614 Semi-rigid Barrier Systems and End Treatments

614.1 Description

(1) This section describes providing steel guardrail systems including rail, terminal and transition treatments, other roadside energy absorbing safety devices, and earthwork for barrier systems. This section also describes providing and removing temporary guardrail, adjusting existing guardrail, salvaging materials from existing installations.

614.2 Materials

614.2.1 General

(1) Furnish materials conforming to the following:

Asphaltic surface 465.2

Non-bituminous joint sealer 502.2

Structural steel and miscellaneous metals 506.2

Steel reinforcement 505.2

Wood posts and offset blocks 507.2

Emulsified asphalt 604.2

(2) Furnish grade A concrete conforming to 501 as modified in 716, except under the Crash Cushions Temporary bid item the contractor may use SHES concrete as specified for SHES concrete repair and replacement in 416.2. Provide QMP for class II ancillary concrete as specified in 716. If crash cushion manufacturer details specify concrete strength for pads or blocks, provide QMP for class I structure concrete as specified in 715. Define class I structure sublots for each crash cushion location, apply the small quantity exceptions specified in 715.1.1.2, base acceptance on individual sublot average strength, and adjust pay under 715.5.3 as specified for lots with less than 4 sublots.

(3) Unless the plans show otherwise, furnish steel nuts conforming to ASTM A563, washers conforming to ASTM F436, grade 1, and bolts conforming to ASTM A307. Ensure that the nuts, washers, and bolts are either hot-dip coated according to AASHTO M232 class C or mechanically coated according to ASTM B695 class 50.

(4) Furnish wire rope and fittings conforming to the plans and galvanized according to ASTM A741.

(5) Before installation store galvanized components above ground level and away from surface run off. The department may reject material if the galvanization is physically damaged or oxidized.

(6) Provide manufacturer's drawings, and installation and maintenance instructions for proprietary systems.

(7) Furnish shop-applied type F reflective sheeting from the APL.

(8) Furnish object markers conforming to the type 3 object marking pattern shown in the WMUTCD.

(9) Furnish guardrail reflectors from the APL.

614.2.2 Controlled Low-Strength Backfill

(1) Provide controlled low-strength backfill consisting of a contractor-designed cementitious mixture of fine aggregate, fly ash, cement, water, and optional admixtures. Ensure that the resulting mixture hardens with 24 hours to the degree that it will support foot traffic and conforms to the following:

TEST METHOD VALUE

Strength ASTM D4832 40-80 psi in 28 days

(2) Submit design mix along with strength test results to the engineer at least 10 business days before placing material.

614.2.3 Steel Rail and Fittings

(1) Furnish galvanized steel rail conforming to AASHTO M180 class A, type II beam using the single-spot test coating requirements. Furnish steel for retrofit assemblies, anchor post assemblies, plates, anchor plates, post mounting brackets, and other structural steel components conforming to 506.2.2.1 and hot-dip galvanized according to ASTM A123.

(2) For rail requiring bends with a radius less than 150 feet, ensure that the required bends are made in the manufacturer's fabrication shop.

(3) Furnish steel tubes for breakaway posts conforming to ASTM A500, grade B and hot-dip galvanized according to AASHTO M111.

(4) Furnish anchor assemblies fabricated as the bridge parapet details show. Over-tap threaded inserts according to ASTM A563 and electro-galvanize the entire assembly according to ASTM B633 after fabrication. Furnish cap screws hot-dip galvanized as the parapet details show.

614.2.4 Energy Absorbing Terminal

Revise 614.2.4 to replace damaged or missing EAT marker posts.

(1) Furnish energy absorbing terminals (EAT's) and EAT marker posts from the APL. Replace damaged or missing EAT marker posts. Furnish reflective sheeting panels constructed from sheet aluminum with shop-applied reflective sheeting conforming to the plan details and 637.3.2.

614.2.5 Posts and Offset Blocks

614.2.5.1 Wood Posts and Offset Blocks

(1) Furnish sawed posts and offset blocks of one of the following species:

Douglas fir Southern pine Ponderosa pine Jack pine White pine

Red pine Western hemlock Western larch Hem-fir Oak

(2) Ensure that posts are the size the plans show and conform to the nominal and minimum dimensions tabulated in 507.2.2.3. The contractor does not have to surface the posts. Provide posts of the net length the plans show after setting and cut off.

(3) Use stress graded posts rated at 1200 psi fb or higher. Determine the stress grade rating for douglas fir, western larch, and southern pine as specified in 507.2.2.4.

(4) For hem-fir; hemlock; red, white, jack, or ponderosa pine; and oak conform to the following:

TABLE 614-1 PROPERTIES FOR WOOD POSTS AND BLOCKS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SPECIES | | | WESTERN HEMLOCK, HEM-FIR, RED PINE, WHITE PINE, JACK PINE, PONDEROSA PINE | | OAK | |
| MAXIMUM SLOPE OF GRAIN | | | 1 in 15 | | 1 in 12 | |
| NOMINAL WIDTH OF FACE | | | 6" | 8" | 6" | 8" |
| SHAKES, CHECKS, AND SPLITS | | GREEN | 1" | 1 3/8" | 2 3/8" | 3 1/8" |
| SEASONED | 1 1/2" | 2" | 2 5/8" | 3 1/2" |
| MAXIMUM WANE | | | 1" | 1 3/8" | 1 1/8" | 1 5/8" |
| MAXIMUM ALLOWABLE KNOTS | NARROW FACE | MIDDLE 1/3 OF LENGTH | 1 3/8" | 1 5/8" | 2 1/8" | 2 3/8" |
| END*[1]* | 2 3/4" | 3 1/4" | 4 1/4" | 4 3/4" |
| SUM IN MIDDLE 1/2 OF LENGTH*[2]* | 11" | 13" | 17" | 19 |
| WIDE FACE | EDGE KNOT N MIDDLE 1/3 OF LENGTH | 1 3/8" | 1 5/8" |  |  |
| EDGE KNOT AT END*[1]* | 2 3/4" | 3 1/4" |  |  |
| CENTERLINE | 1 3/8" | 1 7/8" | 2 1/4" | 2 7/8" |
| SUM IN MIDDLE 1/2 OF LENGTH | 5 1/2" | 7 1/2" | 9" | 11 1/2" |

*[1]* But do not exceed the maximum allowable knot on the centerline of the wide face of the same piece.

*[2]* But do not exceed 4 times the maximum allowable knot on the centerline of the wide face of the same piece.

(5) Pressure treat posts and offset blocks as specified in 507.2.2.6. Use one of the oil-soluble preservatives or chromated copper arsenate conforming to 507.2.3. Use the same material for offset blocks and posts and treat material used in each continuous installation with the same type of preservative.

614.2.5.2 Steel Posts

(1) Furnish steel posts conforming to AASHTO M270 Grade 36 and galvanized according to AASHTO M111.

614.2.5.3 Plastic Offset Blocks

(1) Furnish plastic offset blocks from the APL.

614.2.6 Sand Barrel Arrays

614.2.4 Add via ASP-6 with November 2023 LET. Update information for fine aggregate following removal of Table 501-4.

(1) Furnish sand barrels from the APL. Use fine aggregate conforming to gradation shown in Table 614-2 mixed with sodium chloride conforming to AASHTO M143. Apply an object marker to front-most barrel in the array.

TABLE 614-2 FINE AGGREGATE GRADATION

|  |  |
| --- | --- |
| SEIVE | FINE AGGREGATE (% PASSING by WEIGHT) |
| 3/8-inch | 100 |
| No. 4 | 90 – 100 |
| No. 8 | - |
| No. 16 | 45 – 85 |
| No. 30 | - |
| No. 50 | 5 – 30 |
| No. 100 | 0 – 10 |
| No. 200 | <=3.5 |

614.2.7 Crash Cushions

(1) Furnish permanent and temporary crash cushions from the APL. Use cushions as wide or wider than the plan back-width. Submit details of the object being shielded and orientation of traffic to the crash cushion manufacturer. The crash cushion manufacturer is responsible for providing design details for each installation that include their crash cushions as well as connections and transitions to the object being shielded. Ensure that the crash cushion manufacturer's design details are signed and sealed by a professional engineer registered in the state of Wisconsin.

(2) Furnish transitions and connections conforming to the crash cushion manufacturer's design and specifications. Ensure that the transition and connection design includes required modifications to the object being shielded. Submit a copy of the manufacturer's crash cushion, connection, and transition design details to the engineer before installation. Modifications to the object being shielded require the engineer's approval before installation.

(3) Apply an object marker to the nose of the crash cushion of the color and pattern the WMUTCD shows for work zones or permanent installations.

614.2.8 Adhesive Anchors

(1) Furnish adhesive for concrete anchors conforming to ICC-ES AC308 and capable of resisting the bond strength the plans show. Provide the adhesive manufacturer’s installation instructions to the engineer before installing anchors.

614.3 Construction

614.3.1 General

614.3.1 Revise to require final grading and associated earthwork before installing barriers.

(1) Complete final grading of shoulder and associated earthwork before installing hardware.

(2) Paint the ends of cut-off galvanized posts, rail, bolts, cut or drilled surfaces of galvanized components, and areas of damaged galvanization according to ASTM A780. Clean and deburr the damaged and adjacent areas thoroughly before applying paint.

(3) Apply 2 coats of wood preservative to cut surfaces of wood components. Use the same preservative originally used to treat that component or use copper naphthenate solution containing 2 percent or more copper metal conforming to AWPA P34.

(4) Anchor barrier systems as the plans show or as manufacturer details show. For anchoring to concrete, clean holes and install according to the adhesive manufacturer's recommendations.

614.3.2 Guardrail

614.3.2.1 Installing Posts

(1) Set posts at the required plan locations with the front faces in a straight line or, if on a curve, at a uniform distance from the centerline. Ensure that they are installed plumb, to the required depth, and with adequate lateral stability. The contractor may drive posts or set them in excavated post holes. If rock is encountered, install as the plans show.

(2) If the required plan depth cannot be achieved by driving, set posts in excavated holes. Replace posts damaged during driving. Ensure driving does not damage the shoulders and adjacent slopes.

(3) If installing posts in excavated post holes, excavate to the plan depth and compact the bottom of the holes to provide a stable foundation. Set posts to firm bearing and backfill with engineer-approved material compacted in layers.

(4) For bid items 614.0220, 614.0230, and 614.2500; do not trim posts before installation and mark one face of each post as follows:

- Draw an embedment depth line.

- Above the embedment line, write the post length.

- Posts 3 through 8 of bid item 614.0220 do not require marking.

Install posts with the markings on the roadway side. Ensure the markings remain on the posts until guardrail final acceptance.

(5) Ensure that posts are at least the minimum length and minimum embedment the plans show before cutting post tops to the finished elevation. After installation, the engineer may direct the contractor to remove and re-install up to 5 percent of the posts to verify they were placed to the required plan depth. If a post is embedded less than the required plan depth, the engineer may direct additional sampling. Re-install sampled posts at the locations and to the depths the plans show. Replace posts and other components that are damaged during sampling.

(6) Provide offset block-mounted reflectors as the plans show.

614.3.2.2 Installing Rail

(1) Install rail with lap splices in the direction of traffic. Ensure that the number and dimensions of holes and bolts conforms to the plan details for new splices. Place the round head of bolts on the traffic side.

(2) Cut rails to length by shearing or sawing; do not use cutting torches. Drill bolt holes and punch slots; ensure that they are burr free. After installation, cut anchor bolts that project more than one inch from the nut to 1/2 inch from the nut; deburr the threaded end of cut bolts.

614.3.2.3 Guardrail Terminals and Transitions

(1) Attach rail ends to cast in place concrete anchorages, energy absorbing terminals (EAT's) or other terminal types, or transition between rail types at structure approaches as the contract requires for each guardrail system installation.

(2) If concrete anchorages are specified, place concrete without forms filling the entire excavation with concrete to the elevation the plans show. Ensure that steel reinforcement and the rail are secured at their plan locations before placing concrete. Do not apply forces to the rail element embedded in the concrete anchor until after the concrete develops adequate strength to open it to service under 415.3.15.

(3) If there is an existing reflective panel on EAT, remove, and replace with new reflective panel. If there is no reflective panel, install a reflective panel on EAT with stainless steel self-tapping screws.

(4) If anchoring to structures, attach guardrail to the parapets of structures using anchor assemblies cast into the parapets or drill through the parapet whichever the plan details show. Plug anchor assemblies not receiving beam guard using cap screws with anti-seize compound applied to their threads.

(5) Install EAT's according to manufacturer's instructions and as the plans show. Attach reflective panels to the EAT head with stainless steel self-tapping screws and install EAT markers as the plans show.

614.3.2.4 Mow Strips

(1) Provide mow strips with blockouts for guardrail posts as the plans show. Construct concrete as specified for concrete sidewalk under 602. Construct asphalt as specified for asphaltic surface under 465. Backfill post blockouts after post installation with controlled low-strength backfill.

(2) Apply emulsified asphalt to finished aggregate shoulders following the asphalt manufacturer's recommended procedures. Minimize run-off and overspray during application and remove excessive run-off and over spray from adjacent areas immediately after application.

614.3.2.5 Grading, Shaping, and Finishing for Barrier Systems

(1) Grade, shape, and finish embankment slopes for barrier systems at the locations the plans show. Furnish materials and construct as the plans show and engineer directs conforming to the following:

Common excavation and material disposal 205

Embankment 207

Borrow 208

Topsoil 625

Mulching 627

Erosion mat 628

Fertilizer 629

Seeding and seed watering 630

Construction Staking 650

614.3.2.6 Temporary Guardrail

(1) Provide and maintain temporary guardrail and associated terminals and transitions conforming to the requirements for permanent installations except the contractor may furnish used materials. Replace guardrail components damaged during construction immediately. Remove and dispose of temporary guardrail components when no longer needed.

614.3.3 Sand Barrel Arrays

(1) Provide sand barrel arrays and foundation at each location the plans show. Have the sand barrel manufacturer design the barrel array layout and determine the sand weights for each individual barrel. Ensure that the manufacturer's design at each plan location conforms to the design speed, shields the required obstruction width, and is appropriate for the traffic direction. Submit a copy of the manufacturer's design details stamped and sealed by a professional engineer registered in the state of Wisconsin to the engineer before installation.

(2) Fill the barrels with a homogeneous mixture of 3 parts dry sand to one part granular sodium chloride by volume. Do not use pre-packaged sand. Do not place the mixture into the barrels in a wet condition.

(3) Construct concrete foundation pads as specified for concrete sidewalk under 602 conforming to dimensions the sand barrel manufacturer specifies. For permanent installations, provide an engineer-approved non-reflective aluminum plaque that identifies the manufacturer, barrel locations and weights, traffic direction, and the installation date. Coordinate with the engineer to determine location-specific size and material requirements. Attach the plaque to the object being shielded at an engineer-directed height above the grade and secured as the engineer directs.

614.3.4 Crash Cushions

(1) Provide and maintain permanent crash cushions and transitions at the locations the plans show. Conform to the contract design criteria and to manufacturer's specifications. Certify that the installation was done according to manufacturer's recommendations. Install object markers with reflective sheeting to the crash cushion nose piece before opening to public traffic. Replace parts of crash cushions damaged during construction immediately.

(2) Provide and maintain temporary crash cushions and transitions conforming to the requirements for permanent installations except the contractor may furnish used materials. Replace components damaged during construction immediately. Remove and dispose of crash cushions when no longer needed.

(3) Provide concrete backup blocks and either concrete or asphalt foundation pads conforming to the crash cushion manufacturer's design. Construct concrete components as specified for concrete sidewalk under 602.3 and construct asphalt components as specified for asphaltic surface under 465.

(4) For permanent crash cushions, provide an engineer-approved non-reflective aluminum plaque that identifies the crash cushion manufacturer, model designation, and the installation date. Coordinate with the engineer to determine location-specific size and material requirements. Attach the plaque to the object being shielded at an engineer-directed height and secured as the engineer directs.

614.3.5 Adjusting Guardrail

(1) Adjust existing guardrail to the plan height. The contractor may raise offset blocks up to 3 inches. Adjustments over 3 inches require placing new posts and backfilling with foundation backfill conforming to 520.2.

(2) Use the existing serviceable guardrail beam, bolts, posts, and offset blocks. Replace existing rail components that are either unserviceable or missing. Straighten existing posts out-of-plumb by 6 inches or more. Straighten existing blocks and reinstall the galvanized nail as the plans show. Replace unstable or deteriorated posts and blocks.

614.3.6 Thrie Beam Structure Approach Retro Fits

(1) Reinforce existing thrie beam by installing thrie beam retrofit assemblies or posts of the type the bid item indicates and as the plans show. Modify existing work conflicting with retrofitting as the plans show or engineer directs.

(2) Install posts and drill holes into existing thrie beam conforming to 614.3.2.

614.3.7 Anchor Post Assemblies

(1) Before drilling into concrete, adjust beam guard post locations to avoid placement conflicts. do not relocate post more than 1 foot from the plan location without the engineer's written approval. Set anchor post assemblies with the front faces in a straight line or, if on a curve, at a uniform distance from the centerline.

614.3.8 Replacing Material

(1) Remove and replace unserviceable posts, blocks, rail, rail hardware, and guardrail reflectors at locations within existing guardrail systems where the contract or engineer designates. Take care to avoid damage to adjacent materials remaining in place.

614.3.9 Salvaging Material

(1) Dismantle and remove the rail, guardrail end treatment, or other component the salvaged bid item indicates from the locations the contract designates. Minimize damage to reusable materials. Do not cut material that would be otherwise reusable. Replace contractor-damaged materials that are to remain in place. Remove and dispose of wooden component parts and unwanted or damaged materials. Restore the site.

(2) Sort by component part and load reusable materials onto separate pallets for each component part. The contractor may place hardware and smaller parts in clearly labeled crates or plastic buckets. Stockpile reusable material in engineer-approved locations on the project.

(3) The contractor may use salvaged materials for temporary installations under the contract.

614.4 Measurement

614.4 Revise to add information and bid item for replacing EAT marker post.

(1) The department will measure the EACH bid items under this section as each individual unit acceptably completed except as follows:

- The department will measure terminals as everything required within the system length the plan details show; for type 2 terminals the department will measure rail under the linear foot rail bid items.

- The department will measure Steel Thrie Beam Structure Approach Retrofit as each individual assembly or retrofit post.

- The department will measure Sand Barrel Arrays as each individual sand barrel array, including foundation, measured individually for each required plan location.

- The department will measure Salvaged Sand Barrels as each individual barrel.

- The department will measure Replacing Guardrail Posts and Blocks as each individual post/block unit whether the post, block, or both are replaced.

- The department will measure Barrier System Grading Shaping Finishing as each individual plan location acceptably completed.

- The department will measure Anchor Post Assemblies as each individual post.

- The department will measure Replacing EAT Reflective Panel as each individual reflective panel installed. EAT Reflective Panel installed as part of a new EAT installation will not be measured.

- The department will measure Replacing EAT Marker Post as each individual marker post installed. Marker posts installed as part of a new EAT installation will not be measured.

(2) The department will measure the LF bid items under this section by the linear foot acceptably completed, measured along the face of the rail element except:

- The department will measure Steel Plate Beam Median Guard along the centerline of the completed installation.

- The department will measure the Short Radius bid items as the length along the curved rail only.

(3) The department will measure the mow strip bid items by the square yard acceptably completed, measured without reduction for the area of the post blockouts.

614.5 Payment

614.3.1 Revise to bid item and information for replacing EAT Marker Posts.

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER DESCRIPTION UNIT

614.0010 Barrier System Grading Shaping Finishing EACH

614.0115 - 0149 Anchorages for Steel Plate Beam Guard (type) EACH

614.0150 Anchor Assemblies for Steel Plate Beam Guard EACH

614.0200 Steel Thrie Beam Structure Approach LF

614.0210 - 0219 Steel Thrie Beam Structure Approach Retrofit (type) EACH

614.0220 Steel Thrie Beam Bullnose Terminal EACH

614.0230 Steel Thrie Beam LF

614.0250 Steel Thrie Beam Structure Approach Temporary LF

614.0300 - 0339 Steel Plate Beam Guard (class) LF

614.0340 Steel Plate Beam Guard Over Low-Fill Culverts Class A LF

614.0345 Steel Plate Beam Guard Short Radius LF

614.0355 Steel Plate Beam Median Guard LF

614.0360 Steel Plate Beam Guard Temporary LF

614.0370 Steel Plate Beam Guard Energy Absorbing Terminal EACH

614.0380 Steel Plate Beam Guard Energy Absorbing Terminal Temporary EACH

614.0390 Steel Plate Beam Guard Short Radius Terminal EACH

614.0395 - 0399 Guardrail Mow Strip (material) SY

614.0400 Adjusting Steel Plate Beam Guard LF

614.0500 - 0599 Guardrail Stiffened (type) LF

614.0700 Sand Barrel Arrays EACH

614.0800 Crash Cushions Permanent EACH

614.0805 Crash Cushions Permanent Low Maintenance EACH

614.0905 Crash Cushions Temporary EACH

614.0920 Salvaged Rail LF

614.0925 Salvaged Guardrail End Treatments EACH

614.0930 - 0939 Salvaged (component) EACH

614.0950 Replacing Guardrail Posts and Blocks EACH

614.0951 Replacing Guardrail Rail and Hardware LF

614.0952 Replacing Guardrail Reflectors EACH

614.0953 Replacing EAT Reflective Panel EACH

614.0954 Replacing EAT Marker Posts EACH

614.1000 MGS Guardrail Temporary LF

614.1100 MGS Guardrail Temporary Thrie Beam Transition LF

614.1200 MGS Guardrail Temporary Terminal EAT EACH

614.2300 MGS Guardrail 3 LF

614.2310 MGS Guardrail 3 HS LF

614.2320 MGS Guardrail 3 QS LF

614.2330 MGS Guardrail 3 K LF

614.2340 MGS Guardrail 3 L LF

614.2345 MGS Guardrail 3 SL LF

614.2350 MGS Guardrail Short Radius LF

614.2500 MGS Thrie Beam Transition LF

614.2610 MGS Guardrail Terminal EAT EACH

614.2620 MGS Guardrail Terminal Type 2 EACH

614.2630 MGS Guardrail Short Radius Terminal EACH

614.8010 - 8019 Anchor Post Assemblies (type) EACH

(2) Payment for the Anchorages for Steel Plate Beam Guard bid items is full compensation for providing concrete anchorages, including concrete and reinforcement; and for excavating and backfilling.

(3) Payment for Anchor Assemblies for Steel Plate Beam Guard is full compensation for providing anchors in parapet walls.

(4) Payment for the Steel Thrie Beam, Steel Plate Beam Guard, Guardrail Stiffened, MGS Guardrail, Short Radius, and various transition bid items is full compensation for providing guardrail and transitions; for removing and re-installing posts as required under 614.3.2.1(4) to verify embedment depth; for offset block-mounted reflectors; for repairing damaged galvanization; and for excavating and backfilling.

(5) Payment for the Steel Thrie Beam Structure Approach Retrofit bid items is full compensation for providing retrofit assemblies or posts; for required modifications to existing work; and for drilling and repairing damaged galvanized coated thrie beam.

(6) Payment for the terminal bid items is full compensation for providing terminals required under the selected system; for EAT reflective sheeting panels and marker posts; for railing, except the department will pay separately for railing within type 2 terminals under the MGS Guardrail bid items; and for excavating and backfilling.

(7) Payment for the Guardrail Mow Strip bid items is full compensation for providing the paved strip adjacent to the guardrail installation; for concrete, asphaltic surface material, or emulsified asphalt; and for controlled low-strength backfill including mix design and testing.

(8) Payment for Adjusting Steel Plate Beam Guard is full compensation for adjusting existing guardrail including excavating, and backfilling. The department will pay separately for replacing unserviceable posts, blocks, rail, and rail hardware under the replacing guardrail bid items.

(9) Payment for Sand Barrel Arrays is full compensation for providing manufacturer design details for each sand barrel array; for the foundation pad; for providing each system at the plan location including barrels, sand, and sodium chloride; and for ID plaques.

(10) Payment for the Crash Cushions bid items is full compensation for providing crash cushions; for the foundation pads, transitions, and backup blocks; and for ID plaques.

(11) In addition to the work elements enumerated for the various permanent bid items, payment for the temporary bid items is full compensation for maintaining and replacing damaged components; and for removing materials when no longer needed.

(12) Payment for the salvaged bid items is full compensation for dismantling and stockpiling reusable rail, end treatments, or system elements; for replacing contractor-damaged material remaining in place; for removing wooden components and unwanted or damaged materials; and for restoring the site.

(13) Payment for Replacing Guardrail Posts and Blocks is full compensation for replacing posts and blocks; and for excavating and backfilling.

(14) Payment for Replacing Guardrail Rail and Hardware is full compensation for replacing rail and associated hardware.

(15) Payment for Replacing Guardrail Reflectors is full compensation for replacing offset block-mounted reflectors.

(16) Payment for Replacing EAT Reflective Panel is full compensation for removing and replacing EAT reflective panel with new reflective panel or installing new EAT reflective panel. Payment for EAT Reflective Panel installed with a new EAT will be paid for with EAT bid item.

Payment for Replacing EAT Marker Post is full compensation for removing and replacing EAT Marker Post or installing a new EAT Marker Post. Payment for EAT Marker Post installed with a new EAT will be paid for with EAT bid item.

(17) Payment for Barrier System Grading Shaping Finishing is full compensation for providing embankment at each barrier system plan location including required construction staking, excavation, borrow, topsoil, mulch, erosion mat, fertilizer, seeding, and seed watering when the barrier system is outside the contract grading limits. If the work specified in 614.3.2.5 falls within the contract grading limits, the department will pay separately for that work under the associated contract bid items.

(18) Payment for the Anchor Post Assemblies bid items is full compensation for providing anchor post assemblies.