

Review Procedure for Projects with Guardrail

The following information shall be used as a guide for the field review and design of new guardrail.

Preliminary Investigation

- Get the exact limits of the project and generate a location map.
- Review record plans of the area using archived plans in the NHDOT Project Viewer (Engineering Tools -> GIS Interactive Map – Project Viewer) and/or in the Records Section of Highway Design for the project(s) that may have installed the guardrail to identify type and vintage.
 - Note the Design Speed used to design the guardrail should be on the front sheet of the proposed plan set. When no as-built exists, use 5 mph over the posted speed.
- Optional: Verify any information found with a satellite/street view service, such as Google Earth or Bing. This is usually a quick and easy way to check if the guardrail has been replaced, extended, or otherwise changed since the original installation.
 - If the existing guardrail is vintage/Non-MASH compliant cable, the entire run should be planned to be replaced. These areas often have less slope break than our current standards, so keep that in consideration when designing. Cable runs are often shorter than today's requirements as well, so extensions are should be anticipated.
 - If the existing guardrail is beam and has a turndown terminal (F-terminal), the terminals will need to be replaced, and the longitudinal rail will likely need extension to meet today's requirements.
 - If the existing guardrail is beam without a turndown terminal, then the replacement will be determined by the vintage and condition of the rail, as well as the current end terminals. The Specialty Section can provide assistance if there is uncertainty about the crashworthiness of existing terminals.
- Utility Verifications – Design Services needs the location of the guardrail runs so they can perform verifications. Provide as-built plans or the plans you are creating, whichever is more accurate.
- Request Accident History if there is a suspicion of higher than average crashes at a particular location.
- Contact Maintenance for any problems they may want to have fixed.

Field Review

- Before going out in the field be sure to review the Roadside Design Guide (Ch. 3 & 5). This book is used as a guide to design the guardrail. There will be instances when it does not make sense to fully follow the guide. Use good engineering judgment in these situations and document your assumptions, include photographs.
- It may be beneficial to video tape a small scale project. This video can be used to evaluate areas that you may not have taken pictures of. Consider referring back to Google or Bing if you find a need to view an area where a picture wasn't taken.
- At each replacement location a sketch should be used to identify all the key information for assessing the existing guardrail and designing new guardrail, if necessary. A field review sheet has been created and can be found at the following location: <S:\Global\B34-HighwayDesign\Guardrail> in the Guardrail Calculation Spreadsheet. This sheet should include all of the following information:
 - Description of Location
 - Route and direction of closest lane of traffic (ex. Route 16 NB), existing lane widths, guardrail dimensions, hazard location, type of existing terminal unit, and picture(s) taken.
 - Take a picture at each proposed end unit location using something in the picture to identify where the unit will be (measuring wheel, backpack, etc.).
 - Note any potential conflicts that may need to be addressed, including their location along the rail, and distance from edge of pavement. This could include elements such as utility poles, fire hydrants, mailboxes, culverts, etc.
 - Note the overall length of the existing guardrail. Separate measurements can be taken for partial replacements, if necessary.

Field Design Considerations:

New installations shall provide a clear area of 20' wide by 50' long behind the terminal. Strive for the same area at existing locations, however, ROW, wetland, or other constraints may prevent this.

- At a very minimum, be sure to not place the terminal unit in front of anything that could cause the terminal to function improperly (keep the first 12.5' free of obstructions) such as utility poles, earth berms, or non-breakaway signs.

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- Evaluate and identify the hazard type and location. The location can be the distance from a fixed object such as the first post, or using the alignment stationing. Common hazards are slopes greater than 4:1, piers, abutments, overhead sign structures, drinking water sources, etc.
 - Utility poles, trees, and signs with breakaway posts are not considered warrantable for guardrail installation.
 - If no hazard is identified, it may be possible to remove the guardrail. Confirm with District to ensure there aren't other reasons the guardrail exists.
 - Where possible, flattening slopes to eliminate slope hazards is encouraged. LRS can often be used within NHDOT ROW. Coordinate with BOE if this is applicable.
- Determine the estimated Length of Need where work is being done using guidance provided by Specialty Section. Ensure the extension of guardrail and new terminal location will be appropriate for the area.
- Note existing limits of curbing or curb board. Curb board should be replaced with bituminous curb. Indicate proposed curbing in the guardrail note.

Things to remember:

- Coordination with Bridge Design should occur any time roadway guardrail attaches to a bridge. Take appropriate measurements and pictures to aid their design.
- No non-breakaway object shall be within 6' of the face of guardrail.
- Guardrail can be tapered to assist in decreasing the overall length of the guardrail run using the flare rates provided in the Roadside Design Guide.
 - The slope in front of all guardrail needs to be 10:1 or flatter. This includes all the area in front of tapered rail. A typical slope will match the slope of the roadway shoulder. It is important to consider the amount of fill that may be needed and if it is economical to bring in the fill.
- Consider E-2's when possible. E-2 units eliminate the possibility of an impact with the head of the terminal, as it is buried into the backslope. Refer to the E-2 detail posted online. It may not always be practical or economical to select an E-2, especially if the project does not include much earthwork, or if the location would require ledge work.
- Be aware of the existing drainage (closed drainage, culverts, underdrain, ditches, etc.) in the area.

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- At minimum of 4.5 feet of cover above existing and proposed drainage must be available to consider placing a guardrail post at the same location. Ideally, greater than 5 feet should be provided to avoid the possibility of driving rocks or other objects through the drainage during installation of the post. When possible, span pipes with the standard post spacing. If longer spans are required, consult the Specialty Section.
- Terminal platforms may affect existing drainage paths and require regrading of ditch lines. Pipes can be added if needed to resolve the conflict.
- When possible, replace sluice drains with DI-DB and slope drains. Consider ROW impacts and the scope of your project to determine if this work is practical.
- Guardrail over low fill culverts or utilities can be spanned. Make note of any markers noting underground utilities during the field review. Pass the information along to Design Services.
- It is important to be on the lookout for possible wetland areas and contact the Bureau of Environment for a field review of these areas. Take pictures.
- Use curved guardrail w/CRT posts when appropriate (Ramp Noses, sideroads, etc.). Refer to the Special Detail for appropriate locations. Do not forget the clear zone needed behind the CRT posts. Keep in mind this needs a design exception memo when on the NHS.
- Guardrail on the interstate is set at 6' from the TW on the left and 12' from the TW on the right.
 - On interstate ramps with curbing, the face of guardrail is set at 6' from the face of curb. If there is no curbing, the face of guardrail is set at the edge of pavement.
- Be aware of informal drives or access points, such as trails or pathways. District should be consulted if any of these are being considered to be closed off, as they may provide access to an undeveloped parcel or provide beach access to a landowner on the opposite side of the road.
 - Be aware of as-built plans that show purchased CA ROW and points of access granted. Do not block a parcel completely with guardrail when they have access granted.
- When using reset block and rail, include a quantity for post assemblies and post replacement.