GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No. 2012/CE-III/BR/Cuttings New Delhi, dt. 20.03.2014.

Principal Chief Engineer, All Indian Railways
General Manager (Const.), N.F.Railway, Guwahati.
CAO/Const., All Indian Railways.

Managing Director, Konkan Railway Corporation Ltd, Navi Mumbai.
Managing Director, IRCON, New Delhi.
Managing Director, RITES, New Delhi.
Managing Director, DMRC, Metro Bhawan, Barakhamba Road, New Delhi
Managing Director, CONCOR, New Delhi.
Managing Director, RVNL, New Delhi.
Managing Director, DFCCIL, New Delhi.

Director, IRICEN, Pune.
Director, IRIEEN, Nasik.
Director, IRISET, Secunderabad.
Director, IRIMEE, Jamalpur.
Director, IRITM, Manak Nagar, Lucknow.
Director General, National Academy of Indian Railways, Vadodara.

FA & CAO, All Indian Railways.
Director General, RDSO/Alambagh, Lucknow.
Chief Commissioner of Railway Safety, Lucknow.

Genl. Secy., AIRF, Rail Bhavan.
Genl. Secy., NFIR, Rail Bhavan.
Genl. Secy., IRPOF, Rail Bhavan.
Genl. Secy., FROA, Rail Bhavan.
Genl. Secy., AIRPFA, Rail Bhavan.
Genl. Secy., DAI (Railways) Rail Bhawan, New Delhi.

Sub: *Advance Correction Slip* ***No.28 to*** *Indian Railways Bridge Manual.*

Ministry of Railways (Railway Board) have decided that correction/addition as indicated in the enclosed Advance Correction Slip No.28 dated 20.03.2014 to relevant paras of the IRBM be made.

Receipt of this letter may please be acknowledged.

DA: As above

(V.K.Jain)
Director Civil Engg.(B&S),
Railway Board

No. 2012/CE-III/BR/Cuttings New Delhi, dt. 20.03.2014.

Copy to: CRB, ME, ML, MS, MM, MT, FC, Secretary

AM/CE, AM(W), AM(Budget), AM(Elect.), AM(Fin.), AM(Sig.), AM(Plg.), AM(RS), AM(Mech.), AM(PU), AM(Tele.), AM(Traffic), Adv.(Vig.), Adv.(L&A), Adv (Bridges), Adv(Safety)

EDFX, EDCE(P), ED(Works), ED(PM), EDV(E), EDTK(M), EDTK(MC), EDTK(P), EDCE(G), ED(L&A), ED(L&A-II), ED(L&A-III), EDCE(B&S), EDCE(B&S-II), ED(WP) & OSD/ME

DTK(MC), DTK(M), Dir(Works) I & II, Dir.(L&A), DVE-I & DVE-II, IPWE (I), DCE(P), DTK(P), Dir(WCS), DCE(B&S-II), Dir(WP)

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

INDIAN RAILWAYS BRIDGE MANUAL -1998

ADVANCE CORRECTION SLIP No. 28 dated 20.03.2014

Chapter- X, PART B - Title of "DEEP CUTTINGS" replaced by "CUTTINGS" and Para 1010 to 1015 & Annexure 10/2 replaced by Para 1010 to1017 (as below) and Annexure 10/2 (attached) respectively.

1010. General

A register for inspection of cuttings should be maintained in the proforma given in Annexure 10/2. Separate page will be maintained for each cutting. This register should be sent to CBE for his perusal every year.

1011. Schedule of Inspection of Cuttings

1. Immediately after the monsoon, the SSE/JE Pway should inspect each cutting and record his observation in the register which should be sent to the AEN for his examination well before the next monsoon to enable planning of remedial measures that he may like to take in the intervening period.

2. Each cutting should be inspected before the onset of rains by the AEN concerned and he should record his remarks in the register which should then be sent to the SSE/JE Pway for taking appropriate action. Action taken by the SSE/JE Pway should be recorded in the register and the same returned to the AEN for his perusal before the onset of the monsoon. Date by which these registers should be returned to the AEN for his perusal to ascertain that adequate action has been taken should be specified by the Sr. DEN/Co-ordination depending upon the time when the monsoon starts in a particular section.

3. Divisional Engineer/Sr. Divisional Engineer should inspect the cuttings referred to him by AEN and by CBE if referred by Divisional Engineer/Sr. Divisional Engineer.

4. During spell of heavy rains, the AEN &SSE/JE Pway should inspect by trolley, foot-plate of the engine or other means the cuttings and allied works as frequently as possible.

1012. Vulnerable Cuttings- Identification and special Precautions

1. Divisional Engineer/Sr. Divisional Engineer should review and identify the vulnerable cuttings in his jurisdiction at least once in every three years. If required, an experienced geologist from reputed institute/organization may be associated for joint inspection.

2. Vulnerability of cuttings is to be established after careful evaluation of risk potential that the cuttings pose to traffic and workmen from critical study of relevant factors. (Refer: RDSO Guidelines for Cuttings in Railway Formations; Guideline No. GE: G-2, August 2005: Chapter VIII, Part B, Para 5.0)

3. Stationary watchmen should be posted round the clock at nominated vulnerable cuttings during the monsoon period in accordance with para 1014 of Indian Railway Permanent Way Manual 2004.

4. During monsoon, frequent inspection of vulnerable cuttings may be carried out as required keeping in view the past history and the vulnerability of the cuttings.

1013. Points to be noted during inspection of cuttings

1. Method of inspection, procedure for identification of loose mass and its removal for different heights of cuttings shall be as given below-

   i) Cuttings which are of height less than 5m

   These cuttings should be inspected thoroughly by walking over them. The loose soil, susceptible boulders shall be identified and marked with paint. Removal of loose boulders shall be planned and executed well before monsoon in a systematic manner, observing adequate safety precautions.

   ii) Cuttings with height 5 to 10m

   These Cuttings should be inspected using binoculars and integrity of cuttings judiciously examined. Particular attention should be given to locations having mixed type of strata (like boulders and soil) and to cracks, fractures and joints in rock cuttings. If there seems any chance of separation of boulders/rock mass during monsoon, it should be immediately attended before onset of monsoon.

   iii) Cuttings more than 10m height

   The specially trained persons normally designated as hill gang shall be recruited for climbing by using harnesses, rope and other accessories as required for rock climbing. The doubtful locations shall be judiciously identified by inspecting persons and necessary action for felling of loose boulders etc. shall be taken using "Boulder Special".

2. The inspecting official should carefully examine:

   i) Signs of upheaval in the regular slope surface of cuttings.

ii) Whether catch water drains have been provided to intercept water from running down the hill side and getting into the cuttings. He should see that the catch water drains are clear of all obstructions and ensure that there are no depressions in the longitudinal level of these drains which could collect storm water and may cause slips. He should check that the catch water drains have a good longitudinal slope towards the outfall.

iii) The condition of side drains and see that they are not choked up.

iv) Any loose boulders and perched trees on top of cuttings and side slopes which are likely to fall and are in precarious position.

v) The condition of pitching on the slopes, if any.

vi) The condition of retaining walls, weep holes and other protection/ strengthening measures. Instructions as given in para 1014 and 1015 shall be followed for inspection of Boulder nets and Rock Bolts respectively.

vii) Availability and condition of warning systems/boards and trolley refuges.

1014. Inspection of Boulder nets provided in cuttings:

1 Boulder nets, joints, fixtures and other accessories should be inspected for signs of corrosion.

2 PVC coating on the boulder nets should be inspected to detect any loss that might have taken place.

3 Top, bottom and intermediate anchoring of boulder nets should be inspected for their adequacy and effectiveness.

4 Interlacing of boulder nets should be inspected and corrected if required.

5 Boulder nets shall be inspected for loose/trapped boulder/rock mass and necessary action for their removal shall be taken as per requirement.

6 The boulder nets shall be inspected for any damages/bulging.

7 If boulder nets show any signs of distress, suitable remedial/strengthening measures should be taken to ensure effectiveness of boulder nets. In case of suspected loss of strength of boulder nets, a sample piece should be sent to a reputed laboratory for confirmatory tests as per applicable specifications and necessary remedial/strengthening action shall accordingly be taken.

Comments /observations on above items shall be recorded in Cutting Inspection Register.

1015. Inspection of Rockbolts provided in Cuttings/Tunnels.

1 The inspection of rockbolts provided in cuttings/tunnels shall be carried out alongwith respective cuttings/tunnel inspection and it should be entered specifically in the respective registers.

2 The schedule of Inspection of rockbolts will be same as that of the inspection schedule of cuttings/tunnel.

3 Rockbolts shall be numbered serially in the order of increasing KM.

4 Rockbolts (including accessories) shall be inspected for signs of corrosion and looseness. The surroundings of bolts should be closely inspected for any sign of distress.

5 Any dampness observed around the rockbolt should be recorded.

6 If rockbolt shows any signs of distress, sounding of the location should be done for 10m on either side and pull out tests (as per IS: 11309-1985) should be conducted (if required) on sample rock bolts (as decided by AEN) in distressed stretch. Based on the results of sounding and pull out tests (if conducted), suitable remedial/strengthening measures should be taken.

1016. Action to be taken in the case of boulder fall

1. In case of boulder fall, the boulder may be removed by jacking. If the boulder cannot be moved by jacks or levers, blasting will be necessary.

2. SSE/JE who will handle blasting equipment should be conversant with the methods of blasting and should be familiar with all safety precautions to be observed for the custody and use of explosives.

3. The following equipments should be kept at the Headquarters of each SSE/JE in whose section such vulnerable cuttings exist:

   i) Adequate capacity Jacks in good working condition,
   ii) Jumping steel bars 1"dia and 5' long,
   iii) Charging rods and
   iv) Suitable stock of explosives, fuses and detonators at specified places.

4. In case of report of boulder fall at any location, immediate action should be taken to loose-scale the cutting covering a length of about 50 meter on either side of the location. Till such time the loose scaling is completed, the location should be treated as "VULNERABLE".

1017. Action to be taken for maintenance of cuttings

1. Cleaning, repairing and improving drainage.
2. Weeding, trimming and felling of plants, trees and shrubs and managing vegetation to reduce any deleterious effects.
3. Provision of protection and strengthening measures as necessary.
4. Repairing local slips and settlement or erosion channels.
5. Scaling.
6. Maintenance and repair of protection and strengthening measures.
7. Maintenance/repair of inspection steps/pathways/Trolley Refuges.
8. Following safety equipments/gears shall be used by the officials/workmen during inspection and maintenance of cuttings; for which adequate stock shall be maintained by SSE/Pway in-charge.

    i) Helmets
    ii) Safety Belts
    iii) Sun Glasses, to protect from bright light and small debris
    iv) Good quality trekking and climbing shoes
    v) Chalk required to keep hands dry and for marking loose boulders
    vi) Gloves
    vii) Binoculars
    viii) Good quality harness and holds

Note:

a) The inspecting persons should be well trained in rock climbing, preferably from any Mountaineering Institute.
b) The health and fitness of inspecting person should be sound with good agility and judgment.

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Annexure-10/2

Para 1010

CUTTING INSPECTION REGISTER

General Information (last updated on _____) **Division: _____**

1. Section: _____ 2. Between stations: _____ 3.Cutting No_____

4. Chainage: _____5. Length: _____ 6. Maximum Height: UP_____DN _____

7. Type of cutting: _____8. Vulnerable: Yes/No 9. Stationary Watchman Posted: Yes/No

10. Authority for nominating as Vulnerable: _____ 11. Year of last review for Vulnerability _____

12. Unusual occurrences and remedial measures adopted:-

S.N.	Month/year	Details of unusual occurrence	Strengthening/ Remedial Measures/ Action taken

13. Details of Drainage, Preventive and Protective Measures:-

Items/Works	Line	Chainage		Details	Remarks
		From	To		
Side drains	UP				
	DN				
Catch water drains	UP				
	DN				
Retaining Wall/Breast Wall	UP				
	DN				
Boulder Nets	UP				
	DN				
Pitching	UP				
	DN				
Warning Boards	UP	At chainage:			
	DN	At chainage:			
Trolley Refuge	UP	At chainage:			
	DN	At chainage:			
Others					

14. Other Geotechnical Information

CUTTING INSPECTION REGISTER

Proforma of Inspection Form for AEN/SSE/JE Pway Registers

Date of Inspection: _____Name & Designation of Inspection official_____

1. Drainage

		Satisfactory	Unsatisfactory	Remarks	Compliance
Side Drains	Adequacy				
	Effectiveness				
Catch Water Drains	Adequacy				
	Effectiveness				

2. Condition of slopes

		Line	Remarks	Compliance
i	Sign of surface cracks, bulging, upheaval of berms, sliding etc.	UP		
		DN		
ii	Sign of separation of boulders from soil	UP		
		DN		
iii	Observations on cracks/fractures/joints of cuttings	UP		
		DN		
iv	No (or stretch) of loose boulder/rocks identified for removal	UP		
		DN		
v	No of trees identified to be felled	UP		
		DN		

3. Preventive and protective measures

		Line	Satisfactory	Unsatisfactory	Specific Observation/Remarks	Compliance
Retaining walls/Breast walls	Structural condition	UP				
		DN				
	Condition/ Cleanliness of weep holes	UP				
		DN				
Pitching		UP				
		DN				
Boulder nets		UP				
		DN				
Rock bolts		UP				
		DN				
Warning Boards		UP				
		DN				
Trolley refuges		UP				
		DN				

4. Proposed Remedial/Strengthening Measures

Remarks and Signature of inspecting official_____