

	PROJECT		Standby SRU & Additional Tanks	
	CLIENT		IOCL Paradip Refinery	
BARRICADING PROCEEDURE	Project No. 080557C001	Document No. 080557C-000-PP-802	Rev. No. 0	Page 1 of 12

PROCEDURE FOR STANDARD BARRICADING WORKS

0	21/10/2019	FOR INFORMATION	SMP	PKP	LA/ANJ	MP
REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED	AUTHORIZED



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1. INTRODUCTION

INDIAN OIL CORPORATION LIMITED (IOCL) has awarded Fax of Acceptance (FOA) dated 29th August 2019 to M/s. Technip India Limited (TPIL) for Consultancy services (PMC/EPCM services) for overall project management, FEED Review / FEED, Detailed Engineering, Procurement & expediting services, Tendering & award, Construction Management & Supervision, Assistance in start-up, Commissioning & performance test runs for installation of a Standby SRU of 525 TPD capacity and execution of Additional tanks for Paradip Refinery, Odisha, India.

2. DEFINITIONS & ABBREVIATIONS

Abbreviation	Definition /Expanded form
IOCL/ CLIENT	Indian Oil Corporation Limited
PMC/ CONSULTANT	Technip India Limited
LICENSOR	Party selected by IOCL for process technology ownership for any UNIT
CONTRACTOR	Party whose services are obtained for performing the works specified as part of LSTK / packages.
EPCM	Engineering, Procurement & Construction Management Services.
LSTK	Lump Sum Turn Key portion of the work to be executed by CONTRACTOR
FEED	Front End Engineering Design
AUTHORISED REPRESENTATIVE	IOCL's/ CONSULTANT's representative authorized to act for and on behalf of them.
VENDOR	Any third party supplying the equipment/materials for setting up the Plant
PROJECT	Indicates Standby SRU and Additional tanks Project, Paradip Refinery
UNIT	Indicates any particular portion of the project to be built which can be Process related or Utilities/Offsites related
SRU	Sulphur Recovery Unit

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3. PURPOSE

Purpose of this procedure is to provide guidelines for Safe execution and quality control of Barricading Works and to avoid possible errors and risks during construction work, while working with in running refinery complex.

4. SCOPE

The scope of this procedure is to cover the requirements for material, Earth works, civil foundation, Steel structural fabrication, assembly, painting, erection, alignment, grouting and Sheeting of Barricading Works at fabrication shop / site Stand by SRU and Tankages project site of IOCL, PARADIP.

5. CONTROLLING SPECIFICATIONS

- DETAILED DRWAINGS
- CONTRACT DOCUMENTS

6. METHODOLOGY

The sequential activities and corresponding tasks shall be in general but not limited to the following:

6.1 General:

Activities Excavation, Filling, PCC, Concreting, Steel structure fabrication and installation of Barricading Works to be followed as per this Job Procedure in case of any additional requirement exists the procedure shall be revised accordingly.



6.2 Detail Drawing:

Civil activities, Fabrication, welding and erection of Barricading Works shall be performed as per approved drawings prepared by CONTRACTOR in line with this procedure. During execution & erection work, if any modification or changes at site shall be noticed to CUSTOMER OR CONSULTANT site execution In-charge for further proceeding.

6.3 Material:

Barricading Works - structural steel material shall be asper drawing. CONTRACTOR shall maintain test certificate / manufacturer's quality certificate or batch test certificates for each batch of material received at site.

Welding electrodes shall be used as per CUSTOMER approved brand and shall be stored separately in enclosed room as per manufacturer's recommendation.

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All painting materials brought to fabrication shop for application shall be procured from CUSTOMER approved manufacturer and shall be accompanied by manufacturer's test certificate & MSDS. Primers and finish coat paints shall be from the same manufacturer in order to ensure compatibility. Otherwise concurrence to be obtained from manufacturer.

6.4 EARTH WORKS:

6.4.1 REFERENCE:

- Project drawings/Contract documents
- Contract Specifications
- IS: 3764 – Safety Code for Excavation work
- IS: 4014 – Safety regulations for scaffolding work
- IS: 7923 – Safety code for working with construction machinery
- IS: 2720 – Method of test for soils (Part as applicable)
- IS: 1200 – Method of measurements of building & civil Engg. works (Part-1)

6.4.2 PRIORITY REQUIREMENTS:

In case of any variation and discrepancy, priority shall be as under.

1. Special Condition
2. Project Specification
3. Codes



6.4.3 EARTH WORK EXECUTION PROCEDURE: -

UG Survey

UG survey (if necessary or directed by CUSTOMER) should be carried out before carrying out any excavation to determine existence of any underground structures. If any utilities or live cables or any other structures are found, same should be re-routed/ removed as per instruction of PMC/client.

Setting Out:

Setting out works shall be carried out with Total Station by CONTRACTOR. All reference points shall be maintained and shall not be removed from its position. Spot levels shall be taken and recorded as and when required or as per direction of Engineer in-charge.

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Dewatering:

All areas shall be kept free of water. Maintain required slope below the PCC level to prevent water accumulation on PCC area. If required a pit/trench will be excavated away from the PCC area and water through the temporary drain by CONTRACTOR will be diverted into the said pit / trench. All water in the pit/trench area is to be removed by pumping using require capacity pump. Precautions shall be taken to prevent the removal of materials from the excavated bottom or sides of foundation & pit during dewatering operations. It should continue till completion of work.

Safety Measures of Excavation:

The safety of workers who are performing the excavation and the inhabitants in the surrounding areas shall be ensured. Necessary arrangements like shoring, lighting, fencing and other suitable measures for protection against risk of accidents due to open excavation shall be made.

Heavy earthmoving equipment's/excavator shall be placed 1.5 mtr. away from the side of an open excavation or foundation due to open excavation shall be made. Maximum height of deposit of excavated material shall be kept 2.0 mtr. from ground level and 1.5 meter from edge of the excavated pit. Adjoining structure should not get damaged. Excavated area shall be cordon off.

Deep excavated pit shall be arranged protective fencing / hard barricading with warning signs around the excavation area. As per HSE specifications all excavated pits / trench which are considered as confined space entry if it is of depth 1.2mts. All confined space work permit requirements to be followed without fail.

If excavated pit or trench more than of 2.0-meter depth, provide proper two entry / exit points access.

Shoring and supports:



To protect the excavated foundations / Pits, adjacent paving, structures, utilities and to prevent property damage and personnel injuries, timbering, sheet piling, bracing, anchoring and other supports shall be provided as per site condition.

Excavation

1-st Trial Pit to be made by manually excavation up to 1.2-meter depth, to determine the existing underground facilities like cable or any Pipe Line before start the excavation.

Excavation for the foundation in plant area shall be done by manually or mechanically to the required line and level as shown in the drawings and to the limits for performing the construction work. Construction area will be as free as possible from obstruction and from interference with the transportation, storage or handling of materials.

The excavation shall be done to the minimum dimensions necessary to carry out the work safely. All excavations shall be properly planned for the method which is adopted including dimension, side slopes, dewatering, disposal, etc.

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Disposal of surplus earth/overburden

Excavated soil if required shall be used for filling sub-grade and backfilling to the extent required. Surplus earth, if any and materials which are not suitable for filling/backfilling, shall be disposed by CONTRACTOR in a designated area as advised by CUSTOMER.

Final Grading

After all construction work has been completed, ground surface area that was disturbed by this work shall be graded to the required lines and level. The grading shall be finished to the elevation as indicated on the drawing or if not indicated, to matching contour and elevation of original or undisturbed ground surface. The final grading shall provide smooth uniform surface.

Backfilling



All the soft patches encountered at the desired level of excavation, shall be removed completely and filled back with good soil, layer wise (200mm thickness) and duly rammed and compacted with water to the required density of filling as per IS-2720 Part-VII.

Compaction (Relative Density) of soil / sand shall be checked & should be 90% of the maximum dry density. Soil / Sand shall be locally available and shall not contain any vegetation, organic or clay material. A minimum of one test shall be carried in alternate layer of each foundation. The fill shall be compacted using appropriate vibro-plate compactor with required capacity & adequate water shall be used for compaction. Optimum moisture content should be maintained during compaction.

6.5 CONCRETING WORKS:

6.5.1 REFERENCE: -

- Drawings and Contract Documents
- IS – 456-2000 – Code for plain and reinforced concrete
- IS – 383 – Specification for Coarse and fine aggregates from natural sources for concrete.
- IS – 2386 – Code for Methods of tests for aggregates of concrete
- IS – 455 – Code for Portland Slag Cement. Or as per .
- IS – 10262 – Code for Concrete Mix Design.
- IS – 1786 – Specification for high strength deformed steel bars & wires for concrete reinforcement.
- IS – 2502 – Code of practice for bending & fixing of bars for concrete reinforcement.
- IS 4925 - Specification for Concrete Batching and Mixing Plant.
- IS 4926 - Specification for Ready Mix Concrete.



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6.5.2 EQUIPMENT REQUIRED: -


- Auto level
- Total station
- RMC Plant
- Transit Mixers
- Mechanical / Electrical Vibrators
- Concrete Pump (If applicable)

6.5.3 Methodology:

- Required design mix shall be established by CONTRACTOR and accepted by CUSTOMER before commencing the activity.
- Before placing of reinforcement, bar bending schedule is to be prepared by CONTRACTOR, checked & approved by CONSULTANT.
- in a raised platform to make the bars unscathed from soil/ mud/ water at site. Reinforcement is to be cut, bent to shape and dimensions as shown in BBS/ Drawings.
- All reinforcement is to be fixed in the correct position as shown in the /IFC drawing & shall be properly supported to ensure that displacement will not occur when the concrete is poured & compacted. Reinforcement bars are to be tied at every intersection.
- Cover blocks of specified thickness, made of same grade of concrete and cured properly are to be placed in between forms & reinforcement to provide sufficient cover for the Reinforcement.
- In case of overlapping of two bars, lap length is to be provided as shown in the /IFC drawing or as per IS Codes. The lap should be staggered as far as possible.
- Placing of reinforcement bars should be made within acceptable limit as per /Project specification.
- This includes all kinds of temporary supports to the concrete during the process of setting of concrete. The formwork shall be designed & constructed, so that the concrete can be placed properly in position and thoroughly compacted to obtain the required shape, position and level subject to specified tolerance.
- Forms for concrete shall be made of plywood conforming to IS 6461 or steel as per Project specification to give smooth and even surface after removal thereof. The formwork shall be true, rigid & adequately braced both horizontally & diagonally. The formwork shall have smooth & even surface & sufficiently rigid to carry, without deformation, the dead weight of the green concrete, working load, wind load & also the side pressure exerted by green concrete.
- Formwork joints should be leak proof and shall be strong enough to withstand the effect of vibrations.

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- Before re-use, all form shall be thoroughly scrapped, cleaned, examined & whenever necessary shall be repaired and retreated before re-setting.
- Prior to placing concrete in foundation, all the soil surfaces upon which or against which the concrete is to be placed, shall be thoroughly compacted. The excavation shall be free from all water and debris. Soft or yielding soils shall be removed and replaced with appropriate selected soils or lean concrete compacted to the desired density. When concrete comes in direct contact with absorptive soil, the surface of the soil shall be thoroughly moistened prior to placing concrete.
- No concrete shall be placed prior to the approval by CUSTOMER/CONSULTANT of the formwork, scaffolding, placement of reinforcement and embedded items etc. Any water collected over formwork, bedding surfaces shall be removed.
- Open troughs and chutes shall be equipped with baffles and be of short lengths to prevent segregation. The slope of the chute shall not be less than 1 vertical to 3 horizontals, nor more than 1 vertical to 2 horizontals. Chutes shall be designed such that the concrete at the lower end passes through a funnel shaped pipe or drop chute, thus causing a certain degree of remixing. Alternately they should discharge into a hopper from which concrete is further conveyed in wheel barrows. In case drop chutes are used the maximum lateral flow of the discharged concrete shall be limited to one meter. When drop chutes are swung from the vertical, the bottom two segments must be vertical in order to prevent segregation. No water shall be added at any point of the chute system to facilitate movement of concrete. Concrete shall not be permitted to fall freely for a height of more than 1.0m nor to strike the forms at an angle. All chutes, troughs and pipes shall be flushed with water at the end of each run, to keep them clean and free from coatings of hardened concrete. The use of long troughs, chutes and pipes shall be permitted only with the approval of CUSTOMER.
- Concrete shall be discharged by means of vertical drop only. The drop height shall not exceed 1.0m in any stage of delivery.
- To avoid re-handling of concrete, it should be deposited as near as possible to its final position. Concrete shall be placed in horizontal layers of thickness not exceeding 300mm. In case of any segregation, it shall be corrected by shovelling aggregate into mortar and not mortar over aggregate. All care shall be taken to prevent the formation of pockets or mortar accumulation in the corners of formwork. In case they are formed they shall be removed and refilled ensuring bondage with the earlier concrete.
- Concrete placed below ground level shall be protected from falling earth. The concrete shall be prevented from coming in contact with the earth or ground water for the first 3 days after placement. The ground water level shall be lowered to an approved level by suitable means to prevent floatation or flooding at no extra cost.
- After the striking of the formwork, all concrete work shall be inspected for defects such as honey-combed surfaces, rough patches, holes left by for bolts etc. and shall be brought to the notice of Engineer-In-Charge. Engineer-In-Charge shall at his discretion, permit repair of such defective work or reject it.
- All concrete shall be cured by use of continuous sprays for the period of complete hydration with a minimum period of 14 days. The quality of curing water shall be the same as that used for mixing.



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- Samples in the form of 15cm x 15cm x 15cm cubes shall be taken from fresh concrete as per IS 1199, cured and tested at 7 days (if required) and 28 days in accordance with IS 516. Strength requirement will depend on the GRADE of concrete. Frequency of sampling will be as per IS 456. The concrete should be complying with the strength requirement and acceptance criteria as per IS 456.
- In case of any Precast works, place to be identified by CONTRACTOR and formal approval to be obtained from CUSTOMER. Erection shall be done with care. Erection plan shall be provided by CONTRACTOR and approval shall be done by CUSTOMER prior to commencement of the activity.

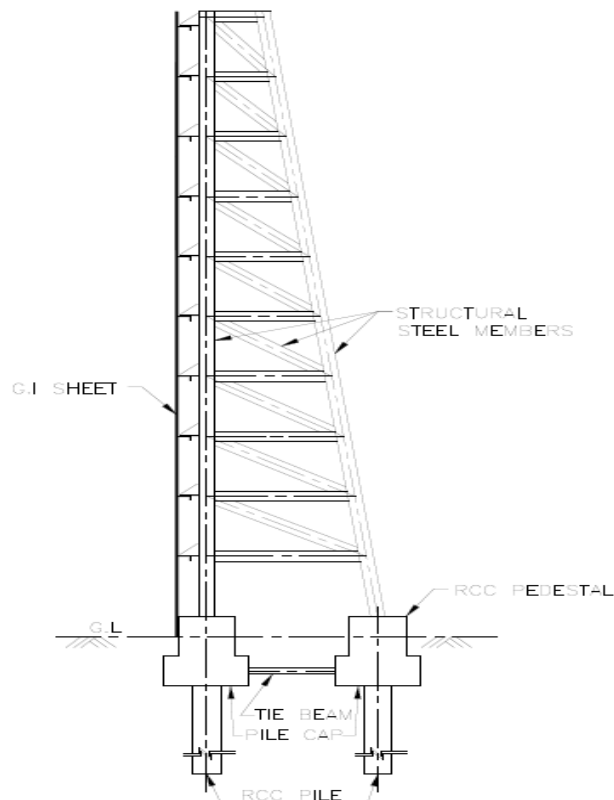
5.5 STEEL STRUCTURAL WORKS:



5.6.1 Methodology:

- All structural material shall be made good and straightened by pressure and shall be free from distortions / warps / bends. Marking and cutting shall be done on the sections / members as per approved drawing. All cutting edges shall be clean, square, and free from any distortion and burrs and grinded to smooth finish. All holes shall generally be drilled to the required size and at the required position. Fabrication of structures shall be done as per the sequence of erection using drawings.
- WPS for structural welding shall be made as per IS-2062 Gr A or Gr B0 /BR. Qualified welders as per approved WPS shall carry out welding. A minimum of two runs to be made for welding on structural steel. CONTRACTOR shall make necessary arrangements for providing sufficient number of welding sets of the required capacity, all consumables, cutting and grinding equipment with requisite accessories/auxiliaries, equipment & materials for carrying out welding activity. Adequate protection against rain, dust & strong wind shall be provided to the welding personnel and the structural members during welding operation.
- Fit-up shall be carried out as per approved drawing. The fit up shall then be checked & inspected by Site Engineers. After clearance of the fit-up, welding of the pre-fabricated structural work shall be carried out by the qualified welders as per the approved WPS. Welding shall be carried continuously to completion as stated in approved welding procedure. Welding sequence shall be controlled to minimize distortion and shrinkage.
- The steel surfaces shall be clean of the grease, oil, dirt, rust, welding slag, loose particles and any other foreign material by blast cleaning to achieve required surface prior to primer application. Priming & painting of structure steel shall be done as applicable.
- After obtaining inspection clearance from CUSTOMER/ CONSULTANT the finished section / goods from painting shop shall be shifted to the erection site depending upon the front availability or kept in safe storage.
- Before commencement of any erection activity foundation shall be checked for its elevation, centreline and roughness of top surface.
- Simultaneously location, orientation, size & length of foundation bolts shall be checked with column base plate holes and column orientation.

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- By deploying suitable capacity crane/ F15, the steel columns/trestle shall be lifted for placement on foundation. The orientation to be checked as per drawing before placement. Packing plates of suitable size shall be placed under the base plate for final adjustments of elevation, which will be covered during grouting. Erection plan shall be provided by CONTRACTOR and approval shall be done by CUSTOMER/CONSULTANT prior to commence the activity.
- After erection of barricading structure shall be aligned.
- Anchor bolts shall be tightened immediately with two washers and two nuts Beams and other secondary beams shall be erected Scaffolding shall be erected as desired for the erection of structures.
- Pre coated green / blue colour sheet thickness as per Drawing to be fixed with 'J' hook or Self screw bolt.
- The area / location of grouting shall be cleaned of moisture, dirt and any oily substances. Grouting material GP2 or Normal Cement Mortar shall be used as per the approved drawing.



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HEALTH SAFETY & RISK ASSESSMENT

Work Permit System:

Work permit system shall be followed for all these works. CONTRACTOR execution team shall ensure full compliance to permit to work system throughout execution of this work.

CONTRACTOR Field HSE to ensure implementation of Site HSE plan Requirements in all activities. Same shall be ensured by CONTRACTOR HSE.

The site execution team shall ensure all lifting tools & tackles are inspected, color coded & having valid certificates before put into use. A risk assessment shall be carried out prior to start of the job as well as PTW. All Health Safety Environment requirement enumerated in HSE procedure shall be followed.

Work at height requirements shall be complied as mentioned in the site HSE plan. Details of working platform for erection of sheeting, bolting will be submitted before start of work.

Structural erection procedure and lifting mechanism to be defined before start of work by CONTRACTOR and will be implemented after approval by CUSTOMER/ CONSULTANT.

7 QUALITY CONTROL

Quality Control of Fabrication and Erection work will be as per Inspection Test Plan. Format of records as mutually agreed and approved by PMC shall be maintained for Fabrication and erection work.

8. RECORDS: ITP & FORMATS

Inspection Test Plan: **-CONTRACTOR/IOCL/080557C001/GEN/BARRICADE/001Rev. 0**

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