Section-9 : Bill of Quantities(BOQ)

VOLUME-II: FINANCIAL PROPOSAL

BILL OF QUANTITIES

FOR

"Design, supply, erection, testing and commissioning of 25 kv, 50 Hz Single Phase Retractable Rigid Catenary System(RRCS) , Rigid Over Head Conductor System (ROCS) connecting conventional regulated existing OHE at either end of RLS-1 & RLS-2 with each RLS having single track and single chutes on single track including Annual Maintenance Contract(AMC) of 3 years for Development of Rail Infrastructure for 02 Nos. RLS(15 MTY) at Lajkura of IB Valley Area, IB Coalfields of MCL in Bilaspur division of South East Central Railway in Odisha"

Tender No: IPRCL/Mumbai/Projects/MCL/Lajkura/Elec./RRCS/2024/07

Date: 28/10/2024

OCTOBER-2024
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Bill of Quantities

PREAMBLE

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General Conditions, Particular Conditions of Contract, Works Requirement (Technical Specifications and Drawings).

2. The quantities given in the Bill of Quantities are estimated and provisional and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and executed as measured by the Contractor and verified by the Engineer and valued at the rates and prices accepted in the priced Bill of Quantities, where ever applicable or otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.

3. The basis of payment will be the actual quantities of work ordered and executed as measured by the Contractor and verified by the Engineer and valued at the rates and prices accepted in the priced Bill of Quantities, where ever applicable or otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.

4. In the Bill of Quantities, quantity and unit rates and thereby the amount against each item have been indicated. From this, the estimated price of each bill has been worked out and indicated in the BOQ. The Bidder shall quote rates as **percentage above/below/at par** for the estimated rate. If no percentage as above, below or at par is indicated, the same will be considered as percentage at par.

5. Deleted.

6. General directions and descriptions of work and materials are not necessarily repeated or detailed in the Bill of Quantities. References to the relevant specifications and sections of the contract documentation should be made before quoting rates in the Bill of Quantities.

7. The rates and prices Bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, plant, labour, supervision, materials, erection, maintenance, insurance, profit, royalty, octroi, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.

8. All material, equipment, labour, casting beds, stress frames, form work, staging, scaffolding etc is to be arranged by the contractor within the quoted rate.

9. All design mix concrete shall be machine batched with automatic weight batch, machine mixed and machine vibrated or Ready Mix Concrete prepared in depot and transported by transit mixer to the site of work.

10. Prior to demolishing of any structure measurements have to be taken, scheme of dismantling has to be got approved from the Engineer.

11. The price quoted also includes RITES/RDSO inspection and testing charges unless otherwise specified in the bill of quantities or Technical Specification. In case of change of inspection from RDSO/RITES due to purchase amount less than 5 lakhs (as per Railway board letter 2000/RS/(G)/379/2 dated 06.09.2017 for inspection from RDSO/RITES minimum purchase amount should be more than 5 Lakhs) to IPRCL/Consignee , 1% of cost of material will be charged by IPRCL, as inspection charges.

Preamble for Retractable OHE Work

A. General Instructions

1. The bill of quantities (BOQ) shall be read in conjunction with the Instructions to the bidders, General Conditions of Contract, Particular Conditions of Contract, Works requirements, Technical specifications & Drawings, Explanatory notes detailed after BOQs of Retractable works separately, Payment conditions, pre-bid clarifications and Addenda and Corrigenda if any.

2. Deleted

3. The quantities given in the Bill of Quantities are estimated and provisional and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out including spares to be handed over to Railway/Siding Owner as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the priced Bill of Quantities, where applicable or otherwise at such rates and prices as the Engineer may fix within the terms of the Contract. If any quantities which have been supplied by the contractor and paid by IPRCL are determined to be surplus by the Engineer (except those quantities which become surplus due to change in planning/scheme by Railway/Port/Siding Owner/IPRCL) during the progress of the work or at the completion of the work shall be retained by the contractor. The payment made for such materials shall be recovered from the pending claims. The material which have become surplus due to change in planning/scheme by Railways/ Ports/Siding Owner/IPRCL and are still in usable condition shall be taken over by IPRCL and any part payment, still to be made, shall be released to the contractor.
   Cables/Catenary/Contact wire shall be measured in length for the types used in the works and the 2nd stage payment for these Cables/Catenary/Contact wire shall be as per actual length measured after laying/erection. The unused cut pieces generated during laying/erection shall not be measured and cost of such cut pieces shall be deemed to be included in the rates.

4. In the Bill of Quantities, quantity and unit rates and thereby the amount against each item have been indicated. From this, the estimated price of each bill has been worked out and indicated in the summary sheet in BOQ. The Bidder shall quote rates as percentage above/below/at par for each schedule in the summary sheet. If no percentage as above,

below or at par is indicated for any particular bill, the same will be considered as percentage at par.

5. The rates for each bill shall be written in indelible ink or type written in the summary sheet against each bill, in both words and figures clearly indicating whether the percentage quoted is above/below/at par over the estimated rate in the respective columns. The price for each bill shall accordingly be calculated and written against each bill in both words and figures. The total price, as the sum of prices of all bills, shall be shown at the bottom of the summary sheet. The total price shall also be written in both words and figures.

6. General directions and descriptions of work and materials are not necessarily repeated or detailed in the Bill of Quantities. References to the relevant specifications and sections of the contract documentation should be referred to before quoting rates in the Bill of Quantities.

7. The rates and prices Bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, plant, labour, supervision, materials, erection, maintenance, insurance, profit, royalty, octroi, taxes and duties except GST, together with all general risks, liabilities and obligations set out or implied in the Contract

8. The rates are deemed to be inclusive of all lead (except GST and otherwise specifically provided in the description of the particular item), lifts, ascend, descend, handling, re-handling, crossing of nallah/streams/tracks any other obstructions.

9. All enabling works for executing the work e.g. approach road to site, launching arrangements, procuring right of way, arrangement of water and electricity etc is to be arranged by the contractor at his own cost and deemed to be included in the quoted rates. Where a temporary tube well or any other water source are constructed by the contractor in the Railway/Siding Owner land for the purpose of taking power /water for construction purposes, no charge would be recovered from the contractor but written permission will however, be obtained by the contractor from the Engineer who may, at his discretion, refuse such permission for such construction of temporary arrangement. The contractor shall also be required to restore the site to its proper condition as directed by the Engineer.

10. Storage of Material: All the material at site will have to be properly stacked & stored so as to facilitate inspection. The material should be properly protected from the detrimental effects of nature and fire, theft etc. The contractor shall be responsible for watch & ward and any loss or deterioration on account of above shall lead to rejection of material and contractor has to replace the same at his own cost. All the disposable material should be disposed off outside the railway boundary at a designated place as directed by the Engineer.

11. The method of measurement of completed work for payment shall be in accordance with provisions in Works Requirements (Specifications) except as otherwise specifically provided in the description of item or particular bill of quantities or explanatory notes to the particular bill of quantities.

12. Trees falling in the alignment or any other site of the works which belongs to the Railways/Siding Owner will be trimmed and stacked at a nominated place at his /their own cost as directed by Engineer and the same will become Port/Railway/Siding Owner/Employer's property. Trees of the forest department will be trimmed and deposited in the nearest forest depot. No separate payment on this account shall be made to the contractor.

B. Instructions for quoting by the bidders

1. The prices for supply of materials and erection are in accordance with the technical specifications, approved drawings and designs. The contractor should note that no item of materials, equipment, fittings and components shall be supplied by the Employer.

2. UNIT PRICE:

i. The unit price indicated under "Supply" in the bills is the inclusive of price of materials and all incidental charges for transport, loading/unloading and handling etc.

ii. The price also includes taxes, duties, levies (including octroi) applicable on Works contracts, insurance/bank guarantee/indemnity bond charges etc excluding G.S.T.

iii. The prices also include provision for losses and wastages in transit and erection.

iv. The price quoted also include inspection charges by RITES/RDSO and testing charges unless otherwise specified in the bill of quantities or Technical Specification. In case of change of inspection clause from RDSO/RITES to IPRCL/CONSIGNEE, 1% of the cost of material will be deducted by IPRCL as inspection charges.

v. The unit price indicated under "Erection" in the bills should be inclusive of the cost of erection and testing and also include all cost of administration of the contract, insurance premier, banker's charges, cost of stamps/storage/loading/unloading and handling of materials and also include the cost of transportation which the contractor may incur for transfer of material to the site of works. The unit prices should also include cost of works and adjustment that may become necessary during or after the tests for commissioning.

vi. If rates for supply and erection are not mentioned for any item of work, 80% of the item price shall be considered as supply rate and balance 20% shall be taken as erection rates.

3. The whole cost of complying with the provisions of the contract shall be included in the items/bills provided in the BOQ and the cost shall be deemed to be distributed among the rates and amount entered for related Items of Works where no items/bills are provided,

C. NOTES SPECIFIC TO PAYMENT: INVOICING PROCEDURE

1. All invoices shall be submitted with original supporting documents or certified true copies wherever these are acceptable to the Engineer as per contract. Where copies of original documents are required in support of several invoices, true certified copies of the original documents may be forwarded to the Engineer with his consent.

2. Invoices shall be submitted only on the basis of provisions in Contract Agreement and prices. The quantities and measurement of works completed should be approved by the Engineer prior to the submission of invoices. For this purpose, the schedule of quantities and measurement submitted by the contractor for approval of the Engineer may be only up to the extent of work completed except in the case of payments on Provisional Acceptance.

D. PAYMENT PROCEDURE:-

Payment for Construction work Contract (Sch.-A) is only applicable after 3 months of successful operation of RRCS System under Silo.

1. ON ACCOUNT PAYMENT AGAINST SUPPLY OF MATERIAL:

On Account Payment for Supply of Materials (Schedule-A) will be made as described below only against the submission of 100 % of equivalent amount of Bank Guarantee valid up to 3 months from the successful commissioning of project, While payment for AMC Contract will be made on quarterly basis after completion of every 3 month of AMC Contract:

(i) "**On Account Payment**" shall be made only for the supply items specified in each schedule.

(ii) **'On Account Payment'** shall be made to the extent of 80% of the accepted supply rate after receipt, acceptance, accountal, proper storage and protection against loss, damage or deterioration on the items mentioned in each schedule, and submission of unconditional bank guarantee in favour of IPRCL of equal amount.

(iii) '**On Account Payment'** made to the contractor will subsequently be adjusted against progress payments and against payment due on provisional acceptance.

(iv) All invoices shall be accompanied with the following, for the purpose of arranging 'On Account Payment' against the contract:

a. Supplier's Delivery Challans.

b. Inspection certificate granted by the authorized approved agency/Purchaser's representative as per contract agreement.

c. Certificate of receipt of material at Contractor's depot/work sites duly accepted by the Engineer.

d. Comprehensive Insurance Policy for supply and safe custody of material.

e. Indemnity Bond for any loss, theft, damage, or deterioration of material for equivalent amount for which On Account Payment is claimed.

f. Quality assurance documents.

2.

(i) PROGRESS PAYMENT AGAINST SUPPLY AND ERECTION OF MATERIAL FOR CONSTRUCTION CONTRACT(SCH.-A): No payment except as specified above in para 1. for supply of items, shall be made to the contractor before commissioning and successful operation for three months. After successful operation of three months, only the payment equal to 80% of the total cost of the work will be made to the contractor and the balance 20% of the total cost of the work shall be made as under.

REMAINING 20% PAYMENT: The balance 10% cost of the work done shall be paid to the contractor after one year of the defect liability period is over, and balance 10% of the cost of work shall be paid to the contractor after defect liability period is over.

(i) **PAYMENT AGAINST AMC CONTRACT(SCH.-B):-**

AMC payment will be only on quarterly basis**.** 80% of One-fourth of Annual Contract Price will be paid to agency against the submission of tax invoice after completion of every three month of AMC Contract.

Remaining 20% of quarterly AMC Contract price will be paid after completion of 3 years i.e. after completion of AMC Contract.

E. TECHNICAL SPECIFICATIONS/WORK REQUIREMENTS

1.0 Retractable Rigid Catenary System (RRCS) under RLS:

1.1 Objective –

a. To provide a solution for facilitating overhead loading under RLS in electrified territory.
b. To minimize the rake loading time and thereby improving wagon turnaround time.
c. To ensure safety of personnel involved in loading.
d. To optimize utilization and human intervention of the crew as well number ofoperating personnel.
e. To minimize damage to OHE during loading in RLS system.
f. Compliance of National Green tribunal (NGT) guidelines for

minimizing pollutionduring loading.

1.2 Components of Retractable Rigid Catenary System (RRCS) Connecting Flexible/tensioned OHE (Conventional/tramway OHE) through Rigid Overhead Catenary System (ROCS):

a. Section Insulators for segregation purpose.
b. Double pole motorized isolators with earthing heel and suitable interlock with Retractable Rigid Conductor System (RRCS)'s operating system for the continuity of power as well as Single Pole motorized Isolators along with feeder (150 sq. mm copper feeder) for bypass supply (if necessary).
c. For movement of the pantograph from tensioned flexible (Conventional/tramway) OHE, as available on outside periphery of existing/upcoming RLS of siding to connect Retractable Rigid Catenary System (RRCS) through a 'Transition element' will be provided. This transition element (Rigid Overhead Catenary System – ROCS) will be of rigid type connecting flexible/tensioned OHE at one end and RRCS on the other end through male-female contact.
d. Un-Insulated Overlap between 'Transition element (Rigid Overhead Catenary System – ROCS) and Retractable Rigid Catenary System (RRCS) (covering the loading area).
e. Retractable Rigid Catenary System (RRCS) will have the following components:
    (i) Conductor rail (Aluminum alloy by extrusion moulding process of suitable length) assembly, it should be of suitable electrical and mechanical capacity equivalent to existing OHE in the siding & it should be suitable for holding contact wire as per RDSO specification (TI/IN/0041). Aluminum conductor rail section shall be designed havingsuitable current carrying capacity with external OHE system. The aluminum conductor rail shall be suitable for 107 Sq. mm as availablein adjoining flexible OHE.
    (ii) Rigid Rail shall be secured by protection cover of transparent polycarbonate halogen free material having V0 grade and shall be sealed from the end as well as middle in case of joint to avoid IP68 protection.
    (iii) Copper Contact wire (107 sq. mm) as per latest RDSO specification- ETI/OHE/76(06/97 with A and C slip No. 1,3,4,5,6,7,8,9 and 10 orlatest).
    (iv) Geared Motor swiveling Arm for holding Aluminum alloy conductor Railfor Retractable Rigid Catenary System (RRCS) with insulator of not lessthan 1050 CD composite for ESDD less

than 0.3 mg/Sq. Cm for supporting conductor rail assembly. For higher ESDD, 1600 mm CD of composite type insulator to be used with approval of Client/PCEE. Geared motor shall be of 415 V, 50 Hz with suitable electro-mechanical operating capacity. Speed of RRCS movement in either direction shall not be more than 1 minute.

(v) Geared Motor unit(s) to facilitate rotation of the Retractable Rigid Catenary System (RRCS) swiveling arm assembly. The swiveling arms are the connection from a fixed attachment chair in the structure to the Rigid Catenary, also including a composite insulator. The rotation movement is made by a geared motor, equipped with a friction torque limiter. This electric geared motor is assembled on the fixation chair having a pinion and swiveling ring so that it can rotate smoothly resulting to least maintenance. The motor should be suitable to work in potentially dusty atmospheres and tropicalized environment unlike depots working under clean environment. A common frequency converter on the jibs arm is to be provided. The swiveling arm shall be of steel tube of as light as possible and painted with epoxy antirustprime layer covered with a second coat of lacquer.

(vi) Central control system (PLC with interlocking system-Supervisory PLC) to control the operation of geared motor assembly, Motorized Isolator and audio-visual existing signal at outside periphery, and existing RLS Panel, chute etc. It may include other controls as per the system requirement of the siding with provision of manual and centralized control system for synchronized operation in sequences.

(vii) Other parts of Electrical continuity system: Male-Female contact assembly in between ROCS and RRCS, Jumper, small parts etc.

(viii) Earthing and bonding: All metallic structures, OHE structures, Isolator with earthing heel, Earth continuity from the insulator to the Rail & Earth pit to be ensured as per Earthing & Bonding code. Track under the loading area shall be connected to the earth pit. An aerial protection cable (APC) will interconnect all Geared Motor Jib Arm together in order to guarantee equipotential on any point of Retractable Rigid Catenary System (RRCS), APC will be connected on each end to the RLS main earthing points.

(ix) Rotation of the swiveling Arm assembly should be more than 85° fromcenterline of structure supporting the jib arm to maintain safe electrical working clearance as well as less accumulation of dust.

(x) Contractor should have to provide earthing of all metallic parts

of the loading equipment.

f. Design requirements: System shall have following design features:
   (i) Standard height of OHE shall be 5.6 m from rail top level.
   (ii) Electrical clearance from the live RRCS system and pantograph to the earthed structure shall be as large as possible (minimum value is specifiedin the IRSOD & ACTM) depending upon the site condition and as decided bythe EIG.

g. Portal, Structure, TTC etc. as structural supporting arrangement.
h. Civil foundation work related to this work if needed.
i. Caution board, electric engine stops board, number plates and its mounting arrangements. Caution board shall be suitably placed for all variation of electric locos in operation ensuring the placement of first wagon right below the nominated chute of RLS during loading.
j. Other related works – Electrification as required for RRCS, and it's PLC, provision of main LT panel for power supply, power supply to LT Panel, any modification work of existing OHE.

1.3 Safety Aspects:

a. For the safety of working personnel in loading area, audio-visual signal provided before energization of the loading area.
b. As the Coal Siding environment is very heavy dusty, so the electrical panel should be minimum IP54.
c. Geared motor swiveling arm operation is locked after moving the RRCS both in either position of parking and loading.
d. Loco will always operate with the rare pantograph in raised condition during movement.
e. Loco with raised pantograph in the overlap zone is not allowed during operation of isolator with earthing heel as per RDSO Guide line.
f. Loco shall be so placed ensuring placement of first empty wagon right below of dedicated chute for filling of wagon as per RDSO Guide line.
g. Commencement of loading shall be synchronized with the traversing mechanism of the chute. After completion of rake loading, the traversing chute will be retracted back automatically to parking position as per RDSO guide line
h. Isolator must be opened before rotating (retraction and traction) of Retractable Rigid Catenary System (RRCS) This operation shall be carried out automatically as per sequence of operation under control of Centralized PLC. Provision should also be considered in PLC to operate RRCS in sequence manually in case of emergency.
i. Suitable arrangement to prevent the falling of loading/foreign material on the RRCS should be ensured from existing RLS/Telescopic cum traversing

Chute.

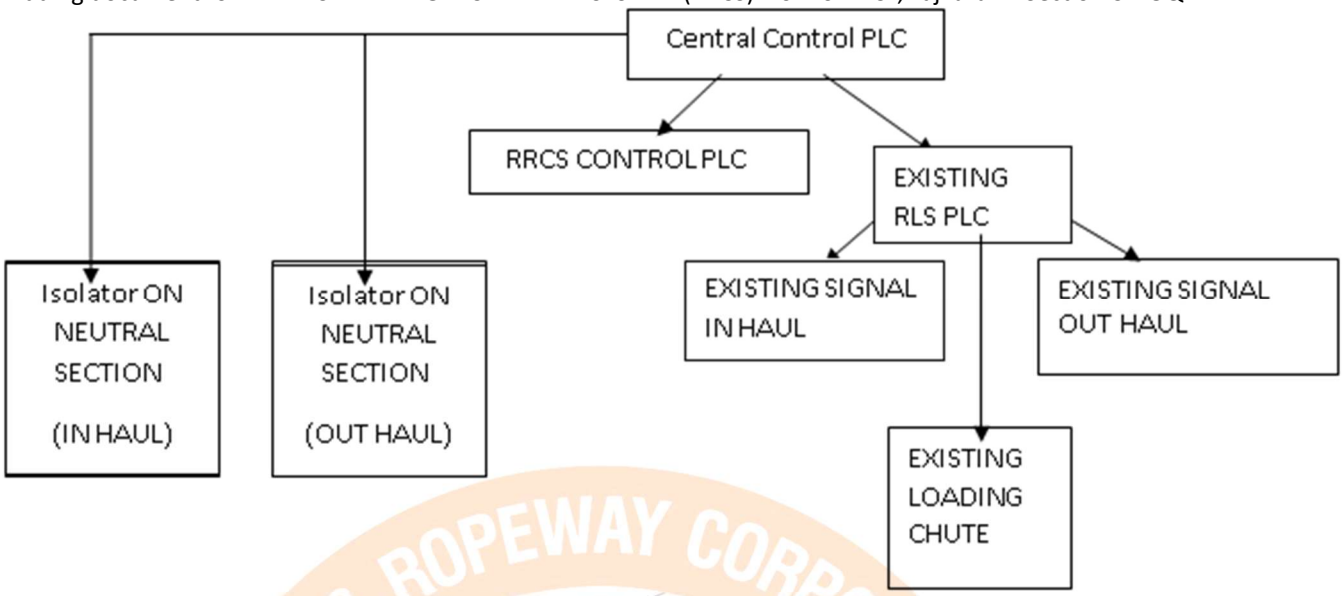
j. The normal position of the rotating type Retractable Rigid Catenary System (RRCS) should always be kept in position away from the track, i.e. not above the center of track. 'ON' position is desired only for passage of locomotive.

k. Protection of geared motor shall be suitable for tropicalized protection against dusty environment with minimum of IP 65 standard.
l. PLC panel shall be of IP 54 Standard.
m. All cables shall be of FRLS-ZH type.
n. Protective screen must be provided at suitable height of existing RLS floor and safety arrangement must be provided on the roof of control room for safety of maintenance personnel.
o. RRCS should be provided with proper dust cleaning arrangement (utility system) to avoid accumulation of dust as generated during every loading operation.
p. A provision shall be made in the control panel and centralized PLC for interfacing for Signaling and RLS system to make the whole operation automatic without adding any extra hardware and equipment.
q. Three phase UPS shall be provided for Power back-up in case of power failure, if power fails during RRCS movement.
r. CCTV with 30 days backup on SSD with latest 4 IP camera of minimum 2 MP shall be provided to record RRCS operation. Location of camera shall be decided at the time of project execution.
s. Control panel shall be provided with 4/5G SIM card to transfer the data to the server installed in the control room, if required.
t. Contractor has to pay data cost during defect liability period and also during AMC period.

1.4 Interlocking and Automation:

Following interlocks are proposed

1. The existing/upcoming Telescopic cum traverse chute and the Retractable Rigid Catenary System (RRCS) having geared motor swiveling arm assembly shall have interlock arrangement through centralized PLC in such a fashion that when one is in operation the other can't change its position. Thus, operation of RLS chute and RRCS becomes automatic and will work in sequence. The same operational philosophy (sequence) will be followed if it is operated manually in case of emergency.
2. Interlocking between DP/SP isolator with earthing heel and by pass isolator as required as well as existing signaling (through axle counter sensor) on each of the loading line are also automatically controlled through Central Control PLC and also manually in case of emergency.



3. List is not exhaustive.

1.5 Indication:

Following indicators to be activated.

e. Indication for detecting that engine has reached the out haul section (Post loading line) away from overlapping zone of Retractable Rigid Catenary System (RRCS) and Rigid Overhead Catenary System (ROCS) so that the Retractable Rigid Catenary System (RRCS) can be withdrawn after opening out of concerned isolator. Placement of the first wagon right below the dedicated chute should be ensured for proper loading operation.
f. Audible Indication for detecting presence of engine within loading zone.
g. Existing/upcoming Signaling system (Dual aspect) at inhaul with red & Amber disposition (Pre loading line). Tenderer has to connect the existing signaling system connecting the existing double aspect signal. Siding owner will provide all details of existing signaling arrangement.
h. Geared motor is equipped with a friction Torque Limiter to protect any mechanical overload and can un-clutch the motor at any time. There is a sensor for “traction” and “retracted” position to sense rotation of the geared motor swivel arm assembly detecting the rotation angle of the related arm. Both under in rail (“traction”) and out rail (“retracted”) condition.

1.6 The above system is broadly consisting following items and activities:-

1. Retractable Rigid Conductor System (RRCS) comprising of Aluminum Alloy conductor rail of suitable electrical and mechanical capacity equivalent to existing siding OHE. The cross sectional area of conductor rail shall be in the range of 2200 Sq.mm to 2281 Sq. mm as the OHE current carrying capacity is 600 A.

2. Rigid Overhead Conductor System (ROCS) comprising of Aluminum Alloy conductor rail connecting RRCS through male-female contact
3. Length of each conductor rail shall be tailor made and shall not be more than 12 Mtr.
4. Conductor rail RRCS/ROCS under RLS/surge hopper shall not have any joint.
5. The design of the system shall be such that the first wagon of the empty rake under loading shall be properly placed for loading with rear pantograph of the loco ensuring the placement of first wagon right below the nominated chute.
6. The motor capacity of geared motor arrangement shall be designed in such a way so that total power requirement of the system will be as low as possible with least OPEX consideration duly taking care of factor of safety
7. ROCS and RRCS shall both be non-tension type.
8. Section insulators of conventional type
9. Motorized double pole motorized isolators with earthing heels
10. Motorized single pole motorized isolators
11. Copper contact wire as per RDSO specification connecting the terminal existing OHE and ROCS,RRCS
12. Motor gear unit of RRCS to facilitate rotation of RRCS jib arm with insulator. The jib arm shall be capable of rotating in horizontal plane 85 Degree and above with respect to center line of track ensuring more safe working electrical clearance.
13. Necessary dust protection arrangement for avoiding the dust accumulation on Jib arm, Aluminum conductor section, contact wire and insulator of jib arm. Insulator shall be of composite type
14. Control system (supervisory centralized programmable logic control)shall control operation of gear motor of RRCS, motorized Isolators, existing Audio- Visual signals and other controls viz. synchronized working of existing RWLS (Rapid Wagon Loading System), existing S&T, movement of existing telescopic cum traversing chute etc.
15. Sliding Clamps
16. Existing S&T will be operated manually from RWLS operator PANEL in case of failure of automatic system.
17. Flexible OHE system not less than 25 Mtr. on either side from centre line of RLS with necessary structural supports with mounting arrangement of motorized isolators as necessary and associated modification of existing OHE installation. Contact wire height shall be 5.6 Mtr.- Battery limit of work
18. Portal, TTC, insert plates on existing RLS/Surge hopper RCC Columns/Structure etc. as structural supporting arrangement as required
19. Civil foundation work of related items within the battery limit
20. Caution Board, electric engine stop board, number plate and its mountings
21. Power supply arrangement from existing RLS/Surge hopper operator room to above panels
22. Protective screen and utility arrangement as necessary arrangement for dust protection on RRCS.
23. Commissioning spares
24. Training for thirty days for maximum of six personnel to be nominated by

Client.

25. Submission of list of drawings and basic drawings with dimensional details and design calculation (soft copy)
26. Submission of as built drawing (soft copy), O&M Manual (soft copy), QAP (soft copy)
27. Customs duty, port clearance and inland transportation of imported component including transportation of indigenous component to site
28. Erection, testing and commissioning of integrated system including trial run and arrangement of hiring of tower wagon with fuel and crew except power block as required is in the scope of contractor, Electric loco and test wagon will be provided by IPRCL/Siding owner as may be required during commissioning of system.
29. Necessary submission of document, drawings as specified in RDSO Guide line for obtaining EIG Sanction
30. Inspection charges (if any including Third Party) shall be borne by Contractor.
31. Wind pressure 105 kgf/sqm.
32. IPRCL/Siding owner shall provide drawings related to existing RLS and its column design with existing OHE layout plan, signaling system, existing RWLS IOs of panel and sectioning diagram.

NOTE:-

- Bidder has to quote normal operational spares for Indigenous as well as imported component (as may be required for three years Annual Maintenance Contract-AMC) duly indicating item and quantity
- Bidder has to quote annual maintenance contract price for a period of three years without three years normal operational spares.
- Bidder has to arrange for site visit to see the manufacturing facilities as well as installation in operation anywhere in India and Abroad for a maximum of four officials to be nominated by MCL/IPRCL.
- Bidder has to ensure adequate qualified technician and helpers 24 hrs onsite for attention for the first 3 months to ensure smooth operation. For which, No extra payment will be done.
- The Bidder offered Cost includes 30 days training of 6 person to familiarize with the system at site. For which, No extra payment will be done.

1.7 Supervisory centralized programmable logic control (PLC) system shall be designed in such a way so that entire operation related to wagon loading along with RRCS will be controlled in sequence with interlocking facility automatically as per logic of operation. The PLC should have also the provision for controlling the sequential operation manually from push button station. There shall be the provision for connecting the existing S&T system and interconnection with Audio/visual signal before energisation of loading area. The sequence of operation shall be as follows in brief:

- Both RRCS and Chute will remain in parking position normally before loading
- Empty rake with electric loco shall stop at entry point of loading area with rear

pantograph in raised condition up to existing dual aspect stop signal, located before the entry side of RLS, glowing red. At the entry point, a sensor/indicator shall be provided

- Supervisor PLC will check the healthiness of loading system (i.e RRCS and chute are in parking position, RLS is fed with fresh weighed stock for loading, isolators are in open conditions etc.).
- Supervisor PLC will command the RRCS to move from parking to loading followed by closing of motorized isolators in sequence duly ensuring that the telescopic cum traversing chute is in parking position and locked. This will facilitate movement of electric loco on its own power.
- Retractable Rigid Catenary System (RRCS) of suitable length equipped with geared motor arrangement (will be installed in between two terminals of ROCS-Rigid overhead catenary system) connecting OHE through male-female contact provided at either end of RLS. RRCS has been designed suitable for rotation 85 Degree and above to ensure the safe electrical and working clearance (as much as possible) with proper periodic auto-dust cleaning/utility arrangement for every loading sequence. The system has to be designed considering all probable type of electric loco (WAG- 5,WAG-7,WAG-9,WAG-12) and it's combination (Single Loco, Double Loco and Multiple Loco) to ensure the placement of first wagon right below of the chute in operation for loading (as will be selected based on Loco arrival information). Accordingly, the sensor/indicator arrangement has to be decided.
- Loco will pass below the RLS with creep speed (i.e 0.8-1.2 Kmph) and will be stopped at the exit side of RLS under concerned electric engine stop board ensuring the placement of first wagon below the nominated chute. Stop board shall be so placed that it caters for different variants of electric loco and it's combination
- After passing of electric loco under the RRCS, the motorised isolator will be de-energised first to facilitate the sway back movement of RRCS in the same plane in offset condition ensuring free movement of Telescopic cum traversing chute
- Telescopic chute will traverse forward from parking to loading position for commencing loading of rake after lowering of the chute. The existing chute should be equipped with level sensor ensuring less spillage during loading operation. The loading will continue till the entire rake is loaded fully.
- Immediately, after completion of loading, Telescopic chute will retract and traverse back in parking position fully.
- RRCS & Telescopic chute will continue to be in the parking position till the next rake is approaching the loading point. The sequence of above mentioned operation will be repeated during next loading
- Anything required for completeness of the system, safe operation and less maintenance is required whether mentioned or not to be incorporated in the overall system proposed

1.8 MAIN CHARACTERISTICS OF RRCS (Retractable Rigid Catenary System):-

1. Retractable Rigid Catenary System (RRCS) is made of several articulated fabricated steel tube jib arms.
2. The jib arms equipped with Geared Motor which is mounted from a fixed

attachment chair with the structure. Jib arm is connecting the Aluminium Alloy conductor rail holding copper contact wire through composite insulator and clamp.

3. The rotation of Jib Arm is made by a geared motor, equipped with a friction torque limiter. This electric geared motor is assembled having the fixation chair, pinion, swiveling ring (slew ring integrates bearings protected by a lip seal) etc.
4. The motor to be adopted shall be of fire proof (coal hazards) IP-65, dusty atmospheres and tropicalized. To avoid oscillation movements, the retractable catenary (RRCS) has a variable speed rotation movement. A frequency converter to be provided on the jibs arm.

   Each section of the retractable catenary is equipped with two detectors, one to validate the TRACTION position, the other validating the RETRACTED position. This information is grouped together in a terminal of the main cabinet so it can be processed by the system managing the safety of interlocking.

5. Tenderer to furnish the functions of individual component, characteristics, technical data etc. for appreciation and evaluation. The time required for retraction or traction shall be less than one minute preferably. It is to be ensured that the system permits loading of each wagon spillage free and less than one-minute time depending on the creep speed.
6. All safety measures including bonding and earthing shall be strictly followed in pursuance of ACTM and also APC (Arial Protection cable) to be provided.
7. Entire system shall be as light as possible to minimize the power consumption/load on the columns etc. resulting to lesser operational expenditure (OPEX) of siding.
8. Aluminum conductor rail shall have facility to hold 107 Sq. mm copper contact wire to RDSO Specification

1.9 CENTRALISED PROGRAMMABLE LOGIC CONTROL SYSTEM (PLC)-SUPERVISORY PLC (COMPONENT OF PLC)

Technical Details

There will be a single controller for the above-mentioned System and will have

- Compact Logix Platform
- 1 MB Memory
- There will be a PLC cum IO panel for the above-mentioned system.

There will be a composite PLC cum IO panel for the above-mentioned sections L2 & L3 Engineering and SCADA

The Control & Visibility system responsible for the Plant Monitoring with control will have:

- A common Factory Talk View SCADA Runtime License with Unlimited Tag Support. The Factory Talk View SCADA supports the following key features:
  - Unlimited Tag Support
  - Role Based Authentication for both the Server and the Web Client
  - Device Level Alarms

- Built-in Alarms and Events Server
- Inbuilt SOE
- Default Data Logging Options
- Integration with Reporting Software
- Notifications and Alerts through SMS and e-mail

Networking & Security

Network & Security is pivotal to a Robust and Efficient SCADA Infrastructure. The design considers the following key elements for the same

- A Seamless IP Network throughout the Plant
- Connection with SAP & data transfer based on existing Reports & API IP Everywhere Architecture With Ethernet based IP Everywhere Architecture, all network capabilities such as motion, time synchronization, control systems, process instrumentation, and safety are available on a common network infrastructure. The architecture has the following benefits:
- Ease of secured access to all devices to carry out:
  - Remote monitoring
  - Remote Troubleshooting & Maintenance
  - Remote Programming
  - Remote Calibration of the connected instruments

- Centralised Configuration
- Option for Seamless Integration with Enterprise IT systems such as ERP, email, SCM etc
- Better & Accurate Response with Load Cell Controllers, MFMs, Weighing Modules etc that will be connected on the same seamless Ethernet/IP/Modbus TCP/IP Network.

Additional Points

- Bidder to indicate the motor power of each motor involved under RRCS, PLC and as a whole the total power requirement under each system. The total power requirement of complete system shall be considered as performance guarantee parameter and evaluation.
- Bidder shall have electrical license for high voltage (33 KV and above) system.
- Contact wire, isolator, section insulator and insulators as required for flexible OHE together with post insulators for motorized isolators shall be as per RDSO specification and procured through RDSO approved vendors.
- All necessary components and it's specification, assembly drawings, power supply system, GA drawings, layout plan etc. to be furnished by successful tenderer
- Other than general requirement as mentioned above, following details are required to be furnished by the Bidder in the offer:-
  1. Standby power supply for control system to be arranged by contractor ensuring uninterrupted supply at operator room for operation of system.
  2. Pollution degree for component
  3. Fire retardant class of cables shall be of FRLS-ZH
  4. Schedule of type test for component and assembly
  5. Electrical and mechanical clearance of the system

6. Protective system for safety of operation and personnel
7. Dust protection system
8. Contact wire, isolator, section insulator shall be as per RDSO latest specification and procured through RDSO latest approved vendors.

1.10 Technical Documentation: As per RDSO Technical instruction No. TI/IN/0041 or latest.

BILL OF QUANTITIES:

SCHEDULE-A: RETRACTABLE OHE FOR RLS-1&RLS-2 WITH EACH RLS HAVING SINGLE TRACK AND SINGLE CHUTES ON SINGLE TRACK					
Sr. No.	**Description of Items**	**Unit**	**Qty.**	**Rate in Rs.(Excl. GST)**	**Amount in Rs. (Excl.GS)**
1	Preparation & Submission of Design and Drawings including layout plan and bill of material	Lot	2	88,66,737.43	1,77,33,474.86
2	Supply of material for Rigid retractable Catenary System (RRCS) and Rigid Overhead Catenary System (ROCS) and other required items.	Lot	2	1,42,69,125.10	2,85,38,250.20
3	Supply of materials covering conventional OHE including motorised isolator, Power supply arrangement, bypass arrangement with 150sq.mm cooper feeder wire as per RDSO Specs or 33kV 1cx150sq.mm UG Cu Copper cable and other required items.	Lot	2	33,89,966.16	67,79,932.32
4	Supply of Centralised PLC and cables with provision of interlocking and sync of existing chute in SILO system including existing S&T.	No.	2	82,13,336.24	1,64,26,672.48
5	Installation of RRCS & ROCS with PLC Panel in all respect	Lot	2	41,06,668.12	82,13,336.24
6	Installation of conventional OHE including motorized isolator in all respect.	Lot	2	11,90,166.10	23,80,332.20
7	Commissioning of above system including EIG.	Lot	2	12,32,000.44	24,64,000.88
8	3 years spares for normal operation with special tools as per list attached as Annexure-A.	Lot	2	12,32,000.44	24,64,000.88
TOTAL VALUE OF PROJECT (Excl. GST) for SCHEDULE-A					**8,50,00,000**

SCHEDULE- B: AMC FOR THE ABOVE RETRACTABLE OHE SYSTEM UNDER RLS-1 & RLS-2					
1	Manpower Charges for Annual Maintenance of above project (without material) for 1st Year	Year	1	28,12,500.00	28,12,500.00
2	Manpower Charges for Annual Maintenance of above project (without material) for 2nd Year	Year	1	30,00,000.00	30,00,000.00
3	Manpower Charges for Annual Maintenance of above project (without material) for 3rd Year	Year	1	31,87,500.00	31,87,500.00
TOTAL VALUE OF AMC (Excl. GST) for SCHEDULE-B					**90,00,000**
Total Project Cost including AMC for 3 years (SCHEDULE-A+ SCHEDULE-B) (Excl. GST)					**9,40,00,000**

NOTE:- 1 Lot/No. of payment against each item of Sch.-A means payment for only one no. of RLS. Similarly, 2 Lots/Nos. of payment against each item of Sch.-A means payment for two nos. of RLS.

SUMMARY SHEET FOR PROVISION OF RETRACTABLE OHE UNDER 2 NOS. OF RLS FOR MCL, LAJKURA PROJECT								
Schedule	**Description of Schedule**	**AMOUNT AS PER ESTIMATE**		**Quoted Percentage Above/ Below/ at per over Estimate Amount filled by the Bidder**			**Total Quoted Amount filled by the bidder**	
		Price in Figure	**Price in Words**	**% in Figure**	**% in Word**	**Above/Below /At par**	**In figure**	**In Word**
SCHEDULE-A	RETRACTABLE OHE FOR RLS-1&RLS-2 WITH EACH RLS HAVING SINGLE TRACK AND SINGLE CHUTES ON SINGLE TRACK	**8,50,00,000**	Eight Crores fifty Lakhs Rupees only					
SCHEDULE-B	AMC FOR THE ABOVE RETRACTABLE OHE SYSTEM UNDER RLS-1 & RLS-2	**90,00,000**	Ninety Lakhs Rupees only					
Total Estimated Amount		**9,40,00,000**	Nine Crores Forty Lakhs Rupees only.					
Total Quoted Amount by the Bidder		**In Figure**						

Note-

1) The item rates given in each bill are exclusive of GST. GST shall be payable separately as per the extant provisions for composite work.
2) For working out the offer rate, the calculation will be as per % quoted only. Any discrepancy in calculation by the bidder will be superseded by the employer as percentage offered in words only.
3) While quoting their rates, Bidders shall consider the various provisions of The Central Goods and Services Tax Act, 2017(CGST)/ Integrated Goods and Services Tax Act, 2017(IGST)/ Union Territory Goods and Services Tax Act, 2017 (UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt & as amended from time to time and all taxes, duties, and levies applicable to the contract. Bidders shall also ensure that full benefit of Input Tax Credit (ITC) likely to be admissible to them is duly considered while quoting rates.
4) The successful bidder who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to the Employer within 28 days from the date of the award of contract, without which no payment shall be released to the contractor. The contractor shall be responsible for deposition of applicable GST to the concerned authority. In case the successful bidder is not liable to be registered under CGST/IGST/UTGST/SGST Act, the Employer shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority.
5) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/SGST Act, the IPRCL shall deduct the applicable GST from his/their bill under reverse charges mechanism (RCM) and deposit the same to the concerned authority.
6) Each item of the BOQ covers all associated fittings/hardware etc for Supply, Erection, testing and Commissioning purpose.
7) Material to be provided as per extant RDSO/RAILWAYBOARD/ZONAL RAILWAYS Guidelines/A&C.
8) Inspection fee is to be borne by the vendor/supplier for all items including imported.
9) Spare part to be supplied for next 3 years from the date of commissioning with the quoted price of each as an option item under separate contract.
10) Two-year warranty from the date of commissioning with free replacement of defective material.
11) Cost includes all the approval and statutory fees of Railways including EIG including Tower wagon hiring charges.
12) Cost includes 30 days training of 6 person to familiarize with the system at site.
13) System shall be designed as per RDSO specification No. TI/IN/0041 dt. 22.09.20 or latest.
14) The price shall include approval of all drawings required for RRCS work under Silo.
15) The Price shall includes adequate qualified technician and helpers 24 hrs onsite for attention for the first 3 months to ensure smooth operation. For which, No extra payment will be done
16) DLP & AMC – Bidder has to ensure adequate qualified technician and helpers 24 hrs onsite for attention.
17) 1 Lot/Nos. of payment against each item of Sch.-A means payment for only one no. of RLS. Similarly, 2 Lot of payment against each item of Sch.-A means payment for two nos. of RLS.

ANNEXURE-A

Spare parts for 3 years for normal operation:

(a) Spare parts for RRCS:

1) PLC/HMI -Two Nos.(2);
2) Network port- One No. (1);
3) Sensors-Three Nos.(3)
4) Gear motor Unit-One No. (1);
5) Inverter frequency -One No. (1)

(b) Spare parts for Centralised PLC

6) Flex EtherNet/IP Adapter Redundant-One No. (1)
7) Flex 32 Point Digital Input Module-One No. (1)
8) 32 Channel DO Module-One No. (1)
9) Flex 12 Point Analog Input Module-One No. (1)
10) Flex 4 Point Analog Output Module-One No. (1)
11) Flex Terminal Base for the above-One No. (1)

NOTE:- The list of required items as mentioned in para-(a): spare parts for RRCS and para-(b): Spare parts for Centralized PLC are tentative. It may change depending upon the approval design and drawings of complete system (RRCS, ROCS and Centralized PLC) from Railway/RDSO. but, Bidder has to provide all spare parts required for maintenance of 3 years including any additional required materials as spare within the price quoted by them. A List of Spare parts for maintenance of 3 years should be approved by IPRCL/Railway/RDSO.

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THE END