Section 21:

Guardrail, End Treatments, Impact Attenuators, and Delineators

SECTION 21 – GUARDRAIL, END TREATMENTS, IMPACT ATTENUATORS, AND DELINEATORS

21.1 GUARDRAIL

When guardrail or delineators are used, they must be placed as shown on the plans and the material must comply with the SS. The guidance for the type and location of guardrail is subject to change and the PEMS must be aware of the provisions included as a part of the contract documents. Guardrail should never be placed where current guidance does not dictate its use as the guardrail itself could constitute a hazard.

The height of guardrail is an important element of design and placement. For the guardrail to function properly, the PEMS should verify that guardrail is placed at the proper height based on the Standard Drawings. When existing guardrail is to remain in place, the PEMS should check the Standard Drawings and SS to determine if minimum height requirements are met. If there is a discrepancy in the minimum height in the field compared to that indicated within the Standard Drawings, the AE should be contacted for further discussion.

21.2 GUARDRAIL END TREATMENTS AND IMPACT ATTENUATOR

Guardrail end treatments (sometimes called end terminals) are energy-absorbing safety devices used to protect the exposed end at the beginning run of guardrail. One common treatment is designed to absorb the energy of a crash by having the impact head slide down the length of the guardrail. Treatments should be installed at the locations shown on the plans and selected from the Department’s Qualified Products list.

Impact attenuators (often called crash cushions) are also energy-absorbing safety devices but are used to protect a significant structure such as a bridge pier or concrete barrier wall end. A frequently used device is a sand or gravel-filled attenuator which consists of barrels filled with sand or gravel meant to absorb crash energy. Attenuators should be installed at the locations shown on the plans and selected from the Department’s Qualified Products list.

Certification to assemble, repair, and install guardrail end treatments and impact attenuators is required by the Department for construction contracts. Contractor personnel must be certified prior to repair and installation. Certified Installers are listed on the Departments website. Quality assurance inspection of the device by certified Department personnel is required after installation by the Contractor.

21.2.1 Certification Process

To become certified on a specific unit, personnel must attend and pass a certification training provided by the Manufacturer of the device. The Department will provide the Manufacturer's training resources, found on the Department’s website, with either an on-demand video or redirecting to the manufacturers' training website.

Once an individual is certified and receives a form of certification from the Manufacturer, it is the responsibility of that individual to provide the form of certification to Construction Management

for recording. It is up to each District Office to determine which field personnel will be certified for each unit.

For more information, refer to the following Department website: INDOT: Doing Business with INDOT: Guardrail End Treatment and Impact Attenuator On-Demand Training for Installers

21.2.2 Quality Assurance Inspection Procedures

Confirming Certification. Construction personnel that have devices to be installed on their projects are required to verify on the Department's website listed above that at least one member of the crew, typically the foreman, is certified to install the device specified in the contract documents.

Request for Certified Inspector. Once a device is installed, replaced, or repaired, the PEMS should immediately notify their AE and request a certified Department inspector to visually inspect the device. The communication should include device type and location.

Device Inspection. The certified Department inspector will perform a visual inspection to verify that the device was installed correctly. This QA inspection will be performed within 15 calendar days of the PEMS' request.

AWP Requirements. The following should be recorded within an AWP Daily or Diary:

- Type of device installed, replaced, or repaired
- Location of device
- Name of Contractor's crew member who is certified to install device
- Name of Department's certified inspector who performed the QA inspection.

Follow up Corrections. If it is determined that there is a problem with the installation, the Department certified inspector will notify the PEMS and AE. The Contractor will then be notified of any deficiencies found during the QA inspection. The Contractor shall remobilize to the site, provide proper traffic controls, and correct all problems at no additional cost to the Department.

The following should aid a non-certified PEMS witnessing the installation of a specific device. These are some basic items to be aware of when inspecting to ensure proper installation.

Guardrail End Treatments

- Cables must be taut with brackets properly engaged
- Blockouts and posts must not be damaged
- All bolts and nuts must be snug
- Ground under and in front of device must be free of damaging or disruptive debris
- Delineation panel must be securely attached and free of damage.

Sand or Gravel Barrel Attenuators

- Barrels must show no sign of cracks
- All lids must be locked down and secured
- Ground under and in front of device must be free of damaging or disruptive debris
- The level of the sand or gravel within the attenuators should be checked by a certified inspector for the proper height.

Impact Attenuators

- Cables must be taut and not sagging
- Diaphragms and bays must have a straight alignment
- All rail panels must be tight and not damaged
- Cartridge/rip plates must not be damaged
- Cylinders must show no signs of cracking
- All bolts and nuts must be snug
- Ground under and in front of device must be free of damaging or disruptive debris
- Delineation panel must be securely attached and free of damage.

21.3 DELINEATORS

Normally, construction plans will indicate the placement of delineator posts. Post locations are planned for sub-surface drain outlets, shoulder edge delineation, and at hazardous locations such as sharp curves, steep grades, or lane reduction transitions. When determining where delineators should be used, designers review the location of the contract and prevailing topography to help determine what would constitute a sharp curve or a steep grade.

The spacing for delineators should match those shown in the Indiana MUTCD. Any spacing details requiring additional clarification should be referred to the DTE.