

**STATE**

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**OF****TENNESSEE**

January 1, 2015

**SPECIAL PROVISION****REGARDING****GUARDRAIL REPAIR / REPLACEMENT****SCOPE OF WORK**

The Contractor shall be responsible for repairing concrete barrier wall, bridge ends, pier protections, replacing damaged glare foils, removing and/or replacing metal beam guardrail, terminal anchors, post, and miscellaneous hardware in kind or to current standards at all designated locations within the Region specified in the Special Notes for this contract. In addition, entire guardrail sections may be removed and replaced to current standards, if the major portion of the section is damaged beyond repair and directed by the Engineer. Guardrail, concrete, and glare foil on bridges will be included within this contract. The previously specified work shall include all labor, equipment, materials and incidentals needed to perform the work successfully.

Estimated quantities are for bid purposes only and quantities shown may be increased, decreased or eliminated depending on actual need and/or as directed by the Engineer.

**MATERIALS, SPECIFICATIONS, AND DESIGN REQUIREMENTS**

The Contractor shall be responsible for providing updated and approved manufacturers' drawings, component shop drawings, specifications, and parts catalogues for each approved guardrail system found on the QPL as well as installation and training documentation for each system if offered by the manufacturer to the Engineer at the preconstruction conference. Product specifications and drawings may be obtained by contacting the manufacturer. A listing of the currently accepted guardrail systems by manufacturer may be obtained by referring to the Material & Tests Divisions, Qualified Products List (QPL). Only qualified manufacturer's products which appear on the QPL shall be installed under the terms of this contract.

All repair work shall be done in accordance with the currently adopted TDOT version of the MUTCD, the currently approved Standard Drawings for safety appurtenances, manufacturer's shop drawings, and the January 1st, 2015 edition of the Standard Specifications for Road and Bridge Construction with all its supplements and modifications within this Special Provision.

Materials used to construct earth pads for tangential energy absorbing guardrail terminals shall conform to the requirements of Sections 303 and 903.05 of the Standard Specifications.

Concrete and steel bar reinforcement used for the execution of work for this contract shall meet the requirements of Section 604 of the Standard Specifications. All concrete used shall meet "CLASS A" requirements for classification, proportioning, and quality assurance. However, pre-packaged concrete may be used at locations requiring 1/4-cubic yard or less if approved by the Engineer.

Materials used in the replacement or repair of damaged guardrail shall conform to the requirements of Section 909 of the Standard Specifications.

**Damaged Materials.**

Any and all damaged material produced as a result of the repair/replacement work shall become the property of the Contractor and shall be removed from the right-of-way and disposed of at the Contractors expense.

**EQUIPMENT**

All equipment necessary for the satisfactory performance of this work shall be on hand before construction will be permitted to begin.

**PROGRESS OF WORK**

At the Pre-construction Meeting, the Engineer will provide all known damaged guardrail locations. Mobilization shall occur within fourteen (14) calendar days following the Pre-Construction Meeting. The initial list of damaged guardrail locations shall be repaired or replaced within the following timeframe:

<b>Number of Locations</b>	<b>Calendar Days</b>
1-50	30
51-100	60
101-150	90

As additional damaged guardrail locations are identified by the Department, the locations will be provided to the contractor and shall be repaired or replaced within thirty (30) calendar days of contractor receipt.

In the event damaged guardrail creates a major hazard to the traveling public, the Engineer will issue an Emergency Work Order. The Emergency Work Order will consist of one location. The work at the one location shall begin within two (2) calendar days. Identification of Emergency Work Order locations will be at the discretion of the Engineer.

Once work begins, a continuous operation shall be maintained. A Continuous Operation is defined as the uninterrupted performance of work on successive calendar days until the completion of all identified damaged guardrail locations (see Section 101.03 of the January 1, 2015 Standard Specifications for the definition of Calendar Day). Each damaged guardrail location repair shall be complete before moving to the next location unless approved by the Engineer. Failure to promptly perform the work may result in the work being performed by others at the contractor's expense in accordance with Subsection 107.12 of the Standard Specifications.

Damaged guardrail discovered when traveling from one designated location to another may be repaired if approved by the Engineer. Typically, these locations should only be repaired if severely damaged and non-functional at the Engineer's discretion.

A repair site will consist of work to be performed in a section of guardrail. A section of guardrail is defined as one continuous run of guardrail (regardless of length) between two end terminals on one side of the roadway or median. There may be more than one repair or replacement site in a single section of guardrail, e.g., posts, rail, and an end terminal not immediately adjacent to the posts and rail being repaired or replaced (resulting from two separate vehicular impacts).

The contractor's work schedule shall provide to the Engineer one week in advance to allow for inspection scheduling.

## **CONSTRUCTION REQUIREMENTS**

All construction methods used to perform work under this contract shall conform to Sections 303, 705, and 706 of the Standard Specification for Road and Bridge Construction dated January 1, 2015 with addenda, and as modified in the Special Notes and this Special Provision.

In accordance with Section 705.06 of the Standard Specification the Contractor shall be responsible for notifying each utility owner of the plan of operation by calling 1-800-351-1111, and ensuring that utilities within the designated project limits have been properly located and marked prior to beginning work.

The Department reserves the right to perform any guardrail repair within the limits of this contract whenever the Department determines that such work is in the public's interest and safety. Sections of guardrail within construction or maintenance work zones may be temporarily suspended from the terms of this contract.

The Contractor will be relieved of maintenance for a site when the repair or replacement is completed, accepted, and serving its intended purpose. Repairs or replacements completed by the Contractor with defective materials or substandard workmanship, pending final acceptance of the site, shall be corrected by the Contractor without additional compensation.

### **Guardrail Adjustment, Removal, and Resetting**

Substandard or impacted metal beam guardrail sections may require re-alignment, re-setting, removal, or some combination of the three in order to bring the section back into current specification. When required these items of work are paid according to the following definitions. **Re-align Guardrail** shall be defined as the length in feet of impacted or substandard undamaged guardrail which has been restored to its original functional position within  $\pm 6$  inches horizontally and  $\pm 2$  inches vertically without having to disassemble and/or replace any of the components over the impacted repair length. **Reset Guardrail** shall be defined as the undamaged length in feet of impacted or substandard guardrail which has been restored to its original functional position by removing the original components, repairing the impacted ground, and resetting them in place. **Remove Guardrail** shall be defined as the length in feet of guardrail which is removed and not replaced and includes removal of all components of the system and the repair of impacted ground from the removal process. Measurement for these items of work shall include the lengths of terminal and in-line type anchors where applicable.

### **Steel Beam Guardrail.**

Existing blockouts that are 7.5 inches deep may be replaced with any of the 7.5 inch blockouts on the TDOT Qualified Products List regardless of the type of blockout material and provided the blockout depths remain constant in any given run of guardrail (terminal to terminal).

### **Guardrail End Treatments**

Damaged trailing end guardrail terminals on divided roadways shall be replaced with Guardrail Terminal Anchor (Type 13), if feasible.

All end treatment replacements on National Highway System at or above 45 mph shall be replaced with MASH Test Level 3) approved terminals listed on the QPL. The minimal end treatment replacement on the National Highway System below 45 mph, shall be with NCHRP #350 TL-2 or MASH (Test level 2) terminals from the Department QPL.

The Contractor shall furnish the Department the manufacturer's crash tested drawings, component shop drawings, and Specifications along with the FHWA NCHRP 350 or MASH approval letter. These must be available to the Engineer anytime he requests to see them. These units shall be installed as per the manufacturer's specifications. Installer shall be certified by manufacturer prior to installation.

All bid prices for the above terminals shall include an appropriate hazard marker for the nose piece if present and the labor, equipment, and materials required to install it.

**Concrete Barrier**

Concrete barrier wall shall be reconstructed in accordance with Section 711 of the Standard Specifications. Damaged sections of concrete barrier wall shall be smoothly sawed from top to bottom in a plane perpendicular to the length of the wall and removed. Sections removed for replacement shall have a minimum length of four (4) feet and shall be at least four (4) feet from the nearest joint. If the damaged section is located within a separately poured glare screen, only the glare screen shall be removed and replaced. In these areas, the glare screen shall be removed one foot wider than the damaged sections or to the construction joint of the barrier wall, and saw cut for vertical sides.

Longitudinal reinforcement shall be replaced in kind. Longitudinal reinforcing bars shall be inserted into the undamaged concrete barrier by drilling holes a maximum of 1/4-inch larger than the bar diameter, cleaned properly, and secured with epoxy grout. Embedment length shall be not less than 20 bar diameters.

When sawing does not occur at a joint, tie bars shall be inserted along the centerline of the sawed face on six (6) inch centers beginning six (6) inches from the top of the wall. Tie bars shall be installed by the method described above and shall have a length of at least 40 bar diameters.

The exposed surface of concrete barrier repairs shall be given the same finish (texture coating) as the exposed surface of the wall being repaired in accordance with Subsection 604.21.

**Guardrail at Bridge Ends or Pier Protection**

The guardrail attachments of concrete bridge ends and pier protections shall be reconstructed in accordance with Section 604 of the Standard Specifications. The damaged concrete wall sections shall be removed a minimum of one (1) foot wider than the damaged area or to a construction joint. Damaged sections of the guardrail attachments shall be smoothly sawed a minimum depth of 1 ½ inches so as not to damage the reinforcing steel. Damaged reinforcing steel requiring embedment shall be as detailed in Concrete Barrier above. In areas where the reinforcing steel may remain the concrete shall be removed 1 ½ inches beyond the reinforcing steel.

Replaced portions of concrete bridge ends, pier protections and barrier wall shall be finished in the same manner and color as the existing structure in accordance with Sections 604 or 711 of the Standard Specifications. The replacement in-kind includes texture coating surfaces.

Nothing in the general notes or special provisions shall relieve the contractor of his responsibilities toward the safety and convenience of the general public and the residents along the highway. In the event the guardrail operation causes an unsafe situation for the traveling public, the Engineer has the authority to stop work and set working times that must be followed by the contractor to rectify the safety concern.

**Earth Pads**

Earth pads installed in conjunction with tangential energy absorbing guardrail terminals shall be constructed per Standard Drawings S-GRT-2P and S-GRT-2R or as directed by the Engineer.

**Environmental**

The contractor shall take all appropriate steps to ensure that environmental features (streams, wetlands, or springs) are not impacted by the work conducted under the terms of this contract without the approval of the Engineer and the TDOT Environmental Permits Section.

### **Quality Assurance Testing**

Random verification of post installations will be conducted under this contract for all guardrail posts installed region wide by all Contractors for the term of this contract. The Contractor will be required to remove posts as directed by Regional Materials & Tests staff for inspection. Costs for removing and reinstalling posts will be paid for under Item Number 706-10.72, Pull and Reinstall Guardrail Post for Verification, Each. If a new replacement post is required due to damage to the pulled post, it will be paid for under Item No. 706-03.01, Posts Furnished, Each. A mobilization payment will be made for each call-out performed exclusively for post verification.

### **TRAFFIC CONTROL**

The Contractor shall establish and maintain traffic control work zones and all traffic control devices according to these notes, the State of Tennessee currently adopted edition of the Manual on Uniform Traffic Control Devices (MUTCD) defined under the Rules of Tennessee Department of Transportation Chapter 1680-3-1, and the Standard Specifications.

Arrow boards utilized for traffic control under this contract shall be "Type B" flashing boards as defined in the MUTCD or an approved equivalent (see Std. Dwg. T-WZ-FAB1).

All ramp and lane closures including traffic control for mobile operations must be requested by the Contractor and approved in advance by the Engineer. All requests shall be made a minimum of seven (7) days in advance of the anticipated work for work orders. Since lane closures are scheduled and approved in advance, if the Engineer determines that work cannot commence as scheduled, call-out time should be suspended until a future lane closure can be scheduled and approved.

All work including the set-up and removal of traffic control work zones shall only be allowed as scheduled and approved by the Engineer. The approved working schedule shall be determined using the table below based on the roadway classification and ADT for the work required in each roadway segment. No scheduled work or closures of any type shall be allowed during holidays or holiday weekends as specified in section 104.04 of the Standard and Supplemental Specifications.

<b>Roadway Classification</b>	<b>Roadway ADT</b>	<b>Working Hours</b>
Interstate and Access Controlled Highways*	ADT $\geq$ 25,000	8:00 PM – 6:00 AM
	ADT < 25,000	8:00 PM – 6:00 AM
		9:00 AM – 3:00 PM
Multi-lane Highways (# of lanes >2)*	ADT $\geq$ 25,000	8:00 PM – 6:00 AM
	10,000 $\leq$ ADT < 25,000	8:00 PM – 6:00 AM
		9:00 AM – 3:00 PM
	ADT < 10,000	No Working Restrictions
Two Lane Highways (One lane in each direction)*	ADT $\geq$ 25,000	8:00 PM – 6:00 AM
	5,000 $\leq$ ADT < 25,000	8:00 PM – 6:00 AM
		9:00 AM – 3:00 PM
	ADT < 5,000	No Working Restrictions
*Work requiring the use of shoulder closures(only) will be allowed between 9AM -3PM		

Signs and channelizing devices for lane closures shall be erected immediately before work begins each day and shall be removed at the end of work each day to permit traffic to have unrestricted use of all traffic lanes when work is not in progress.

**Truck Mounted Attenuator with Mounted Message Board**

The following truck shall be utilized on Interstate and Access Controlled Highways with ADT  $\geq 25,000$  ADT.

1. A truck mounted
2. that meets or exceeds NCHRP-350 TL-3 or MASH requirements. Mobile queue warning truck cab & chassis must meet and/or exceed manufacturers recommended gross vehicle weight (GVW) requirements.
3. A minimum of Four (4) strobe lights (with auto-dimmers) positioned rear facing
  - Two (2) mounted under rear bumper
  - Two (2) mounted at cab level
4. A truck mounted message board with a full matrix display and a minimum panel size of 72" W x 35" H mounted as per manufacturer specifications.
5. Four Hour National Traffic Incident Management (TIM) Responder Training for Queue Truck Operators or approved equal training program developed by ATSSA or The National Safety Council

**COMPENSATION****Method of Measurement**

Re-Aligned, Reset, and Removal of guardrail will be measured by the Linear Foot. Each repaired section of guardrail will be measured separately. No measurement for payment will be made for excavation or backfilling performed in connection with removing or installing post or terminal anchors.

Glare Foils will be measured for payment by the unit per each.

Concrete Barrier Wall Repair, Bridge End Repair, or Pier Protection Repair will be paid for by the cubic yard of concrete measured in place.

Guardrail End Terminals will be paid per each for complete assemblies complete and in place.

W Beam guardrail will be paid per lineal foot complete and in place.

Truck Mounted Attenuator with Message Board will be paid per day and shall include providing the truck as defined above including driver. A day is defined as a work shift and includes all incidentals.

**Basis of Payment**

Guardrail elements which are to be installed on a curve with a radius of 150 feet or less shall be shop curved and will be paid for as Radius Rail Item No. 706-06.03.

Payment for reset guardrail, including but not limited to W-Beam, Thrie Rail, Box Beam, and Weak Post Systems, shall include the removal and resetting of the guardrail including the furnishing of all labor, tools, equipment and incidentals to satisfactorily complete the work.

Payment for the removal of guardrail and post(s) shall include the complete removal of all guardrail elements including rails, posts, anchors, footings, and miscellaneous hardware.

Damaged guardrail parts requiring removal prior to replacement with new guardrail components will be paid under the items for new guardrail items. No additional payment will be made under the removal item.

Payment for the replacement of damaged guardrail end terminals shall be for a complete new unit. This work shall include the complete removal of the damaged unit from the right-of-way, all required rails, posts, anchors, footings, miscellaneous hardware, and decals as directed by the Engineer. No additional payment will be made for the removal of the damaged end terminal.

All work necessary to construct Earth Pads, for guardrail end terminals, shall be paid for under item 705-04.11 per ton. This item shall include the delivery and placement of stone, grading of stone, erosion control, and final stabilization items necessary to complete the work as detailed in Standard Drawing S-GR-38A.

Payment for Concrete Barrier Wall Repair, Bridge End Repair, or Pier Protection Repair will be made at the contract unit price bid per cubic yard of concrete measured in place and shall include sawing, removal, and disposal of the damaged portion of the structure. These items of work shall also include furnishing and installation of guardrail attachments, steel bar reinforcement and tie bars as described above, finishing, texture coating if required, and all costs of forms, labor, materials, and incidentals necessary for the complete performance of the work. Payment for concrete repairs shall be a minimum of one half (0.5) cubic yard per location.

Payment for the repair or replacement of Glare Foils will be made at the contract unit price per each and shall include full compensation for all labor and incidentals required to complete this item of work in accordance with these Specifications.

All cost for temporary traffic control, excluding lane closures, shall be included in unit prices bid on other items of work. Payment will be made for each lane closure at the contract unit price per each and shall include full compensation for all flagmen, traffic control devices, and other equipment and materials required to complete this item of work in conformance with the requirements described above and subject to the following:

- a) Only one lane closure payment will be made for lane closures erected at a single work site for the duration of the work order.
- b) Only one lane closure payment will be made for repair operations performed within a continuous highway section one quarter mile or less in length. On divided highways each directional roadway will be considered independently in establishing the length of the continuous highway section.
- c) No lane closure payment will be made if the lane is not properly closed and deemed necessary by the Engineer. Lane closures will be identified by the Engineer per callout.

The Department will pay for Emergency Work Orders per each location. The payment shall include one Mobilization for each Emergency Work Order. Payment for Emergency Work Order mobilization will be paid under Item Number 717-01.04, Mobilization (Emergency Call-Out) The Work for each Emergency Work Order shall be paid for at the contract unit cost for the items associated with the work

The accepted quantities of work will be paid for at the contract unit price for each item shown on the plans or as tabulated in the general notes. The price shall be full compensation for repairing concrete barrier wall, bridge ends, pier protections, glare foil, metal guardrail, terminal anchors, posts, and miscellaneous hardware in kind or to current standards in accordance with the plans, tabulated quantities in the general notes, or as directed by the Engineer, including the furnishing of all labor, tools, equipment, and incidentals to satisfactorily complete the work.