

# **CHAPTER 5**

## **RIGHT-OF-WAY**

TDOT ROADWAY DESIGN GUIDELINES

CHAPTER 5 RIGHT-OF-WAY

English

Revised:

**Contents**

INTRODUCTION ..... 1

SECTION 1 – PREPARING RIGHT-OF-WAY PLANS ..... 1

    5-100.00 RIGHT-OF-WAY ..... 1

        5-100.01 FEDERAL TRACTS ..... 1

    5-101.00 RIGHT-OF-WAY NOTES FOR ALL RIGHT-OF-WAY PROJECTS..... 1

    5-102.00 UTILITY OWNER INFORMATION ..... 1

    5-103.00 ADVANCE ACQUISITION PROJECTS ..... 2

    5-104.00 PROJECT COMMITMENTS SHEET IN RIGHT-OF-WAY PLANS ..... 3

SECTION 2 – ROADSIDE DESIGN CRITERIA..... 6

    5-200.00 ROADSIDE DESIGN CRITERIA ..... 6

    5-201.00 CLEAR ZONE CONCEPT ..... 6

    5-202.00 ROADSIDE BARRIERS ..... 7

        5-202.01 BARRIER WARRANT 1: AT BRIDGES OR CULVERTS ..... 7

        5-202.02 BARRIER WARRANT 2: NON-TRAVERSABLE SLOPES ..... 8

        5-202.03 BARRIER WARRANT 3: ROADSIDE OBSTACLES.....12

        5-202.04 BARRIER WARRANT 4: FREEWAY MEDIAN DEPARTURES .....13

        5-202.05 EXCEPTIONS TO BARRIER WARRANTS .....13

        5-202.06 BARRIER LENGTH OF NEED .....14

        5-202.07 BARRIER TYPE SELECTION CRITERIA .....14

    5-203.00 GUARDRAIL .....15

        5-203.01 GUARDRAIL SPECIAL DESIGNS .....15

    5-204.00 CONCRETE MEDIAN BARRIERS .....17

    5-205.00 CABLE BARRIERS .....17

    5-206.00 END TREATMENTS .....18

        5-206.01 ANCHORAGES.....18

        5-206.02 GUARDRAIL END TERMINALS .....19

    5-207.00 CRASH CUSHIONS.....19

        5-207.01 CRASH CUSHION WORK ENERGY PRINCIPLE (NON-GATING, RE-DIRECTIVE SYSTEMS).....20

        5-207.02 CRASH CUSHION CONSERVATION OF MOMENTUM PRINCIPLE (GATING SYSTEMS).....21

        5-207.03 CRASH CUSHION SELECTION GUIDELINES.....21

**TDOT ROADWAY DESIGN GUIDELINES**

**CHAPTER 5 RIGHT-OF-WAY**

**English**

**Revised:**

5-207.04	CRASH CUSHION SELECTION BASED ON SITE CHARACTERISTICS	22
5-207.05	CRASH CUSHIONS IN TEMPORARY WORK ZONES	23
SECTION 3 – TRAFFIC CONTROL PLAN DESIGN		25
5-300.00	TRAFFIC CONTROL IN CONSTRUCTION ZONES	25
5-301.00	CONSTRUCTION SIGNING	26
5-302.00	BARRICADES AND DRUMS LIGHTING DEVICES	26
5-303.00	MARKINGS	27
5-304.00	TEMPORARY RAISED PAVEMENT MARKERS	27
5-305.00	PORTABLE BARRIER RAIL	27
5-306.00	BARRIER RAIL DELINEATORS	28
5-307.00	DIFFERENCES IN ELEVATION BETWEEN ADJACENT ROADWAY ELEMENTS	28
5-308.00	WORK ZONE SPEED CONTROL	28
5-309.00	USE OF LANE CLOSURE WITH LEFT HAND MERGE	29
5-310.00	WORK ZONE DESIGN DEVIATION FORM	30
SECTION 4 – ENVIRONMENTAL CONSIDERATIONS		31
5-401.00	KNOWN ENVIRONMENTAL CONSTRAINTS	31
5-402.00	ENVIRONMENTAL NOTE REQUIREMENTS	31
5-403.00	ADDITION OF EPSC PLANS INTO FIELD REVIEW AND FINAL RIGHT-OF-WAY PLANS	32
5-403.01	ADDITION OF CONTOURS TO EPSC SHEETS	32
5-404.00	ENVIRONMENTAL PERMIT REQUIREMENTS	32
5-405.00	PLACEMENT OF TREES IN MITIGATION AREAS	33
5-406.00	ABANDONMENT OF WATER WELLS	34
5-407.00	ADDITION OF NATURAL STREAM DESIGN SHEETS TO RIGHT-OF-WAY PLANS	34
SECTION 5 – NON-TRADITIONAL PROJECTS		36
5-500.00	NON-TRADITIONAL PROJECTS	36
5-501.00	PROJECTS OF LIMITED SCOPE	36
5-502.00	RESURFACING PROJECTS	36
5-502.01	RESURFACING PLANS CERTIFICATION OF SCOPE OF WORK	37
5-502.02	PEDESTRIAN ACCESSIBILITY AND BICYCLE ACCOMMODATION DURING RESURFACING PROJECTS	37

**TDOT ROADWAY DESIGN GUIDELINES**

**CHAPTER 5 RIGHT-OF-WAY**

**English**

**Revised:**

---

5-502.03	SAFETY IMPROVEMENTS ON RESURFACING PROJECTS.....	38
5-502.04	PAVING POLICY - RESURFACING.....	39
5-502.05	NOTE ALLOWING TRAFFIC TO TEMPORARILY DRIVE ON MILLED SURFACE TO BE PLACED IN INTERSTATE RESURFACING PLANS .....	39
5-502.06	STRIPING RAMPS ON RESURFACING PLANS .....	40
5-502.07	TOTAL LANE MILES PAVED FOR RESURFACING PROJECTS.....	40
5-503.00	STRATEGIC TRANSPORTATION INVESTMENT DIVISION - ROAD SAFETY AUDIT REVIEW (RSAR) PROJECTS .....	41
5-504.00	LANDSCAPING PLANS.....	42
5-505.00	LOCAL PROGRAM DEVELOPMENT PROJECTS .....	43
SECTION 6 –	RIGHT-OF-WAY PROCESS .....	45
5-600.00	RIGHT-OF-WAY FUNDING APPROVAL REQUESTS.....	45
5-601.00	SUBMITTAL FOR "UTILITIES ONLY".....	45
5-602.00	SUBMITTALS OF RIGHT-OF-WAY APPRAISALS AND ACQUISITION .....	45
5-603.00	RIGHT-OF-WAY REVISIONS .....	47
5-604.00	REVISIONS ON UNECONOMIC REMNANTS.....	47

## INTRODUCTION

### ROADWAY DESIGN GUIDELINES AND STANDARD DRAWINGS

Roadway Design Guidelines (RDG) and Standard Drawings have been created to ensure that there is consistency in TDOT projects across the state. The Roadway Design Guidelines and Standard Drawings indicate the current recognized design standards for new construction or reconstruction of existing highways and shall be utilized while giving due regard to topography, natural conditions, availability of road material, and prevailing traffic conditions.

Throughout these guidelines you will see the following terms used. To clarify the meanings intended in this guide, by the use of these words, the following definitions shall apply:

- **Designer** – HQ Design, Project Development, or Consultant Designer
- **Design Manager** – HQ Design, Project Development, or Consultant Design Manager
- **Design Team** – HQ Design, Project Development, or Consultant Design Manager and Consultant
- **Technical Report** – Transportation planning reports (i.e. Transportation Investment Reports (TIR), Transportation Planning Report (TPR)) developed by the Strategic Transportation Investments Division
- **Right-of-Way** – Refers to the phase of a project and **right-of-way** refers to the actual property

## SECTION 1 – PREPARING RIGHT-OF-WAY PLANS

### **5-100.00 RIGHT-OF-WAY**

The Right-of-Way phase of plans begins when Preliminary Plans have been distributed. During this phase, the project will progress and right-of-way impacts will be shown on the plans. The incidental funding is requested prior to requesting Right-of-Way funding so that R.O.W. personnel will be able to begin the task of researching incidentals, including title searches, and preparing the R.O.W. proposal. See Chapter 4-202.00, Incidentals Funding Request for more information. Once the Environmental Document is completed, Right-of-Way funding can be requested. After Right-of-Way funding is approved and final Right-of-Way plans are distributed, the Right-of-Way Division and Regional Right-of-Way Offices can begin activities including the appraisal and acquisition of land needed for state highway construction and relocation of displaced families and businesses, as well as utility and railroad coordination. For additional information, refer to the Right-of-Way Manual.

#### **5-100.01 FEDERAL TRACTS**

Federal tracts should be marked as permanent easements on federal tracts in the Right-of-Way acquisition table when obtaining land rights from the Tennessee Valley Authority, the U.S. Corps of Engineers, other U.S. Government Agencies. Railroads, Cities and Counties. ((See [TDOT Right-of-Way manual Chapter VIII-7](#))

### **5-101.00 RIGHT-OF-WAY NOTES FOR ALL RIGHT-OF-WAY PROJECTS**

See *Chapter 9 Section 3, Right-of-Way/Utility Notes*, to determine which notes apply. These notes shall be placed on Plan Sheet 3 - Right-of-Way Notes, Utility Notes, and Utility Owners sheet of the Right-of-Way Plans.

### **5-102.00 UTILITY OWNER INFORMATION**

Utility owner information is submitted in the Survey CADD file. All utility owner's names with contact information shall be confirmed by Project Development Utility personnel and shall be listed on Plan Sheet 3 – Right-of-Way Notes, Utility Notes, and Utility Owners. For format of Utility Owners see *Figure 5-1, Typical Format for Utility Owner Information*.

UTILITY OWNERS AND CONTACTS
<p>Water:</p> <p>Metro Water and Sewer                      P.O. Box 123                      Nashville, TN 37243                      Contact: John Smith                      Telephone: 615-555-1212                      Fax: (if available)                      Email: (if available)</p>
<p>Electrical:</p> <p>Nashville Electric                      1000 Church Street                      Nashville, TN 37216                      Contact: Mike Jones                      Telephone: 615-555-1234                      Fax: (if available)                      Email: (if available)</p>
<p>Sewer:</p> <p>Metro Water and Sewer                      P.O. Box 123                      Nashville, TN 37243                      Contact: Bill Williams                      Telephone: 615-555-1213                      Fax: (if available)                      Email: (if available)</p>

**Figure 5-1**  
**Typical Format for Utility Owner Information**

**5-103.00 ADVANCE ACQUISITION PROJECTS**

Once "Advance Acquisition" has begun, tract numbers may not be changed. The term advance acquisition, for purposes of this discussion, means any right-of-way on a project that is acquired an appreciable length of time before it is needed for construction (i.e. the Right-of-Way phase is scheduled for completion at least 6 months in advance of the construction letting). This also includes individual parcels acquired under hardship or protective purchase procedures in advance of normal project acquisition. In these cases, the Design Team, in consultation with the Regional Right-of-Way Office, must make certain decisions concerning the acquired right-of-way.

**5-104.00 PROJECT COMMITMENTS SHEET IN RIGHT-OF-WAY PLANS**

All commitments made during the planning and development of the project, shall be added to the PPRM Project Commitments page found in PPRM Project Manager. Those commitments shall be included on a separate Project Commitments sheet in the Right-of-Way plans. For an example of the Project Commitments sheet see *Figure 5-2, Example of Project Commitments Sheet*.

The Project Commitments sheet shall be developed using the [Project Commitments template](#). The sheet shall be placed in the plans as sheet 1B.

The following procedures shall be used for identifying project commitments and developing the Project Commitments sheet:

1. Each Division is responsible for placing their respective project commitments on the PPRM Project Commitments page found in PPRM Project Manager. The Division adding the commitments shall be defined. The commitment shall be well defined with stations and locations if applicable. Once the commitment is added, the program will define a commitment ID.
2. The Designer will be responsible for checking the Project Commitments page and developing the Project Commitments sheet at the beginning of Right-of-Way plans development and update as needed. Each commitment shown on the Project Commitment sheet shall contain the commitment ID, source division, commitment description, and the station/location.
3. For any pending commitments, Designers should contact the Division responsible for the commitment prior to issuing Right-of-Way plans to verify if the commitment may be active. If project commitments are added or revised after final Right-of-Way plans submittal, a Right-of-Way revision will be necessary.
4. The Design Manager will be responsible for checking the Project Commitments page in PPRM and supplying the commitment information to consultants to develop the Project Commitments sheet.
5. A commitment should only be added to the plans if the *Plans Report* column in PPRM is checked and the Status column is marked as *Active*. If the commitment is marked as *Pending*, Designers shall contact the source division for an update on the commitment.
6. Design Managers shall be responsible for verifying that the commitment does not violate any of the 10 controlling elements of design or design standards. In the event a commitment requires a Design Exception and Justification Form or other documentation, it shall be the responsibility of the Design Manager to obtain a design exception or provide appropriate documentation needed to document the variance from the standard design practice prior to adding the commitment to the Project Commitments sheet. The Design Manager should also follow up with the Division responsible for the commitment.



# TDOT ROADWAY DESIGN GUIDELINES

## CHAPTER 5 RIGHT-OF-WAY

English

Revised: 2/1/21

7. Project commitments are intended to include commitments made during the development of the environmental document, to mitigate environmental impacts, to address issues related to the project design, or Right-of-Way acquisition that the Department has agreed to during project planning and development. Commitments should not include items normally included as part of a set of construction plans, covered under standard specifications, supplemental specifications, or other contract documents. If the Design Manager believes a commitment has been added that is not warranted, the Design Manager will follow up with the appropriate person or persons in the Division which added the commitment to determine if the commitment is appropriate.

**TDOT ROADWAY DESIGN GUIDELINES**  
**CHAPTER 5 RIGHT-OF-WAY**

English

Revised: 2/1/21

PROJECT COMMITMENTS		STATION / LOCATION
COMMITMENT ID	SOURCE DIVISION	DESCRIPTION
EDH2001	Environmental Division, Hazardous Materials	Asbestos Containing Material (ACM) surveys were conducted on Bridge No. 83E0270011, SR-174 over Little Tammock Creek LM 39.41 (83-SR174-39.40). No ACM was detected. No special accommodations for demolition and waste disposal are anticipated for these structures and the material can be deposited in a C&D landfill. Prior to the demolition or rehabilitation of any structure (bridge or building), the contractor is required to submit the National Emission Standards for Hazardous Air Pollutants (NESHAP) permit application to the TDEC Division of Air Pollution Control (per TDEC Standard Specifications for Road and Bridge Construction (January 1, 2015) Sections 107.06, D and 202.03).
ETH2001	Environmental Tech. Office, Region 3	Due to the presence of the State Deemed-in-Need-of-Management species, Turtlesp. Darter (Etheostoma bairdianum), Splendid Darter (Etheostoma barrenense), Orangefin Shiner (Etheostoma bairdii), and Blotched Darter (Etheostoma caeruleum), a fish sweep will be conducted immediately prior to stream work. The contractor is required to submit a permit application to the TDEC Division of Air Pollution Control (per TDEC Standard Specifications for Road and Bridge Construction (January 1, 2015) Section 107.06, D and 202.03).
		STR-1

**R.O.W. FIELD REVIEW**

SEALED BY \_\_\_\_\_

STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION

**PROJECT COMMITMENTS**

**Figure 5-2**  
**Example of Project Commitments Sheet**

**SECTION 2 – ROADSIDE DESIGN CRITERIA**

**5-200.00 ROADSIDE DESIGN CRITERIA**

The roadside is defined as the area beyond the traveled way. The Roadside Safety Design focuses on the placement and selection of roadside safety features with the intention of minimizing the consequences of a motorist inadvertently leaving the roadway. Roadside safety technology is a rapidly changing, evolving field. As performance experience is gained and research programs reveal new and improved practices, roadside design criteria and safety policies are being updated as well.

While it may not be practical or feasible to apply all new technology to existing roadways, Designers should use this section to evaluate and reduce the severity of impacts during reconstruction projects on existing alignment. Refer to the Maintenance Division’s [Pavement Resurfacing Program Standard Operating Guidelines](#) for low cost safety improvements that could be applied during the development of resurfacing plans.

This chapter discusses the development and evaluation of the forgiving roadside concept and its application to roadside design and clear zones applicable to new construction and major reconstruction projects. For more information refer to the AASHTO Roadside Design Guide and FHWA’s Office of Safety. At locations where the following roadside design criteria could not be met, Designers shall complete a [Design Exception](#) or a [Design Waiver](#) form for roadway cross sectional elements to evaluate safety in design.

**5-201.00 CLEAR ZONE CONCEPT**

A clear zone is the unobstructed, traversable area provided beyond the edge of the through traveled way for the recovery of errant vehicles. The clear zone may consist of shoulders, bike lanes, auxiliary lanes (unless functioning as a through lane), a recoverable slope, a non-recoverable slope, and/or a clear run-out area. Obstacles located within this clear zone distance should be removed, relocated, redesigned to be crashworthy, or shielded by traffic barriers or crash cushions.

Roadway Standard Drawing S-CZ-1 provides a general approximation of clear zone distances. The tabulated data shown in the drawing are based on limited empirical research extrapolated to provide suggested clear zone distances to address for a wide range of conditions. Designers should keep in mind site-specific conditions, design speeds, rural versus urban locations, and practicality when reviewing clear zones. It is important to remember the clear zone distance with horizontal curves are always larger (10% to 50%) than tangent sections. The distances obtained from Roadway Standard Drawing S-CZ-1 should suggest only the approximate center of a range to be considered and not a precise distance to be held as absolute.

For roadways with low traffic volumes (ADT<2000), it may not be practical to apply even the minimum values found in Roadway Standard Drawing S-CZ-1.

## **5-202.00 ROADSIDE BARRIERS**

Roadside barriers are used to protect the traveling public from an unavoidable and unmovable object, body of water, non-traversable slopes, and to prevent lane departures into oncoming traffic. Roadside barriers should only be placed in areas where a roadside hazard exists that cannot be removed and the potential harm from an impact with the barrier is less serious than impacting an object or the potential of overturning resulting from a non-traversable steep slope. The warrants below are meant as a guideline for Designers to make the determination.

When barriers are indicated by warrant, Designers should first consider the following in the order listed:

1. Remove the obstacle. (Is the obstacle necessary? If not remove the obstacle.)
2. Relocate the obstacle to a point where it is less likely to be struck. (If the obstacle is necessary, can it be moved outside of the clear zone?)
3. Redesign the obstacle to be safely traversed. (Such as flattening a steep 2:1 slope to flatter than 3:1)
4. Reduce impact severity by using an appropriate breakaway device. (Typically applies to signs and some poles)

Based on site conditions, Designers should also consider the use of a rumble strip/stripe, to delineate the obstacle, provide advanced warning signs, and in some cases reduce the design speed (or posted speed for reconstruction projects).

The following sections give guidance on warrants, length of need, and choosing the appropriate barrier system.

### **5-202.01 BARRIER WARRANT 1: AT BRIDGES OR CULVERTS**

Barriers are warranted anytime the road crosses a bridge, box culvert or slab bridge. Most structures will be designed with a specified concrete bridge rail by the Structures Division. A minimum length of bridge transition section with proper end terminal must be provided at bridge ends. Typical Length of Need (LON) distance will be greater so the designer should determine the minimum LON required for each approach. Due to existing considerations, providing the desired LON may be limited during reconstruction and rehabilitation projects or routine maintenance activities. The Designer should use sound engineering judgement during the roadside design of such projects. See *Chapter 5-202.06 – Barrier Length of Need* for more information.

For installation details when Warrant 1 is met, see Roadway Standard Drawings - Safety Plan series:

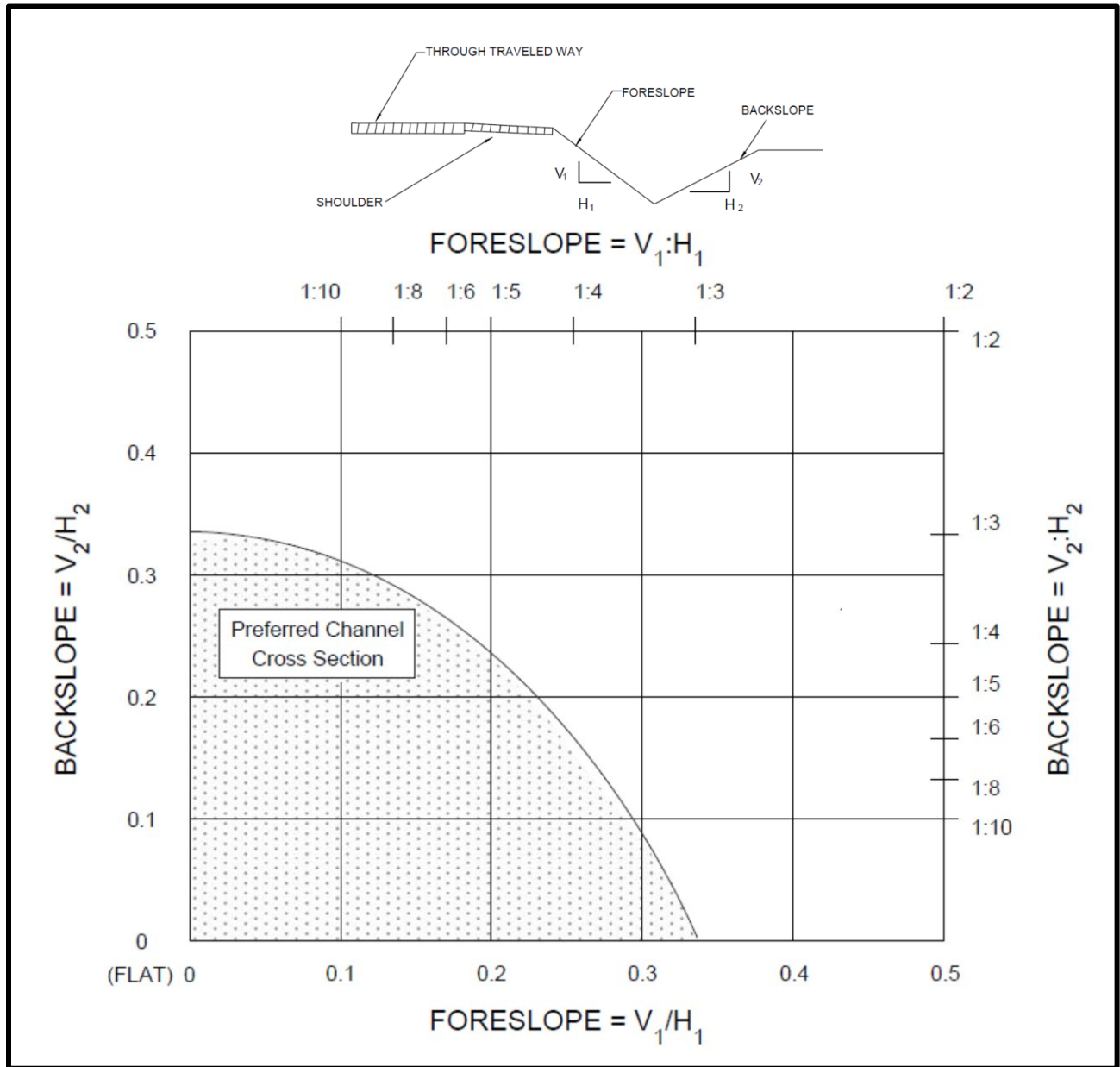
- **S-PL-1** SAFETY PLAN BARRIER LENGTH OF NEED
- **S-PL-3** SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS
- **S-PL-4** SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE
- **S-PL-5** SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS

In some cases, box culverts or slab bridges may use guardrail instead of bridge parapet rail. The amount of fill over the bridge will determine how the guardrail will be installed. See *Chapter 5-203.01 – Guardrail Special Designs* and Roadway Standard Drawing S-GRS-2 for more information.

During the development of reconstruction projects on existing alignment, at locations where a bridge transition with tangential guardrail end terminal could not be installed due to intersection side road or a driveway, the Designer should evaluate the best practices to reduce the crash severity. Some design alternatives include: maintaining the same hardware type to eliminate transition section; installing a curve guardrail (Roadway Standard Drawing S-GRS-7) rather than a tangential guardrail terminal; or installing a crash cushion, which will reduce the impact severity (but may not satisfy the length of need). These will offer significant safety benefits at locations with extreme site limitations. Bridges located within a horizontal curve on high speed ( $V > 45$  mph) rural highways may need further evaluation. Providing additional lateral offset (wider outside shoulder) will provide a safety benefit at locations with road departure crash history.

**5-202.02      BARRIER WARRANT 2: NON-TRAVERSABLE SLOPES**

One of the controlling criteria of geometric design is side slope (foreslope) development. Providing traversable foreslopes within the clear zone to reduce crash severity is also a roadside safety design criteria. A typical side slope design should follow the Roadway Standard Drawing RD11-TS- Series showing traversable side slope rates based on functional classification, speed, and ADT. In addition, the Roadway Standard Drawing RD11-S-11 provides traversable rounding details at slope break and Roadway Standard Drawing RD11-S-11A provides typical sections of traversable ditch designs. Refer to *Figure 5-3, Preferred Traversable “V” Ditch Cross Section Configurations* for preferred ditch configurations.



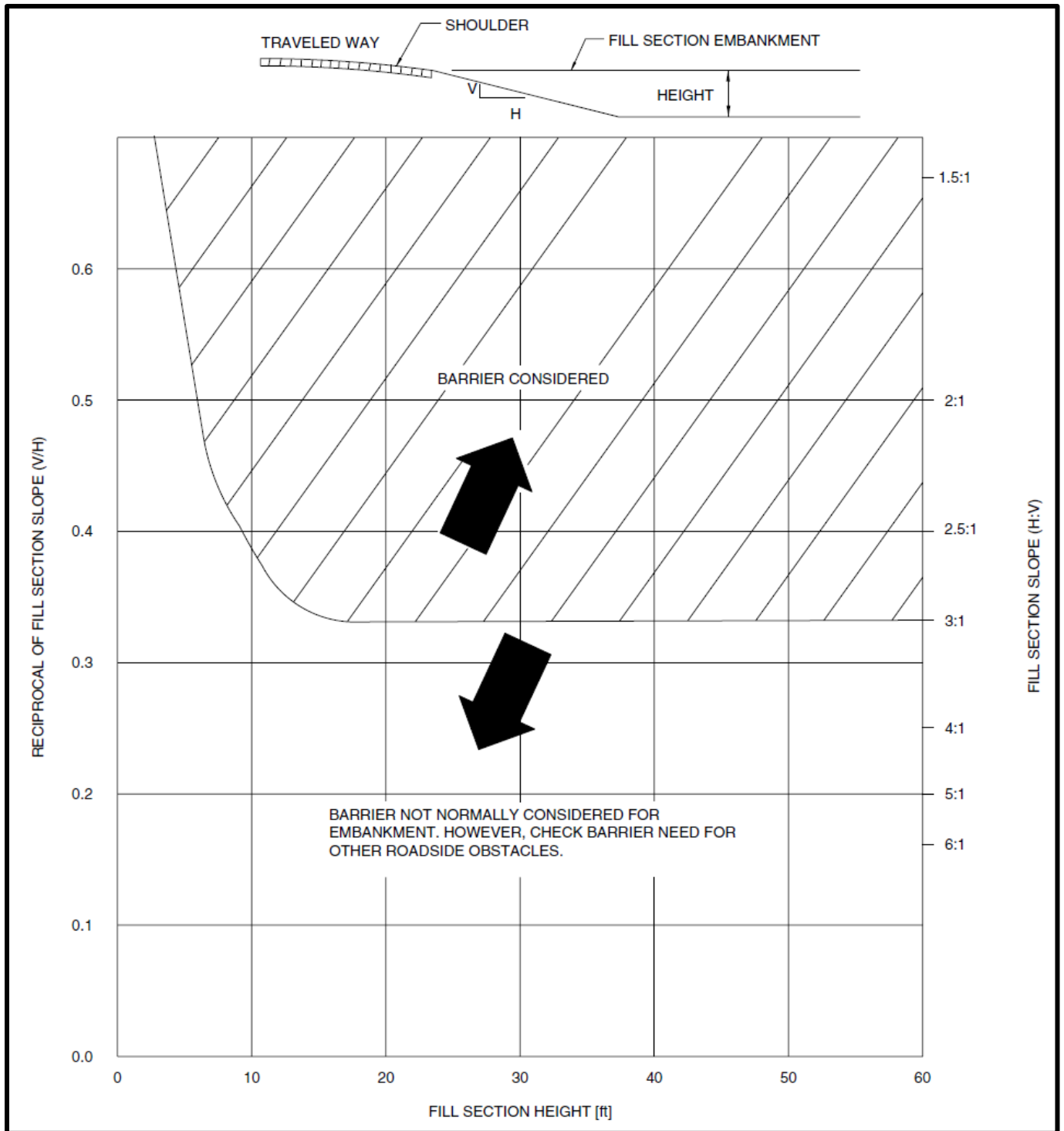
**Figure 5-3**  
**Preferred Traversable “V” Ditch Cross Section Configurations**  
*(Ref. AASHTO Roadside Design Guidelines 4<sup>th</sup> Edition)*

Fill section slopes (foreslopes) located inside the clear zone are categorized as:

- Recoverable slopes: fill slopes between 6:1 to 4:1, an errant vehicle could return to roadway,
- Non-recoverable slopes: fill slopes between 4:1 to 3:1, an errant vehicle usually maintains stability reaching the toe of the fill, therefore, additional 10' of clear landing area is desired within the ROW - See AASHTO Roadside Design Guide, 4<sup>th</sup> edition, Section 3.3.2 Non-Recoverable Foreslopes.
- Critical slopes: fill slopes steeper than 3:1.

Barriers are warranted if the combination of non-recoverable or critical fill slopes and the fill section height combine to create a hazard for an errant vehicle departing the travel lane. See the below *Figure 5-4, Comparative Barrier Consideration for Embankments* for warrant criteria.

In addition to the main roadway foreslope, there are other intersecting slopes of the roadway, driveway, or median crossovers located inside the clear zone called Transverse Slopes. Although the exposure to transverse slopes is less than foreslopes or backslopes, they generally are more critical to errant vehicles because run-off-the-road vehicles typically strike them head-on. Transverse slopes 6:1 or flatter are suggested for high speed facilities located inside the clear zone. Designer should use D-SEW-1A parallel pipe endwalls inside the clear zone matching 6:1 fill slope. Pipes located under median crossovers will use D-SEW-12D pipe endwall at 12:1 slope.



**Figure 5-4**  
**Comparative Barrier Consideration for Embankments**



**5-202.03 BARRIER WARRANT 3: ROADSIDE OBSTACLES**

Barriers are warranted on high speed roadways anytime an obstacle is found inside the clear zone area (as defined on Roadway Standard Drawing S-CZ-1) based on traffic volumes, speeds, and slopes. Designers should consider the context of the roadway location since the implementation of S-CZ-1 may not be feasible in urban locations.

For installation details of barriers when Warrant 3 is met, see Roadway Safety Plan Standard Drawing S-PL Series. Typical obstacles are listed below, though other obstacles not on the list may also warrant a barrier if determined by engineering judgment.

**Typical Roadside Obstacles Warranting Barriers**

- Critical fill slopes (less than 3:1)
- Steep transverse slopes (fill slope of intersecting side road)
- Trees
- Poles
- Bridge Abutments and Piers
- Retaining Walls
- Streams
- Traffic Signal Poles
- Lighting Structures
- Overhead Sign Structures
- Utility Structures
- Pipe Headwalls (Type A, B, or Straight)

In general, the following roadside objects are not considered hazards. These objects may be installed in the clear zone (if noted conditions are met) without the need for shielding.

**Typical Objects Not Warranting Barriers**

- Objects utilizing breakaway supports approved by the Department such as small or large signs posts, light poles.
- Relatively smooth vertical backslopes (such as rock cuts) generally do not require protection as impacting a barrier is unlikely to provide any benefit to the occupant of the vehicle as opposed to striking the vertical backslope. Delineation of the backslope is recommended on the outside of a curve.
- Right-of-way Fences
- Cross drains utilizing Roadway Standard Drawing D-PE Series “U” endwalls or side drains (parallel drains) with D-SEW endwalls. These endwalls are designed to be traversable and will allow a vehicle to safely pass over.
- Small trees (less than 4” in diameter)

**5-202.04 BARRIER WARRANT 4: FREEWAY MEDIAN DEPARTURES**

On full or semi-full access-controlled highways or freeways where the opposing lanes of traffic are separated by an at-grade (paved) median, a barrier should be considered at locations where proper clear zone width cannot be provided. In cases when the freeway is separated by a depressed median, the fill slopes of the median should provide traversable clear zone distance in accordance with Roadway Standard Drawing S-CZ-1 for an errant vehicle to recover. If one or more of the below conditions exist, barriers are warranted for the median.

- This warrant is independent of, and superseded by, warrants 1 through 3. In cases where a bridge end, obstacle, or steep slope is present in the median, placing barriers for those conditions take precedence.
- For installation of barriers when Warrant 4 is met, double sided median guardrail, cable barrier, or concrete median barrier with crash cushions based on the site conditions may be used. See Roadway Standard Drawings: S-PL-6 and S-PL-6A.

**5-202.05 EXCEPTIONS TO BARRIER WARRANTS**

In certain cases, barriers should not be placed because doing so would be undesirable for the level of access provided by the roadway, be infeasible due to lack of sufficient space, or cause greater safety hazards than the hazard being shielded. In general, the following conditions generally do not warrant barrier protection.

**Urban Context:** Barriers are typically not recommended on low speed urban roads and streets (local roads and streets are usually posted 35 mph or less) because:

- Low speeds make roadway departure crashes less likely and less severe
- Urban zones require higher access that would be hindered by barriers
- Urban zones have many more intersections that make barrier installation impractical

**Small Sections with Short Drop-offs:** Barriers are typically not recommended to protect small critical fill slope sections of roadway (less than 100 feet along centerline) with drop-offs less than 10 feet because the risk from a vehicle encroaching this section is less than the risk of striking a barrier system.

**Utility Poles:** In many cases utility poles are within TDOT right-of-way and are often in the clear zone of rural highways. It is impractical and infeasible to install barriers to protect every utility pole. During the planning of new projects, coordination should be made with the utility company to relocate the poles as far away from the edge of the roadway as possible to mitigate risk. For poles that cannot be moved away from the clear zone the poles should be delineated. Utility owners currently occupying TDOT right-of-way may be asked to evaluate feasible alternatives as required by Title 23 U.S.C. for relocation within or outside of State right-of-way.

**5-202.06 BARRIER LENGTH OF NEED**

Once the need for a barrier is determined the next step is to calculate the amount of barrier needed. The distance required is referred to as “Length of Need” (LON). There are two types of hazards. The first one is a single obstacle (a rigid object) located inside the traversable clear zone, which will have shorter LON since the full width of clear zone will not be used during the determination of the length. The second one is a non-traversable obstacle such as a river. Non traversable objects travel beyond the maximum clear zone distance therefore LON calculations use max clear zone distance. Most of the time, the beginning of the critical fill slope approaching a bridge for a stream crossing determines the area of concern, therefore it will determine the LON.

As the clear zone distance to a single object or non-traversable object will vary for the opposing traffic, the LON will change at the trailing end as well. The Designer should pay extra attention calculating LON inside the horizontal curves since clear zone distances are 10 to 50 percent larger than the tangent sections. If warranted, the Designer should consider extending the trailing end of guardrail installation to contain errant vehicles failing to negotiate the outside of the curve as a good safety practice. The Roadway Safety Plan Standard Drawing series drawings show typical installations for various cases.

- **S-PL-1:** LON along the roadway for objects or hazards (Warrants 1, 2 and 3)
- **S-PL-3:** Minimum guardrail installation length for bridge ends. Designer must confirm LON requirement. (Warrant 1)
- **S-PL-4:** Minimum freeway bridge pier protection installation details. Designer shall calculate the minimum LON required. (Warrant 2)
- **S-PL-5:** Typical guardrail placement to protect grade separated bridge ends in the depressed median (Warrant 1)

**5-202.07 BARRIER TYPE SELECTION CRITERIA**

Utilize the following guidelines to determine the appropriate system. See appropriate Roadway Standard Drawings for installation details of each system, S-PL-6 and S-PL-6A.

**A) BARRIER TYPE SELECTION CRITERIA FOR WARRANTS 1 THROUGH 3**

Typical structural features placed within the clear zone distance: bridge piers, abutments, retaining walls, overhead sign supports, etc.

- a. If the distance from the edge of shoulder to the object is less than 5 feet, use concrete median barrier S-SSMB-3 or S-SSMB-2
- b. If the distance from the edge of shoulder to the object is greater than 5 feet, use guardrail. See Roadway Standard Drawing S-PL-6.
- c. Some roadway features are critical such as bridge piers or MSE type retaining walls and are vulnerable to impact forces. Designers should communicate with the Structures Division to evaluate the design and select proper roadside safety hardware (TL-5 or TL-6) to protect such features and motorists.

**B) BARRIER TYPE SELECTION CRITERIA FOR WARRANT 4**

- a. By design, highways separated by medians offer a safer operational environment on high speed facilities providing desirable traversable clear zone distances for errant vehicles to recover. However, Designers should evaluate the rare possibility of run-off-the road lane departure and evaluate if the facility needs cable barrier. Refer to *Chapter 5-205.00 – Cable Barriers* for Cable Barrier evaluation criterion. Follow the guidance provided on Roadway Standard Drawing S-PL-6A, *Safety Hardware Placement in Median* for guidance provided to select appropriate hardware type based on site conditions.

**5-203.00 GUARDRAIL**

A guardrail system consists of rail, connections, terminals, and anchors. Guardrail consists of metal W-Beam rail supported by wooden post with wood blockouts or steel posts with wood or composite blockouts. If required for special conditions, powder coated alternative with corresponding pay item numbers may be used.

For a W-beam guardrail installation to perform properly, the system must be anchored at both ends to maintain tension (See Roadway Standard Drawings S-GRA series). Approach ends of guardrail must be terminated with an approved crashworthy end terminal with an earth pad (see Chapter 5-206.02). If the trailing end is located outside the clear zone an anchor may be installed at the trailing end in lieu of a terminal to maintain tension on the GR system (see Chapter 5-206.01)

To ensure proper embedment depth for guardrail post, use 8' long post option for all roadway fill sections 6:1 and steeper. Relocating slope break two feet behind the guardrail face will provide needed embedment depth eliminating the need for 8' post. Performance of the guardrail system will be affected when used in conjunction with curbing (6" vertical or slope), or an offset placement from the edge of travelled lane due to placement of sidewalk, shared-use-path, etc. Refer to S-PL-6 for installation guidance.

At the point of impact, semi-rigid guardrail dynamic deflection may reach up to five feet. To provide the system with working room to perform, provide five feet behind the face of guardrail. This zone should be kept clear of rigid obstructions.

Double-sided guardrail (Median Divider Guardrail) may be used in limited cases in the median in place of concrete or cable barriers, particularly when the required length is relatively short. Median divider guardrail is also used when guardrail may be subject to impacts from either side. In cases where the median divider guardrail is installed near the edge of pavement, it is important that the area between the posts is free of asphalt to provide post rotation in soil for the post to perform as designed. See Roadway Standard Drawings S-GR31-1C, S-SSMB-6B or S-SSMB-6E for more details.

**5-203.01 GUARDRAIL SPECIAL DESIGNS**

Due to site conditions sometimes a guardrail system may not be installed as shown on the standard drawings. However, there are several special installations that may be utilized.

**Guardrail at Underground Conflicts:**

In the case when a utility or pipe culvert prevents driving guardrail posts the Designer shall refer to:

- Roadway Standard Drawing S-GRS-1 if omitting one post or if only one post is affected by the obstruction
- Roadway Standard Drawing S-GRS-3 if guardrail post or posts could not be driven due to underground facilities.

**Guardrail across Box Culvert or Slab Bridge:**

- In the case when guardrail runs across a box culvert or slab bridge that has fill of less than 3'-4" over the deck, the Designer shall refer to Roadway Standard Drawing S-GRS-2. In this case, the guardrail will be paid for under Item Number 705-01.04 Metal Beam Guard Fence per L.F.
- If the fill is greater than 3'- 4", guardrail will be installed in the typical method as shown on Roadway Standard Drawing S-GR31-1. In this case, the guardrail will be paid for under Item Number 705-06.01 W Beam GR (Type 2) Mash TL3 per L.F.

**Guardrail at Intersections:**

When the length of need for guardrail extends beyond the location of an intersection or a driveway, the guardrail shall be curved around the intersection radius and type in-line anchors installed as shown on Roadway Standard Drawing S-GRS-7. When curved guardrail cannot be installed due to extreme site limitations, the Designer shall terminate the guardrail and install an in-line anchor (see S-GRA-4) to provide downstream tension for the GR system. Every effort should be made to locate the GR end as far away from the moving traffic to reduce crash severity. Such locations should be further evaluated to confirm if LON is provided.

**Guardrail at Steep Slopes:**

When a guardrail must be installed where the 2' earth pad behind the post cannot be installed on a slope steeper than 6:1, the length of the posts shall be increased to 8'. See Roadway Standard Drawings S-PL-6 and S-GR31-1 through S-GR31-1C.

**Guardrail Height Transition Detail:**

When MASH evaluated 31" GR has to be connected to existing 27" GR, the guardrail shall receive a transition section no steeper than 1" per span (6'-3 1/2") vertical taper. See Roadway Standard Drawing S-GRS-4.

**5-204.00 CONCRETE MEDIAN BARRIERS**

Concrete Barrier is a rigid barrier consisting of a 36" or 51" tall concrete wall offering MASH TL-4 and TL-5 performance. See Roadway Standard Drawings – S-SSMB series for details. The 51" wall should be the Designer's first choice at all locations where satisfying sight distance is not critical. The 51" wall serves as a glare screen to limit headlight glare from opposing lanes in urban areas. TDOT utilizes a single slope wall. At impact, the barrier wall does not deflect resulting in a near sudden deceleration for the occupant of the impacting vehicle. Because of the sudden deceleration, the system should only be used when the level of protection is required. The barrier is best suited

- To prevent crossover crashes at narrow, at grade medians.
- To prevent catastrophic damage to structures near the roadway.
- To prevent outside the curve run-off-road incidents for large vehicles.
- To limit the zone of intrusion of a large vehicle box and to limit the tilt angle.

The blunt ends of concrete median barrier walls are considered a roadside hazard because of their unyielding nature. The ends must be protected by means of an approved crash cushion (attenuator). Guardrail to concrete barrier transitions require a three beam transition section to prevent the guardrail from deflecting, creating a pocket that would allow a vehicle to impact the end of the wall. See Roadway Standard Drawings S-SSMB-6 through S-SSMB-6F and Roadway Standard Drawings – Guardrail Connections series for details of the semi-rigid transition guardrail.

**5-205.00 CABLE BARRIERS**

Cable barrier systems are typically installed at existing four lane divided highways with traversable depressed medians wider than minimum clear zone distance. Cable barriers may be used to mitigate locations experiencing the severe run-off-the-road left crash density or as an improved safety measure, to reduce crash severity. Cable barriers are designed to perform for impacts on either side; thus, only one run may be installed on recoverable, 4:1 or flatter fill slopes. High tension cable barrier consists of three or four high tension steel cables supported by steel posts. Cable barriers require an anchor to provide the tension, as well as, savage type fittings to adjust and maintain tension for the system to perform under the desired performance criteria. At the point of impact, cable barriers typically deflect up to 11 feet. In order to maintain maximum 10' deflection performance from a cable barrier system, the installed length shall not exceed 5000 ft from anchor to anchor with maximum 11' post spacing and initial tension as shown on Standard Drawing S-CB-2 Table B. Because of the deflection, cable barriers are not suited to shield objects

close to the roadway or narrow medians. If proposed at these locations, use a reduced post spacing to limit the deflection rates.

The performance of high tension cable barrier systems depends on soil specific design of the anchoring system. Cable Barrier Terminals should not be included in the length of need since they do not offer re-directive capacity, but they are designed to be crashworthy. Terminals should be overlapped by another barrier system, if continuous barrier protection is needed while transitioning from one hardware type to the other. Shorter runs of cable barrier systems that overlap are advantageous to maintain tension across critical areas. See Roadway Standard Drawing Series S-CB for cable barrier installation guidance.

## **5-206.00 END TREATMENTS**

To prevent the end of barrier systems from becoming hazards to the driving public, the ends must be anchored and protected with either an attenuator or end terminal if they are located within the clear zone. The following sections provide the design considerations for Anchorages, Guardrail End Terminals, and Crash Cushions.

### **5-206.01 ANCHORAGES**

For guardrails to function properly both ends must be anchored to provide the system with tension. Guardrail anchors are shown in the Roadway Standard Drawings – S-GRA Guardrail Anchor Series.

In cases where the end treatment is facing oncoming traffic and within the clear zone, an end terminal is required. The anchor is installed with the terminal (Type 38, or Type 21). Note: There is no separate anchor standard drawing for a Type 21 or Type 38 anchor since it is proprietary and is included in the cost of the end terminal.

When the end of the guardrail is located outside the clear zone of oncoming traffic or the trailing end of a guardrail that is outside the clear zone of opposing traffic, a crashworthy end treatment may not be required. In this case the Type 13 anchor may be installed.

When a guardrail is curved around an intersection or driveway, an anchor is installed along the tangent section of guardrail near the point of curvature to maintain system tension. In this case, an In-Line anchor is installed per Roadway Standard drawing S-GRA-4 as a best engineering practice to reduce crash severity. When site conditions permit, Designers should always prefer curved guardrail installation following the Roadway Standard Drawing S-GRS-7. Again, S-GRA-4 is for use on non-NHS roads; S-GRS-7 is for NHS roads; they are not interchangeable.

**5-206.02      GUARDRAIL END TERMINALS**

On every road the first choice for approach end terminal shall be the buried in backslope, Guardrail End Terminal (Type 12). See Roadway Standard Drawing S-GRT-1. This system is non-gating meaning the entire system is designed to redirect a vehicle. The buried in backslope end terminal requires a backslope of 2:1 or steeper. Guardrail lengths may be extended up to 200 feet to a section of backslope meeting the backslope requirements. When the above required conditions cannot be achieved, the Designer shall use the following guidance to choose the appropriate system:

On roadways with posted speeds greater than 45 mph, the tangential energy absorbing guardrail end terminal (Type 38) shall be used. See Roadway Standard Drawing S-GRT-2. For the system to work as designed, the earth pad as shown on Roadway Standard Drawing S-GRT-2P must be installed. Only SOFTSTOP provides re-directive capacity at the first post at determined GR need point (LON). At restrictive sites, Designers shall use SOFT STOP to reduce the installation length by two posts (12.5')

On roadways with posted speeds less than 45 mph, Type 21 (TL-2) terminals may be used instead of a Type 38. See Roadway Standard Drawing S-GRT-3. For the system to work as designed, the earth pad as shown on Roadway Standard Drawing S-GRT-2P must be installed.

If standard bridge parapet wall transitions and guardrail terminals are unable to meet the length of need installation requirements due to site limitations, a Curved Parapet Wall detail may be used on facilities with speeds less than or equal to 40 mph. See Roadway Standard Drawing S-CPW-1.

**5-207.00      CRASH CUSHIONS**

Crash cushions (impact attenuators) are used to shield fixed roadside objects located within the clear zone such as bridge piers, overhead sign supports, ends of retaining walls, concrete median barriers, bridge abutments, and bridge railings, etc. Crash cushions operate based on energy absorption or energy transfer by either decelerating a vehicle to a controlled stop after a frontal impact, or by redirecting a vehicle away from a fixed object after a side impact. Where a fixed roadside object is identified, the Designer should first consider removing, relocating, making the object breakaway, or shielding the fixed object with a longitudinal barrier. Where this is impractical, the use of an approved crash cushion system should be considered.

All crash cushions shown on TDOT Qualified Product List 34 are evaluated under NCHRP 350 and TDOT Qualified Product List 45 are evaluated under the AASHTO Manual for Assessing Safety Hardware (MASH) for Test Level 3 (TL-3) or Test Level 2 (TL-2). This requirement shall apply to all temporary work zone and permanent installations.



**5-207.01 CRASH CUSHION WORK ENERGY PRINCIPLE (NON-GATING, RE-DIRECTIVE SYSTEMS)**

Crash cushion design based on the work-energy principle involves the reduction of an impacting vehicle’s kinetic energy to zero. If a vehicle will be stopped after an impact, then the “work” done on a vehicle equals the initial kinetic energy of the vehicle. An impact to a crash cushion will result in some damage to a vehicle; however, under the work-energy principle, the potential for serious injury to the vehicle occupants is reduced.

Crash cushions that operate under the work-energy principle utilize “crushable” or “deformable” material to convert the kinetic energy of a vehicle into other forms of energy including mechanical, potential, heat, and sound energy. Crash cushions of this type, referred to as compression crash cushions, require a rigid support backup structure or foundation to resist the impact force of the vehicle utilizing the energy-absorbing material. These types of crash cushions are considered non-gating, re-directive systems, in that they are not intended to capture the vehicle upon impact (unless frontal impact occurs); but rather, redirect the vehicle after collision. Various systems are available that offer re-directive capabilities on one or both sides of the system.

*Table 5-1, Non-Gating Re-directive Crash Cushion Classification* summarizes the three types of non-gating/re-directive crash cushion systems considered acceptable for use on TDOT projects. See *Figure 5-5, Crash Cushion Selection Flowchart* for selection flowchart.

Non-Gating Crash Cushion Classification	Roadway Location Characteristics			
	ADT	Impact Frequency per Year	Distance (D) from Travel Way (feet)	Repair Considerations
Reusable	<25,000	1-2	D>10	Many reusable components, Unlimited repair time
Low Maintenance	≥25,000	3 or more	D≤10	Time and workspace limitations
Self-Restoring	≥25,000	3 or more	D≤10	Multiple hits before repairs needed

**Table 5-1  
Non-Gating Redirective Crash Cushion Classification**

**5-207.02 CRASH CUSHION CONSERVATION OF MOMENTUM PRINCIPLE (GATING SYSTEMS)**

The conservation of momentum principle for crash cushion design involves the transfer of the vehicle's momentum to an expandable mass of material located in the vehicle's path. The conservation of momentum principle is involved with all crash cushion impacts, since some portion of a vehicle's kinetic energy is transferred to the cushion by accelerating and moving various components of the cushion during an impact. For gating systems, this expandable mass will normally consist of containers filled with sand. Sometimes referred to as inertial crash cushions, these types of systems require no rigid backup or support to resist a vehicle's impact force and may be used for both temporary and permanent installations.

Gating systems are energy dissipation devices only and rely on the conservation of momentum principle. They have no capability to re-direct an errant vehicle but will either capture a vehicle or allow it to pass through the system along the same general path. Use of a gating crash cushion should be limited to locations where the roadside object is not likely to be impacted at an angle on the side with any significant velocity or when no other safety device product will fit the location (i.e. very wide hazards). Also, gating systems may be appropriate for use on low speed facilities and in temporary work zones with higher speeds where lane widths are constrained and the potential for a high angle impact is limited. Every gating system must be specifically designed for the fixed object it is intended to shield.

For gating, non-redirective systems (i.e. sand-filled barrel arrays), the Designer should verify that adequate clear run-out area is available behind the device. Barrel arrays should not be used where there is high potential for vehicles to impact the device in the reverse direction (e.g. a vehicle would hit the heaviest barrels placed directly adjacent to the fixed object being shielded).

**5-207.03 CRASH CUSHION SELECTION GUIDELINES**

The location of all permanent crash cushions should be shown on the Proposed Layout sheets along with the cushion type for each occurrence of a crash cushion on the project. In addition, the Designer should provide the available reserve area (length and width after deducting for offsets - see Roadway Standard Drawing S-CC-1) for each location where a crash cushion is to be installed. The Designer will specify the type of crash cushion to be used, and the contractor will choose an approved product for that type selected. In some instances, it may be necessary to provide special details for a given location. When special details are required, they should be shown on the Detail Sheets in the plans.

For new construction projects, use *Figure 5-5, Crash Cushion Selection Flowchart* to determine the appropriate type of crash cushion to specify, see Roadway Standard Drawing S-CC-1 for more details. Maintenance projects shall follow the maintenance contract. See Roadway Standard Drawing S-GR28 series.

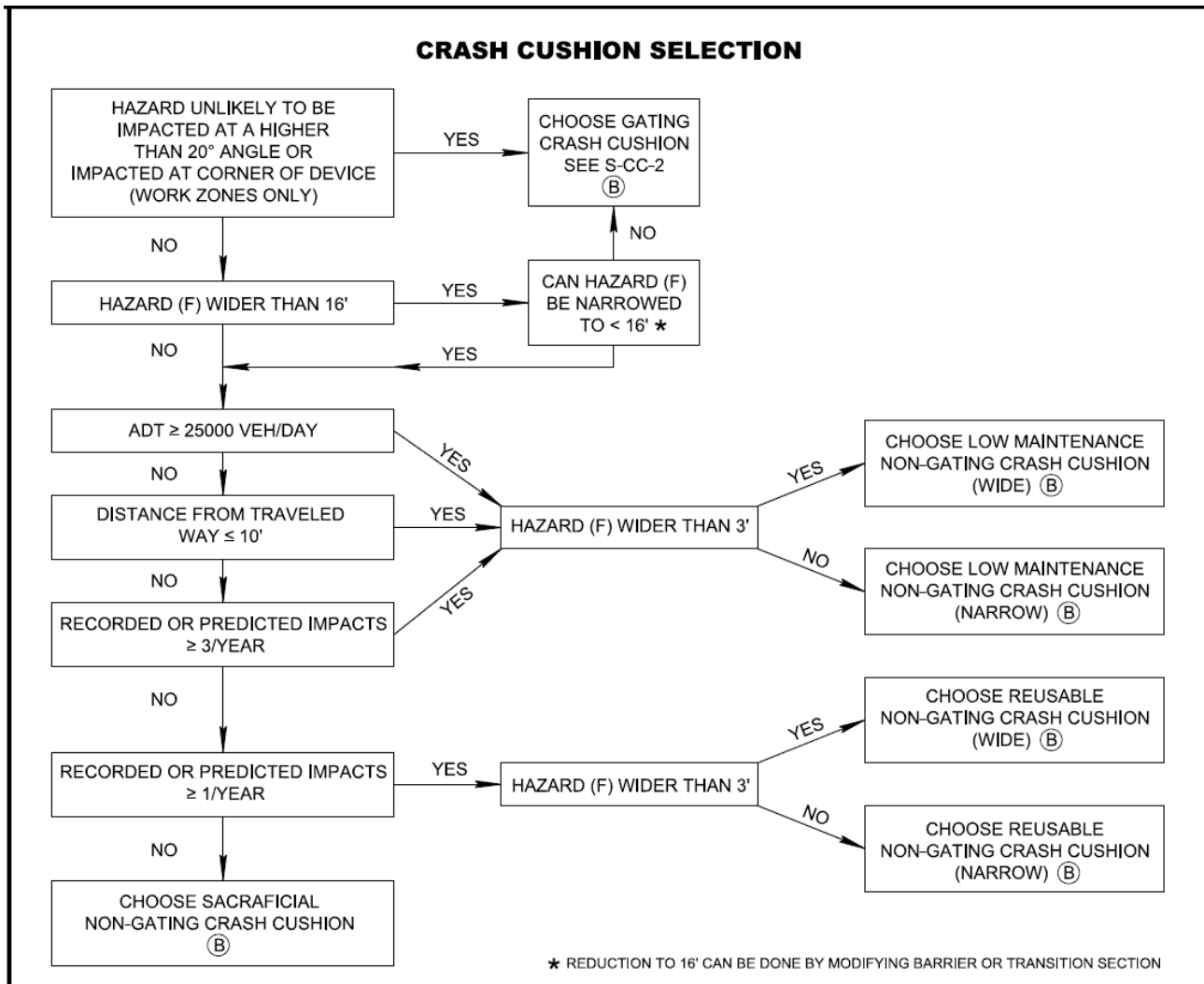


Figure 5-5

**Crash Cushion Selection Flowchart**

\*Reduction to 16' can be done by modifying barrier or transition section  
(From Roadway Standard Drawing S-CC-1, see note B)

**5-207.04 CRASH CUSHION SELECTION BASED ON SITE CHARACTERISTICS**

Provisions for providing adequate space (reserve area) for crash cushions to shield fixed objects should be made during the preliminary plan stage for new roadway construction projects and for the rehabilitation or reconstruction of existing roadways. Roadway Standard Drawing S-CC-1 provides the minimum and desired reserve area dimensions that should be made available. The preferred condition represents the optimum and desirable values for any location. The unrestricted conditions represent the minimum dimensions for all locations. The restricted

conditions shall be used only where it can be demonstrated that dimensions of the unrestricted condition are unattainable. The information in the table is for preliminary design purposes. Final design should be based on the crash cushion system selected and the manufacturer's specifications. Additionally, the table values are generic and may not apply to some proprietary systems.

To allow crash cushions to compress uniformly during an impact, systems should be installed on a hard, smooth, and generally flat surface of asphalt or concrete (preferred). All non-gating systems will require a foundation of this type. This can easily be accommodated for new construction; however, at retrofit locations or major roadway rehabilitation sites, the Designer should attempt to remove sloped surfaces as part of the project plans. Longitudinal and transverse slopes in excess of 5 percent should be avoided. Additionally, if the cross slope varies by more than 2 percent over the length of the system, the Designer may need to make site alterations. For gating systems, the hard-flat surface should be placed to provide a uniform foundation on which the barrel-array pattern may be installed, and the design masses of the sand-filled barrels can be marked. These marked locations will aid in the proper reconstruction of the barrel system to its originally designed capacity and configuration after a vehicle impact.

On new construction projects, no curb, curb and gutter, or raised pavement should be designed in the area surrounding or occupied by the crash cushion. When retrofitting an existing location, existing curbs, curb and gutter, or raised pavement should be removed where possible. If an existing curb is to remain, it shall be no more than 4 inches in height. The Designer should also verify that the existing curb has not previously contributed to poor crash performance.

The Designer should verify if sight distance will be compromised by installing a crash cushion at some intersection locations (i.e. locations at the end of concrete median barriers located at at-grade intersections). Where this is a concern, the Designer should choose a system that provides reduced overall height while still meeting the attenuation need at the location.

**5-207.05 CRASH CUSHIONS IN TEMPORARY WORK ZONES**

For temporary work or construction zones, the Designer should select a crash cushion system consistent with the expected time and site conditions that may be present at the given location. If the posted speed limit is greater than 45 mph, crash cushions installed in temporary work zones shall meet Test Level 3 criteria and each system must be listed on the Qualified Products List. Temporary systems shall be selected, designed, and installed based on the same guidance provided for permanent applications.

Non-gating, re-directive systems are approved for use in temporary work zones and available in narrow widths giving the ability to satisfy attenuation requirements where working conditions are constrained, provided that a paved surface is available for proper anchorage.

With all temporary applications, the selected system should provide adequate separation distance between the installed system and the actual area where work is being performed due to the possibility of flying debris during an impact. Additionally, sight distance at intersecting

**TDOT ROADWAY DESIGN GUIDELINES**

**CHAPTER 5 RIGHT-OF-WAY**

**English**

**Revised: March 23, 2022**

roadways or points of ingress/egress to the work zone should be considered and checked during the selection process.

## SECTION 3 – TRAFFIC CONTROL PLAN DESIGN

### **5-300.00 TRAFFIC CONTROL IN CONSTRUCTION ZONES**

TDOT's policy is to plan, design, construct, maintain, and operate safe and efficient work zones. The control of all road users through a work zone is an essential part of highway construction, utility work, maintenance, and right-of-way use permits. All projects shall follow TDOT's [Traffic Operations Division Work Zone Safety and Mobility](#) (WZSM) manual as well as the Work Zone Design Manual (WZDM). Consideration and management of work zone impacts begin at project inception and continue through all phases of design.

According to [23 CFR Part 630, Subpart J](#), all federally funded projects must have a Work Zone Significance Determination Evaluation and an appropriate Traffic Management Plan (TMP). TDOT's policy is to have a TMP for state-funded projects, as well as, federally funded projects. This is for all projects, including bridge repair, utility, or Local Program projects. All state/local projects shall include these three goals and objectives:

- A. Maximize safety in all work zones having TDOT oversight by reducing fatality, injury, and property damage crashes statewide.
- B. Minimize delay and other negative operational aspects of work zones.
- C. Promote consistency in all phases of work zone development, including planning, design, implementation, and operation.

The first step is to determine whether the project is exempt according to the introduction of the TDOT Work Zone Safety and Mobility Manual. If it is not exempt, then the next step is to complete the [TMP Cover Page](#) and [Work Zone Significance Determination](#) form and develop a TMP. The TMP template should be completed for all projects, whether significant or non-significant. The template format is available in Chapter 1 of the Work Zone Safety and Mobility Manual. The TMP packet includes the TMP template, TMP Cover Page, Work Zone Significance Determination form, and Traffic Control Plans. Local agencies should use the Local Program version of these forms, as TDOT personnel will not be approving Local TMPs. For more guidance, refer to the Work Zone Design Manual (WZDM).

Consideration and management of work zone impacts begin at project inception and continue through all phases of design. The TMP shall at the minimum include a temporary traffic control plan which shall either be a project specific temporary traffic control plan, approved TDOT standard drawings, or a reference to specific temporary traffic application in the MUTCD. The Designer shall use the Roadway Standard Drawing T-WZ series and the MUTCD to develop the traffic control plans. Additionally, all Operational Strategies agreed to at the Field Review and included on the TMP shall be shown as a special note on the Traffic Control Plan in the project plans.

The different responsibilities for Designers and Managers are specified in Appendix B of the WZSM. If the project type is not listed in the table, the Design Manager shall ensure that the significance determination and TMP are completed.

Prior to the ROW submittal, the Design Manager will submit the TMP packet to the Regional Traffic Engineer for approval and TMP cover sheet signature. The TMP packet with signed TMP cover sheet shall be uploaded to FileNet at the ROW plans submittal. Refer to *Chapter 1-105.05*. The naming convention shall be **nnnnnn-nn-ROW-TMP.pdf** where “nnnnnn-nn” is the project PIN. The revised, finalized, and signed TMP shall be uploaded to FileNet at the Construction submittal. Refer to *Chapter 1-105.08*. Naming conventions shall be nnnnnn-nn-TMP.pdf, where “nnnnnn-nn” shall be the project PIN. For more detailed information, please see TDOT’s [Work Zone Safety and Mobility Manual](#) and Work Zone Design Manual.

At the Right-of-Way Field Review, the Traffic Control Plan sheets shall be a draft version and printed for informational purposes only. The sheets will not be shown in the Right-of-Way Index and shall be removed from the plan set prior to submittal. The sheet(s) shall have the *Info Only* stamp. Traffic control shall be discussed to ensure that all aspects of the traffic control and construction phasing are discussed during the Right-of-Way phase. After the field review, changes shall be made to the Traffic Control sheets prior to Right-of-Way submittal. When Right-of-Way plans are submitted, the draft traffic control plans will be an independent pdf named *nnnnnn-nn-DraftTrafficControlROW.pdf* and placed on FileNet. After submittal, these plans will not be updated. If traffic control plans change significantly from the ROW draft, the Regional Utility office will need to be notified. The TMP shall be reviewed, revised, and finalized at the Construction Field Review or as deemed necessary by the Design Manager

**5-301.00 CONSTRUCTION SIGNING**

Detour signs shall be used only when traffic is rerouted onto another road and not used for diversions (runarounds), lane shifts, etc. on the road under construction. A Road Work Next XX Miles sign shall be used on road work more than 2 miles in length or as instructed by TDOT Standard Drawings, and shall be rounded to the next mile up (example: 5.4 miles in road work shall be shown as 6 miles on the Road Work Next XX Miles sign).

**5-302.00 BARRICADES AND DRUMS LIGHTING DEVICES**

Plastic drums shall be used in lieu of Type II barricades due to better performance in terms of durability and target value.

1. Where plastic drums are used, there are certain situations where additional delineation provided by lighting devices is not necessary. Type C (steady burn) lamps are not recommended for use with plastic drums along tangent sections following a lane closure taper or along a line of drums delineating the edge of the traveled way. The large target area of reflective sheeting on drums has been shown to provide adequate delineation for these conditions. However, the use of Type C lamps is still recommended for use with drums on

tapers. Also, Type C lamps on drums, including tangent sections, might be considered when climatic conditions (for example fog) dictate the need for additional delineation.

2. Where portable concrete barrier rails are used, portable barrier rail delineators are recommended in lieu of Type C lamps. These devices have provided adequate delineation at a much lower cost, while requiring much less maintenance effort as compared to Type C lamps.
3. The use of high intensity (Type B) lamps is optional according to the *MUTCD*. These lamps are frequently attached to the initial set of road work signs in advance of the work zone (Road Work Ahead, Road Work ½ Mile, etc.). These lamps do not add any significant degree of attention to these signs and are costly to provide and maintain. The use of Type B lamps shall be limited to just those situations where a "spot" hazard is anticipated, and additional delineation of a channelizing device is considered necessary.

**5-303.00      MARKINGS**

Wide (8 inch) solid lane lines are recommended for use as temporary marking at lane transitions and lane shifts. Wide lines provide better guidance through changes in alignment, especially where conflicting traces of removed markings may remain. Wide-edge line marking is also recommended for use next to portable concrete barrier rail. Review Roadway Standard Drawings - T-WZ Series for pavement marking requirements.

**5-304.00      TEMPORARY RAISED PAVEMENT MARKERS**

Raised pavement markers should be placed on lane lines for lane shifts on divided highways and freeways and 2-lane two-way diversion (run-arounds), as shown on the Roadway Design T-WZ-series Standard Drawings.

Temporary raised pavement markers should also be considered for use throughout construction projects on major facilities and locations where the lane visibility is an issue. The use of temporary raised pavement markers should be addressed at the construction field review on projects involving major facilities.

Designers should ensure that the appropriate 716 series of pay items are included in the construction plans for temporary raised pavement markers.

**5-305.00      PORTABLE BARRIER RAIL**

Horizontal taper rates shall be 10:1 or flatter for designs where posted speeds are less than or equal to 45 mph and 15:1 or flatter for designs where posted speeds are greater than 45 mph, see standard drawings T-WZ series for more information. The approach ends of the portable barrier rail shall be located outside the clear zone or be shielded with a portable energy absorbing terminal. The energy absorbing terminals shall be paid for under Item Number 712-02.60 Temporary Crash Cushion (MASH TL-3) per Each, and footnoted as follows:



“This item shall be a portable energy absorbing terminal meeting the requirements of AASHTO MASH for Test Level 3. The pay item will include furnishing and installing all components as shown on the manufacturer’s drawing.”

**5-306.00 BARRIER RAIL DELINEATORS**

Barrier Rail Delineators (Item Number 712-04.50 Barrier Rail Delineator per Each) shall be used on portable barrier rail in accordance with the Roadway Standard Drawings T-WZ-Series and *Chapter 6-201.01, Temporary Pavement Marking for Use on Pavement Surface Other than Final*. Barrier rail delineators should meet the following specifications. The TDOT approved qualified product list will be used to identify acceptable products.

1. Portable barrier rail delineator reflective sheeting shall meet ASTM D4956, Type V specifications.
2. Delineator should have 4” x 3” dimensions. Delineators with dimensions other than 4” x 3” may be used if the product is on the approved products list. The variations in delineator dimension should not exceed ±10%.
3. Different types of barrier rail delineators should not be mixed in the same line.
4. Portable Barrier Rail Delineators shall be high impact, UV-stabilized, engineered thermoplastic or polycarbonate substrate.

**5-307.00 DIFFERENCES IN ELEVATION BETWEEN ADJACENT ROADWAY ELEMENTS**

To minimize the hazard to traffic where differences in elevations between adjacent roadway elements exist, the Designer shall follow the procedures listed in *Chapter 9 Section 5 Pavement Edge Drop-Off Traffic Control Notes*, unless otherwise shown on the plans or directed by the Engineer. The Designer is advised that the procedure listed in *Chapter 9 Section 5* shall be presented in the form of traffic control notes shown on the first sheet in the traffic control plans and not on the general notes sheet.

**5-308.00 WORK ZONE SPEED CONTROL**

**WORK ZONE SPEED LIMITS**

Speed limits in work zones shall be established based on the Work Zone Speed Control chapter of TDOT’s [Guidance on Setting Speed Limits](#) manual. An evaluation for the need for a speed limit reduction shall be done for all freeway and expressway projects. If the criteria are met for a reduction, a written request shall be made to the State Traffic Engineer identifying the existing speed limit, proposed speed limit, whether it is to be variable or continuous, and which conditions and factor(s) necessitating the reduction are met. If approved, a pay item for portable, changeable speed limit signs shall be included. These signs shall be located at the beginning of

the active construction work zone and every 1 to 1.25 miles on the right side of the roadway throughout the project length. A static speed limit sign (R2-1) with the original speed limit shall be placed at the end of the work zone to establish that limit.

**“WORKERS PRESENT” SIGN**

A pay item for the “Workers Present” (TN-44) sign is to be used on all freeway and expressway construction projects if reduced speed limits for the construction zone are approved for use. This sign is to be placed 1,000 feet in advance of the reduced speed limit sign which is to be located at the beginning of the active construction work zone. These signs shall be located on the right side and on the median side of the roadway (except on the concrete median barrier wall sections). The signs shall be located only on the right side downstream of each interchange on-ramp within the active construction work zone.

The “Workers Present” sign will be paid for under Item Number 712-06.16 Signs (Construction) (Reduced Speed Warning) per Each. This item will be footnoted as follows:

“Item to be used only when a reduced speed limit is established within the project construction work zone limits. Item includes sign face, supports, and two type “B” flashers per the standard specifications. The contractor shall be responsible for turning on the type “B” flashers when workers are in the construction work zone and turning them off when workers are no longer in the construction work zone.”

**5-309.00 USE OF LANE CLOSURE WITH LEFT HAND MERGE**

Controlled access projects which utilize left lane closure details shall be reviewed for the inclusion of Left Hand Merge. Roadway Standard Drawing T-WZ-21 details Lane Closure Left Hand Merge. The layout and signage may require modification depending on site and field conditions. Freeway construction or maintenance projects where the left lane of traffic is closed through the work zone are the primary candidates.

The following criteria will be used for determining Merge Left use:

- Projects on rural freeways should include Merge Left
- Projects on urban freeways will be reviewed for Merge Left considering factors such as number of lanes, interchange spacing, and proximity to major splits
- Other controlled access facilities will be considered on a case-by-case basis

The State Work Zone Engineer should be notified by email ([TDOT.WZ-Review@Tn.gov](mailto:TDOT.WZ-Review@Tn.gov)) for any freeway or controlled access facility with lane closures not utilizing Left Hand Merge prior to finalizing the traffic control. The memorandum shall contain the reasons left hand merge would not be warranted.

**5-310.00 WORK ZONE DESIGN DEVIATION FORM**

All projects with Temporary Traffic Control plans that do not meet TDOT or MUTCD standards shall require the completion and approval of a [Work Zone Design Deviation](#) Form.

Despite the range of flexibility that exists with respect to the controlling elements of temporary traffic control design, there are situations in which Roadway Standard Drawings -T-WZ series or MUTCD Part 6 criteria are not applicable to the project circumstances or cannot reasonably be met. For such instances, the work zone design deviation process allows for the request, justification, mitigation, and acceptance of alternate design criteria.

The work zone design deviation process requires formal approval for exceptions relating to TDOT's and MUTCD's accepted standards. Work Zone Design Deviation requests shall be submitted to the State Work Zone Engineer ([TDOT.WZ-Review@tn.gov](mailto:TDOT.WZ-Review@tn.gov)) using the [Work Zone Design Deviation Form](#). Designers shall keep a copy of the signed form in the Project Folder. Approved deviations shall then be described in detail within the Traffic Control Plan Notes. For more information refer to the Work Zone Design Manual.

**SECTION 4 – ENVIRONMENTAL CONSIDERATIONS**

**5-401.00 KNOWN ENVIRONMENTAL CONSTRAINTS**

Any known environmental constraints identified in environmental technical documents should be indicated on the plans and brought to the Design Manager’s attention as soon as the constraints are recognized. Constraints may include, but are not limited to the following: streams, wetlands, endangered or protected species, registered historical or archeological sites, etc. Ecology, permit assessment, and SWPPP review items encountered are to be addressed prior to the Right-of-Way plan submittal.

**5-402.00 ENVIRONMENTAL NOTE REQUIREMENTS**

Designers should refer to *Chapter 9-400 Environmental Notes* for Environmental Note requirements. The blue instructional text listed there will help guide as to whether notes are needed in the plans and the placement of those notes. These notes shall be part of the ROW Field Review and part of the official ROW plan submittal. The notes shown in Chapter 9-400 through 9-405 shall be placed in the Environmental Notes sheet series. This series comes after the General and Special Notes sheets. The notes shown in Chapter 9-410 through 9-415 shall be placed in the Erosion Prevention and Sediment Control (EPSC) Notes sheet series. This is the first sheet of the EPSC sheet series.

Project Specific Notes requested by the Environmental Division should be included in the Environmental Notes or EPSC sheets as Special Notes except for special circumstances that require the note to be shown on the specific plan sheet for which the note applies. In these cases, a special note should be included in the Environmental or EPSC Special Notes indicating the location of the note.

The Designer should add any additional Special EPSC Notes which provide project specific information on requirements for the proposed EPSC measures, as well as, specific steps the contractor is to take in the execution of the EPSC Plan. These notes should also be added to the first sheet of the EPSC Plans.

For notes added at the direction of the Environmental Division, the following sub-headers should be used:

- A. Environmental - Air and Noise
- B. Environmental – Archaeology
- C. Environmental – Ecology
- D. Environmental - Hazardous Materials

- E. Environmental - Historic Preservation
- F. Environmental – Mitigation
- G. Environmental – Permits

**5-403.00 ADDITION OF EPSC PLANS INTO FIELD REVIEW AND FINAL RIGHT-OF-WAY PLANS**

EPSC Plans sheets shall be included in the Right-of-Way Field Review plans. Updates from comments at the field review should be made to the plans prior to submittal for Right-of-Way Appraisals and Acquisition. EPSC Plan sheets shall be named and follow the sequence as shown in *Chapter 1-205.01, Right-of-Way Index of Sheets* and include all listed items in the ROW checklist. Refer to the Drainage Manual *Chapter 10 Erosion Prevention and Sediment Control* for additional information on EPSC plans.

All projects requiring a NPDES permit will require at least three (3) EPSC stages:

1. Clearing and Grubbing Stage
2. Intermediate Stage (example: a widening project where traffic remains on existing roadway and portion of road is being constructed)
3. Final Construction Stage

In all cases, the plans will have the same number of EPSC stages as it has Traffic Control phases, as long as Traffic Control has three phases.

The Design Manager should contact the Regional Environmental Technical Groups when EPSC Plans are revised to determine if revised plan sheets or other information is needed.

**5-403.01 ADDITION OF CONTOURS TO EPSC SHEETS**

Contours shall be included in plans as part of the EPSC sheets for all projects submitted for Right-of-Way Appraisal and Acquisition except for resurfacing projects, projects where a survey is not required, and small projects or projects of limited scope where a surface is not developed. Contours should include existing (pre-construction), intermediate, and proposed contours. Contour sheets should include all listed items in the ROW checklist.

Since site conditions and topography are unique to each project, Designers should seek input from Regional Environmental Technical Offices to determine contour intervals.

**5-404.00 ENVIRONMENTAL PERMIT REQUIREMENTS**

Several State and Federal Agencies issue permits for impacts to Waters of the United States and Waters of the State of Tennessee. These agencies have regulatory authority over the Tennessee Department of Transportation. These agencies and the permits the agencies issue are described in the [Tennessee Environmental Procedures Manual](#).

Roadway designers are responsible for preparing all requested information, permit sketches, and modifications to their plans that the Regional Environmental Technical Office and Environmental Division – Permits Office use to apply for permits. This document assists in determining what is included in the packet and on the individual sketches. Once the Environmental Permit Package is complete and uploaded to FileNet, send a notification by email to the HQ Environmental Division ([TDOT.Env.Permits@tn.gov](mailto:TDOT.Env.Permits@tn.gov)) and the appropriate Regional Environmental Technical Office:

Region 1 – Environmental Technical Office [R1.EnvTechOffice@tn.gov](mailto:R1.EnvTechOffice@tn.gov)

Region 2 – Environmental Technical Office [R2.EnvTechOffice@tn.gov](mailto:R2.EnvTechOffice@tn.gov)

Region 3 – Environmental Technical Office [R3.EnvTechOffice@tn.gov](mailto:R3.EnvTechOffice@tn.gov)

Region 4 – Environmental Technical Office [R4.EnvTechOffice@tn.gov](mailto:R4.EnvTechOffice@tn.gov)

Once the application for water quality permits (which includes the permissible roadway plans and permit sketches) for a given roadway project has been submitted to the various permitting agencies (i.e. Tennessee Department of Environment and Conservation, U.S. Army Corps of Engineers, and Tennessee Valley Authority) by the Environmental Division, an email will be sent to the project’s Design Manager notifying them of this application submittal. It should be noted that if agency review results in a request for additional information (RAI) from the Environmental Division, revisions to the roadway plans and/or permit sketches may be required from the roadway designer to satisfy the RAI comments. If revisions to the plans or sketches are required, this information will be coordinated by the Environmental Division to either the Environmental Technical Office or the Design Manager/designer by email.

If the project does not require items submitted for permit evaluation, the Regional Environmental Technical Office or Environmental Division shall send an email to the Designer, copied to the Program Scheduling Office, stating that no environmental impacts will occur as a result of the project.

**5-405.00 PLACEMENT OF TREES IN MITIGATION AREAS**

Areas designated for tree planting for water quality impacts typically include restored or existing wetlands, channel changes, and when specified, areas around streams and the inlet and outlet areas at culverts. The Environmental Technical Office or TDOT Mitigation shall be consulted to determine which areas require tree planting. All required tree planting must be located within the permanent right-of-way rather than in a drainage easement. Sufficient room shall be designated for the placement of trees and seedlings near culverts, channel relocations, and along stream banks, or other mitigation features within the right-of-way boundaries. These trees should be protected from disturbance during construction and from maintenance activities

after construction. Within the approved permit, the regulatory agencies will specify how long and what percentage of survival is needed to satisfy the conditions of the specific permit.

All notes required by the Technical Studies Office, Environmental Division, Regional Environmental Tech Offices, or specified in the Ecology report must be placed in the final Right-of-Way plans for the permit applications. Email addresses are as follows:

[TDOT.Env.Ecology@tn.gov](mailto:TDOT.Env.Ecology@tn.gov)

[R1.EnvTechOffice@tn.gov](mailto:R1.EnvTechOffice@tn.gov)

[R2.EnvTechOffice@tn.gov](mailto:R2.EnvTechOffice@tn.gov)

[R3.EnvTechOffice@tn.gov](mailto:R3.EnvTechOffice@tn.gov)

[R4.EnvTechOffice@tn.gov](mailto:R4.EnvTechOffice@tn.gov)

**5-406.00 ABANDONMENT OF WATER WELLS**

If during the Environmental Boundaries and Right-of-Way phase it is determined that a water well requires abandonment, the Design Manager shall request information after final Right-of-Way plans have been submitted by notifying the Geologist Water Well Program, Division of Water Supply, 401 Church Street, Sixth Floor L & C Tower, Nashville, Tennessee 37245-1549, telephone 1-800-525-4873 or (615) 532-0176. The Design Manager shall also request an inspection of the well and recommendations concerning sealing. Quantities and bid items shall then be set up in the project plans for the contractor to perform the actual sealing of the well. The abandonment of water wells shall become a project commitment. See *Section 5-104.00 Project Commitments Sheet in Construction Plans*.

When requesting a well inspection and recommendations for sealing from the Water Management Division, the Designer shall provide the following:

1. A print of the title sheet and of the plan sheet showing the location of the well.
2. The name, address, and telephone number of the driller, the date the well was drilled, and the name and telephone number of the property owner at the time the well was drilled, if the information is available.

The Designer shall take the initiative to ensure that this information is returned in time to incorporate it into the project plans. The well shall be located on the proposed layout sheet and a note added as to whether the well is to be sealed by the contractor.

Every effort is to be made to ensure that this information is on the project plans before turning them in for the letting. All water wells shall be sealed in accordance with the standards set forth by the Tennessee Department of Environment and Conservation (TDEC).

**5-407.00 ADDITION OF NATURAL STREAM DESIGN SHEETS TO RIGHT-OF-WAY PLANS**

# TDOT ROADWAY DESIGN GUIDELINES

## CHAPTER 5 RIGHT-OF-WAY

**English**

**Revised: 6/15/2023**

For a project involving a stream relocation, the Environmental Division, Natural Resources Office, will determine if a Natural Stream Design is required and will notify the Designer in the Permit Assessment. The Designer will not be responsible for developing the Natural Stream Design.

The Designer is not responsible for showing the natural stream design on the Proposed sheets; however, the Designer shall add the following note on each Proposed sheet in which the natural stream design would otherwise appear:

NOTE: NATURAL STREAM DESIGN IS NOT SHOWN, SEE SHEET NS SERIES PLANS FOR DETAILS.



**SECTION 5 – NON-TRADITIONAL PROJECTS**

**5-500.00 NON-TRADITIONAL PROJECTS**

Non-traditional projects are projects that do not follow the normal project design and process. These projects can be on existing right-of-way or address specific concerns to improve the safety or longevity of the roadway.

**5-501.00 PROJECTS OF LIMITED SCOPE**

Projects of limited scope will permit implementation of projects addressing safety and operational concerns in a timely manner without requiring design exceptions for those elements of the roadway that are beyond the scope of purpose and funding for the projects such as, traffic engineering, spot improvements, Road Safety Audit Review (RSAR) projects, and safety projects such as signing, marking, signalization, roadway lighting, and traffic barriers which include very minor or no roadway work as permitted under 23 CFR 625.3 (e). The note “**Project of Limited Scope**” shall be placed on the title sheet directly above the Chief Engineer’s signature.

**5-502.00 RESURFACING PROJECTS**

The scope of work for resurfacing projects generally does not include grading or drainage work, but may include upgrades involving safety, pedestrian accessibility, bicycle accommodation, and signage. Maintenance of drainage structures may also be included. See the [Pavement Office website](#) for additional resurfacing information and forms.

Plan sets consist of only a title sheet, typical section showing proposed pavement schedule, estimated quantities sheets, tabulated quantities, and notes sheets. Additional plan sheets may be added due to railroad involvement, bridge repair, or ATR/embedded detection loops. An Engineer’s stamp and signature is required. See the [resurfacing checklist](#) for a guide on plan sheet requirements.

Items to remember:

- See the [Resurfacing Delivery Schedule](#) for submittal dates.
- If safety improvements are to be completed under a separate project number, then the Designer shall list those items as a separate column in the Estimated Quantities sheet.
- If a bridge repair project is added to the resurfacing project, the work zone item numbers associated with bridge repair portion should be listed under the bridge repair estimated quantities.
- Special Provisions should not be noted in the resurfacing plan sheets. If one is needed for a project, it is included in the contract proposal book.
- The Designer shall upload the PS&E Report to the Design FileNet folder at the time that

the plans are sent for review.

**5-502.01 RESURFACING PLANS CERTIFICATION OF SCOPE OF WORK**

All resurfacing projects require the Designer to complete a [Resurfacing Plans Certification of Scope of Work form](#). At the beginning of project development, the Design Manager shall complete the form and forward it to the Regional Resurfacing Coordinator to review and sign the form. This form, along with a pdf of the Title sheet and any bridge recommendations (if applicable) shall be submitted at a minimum of eight and a half weeks prior to the turn-in or as early in the project development process as possible to the following technical sections and offices:

- [TDOT.Env.AirNoise@tn.gov](mailto:TDOT.Env.AirNoise@tn.gov)
- [TDOT.Env.CulturalResources@tn.gov](mailto:TDOT.Env.CulturalResources@tn.gov)
- [TDOT.Env.HazmatOffice@tn.gov](mailto:TDOT.Env.HazmatOffice@tn.gov)
- [TDOT.Env.NEPA@tn.gov](mailto:TDOT.Env.NEPA@tn.gov)
- [TDOT.Env.Permits@tn.gov](mailto:TDOT.Env.Permits@tn.gov)
- [TDOT.MultimodalPlanning@tn.gov](mailto:TDOT.MultimodalPlanning@tn.gov)

Choose appropriate Regional Environmental Technical Office:

- [R1.EnvTechOffice@tn.gov](mailto:R1.EnvTechOffice@tn.gov)
- [R2.EnvTechOffice@tn.gov](mailto:R2.EnvTechOffice@tn.gov)
- [R3.EnvTechOffice@tn.gov](mailto:R3.EnvTechOffice@tn.gov)
- [R4.EnvTechOffice@tn.gov](mailto:R4.EnvTechOffice@tn.gov)

This process **does not apply** to projects involving work on drainage or grading. Projects involving grading, drainage or otherwise expanded scopes of work will follow the normal plans submittal process to the Environmental Division and Regional Environmental Technical Office. This is for resurfacing projects limited to paving and/or installation of safety related items.

In the event that the scope of work is modified during plans development, or if the project Begin/End stations are extended for any reason after the initial submission, it will be the responsibility of the Design Manager to submit a Resurfacing Plans Certification of Scope of Work form with the Addendum to Scope of Work filled out at the bottom and a new title sheet. The Design Manager shall submit the form to the Regional Resurfacing Coordinator for certification and then submit the form to the Environmental Division.

**5-502.02 PEDESTRIAN ACCESSIBILITY AND BICYCLE ACCOMMODATION DURING RESURFACING PROJECTS**

During resurfacing projects, it is the Department’s commitment to identify, correct and/or install curb ramps following Roadway Standard Drawings - Multimodal series. See TDOT Policy Number 530-01. Refer to *Chapter 3, Multimodal Design* and the *Public Rights-of-Ways Accessibility Guidelines (PROWAG)* for additional guidance to identify features required for proper installation of pedestrian facilities. Existing pedestrian facilities shall be evaluated for safety,

# TDOT ROADWAY DESIGN GUIDELINES

## CHAPTER 5 RIGHT-OF-WAY

English

Revised:

connectivity, ADA accessibility, signalization, proper signage, etc. Any deficiencies, as well as, possible improvements shall be documented in the [Resurfacing PS&E Report](#), along with any inspection forms. Improvements for pedestrian safety shall include the entire intersection by evaluating curb ramp locations/type, crosswalk marking, alignment, and offset to travelled lanes. The roadway designer shall use the report to develop resurfacing plans addressing facility improvements.

If a bike facility is recommended by the Multimodal Division's Bike coordinator, the local municipalities shall provide the signed and sealed bike facility plans if the existing roadway conditions, lane and shoulder widths, posted speed, and ADT allow. Existing bicycle facilities should also verify compliance with current TDOT requirements. Local municipalities should refer to *Chapter 3 Multimodal Design* and the Roadway Standard Drawings-Multimodal series for additional guidance to identify features required for proper installation of a bike facility.

### **5-502.03 SAFETY IMPROVEMENTS ON RESURFACING PROJECTS**

To enhance safety on state routes, low cost safety improvements should be included on all state route resurfacing projects. Eligible safety improvements include the following: installation of skid-resistant surfaces in intersections or curves, evaluation of guardrail length of need, and adjustment of guardrail length as necessary; upgrade of guardrail end terminals to MASH TL-3; installation of centerline rumble stripes; sign replacement or upgrades; replacement of non-frangible sign posts with breakaway posts; installation of safety endwalls, removal of roadside objects inside the clear zone if it can be accomplished without additional grading or right-of-way purchase; correcting super elevation rates; improvements (such as vegetation removal) to improve sight distance without purchasing right-of-way or relocating utilities; and widening shoulders without purchasing right-of-way or relocating utilities.

The applicable use of the above various safety improvements will be guided by the [Resurfacing PS&E Report](#) and will be completed by the team responsible for each resurfacing project. This checklist will be used as documentation for decisions regarding low cost safety improvements on resurfacing projects.

Installation of new shoulder rumble stripes/strips and raised pavement markers (RPM) are also considered low cost safety improvements. These are to be installed per the current pavement marking policy in *Chapter 6-205.00, Permanent Pavement Markings*. All low-cost safety improvements including rumble stripes/strips and RPMs may be paid for under safety project funding should the project meet the safety upgrade threshold. If the roadway has existing shoulder rumble stripes/strips and snowplowable raised pavement markers (SRPM), they are considered a maintenance item and do not qualify as low cost safety improvements.

Items for low cost safety improvements shall be funded separately from other resurfacing plan items in both federally funded and 100% state funded resurfacing projects if the total estimated costs of the safety upgrades are greater than \$10,000. A federal project number for HSIP funds will be provided to Designers for inclusion of safety improvements in the resurfacing project. Designers should correctly identify items by the funding source in the resurfacing plans.

## TDOT ROADWAY DESIGN GUIDELINES

### CHAPTER 5 RIGHT-OF-WAY

English

Revised:

If it is determined that the estimated cost for safety improvements is less than \$10,000, the Designer shall contact the Programming Development and Scheduling Office, [TDOT.PDSO@tn.gov](mailto:TDOT.PDSO@tn.gov), to request removal of the HSIP number. Removal of the HSIP project number should be requested at least 5.5 weeks prior to construction turn-in. Safety improvements shall be funded using the same project number and resurfacing funds used for other items in the project.

#### **5-502.04 PAVING POLICY - RESURFACING**

This policy is for paving intersecting public roads, private drives, field entrances, and business entrances that are within the project limits.

1. Public Roads (no curb and gutter)

Public road intersections will be resurfaced a paver width through the intersection as a minimum. Should the pavement of the intersecting road be distressed, the resurfacing width may be increased to the normal right-of-way.

2. Public Roads (curb and gutter section)

On curb and gutter sections, public road intersections will be resurfaced to the end of radius.

3. Private drives, field entrances, and business entrances (no curb and gutter)

Private driveways, field entrances, and business entrances will be resurfaced a paver width (lane width) as a minimum. A pavement taper to transition the new pavement shall be required, it shall be based on an additional 1 foot of width per 1 inch depth of pavement. If the shoulder is narrow enough that the sum of the shoulder and transition is less than a paver width (lane width), the transition shall occur within the paver width. If the sum of the shoulder and the transition is greater than a paver width (lane width), the transition shall occur outside of the paver width.

4. Private drives and business entrances (curb and gutter section)

For urban typical sections (curb and gutter), a minimum width of material, not to exceed 1 foot, will be used to feather the pavement edge.

#### **5-502.05 NOTE ALLOWING TRAFFIC TO TEMPORARILY DRIVE ON MILLED SURFACE TO BE PLACED IN INTERSTATE RESURFACING PLANS**

See *Chapter 9-215.01, Resurfacing* for a note to be added to interstate resurfacing plans for all projects which include cold planing items. The note should be added as a Special Note.

Designers should also include the Grooved Pavement (W8-15) and Motorcycle (W8-15P) warning signs on interstate resurfacing projects. Two (2) signs should be placed on the interstate in advance of the cold planed section. A motorcycle warning sign should also be placed on entrance ramps located within the limits of a cold planed section.

**5-502.06 STRIPING RAMPS ON RESURFACING PLANS**

In the process of preparing plans for construction or resurfacing projects involving roadways that abut connecting ramps, consideration shall be given to striping these ramps. When work is not being done on the entire ramp, this ramp would not normally be re-striped beyond where the work is being done. The roadway Designer shall contact the Regional Traffic Engineer to determine the need to re-stripe these ramps in their entirety. Stop bars, turn lane arrows and other pavement instructive markings may be included at the discretion of the Regional Traffic Engineer applying the appropriate standard drawings that shall be included in the plans. The decision to re-stripe shall be made based on the condition of the pavement markings and consideration may be given to compliance with the standards. If this striping is done, the ramps shall be marked using current standards for pavement markings as shown on Roadway Standard Drawings T-M-6 and T-M-9 and other appropriate standard drawings and marked up to the connecting roadway. Add the following footnote to the plans:

“Ramps shall be marked up to where they connect to the intersecting roadway.”

**5-502.07 TOTAL LANE MILES PAVED FOR RESURFACING PROJECTS**

The title sheet of **all resurfacing projects** shall include the length of the proposed lane miles to be paved. An example of this is shown below in *Figure 5-6, Resurfacing Project Lengths on Title Sheet*. The length will be located under Project Length information as “**Total Lane Miles Resurfaced**” and be shown to the nearest hundredth of a mile. See *Chapter 1-207.00, Resurfacing Title Sheet*.

The total lane mile length should include all traffic lanes and continuous turning lanes paved. Side roads, paved shoulders, private drives, field entrances, business entrances, ramps, and turn lanes located at intersections less than 1000 ft. in length do not need to be included in the length.

PROJECT LENGTH	XX.XX MILES
TOTAL LANE MILES RESURFACED	XX.XX MILES

**Figure 5-6  
Resurfacing Project Lengths on Title Sheet**

**5-503.00 STRATEGIC TRANSPORTATION INVESTMENT DIVISION - ROAD SAFETY AUDIT REVIEW (RSAR) PROJECTS**

The primary purpose of the [Road Safety Audit](#) Review (RSAR) program is to reduce the number of injuries and fatalities on public roads. A RSAR report is written for each RSAR project and shall be used as guidance for the development of RSAR plans. Projects currently selected for the program are spot or roadway sections on freeways, state routes, and functionally classified local roads for the Highway Safety Improvement Program list. Projects may also be selected if they qualify for the [High Risk Rural Roads](#) funds. Currently project funding comes from either [Highway Safety Improvement Program](#) funds (\$1 million limit per project) or High Risk Rural Roads funds (approximately \$50,000 limit per project).

Scope of work for RSAR projects is developed by a RSAR Team and will consist of a Pre-Briefing Meeting, Onsite Visit, and Post Meeting or Conference Call of team members. A representative from either Headquarters Roadway Design Division or Regional Project Development will be included on each team. The Regional Assistant Director or the Project Safety Office Manager 2 will coordinate with the Headquarters and Regional Design Managers to ensure Roadway Design is represented at each meeting. The representative will be responsible for ensuring design issues are addressed prior to finalizing and submitting the RSAR Report for approval.

Except as noted in this section, guidance provided in the Design Guidelines do not apply to the development of RSAR projects. Proposed improvements shall be designed in accordance with current design standards; however, it is not the intent of the RSAR program to bring all design elements up to current standards.

In order to provide consistency in the development of RSAR projects the following guidance shall be used during the development of RSAR plans:

1. Plans shall be developed in accordance with the approved RSAR report.
2. Scope of the project shall be limited to items addressed in the RSAR report.
3. Any deviation from the RSAR report will require a revision to the report and estimate. Proposed changes shall first be approved by the Regional Project Development Director prior to initiating a request to change the approved RSAR report.
4. Additional improvements shall not be added to the project unless required to meet the objective outlined in the RSAR report.
5. Improvements to include additional capacity (except where identified in the RSAR report) shall not to be added to RSAR projects.
6. Design Exceptions for these projects of limited scope shall only be requested when the proposed element to be improved cannot be brought up to current design standards.
7. Design Exceptions shall not be requested for other controlling elements of design that are not addressed in the RSAR report and are beyond the scope of purpose and

- funding for the projects.
8. Plans shall be developed using the minimal amount of survey and plan details necessary to provide sufficient detail to acquire right-of-way (if required) and construct the project. Example: Topography of adjacent properties is not needed when the improvement is going to be constructed inside existing right-of-way. However, EPSC plans may need to be developed to the same detail as a typical roadway project.
  9. The acquisition of additional right-of-way and easements and the relocation of utilities shall be addressed in the RSAR report. Designs for RSAR projects not proposing additional right-of-way and/or easements or utility relocations acquisition shall avoid additional right-of-way or utility relocations whenever possible. If the need for additional right-of-way and/or utility relocation is identified during project development, the Designer shall immediately notify the Design Manager or RSAR Coordinator.
  10. The Work Zone Significance Determination shall be completed and procedures in the [Work Zone Safety and Mobility Manual](#) shall be followed for all RSAR projects.
  11. RSAR project development shall follow guidance regarding permits and submittals to the Environmental Division found in the Design Guidelines.
  12. Signing and marking shall be in compliance with the current edition of the Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*.
  13. The following note will be placed on the title sheet directly above the Chief Engineer's signature. "**RSAR Project – Project of Limited Scope**".

#### **5-504.00 LANDSCAPING PLANS**

The cost of landscaping and hardscaping for the purpose of beautification should not exceed 5% of the total project estimate. **This amount should not include any landscaping or vegetation required for environmental mitigation.** In addition, items that are considered common items used in construction including, but not limited to, sodding slopes on urban projects, stamped concrete, and decorative facing on retaining walls, bridge columns, parapets, and pedestrian curb ramps should not be included in the 5% of the total project estimate.

On projects where substantial landscaping is proposed or the Design Manager estimates that the cost of landscaping items may exceed 5%, the Design Manager will request the Bid Analysis and Estimating Office to verify the percentage of landscaping as a percentage of the total project using the latest estimate available.

Projects requiring landscaping and/or hardscaping due to a prior commitment where the cost of the landscaping and/ or hardscaping cost exceeds 5%, the Design Manager should notify the Director of Project Development for guidance.

## TDOT ROADWAY DESIGN GUIDELINES

### CHAPTER 5 RIGHT-OF-WAY

**English**

**Revised:**

The local government may include additional landscaping plans at the local government's expense. The proposed landscaping shall be within the NEPA studied boundary and such items will be included as non-participating items in the estimated roadway quantities. In this case, the local government is responsible for notifying the Design Manager by the Right-of-Way Field Review of this intention and for providing a landscaping plan sealed and signed by a Registered Landscape Architect. The Designer shall only be responsible for adding "Landscaping Plan Sheet, LSC-1" to the plans index and adding a note to the appropriate proposed sheets:

NOTE: LANDSCAPING PLAN NOT SHOWN, SEE LSC SERIES SHEETS"

Landscaping shall not cause a sight distance or clear zone conflict. See the Environmental Division – Beautification Office's [Landscape Design Guidelines](#) for roadside landscaping details available on the Landscape Design Guidelines webpage.

#### **5-505.00 LOCAL PROGRAM DEVELOPMENT PROJECTS**

TDOT's [Local Programs Development Office](#) assists Tennessee's Local Governments with conducting environmental processes and clearances, designing, constructing, and maintaining transportation facilities. The TDOT Local Program Development Office is the single TDOT point of contact for project correspondence between the Department and local governments. Detailed information about the program may be found in [The Local Government Guidelines \(LGG\) Manual](#).

Locally Managed Projects primarily involve local roads, but they may also involve the National Highway System (NHS) or TN State Routes. Types of projects may include roadway, resurfacing, shared-use paths, visitor centers, signalization of intersections, pedestrian facilities, and bridge replacements. In addition, the funding for each Locally Managed Project may come from Federal-aid and/or State Funds combined with Local Funds, or solely from Federal-aid, State Funds, or Local Funds.

All projects developed under the Local Programs Office which involve a roadway shall be designed in accordance with TDOT Design Policies and Procedures and Federal Regulations.

Projects such as Bridge Replacement (BRZ) Projects, State Industrial Access (SIA), Local Interstate Connector (LIC), Intersection Improvements, Roadway Resurfacing, Roadway Features or Auxiliary to Roadway Features, Roadway Signing and Striping Improvements, as well as, Sidewalks and Pedestrian Facility Improvements, Bike Lanes, Bike Routes, Shared-use Paths, Safe Routes to Schools, and Landscape Projects shall be considered as a Roadway Project since the project scope would involve roadway design elements.

Projects such as Building Projects and Parking Improvements are non-roadway projects and they are covered under The Local Government Guidelines (LGG) Manual-Chapter 10: Non-Traditional Projects.



## TDOT ROADWAY DESIGN GUIDELINES

### CHAPTER 5 RIGHT-OF-WAY

**English**

**Revised:**

Refer to the [Local Government Guidelines](#) (LGG) Manual, Chapter 5, “Roadway Design Procedures, Including Structural Design” for more information.

Tennessee’s Functional Classification Maps can be found on the TDOT [Functional Classification Maps](#) webpage. Adobe PDFs of counties and cities are available for download.

**SECTION 6 – RIGHT-OF-WAY PROCESS**

**5-600.00 RIGHT-OF-WAY FUNDING APPROVAL REQUESTS**

Funding approval shall be requested by the Design Manager and received on all Right-of-Way projects prior to their submission for appraisals and acquisition. The funding approval shall be requested approximately two (2) weeks prior to the anticipated Right-of-Way turn-in date and shall not be requested until the Environmental Document is approved. See *Chapter 1-402.02* for further details.

When requesting funding approval for Right-of-Way “appraisals and acquisition”, email [TDOT.PDSO@tn.gov](mailto:TDOT.PDSO@tn.gov) a PDF copy of the title sheet and the [Right-Of-Way Funding Approval Request](#) transmittal letter to the Program Operations Office, Federal Aid Section. An approved signed and dated copy of the Right-Of-Way funding request approval transmittal letter shall be attached to the first page of the Right-of-Way Plans uploaded to FileNet.

**5-601.00 SUBMITTAL FOR "UTILITIES ONLY"**

On any project, other than a paving or resurfacing projects, that do not have right-of-way acquisition involved, the Designer shall submit Right-of-Way plans and stamp them Right-of-Way Plans (Utilities Only) (See *Chapter 1-402.02*). Submission of these plans will be treated as Right-of-Way plans and follow the procedures listed in *Chapter 1-501.00* and *Chapter 5-602.00*.

It will be the responsibility of the Right-of-Way Office to print and distribute copies of the plans as needed.

**5-602.00 SUBMITTALS OF RIGHT-OF-WAY APPRAISALS AND ACQUISITION**

When submitting a project for Right-of-Way “appraisals and acquisition,” the Design Manager in charge of the project is to upload all required files to FileNet (see *Chapter 1-105.05*) and send an email notification of the Right-Of-Way plans turn-in to the appropriate personnel listed in *Chapter 1-502.01 - Table 1-12 Internal Email Distribution List*. The [Right-Of-Way Plans Submittal](#) form is available on the Roadway Design Documents page.

The email subject line shall include the following:

**Region X, County Name, Route Name (as shown in [PPRM](#)), PIN nnnnnn-nn, "ROW Turn-in".**

It will be the responsibility of the Regional Right-of-Way office to print and distribute copies of the plans as needed.

## TDOT ROADWAY DESIGN GUIDELINES

### CHAPTER 5 RIGHT-OF-WAY

**English**

**Revised:**

Refer to *Chapter 1-402.02* for Right-of-Way Estimate submittal. This estimate shall be completed and submitted to the Estimating and Bid Analysis Office prior to submitting plans for “appraisals and acquisition”. The date the information was submitted to the Estimating and Bid Analysis Section shall be included in the right-of-way submittal transmittal letter.

It is important that the incidentals report data be incorporated into the plans before finalizing the Right-of-Way Plans to reduce Right-of-Way revisions (see Chapter 4-202). However, **if it is imperative** that final Right-of-Way Plans be submitted before receiving the incidentals report data, the Regional Project Development Director will give the approval to proceed to the Design Manager in charge of the project. This approval shall be noted on the Right-of-Way Funding Request approval transmittal letter to the Program Operations Office, Federal Aid Section. See *Chapter 5-600.00* for additional information.

When a consultant submits plans for Right-of-Way “appraisals and acquisition,” the consultant’s seal, signature, and date shall be placed on the right side of the title sheet above the Chief Engineer’s signature as stated in Chapter 1.

All cross-sections will have the project number shown and be numbered in the upper right-hand project identification block. The sheet numbering will follow the numbering used on the plan sheets in the same manner used in the construction plans.

Before plans are submitted for Right-of-Way appraisals and acquisition, all information which might affect the existing or relocated utilities shall be shown on the plans. This includes, but is not limited to, the following:

1. Storm sewers, catch basins, manholes, cross drains, side drains, box culverts, channel changes, special ditches, and other drainage facilities
2. Preliminary bridge layouts and hydraulic data
3. Retaining walls and/or noise walls
4. Guardrails
5. Detour roads
6. Traffic signal pole locations including attachment heights and footing details
7. Street light pole locations
8. Erosion prevention and sediment control devices (EPSC Plan)
9. Other details which might affect utilities

**5-603.00      RIGHT-OF-WAY REVISIONS**

When a project has been submitted for Right-of-Way appraisals and acquisition, and a change becomes necessary anywhere on the project, a Right-of-Way Plans revision is required. All Right-of-Way revisions will be submitted through the Design Manager responsible for the project in an accurate and timely manner.

The Design Manager responsible for the project will upload the revised plan set to Design FileNet (See *Chapter 1-105*) and submit a notification to the appropriate personnel listed in *Table 1-12 Internal Email Distribution List*. The plans revision distribution shall be sent by email for all Right-of-Way revisions regardless of whether they have been let to contract or not. The email will contain the revision letter and a PDF of the revised sheets only. See *Chapter 1-105.00 FileNet Project Deliverables and Plan Sets*, for file naming convention. If the PDF is larger than the allowable email limit, then the PDF should be placed on FileNet and noted at the bottom of the email. It will be the responsibility of the Regional Right-of-Way Office to print and distribute copies of the plans as needed.

The email subject line shall read:

**Region X, County Name, Route Name, PIN nnnnnn-nn, ROW-Revision**

Once plans are formally submitted, any changes to the EPSC Plan sheets due to design revisions, right-of-way revisions, permit requirements, mitigation requirements, ecological evaluation requirements, EPSC notes revisions, addition or deletion of sheets, etc. will require a formal plan revision.

**5-604.00      REVISIONS ON UNECONOMIC REMNANTS**

A plan change request will be submitted by the division requesting to add the uneconomic remnant acquisition. The parent (original) tract will be left as it appears in the acquisition table. Place the uneconomic remnant in the table separately as an 8000 series number using the parent tract number as the last digits. For example, Tract 25 would be Tract 8025. The "Total Area Acquired" column for Tract 8025 will be the area remaining from Tract 25 as an uneconomic remnant. In order to identify the remnant properly, it shall be specially shown on the property map and the present layout sheets with broken single cross hatching and labeled as an uneconomic remnant. If there is a driveway associated with the uneconomic remnant and TDOT purchases the remnant (8000 series Tract), the driveway can be removed from the plans. If an uneconomic remnant is sold, the word "Sold" and the excess land request number shall be added to the acquisition table by footnote. The word "Sold", name of grantee, date of transfer, and the excess land request number shall be placed on the property map and present layout sheets adjacent to the remnant.