# MEMORANDUM

**State of Alaska**
**Department of Transportation & Public Facilities**
**Central Region Design and Engineering Services**

**TO:** Distribution

**DATE:** May 31, 2019

**FROM:** John Linnell, P.E. JRL
Preconstruction Engineer
Central Region

**SUBJECT:** Guardrail Replacement
Regional Practice for Projects

Use the attached Central Region TEST inspection materials for existing guardrail on all projects in preconstruction.

- Locate PRIORITY and DAMAGED guardrail using the 2019 Field Inspection Rating Guide
- Upgrade guardrail per the Guardrail Deficiency Procedure (flowchart) and End Treatment Replacement Requirements (pending update to Hwy Precon Manual Table 1130-12)
- Make notes of what works and what doesn't for this method through October 31, 2019.
- Return comments to the Traffic & Safety Engineer for finalizing updates to this TEST method.

The objective is to identify and replace safety deficiencies and damage which shows guardrail to be beyond its design life (a minimum of 10 years, up to 20 years). When an individual guardrail "run" or the entire project limits show a frequent and recurring (F) or (D) rating, that run or the entire corridor has deteriorated beyond its "end of life" and is eligible for upgrade to current standards. Length-of-Need must be calculated and re-established for new or replaced runs and end terminals.

Use engineering judgment to upgrade single guardrail runs or entire corridors on 1R and 3R projects. Otherwise, infrequent, isolated or recent (F) conditions on newer rail less than 20 years old should be forwarded to M&O for fixes as routine maintenance allows.

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**Attachments:**
DRAFT Guardrail Deficiency Procedure
DRAFT End Treatment Replacement Requirements
DRAFT 2019 Field Inspection Rating Guide

# Example Guardrail Field Inspection Rating Inventory Form

**DATE:**______________ **INSPECTOR:**______________

| Station or Milepost, Landmark | Direction of Travel | Side LT RT | Latitude | Longitude | Grade F Condition (See Guide) |
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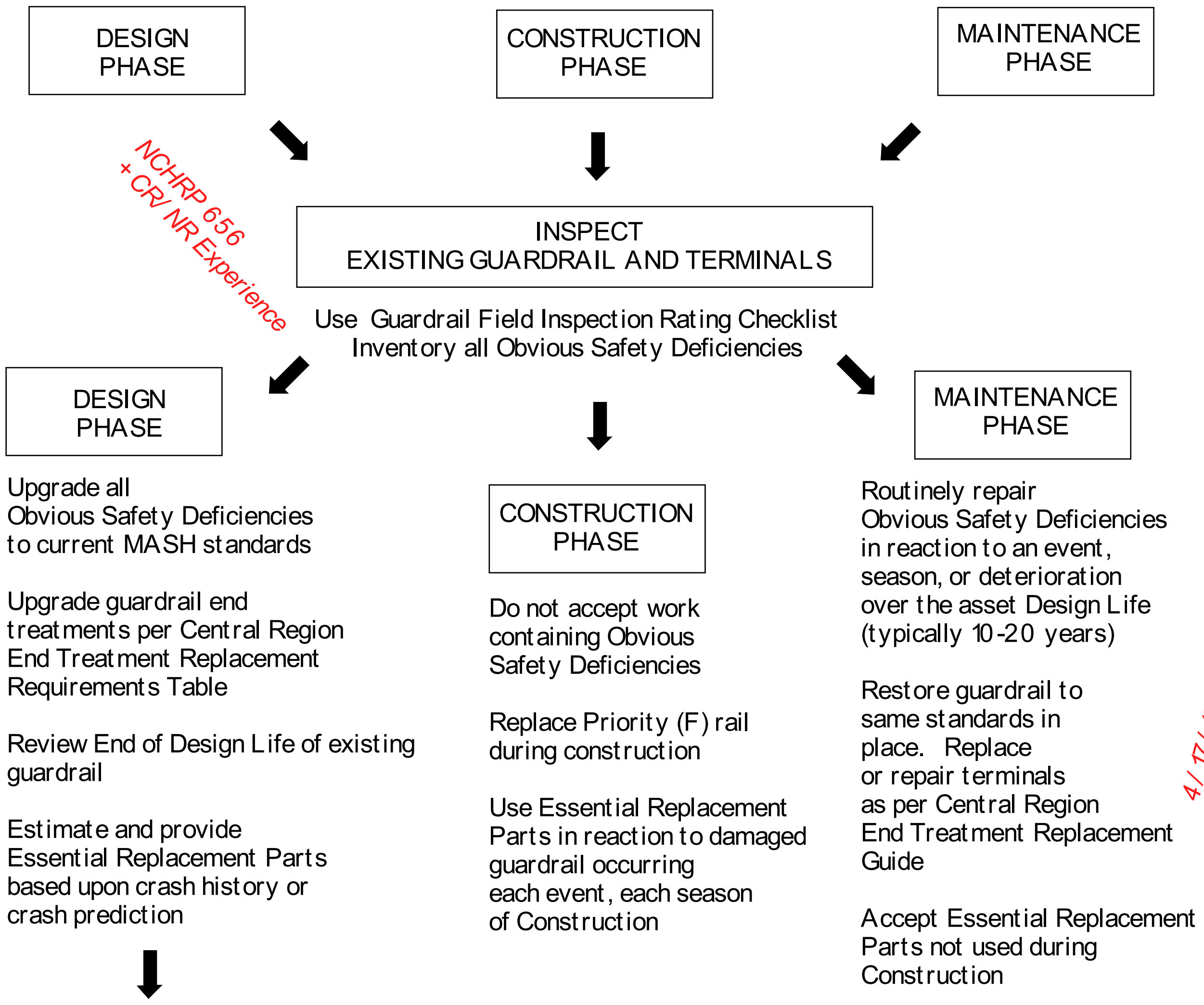
# Guardrail Deficiency Procedure

OBJECTIVES:
1. Identify and replace unacceptable guardrail elements
2. Identify frequent and recurring damage.
3. Judge whether guardrail is beyond its Design Life.
4. Increase roadside recovery area to prevent rollovers or guardrail when cost-effective
5. Reduce guardrail maintenance needs by minimizing guardrail need or length



DESIGN PHASE

CONSTRUCTION PHASE

MAINTENANCE PHASE

NCHRP 656
+ CR/NR Experience

INSPECT
EXISTING GUARDRAIL AND TERMINALS

Use Guardrail Field Inspection Rating Checklist
Inventory all Obvious Safety Deficiencies

**DESIGN PHASE**

Upgrade all
Obvious Safety Deficiencies
to current MASH standards

Upgrade guardrail end treatments per Central Region End Treatment Replacement Requirements Table

Review End of Design Life of existing guardrail

Estimate and provide Essential Replacement Parts based upon crash history or crash prediction

**CONSTRUCTION PHASE**

Do not accept work containing Obvious Safety Deficiencies

Replace Priority (F) rail during construction

Use Essential Replacement Parts in reaction to damaged guardrail occurring each event, each season of Construction

**MAINTENANCE PHASE**

Routinely repair Obvious Safety Deficiencies in reaction to an event, season, or deterioration over the asset Design Life (typically 10-20 years)

Restore guardrail to same standards in place. Replace or repair terminals as per Central Region End Treatment Replacement Guide

Accept Essential Replacement Parts not used during Construction

4/17/18 FHWA Memo

| 1R | 3R | DESIGN CONSIDERATIONS |
|---|---|---|
| x | x | Remove guardrail when it is more severe than the object being shielded |
|  | x | Use traversable, recoverable slopes when more cost-effective than guardrail |
| x | x | Avoid guardrail on both sides of busier 2 lane roads and principal arterials |
|  | x | Place guardrail four feet or more from travel lanes when practicable |
|  |  |  |
| x | x | Calculate length-of-need for any end terminal replacements |
| x | x | Use buried-in-backslope terminals as the first option on rural highways |
| x | x | Use parabolic plus flared approaches as slopes allow |
| x | x | Use tangent approach rail only after considering other end treatment options |

Tbl. 1130-12
1140.3.1
1160.1.3 HPM

OBVIOUS SAFETY DEFICIENCY: Guardrail and terminals rated F = PRORITY as per the Guardrail Field Inspection Rating Checklist.

ESSENTIAL REPLACEMENT PARTS: All previously acceptable guardrail and terminals estimated to become new failures (F) that may occur during highway construction.

6/10/08 FHWA Memo

## CENTRAL REGION DOTPF

# Guardrail End Treatment Replacement Requirements

<table>
<tr><th colspan="11">Alaska DOT&PF Guardrail End Terminal Replacement Requirements (Rev 05-31-18)</th></tr>
<tr><th rowspan="5">Existing Guardrail End Terminal (GET)</th><th rowspan="5">Type of Project or Maintenance</th><th colspan="3" rowspan="2">Non-NHS</th><th colspan="6">National Highway System (NHS)</th></tr>
<tr><th colspan="3">Non-High Spd / High Volume<br>< 45 MPH / < 6000 ADT</th><th colspan="3">High Speed and High Volume<br>>= 50 MPH / >= 6000 ADT</th></tr>
<tr><th colspan="3">GET Condition</th><th colspan="3">GET Condition</th><th colspan="3">GET Condition</th></tr>
<tr><th rowspan="2">OK</th><th colspan="2">Damage</th><th rowspan="2">OK</th><th colspan="2">Deficiency</th><th rowspan="2">OK</th><th colspan="2">Damage</th></tr>
<tr><th>F-Priority</th><th>D-Damaged</th><th>F-Priority</th><th>D-Damaged</th><th>F-Priority</th><th>D-Damaged</th></tr>
<tr><td>No existing guardrail</td><td>New Construction Projects</td><td>MASH</td><td rowspan="7">MASH</td><td>MASH</td><td>MASH</td><td rowspan="7">MASH</td><td>MASH</td><td>MASH</td><td rowspan="7">MASH</td><td>MASH</td></tr>
<tr><td rowspan="4">Non-MASH Compliant Or BCT's</td><td>4R Projects</td><td>MASH</td><td>MASH</td><td>MASH</td><td>MASH</td><td>MASH</td><td>MASH</td></tr>
<tr><td>3R Projects (Including Gravel to Pavement)</td><td rowspan="3">RNR</td><td rowspan="3">RNR</td><td rowspan="2">R350 ~~BCT~~</td><td rowspan="2">R350 ~~BCT~~</td><td>MASH</td><td>MASH</td></tr>
<tr><td>1R Preventive Maintenance Projects</td><td>R350 ~~BCT~~</td><td>R350 ~~BCT~~</td></tr>
<tr><td>State-funded maintenance (non-project)</td><td>RNR</td><td>RNR</td><td>RNR</td><td>R350 ~~BCT~~</td></tr>
<tr><td rowspan="2">Turned Down or Blunt Ends</td><td>All projects (4R, 3R, 1R )</td><td>MASH</td><td>MASH</td><td rowspan="2">MASH</td><td rowspan="2">MASH</td><td rowspan="2">MASH</td><td rowspan="2">MASH</td></tr>
<tr><td>State-funded maintenance (non-project)</td><td>RNR</td><td>RNR</td></tr>
</table>

**Notes:**

- **F - PRIORITY and D – DAMAGED** terminal ratings are per Central Region Guardrail Inspection Guide.
- Terminal replacement requirements may be waived for a current project, if a separate guardrail project is funded in the STIP to receive construction funding less than one year after construction begins on the current project, and will correct terminal deficiencies within the limits of the current project.
- Make nothing worse. If the Design creates the deficiency or makes it worse after project completion, then the deficiency should be remedied to MASH compliance by the Design.
- Terminal replacement is not required for terminals outside the clear zone. Those may be removed.

**MASH:** MASH compliant terminal replacements are required. For MASH replacements, install embankment widening conforming to standard drawing G-20. Review Length-of-Need (LON) and widening location for all replacements. If embankment widening is not feasible due to slope steepness, height and constraints on the road footprint, document the reasons for nonconformance in the Design Study Report (DSR).

**R350 ~~BCT~~:** NCHRP-350 compliant terminals can remain. Replace BCT's with a MASH compliant device.

**RNR:** Replacement Not Required. BCT's can remain. However, if terminals are not replaced, damaged parts still must be repaired through routine maintenance. When terminals are replaced, replacements must be MASH compliant.

**1R Preventive Maintenance Projects:** Federal Preventive Maintenance projects which resurface the roadway include asphalt surface treatments, rut filling, profiling, and similar work and may be done either by DOT&PF maintenance or contractors. This table does not apply to other preventive maintenance that does not change the surface pavement profile, such as crack sealing or striping.