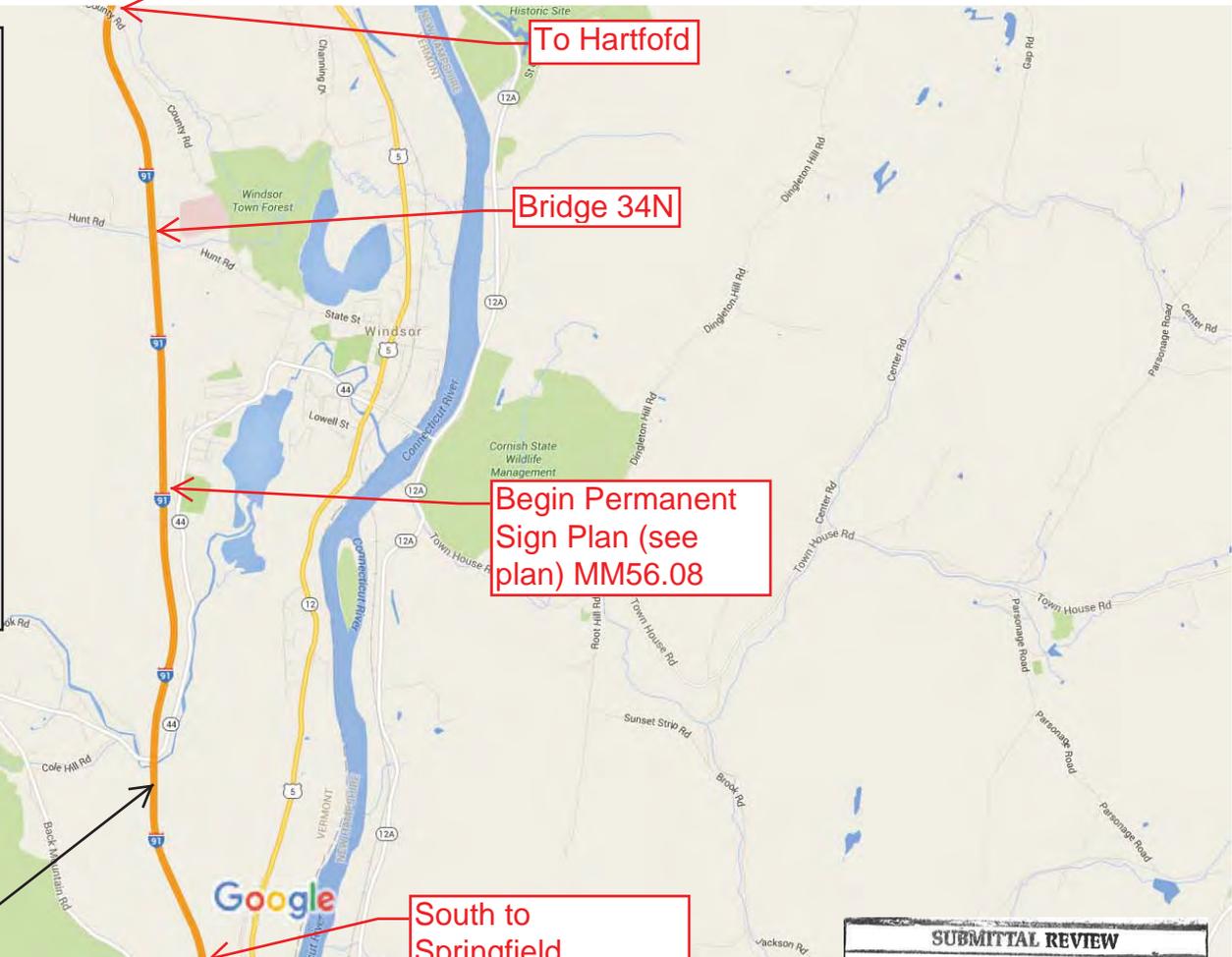
**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

**PCMS#1 MESSAGES FOR EACH STAGE.  
( 2 PHASES)**

<b>PHASE 1</b>	<b>PHASE 2</b>
1. ROADWORK 2 MILES AHEAD	BEGINS JUL X
2. USE FOR WORK RIGHT LANE CLOSED	(SEE NOTE*)

**\*AS NEEDED:  
PLEASE MERGE EARLY  
USE CAUTION, EXPECT DELAYS**



Northbound PCMS Board Site #1-34N (Median, behind Guard Rail) Placed in advance of Permanent Lane Closure. MM55.50

Map data ©2016

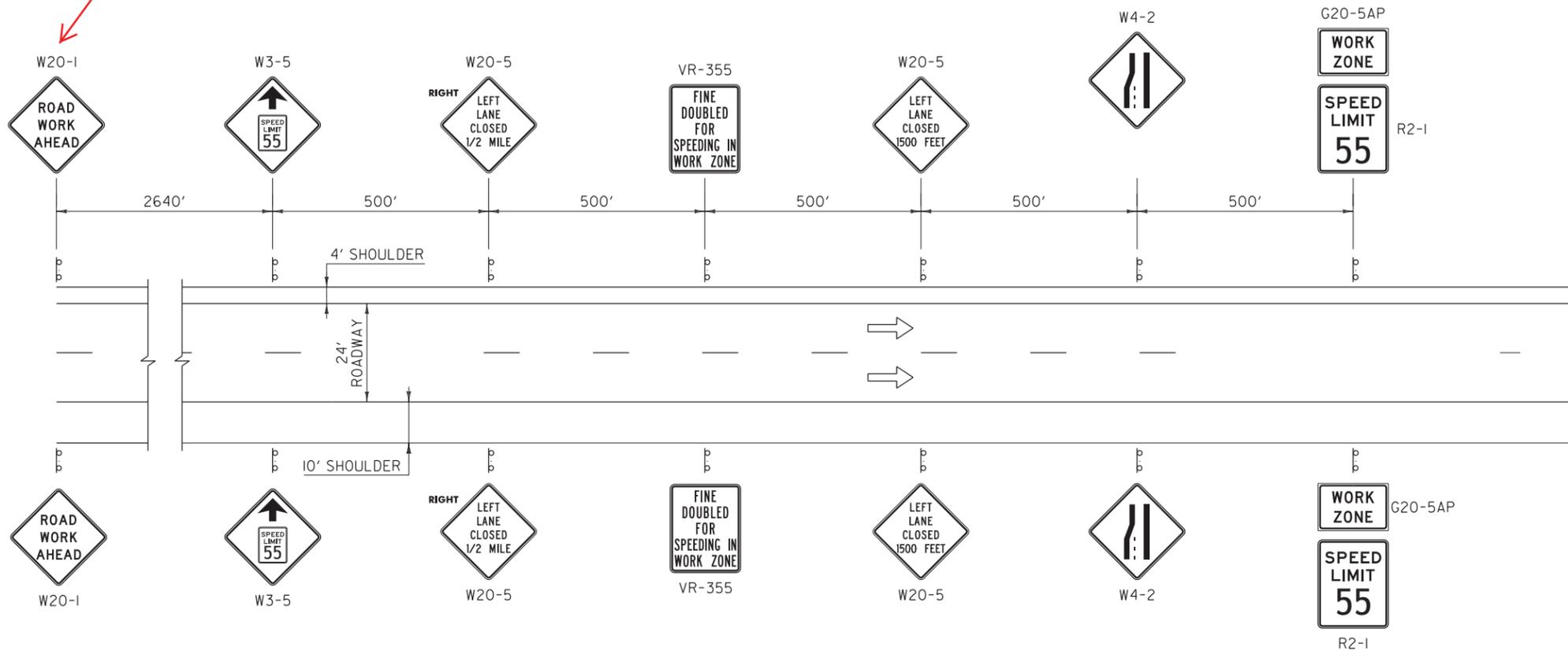
BY: Mark Sargent DATE: 07/22/2016  
**CONFIRMANCE**  
 and Checked for  
 ON: July 22 2016  
**RECEIVED**  
 Vermont Agency of Transportation

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY: <i>E. Benjamin</i>	
DATE: <i>7/22/16</i>	

# BRIDGES 34N PERMANENT SIGN PLAN - LEFT LANE

MILE MARKER  
56.08

MILE MARKER  
57.05



Cover signs until needed for permanent closure

**LEGEND**

- ➔ FLOW OF TRAFFIC
- RETROREFLECTIVE PLASTIC DRUM /cone

SUBMITTAL REVIEW	
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<input type="checkbox"/> NO EXCEPTIONS TAKEN <input checked="" type="checkbox"/> MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED <input type="checkbox"/> AMEND AND RESUBMIT <input type="checkbox"/> REJECTED - SEE REMARKS	BY: <i>L. Beggs</i> DATE: <i>7/22/16</i>

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**GENERAL NOTES:**

1. IF APPLICABLE, THE CONTRACTOR SHALL HAVE SIGNS FOR CLOSURE OF RIGHT AND LEFT LANES ON PROJECT BEFORE WORK COMMENCES.
2. THE "SPEED LIMIT XX" (R2-1) AND "SPEED REDUCTION WARNING" (W3-5) SIGNS SHALL ONLY BE USED IF A TEMPORARY SPEED LIMIT CERTIFICATE HAS BEEN APPROVED. THE "SPEED LIMIT XX" (R2-1) AND OTHER RELATED SIGNS SHALL BE REMOVED OR COVERED WHEN WORK IS NOT IN PROGRESS AND ROADWAY IS NOT RESTRICTED.
3. "FINE DOUBLED FOR SPEEDING IN WORK ZONE" (VR-355) SHALL ONLY BE USED IF TEMPORARY SPEED LIMIT CERTIFICATE HAS BEEN APPROVED.
4. EXISTING SPEED LIMIT SIGNS SHALL BE COVERED WHEN TEMPORARY SPEED LIMIT SIGNS ARE POSTED.
5. FOR SHORT TERM PROJECTS (THREE CONSECUTIVE DAYS OR LESS) WITH NO OFFICIAL TEMPORARY SPEED LIMIT, THE "SPEED LIMIT XX" (R2-1) AND "SPEED REDUCTION WARNING" (W3-5) SIGNS MAY BE SUBSTITUTED WITH ADVISORY SPEED PLAQUES (W3-IP) MOUNTED AS SUPPLEMENTAL SIGNS BELOW THE "LANE ENDS" (W4-2) SIGNS.
6. FOR AN ANTICIPATED LONG TERM CLOSURE (GREATER THAN THREE CONSECUTIVE DAYS) WITH A NON-MOVING OPERATION, ALL SIGNS SHALL BE POST MOUNTED.
7. FOR A LONG TERM CLOSURE WITH A MOVING OPERATION, THE "ROAD WORK AHEAD" (W20-1) SIGN SHALL BE POST MOUNTED. THE REMAINING SIGNS MAY BE PORTABLE AND SHALL MOVE AS THE WORK AREA CHANGES.
8. FOR A SHORT TERM PROJECT (THREE CONSECUTIVE DAYS OR LESS), SIGNS MAY BE POST MOUNTED OR PORTABLE.
9. THE "SPEED LIMIT XX" (R2-1) SOLID SUBSTRATE SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING AASHTO M 268 [ASTM D 4956] TYPE III.

**OTHER STDS. REQUIRED: T-1, T-12, T-31**

REVISIONS AND CORRECTIONS  
 AUG. 6, 2012 - ORIGINAL APPROVAL DATE

APPROVED  
  
 HIGHWAY SAFETY & DESIGN ENGINEER  
  
 DIRECTOR OF PROGRAM DEVELOPMENT  
  
 FEDERAL HIGHWAY ADMINISTRATION

## CONSTRUCTION APPROACH SIGNING DIVIDED HIGHWAY ONE LANE CLOSED



STANDARD  
 T-11  
 MODIFIED

Vermont Agency of Transportation

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ON: July 22, 2016

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**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

SUBMITTAL REVIEW	
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<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>R. Beggs</i>
DATE:	<i>7/22/16</i>

b. Temporary Closures

Temporary closures will be required for the bridges lanes and shoulders during the installation of the rigging and containment systems and for equipment that may be required on the bridge during a given workday. The closure will be used for northbound and southbound traffic. The closure will require the following plan to be used with the permanent sign plan. Signs will be mounted on stands.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
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<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>L. Beggs</i>
DATE:	<i>7/22/16</i>

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**RECEIVED**

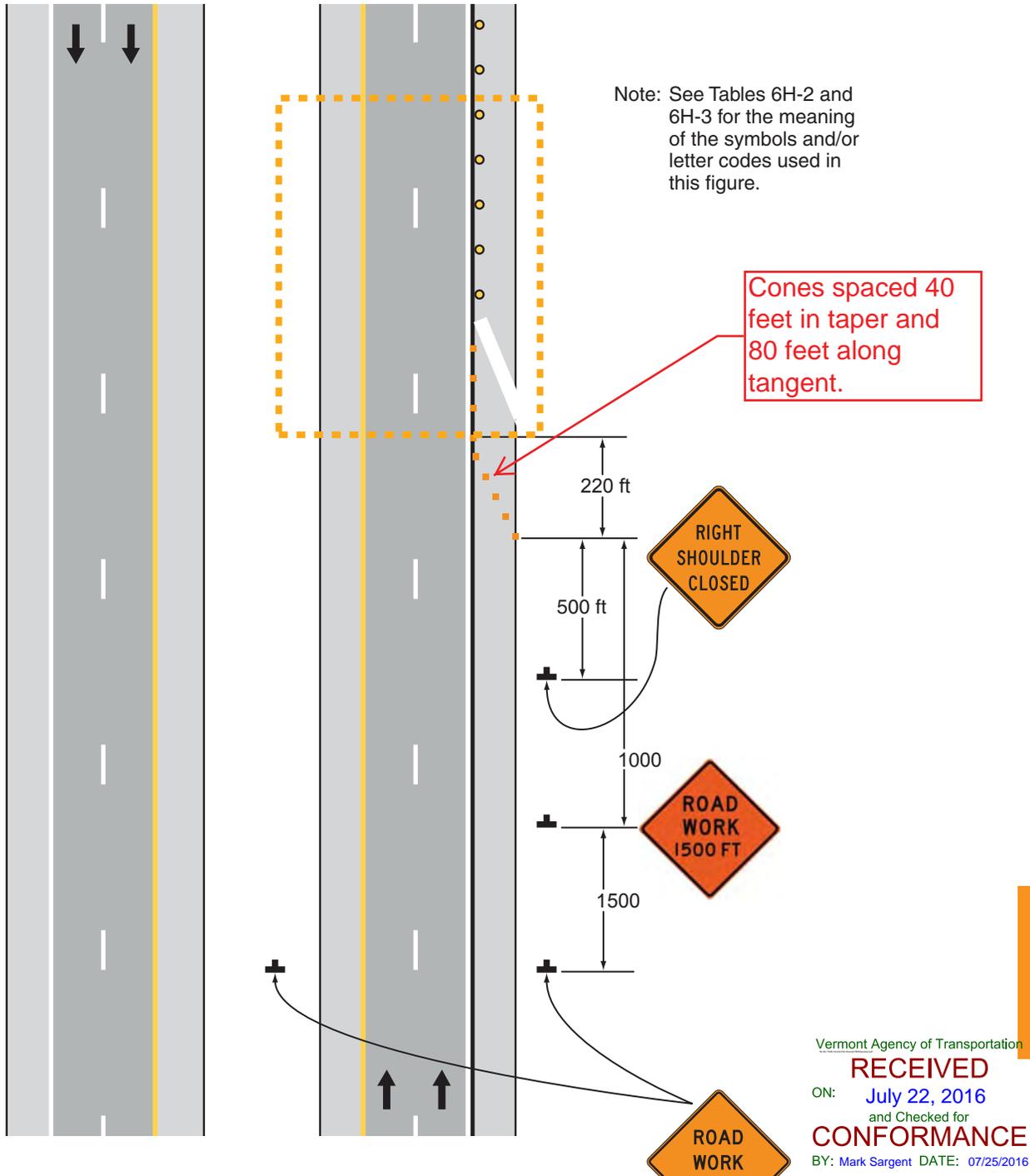
ON: **July 22, 2016**

and Checked for

**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

Figure 6H-5. Shoulder Closure on a Freeway (TA-5)



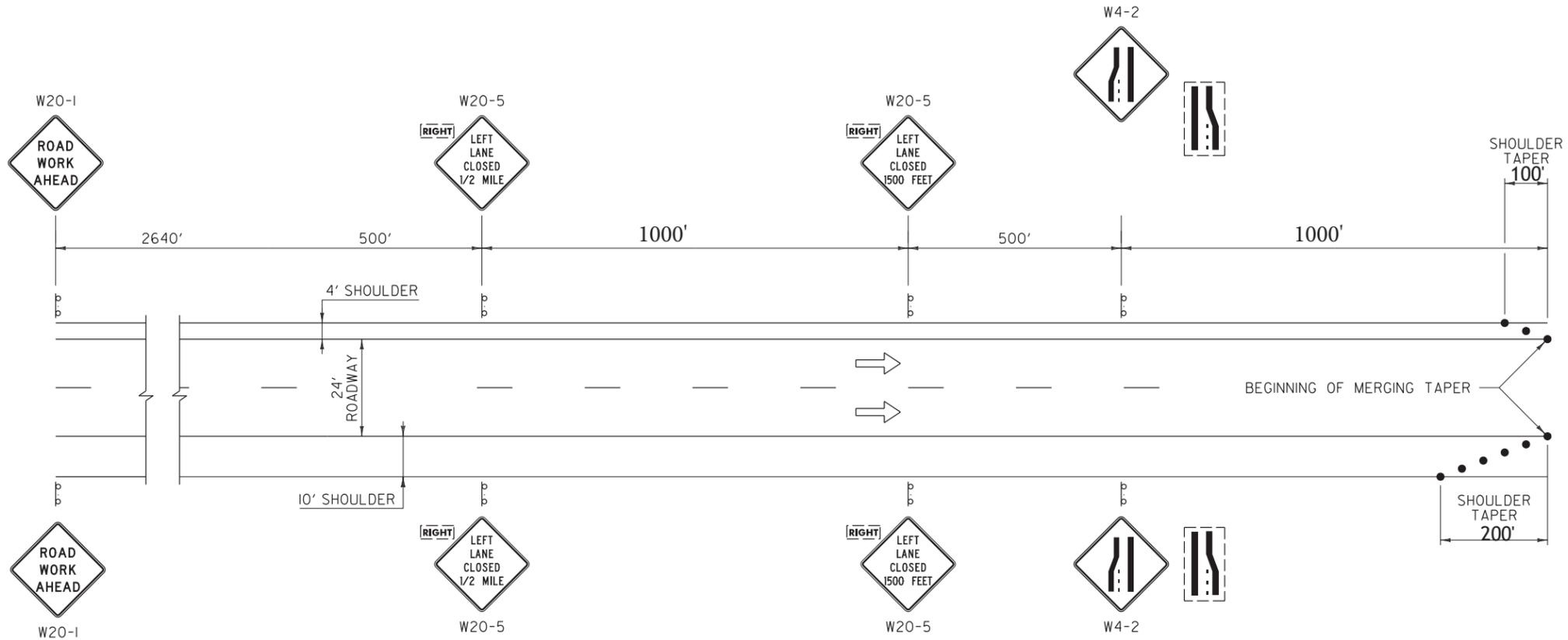
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Note:  
 Flip layout for left shoulder closure, use "LEFT" on closure sign. Reduce taper length to 100 feet.

**Typical Application 5**  
 Modified  
 For temporary daily closure

SUBMITTAL REVIEW	
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<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED
<input type="checkbox"/>	RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>L. Beggs</i>
DATE:	<i>7/22/16</i>

# Temporary Daily Closures



## LEGEND

- FLOW OF TRAFFIC
- RETROREFLECTIVE PLASTIC DRUM /cone

REVISIONS AND CORRECTIONS  
AUG. 6, 2012 - ORIGINAL APPROVAL DATE

APPROVED  
*W.A.C.M.*  
HIGHWAY SAFETY & DESIGN ENGINEER  
*Rudon Stewart*  
DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
FEDERAL HIGHWAY ADMINISTRATION

CONSTRUCTION APPROACH  
SIGNING DIVIDED HIGHWAY  
ONE LANE CLOSED

## GENERAL NOTES:

- IF APPLICABLE, THE CONTRACTOR SHALL HAVE SIGNS FOR CLOSURE OF RIGHT AND LEFT LANES ON PROJECT BEFORE WORK COMMENCES. FOR A SHORT TERM PROJECT (THREE CONSECUTIVE DAYS OR LESS), SIGNS MAY BE POST MOUNTED OR PORTABLE.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
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<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY: <i>L. Begun</i>	
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OTHER STDS. REQUIRED: T-1, T-12, T-31



STANDARD  
T-11  
MODIFIED

# Temporary Daily Closures

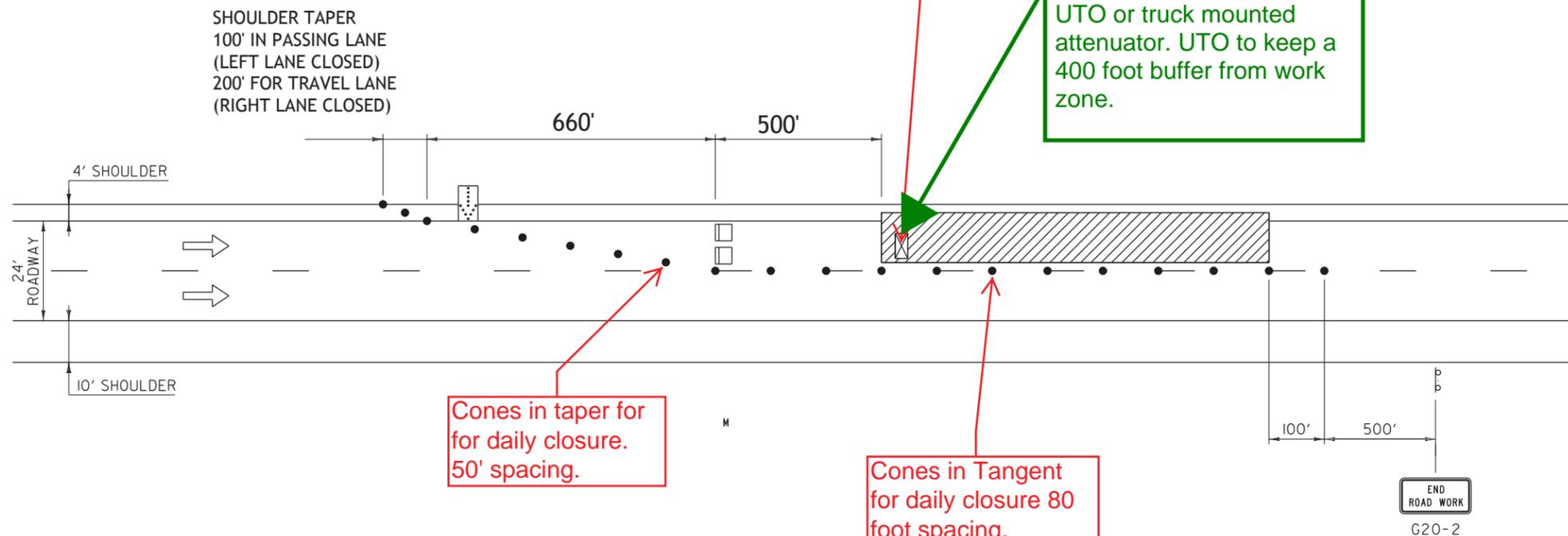
Why no truck mounted attenuator or UTO?

No truck mounted attenuator.

UTO or truck mounted attenuator. UTO to keep a 400 foot buffer from work zone.

Cones in taper for for daily closure. 50' spacing.

Cones in Tangent for daily closure 80 foot spacing.



## GENERAL NOTES:

CHANNELIZING DEVICES OTHER THAN RETROREFLECTIVE PLASTIC DRUMS SHALL BE ALLOWED ALONG THE BUFFER SPACE AND WORK AREA. THE TYPE OF DEVICE SHALL BE CONSISTENT THROUGHOUT THE BUFFER SPACE AND WORK AREA AND SHALL REMAIN STABLE WHILE UNATTENDED.

THE NUMBER OF CHANNELIZING DEVICES, TYPE III BARRICADE AND OTHER TRAFFIC CONTROL DEVICES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED ARE TO BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR, CURVE, ETC.). WARNING LIGHTS SHALL NOT BE USED ON CHANNELIZING DEVICES.

PLACE LAST CHANNELIZING DEVICE 100 FEET BEYOND THE ANTICIPATED WORK ZONE TERMINAL POINT EACH DAY.

THE ARROW PANEL SHALL BE PLACED ON THE SHOULDER OF THE ROADWAY, AS CLOSE AS PRACTICAL TO THE BEGINNING OF THE MERGING TAPER.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
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<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
BY: <i>P. Beggs</i> DATE: <i>7/22/16</i>	
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- LEGEND**
- FLOW OF TRAFFIC
  - CHANNELIZING DEVICE
  - ▤ FLASHING ARROW PANEL
  - TYPE III BARRICADE
  - ▨ WORK AREA

POSTED SPEED (MPH)	TAPER LENGTHS (FT)		TANGENT W=12 FT (L/2)	BARRIER FLARE RATE (MINIMUM)	MINIMUM BUFFER SPACE LENGTH (FT)	MAXIMUM CHANNELIZING DEVICE SPACING (FT)	
	SHOULDER W=10 FT (L/3)	MERGING 12 FT LANE (L)				TAPER (S)	TANGENT (2S)
55	185	660	330	1:13	495	55	110

OTHER STDS. REQUIRED: **T-1, T-11**

TRAFFIC CONTROL  
 DIVIDED HIGHWAY  
 ONE LANE CLOSED



STANDARD  
**T-12**  
 Modified

c. Permanent Closures

A long term closure will be required for the northbound left lane. The following plan will be required for the closure. Signs will be post mounted.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
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<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
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BY:	<i>R. Beggs</i>
DATE:	<i>7/22/16</i>

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**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

Speed Limit 65 MPH  
REDUCED TO 55 MPH

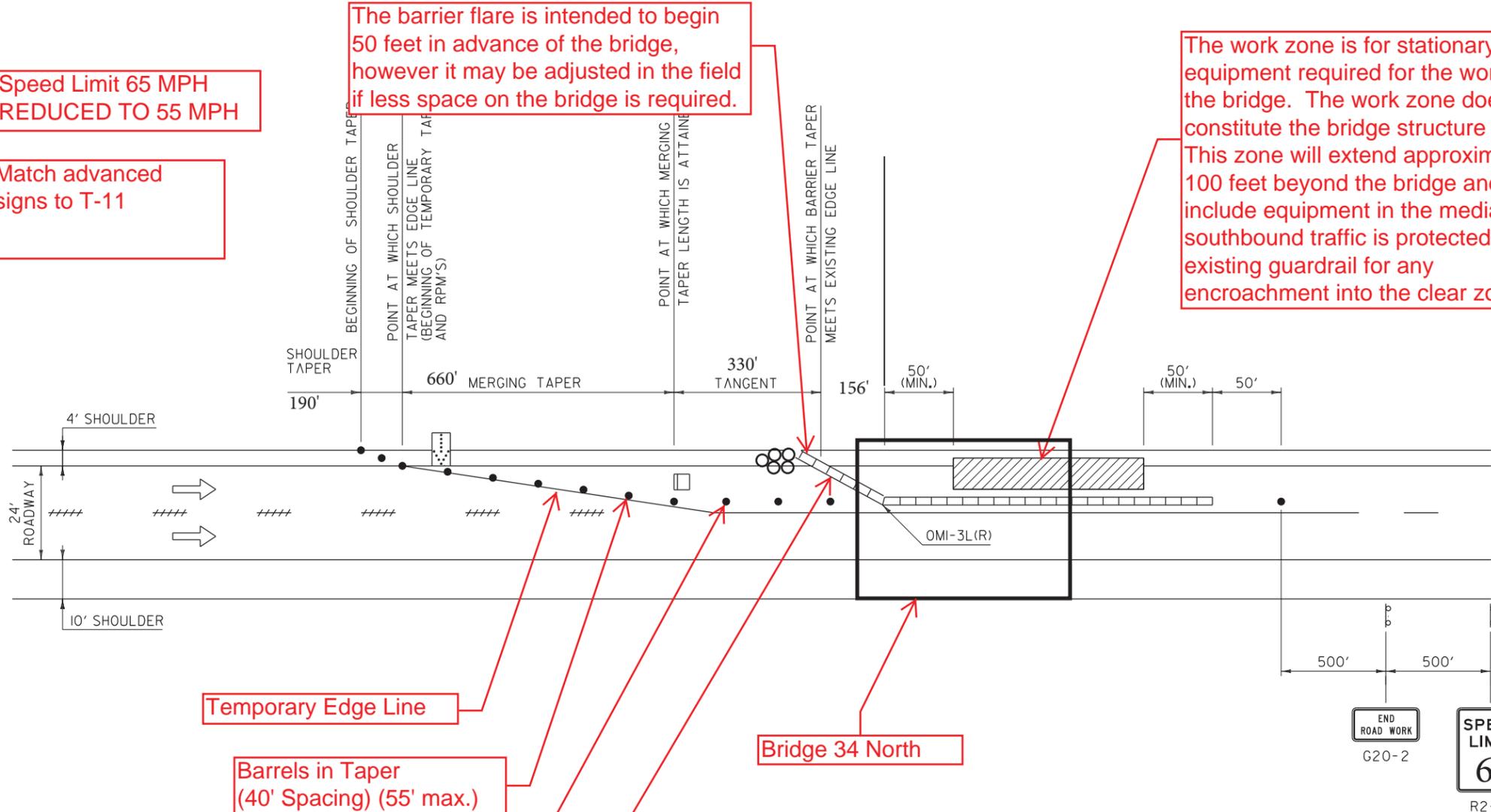
Match advanced  
signs to T-11

The barrier flare is intended to begin 50 feet in advance of the bridge, however it may be adjusted in the field if less space on the bridge is required.

The work zone is for stationary equipment required for the work below the bridge. The work zone does not constitute the bridge structure itself. This zone will extend approximately 100 feet beyond the bridge and will include equipment in the median. The southbound traffic is protected by existing guardrail for any encroachment into the clear zone.

SUBMITTAL REVIEW	
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PB AMERICAS, INC.	
BY:	<i>R. Begun</i>
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BY: Mark Sargent DATE: 07/25/2016



Temporary Edge Line

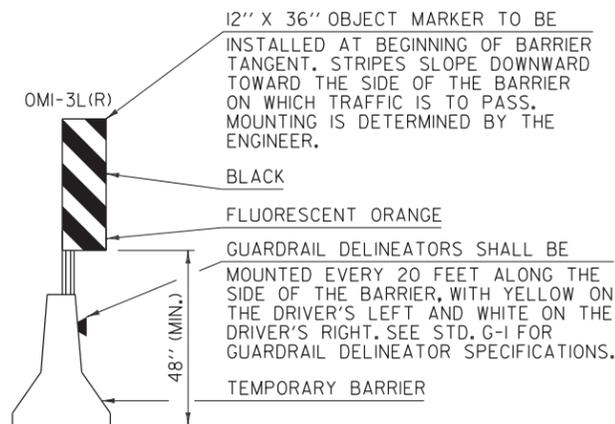
Barrels in Taper  
(40' Spacing) (55' max.)

Barrels in Tangent  
(80' Spacing) (110' max.)

Barrier Flare  
1:13. Terminate at  
Guardrail with  
Energy Absorption  
Attenuator Barrels  
See array plan in  
appendix for  
55mph design.

Bridge 34 North

**ONE LANE CLOSED WITH  
TEMPORARY BARRIER PROTECTION**



**GENERAL NOTES:**

- THE EXISTING TRAVEL LANE WIDTH SHOULD BE MAINTAINED IF POSSIBLE.
- TEMPORARY TAPE EDGE LINES SHALL BE APPLIED AND SHALL MAINTAIN A ONE FOOT MINIMUM DISTANCE FROM THE BARRIER WITH TWO FEET BEING DESIRABLE.
- RAISED PAVEMENT MARKINGS (RPM'S) SHALL BE PLACED TO THE OUTSIDE OF THE TRAVEL LANE AT 20 FOOT SPACING.
- IF THE BARRIER IS PLACED SUCH THAT THE EXISTING LANE NEEDS TO BE MOVED ONTO THE SHOULDER THEN THE EDGE LINE SHALL BE REMOVED AND TEMPORARY TAPE SHALL BE USED TO PROVIDE A 12 FOOT LANE. RUMBLE STRIP SHALL BE FILLED AND RESTORED AS DIRECTED BY THE ENGINEER.
- THE END OF THE BARRIER FACING APPROACHING TRAFFIC SHALL MEET THE FOLLOWING REQUIREMENTS:
  - WHEN NO GUARDRAIL IS PRESENT A 30 FOOT OFFSET FROM THE EDGE OF TRAVELED WAY SHOULD BE USED.
  - WHEN NO GUARDRAIL IS PRESENT AND A 30 FOOT OFFSET CANNOT BE ATTAINED AN ENERGY ABSORPTION ATTENUATOR SHALL BE USED.
  - WHEN GUARDRAIL IS PRESENT THE GUARDRAIL SHALL BE BROKEN AND THE BARRIER TAPERED TO A POINT OUTSIDE THE DEFLECTION DISTANCE OF THE GUARDRAIL.
- DASHED LANE LINE REMOVAL SHALL BEGIN 750 FEET IN ADVANCE OF THE BEGINNING OF THE SHOULDER TAPER.
- CHANNELIZING DEVICES OTHER THAN RETROREFLECTIVE PLASTIC DRUMS SHALL BE ALLOWED ALONG TANGENT SECTIONS. THE TYPE OF DEVICE SHALL BE CONSISTENT THROUGHOUT THE TANGENT SECTION AND SHALL REMAIN STABLE WHILE UNATTENDED.
- THE NUMBER OF CHANNELIZING DEVICES, TYPE III BARRICADE AND OTHER TRAFFIC CONTROL DEVICES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED ARE TO BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR, CURVE, ETC.). WARNING LIGHTS SHALL NOT BE USED ON CHANNELIZING DEVICES.
- PLACE LAST CHANNELIZING DEVICE 50 FEET BEYOND THE END OF BARRIER.
- THE ARROW PANEL SHALL BE PLACED ON THE SHOULDER OF THE ROADWAY, AS CLOSE AS PRACTICAL TO THE BEGINNING OF THE MERGING TAPER.
- THE "ROAD WORK NEXT XX MILES" SIGN (G20-1) SHALL BE INSTALLED IN ADVANCE OF TEMPORARY TRAFFIC CONTROL ZONES THAT ARE MORE THAN TWO MILES IN LENGTH, OR AS DIRECTED BY THE ENGINEER. DISTANCES SHALL BE STATED TO THE NEAREST WHOLE MILE.
- "SPEED LIMIT XX" (R2-1) SIGN TO BE USED IF A TEMPORARY SPEED ZONE IS IN PLACE.

**OTHER STDS. REQUIRED: G-1, T-1, T-11, T-12**

**LEGEND**

- FLOW OF TRAFFIC
- RETROREFLECTIVE PLASTIC D
- FLASHING ARROW PANEL
- TYPE III BARRICADE
- PAVEMENT MARKING REMOVAL
- TEMPORARY BARRIER
- WORK AREA

**LEFT LANE CLOSURE PLAN  
FOR  
LONG TERM ON BRIDGE 34NB**

STANDARD  
**T-13**  
MODIFIED

### 3.3 Bridges No. 41 North and South

This phase will include mobilization, maintenance of traffic (temporary lane closures for equipment), installation of containment system, cleaning, sand blasting, painting and demobilization.

a. Permanent Signs

This phase will include the installation of Permanent Project Approach Signing. The work zone will be from under the bridge with only temporary closures on I-91. Signs will be installed as described in the following Figures.

No advanced warning PCMS boards are proposed for the work. Permanent lane closures will be performed on the I-89 to I-91 NB ramp and advanced warning would be on I-89.

Workers will use a UTO in advance of sign installation equipment along with strobe lights on the installation trucks. The onsite “responsible person” may add portable “Shoulder Work, W21-5a” signs 1500 feet in advance of the work on each side of the highway depending on the actual installation time before moving to the next signs.

See the following figure for permanent signage locations:

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>L. Begun</i>
DATE:	<i>7/22/16</i>

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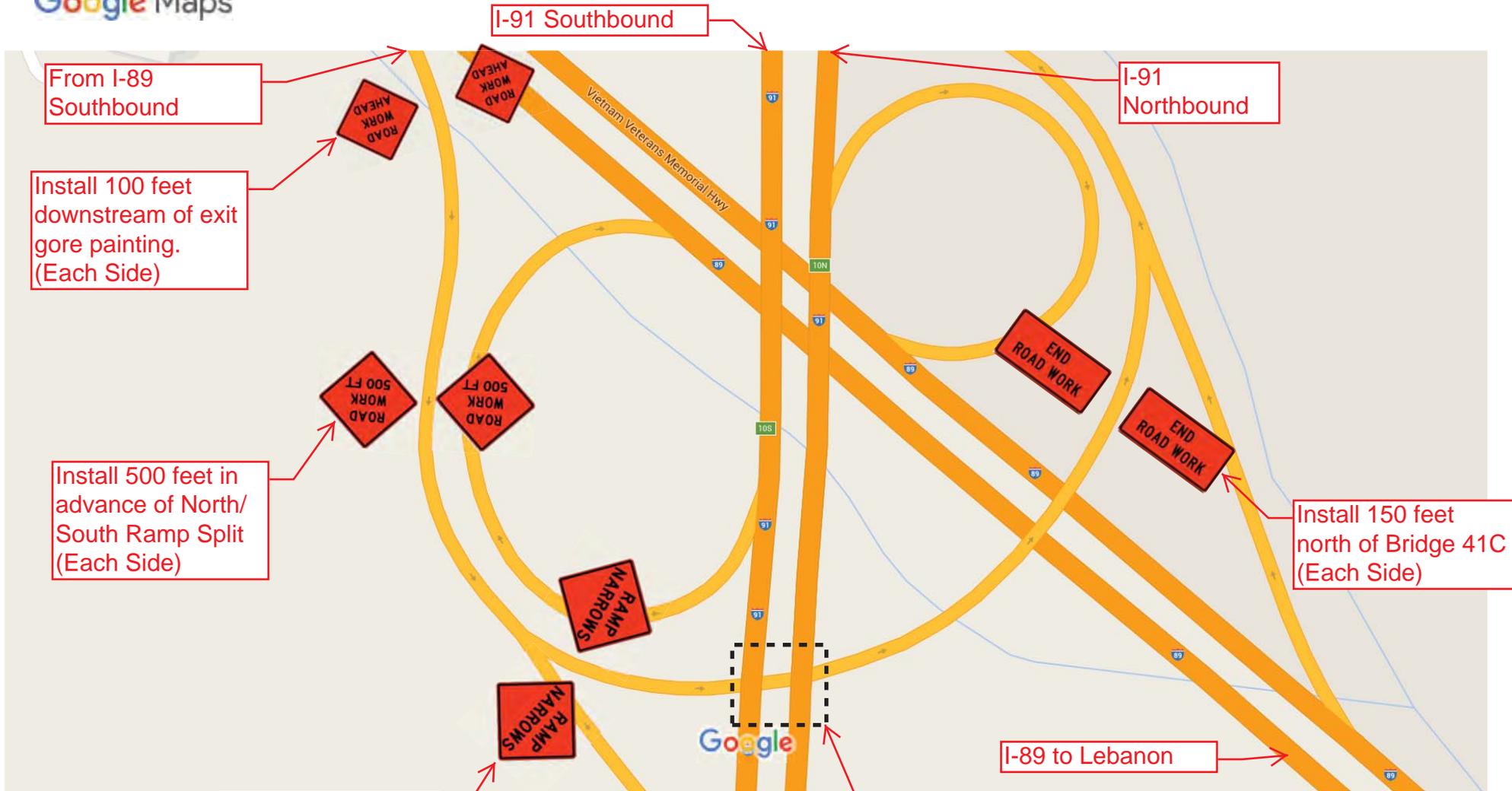
and Checked for

**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

# PERMANENT SIGN PLAN - BRIDGE 41N AND 41S

Google Maps



Map data ©20

Install below Informational Ramp Sign (Under left arrow pointing to White River Jct.) and opposite side. Cover Until needed for closure.

Work Zone Lane Shift on ramp under Bridges 41N and 41S

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED
<input checked="" type="checkbox"/>	RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
RECEIVED Vermont Agency of Transportation PB AMERICAS, INC. BY: <i>L. Beggs</i> DATE: <i>7/22/16</i>	

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and Checked for  
ON: July 22, 2016  
By: Mark Sargent DATE: 07/22/2016

b. Temporary Closures

Temporary closures will be required on the interchange ramp under the bridges and on the I-91 lanes and shoulders. The closures will be required for the temporary use of the shoulder to install the rigging and containment systems and when equipment may be positioned on top of the bridge during a given work day.

Temporary Lane Closures will use the following plans with the permanent sign plan. Signs will be mounted on stands. The majority of the lane closures will be in the left lane on I-91 as to eliminate the need for using a modified T-23 which has also been included.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
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BY:	<i>R. Sargent</i>
DATE:	<i>7/22/16</i>

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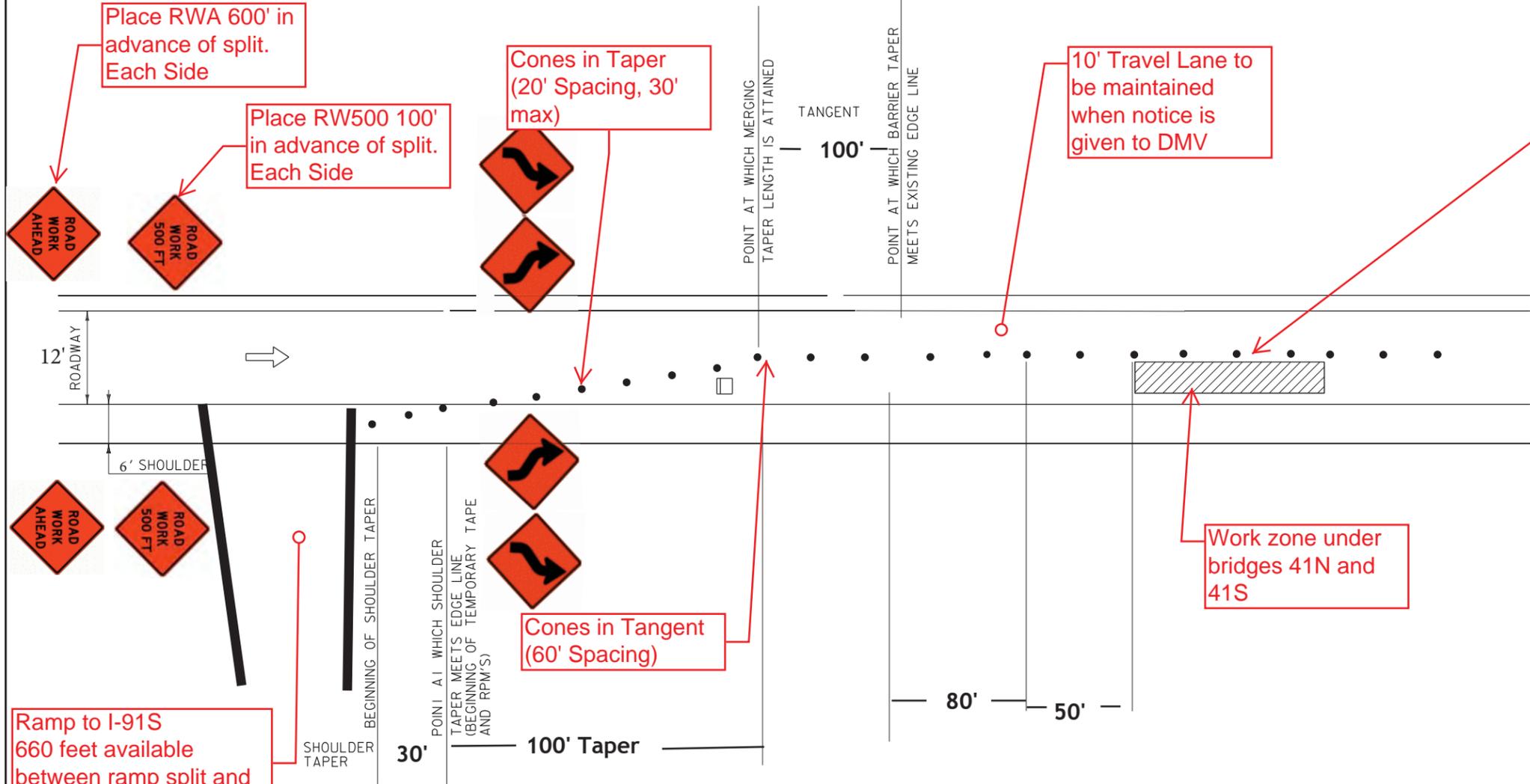
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BY: Mark Sargent DATE: 07/25/2016

I89 Ramp Advisory Speed = 40MPH  
 Ramp split to I-91N Advisory Speed reduces to 30MPH

NOTES:  
 1. COORINDATE WITH PERMANENT SIGN PLAN  
 2. FLIP PLAN FOR LEFT SIDE CLOSURE



Ramp to I-91S  
 660 feet available  
 between ramp split and  
 Bridge 41S Work Area

- LEGEND**
- FLOW OF TRAFFIC
  - CONE
  - ▨ FLASHING ARROW PANEL
  - TYPE III BARRICADE

▨ WORK AREA

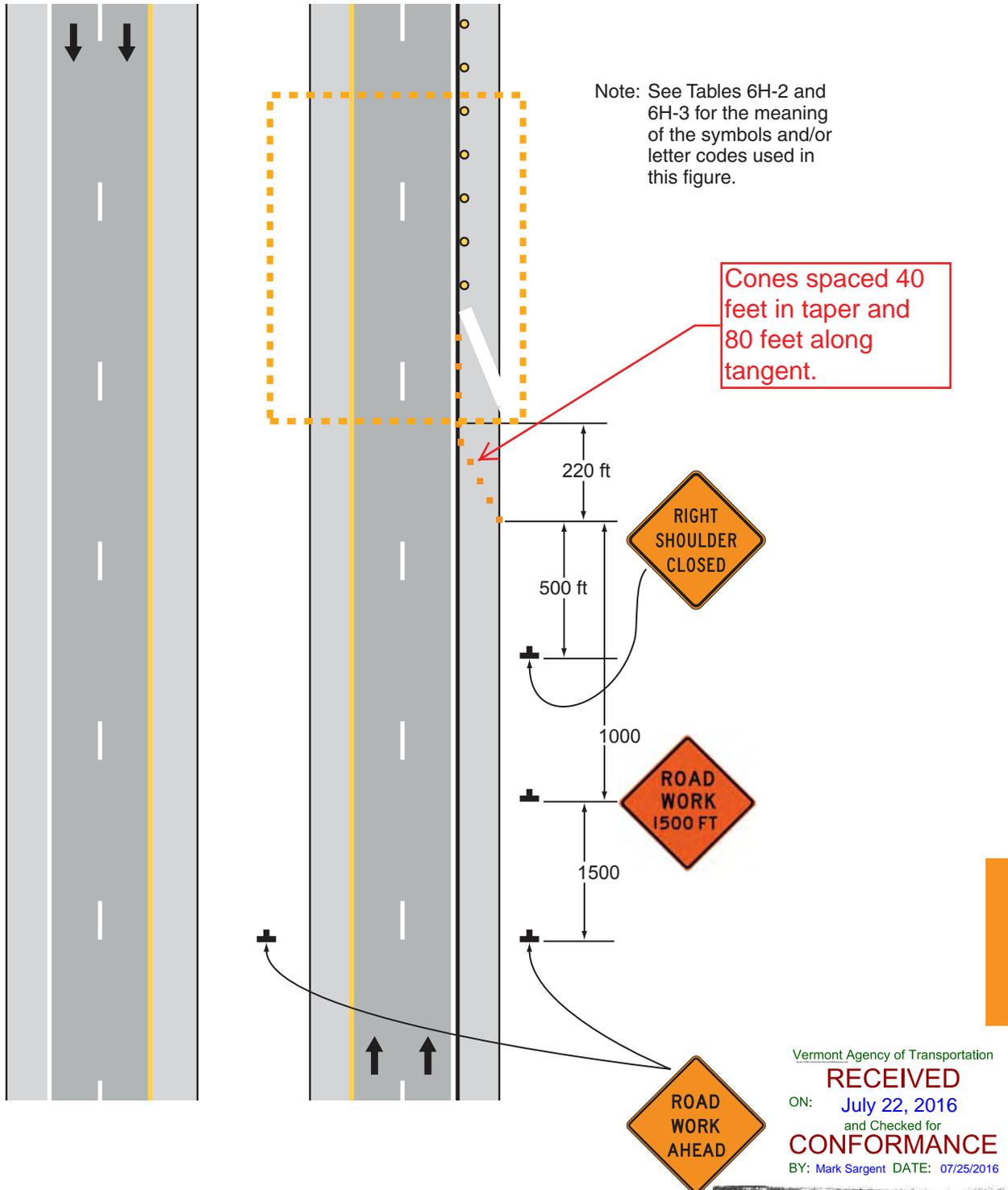
SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY: <i>R. Benjamin</i>	
DATE: 7/22/16	

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## RIGHT SIDE RAMP CLOSURE PLAN

### FOR SHORT TERM ON RAMP C UNDER BRIDGES 41N AND 41S

Figure 6H-5. Shoulder Closure on a Freeway (TA-5)



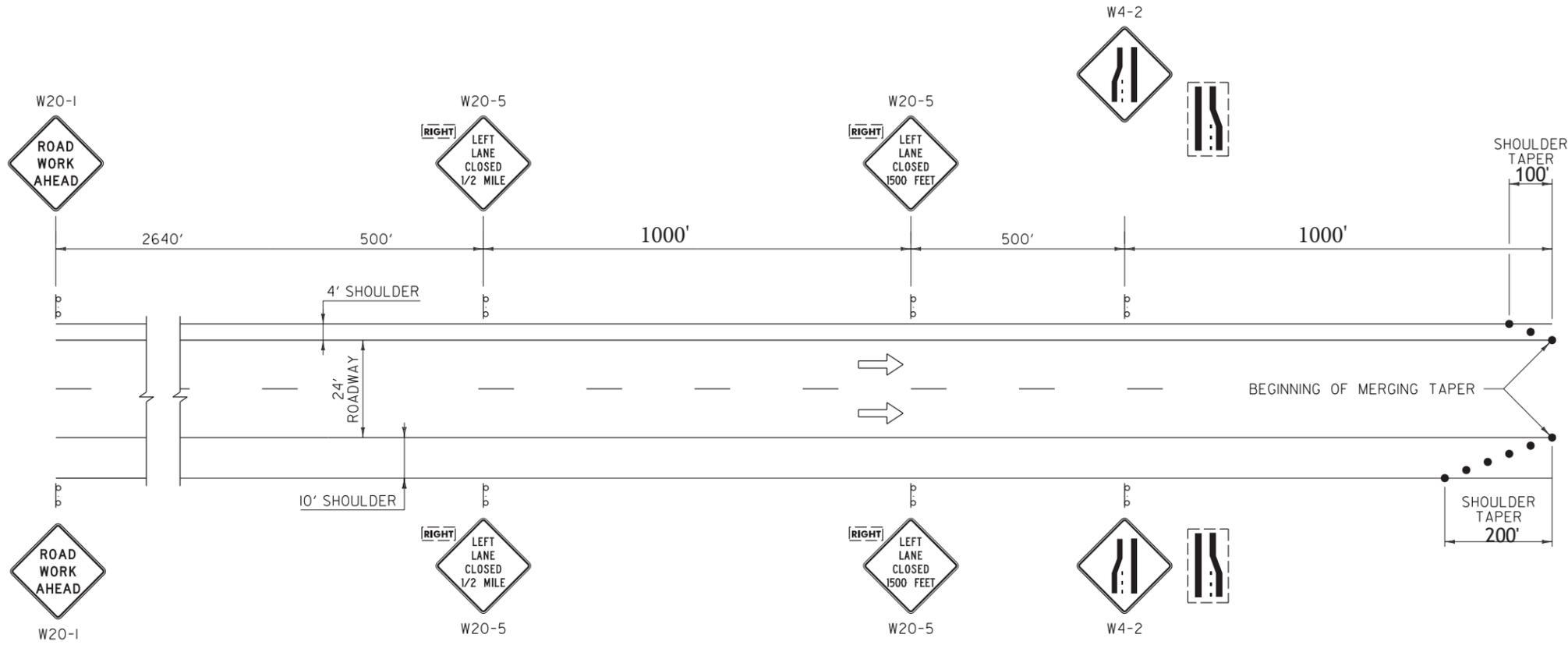
Note:  
 Flip layout for left shoulder closure, use "LEFT" on closure sign. Reduce taper length to 100 feet.

**Typical Application 5**  
 Modified  
 For temporary daily closure

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<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>R. Beggs</i>
DATE:	7/22/16

# Temporary Daily Closures



### GENERAL NOTES:

- 1. IF APPLICABLE, THE CONTRACTOR SHALL HAVE SIGNS FOR CLOSURE OF RIGHT AND LEFT LANES ON PROJECT BEFORE WORK COMMENCES.
- FOR A SHORT TERM PROJECT (THREE CONSECUTIVE DAYS OR LESS), SIGNS MAY BE POST MOUNTED OR PORTABLE.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY: <i>L. Beggs</i>	
DATE: <i>7/22/16</i>	

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 BY: *Mark Sargent* DATE: *07/25/2016*

OTHER STDS. REQUIRED: **T-1, T-12, T-31**

**LEGEND**  
 → FLOW OF TRAFFIC  
 • RETROREFLECTIVE PLASTIC DRUM /cone

REVISIONS AND CORRECTIONS  
 AUG. 6, 2012 - ORIGINAL APPROVAL DATE

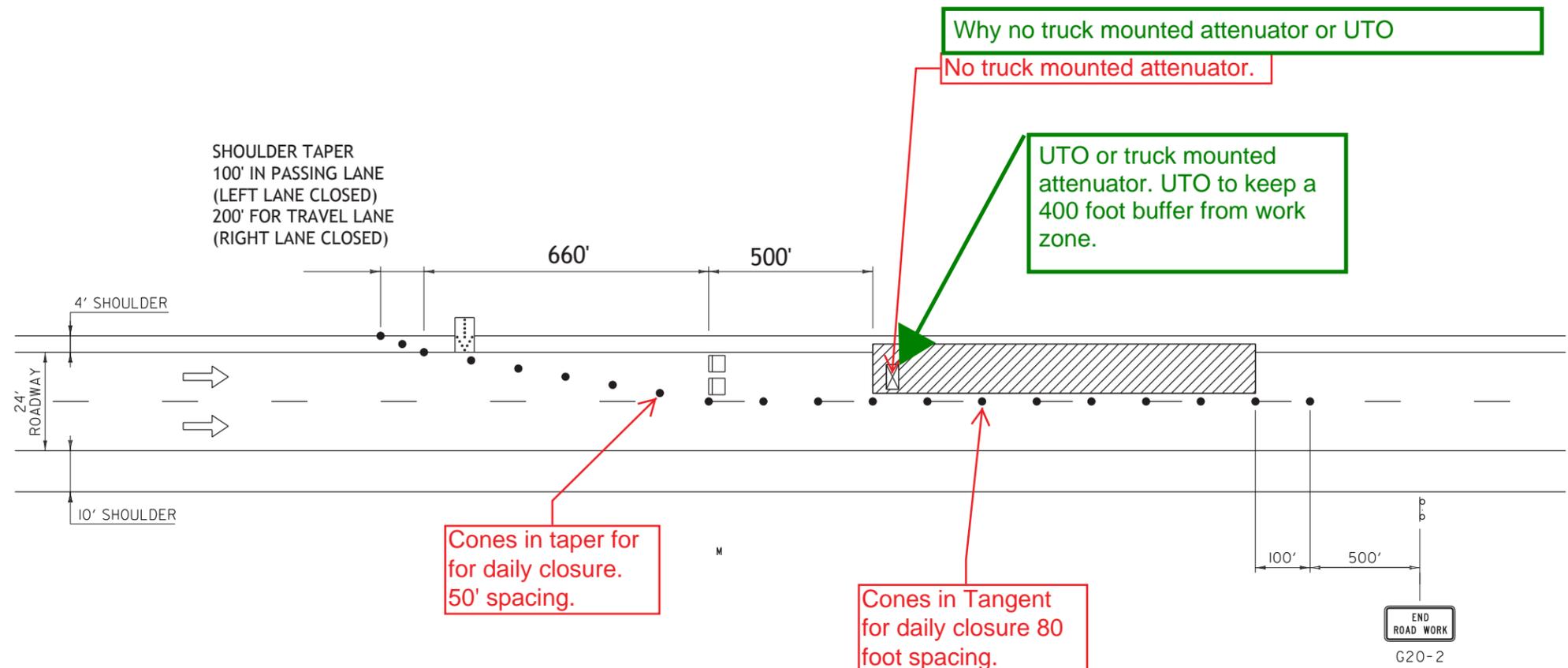
APPROVED  
*W.A.G.P.*  
 HIGHWAY SAFETY & DESIGN ENGINEER  
*Rudolf Stewart*  
 DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
 FEDERAL HIGHWAY ADMINISTRATION

CONSTRUCTION APPROACH  
 SIGNING DIVIDED HIGHWAY  
 ONE LANE CLOSED



STANDARD  
**T-11**  
 MODIFIED

# Temporary Daily Closures



## GENERAL NOTES:

CHANNELIZING DEVICES OTHER THAN RETROREFLECTIVE PLASTIC DRUMS SHALL BE ALLOWED ALONG THE BUFFER SPACE AND WORK AREA. THE TYPE OF DEVICE SHALL BE CONSISTENT THROUGHOUT THE BUFFER SPACE AND WORK AREA AND SHALL REMAIN STABLE WHILE UNATTENDED.

THE NUMBER OF CHANNELIZING DEVICES, TYPE III BARRICADE AND OTHER TRAFFIC CONTROL DEVICES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED ARE TO BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR, CURVE, ETC.). WARNING LIGHTS SHALL NOT BE USED ON CHANNELIZING DEVICES.

PLACE LAST CHANNELIZING DEVICE 100 FEET BEYOND THE ANTICIPATED WORK ZONE TERMINAL POINT EACH DAY.

THE ARROW PANEL SHALL BE PLACED ON THE SHOULDER OF THE ROADWAY, AS CLOSE AS PRACTICAL TO THE BEGINNING OF THE MERGING TAPER.

- LEGEND**
- FLOW OF TRAFFIC
  - CHANNELIZING DEVICE
  - FLASHING ARROW PANEL
  - TYPE III BARRICADE
  - WORK AREA

Vermont Agency of Transportation  
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<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
BY: <i>PB AMERICAS, INC.</i>	
DATE: <i>7/22/16</i>	

POSTED SPEED (MPH)	TAPER LENGTHS (FT)		TANGENT W=12 FT (L/2)	BARRIER FLARE RATE (MINIMUM)	MINIMUM BUFFER SPACE LENGTH (FT)	MAXIMUM CHANNELIZING DEVICE SPACING (FT)	
	SHOULDER W=10 FT (L/3)	MERGING 12 FT LANE (L)				TAPER (S)	TANGENT (2S)
55	185	660	330	1:13	495	55	110

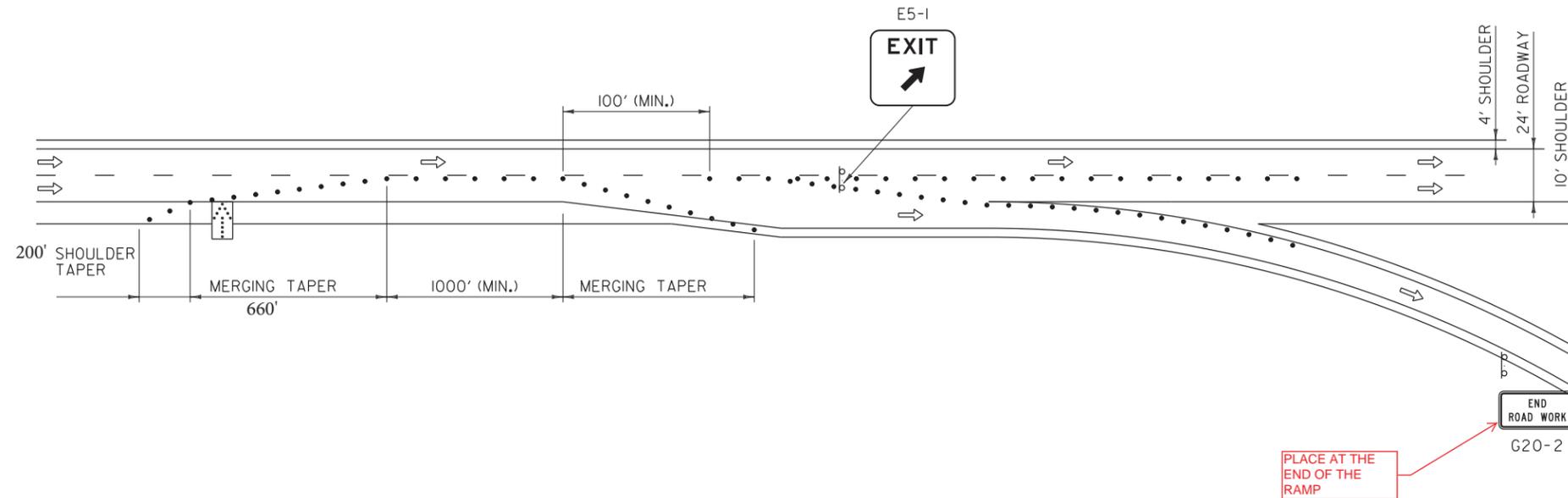
OTHER STDS. REQUIRED: **T-1, T-11**

TRAFFIC CONTROL  
 DIVIDED HIGHWAY  
 ONE LANE CLOSED



STANDARD  
**T-12**  
 Modified

# DAILY CLOSURES USED WITH RIGHT LANE CLOSURES FOR BRIDGES 41N, 41S, 45N AND 45S



## LEGEND

- ⇒ FLOW OF TRAFFIC
- RETROREFLECTIVE PLASTIC DRUM (TAPERS) OTHERWISE CONES
- ⬢ FLASHING ARROW PANEL

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<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY: <i>[Signature]</i>	
DATE: 7/22/16	

## GENERAL NOTES:

1. ALL WORK VEHICLES SHALL DISPLAY HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS, IN ADDITION TO VEHICLE HAZARD LIGHTS.
3. CONE SPACING SHALL BE TWICE THE SPEED LIMIT, IN FEET.
4. THE NUMBER OF CHANNELIZING DEVICES AND OTHER TRAFFIC CONTROL DEVICES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED ARE TO BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR, CURVE, ETC.). WARNING LIGHTS SHALL NOT BE USED ON CHANNELIZING DEVICES.
5. ALL DISTANCES ARE DESIRABLE MINIMUMS. FIELD CONDITIONS SHALL CONTROL THE ACTUAL PLACEMENT.
6. HAND WORK MUST BE PERFORMED WITH A SPOTTER AT ALL TIMES.

OTHER STDS. REQUIRED: T-1, T-12,

TRAFFIC CONTROL FOR  
**WORK IN THE VICINITY OF RAMPS**  
 ON DIVIDED HIGHWAY

T - 23  
 MODIFIED

c. Permanent Closures

A long term closure will be required for the right sides and left side of the ramp from I-89 to I-91 Northbound. Signs will be post mounted.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY:	<i>R. Bognanni</i>
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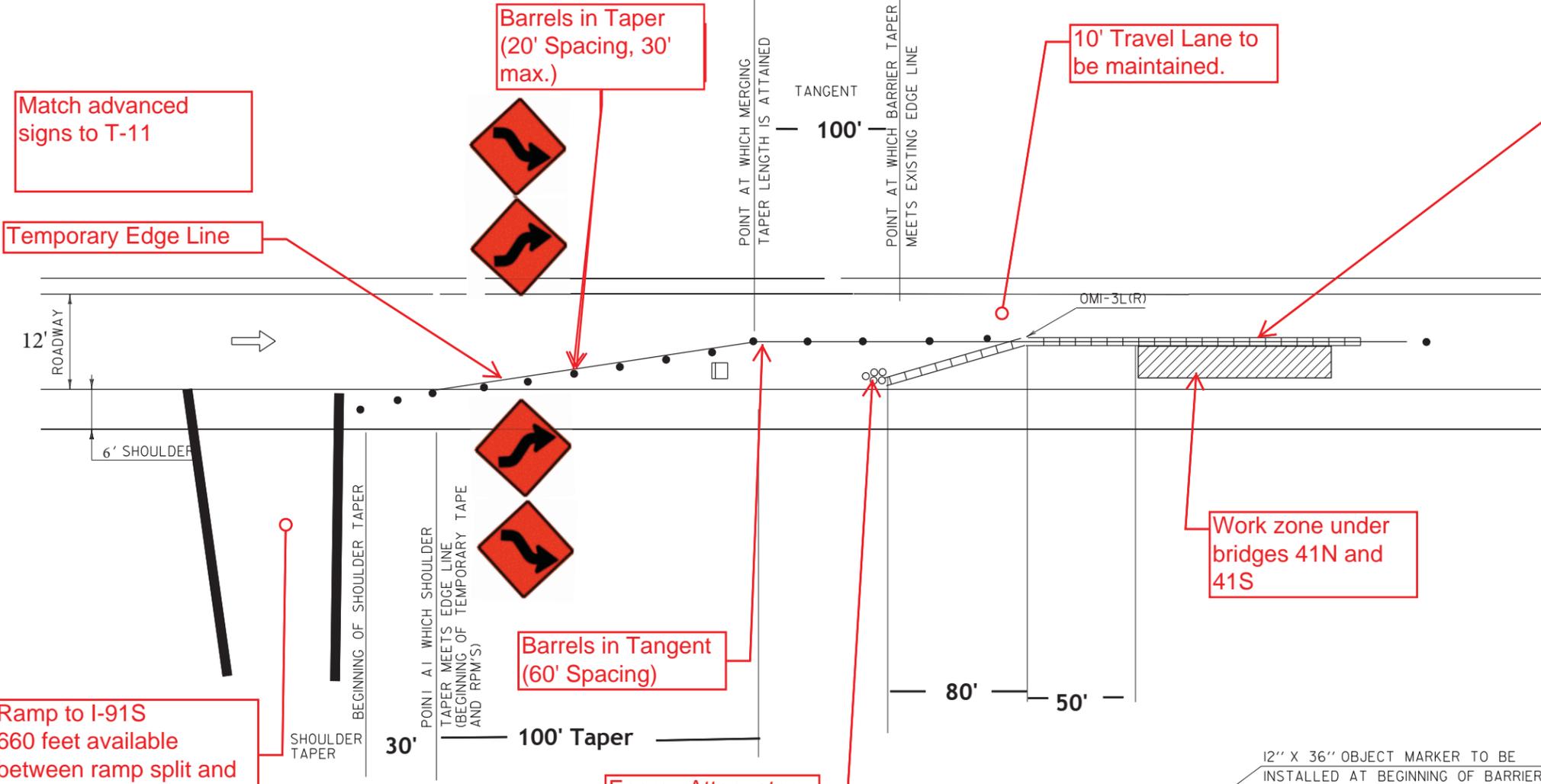
and Checked for

**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

189 Ramp Advisory Speed = 40MPH  
 Ramp split to I-91N Advisory Speed reduces to 30MPH

NOTES:  
 1. COORINDATE WITH PERMANENT SIGN PLAN  
 2. FLIP PLAN FOR LEFT SIDE CLOSURE



**GENERAL NOTES:**

1. THE EXISTING TRAVEL LANE WIDTH SHOULD BE MAINTAINED IF POSSIBLE.
2. TEMPORARY TAPE EDGE LINES SHALL BE APPLIED AND SHALL MAINTAIN A ONE FOOT MINIMUM DISTANCE FROM THE BARRIER WITH TWO FEET BEING DESIRABLE.
3. RAISED PAVEMENT MARKINGS (RPM'S) SHALL BE PLACED TO THE OUTSIDE OF THE TRAVEL LANE AT 20 FOOT SPACING.
4. IF THE BARRIER IS PLACED SUCH THAT THE EXISTING LANE NEEDS TO BE MOVED ONTO THE SHOULDER THEN THE EDGE LINE SHALL BE REMOVED AND TEMPORARY TAPE SHALL BE USED TO PROVIDE A 12 FOOT LANE. RUMBLE STRIP SHALL BE FILLED AND RESTORED AS DIRECTED BY THE ENGINEER.
5. THE END OF THE BARRIER FACING APPROACHING TRAFFIC SHALL MEET THE FOLLOWING REQUIREMENTS:
  - A. WHEN NO GUARDRAIL IS PRESENT A 30 FOOT OFFSET FROM THE EDGE OF TRAVELED WAY SHOULD BE USED.
  - B. WHEN NO GUARDRAIL IS PRESENT AND A 30 FOOT OFFSET CANNOT BE ATTAINED AN ENERGY ABSORPTION ATTENUATOR SHALL BE USED.
  - C. WHEN GUARDRAIL IS PRESENT THE GUARDRAIL SHALL BE BROKEN AND THE BARRIER TAPERED TO A POINT OUTSIDE THE DEFLECTION DISTANCE OF THE GUARDRAIL.
6. DASHED LANE LINE REMOVAL SHALL BEGIN 750 FEET IN ADVANCE OF THE BEGINNING OF THE SHOULDER TAPER.
7. CHANNELIZING DEVICES OTHER THAN RETROREFLECTIVE PLASTIC DRUMS SHALL BE ALLOWED ALONG TANGENT SECTIONS. THE TYPE OF DEVICE SHALL BE CONSISTENT THROUGHOUT THE TANGENT SECTION AND SHALL REMAIN STABLE WHILE UNATTENDED.
8. THE NUMBER OF CHANNELIZING DEVICES, TYPE III BARRICADE AND OTHER TRAFFIC CONTROL DEVICES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED ARE TO BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR, CURVE, ETC.). WARNING LIGHTS SHALL NOT BE USED ON CHANNELIZING DEVICES.
9. PLACE LAST CHANNELIZING DEVICE 50 FEET BEYOND THE END OF BARRIER.
10. THE ARROW PANEL SHALL BE PLACED ON THE SHOULDER OF THE ROADWAY, AS CLOSE AS PRACTICAL TO THE BEGINNING OF THE MERGING TAPER.
11. THE "ROAD WORK NEXT XX MILES" SIGN (G20-I) SHALL BE INSTALLED IN ADVANCE OF TEMPORARY TRAFFIC CONTROL ZONES THAT ARE MORE THAN TWO MILES IN LENGTH, OR AS DIRECTED BY THE ENGINEER. DISTANCES SHALL BE STATED TO THE NEAREST WHOLE MILE.
12. "SPEED LIMIT XX" (R2-I) SIGN TO BE USED IF A TEMPORARY SPEED ZONE IS IN PLACE.

OTHER STDS. REQUIRED: **G-1, T-1, T-11, T-12**

**LEGEND**

- FLOW OF TRAFFIC
- RETROREFLECTIVE PLASTIC DRUM
- ▨ FLASHING ARROW PANEL
- TYPE III BARRICADE
- #### PAVEMENT MARKING REMOVAL
- ▭ TEMPORARY BARRIER
- ▨ WORK AREA

**SUBMITTAL REVIEW**

Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.

NO EXCEPTIONS TAKEN

MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED

AMEND AND RESUBMIT

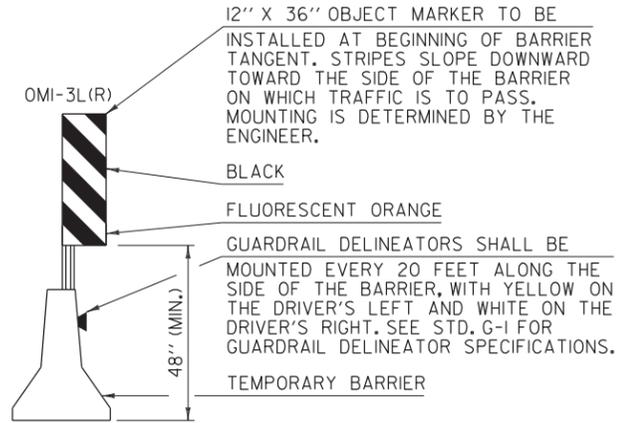
REJECTED - SEE REMARKS

BY: *L. Benjamin*

DATE: *7/22/16*

PB AMERICAS, INC.

**ONE LANE CLOSED WITH TEMPORARY BARRIER PROTECTION**



**RIGHT SIDE RAMP CLOSURE PLAN**  
**FOR LONG TERM ON RAMP C UNDER BRIDGES 41N AND 41S**

STANDARD  
**T-13**  
 MODIFIED

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### 3.4 PHASE 3 – Bridges No. 45 North and South

This phase will include mobilization, maintenance of traffic (temporary lane closures for equipment), installation of containment system, cleaning, sand blasting, painting and demobilization.

a. Permanent Signs

This phase will include the installation of Permanent Project Approach Signing. The work zone will be from under the bridge with only temporary shoulder closures on I-91. Signs will be installed as described in the following Figure.

No advanced warning PCMS boards are proposed for the work.

Workers will use a UTO in advance of sign installation equipment along with strobe lights on the installation trucks.

See the following figure for permanent signage locations:

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
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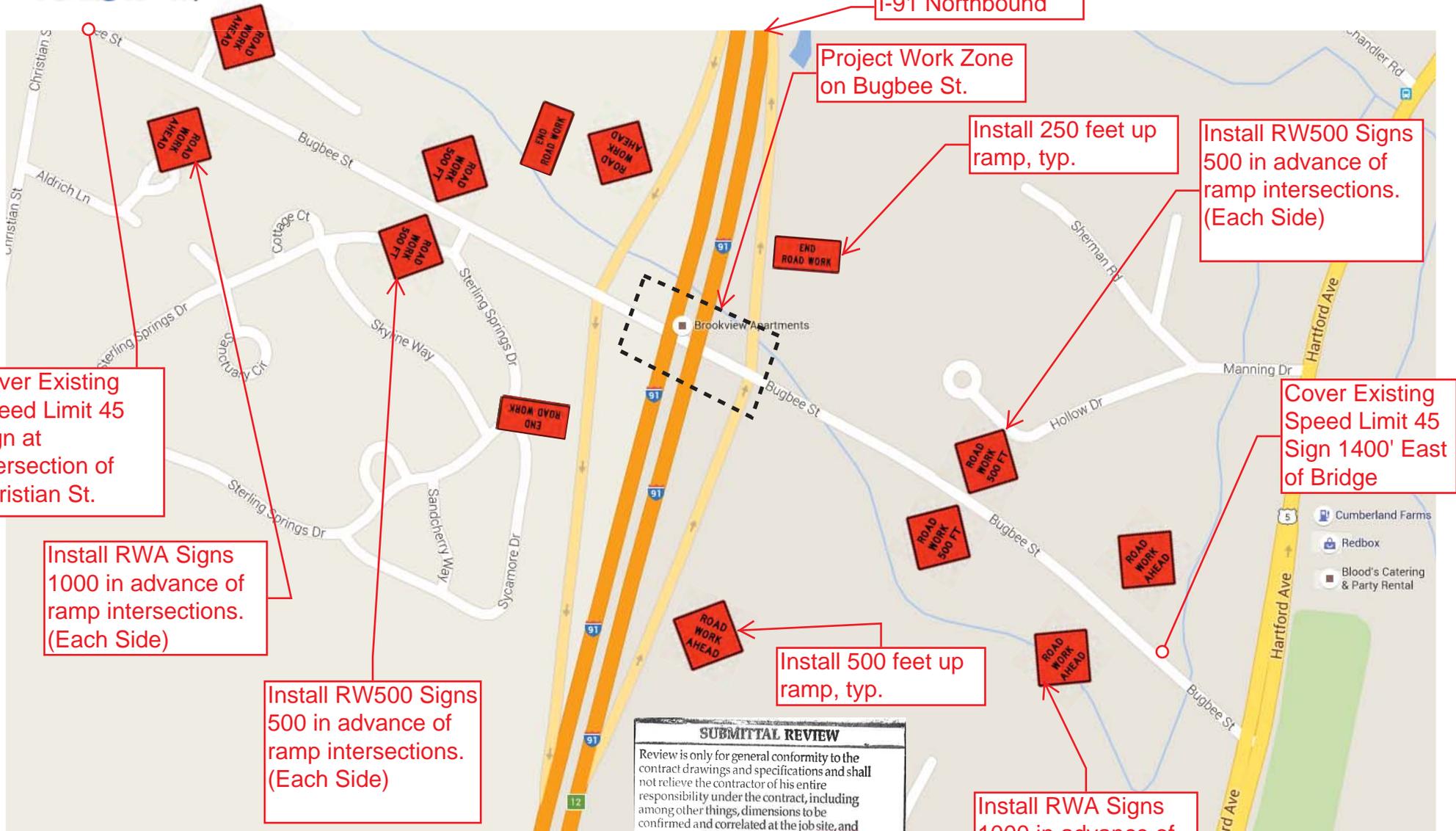
and Checked for

**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

# PERMANENT SIGN PLAN - BRIDGE 45N AND 45S

Google Maps



I-91 Northbound

Project Work Zone on Bugbee St.

Install 250 feet up ramp, typ.

Install RW500 Signs 500 in advance of ramp intersections. (Each Side)

Cover Existing Speed Limit 45 Sign at intersection of Christian St.

Install RWA Signs 1000 in advance of ramp intersections. (Each Side)

Install RW500 Signs 500 in advance of ramp intersections. (Each Side)

Southbound to White River Jct.

Install 500 feet up ramp, typ.

Cover Existing Speed Limit 45 Sign 1400' East of Bridge

Install RWA Signs 1000 in advance of ramp intersections. (Each Side)

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
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200 ft

a. Temporary Closures

Temporary lane and shoulder closures will be required for both NB and SB left and right lanes. The closure will be required for the temporary use of the shoulder to install the rigging and containment systems and when equipment may be positioned on top of the bridge during a given work day.

Temporary lane closures will also occur on Bugbee Road to install rigging and containment along with the installation of the barrier walls and permanent lane shifting. Signs will be mounted on stands.

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
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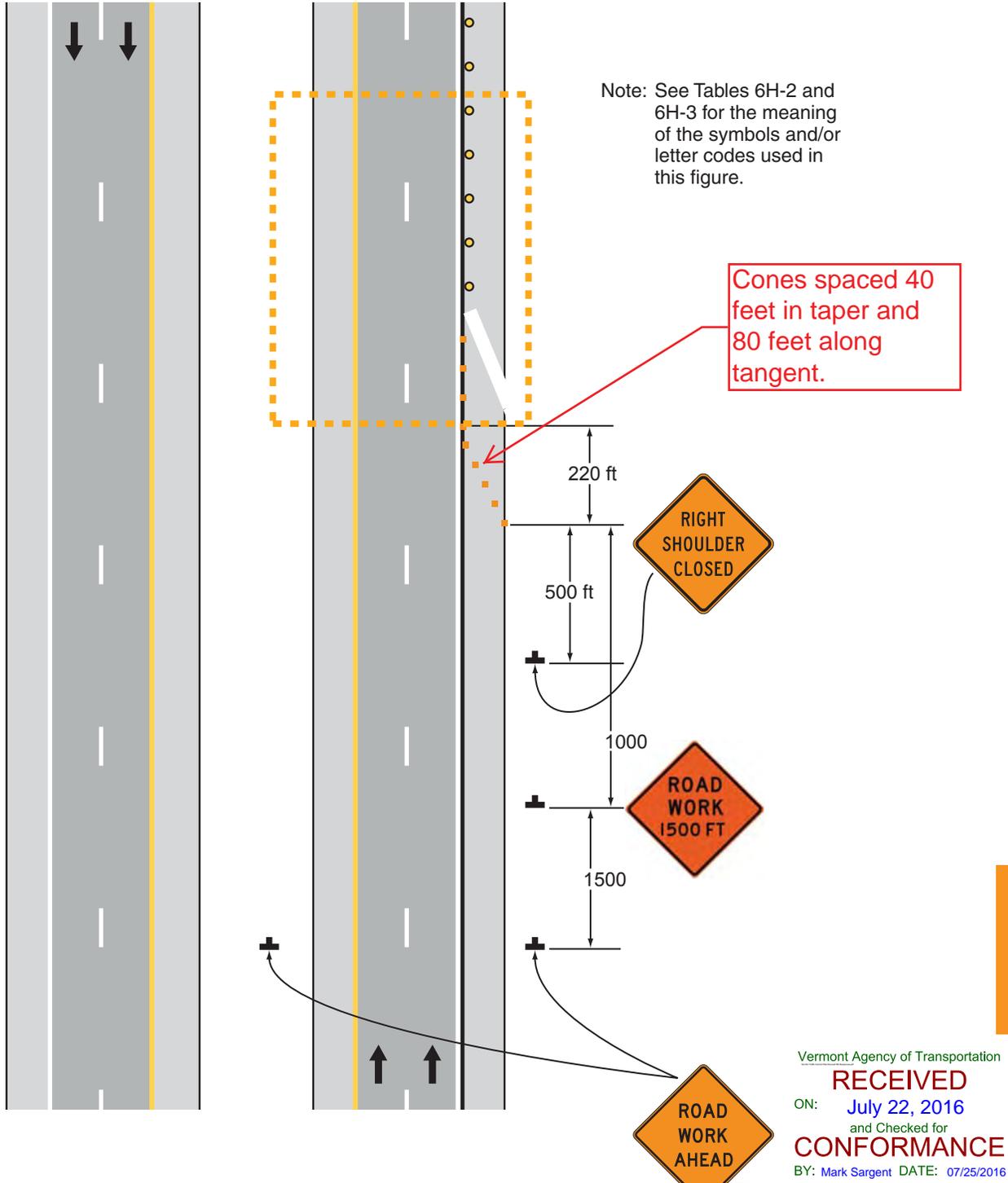
ON: **July 22, 2016**

and Checked for

**CONFORMANCE**

BY: Mark Sargent DATE: 07/25/2016

Figure 6H-5. Shoulder Closure on a Freeway (TA-5)



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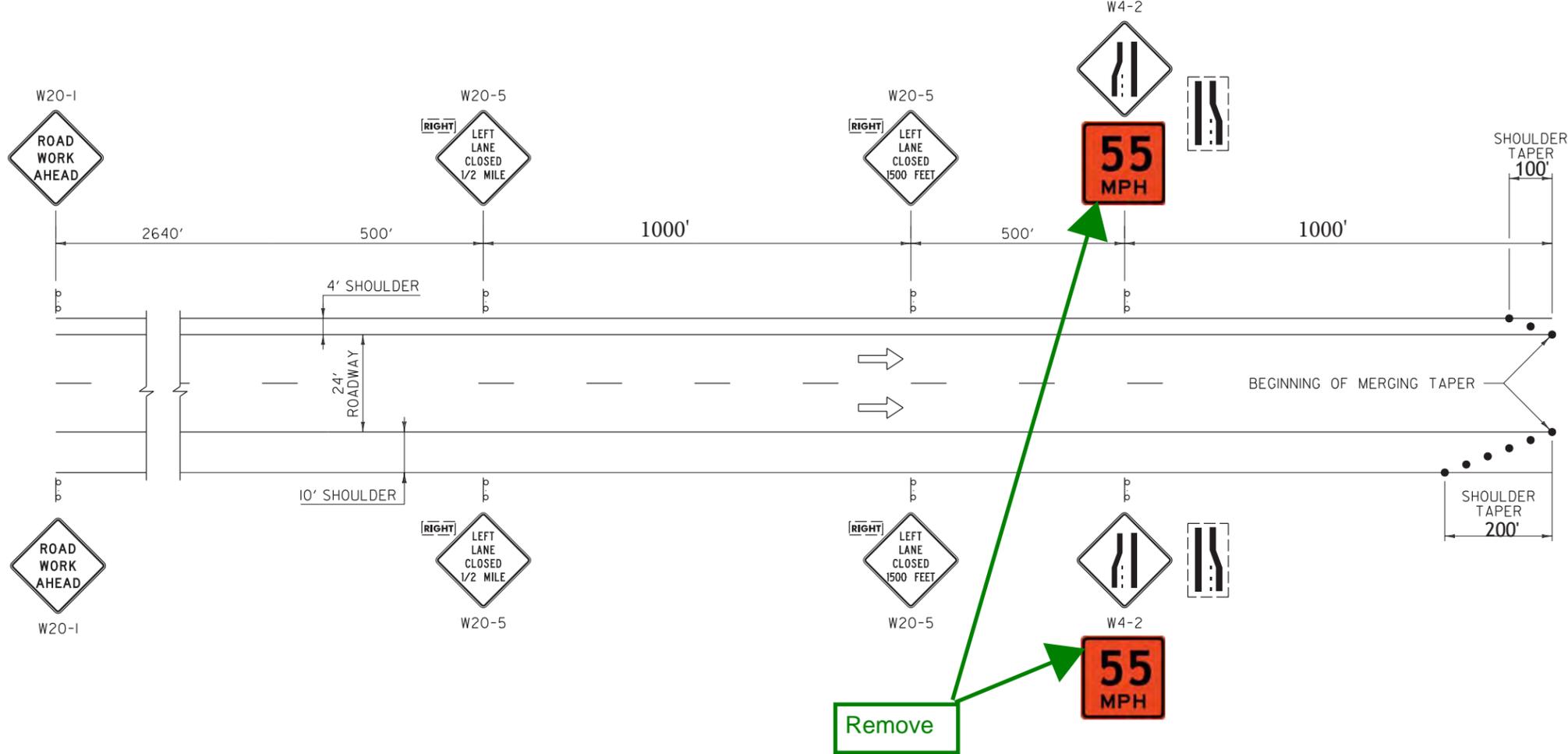
BY: Mark Sargent DATE: 07/25/2016

Note: Flip layout for left shoulder closure, use "LEFT" on closure sign. Reduce taper length to 100 feet.

Typical Application 5 Modified For temporary daily closure

SUBMITTAL REVIEW	
Review is only for general conformity to the contract drawings and specifications and shall not relieve the contractor of his entire responsibility under the contract, including among other things, dimensions to be confirmed and correlated at the job site, and information that pertains to the fabrication processes or to techniques of construction.	
<input type="checkbox"/>	NO EXCEPTIONS TAKEN
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED RESUBMITTAL NOT REQUIRED
<input type="checkbox"/>	AMEND AND RESUBMIT
<input type="checkbox"/>	REJECTED - SEE REMARKS
PB AMERICAS, INC.	
BY: <i>L. Beggs</i>	
DATE: <i>7/22/16</i>	

# Temporary Daily Closures



### GENERAL NOTES:

- 1. IF APPLICABLE, THE CONTRACTOR SHALL HAVE SIGNS FOR CLOSURE OF RIGHT AND LEFT LANES ON PROJECT BEFORE WORK COMMENCES. FOR A SHORT TERM PROJECT (THREE CONSECUTIVE DAYS OR LESS), SIGNS MAY BE POST MOUNTED OR PORTABLE.

SUBMITTAL REVIEW	
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OTHER STDS. REQUIRED: **T-1, T-12, T-31**

**LEGEND**  
 → FLOW OF TRAFFIC  
 • RETROREFLECTIVE PLASTIC DRUM /cone

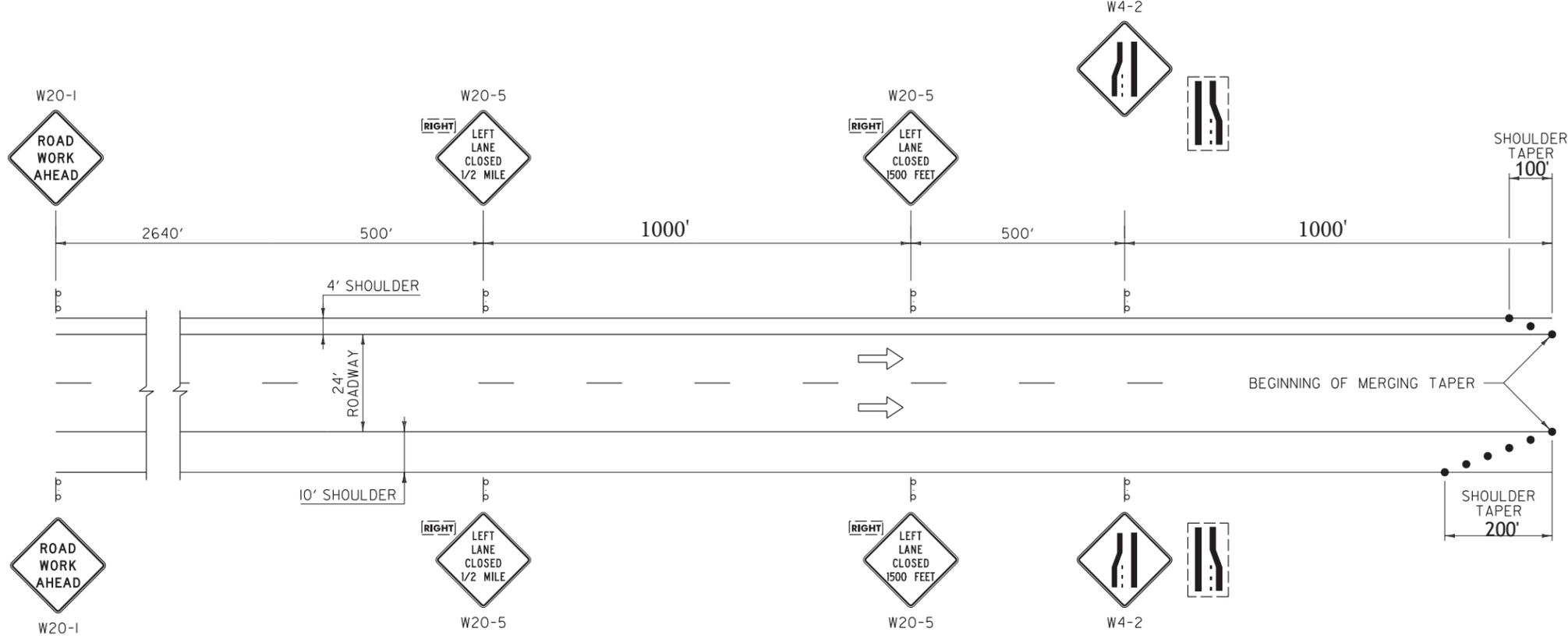
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*Rudolf Stewart*  
 DIRECTOR OF PROGRAM DEVELOPMENT  
*Mark D. Richter*  
 FEDERAL HIGHWAY ADMINISTRATION

CONSTRUCTION APPROACH  
 SIGNING DIVIDED HIGHWAY  
 ONE LANE CLOSED  
 Page 38

VERMONT AGENCY OF  
 TRANSPORTATION  
**STANDARD**  
**T-11**  
 MODIFIED

# Temporary Daily Closures



**GENERAL NOTES:**

- 1. IF APPLICABLE, THE CONTRACTOR SHALL HAVE SIGNS FOR CLOSURE OF RIGHT AND LEFT LANES ON PROJECT BEFORE WORK COMMENCES. FOR A SHORT TERM PROJECT (THREE CONSECUTIVE DAYS OR LESS), SIGNS MAY BE POST MOUNTED OR PORTABLE.

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- LEGEND**
- ➔ FLOW OF TRAFFIC
  - RETROREFLECTIVE PLASTIC DRUM /cone

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CONSTRUCTION APPROACH  
SIGNING DIVIDED HIGHWAY  
ONE LANE CLOSED



STANDARD  
T-11  
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Figure 6H-10. Lane Closure on a Two-Lane Road Using Flaggers (TA-10)

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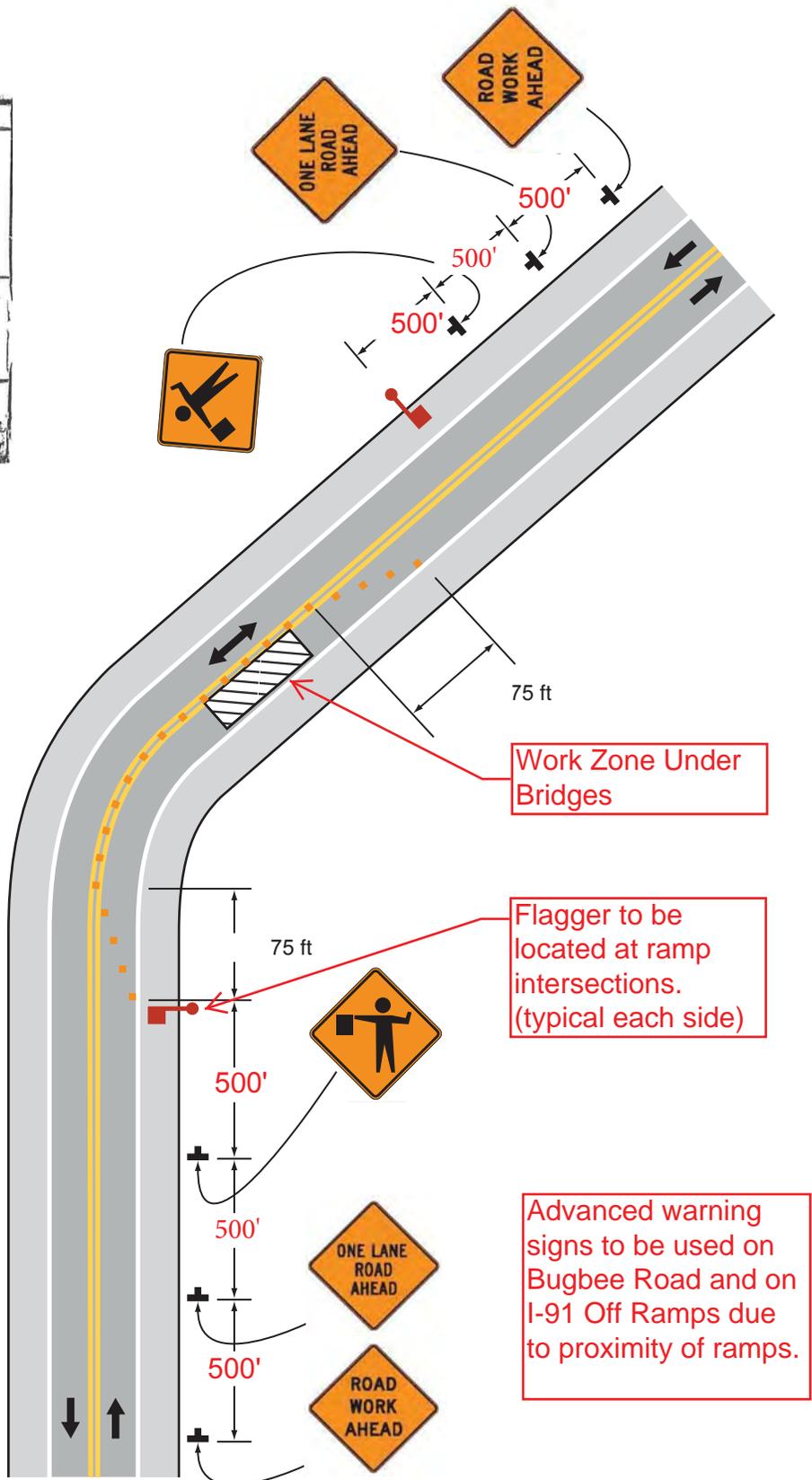
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Typical Application 10

b. Permanent Closures

A long term closure will be required under the bridges. The lanes will be narrowed to 10 feet. The following plans will be required for the closure. Signs will be post mounted.

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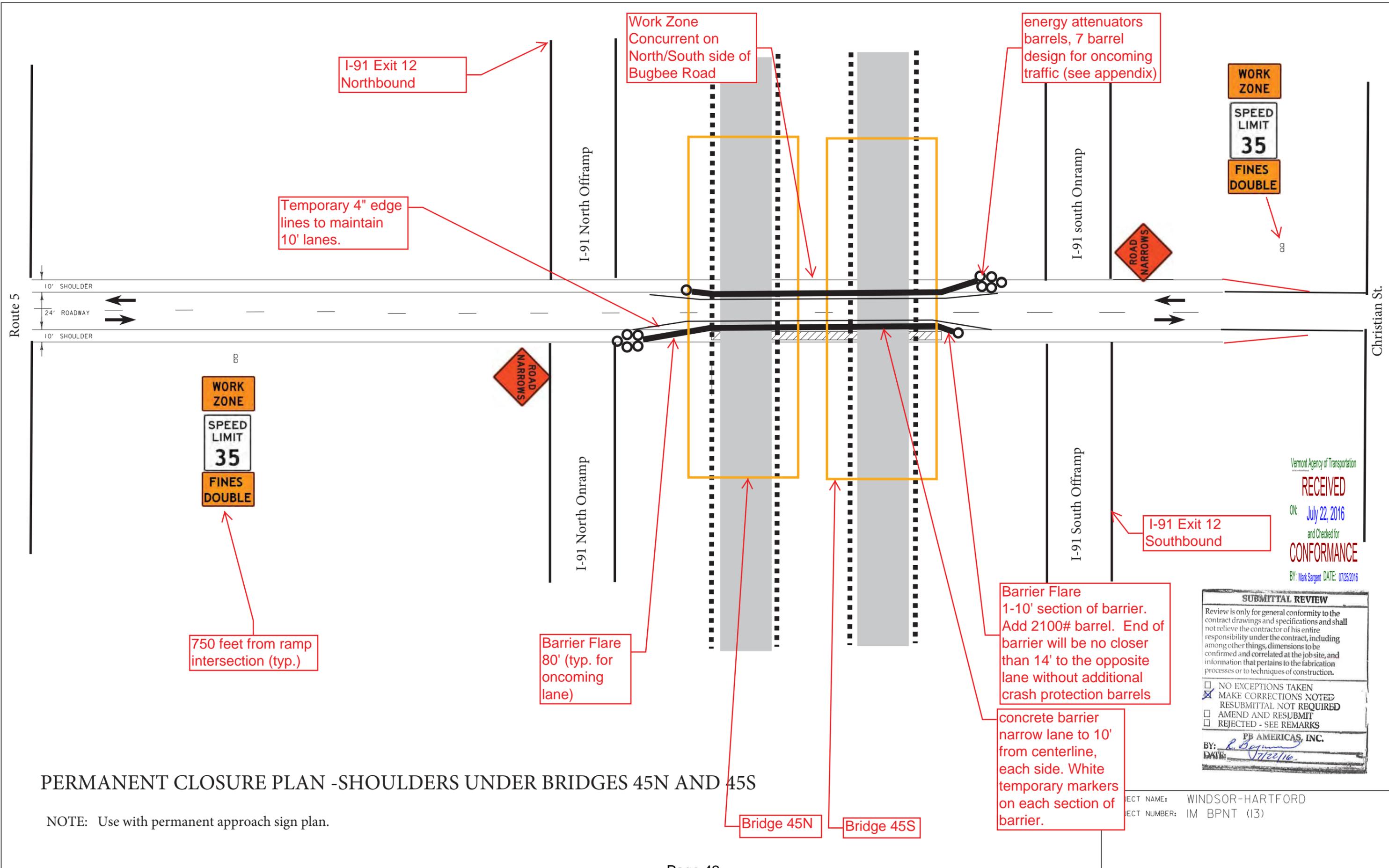
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I-91 Exit 12 Northbound

Work Zone Concurrent on North/South side of Bugbee Road

energy attenuators barrels, 7 barrel design for oncoming traffic (see appendix)

Temporary 4" edge lines to maintain 10' lanes.

WORK ZONE  
SPEED LIMIT 35  
FINES DOUBLE

WORK ZONE  
SPEED LIMIT 35  
FINES DOUBLE

750 feet from ramp intersection (typ.)

Barrier Flare 80' (typ. for oncoming lane)

Barrier Flare 1-10' section of barrier. Add 2100# barrel. End of barrier will be no closer than 14' to the opposite lane without additional crash protection barrels

concrete barrier narrow lane to 10' from centerline, each side. White temporary markers on each section of barrier.

I-91 Exit 12 Southbound

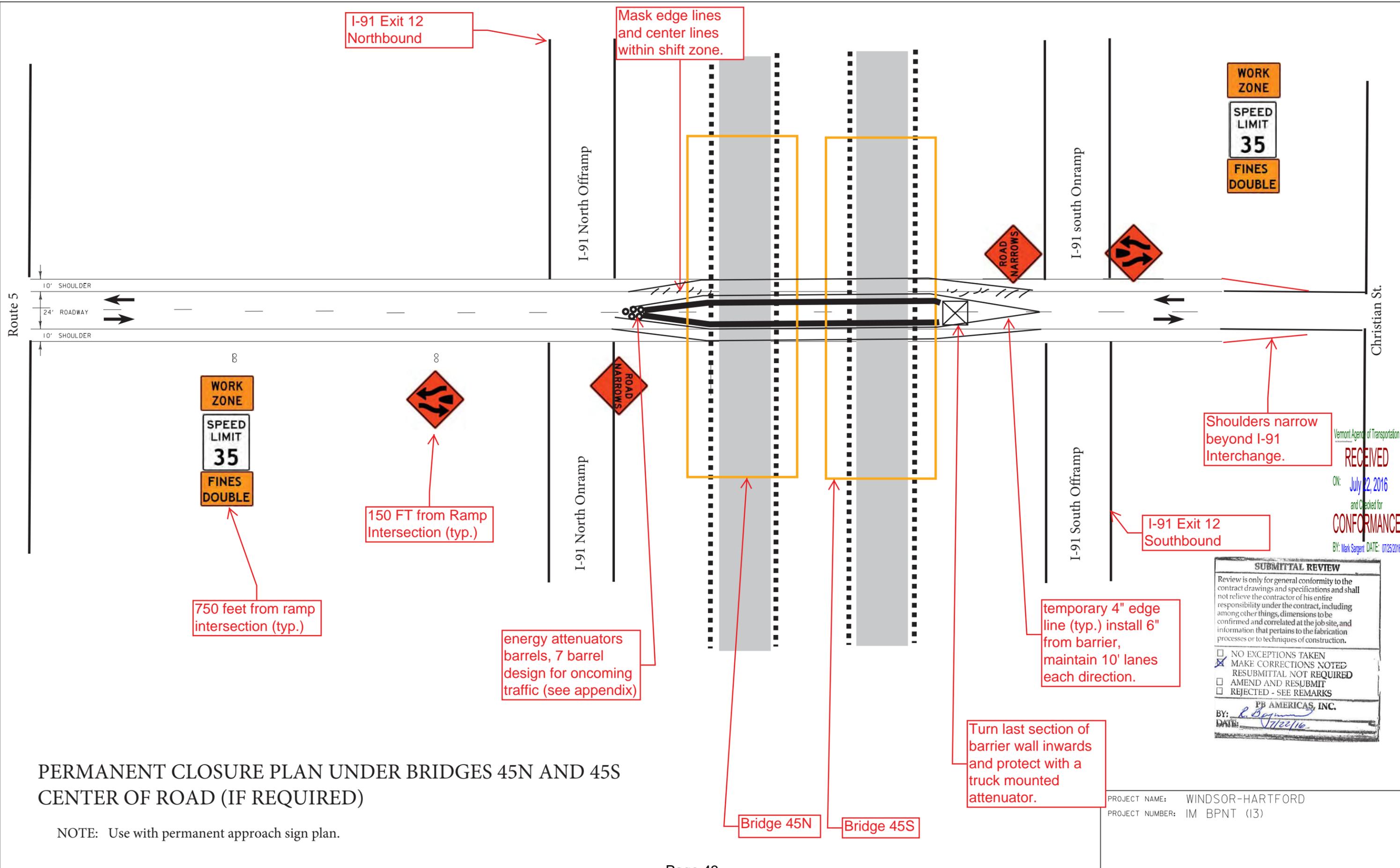
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PERMANENT CLOSURE PLAN -SHOULDERS UNDER BRIDGES 45N AND 45S

NOTE: Use with permanent approach sign plan.

PROJECT NAME: WINDSOR-HARTFORD  
PROJECT NUMBER: IM BPNT (13)



I-91 Exit 12 Northbound

Mask edge lines and center lines within shift zone.

WORK ZONE  
SPEED LIMIT 35  
FINES DOUBLE

I-91 North Offramp

I-91 south Onramp

Route 5

Christian St

10' SHOULDER  
24' ROADWAY  
10' SHOULDER

WORK ZONE  
SPEED LIMIT 35  
FINES DOUBLE



150 FT from Ramp Intersection (typ.)

I-91 North Onramp



I-91 South Offramp

Shoulders narrow beyond I-91 Interchange.

I-91 Exit 12 Southbound

750 feet from ramp intersection (typ.)

energy attenuators barrels, 7 barrel design for oncoming traffic (see appendix)

temporary 4" edge line (typ.) install 6" from barrier, maintain 10' lanes each direction.

Turn last section of barrier wall inwards and protect with a truck mounted attenuator.

Bridge 45N

Bridge 45S

PERMANENT CLOSURE PLAN UNDER BRIDGES 45N AND 45S  
CENTER OF ROAD (IF REQUIRED)

NOTE: Use with permanent approach sign plan.

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PROJECT NAME: WINDSOR-HARTFORD  
PROJECT NUMBER: IM BPNT (13)

Appendix A –Supporting Information

Flagger Hand Signals

Breakaway Sign Post Requirements

Typical Ground Mounded Sign

Typical Energy Absorption Attenuator Barrels

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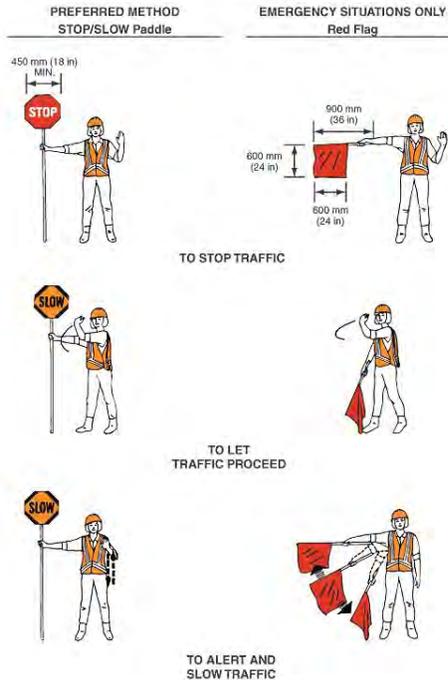
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Figure 6E-1. Use of Hand-Signaling Devices by Flaggers



Standard: The following methods of signaling with paddles shall be used:

- A. To stop road users, the flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.
- B. To direct stopped road users to proceed, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed.
- C. To alert or slow traffic, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.

Option: To further alert or slow traffic, the flagger holding the SLOW paddle face toward road users may motion up and down with the free hand, palm down.

Standard: The following methods of signaling with a flag shall be used:

- A. To stop road users, the flagger shall face road users and extend the flag staff horizontally across the road users' lane in a stationary position so that the full area of the flag is visibly hanging below the staff. The free arm shall be held with the palm of the hand above the shoulder level toward approaching traffic.
- B. To direct stopped road users to proceed, the flagger shall stand parallel to the road user movement and with flag and arm lowered from the view of the road users, and shall motion with the free hand for road users to proceed. Flags shall not be used to signal road users to proceed.
- C. To alert or slow traffic, the flagger shall face road users and slowly wave the flag in a sweeping motion of the extended arm from shoulder level to straight down without raising the arm above a horizontal position. The flagger shall keep the free hand down.

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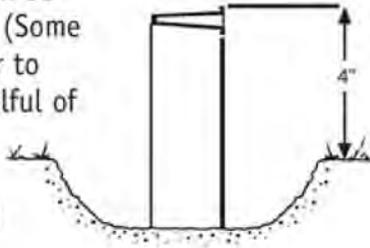
# THE LAP SPLICE™ U-CHANNEL BREAKAWAY SYSTEM

Patent No. 5125194

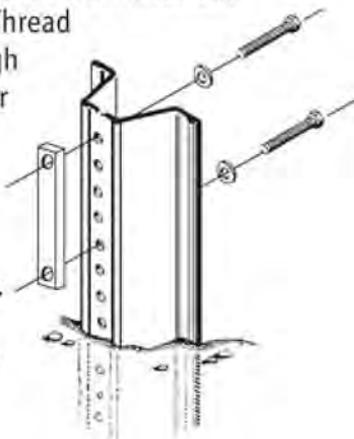
## Installation

The LAP SPLICE system consists of two each of these components: cut washers, specially designed Grade 9 bolts, self-locking flange nuts; and a single bar spacer. This system is FHWA approved only when used to lap splice Nucor Steel Marion RIB-BAK® U-channel sign and base posts.

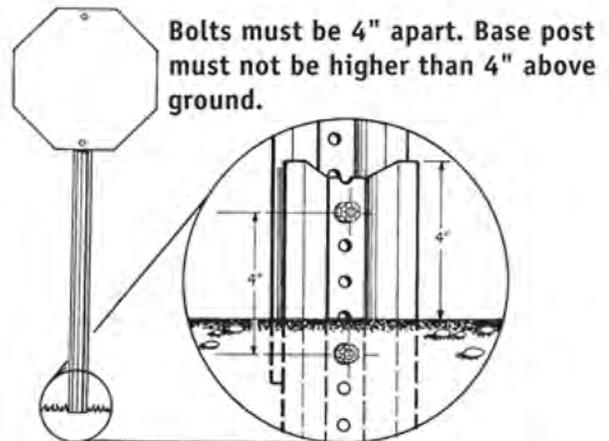
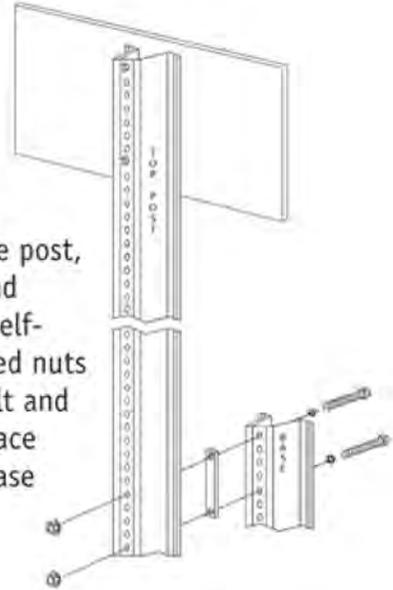
**1** Drive base post so that no more than 4" is above the ground. Remove enough soil around base so that the fifth hole is exposed and can be easily reached. (Some installers prefer to remove a shovelful of soil prior to installation of the base post.)



**2** Put flat washer on bolt and insert into top hole of base post. (If first hole on top post is less than 1" from end, use second hole.) Thread top bolt through threaded spacer bar. Put flat washer on second bolt and thread into spacer bar. Tighten both bolts in spacer securely.



**3** Nest the bottom hole of the top post onto the bottom hole of protruding bolts of the base post. (If the bottom hole of the top post is less than 1" from the end of the post, use the second hole.) Place self-locking flanged nuts onto each bolt and tighten. Replace soil around base post.



### BAR SPACER SIZE CHART

Post Size (lbs./ft.)	Bar Color	Bar Size
2 & 2.5	Silver	3/8" x 3/4" x 5"
3 & 4	Gold	1/2" x 3/4" x 5"

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# TYPICAL SIGN STAND -1



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## LITTLE BUSTER SIGN STAND PRODUCT INFORMATION

- Step-n-Drop leg feature enables you to quickly set-up the stand without having to bend over or stoop down. Simply place your foot on the release levers, step down and two legs will drop into position
- Dual spring sign stand is designed to hold 30", 36" and 48" aluminum, wood or roll up signs in high wind conditions
- All steel construction with powder coated paint to resist rusting
- Rigid signs can achieve bottom heights of 12 to 18 inches. Roll up signs can achieve bottom heights of 12 inches to 5 feet and a 7 foot height can be achieved with optional 77 inch inner mast (RU7)
- A two position leg adjustment allows all four legs to be individually adjusted for uneven terrain
- Ideal for both roll up and rigid signs for city, utility and highway applications
- NCHRP-350 approved when used with Safe Sleeve-350 for .080 aluminum signs
- NCHRP-350 approved with roll up signs and plastic Safe Sign 350

# TYPICAL SIGN STAND - 2



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## TRI-BUSTER SIGN STAND PRODUCT INFORMATION

- Constructed of corrosion resistant heavy duty galvanized tubing and can be folded for compact storage
- Accommodates 48" x 48" or smaller; plywood, aluminum, aluminum poly laminate, plastic and roll up sign materials
- Three leg design is very stable in windy conditions. Ballasting hook allows sand bags or weights to be hung from sign stand for added stability
- Safety engineered with guards to protect fingers from dangerous "pinch points"
- Optional roll-up sign bracket and leg extending leveling kit may be ordered to enhance Tri-Busters performance
- NCHRP 350 approved with rigid and roll up signs

# Energite® III/ Fitch® Universal Module Systems



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*The Easy-To-Install Inertial Barrel Systems*

**DESIGN**

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**ENERGY ABSORPTION  
SYSTEMS, INC.**

A Quixote Company

## General Information

### Table of Contents

Introduction/System Overview .....	2
General Specifications .....	5
Design Criteria .....	6
Limitations and Warnings .....	Inside Back Cover

### Important Introductory Notes

Proper array design of the Energite® III/Fitch® Universal Module Systems is essential to assure maximum performance. Take the time to review the design information and product limitations thoroughly.

If you need additional information or have questions about the Energite® III/Fitch® Universal Module Systems, please call Energy Absorption Systems' **Customer Service Department at 1-888-32-ENERG.**

### System Overview

The Energite® III/Fitch® Universal Module Systems are non-redirective, easy-to-install crash cushions consisting of a number of sand-filled polyethylene or polypropylene plastic modules that are installed in a specific geometric array in front of a hazard.

Each module of the Energite® III Module System consists of a barrel, a lid, and in some cases, a cone insert. The cone insert is used to adjust the sand height or center-of-mass and the overall weight of sand in the barrel. The barrel's sand weight requirement is determined by its place within the array.

The Energite® III Module Systems modules are available in 90, 180, 320, 640 and 960 kg (200, 400, 700, 1400 and 2,100 lb) sizes. Refer to Figures 1A/B and 2A/B.

Each module of the Fitch Universal Module consists of one set of walls, one core, one lid and four zip strips. These components will make any weight module 90, 180, 320, 640, 960 kg (200, 400, 700, 1400, 2,100 lb) required.

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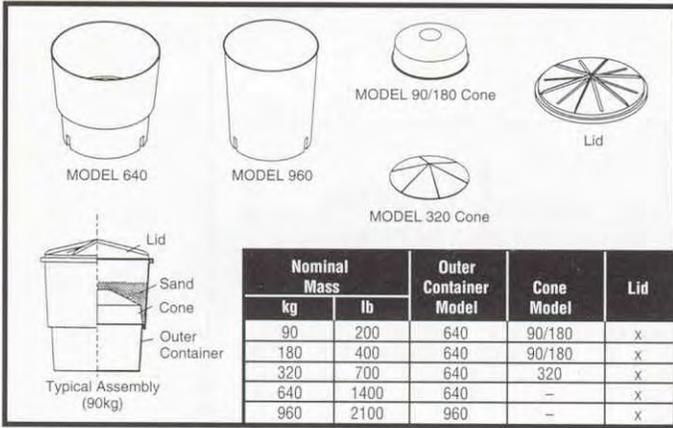
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Figure 1A—Energite® III



Energite III System Components

## Crash Performance

The Energite® III/Fitch® Universal Module Systems have been successfully tested to NCHRP Report 350, Test Level 3 for non-redirective, gating crash cushions. NCHRP 350 differs from NCHRP 230 in that the heavy vehicle is now a pickup truck with a higher center-of-gravity plus the impact severity has increased by 6.7% due to the impact speed of 100 km/h (62 mph).

The inertial barrel systems break up during impact. As the impacting vehicle passes through the array, its speed is slowed by transfer of its momentum to the sand, allowing for safe, steady deceleration.

**Caution: Inertial barrels are not recommended for sites where redirective capabilities are warranted.**

Figure 1B—Fitch® Universal Module System

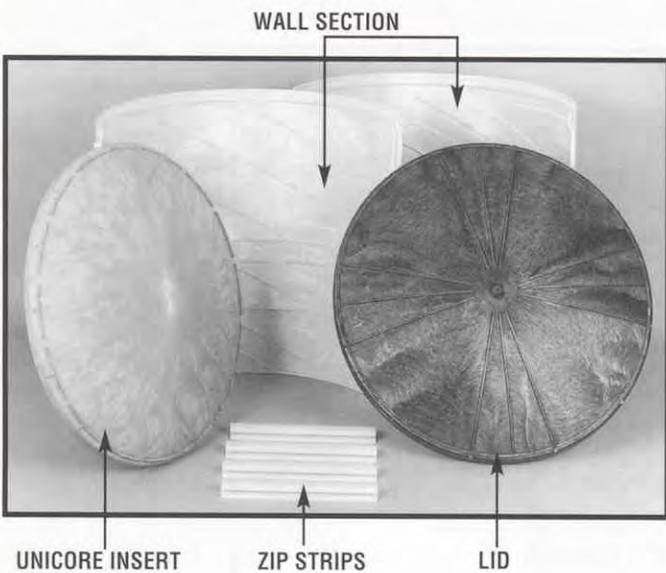
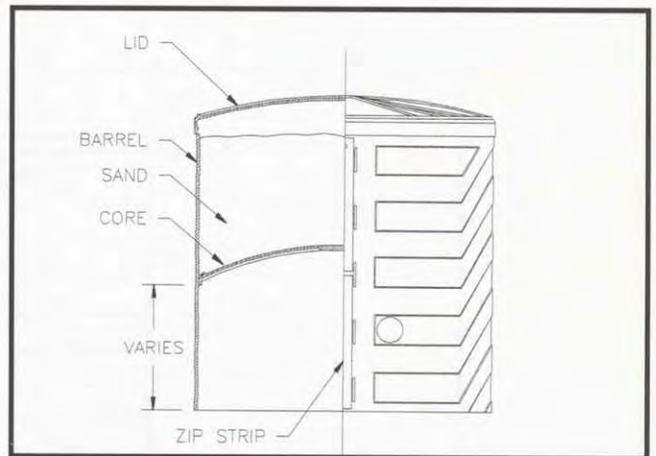


Figure 1C—Fitch® Universal Module System



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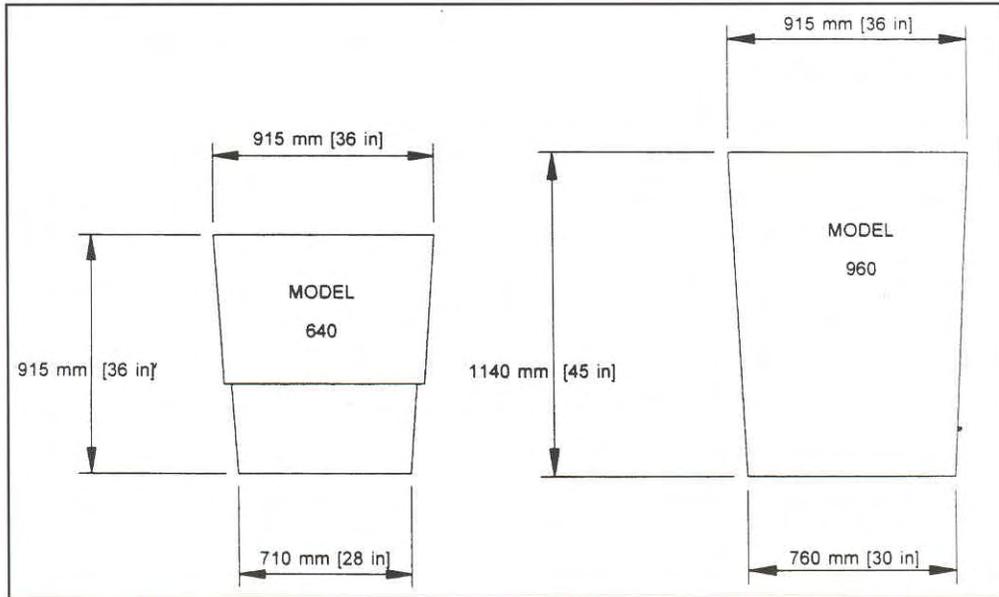
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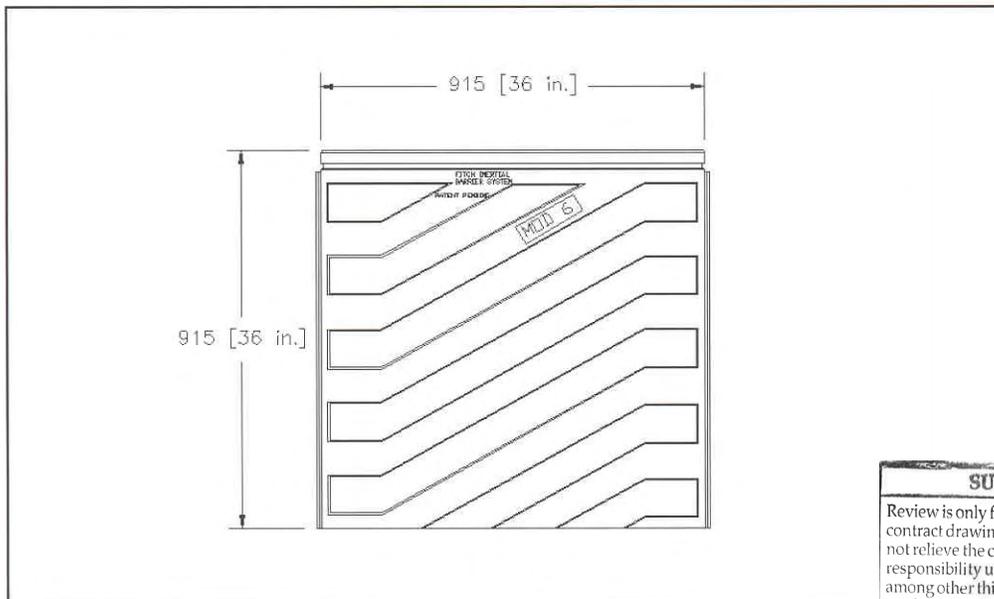


Figure 2A—Energite® III



Energite III System Dimensions

Figure 2B—Fitch® Universal Module System



Fitch System Dimensions

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## General Specifications

### I. General

The Energite® III/Fitch® Universal Module Systems shall be designed and manufactured by Energy Absorption Systems, Inc. of Chicago, Illinois.

### II. Description of System

- A. The Energite® III/Fitch® Universal Module Systems modules shall be available in 90, 180, 320, 640 and 960 kg sizes.
- B. The 90, 180 and 320 kg Energite® III modules shall consist of three basic components:
  1. A Model 640 outer container molded in one piece with a minimum capacity of 0.4 m<sup>3</sup> (14 ft<sup>3</sup>). The material shall be durable, weatherproof and shall be formulated to resist deterioration from ultraviolet rays. The standard color shall be yellow. This model must be of continuous molded construction and be nestable.
  2. Cone-shaped supporting inserts are used to support 90, 180 and 320 kg sand masses. The height and diameter of the cones shall be such to ensure that the center-of-gravity of each module is at the proper elevation to control the attitude of standard passenger vehicles when filled to the proper level. The cone inserts shall be placed inside the Model 640. The cone inserts shall interface smoothly with the Model 640 "step". The interface shall permit free drainage of excess water contained within the sand mass. Cone inserts shall be of one-piece molded construction and be nestable.
  3. A black lid which locks securely over the top lip of the outer container. The material shall be durable, weatherproof and shall be formulated to resist deterioration from ultraviolet rays. Lids shall be nestable.
- C. The 640 kg module shall consist of two components:
  1. A Model 640 outer container as described previously in II.B.1.
  2. A lid as described previously in II.B.3.
- D. The 960 kg module shall consist of two components:
  1. A Model 960 outer container molded in one piece with a minimum capacity of 0.6 m<sup>3</sup> (21 ft<sup>3</sup>). Material is the same as Model 640 described previously in II.B.1.
  2. A lid as previously described in II.B.3.
- E. Each module of the Fitch Universal Module consists of one set of walls, one core, one lid and four zip strips.

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BY: <i>E. Benjamin</i> DATE: <i>7/22/16</i>	
PB AMERICAS, INC.	

# General Information

### III. Performance Criteria

- A. Each Energite® III/Fitch® Universal Module array shall be configured to provide a satisfactory average rate of deceleration (8 G's maximum preferred for each row) for errant vehicles in the weight ranges of 820 to 2000 kg (1810 to 4410 lb). Placement of the modules within an array and the geometric design of the array itself shall be determined by a qualified engineer. Standard size modules shall contain either 90, 180, 320, 640 or 960 kg of sand.
- B. The modules shall be designed and manufactured from a frangible polyethylene or polypropylene material which shall shatter upon impact to permit dispersion of the sand mass contained within.
- C. The center-of-gravity of each properly-filled module shall be at a height which will aid in controlling the pitch of standard passenger vehicles.
- D. The components of the Energite® III/Fitch® Universal Module modules shall interface to prevent leakage of sand contained therein. The interface shall, however, permit drainage of excess water contained within the sand mass.

### IV. Testing Criteria

- A. An Energite® III/Fitch® Universal Module Systems array shall have been tested to the procedures set forth in NCHRP 350 for TL-3 non-redirective gating crash cushions. For impacting vehicles weighing between 820 to 2000 kg (1810 to 4410 lb) traveling at speeds up to 100 km/h (62 mph), the maximum 60 cm (24") occupant flail space velocity shall be less than 12 m/sec (39 ft/sec) and the vehicles' highest 10 ms occupant ridedown acceleration shall be less than 20 G's.

### V. Design and Selection Criteria

- A. Design and placement of arrays shall follow guidelines established in:
  1. American Association of State Highway and Transportation Officials (AASHTO) publication, *Roadside Design Guide, 2002*.
- B. Sand placed into these modules should be washed concrete sand conforming to ASTM-C-33 or equal.

## Design Criteria

Before selecting inertial barriers as the attenuator for any given site, certain conditions of the site must be taken into consideration. Figure 3 lists the recommendations of the

Federal Highway Administration (FHWA) and of Energy Absorption Systems, Inc., for these site conditions.

The Energite® III/Fitch® Universal Module Systems is a non-redirective crash cushion and should be used appropriately.

Figure 3

Conditions	FHWA Recommendations	Energy Absorption Recommendations	Sample
1. Angle of array in relation to center line of obstacle	Not recommended for more than 10°	Same as FHWA	
2. Bidirectional traffic	Offset array to avoid impact to the rear module from wrong-way vehicles	Same as FHWA	
3. Module spacing: module to module, module to hazard	None given 300 to 610 mm [1' to 2']	0-150 mm [6"] width 150 mm [6"] minimum length	
4. "Coffin" corner	Shield 760 mm [30"] outside of hazard	Same as FHWA	
5. Sloping sites (lateral and longitudinal)	5% grade maximum	Same as FHWA	
6. Curbs and raised islands or pallets for temporary sites	No more than 100 mm [4"] high	Same as FHWA	
7. Foundation pads	Flat surface; concrete or asphalt	Same as FHWA	
8. Intermixing of brands of modules	Approved - As long as modules are federally approved and array meets design criteria.	Same as FHWA	
9. Maintenance	Keep site clear of debris and snow	Same as FHWA	
10. Sand densities	1600 kg/m³ [100 lbs/cf]	Determine in the field	
11. Single rows of modules	Not recommended	Same as FHWA	
12. Vandalism	Check periodically for damage.	Same as FHWA	

### Site Conditions and Recommendations

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FB AMERICAS, INC.

BY: *E. Boyman*  
DATE: *7/22/16*

# Arrays

## Special Site Considerations

Other special considerations warrant consideration in the design and installation of inertial barrier systems. The following conditions and recommendations for treatment are based on performance observations.

### 1) Freezing Temperatures

In cold climates, sand having a moisture content of 3% or more should be mixed with 5% rock salt (by weight) to prevent the sand from freezing into potentially dangerous solid blocks.

### 2) Modules Placed on Structures

On structures where the vibrations from moving traffic may cause modules to shift, steel or formed-in-place asphaltic concrete half-rings placed on the downhill side of the modules will prevent such movement. Also, nails or bolts through the bottom of the outer container and into the roadway will prevent module movement.

### 3) Partial Impacts

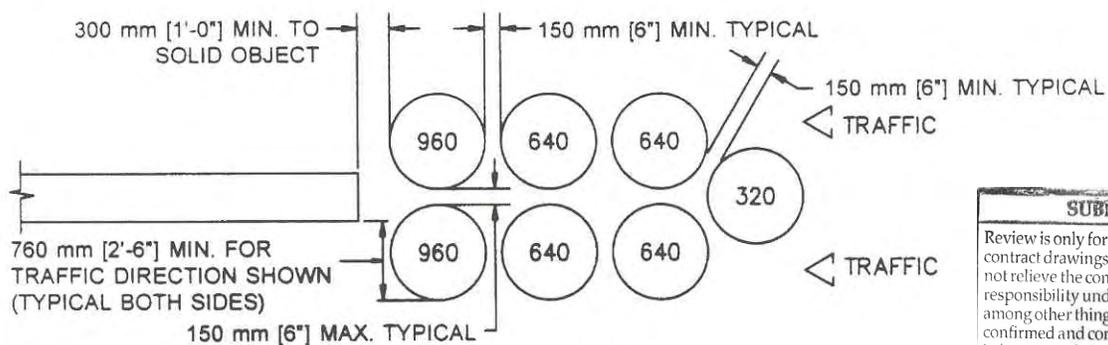
When a vehicle contacts less than the full width of a module, the module's deceleration effectiveness is equivalent to the percentage of the module contacted. If half of a module is impacted, then only 50% of that module's weight is effective and should be kept in mind when placing an array.

### 4) Other Unique Conditions

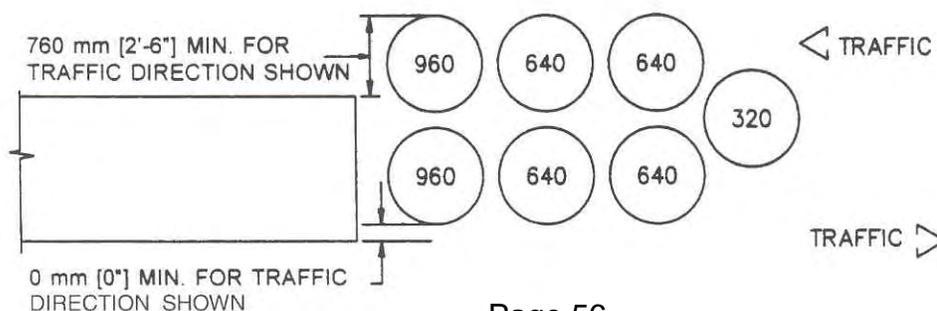
You may find that there are other conditions unique to a particular site that must be considered to ensure a properly designed and functional inertial barrier system.

## Standard Arrays

Following are several standard arrays for the Energite® III/ Fitch® Universal Module Systems. They will perform as indicated in the calculations only if hit head-on. Arrays are provided using both metric and English units. Below are typical arrays showing unidirectional and bidirectional configurations. These are minimum arrays and more barrels are recommended and should be used when conditions permit.



Unidirectional



Page 56  
Bidirectional

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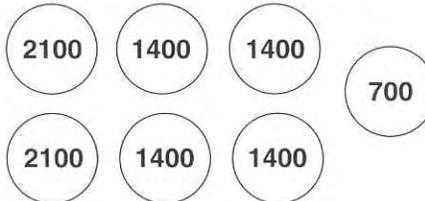
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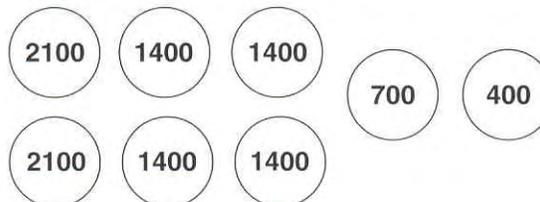
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## Arrays Based on English Units (cont.)

DESIGN VELOCITY 35 mph (56 km/h)							
ROW	SAND MASS (lbs)	1800 lb vehicle			4500 lb vehicle		
		EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)
0		35.0			35.0		
1	700	25.2	6.6	0.07	30.3	3.4	0.06
2	2800	9.9	6.0	0.12	18.7	6.3	0.08
3	2800	3.9	.9	0.30	11.5	2.4	0.14
4	4200	1.2	.2	0.82	6.0	1.1	0.23



DESIGN VELOCITY 40 mph (64 km/h)							
ROW	SAND MASS (lbs)	1800 lb vehicle			4500 lb vehicle		
		EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)
0		40.0			40.0		
1	400	32.7	5.9	0.06	36.8	2.8	0.05
2	700	23.6	5.7	0.07	31.8	3.8	0.06
3	2800	9.2	5.2	0.12	19.6	7.0	0.08
4	2800	3.6	.8	0.32	12.1	2.7	0.13
5	4200	1.1	.1	0.87	6.2	1.2	0.22



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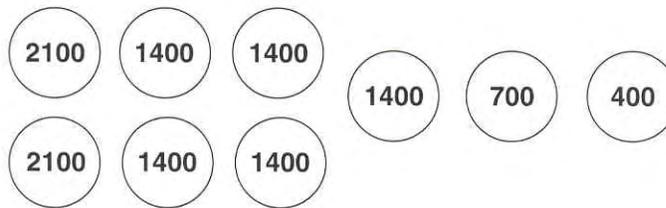
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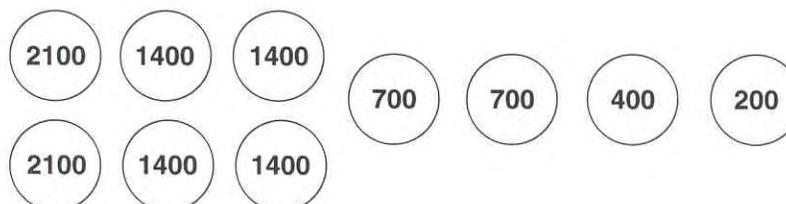


## Arrays Based on English Units (cont.)

DESIGN VELOCITY 45 mph (72 km/h)							
ROW	1800 lb vehicle				4500 lb vehicle		
	SAND MASS (lbs)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)
0		45.0			45.0		
1	400	36.8	7.5	0.05	41.3	3.5	0.05
2	700	26.5	7.3	0.06	35.8	4.8	0.05
3	1400	14.9	5.4	0.10	27.3	6.0	0.06
4	2800	5.8	2.1	0.20	16.8	5.1	0.09
5	2800	2.3	.3	0.50	10.4	2.0	0.15
6	4200	.7	.1	1.38	5.4	.9	0.26



DESIGN VELOCITY 50 mph (80 km/h)							
ROW	1800 lb vehicle				4500 lb vehicle		
	SAND MASS (lbs)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)
0		50.0			50.0		
1	200	45.0	5.3	0.04	47.9	2.3	0.04
2	400	36.8	7.5	0.05	44.0	4.0	0.04
3	700	26.5	7.3	0.06	38.1	5.4	0.05
4	1400	14.9	5.4	0.10	29.0	6.7	0.06
5	2800	5.8	2.1	0.20	17.9	5.8	0.09
6	2800	2.3	.3	0.50	11.0	2.2	0.14
7	4200	.7	.1	1.38	5.7	1.0	0.24



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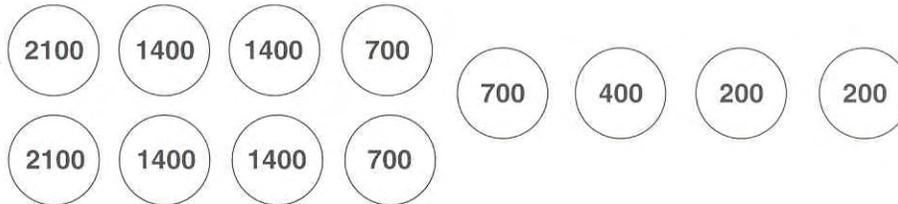
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## Arrays Based on English Units (cont.)

DESIGN VELOCITY 55 mph (88 km/h)							
ROW	1800 lb vehicle				4500 lb vehicle		
	SAND MASS (lbs)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)	EXIT VEL (mph)	AVE G'S FOR ROW	IMPULSE TIME (sec)
0		55.0			55.0		
1	200	49.5	6.4	0.04	52.7	2.8	0.04
2	200	44.6	5.2	0.04	50.4	2.6	0.04
3	400	36.5	7.3	0.05	46.3	4.4	0.04
4	700	26.2	7.1	0.07	40.1	6.0	0.05
5	1400	14.8	5.2	0.10	30.6	7.5	0.06
6	2800	5.8	2.1	0.20	18.8	6.5	0.08
7	2800	2.3	.3	0.51	11.6	2.5	0.13
8	4200	.7	.1	1.39	6.0	1.1	0.23



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# Limitations and Warnings

## Limitations and Warnings

The Energite® III/Fitch® Universal Module Systems have been tested and evaluated per recommendations of the National Cooperative Highway Research Program (NCHRP) Report 350\* for Test Level 3, non-redirective impact conditions. The Energite® III/Fitch® Universal Module Systems, as currently designed, with the proper array, are capable of decelerating and stopping light and heavy weight vehicles (820 to 2000 kg, 1810 to 4410 lbs) when impacted head-on or at angles from 0° to 15° and at 100 km/h (62 mph). Tests were conducted on slopes less than 5% and without curbs.

The Energite® III/Fitch® Universal Module Systems are non-redirective crash cushions and should be used appropriately.

Curbs may create a vehicle ramping condition which could cause an unsafe vehicle trajectory.

Impacts that exceed the design capabilities described may not result in acceptable crash performance as described in NCHRP Report 350 relative to structural adequacy, occupant risk and vehicle trajectory factors.

\*Copies may be obtained from:

Transportation Research Board  
National Research Council  
2101 Constitution Avenue, NW  
Washington, D.C. 20418

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Appendix B – VTrans Standard Sheets with Modifications

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1. TRAFFIC CONTROL DEVICES NOT DETAILED IN THE VERMONT AGENCY OF TRANSPORTATION (VAOT) "STANDARD DRAWINGS" OR THE PROJECT PLANS SHALL BE IN ACCORDANCE WITH THE "MANUAL ON TRAFFIC CONTROL DEVICES" (MUTCD) AND THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHSM) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION (FHWA).
2. CONSTRUCTION SIGNS SHALL BE ERECTED BEFORE THE START OF ANY WORK AND SHALL BE COVERED UNTIL WORK COMMENCES, DURING PERIODS OF INACTIVITY OR UPON COMPLETION OF THE WORK. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMANLIKE MANNER.
3. CONSTRUCTION SIGN COVERS SHALL CONSIST OF A PANEL, PAINTED FLAT BLACK, THE SAME SIZE AS THE SIGN IT COVERS. THE PANEL SHALL BE OF WOOD, PLYWOOD, HARDBOARD OR ANY MATERIAL SATISFACTORY TO THE ENGINEER. NO MATERIAL WILL BE APPROVED THAT WILL DETERIORATE BY EXPOSURE TO THE WEATHER DURING THE PROJECT. MOUNTING OF THE PANEL SHALL BE DONE IN SUCH A WAY AS NOT TO DAMAGE THE SIGN FACE MATERIAL.
4. SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACED OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED OR REPLACED AS ORDERED BY THE ENGINEER.
5. NO CROSS-BRACING OR BACK-BRACING TO KEEP POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS OR SOIL BEARING PLATES ARE NOT PERMITTED. CONSTRUCTION SIGNS SHALL BE PLACED ON TWO POSTS.
6. CONSTRUCTION SIGNS INSTALLED ON POSTS SHALL BE SET SECURELY IN THE GROUND. THE BOTTOM OF A SIGN SHALL BE AT LEAST FIVE FEET ABOVE THE EDGE OF PAVEMENT AND THE NEAREST EDGE OF A SIGN SHALL BE AT LEAST SIX FEET OUTSIDE THE SHOULDER POINT, FOUR FEET OUTSIDE GUARDRAIL, OR TWO FEET OUTSIDE CURBING OR SIDEWALK. THE INSTALLATION OF SIGNS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER. IN URBAN AREAS, THE BOTTOM OF THE SIGN SHALL BE AT LEAST SEVEN FEET ABOVE THE SIDEWALK OR EDGE OF PAVEMENT, WHICHEVER IS HIGHER.
7. PORTABLE SIGNS SHALL BE PLACED ON THE EDGE OF ROADWAY AND A MINIMUM OF ONE FOOT ABOVE THE TRAVELED WAY. ALL VEGETATION THAT INTERFERES WITH VISIBILITY OF THE SIGNS SHALL BE REMOVED. WHEN PLACED BEHIND GUARDRAIL, THE BOTTOM OF THE SIGN FACE SHALL BE ABOVE THE TOP OF THE GUARDRAIL.
8. SIGNS SHALL BE REMOVED UPON COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.
9. ROLL UP CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ["AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956] TYPE VI AND TYPE VII UNLESS OTHERWISE NOTED.
10. SOLID SUBSTRATE CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ["AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956] TYPE VIII OR IX REQUIREMENTS UNLESS OTHERWISE NOTED.
11. WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARDRAIL OR OTHER APPROVED TRAFFIC BARRIERS, ALL SIGN STANDS AND POST INSTALLATIONS SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION. NO SIGN POSTS SHALL EXTEND OVER THE TOP OF THE SIGN INSTALLED ON SAID POSTS. WHEN ANCHORS ARE INSTALLED, STUBS SHALL NOT BE GREATER THAN FOUR INCHES ABOVE EXISTING GROUND.
12. ROADWAY AND SHOULDER WIDTHS DEPICTED ON THE STANDARD DRAWINGS MAY VARY.
13. THESE STANDARD DRAWINGS ARE INTENDED TO SERVE AS VTRANS STANDARD OPERATING PROCEDURE. IT IS NOTED THAT COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL WORK ZONE MAY BE MODIFIED DUE TO FIELD CONDITIONS, AT THE DISCRETION OF THE ENGINEER.

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OTHER STDS. REQUIRED: **NONE**

REVISIONS AND CORRECTIONS  
 AUG. 6, 2012 - ORIGINAL APPROVAL DATE

APPROVED  
*[Signature]*  
 HIGHWAY SAFETY & DESIGN ENGINEER  
*[Signature]*  
 DIRECTOR OF PROGRAM DEVELOPMENT  
*[Signature]*  
 FEDERAL HIGHWAY ADMINISTRATION

# TRAFFIC CONTROL GENERAL NOTES



# STANDARD T-1

**TRAFFIC CONTROL NOTES - US ROUTE 7:**

1. THE TRAFFIC CONTROL PLAN SHOWN IS A SCHEMATIC ONLY AND SHOULD BE USED AS A REFERENCE. THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR BRIDGES 11, D15, 16N, 16S, AND 56C TO VTRANS FOR APPROVAL. PAYMENT FOR PREPARING AND SUBMITTING THE TRAFFIC CONTROL PLAN, AND MAKING NECESSARY REVISIONS TO THE PLAN, WILL BE INCLUDED IN THE UNIT PRICE BID FOR CONTRACT ITEM 641.10 - TRAFFIC CONTROL. THE CONTRACTOR SHALL ALLOW TWO WEEKS FOR APPROVAL OF THE TRAFFIC CONTROL PLAN. NO WORK SHALL COMMENCE UNTIL THE CONTRACTOR HAS AN APPROVED TRAFFIC CONTROL PLAN.
2. THE SPEED LIMIT WILL BE REDUCED TO TEN MPH BELOW THE POSTED SPEED LIMIT IN THE WORK ZONE FOR THIS PROJECT. ANY EXISTING SPEED LIMIT SIGNS WITHIN THE SPEED REDUCTION AREA SHALL BE COMPLETELY COVERED.
3. CONSTRUCTION SIGNS SHALL BE INSTALLED SO AS NOT TO OBSTRUCT EXISTING SIGNS.
4. TRAFFIC CONTROL DEVICES NOT DETAILED IN THE VERMONT AGENCY OF TRANSPORTATION (VAOT) "STANDARD DRAWINGS" OR THE PROJECT PLANS SHALL BE IN ACCORDANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHSM) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION, OR AS DIRECTED BY THE ENGINEER.
5. SOLID SUBSTRATE CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 "AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956J TYPE VII OR IX UNLESS OTHERWISE NOTED.
6. ROLL UP SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 "AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956J TYPE VI UNLESS OTHERWISE NOTED.
7. CONSTRUCTION SIGNS SHALL BE ERECTED BEFORE THE START OF ANY WORK AND SHALL BE COVERED UNTIL WORK COMMENCES, DURING PERIODS OF INACTIVITY OR UPON COMPLETION OF THE WORK. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMANLIKE MANNER.
8. CONSTRUCTION SIGN COVERS SHALL CONSIST OF A PANEL, PAINTED FLAT BLACK, THE SAME SIZE AS THE SIGN IT COVERS. THE PANEL SHALL BE MADE OF WOOD, PLYWOOD, HARDBOARD OR ANY MATERIAL SATISFACTORY TO THE ENGINEER. NO MATERIAL WILL BE APPROVED THAT WILL DETERIORATE BY EXPOSURE TO THE WEATHER DURING THE PROJECT. MOUNTING OF THE PANEL SHALL BE DONE IN SUCH A WAY AS NOT TO DAMAGE THE SIGN FACE MATERIAL.
9. SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACED OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED OR REPLACED AS ORDERED BY THE ENGINEER.
10. NO CROSS-BRACING OR BACK-BRACING TO KEEP POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS OR SOIL BEARING PLATES ARE NOT PERMITTED. CONSTRUCTION SIGNS SHALL BE PLACED ON TWO POSTS.
11. CONSTRUCTION SIGNS INSTALLED ON POSTS SHALL BE SET SECURELY IN THE GROUND. THE BOTTOM OF A SIGN SHALL BE AT LEAST FIVE FEET ABOVE THE EDGE OF PAVEMENT AND THE NEAREST EDGE OF A SIGN SHALL BE A LEAST SIX FEET OUTSIDE THE SHOULDER POINT, FOUR FEET OUTSIDE THE GUARDRAIL, OR TWO FEET OUTSIDE THE CURBING OR SIDEWALK. THE INSTALLATION OF SIGNS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER. IN URBAN AREAS, THE BOTTOM OF THE SIGN SHALL BE AT LEAST SEVEN FEET ABOVE THE SIDEWALK OR EDGE OF PAVEMENT, WHICHEVER IS HIGHER.
12. PORTABLE SIGNS SHALL BE PLACED ON THE EDGE OF ROADWAY AND A MINIMUM OF ONE FOOT ABOVE THE TRAVELED WAY. ALL VEGETATION THAT INTERFERES WITH VISIBILITY OF THE SIGNS SHALL BE REMOVED. WHEN PLACED BEHIND THE GUARDRAIL, THE BOTTOM OF THE SIGN FACE SHALL BE ABOVE THE TOP OF THE GUARDRAIL.
13. SIGNS SHALL BE REMOVED UPON COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.
14. WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARDRAIL OR OTHER APPROVED TRAFFIC BARRIERS, ALL SIGN STANDS AND POST INSTALLATIONS SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION. NO SIGN POSTS SHALL EXTEND OVER THE TOP OF THE SIGN INSTALLED ON SAID POSTS. WHEN ANCHORS ARE INSTALLED, STUBS SHALL NOT BE GREATER THAN FOUR INCHES ABOVE EXISTING GROUND.

NOTES CONTINUED ON TRAFFIC CONTROL SHEET (2).

**TRAFFIC CONTROL NOTES - US ROUTE 7:**

NOTES CONTINUED FROM TRAFFIC CONTROL SHEET (1):

15. THE CONTRACTOR SHALL HAVE SIGNS FOR CLOSURE OF LEFT OR RIGHT LANES INSTALLED BEFORE WORK COMMENCES.
16. THE NUMBER OF CHANNELIZING DEVICES, TYPE III BARRICADES AND OTHER TRAFFIC CONTROL DEVICES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. THE ACTUAL NUMBER REQUIRED IS TO BE DETERMINED BASED ON INDIVIDUAL DETOUR CONDITIONS (TAPERS, SPEED LIMITS, LENGTH OF DETOUR, CURVE ETC.). WARNING LIGHTS SHALL NOT BE USED ON CHANNELIZING DEVICES.
17. PLACE LAST CHANNELIZING DEVICE 100 FEET BEYOND THE ANTICIPATED WORK ZONE TERMINAL POINT EACH DAY AND START THE END TAPER. THE END TAPER SHALL BE CONSTRUCTED OF 5 ADDITIONAL RETROREFLECTIVE DRUMS SPACED AT 10 FEET ON CENTER.
18. THE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE USED FOR US ROUTE 7 LANE CLOSURES AND AT THE DISCRETION OF THE ENGINEER FOR LANE CLOSURES ON OTHER ROADWAYS.
19. TRAVEL LANES SHALL BE A MINIMUM OF 12 FEET WIDE ON US ROUTE 7, UNLESS OTHERWISE NOTED.
20. AT NO TIME WILL THE CONTRACTOR BE ALLOWED TO HAVE WORKERS' VEHICLES, CONSTRUCTION EQUIPMENT OR STOCKPILED MATERIALS WITHIN THE CLEAR ZONE OF US ROUTE 7 WITHOUT POSITIVE PROTECTION. POSITIVE PROTECTION SHALL BE AS DIRECTED BY THE ENGINEER.  
THE CLEAR ZONE IS DEFINED AS FOLLOWS:  
US ROUTE 7: BR 11 - 18 FEET FROM THE EDGE OF TRAVELED WAY  
US ROUTE 7: BR D15 - 30 FEET FROM THE EDGE OF TRAVELED WAY  
US ROUTE 7: BR 16N - 30 FEET FROM THE EDGE OF TRAVELED WAY  
US ROUTE 7: BR 16S - 30 FEET FROM THE EDGE OF TRAVELED WAY  
US ROUTE 7: BR 56C - 30 FEET FROM THE EDGE OF TRAVELED WAY
21. ARROW BOARDS SHALL BE PLACED ON THE SHOULDER OF THE ROADWAY, OR IF PRACTICAL, FURTHER FROM THE TRAVELED LANE AT THE END OF THE SHOULDER TAPER.
22. SEE TRAFFIC CONTROL SHEET (1) FOR LEGEND, TAPER RATES, AND DEVICE SPACING TABLE.

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Appendix C – Night Lighting

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## Magnum Light Tower – MLT4150 Specifications

### ENGINE

- Mitsubishi® S4L2-W461ML - liquid cooled, diesel engine
  - Standby - 24.7 hp @ 1800 rpm
  - Prime - 23.5 hp @ 1800 rpm
  - 4 cylinder
  - 1.76 L displacement
- Fuel consumption (prime) – 1.30 gph (4.92 Lph)
- 60 Hz engine/generator
- Industrial engine exhaust system
- Rubber vibration dampers isolate engine/generator from frame
- Cooling system capable of operating at 120°F ambient
- Full flow oil filter, spin on type
- Fuel filter with replaceable element
- Dry type cartridge air filter
- Polyethylene fuel tank with large diameter opening
  - 56 gal. capacity
  - 43 hr. run capacity
  - 3 ½” fill port

**TYPICAL  
ONLY**



### ENGINE CONTROLS

- Engraved, aluminum punched and anodized control panel
- Four position keyed switch – glow plugs (preheat, off, run, start)
- Hour meter
- Automatic low oil/high temperature shutdown system

### GENERATOR

- Marathon Electric®
  - Brushless
- 15 kW standby output
- 120/240 VAC – 125/63A
- +/-1% voltage regulation

### ELECTRICAL SYSTEM AND CONTROLS

- Individual floodlight circuits with 15A breakers
- Ballast indicator lights
- 70A start limit breaker (assures no load condition exists before starting)

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- Standard individually breakered convenience outlets:
  - (2) 120 VAC 20 Amp GFCI duplex outlets (Nema 5-20R type)
  - (2) 240 VAC 30 Amp twistlock outlets (Nema L6-30R type)
  - (2) 240 VAC 50 Amp twistlock outlets (Non Nema 6369)
- 440 CCA wet cell battery

## FLOODLIGHTS

- Four light fixtures – 1000 watts each - metal halide
- Oval aluminum reflector
- Tempered glass lens
- Silicone gaskets for moisture and dust protection
- Individual floodlight On/Off switches

## WIRING

- All wiring is sized to the amperage draw required
- AC & DC wiring diagrams are provided

## MAST

- 30' maximum extension, 3-section, tubular steel
- Urethane guides on all sides of mast tubes
- Industrial black powder coat finish
- Automatic locking system in horizontal position for travel
- 1500 lb. automatic self-braking winches
- 360° rotation with locking system
- Coiled mast cord
- Dual winch system located at ergonomic height allowing single person operation
- Equipped with single lifting eye and fork pockets

## ENCLOSURE

- Steel enclosure – 14-gauge
  - UV& fade resistant, high temperature cured, white polyester powder paint
  - 68 dB(A) at 23 feet – prime power
- Stainless steel hinges on doors
- Multi-lingual operating/safety decals
- License plate holder with light
- Manual holder with operating manual

## TRAILER

- Mast support - 3" square tube, 1/4" wall
- Removable tongue - 48" long
- Tubular steel frame - 3/16" wall
- Four, 2000 lb. adjustable leveling jacks – 4 point stance
- All jacks transport and lock in horizontal position for storage
- Side outriggers - 11' 8" span
- Safety chains with spring loaded safety hooks
- 2" ball hitch
- Single wall polyethylene fenders

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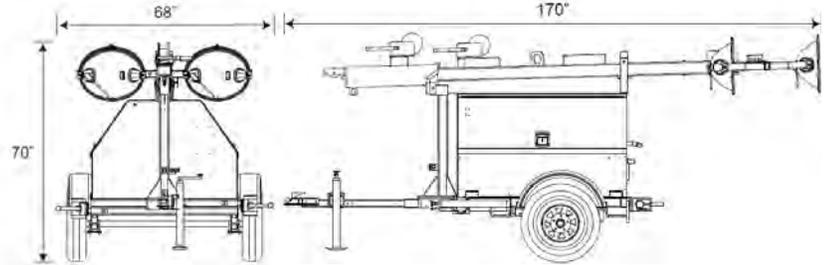
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- DOT approved tail, side, brake, and directional lights
  - Recessed rear lights
- 3000 lb. leaf spring axle
- P205/75R15 – 6 ply
- 58 in. axle span

**WEIGHTS & DIMENSIONS**

- Dry weight: 2015 lbs (914 kg)
- Operating weight: 2413 lbs (1095 kg)
- Mast stowed: 170 x 68 x 70 in (4.32 x 1.73 x 1.78 m)



**WARRANTY**

- Engine and generator covered under OEM warranty – consult factory for details.

**CERTIFICATIONS**

- CSA certified

**MLT4150 Options**

**COOLANT OPTIONS**

- ◆ 60/40 Coolant, 60% Ethylene glycol

**ENGINE OPTIONS**

- ◆ Heated fuel filter
- ◆ Oil drain valve kit
- ◆ Lower radiator hose – engine heater

**ELECTRICAL CONTROLS OPTIONS**

- ◆ 720 CCA wet cell battery
- ◆ 720 CCA AGM sealed battery (Optima)
- ◆ 775 AGM sealed battery
- ◆ Battery disconnect
- ◆ Battery charger – 2A trickle
- ◆ Autolight controller
- ◆ Alternative receptacle panel – consult factory for configurations

**CABINET OPTIONS**

- ◆ Interior cabinet light
- ◆ Level indicator

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### HITCH OPTIONS

- ◆ 2.5" lunette ring
- ◆ 3" lunette ring
- ◆ 3" HD lunette ring
- ◆ 2 5/16" ball
- ◆ Combination hitch – 2.5" lunette ring / 2" ball

### TRAILER OPTIONS

- ◆ Tube and sleeve jack
- ◆ 6 pin or 7 spade connectors
- ◆ Spare tire and carrier
- ◆ Parking brake
- ◆ Electric brakes
- ◆ Surge brakes

### LIGHT OPTIONS

- ◆ Tubelight™ Diffused Light accessory
- ◆ High pressure sodium, quick disconnect lights

### MAST CORD OPTIONS

- ◆ Drape cord

### MAST, WINCH, & FINISH OPTIONS

- ◆ Galvanized, manual, dual winch
- ◆ Galvanized, electric, dual winch
- ◆ Galvanized, electric, dual winch, quick disconnect
- ◆ Black, electric, dual winch
- ◆ Black, electric, dual winch, quick disconnect

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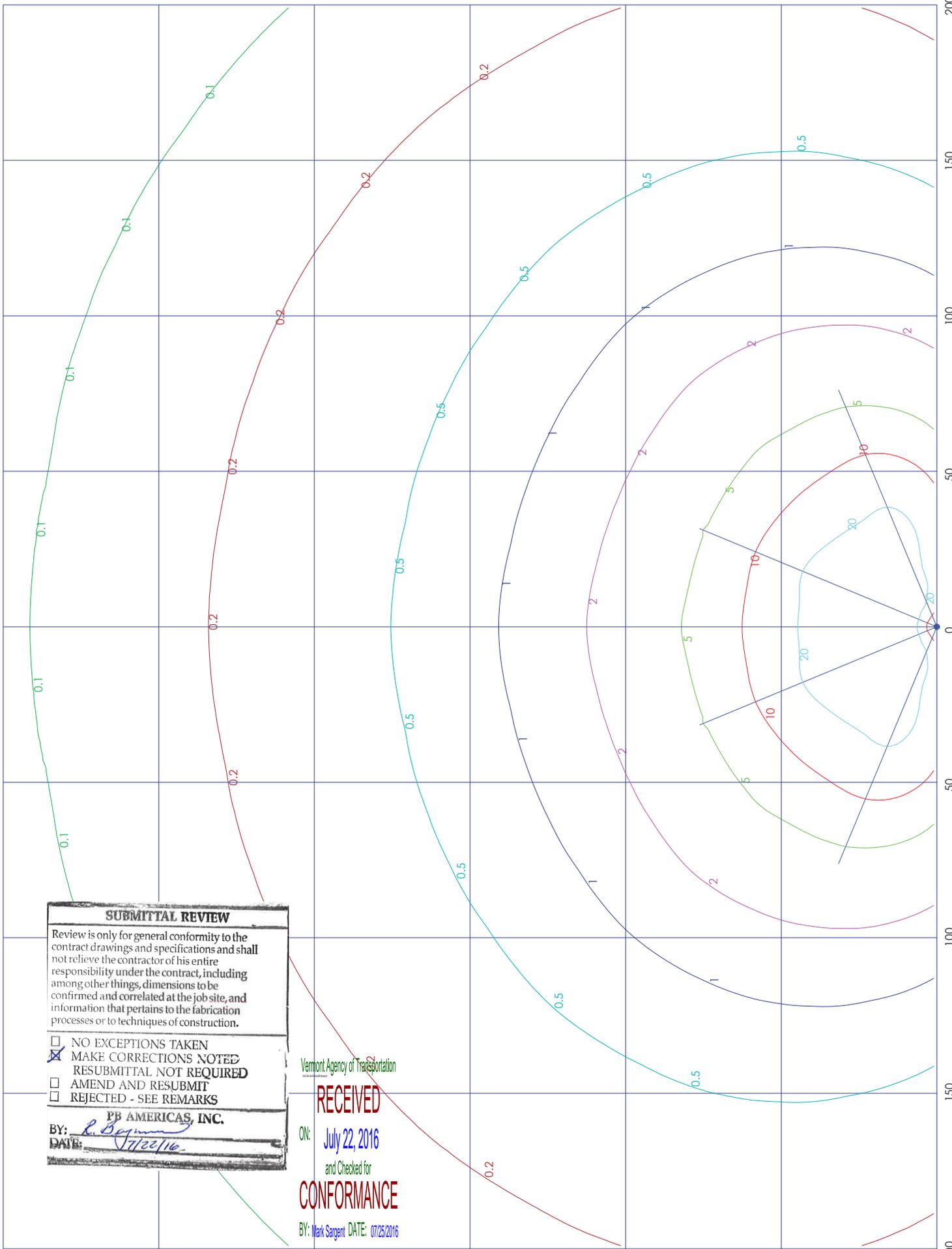
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**TABLE 7 Recommended minimum illuminance levels and categories for nighttime highway construction and maintenance**

Category	Min. Illuminance Level lx (fc)	Area of Illumination	Type of Activity	Example of Areas and Activities to be Illuminated
I	54 (5 fc)	general illumination throughout spaces	performance of visual task of large size; or medium contrast; or low desired accuracy; or for general safety requirements	<ul style="list-style-type: none"> <li>• Excavation</li> <li>• Sweeping and cleanup</li> <li>• Movement area in the work zone</li> <li>• Movement between two tasks</li> </ul>
II	108 (10 fc)	general illumination of tasks and around equipment	performance of visual task of medium sizes; or low to medium contrast; or medium desired accuracy; or for safety on and around equipment	<ul style="list-style-type: none"> <li>• Paving</li> <li>• Milling</li> <li>• Concrete work</li> <li>• Around paver, miller, and other construction equipment</li> </ul>
III	216 (20 fc)	illumination on task	performance of visual task of small sizes; or low contrast; or desired high accuracy and fine finish	<ul style="list-style-type: none"> <li>• Crack filling</li> <li>• Pot filling</li> <li>• Signalization or similar work requiring extreme caution and attention</li> </ul>

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**TABLE 10 Recommended illuminated distance in the direction of travel for various types of construction equipment**

Type of Equipment	Working Speed, mph (km/h)	Reaction Distance <sup>a</sup> , ft (m)	Braking Distance, ft (m)	Distance to be Illuminated in Front and Back of Equipment <sup>b,c</sup> , ft (m)
Slow-moving Equipment				
Paver	4-5 (6.4-8)	11 (3.4)	5 (1.5)	16 (4.9)
Milling Machine				
Fast-moving Equipment				
Backhoe Loader				
Wheel Tractor Scraper	10-15 (16.1-24.2)	33 (10.1)	15-25 (4.6-7.6)	58 (17.7)
Wheel Loader				
Compactor/Roller				
Motor Grader				

<sup>a</sup> Reaction distance = 2.2 x working speed

<sup>b</sup> Distance to be illuminated = reaction distance + braking distance

<sup>c</sup> Minimum illumination level of 10.8 lx (1 fc) at maximum distance