RAIL COACH FACTORY, KAPURTHALA

MD35131 **DATE: 27.04.2026**

Sub: Issue of Purchase Specification No. RCF-MD-2023-5 Rev-05 for Design, Development, Verification, Manufacture, Validation & Supply for Improved Bogiescompatible for IR-LHB Coaches.

Please find enclosed copy of Purchase Specification No. RCF-MD-2023-5 Rev-05 for Design, Development, Verification, Manufacture, Validation & Supply for Improved Bogies compatible for IR-LHB Coaches for information and necessary action please.

27/4/26

DY. CME/BD

CQM-I, CQM-II, CPLE, CWE/Fur, CWE/Shell, CMM/HSQ, CMM/TKJ

Dy.CMM/Fur/LHB, Dy.CMM/G, CMT, Dy.CPLE-I, Dy.CPLE-II, Dy.CPLE-III, Dy.CMM/Fur, ADE/BD

SSE/Filing Section
SSE/Library
SSE/Records

Copy for kind information to:

CDE
Dy. CME/D/Shell
Dy. CME/D/Fur

DOCUMENT CONTROL

Name	Designation	Signature	Role
Dharmender Kr Ray	JE/BD		Prepared
Aman Bhardwaj	SSE/BD		Checked
Ritika Rashmi	Dy CME/BD		Reviewed
Lalit Kishore	CDE		Approved

LIST OF AMENDMENTS

S. No.	Amendment Date	Revision	Details
1.	28/12/2023	0	First issue.
2.	19/01/2024	1	Amendments to clauses 5.1.1.2 & 5.1.1.4
3.	14/02/2024	2	Clause 5.4 added.Clause 5.1.1.4 amended.Annexure 9 amended. Corrections to headers & footers of annexures.
4.	24/04/2024	3	Clause 2, 3, 4, 5, 5.1.1.1, 5.1.1.2, 5.1.1.3, 5.1.1.4, 5.1.1.5, 5.1.2.1, 5.3(6),8.1(1), 8.2.3(3), 8.2.4, 8.2.6, 8.2.7, 8.2.9, 11.1.1,13.1, 21(2) amended/updated Clause 0.1(3), 8.1(3), 8.2.5, 18.2 deleted, Annexure 7 & 8 deleted and Annexure-9 updated
5.	26/02/2026	4	Revised
6.	23/04/2026	5	Clause 4.1(1),Clause 4.7, 7, 19 and Annexure-4 added, Clause 4.8, 6.1, 11, 15,16amended

1 Scope of the specification

The specification covers the requirements for scope of supply, quality assurance requirements, prototype approval, inspection requirements, training requirements as supplied requirements, project schedule, payment milestones and guarantee warrantee.

This document is to be used as part of the tender document.

2 Brief of field operations issues and corrective & preventive measures

The prime objective of this project is to address field issues listed in table below for improving the operational performance of the bogie:

#	**Brief Description of the Issue**
1.	Premature failure of rubber bonded components
2.	Control Arm housing lug hitting & breakage
3.	Primary damper failures
4.	Primary Coil Spring failures
5.	Dropping of phonic wheel & oiler ring of earthing device
6.	En-route failures of Air Spring assembly and tilting of air spring Assembly
7.	Corrosion of Bogie Frame
8.	Hot axle & bearing failure
9.	Wheel Shelling

Many incremental changes have been made to tackle the above field issues over the years. However, it is now felt that the bogie design needs to be reviewed afresh for a detailed root cause analysis and addressing improving the core design for mitigation of defects and improvement of performance.

3 Scope of Work & Supply

i) To analyze, design, simulate, verify, productionize, validate, field test (short & long term) & fatigue test, initiate series manufacturing and supply of bogies which:

a) Are suitable and optimized for all tendered rolling stock superstructure configurations of LHB coaches and are retro-fittable under the existing LHB coach superstructures.

b) Have a maintenance intervention free operational duration of 3 years or more or 1.2 million kilometers.

c) RCF uses NX as the CAD platform and Team-Centre as the PLM application. All design data exchange shall be compatible with these applications. Hence, compatible softwares to be used for design, drawings, simulation and analysis of bogies for each application as mentioned below:

Application	**Software (Design agency-anyone of following)**
FEM	Hyper works / MSC Master Key Tokens /Nastran patran/ Nastran solver
MBDS	VI RAIL / SIMPAC
Solid modeling/drafting	NX

ii) Supply of bogies as mentioned in purchase order.

iii) Training of IR personnel:

a) Training in the design development process, guidelines for selection of materials and bought out components, manufacturing and assembly processes, testing & commissioning, quality assurance processes and maintenance & overhaul processes.This is expected to be done along-with the progress of the project free of

charge in India (Training in RCF and open line required for maintenance, operation etc.)

b) In case Design Agency is not from India, 50 mandays training in design & development by Design Agencies at premises of Design agency free of charge.

c) Travel, lodging and boarding expenses shall be borne by Indian Railways.

d) All training materials shall be provided in hard and soft (editable PDF) copies.

4 Proposed activities to meet scope requirements:

The following activities are proposed for addressing and improving Bogie:

4.1 Analysis of existing bogies

1. Weight of existing coaches has been given in the specification for reference.
2. Available data of actual oscillation trials of LHB coaches and data of impacts & loads on track by LHB coaches over OMRS & WILD system in Indian Railways tracks shall be provided for framing boundary conditions.
3. The contractor shall conduct Multi Body Dynamic Simulation (MBDS) of LHB coaches with existing bogies on Indian Railways track condition to identify boundary & load conditions during operation/service, to which each component of bogie is subjected to. Detailed report shall be prepared.
4. The contractor shall conduct a detailed running trial of the existing bogie to establish baseline reference data. All required instrumentation, data logging systems and data analytic system shall be provided by the contractor.The running of trial trains shall be responsibility of IR. Detailed report for the trials shall be prepared and submitted in hard and soft (PDF & editable) copy. Configuration, input files and details of applications used for simulation to be provided
5. All the above shall be treated as inputs for development of the design of the upgraded bogie.

4.2 Review of the existing design and planning of design interventions

1. The design of each component of bogie is to be reviewed, particularly of primary suspension, secondary suspension, dampers, rubber-metal bonded components, and axle box components in view of boundary conditions & inputs arrived at by above exercise.
2. Design review of existing design of bogie components (by calculations/FEA/computer simulations etc) for solving listed field issues shall be done as per applicable EN/AAR/JIS/any other reputed standard.
3. Identify the bogie components, whose design is found to be suboptimal & need improvement to arrest issues listed above. Deficiencies in design must be elaborated in detail with the help of calculations & simulations. Accordingly, propose the modifications in respective components of Bogie, whose design is found suboptimal.
4. For changes, the weight of upgraded bogie design should not be more than 1.05 X weight of existing bogie design. All efforts for design optimization & weight reduction shall be made by available methods including digital models. The interfaces of upgraded bogies must be such as to ensure that upgraded bogies can be easily & perfectly assembled with existing tendered LHB coaches.
5. If existing design of any failing component such as coil springs,air springs, primary dampers, other type of dampers, rubber metal bonded items, axle box components etc. are found to be adequate in above mentioned review, it shall be required to identify issues in our existing specification & drawing of that failing item or identify the other potential

reasons of failing the items. If required, samples of such failing components will be provided free of cost by IR/RCF for testing & analysis. Based on inputs, upgraded specification & drawing for such items shall be prepared.

6. Link particular type of failures as listed above for identified reasons with proper analysis, calculations & elaboration as detailed above or through suitable alternate method. Feasible solution in design, specification, drawings & maintenance shall be submitted with analysis, calculations &elaboration
7. Technical input for development of specifications, drawings & maintenance protocol for upgraded/ modified bogie and bogie items. For solving any issue listed above, if any other items beyond bogie, like brake system etc. are also to be studied, such exercise must be completed to resolve all the issues listed above.
8. During review, standardization of primary springs, bogie frame, dampers etc. shall be done to ensure lesser number of variants of bogies for LHB coaches in Indian Railway.
9. The design should be such as to minimize maintenance and should not require any scheduled maintenance other than routine inspection/checks upto 3 years from overhaul/ introduction.
10. Adoption of other available suspension technologies for primary suspension in place of helical coil spring may also be explored.
11. Good industrial, engineering & design practices shall be followed. All activities shall be fully document and reports prepared.
12. Reports, Models, Drawings, Documents in hard and soft (editable) copy to be submitted as generated while executing the work detailed above.

4.3 Simulation for verification of performance of the new design of bogie and components

1. Design verification of upgraded bogie components (by calculations/FEA/computer simulations/Lab testing/field trials etc.) shall be done as per applicable EN/AAR/JIS/any other reputed standard.

2. The bogies rotational resistance (X factor) validation under inflated and deflated air spring conditions shall be carried out through suitable calculation/ simulation under tare and loaded conditions. The rotational resistance shall neither cause excessive flange wear nor cause any possibility of flange climbing but shall be adequate to avoid bogie hunting on straight track. The Supplier shall show by analysis that no flange climbing occurs on any curve and moving at all possible speeds set using suitable parameter.

3. Satisfactory train operation of LHB coaches fitted with modified (upgraded) FIAT bogie up to 180 kmph during on IR track testing and up to 220 kmph during simulation.

4. MBDS to establish its safety, stability & riding behavior as per 4th report of standing criteria committee & EN 14363, MBDS as per 4th report of standing criteria committee & EN 14363 shall be done & all parameters related to its safety, stability & riding behavior should be within respective limits. Oscillation trials in these cases shall be done as 4th report of standing criteria committee or latest to ensure field validation of modified bogie design. Criteria for assessment shall be as follows: -

   4.1. Ride index shall be 2.5 but not exceeding 2.75 in lateral and longitudinal both modes.

   4.2. The values of acceleration recorded, as near as possible to the bogie pivot shall be limited to 0.25g both in vertical and lateral directions.

5. A general indication of stable running characteristics of the carriage as evidenced by the movement of the bogie on a straight and curved track, and by the acceleration readings and instantaneous wheel load variations/spring deflections.
6. The Ride Index and acceleration values listed are the maximum permissible. The designer shall optimize the values and provide the best possible design with superior ride index and lesser lateral & longitudinal accelerations.
7. Reports / Models / Drawings / Documents in hard and soft (PDF & editable) copy to be submitted as generated while executing the work detailed above. Configuration and input files and details of applications used for simulation to be provided.

4.4 Fatigue / endurance life of bogie frame and other major items

Major modified items shall be subjected to fatigue/endurance tests as per EN13749 or other applicable ISO/EN standards to prove out the life of improved bogies. Intermittent reports shall also be shared. The testing shall be fully documented, reports to be prepared and submitted in hard & soft copy (PDF &editable). If new wheel set is designed &supplied then its wheel-wear performance shall be demonstrated to be not inferior to the existing LHB wheel profile system of Indian Railways, with comparison based on retention of profile within RDSO prescribed limits.Brake disc & CTRBs shall be procured from proven sources.

4.5 Prototype manufacture

Detailed models / drawings, process sheets, work instructions, technical specification, purchase specification and quality assurance record templates to be prepared and deployed for manufacturing system setup, shall be provided in hard and soft (PDF & editable) copies. 04 Nos of Bogies for each ordered variant of bogie shall be manufactured and supplied for running/performance trials.

4.6 Validation of running performance of the prototype bogies

The prototypes shall be validated by running trials and the performance of the bogies shall be evaluated on Indian track by instrumenting the bogies. The testing shall be fully documented, and reports prepared. Any design iterations required, based on the outcome of the trials shall be done. Reports to be submitted in hard and soft (PDF & editable) copy as detailed above.

4.7 Start series production and supply bogies

Series production and supply of bogies shall commence after successful completion of trials. The bogies shall be supplied as per the schedule provided by the indenter/consignee.

4.8 Extended field trials

1000 bogies (400 for LWACCN, 300 for LWS and 300 for LWSCN) shall be manufactured and put into service. The performance of the bogies shall be monitored by primary depot & bogie supplier for 3 years and report to be submitted on warranty module orjointly to RCF on 1st day of every month.It will be reviewed in intermediate stages also, if more than 10% of bogies are failing and indicates requirements for further design changes, the change shall be implemented without any additional cost to purchaser. Reports to be submittedin hard and soft (PDF & editable) copy as detailed above with performance analysis. Every registered/logged bogie defect shall be considered failure of bogie. Remaining 600 bogies will be supplied after successful B10 review.

5 Identification and marking of bogies and components

All components and sub-components of the bogies shall be marked using DPM technology. Alternative technology for marking may be suggested. However, all marking / identification systems shall have a service life more than the service life of the components on which the marking is made.

The contractor shall propose and seek approval of IR, for the scheme prior to application. The guidelines contained in RCF-MDTS-49398 shall be applicable for setting up the marking scheme.

6 Acceptance Criteria and performance

6.1 B10 Life or MFOP

The expected B10 life or MFOP (Maintenance Free Operation Period) shall be 3 years or 1.2 million kilometres. The overall bogie design, design of the wear components shall meet this requirement and the same shall be demonstrated via calculation and simulation.

This criterion shall be the KPI for the extended field trial of 3 years (1.2 million kms) from fitment of the bogies on rolling stock. Atleast 90% of the population of improved bogies must perform.

Failure of more than 20 % of the population at 3 years or 1.2 million kms shall be treated as epidemic failure. This shall require a review of the contract with the option for pre-closure.

6.2 B50 Life of Bogies

The expected B50 life of bogies shall be 18 years of age or 7.2 million kms or more. This requirement shall be demonstrated in calculation and simulation for structural components/assemblies.

7 Project Schedule

The proposed schedule for the execution is attached as Annexure 4 of this document.Approvals and sign-offs shall be required from RCF at various stages of the project. These are identified as the Hold and Witness Points.These approvals shall be sought on digitally signed PDF documents. These documents shall be submitted via email to the authorized persons and via the DMS of a project management system. The detailed process of submissions and approvals shall be mutually agreed and documented as a part of the agenda for the kick-off meeting.The approvals sought shall be replied within 2 weeks of submission. The time taken for approvals shall not be counted against the project schedule durations.

8 Quality Assurance and Inspection Plan

The Quality Assurance Plan for the project shall be prepared and submitted for approval covering control over outsourced products, processes, testing of raw materials & establishing its traceability, sampling plan, type tests, routine tests, in-process inspection parameters, acceptance tests, schedule of technical requirements for manufacturing of upgraded bogie.

8.1 Inspection Plan

The inspection plan shall be submitted by the contractor based on the Quality Assurance Plan. The inspection plan shall be reviewed and agreed jointly by IR/RCF and the contractor.

9 Approvals during project execution

Contractor shall define various stages of approvals required during execution of project in QAP mutually agreed by IR/RCF/RDSO. Contractor shall submit documents for approval well in advance. The approvals of documents/stage sought by contractor, may take 4 weeks after receipt at RCF/IR.

10 Maintenance schedule documentation infrastructure requirements

Comprehensive documentation for maintenance and service manual of improved bogie specifying procedure of maintenance, schedules of maintenance and list of spares/must change items with approved sources, shall be prepared & submitted in hard copies and softcopies (PDF & editable) for approval of RCF. Detailed catalogue/specification of all components manufactured or purchased by contractor shall be supplied free of charge.
For reference purposes, refer to the LHB Maintenance Manual.

Suppliers shall review existing maintenance infrastructure available with IR/workshops/depots and shall provide special maintenance tools/infrastructure if required for conducting the maintenance schedules.

All maintenance requirements during the warranty period shall be handled by contractor. Supplier shall maintain sufficient stock of all spare items for trouble-free operation of supplied bogies during warranty.

11 Guarantee/Warranty

The contractor shall provide a comprehensive guarantee/warranty for the complete fully assembled bogie for a period of **36 months from the date of fitment** or **48 months from the date of delivery**, whichever is earlier. This provision shall be explicitly incorporated in the tender document.

12 Penalties while under warranty

100% trouble free breakdown free operation of bogie is to be ensured in warranty period during running of train from Primary maintenance depot. In case of breakdown, a grace period of 72 hrs. shall be given from time of intimation, beyond which penalty of ₹10,000/- per coach-day downtime shall be levied till 60 days and thereafter action as per IRS rules shall be applicable.

13 Payment Milestones and Terms

The scope of work includes 2 distinct categories of goods / services to be supplied. The payment terms and conditions for each category shall be as per the details given below.

13.1 Payment for Design Costs

The following payment milestones shall be applicable for the design cost

#	Milestone Description	Payment %	Cumulative Payment%
1.	Upon completion of design of the bogie and that of the manufacturing system with requisite quality assurance framework, submission of all design documents and artifacts in native, editable and PDF copies (as applicable)	20%	20%

2.	After completion of running oscillation trials and submission of updated documentation as detailed at milestone #1 above.	30%	50%
3.	Uponsuccessfulcompletion of B10 field operational service life trials.	30%	80%
4.	Handing over all design related documents at completion of the project.	20%	100%

Note:The firm may opt to submit an irrevocable bank guarantee, or any other suitable and acceptable instrument, mandated by the purchase officer, to release the payment withheld against #3 & #4

13.2 Payment for supply of fully assembled bogies

#	Milestone Description	Payment %	Cumulative Payment%
1.	Upon issue of receipt note	70%	70%
2.	Upon commissioning the supplied bogies on rolling stock	10%	80%
3.	Upon successfulcompletion of B10 field operational service life trials.	10%	90%
4.	Upon completion of warrantee guarantee period.	10%	100%

Note:The firm may opt to submit an irrevocable bank guarantee, or any other suitable and acceptable instrument, mandated by the purchase officer, to release the 10% payment withheld against #3 & #4

14 Pre contract Activities:

14.1 Provision of design information by RCF/RDSO

RCF/RDSO shall provide available track data, the present design of the bogies and available information via an online share.

1. Available CAD Models and Drawings.
2. Material Details and Properties of all the components.
3. Component Manufacturing Processes
4. List of components for which models or drawings are not available.
5. Availability of the components for Reverse Engineering
6. Bogie Body Interfaces of coach.

14.2 Non-Disclosure / End use undertaking & site Visits

Bidders shall be required to submit a Non-Disclosure and End-Use Undertaking as provided in the Annexure 1. And the authorized personnel of the bidders that have submitted the undertaking, can schedule a visit to manufacturing, vehicle assembly, maintenance and overhauling sites of Indian Railways to collect information for bidding.

15 General Terms & Conditions

The following terms and conditions shall be applicable for the project. These are considered in addition to statutory, regulatory requirements and IRS standard conditions.

15.1 Make in India mandate

The contractor shall ensure that the value of supply billed to IR is localized in accordance with the Railway Board guidelines.

15.2 Intellectual Property Rights (IPR)

The contractors are expected to ensure that all documents having IPRs are not transferred to third parties without prior written approval of CDE/RCF.The contractor is expected to create detailed manufacturing design and process documentation for the manufacture of the items detailed in this document. All such design artefacts, 3D models, drawings, process documentation etc., shall the property of RCF/KXH and the same shall form a part of deliverables of the contract.

15.3 Safe-keep during storage and transit

The contractor shall be responsible for safe transporting and loading/un-loading of supplied products. Adequate measures shall be taken to avoid damage during transport/storage.

15.4 Errors omissions & discrepancies

The bidder(s)/contractor shall not take advantage of any misinterpretation of the conditions due to typing or any other error and if any doubt shall bring it to the notice of CDE/RCF without delay in case of any contradiction.

Only the printed rules and books shall be followed and no claim for the misinterpretation shall be entertained.

15.5 RCF's Bid document 14 (latest version on date of opening of tender) may be referred wherever applicable.

16 Free Supply Items

No free supply items shall be provided by the purchaser. Axle, wheel disc, Phonic wheel, CTRB, brake disc, brake caliper and yaw damper will also be in the scope of supplier. However, the contractor may procure standard FIAT bogie items i.e. wheel sets/wheel discs, CTRBs, brake discs, etc., from RCF/IR, subject to placing the demand well in advance and as per applicable terms and conditions.

17 Current bogie and coach parameter

The currently used bogies have the following common attributes and parameters:

#	Parameter / Attribute Description	Value / Attribute
1.	Axle load capacity	16.25t
2.	Axle distance/Wheel Base	2560 mm
3.	Diameter of wheel (New)	915 mm
4.	Diameter of wheel (Worn)	845 mm
5.	Distance between wheel	1600 $\pm$1 mm
6.	Brake disc dia	640 mm
7.	Bogie width	3030 mm
8.	Bogie length	3534 mm
9.	Bogie weight	6635 kg
10.	Primary suspension	Coil Spring
11.	Secondary suspension	Air spring
12.	Coach length over body	23540mm
13.	Coach length over buffer	24000mm
14.	Max. width of coach over body	3240mm
15.	Coach floor height under tare condition	1320mm
16.	Distance between center pivot	14900mm

17.	Max. CBC height tare/ Min. CBC height loaded	1105/1030mm
18.	Emergency Braking Distance required	1260m @ 160kmph & 1600m @ 200kmph
19	Max. Buffer Drop under gross& worn wheel conditions	75mm

The currently deployed configuration of coaches and bogies are listed tables provided in Annexure 2 & 3 of this document. These annexures provide a quick overview of the range of configurations and the salient parameters of the coaches and the bogies.

18 Abbreviations / Terminology

#	**Abbreviations / Terminology**	**Expansion / Explanation**
1.	BoM / PSL	Bill of Materials / Product Structured List
2.	FIAT	FIAT is the designer of the bogies supplied to IR
3.	WSP	Wheel Slide Protection
4.	IPR	Intellectual Property Rights
5.	KXH	Indian Railways station code for Kapurthala
6.	LHB	Linke-Hofmann-Busch
7.	MBDS	Multi body Dynamic Simulation
8.	MDTS	Mechanical Design Technical Specification
9.	MFOP	Maintenance Free Operations Period
10.	MTTR	Mean Time to Repair
11.	OMRS	Online Monitoring of Rolling Stock
12.	PLM	Product Lifecycle Management
13.	QAP	Quality Assurance Plan
14.	RCF	Rail Coach Factory
15.	RDSO	Research Design & Standards Organization
16.	ToT	Transfer of Technology.
17.	WILD	Wheel Impact Load Detector
18.	MOU	Memorandum of understanding
19.	EN	Euro Norms
20.	IR	Indian Railway
21.	STR	Schedule of technical requirements
22.	**NX**	Cad Software
23.	KPI	Key Performance Indicator

19 Price Variation

As applicable as per IRS conditions and policies.

20 Spare parts

Contractor shall submit a list of spare parts to be arranged after expiry of warranty period for all bogies. Contractor shall also submit list of approved/possible sources along with purchase & technical specification for all bought-out items. Contractor shall develop vendor in India for bought out items.

-x-

ANNEXURE 1

CONFIDENTIALITY & PERMITTED USE UNDERTAKING
(On Bidders Letter Head)

I, _____ (the name of tenderer/contractor), the undersigned (hereafter addressed as contractor), do hereby declare and confirm that I am aware that I may be assigned by Rail Coach Factory, Kapurthala, to render certain services as tendered for in tender number _____ date _____.

In connection therewith, I hereby undertake and agree as follows:

Certain Definitions

(a) "Confidential Information" means any data, documents, materials, or other information disclosed to me in connection with the Services, in any form whatsoever, whether orally, visually, in writing or otherwise (including in computerized or electronic form).

(b) "Permitted Purpose" means the use of the Confidential Information to perform the Services.

The Contractor's Confidentiality Obligations

(a) I understand that the Contractor is subject to confidentiality obligations pursuant to the information supplied as a part of specifications for the abovementioned tender.

Undertakings

(a) I undertake to conduct myself and render services with a view to ensuring full compliance of Conditions of Contract for the Provision of Services.

(b) I shall:
(i) use the same care and discretion to avoid disclosure, publication or dissemination of the Confidential Information as I use with my own similar information that I do not wish to disclose, publish or disseminate; and,
(ii) use the Confidential Information solely for the Permitted Purpose.

(c) I hereby undertake that in the case of this tender being awarded to another party, or upon the request of the Rail Coach Factory, Kapurthala, I shall immediately return (or destroy) all Confidential Information disclosed to me or to which I had access during or as a result of the process of tendering, together with all copies thereof.

(d) I understand that in the case of the contract being awarded to us, this requirement of confidentiality stands and shall be applicable throughout the contract. I shall immediately return (or destroy) all Confidential Information disclosed (together with all copies thereof) to me or to which I had access during or because of the process of servicing the tender and the following contract.

SIGNED:

Name:
Date:
Place:

ANNEXURE-2

FIAT Bogie Configuration

Following types of suspension combinations are being used in FIAT Bogies of LHB Coaches presently in IR:

S.No.	Bogie General Arrgt.	Applicability	Coach Layout	Min. tare weight of coach for the group	Max. Gross weight of coach for the group
1.	LW00025	LWSCZAC	1 10113.0.01.000.001	44.5t	51.86t
2.	LE00005	LWACCN	LE90050, FLAT ROOF LE90085	47.6t	53.36t
3.	LP00002	LWLRRM	LP90032	54.9t	59.28t
4.	LP00001				
5.	LG00005	LGS	LG90029	43.19t	56.19t
		LWSCN	LS90018	44t	50.4t

ANNEXURE-3

LHB Coach type and FIAT Bogie Configuration deployed

S.No	Bogie Gen. Arrgt. & PSL (BOM)	Applicability	Bogie Frame	Primary Suspension	Primary Spring Drg. No.		Secondary Suspn.	Damper	Sup. Dia Arrgt
1.	LW00025 MD875	LWSCZAC	LW03002	1268732	Outer	1267411	**Air Spring Capacity** 160kN	PVD- RDSO/CG/DRG/21047, SVD- RDSO/CG/DRG/21046, SLD- RDSO/CG/DRG/21049, YD- RDSO/CG/DRG/21048	LW90033
					Inner	1267412			
2.	LE00005 MD871	LWACCN	LW03002	LE01100	Outer	1277142			
					Inner	1277143			
3.	LP00002 MD865	LWLRRM- SIDE-1, (GUARD SIDE)	LW03003	1272174	Outer	1277142			
					Inner	1277143			
4.	LP00001 MD864	LWLRRM- SIDE-2, (NON GUARD SIDE)	LW03002	1272174	Outer	1277142			
					Inner	1277143			
5.	LG00005 MD872	LWSCN, LWS	LG03001	LG01103	Outer	LG01100		Same as above EXCEPT SVD- RDSO/CG/DRG/21018	
					Inner	LG01101			

ANNEXURE-4

#	Activity	Planned Duration (Weeks)	Completion Milestone (Weeks)	Cumulative Weeks	Deliverables	Witness / Hold Mandate	Contractor	RCF	RDSO
0	Tender Finalization (Issue of Purchase Order)	START	D	0			S	R	I
1	Project Kick-Off Meeting	2	D+2	2			R	R	R
2	Sharing of all available information on bogie design and issues	2	D+4	4	All available information, models drawings, specifications etc to be provided		I	R	R
3	Conduct of instrumented run trails of existing bogies.	6	D+10	10	Report in Hard and Soft (editable & PDF) copy detailing the process and outcome of the trials	HOLD	R	S	R
4.	Review of existing bogie design and identification of areas for improvement	12	D+22	22	Report in Hard and Soft (editable & PDF) copy detailing the issues identified and the improvement proposed.	HOLD	R	S	S
5	Development of designs for modifications / improvements / new bogie to address the areas identified for improvement	20	D+42	42	CAD Models, drawings, specification, calculation sheets all design development artifacts. These shall be provided as soft copies.	HOLD	R	A	A
6.	Simulation based verification of the developed design for static / dynamic stress analysis. Fatigue life analysis Multi-body dynamic analysis for ride quality estimation	4	D+46	46	Reports of simulations in hard and soft copies. Digital Parametric Simulation Models files of improved bogie & bogie items. All configuration and simulation setup files in native formats. Details of software (with version numbers) used for simulation.	HOLD	R	A	A
7	Development of manufacturing bill of materials.	4	D+50	50	Bill of Materials in hard and soft copies (editable & PDF)	HOLD	R	A	A
8	Development of manufacturing design / documentation and tooling / fixtures for manufacturing of the new design of the bogie	4	D+54	54	Manufacturing drawings in hard and soft copies (editable & PDF), Manufacturing drawings of all jig / fixtures and tooling required in hard and soft copies (editable & PDF).	WITNESS	R	A	A
9	Development of purchase / quality assurance requirements documentation for bought out components and assemblies.	2	D+56	56	All documentation in hard & soft (editable & PDF copies).	WITNESS	R	A	A
10	Development of bogie assembly and quality assurance requirements documentation.	2	D+58	58	All documentation in hard & soft (editable & PDF copies).	WITNESS	R	A	A
11	Setting up the production setup at the manufacturing location of the contractor / consortium partner / design agency having MOU with bidder.	4	D+62	62	Setup manufacturing system. All documentation in hard & soft (editable & PDF) copies.	HOLD	R	A	A
12	Prototype manufacturing of the new design of bogies	4	D+66	66	Progress with prototype manufacture.	WITNESS	R	A	A
13	Running oscillation trials and fatigue testing of bogies on IR.	4	D+70	70	Report in Hard and Soft (editable & PDF) copy	WITNESS	R	S	R
14	Review the trial results	4	D+74	74	Report in Hard and Soft (editable & PDF) copy	HOLD	R	A	A
15	Finalize the design of the bogies and update the required documentation	8	D+82	82	All modified documents / drawings /models etc in hard & soft (editable & PDF) copies.	HOLD	R	A	A
16	Manufacture and supply the bogies as per the contract schedule	64	D+146	146	Fully assembled bogies and maintenance spares as per agreed list.	WITNESS	R	S	C
17	Training of IR personnel in design, manufacturing, assembly, testing & commissioning, quality control, and maintenance and overhaul process. (Also to be scheduled alongside development and manufacturing activities)	4	D+150	150	Training of identified personnel. This is expected to be done alongwith the progress of the project. All training materials shall be provided in hard and soft (editable & PDF) copies.	HOLD	R	S	S
18	B10 (MFOP) review after 3 years (say 160 weeks) of first 1000 bogies {400 LWACCN+300 LWSCN+300 LWS}as per contract. Trial period expected to start after start of supply (#16 say D+90)	160	D+306	306	B10 life calculations and report, in Hard & Soft (editable & PDF) copies.	HOLD	R	R	R
19	Handing over of all pending deliverables and project closure.	4	D+310	310	Handing over and confirmation check of all documents, drawings, models, check sheets, reports and all design artifacts.	HOLD	R	R	R

RASCI	Role Full Form	Description of the role
R	RESPONSIBLE	Responsible (also recommender) Those who do the work to complete the task. There is at least one role with a participation type of responsible, although others can be delegated to assist in the work required (see also RASCI below for separately identifying those who participate in a supporting role).
A	ACCOUNTABLE/ APPROVER	Accountable (also approver or final approving authority) The one ultimately answerable for the correct and thorough completion of the deliverable or task, the one who ensures the prerequisites of the task are met and who delegates the work to those responsible. In other words, an accountable must sign off (approve) work that responsible provides. There must be only one accountable specified for each task or deliverable.
S	SUPPORTING	Support Resources allocated to responsible, unlike consulted, who may provide input to the task, support helps complete the task.
C	CONSULTED	Consulted (sometimes consultant or counsel) Those whose opinions are sought, typically subject – matter experts and with whom there is two – way communication.
I	INFORMED	Informed (also informee) Those who are kept up-to-date on progress, often Only on completion of the task or deliverable and with whom there is just one-way communication.

Witness / Hold Mandate	Description
WITNESS	A Witness point is an identified point in the work process where the contract administrator may review, witness, inspect or undertake tests on any component, method or process of works. The contractor is required to notify the contract administrator who may or may not take the opportunity. The subsequent activity however, may proceed.
HOLD	A Hold point is a mandatory verification point beyond which a work process cannot proceed without authorization by the contract administrator. Hold points are usually assigned to those critical aspects of the work that cannot be inspected or corrected at a later stage because they will no longer be accessible. The relevant work cannot proceed until the contract administrator is able to verify the quality of the completed work and releases the Hold point.