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**VOLUME – II**

**SECTION – 2.0**

**BASIC BID WORK**

**FOR**

**S&SRP**

**(Sump Caisson and SWLP Casing Replacement Project)**



**OIL AND NATURAL GAS CORPORATION LIMITED  
INDIA**

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## 2.0 DESCRIPTION OF WORK

This section defines in general terms, the major components of the facilities, which will form, among other things, the Contractor's Scope of Work. The following sub-sections give a general description of the major components of the facilities envisaged under this project.

Section 2.1 of this document covers the survey requirements for platform structure locations and topside modifications.

Section 2.2 of this document covers the overall description of facilities envisaged under this project spanning across offshore installations of ONGC (wherever applicable and miscellaneous facilities as envisaged under scope of work).

Section 2.3 of this document covers the detailed functional description of the facilities envisaged in this project.

## 2.1 SURVEY REQUIREMENT

In addition to the Survey Requirements indicated in General Conditions of Contract (GCC), Vol.-I of bid documents, Contractor shall be fully responsible for carrying out all the pre-engineering (except soil investigation), pre-construction and post-construction surveys for platform locations and also the topside modifications on the existing platforms. However, the Contractor shall confirm all environmental & geotechnical data before the detailed design and shall be responsible for the interpretation of the data and finalization of the accurate water depth and sea bed features etc. and following jobs:-

- Determination of the accurate positioning of all process complexes and wellhead platforms relevant to this project.
- Identification of conditions on the seabed, if required and relevant to the facilities envisaged in this project, with relation to pipelines and composite cables that exist now or which may exist at the time of Installation.
- Determination of seabed conditions and slope of seabed in the way of the Structure.
- Determination and confirmation of the accuracy of as-built data including different elevation supplied by the Company. Modify those data as appropriate.
- CONTRACTOR shall visit the process complexes and wellhead platforms, carryout pre engineering survey of the existing facilities to verify the hook up points / routing of the lines through the bridge, wherever as-built drawings of existing facilities are not available.
- CONTRACTOR shall develop the existing drawings relevant for the intended modifications to as built status for the detailed engineering. Special attention shall be given to minimize the shut down time required at each platform and safety for executing the modifications.
- Contractor shall provide copies of all survey reports to the Company.

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## 2.2 FUNCTIONAL DESCRIPTION

The works shall include but not be limited to the following:

S/N	Asset	Complex	Platform	Equipment	Tag No.	Nature of Work	P&ID No.
1	MH	IC	ICW	SWLP Casing	SWLP-1010	Replacement	-
2	MH	IC	ICW	SWLP Casing	SWLP-1020	Replacement	-
3	MH	IC	ICW	SWLP Casing	SWLP-1030	Replacement	-
4	MH	SH	SHW	SWLP Casing	P-6210	Replacement	-
5	MH	SH	SHW	SWLP Casing	P-6220	Replacement	-
6	MH	SH	SHW	SWLP Casing	P-6310	Replacement	-
7	MH	IC	ICP	Vent Boom	ICP	Replacement	7134-PR-ICP-PID-2001
8	MH	SH	SHP	Vent Boom	SHP	Replacement	7134-PR-SHP-PID-4001
9	MH	SH	SHD	Vent Boom	SHD	Replacement	7134-PR-SHD-PID-4002
10	MH	BHS	BHS	Vent Boom	BHS	Replacement	7134-PR-BHS-PID-3001
11	MH	WIN	NC	Vent Boom	NC	Demolition	7134-PR-NC-PID-8001 to 8007
12	MH	SH	SHG	Well Fluid Heater	E-1150 (Train A)	Replacement	7134-PR-SHG-PID-4003
13	MH	SH	SHG	Well Fluid Heater	E-1160 (Train B)	Replacement	7134-PR-SHG-PID-4004
14	MH	IC-Heera Trunk Line	IC	30" PBIV(Pig Barrel Isolation Valve)(12MT)	IC-Heera Trunk Line	Replacement	7134-PR-ICP-PID-2002
15	MH	RS-21(BHS)	RS-21 wellhead	Topside Structure of platform		Repair of damage structure, handrail, cable tray etc damaged due to hit by OSV	-
16(i)	MH	IC	ICP	Sump Caisson	S-1800	Replacement	7134-PR-ICP-PID-2003

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16(ii)	MH	IC	ICP	Blow case	V-1820	Replacement	7134-PR-ICP-PID-2003
17(i)	MH	SH	SHP	Sump Caisson	S-1060	Replacement	7134-PR-SHP-PID-4005/4006/4007
17(ii)	MH	SH	SHP	Blow case	V-1060	Replacement	7134-PR-SHP-PID-4005/4006/4007
18(i)	MH	SH	SHP	Sump Caisson	S-1070	Replacement	7134-PR-SHP-PID-4005/4006/4007
18(ii)	MH	SH	SHP	Blow case	V-1070	Replacement	7134-PR-SHP-PID-4005/4006/4007
19(i)	N&H	NL	NLP	Sump Caisson	S-5201	Replacement	7134-PR-NLP-PID-5001/5002/5003
19(ii)	N&H	NL	NLP	Blow case	V-5211	Replacement	7134-PR-NLP-PID-5001/5002/5003
20	N&H	NL	NLP	Sump Caisson	S-5200	Piping Replacement Only	NPC-P-20-276
21(i)	N&H	HR	HRA	Sump Caisson	S-810	Replacement	7134-PR-HRA-PID-6001
21(ii)	N&H	HR	HRA	Blow case	V-820	Replacement	7134-PR-HRA-PID-6001

For SWLP Casing, repair work at RS-21 platform, and 30" Pig Barrel isolation valve refer elsewhere in the bid document. Only installation of 30" Pig barrel isolation valve is to be done under this project. Shifting of 30" valve from ICP-R to ICP and its installation is to be under Contractor's scope of work.

## 2.3 DESCRIPTION OF FACILITIES

### 2.3.1. PROCESS

#### 2.3.1.1. Vent Boom – ICP

- Vent Boom at ICP is to be replaced along with flame arrestors, isolation valves, CO<sub>2</sub> snuffing system and associated instrumentation.
- Vent Boom at ICP is to be replaced along with flame arrestors, isolation valves, CO<sub>2</sub> snuffing system and associated instrumentation.

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- iii. New Vent Boom is to be installed at a minimum distance from platform as the existing Vent Boom. Replacement is to be taken on one-to-one basis from downstream of Glycol Seal Pot (V-2150) as per marked-up P&ID.
- iv. Piping from downstream flange of Vent Scrubber (V-2100) till upstream flange of Glycol Seal Pot (V-2150) is also to be replaced.
- v. For details, refer to P&ID No. 7134-PR-ICP-PID-2001.

#### **2.3.1.2. Vent Boom – SHP**

- i. Vent boom on SHP is to be replaced from downstream flange of Vent Scrubber (V-1090) along with flame arrestors, isolation valves, CO2 snuffing system and associated instrumentation.
- ii. New Vent Boom is to be installed at a minimum distance from platform as the existing Vent Boom. Replacement is to be taken on one-to-one basis.
- iii. For details refer to P&ID no. 7134-PR-PID-SHP-4001.

#### **2.3.1.3. Vent Boom – SHD**

- i. Vent boom on SHD is to be replaced from top of KOD (V-790) along with downstream PCV, flame arrestors, CO2 snuffing system and associated instrumentation. New Vent Boom is to be installed at a minimum distance from platform as the existing Vent Boom. Replacement is to be taken on one-to-one basis.
- ii. Replacement of 12" Vent Gas sub-header (12"-VG-A1-2221) is to be taken and all existing lines to be hooked up with new header.
- iii. For details refer to P&ID no. 7134-PR-SHD-PID-4002.

#### **2.3.1.4. Vent Boom – BHS**

- i. Replacement of Vent boom along with flange to flange replacement of Vent Scrubber (V-1090) is to be done at BHS Platform.
- ii. 10" Piping from upstream of Vent Scrubber shall also be replaced.
- iii. The replacement shall be one on one and to include the flame arrestors, isolation valves on both bypass and main line, CO2 snuffing system, and associated instrumentation.
- iv. For more details, refer to P&ID No. 7134-PR-BHS-PID-3001.

#### **2.3.1.5. Vent Boom – NC**

- i. Existing Vent Boom along with vent system of NC Platform is to be demolished.
- ii. Following facilities are currently connected to the Vent System, which shall be disconnected and appropriately blinded

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- i. ND-NC Well Fluid Receiver
- ii. NC-MNP Well Fluid Launcher
- iii. NC-NE Lift Gas Launcher
- iv. ND-NC Lift Gas Receiver
- v. NC-N2 Lift Gas Launcher
- vi. Test Separator
- vii. Closed Deck Drain System

iii. For more details, refer to Piping Scope of work and P&ID No. 7134-PR-NC-PID-8001 to 8007.

#### **2.3.1.6. Well Fluid Heater – SHG**

- i. Replacement of existing 2 no. of WF heaters (E-1150/ E-1160) with two new WF heaters of same capacity at SHG Platform along with associated instrumentation and piping is to be done.
- ii. Access platform for changing the tube bundles of the Well Fluid Heaters is to be provided as per Structure Scope of Work. Relocation of associated piping, instrumentation, NRVs, control valves etc., if required, for the same to be under scope of the contractor.
- iii. Replacement of well fluid heater (train A, train B) are to be done along with shutdown valve on hot oil lines (XSDV-1151/1152, XSDV-1161/1162).
- iv. Flange to flange replacement shall be done for each WF heaters after proper isolation.
- v. Flange shifting, if required based on exchanger size, shall be in Contractor's scope.
- vi. All the piping modification shall be in Contractor's scope. Connection of existing well fluid line with new unit and interconnection of the new unit with existing vent, drain and flare headers shall be done by contractor.
- vii. For replacement scope refer marked up P&ID 7134-PR-SHG-PID-4003, 7133-PR-SHG-PID-4004 and Annexure-1

#### **2.3.1.7. 30" Pig Barrel isolation valve**

- i. 30" Pig barrel isolation valve is to be removed and new valve is to be installed at ICP Platform.
- ii. 30" valve shall be provided by ONGC as a free issue item.
- iii. Shifting of valve from its current location at ICP-R for final installation at ICP and, temporary removal and re-installation of piping, framing etc., shall be under scope of contractor, details of which shall be finalized in detailed engineering.
- iv. Any relocation or shifting of piping/tubing/instrumentation shall be done by contractor with minimum shutdown requirement. After installation, same needs to be restored.

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v. For details, refer to P&ID no. 7134-PR-ICP-PID-2002.

#### **2.3.1.8. Sump Caisson – ICP**

- i. Replacement of existing Sump Caisson (S-1800) along with Blow Case (V-1820) with new sump caisson, Blow Case, associated piping and instrumentation is to be done at ICP Platform. Size of new Sump Caisson shall be same as existing one.
- ii. Existing Sump Caisson is to be removed from its current location along with associated piping and instrumentation.
- iii. Sampling collection provision at final disposal point shall be provided along with servicing/maintenance space at accessible location.
- iv. Existing Blowcase has 2" bleed line at site, which is also to be provided in new sump caisson along with ball valve.
- v. 3" line from Blowcase to Skimmer Vessel is to be replaced till spectacle blind, including all the associated instruments. Extension and rerouting of piping from existing location to new location of Sump Caisson shall be under contractor's scope.
- vi. 10" Open Deck Drain headers are corroded and are to be replaced from header joint. New lines are to be rerouted to the new location of Sump Caisson and connected. Demolition and rerouting of their vent lines are to be under scope of work of contractor.
- vii. New Sump Caisson to be installed at one of the legs of jacket, location of which shall be as per structure scope of work.
- viii. Produced water is to be dumped below the last baffle as close as possible to point of disposal. Rerouting of produced water line to new location of sump caisson shall be under contractor's scope of work.
- ix. For more details, P&ID 7134-PR-ICP-PID-2003, Annexure-2 & Annexure-3 shall be referred.

#### **2.3.1.9. Sump Caisson – SHP**

- i. Removal of existing two Sump Caisson (S-1060/S-1070) and Blow Case (V-1060/V-1070) and installation of one new Sump Caisson of combined appropriate capacity is to be done at SHP.
- ii. Calculation of capacity of new Sump Caisson shall be done by vendor based on data provided in Process Design Criteria. Sump Caisson is to be sized to be able to handle a minimum of existing combined fluid of both Sump Caissons. Produced water is to be dumped at the last baffle as close as possible to point of disposal.
- iii. All the associated piping and instrumentation of sump caisson and blow case shall also be replaced. Rerouting of lines and connection shall be under scope of contractor.
- iv. Hook-up of new sump caisson to the existing vent and fuel gas header shall be in Contractor's scope. Connection of LP Fuel Gas line as shown in P&ID 7134-PR-SHP-

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PID-4006 for purge to HP Flare Header shall be made by the contractor. Hook-up location for the connection shall be finalized during detailed engineering.

- v. Sampling collection provision at final disposal point shall be provided along with servicing/maintenance space at accessible location
- vi. Hook-up of all instrumentation of new sump caisson with DCS/PLC shall be under the scope of the contractor.
- vii. New Sump Caisson to be installed at one of the legs of jacket, location of which shall be as per structure scope of work
- viii. For detailed demolition and construction scope refer to P&ID 7134-PR-SHP-PID-4005/4006/4007. For other details, Annexure-4 to be referred.

#### **2.3.1.10. Sump Caisson – NLP (S-5201)**

- i. Replacement of existing Sump Caisson (S-5201) and Blow Case (V-5211) with new Sump Caisson and Blow Case of same type is to be done at NLP Platform. All associated instrumentation and piping shall also be replaced.
- ii. Sampling collection provision at final disposal point shall be provided along with servicing/maintenance space at accessible location
- iii. 2" LP fuel gas line along with three-way valve till 2" ball valve, along with vent line shall be replaced as shown in the marked up P&ID.
- iv. 3" recovered oil line from blow case to skimmer vessel shall be replaced along with Flow Switch as shown in the marked up P&ID.
- v. 10" old skimmer vessel overflow line for free draining to sump caisson shall be removed and replaced as shown in marked-up P&ID 7134-PR-NLP-PID-5001/5002.
- vi. 16" Produced Water GRE piping from Produced Water Conditioning Unit (Flash Vessel and IGF outlet) shall be replaced. The replaced line shall be routed to the new location of the Sump Caisson. Produced water is to be dumped below the last baffle closest to the point of disposal.
- vii. Hook up of new sump caisson to the existing facilities, fuel gas and vent headers shall be in Contractor's scope.
- viii. Location of sump caisson shall be as per structure scope of work.
- ix. For detailed replacement scope refer marked up P&ID 7134-PR-NLP-PID-5001/5002/5002. For other details, Annexure-5 to be referred.

#### **2.3.1.11. Sump Caisson – NLP (S-5200)**

- i. 16" Produced Water GRE piping from Produced Water Conditioning Unit (Flash Vessel and IGF outlet) up to sump caisson indicated in the P&ID shall be replaced.
- ii. 10" Open Deck Drain U-Tubes (at splash zone) as indicated in the P&ID shall also be replaced.

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#### **2.3.1.12. Sump Caisson – HRA**

- i. Replacement of existing Sump Caisson (S-810) and Blow Case (V-820) with one new Sump Caisson of reduced capacity as per Process Design Basis is to be done at HRA Platform. New Caisson shall be installed at a new location as per Structure Scope of Work.
- ii. Sizing of new Sump Caisson, with reduced capacity as per Process Design Basis, shall be done by the contractor.
- iii. All the associated piping and instrumentation of sump caisson and blow case shall also be replaced. Rerouting of lines and connection shall be under scope of contractor.
- iv. Oil recovery line to skimmer vessel shall be replaced and hook-up of the same shall be under scope of contractor.
- v. 8" Open Deck Drain lines of HRA as per the marked-up P&ID and the hook up of the same with new sump caisson shall be under the scope of contractor.
- vi. Fuel gas line from PCV, including three way control valve and other associated instrumentation/valves/piping needs to be replaced and pile bottom sample collection provision shall be provided.
- vii. Hook-up of new sump caisson to the existing vent and fuel gas header shall be in Contractor's scope.
- viii. Produced water is to be dumped below the last baffle closest to the point of disposal. Rerouting of PWC Line to the new location shall be under scope of the contractor.
- ix. Firewater hose reel at appropriate location to cover entire deck level of Sump Caisson to be provided. For more details, refer to Mechanical Scope of Work.
- x. Sizing of new sump caisson (of reduced capacity) as per data provided in design basis shall be under scope of contractor/vendor.
- xi. New sump caisson shall be installed at the leg of the Platform. Exact location of the new sump caisson shall be as per structure scope of work.
- xii. For details, refer P&ID No. 7134-PR-HRA-PID-6001

#### **2.3.2. PIPING**

- I. The piping scope of work envisaged under this tender broadly consists of but not limited to design, supply, fabrication, installation, testing, pre-commissioning and commissioning & other assistance of piping systems, instruments etc. & Submarine Pipelines, Hook-up, modification works at existing platforms as per the Description of Work (Basic Bid Work) and approved P & IDs including interface jobs as indicated elsewhere in the bidding documents.
- II. The materials, design and workmanship shall conform to relevant codes, piping design criteria & functional specifications contained in the bid package.

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- III. The contractor shall develop Equipment Layouts, Safety Equipment Layouts, Piping General Arrangement drawings, Isometrics & Piping support drawings etc. in accordance with piping design criteria, functional specifications, codes and standards, Description of Work (Basic Bid Work), approved P & IDs, recommendations of Safety Studies, Material Handling Studies etc. during project stage and submit the same for review & approval. However, indicative layouts of Platforms are enclosed with the bid for understanding of scope of work.
- IV. Contractor shall make detailed specification and datasheets (including PMS & VMS) for piping and piping specialty items as per process requirements and submit the same for review & approval during detailed engineering.
- V. Corrosion coupons and retrieval tool kit shall be provided as per process requirement and specification attached elsewhere in the bid package.
- VI. Contractor shall be responsible for complete execution of the project as per design criteria, functional specifications, Description of Work (Basic Bid Work), approved/reviewed DCI & MCI documents and approved P&IDs.
- VII. Supply, design, fabrication and installation of pipe supports are in contractor's scope. Contractor shall develop piping support standards and submit the same for review and approval.
- VIII. Any other work not specifically mentioned above but required for completeness of work as per specification / drawings shall be in contractor's scope.

#### **2.3.2.1. Piping (Modification works)**

- I. The entire scope of piping work related to modification works at existing platforms shall be as per the Description of Work (Basic Bid Work) and approved P & IDs.
- II. Equipment layout drawings for existing well/process platforms where new equipment/vessels/facilities are being installed shall be prepared by contractor based on pre-engineering survey. During pre-engineering survey, in case any unforeseen or unidentified structure/ piping/ equipment etc. found to exist at the platform for which installation of new equipment is hindrance, Contractor shall readjust/ relocate the equipment/ piping as part of scope of work under this tender and submit the modified drawing for Company's approval.
- III. It is contractor's responsibility to ascertain exact pipe routing/pipe sizes/rating/MOC/relocation of Equipment/Requirement of deck extension etc. for meeting the requirement of Basic Bid Work and approved P&IDs. Contractor shall conduct necessary site surveys to collect as built data/drawings not enclosed in the bid package and ensure that piping/ equipment clears all existing structures, cable trays, instrument racks, nearby supporting structure or any other equipment. Wherever as built drawings are not available, Contractor shall carry out detailed site survey, gather information from existing well platforms, develop the drawings and submit these for Company's review/ approval.
- IV. Contractor shall prepare detailed survey report for complete scope of work including hook-up details and submit the same for approval.

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- V. Routing of new lines shall be same as the old one being replaced to the extent possible.
- VI. Contractor shall provide/extend all safety equipment and systems, as required in the areas where new facilities are provided.
- VII. Contractor shall provide deck drains on the extended portions of the platforms and hook it up with existing deck drains.
- VIII. Contractor shall provide necessary material handling provisions for the new facilities.
- IX. Contractor's scope of work shall include modification/ integration as per approved P&IDs and other requirements listed in elsewhere in the Bid Documents. Contractor may be required to open/dismantle/realign/modify any facility or instrument or piping or equipment of the existing facilities. It will be the contractor's responsibility to make good, test and re-commission all such facilities during and after completion of works with minimum period of platform shutdown. Details of total shutdown required for each modification/integration shall be submitted to company for approval.
- X. Contractor shall perform the necessary modification/ integration work on the basis of actual physical conditions/ data/ parameters found during the site survey. Contractor shall not be entitled to any cost and time compensation on this account.
- XI. Contractor shall also do the necessary patch up insulation work where insulation is opened up during tapping/ tie-in/ hook-up. Contractor shall plan & carry out suitable positive isolation, depressurization, cleaning, purging, flushing, hydro-testing, drying, and painting & removal of temporary supports, scaffolding etc. Contractor shall take all precautions & follow safety procedures to execute the job safely without any operational hazard.
- XII. Contractor shall ensure, before submission of bid offer, that the space allocated for the various facilities for the modification is adequate and satisfactory. In case, any additional space/ facility such as provision of any walkway/operating platform for maintenance and operation of valve etc. are warranted, the contractor shall indicate the same in bid offer and the cost shall be included in the lump sum price.
- XIII. In case any existing facility is to be relocated or existing piping is to be altered in order to carryout platforms' modifications, Contractor shall execute these changes including testing etc. without any major shut down.
- XIV. Contractor shall modify the support design wherever necessary to finalize the new support without any intervention with the existing facilities. Installation of pipe work, pipe supports, instruments etc. shall be such that existing walkways / escape routes / maintenance access to existing facilities are not encroached.
- XV. If the bid document / P & IDs specially require any existing facility to be altered or reused, the same shall be done by the Contractor after verifying/ checking the condition of existing facility. If whole or any part of it is found to be

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defective/repairable, contractor shall replace/ repair the same without any extra time and cost.

- XVI.** Contactor shall show the existing piping & Equipment on both sides of the new piping in GAD for modification works to ensure easy location of the piping.
- XVII.** Contractor shall be responsible to complete the scope of work with minimum shut down. To achieve the objective, contractor shall make arrangement like temporary connection/modification in safe manner so that shut down is reduced to minimum. Arrangement/ Procedure for the same shall be finalized during pre-engineering survey and submit the same for company's approval. Company shall have right to change the proposal made by contractor based on production and availability of the platform.
- XVIII.** Contractor to ensure below cellar deck piping routing shall be kept within the platform deck boundary and at the highest elevation to the extent possible.
- XIX.** Contractor shall bring out all the possible piping routing option in the pre engineering survey report.
- XX.** Contractor shall collect all the necessary data regarding current ongoing projects from ONGC for intended modification site prior to carrying out the actual pre engineering survey. This is to avoid interfacing issues prior to modification jobs executions.
- XXI.** It is to be noted that drawings of existing platforms to extent available have already been included in the bid document. Any further details/information required to for detail engineering shall be collected by bidder during pre-engineering survey from the respective platform for modification jobs.
- XXII.** Contractor to ensure that any modifications for completion of scope of work shall in no way interfere with operating philosophy of the existing platform unless approved otherwise by company.

### **2.3.3. STRUCTURAL SCOPE OF WORK**

#### **2.3.3.1. GENERAL**

This Scope of Work detailed below shall be read in combination with "Background and General", of Basic Bid Work, "Structural Design Criteria (sec 3.4)", General Specification for Material, Fabrication and Installation of Structure", Functional Specification for Building Module, Specification for Protective Coating and "Scope of Work for other Discipline" of the Bid.

The Scope shall include the structural work for facility / requirements detailed elsewhere in the bidding documents but not limited to following:

- i) Surveys – Pre-engineering, Post-demolition, Pre-construction & Post construction as detailed below at 2.3.3.2.
- ii) Design & Engineering in compliance to Structural, Architectural design criteria along with all related functional specifications.

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- iii) Procurement of various materials.
- iv) Fabrication.
- v) Load-out.
- vi) Transportation.
- vii) Installation.
- viii) Supply of loose items, if any.
- ix) As built documentation of the project shall be submitted as defined in Bid document.
- x) Mobilization of marine spread in line with the bid scope shall be carried out. Contractor shall make all arrangements for personnel accommodation, storage, fit-up etc. at marine spreads.
- xi) Protective arrangement at platforms for safety of the structures, equipment, piping, instruments etc. during execution of work shall be made by Contractor.
- xii) Preparation & submission of detailed installation methodology including the removal procedure of existing facilities for replacement work for Company's approval.
- xiii) Dismantling of all existing facilities/items to be replaced at offshore platforms shall be under Contractor's scope. Their Loading on cargo barges, sea fastening, transporting and their disposal in environmentally safe manner to an onshore location arranged by Contractor shall be in Contractor's scope. All marine spreads required for transportation of dismantled material shall also be in Contractor's scope. The same shall be done as per scope of work & approved pre-engineering survey report.
- xiv) Any other detail/ aspect required for preparation of AFC drawings and smooth installation and execution of job.
- xv) Contractor shall prepare detailed layout for construction and/or demolition of various structural elements like tubulars, rolled sections, plates, gratings, chequered plates, deck plates, handrails, etc. along with removal drawings & detailed MTO for each item.
- xvi) All the repairs & refurbishment/replacement works shall be executed as per pre-engineering survey report.
- xvii) Contractor shall procure, fabricate, test, load-out, transport, lift and install all the necessary structural elements as per the enclosed specifications & Structural design criteria.
- xviii) Contractor shall prepare the modification plans so as to minimize the obstruction to the working facilities.
- xix) Contractor shall be responsible for all the necessary certifications of lifting aids as per the specifications. Contractor shall provide all the installation aids, consumables, etc.

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- xx) Contractor's scope of work shall include all necessary integration, with the existing facilities. Contractor shall carry out extensive site surveys and familiarize himself with the total work scope to be carried out on the existing platforms. Their scope of work shall include verification of data/ drawings of existing facilities before proceeding with detailed engineering/ procurement based on bidding documents. It shall be Contractor's responsibility to assess the total quantum of work to be carried out on the existing platforms and/or temporary extension of existing platform deck if required.
- xxi) Deck strengthening shall be done by the Contractor (wherever required) based on the findings of Local/Global Deck Inplace analysis with updated loads. Replacement of corroded deck members, plates and additional bracing / stiffening, modification, strengthening of deck beams, providing new supporting beams etc., if required based on Deck Local Inplace analysis of the existing deck structures shall be carried out by the Contractor as a part of his firm scope of work. Contractor to submit all such local design & adequacy check report for review and approval of the company.
- xxii) Additional bracing / stiffening, strengthening, modification etc., if required, to the existing structures due to structural loads or due to site conditions and not visualized at the time of engineering but required at site for completion of work, the same shall be incorporated and provided by the Contractor as part of his firm scope of work.
- xxiii) Pipe support &, cable tray supports shall be provided as per multidisciplinary detailed engineering requirements.
- xxiv) Contractor shall carry out fabrication, painting, load-out, sea fastening and transportation of all materials from Contractor's fabrication yard to offshore platforms. Materials as required for painting at offshore (if any) shall also be procured, supplied, transported and applied at offshore locations by the Contractor.
- xxv) Contractor shall carry out Modification / dismantling / cutting/ rerouting/ temporary shifting of any existing facilities, structures, piping, cabling, cable trays, and instruments as necessary to overcome obstruction in execution of replacement work and make it good after installation activity. In case any damage is taken place during the modifications work, the Contractor shall repair or replace the same with new equipment/facilities at no cost to the Company. All such works shall be carried out immediately.
- xxvi) Contractor shall provide, supply, install & uninstall all the necessary scaffolding for proper access during pre-engineering surveys, execution the works and post-construction surveys in safe manner at offshore.
- xxvii) Contractor shall prepare & submit the detailed execution methodology for the overall scope of work for Company's approval.
- xxviii) Contractor shall prepare & submit the detailed installation methodology for the work for COMPANY's approval.

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xxix) Contractor shall prepare As-Built drawings showing the modifications works performed under the scope of work in existing drawings and obtain COMPANY's approval.

xxx) All material shall be new and unused.

xxxi) Contractor shall mobilize suitable marine spreads/workboats. Contractor shall make all arrangements for personnel accommodation, storage, fit-up etc. at marine spreads.

xxxii) Apart from the above, everything else required for executing the work in accordance with the Scope of Work and Technical Specifications shall also be in the scope of the Contractor.

xxxiii) Cost of modification /strengthening/ replacement shall be included by contractor in lump-sum quoted price & the same is not to be considered in tonnage adjustment. Deck Extension due to (Clamp-on and Sump Caisson etc.) shall be under tonnage adjustment.

### **2.3.3.2. SURVEY**

#### **i) Pre-engineering Survey**

1. To study and find feasibility of proposed scope of demolition/ removal and installation - To verify the dimensions vis-a-vis feasibility of installation of the new structure/equipment before carrying out detailed engineering and examine the feasibility of addition/replacement of facilities (Equipment / Vessels / Piping), etc. If any kind of obstructions/fouling of members is/are found for the proposed/planned demolition and installations including deck extensions & proposed addition or replacement of equipment / piping the matter shall be brought to Company's notice in the pre-engineering survey report(with feasible solutions and shall be put up for review / approval of Company).

2. To carry out the survey/ measurements considering all demolition & installation aspects related to repair/replacement/strengthening-Verification of member sizes & thickness (using ultrasound method) shall be carried out during pre-engineering survey for all proposed Structural repair & refurbishment/ replacement/extension/strengthening/modification, and architectural modifications.

3. To verify as-built documents (like elevations, sizes/ wall thickness of relevant structural as well as non-structural members, etc.) and fill the missing data.

#### **ii) Post-demolition Survey**

Surveys for structural replacement/ strengthening jobs related to replacement of major equipment like Well Fluid Heaters etc.:

1. To assess corroded status of the primary & secondary structural members, platings, equipment supports/ skids etc. beneath equipment (which are

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envisaged to be replaced) may not be possible to full extent during pre-engineering survey.

2. To collect data such as member size, corroded size & thickness (using ultrasound method) of platings, equipment supports/ skids, primary/ secondary structural members for one to one replacement of corroded members/ strengthening of existing members/ providing additional members.
3. Verify the dimensions vis-a-vis feasibility of installation of the new structure/equipment and examine the feasibility of addition/replacement of facilities (Equipment / Vessels / Piping), etc.
4. Identify obstruction if any for the proposed installations including deck extensions & proposed addition or replacement of Equipment / piping.

### iii) Pre-construction Survey

Pre-Construction Surveys is to be taken up before installation. Data obtained from Pre-Construction Surveys is to be compared with data obtained during Pre-Engineering Survey and remedial action, if any, is to be taken up.

### iv) Post Construction Survey

Post Construction Surveys include as-built status of replaced/ repaired/ modified/ Installation works.

## 2.3.3.3. DESCRIPTION OF WORKS:

### 2.3.3.3.1. REPLACEMENT OF SUMP CAISSONS

Sl. No.	Platform	Scope of Removal	Scope of new installation
1.	ICP	Existing sump caisson with clamp supports to be dismantled and disposed.	<ul style="list-style-type: none"> <li>➤ External sump caisson (of same capacity) along with clamps to be provided.</li> <li>➤ Location of new sump caisson is ICP Jacket leg (A4) South-East side (towards Flare Bridge).</li> <li>➤ Deck extension of 3m x 3m shall be provided at spider deck to create access platform for Sump caisson.</li> <li>➤ Maintenance/ access platform of size 0.5m x 0.5m (approx.) to lift and take out blow case is to be provided approximately 4.0m above sump caisson top. A monkey ladder with cage from spider deck to be provided till access platform.</li> </ul>
2.	SHP	Existing 2 nos. sump caisson with clamp supports to be	<ul style="list-style-type: none"> <li>➤ External Sump Caisson (1 no.) of appropriate combined capacity to be installed.</li> <li>➤ Location of new sump caisson is Jacket leg A4 in the east direction of SHP platform.</li> </ul>

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		dismantled and disposed.	<ul style="list-style-type: none"> <li>➤ Deck extension of 3m x 3m shall be provided at spider deck to create access platform for Sump caisson.</li> <li>➤ Maintenance/ access platform of size 0.5m x 0.5m (approx.) to lift and take out blow case is to be provided approximately 4m above sump caisson top. A monkey ladder with cage from spider deck to be provided till access platform.</li> </ul>
3.	NLP	Existing sump caisson with clamp supports to be dismantled and disposed	<ul style="list-style-type: none"> <li>➤ External Sump Caisson (of same capacity) along with clamps to be provided.</li> <li>➤ New sump caisson shall be installed at the same location where existing sump caisson is located.</li> <li>➤ Existing grated deck, handrails etc. to access sump caisson top is to be restored after necessary modifications/ repairs.</li> </ul>
			<ul style="list-style-type: none"> <li>➤ 10" ODD U-tubes (at splash zone) and 16" GRE lines Feed from PWC (Flash vessel and IGF outlets) up to sump caisson needs to be replaced as per drawing</li> </ul>
4.	HRA	Existing sump caisson along with clamps shall be removed & disposed.	<ul style="list-style-type: none"> <li>➤ External Sump Caisson (of same capacity) along with clamps to be provided.</li> <li>➤ Location of new sump caisson is Jacket leg A2 of HRA platform</li> <li>➤ Deck extension of 3m x 3m shall be provided at spider deck to create access platform for Sump caisson.</li> <li>➤ Maintenance/ access platform of size 0.5m x 0.5m (approx.) to lift and take out blow case is to be provided approx. 4m above sump caisson top. A monkey ladder with cage from spider deck to be provided till access platform.</li> </ul>

**#Refer multidisciplinary (Process, Mechanical etc.) scope of work for the complete scope of work.**

#### **2.3.3.3.2. SUMP CAISSON PROTECTOR:**

Sl. No.	Platform	New Caisson Protector required
1	ICP	Yes
2	SHP	Yes
3	NLP	No
4	HRA	Yes

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#### 2.3.3.3.3. REPLACEMENT OF SEA WATER LIFT PUMP CASINGS:

S/N	Platform	No. of SWLP	Scope of removal	Scope of new Installation
1	SHW	3 nos.	Existing casings along with guides and stiffeners.	One-to-one replacement.
2	ICW	3 nos.	Existing casings along with guides and stiffeners.	One-to-one replacement.

#Refer multidisciplinary (Process, Mechanical etc.) scope of work for complete scope of work.

#### 2.3.3.3.4. REPLACEMENT OF WELL FLUID HEATER & PBIV

Sl. No.	Platform	Description/Details
1.	SHG	Replacement of existing two <b>WF heaters</b> with two new WF heaters.
2.	IC-HEERA TRUNK LINE: PIG BARREL ISOLATION VALVE	Replacement of 30" PBIV of weight 12MT.

#Refer multidisciplinary (Process, Mechanical etc.) scope of work for complete scope of work.

#### 2.3.3.3.5. RS-21 DECK MODIFICATION & STRENGTHENING

Strengthening/replacement of damage structure member and Repairs/replacement handrails. Cable tray etc. shall be taken-up due to hit by OSV. Level-wise details of structural scope is described/stated in a separate section below.

#### 2.3.3.3.6. UNDERWATER REPAIR OF JACKET MEMBERS & JOINTS AT SHP JACKET

Location of Members and Joints for Strengthening:

Sl. no.	Platform	Member	Location
1.	SHP	0288-506L (ME39 )	(Horizontal member-Row B).

#### 2.3.3.3.7. VENT BOOM

Sl. No.	Platform	Scope of work	Remarks
1.	ICP	➤ ICP vent boom along with CO2 snuffing system is to be replaced.	One-to-one replacement

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		➤ Vent line needs to be replaced from the top of scrubber till vent boom.	
2.	SHP	➤ The corroded & damaged vent boom supports, channel sections need to be removed and replaced with new structural supports. ➤ Vent boom and vent line to be replaced from the top of scrubber till vent boom.	
3.	SHD	➤ SHD vent boom along with CO2 snuffing system is to be replaced. ➤ Vent line also needs replacement from the top of scrubber till vent boom.	One-to-one replacement
4.	BHS	➤ Vent boom is to be replaced with new vent boom and the truss support to vent boom shall be provided at suitable intervals. ➤ The scrubber needs to be replaced. ➤ 10" pipeline upstream of vent scrubber of approximate length of 140 m need to be replaced due to multiple leakages.	
5.	NC	➤ The vent boom and its support structure is to be dismantled and disposed.	

**#Refer multidisciplinary (Process, Mechanical, Piping, Electrical) scope of work for complete scope of work.**

#### **2.3.3.4. PLATFORM-WISE MATRIX OF THE WORK TO BE EXECUTED AT DIFFERENT PLATFORMS**

Sl.No	Asset	Complex	Platform	Equipment	Nature of Work
1	MH	IC	ICW	SWLP Casing	Replacement
2	MH	IC	ICW	SWLP Casing	Replacement
3	MH	IC	ICW	SWLP Casing	Replacement
4	MH	SH	SHW	SWLP Casing	Replacement
5	MH	SH	SHW	SWLP Casing	Replacement
6	MH	SH	SHW	SWLP Casing	Replacement
7	MH	IC	ICP	Vent Boom	Replacement

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8	MH	SH	SHP	Vent Boom	Replacement
9	MH	SH	SHD	Vent Boom	Replacement
10	MH	BHS	BHS	Vent Boom	Replacement of vent boom and 10" pipeline upstream of vent scrubber of approximate length of 140 m need to be replaced due to multiple leakages.
11	MH	WIN	NC	Vent Boom	Demolition
12	MH	SH	SHG	Well Fluid Heater	Replacement
13	MH	SH	SHG	Well Fluid Heater	Replacement
14	MH	IC-Heera Trunk Line	IC	30" PBIV(Pig Barrel Isolation Valve) (12MT)	Replacement
15	MH	RS-21(BHS)	RS-21 wellhead	Topside Structure of platform	Repair of damage structure, handrail, cable tray etc. damaged due to hit by OSV
16(i)	MH	IC	ICP	Sump Caisson	Replacement
16(ii)	MH	IC	ICP	Blow case	Replacement
17(i)	MH	SH	SHP	Sump Caisson	Replacement
17(ii)	MH	SH	SHP	Blow case	
18(i)	MH	SH	SHP	Sump Caisson	
18(ii)	MH	SH	SHP	Blow case	
19(i)	N&H	NL	NLP	Sump Caisson S-5201	Replacement
19(ii)	N&H	NL	NLP	Blow case	Replacement
20	N&H	NL	NLP	Sump Caisson S-5200	10" ODD U-tubes (at splash zone) and 16" GRE lines Feed from PWC (Flash vessel and IGF outlets) up to sump caisson needs to

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					be replaced as per drawing
21(i)	N&H	HR	HRA	Sump Caisson	Replacement
21(ii)	N&H	HR	HRA	Blow case	Replacement

Note: For Tag no. please refer multi-disciplinary scope.

### **2.3.3.5. DESCRIPTION OF STRUCTURAL SCOPE OF WORK IN LINE WITH 2.3.3.3**

#### **2.3.3.5.1. REPLACEMENT OF SUMP CAISSONS**

- i) New Sump Caissons (external) are planned to be installed exterior to jacket and aligned along with Jacket Legs. New sump caisson shall be installed at the same location where existing sump caisson is located at NLP.
- ii) UT of Jacket legs where new sump caissons are to be installed shall be carried out during Pre-engineering survey.
- iii) Removal of existing Sump caisson shall be carried out prior to installation of the new sump caisson.
- iv) The replacement of the Caissons is to be one to one in terms of material & dimensions unless stated otherwise. Sump caisson shall be designed as per structural design criteria.
- v) Clamps and stub connecting Jacket framing members and sump caisson shall be carried as per structural design criteria as a special structure.
- vi) Contactor to refer Process/Mechanical & other multi-disciplinary scope of work for other details.
- vii) Marine growth cleaning of the affected area where connections are proposed and other necessary works to complete scope of work.
- viii) Obstructions if any, e.g. Riser Protector / Barge Bumper near Jacket leg where Sump Caisson is being installed outside, same shall be removed and re-installed (if required).

#### **2.3.3.5.2. SUMP CAISSON PROTECTOR**

- i) Sump caisson protector in the shape of quarter circle with approx. 3 m radius to be provided at ICP, SHP & HRA. Existing Sump caisson protector is to be removed and reinstalled after necessary modifications/ repairs at NLP.
- ii) Removal of Barge Bumper on Leg A4 for installing Sump Caisson protector on Leg A4 is also to be carried out as per SIA at ICP.
- iii) Contractor shall carry out pre-engineering survey for collection of all necessary information regarding replacement/installation of new sump caisson protector as per scope.
- iv) Design of Sump Caisson Protector shall be as per design of Riser protectors detailed under Structural Design Criteria.

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- v) Sump caisson protector in the shape of quarter circle with approx. 3 m radius to be provided. Dimension of the same shall be finalized during detailed engineering.
- vi) Marine growth cleaning of the affected area where connections are proposed and other necessary works to complete scope of work.
- vii) Obstructions if any, e.g. Riser Protector / Barge Bumper near Jacket leg where Sump Caisson is being installed outside, same shall be removed and re-installed (if required).

#### **2.3.3.5.3. REPLACEMENT OF SEA WATER LIFT PUMP CASINGS**

- i) The new SWLP casings are to be installed at the same location.
- ii) New Casings (3 nos. at SHW & 3 nos. at ICW) of same material and dimensions are to be installed. New Caisson guides/supports and stiffeners to be provided
- iii) UT of Jacket members/joints where new casing connections are proposed shall be carried out during Pre-engineering survey.
- iv) The existing SWLP casings, casing guides and stiffeners under replacement scope are to be removed before installation of new casings.
- v) The replacement of the casings is to be one to one in terms of material & dimensions unless stated otherwise.
- vi) Marine growth cleaning of the affected area where connections are proposed and other necessary works to complete scope of work shall be carried out.
- vii) SWLP casing along with guides & stiffeners to be carried out as per structural design criteria as a special structure.

#### **2.3.3.5.4. REPLACEMENT OF WELL FLUID HEATER & PBIV**

Structural scope related to above includes replacement/strengthening of Equipment supports and Deck Modification including strengthening based on pre-engineering & post demolition survey of existing Platforms. Deck modification including strengthening are to be firmed up during detail engineering based on pre-engineering survey. Deck local analysis shall be carried out as per structural design criteria for Deck Modifications including strengthening.

The removal and installation philosophy shall be developed and submitted to Company for review. Replacement of Handrail, Plating & Gratings etc. at Piping /Equipment/Process modification areas shall be carried out by the Contractor based on site Survey. Any issues envisaged for the modification works shall be brought to the Company's notice in the pre-engineering survey report and feasible solution shall also be proposed.

After removal of these equipment, a post demolition survey shall be performed as detailed below:

1. Corroded status of the primary & secondary structural members, platings, equipment supports/ skids etc. beneath equipment (which are envisaged to be replaced) may not be possible to full extent during pre-engineering survey. Pre-

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engineering survey shall collect enough data for fabrication of equipment supports/ skids, dimensions of platings to be replaced.

2. Post-demolition survey shall be performed (before undertaking structural replacement/ strengthening jobs) to collect data such as member size, corroded size & thickness (using ultrasound method) of platings, equipment supports/ skids, primary/ secondary structural members for one to one replacement of corroded members/ strengthening of existing members/ providing additional members.
3. However, pre-engineering survey performed (with available as-built documents) shall collect data required for keeping necessary structural members of different sizes in the construction barges for the activities detailed at point no.-2 above.
4. Verify the dimensions vis-a-vis feasibility of installation of the new structure/equipment and examine the feasibility of addition/replacement of facilities (Equipment / Vessels / Piping), etc.
5. Identify obstruction if any for the proposed installations including deck extensions & proposed addition or replacement of Equipment / piping.

Temporary structure and deck extension if required for replacement of equipment shall be erected. Local analysis for Deck extension shall be carried out as per structural design criteria.

Temporary structure shall be dismantled and disposed after successful installation. Their Loading on cargo barges, sea fastening, transporting and their disposal in environmentally safe manner to an onshore location arranged by Contractor shall be in Contractor's scope. Marine spreads required for transportation of dismantled material shall also be in Contractor's scope.

Sl. No.	Platform	Description/Details	Remarks
1.	SHG	Replacement of existing two WF heaters with two new WF heaters.	Temporary supports may be provided to support modification works.
2.	IC-HEERA TRUNK LINE: PIG BARREL ISOLATION VALVE	Replacement of 30" PBIV of weight 12MT.	Temporary lift & supports may be provided during Installation. Deck members/platings to be checked & corroded members to be replaced with new one.

The replacement of Plating & Gratings at Piping/equipment/Process modification areas of Platform as per the bid scope shall be carried out by the Contractor. The demolition & relocation of facilities wherever required shall be carried out as part of Scope of work. Any Structural Strengthening at any platform due to facilities &

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modifications as per the scope of work shall be carried out by the Contractor as part of the scope.

#### **2.3.3.5.5. RS-21 DECK MODIFICATION & STRENGTHENING**

Repair of damage structure, handrail, cable tray etc. due to hit by OSV is to be taken up. Following Structural Repair/strengthening/Replacement jobs are to be taken up at RS-21 Platform deck:

##### **Solar Panel Deck:**

- NDT(UT) for Primary tubular brace member (406mm OD x 19.6mm WT) on Truss Row - F2 connecting Decks EL (+)27.000m (Shelter and Battery Room) and (+)31.000m (Below Helideck) is to be performed and Structural adequacy is to be confirmed. Any strengthening measures required shall be taken up. Scratch and abrasion marks are there. Paint of the member shall be restored. Local analysis of damaged structural member shall be carried out.as per structural design considering proposed strengthening.
- Damaged secondary I-beam UB254 below the above mentioned brace member on Truss Row - F2 has a dent for 4000mm long. Same shall be replaced with new section of same size.
- One panel of floor grating (1.30 m x 1.10 m approx.) is damaged. New grating shall be provided and installed.

##### **Main Deck:**

- Hand rail at west side of south west corner is damaged. Hand rail of south corner is also bent. Damaged hand rails shall be replaced with new one.

##### **Cellar Deck:**

- Primary Structural Tubular brace member (356mm OD x 12mm WT) on Truss Row – FA-1 connecting Decks EL (+)17.000m (Cellar Deck) and (+)22.500m (Main Deck) is damaged. A local dent with maximum approximate size of 200 mm depth and 2000mm of length is there. Same shall be replaced with new tubular of same size and strength.
- The primary beam of combined section of size UB 610 + UB 533 including the Peripheral beams on the same Truss Row – FA-1 and connecting the above mentioned damaged brace mentioned shall be replaced with new beam sections of same size and strength.
- Hand rails and gratings at south west corner measuring approximately 12 m x 3 m shall be replaced with hand rails & gratings of same size and specifications.
- Navigation system module including navigation lantern, junction box, cable tray and the extended deck has been observed to be damaged shall be replaced with same system.

Connection design to be carried out for all proposed replaceable structural as per scope of works. Design analysis shall be carried out as per structural design criteria conforming to AISC and API RP2A.

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Refer multi-disciplinary scope of work for other details related to repair jobs to be performed.

#### **2.3.3.5.6. UNDERWATER REPAIR OF JACKET MEMBERS & JOINTS AT SHP JACKET**

Underwater repairing of Jacket brace member(s) & Joint(s) shall be carried out at SHP platform to strengthen the brace members and joints without removal of existing structural member(s). Scope of repair of jacket members and joints shall include with removal & relocation of existing anodes, clamps (if any) and removal of any other obstructions (non-structural) hampering for repair of joints and members. Anode shall be provided for the steel surface added during repair. The design of underwater repairing shall be carried out as per structural Design Criteria section 3.4, Part - III of bid Vol.-II.

Pre Engineering survey shall be carried out for the members & Joints surroundings with measurements of dimension of the tubulars & Joints, elevations, existence of anode or any other obstructions, etc. required for detail engineering. Feasibility of installation of Clamps / clamp components shall also be carried out during pre-engineering survey. Removal of obstruction is within the scope but Structural members shall not be removed. Marine growth cleaning of the affected area other necessary works to complete scope of work.

#### **Detailed Scope of Work for Underwater Repair of Members/Joints**

The detailed platform wise scope of work for repair/ strengthening of jacket members are as detailed in the following clauses:

- Envisaged repair methodology of damaged underwater jacket members/joints is specified in table below. LSTK Contractor shall perform the repair as per the envisaged repair methodology. The envisaged repair methodology can be further supplemented with additional measures like member grouting, additional clamping, reinforcements, gussets etc. as per the requirements of the FEM analysis and to overcome any site constraints observed in executing the underwater repairs.
- LSTK Contractors shall submit specific repair methodology proposed to be adopted for each repair based on the repair methods envisaged for approval of company (Refer table provided below). The engineering shall be performed as per forces, deflections etc., obtained from in-place SACS analysis carried out for information by successful LSTK Contractor.
- As-built data, to the extent available, are attached with the bid document for reference. Contractor shall carry out under water pre-engineering survey with his equipment, marine spread, skilled manpower, divers, surveyors etc. of the platform to obtain the as-built details and other information to enable successful execution of the job. Contractor need to collect all necessary field data for design, fabrication & installation of the proposed strengthening.
- The available SACS Model of Platforms is to be provided to successful bidder. SACS model shall be verified with As-built drawings, environmental parameters & geotechnical data as indicated in the bid. SACS model shall be modified, if

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required, as per As-built drawings & data collected during pre-engineering survey, environmental parameters & geotechnical data indicated in the bid document during detailed design and accordingly, strengthening of members shall be carried out with no additional cost and time impact to Company. LSTK Contractor shall model necessary repair strengthening/stiffening of members and joints in the in-place model and shall obtain actual design forces and deflections in the members and joints due to proposed strengthening / stiffening.

- LSTK Contractor shall carry out Finite Element Analysis of the Jacket member/ joint undergoing repairs/ strengthening with and without proposed repair method in order to ascertain the strength adequacy, stress concentration factors and fatigue life before and after repair works meeting requirements of design basis. The reports shall be submitted to the Company for review and approval.
- Detail engineering, preparation of AFC & fabrication drawings of the repair/strengthening on underwater jacket members and joints.
- Submission of underwater repair execution method, design, drawings & installation procedure to Company for review and approval. For underwater repair design methods, refer design criteria & specification attached with the tender package.
- The LSTK Contractor shall procure, fabricate and install required number of anodes (CP system) on new structural members provided as replacement and/or repair to existing damaged structural members of platform jackets as part of repair/ strengthening as per specification attached elsewhere in the bid package.
- Prior to clamping, the members shall have to be properly aligned using proper rigging arrangement without further damaging the members. Cracks if any will have to be properly sealed by cold process to ensure that grout should not spill into the members and also to ensure structural integrity.
- Field execution including underwater repair of damaged members, joints, welds to be carried out under the supervision of LSTK Contractor's representative, Company's representative and TPI's/CA's representative.
- Provision of temporary members / bracings in the effected portion of jacket structure where repair work is being carried out to ensure structural integrity during construction. Restoration of structural components, anodes (CP system) etc., which are removed for facilitating the installation work in platforms, if any.

**Location of Members and Joints for Strengthening:**

Sl. no.	Platform	Member	Location	Remarks
1.	SHP	0288-506L (ME39 )	(Horizontal member-Row B)	Strengthening of one structural member ME39 (Horizontal member-Row B) with adequate strength metallic clamp.

#### 2.3.3.5.7. VENT BOOM

The detail Engineering shall be carried out by the Contractor based on pre-engineering survey and Scope of Work. Existing vent boom shall be removed wherever indicated.

Existing vent booms & vent lines supports shall be demolished at ICP, SHP, SHD, BHS & NC Platform and disposed-off. New vent booms on ICP, SHP, SHD & BHS Platform shall be installed as per the table provided below:

Sl. No.	Platform	Scope
1.	ICP	<ul style="list-style-type: none"> <li>➤ ICP vent boom along with CO2 snuffing system is to be replaced.</li> <li>➤ Vent line needs to be replaced from the top of scrubber till vent boom.</li> <li>➤ All supports of vent line and vent boom need to be replaced.</li> <li>➤ One-to-one replacement.</li> </ul>
2.	SHP	<ul style="list-style-type: none"> <li>➤ The corroded &amp; damaged vent boom supports, channel sections need to be removed and replaced with new structural supports.</li> <li>➤ Vent boom and vent line to be replaced from the top of scrubber.</li> </ul>
3.	SHD	<ul style="list-style-type: none"> <li>➤ SHD vent boom along with CO2 snuffing system is to be replaced.</li> <li>➤ Vent line also needs replacement from the top of scrubber till vent boom.</li> <li>➤ All supports of vent boom and vent line need to be replaced.</li> <li>➤ One-to-one replacement.</li> </ul>
4.	BHS	<ul style="list-style-type: none"> <li>➤ Vent boom is to be replaced with new vent boom and the truss support to vent boom shall be provided at suitable intervals.</li> <li>➤ The scrubber needs to be replaced.</li> <li>➤ The new structural support shall be provided to vent line at mezzanine deck and other locations to secure vent line after dismantling the existing support.</li> <li>➤ The base plate and stiffeners of vent boom support at Cellar deck need replacement.</li> <li>➤ 10" pipeline upstream of vent scrubber of approximate length of 140 m need to be replaced due to multiple leakages.</li> </ul>
5.	NC	<ul style="list-style-type: none"> <li>➤ The vent boom and its support structure is to be demolished.</li> </ul>

Local Deck In place analysis shall be carried out with vent boom & its deck connections at Cellar &/Main Deck as per structural design criteria. The deck modification & member, joint strengthening shall be carried out based on Local In

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place analysis. The installation shall be carried out in such a way that new Vent boom shall not obstruct boat landing and material handling operations. Design analysis of Vent boom also shall be in the contractor scope of work.

The structural members & supports shall be demolished. Vent boom removal & Installation philosophy shall be developed and submitted to Company for review.

The associated Structural deck modifications/strengthening shall be carried out as per the design engineering.

## **2.3.4. MECHANICAL**

### **2.3.4.1. INTRODUCTION**

The following sub-sections describe the Mechanical works envisaged under S&SRP (Sump Caisson and SWLP Casing Replacement Project). This section is to be read in conjunction with the Basic bid work of Process, Structural, Electrical, Piping & Instrumentation, Process Design Criteria, Design Criteria of Mechanical Safety & Life Saving Equipment, Indicative P&IDs and Functional Specifications placed in the bid package for the complete assessment of Mechanical/Rotary & Life Saving Equipment scope of work.

Further it is to be noted that the standard design criteria of “Mechanical, Safety and Lifesaving Equipment” is enclosed in the bid package which covers all equipment of an offshore platform, therefore only the relevant portions of the design criteria as applicable to this project need to be followed. Bidder to note that anything not mentioned here but nevertheless required to make the system safe and complete shall be supplied and executed.

### **2.3.4.2. SCOPE OF WORK**

The scope of work shall include pre-engineering survey, design, detail engineering, preparation of drawings and documents, sizing (Sump Caisson), selection and procurement of Mechanical, Safety and Life Saving Equipment, supply of all material, equipment, tools & tackles and fabrication, installation, hook-up, testing, commissioning and handing over of mechanical facilities complete in all respects. Interface issues requiring coordination between vendors for equipment's shall be under contractor's scope. Mechanical equipment and facilities shall meet the requirements given in the Process Scope of work, Process Design Criteria, Design Criteria of Mechanical Safety & Life Saving Equipment for Well platform, Process platform, Functional specifications etc., specified in the bid package.

Bidder/Contractor's scope of work shall include but not limited to:

- Pre-engineering Survey
- Design and Detailed engineering
- Preparation of drawings and documents and obtaining approval of same from Company
- Selection and Procurement of Mechanical equipment
- Fabrication and Assembly

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- Testing at shop, yard and at offshore as required.
- Transportation and supply of all material and equipment, tools and tackles
- Installation, pre-commissioning, commissioning, testing and handing over of Mechanical facilities ( The equipment installed will be taken in line for operation – one at a time by operator with presence & support from vendor/contractor for equipment commissioning )

#### **2.3.4.3. EQUIPMENT**

Contractor shall follow description of work / basic bid work in totality, various discipline's design criteria, relevant functional specifications, other respective codes and standards specified / attached with the Bid package and shall carry out design & detail engineering for various equipment envisaged under this project.

All equipment shall be procured as per the specifications attached with the bid package. In case any new specification, not included in the bid package, is required to be generated, the contractor shall prepare the specification and shall submit to Company for approval.

Wherever equal but conflicting requirements arise between this Scope / Specification and the referenced documents, such conflict shall be brought to the attention of the Company in writing.

Contractor shall carry out the following activities for procurement of Equipment:

- Contractor shall prepare the enquiry specifications / documents for each Equipment and materials to be purchased including spare parts for erection & commissioning, special tools and tackles and also to provide list of spare parts for one year normal operation.
- Equipment data sheets (as per relevant API codes, wherever applicable) and as specified in functional specifications shall be submitted for company's review.
- Contractor shall obtain the approval of Purchase Specification of Equipment from Company before placement of order on Vendors selected by them.
- Contractor shall carry out the detailed design review, checking and approval of equipment engineering and all drawing and technical data from Vendors for equipment and materials, to ensure adequacy and consistency with the design, safety and operability requirements.
- Contractor shall prepare Inspection and Test Plan (ITP), indicating inspection stages wherever required, in accordance with Company provided Inspection Requirement Table (IRT), Functional Specifications, Codes and Standards etc. covering relevant components, complete equipment / systems and submit it for review and approval by the company.
- Contractor shall include all the commissioning spares as required in the equipment vendor's scope. Contractor shall procure the same from the equipment vendors and make it available well before commissioning of equipment. In case, any additional spares are consumed during commissioning the same to be provided by the contractor at no additional cost to the Company.

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- For all Equipment, Vendor shall furnish the list of special tools / tackles required for assembly and maintenance. Such tools / tackles shall be supplied by the vendor and shall form part of firm supply of Contractor. Unless otherwise specified, for multiple identical Equipment's (2 or more), at least Two (2) sets of special tools and tackles shall be supplied else one set shall be supplied if the number of equipment is one.
- Contractor's scope shall include complete supply, transportation of equipment from vendor's shop to site, receipt of material at site, handling at site and arrange for storage at site.
- Equipment which are transported by sea shall have sea-worthy packing. The Contractor shall strictly follow the recommended preservation procedures during the period of storage for all equipment.
- Contractor shall carry out the Erection of each Equipment at the specified location on the properly designed foundation / support as per requirement stated elsewhere in Bid.
- Contractor shall carry out the inter-connections at all interface points such as main process and utility connections.
- Contractor shall ensure the presence of equipment manufacturer's representative at yard and site (offshore platform) for supervision of erection, testing and commissioning for Equipment.
- All pressurized cylinders like clean agent cylinders, CO2 cylinders, Nitrogen cylinders etc. shall have PESO approval for refilling in India. All statutory guidelines shall be adhered to in this regard. PESO certificate shall be submitted at the time of detailed engineering to Company.
- Contractor to refer Design Criteria – Mechanical, Safety and Life Saving equipment for various documentation required for information, review and approval.

#### **2.3.4.4. MECHANICAL EQUIPMENT**

##### **1) SWLP Casing**

##### **a) IC Complex: ICW Platform:**

Replacement of Three (03) no Sea water lift pump Caisson (SWLP-1010 / SWLP-1020 / SWLP-1030) with new caisson. Pulling out and running in of the sea water lift pump shall be in the scope of contractor however any spare required during running in of the pump shall be provided by company. Sea water lift pump shall be handed over one by one for casing replacement. Chlorinator piping along with Spurger with Sockolet for hook-up of chlorinator line shall be provided. Provision of sacrificial anode shall be under contractor's SOW. New caisson shall be installed at the same location after removal of existing caisson.

##### **b) SH Complex: SHW Platform:**

Replacement of Three (03) no Sea water lift pump Caisson (P-6210 / P-6220 / P-6310) and replacing it with new caisson. Pulling out and running in of the sea water lift pump shall be in the scope of contractor however any spare required

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during running in of the pump shall be provided by company. Sea water lift pump shall be handed over one by one for casing replacement. Chlorinator piping along with Spurger with Sockolet for hook-up of chlorinator line shall be provided. Provision of sacrificial anode shall be under contractor's SOW. New caisson shall be installed at the same location after removal of existing caisson.

## 2) CO2 Snuffing System

Carbon Dioxide snuffing system shall be provided for vent boom on ICP, SHP, SHD & BHS platforms as a fire suppression system. The equipment shall be skid mounted, automatically activated snuffing system complete with all necessary accessories to make it a complete operable unit. Vendor to ensure that CO2 flow rate is sufficient to extinguish the flame and also cool the vent tip below the auto ignition temperature in case the vent tip has been ignited. CO2 snuffing system shall be supplied for two consecutive firing (for initial charge) with 100% spare charge of CO2 cylinders with necessary piping, pressure switches, gauges, valves, associated controls and shall be completely assembled for ready operation after installation on the platform. The complete system shall be certified by a third party. For more details on CO2 Snuffing System refer Sect 3.7 Design criteria - Mechanical, Safety and Life Saving Equipment. Contractor shall prepare the detailed Purchase Specification for CO2 snuffing system.

## 3) Vent Scrubber

Replacement of One (01) no Vent Scrubber (V-1090) in the vent boom system of BHS platform. Contractor shall prepare the detailed Purchase Specification for vent scrubber (pressure vessel).

## 4) (4) Well Fluid Heater

### SH Complex: SHG Platform:

Two (02) no. of Well Fluid Heater – Shell and Tube type (E-1150 / E-1160) shall be replaced with new heaters of same capacity along with associated instrumentation and piping. For further details of WFH refer Process scope of work / Process Design Criteria / Basic Bid Work / P & ID, Functional Specification for Shell & Tube exchanger (FS 5702F rev2), Design Criteria for Mechanical, Safety and Life Saving Equipment. Contractor shall prepare the detailed Purchase Specification for Well Fluid Heater.

## 5) Sump Caisson with Blow case

### a) IC Complex: ICP Platform:

Removal of One (01) no Sump Caisson (S-1800) with blow case vessel (V-1820) and installation of new sump caisson with blow case with all associated piping and instrumentation aligned along the jacket leg.

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**b) SH Complex: SHP Platform:**

Removal of Two (02) no Sump Caissons (S – 1060 and S – 1070) with blow case vessel (V-1060 & V-1070) and installation of one (01) sump caisson of along with blow case, with all associated piping and instrumentation aligned along with the jacket leg.

**c) Neelam Process Complex: NLP Platform:**

Replacement of One (01) no Sump Caisson (S-5201) and blow case vessel (V-5211) with new sump caisson and blow case, with all associated piping and instrumentation aligned at B3 Leg of NLP platform Jacket. The new sump caisson shall be Flotation pile Design (with gas sparger) same as the existing Sump Caisson.

**d) Heera Process Complex: HRA Platform:**

Removal of One (01) no Sump Caisson (S-810) with blow case vessel (V-820) and installation of new sump caisson with blow case with all associated piping and instrumentation aligned along the platform Jacket Leg. A Fire water Hose Reel shall be installed at most suitable location for firefighting purpose to cover entire spider deck including HRA Sump Caisson.

For all the four sump caissons, necessary appurtenances and attachments on Sump Caisson shall be provided for supporting and lifting Blow case assembly for adjustment and maintenance. Contractor shall prepare the detailed Purchase Specification for Sump Caisson.

For further details of Sump Caissons refer Process scope of work / Process Design Criteria / Basic Bid Work / P & ID, Structural scope of work, Functional Specification for Sump Caisson with Blow Case (FS 5904 rev2), FS for Unfired pressure vessel (FS 5601 rev3), and Design Criteria for Mechanical, Safety and Life Saving Equipment.

**6) HOT SURFACE PROTECTION**

Personnel protection against accidental contact with hot surface shall be provided for equipment's considered for replacement. Bidder to follow FS 2006.

**7) Safety Study**

Contractor shall engage an internationally reputed third party agency having expertise in carrying out HAZID study for installation work at platform. The contractor shall comply with the relevant requirement of functional safety Specifications (FS-5102) for the scope of work as defined in the bid package. Any conflicting requirement shall be brought to company's notice and clarification shall be sought. No new life saving equipment is envisaged in the Project.

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### 2.3.5. INSTRUMENTATION

The purpose of Instrumentation is to provide a system such that all the required information/ data/ signals in the desired form and location are available and they work for the safe monitoring, control and optimal operation of the process, safety and associated systems. Instrumentation also makes the required information available in the required form at the local control centers, central control room and/ or remote telemetry unit interface, following the Scope of Work, Instrumentation Design Criteria and Functional Specifications of the tender document, applicable Codes & Standards etc.

The present Scope of Work (SOW) broadly envisages Engineering, Procurement, Installation/ Erection, Testing/ Calibration and Commissioning of Instrumentation Monitoring & Control Systems for the jobs mentioned below at the existing process & wellhead platforms.

- 1. IC Complex:** 1 No. of Sump Caisson (S-1800) with blow Case (V-1820) at ICP, 30" pig barrel isolation valve (IC-Heera Trunk Line), Vent boom replacement at ICP, Casing of 3 Nos. of sea water lift pumps at ICW (1010, 1020, 1030).
- 2. SH Complex:** 2 Nos. of Well Fluid Heaters at SHG (E-1150 (Train A), 1160 (Train B)), 2 Nos. of Sump Caissons (V-1060,1070) with Blow Cases (V-1060,1070) at SHP, Casing of 3 Nos. of Sea Water Lift Pumps at SHW (6210, 6220, 6310), Vent Booms at SHP & SHD.
- 3. Neelam Complex:** Replacement of 1 No. of Sump Caisson (S-5201) with blow case (V-5211) and Piping replacement of Sump Caisson S-5200
- 4. Heera Complex:** Replacement of 1 No. of Sump Caisson (S-810) with blow case (V-820).
- 5. BHS Complex:** Replacement of 1 No. of Vent Boom at BHS.
- 6. WIN Complex:** Demolition of 1 No. of Vent Boom at NC.
- 7. RS-21 Wellhead:** Repair of top side structure.

All the replacement and additional jobs described above shall be carried out with replacement/ addition of all associated instrumentation, control systems, hook up and integration with the existing system in addition to new requirement of instrumentation and control to meet the present bid scope and as per new Design Standards.

**Section 2.3.5.1** provides general guidelines.

**Section 2.3.5.2** covers details of brief instrument scope of work.

**Section 2.3.5.3** covers the details of Modifications jobs at associated platforms/ complexes.

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### 2.3.5.1. GENERAL

1. This Scope of Work shall be read in conjunction with Instrumentation Design Criteria, Instrumentation Functional Specification, Piping & Instrumentation Diagram (P&IDs), various General/ Job Specifications, Process Scope of Work and other technical documents enclosed in the bid package.
2. Any sub-system/ facility, or instruments/ equipment/ accessories or any other requirement not specifically mentioned here, but needed to meet the functional/ technical requirements as specified in project bid documents shall also be the part of scope of this document.
3. Contractor's scope of work for instrumentation and control system for all platforms shall include but not limited to:
  - a) Design and Engineering for all Instrumentation including Monitoring, Control and Safety Systems.
  - b) Documentation of Design & Engineering.
  - c) Procurement, Shop testing, Supply and Inspection of all new instruments in tamper proof packages at site installation.
  - d) Laying of cables, wiring and interconnection with the existing/ new local panels or centralized DCS system for local and remote monitoring and control as per process requirement.
  - e) Installation, Field Calibration, Testing, Integration and Commissioning.
  - f) Additional F&G detection, if required, shall be provided and integrated with the existing F&G system.
  - g) Pre-Engineering Site Survey.
4. Wherever any doubt/ clarification arises between this Scope/ Specification and the referenced documents, same shall be brought to the attention of ONGC in writing. For resolution, unless specified in the Vol-I of the Bidding Documents, the order of precedence shall be:
  - a) National Statutory Requirements (the Law)
  - b) Basic Bid Work (Description of Work)
  - c) Instrumentation Design Criteria
  - d) Instrumentation Functional Specifications
  - e) Industry Codes and Standards
5. In general, for potential replacements and for new instrumentation being considered on individual platforms, the existing field instrument and the systems on the respective platforms shall be surveyed and documented in the pre-Engineering Survey Document for review and approval. The instruments then considered in the design and finalized during the detailed engineering shall be selected so as to be compatible with the existing control/monitoring system.
6. Unless otherwise specified, the term instrumentation shall mean Instruments, Control system & Safety Instrumented System along with the applicable accessories, utilities, hook-up materials etc.

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7. Any proprietary or non-proprietary sub-system, facility, instruments, equipment, accessories, hardware, software (including any up-gradation requirements), Firmware, up-gradation, licensing, not specifically mentioned in the scope but are found essential (during any stage of the project such as pre-engineering survey, detailed engineering, P&ID approvals, Safety studies, Commissioning etc.) for project completion, commissioning and making the system fully functional for safe & Normal operation shall be in the Contractor's scope of work and form part of the bid.
8. During execution of the project, the Contractor shall, at various stages of the project, submit to the Company as a part of his Detailed Engineering, all the drawings and documents for review/ information/ approval as the case may be, incorporating all the scope, design, selection, methodology of installation etc., as detailed elsewhere in the bid document.

#### **2.3.5.2. Brief Scope of Work**

1. The instruments and control systems in complete, required for the modifications on the platforms envisaged under this project as shown in the P&IDs and the Scope of Work, shall be under the Contractor's scope of work. Provision of all new instruments, instruments under replacement and control systems connected with the said equipment to be replaced, their hook-up and commissioning shall be in Contractor's scope of work. All Instrumentation items shall be in accordance with the hazardous area classification of the respective location. The scope involves the responsibility of the Contractor to ensure that all Instruments being procured shall be compatible with the existing systems to which they will be connected.
2. In general, the work shall be carried out in line with the existing facilities and including, but not limited to following documents enclosed as part of the bid document:
  - a) Instrumentation Design Criteria.
  - b) Instrumentation Functional Specifications.
3. The activities related to the following but not limited to these only, are to be developed and executed by the Contractor for meeting the requirement of the project description/ Basic Bid Work.
4. In general work shall be carried out in line with existing philosophy of operation of the platform.
5. The instruments considered in the design and finalized during the detailed engineering shall be selected so as to be compatible with the existing control/ monitoring system. Wherever the existing system is FF (Foundation Fieldbus type) the new instruments shall also be of FF type, and wherever it is HART, the instruments shall be of HART type. Contractor shall ensure this and specified in the Pre-Engineering Survey Report for review and approval.

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6. All required hardware like I/O cards, components etc. and software modification (graphics, logics etc.), required for commissioning of new facilities shall be in the Contractor's scope. In general, applicable to all platforms, wherever spares are available and identified during pre-engineering survey for use in this project, the used spares (I/O Cards, SCADA Cards, etc.) shall be replenished by Contractor by providing new cards (depending on number of additional I/O counts and as determined by the FS for DCS/ PLC/ IO Modules). The new cards shall be installed and wired as required wherever spare slots are available. Otherwise, it shall be supplied and handed over as loose spares.
7. The Contractor shall supply and install new field instruments, junction boxes, MCT, tubing, fittings, interconnection cables and instrumentation controls including accessories required for replacement in the modification part of the existing process platforms as per the Description of Work-Process, P&IDs, Functional Specifications of various Instrumentation items etc. enclosed in bid. The Contractor shall provide all instrument supports, instrument isolation valves, impulse tubing and other erection material (including tube trays, cable trays, tubing air supply distributors etc.) as required for all new field instruments. All the upcoming new field instruments as per the modification P&ID shall be integrated with the existing Control and Safety Systems at existing process platforms.
8. Distribution of power supply, loop checking and commissioning of new instruments.
9. Extension/ modification of existing instrument air system for the new instruments as required. Bidder shall calculate the Instrument Air consumption requirement and submit to company for review. Pipe & pipe fittings, tube & tube fittings for instrument air supply distribution to instruments as required shall be supplied by the Bidder.
10. The Contractor shall assist along with Vendor, tools, tackles, utility etc. during commissioning of the various systems envisaged under this project. The Contractor shall be responsible for the smooth operation of the existing systems which have been modified to take care of the scope of this project. The Contractor shall ensure that the normal operation of the existing systems on the relevant platforms is not hampered during and after all modification jobs have been carried out. After successful commissioning of replaced systems, the same shall be integrated with existing system.
11. Providing any other item as well as its associated work to make the system on each existing platform complete and fully operational shall be in the LSTK contractor's scope of work.
12. Wherever the bid specifies integration of new Instrumentation & Control system with existing instrumentation & control system, SCADA system, any hardware, software, third party software, configuration, additional/ new licensing, OEM assistance etc. required for complete integration of new and existing facilities shall be in the LSTK contractor's scope of work. Contractor shall ensure any integration

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with the existing control system network without hampering network security by any sort of virus threat.

13. Mandatory spares for all new supplied instruments for all process packaged equipment, mechanical packaged equipment and electrical packaged equipment shall be provided as per clause 3.6.4.8.6 (a) of Instrumentation Design Criteria.
14. All major instruments for package equipment shall be governed by "Instrumentation for packaged equipment" FS-3503. Instruments being replaced on the process lines connected to packaged equipment under present scope shall be procured from ONGC Suggested Vendor List (SVL).
15. The wetted part of the instruments shall be suitable for the intended process/service.
16. Separate earthing for panels, junction boxes, cable shields etc. shall be provided.
17. Supply of all types of cables such as signal, alarm, control, power supply, earth cable etc. as per requirement.
18. Supply of signal barriers, isolators, receiver switches, relays, trip amplifiers etc. for signals being terminated at the control panels.
19. Hook up of field instruments to Distributed Control System (DCS), Emergency Shutdown (ESD) system, Fire & Gas system (FGS) in Control room as per bid requirement and Pre-Engineering Survey Report.
20. The descriptions and requirements contained in this scope of work and specifications attached elsewhere in the bid are concise by necessity and cannot include all details. However, it is the responsibility of the Bidder to execute the job in accordance with the specifications and good engineering practices for smooth and successful operation of the Platforms.
21. Installation, configuration, hook up, field calibration, testing, loop checking, logic verification, integration and commissioning, SAT (Site Acceptance Test) of complete Instrumentation & control systems.
22. Any associated structural work for installation of instruments and panels shall also be in bidder's scope.
23. Modification and addition of logics and graphic pages in existing DCS, ESD and FGS system as per scope of work requirement shall be in bidder's scope.
24. Supply of MCT Blocks and Frames for control room cable entries, deck penetration etc. is in the scope of supply of the Bidder.
25. Electrical Heat Tracing shall be done for instruments which are coming on electrically heat traced lines.
26. Supply of start-up and commissioning spares along with other consumables for all instrumentation items.
27. Scope shall include procurement, supply, testing and commissioning of all field instruments under replacement/ addition scope such as control valves, safety valves, electronic transmitters, temperature switches, level switches, pressure

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gauges, temperature gauges, differential pressure gauges, level gauges, orifice plates, flow meters and accessories, junction boxes, local control panel, branch cables, single pair/ multi pair/ multi triad cables, MCT, cable glands, plugs, cable trays and cable tray supports, tubing & fittings and all other accessories required as indicated by the process requirement, P&IDs.

28. The design and selection of these field instruments shall be as per the relevant functional specifications enclosed in the bid document.
29. Logic for monitoring and control instruments shall be built in existing Process Control System and tripping logic shall be built in existing ESD system. In case if Local Control Panel/ Station is supplied by vendor, same shall be suitably interfaced with existing PCS & ESD systems of platforms.
30. Laying & termination of serial interface cable from field as well as inside control room, if any, required between instruments and control room. Implementation of serial interface links for other foreign devices and system is in bidder's scope.
31. Smart Positioner with position feedback facility (via HART/ compatible protocol) shall be provided for all control valves under replacement along with their cabling to DCS. For all the closed loops, parameters such as SP, PV, OP and VP shall be made available in DCS graphics.
32. Weather protection canopies shall be provided for all field instruments.
33. Installation methods for all field instruments shall maximize ease of maintenance & operation.
34. All existing field instruments, branch cables, cable trays, tube trays, tubing, fittings, junction boxes and other auxiliaries which are under replacement scope shall be dismantled and removed by the contractor. New cable, cable tray, tube tray etc. shall be in the scope of the contractor.
35. OEM's involvement along with necessary Hardware & Software shall be ensured for smooth integration and functioning in case of new panel with the existing panel at Control room, by LSTK contractor.
36. Available existing systems details at various platforms is tabulated below. However, it is bidder's responsibility to finalize the system requirement by quantities and qualities by site visit/ all documents available at site.

Sl. No.	Platform Name	DCS	ESD	FGS
1.	ICP	Honeywell C300	Relay logic based	Dettronics Card based
2.	SHQ	Honeywell Experion	Honeywell Fail Safe Controller (FSC)	Honeywell Fail Safe Controller (FSC)
3.	SHG	DCS-Yokogawa Centum VP	ESD System-Relay based/ SDP-1000	Honeywell Fail Safe Controller FSC

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4.	SHP	Honeywell Experion	Honeywell Fail Safe Controller (FSC)	Honeywell Fail Safe Controller (FSC)
5.	SHD	Honeywell Experion	Honeywell Fail Safe Controller (FSC)	Honeywell Fail Safe Controller (FSC)
6.	NLP	Honeywell Experion	Envirotech Controls Inc. (Pneumatic Master SDP)	GE Fanuc 90-70
7.	HRA	Emerson Delta V	Rockwell (Triplex)	Siemens Quadlog (ICONIC GENESIS 32)

### 2.3.5.3. Modifications jobs at associated platforms/ complexes.

#### 2.3.5.3.1. Replacement of Vent Boom at ICP, SHP, BHS & SHD

1. All associated field instruments as per marked-up P&IDs and process scope of work to be replaced with new one.
2. Associated instruments of upcoming CO2 snuffing system as per marked-up P&IDs shall be provided as per OEM design.
3. Integration of upcoming CO2 snuffing system as per marked-up P&IDs with existing F&G system shall be done as per existing philosophy.

#### 2.3.5.3.2. Replacement of 2 Nos. of Well Fluid Heaters at SHG (E-1150 & 1160).

1. All associated field instruments as per marked-up P&IDs and process scope of work to be replaced with new instruments.
2. Existing shutdown valves of the system as marked in P&ID shall be replaced with new ones.
3. All associated branch cables, instrument tubings from SDP and instrument air supply tubings, junction boxes of field instruments associated with well fluid heaters shall be replaced with new ones.
4. New junction boxes shall be installed at same location of old junction boxes, however, existing multicore cables shall be retained.

#### 2.3.5.3.3. Removal of Sump Caisson (S-1800) with Blow Case (V-1820) and installation of one new Sump Caisson with Blow Case at ICP :

1. New associated field instruments for upcoming Sump Caisson with new blow case shall be provided as per OEM design.
2. New junction box as per area classification with new branch cables and new multicore cable shall be in contractor's scope.
3. All monitoring, control and logic execution of new instruments associated with upcoming sump caisson shall done in existing DCS system.
4. All required hardware like I/O cards, components etc. and software modification (graphics, logic etc.), required for commissioning of new field

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instruments associated with Sump Caisson with OEM's assistance shall be in Contractor's scope of work.

5. New hardware cards, components etc. shall be installed in the DCS cabinet at ICP control room.
6. Associated instrumentation as per marked up P&ID to be replaced with new one.

**2.3.5.3.4. Removal of existing two Sump Caisson (S-1060/ S-1070) and Blow Case (V-1060/ V-1070) and installation of one new Sump Caisson with Blow Case at SHP.**

1. New associated field instruments for upcoming Sump Caisson with new blow case shall be provided as per OEM design.
2. New junction box as per area classification with new branch cables shall be provided. New branch cables shall be laid from new field instruments to new junction box and new junction box shall be installed at same location of old junction box. Multicore cable shall be retained.
3. All the monitoring and control shall be carried out in DCS and all the tripping logic execution shall be carried out by ESD PLC. Existing slots for instruments in DCS and ESD PLC of Sump Caisson can be used for upcoming new Sump Caisson. However the used spares shall be replenished by Contractor by providing equivalent numbers of installed or loose spares.
4. All other associated field instruments as per marked up P&ID to be replaced.

**2.3.5.3.5. Removal of Sump Caisson(S-5201) with Blow Case (V-5211) and installation of one new Sump Caisson with Blow Case at NLP :**

1. New associated field instruments for upcoming Sump Caisson with new blow case shall be provided as per OEM design.
2. New junction box as per area classification with new branch cables shall be provided. New branch cables shall be laid from new field instruments to new junction box and new junction box shall be installed at same location of old junction box. Multicore cable shall be retained.
3. All the monitoring and control shall be carried out in DCS and all the tripping logic execution shall be carried out by shutdown panel. Existing slots for instruments in DCS and existing tripping logic in SDP of Sump Caisson can be used for upcoming new Sump Caisson. However, the used spares shall be replenished by Contractor by providing equivalent numbers of installed or loose spares.
4. All other associated field instruments as per marked up P&ID to be replaced.

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#### **2.3.5.3.6. Removal of Sump Caisson (S-810) with Blow Case (V-820) and installation of one new Sump Caisson with blow case at HRA :**

1. New associated field instruments for upcoming Sump Caisson with new blow case shall be provided as per OEM design.
2. New junction box as per area classification with new branch cables shall be provided. New branch cables shall be laid from new field instruments to new junction box and new junction box shall be installed at same location of old junction box. Multicore cable shall be retained.
3. All the monitoring and control shall be carried out in DCS and all the tripping logic execution shall be carried out by ESD PLC. Existing slots for instruments in DCS and ESD PLC, of Sump Caisson can be used for upcoming new Sump Caisson. However the used spares shall be replenished by Contractor by providing equivalent numbers of installed or loose spares.
4. All other associated field instruments as per marked up P&ID to be replaced.

#### **2.3.5.3.7. Piping Replacement of Sump Caisson (S-5200) at NLP:**

New associated field instruments as per mark up P&ID shall be provided as per OEM design and integrated as per existing philosophy

### **2.3.6. ELECTRICAL**

#### **2.3.6.1. Design, Engineering, Supply, Installation, Testing and Commissioning of Electrical Equipment & Facilities for Modifications:**

This section shall be read in conjunction with relevant portions of the bid package, Electrical design criteria and functional specifications attached in the bid package. Bidder shall note that any item not mentioned here but nevertheless required to make the system safe and complete shall also be supplied and executed by the contractor.

All electrical facilities for modification work at existing platforms as per the scope defined in the bid package shall be provided by the Contractor. The scope of works shall include pre-engineering survey, design and engineering, preparation of drawings & documents, sizing, selection and procurement of electrical equipment, transportation & supply of all material & equipment tools & tackles, installation, construction, testing, commissioning and handing over of electrical facilities complete in all respects.

This section defines the Contractor's electrical scope of work for modification work at existing platforms:

#### **2.3.6.2. Repair Works at RS-21 Well Head Platform:**

The scope of work related to repair job at platform is described elsewhere in the bid package. All electrical works including design, engineering, supply, installation and testing are included in the contractor scope of work.

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Nav-Aid light (1 no.) along with JB shall be replaced with new one as per FS 4003. Power shall be fed from existing Nav-Aid battery charger distribution panel. Existing power cable shall be replaced with new power cable. New cables shall be laid in existing cable trays and MCT. Supply and installation of all accessories i.e., MCT, cable trays, glands & lugs etc. as required are included in Contractor's scope of supply. Nav-Aid system cable shall be fire resistant type.

Cable tray below helideck shall be replaced with new one.

Supply, installation and testing of new solar panels as per FS 4007A against missing and damaged solar panels. No. of new solar panels shall be assessed during pre-engineering survey. These solar panels shall be integrated with the existing solar power system to meet the system requirements. Supply and installation of cables, cable trays, junction boxes and other electrical facilities shall be within contractor scope of work.

#### **2.3.6.3. GENERAL**

All associated electrical works related to the package equipment and modification works defined in other sections of bid is included in the contractor's scope of work.

Relocation of any electrical items such as lighting poles, cables, cable trays, junction boxes etc. if required due to carrying out modifications and any additional lighting required due to modification and / or deck extension anywhere at any Platform where modification / deck extension is included in this Scope of Work.