EAST CENTRAL RAILWAY

CORRECTION SLIP NO. 12

(ACCIDENT MANUAL BOOK -2007)

The following correction to be made in Accident Manual Book- 2007

Delete the existing APPENDIX-N on page no. 208 - 225 and substitute with the following :–

APPENDIX-N

Observation/ Measurement Proforma for Accident Investigation/ Inquiry

General Guidelines

1. Careful observation of clues and a comprehensive record therof is vital for accident enquiry. In addition, a comprehensive record of track and rolling stock parameters and operating features is required for investigation of derailments.

2. There are two broad categories of derailment

   Sudden derailment caused by wheel set jumping of the rails. Such a derailment indicates that the derailing forces were high enough to suddenly force the wheel off the rail. These are typically caused by failure of vehicle/track components, obstruction on track, entaglement of hanging parts of rolling stock etc. These derailments are charecterised by a short mark on rail table between point of mount and point of drop. In some cases the point of mount may even be absent.

   Dertailment by flange climbing, caused by wheel mounting the rail in a relatively gradual manner. It indicates that the derailing forces were powerful enough to overcome the normal stabalising forces, yet not sufficient to cause a sudden derailment. Such derailments are charecterised by a longer mark on the rail table between point of mount and point of drop. Track and rolling stock parameters and operating features influence the rail- wheel interaction forces and, hence, their complete record and a comprehensive analysis is required to arrive at the mechanism of derailment. Cause and consequence of derailment are required to be differentiated through this comprehensive analysis.

3. Locating and examining the wheel mounting mark (s) at the initial point of derailment is very important for identifying the category of derailment. Precise measurement and critical and detailed examination of the wheel mounting marks should be made e.g. their length, strong or faint, broken or continuous, single or multiple, etc. photographs should be taken of such marks; not only on the rail, but also on the fastening, slippers and ballast.

4. Derailment proneness increases with increased Lateral wheel force, reduced Vertical wheel load (Off loading) and increased positive Angularities of wheel. Derailment proneness becomes substantially higher in case of axle moving with a persisitently positive angularity. Track and rolling stock parameters and operating features should be critically analysed for their contribution towards these causes. In case of derailment in curve, proper functioning of bogie rotation system to ensure undue angularity needs close examination. Contribution of track twist and spring defects and twist in bogie frame/ vehicle underframe to derailments caused by wheels Off loading needs to be analysed. In case of derailment at high speed, parameters affecting vehicles oscillation and dumping thereof needs a close analysis.

5. Wheel analyzing the mechanism of derailment, relative contribution of track and rolling stock parameters to the rail-wheel interaction forces needs a comprehensive analysis. Reference should be made to the safety limits/Maintenance limits specified in IRPWM/IRCA Rules/Maintenace Manuals.

6. Proforma for measurement of Locomotive, Wagon, and Carriage are attached as Annexure –A, B & C respectively for recording the details. The Joint Measurement to be submitted by Senior Supervisors shall not be complete till all the measurement of rolling stock and track as per enclosed proforma have been recorded. Only completed joint measurement w.r.t. rolling stock and track shall become a document to be relied upon by the enquiry committee for drawing conclusion regarding cause of accident.

7. No enquiry shall be completed before the complete measurement of rolling stock and track is available and made part of the enquiry report. Enquiry committee may get additional measurements done as per requirement of the derailment case.

8. The photographs of the concerned sections of track and part of rolling stocks shall be taken and annexed in the enquiry report. ART personnel should be trained for identifying such relevant part of tracks and rolling stocks involved in the accident.

9. In case of derailment of passenger trains causing injury to passengers, video recording of the concerned part of track and rolling stock shall be carried out by nominated ART personnel, trained for the purpose.

Photography and vedeography of accident site shall be with great care & precision, similar to a crime scene photography/videography. ART personnel nominated for this shall suitably be trained for the purpose. The photographs, videos should be self explanatory such that relevant conclusion can be drawn.

10. Site sketch of the derailment/accident location shall be prepared giving due care that all the relevant items are included alongwith the dimensions. A sample sketch is attached for guidance. Instructions for the preparation of sketch of the site of accident as given in “Accident Manual” shall be followed.

Preservation of relevant clause, documents & photographs/videogrpahy of the accident scene shall be done under the supervision of Safety Officials of the Division.

11. M&C report from RDSO must also be part of accident enquiry report in case accident is attributed to brerakage of any component of track or rolling stock.

12. In case of suspected sabotage, Tell-tale sign must be preserved and recorded.

13. If rail/weld failure is suspected to be cause of derailment, asssessment of impact loading to which the rail/weld was subjected to prior to its failure becomes important. In such cases, WILD data for few precedings trains shall be analysed for critical alarms and any critical alarm shall be brought out and deliberated by enquiry committee.

14. Observarion of SM’s Pannel need to be recorded in case accident takes place in station area.

15. Speed recorders and event recorders in the locomotives shall be freezed immediately post the accident. SM’s control panel shall be freezed till the time position of the knobs, switches, points & crossings etc. are jointly recorded. It is the responsibility of the concerned controlling officer/safety officials to ensure freezing of the above. Safety official shall take into custody all the relevant documents, broken parts etc.

Annexure – ‘A’

Proforma for Motive Power/Locomotive (Diesel & Electric)

Proforma to be filled in case of accident / derailment when loco is involved in accident.

1. **Basic information:**
   (a) Date of Accident:
   (b) Train No.:
   (c) Loco Class:
   (d) Loco Number:
   (e) Loco manufacture year and place:
   (f) Base Shed of Loco:
   (g) Date & Place last POH:
   (h) Kilometers earned after last POH:
   (i) Date & Place of last major inspection:
   (j) Date & Place of last schedule inspection:
   (k) Whether any schedule is overdue?:

2. **Give brief particulars of the safety items not provided or provided but missing/not working**

   Whether Loco is provided with:

Safety fittings	Provided	Working
Headlight		
Speedometer		
Speed Recorder		
Flasher light		
Horn		
Brake system		
VCD		

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3. **Check & Record the observations as follows:**
   (a) Position of control handles, cutout cocks etc. after the accident.
   (b) Functioning of brake synchronizing valve-whether working or not.
   (c) Position of brake blocks after accident- whether applied or not.
   (d) Condition of cattle guard.
   (e) Any sign of seizure of roller bearing in Axle box including condition of its components.
   (f) Condition of Pivot and Side Bearer arrangement bogie including obstruction to Bogie rotation.
   (g) Condition of Friction Damper components/Hydraulic Dampers.
   (h) Condition of Traction Rod/Guide Rod including its connection.
   (i) Condition of Traction Link including its connection.
   (j) Condition of Lateral Stop components between Bogie and Loco body underframe.
   (k) Any other observation in respect to mechanical defect of the locomotive, which might have any bearing on safe running of loco.

Note: Defective or broken material should be sent to CMT for testing, if necessary.

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4. **Measurement of Wheels for All Classes of Locomotives with wheel gauge**

(04 locations applicable for Bo-Bo Locos)

S.No.	Description	Observed Value (in mm)			Remarks
1.	Particulars of axle (ID No.)	Observed Value			
		1			
		2			
		3			
		4			
		5			
		6			
2.	Diameter of wheel at tread		LH	RH	
		1			
		2			
		3			
		4			
		5			
		6			
3.	Wheel Flange thickness		LH	RH	
		1			
		2			
		3			
		4			
		5			
		6			
4.	Wheel Root wear		LH	RH	
		1			
		2			
		3			
		4			
		5			
		6			
5.	Tread wear		LH	RH	Tread wear should be measured from tread at 63.5 mm from wheel gauge face (from the back face of flange) in BG and at 57 mm from wheel gauge face (from the back face of the flange) in MG.
		1			
		2			
		3			
		4			
		5			
		6			
6.	UST of axle: Give the date of last UST test done	Axle	Observation		Information is relevant in case of axle breakage.
		1			
		2			
		3			
		4			
		5			
		6			

Notes:

1. Wheel number one is the outer end axle of truck under the short hood and wheel count increases towards the Long hood on diesel loco, whereas for Electric loco, wheel number one is the outer end axle under cab-1 (Cab-1 is that side of the loco which has the compressers and Cab-2 is that side of the loco which has the ARNO convertor) and wheel count increases towards the Cab-2.
2. The measurements of wheels are to be done using wheel gauges to RDSO drawing No.-SKDL-3592 for all BG locomotives except WAP-5 locos. For WAP-5 locos RDSO's drawing No. SKOL-4446 & SKDL-4447 may be followed.
3. All measurements are to be taken on a level, un-canted track at the nearest yard.
4. Service limits given in the Maintenance Manual are for good maintenance practice and these are not safety limits. However, the measured values shall be compared with the service limits and degradation in values shall be discussed while finalizing the findings.

S.No.	Description	Observed Value (in mm)		Remarks
7.	Wheel gauge: For checking wheel gauge, three measurements at equal spacing on the inner periphery of the two wheels on the same axle is to be recorded. Check for bent axle, if any.	1		All measurements shall be taken on a level tangent un-canted track. Information is relevant in case of wheel disc shifting/ bent axle only. For safety, similar limits as applicable for track gauge are relevant for wheel gauge also.
		2		
		3		
		4		
		5		
		6		

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5. Measurement of other relevant items:

S.No.	Description		Observed Value (in mm)	Remarks
1.	Buffer / coupler height measurement of parameters such as buffer length etc. may also be done to check possibility of buffer entanglement.			All measurement shall be taken on a level tangent un-canted track. This measurement is required to be taken only in case trailing stock is with buffers.
2.	Lateral clearances	End Axles (1,3,4 & 6)		
		Middle Axles (2 & 5)		
3.	Lateral clearances	End Axles (1,2,3 & 4)		Applicable for Bo-Bo locomotives only.
4.	Longitudnal clearances, between axle box & bogie. Pedastal liner (for all axles)			Except: WDP-3A, WDG-4, WDP-4, WDP-4B, WAP-5, WAP-7, WAG-9 locomotives
5.	Longitudnal clearances between axle box and bogie pedestal liner (for middle axles)			Applicable to WDP-3A locomotive only.

6.	Height of Rail Guard from rail level		
7.	Condition of suspension Springs i.e. normal/ broken fresh and old fracture or deformities occurred after derailment due to sudden impact.		
8.	Deflected height of coil spring after re-railing on level, un-canted track.		
9.	Condition of rubber/ elastomeric Spring Assembly at the Secondary stage.		

Note:- Measurement of items (e) to (j) in Para 3 & item 8 & 9 in Para 5 will be done as per site condition.

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Annexure- 'B'

Proforma for Wagon

Note: - Details regarding all derailed vehicles should be given except:-

1. (i) Where vehicles have derailed due to locomotive derailment.
   (ii) When the obvious and indisputable cause is sabotage or an obstruction on track.
2. Front and rear and left (L) and right (R) are with respect to direction of movement.
3. For an obvious cause of derailment such as a broken axle, spring dropping off the run, and/or some part of undergear hanging, loose and causing obstruction; only relevant particulars need be filled.
4. Particulars for each derailing vehicle should be given in one sheet. Information against columns (5), (6), (8), (16), (17), (21), (22) should invariably be given for adjacent wagons on the same sheet.
5. Relevant details of adjacent vehicles should also be given if cause of derailment is not apparent.

S.No.	Date of incident & Time	Train No.	Details of BPC alongwith the name of station from where it is issued and of engineer(C&W) who issued	Wagon No.	Type	Mech. Code	Tare in Tonnes	Carrying capacity and axle load	Built Date	Return Date
1	2	3	4	5	6	7	8	9	10	11

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POH Particulars		ROH Particulars		Payload in Tonnes		Commodity loaded and remarks regarding uneven loading (give sketch for details of uneven loading)	Station		Position from Engine
Date	Shop	Date	Depot	From Lables	From actual Weighment		From	To	
12	13	14	15	16	17	18	19	20	21

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Buffer/Coupler Height	Wheel and axle face Particulars (in case of breakage of wheel/axle)		
(i) Measure Buffer/Coupler height after uncoupling & re-railing on un-canted level track. (ii) Record whether there is buffer entanglement (Yes/No)	Axle face Particulars	Ultrasonic particulars on the hub of the disc	Stamping particulars on wheel disc regarding Manufacturer/RA/RD
22	23	24	25
End 1 L	1L	1L	1L
	1R	1R	1R
End 1 R	2 L	2 L	2 L
	2 R	2 R	2 R
End 2 L	3 L	3 L	3 L
	3 R	3 R	3 R
End 2 R	4 L	4 L	4 L
	4 R	4 R	4 R

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Wheel and Axle								
Wheel diameter (i) Measurement (ii) Record whether below condemning size (Yes/No)	Wheel gauge in mm *(taken at three places)	Observation after measuring the profile with tyre defect gauge (Good/Rejectable) **						
26	27	28						
	1		Thin flange	Sharp flange	Worn out root	Deep flange	Hollow tyre	Flat tyre
		1L						
	2	1R						
		2L						
	3	2R						
		3L						
	4	3R						
		4L						
		4R						

* The wheel gauge is to be measured at the horizontal plane passing through the center of axle

** The wheel profile is to be checked with tyre defect gauge only

(Ref: IRCA Pt.III Rule No.3.2.2(d) and 4.18.1 Plate No.-57 to 66)

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Roller Bearing (To be recorded in case of any abnormalities observed in Roller bearing/Axle Box)		
Condition of face cover plate	Condition of locking plates & studs	Condition of Roller Bearing and its components
29	30	31

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Axle Box (for IRS Stock/UIC) **(To be recorded only when failure of plain bearing is involved as a cause)**				
Brass thickness in (mm)	Codition of box and brass	Condition of sole plates	Condition of journals	Clearance between brass and collar of journal in (mm)
32	33	34	35	36

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Axle Guard (for IRS/UIC Stock)			
Lateral clearance between axle box and axle guard in (mm)	Whether axle guard can work clear of axle box	Are the axle guard bent or otherwise damaged to prevent free movement of axle box	Remark regarding bridle bar
37	38	39	40

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CLEARANCEES FOR CANSUB BOGIE **(Corresponding measurements to be taken for IRS/UIC Bogie)**			
Type of Bogie	Lateral clearance between side frame & bolster in mm	Lateral clearance between side frame & axle box adopter in mm	Longitudinal clearance between side frame & axle box adopter in mm
41	42	43	44

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SPRING AND SPRING GEAR						
Any Broken/ cracked/ missing/ clearance of shackle and shackle pin and general condition (for UIC/IRS)	Thickness of packing plate under spring seat in mm	Remarks whether any spring eye touches sole bar (for laminated spring only)	Condition of suspension springs i.e. normal, broken/ fresh and old fractured or deformities occurred after derailment due to sudden impact	Camber of spring in mm after re-railing on a level uncanted track (for laminated spring only)	Deflected height of coil spring after re-railing on level, uncanted track (for Casnub)	Condition of elastomeric pad above adaptor (for Casnub)
45	**46**	**47**	**48**	**49**	**50**	**51**

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Bogie		
Condition of center Pivot including lubrication and wear (for Casnub)	Condition of Side Bearer including Vertical clearance at side bearers (for stock having clearance type side bearers only)	Condition of Friction Snubber Wedge Assembly (for Casnub)
52	**53**	**54**

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Whether a load is placed on more than one wagon	Any other defect in vehicle which may have contributed to or caused the derailment	Details of broken parts giving location w.r.t. point of mount and drop	List of damages to the wagon due to accident	Other observations*
55	**56**	**57**	**58**	**59**

Note:- Measurement of Item 3, 4 & 5 of opening note, item **42, 43, 44, 46, 47, 49, 50, 56 & 59** will be done as per site condition.

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Annexure- 'C'

Proforma for Carriage

Proforma to be filled in case of Derailments:

Note: Details regarding all derailed vehicles should be given except:-

1. (i) Where vehicles have derailed due to locomotive derailment.
   (ii) When the obvious or indisputable cause is sabotage or an obstruction on the track or broken axle or wheel.
2. Particulars for each derailed vehicle should be given in one sheet. Information against columns nos. (5), (6), (7), (14), (50) and (51) should invariably be given for adjacent coaches on the same sheet.
3. Front and Rear, left (L) and Right (R) are with respect to direction of movement.
4. For an obvious case of derailment such as a broken axle, spring dropping off on run, and/or some part of undergear hanging loose and causing obstruction, only relevant particulars need to be filled.
5. Relevant details of adjacent vehicles should also be given if cause of derailment is not apparent.

S.No.	Date of incident & Time	Train No.	Details of BPC along with name of the station where issued and Engineer (C&W) who issued it.	Vehicle No.	Type	Tare in tonnes	Carrying capacity in tonnes	Built date	Return date	POH details
1	2	3	4	5	6	7	8	9	10	11

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Station		Position from engine	Wheel gauge in mm (to be measured at three locations) measured in empty condition at the horizontal plane passing through the center of the axle.	Wheel diameter (i)Measurement (ii) Record whether below condemning size (Yes/No)		Any indication of bent axle or wheel having shifted on axle	Wheel and axle face particulars (in case of breakage of any wheel/ axle)		Stamping particulars on wheel discs regarding manufacturer/ RA/RD (in case of breakage of any wheel/ axle)		Observations after measuring the profile with wheel defect gauge (Good/ Rejectable)	
From	To						Axle face particulars	Ultrasonic particulars on the hub of the disc			L	R
12	13	14	15	16(i)	16(ii)	17	18	19	20		21	22
							1L	1L	1L			
							1R	1R	1R			
							2L	2L	2L			
							2R	2R	2R			
							3L	3L	3L			
							3R	3R	3R			
							4L	4L	4L			
							4R	4R	4R			

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ROLLER BEARING

(To be recorded in case of any abnormalities observed in Roller bearing/Axle Box

Condition of axle box, rear and front covers/end cap (FIAT)	Condition of face cover plate	Condition of bearing seal & studs/locking plate and bolts (FIAT)	Condition of Roller Bearing and its components
23	24	25	26

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SPRING AND SPRING GEAR								
Condition of Coil suspension spring i.e. Normal/ Fractured (old/fresh)	Condition of Rubber Spring i.e.Normal /Cracked including length of crack (for LHB only)	Condition of Air Spring including leakage in piping	Deflected height of Coil spring after re-railing on a level uncanted track	Vertical clearances (for ICF)			Condition of Rubber Disc and Bump Stop of Primary Suspension (for LH B)	Height of Bogie Bolster base plate from rail level (for LHB)
				Crown clearance	Bogie frame-Bolster clerance	Body-Bogie frame clearance		
27	28	29	30	31	32	33	34	35

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CONDITION OF BOGIE COMPONENTS			
Condition of Hanger (for ICF)	Condition of Equalising Stay (for ICF)	Condition of Anchor Link (for ICF)	Condition of Control Arm, Rubber element and Bore (for LHB)
36	37	38	39

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Damping System		
Condition of Axle Guide Cum Dash Pot including Oil level (for ICF)	Condition of Hydraulic Dampers	Condition of Anti Roll Bar (for LHB)
40	41	42

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System of Bogie Rotation and Clearance					Condition of Grounding cables, Wheel Slip Protection (WSP), and Speed sensor (for LHB)	Condition of Brake Gear Assembly
Coditions of Center Pivot including verticality of Pivot pin (for ICF)	Condition of side Bearer incuding Oil level and Wear (for ICF)	Condition of longitudinal/ Lateral flexibility of Secondary Spring (for LHB)	Clearance between Traction Center and Longitudinal/ Lateral Bump Stop (for LHB)	Remarks regarding free movement of bolster and pivot and their condition		
43	44	45	46	47	48	49

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Buffer/Coupler height (to be taken on a level uncanted track after uncoupling and re-railing) (in mm)		Condition of Side Buffers Working, dead, drooping, entanglement	Details of broken parts giving location w.r.t. point of mount and derailment and whether breakage considered due to accident	Any other defect in the vehicles which may have contributed to or caused the derailment such as condition of coupler, draft gear pocket, shearing plates etc.	List of Damages to Coaches due to accident	Other observations considered relevant to derailment
Front	Rear					
50	51	52	53	54	55	56

Note:- Measurement of Item 5 of opening note, item 24, item 28 to **49,** item **54** & item **56** will be done as per site condition.

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Annexure- 'D'

Proforma for Track measurement (PART- A)

Proforma showing the detailed particulars to be collected in the case of Permanent Way during an Accident

Soil			Type of Formation	Rain Fall	Ballast		
S.N.	Type e.g. Sandy, loamy clay, Moorum, Black cotton etc.	Condition - Firm, Wet, clushy etc.			Type/stone, Moorum, Sand, Ash etc.	Depth below sleeper bottom in cms. Stating whether clean or caked	Drainage
1	2	3	4	5	6	7	8

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Width of shoulders in cm. from outside of rail				Sleepers				
Left	Right	Left	Right	Type- Wooden, CST-9, steel trough etc.	Condition-New/ second hand damaged/ unserviceable etc.	Density	Square or not	Packing loose or sound
9	10	11	12	13	14	15	16	17

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Rails			Rail fastenings		Rail joints		
Weight 52 Kg/ 90R/75 R etc **(Year of manufacturing)**	Condition of wear (attach rail profile if wear is heavy)	GMT Carried	Dog/screw spikes, keys, tie bars, cotters, loose jaws etc.		Condition: Hogged, battered, low etc.	Staggered or square	Creep- Direction and extent of creep, type of creep anchors used with numbers per rail in the affected section
			Number per sleeper seat	Condition: Tight or loose or missing (in each sleeper)			
18	19	20	21	22	23	24	25

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General remarks about cracks Or Fracture of fish-plates, fish bolts and other components	Description of anti-sabotage measures like reverse jaws, welded rails etc.	Location of points of mount		Location of points of derailment	
		Whether on straight, curve or transition	Whether on a falling grade, level or rising grade and / or on sag	Whether on straight, curve or transition	Whether on a falling grade, level or rising grade and / or on sag.
26	27	28	29	30	31

Note-

(1) Left and right are with respect to direction of Train movement.

(2) The data in Col. 2 to 26 need not be collected when the defect is obviously and indisputably on account of sabotage and/or obstruction on track.

(3) Only broken track material which is not indisputably to be broken after the accident should be included in Col. 26 and should be preserved.

(4) Col. 27 need be filled in only when there is a suspicion about sabotage being the cause of derailment.

(5) Sag extends 90 meters on either side of theoretical junction of the grade lines Col. 29 and 31.

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Proforma for Track measurement (PART- B)

Station No.	Distance apart (metres)	Gauge slack or tight from the Exact **in loaded condition (mm)**	Cross Level **under Loaded condition (mm)**	Marks on sleepers or rail top	Grinding or rubbing marks on rail
1	2	3	4	5	6

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Examination of alignment for perceptible kinds of track distortion in the vicinity of the point of derailment	Subsidence of track	Versine in mm. **In loaded condition**			
		On 20 M. or 10 M. chord depending on practice prevalent on the Railway for flat curves more than 600 M. radius	On 10 M. or such shorter chords as condireded necessary for sharp curves (less than 600 M. radius on B.G. and M.G.)	Remarks regarding length of transition, degree of curve and specified super elevation general alignment etc.	Longitudinal level to be recorded in the case of M.G. and N.G in case of sags and curves
7	8	9	10	11	12

Note-

(i) The point of mount should be marked station No. 0 and the stations numbered serially as (+) for measurements ahead of site of derailment and (--) for measurements in rear.

(ii) The cross level will be measured on the left rail only as determined from the direction of movement.

(iii) Normally measurement will be taken at station 3 M. apart for a distance of 45 meters on either side of 0 station if the cause of derailment is indisputably known, otherwise they will be taken for a distance of 100 meters in rear and 45 meters ahead of zero station.

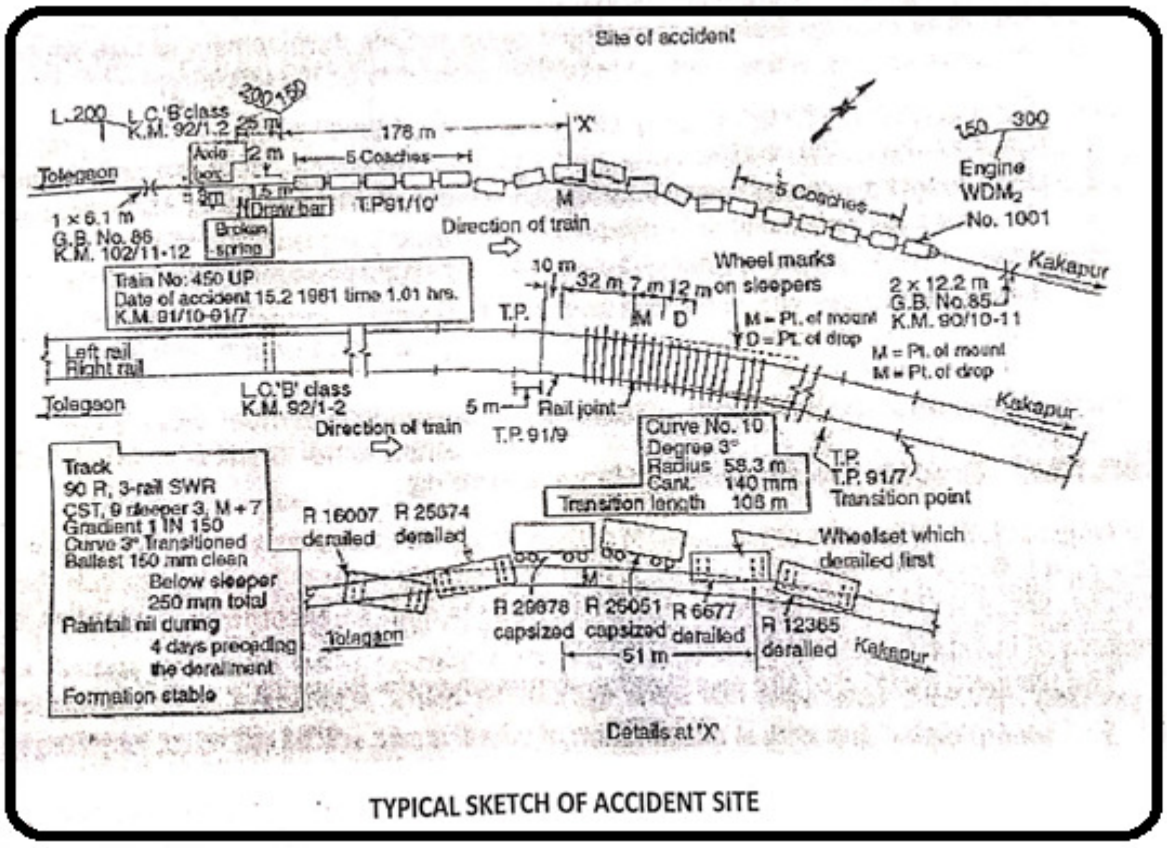
(iv) Where necessary measurements for Col. 3, 4 and 5 may in addition be taken at individual sleepers.

(v) This proforma need not be filled when the cause of derailment is obviously established as due to sabotage, obstruction on track, broken axle, and/or spring having fallen off prior to point of derailment.

(vi) Longitudinal levels should be recorded for 300 meters on rear and 100 meters in front, in case of straights at the middle of each rail and at versine recording points on curves @ 20/10 M intervals.

TO BE JOINTLY SIGNED BY		
SUPERVISOR (C&W)	SUPERVISOR (TRAFFIC)	SUPERVISOR (P.Way)

A SAMPLE OF TYPICAL SKETCH OF ACCIDENT SITE



TYPICAL SKETCH OF ACCIDENT SITE

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SUPERVISOR (C&W)	SUPERVISOR (TRAFFIC)	SUPERVISOR (P.Way)

All concerned will correct English Accident Manual -2007 of ECR accordingly and the same to be brought to the notice of all officials concerned.

Sd/-

Date: 09.04.2019

(Salil Kumar Jha)
Principal Chief Operations Manager
East Central Railway