06.11 AUTOMATION SYSTEM (LEVEL-1)

6.11.01 GENERAL

01. This specification is intended to define the basic requirements for Automation (Level-1) system of the Ore Handling Plant (Existing & New) including Priority route conveying system coming under the 7.0 MTPA Expansion of BHILAI Steel Plant (BSP) with a view to achieve smooth, efficient, safe, integrated and reliable operation of the process.

02. Monitoring, Control, Interlocking and Sequential functions for the entire Ore Handling Plant (Existing & New) and Priority route conveying system including its various mobile machines and auxiliary system, shall be achieved through PLC based Level-1 automation system.

Detailed functional requirement of the new Wagon Tippler / SAC / Paddle feeders/ Stacker/ Reclaimer etc. is given elsewhere in TS. Each of the above machines shall be controlled through independent PLC system and hooked up with PLCs at Despatcher / control rooms.

03. For running the entire Ore Handling Plant (consisting of the following units / plants / conveying routes) in an integrated manner, PLC based level-1 Automation system shall be provided as per enclosed Automation Configuration Diagram.

   a) Proposed OHP (Part-B) covered under this specification as per technological layout & material flow diagram with new automation.

   b) Existing OHP (OHP-I) covering transportation of raw materials from existing Wagon Tippler / Track Hopper to storage yard and reclaiming & conveying to Sinter plant 2, JH-27, RMP-2, SMS-2, Base Blending Conveying Route, Lime Plant-3, BF conveying route etc. by

   1) Replacement of existing 5-60/5-80 series PLC of M/s Allen Bradley / Rockwell make (located at Despatcher D1 & D2) by new, latest PLC with redundant processor, communication cards, Power supply cards etc. and new RI/O Panels for new drives and equipment proposed under new series parallel to existing OHP-I to Junction House J-15 as per Automation configuration diagram.
2) Existing Quantum series PLC (of M/s Schneider/L&T make, Modicon Quantum Processor sub-system in hot-standby mode with L&T make B1600 I/Os) located at exiting Despatcher-D3 near JH-27 shall be retained. Suitable Gateway for connectivity of PLC of D3 to Control Level Ethernet shall be considered. I/Os for new drives JH-J15 onwards to JH-J20 shall be kept in spare slots of existing PLC/ RIO.

c) OHP Part-A (i.e. new conveying routes from new wagon tippler to stacking in OHP and reclaiming from storage bed) being arranged by the purchaser through a separate package.

04. PLC based automation system of Ore Handling Plant (Part-A) shall be interfaced with the automation system of OHP (Part-B). Stacking conveying route from Wagon Tippler to storage yard of OHP (part-A) shall be controlled from Despatcher-D1. Reclaiming conveying system of OHP (part-A) shall be controlled from to Despatcher-D2.

05. The existing 5-60/5-80 series PLC (of M/s Allen Bradley/ Rockwell make) having processor level redundancy and 1771 series I/O sub-system) located at exiting control room (D1 & D2) near JH-4 and JH-10 shall by replaced by new PLC retaining the existing RI/O panels. The existing RIO panel shall have new Adapter card for making it compatible with new PLC system. The communication cable from existing RIO to new PLC shall also be changed.

06. Existing Quantum series PLC (of M/s Schneider/L&T make, Modicon Quantum Processor sub-system in hot-standby mode with L&T make B1600 I/Os) located at exiting Despatcher-D3 near JH-27 shall be retained. The existing PLC is not Ethernet compatible. Suitable Gateway for connectivity of PLC of D3 to Control Level Ethernet shall be considered. I/Os for new drives JH-J15 onwards to JH-J20 shall be kept in spare slots of existing PLC/ RIO.

07. Control, Monitoring, Interlocking and Sequential functions of augmented drives and equipment proposed under Ore Handling Plant shall be achieved through the New PLC based Automation system for Reversible Shuttle Conveyor J9B-RSC1.

Tenderer shall provide new RI/O Panels for new drives and equipment proposed under new series parallel to existing OHP-I to Junction House J-20 as per Automation configuration diagram.
The details of existing controls system is as given below:

Despatcher D1 controlling from existing control room near JH-4:

- Material transportation from Wagon tipplers & Track Hopper to Existing OHP beds including yard machines (Part-A and existing) / reclaiming partly.

Despatcher D2 controlling from existing control room near JH-10:

- Reclaiming of raw materials from Existing OHP yards or delivery from conveyors (J8C1 & J8C2) and then dispatch to JH-15, SMS-2, RMP-2 and JH-N101.

  Conveyors J15AC1, J34-C1 and J34RC1 in SMS-2 route and By pass conveyor which feeds materials on conveyors R-101 & R-102.

Despatcher D3 controlling from existing control room near JH-27:

- Receive materials on conveyors J17C3, C4, C5 & C6 from OHP, SP-2, CSS III and send to JH-27 through priority conveying system.

New Despatcher D4 controlling from new building near JH-Z5:

- Material transportation from new Wagon tippler and Track hopper to new OHP beds and reclaiming from yard to convey up to junction house Z-10. It shall be in a new building near JH-Z5.

New Despatcher D5 controlling from new building near JH-Z14:

- Conveying routes from JH-Z10 to JH-Z15 under BF -8 route, Base Blending Plant and lime plant through conveyors R103, R104, R103A & R104A. It shall be in a new building near JH-Z14.

08. Software modification for selection and feeding of additional points for the shuttle conveyors as per material flow diagram

09. Development of software for new equipments and its interfacing with existing controls as per material flow and Automation control philosophy.

10. The tentative list of existing MCCs / PLC / RI/O Panels and their location are as indicated below.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>MCC No.</th>
<th>Location</th>
<th>Nos. of RI/O Panels</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1MCC</td>
<td>Near Existing WT</td>
<td>2 Nos.</td>
<td>1 panel for each eqpt.</td>
</tr>
</tbody>
</table>

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### STEEL AUTHORITY OF INDIA LIMITED

**Bhilai Steel Plant (BSP)**

**Technical Specification for Augmentation of Raw Material Receipt & Handling facilities with new OHP, Part-B**

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>2MCC Near J9FCI 2 Nos. -DO-</td>
</tr>
<tr>
<td>3.</td>
<td>3MCC Near STC-6 2 Nos. -DO-</td>
</tr>
<tr>
<td>4.</td>
<td>5MCC Near JH10 2 Nos. RI/O -DO-</td>
</tr>
<tr>
<td>5.</td>
<td>JH10 JH10 Dispatcher 1 No. for RI/O Racks and 1 No. for 2 x PLC Processor Racks</td>
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<td>6.</td>
<td>6MCC-1 Near JH11 2 Nos. 1 panel for each eqpt. section</td>
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<td>7.</td>
<td>6MCC-2 Near JH13 2 Nos. -DO-</td>
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<tr>
<td>8.</td>
<td>261MCC SP-II Ore Fines (RMRB) 2 Nos. -DO-</td>
</tr>
<tr>
<td>9.</td>
<td>7MCC Below JH15 2 Nos. -DO-</td>
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<tr>
<td>10.</td>
<td>28MCC C/O Coal Yard 2 Nos. -DO-</td>
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<tr>
<td>11.</td>
<td>CR 1A JH4 Despatcher 2 Nos.</td>
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<tr>
<td>12.</td>
<td>14MCC Near RMP2 Controlled from 7MCC</td>
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<td>13.</td>
<td>30 MCC Near Stk-4, S/S-22 2 Nos. -DO-</td>
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<td>14.</td>
<td>9MCC-1 JH-20 2 Nos. Total 2 RIO panel in 9 MCC for MCC-1 &amp; 2</td>
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<tr>
<td>15.</td>
<td>9MCC-2 JH-20 2 Nos.</td>
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<tr>
<td>16.</td>
<td>10MCC-1 JH27 Despatcher Total 3 panels in JH27 – 1 for 2 x PLC Processor &amp; 2 RI/O panel for 10 MCC-1 &amp; 2</td>
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<td>17.</td>
<td>10MCC-2 JH27 Despatcher</td>
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**Existing PLC Details:**

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<tr>
<th>MCC</th>
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<th>DO Mod.</th>
<th>AI Mod.</th>
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<th>DO Mod.</th>
<th>AI Mod.</th>
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<tr>
<td>2 MCC</td>
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<tr>
<td></td>
<td>4</td>
<td>8</td>
<td>3</td>
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### Augmentation of Raw Material Receipt & Handling facilities with new OHP, Part-B

#### MCC Breakdown

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<th>DO Mod.</th>
<th>AI Mod.</th>
<th>AO Mod.</th>
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#### Channel per Module

- **16**
- **16**
- **8**

#### Total I/O

- **896**
- **688**
- **32**

---

### PLC at existing JH-27

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<tr>
<th>MCC</th>
<th>Rack No.</th>
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<th>DO Mod.</th>
<th>AI Mod.</th>
<th>AO Mod.</th>
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</table>

#### Channels per Module

- **16**
- **16**
- **8**
- **4**

#### Total I/O

- **528**
- **272**
- **32**
- **20**

---

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11. This specification should be read together with the General Technical Specification (No. GS-03) separately attached with this specification, General Conditions of Contract (GCC) and other commercial terms & conditions.

12. Automation equipment offered for the process shall be complete in all respect in line with this specification. Any equipment / accessories, not explicitly indicated in this specification, but considered essential for proper functioning of technological equipment and process (including utilities) shall be included by Tenderer in their scope of work and supply.

13. All the automation equipment shall be supplied brand new & from the latest product ranges of reputed manufacturers as per the List of Preferred Makes, furnished in this Tender document. Purchaser/ Consultant reserve the right of selecting particular make and model of Automation equipment with a view of standardization of the whole plant. Tenderer shall comply with such requirements.

14. Tenderer shall execute the entire work on turnkey basis to the satisfaction of Purchaser/ Consultant. Design aspects and selection criteria as per GTS (GS-03).

15. Automation systems of new Blast Furnace Conveying routes, Sinter plant, Lime Plant etc. will be separately arranged by Purchaser along with its technological package. The PLC based automation system of entire Ore Handling Plant (Existing & New) shall be interfaced with new & existing plants / shops for information exchange, interlocking and monitoring of the plant. Tenderer shall provide required hardware & software for interfacing of the offered automation system with the automation system of the above units. The required communication bus from the PLC of the above plants to respective Despatcher / Control Room shall be included under this package. Details of interfacing requirement shall be finalised during detailed engineering stage.

16. For remote operation from Despatcher, interlocking and monitoring of various new material handling machines, PLC with radio modems for wireless data communication shall be provided on the machines and at ground control rooms / Despatchers. This shall be in addition to hardware interlocking through Control cable Reeling Drum. All necessary hardware and software shall be provided to achieve the same.

17. The Automation system facilities shall be generally offered inline with the basic ‘Automation System Configuration’ diagram (Drg. No: MEC/S/9101/11/E9/00/00/061.01/R3, 2 sheets) enclosed with this specification. Client-server based architecture shall be considered for
automation system of OHP. Tenderer shall submit configuration diagram of the automation system offered by him accordingly. Requirements of Controllers & their division, Work-stations/Servers, Engineering stations, Printers etc. shall be indicated in the configuration drawing of the offer.

18. Automation system of OHP (Part-B) shall have three level Ring Architecture type communication buses as follow:

- HMI-level Ethernet for HMI Stations, MIS Servers, MIS Clients, Higher-level systems etc.
- Control-level Ethernet for connecting PLCs, Servers, Engineering Stations etc.
- I/O level communication bus.

19. 2 Nos. field programming units for connecting to Remote I/O stations and 4 Nos. field programmers for yard machines shall be included in the scope of Tenderer.

20. 4 nos. view monitor shall be provided. Location will be finalized during DE.

21. MIS software should have capacity to serve at least 10 MIS clients in addition to the server envisaged.

22. The communication networks will be duly tested and certified by competent agency and test certificate to be submitted.

23. PLC shall have separate NO, NC contact, 230V 10Amp. Change over contact for output relay is not accepted.

24. All printers in the new & existing Despatcher / Control room provided with PCs shall be laser type.

25. The design shall be done in such a manner that involvement of cabling and wiring is minimum.

26. All the automation equipment shall be configurable to a user configurable fail-safe state to avoid dangerous situations in case of any failures due to power failure, communication failure etc.

27. Different levels of networks shall be inter-connected through intelligent devices which are capable of high speed switching at least at Layers 3 & 4 with access control. For all important systems firewall shall be provided, taking care at Layers 3 to 7.
28. Temperature monitoring of all remote I/O stations shall be provided through respective PLC.

29. Power & Control Supply monitoring of all mechanisms shall be provided through PLC.

6.11.02 SCOPE OF WORK AND SUPPLY

Tenderer’s scope of work and supply shall include design, engineering, manufacture/procurement, assembly, calibration, shop testing, inspection at works & at site, painting, packing, transportation to site including loading, unloading, storage & handling of all Automation equipment including electrical accessories, cables, GI pipes, erection accessories, panels/cabinets and all associated hardware, as required for completeness of Automation system in all respect along with site fabrication, erection, testing, commissioning of the complete automation system including integration of existing Ore Handling Plant by providing new PLC/new processor and interfacing with PLC of OHP (Part-A) for completeness & satisfactory stable operation of the entire Ore Handling Plant (Part-A & B) as per technological layout and material flow diagram. The scope of work shall also include liquidation of defect points, participation in tests for establishment of plant performance guarantee (PG) and post commissioning activities till issue of final acceptance certificate (FAC) by BSP. The scope of work and supply shall include but not limited to the following:

1. Automation system as per the facilities indicated in the Automation System Configuration diagram Drg. No: MEC/S/9101/11/E9/00000/061.01/R3, 2 sheets) and as described in Salient Features of OHP (Existing & new) and clause no. 6.10B.10 under Electrics. This shall mainly include independent PLC systems with redundancy in processors, power supply modules, communication modules, network interface modules, operator’s and engineering workstations, MIS servers etc. for plants/units of the proposed Plant including PLC based automation for Wagon Tippler, Paddle feeders, Yard Machines etc. Communication bus shall be ring architecture type. The automation system shall be client-server based configuration. All the required facilities & features for interfacing of PLC systems shall be considered and provided accordingly.

2. Suitable local or remote I/O panels for installation of I/O cards, power supply modules, communication modules, etc.

3. Required nos. of remote I/O panels with adequate quantity of various types of I/Os, i.e. Digital, Analogue, RTD, Thermocouples, Pulse, power
supply cards, Relays with NO contacts for outputs etc. at different locations. Tenderer shall also consider input interposing relays for field mounted proximity switches in the I/O chassis.

4. Preferred Makes of individual equipment i.e. PLC systems, Workstations, Servers, Engineering stations, printers etc., shall be as indicated in this Tender document (GS-13). All PLCs, work stations, server, printers etc. under proposed Plant Automation system and mobile machines shall be of same make.

5. All required software i.e. System software, HMI software, Application programmes etc. for PLC, Workstations, Servers, communication interface amongst various automation systems etc. Required number of software licenses shall also be provided.

6. All maintenance, diagnostic tools & devices required for implementation, maintenance & trouble shooting.

7. All Network components like Gateways / interfacing modules, cables, multi-port switches (if applicable) etc., as required for interfacing.

8. Optical Link Modules, Light Interface Unit, Redundant link modules, Power supply Cards, Converters, Terminators etc. as per requirements.

9. Other than the PLC systems specified in the configuration diagram, if any separate PLC systems are required for operation of the auxiliary units of the proposed OHP (Existing & new) the same shall also be offered and suitably interfaced with the main automation system. Details shall be indicated in the offer.

10. All types of system cables, communication cables, LT power cables, special cables, etc., as required. This shall also include the required communication interface and cable for interfacing with the PLCs of conveying system of Blast Furnace, Sinter Plant-II, Lime Plant-2 & 3 and conveying routes beyond JH-27, conveying routes for SMS-2 and Sinter Plant-3 etc., located at respective control rooms.

11. Control room furniture.

12. Submission of drawings and documents as per mentioned at clause no. 6.11.05 of this TS.

13. Erection, testing, calibration and commissioning of the total Automation equipment / system included in this specification.
14. Successful Tenderer shall arrange tools, tackles and consumables as may be required for erection, testing, calibration and commissioning activities.

15. Tenderer shall arrange inspection of Automation equipment by Purchaser/ Consultant. Inspection and Testing shall be carried out in compliance with the Quality Assurance Plans and FAT document, to be approved during detailed engineering stage.

16. Tenderer shall arrange visit by respective Automation manufacturer’s representatives at site, as & when required, during erection & commissioning.

17. Testing tools & equipment for automation system (Tenderer to furnish the list of such items considered by them during offer stage).

18. Special tools shall be provided in sufficient number for tracing, location, testing, jointing, fault location & rectification, termination etc. for all cables including special cables.

19. Tenderer shall involve Purchaser / Mecon in control philosophy development, design of application software and hardware, drawing up of software specifications, software development, off-line testing etc.

20. All tests on software, hardware, network, communication etc. shall be carried on the basis of a pre-agreed protocol clearly listing out steps involved in testing with its responsibility and minimum expected results as per specifications, engineering and other documents.

21. Troubleshooting manual for all application software, system software, configuration, hardware, network etc. shall be provided clearly spelling out possible causes, checks and measures for corrective action.

22. Tenderer shall arrange training for Purchaser’s personnel on the automation system at manufacturer’s works and also at site.

23. Two years maintenance spares, if the order is separately placed by Purchaser.

24. Commissioning spares and three months consumables.

6.11.03 SALIENT FEATURES OF CONTROL & AUTOMATION SYSTEM FOR OHP (EXISTING & NEW)

01. For monitoring, control, interlocking and sequential operation of material transportation system including new and existing Yard machines, Wagon tippler, Track Hopper, Paddle feeders, OHP (Part-A) etc. PLC based
automation systems shall be provided. Considering information exchange & operational requirement all the systems shall be suitably interfaced with each other. All the printers shall be provided with network connectivity.

02. In Client server based Automation system, servers shall be considered. This architecture shall have 3 level ring type bus system. The PLC systems shall communicate with each other and the servers through a common ring tropology bus. All the HMI stations shall be interfaced with the servers through a separate higher level bus. Respective PLCs shall have independent engineering station. Suitable communication cards shall be provided in respective I/O panels for interfacing with HT switchboards; Intelligent MCCs, Remote I/O station, Weighing Controllers, TR controllers etc.

03. Each Operator Workstations shall have 21” Flat TFT Monitor as shown in Configuration drawings.

04. The automation system shall be powered from UPS of suitable rating. Details of UPS have been separately indicated in this TS and GTS.

05. Each new machine of the Ore Handling System, such as Wagon Tippler, Stacker & Reclaimer machines etc. shall have its in-built PLCs for its operation and positioning. Each of these PLCs shall communicate with respective Despatcher PLC through radio communication link and also through cables. All these PLCs shall work in integrated way to achieve overall functional requirement.

06. All the new MCCs / DFPs shall be of Intelligent Type. i.e. every controller (DOL/RDOL feeder) shall have an intelligent relay having capability to communicate directly with PLC Controller. Power supply feeders in MCC need not to communicate with PLC except of those feeders which feed to other Process MCCs & ACB/MCCB incomers. Existing MCC / DFP are non-intelligent type.

07. All the weighing controller/Indicator panels, VFD etc. shall communicate directly with PLC Controller.

08. Optical link module shall be used for converting Electrical bus to Optical bus.

09. Tenderer shall consider Remote I/O panels at each electrical premises with all kinds of Remote I/Os.

10. Additional Engineering spare Remote I/Os shall be carefully planned at each location in such a way that they can be used in the unlikely event of
non-establishment of communication with field devices having bus communication.

11. One Remote I/O panel (with required numbers interface modules/types of I/Os) shall be planned in each electrical premises, each electrical floor (in case of multi-story rooms) & junction houses / Technological Buildings for interfacing of field switches.

12. All the communication cables shall be laid in GI pipes. Separate pipes with separate routes (to the extent possible) shall be used for ring topology type communication bus.

**GENERAL CONTROL REQUIREMENT**

13. All the drives shall generally be provided with following modes of operation and control:

- Local De-interlock
- Local interlock
- Remote

Mode of selection shall be carried out for all drives with the help of selector switch provided on the MCCs / DFPs and required nos. of wall mounted boards / boxes for HT motors.

14. For local operation of drives, permission from Operator at Despatcher Control room shall be obtained which shall be named as automation permission. For this purpose, specific menu shall be provided with operator workstation for such drives.

15. Local De-interlock mode of operation shall be used only for adjustment, maintenance and testing purpose. After the selector switch at MCC / DFP is selected to Local De-interlock mode and Operator/PLC permission is obtained from Control room, the drives/valves can be started/opened/closed from Local control stations using start/open/close push buttons. Under this mode of operation, all safety interlocks (Pull Chord Switches, motor over load, Emergency switch etc.) shall be provided through hardwire in the circuit.

The stop push button provided in Local Control station shall stop the drive under all mode of operation. In case of emergency Stop, alarm shall be provided at the Operator workstation at control room to warn the operator. Hooter PB shall be provided in LCS for pre start warning.

16. Local interlock mode for running the drive in sequence interlocked mode from LCS. Selector switch shall be put in local interlocked position and
permission from operator / PLC shall be pre requisite condition. In this mode start, stop, motor over load, emergency stop, Pull Chord & Belt Sway Switches, Zero Speed Switch, chute jamming switches shall be in the circuit through hardwire in addition to interlock with successive conveyor / equipment.

17. Under remote mode of operation, following control modes for all drives shall be provided through Operator workstation.

i. Remote Manual

ii. Automatic

Selection of remote manual or automatic mode of operation shall be carried out using command menus through Operator workstations.

Remote Manual mode

Under remote manual mode of operation, individual drives shall be started/stopped from Operator workstation. However, necessary safety interlocks shall be provided by automation system. This mode can be used for testing of individual drives from Control room.

Automatic mode

Under Automatic mode, the plant/equipment shall be controlled, started/stopped automatically in sequence by automation system using various command menus from any of the Operator workstations.

6.11.04 CONTROL ROOM AND DESPATCHER ROOMS

01. For route wise operation of the entire OHP (New & existing) & priority conveying system, 5 nos. Despatcher rooms shall be as follow. Civil, Structural, floor & Ceiling requirements for Despatcher / Control Buildings are described elsewhere in the TS.

D1 – Material transportation from Wagon tipplers & Track Hopper to Existing OHP beds including yard machines (Part-A & B and existing) / reclaiming partly. It shall be in exiting building near JH-4.

D2 – Reclaiming of raw materials from Existing OHP yards or delivery from conveyors (J8C1 & J8C2) and then dispatch to JH-15, SMS-2, RMP-2 and JH-N101. Conveyors J15AC1, J34-C1 and J34RC1 in SMS-2 route and By pass conveyor which feeds materials on conveyors R-101 & R-102 shall be under control of PLC of D2. Despatcher D2 shall be in existing building near JH-10. Renovation, Modification of existing Despatcher D2 at JH-10 shall be considered.
D3 – Receive materials on conveyors J17C3, C4 C5& C6 from OHP, SP-2, CSS III and send to JH-27 through priority conveying system. Despatcher D3 shall be in the existing control room in JH-27.

D4 – Material transportation from new Wagon tippler and Track hopper to new OHP beds and reclaiming from yard to convey upto junction house Z-10. It shall be in a new building near JH-Z5.

D5 – Conveying routes from JH-Z10 to JH-Z15 under BF -8 route, Base Blending Plant and lime plant through conveyors R103, R104, R103A & R104A. It shall be in a new building near JH-Z14.

02. The Despatcher / Control Buildings shall be air-conditioned and provided with false ceiling & false flooring. The respective rooms shall have following suitable aluminum framed glass partitions as listed below:

a. At one partition called as operator room shall house the operator workstations, printers and other peripherals of the automation system along with Control desk (for work stations/printers) & operator chairs.

b. A separate partition in the control room / Despatchers shall be used for installation of Engineering Stations, Servers (if applicable) & Software / Hard-ware related documentation.

c. A separate partition shall be used for installation of PLC Panels, I/O panels, Instrumentation panels, Weighing panels, & all other electronic panels as per the detail engineering.

03. All the above partitions shall be accessible directly from a common walkway.

04. Control room and Despatcher shall also have facility of Toilet block. Central control room shall have one conference room (with Table & Chairs for 12 persons) & Pantry. However Tenderer may accommodate some of these facilities on floor below Control room also, during detail engineering.

05. Control desk (for installation of HMIs & Engineering Stations etc) shall be of most modern & aesthetic design with Cable Management system.

6.11.05 LIST OF DRAWINGS & DOCUMENTS

Following drawings and documents shall be submitted by the Tenderer:

A) TO BE SUBMITTED ALONGWITH OFFER
01 System configuration diagram for the Automation system along with its peripherals. Configuration should indicate nos. of Processors, Locations of RI/Os for new and existing plant etc.

02 Bill of quantities of all hardware & peripherals viz; CPU, I/O units, communication & power supply modules, operator/engineering stations, bus cables & erection accessories etc. offered for the automation system with brief specification.

03 Detailed technical catalogues & a write-up explaining the system offered shall also be submitted along with details of various software being considered.

04 Total power requirement & heat load for automation system.

05 List of commissioning spares with details.

06 List of two years operation & maintenance spares with details & unit rates.

B) TO BE SUBMITTED BY THE SUCCESSFUL TENDERER DURING DETAILED ENGINEERING

I) FOR APPROVAL:

01. Finalised system configuration diagram for the automation system along with its peripherals with list of hardware and write-up on the system.

02. Bill of Materials & Data Sheets of all the hardwares i.e. Processors, Communication modules, Power supply cards, RLM, OLM, Operator stations, Eng Stations, Servers, Bus cables etc.

03. Overall General arrangement drawings & sectional views of various cabinets, panels, consoles, etc., showing internal disposition of all components/ units, with dimensional details and bill of materials.

04. Interconnecting diagram between existing MCCs & other panels of purchaser and PLC / Remote I/O stations of the tenderer.

05. Single line power supply diagram with specification and bill of quantities of electrical accessories.

06. Quality assurance plan & Factory Acceptance Test procedures for Automation system.
07. Control room layout drawing showing disposition of panels, consoles, desks, etc with dimensional details.

II) FOR SCRUTINY AND REFERENCE

01. Detailed technical literature/catalogue for Automation system with peripherals, highlighting the model number.

02. Input/Output list.

03. Terminal diagram of all the RI/O & Marshalling panels.

04. Cable schedule and specification.

05. System grounding scheme.

06. Formats and work sheets for generation and display of overview, groups, loops, graphics, alarms, operator’s guide messages, real time & historical trends, log & shift formats.

07. Detailed listing of application software, system software, HMI software, etc and the number of licenses.

08. Application software formats and details in documentation and CDs.

09. Manufacturer’s test, calibration and guarantee certificates for all instruments and automation system.

10. Operation and maintenance manuals for Automation system.

11. As-built documentation.

12. Soft copy of all the above drawings & documents in CDs/DVDs.