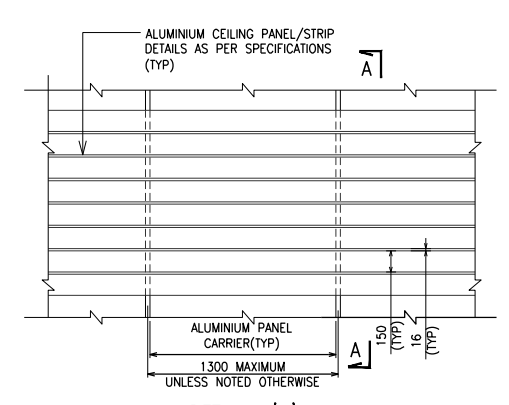
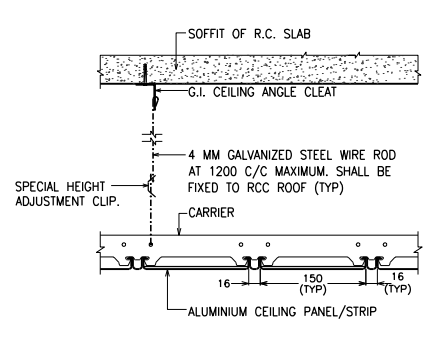


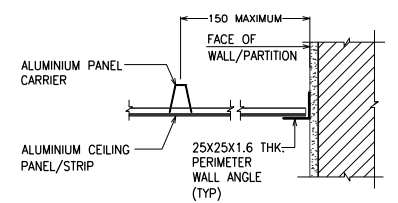
TYP. SECTION THROUGH REFLECTED CEILING FOR ALUMINIUM TILES AND GYPSUM BOARD AT PERIPHERY  
SCALE- 1:5



DETAIL- '1'  
SCALE- 1:25



SECTION A-A (PART)  
TYPICAL DETAIL OF CARRIER SUPPORT  
(SCALE- 1:5)



TYPICAL SECTION AT WALL/PARTITION END  
(SCALE- 1:5)

**LEGEND**

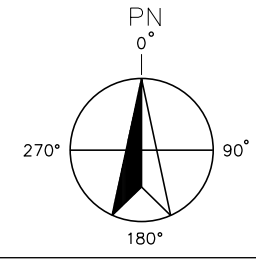
- = 230 THK BRICK WALL (FULL HEIGHT)
- = 115 THK BRICK WALL (UPTO 150mm ABOVE FALSE CEILING)
- = 115 THK BRICK WALL (2300 HIGH)
- F/C = FALSE CEILING
- (B.O.F/C) = BOTTOM OF FALSE CEILING
- (TYP) = TYPICAL
- M/V = MECHANICAL VENTILATION
- A/L = AIR LOCK
- = ALUMINIUM CEILING PANEL (STRIP)
- = PANEL CARRIER
- = PERIMETER WALL ANGLE
- = 600X600 POWDER COATED ALUMINIUM TILE

**LEGEND FOR ELECTRICAL**

- LIGHTING FIXTURE
- LIGHTING FIXTURE
- LIGHTING FIXTURE
- LIGHTING FIXTURE
- INTELLIGENT 3D MULTI SENSOR DETECTOR
- RESPONSE INDICATOR
- SPEAKER

**LEGEND FOR HVAC**

- EXHAUST AIR DIFFUSER
- SUPPLY AIR DIFFUSER

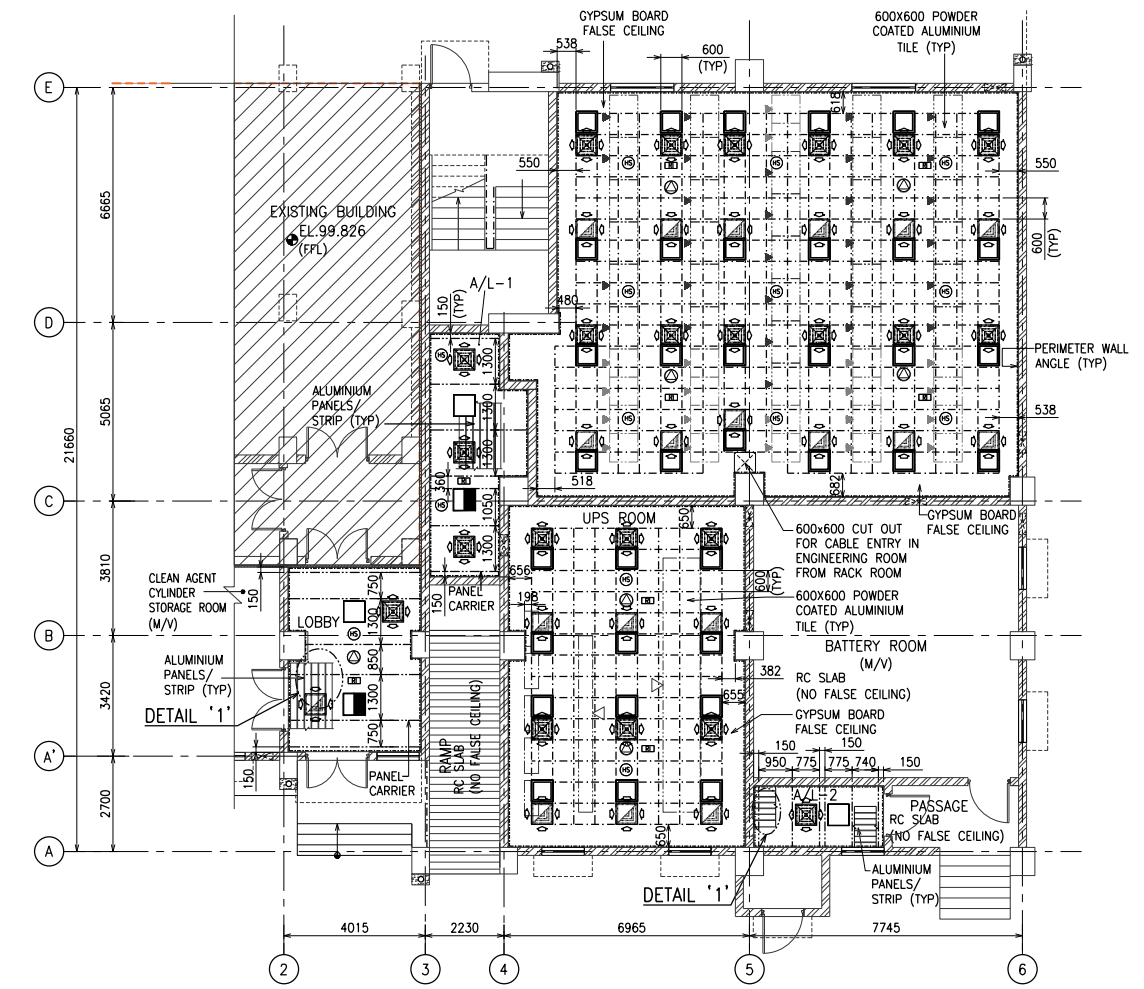


**REFERENCE DRAWINGS**

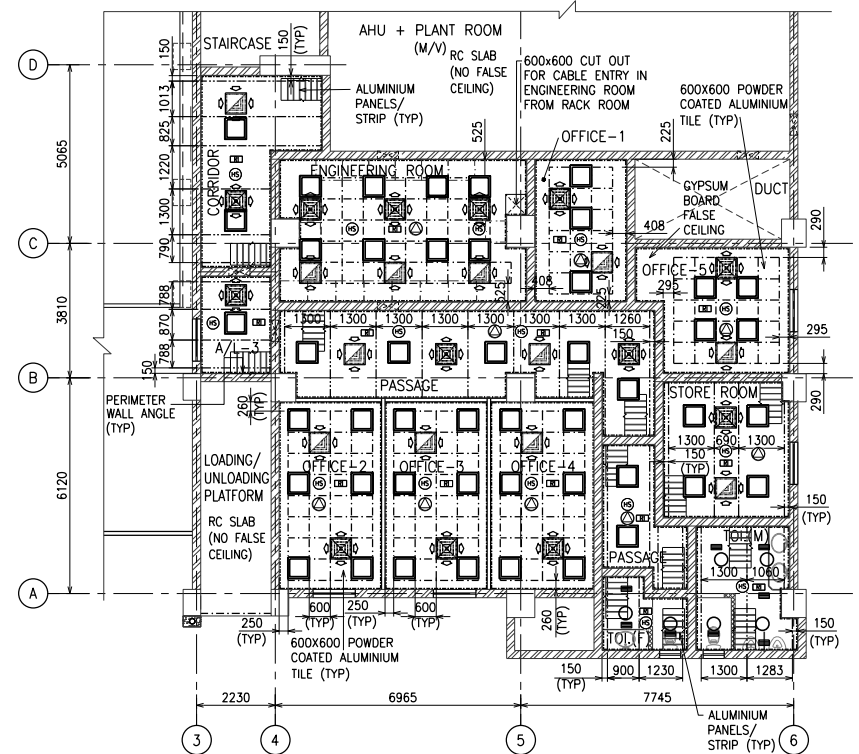
SR. No.	DRAWING No.	TITLE
1	EPCM24-6373-C00-BLG-DWG-RCBG-2501	SRR-3 ARCH. GROUND FLOOR PLAN
2	EPCM24-6373-C00-BLG-DWG-RCBG-2502	SRR-3 ARCH.1ST FLR. AND ROOF PLAN
3	EPCM24-6373-C00-BLG-DWG-RCBG-2503	SRR-3 ARCH.SECTIONS
4	EPCM24-6373-C00-BLG-DWG-RCBG-2504	SRR-3 ARCH.ELEVATIONS
5	EPCM24-6373-C00-BLG-DWG-RCBG-2505	SRR-3 ARCH. FINISH SCHEDULE
6	EPCM24-6373-C00-BLG-DWG-RCBG-2506	SRR-3 ARCH. DOOR/WINDOW SCHEDULE
7	EPCM24-6373-C00-BLG-DWG-RCBG-2507	SRR-3 ARCH.PLUMBING, SANITARY LAYOUT AND TOILET DETAILS

- GENERAL NOTES**
- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS/COORDINATES ARE IN METERS UNLESS NOTED OTHERWISE.
  - ALL DIMENSIONS ARE UNFINISHED DIMENSIONS.
  - HPP 99.580 CORRESPONDS TO RL 42.500.
  - ALL WALLS AROUND FIRE SAFE AREA SHALL BE UP TO RC CEILING IF APPLICABLE
  - LAYING AND FIXING OF FALSE CEILING SHALL COMMENCED AFTER UNDER DECK INSULATION, HANGER HOOK FOR FALSE CEILING, A.C. DUCTING, ELECTRICAL CONDUITS, SUPPORTING ARRANGEMENT OF LIGHTING FIXTURE, FIRE FIGHTING SYSTEM ARE INSTALLED IN POSITION.
  - ADDITIONAL FRAMING/SUSPENSION SYSTEM SHALL BE PROVIDED FOR ELECTRICAL FIXTURES, HVAC SYSTEM AS PER DETAILS BY RESPECTIVE VENDOR.
  - CEILING TILES/PANEL/BOARDS SHALL BE RESISTANT TO FIRE, TERMITES, FUNGI, WOOD BORING INSECTS, AND DELAMINATION DUE TO MOISTURE AND CYCLIC CHANGES IN WEATHER.
  - SUSPENSION SYSTEM, GRID SYSTEM, CEILING ANGLE CLEAT,SUSPENDERS AND ALL ACCESSORIES SHALL BE VERIFIED AS PER MANUFACTURER'S SPECIFICATIONS.
  - THE GRID PATTERN SHALL BE SUITABLY MODIFIED TO ACCOMMODATE LIGHTING FIXTURE, HVAC INDOOR UNIT AND OTHER FIXTURES IF REQUIRED.
  - THE CEILING SHALL BE ERECTED IN CONTINUOUS MANNER AS PER APPROVED MANUFACTURER'S RECOMMENDATIONS & SPECIFICATIONS
  - EXACT LOCATION OF LIGHT FIXTURES, FIRE ALARM, PAGING, SMOKE DETECTOR, HVAC AND FIRE FIGHTING SYSTEM SHALL BE VERIFIED AT SITE WITH VENDORS'/RESPECTIVE LAYOUT DRAWINGS.
  - ALL EXPOSED ROOF OF AIR CONDITIONED AREA SHALL HAVE UNDER DECK INSULATION AND SHALL BE PROVIDED BY HVAC CONTRACTOR.
  - OPENING IN FALSE CEILING SHALL BE ADEQUATELY SECURED AND PROPERLY SEALED AFTER INSTALLATION OF FIXTURES.
  - THE REFLECTED CEILING SYSTEM MATERIAL TO CONFORM TO CLASS -1 (BS-476) AND NBC PART-4
  - REQUIRED OPENINGS FOR CLEAN AGENT SYSTEM PIPING WILL BE ARRANGED BY EPC CONTRACTOR BASED ON THE CLEAN AGENT SYSTEM DESIGN DURING DETAIL ENGINEERING STAGE IF APPLICABLE.
  - THE DETAILS OF CUTOUTS REQUIRED FOR HVAC SYSTEM WILL BE PROVIDED BY EPCM-17 CONTRACTOR.
  - HVAC EPCM-17 CONTRACTOR TO PLAN THEIR UTILITY LAYOUTS ABOVE CEILING WITHOUT AFFECTING THE REFLECTED CEILING LAYOUT (LIGHTING, FIRE ALARM, PAGING, SMOKE DETECTOR ETC.) & ITS SUSPENSION SYSTEM.

REV.	DATE	STAGE	PURPOSE	PREP	CHKD	APVD	AUTHD
2	17/03/2022	AF	ISSUED FOR CONSTRUCTION	PGB	RTB	SGJ/DKS	DDJ/VLP
1	17/02/2022	AFD	ISSUED FOR DESIGN	PGB	RTB	SGJ/DKS	DDJ/VLP
0	19/10/2021	AFP	ISSUED FOR APPROVAL	PRG	RTB	SGJ/DKS	DDJ/VLP



REFLECTED CEILING LAYOUT AT EL 102.826 (B.O. F/C) FOR GROUND FLOOR AT EL.99.826 (FFL)  
SCALE- 1:100



REFLECTED CEILING LAYOUT AT EL 108.376 (B.O. F/C) FOR FIRST FLOOR AT EL.105.376 (FFL)  
SCALE- 1:100

BR-9 EXPANSION PROJECT OF IOCL BARAUNI REFINERY, INDIA

**IndianOil**

INDIAN OIL CORPORATION LIMITED  
LOCATION BARAUNI, BIHAR, INDIA

SECURITY LEVEL: 2

**TOYO ENGINEERING**

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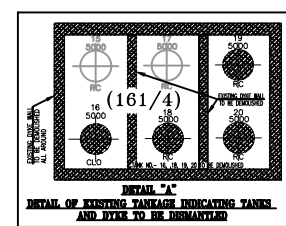
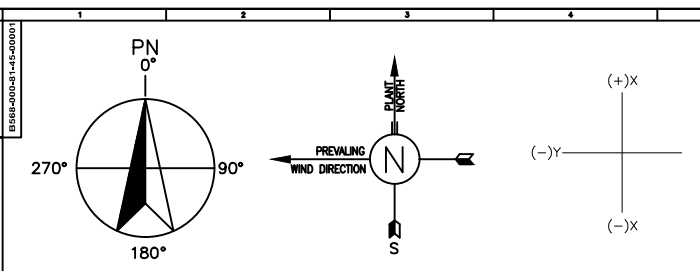
TOYO WORK NO. 6373 CLIENT'S WORK NO. -

SRR-3  
ARCHITECTURAL REFLECTED CEILING LAYOUT AND DETAILS FOR GROUND FLOOR AND FIRST FLOOR

Equipment No.	System No.	FWBS	AWBS

SCALE	TOYO DWG. No.	CLASS	LOCATION	AREA	DIS	TYPE	SUB-TYPE	SEQ	SHEET	REV.
1:100	EPCM24-6373-C00-BLG-DWG-RCBG-2508	RCBG	BLG	2508						
1:25										
1:5										

@A1 FILE NAME EPCM24-6373-C00-BLG-DWG-RCBG-2508\_R2



**SAFETY DISTANCE TABLE AS PER OISD-118 (EIL JOB NO.-B568)**

Sr. No.	FROM	TO	AS PER OISD-118	ACTUAL DISTANCE	REMARKS
1	BITUROX - II	H2 BULLET	60.0M	60.0M	
2	BITUROX - II	EXISTING CRU	30.0M	81.1M	
3	BITUROX - II	EXISTING CRU CONTROL ROOM	30.0M	55.0M	
4	BITUROX - II	CONTROL ROOM (BLAST RESISTANT)	30.0M	33.0M	
5	BITUROX - II	CONTROL ROOM (BLAST RESISTANT)	30.0M	30.0M	
6	BITUROX - II	EXISTING H2 BULLET	45.0M	51.3M	

**SPECIAL NOTES (UNDER JOB NO. B568):-**

- ALL DIMENSIONS ARE IN METRE UNLESS SPECIFIED OTHERWISE.
- EFFLUENT FROM NEW FACILITIES SHALL BE ROUTED TO TIE-IN POINTS IN EXISTING SEWER SYSTEM AS FURNISHED BY IOCL.
- ALL STATUTORY MINIMUM DISTANCES AS SHOWN IN OVERALL PLOT PLAN OR MENTIONED IN TABLE ARE TO BE ENSURED AT THE SITE BEFORE CONSTRUCTION OF ANY FACILITY.
- THE PLOT PLAN FURNISHED AS PART OF BID IS NOT TO SCALE. THE SAME SHALL BE RETURNED AS CONFIRMED BY CLIENT. HENCE, ALL COORDINATES AND DIMENSIONS MENTIONED ON PLOT PLAN SHALL BE CONSIDERED FINAL AND THE SAME SHALL NOT BE MEASURED ON DRAWING.

**FIELD NOTE:-**

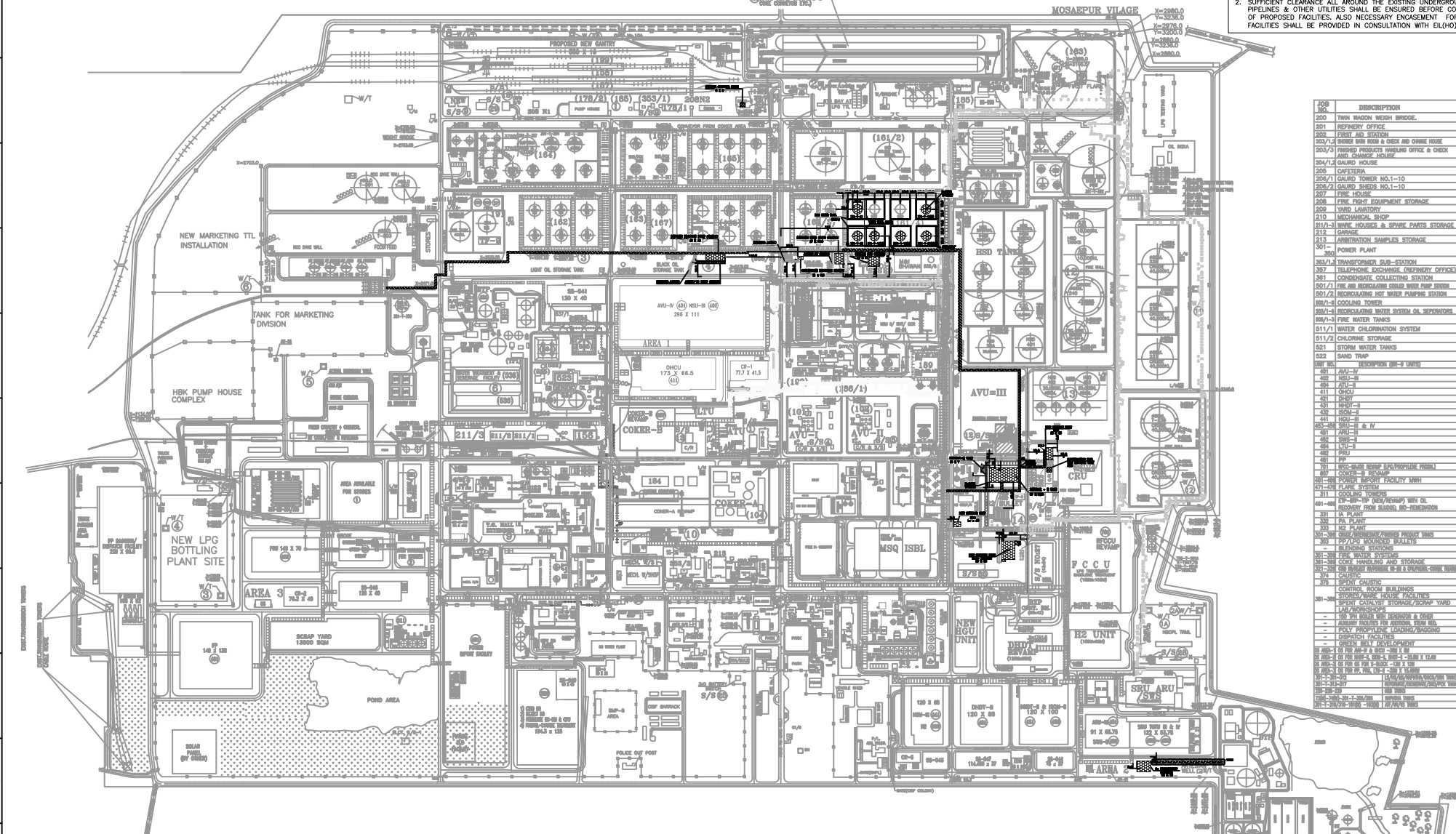
- ALL EXISTING UNDERGROUND UTILITIES SUCH AS PIPELINES, H/T CABLES ETC. SHALL BE IDENTIFIED & LOCATED BY THE CONTRACTOR BEFORE START OF ANY EXCAVATION AND TRENCHING WORK. CONTRACTOR SHALL INTIMATE THE CONCERNED AUTHORITY HAVING JURISDICTION AND SHALL CARRY OUT SUCH WORKS TAKING ADEQUATE PRECAUTIONS & SAFETY MEASURES TO PREVENT ANY DAMAGE TO UTILITIES.
- SUFFICIENT CLEARANCE ALL AROUND THE EXISTING UNDERGROUND PROCESS PIPELINES & OTHER UTILITIES SHALL BE ENSURED BEFORE CONSTRUCTION OF PROPOSED FACILITIES. ALSO NECESSARY ENCASEMENT FOR U/G FACILITIES SHALL BE PROVIDED IN CONSULTATION WITH EIL(MO).

JOB NO.	DESCRIPTION	REF. DWG. NO.	REFERENCE DRAWING TITLE
101	ATMOSPHERIC AND VACUUM UNIT NO.-1	BS-403-20-PP-01-00-001	OVERALL PLOT PLAN FOR NEW BITUROX UNIT & TANKAGE AREA
102	ATMOSPHERIC AND VACUUM UNIT NO.-2		
104	COILING UNIT		
105	STORIES		
106	FUEL OIL STORAGE TANKAGE		
107	SOLVENT STORAGE		
108	CHEMICAL STORAGE		
109/1	POWDER LINE STORAGE		
109/2	AMMONIA CYLINDER STORAGE		
109/3	CAUSTIC STORAGE		
109/4	SULPHURIC ACID STORAGE		
107	TANK ON LOADING RACK FOR LIGHT OIL PRODUCT		
108	TANK ON LOADING RACK FOR BLACK PRODUCT		
100	LABORATORY		
101	CRUDE TANKAGE		
102	FINISHED MOTOR GASOLINE TANKAGE		

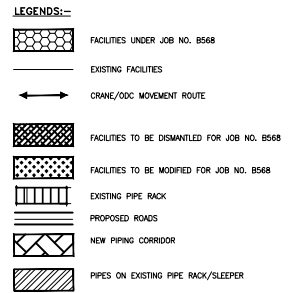
**NOTES :-**

- HIGH FLOOD LEVEL (HFL) RECORDED BASED ON 20 YEARS DATA = 41.76M

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JOB NO.	DESCRIPTION
200	REFINERY OFFICE
201	REFINERY STORE
202	REFINERY STORE
203/1	REFINERY STORE
203/2	REFINERY STORE
203/3	REFINERY STORE
204/1	REFINERY STORE
204/2	REFINERY STORE
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300	REFINERY STORE



**HOLD :-**

- B/A COORDINATE OF PROPOSED FACILITIES TO BE UPDATED BASED ON SITE SURVEY DURING EXECUTION.
- FGL OF FACILITIES TO BE UPDATED BASED ON EXISTING GROUND LEVEL DATA FURNISHED BY GEO. TECHNICAL INVESTIGATION CONTRACTOR.
- PIPING CORRIDOR OR FROM CO. PACKAGE TO SNAI.
- PIPING CORRIDOR TO UNIT SRI AND UNIT SS.
- OC MOVEMENT ROUTE SHALL BE INDICATED ON FINALISATION.

**LIST OF UNIT UNDER JOB NO. B568**

UNITS	AREA (SQ. FT)	UNIT NO.	CAPACITY (KTYA)	LICENSED
BITUROX-2	1567.5	466	300	POERNER

**LIST OF EXISTING STORAGE TANKS TO BE RETAINED**

S.NO.	TANK NO.	CLASS	DIAMETER (M)	HEIGHT (M)	LIQUID STORAGE CAPACITY (M <sup>3</sup> )	SERVICE	LOCATION	TYPE OF ROOF
1.	T-15	EXCLUDED PETROLEUM	22.79	11.855	9000	RCO	REFINERY	CONE ROOF
2.	T-17	EXCLUDED PETROLEUM	22.79	11.855	9000	RCO	REFINERY	CONE ROOF

**LIST OF NEW STORAGE TANKS (UNDER JOB NO B568)**

S.NO.	TANK NO.	CLASS	DIAMETER (M)	HEIGHT (M)	LIQUID STORAGE CAPACITY (M <sup>3</sup> )	SERVICE	LOCATION	TYPE OF ROOF
1.	304-T-21	EXCLUDED PETROLEUM	20	18.5	5400	BITUROX UNIT FEED & PRODUCT	REFINERY	CONE ROOF
2.	304-T-22	EXCLUDED PETROLEUM	20	18.5	5400	BITUROX UNIT FEED & PRODUCT	REFINERY	CONE ROOF

**LIST OF NEW STORAGE TANKS TO BE BUILT AFTER DEMOLISHING EXISTING TANKS.**

S.NO.	TANK NO.	CLASS	EXISTING DIAMETER (M)	EXISTING HEIGHT (M)	EXISTING LIQUID STORAGE CAPACITY (M <sup>3</sup> )	MODIFIED DIAMETER (M)	MODIFIED HEIGHT (M)	MODIFIED LIQUID STORAGE CAPACITY (M <sup>3</sup> )	SERVICE	LOCATION	TYPE OF ROOF	
1.	304-T-16(M)	EXCLUDED PETROLEUM	20	18.5	5400	20	18.5	5400	RCO	BITUROX UNIT FEED & PRODUCT	REFINERY	CONE ROOF
2.	304-T-18(M)	EXCLUDED PETROLEUM	20	18.5	5400	20	18.5	5400	RCO	BITUROX UNIT FEED & PRODUCT	REFINERY	CONE ROOF
3.	304-T-19(M)	EXCLUDED PETROLEUM	20	18.5	5400	20	18.5	5400	RCO	BITUROX UNIT FEED & PRODUCT	REFINERY	CONE ROOF
4.	304-T-20(M)	EXCLUDED PETROLEUM	20	18.5	5400	20	18.5	5400	RCO	BITUROX UNIT FEED & PRODUCT	REFINERY	CONE ROOF

1. 03.08.2018 ISSUED FOR PERIOD APPROVAL  
 2. 04.11.2018 ISSUED FOR ENGINEERING  
 3. 04.09.2018 ISSUED FOR PPRP  
 4. 04.05.2018 CLIENT AND INTERNAL COMMENTS INCORPORATED  
 5. 04.03.2018 ISSUED FOR COMMENTS

REVISIONS: BY: CHKD/APPD/PM

**INDIAN OIL CORPORATION LIMITED**  
 NEW BITUROX PLANT AND ALLIED FACILITIES AT BARAUNI REFINERY

सम्पूर्ण क्षेत्र विन्दास OVERALL PLOT PLAN  
 SCALE: JOB NO. UNIT DIVN. DEPT. DWG. NO. REV.  
 NTS 15 6 8 0 0 0 8 1 4 5 0 0 0 1 1

**Part A - Section: V**  
**Annexure –XII to B568-304-YE-SP-1511 Rev 0**

<b>UNIT RATES FOR ADDITION &amp; DELETION (AS APPLICABLE) PURPOSE OF DCS/PLC AND OTHER ITEMS</b>					
<b>Sr. No.</b>	<b>Item</b>	<b>Description</b>	<b>UOM</b>	<b>Unit Rate in (INR)</b>	<b>REMARK</b>
<b>DCS System Items</b>					
1	DCS Controller Sub- system <b>(Redundant Set)</b>	DCS Controller complete with Processor Module, Power Supply Module, Communication Module, Rack, Connectors, Nodes, Main Data Bus / Communication Bus interface - Redundant Set (excluding the I/O Cards)	Set		NOT APPLICABLE
2	DCS AI Module <b>(Redundant Set)</b>	DCS Analog Input Card for Close Loops/ Open loops (Redundant set) with each redundant cards set catering to 16 inputs and complete with termination assemblies/ blocks	Set		Vendors having cards with no. of inputs less than 16, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 16 inputs.
3	DCS AO Module <b>(Redundant Set)</b>	DCS Analog Output Card for Closed loops/Open loops (Redundant set) with each redundant cards set catering to 16 outputs and complete with termination assemblies/ blocks.	Set		Vendors having cards with no. of outputs less than 16, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 16 outputs.
4	DCS DI Module <b>(Redundant Set)</b>	DCS Digital Input Card (Redundant set) with each redundant card catering to 32 inputs and complete with termination assemblies/ blocks.	Set		Vendors having cards with no. of inputs less than 32, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 32 inputs.
5	DCS DO Module <b>(Redundant Set)</b>	DCS Digital Output Card (Redundant set) with each redundant cards set catering to 32 outputs and complete with termination assemblies/ blocks.	Set		Vendors having cards with no. of outputs less than 32, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 32 outputs.
6	DCS Serial Interface Module <b>(Redundant Set)</b>	DCS Serial interface Module suitable for 4 serial devices and complete with termination assemblies/ blocks - Redundant set	Set		Vendors having Module with no. of serial devices less than 4, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 4 serial devices
7	DCS Ethernet communication module <b>(Redundant Set)</b>	DCS Ethernet Communication Module suitable for 4 serial devices and complete with termination assemblies/ blocks - Redundant set	Set		NOT APPLICABLE

PLC System Items					
8	PLC Controller Sub- System <b>(Redundant Set)</b>	PLC Controller complete with Processor rack/ System Power Supply Module, Communication module, Racks, Connectors, Nodes, Main Data Bus / Communication Bus interface - QUAD set / TMR set (as applicable) (Excluding I/O Cards)	Set		NOT APPLICABLE
9(a)	PLC AI Module <b>(Redundant Card)</b> for QUAD PLC / Single card with triplicated channel for TMR PLC)	PLC Analog Input Card with (Redundant set for QUAD PLC) catering to 16 inputs and complete with termination assemblies/ blocks	Set		Vendor shall provide unit price for any one of the applicable configuration.
9(b)		PLC Analog Input Card with (Redundant set for QUAD PLC) catering to 32 inputs and complete with termination assemblies/ blocks	Set		
9(c)		PLC Analog Input Card with (Redundant set for QUAD PLC) catering to 96 inputs and complete with termination assemblies/ blocks	Set		
9(d)		PLC Analog Input Card with (Single card with triplicated channel for TMR PLC) catering to 32 inputs and complete with termination assemblies/blocks	No.		
10(a)	PLC DI Module <b>(Redundant Card)</b> for QUAD PLC / Single card with triplicated channel for TMR PLC)	PLC Digital Input Card (Redundant set for QUAD PLC) catering to 16 inputs and complete with termination assemblies/ blocks	Set		Vendor shall provide unit price for any one of the applicable configuration.
10(b)		PLC Digital Input Card (Redundant set for QUAD PLC) catering to 32 inputs and complete with termination assemblies/ blocks	Set		
10(c)		PLC Digital Input Card (Redundant set for QUAD PLC) catering to 96 inputs and complete with termination assemblies/ blocks	Set		
10(d)		PLC Digital Input Card (Single card with triplicated channel for TMR PLC) catering to 32 inputs and complete with termination assemblies/ blocks	No.		

11 (a)	PLC DO Module <b>(Redundant Card for QUAD PLC / Single card with triplicated channel for TMR PLC)</b>	PLC Digital Output Card (Redundant set for QUAD PLC) catering to 16 outputs and complete with termination assemblies/ blocks	Set		Vendor shall provide unit price for any one of the applicable configuration.
11 (b)		PLC Digital Output Card (Redundant set for QUAD PLC) with each set catering to 32 outputs and complete with termination assemblies/ blocks	Set		
11 (c)		PLC Digital Output Card (Redundant set for QUAD PLC) with each set catering to 96 outputs and complete with termination assemblies/ blocks			
11 (d)		PLC Digital Output Card (Single card with triplicated channel for TMR PLC) catering to 32 outputs and complete with termination assemblies/ blocks	No.		
12	PLC Serial Interface Module <b>(Redundant Set)</b>	PLC Serial interface Module suitable for 4 serial devices and complete with termination assemblies/ blocks - Redundant set	Set		Vendors having Module with no. of serial devices less than 4, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 4 serial devices
13	PLC Ethernet communication module <b>(Redundant Set)</b>	PLC Ethernet Communication Module suitable for 4 serial devices and complete with termination assemblies/ blocks - Redundant set	Set		Vendors having Module with no. of serial devices less than 4, no. of redundant sets shall be calculated and quoted accordingly to meet the requirement of 4 serial devices
<b>Cabinets / Consoles</b>					
14	System Cabinet -1	800mm (W) x 800mm (D) x 2100mm (H) System Cabinet complete with fan/ temp. sensors, utility sockets/ power receptacles, fan failure and temp. detection units, lights, wiring raceways and mounting plates/ accessories, MCT/ cable glands for Controllers sub-systems and I/O Modules.	No.		NOT APPLICABLE
15	System Cabinet-2	1200mm (W) x 800mm (D) x 2100mm (H) System Cabinet complete with fan/ temp. sensors, utility sockets/ power receptacles, fan failure and temp. detection units, lights, wiring raceways and mounting plates/ accessories, MCT/ cable glands for Controllers sub-systems and I/O Modules.	No.		NOT APPLICABLE

16	Marshalling Cabinet-1	800mm (W) x 800mm (D) x 2100mm (H) Marshalling Cabinet complete with fan/ temp. switch, utility sockets/ power receptaces, fan failure units, lights, wiring raceways and mounting plates/ accesories for isolators/ Relays	No.		Vendor to quote if applicable
17	Marshalling Cabinet-2	1200mm (W) x 800mm (D) x 2100mm (H) Marshalling Cabinet complete with fan/ temp. switch, utility sockets/ power receptaces, fan failure units, lights, wiring raceways and mounting plates/ accesories for isolators/ Relays	No.		Vendor to quote if applicable
18	Power Distribution Cabinet-1	800mm (W) x 800mm (D) x 2100mm (H) PDB Cabinet with 2 sets of redudant busbars and accessories for mounting Terminal Blocks, MCBs , complete with complete with fan/ temp. switches, utility sockets/ power receptaces, fan failure units, lights, wiring raceways and mounting plates/ accesories	No.		
19	Power Distribution Cabinets	1200mm (W) x 800mm (D) x 2100mm (H) PDB Cabinet with 2 sets of redudant busbars and accessories for mounting Terminal Blocks, MCBs , complete with complete with fan/ temp. switches, utility sockets/ power receptaces, fan failure units, lights, wiring raceways and mounting plates/ accesories	No.		
20	Network Cabinet	Network Cabinet with accessories for mounting Network Switches and components and complete with Terminal Blocks, MCBs, and fan/ temp. switches, utility sockets/ power receptaces, fan failure units, lights, wiring raceways and mounting plates/ accesories	No.		
21	Server Cabinet	Server Cabinet with accessories for mounting Serverss and complete with Terminal Blocks, MCBs, and fan/ temp. sensors, utility sockets/ power receptaces, fan failure and temp. detetction units, lights, wiring raceways and mounting plates/ accesories	No.		NOT APPLICABLE
22	Dual Tier Operator Console	Dual Tier Blank Operator Console along with power socket and receptacles	No.		NOT APPLICABLE
23	Auxiliary / Hardwired Console	Dual Tier Blank Console along with power socket and receptacles	No.		NOT APPLICABLE

<b>Workstation Items</b>					
24	Operator Station - Dual Stacked Monitor	DCS / PLC - Operator Station - Dual Stacked monitors with touch screen, QWERTY Keyboard, Mouse, Communication Interface Card) along with software (operating, and application database) - Console / Desk mounted	No.		NOT APPLICABLE
25	Operator Keyboard	Dual Function Assignable Operator Keyboard	No.		NOT APPLICABLE
<b>Network Components</b>					
26	Ethernet Switch	Industrial Grade Network Switch with diagnostics for DCS Communication Systems - Redundant set	No.		
27	Firewall	Firewall	No.		NOT APPLICABLE
28	Prefabricated System Cables	Prefabricated System (Network / Data highway / system) Cables along with connectors at both ends	Meter		
29	Serial Cable	Serial Cable RS 485 / Ethernet Cable along with connectors at both ends	Meter		
<b>Auxiliary Items</b>					
30	AI IS Isolator-1 IN 1 OUT	Analog Input Intrinsically Safe isolator- 1 IN 1 OUT	No.		
31	AO IS Isolator	Analog Output Intrinsically Safe isolator	No.		
32	DI IS Isolator	Digital Input Intrinsically Safe isolator	No.		
33	DO IS Isolator	Digital Output Intrinsically Safe isolator	No.		
34	AI Non-IS Isolator	Analog Input Non Intrinsically Safe Isolator	No.		
35	AO Non-IS Isolator	Analog Output Non Intrinsically Safe Isolator	No.		
36	Relay -Non-SIL	Interposing Relay Non-SIL	No.		
37	AI IS Isolator-1 IN 1 OUT - SIL-2/3	Analog Input Intrinsically Safe isolator- 1 IN 1 OUT (SIL-2/3)	No.		
38	DI IS Isolator - SIL 2/3	Digital Input Intrinsically Safe isolator - SIL-2/3	No.		
39	DO IS Isolator - SIL 2/3	Digital Output Intrinsically Safe isolator - SIL-2/3	No.		
40	Interposing Relay SIL-3	Interposing Relay-SIL-3	No.		
41	Interposing Relay TUV	Interposing Relay-TUV certified for HT motor	No.		
42	Interposing Relay SIL3 - Line Monitoring	Interposing Relay SIL3 - Line Monitoring	No.		

43	BPS- 10A (R)	Bulk power supplies of each type (redundant set) with redundant mosfet orings with 10 A rating	Set		
44	BPS- 20A (R)	Bulk power supplies of each type (redundant set) with redundant mosfet orings with 20 A rating	Set		
45	BPS- 40A (R)	Bulk power supplies of each type (redundant set) with redundant mosfet orings with 40 A rating	Set		
46	EM. Push Button	Emergency Switch Push Buttons	No.		
47	Push Button	Push Buttons	No.		
48	Annunciator set	Alarm Annunciator set with 12 windows	No.		
49	lamps	Lamps	No.		
50	Selector Switch	Selector Switch	No.		
51	ATS	Automatic Transfer Switch - 7 KVA	No.		
52	MCB - upto 16 A	MCB with rating upto 16 A	No.		
53	MCB - 32 / 63 A	MCB with rating 32A/63A	No.		
54	MCCB - upto 160 A	MCCB with rating upto 160 A	No.		
55	Isolation Spark Gap	Isolation Spark Gap for joining instrument earth and electrical earth	No.		



## TECHNICAL QUESTIONNAIRE

**Job No:** B568

**Project:** EPCM Services for New Biturox Plant & Allied Facilities at  
Barauni Refinery

**Client:** IOCL REFINERY DIVISION - HEAD OFFICE

**Req. No.:** B568-304-YE-MR-1501

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A	07/Nov/2024	Issued For Bids	BISWANATH ORAON	KAMALESH KANTI PODDAR	SONIA MADAN
Rev No.	Date	Purpose	Prepared By	Checked By	Approved By

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This questionnaire shall be duly filled in and submitted along with unpriced sets of offers to avoid further queries and to ensure proper evaluation of your offer in time. If this is not complied with, your offer is liable to be rejected.

ANSWER 'YES' 'NO' OR 'NOT APPLICABLE'

DESCRIPTION	BIDDER'S RESPONSE
1. Have you any deviations to the following: i) General Specifications (clausewise) ii) Special requirements (clausewise) iii) Instrument specifications indicated in the data sheets. iv) The scope of supply as indicated in the material requisition. If 'yes' have you included the list of deviations? (If no deviations are furnished, it will be assumed that all the specifications and requirements of the subject requisition are complied with and no deviations whatever will be accepted after the placement of order.)	
2. Have you quoted for the spare parts including consumable items required for the startup and 2 years normal operation/maintenance of the Instruments?	
3. Have you quoted for the mounting accessories, special calibration kits and equipments (complete with technical details) required if any, for the erection, commissioning and maintenance of the instruments?	
4. A) Have you enclosed the relevant technical catalogue/Literature in ENGLISH language including model decoding details, drawings etc. necessary for the evaluation of your offer? (NOTE: In case of line mounted instruments, viz. control valves, positive displacement meters, Pressure relief valves etc., for all the lines quoted, relevant dimensional details required for the installation must be furnished along with the offer.) B) Have you confirmed that the documents required as per vendor data Requirements will be supplied after the placement of order. C) If so, have you indicated the extra price applicable, if any?	
5. Have you furnished sizing, noise level calculations and certified capacity curves for the instruments, wherever applicable?	
6. Have you furnished, separately the `Shop inspection charges, if any, for inspection at your works by EIL/Third party? (The details of the tests to be carried out on the instruments during shop inspection are to be furnished)	
7. Have you furnished the certificates from statutory bodies vis. BASEEFA, FM, CSA etc. for the Explosion proof construction / intrinsically safe design of the instruments, wherever specified?	
8. Have you furnished the certificates from statutory authority i.e., CCOE certificate for all electrical equipments for intrinsically safe/ explosion proof design wherever specified?	
9. Have you confirmed that IBR certification in Form III(C) or equivalent certification from statutory bodies viz. Lloyds, Bureau veritas, TUV etc. will be furnished wherever specified?	
10. Have you indicated separately the installation and commissioning charges, in case the same are included in your scope of work?	

Deviation       No Deviation

Vendor Seal And Signature

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11. Have you furnished the estimated power / utility consumptions and special cable requirements, if any, for the instruments quoted?

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12. Have you furnished the customer reference list in India/Abroad.

NOTE: If the answer is 'NO' , then furnish reasons thereof.

## SECTION-VI (VENDOR'S PROPOSAL OUTLINE)

0	05-11-2024	ISSUED with MR	BO	KKP	SM
<b>Rev. No</b>	<b>Date</b>	<b>Purpose</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>

## 1.0 GENERAL

- 1.1 Bidder shall submit a proposal containing, as a minimum, information described in this section. Bidder's proposal should be organized into tabbed and indexed volumes.
- 1.2 Bidder to note that all the volumes of proposal shall be submitted in soft copies through EIL eDMS portal only. Incomplete proposals and proposals not conforming to this specification are likely to be rejected.
- 1.3 Bidder must prepare their proposal as per the sections indicated. Each section shall contain the information as asked specifically. The proposal not prepared in the described format shall be considered incomplete.

## 2.0 PROPOSAL CONTENTS

- 2.1 The proposal shall comprise of the following sections:

- a) SECTION I- Synopsis of the Proposal
- b) SECTION II- Bidders Capability

This section shall be used by the Bidder to establish their capability in the field of Distributed Control Systems. The details shall be forwarded as under:

- Introduction
- Company profile
- Bidders experience (in PTR format)
- System engineering capability
- Sub-vendor list (for all bought-out items)
- Bidders Organization chart
- Miscellaneous

- c) SECTION III- Project Execution

This section shall be used by the Bidder to provide details about execution of the project DCS. The details shall be forwarded as:

- Proposed project management
- Man-power Deployment Chart
- Bio-data of Key persons
- Estimated engineering and delivery schedule including bar chart.
- Methodology of execution
- Bidders responsibility chart
- In case of an Indian company as vendor with foreign collaborator / principal, specify:
  - Work to be carried out by Indian vendor
  - Responsibility of system engineering
  - Overall system responsibility
  - Source of supplies

- Sub-vendor's Responsibility Chart  
To be filled separately for each bought-out item.
  - Sub-vendor's Manpower deployment chart  
To be filled separately for each bought-out item.
  - Logistic Support Certificate  
To be submitted separately for each bought-out item.
- d) SECTION IV- System Description/ Operation
- This section shall include the following details separately for each system item i.e. DCS, PLC etc.
- i) System provenances  
Completely filled PTR format for the offered system.  
To be submitted separately for each major bought-out system item as per MRc.
  - ii) A drawing showing the offered system architecture and all subsystems offered by the Bidder.
  - iii) A single line diagram showing interconnection of all hardware functional modules subsystem-wise, e.g. I/O modules, controller modules, communication subsystem interface module etc. for each system item.
  - iv) Detailed functional description for each system item explaining how the system meets each of the functional requirements specified in the requisition.
  - v) Bidder to explain redundancy levels and methodology of change-over at each processor level i.e. I/O module, Processor module and communication at Processor and network level (for controller, console, PLC)
  - vi) Bidder to explain availability of Diagnostics at various levels with the system.
  - vii) Bidder to forward detailed explanation as to how they propose to meet the 20% future expansion requirements with respect to hardware and software as specified under 3.0 of Standard Specification for Distributed Control System (6-52-0055).
- e) SECTION V- Technical Specifications
- This section shall include the following details separately for DCS, PLC etc.
- i) Bidder shall complete all the data sheets supplied as project specification filling up all the information required to be filled by Bidder (denoted by \* or \*\*) Bidder shall include printed literature to support the data filled. In addition, Bidder shall clearly explain as to how each subsystem fits into the functional requirements specified in the requisition.
  - ii) Bidder to specifically indicate the availability of the following system alarms:
    - A. For DCS and PLC
      - Channel failure alarm of main as well as back-up I/O module.

- Module failure alarm of main as well as back-up module.
  - Availability of PLC system alarms on DCS operator console.
  - Power supply failure alarm.
  - Fan failure and cabinet temperature high alarm
  - Main and redundant bus failure alarm
  - I/O channel latent fault (permanent open / short) detection and alarming – for PLC only.
  - Barrier failure diagnostic
  - Disc failure alarm. In case of dual disc configuration, Main as well as redundant disc.
    - Update rate on DCS console.
- iii) Bidder shall include any other information not mentioned in the data sheets but important or required to be furnished to support and explain the functional requirements for the system. The additional information shall be provided on separate sheets and shall be attached to appropriate data sheet.
- iv) Bidder shall furnish all the data and drawing required as per the "Vendor Data Requirements". Bidder shall also furnish data for power consumption, ventilation and air conditioning requirements, and air quality requirements as per the enclosed format. Since this information is being used for engineering, Bidder must certify the correctness of the data provided.
- v) Bidder shall include the detailed description and capabilities of all the software offered.
- vi) Bidder shall include separate lists for mandatory spares, recommended spares for two (2) years normal operation, test equipment and tools, and consumables.
- f) **SECTION VI -TECHNICAL COMPLIANCE**  
Bidder must furnish signed and stamped Technical compliance Statement alongwith the offer which shall be the main basis of evaluation. Submission of signed Technical Compliance Statement in the format given in Section-III of the MR shall be construed as total compliance to the MR and deviation/ clarifications taken by the bidder anywhere in the offer shall not be taken cognizance of.
- g) **SECTION VII- Quality Assurance, Factory Testing and Field Acceptance**
  - i) Bidder shall enclose "Vendor Standard" procedures including the test facilities available with them to perform the following:
    - A. Quality Assurance
    - B. Factory Acceptance
    - C. Field Testing
    - D. Field Acceptance

Bidder has to provide procedure being adopted by them to demonstrate scan time, loading, resolution time (for SOE) etc.

- ii) Bidder shall enclose the details of simulation method of all process inputs.
- iii) Bidder shall also enclose the detailed schedule for factory testing, installation, loop checking, field testing, commissioning and field acceptance of the system.

h) SECTION VIII - Price Details

This section shall contain all the pricing information including Bill of Materials, as per the requirements of this requisition.

The prices shall be given

- i) Lump-sum for all systems
- ii) Price for training (at works and at site)
- iii) Unit rates for all items being offered for addition/ deletion.
- iv) Price for recommended spares for two years operation



## VENDOR DATA REQUIREMENT

**Job No:** B568

**Project:** EPCM Services for New Biturox Plant & Allied Facilities at  
Barauni Refinery

**Client:** IOCL REFINERY DIVISION - HEAD OFFICE

**Req. No.:** B568-304-YE-MR-1501

0	07/Nov/2024	Issued For Bids	BISWANATH ORAON	KAMALESH KANTI PODDAR	SONIA MADAN
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Rev No.	Date	Purpose	Prepared By	Checked By	Approved By
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S. No.	Description	WITH BID	POST ORDER			REMARKS
			For Review	For Records	As-Built (Final)	
51	Cyber Security Audit Procedure		X(A)		X	
1	Vendor drawings-documents schedule		X(A)			
2	Control Room Layout		X(A)		X	
3	Hardwired Console Layout		X(A)		X	
4	Cabinet/ Rack General Arrangement		X(A)		X	
5	Cabinet/ Rack Wiring Diagram		X(A)		X	
6	Overall dimensional dwg (including wt and clearance required for all equipment)		X(I)		X	
7	Control room equipment/panel foundation details (channel base drawing)		X(I)			
8	System Architecture Drawing(DCS,PLC, F&G)	X	X(A)		X	
9	UPS Power consumption	X	X(I)		X	
10	Ventilation and Air-conditioning requirements	X	X(I)		X	
11	Air purity requirement for control room	X	X(I)			
12	Recommended illumination level	X	X(I)			
13	Functional Schematics		X(A)		X	
14	MCC Interface		X(A)		X	
15	Nest loading details input/output assignment		X(A)		X	
16	Loop wiring diagram		X(I)		X	
17	Power supply distribution diagram		X(A)		X	
18	Interconnection cable details		X(I)		X	
19	System grounding details		X(I)		X	
26	Bill of materials	X	X(I)		X	
27	Logic Diagrams(ISA Format)		X(A)		X	
29	Factory Testing and Acceptance procedure		X(A)			
30	Site Testing and Acceptance procedure		X(A)			
31	Test reports and log books		X(I)			
32	Special test equipments and tools requirements for maintenance	X	X(I)		X	
35	Catalogues including technical information	X	X(I)		X	
36	Hardware specifications		X(A)		X	
37	MCT Block Assignment and Drawing		X(A)			

S. No.	Description	WITH BID	POST ORDER			REMARKS
			For Review	For Records	As-Built (Final)	
40	Mandatory spares summary		X(A)		X	
41	Recommended spare parts for Two years continuous operation	X				
42	Spares summary for consumables		X(I)		X	
44	Earthing pit connectivity details		X(I)		X	
45	TUV/ SIL Certificate for PLC with complete reports	X	X(A)		X	
47	System configuration and programming Manuals				X	
48	System Installation Manuals		X(I)		X	
49	System Operation and Maintenance Manuals				X	
50	Soft Copy of Final Documentation				X	

**NOTES :**

1. Fold all drawings to 216mm X 279mm and roll transparencies.
2. Vendor to provide all printed matter to ENGINEERS INDIA LIMITED (EIL).

**ATTENTION -**

Vendor Print Control

EIL, R&amp;D Complex, Sector-16 (on NH8), Gurgaon-1220016

**LEGEND:**

Categories preceded with \* will be approved for fabrication by Engineers India Limited.  
 The remaining drawings are needed for information only.

A/C = As compiled A/R = As required W/S = With shipment W = Weeks

**IMPORTANT**

While submitting drawings and documents for review as indicated in vendor data requirement, vendor must ensure the following :

1. A blank space measuring 75 mm W x 38 mm H shall be provided on all vendor drawings (on the front side) for marking review codes etc. by ENGINEERS INDIA LIMITED.
2. The review of the drawings shall be done as applicable, under the following review codes :
  - a) Review Code 1 : No Comments.
  - b) Review Code 2 : Proceed with manufacture / fabrication as per commented drawing. Revised drawing required.
  - c) Review Code 3 : Document does not conform to the basic requirements as marked. Resubmit for review.
3. Review of the vendor drawings by EIL would be only to check compatibility with basic design and concepts and would in no way absolve the manufacturer / fabricator of his responsibility to meet the applicable codes, specifications and statutory rules and regulations.

4. For drawings / documents indicated as FOR INFORMATION in the vendor data requirement, vendor must clearly mark FOR INFORMATION ONLY on the submitted drawings / documents.

I. Any drawing/document not indicated in the list above but required during erection, commissioning or for reconfiguration of the system shall also be supplied by the Vendor on demand.

II. X indicates required. Suffix Codes mean the following:

- (I) For Information
- (A) For Approval

III. The soft copy of documentation shall be in editable form (CAD, Excel, Database etc as well as SPI ).

IV. Note-1 & 2 above is not applicable as document shall be submitted as soft copies through eDMS.