



Core Engineering Group

## **Technical Services Profile**

**OFFSHORE OIL & GAS INDUSTRY**

**Production / Processing Facilities  
AND**

**Marine Engineering**



**Core Engineering Group**

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## 1. Outlook

Increasing liberalisation and globalisation of various economies around the world coupled with the communication revolution has added a new dimension to the competitiveness in business. The order of the day is mergers, acquisitions and alliances aimed at shedding costs, consolidating and synergies to produce globally competitive Companies.

In the sphere of Technical Services, India offers a great opportunity to global players to take advantage of these emerging scenarios. With a large pool of skilled and competent technical manpower combined with its economic edge, India makes an attractive choice for establishing partnerships. The objective is to provide quality Consultancy Services in Specialised areas to global players to achieve higher cost competitiveness on an international level.

## 2. The Group

**Core Engineering Group** was formed by engineers having an experience in excess of 30 years in the field of Project Management, design, construction and installation of marine structures, Offshore Oil Platforms, Jetties, Submarine Pipelines, loading / unloading terminals and other onshore facilities etc.

The Group was formed in 1998 with a view to establish a group of professionals providing specialized services in specific areas of Marine Engineering as well as large Industrial and Infrastructure projects. The Group also formed alliances with Associates who complement our strengths to develop a system fully capable of providing services for engineering of projects involving multi-disciplinary fronts.

Members of the Group have worked on various offshore oil / gas projects in India as well as with many International Companies and have been associated with the development of offshore oil fields in Bombay High since its inception in late 70s. In addition they also worked on many offshore oil / gas projects in the Gulf during last

many years for various clients viz. ADAMA-OPCO, ADNOC, ZADCO, QGPC, QLGC, Saudi-ARAMCO, ELF, TOTAL, SHELL, MOQ, SAIPEM, Samsung etc. in various capacities.

Long exposure to Project Management and Design / Engineering of large industrial projects has provided the Group the ability to provide assistance to Clients during conceptualization and feasibility study of such projects. Though the Group is able to offer assistance in many areas however the its area of strength remains to be the structural and pipeline engineering for offshore oil and gas facilities where the Group possess extensive relevant experience. Areas of strength are further elaborated below:

- Front End Engineering and Conceptual Design of Offshore Platforms and Jetties.
- Detailed design and engineering of offshore platforms and Jetties including all disciplines.
- Installation Studies, Engineering and Design of Construction aids for Offshore Platforms.
- Solutions for Complex Analytical Problems.
- Engineering Co-ordination for Projects involving Marine facilities.

This extensive experience of dealing with a variety of situations has also given the Group a unique problem solving capability by systematically analyzing any situation and presenting a step by step solution to reach the desired objective.

The Group started its operation as a Partnership Company in 1998. Since then it has provided engineering services in the field of Structural Engineering for Offshore Structures and Submarine Pipelines to clients such as NPCC - Abu Dhabi, CCC – Abu Dhabi, Larson & Toubro – India, LTV – Bangalore, Kvaerner Powergas – Mumbai, Technip KT – India, Triune Projects Pvt. Ltd. – New Delhi, Shell Exploration BV – Dubai, PT Saipem – Jakarta, Samsung Heavy Industries etc.

Keeping in view the growth of business of the Group it was corporatized in year 2006.

Over the years the Group has provided engineering services to its Clients for a number of projects. Some of the Major Offshore Projects handled by Core Engineering Group since its inception are listed below.

- Detailed structural design and engineering for BH – N09 Well Head Platform Deck, Helideck, Jacket and appurtenances etc. of Qatar Petroleum in the Bul Hanine Field Development Project of NPCC.
- Detailed structural engineering for NLQ and SLQ integrated Living Quarters Decks and Helidecks of Shell/ NIOC Iran in the Soroosh and Nowrooz Development Project for NPCC.
- Detail structural Engineering for Block Modules on CPP 3 Platform of Vietsovetro, Vietnam on behalf of Keppel Fels / TPPL.
- Detail Structural Engineering for Production and Storage Platform, F02a Hanze Field Development of Veba Oil Netherlands on behalf of Hyundai / TPPL.
- Mundra – Delhi Pipeline Project of HPCL. Was responsible for all the meterening stations on pipeline route.
- Development of Specifications and Engineering Standards for Triune Projects, New Delhi.
- Structural engineering for modifications to LA and LB platforms of Cairns India on behalf of Technip KTI. Reassessment of Jacket and piles from the consideration of in-place integrity and fatigue life was also included under the scope.
- Detailed Installation engineering for RS2, ZB, RS1, RS3 and RS11 Jackets of ONGC 9 Well Platforms Project. The work was carried out on behalf of Kvearner Powergas.
- Complete detail structural engineering of Topsides, Jacket, Piles and Appurtenances for Gas Injection Platform of Banduq Oil o behalf of Kvarner Powergas / L&T.

- Various structural Analyses and design for ZB, RS-11, RS-1, RS-2, RS-3, RS-8 and RS-5 Jackets. The work was carried out on behalf of Kvarner Powergas / L&T.
- Reassessment of Structural Integrity of Telecommunication Towers on SLQ and NLQ Living quarter platforms of Shell BV in Iran. The work was carried out on behalf of Shell BV.
- Water intake structure including an electrical building for TEMA Refinery, Ghana.
- Complete Structural design and engineering for Jacket, piles, appurtenances and drilling deck for IA, HA and BD platforms of Maersk Oil Qatar on behalf of NPCC.
- Complete Structural Engineering for OGIP Project of ONGC on behalf of Kevin Engineering / Naftogaz. The project included complete structural engineering for installation of new J Tubes on 26 well platforms and 5 process platforms and deck extension on 19 well platforms. New EI houses were also added on 19 well platforms. CEG was responsible for complete structural engineering for the project including field surveys and interaction with ONGC team for approval of engineering.
- Various works for PT Saipem Indonesia including the following:
  - \* Pre Bid Engineering for Ichthys RSS (Riser Support Structure) of Impex Browse Ltd Australia. The structure was to be located in 250 m water depth and was to be supported on gravity foundation. CEG carried out complete static and dynamic simulation for this structure including seismic evaluation and generation of drawings.
  - \* Pre bid engineering for ONGC's B and N series Platforms.
  - \* Construction / Installation Engineering for various Jackets in Indonesian and Malaysian waters.

Further details of some major projects executed by **CEG** supported by Client Purchase Orders are included in **Appendix A**.

**CEG** perceives Knowledge and Skill to be the prime drivers of its business. Accordingly, acquiring, developing and retaining these attributes has been the prime strategy of **CEG** in structuring its business model. It endeavors to always retain a leading edge in the areas of its specialization and be known for its expertise.

**CEG** derives its strength from the Experience, Knowledge and Skills of its **Principal Members**. It retains the option of enrolling Engineers and Managers of exceptional competence as Members in future to enhance its capabilities.

**CEG** has made investments in past years to create a facility and acquire recourses to carry out complete detail engineering for Offshore Platforms. In many instances **CEG** is takes the role of a **Consultant** or **Knowledge Provider**. In addition to working as an engineering sub-contractor to major Consultants and EPC contractors it also works as an Engineering Back Office to EPC Contractors and Engineering Companies.

Some of the Major Projects handled by the Principal Members in various capacities are listed below.

- HRC Process Platform of ONGC in Bombay High
- Al Shaheen Field Development Project of Maersk Oil Qatar with ABB Holland
- Well Head Platforms in South Pars Gas field of NIOC of Iran
- TOTAL Abu Al bukhoosh Gas Project For TOTAL
- Water Disposal Platforms and Well Head Platforms of QGPC, Qatar
- Alkhaleej Block 6 Field Development including Well Head Platforms, submarine pipelines and submarine cables for ELF Petroleum, Qatar
- CALM Buoys for KOC, Kuwait
- Conceptual Design for Loading / Unloading Jetty from Oman LNG Plant
- GA Project of Abu Dhabi Oil Company (Japan Oil Company), UAE
- Pre-bid engineering of unloading jetty at Dhabol, India for Bechtel of UK

- Detailed techno-economic study and cost estimates for Neelam Field Development including Process Platforms, Well Head Platforms, Pipelines and offshore loading terminals for ONGC in Arabian Sea.
- ADGAS Jetty longevity Project at Das Island
- N4, N5, N6 and N7 Well Head Platform and pipelines of ONGC in Bombay High..
- Ruwais Refinery Berth Expansion Project for ADNOC with TPG, France
- WIS Water Injection Process Platform in Bombay High South.
- Detailed techno-economic study and cost estimates for Panna Field development of ONGC India
- South Bassein Phase I Development of ONGC in Arabian Sea.
- Design and basic engineering for SHP Process Platform of ONGC
- Several well head platforms and associated submarine pipelines for ONGC in Arabian Sea.

Details of some assignments handled by the Group since its inception are placed at **Appendix A**. Also a brief outline of a few projects handled by Principal Members in lead positions such as Engineering Project Managers / Lead Engineers are also included in **Appendix B** of this presentation.

Continuous upgrading of knowledge and acquisition of latest skills is central to Consulting Business. These are the key drivers, which help us in delivering innovative and cost effective solutions to Clients. In order to be at the forefront of the technological spectrum we have found it very essential to be in touch with leading academic institutions. **Core Engineering Group** is currently a corporate member of *Foundation for Innovation and Technology Transfer* established at the *Indian Institute of Technology (IIT)*, New Delhi. This forum allows a two-way interaction of professional engineers with researchers and academicians at the IIT on complex issues. As a result of this association we have access to state of the art laboratory and testing facilities at the IIT. The well-stocked library at IIT makes for easy access of most



international technical journals and books thereby helping us keep in touch with the latest trends.

Availability of relevant Codes and Standards is essential for carrying out any engineering assignment. **Core Engineering Group** is a member of **Bureau of Indian Standards** information system. This association allows us access to codes and standards issued by all major International Standards Organizations.

### 3. Our Endeavour

Group's perception is that many Global Players operating in the field of Engineering Projects, Consultancy, Project finance and Insurance require cost effective and need based services of experienced professional engineers. Our Group presents a viable option to Engineering Companies and Clients to reduce costs without losing control over quality.

While it is feasible to carry out complete **Front End Engineering** as well as **Detail Engineering** for Projects through the Group and its Associates in India, we perceive that Clients require external help during the peak load periods of the Projects. We encourage such need-based utilisation of our specialised services with a view to develop long-term relationship based on confidence. Exact boundaries of services can be defined based on the specific needs of an individual Client. With the depth of experience available with us, and our firm commitment to quality, we are sure that we would be able to assist you in any of your ventures in the above fields.

**Finally - as they say - *A picture is worth a thousand words!***

Pictures included on next sheet provide a glimpse of Projects where Group Members were involved.



ONGC HRC JKT  
Heera Field, India  
HLS-2000  
16-03-1998

Jacket being transported to offshore site onboard a cargo barge for installation by launching.

Jacket during Launching operation.



HLS-2000  
HRC JKT Heera  
HRC Bridge & Deck  
31-03-1998

Bridge being installed between two platforms offshore.



Jacket under fabrication at yard.

Integrated Topside under fabrication at yard.



Deck Being Installed offshore using a derrick mounted heavy lift crane.



# Appendix A

## Summary of Major Assignments Handled by Group

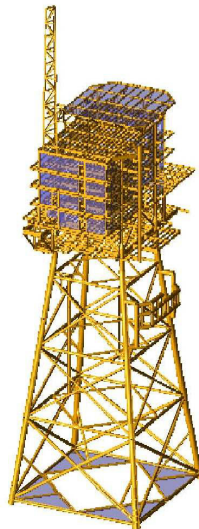
## **SOROOSH / NOWROOZ Project – Shell BV**

### **Structural Engineering For Helidecks and Living Quarters**

The project was awarded to NPCC – Abu Dhabi by Shell BV on EPC Basis. The following works were sub-contracted to CEG by NPCC.

1. Structural Analysis for Heli-decks of NLQ and SLQ Living Platforms.
2. Complete Structural Analysis for Living Quarter Module on NLQ and SLQ Platforms. Integrated In-place and earthquake analyses including Jacket, Piles, LQ Modules and Heli-decks. These platforms are located in a water depth of 42 m.
3. The analysis of living quarters was performed using stressed skin approach as per LRFD recommendations.
4. Pre-service engineering for heli-decks and SLQ / NLQ Living Quarter modules.

A 3D extract from platform model is shown below:



Copy of PO issued for the work and long term service order issued by NPCC are attached for reference.

## Well Platform BH N09 – Qatar Petroleum

### Structural Engineering Topsides, Jacket, Piles and Appurtenances

The project was awarded to NPCC – Abu Dhabi by QGPC on EPC Basis. Complete Structural Engineering for the platform was sub-contracted to CEG by NPCC. CEG's Scope of Work is briefly outlined below:

1. Structural Design and Engineering for Topsides (Deck + Helideck)
2. Structural Design and Engineering for Jacket and Piles.
3. Structural Design and Engineering for Appurtenances.
4. Preparation of Structural Drawings for the entire facility.
5. The following analysis were performed:
  - Inplace analysis.
  - Fatigue Analysis.
  - Seismic Analysis.
  - Load out Analysis.
  - Lift Analysis.
  - Upending Analysis.
  - Transportation Analysis.
  - Pile Design.
  - Design of Appurtenances and Miscellaneous Design.



3D Model Extract of BH N09

This platform is located in a water depth of 27 m.

Copy of PO issued for the work issued by NPCC is attached for reference.



## Well Platforms LA / LB – Cairns India

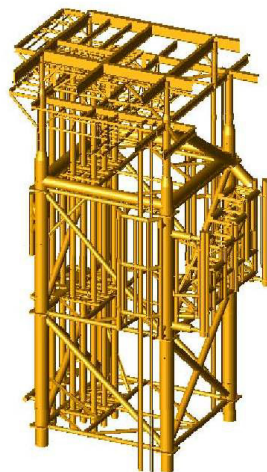
### Structural Engineering for Modifications

The project was awarded to Technip KTI by Cairns for engineering. Complete Structural Engineering work was sub-contracted to CEG by Technip KTI. CEG's Scope of Work is briefly outlined below:

1. Structural Design and Engineering for modifications to Topsides.
2. In-place analysis of LA / LB Platforms for reassessment of integrity after modifications.
3. Fatigue analysis of LA / LB Platforms for reassessment of fatigue life.
4. Re-engineering of CP System after modifications.
5. Preparation of structural drawings for modifications and remedial measures.

These platforms were located in a water depth of 18.6 m.

A 3 D extract of Model is included below:



Copy of PO issued for the work issued by Technip KTI is attached for reference.



## **Well Platforms ZB, RS11, RS1, RS2, RS3, RS5 and RS8 – ONGC**

### **Structural Analysis, MTO and Drawings**

The project was awarded to L&T / KPGI by ONGC on EPC Basis. The following works of Structural Engineering for the platforms was sub-contracted to CEG by KPGI.

1. Floation and Upending Analysis and design of upending eyes / buoyancy tanks for ZB, RS11, RS1, RS2 and RS3 Jackets. Water depth for these Jackets is 70 – 85 m.
2. Sea-fastening design for ZB, RS1 and RS 2 Jackets.
3. In-place, fatigue and launch analysis for RS5 Jacket for selection of configuration. Water depth of this platform is 85 m.
4. In-place and fatigue analysis for RS8 Jacket for selection of configuration. Water depth of this jacket is 77 m.

Copy of POs issued for the work issued by KPGI are attached for reference.



## Gas Injection Platform – Bunduq Oil Company, Abu Dhabi

### Structural Engineering Topsides, Jacket, Piles and Appurtenances

The project was awarded to L&T / KPGI by Bunduq on EPC Basis. Complete Structural Engineering for the platform was sub-contracted to CEG by KPGI.

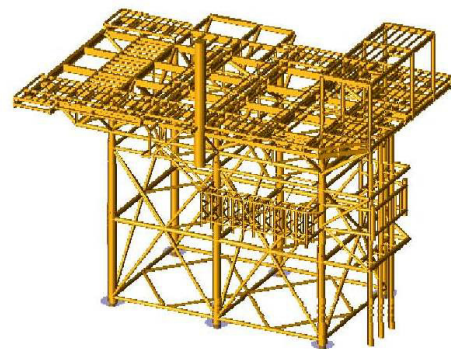
This is a six legged process cum production platform where in addition to well head conductors all processing facility for gas injection was provided. Three gas injection compressors were provided on the main deck in addition all other process equipment and utilities. Lift weight of topside was about 2500 MT.

CEG's Scope of Work for the project is briefly outlined below:

1. Structural Design and Engineering for Topsides.
2. Structural Design and Engineering for Jacket and Piles.
3. Structural Design and Engineering for Appurtenances.
4. Preparation of Structural Drawings for the entire facility.
5. The following analysis were performed:

- Inplace analysis.
- Fatigue Analysis.
- Seismic Analysis.
- Load out Analysis.
- Lift Analysis.
- Upending Analysis.
- Transportation Analysis.
- Pile Design.
- Design of Appurtenances and Miscellaneous Design.

3D Model Extract of GIP Process Platform



This platform is located in a water depth of 20 m.

Copy of PO issued for the work issued by KPGI is attached for reference.



## **Telecom Towers on SLQ / NLQ – Shell BV, Iran**

### **Structural Reassessment of Towers**

Additional antennas were to be installed on existing Telecom towers on SLQ and NLQ living quarter platforms of Shell BV in Iran. Structural reassessment work for telecom towers was awarded to CEG directly by Shell BV.

Copy of PO issued for the work issued by Shell BV is attached for reference.



## **IA, HA and BD Platforms – Maersk Oil Qatar**

### **Structural Engineering Topsides, Jacket, Piles and Appurtenances**

The project was awarded to NPCC by MOQ on EPC Basis. Complete Structural Engineering for the above three platforms platform was sub-contracted to CEG by NPCC.

These are four legged process cum production platforms in water depths of 70m, 57m and 61m respectively. The Jackets have been designed to accommodate installation of a process module having operating weight in excess of 6000 MT.

CEG's Scope of Work for the project is briefly outlined below:

6. Structural Design and Engineering for Topsides.
7. Structural Design and Engineering for Jacket and Piles.
8. Structural Design and Engineering for Appurtenances.
9. Preparation of Structural Drawings for the entire facility.
10. The following analysis were performed:
  - Inplace analysis.
  - Fatigue Analysis.
  - Seismic Analysis.
  - Post Impact Analysis.
  - Load out Analysis.
  - Lift Analysis.
  - Upending Analysis.
  - Transportation Analysis.
  - Pile Design.
  - Design of Appurtenances and Miscellaneous Design.

Copy of PO issued for the work issued by NPCC is attached for reference.



## **OGIP Project – ONGC, India**

### **Structural Detail Engineering**

The Project Scope of work comprised of the following:

- Installation of new J tubes at 26 existing well platforms and 5 Process Platforms.
- Deck extensions at 19 existing well platforms.
- New E I Houses at 19 well platforms.

CEG was responsible for complete structural detail engineering including field surveys and interaction with ONGC team for approval of engineering.

Copy of PO issued for the work issued by Kevin Engineering is attached for reference.



Core Engineering Group

## **Appendix B**

**Outline of a few sample Projects Handled**

**By**

**Principal Members in Various Capacities**

## Al Khalij Block 06 Development<sup>1</sup>

### ELF Petroleum, Qatar

#### 1. Major Components of the Facility

- ◇ ALK DP1 Platform
- ◇ ALK WP1 Platform – Phase I
- ◇ Halul Process Area
- ◇ Sea Lines
  - ◆ DP 1 – Halul
  - ◆ WP 1 – DP 1
- ◇ Submarine Cable
  - ◆ Halul – DP 1
  - ◆ DP 1 – WP 1

#### 2. Salient Features of DP 1 Platform

- ◇ Four Legged Platform
- ◇ Fully Integrated Deck Consisting of four Levels ( 20m x 20m )
- ◇ Provision for 10 well slots ( 9 oil + 1 water )
- ◇ Capacity – 20,000 BLPD ( Present )
- ◇ Major Facilities on the Platform
  - ◆ Four Well Heads
  - ◆ Well manifold consisting of production and test headers.
  - ◆ Manifolding of oil received from WP1 and WP2.
  - ◆ One vertical scraper launcher.
  - ◆ Multiphase flow meter for well testing.
  - ◆ Chemical Injection Skid.
  - ◆ Closed drain system with drain drum and re-injection pump.
  - ◆ Open drain system with sump caisson.
  - ◆ Micro wave / satellite communication link with Halul.
  - ◆ Radio link with ALK WP1.
  - ◆ Fire and Gas system.
  - ◆ Air conditioned and pressurized technical room housing:
    - \* HV / LV switch gear.
    - \* Electrical Panels and Equipment.
    - \* Control System.
    - \* Communication Equipment.
    - \* UPS

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<sup>1</sup>

This project was one of the various assignments handled by one of the Principal Members while working for NPCC, Abu Dhabi, UAE.

- \* HVAC Equipment and Panel.
- \* Eye Wash Station.
- \* First aid and survival kit.
- ◆ One 22kV / 415V Power Transformer.
- ◆ Six ESP Transformers ( 4 for DP1 and 1 each for WP1 and WP2).
- ◆ One 10MT capacity Pedestal Crane.
- ◆ W I Manifold.
- ◆ Fire Water Network (Dry).
- ◆ Safety Equipment.
- ◆ One Boat Landing on East Side.
- ◇ Provision for the following future facilities
  - ◆ Reservation for 5 oil producing and 1 water injection wells.
  - ◆ Reservation for 4 ESP transformers.
  - ◆ Reservation for Booster pump for Injection water.
  - ◆ Reservation for 2 scraper receivers.
  - ◆ Reservation for I Tubes.
  - ◆ 2 Nos LV Switch Gear, ESP feeder panels ( excl. ACB & Soft Starters ).
  - ◆ Reservation for 3 nos LV Switch gear ESP Feeder Panels.
  - ◆ Radio Link with ALK WP2.

### 3. Salient Features of ALK WP1 Platform – Phase I

- ◇ Tripod Jacket with provision to accommodate four well slots ( 13 m side )
- ◇ One well head – 5000 BLPD Capacity.
- ◇ Working Area at (+) 8.000 m Elevation.
- ◇ One drain drum located at (+) 11.000 m elevation.
- ◇ Boat landing on east face.
- ◇ Solar Powered hydraulic safety shut down system.
- ◇ RTU / Radio link with ALK DP1 platform.
- ◇ One MT capacity manually operated davit.
- ◇ Chemical injection.
- ◇ Power feeder from DP1 to energize down hole pump.
- ◇ Solar powered navigational aids.
- ◇ Safety equipment.
- ◇ Space provision for scraper launcher.
- ◇ Provision for installing a top sides at a later date.

### 4. Facilities at Halul Island

- ◇ Halul Process Area
  - ◆ Scraper Receiver Station
  - ◆ Slug Catcher.
  - ◆ Indirect Fired water bath heater.

- ◆ Atmospheric Separator.
- ◆ Knock out drum.
- ◆ Oil transfer pumps.
- ◆ Water transfer pumps.
- ◆ Chemical Injection System.
- ◆ Fiscal metering skid with prover.
- ◆ PLC based process control system.
- ◆ Relay based ESD panel.
- ◆ Fire and gas system.
- ◆ Tie-ins to existing facilities of QGPC.
- ◆ Fire water system.
- ◆ Communication equipment.
- ◆ Safety equipment.

### 5. Electrical Sub-station

- ◇ An air conditioned concrete building ( 6 m x 8 m ) housing H V Switch gear and other panels.
- ◇ An out door transfer bay housing power transformers, reactive power compensator, circuit breaker etc.
- ◇ Tie in to existing power system of QGPC.

### 6. Sea Lines and Submarine Cable

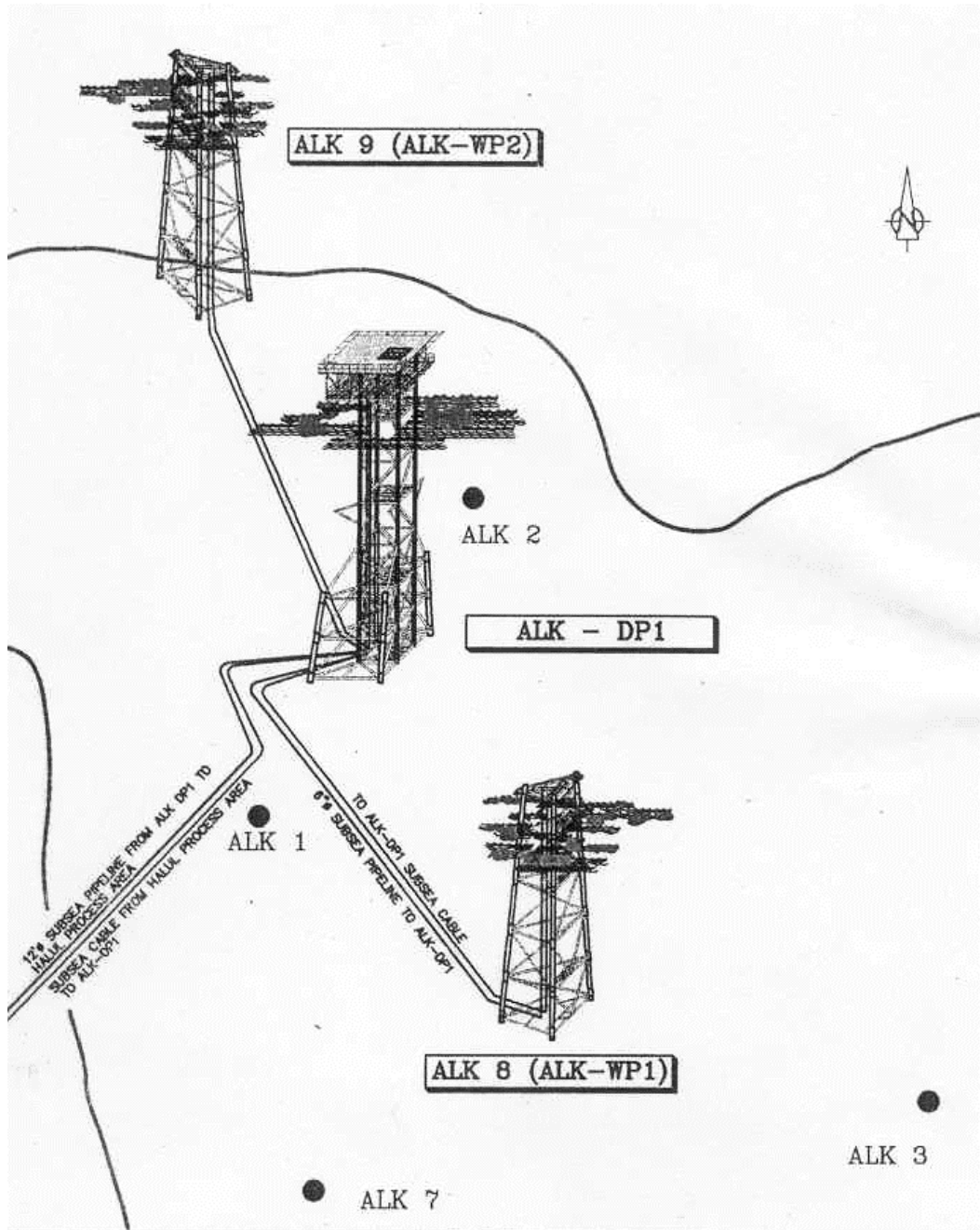
- ◇ Well fluid export line from DP1 to Halul island with the following features:
  - ◆ 12 Inch diameter.
  - ◆ 41 kM submarine route with riser on DP1 end.
  - ◆ 1.3 kM onshore route on Halul Island.
  - ◆ One submarine cable crossing.
  - ◆ Mechanical protection by grout mattresses in shore approach.
  - ◆ Designed to carry 110,000 BLPD at 130 barg inlet pressure or 30,000 BLPD at 30 barg.
- ◇ Well fluid transportation line from WP1 to DP1 with the following features:
  - ◆ 6 Inch diameter.
  - ◆ 3.3 kM submarine route with riser at both ends.
  - ◆ Designed to carry 20,000 BLPD at 45 barg.
- ◇ 22 kV Submarine cable from new substation at Halul to ALK DP1 Platform with the following features:
  - ◆ 3 x 70 mm<sup>2</sup> Copper Conductor.
  - ◆ 2 x 2.5 mm<sup>2</sup> Pilot wire.
  - ◆ 42 kM submarine route.
  - ◆ One submarine cable crossing.





- ◆ Mechanical protection by grout mattresses in shore approach.
- ◇ 22 kV Submarine cable from ALK DP1 to ALK WP1 Platform with the following features:
  - ◆ 3 x 70 mm<sup>2</sup> Copper Conductor.
  - ◆ 2 x 2.5 mm<sup>2</sup> Pilot wire.
  - ◆ 3.3 kM submarine route.
  - ◆ Carries flat pack piggybacked for chemical injection.

Attached sketch shows overall layout of the facility.





## **Al Shaheen Field Development<sup>2</sup> Maersk Oil, Qatar**

The Project consisted of central processing facilities at the MOQ Al Shaheen field in QATAR. The project was a part of overall field development including production, gathering and processing of oil and gas at Al shaheen.

The processing facilities consisted of:

- The eight-legged process platform AB, bridge linked to the existing monopod structure AA installed as an early production platform. The AB platform had a heavy topside facility weighing nearly 5000 t before installation and was installed by float-over method. The processing facilities included oil testing and separation [120,000 BLPD], water injection [150,000 BWPD at 1800 psig], gas injection [future], power generation, and other standard off sites.
- and a new 124 men 4-legged living quarter platform LQ.

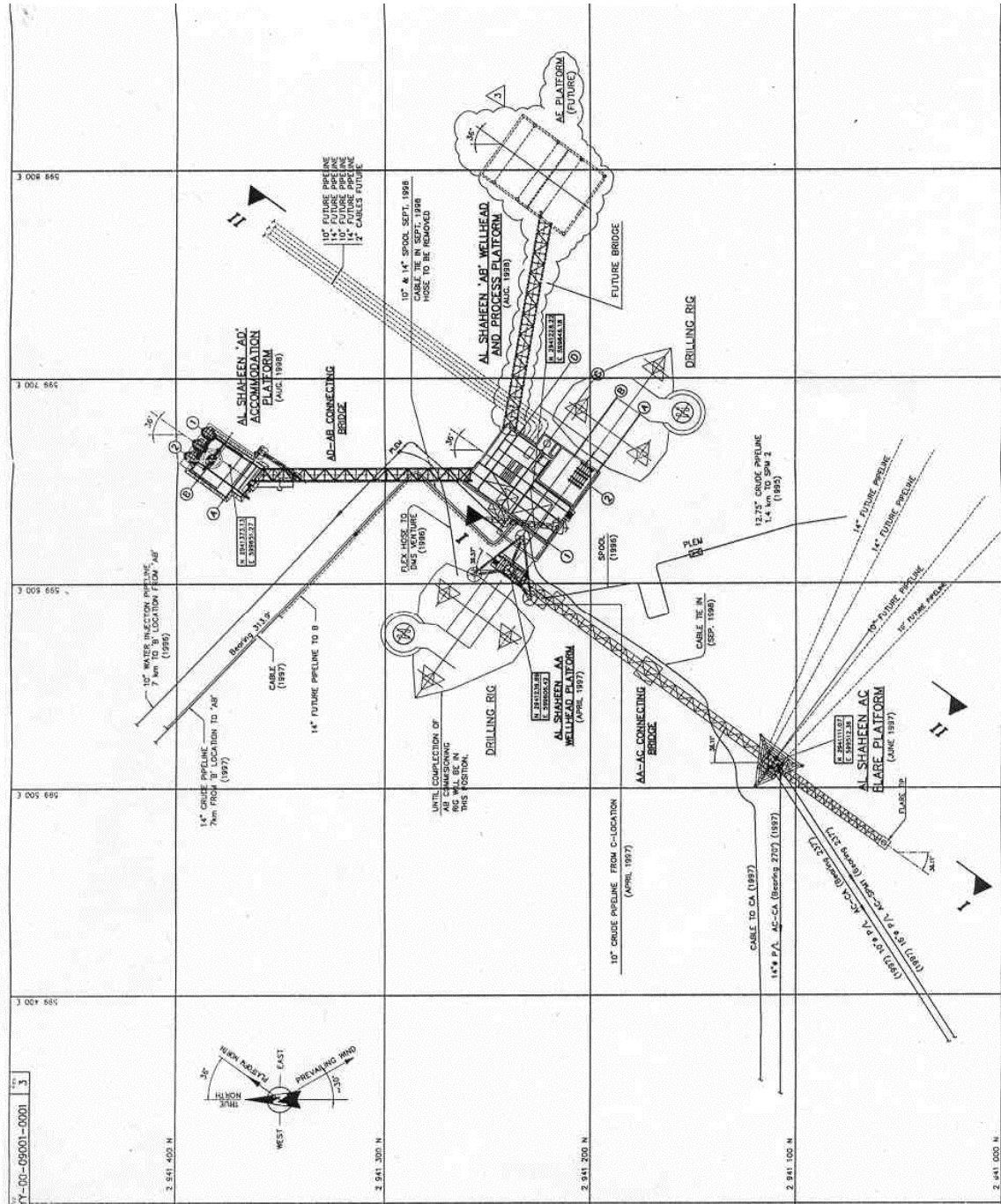
The engineering was carried out jointly by ABB Lummus Global and NPCC.

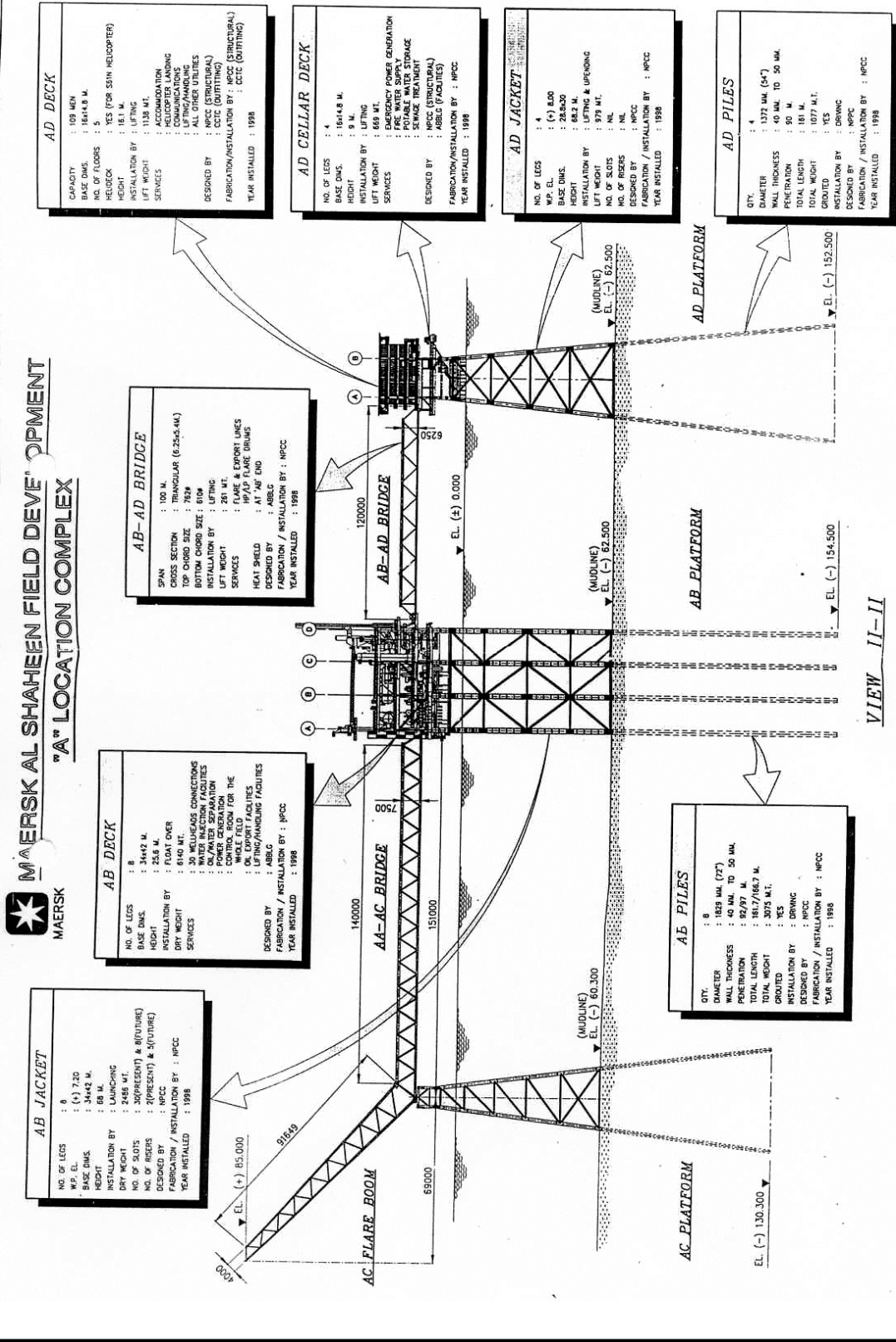
Enclosed sketches and drawings show complete details of the Project.

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<sup>2</sup>

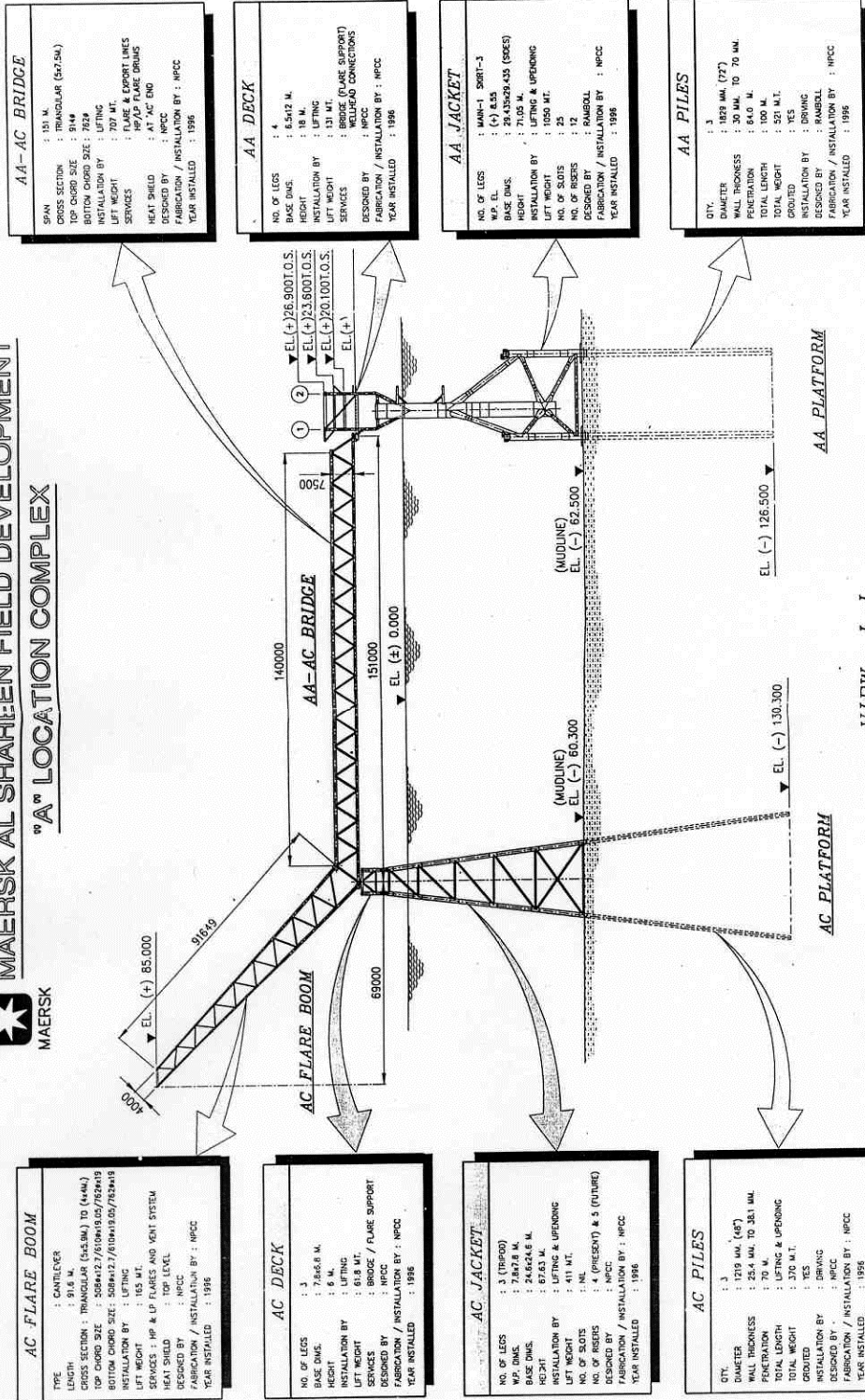
This project was one of the various assignments handled by one of the Principal Members while working for NPCC, Abu Dhabi, UAE.







**MAERSK AL SHAHEEN FIELD DEVELOPMENT**  
**9<sup>th</sup> A<sup>th</sup> LOCATION COMPLEX**



AA-AC BRIDGE	
SPAN	: 151 M.
CROSS SECTION	: TRIANGULAR (547.5M)
TOP CHORD SIZE	: 9149
BOTTOM CHORD SIZE	: 7829
INSTALLATION BY	: LIFTING
LEFT WEIGHT	: 707 MT.
SERVICES	: FLARE & EXPORT LINES : FLARE BRIGGS
HEAT SHIELD	: AT "AC" END
DESIGNED BY	: NPCC
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

AA DECK	
NO. OF LEGS	: 4
BASE DIMS.	: 6.942 M.
HEIGHT	: 19.8 M.
INSTALLATION BY	: LIFTING
LEFT WEIGHT	: 131 MT.
SERVICES	: BRIDGE (FLARE SUPPORT) : WELLSHEAD CONNECTIONS
DESIGNED BY	: NPCC
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

AA JACKET	
NO. OF LEGS	: MAIN-3, SHORT-3
W.P. DIMS.	: (4) 8.43
BASE DIMS.	: 24.43299.433 (SIZES)
HEIGHT	: 71.05 M.
INSTALLATION BY	: LIFTING & UPDRESSING
LEFT WEIGHT	: 1050 MT.
NO. OF SLOTS	: 25
NO. OF RISERS	: 12
DESIGNED BY	: RAMBOLL
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

AA PILES	
QTY.	: 3
DIAMETER	: 1929 MM (72")
WALL THICKNESS	: 30 MM, TO 70 MM
PENETRATION	: 64.0 M.
TOTAL LENGTH	: 100 M.
COUPLER	: 2 SET
INSTALLATION BY	: DRIVING
DESIGNED BY	: RAMBOLL
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

AC FLARE BOOM	
TYPE	: CANTILEVER
LENGTH	: 916.6 M.
CROSS SECTION	: TRIANGULAR (545.5M) TO (444M)
TOP CHORD SIZE	: 508#412.7/610#418.05/782#419
BOTTOM CHORD SIZE	: 508#412.7/610#418.05/782#419
INSTALLATION BY	: LIFTING
LEFT WEIGHT	: 163.41 MT.
SERVICES	: FLARE & EXPORT LINES : FLARE BRIGGS
HEAT SHIELD	: AT "AC" END
DESIGNED BY	: NPCC
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

AC DECK	
NO. OF LEGS	: 3
BASE DIMS.	: 7.8678 M.
HEIGHT	: 19.8 M.
INSTALLATION BY	: LIFTING
LEFT WEIGHT	: 61.8 MT.
SERVICES	: BRIDGE / FLARE SUPPORT
DESIGNED BY	: NPCC
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

AC JACKET	
NO. OF LEGS	: 3 (TRIPPO)
W.P. DIMS.	: 7.8678 M.
BASE DIMS.	: 24.4624.6 M.
HEIGHT	: 87.63 M.
INSTALLATION BY	: LIFTING & UPDRESSING
LEFT WEIGHT	: 1111 MT.
NO. OF SLOTS	: 25
NO. OF RISERS	: 4 (PRESENT) & 5 (FUTURE)
DESIGNED BY	: NPCC
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

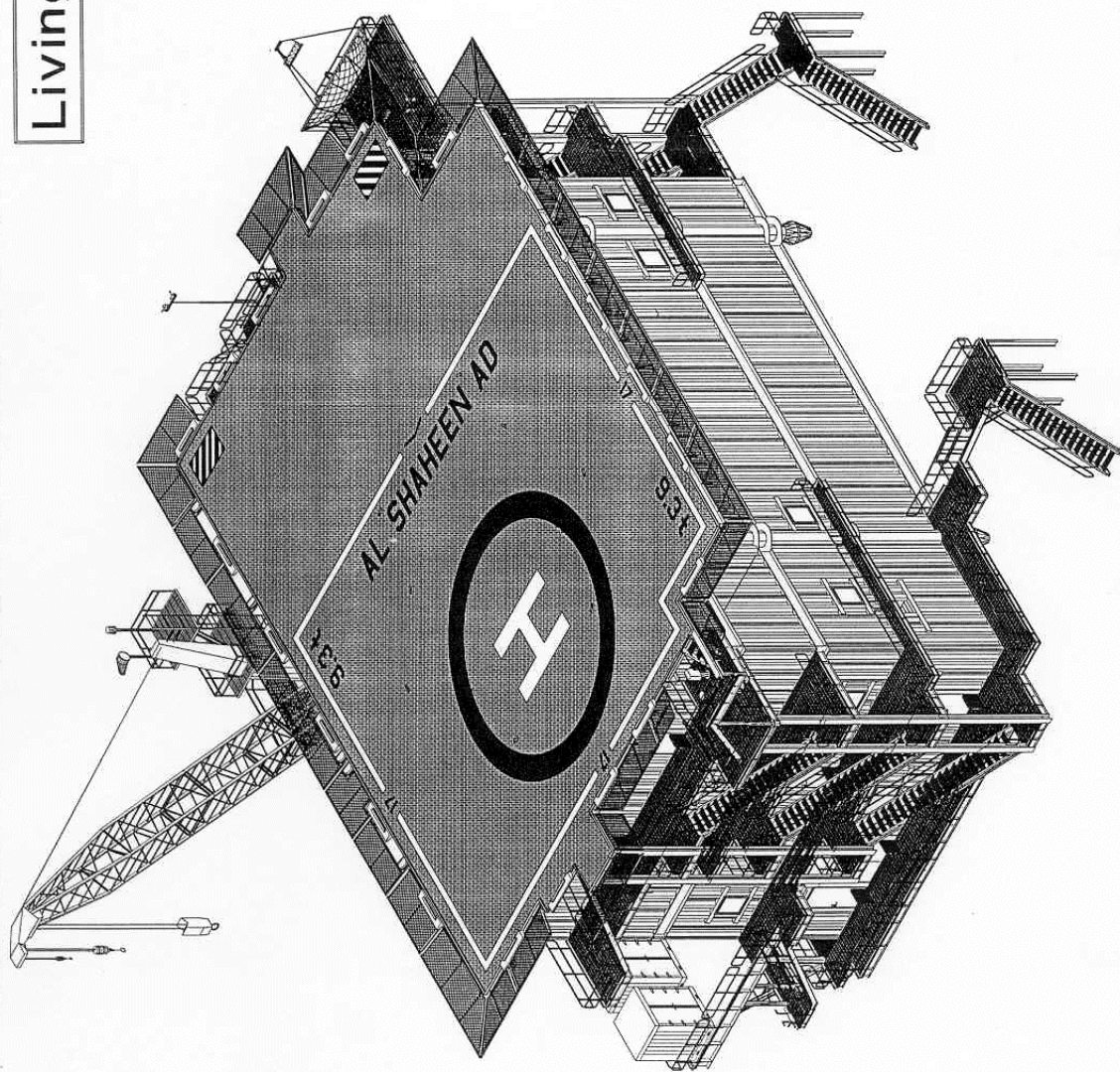
AC PILES	
QTY.	: 3
DIAMETER	: 1219 MM (48")
WALL THICKNESS	: 25.4 MM, TO 38.1 MM
PENETRATION	: 70 M.
TOTAL LENGTH	: 100 M.
COUPLER	: 2 SET
INSTALLATION BY	: DRIVING
DESIGNED BY	: NPCC
FABRICATION / INSTALLATION BY	: NPCC
YEAR INSTALLED	: 1996

VIEW I-I



Living Quarters

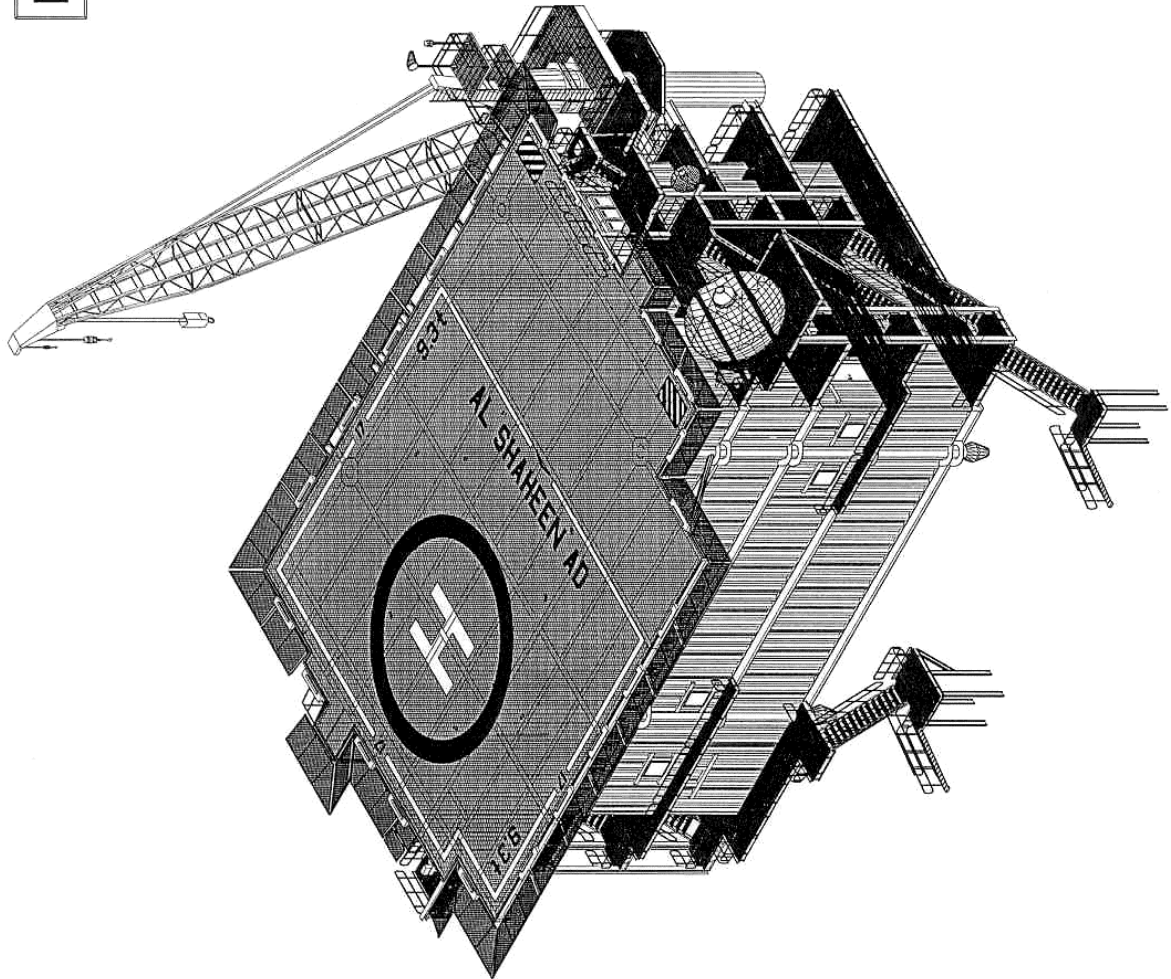
North View





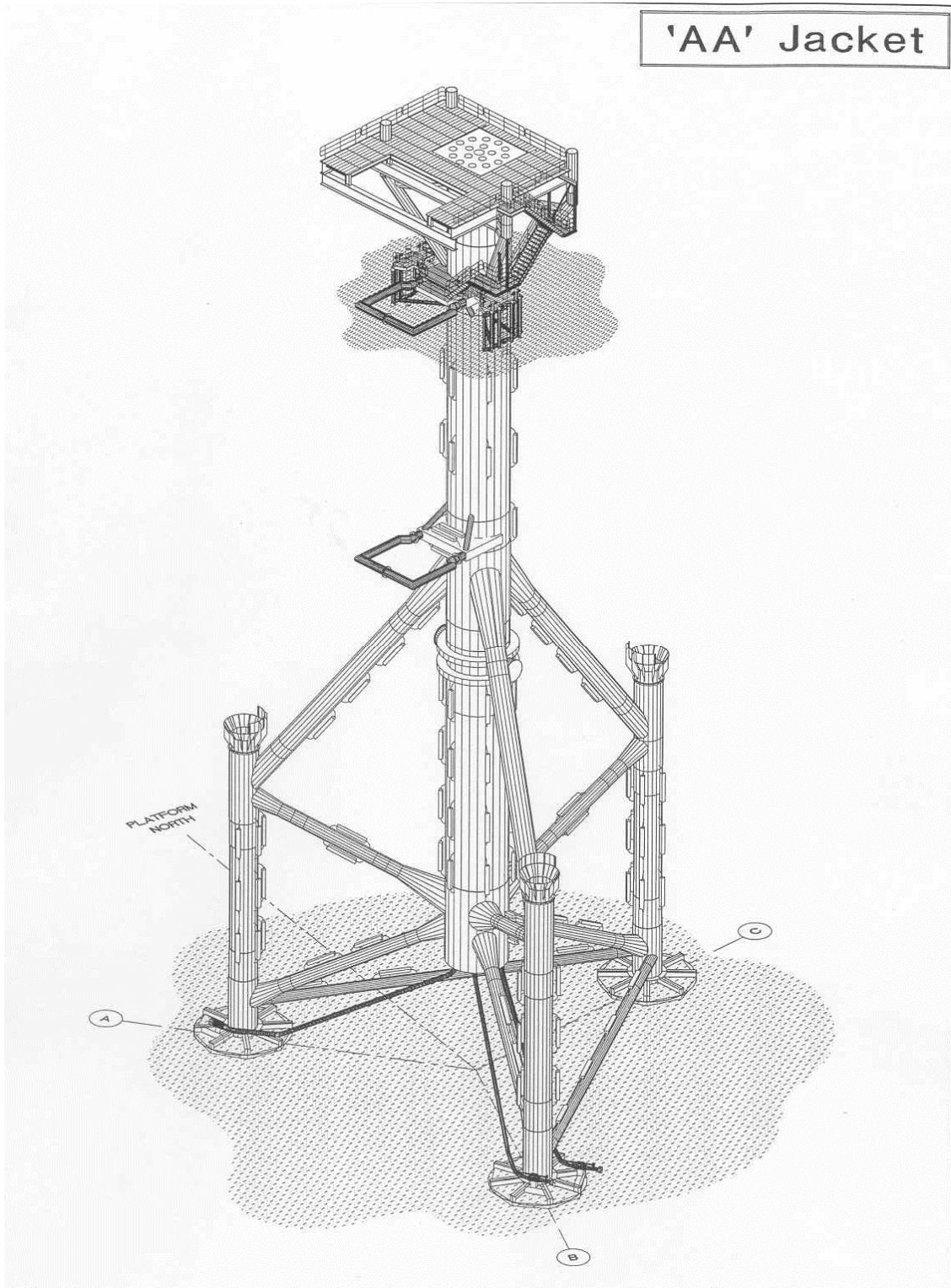
Living Quarters

West View





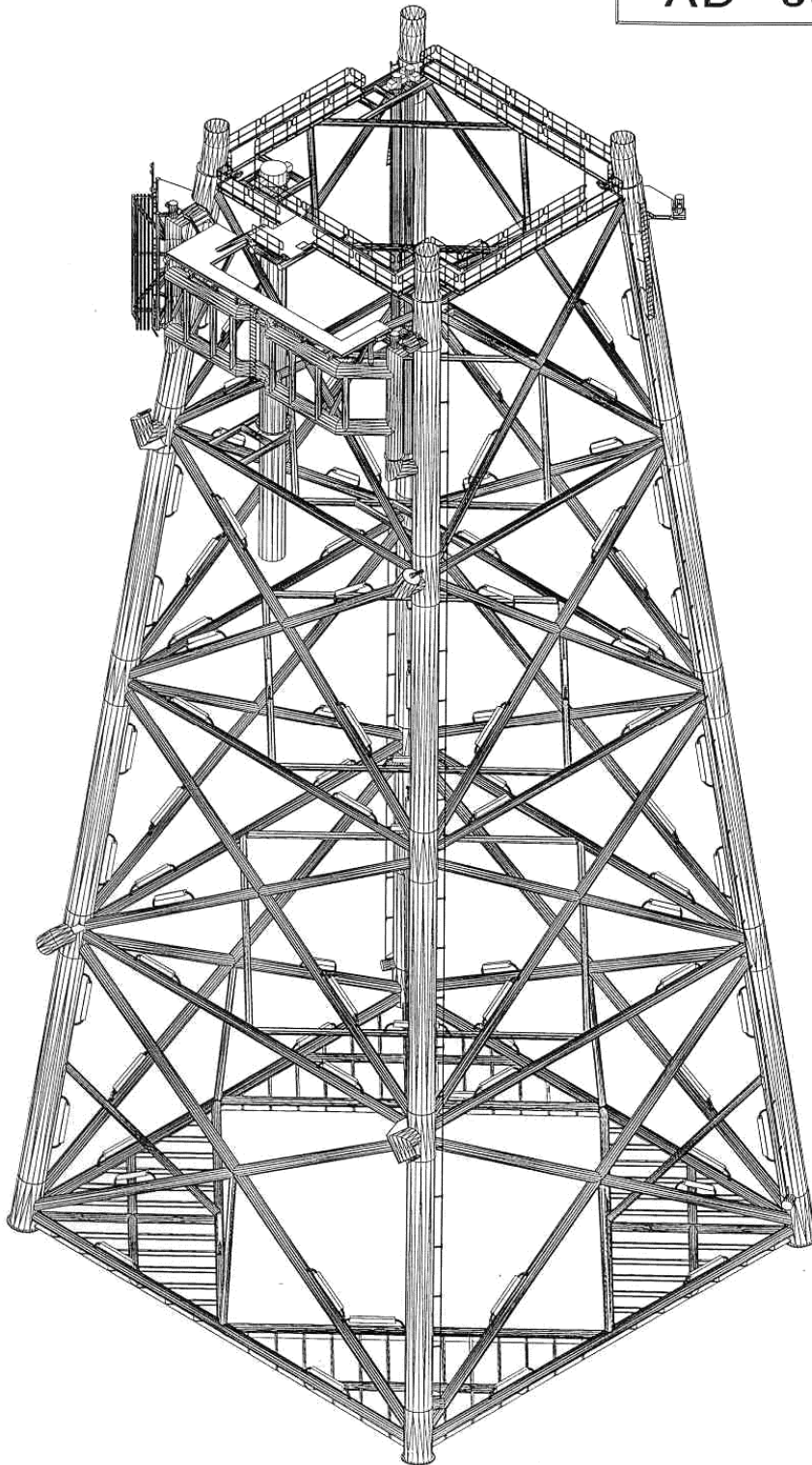
'AA' Jacket





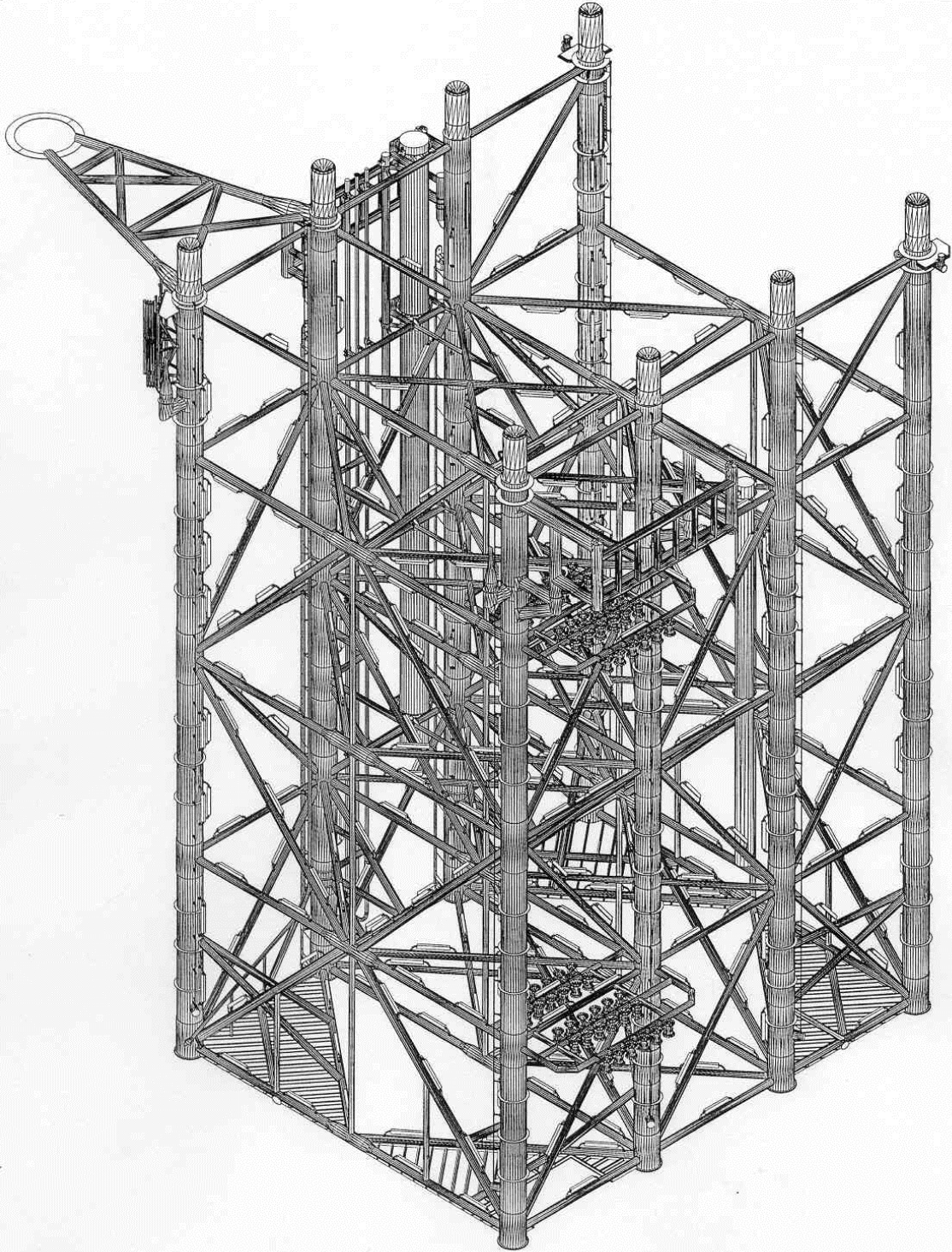
Core Engineering Group

'AD' Jacket





'AB' Jacket





## **Ruwais Refinery Berth Expansion<sup>3</sup>**

### **Abu Dhabi National Oil Company**

The project consisted of providing complete design, detailed engineering, fabrication, construction and offshore installation of new loading / unloading facilities at Ruwais Refinery Jetty, good for a large range of tankers from 40,000 DWT to 300,000 DWT, in water depths of approx. 20m. The engineering was carried out at TPG Paris.

The Berth expansion facilities included provision of the following:

- One eight legged loading platform, with product loading arms and a control room
- Four breasting dolphins for tanker berthing
- Six mooring dolphins
- and pipe-way trestles to carry product lines and roadway from the existing refinery to the new loading platform and tie-in to the existing facilities

Attached Perspective shows the completed facility.

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<sup>3</sup>

This project was one of the various assignments handled by one of the Principal Members while working for NPCC, Abu Dhabi, UAE.



## Neelam Process Complex<sup>4</sup>

### Oil and Natural Gas Commission of India

Neelam Oil field is located off the West Coast of India. A comprehensive development plan for this field was developed. The complete development plan envisaged the following:

- ◆ A Process Complex having facilities for oil / gas separation, associated gas compression and dehydration, oil pumping, Injection water treatment and supply, flaring, living accommodation, power generation and utilities. Two eight legged platforms namely NPL and NLW have been installed to house all the envisaged facilities. NPL houses all hydrocarbon-handling facilities while water injection facilities, LQ and utilities are located on NLW platform. Process complex is located next to Well Platform NLM 3 and all three platforms are bridge connected.
- ◆ Ten Oil Well Platforms each having nine well slots namely NLM 2 through NLM 11.
- ◆ Two water Injection Well Platforms viz., WN1 and WN2.
- ◆ Network of submarine pipelines for well fluid gathering, injection water supply and lift gas supply.
- ◆ A submarine HP flare and a bridge connected LP Flare.
- ◆ Export facilities comprising of a SPM / PLEM and pipelines for transportation of oil and gas to shore.

NLP Process platform has been designed for handling a production of 6 MMTPA of oil and 2.56 MMSCMD of associated gas. Power generation of 24.6 MW through gas turbine driven generators also has been provided on NLP.

NLW Process platform has a water treatment capacity of 228,000 BWPD to meet injection water quality requirement. A 120 men living quarter has been provided on NLW. Helideck provided in the complex is suitable for MI 8 helicopter.

A field layout of Neelam Field is attached for more details.

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<sup>4</sup>

This project was one of the various assignments handled by one of the Principal Members while working for EIL,

