


STATE OF NEW HAMPSHIRE
INTRA-DEPARTMENT COMMUNICATION

FROM: William Cass 
Assistant Commissioner

DATE: April 26, 2021
AT (OFFICE): Department of Transportation
Commissioner's Office

SUBJECT: Energy Absorbing Guardrail and Older Legacy Terminals

TO: Peter Stannas, P.E.
Director of Project Development

David Rodrigue, P.E.
Director of Operations

MEMORANDUM

The purpose of this memo is provide guidance on Energy Absorbing Guardrail Terminals (EAGRT), specifically X-Lite, ET-Plus and other older guardrail terminal systems. This memo updates and revises the direction given in the June 29, 2017 memo that focused specifically on ET-Plus and X-Lite terminals related to ongoing and future Construction. This memo provides further clarity and guidance on those as well as other older guardrail terminal systems for design and operations.

It remains the Departments goal to utilize roadside hardware that meets national crash test criteria. Lindsay Corporation's X-Lite and Trinity's ET-Plus are no longer being installed as they do not meet MASH crash performance criteria. Two proprietary systems currently that meet the MASH crash performance criteria are Softstop by Trinity and MSKT-SP-MGS by Road Systems, both tested to TL 2 and TL 3 performance. Lindsay Corporation's Max-Tension has been accepted for use by the Department only as a special case TL 2 terminal. These terminals make up our current EAGRT specification.

It is the Department's intent to remove and replace Lindsay Corporation's X-Lite terminals from New Hampshire's roadways in an active manner as they are encountered through our work. It is estimated that approximately 288 X-Lite terminals are currently installed on NH State owned roadways. In-service reviews of crashes suggest that higher speed roadways would experience the greater risk of these terminals not performing as tested. Effective immediately is the following **revised** Department direction to be implemented to address ET-Plus, X-Lite and provide additional guidance on other non-MASH guardrail terminals:



X-Lite



ET-Plus

Project Development

1. Use on Projects to be Advertised, *the Construction of Individual New Rail Runs*: Projects advertised are to use MASH compliant terminal units. Utilize special provision 606.125X - EAGRT, TL 3, TL 2, and TL 2-25' for accepted systems and their intended uses. (See Attached reference matrix as well)
2. Use on Projects to be Advertised, *Impacting an Existing Guardrail Run with Reset, Rehabilitation, or Bridge Rail Work* (see also attached matrix)
 - a. Tier 1 Roadways & Tier 2 Roadways Posted Greater than or equal to 55 mph (with the exception of crack seal only projects): Replace existing X-Lite terminals, ET-Plus terminals, & non-NCHRP-350 rail or hardware, on the guardrail run being reset or rehabbed, with approved terminals per current EAGRT special provision. In addition, if a guardrail contractor is already being called on to do work on the project, the intent is to replace these terminals elsewhere within the project limits when found. Therefore, replace other existing X-Lite, ET-Plus, and non-NCHRP-350 terminals within project limits or within 1000 feet outside of the project limits, even if there was no project work planned on the guardrail run. **Under any circumstances, replace X-Lite terminals within project limits.**
 - b. Tier 2-3 Federally Eligible Roadways with Speed Limits 45 mph or higher (with exception of Tier 2 above): Replace existing X-Lite and ET-Plus terminals, & non-NCHRP-350 rail or hardware, on the guardrail run being rehabbed, with MASH compliant systems. In addition, replace other existing X-Lite and ET-Plus terminals within project limits or within 1000 feet outside of the project limits, even if there was no project work planned on the guardrail run. **Under any circumstances, replace X-Lite terminals within project limits.**
 - c. Tier 2-4 Non-Federally Eligible Roadways with Speed Limits 45 mph or higher: (with exception of Tier 2 in a): If rail would require replacement due to conditions in **b.** above, hold scoping meeting with Front Office to determine if rail work will be included or addressed with future statewide programs. **Under any circumstances, replace X-Lite terminals within project limits.**
 - d. Tier 2-3 Federally Eligible Roadways with Speed Limits under 45 mph: Replace existing X-Lite and ET-Plus terminals & non-NCHRP-350 rail or hardware, on the guardrail run being rehabbed, with MASH compliant systems. Other NCHRP-350 terminals, on the guardrail run being reset or rehabbed, can be reset if not damaged. Non-NCHRP-350 terminals on runs being rehabbed or reset shall be replaced with approved EAGRT terminals. **Under any circumstances, replace X-Lite terminals within project limits.**
 - e. Tier 2-4 Non-Federally Eligible Roadways with Speed Limits under 45 mph: If rail would require replacement due to conditions in **d.** above, hold scoping meeting with Front Office to determine if rail work will be included or addressed with future statewide programs. **Under any circumstances, replace X-Lite terminals within project limits.**

Division of Operations

1. For existing guardrail terminals that require repair due to damage, the following maintenance action shall be implemented:

a. **All Tier Roadways and Speed Limits:** Damaged ET-Plus, X-Lite, or non-NCHRP-350 terminals shall be replaced with a MASH terminal.

Insurance Reimbursement Process: Impacted terminals that seek reimbursement through this process shall be replaced with MASH guardrail terminals.

CC: Bureau Administrators

Attachments: Terminal Replacement Matrix, Terminal Guide

Terminal Replacement Reference Matrix

Project Development Rehab Projects Encountering Existing Guardrail

(used in conjunction with memo on EAGRT terminals, 2. revised 4/26/21)

<u>PROJECT OR SECTION OF ROADWAY</u>	<u>X-LITE</u>	<u>ET-PLUS</u>	<u>Non-350</u>
a) T1, T2 >= 55mph Fed. Eligible			
Rehabbed runs	Replace	Replace	Replace
Runs with no work within project limits	Replace	Replace	Replace
Runs up to 1000' outside of project limits	Replace	Replace	Replace
No BGR work in the project	Replace	Leave	Leave
b) T2, T3 >=45mph Fed Eligible			
Rehabbed runs	Replace	Replace	Replace
Runs with no work within project limits	Replace	Replace	Leave
Runs up to 1000' outside of project limits	Replace	Replace	Leave
No BGR work in the project	Replace	Leave	Leave
c) T2, T3, T4 >=45mph NON-Fed Eligible			
Rehabbed runs	Replace	Leave?	Leave?
Runs with no work within project limits	Replace	Leave?	Leave?
Runs up to 1000' outside of project limits	Replace	Leave?	Leave?
No BGR work in the project	Replace	Leave?	Leave?
d) T2, T3 <45mph Fed Eligible			
Rehabbed runs	Replace	Replace	Replace
Runs with no work within project limits	Replace	Leave	Leave
Runs up to 1000' outside of project limits	Replace	Leave	Leave
No BGR work in the project	Replace	Leave	Leave
e) T2, T3, T4 <45mph NON-fed Eligible			
Rehabbed runs	Replace	Leave?	Leave?
Runs with no work within project limits	Replace	Leave?	Leave?
Runs up to 1000' outside of project limits	Replace	Leave?	Leave?
No BGR work in the project	Replace	Leave?	Leave?

Leave? = Hold scoping meeting with Front Office to determine whether to retain terminal








Beam Guardrail Terminal Units

Current Standard Terminal Options
(For New Installations)



Acceptable Existing Terminals
(Normal Maintenance)



<p>MASH Compliant EAGRT – Installed at Maximum 25:1 Taper</p>  <p>Softstop MASH TL 2 & 3</p>	 <p>MSKT (Stamped 'SKT') MASH TL 2 & 3</p>	<p>MASH Compliant SPECIAL USE EAGRT TL 2 (Proprietary – Redirective to 1st post)</p>  <p>MAX-Tension MASH TL 2 & 3</p>	
<p>Acceptable up to 45 MPH</p>  <p>MELT NCHRP-350 TL 2</p>	<p>Top Rail Stays at Constant Height</p>  <p>E-2 NCHRP-350 TL 3 but Close Enough to MASH version</p>	<p>On Departure End of One-Way Or Divided Roads Only (Note cable attached to last post)</p>  <p>G-2 Not MASH but Close Enough</p>	<p>Low Speed, Low Volume – Radial Portion Has Breakaway Posts</p>  <p>CRT w/ Special Anchor NCHRP-230 but no MASH equal</p>

 <p>ELT NCHRP-350 TL 3</p>	 <p>SKT NCHRP-350 TL 2 & 3</p>	 <p>ET-2000 NCHRP-350 TL 3</p>	<p>Special Use</p>  <p>X-Tension NCHRP-350 TL 3</p>
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Beam Guardrail Terminal Units (Con't)

Obsolete. Replace if Feasible



Blunt Ends – Ends Abruptly with No Anchoring Element



Top Rail Tapers Down Into Embankment



E-1

NCHRP-350 but removed



F-Terminal

No idea

Limited Maintenance Permitted:
Replace per Dept. memo guidance



Curved Beam
w/o Breakaway Posts (when
radius is small enough for CRT)

Parts Not Readily Available



FLEAT

NCHRP-350 TL 2 & 3

EAGRT Terminals with
Limited Maintenance Allowed (See Directive)



ET-Plus

NCHRP-350 TL 2 & 3



X-Lite

NCHRP-350 TL 3