

Monsoon Precautions.

1. Special instructions to be followed in regard to pre-monsoon precautions are reproduced below for early compliance wherever action has not been taken.
 - 1.1.1 **Drainage:** All side drains and catch water drains including their out falls, should be cleared of silt vegetation and other obstructions so as to ensure that storm water is drained freely and quickly away from the formation. In the case of double line formations, where the lines are spaced wide apart, attention should be paid to the drainage of the inter-space by providing shallow pucca longitudinal drains. Suitably, graded to discharge into the nearest water source.
 - 1.1.2 **Water Course:** Particular attention should also be paid to the drainage of track circuited lengths since water logging of track can lead to short-circuiting and consequent failure of track circuits.
 - 1.1.3 Water shall not be allowed to stagnate on the track. For this purpose, cross-drains should be provided at regular intervals. In Yards, cross drains and longitudinal drains should be cleared/provided to proper grades.
- 1.2 **Bridge water ways and Protective works:**
 - 1.2.1 The water way of all bridges should be cleared of vegetation and obstructions. Special attention must be made such that which can lead to heading up of the water upstream does not occur with consequent risk of slip on wash out.
 - 1.2.2 In the case of hill streams with past history of water ways getting blocked by wood, it would be advantageous to erect a row of vertical rail posts across the channel on the upstream side, suitably so as to arrest floating materials like reeds, branches of trees, etc. which might other wise obstruct the bridge openings. Where such barriers have been provided, the accumulations of drift wood behind the same should be cleared from time to time.
 - 1.2.3 Where sitting is noticed, it should be removed so as to ensure that the full water way is available for passing of flood discharge where no flooring exists, care should be exercised to avoid excessive removal of silt below the original bed level as ascertained from the bridge register on the completion drawing on by trial pits, and on no account should silt be removed below the original bed level.
 - 1.2.4 In the case of rivers which have shown a tendency for progressive rise in bed level over the years desilting may not be economical on effective and the only long term remedy may lie in raising the bridge to provide adequate clearance above the HFL. All such cases should be specially investigated and reported to the head quarter's office with suitable proposals.
 - 1.2.5 Protective works and river training works should be examined for their condition and any repairs found necessary should be completed before the advent of the monsoon scour holes should be filled with boulders. All repairs to bridges and flood damages should be completed before the monsoon.

II

1.2.6 The Rivers and floods register maintained by ADENs should be brought up to date and kept ready for further posting.

1.2.7 All bridges which are liable to be affected by Railway affective works should be marked with "RAW" tablet on the top of one of the up stream parapets in each case the tablet shall have engraved on it the RAW followed by a raw mark for pointing in the direction of the Railway affecting storage mark in question (details see appendix)

1.3 Danger Levels and HFL mark on bridges:

1.3.1 The danger level should be marked with bright paint on an abutment on pier of every bridge so as to be seen easily by a patrolman / watchman or any inspecting official off-white background should be provided for the red marking to ensure clear visibility even at night with the aid of hand signal lamp or electric torch. The marking of the HFL should be done with white or black paint depending on the colour of the substructure. The location of the danger level and HFL marks should be such that these can be conveniently seen by a person proceeding along the bridge in the normal direction of traffic in the case of double line and in both directions in the case of single line

1.3.2 In the case of canals the full supply level (FSL) should be painted with white paint.

1.3.3 At important bridges where the daily water levels are required to be recorded, gauge should be painted on the up stream and down stream sides of the pier or abutment where the lowest water level can also be read.

1.4 Formation:

1.4.1 The kilometerages of yielding formations where cross-levels go out frequently should be identified and recorded in a register. The Sr. SE. / SE. (P-Way) concerned should keep a close watch on such stretches by checking the cross levels at every joint and at the center of each rail once a day or at such intervals as warranted and recording the observations in a register. Excessive variations in cross-level likely to affect the safety of running trains should be promptly rectified and wherever considered necessary, temporary speed restrictions imposed. The particulars of attention given and speed restrictions imposed should be entered in the register and initiated by the Sr. SE./SE(P.Way) concerned.

1.4.2 On double line banks having the problem of yielding formation, it is generally considered good practice to maintain the cess side rail uniformly higher than the fairway side rail by about 2 mm since the former has a tendency to settle faster than the latter.

- 1.4.3 High banks on the approaches of bridges and also at the vulnerable locations should be examined in respect of their width, level of cess and condition of slopes, duly keeping in view any past history of slips, washouts etc. wherever repairs to cess, rain cuts etc. on stabilization of slopes by flattening the same or by provision of sub-banks boulders drains, revetments etc. are considered necessary the same should be planned and executed systematically so as to be completed before the onset of the monsoon. Where the stability of bank is affected by capillary rise of water from borrow pits nearby, steps should be taken to drain the same into the nearest water course as far as practicable.
- 1.4.4 For the various types of work mentioned in para 1.4.3 above the priorities should be decided by the sectional Sr.DENs / DENs, taking into account the extent of speed restrictions or / and safety hazard that may be involved in each case.
- 1.4.5 In bad formations, where boulder drains have been provided at intervals for drainage of the ballast pockets, it is necessary to ensure their effective functioning by periodic cleaning. This should be done by taking out the boulders, removing the accumulated muck and dirt and re-packing the boulder in position. The use of graded boulders will help minimize the problem of clogging of the drains.
- 1.4.6 Heaps of surplus cinder, boulders, etc. left along the cess after carrying out emergency repairs to banks which might have slipped during the previous monsoon, constitute potential causes for fresh trouble as they may affect the drainage of the track bed and also add to the load on the cess contributing to slips. Special care should therefore be taken to remove such surplus materials to safer locations.
- 1.5 *Safety of cutting and hill slopes:*
- 1.5.1 Where the line traverses hilly terrain, obstructions may be caused during the monsoons by the dropping of boulders on slipping down of larger masses of earth or disintegrated rock from the hill slopes. All such locations should be carefully inspected every year, well in advance of the commencement of the monsoons with special attention paid to those kilometer ages which have been listed as vulnerable on account of past history of such assurances, loose boulders and disintegrated rock masses which are found to be dangerous, should be marked and brought down on a programmed basis taking care to arrange for the fallen material etc.
- 1.5.2 At location where it has been found necessary based on experience during the previous year, to construct earth retaining structures to prevent further slips, to provide rock dowels or balls to stabilize rock faces against sliding down, such works should also be undertaken and completed, as far as possible, before the onset of the next monsoon.
- 1.5.3 Locations where the risk of further slips or rock falls has not been eliminated by carrying out appropriate stabilisation measures should continue to be kept on the vulnerable list and arrangements made for their being guarded by stationary watch men or mobile patrolmen, as warranted in each case.

1.6 Preliminary arrangements for patrolling.

1.6.1 Prior to the commencement of every monsoon, the DEN shall review, conjointly with the ADEN's, the lists of sections to be patrolled and the vulnerable. Locations to be watched, and make such changes as may be found justified with the approval of the Sr.DEN(Co.)for each of the sections to be patrolled ,patrol charts should be prepared and the requisite number of copies the re of should be supplied by the DEN, well in time ,to the ADEN's/Sr.SE/SE(p.way)and all other concerned.

1.6.2 The equipment for patrolman and stationary watchmen should be checked by the Sr.SE/SE (p.way) and replenished well in time so as to be in readiness for introduction of patrolling at short notice.

1.6.3 The selection of suitable patrolmen and stationary watchmen and their assignment to the different beats should also be completed well in advance of the monsoons. Intelligent, experience and trust worthy men should be selected. Preferably those who can read bridge and telegraph/electric post nos. should be chosen, they must be trained where necessary and tested for their knowledge of rules. T he proposed assignments for them must be detailed well in advance. Sr.SE/SE (p.way) shall ensure that men selected for patrolling fully understand the rules and to apply them intelligently. The men selected for patrol duties should be sent for vision test and not employed as patrolmen un less they have passed the requisite medical test .An assessment should be made of the total number of men required and twice this number selected so as to allow for emergency patrols and for relief in the case of rest on illness.

1.6.4 The Sr.SE/SE(p.way) shall submit a certificate to the Divisional Engineer through the Assistant Engineer by 15th May that he has made all arrangements for monsoon patrolling and for watching vulnerable locations, bridges. and that patrolmen and that patrolmen and watchmen have been made conversant with their duties, rules for protection of the line and vulnerable locations in their beats .He will also submit to the Assistant Engineer a list of names of patrolmen and watchmen with their duties /location assigned.

1.7 Materials for anticipated emergencies.

1.7.1 Arrangements should be made to stock sufficient quantities of rails, sleepers, materials for cribs, emergency girders, ballast, cinders, boulders etc. At suitable points so that the same may be rushed to the site at a short notice as and when required.

1.7.2 Boulders should be stacked at locations above the HFL and as close as possible to the vulnerable points such as mole heads of the guide on the points of severe attacks and deep scours. The boulders reserve should be stacked on both the sides of the streams so that protective action could be taken on any of then banks.

1.8 Rain Gauges:

1.8.1 The Sr.DENs/DENs should maintain a register of rain gauges installed within their jurisdiction indicating the designation of the persons manning them. The rain gauges must be inspected prior to the commencement of the monsoon to ensure that they are in working condition and replacement of unserviceable parts arranged promptly. It should be ensured that daily readings of every rain gauge are taken at 8.30 hrs.in the morning and weekly returns of rainfalls are submitted to the ADENs and Sr.DENs/DENs. The incidence of rainfall exceeding 75 mm, during 24 hrs. Should be advised by the persons in charge of the main gauge to the ADENs, Sr.DENs/DENs. When there is continuous heavy down pour hourly readings of the rain gauge should be recorded so as to ascertain the intensity of rainfall.

1.9 Other Matters:

1.9.1 The equipment of Accident Relief Trains on the division and the Monsoon Relief Train based at Araku should be checked up and necessary action taken to ensure that all the prescribed materials, tools and plant complete and in good order before the commencement of the monsoon.

1.9.2 All temporary Engineering indicators, including the 'C' and 'T' board to be used at vulnerable locations should be kept well painted and ready for use, along with the requisite number of lamps in good working condition.

1.9.3 All trollies and diplorries should be checked up and maintained in good working order, with adequate stocks of consumable stores. Spare push trolleys, if available, should be kept in readiness at the Hd.Qr. of Sr.Section Engineer/Section Engineer (P.Way) and/ or other station in the proximity of known points of danger, Motor Trolleys must be checked up for the fitness of their conditions and an adequate stock of consumable stores kept ready.

1.10 Cutting of dried up trees

1.10.1 Dried up trees and sometimes even not so sound green trees adjacent to the track on an island platforms at stations may get uprooted when a gale or thunderstorm lashes and fall on the adjacent track obstructing movement.

1.10.2 The ADENs/Sr.SE/SE (P.Way) should survey the trees adjacent to the track, on the slopes of banks or cuttings on island platforms and other locations where chances of obstruction on the line exist if any tree on a portion of tree falls on the adjacent track, and arrange for their cutting/lopping on priority so that such occurrence can be prevented. Sound green trees should not be cut.

1.10.3 Barring emergencies, staff and officers should not be allowed to go on leave during the monsoon month. In each case, the specific prior approval of the DRM/CE should be obtained.

2. Specific instructions to be followed during monsoon are reproduced below for compliance:
 - 2.1 A patrol book containing sufficient number of pages shall be supplied to each patrol with a tin case. The book shall be serially numbered to correspond with the number of patrol on each section. Where the patrolling is done only by night, the patrol books shall remain in the custody of the Station Master/Switchman during the day.
 - 2.2.1 In case of exceptionally heavy rain or abnormal floods occurring during the monsoon period the Sr.SE/SE (P.Way)/JE-I/JE-II (P.Way), PWS and Gang mates shall on their own initiative organise patrolling by the Gangs of these portions of the line which are likely to be affected thereby, until the danger passes. This shall be done irrespective whether regular monsoon patrolling by Patrolman in force or not. In case of heavy rainfall and floods, the gang patrols shall pay special attention to known points of danger, such as banks and cuttings which are liable to slips or subsides bridges and their approach banks likely to be affected by floods and portions of the line which may be endangered by railway affecting tanks. In case of cyclone or heavy gale, the patrolman shall also inspect the bridges which are likely to be fouled by falling of trees etc. (vide GR/SR Para 15.05.02)
 - 2.2.2 Duties of patrolmen (vide IRPWM Para 1010) the duties of a patrolman shall be as follows:
 - (a) Walk to and fro over the beat in accordance with the chart pertaining to his "Patrol-section" looking out of subsidence slips, signs of erosion, trees shown across the track during storms or any other causes likely to endanger the safety of line. Bridges and their approaches should be especially watched.
 - (b) Apprehend damage to line when.
 - (i) The flood exceeds danger level at any of the bridges.
 - (ii) When there is damage to the protection work or on approaches even before danger level is reached.
 - (iii) The water one side of the embankment is at a much higher level than on the other side.
 - (iv) When any obstruction such as a fallen tree is blocking the water way of a bridge.
 - (v) The track shows sign of a settlement.
 - 2.3 The patrolman shall, during his duty hours, patrol his beat as specified by the Sr.DEN/DEN. A Patrolman whose beat terminates at a station shall, on reaching there, present his patrol book to the Station Master/Switchman, who shall enter there in the time of his arrival and departure and sign the book.

VII

The name of the Patrolman and his time of arrival/departure shall also be recorded in station diary. At the other end of the beat where there is no station the patrolman shall exchange his patrol book with the patrolman of the next beat and shall then retrace his beat. The intermediate patrolman shall also exchange the patrol books accordingly. In this way, each patrol book will be conveyed from one station to the other and back.

If a patrolman, on arrival at the end of his beat in the mid section, does not find the next patrolman to take own his patrol book, he shall after waiting for 15mts, proceed ahead until he meets him on the patrolman shall report such cases of absence of patrolman from the nominated beat to the gang mate on the following day. If there be any gang hut on the way, he shall advise the gang mate immediately for deputing another gang man for patrolling (Vide GR/SR-1996 Para 15.05.06 & 15.05.07)

- 2.4 Station Master/Switchman shall verify whether the patrolman coming on duty an sober and fully equipped that their lamp are trimmed and filled with oil and that they leave for their beats on time (Vide GR/SR-1996 para 15.05.08)
- 2.5 If patrolman does not turn up within 15 minutes of his scheduled arrival, the Stationmaster on duty shall take the following action.
 - (a) He shall stop run through trains proceeding in the next block section, out of course.
 - (b) He shall advise the Station Master at the other end of the Section to take similar action and also advise the section controller.
 - (c) He shall issue a caution order in from EP/T 80 to every train proceeding into the block section, advising the driver to be on the alert and to observe a speed restriction of 40Kmph during the day when visibility is clear and 15 Kmph during the night or arrives and reports that the line is safe for passage of trains.
 - (d) He shall sent out a station staff/trackman to ascertain the whereabouts of the patrolman and the reason for delay and, in case the patrolman is not found, the Station Master shall immediately contract the concerned gang mate/Sr.SE/SE (Pway) to arrange for another Patrolman (Vide GR-SR/2002, Para 15.05.10)
- 2.6 Duties of patrolman in regard to safety of the line (Vide GR-SR/2002,Para 15.05.11).
 - (a) The patrolman shall walk to and for over his beat in accordance with the chart pertaining to the beat, looking out for subsidence, slips, signs of corrosion, traces blown across the track during storms or any of the cause, likely to endanger the safety of the line. Bridges and their approaches shall be specially watched.
 - (b) He shall apprehend damage to the line when.
 - (i) The flood level reaches on higher than the danger level marked on any E/the bridges.

VIII

- (ii) The water one side of the embankment is at a much higher level than on the other side.
- (iii) Any obstruction, such as a taken trace, is blocking the water way of a bridge .
- (iv) The track shown signs of settlement or
- (v) Failure of any part of bridge structure or its approach, which may endanger the safety of the bridge, is likely.
- (c) He shall take immediate stops, in accordance with the instruction given below to stop trains when any portion of the line is rendered unsafe or is likely to be rendered unsafe due to abnormal rain or flood or any other cause.
- (d) When no danger is apprehended, the patrolman shall stand on the cress on the left hand side of the train and facing if and inhibit his number plate, turning the light of his lamp on to if so that the number can be seen from the passing trains. He shall also whistle continuously during passage of the wheel trains.
- (e) He shall obtain the signature of the Stain Master or switchman on duty at the Station concerned for his arrival and departure and exchange patrol book with adjacent patrolman, as the case may be.
- (f) He shall exchange information with adjacent patrolman and Stationary watchmen about the condition of their beats.
- (g) He shall heed instruction from drivers in respect of any dangerous condition noticed enroute by the latter and proceed to the being breached or otherwise rendered unsafe for traffic; the patrolmen shall out as follow.
- (h) In the event of any portion of the being breached or otherwise rendered unsafe for traffic, the patrolmen shall out as follow.
- (A) In cases where two patrolmen are employed:
 - (i) Danger signals shall be shown at once in bath directions.
 - (ii) The two patrolmen shall then proceed in opposite direction, showing danger signal, and at 600 meters from the point of obstruction each shall place one detonator on the rail and therefore, proceed to a distance of 1200m from the point of obstruction where he shall place 1200m from the point of obstruction, where he shall place three detonators on the rail about 10m apart, on double line section, the detonators shall be placed on the line trouble on which trains would normally approach.

- (iii) One patrolman shall then remain at the place where he has fired three detonators and continue to show the stop hand signal, while the other patrolman, who is closer to the nearest block station, shall proceed with all haste to that station, exhibiting stop hand signal. If there be any gang on the way, he shall inform the gang mate of the occurrence the mate shall immediately proceed with his gang to the affected spot and ensure process protection of line and attend to such repairs as are within his competence. On reaching the station, the patrolman shall inform the Station Master/Switchman about the danger. He shall, there after, return to the site of obstruction and shall continue to protect the line till he is relieved by the gang mate.
 - (iv) Should the nature of the obstruction be such as to render it absolutely impossible for either of the patrolman to get across the same, as far instance a wash away with strong current, one of the men shall remain at the site of obstruction and show stop hand signal and endeavor to stop trains approaching from the opposite side, while near, taking action as described in Para (ii) and (iii) above.
- (B) In case where a single patrolman is employed and the damage or obstruction or detailed on single line.
- (i) The patrolman shall a red hand signal at a prominent place to warn any train, which may approach from one direction and then proceed in haste in the opposite direction and place one detonator at 600 M and 3 detonators about 10 M. apart at 1200 M from the obstruction.
 - (ii) He shall thereafter return immediately and protect the other side with detonator in a similar manner.
 - (iii) In the event of it being absolutely impossible to get to the other side of the obstruction (as in a wash away with strong current) the stop hand signal shall be placed in such a position that it may be seen from as long a distance as possible by a train approaching from the opposite direction.
- (C) In cases where a single Patrolman is employed and the danger or obstruction is detected on a double line section.
- (i) When obstruction is only on one line, the Patrolman shall a red hand signal on the opposite side near the site of obstruction and run in the direction from which trains would approach and place detonators as described in Sub-Para (B)(I).
 - (ii) When both the lines are blocked, the Patrolman shall place red hand signal at a prominent place so as to warn any train approaching on one track. Then he shall run along the other track in the direction from which trains would approach and place detonators as described in Sub-Para (B)(i). He shall thereafter, run back immediately and protect with detonators the other line (on which the red hand signal had earlier been placed) by placing detonators as described in sub-para B(i). After having protected both the lines, the Patrolman shall proceed with all haste towards the nearest station exhibiting the stop hand signal. If he finds it impossible due to the station on the other side and report the matter on arrival,

to the Station Master/Switchman on duty. If on the way, he passes by a gang, he shall intimate the gang mate of the obstruction and the later shall proceed with his gang to the site of obstruction and ensure proper protection of line and attend to such repairs as are within his competency.

- (iii) In all cases mentioned in sub-rule (h) above, after having protected the line and summon is assistance, the Patrolman shall resume patrolling of their beat.

2.7

- (a) Record the daily water level including the highest level obtained during the peak of each flood.
- (b) Measure and record the depth of flood and the source around piers and abutments, by sounding, and velocity of flood by float on current meter.

2.8 Special precaution when track is submerged (vide IROWM - 99 para 717).

- (i) The following precautions shall be observed when the track is sub-merged.
 - (a) In all cases train shall be stopped dead and allowed to proceed at a speed not exceeding 10kmph.
 - (b) If water rises over the top of the ballast but in below rail level, the train should be checked before each train by two men walking abreast one at either end of the sleepers, and only if the trains has not been disturbed, should the train be allowed over the train.
 - (c) When water overtops the rails, the Sr.SE/SE (P.Way), and JE-I/II pilot the train, after ensuring that the track is safe by walking over the track and checking by means of probiny, subject to depths, as under not being exceeded.

Permissible depth of water for passenger of trains

In the case of cause ways that are flooded and the velocity of current in significant, trains may be permitted to pass when the depth of water above rail level does not exceed the following values, provided in each case Sr.SE/SE/JE-I/II(P.Way) has satisfied himself by walking over and probity that permanent way is intact and in a fit condition.

- | | |
|------------------------------|--------|
| (a) Passenger & Mixed trains | 300 mm |
| (b) Goods train | 450 mm |

- (2) Telegraphic advise should be sent by the Sr.SE/SE, HE-I/II to the assistant and DEN, DRM and CE when water rises above ballast level again when it subsides. This should be followed up by special reports to the ADEN and DEN. Record of such occurrences should be entered in the Sr.SE/SE's section register.

3. Specific instruction after the monsoon.

- 3.1 Attention to be given on run down lengths in the entire gang beat to restore the section to good shape.