

**Government of Himachal Pradesh  
Public Works Department.**

No. PWD(C)F(10)-21/2020

Dated Shimla-2, the

9<sup>th</sup>

November, 2021.

NOTIFICATION

The Governor of Himachal Pradesh is pleased to notify the Policy for replacement/maintenance of damaged crash barriers in the State of Himachal Pradesh, as following:-

- The Hon'ble Supreme Court Committee on Road Safety vide letter dated 26.11.2019 directed the State to frame a policy and fix timelines for replacement/maintenance of damaged crash barriers as per IRC standards by way of notification. The Hon'ble Supreme Court Committee on Road Safety has further directed the State to install crash barriers, as per IRC Standards, on all identified road accident blackspots/vulnerable spots as majority of fatalities take place due to Run-off-Road and also directed to ensure that damaged crash barriers are replaced within a shortest possible time.
- The State Public Works Department (PWD) has about 38500 kms. road network comprising of NH, SH/MDR and Rural Roads. To ensure safety of erring vehicles and the road users, safety barriers such as concrete/stone parapets have been constructed where required. Subsequently with transition in safety barriers now metal crash barriers are being installed. HPPWD has installed 472.72 Kms of W-Beam crash barriers at previously identified black spots, vulnerable locations and sharp curve in large and Thrie beam crash barriers are also being installed on NHs.
- The crash barriers along with reflective tapes/devices have been very successful on hill roads, curves, rocky areas, around trees and median to provide protection on valley-side and perfectly delineate the road during day/night/inclement weather for containing vehicles & also around other obstructions on road network. The crash barriers of high quality, when installed with precision absorb the impact of energy from the colliding motor vehicle resultantly minimizing the risk and damage to both motor vehicle(s) and passengers. The crash barriers laterally restrain the vehicle from running-off-road veering over and also re-direct the errant vehicle back onto the road.
- Further, the crash barriers with bull nose along with reflective tapes provide protection to vehicles from colliding with the abutments and piers and the deck of the structures.

**1. Protocol for repair or replacement of damaged Crash Barrier:**

- Pursuant and in compliance to the directions of the Hon'ble Supreme Court Committee on Road Safety and reduction of run-of-the road accidents on hill roads and maintaining the standards roadsides protection ensuring safety and security of traveling people and vehicles during day and night on hill roads, the State has prepared this protocol.
- To ensure the compliance of protocol for replacement/repair of damaged crash barrier, the Contractors with skilled manpower for installation of crash barriers and back end support arrangement/ agreement/MoU with reputed Indian manufacturers of metal beam crash barriers will be pre-qualified/empanelled/awarded the replacement, maintenance and repair works of crash barriers for a consecutive three year contract duration.



- Every PWD (Civil) Division shall award three to five contracts by inviting online bids on competitive basis for three year duration for replacement and repair of damaged crash barriers for the entire road network under its jurisdiction. Service Level Agreement for repair and maintenance with penalty for non-performance and non-conformance to specifications shall be entered into the contract. In case, the Contractor fails to replace / repair the damaged crash barrier within stipulated period as mentioned in tables under para 3, a penalty per day of delay (max. penalty to be levied is 10 % of the contract price) shall be imposed other than force majeure. The contractor will arrange /maintain spare parts and crash barriers for the entire three years immediately and when required. A standard agreement template shall be framed by the HPPWD for use by the Divisions.
- Kilometer-wise data pertaining to crash barriers installed on NHs/SHs/MDRs/Rural Roads along with details of damaged crash barriers shall be in public domain at [hppwd.gov.in](http://hppwd.gov.in).
- In case of an accident or rock fall/landslide, the Junior Engineer/Work Inspector of HPPWD Section will inspect the road in his jurisdiction to assess the damage extent leaving the crash barrier non-functional and beyond repair or minor repair warranted at a particular location and take all details including road features, road chainage, still photographs & video clips etc.
- Every Junior Engineer/Assistant Engineer In-charge of Section will carry-out regular inspection for preventive maintenance of crash barriers. Special and need based inspection shall be undertaken during pre& post-monsoon, winter rains and snow fall season. During preventive inspections they will check loose connections, theft, requirements, diagnosis, edges etc.
- Clear any debris on shoulders. Place debris that cannot be hauled away at least 3 ft behind still-effective crash barrier.
- In case of an accident or rock fall/landslide, the damage leaves the W-Beam/ Thrie beam Crash Barrier non-functional and cannot be repaired immediately. Erect temporary board displaying hazard warning and limit the speed to 20 Km /hour with work zone safety signs. The Bullnose crash barriers temporarily shall be installed as per site requirements.
- All type of crash barriers shall conform to IRC and Guidelines of Ministry of Road Transport & Highways(viz. MORTH circular No. RW/NH-29023/02/2019-S&R (P&B) dated 1st January, 2020 and others). Global specifications like AASHTO M180 (American Association of State Highway and Transportation Officials (AASHTO) (Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail) or equivalent will be applicable.
- The Junior Engineer/Assistant Engineer In-charge shall be liable for disciplinary action, in case Repair/rectification of damaged crash barrier is not done in timely manner in spite of availability of logistic support in their jurisdictions.
- Every Executive Engineer/Senior Officers during their tour to their jurisdiction will give special emphasis to notice any damaged crash barriers during their entourage.
- Every PWD Circle will monthly review followed by quarterly review at Zonal Chief Engineer level the status of all crash barriers in a jurisdiction. The record of the inspection by date and person carrying out the inspection will be kept in each PWD Division in case of any legal liability resulting from a road accident.



### 3. Inspection & Maintenance Protocol:

#### Crash-Barrier Damage Classification-

Category	Damage Category	Damage Attributes
Category-I	Non-Functional	<ul style="list-style-type: none"> <li>• 2 or more posts broken off or no longer attached to rail or with compromised earth support on valley side.</li> <li>• Deflection of rail element is more than 150 mm</li> <li>• Rail height is less than 600 mm for a significant length (i.e. 600mm length)</li> <li>• Rail element is no longer continuous</li> <li>• Any splits &amp; tearing (post angle more than 20 degree)</li> <li>• Rail flattening greater than 50% of thickness or greater than 30% height</li> </ul>
Category-II	Damaged but may still work	<ul style="list-style-type: none"> <li>• 1 post is broken or separated from the rail element or with compromised earth support on valley side.</li> <li>• Deflection of rail element is less than 150 mm</li> <li>• Rail element is continuous (can be bent or crushed more than one-third width)</li> <li>• Deflection of rail element is localized.</li> </ul>

#### Crash-Barrier Repair Priorities by Damage Type-

Damage Type/Description	Time period for rectification by any Division
<b>Category -I</b>	
(i) Rail deflection < 150 mm	2-3 days <b>(Immediate Repair)</b>
(ii) Rail Tear (vertical& horizontal)	
(iii) Erosion of soil around posts	
(iv) Snowplow /Mowing damage/tree fall/boulder fall	
(v) Splice Damage	
(vi) Missing bolts/hardware	
(vii) 2 or more posts broken or crack/tear in post	
(viii) Missing Blockout	
(ix) Bolt pulled out through rail /Loose bolts/hardware	
<b>Category-II</b>	
(i) Rail deflection>150mm	7-10 days <b>(Maximum Period)</b>
(ii) Rail flattening less than 50% of thickness or less than 30% height	
(iii) Twisted Blockout	
(iv) Rail/post corrosion or rust	
(v) Loose bolts/hardware	
(vi) One post broken or crack/tear in post	



### Basic Inspection:

The periodic and routine inspection of roadside crash barriers should be part of the normal maintenance function. The examination of the following points should be included in all inspections, including routine maintenance inspections:

### Crash Barrier Rail:

- 1) Is the barrier generally in shape, with no significant corrosion, accident damage, slip/snow removal machinery damage, tree fall damage or other misalignment?
- 2) Are all splice bolts and post attachment bolts in place and tight?
- 3) Are the rails properly attached to terminals and transitions?
- 4) Have any fixed objects such as small trees, poles, or other objects intruded within the deflection space?
- 5) Is the required rail height maintained?
- 6) Is there anything in front of the barrier that can cause a vehicle to vault? Typical problems include rough ground, erosion, vegetation and debris.
- 7) Is the barrier face smooth? Irregular curves or joints can cause a vehicle to snag and should be repaired as soon as possible.
- 8) Is the barrier correct height? When the variation of height is greater than 2 inch, plans should be made for correction.

### Barrier Posts and Blockouts:

- 1) Are any posts missing or severely misaligned?
- 2) Are any blockouts missing or rotated out of the vertical position?
- 3) Do the posts appear firmly embedded, with no tilting or soil erosion around the posts? A minimum of 2t of soil is required.
- 4) Is there any earth/soil settlement of road on valley side?

### In-Depth Inspection:

A more in-depth inspection shall be carried out when the roadway is proposed for reconstruction or extensive repair, including the following points:

- 1) Rail height should be checked throughout the proposed project to ensure it will be within tolerance after completion of the road work. If necessary, height adjustment should be included in the project.
- 2) Are all existing barriers needed to meet the existing standards? Can the hazard be removed or modified to eliminate the need for a barrier?
- 3) Does the existing barrier meet length of need criteria, or are length adjustments required?
- 4) Do kerb or embankment slopes in front of the barrier pose a risk of vehicle vaulting over the barrier?
- 5) Are flat slopes provided in front of terminals and transitions and traversable and clear areas behind "gating" terminals?
- 6) Is this type of barrier appropriate considering current road and traffic parameters, or would another barrier type provide a significant safety upgrade?
- 7) Is post spacing appropriate for the available deflection distance?
- 8) Are terminals and transitions consistent with current standards, including proper flares and offsets?



**Routine Maintenance:**

- Routine maintenance requirements are minimal. Occasionally, it may be necessary to replace post attachment bolts or realign posts damaged by snow clearance.
- Modifications to the barrier must not be made unless consistent with more modern standards for that barrier type. Barrier components or features must not be omitted.

**Crash Related Maintenance:**

The primary maintenance requirement for a W-beam/thrie beam barrier is the repair of crash damage.

Since these barriers are inherently stiff, most minor side impacts may result only in minor damage, which usually requires no maintenance response. For moderate impacts, damage is often limited to one or two sections and minor post misalignment. For more severe accidents, significant damage may occur that requires removing and replacing rail sections, blockouts and damaged posts. Whenever maintenance activities are performed on traffic barriers, several general principles should be followed:

- 1) Standard specifications for the barrier in question should be reviewed to ensure that proper details are followed.
- 2) All parts used must meet appropriate specifications. If used or salvaged parts are used, they must be in good condition.
- 3) Modifications to the barrier must not be made unless consistent with more modern standards for that barrier type. Barrier components or features must not be omitted.
- 4) During repairs, roadside conditions affecting performance should be checked, such as introduction of new fixed objects.
- 5) If significant damage occurs to a substandard barrier or terminal, it should be upgraded to current standards.
- 6) Feedback on recurring problems should be provided to design and construction staff so future installations can be improved.

**Posts:**

Posts can be extracted using a tractor bucket or dump truck body. A truck mounted postdriver is most effective for replacing steel posts, although they may be installed using handheld impact drivers, especially if the original hole is not disturbed. In some cases, it may also be possible to drive a new post in the existing hole.

**Rail:**

One or more sections of W-beam /thrie beam may be damaged to the extent that replacement is necessary. The bolted connections ease the task of replacing more rail sections as needed. Following replacement and realignment of the posts, blockouts and damaged rail sections, the repair is completed by attaching the rail to the posts.

**Terminals:**

For any impact involving the terminals, or on the standard guardrail section near the terminal, it is essential that terminal is checked for damage. Because some terminal designs are complex and include a number of critical components, the entire terminal must be carefully inspected for hidden damage. Even apparently superficial damage such as bent or misaligned bolts may have an adverse effect on terminal performance in subsequent impact.



**General:**

1. When the damage leaves the crash barrier non-functional, and it cannot be repaired immediately warn traffic of the hazard by putting out temporary warning devices, such as properly painted drums, vertical panels, cones, or other devices.
2. Continuity of tension is preserved: no tears in the W-beam elements, all eight bolts are in each splice; all transitions are firmly connected to rigid objects; anchor cables are firmly attached to rail and posts.
3. Rail height is adequate. Erosion and debris buildup can affect the effective rail height.
4. Integrity of the material is sound. No significant corrosion of the steel in the rail elements (especially watch for rusting steel), the offset blocks, or the posts.
5. The amount of crash barrier in advance of the hazard (length of need) is long enough to adequately shield the hazard.
6. Identify older, nonstandard W-beam /thrie beam (or other types) systems (such as non-blocked out rail) be replace on higher traffic locations.
7. For end treatments, ensure 1st post is sound and connected to its foundation and with stay rail at an angle as per specification duly embedded in the ground.
8. For energy-absorbing end treatments, the impact head (bull nose/attenuators) is attached to 1st post.
9. The grading around the end treatment allows a small vehicle impacting on the end to pass over any remaining foundation/post/strut.
10. Ensure adequate, available deflection distance (preferably 3 ft for the standard W-beam system) to vertical rigid objects.
11. Flare (the rate at which the guardrail moves closer to the travel way going downstream) is not excessive (not sharper than 1:7 (Vertical: Horizontal)).
12. Check for adequate soil backing to provide the stiffness for the posts.
13. Crash barrier is no longer reasonably functional. i.e. W-beam element is separated completely or W-beam element is torn or Rail is bent/pushed more than 6 inches out of line, and/or became less than 24 inches high, or three or more posts are broken/bent over and separated from the rail.
14. Rail is bent/pushed more than 6 inches out of line, and/or became less than 24 inches high, or three or more posts are broken/bent over and separated from the rail.
15. Guardrail-mounted delineators in damaged section replaced. If no guardrail-mounted delineators previously existed, install delineators.
16. The function of the end treatment is to prevent serious injury to occupant when struck on the end and provide tension for the W-beam /thrie beam for side (traffic face) impacts.

By Order

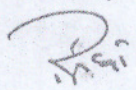
(Subhasish Panda)  
Principal Secretary (PW) to the  
Government of Himachal Pradesh

Endst. No.PWD(C)F(10)-21/2020

Dated Shimla-171002, the 9<sup>th</sup> November, 2021.

Copy to:-

1. The Addl. Chief Secretary-cum-Principal Secretary to Hon'ble Chief Minister, Himachal Pradesh .
2. All Administrative Secretaries, Govt. of Himachal Pradesh.
3. All DCs in the State of Himachal Pradesh.
4. Sr. Private Secretary to the Chief Secretary, Himachal Pradesh.
5. The Engineer-in-Chief, HP PWD, Shimla-2 w.r.t. his letter No.PW-M&P-Road Safety/2021-22-8833 dated 17-08-2021 for immediate necessary action.

  
(Pushp Lata Singha)  
Joint Secretary (PW) to the  
Government of Himachal Pradesh.