



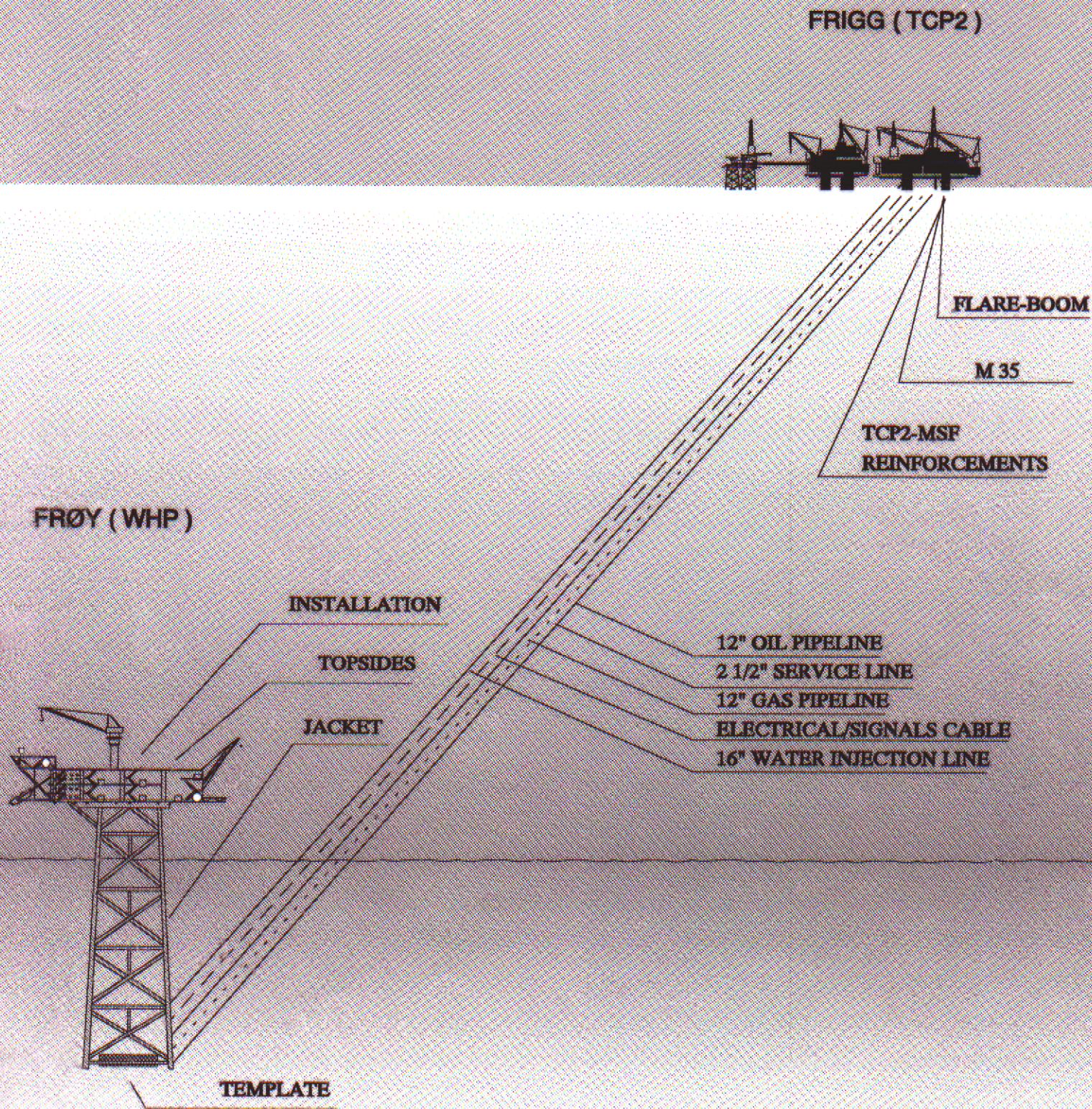
D. F. I.

Design Fabrication And Installation Resumé Frøy Development

RE-FD-22-00-0029

SECTION III VOLUME I BOOK 1

M 35



FRØY DEVELOPMENT

Ref. No.: RE FR 22 00 0029
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Document title: Frøy Development
 Design, Fabrication & Installation Resume

Abstract:

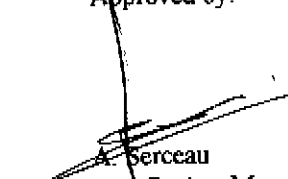
The DFI is prepared to provide future users of the Frøy facilities a summary of the history of the design, fabrication and installation phases of the Frøy development project. The document also provides lists of non-conformities, recommendations for future condition monitoring programs and guidance to where further information can be found.

Key words:	1: DFI	2: Loadbearing Structures
	3: Pipelines	4:

Classification: Non EAN confidential EAN strictly confidential

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Approved by:


 A. Serceau
 Frøy Project Manager



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- Approved Elf general document XXG

Letter A,B,C etc. indicates approved status. The numbers 00, 01 etc. indicate the number of issues the document has been through (consecutive numbering).

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RE-FF-22-21-4058 Frigg Modules Installation Resumé

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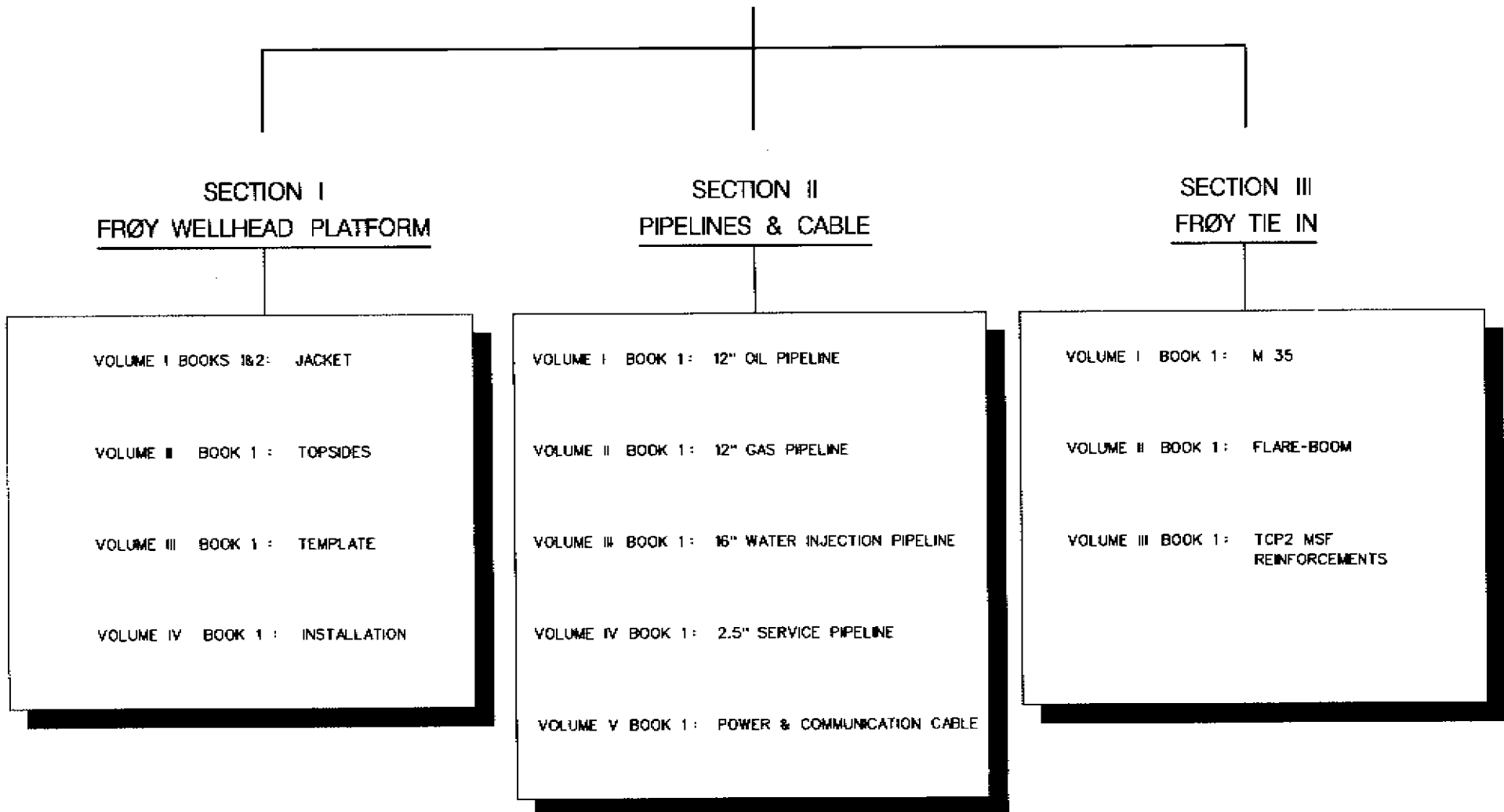
1.0 INTRODUCTION

The section III of the Design, Fabrication, and Installation resume consists of the Frøy Integration works on Frigg TCP2. The Frøy facilities on Frigg TCP2 are mainly systems dealing with the gas and oil treatment, and water injection supply to the Frøy Wellhead Platform.

Section III is divided into three volumes:

- **Volume I** **Module M35**
- **Volume II** **Flare boom on TCP2**
- **Volume III** **TCP2 MSF reinforcements**

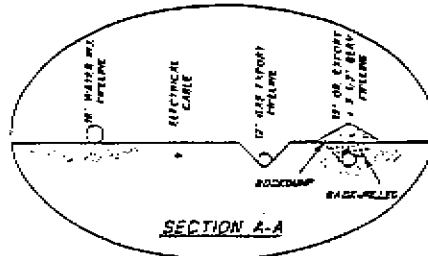
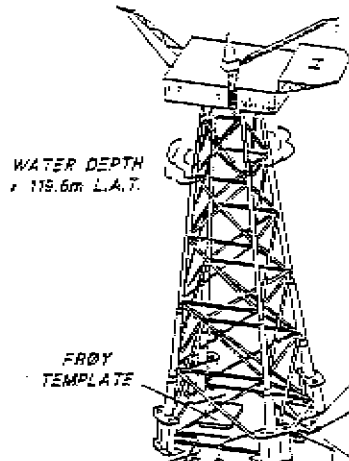
All three volumes consist of one book each.



FRØY PROJECT 1992 - 1995

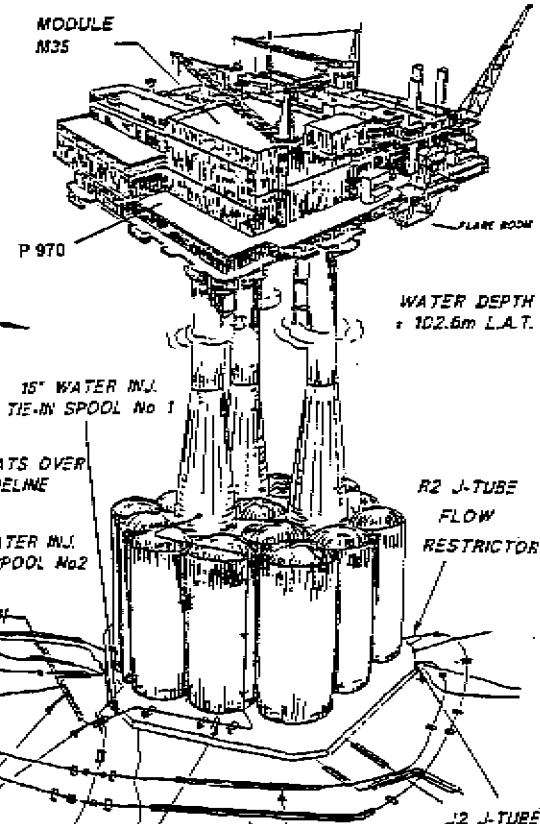
FRØY PLATFORM

475 133.2
6 622053.0

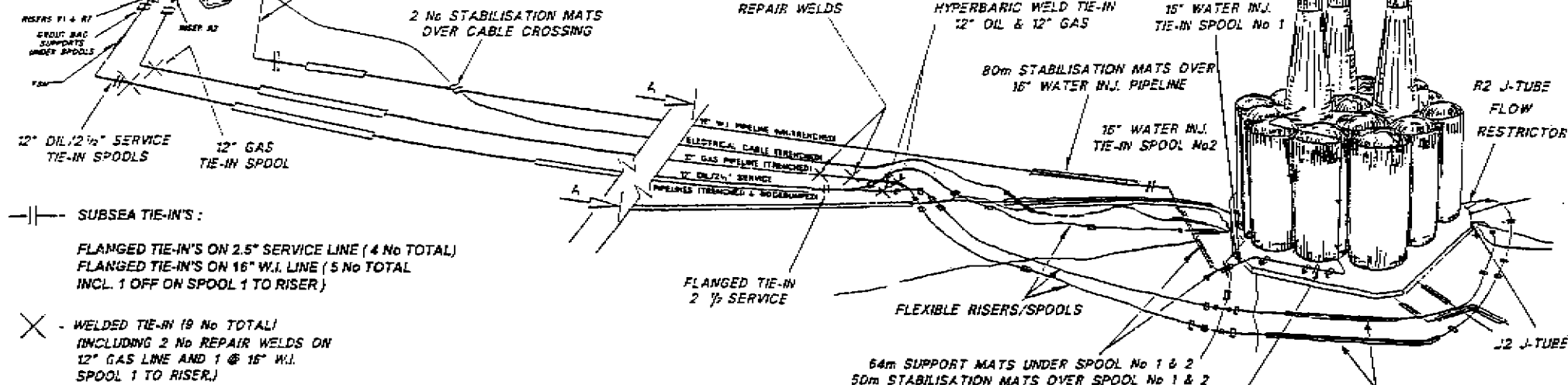


FRIGG TCP-2 PLATFORM

447 754.62 E
6 638 573.04 N

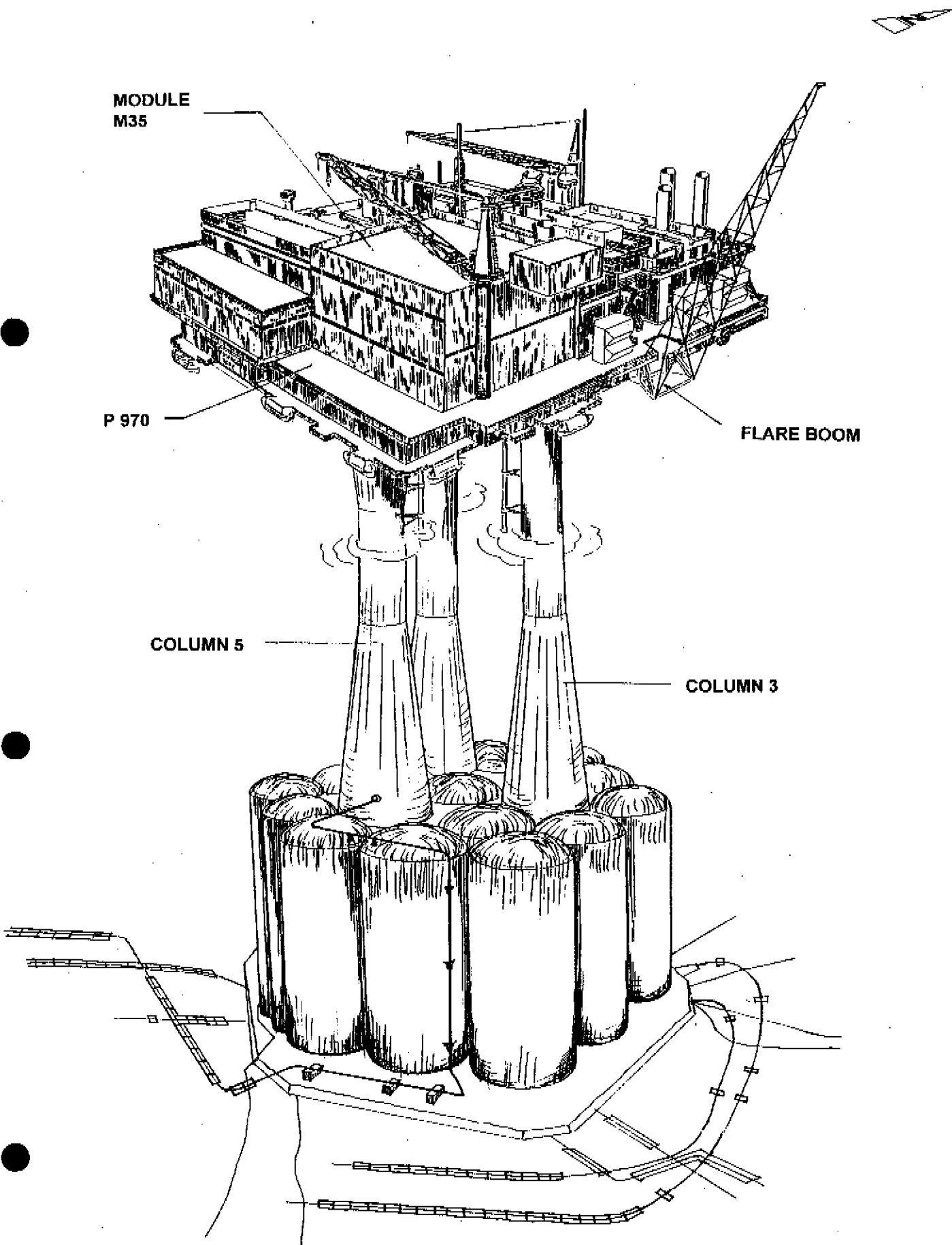


32km FROM FRIGG TO FRØY



- SUBSEA TIE-IN'S :**
- FLANGED TIE-IN'S ON 2.5" SERVICE LINE (4 No TOTAL)
 - FLANGED TIE-IN'S ON 16" W.I. LINE (5 No TOTAL INCL. 1 OFF ON SPOOL 1 TO RISER)
 - WELDED TIE-IN (9 No TOTAL) (INCLUDING 2 No REPAIR WELDS ON 12" GAS LINE AND 1 @ 15" W.I. SPOOL 1 TO RISER.)
- NOTE:**
SERVICE LINE PIGGY-BACK TO 12" OIL LINE AT THE FRØY TIE-IN SPOOL AND THE SUBSEA PIPELINE

FRIGG TCP2 PLATFORM





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2.0 DESIGN RESUME M35

2.1 Introduction

This DFI resume is the Basic Technical Report Summarizing the main aspects of the Basic Data, Design, Fabrication, Installation and In-Place stage. It should be sufficient in most cases to give the information necessary for the management or the operational engineer during the production phase.

The Design Reports for Frøy Tie-In Module M35 was reviewed by EPM FRANCE through LAP in Pau, France. The third party design verification was found to comply with relevant Norwegian regulatory requirement for the In-Place, lifting, transportation, explosion and fire conditions except for some minor recommendations. The recommended design changes were implemented directly at the yard, and included in the Grootint's main structural shop drawings.

Ref. /40/

The steel structure and all its components fabricated and designed in accordance with the specifications herein has a design life of 25 years, with proper maintenance leading to no deterioration in the member properties or dimensions.

2.1.1 Module live loads

It should be noted that module M35 has a unusual support configuration. This was due to the fact that large TCP2 MSF deflections were calculated for the in-place condition if a conventional support arrangement was used. It was also necessary to reduce the maximum total live load in M35 to approximately 100 tons for the entire module, inclusive the laydown areas. The operational weights are, however, in addition.

Ref. /20/

2.1.2 Module crane CM7

The module M35 is equipped with a pedestal crane, CM7, at the SE corner of the module. Both the pedestal and crane were manufactured by AS Stålprodukter. The crane is of type 3630/1260, and has the following working radius and SWL:

- 36 tons between a radius of : 9 - 30 metres
- 12 tons with a maximum radius of : 60 metres



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The weights of the major items of the crane are:

- Crane body:	95	tons
- Crane boom:	30.5	tons
- Block and hook:	2.0	tons
- Pedestal:	75.5	tons

Total:	203	tons

For further information, see:

- Pedestal support arrangement:	1.3.5 Pedestal support configuration
- Drawing of crane w/load chart:	RE-FF-22-00-29-0100
- Detail drawings of crane CM7:	Final supplier documentation, RE-FF-22-00-0143, Book 8 of 10

2.1.3 Pancake P970

The pancake P970, which is located south of module M35, was installed separately after the module installation. The dry weight is 80 tons, and the size is 7x31 m. This pancake was originally pancake P950 installed south of East-Frigg module M51 on TCP2. This pancake was removed prior to Lille-Frigg module M52 installation, transported onshore, modified by Offshore & Marine, and re-installed on TCP2 as pancake P970. No separate DFI is established for P970. For further information, see East-Frigg fabrication documentation.



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2.2 Environmental Criteria

2.2.1 Wind Loads

Environmental loads for M35 consist mainly of wind loads.

The wind acts mainly from south and east, but wind loading from north and west are also included, ref. in place loadcase 6 to 9. M35 is located on the MSF upper chords on the south east corner of TCP2, partly wind protected by module M33 on the north face and M50 and M51 on the west side. Corrugated wall cladding is supported on secondary steel on the south and east faces. Some areas on north and west faces are covered, mainly above adjacent modules. All wind forces on M35 are applied on the three deck levels.

Wind forces:

The design wind speed over 10 minutes and 10 metres above sea level is on Frigg CC $U(z_0, t_0) = 36.2 \text{ m/s}$. The wind speed at z m above mean sea level (MSL) and with an average duration t s is given by:

$$U(z, t) = U_{(10, 600)} (1.0 + 0.137 \ln(z/z_0) - 0.047 \ln(t/t_0)) \quad \text{Ref./17/ sect. 2.7.1}$$

The wind pressure Q is given by:

$$Q = \frac{1}{2} \times C \times \rho \times U(z, t)^2,$$

where ρ is the mass density of air ($\rho = 1.225 \text{ kg/m}^3$) and C is the wind shape coefficient.

2.2.2 Snow and ice loads

Ref./17/sect. 2.7.2

Snow 0.5 kN/m²

Snow and ice are not applied simultaneously in the load combinations.

Hence 0.5 kN/m² is applied in the computer analysis on external horizontal decks.

Ref./17/

Ref./11/

2.2.3 Earthquake loads

No seismic loads are considered, this has been approved by NPD.



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2.2.4 Accidental loads

For accidental load analysis the deck live loads listed in section 4.2.3 ref. /1/ are used. The deck above process vessels located on weather deck are designed for dropped objects. Dropped objects considered is limited to a standard cargo container weighing 3 tons dropped from a height of 5m.

2.2.5 Blast pressure

Walls, decks and emergency equipments on these decks are designed for the following calculated blast overpressures:

- main deck 0.1 bar overpressure, blast duration 400millisec.
- mezzanine deck 0.1 bar overpressure, blast duration 400millisec.
- intermediate deck 0.2 bar overpressure, blast duration 300millisec.
- weather deck 0.05 bar overpressure, blast duration 400millisec.

The main structural tubulars are designed for 0.2 bar overpressure and a blast duration of 300 millisec.

All external walls on the E/I-interface rooms facing towards M35, M33 and to the east are designed for 0.1 bar overpressure without collapse.

2.2.6 Temperature loads

Temperature loads from normal operation of platform is not considered in the design of the module.



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2.3 Description of Module M35

2.3.1 General

Module M35 is located at the south-east corner of TCP2. It is supported on shim plates which are welded to the MSF upper chords A and C. The shim plates serve both as shimming for levelling purposes and for local MSF reinforcement.

Ref./20/

The outer dimensions of module M35 are:

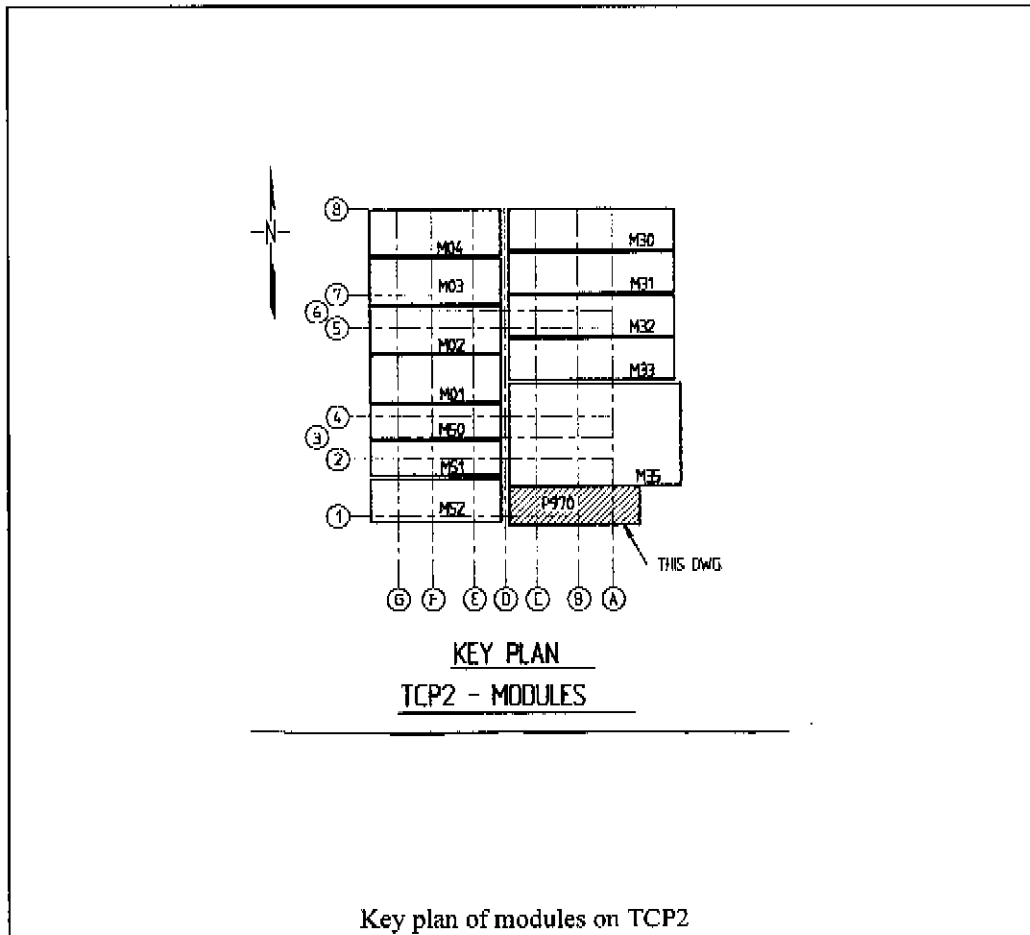
- length (east-west): 40.5 metres
- width (north-south): 24 metres
- height: 24.8 metres (not including the module crane)

The gross dry weight of the module is 3216 tonnes according to the weighing results and weight report performed by Grootint on 14.11.94.



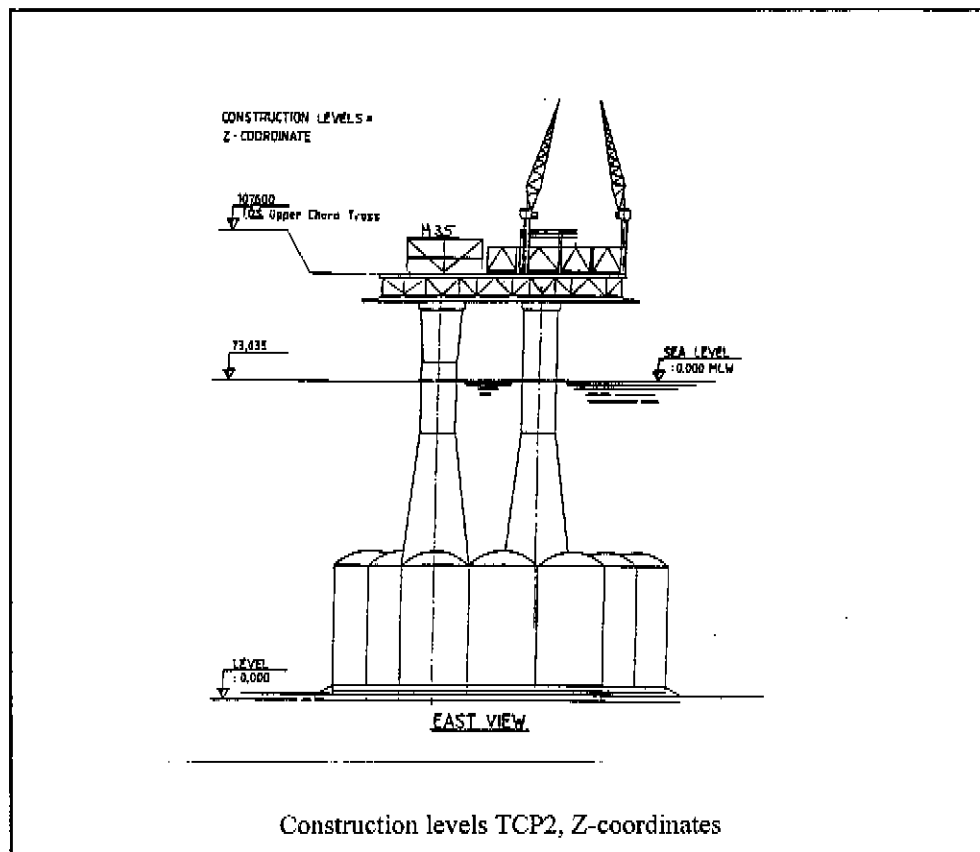
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2.3.2 Main Equipment

The module M35 contains equipments for treatment of oil and gas, and compression facilities for gas. The main equipments are:

- Pig Traps
- Heat Exchangers, oil heaters
- Separators
- Oil export Pumps
- Gas and oil Metering
- Gas Compressors
- Fuel gas Compressor
- Produced water treatment
- Injection water treatment and pumps.

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Integration TPC2:

- Flare boom, flare tip and shield.
- Oil booster pumps, water inj. feed pumps.
- Condensate pumps, generator cooling pumps.
- Recirculation pumps.
- Flare KO drum and pumps. Flare ignition package. KO drum heater.

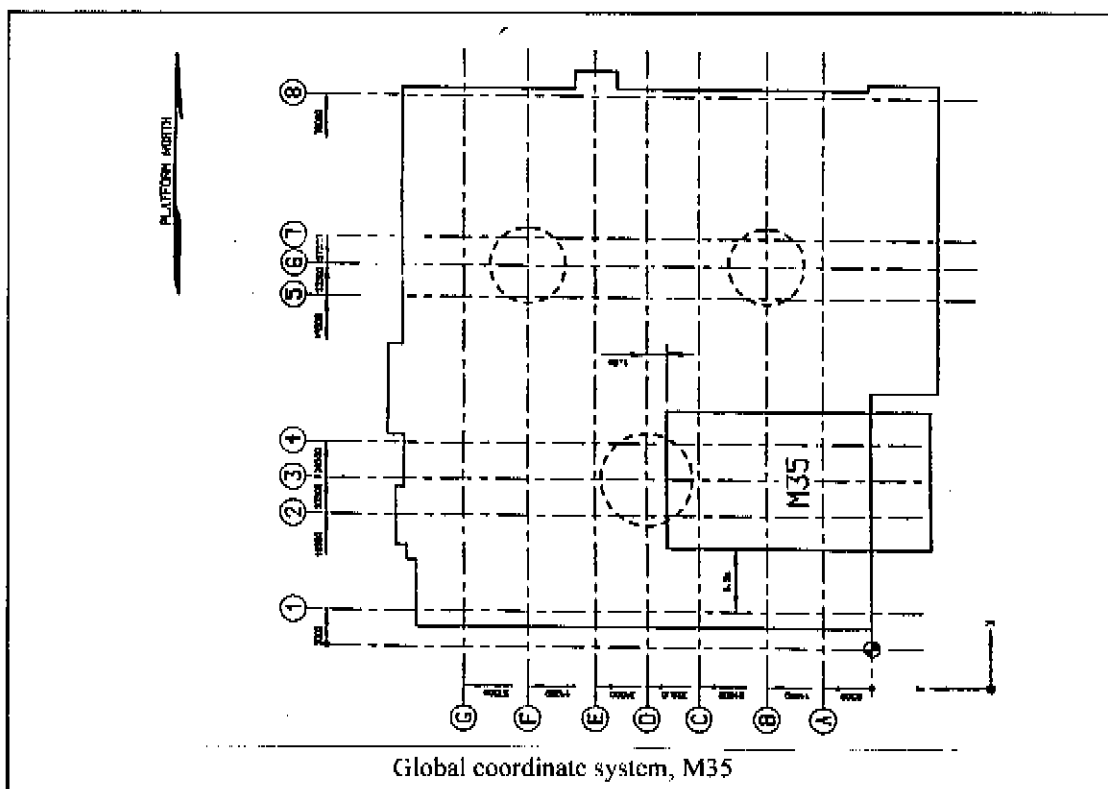
2.3.3. Global Coordinate System

The origin of the global coordinate system is at the north-west lower corner of the module.

The global axes are defined as follows:

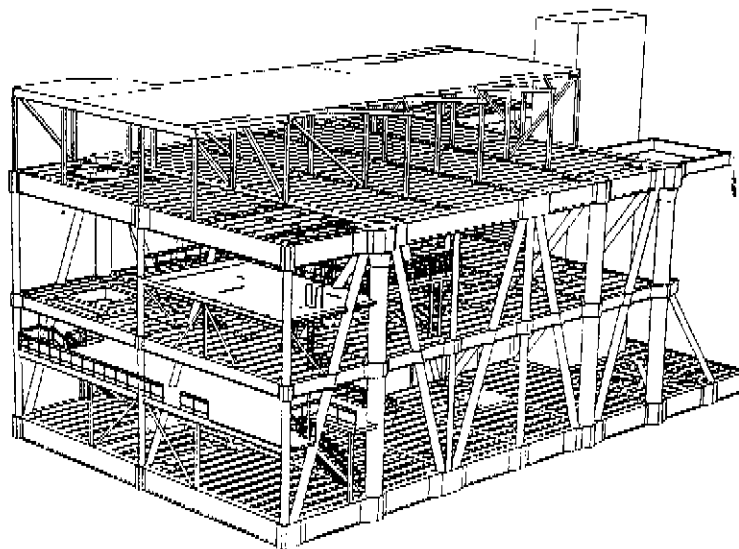
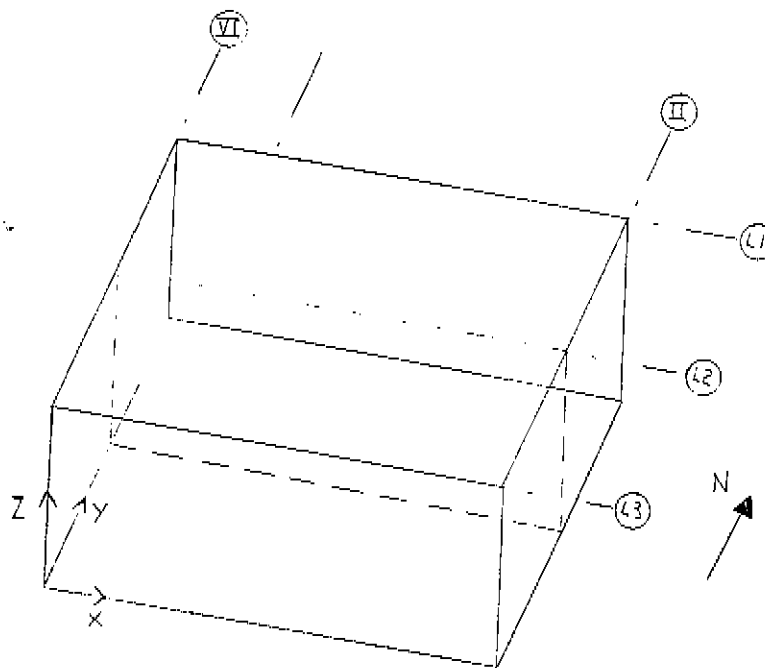
- x-axis: eastwards from the origin
- y-axis: upwards from the origin
- z-axis: southwards from the origin

The global coordinate system is show in figure below:



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M35 SESAM 80 computer model axis system.

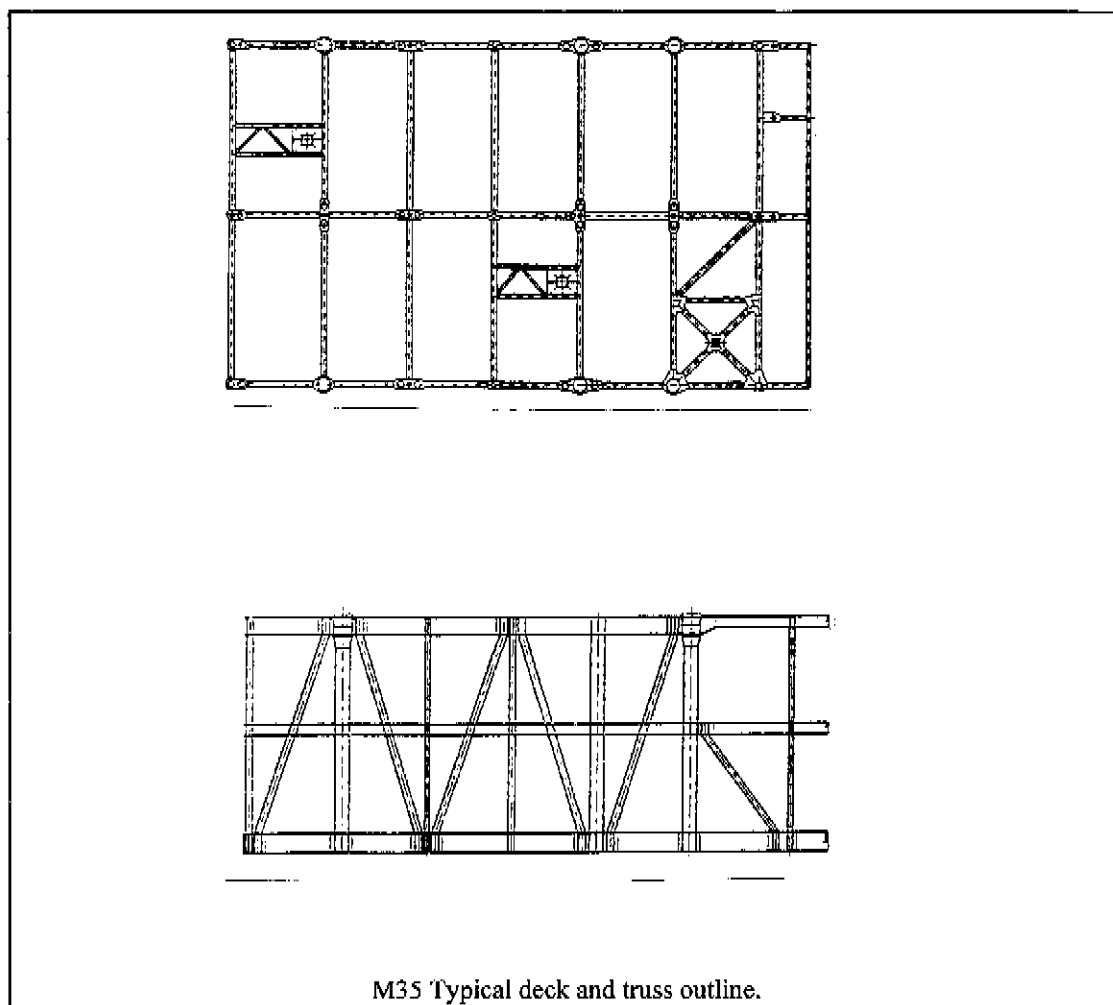
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2.3.4 The Structure

The module consists of three longitudinal trusses and five end transverse trusses. It is supported on the Module Support Frame (MSF) on two of the transverse trusses.

The stiffness of the module is taken into account for the design of the MSF reinforcement. Its stiffness is modelled like a pyramidal-shaped stick model.



Main deck	El. + 109.058 TOS
Mezz. deck	El. + 113.358 TOG
Intermed. deck	El. + 116.858 TOS
Weather deck	El. + 124.408 TOS
Gas meter. pl.form	El. + 129.408 TOS

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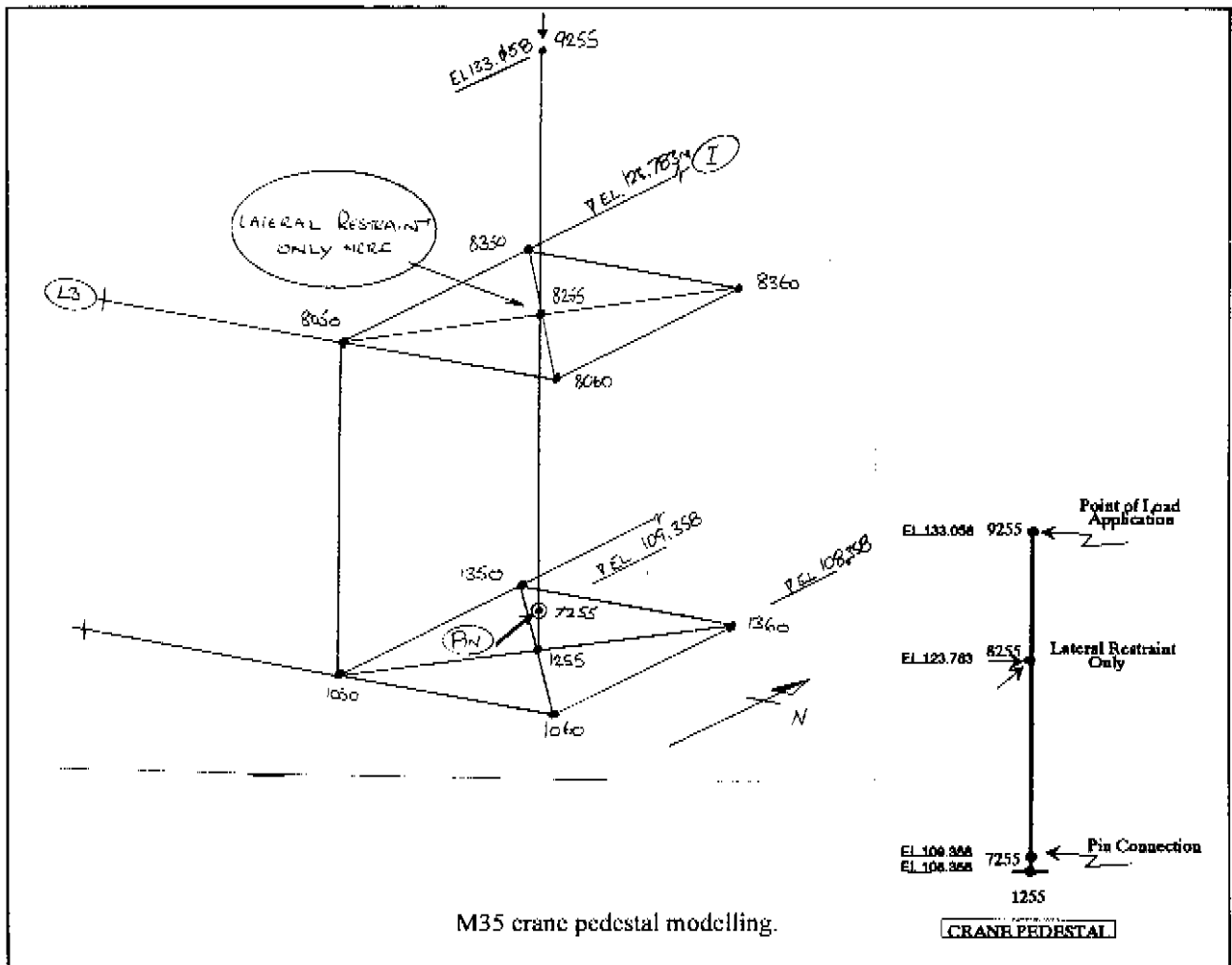
2.3.5 Pedestal support configuration

For all the applied loads from crane which has been used in the in-place analysis, input from crane supplier has been implemented, ref. /18/ sect. 2.5.2.

The crane pedestal, DIA 3750mm, is supported at two levels;

Ref. /21/
Sect. 3.0

- Main deck EL 109.058: Pinned. Vertical, horizontal and torsional loads only.
- Weather dk EL 124.408: Pinned. Horizontal loads only.





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2.4 References

- /1/ Doc. No. S-10-21-0001 Rev. 04G, "Topsides Structural Design Specification, 22.04.92, ELF AQUITAINE NORGE A/S.
- /2/ Doc. No. S-10-25-0002 Rev. 03E, "Structural Material Specification", 08.04.91, ELF AQUITAINE NORGE A/S.
- /3/ NS3472, "Steel Structures". Design Rules", 2 nd. ed. June 1984, Norges Byggstandardiseringsråd.
- /4/ NS3479, "Design Loads for Building Structures", 2 nd. ed. 1981, Norges Byggstandardiseringsråd.
- /5/ NS5514, "Kraner og løfteutstyr", 1978, Norges Byggstandardiseringsråd.
- /6/ "Rules for Classification of Fixed Offshore Installations", July 1989, DnV.
- /7/ NPD "Regulations for fixed means of access, stairs, ladders and railings on production installations etc., stipulated 02.04.79."
- /8/ "Standard for Insurance Warranty Surveys in Marine Operations", June 1985, DnV.
- /9/ "Acts, regulations and provisions for the petroleum activity, Volume 2, Forskrift for bærende konstruksjoner. section 4.2.5", 1992, NPD.
- /10/ "Guidelines concerning loads and load effects to regulations concerning load bearing structures in the petroleum activities", July 1992, NPD.
- /11/ NPD "Guidelines on design and analysis of steel structures, stipulated 29.10.84."
- /12/ NPD "Guidelines on determination of loads and load effects, stipulated 2.1.87."
- /13/ DNV "Rules for certification of lifting appliances".
- /14/ DNV "Rules for the design, construction and inspection of offshore structures 1977, with appendices."
- /15/ DNV Classification notes No. 30.5
"Environmental conditions and environmental loads". March 1991.
- /16/ Doc. No. RE-FF-22-00-1000, rev. 13B, "Weight report- Close-out report, M35", Veritec.
- /17/ Doc. No. RE-FF-22-21-1002, rev. 03D, "Design brief M35", Veritec.
- /18/ Doc. No. RE-FF-22-21-1005, rev. 02D, "Structural design report M35, Inplace analysis", Veritec.
- /19/ Doc. No. RE-FF-22-21-1006, rev. 04D, "Structural design report M35, Installation analysis", Veritec.



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References - continued:

- /20/ Doc. No. RE-FF-22-21-1007, rev. 01G, "Technical note: M35/M35 interaction", Veritec.
- /21/ Doc. No. RE-FF-22-21-1011, rev. 00B, "Structural design report M35, Local design report", Veritec.
- /22/ Doc. No. RE-FF-22-21-1012, rev. 01D, "Structural design report M35, Secondary steel design", Veritec.
- /23/ Doc. No. RE-FF-22-21-1015, rev. 01G, "Technical note, M35 collapse analysis", Veritec.
- /24/ Doc. No. RE-FF-22-21-1016, rev. 01B, "Structural design report M35, Transportation motion analysis", Veritec.
- /25/ Doc. No. RE-FF-22-21-1029, rev. 01D, "Structural design report M35, Installation aids design", Veritec.
- /26/ Doc. No. RE-FF-22-21-1036, rev. 03D, "Structural design report M35, scafastening and grillage", Veritec.
- /27/ Doc. No. RE-FF-22-21-1039, rev. 02D, "Structural design report M35, South bumper design", Veritec.
- /28/ Doc. No. RE-FF-22-21-1040, rev. 02D, "Structural design report M35, South bumper design", Veritec.
- /29/ Doc. No. RE-FF-22-21-1041, rev. 03D, "Structural design report M35, West bumper design", Veritec.
- /30/ Doc. No. RE-FF-22-21-1046, rev. 00D, "Structural design report M35, Transportation analysis", Veritec.
- /31/ Doc. No. RE-FF-22-21-1047, rev. 00D, "Structural design report M35, Transportation analysis", Veritec.
- /32/ Doc. No. RE-FF-22-21-1048, rev. 00, "Structural design report M35, Installation", Veritec.
- /33/ Doc. No. RE-FF-22-21-1049, rev. 00, "Structural design report M35, Installation", Veritec.
- /34/ "Weight monitoring report, M35", rev. G, Grootint B.V. Zwindrecht.
- /39/ Doc. No. S10-000013 Weighing Spec., rev.00G, dated 1993.03.01.



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References - continued:

/40/	Third party design verifications. Report numbers.
RE-FF-22-21-0001	QA-plan for verification
RE-FF-22-21-0003	M35, Calculation procedures
RE-FF-22-21-0004	M35, In-place analysis
RE-FF-22-21-0005	M35, Load-out analysis
RE-FF-22-21-0006	M35, Lifting Analysis
RE-FF-22-21-0007	M35, Transportation Analysis
RE-FF-22-21-0008	M35, Structural detail verification, lifting point node.

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2.5 Materials

The primary steelwork in M35 is HS20, grade II.

Mechanical properties:

Thickness (t) range (mm)	Tensile strength (MPa)	Min. yield strength (MPa)
$t < 16$	470 to 630	353
$16 < t < 50$	470 to 630	345
$50 < t < 100$	470 to 630	325

Material properties

In the code checks, minimum yield strength is assumed to be 345MPa for all members in module M35. This is applicable since the maximum thickness is $t_{max} = 49\text{mm}$, which is higher than the actual flange thicknesses used in the Plate Girders.

Following material factors γ_m are used:

1.15	U.L.S (elastic design)	Ref. /1/
1.0	PLS	Sect. 6.4.2
1.0	FLS (fatigue)	
1.0	SLS	

The stiffening effect of deck plate is allowed for by adding cross bracing members to the Sesam computer model such that the strain energy in them is equivalent to that stored in the plate panel which they replace. The area required for each single diagonal member is given as:

$$A = \frac{D^3 t}{4WL(1+\nu)}$$

Ref./18/
Sect.2.3.3

Where:	A	Equivalent cross-section area, "dummy brace"
	W	Width of panel
	L	Length of panel
	ν	Poisson's ratio
	D	Diagonal length
	t	Plate thickness



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Materials for grillage/seafastening

Materials

Mechanical properties for grillage/seafastening for river tow and M7000 transportation correspond to IIS20 GR II.

Material factor:

$Y_m = 1.15$ elastic design, ULS

Ref. /1/ sect. 6.4.2

2.6 Design Philosophy

This chapter lists considerations relevant for the computer analyses and the hand calculations. These are the basis for the design and are described in the following sections.

Ref. see chapter 1.4

2.6.1 General about the concept

According to the basic engineering the module M35 was originally intended half the final module size, with a weight of approximately 1400-1500 tons. Hence, no thorough basic engineering studies were performed before detail engineering was started off. In addition, a large module crane was decided to be included into the module design. The introduction of a large module resulted in unexpected additional weight increase, which again introduced MSF deflection problems and a high numbers of overstressed MSF members.

The implementation of the module crane had a negative effect on the CoG location, which shifted towards east. Again, this had a knock-down effect on the location of the cast padears and main truss configuration.

Fabrication of the module was started when detail engineering had a progress of approximately 50%.

2.6.2 Configuration

The module M35 has four supports as detailed below in section 1.8.7. The frame consists of three longitudinal trusses and three transverse trusses with a lattice of beams at three deck levels



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The four inplace support points are located under the longitudinal trusses. The four lifting points are located at the Weather deck level with the two points to the west directly above two inplace supports. The two lifting points to the east are 6.5m offset to the inplace supports. In general, deck stringers and secondary support beams run parallel to the longitudinal trusses with additional deck plate stiffening in the transverse direction.

Deck plating

The thickness of deck plate and the spacing between stiffeners are based on the point load specified in the Elf spec. No corrosion has been considered for the deck plate. The deck plate thickness of 8mm are used. The deck plate stringers and stiffener sizes have been selected from standard sections.

Ref. /17/

In trolley routes and areas subjected to material handling the deck plate thickness is 12mm.

Primary deck beams

Primary deck beams on main and weather decks span between the longitudinal trusses, and consist of built-up plate girders with a top and bottom flange of 20, 25 or 40mm thick plates. The top flanges are welded continuously between the deck plating. The web thicknesses vary between 10, 12, 15, 20 or 30mm. The primary deck beams on intermediate deck consist of standard rolled sections.

Truss chords

Truss chords on main and weather decks consist of built-up plate girders. Flange and web thicknesses are similar to the primary deck beams.

Truss bracing

Truss bracing consist of seamless tubes connected to the truss chords. One typical brace consists thus of two prefabricated lengths, one installed between main and intermediate decks, and the other between intermediate and weather decks.

Vertical columns

The four inplace support columns and the vertical columns connected to the lifting points consist of rolled tubes. All the other vertical columns consist of rolled tubes. One typical column consists thus of two prefabricated lengths, one installed between main and intermediate decks, and the other between intermediate and weather decks.

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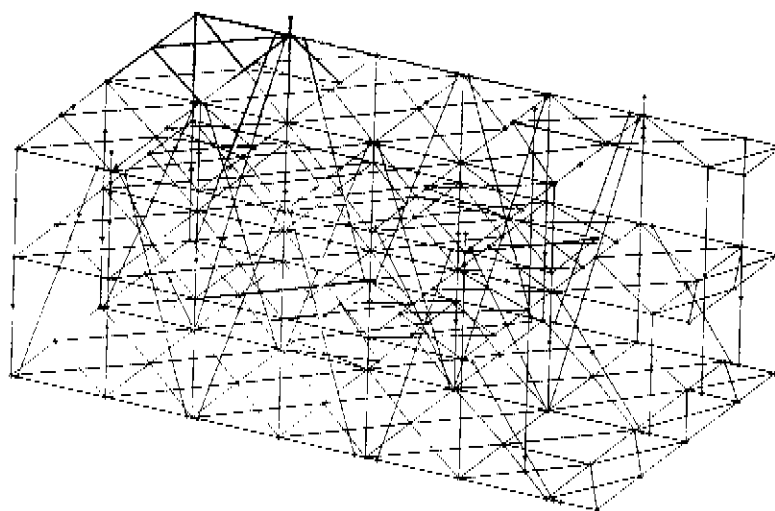
2.7 In-place Analysis

Inplace model

Module M35 is supported by a MSF on a 3-legged platform, the support locations are relatively flexible, and as such the flexibility of these support positions are required. The vertical flexibility of the MSF has been simulated by introduction of an out-of-plane displacement as described in section 2.5.3 (Ref. /18/).

The horizontal flexibility of the MSF has been calculated manually, depending on the flexural or axial stiffness of the MSF support girders

Geometry of M35 in the inplace condition is shown on figure below:



M35 main steel, support modelling.



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2.7.1 Basic Loads

General

This section presents the basic load cases used in the computer in-place analysis.

Basic loads, in-place analysis

The basic loads in the in-place analysis are grouped in permanent, live, environmental, snow & ice, crane loads, and differential deflection loads as follows:

Permanent loads

	<u>Loadcase No.</u>
1) Computer generated structural dead weight.	1
2) Secondary & miscellaneous structure.	2
3) Installation aids, (permanent).	3
4) Deformation at support joint.	5
5) Wind loads.	6-9
6) Live loads (on 6 different predefined areas).	10-15
7) Live laydown loads (on 2 different predefined areas).	16-17
8) Uplift loads over equipment obstructed areas (6 areas).	18-23
9) Snow & ice loads.	24
10) Crane dead load.	25
11) Crane live loads (boom in different directions).	26-30
12) Live loads on stairs and walkways.	31
13) Architectural dry weight.	35
14) Electrical loads.	45
15) HVAC loads.	55
16) Instrument loads.	65
17) Loss control loads.	75
18) Mechanical dry weights.	85
19) Mechanical operating loads (loads over dry weight).	86
20) Piping dry weights.	95
21) Piping operating weights (loads over dry weight).	96



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Summary of basic loads

A summary of the basic load input (computer generated) differ from the weight report. This is due to the weight used as load input to the computer is generated separately from the weight report. The weight report was updated on a monthly basis throughout the detail engineering phase. Hence, the different loadcases were factored to compensate for any changes in the weights. The weight correction factor is defined as the ratio between the weight report gross weight and the computer input.

The basic load inputs for the module M35 is quite extensive, and is therefore not detailed in this resumè. Section 2.5 in ref. /18/ covers basic load derivation for the module M35.



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Structural loads

The structural weights are:

Description		FY (kN) (computer)
Total profile loads (computer generated)	main structure: decks, trusses, crane pedestal, crane adapter, paint on steel, etc.	6675
Secondary & miscellaneous steel		6597
Installation aids, permanent	main and weather decks	628
Architectural dry	Cladding walls, etc.	871
Total Steelweight		14771

Table Structural loads (LC 1, 2, 3, and 35)

Equipment operating loads

The equipment dry weights in the computer analysis may be summarized as follows:

DESCRIPTION:	LOADCASE	WEIGHT, DRY (Kn)
Crane, dead	25	1364
Electrical	45	1177
HVAC	55	240
Instrument	65	1782
Loss control	75	208
Mechanical	85+86	7140
Piping	95+96	4960
TOTAL WEIGHT (computer input)		16871

Table Equipment loads



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2.7.2 Live Loads

General

The live loads arise from functional activities. In the computer model, the live loads are defined in basic loadcases:

10-15	operational live loads, deck areas
16-17	live loads on laydown areas
18-23	uplift over obstructed areas
26-30	crane live loads
31	stairs and walkways live loads

Equipment live loads

The equipment operational live loads, loadcases 86 and 96, consist of inventory loads in the mechanical equipments and piping.

General deck live loads

The total deck area is divided into 6 separate areas. The boundaries and the applied loadings are found in ref. /18/, section 2.5:

Area A1,	Loadcase 10:	Page 162-166
Area A2,	Loadcase 11:	Page 167-170
Area A3,	Loadcase 12:	Page 171-174
Area A4,	Loadcase 13:	Page 175-178
Area A5,	Loadcase 14:	Page 179-183
Area A6,	Loadcase 15:	Page 184-188

2.7.3 Deformation loads

Ref. /1/

Module M35 is checked for differential settlement of supports.

The out-of plane support displacement due to shimming tolerances and the interaction effects between M35 and the MSF is introduced by specifying a forced displacement at support point 154 (M35E) of 10mm acting downwards. This loadcase is factored in the loadcombinations to simulate the out-of-plane support displacement calculated in section 2.5.3, (Ref. /18/). The MSF computer model has been used to calculate the support displacement s. The out-of-plane displacement was then found by using formula given in the mentioned section.

The maximum calculated out-of-plane displacement is:	-30mm
The minimum calculated out-of-plane displacement is:	-18mm



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2.7.4 Load Factors

ULS and SLS load factors

The load combinations (LC) and load factors for the inplace analysis are shown in table below. Load factors are in accordance with topside structural spec, except for the commented factors.

Ref. /1/
Sect. 6

Load combination	P	L	D	E	S+I
ULS ordinary	1.3	1.3	1.0	0.7	1.3
ULS ¹⁾	1.0	1.0	1.0	1.3	0

Load combinations, Inplace condition

- 1) Not considered in the computer analysis. Not critical condition.

Ref. /1/
Sect. 6.2.1

ULS condition

The wind loads are relatively small and therefore, the ULS extreme condition is considered to be non-critical.

SLS condition

Analysis of SLS load combinations is not performed. However, ref. /22/ (Secondary steel design report) covers local deflection checks of all critical deck stringers on all decks.



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2.7.5 Load Combination

ULS Load Combinations:

The load combinations for the ULS condition are set up based on the following considerations:

- All permanent basic loads are applied on all load combinations.
- All equipment and piping basic live loads, including monorail loads, are applied on all load combinations.
- General live loads are applied on the 6 different deck areas.
- Laydown live loads are applied on the 2 different deck areas.
- All environmental basic loads are applied on all load combinations.
- Ice and snow basic load is applied to all load combinations.
- Support deflection, (M35E) is applied in two different cases:
 - i) 30mm max diff. deflection, load comb. 201-208
 - ii) 18mm min diff. deflection, load comb. 211-218
- Wind loading in 4 different directions.
- Crane boom loading in 8 different directions.

The module M35 has been code checked for the following load combinations:

- Load combinations 201 to 208:

Global design conditions for eight boom orientations, live loads and a maximum stipulated out-of-plane deflection, all inclusive the appropriate NPD load factors and weight change factors.

- Load combinations 211 to 218:

Global design conditions for eight boom orientations, live loads and a minimum stipulated out-of-plane deflection, all inclusive the appropriate NPD load factors and weight change factors.

The loadfactors for the different load combinations are shown on the next page.



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2.7.6 Results, inplace analysis

This section presents the results of the capacity checks and deflection checks performed in the inplace analysis.

Ref. /22/

Capacity check of members

An elastic check of the members in module M35 is performed. The code is not performed for all members, as shown on table below.

Ref. /18/

member numbers	description	note	number of members
Ref/18/	dummy braces used for modelling deck plates	not code checked See ref. /18/ for hand calculations of deck plate	Approx. 150
1910,191 1010 1940,194 1540,154	spring members support members	not code checked See ref. /17/ for check of support joints	7
all other members		code checked See this chapter	Approx. 395
			total - 552

Ref. /18/

Ref. /18/

Table Code checked members and exceptions (inplace).

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For a complete list of member utilizations for the various load cases, see ref. /18/.

Members with highest utilization ratios are listed in table below.

Member	Utilization ratio	Critical condition	Hand calculations
145	1.169	yield/stability	0.642
151	1.113	yield/stability	0.791
780	1.036	yield/stability	0.537

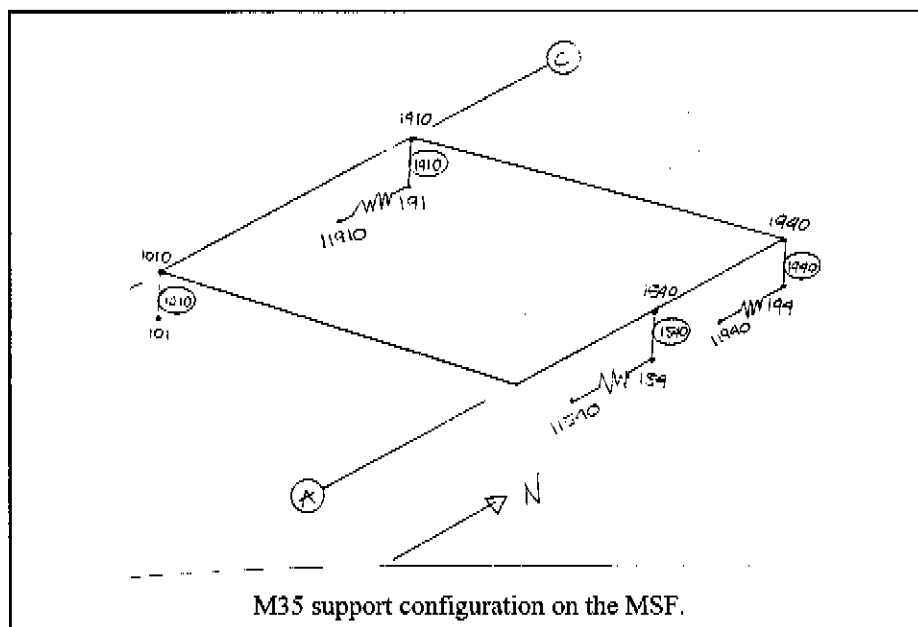
Table Highest utilization ratios (inplace).

The three members have utilization ratios above 1.0. These members are checked by hand calculations and found to have ratios below 1.0.

Ref. /18/
Sect. 2.7.2

Support reactions

In the inplace condition, module M35 is vertically supported on four supports; M35A, M35B, M35D and M35E. In addition, M35A, M35D and M35E are spring supported as shown below.





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Following load cases were checked to verify the maximum individual support loading of the four M35 supports:

- I.C 2001-2008 Global design - ULS:
5mm downwards out-of-plane deformation to account for shimming tolerance.
Live loads on laydown areas only.
- LC 2011-2018 Global design - ULS:
5mm upwards out-of-plane deformation to account for shimming tolerance.
Live loads on laydown areas only.
- LC 3001-3008 Local design - ULS:
5mm downwards out-of-plane deformation to account for shimming tolerance.
Loads as for module design.
- I.C 3011-3018 Local design - ULS:
5mm upwards out-of-plane deformation to account for shimming tolerance.
Loads as for module design.
- LC4016 - Global check - SLS:
Similar loads as for I.C2016, but with load factors equal to 1.0.

Maximum vertical reaction forces at each support for the ultimate limit state (ULS) are listed in table below.

support joint	Load comb. No.	vertical reaction incl. loadfactor (kN)
M35A,191	3018	-5630
M35B,101	3007	-13700
M35D,194	3001	-11370
M35E,154	3016	-29830

Table Maximum support reactions.

The values in table above have been used as input to the MSF computer model analyses, and to the MSF local analysis report, RE-FF-22-21-1022. (See also separate MSF reinforcement section in DFI resumè).



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2.8 Load-Out Analysis

2.8.1 General

A load-out by multiwheel trailers from site onto a barge was considered.

Since the support conditions were different from those in sea transport, a separate analysis for load-out was required, even if the loads are principally the same.

The loads were based on the latest available weight report from Grootint.

	Gross weight	COG X	COG Y
Weight report	3264t	18.696m	11.896m
Computer input	3264t	18.589m (12.304m Easting)	11.902m (23.096m Northing)

Table Weight input, Load-out condition.

A complete table of load inputs to the load-out analysis is given on next page.



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Load Class	Description	1			2		3				
		Total Load kN	Moment X kNm	Moment Y kNm	Weight Report Tonnage	Weight Report kN	Total Load incl. factor kN	Total Moment X kNm	Total Moment Y kNm	Total Factor 1/3 and 1/2	
1	Primary structure, Node 1)	-5675.32	-73005.30	141182.02	659.360	-6568.42	0.9384	-8566.42	-71815.32	138858.69	1.2738
2	Secondary structure	6554.18	-82488.49	121409.39			0.968	5852.35	-74739.07	108998.87	1.1777
2 ***	Secondary structure	619.94	-8131.26	10235.44	657.889	-6453.89	0.904	-61.54	-7363.40	3272.63	1.177
3	Perm. Ins. Aids	630.14	-9692.36	9095.81	81.368	-788.22	1.247	-788.22	-12248.43	11521.90	1.6467
4	Temp. Ins. Aids	47.89	0.00	438.96			1.072	-72.58	0.00	471.78	1.3640
4 ***	Temp. Ins. Aids incl. slings	-1733.78	-21518.94	32431.04	158.907	-1581.66	1.072	-1650.38	-23074.13	3473.79	1.3940
25	Crane *** (Hoses & boom)	-1187.82	-3503.78	39709.27			0.88	-1118.48	-3255.44	30028.37	1.2450
25 ***	Crane Boom, Node 1)	-341.00	-211.00	0.00	134.813	-1300.55	0.954	-302.07	-522.07	0.00	1.2450
35	Architectural	660.07	-10005.01	16868.19	117.583	-1157.41	1.263	-107.41	-17878.54	25830.44	2.2756
45	Electrical	-799.91	-13668.80	20391.60	85.660	-840.32	1.05	-840.32	-14051.34	21411.41	1.05
55	Misc	240.24	-4933.46	6512.38	25.749	-252.60	0.81	-252.60	-5008.33	8650.36	1.3859
65	Pneumatic	-1430.70	-19985.33	18841.82	237.814	-2333.94	1.338	-1919.29	-28834.68	25238.70	1.7412
65 ***	Isolation	-311.81	-4150.21	4633.07	19.208	-188.41	0.904	-188.41	-3260.83	3034.58	1.3704
75	Loos Control	-203.28	-2511.38	3370.68			0.904	-188.41	-3260.83	3034.58	1.3704
85	Mechanical, Node 1)	-4871.22	-60487.51	791510.80	487.976	-4787.04	0.961	-4787.04	-9432.61	78136.82	1.2775
95	Piping etc. temperatures	-3433.68	-80088.44	47606.71	549.558	-5394.08	1.337	-4502.38	-53545.51	63070.38	1.7387
95 ***	Piping etc. temperatures	-589.43	-7978.41	9396.00			0.813	-901.71	-10670.74	12813.20	1.1387
100	Trailer Load	3000.84	382781.02	-613438.80			0.970	30204.56	381161.17	-593291.11	1.2545
101	Correction Load, X	0.00	8880.78	0.00			1.00	0.00	6880.78	0.00	1.3000
102	Correction Load, Y	0.00	0.00	3287.30			1.00	0.00	0.00	3287.30	1.3000
Total:	{ Loadcase # in 85, 101, 102 }	-30168.30	3075	3075	3284	-32024.56		32024.56	-381161.17	565296.86	

Note 1): In the computer model in the crane's platform (40.017) level, in the primary structure weight, but in the mechanical weight in Grodinf's weight report.

* Ref. PREFRAMELIS 119
** Ref. Weight Report from Grodinf
*** Loads applied on the top platforms.

C.O.G.	Computer Model number	Grodinf Information number (J)	Grodinf Information number (I)
C.O.G. East-Direction : C.O.G. North-Direction :	18.589 11.902	14.839 11.902	18.498 11.488

i) - based on trailer axis
ii) - from taken weight report

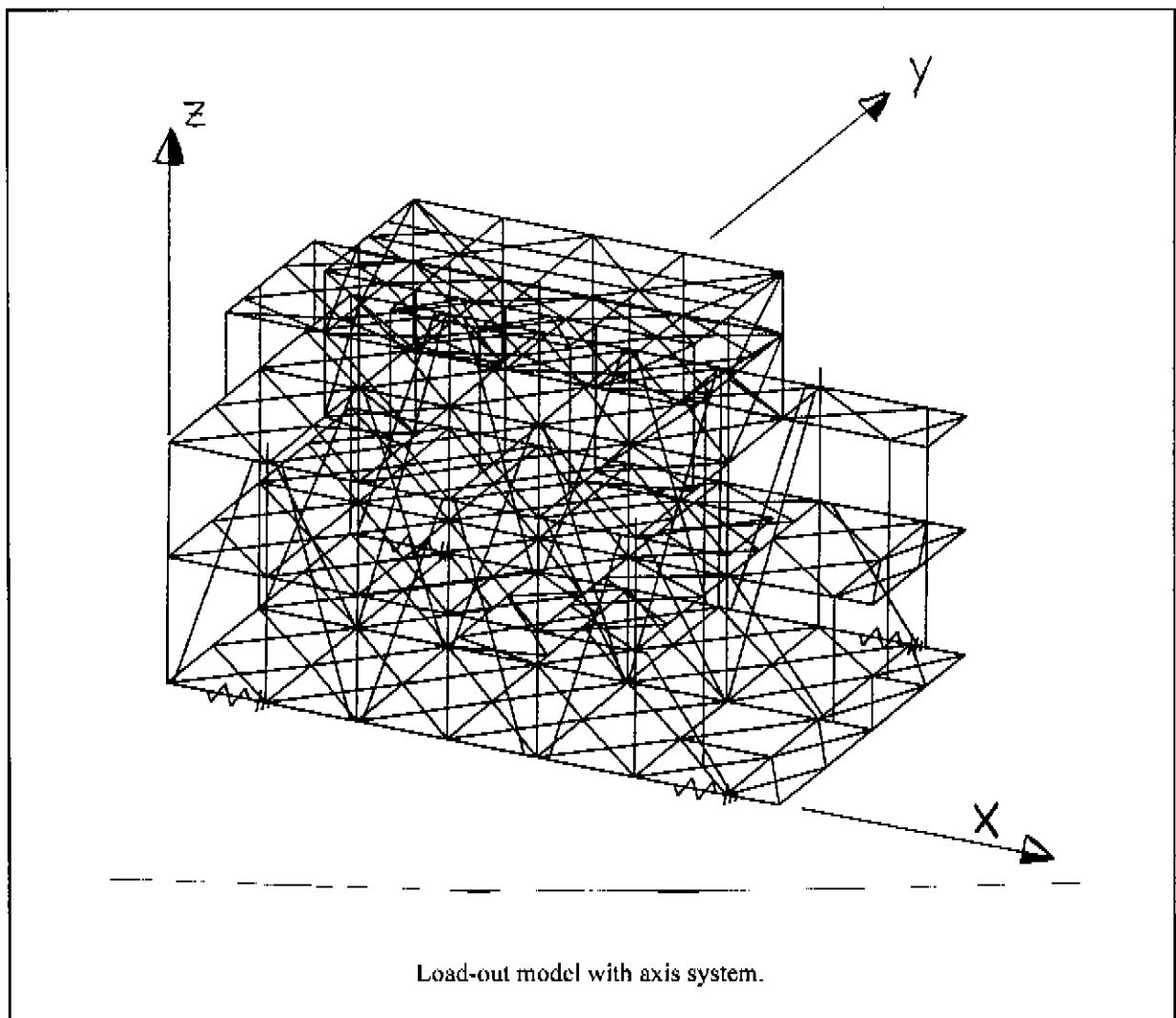
M35 detailed load-out weights.

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The load-out analysis has been performed by using two superelements. Module M35 -
 superelement 1- is similar to the model used in the inplace analysis
 Superelement 2 consists of the top platforms; gas metering platform and the sling
 laydown platform.

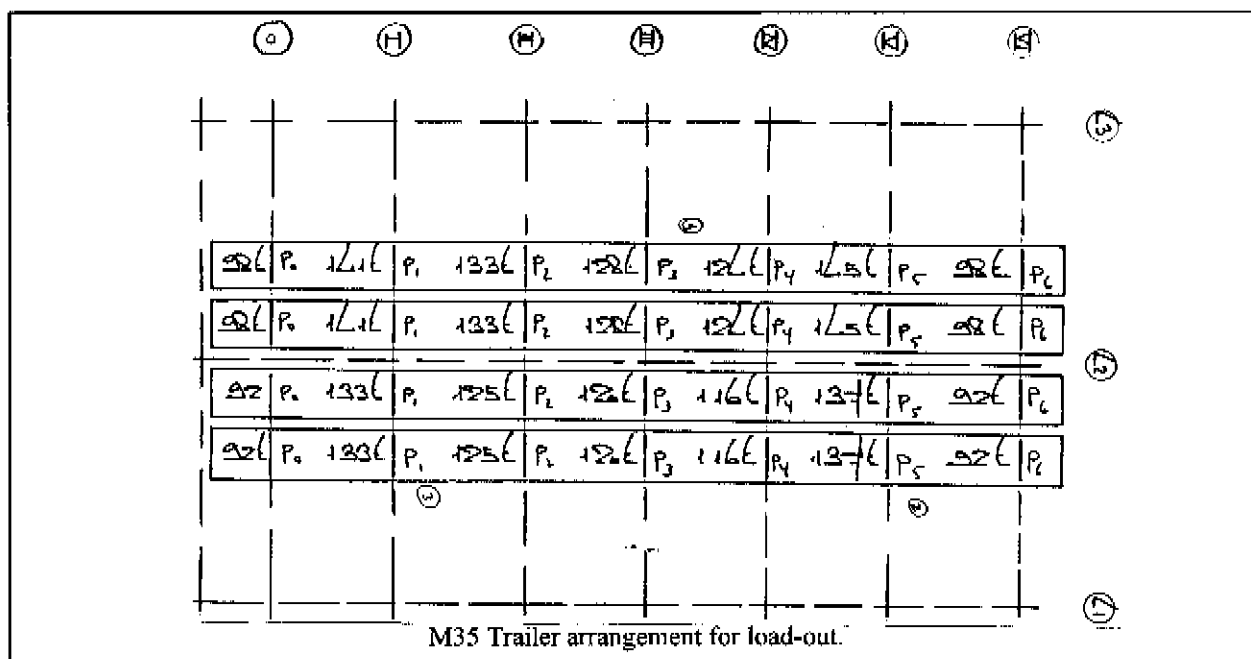
Ref. /18/



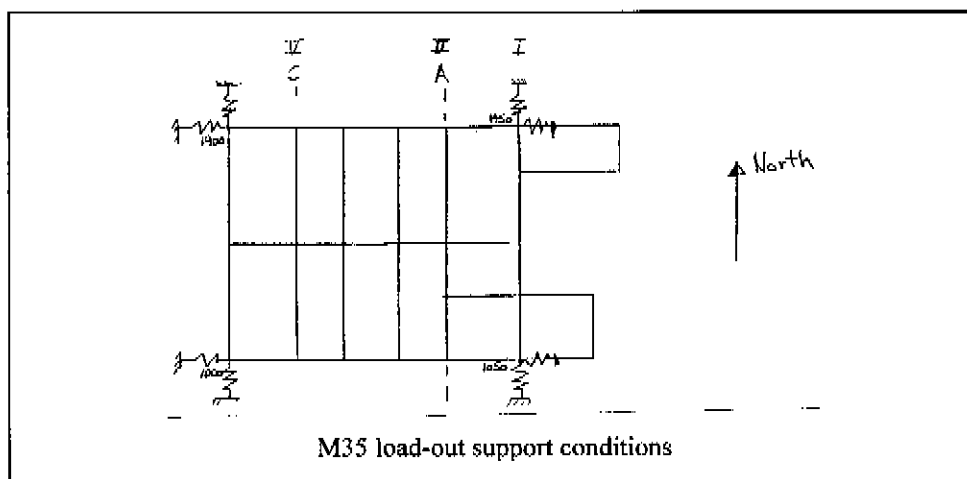


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The trailer support loads are applied upwards on the module. These loads are equal to the loadout weight of the module. To prevent rigid body movement, the module has spring-to-ground connection in four nodes. The sum of reaction forces in these nodes should be approximately equal to zero.





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2.8.2 Basic loads

Environmental loads

Wind speed is defined by Grootint to be less than 10.7m/s. This gives a wind force, (NPD factors included), of 0.1 kN/m².

A conservative wind area of 40m (width)x 18m (height) was chosen. This gives the following:

Horizontal force: 72 kN
Moment: 648 kNm

Load distribution on trailers

Following load distribution was implemented on the trailer groups:

Point	Trailer Loads	Total Load kN	Uniform distr. load N/m
Trailer Group 1			
	Total Load (tonnes) :		
P0	98.00	961.38	395630
P1	141.00	1383.21	569222
P2	133.00	1304.73	536926
P3	128.00	1255.68	516741
P4	124.00	1216.44	500593
P5	145.00	1423.45	585370
P6	98.00	961.38	395630
		8505.27	
Trailer Group 2			
	Total Load (tonnes) :		
P3	60.00	588.60	242222
P4	116.00	1137.96	468296
P5	137.00	1343.97	553074
P6	92.00	902.52	371407
		3973.05	
Trailer Group 3			
	Total Load (tonnes) :		
P0	92.00	902.52	371407
P1	133.00	1304.73	536926
P2	125.00	1226.25	504630
P3	60.00	588.60	242222
		4022.10	
Total Loads :	3364.00	33001	

Load distribution, trailers



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2.8.3 Load Combination

The basic load cases, 1-96, have been combined into one load combination:

L.C. 600 - incl. loadfactor of 1.3

Load combinations, load-out analysis

The load combinations and load factors for the load-out analysis are shown in table below.

Ref. /19/
Vol. 3 of 3

Load combination	P	L	D	E	S + I
U.L.S ordinary	1.3	1.3	1.0	0.7	0
U.L.S ¹ extreme	1.0	1.0	1.0	1.3	0

Table Load combinations, Load-out condition.

1) neglected, due to low wind loading.

The load-out analysis reveals that no members were reported to have utilization ratios above 1.0.

Member	I.R	Check	Loadcase	Location
211	0.914	yield	600	main deck
216	0.898	yield	600	main deck
241	0.797	yield	600	main deck
246	0.766	yield	600	main deck
251	0.731	yield	600	main deck
221	0.729	yield	600	main deck
256	0.711	yield	600	main deck
2524	0.740	yield	600	sling laydown platform
771	0.78	stability	600	truss, row L2
753	0.92	stability	600	truss, row L2

Table Member I.R.s, Load-out condition.



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2.9 Transportation Analysis

2.9.1 General

Ref. /30/ and /31/

M35 was transported on a 300'x100'x25' barge, (Smit barge 1), from Grootint Zwijndrecht BV in Zwijndrecht, to Europort, Rotterdam. This river tow distance is approximately 50km.

At Europort the module M35 was lifted on to the Micoperi 7000 deck for transportation to the Frigg field.

Pancake P970 was transported from O&M base in Sandnes to Europort, Rotterdam, on an Elf operated supply vessel. P970 was also lifted on to the deck of Micoperi 7000 for transportation to Frigg field.

2.9.2 River Tow

Ref./30/

The grillage and seafastening design was designed by Saipem and verified by Elf by means of a global design check.

M35 was supported on 4 pairs of supports. Following Saipem drawings were made for the grillage/seafastening for river tow:

- FF-22-21-02-4036.001 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.002 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.003 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.004 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.005 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.006 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4037.001 Arrangement of seafastenings for Frigg M35 on Smitbarge
- FF-22-21-02-4037.002 Arrangement of seafastenings for Frigg M35 on Smitbarge

2.9.3 M7000 transportation

Ref. /31/

The grillage and seafastening design was designed by Saipem and verified by Elf by means of a global design check.

M35 was supported on 4 pairs of supports. Following Saipem drawings were made for the grillage/seafastening for river tow:

- FF-22-21-02-4036.001 Arrangements of grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.002 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.003 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.004 Details for grillages for Frigg module M35 on Smitbarge.



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CONT.

- FF-22-21-02-4036.005 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4036.006 Details for grillages for Frigg module M35 on Smitbarge.
- FF-22-21-02-4038.001 Arrangement of grillages/seafastenings for M35 on M7000.
- FF-22-21-02-4038.002 Arrangement of grillages/seafastenings for M35 on M7000.

2.9.4 Basic loads

For both the river tow and M7000 transportation analyses the total weight and Center of Gravity, CoG, used are as follows:

Superelement	Description	Total Weight			Local C.O.G. for each Superelement		
		Mx kg	My kg	Mz kg	Xcg m	Ycg m	Zcg m
1	Module M35	2363349 8250	2358755 2920	2363349 7500	18.6719	12.2922	116 9204
2	Grillage	40707 8184	40707 8184	40707 8184	18.7338	11.0237	107 0318
3	Seafastening	3686 9072	3686 9072	3686 9072	16.6729	12.1228	107 2280
4	Ram + 10 tie	36134 0200	36134 0200	36134 0200	20.6129	10.1032	123 3257
5	Top Platform	346103 4000	312957 7190	346103 4000	17.3383	12 8396	131 2664
Total :		3317702	3317702	3317702	18.8624	11.9639	119.4039
M35 only (Superelement 1, 4 & 5) :		3273307	3273307	3273307	Local X 18.8733	Local Y 11.9753	Global Z 119.5715
Latest Weight Report :					Northing 23.1753	Easting 12.1267	Elevation 119.5716
Difference :					23.8960	12.3040	119.7000
					-0.0793	0.1773	0.1286

M35 Transportation loads



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Load Case	Description	Superelement 1 M35 Module Ref. M35 preframe ls	Superelement 2 Scaffastning Ref. scafast-1 preframe ls	Superelement 3 Seafastning Ref. scafast 2 preframe ls	Superelement 4 Items > 10 t. Ref. item preframe ls	Superelement 5 Top Pitt. Ref. top preframe ls	Sum weight used in the preprocessor	From Grootint's Weight Report
LC 1	Primary Struct. *	508870+9890+750+84000 680480	N/A	N/A	0	0	680460	669360
LC 2	Sec. Struct.	596878	N/A	N/A	0	118026	714904	657889
LC 3	Perm. Inst. Aids.	81368	N/A	N/A	0	0	81368	81368
LC 4	Temp. Inst. Aids.	0	N/A	N/A	0	137817	137817	196807
LC 35	Architectural	117983	N/A	N/A	0	0	117983	117983
LC 45	Electrical	85860	N/A	N/A	0	0	85860	85860
LC 55	H V A C.	25749	N/A	N/A	0	0	25749	25749
LC 65	Instrument	193716	N/A	N/A	12415	31783	237914	237914
LC 75	Loss Control.	19206	N/A	N/A	0	0	19206	19206
LC 85	Mechanical **	73150	N/A	N/A	549439	0	622689	622589
LC 95	Piping	489179	N/A	N/A	0	60677	549856	549856
Total Masses :		2363349	N/A	N/A	561854	348103	3273306	3264481

* Incl. 84000 kg from Crane Pedestal, Pedestal adapter and Diesel Fuel.
9890 kg from paint on steel.
750 kg from Telecommunication

** Excl. 84000 from Crane pedestal, Pedestal adapter and Diesel Fuel
Crane House and Boom included

LC 2 contain 57015 kg from LC 4, Secondary structure (sting laydown platform)

Load summary for M35 transportation analysis.



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2.9.5 Sea State Data

River Tow.

The module M35 and the grillage and seafastening have been checked for following transportation criteria given by Saipem:

Heave acceleration: 0.1 g

The heave acceleration was combined with a 5° static angle in either roll or pitch.

M7000 transportation.

	Definition	Beam seas 90°	Head seas 180°
Roll motion	Degr.	7.57	0.47
Pitch motion	Degr.	3.54	9.68
Yaw motion	Degr.	0.05	0.11
Roll acceleration	dcg/s ²	2.23	0.11
Pitch acceleration	deg/s ²	0.45	2.18
Yaw acceleration	deg/s ²	0.03	0.03
Surge acceleration	m/s ²	0.27	1.14
Sway acceleration	m/s ²	1.57	0.08
Heave acceleration	m/s ²	1.75	1.67

Environmental loads

The wind speed used for the river tow and M7000 transportation is: 23.0 m/s.

Total wind force from North 462kN
Total wind force from South 422kN
Total wind force from East 294kN
Total wind force from West 325kN



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Basic Loadcase	Description	Superelement Number				
		1	2	3	4	5
		Loadcase Number in Preframe Module M35	Loadcase Number in Preframe Spillage	Loadcase Number in Preframe Sækkvæmning	Loadcase Number in Preframe Item	Loadcase Number in Preframe Tcp pladama
1	gx = 1 m/s ²	1	1	1	1	1
2	gy = 1 m/s ²	2	2	2	2	2
3	gz = 1 m/s ²	3	3	3	3	3
4	Rx = 1 rad/s ²	4	4	4	4	4
5	Ry = 1 rad/s ²	5	5	5	5	5
6	Rz = 1 rad/s ²	6	6	6	6	6
7	Support Deflection I	N/A	7	N/A	N/A	N/A
8	Support Deflection II	N/A	8	N/A	N/A	N/A
9	Support Deflection III	N/A	9	N/A	N/A	N/A
10	Support Deflection IV	N/A	10	N/A	N/A	N/A
11	Wind from North	7	N/A	N/A	N/A	N/A
12	Wind from South	8	N/A	N/A	N/A	N/A
13	Wind from East	9	N/A	N/A	N/A	N/A
14	Wind from West	10	N/A	N/A	N/A	N/A
15	gz = 1 m/s ²	3	3	3	3	3

Module M35 - Support Deflection

Basic loadcases, M35 transportation.

Load Combination Number	Basic Loadcases (Generated in PRESEL)															
	Translation				Rotation			Support Deflection				Wind (Factor)				
	1	2	3	15	4	5	6	7	8	9	10	11	12	13	14	
	m/s ²	m/s ²	m/s ²	m/s ²	rad/s ²	rad/s ²	rad/s ²	rad/s ²	mm	mm	mm	mm	North	South	East	West
Head Seas	500	1.48	0.00	-2.17	-9.81	0.000	0.050		5							1.3
	501	1.48	0.00	-2.17	-9.81	0.000	0.050			6						1.3
	502	1.48	0.00	2.17	9.81	0.000	0.050				5					1.3
	503	1.48	0.00	-2.17	-9.81	0.000	0.050					5				1.3
	504	1.48	0.00	-2.17	-9.81	0.000	-0.050		5						1.3	
	505	1.48	0.00	2.17	9.81	0.000	-0.050			5					1.3	
	506	-1.48	0.00	-2.17	-9.81	0.000	0.050				6				1.3	
	507	-1.48	0.00	-2.17	-9.81	0.000	-0.050					5			1.3	
	508	1.48	0.00	2.17	9.81	0.000	0.050		5						1.3	
	509	1.48	0.00	2.17	9.81	0.000	0.050			5					1.3	
	510	1.48	0.00	2.17	9.81	0.000	0.050				5				1.3	
	511	1.48	0.00	2.17	9.81	0.000	0.050					5			1.3	
	512	1.48	0.00	-2.17	-9.81	0.000	0.050		5						1.3	
	513	-1.48	0.00	-2.17	-9.81	0.000	0.050			5					1.3	
	514	1.48	0.00	-2.17	-9.81	0.000	-0.050				5				1.3	
	515	1.48	0.00	2.17	9.81	0.000	-0.050					5			1.3	
Beam Seas	516	0.35	2.04	2.28	9.81	0.051	0.010		5				1.3			
	517	-0.35	-2.04	-2.28	-9.81	0.051	0.010			5			1.3			
	518	0.35	2.04	2.28	9.81	0.051	0.010				5			1.3		
	519	0.35	-2.04	-2.28	-9.81	0.051	0.010					5		1.3		
	520	0.35	2.04	2.28	9.81	0.051	0.010		5					1.3		
	521	0.35	2.04	2.28	9.81	-0.051	0.010			5				1.3		
	522	0.35	2.04	2.28	9.81	0.051	0.010				6			1.3		
	523	0.35	2.04	2.28	9.81	0.051	0.010					5		1.3		
	524	0.35	2.04	2.28	9.81	0.051	-0.010		5					1.3		
	525	0.35	-2.04	-2.28	-9.81	0.051	0.010			6				1.3		
	526	0.35	2.04	2.28	9.81	0.051	-0.010				5			1.3		
	527	0.35	-2.04	-2.28	-9.81	0.051	0.010					5		1.3		
	528	0.35	2.04	2.28	9.81	0.051	0.010		5					1.3		
	529	0.35	2.04	2.28	9.81	-0.051	0.010					5		1.3		
	530	0.35	2.04	2.28	9.81	0.051	-0.010						5	1.3		
	531	0.35	2.04	-2.28	-9.81	0.051	0.010							1.3		

* Loadcase 3 is vertical gravity accelerations from Case 1 - Environmental) made only
** Loadcase 15 is vertical gravity accelerations from Case 1 - Selfweight of Module etc

M35 Transportation analysis. Load combinations.



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2.9.6 Analysis results

The transportation analysis reveals that no members were reported to have utilization ratios above 1.0.

Member	I.R	Check	Loadcase	Transportation	Location
802	0.745	buckling	M7000	572	Truss row L1
751	0.889	buckling	M7000	519	Truss row L2
759	0.796	buckling	M7000	553	Truss row L2
7	0.857	buckling	M7000	521	seafast. member
9	0.746	buckling	M7000	530	seafast. member
77	0.812	buckling	M7000	551	grillage
78	0.917	yield	M7000	551	grillage
200	0.952	yield	M7000	550	grillage
220	0.967	yield	M7000	575	grillage
242	1.023	yield	M7000	551	grillage
262	0.984	yield	M7000	573	grillage
802	0.715	buckling	river tow	568	Truss row L1
759	0.763	buckling	river tow	553	Truss row L2
751	0.833	buckling	river tow	553	Truss row L2
200	0.914	yield	river tow	573	grillage
220	0.964	yield	river tow	571	grillage
240	0.948	yield	river tow	567	grillage
78	0.973	yield	river tow	567	grillage
242	1.009	yield	river tow	567	grillage
262	0.986	yield	river tow	569	grillage

Table Member I.R.s, Transportation condition

2.9.7 Transportation Limitations

The transportation limitations for the navigation of the M7000 at transit draft are as follows:

Seastate : < 4.0m significant
Windspeed : 30m knots



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2.10 Lifting Analysis

2.10.1 General

The lifting analysis was carried out based on the Veritec Weight Report dated October 1994.

Ref. /19/

- Gross weight, lifting 3096.1 t

Final lifting load calculated by Grootint:

- Gross weight, lifting 3396.3 t (Nov. -94)

For detailed weight breakdown, see Installation analysis report.

Ref. /19/

The weight increase of 300 tons, (9.7%), was due to design changes and underestimated item weights. The Lifting Analysis, ref /19/, was not revised with correct weight. This was mainly due to the conservative factors, (DAF), and the utilization ratio of the members.

Following factors were used in the lifting analysis:

- Weight contingency: 1.0, (Oct. weight report)
- COG shift factor: 1.16
- Dynamic amplification factor: 1.10 (offshore lift from barge)
- Skew load factor 1.25

Consequence factor: 1.75 for lifting points
1.5 for primary members
1.3 for secondary members

The original design premise was to have the hook location 588mm to the North of the geometric center of the cast padears. The reason for this was to secure a module tilt away from the existing module M33 on TCP2 during installation. This was later on changed, and four equal length slings were used. However, the slings were measured before use, and the two longest slings were thus installed on the two southern padears.

The cast padears were checked for such an increase in horizontal loading, and found to be acceptable. Ref. report No. RE-FF-22-21-0022.



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2.10.2 Load combinations

Load combinations

BASIC LOADSET DESCRIPTION	Loadset No.	Basic Loadset No.	LOAD COMBINATIONS						
			400	401	402	403	404	405	406
Structural Weight	Main	1	1.0384	2.2599	2.2399	1.9166	1.9166	1.6184	1.6184
	Misc	2	0.9727	2.4765	2.4765	1.8882	1.8882	1.6191	1.6191
Installation Aids	Main	3	1.0002	2.2411	2.2411	1.9218	1.9218	1.6639	1.6639
	Comp	4	0.9897	2.2367	2.2367	1.9200	1.9200	1.6640	1.6640
Support Deflection Hook Pl. 1 (+VE)		5		1.2193		1.2193		1.1109	1.1109
Support Deflection Hook Pl. 1 (-VE)		6			1.1100		1.1100		1.2100
Support Deflection Hook Pl. 1 (+VE)		7	1.0380	2.2407	2.2407	1.9206	1.9206	1.6648	1.6648
Crane Dead		8	1.0383	2.1473	2.1473	1.8455	1.8455	1.5951	1.5951
Crane Dead Moment		9	1.0471	2.1468	2.1468	1.8458	1.8458	1.5933	1.5933
Dry Loads	Arch	10	0.9885	2.2113	2.2113	1.8953	1.8953	1.6426	1.6426
	Disc	11	1.0010	2.2450	2.2450	1.9225	1.9225	1.6622	1.6622
	Flow	12	0.9748	2.1819	2.1819	1.8719	1.8719	1.6222	1.6222
	Gen	13	0.9997	2.2401	2.2401	1.9201	1.9201	1.6641	1.6641
	Lum	14	0.9487	2.2377	2.2377	1.9181	1.9181	1.6621	1.6621
	Mech	15	1.0001	2.2410	2.2410	1.9209	1.9209	1.6648	1.6648
	Wing	16							

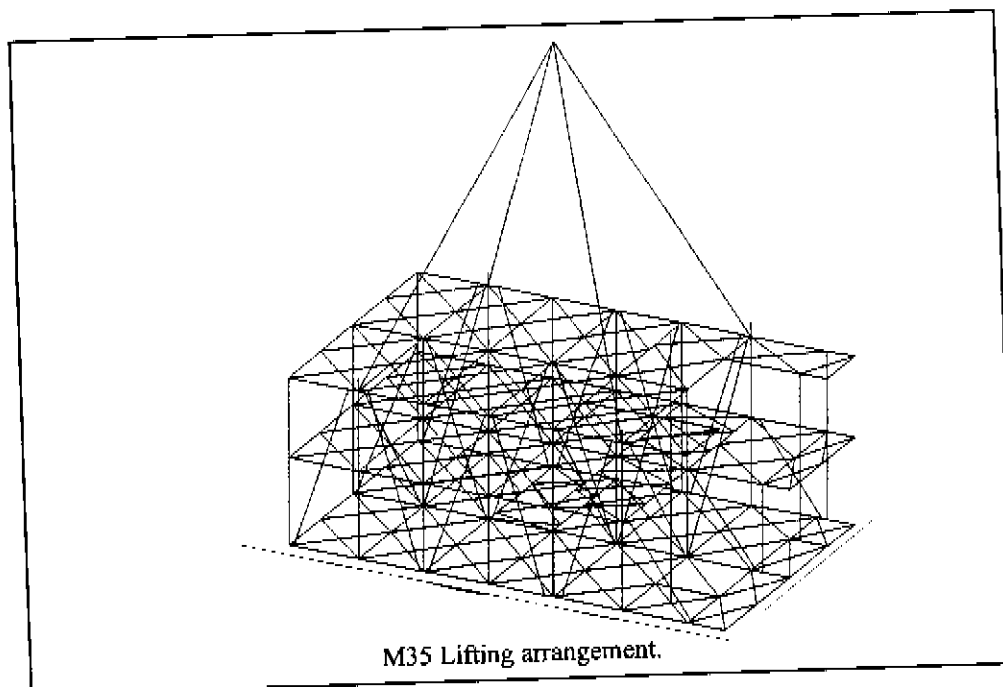
Note:
Load factors include:
1) MF2 coefficients for ULS combination 10.
Inclined using the relevant consequence factor
at Centre of gravity shift factor (1.104)
2) DAF (1.11)

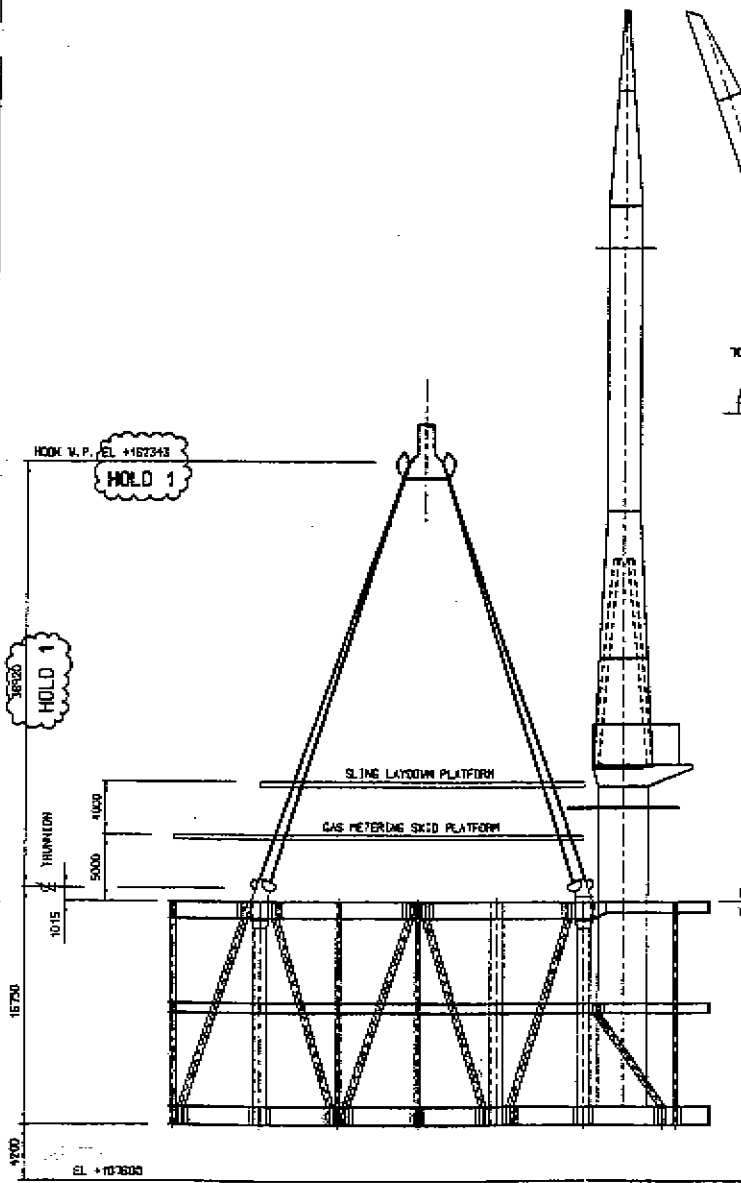
3) The shear load factor is introduced through loadcases 4 & 6 by introducing a deflection in one of the hook rods.

Loadset	Design
400, 401	Full design condition
403, 404	Members transfer into pulleys
405, 406	All other members

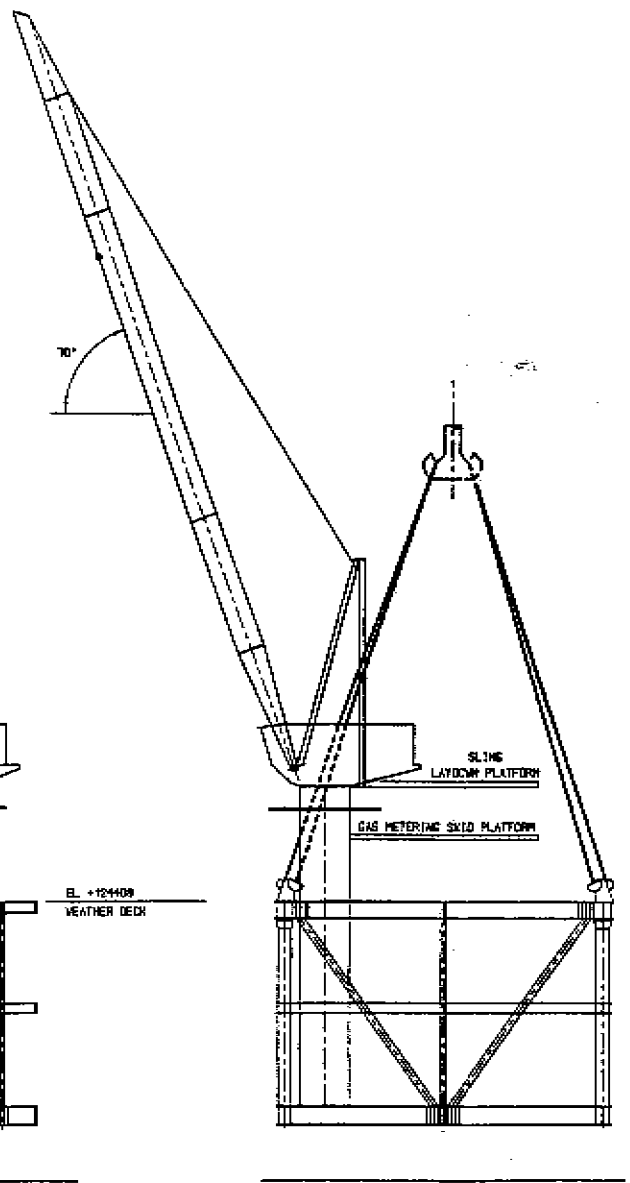
THE FACTOR OF 1.31 FOR THE SLEW LOAD IS CORRECT FOR LOADCASE 401 AND 402. BUT CONSERVATIVE FOR 403, 404, 405, 406. (SEE ALSO PAGE 2.7)

M35 load combinations, lift design.

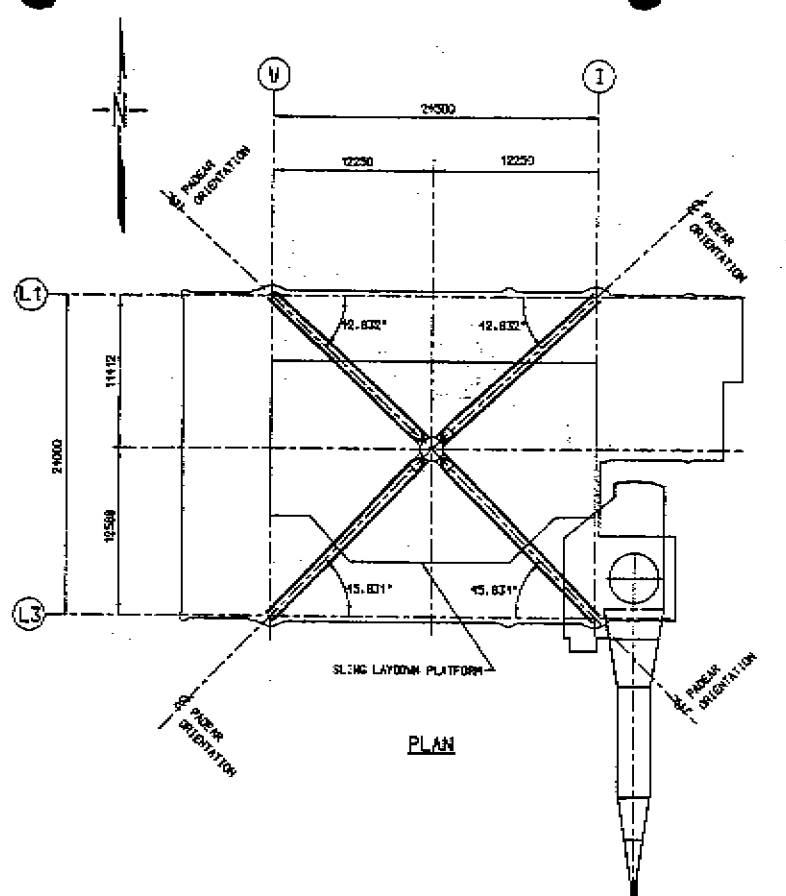




ELEVATION LOOKING NORTH



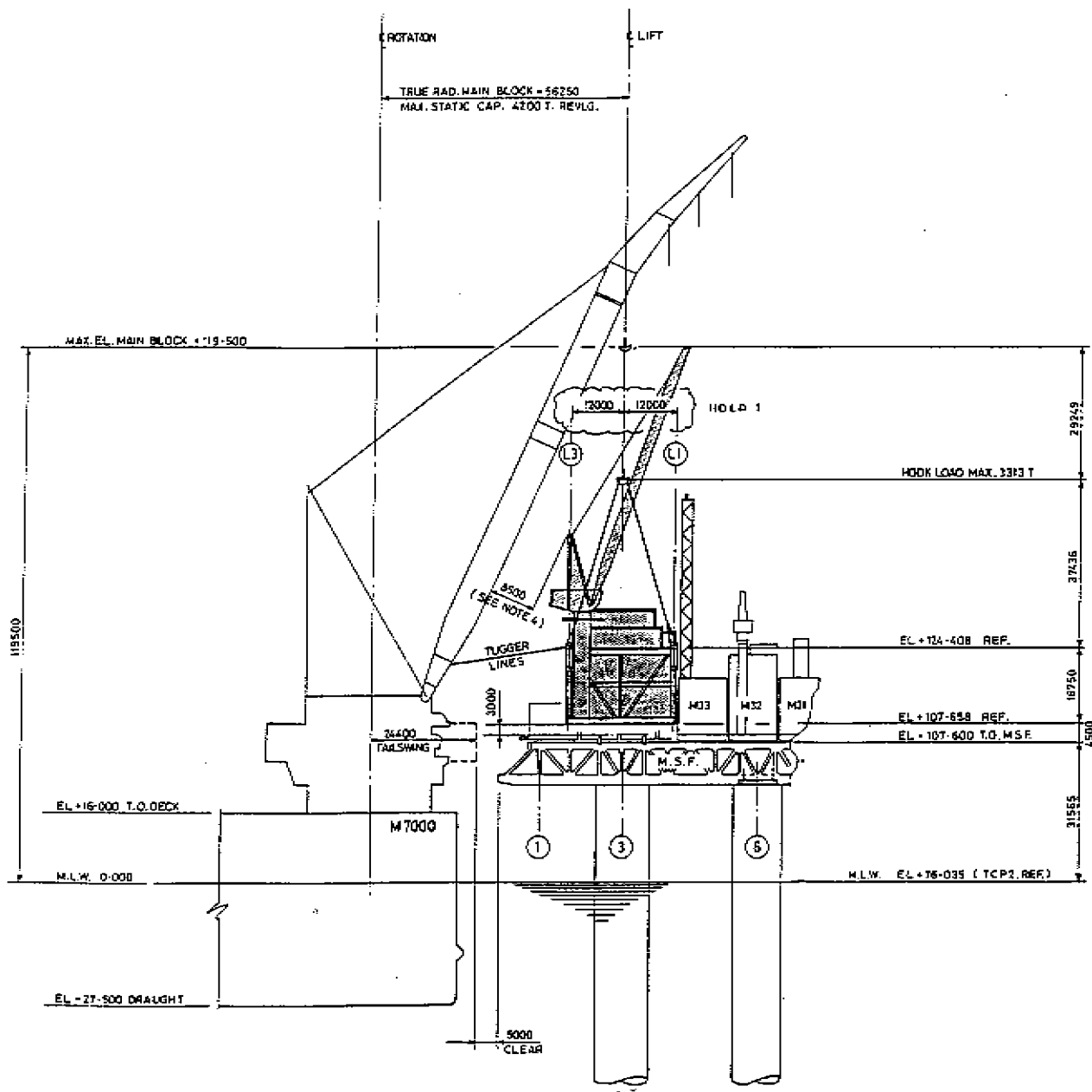
ELEVATION LOOKING WEST



PLAN

- HOLDS LIST :**
 1. HOOK ELEVATION
 2. RELEASED

FF-22-21-02-1115	SLING LAYDOWN PLATFORM DETAIL ELEV. PLAN			
FF-22-21-02-1115	GAS METERING PLATFORM DETAIL ELEV. PLAN			
FF-22-21-02-1115	FIELD STAGE GENERAL ARRANGEMENT			
FF-22-21-02-1115-01	GENERAL INFORMATION			
FF-22-21-02-1115-01	STRUCTURAL MEMBER LIST			
FF-22-21-02-1115-01	MEMBER LIST			
REFERENCE DRAWINGS				
REV	DATE	ISSUED FOR	BY	CHKD BY
1		ISSUED FOR CONSTRUCTION	JAN	COFF
2		ISSUED FOR MODIFICATION	L11	TRD
<p style="text-align: center;">VERITEC</p> <p style="text-align: center;">VERITEC PROJECT</p> <p style="text-align: center;">MODULE 103</p> <p style="text-align: center;">LIFTING ARRANGEMENT</p>				
FRIGG FIELD	FF-22-21-02-1115	010		



GENERAL NOTES

1. HOOK LOAD = 3313 T.
2. HOOK LOAD BASED ON CLIENTS BUDGET WEIGHT (3100 T) + 3% FOR WEIGHING INACCURACIES + 120 T. RIGGING WEIGHT.
3. THE CRANE CAPACITY SHOWN ON THIS DRAWING IS NETT AND INCLUDES ALL CRANE TACKLE PLUS 10% ALLOWANCE FOR DYNAMIC AND WIND FORCES.
4. CLEARANCE SHOWN BASED ON MODULO WORST CASE WITH 2° TILT.

REFERENCE DRAWINGS

- FF 22/21/00/4084.001 FRIGG MODULE M35 OUTF FROM BGE BY M7000 (ELEV)
- 4083.002 " " (PLAN)
- 4084.002 INSTALLATION OF FRIGG MODULE M35 BY M7000 FROM PLAT. SOUTH (PLAN)

Holds:
 1. c.f.c. Port.

NO.	ISSUED FOR COMMENT	DATE	BY	CHKD	APPD
REV	REVISION	DATE	BY	CHKD	APPD
<p>The contents of this drawing are the property of the information carrier and shall not be disclosed to any third party without written permission from the carrier's project manager.</p>					
<p>ELF PETROLEUM NORGE A/S</p>					
<p>Saipem U.K. Limited</p>					
<p>PROJECT FRIGG DEVELOPMENT PROJECT</p>					
<p>TITLE INSTALLATION OF FRIGG MODULE M35. BY M7000 FROM PLAT. SOUTH (ELEV)</p>					
SCALE	1:500	DATE	OCT-93	PROJECT NO.	FF 22/21/00/4084.001
DRAWN		CHECKED		DATE	
APPROVED		DATE			



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References
See chapter 2.4

2.10.3 Analysis results

Analysis results.

Member	I.R	Check	Loadcase	Location
731	0.80	yield	403/404	Truss row L3
728	0.82	yield	403/404	Truss row L3
828	0.82	yield	403/404	Truss row L1
831	0.90	yield	403/404	Truss row L1
909	0.88	yield	403/404	Truss row V
907	0.87	yield	403/404	Truss row V
908	0.90	yield	403/404	Truss row V
917	0.88	yield	403/404	Truss row I
918	0.91	yield	403/404	Truss row I
380	0.89	yield	405/406	Main deck
381	1.03	yield	405/406	Main deck
320	0.84	yield	405/406	Main deck
321	0.97	yield	405/406	Main deck
725	0.86	yield	405/406	Truss row L3
751	0.93	stability	405/406	Truss row L2
825	0.92	yield	405/406	Truss row L1
875	0.91	yield	405/406	Truss row L1
758	0.89	stability	405/406	Truss row L2
804	0.80	stability	405/406	Truss row L1

Table Member I.R.s, Lifting condition

2.10.4 Cast Padears

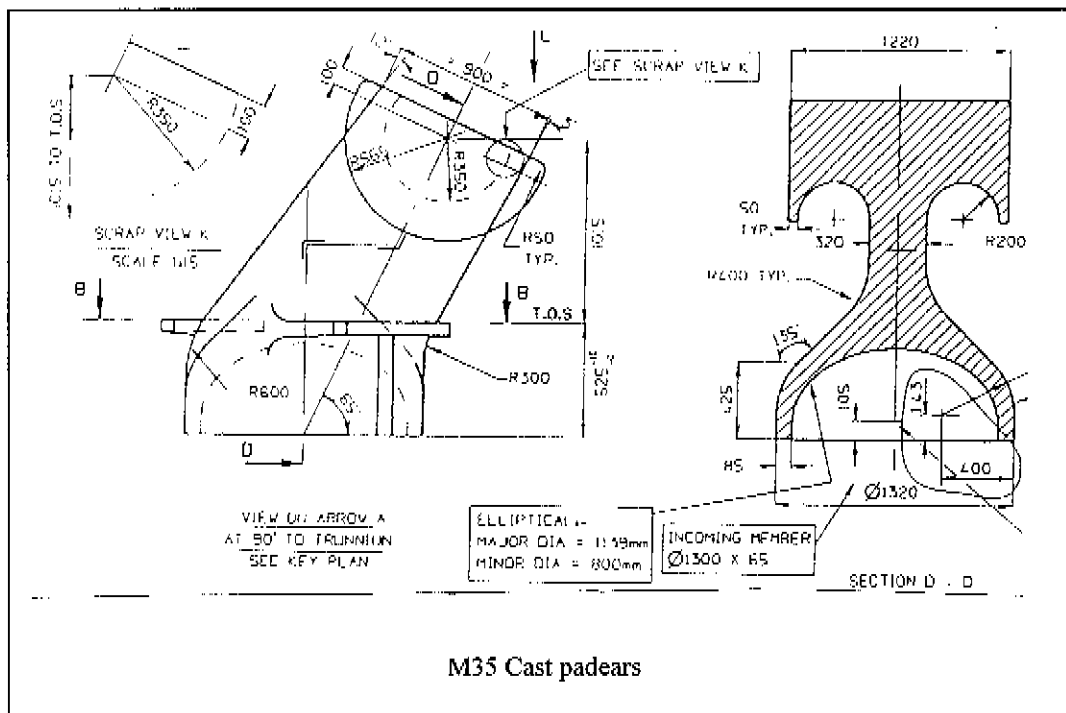
The module M35 was equipped with four cast padears designed and manufactured by River Don Castings. For additional information, see Manufacturer's Record Books, P.O. No. FF-22-21-1606.

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References
See chapter 2.4

The lifting analysis resulted in following loading in the cast padears compared with the original design input to River Don:

Sling member	Load case	River Don input, kN	Lift analysis
1000	401	10000	13290
	402	25300	22240
1001	401	10600	23470
	402	25700	22890
1002	401	25000	22890
	402	9800	13940
1003	401	24100	21490
	402	8970	12470





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References
See chapter 2.4

2.10.5 Installation impact analysis

To verify the module M35 and the MSF during set-down, a technical note/report was established to calculate the maximum acceptable impact loads at the different touchdown points. The report was based on pre-assumed module velocities/movements. For further information, see RE-FF-22-21-1049 "Module M35 Installation impact Analysis".



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References
See chapter 2.4

2.11 Accidental Analysis

2.11.1 Explosion Loads

The blast pressure is considered to act either inside the module or on top of the module.

The explosion loads for process areas are:

Ref. /1/
3.11.2

walls and decks: 20 kN/m² (0.2 bar)
structural members: 35 kN/m² (0.35 bar)

The decks are therefore designed to withstand the actual pressure.

Ref. /

Module M35 is provided with cladding walls in the east and south. The cladding is supported on a secondary structure, which is bolted to the main structure of the module. These bolt connections are designed for wind loads and will fail in case of an explosion at a pressure of approximately 5 kN/m². Therefore 20 kN/m² is not applied on the walls.

2.11.2 Dropped Object Protection

The module laydown areas are designed for dropped object as per criteria in Company specification.

Ref. /1/

The Gas Metering platform, EL 134000, is designed for dropped object protection for the process vessels on Weather deck.

The design criteria used for the module M35 is the following:

Ref. /22/

Weight: 3 tons
Fall height: 5 m



FRØY TIE-IN

DESIGN - FABRICATION - INSTALLATION RESUMÉ

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References
Sec chapter 2.4

2.12 Vibration Evaluation

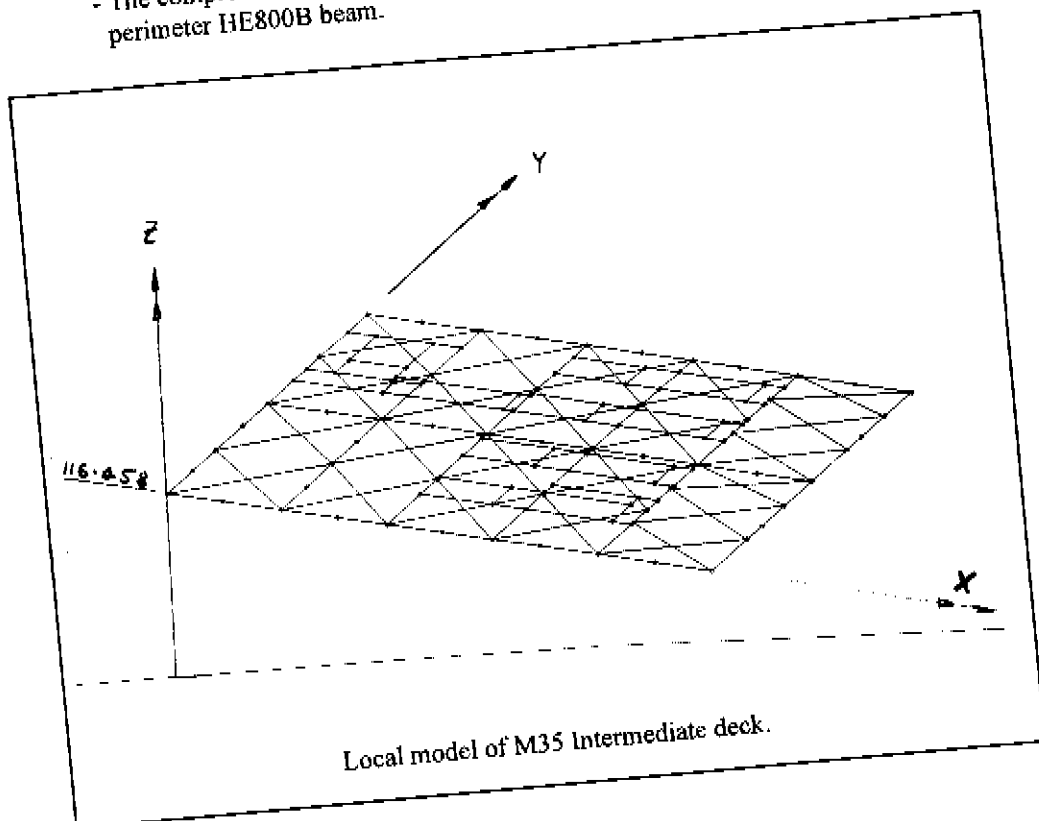
Ref. /18/

The intermediate deck level of M35 supports equipments with rotating machinery. These equipments include five gas and fuel gas compressor skids and two export pumps. The operating speed of the equipment may coincide with the natural frequency of the deck thus lead to vibration problems.

The vibration analysis estimates the natural frequency of the deck structure and compares it with that applied from the miscellaneous rotating equipments. The Sesam program Sestra has been used for the analysis.

The basic three dimensional model for the in-place analysis which includes all primary load bearing elements and plate simulation was adopted and modified to suit the dynamic analysis:

- The intermediate deck was isolated from the model.
- The deck model thus formed was then fixed at the points of attachments to the trusses on gridlines L1, L2, L3, I, II and V.
- Major pieces of secondary steel were added to the model. This included the supports to the de-aerator tower and the equipments.
- The compressor skid members were included in the model simply as a single perimeter HE800B beam.





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Loads:

In the vibration analysis, the same basic loads are applied as in the inplace analysis, with the following exceptions:

Ref. /12/

- No environmental and deformation loads are applied.
- Loads are applied on all possible directions of movement.

The dynamic loading from the different compressors are based on information from the vendor Thermodyn.

Results:

The dynamic response shows that the natural frequency of the module M35 is 3.6 to 8.8Hz for the first 5 harmonics. In reality these figures will be higher as the model underestimates the deck stiffness and overestimates the mass for some conditions.

The natural frequency of the structure is however well below the four principal operating frequencies and as such vibration is not expected to be a problem.

The four principal frequencies are:

ITEM	SPEED RPM	PERIOD S	FREQUENCY Hz
K601/602 Compressor	12272	0.0048	208
Compressor motors	1480	0.04	25
K603/604 Compressors	8262	0.0072	139
CP605 A/B Pumps	2978	0.02	5

The above table shows that all four frequencies can be sympathetic with the 50th cycle of K603/604 compressors. Thus a "beat" frequency equal to 2.75Hz (165 RPM) can exist where all amplitudes are additive. This "beat" frequency is however below the first harmonic of the structure and is therefore not expected to cause a problem.

Deflections

The dynamic forces were added for imbalance conditions and the maximum displacement found. This was found to be less than 0.5mm in the center of the deck, and as such will not present any problems in the operation of the machinery.



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Natural frequencies

The following figure present the natural frequencies for Intermediate deck, module M35.

All supports free to rotate.

No.	Eigenvalue (SEC) ⁻²	Frequency Hz	Period S
1	0.5280787 E03	3.657	0.27
2	0.9659042 E03	4.945	0.20
3	0.1127070 E04	5.343	0.19
4	0.1628531 E04	6.423	0.16
5	0.2156478 E04	7.391	0.14

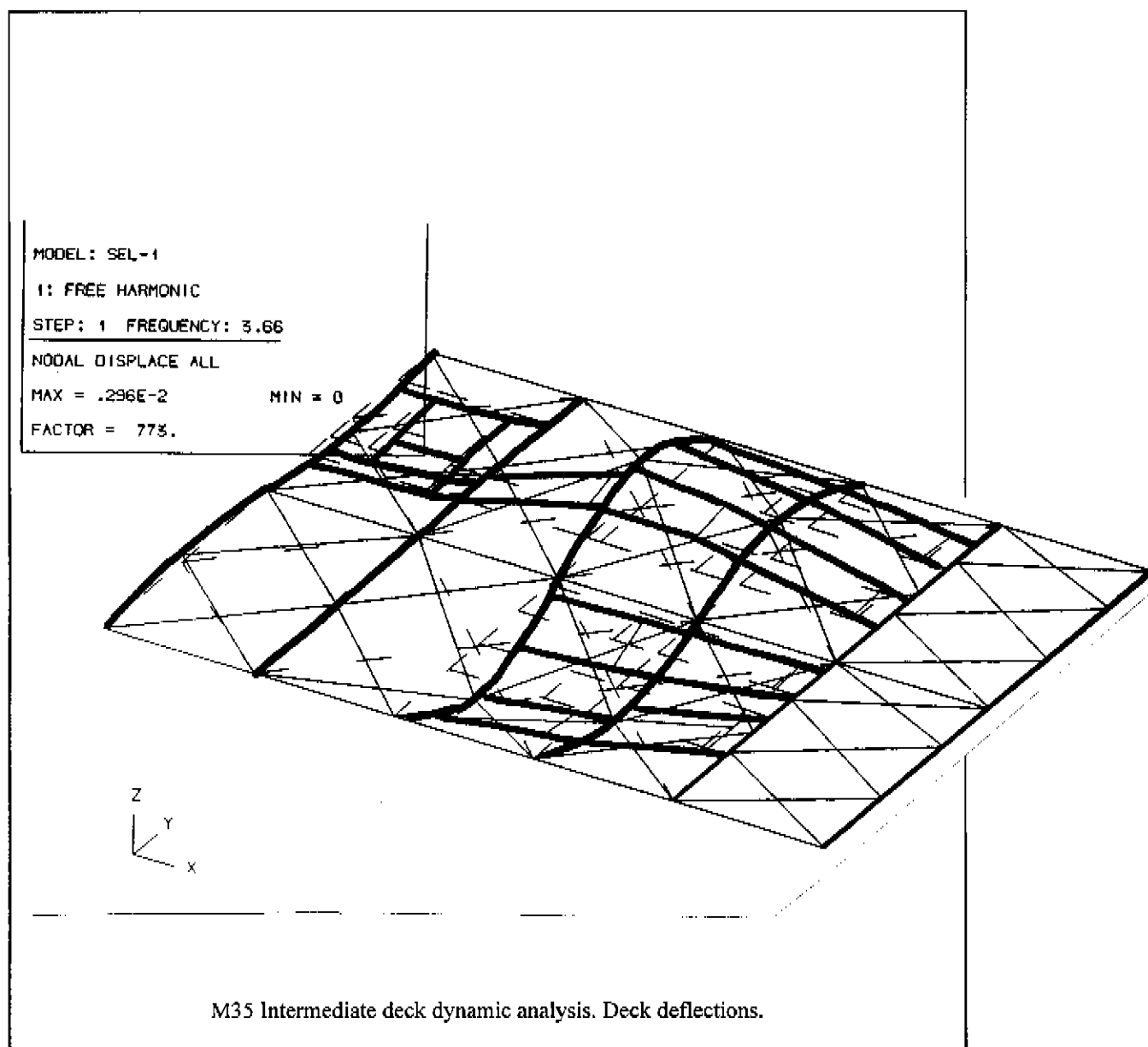
Supports on grids L1/L3 fixed in rotation.

No.	Eigenvalue (SEC) ⁻²	Frequency Hz	Period S
1	0.1095646 E04	5.268	0.189
2	0.1731623 E04	6.623	0.151
3	0.1976970 E04	7.077	0.141
4	0.2250130 E04	7.550	0.132
5	0.3056891 E04	8.800	0.114



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2.13 Installation Guides and Bumpers

Design criteria

Design impact loads on installation guides, bumpers, pins and buckets occurring during the installation of the structure are presented in table below. Impact forces in % of lift weight unfactored.

The design criteria is taken from "Topside Structural Design Spec."

Ref. /1/
Table 5.2

Vertical Post		SAIPEM UK	ELF
Primary	Fhoriz	10%	10%
	Fvert	1%	1%
	Flong'l	5%	5%
Secondary	Fhoriz	5%	5%
	Fvert	1%	1%
	Flong'l	1%	2.5%
Sloping Post			
Primary	Fhoriz	10%	10%
	Fvert	10%	20%
	Flong'l	5%	5%
Secondary	Fhoriz	5%	5%
	Fvert	10%	10%
	Flong'l	1%	2.5%

Table Bumpers and guides impact load criteria.

M35 bumpers

Primary bumpers.

The module was equipped with two horizontal bumpers on the north face of the module, Main deck. These were both designed to be permanent. The south bumper was removed immediately after module installation.

Secondary bumpers.

The module was equipped with one horizontal bumper on the west face of the module, Main deck. This was designed to be permanent.

In addition, the main deck of M35 was also equipped with two buckets to fit two pre-installed pins on TCP2 MSF.



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TCP2 guides

Primary bumpers.

The module M33 on TCP2 was equipped with two vertical permanent guides on its south face. Parts of the brace arrangements were removed after installation of M35.

In addition, a guide on south end MSF truss row C was installed to stop module rotation.

This guide was removed immediately after module installation.

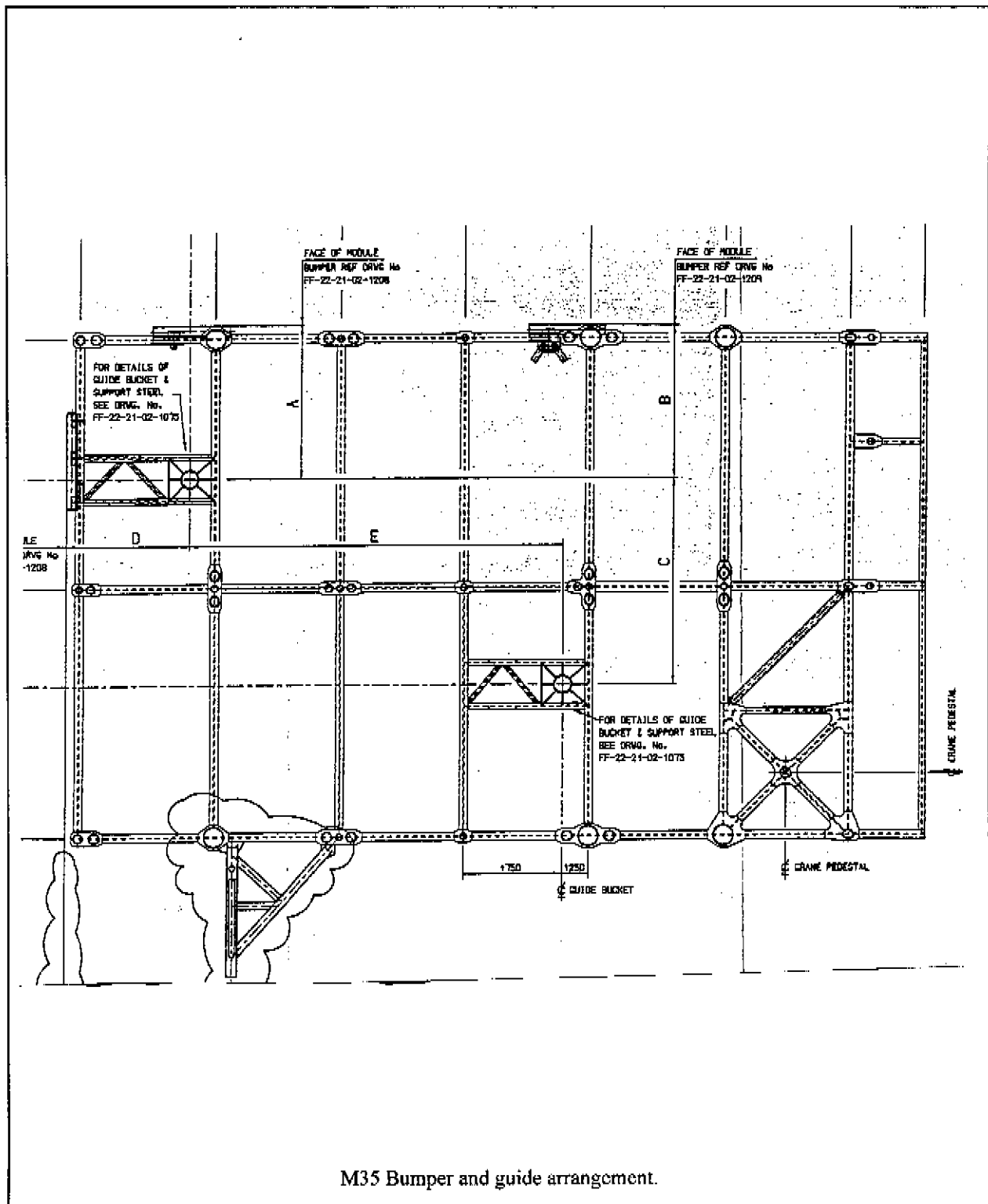
Secondary guides.

Two permanent pins were installed on the TCP2 MSF to serve as module guidance.



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M35 Bumper and guide arrangement.



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References
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1.14 Weighing

Introduction

The weighing of module M52 module was performed twice during the construction period. The monthly weight report from Grootint was thus updated and adjusted to suit the weighing results. Hence, the final weight report issued on the 14.11.94, (Frøy project module M35, Weight monitoring Report, rev. G), included the last physical weighing.

The weighing procedure and physical operations were performed according to Company specification, ref. /39/, and witnessed by a company representative.

Weighing results

Module M35	VERITEC	GROOTINT
	Close-out weight report tons	Weighing/weight report tons
Weight	3071.24	3216.06
C.o.G, Northing	22.858	23.054
C.o.G, Easting	11.929	12.083
Contingency	2.6%	3.1%

Gross dry weight, incl. contingencies

Operating weight

The operating weight for the module M35 is:

- Operating weight, incl. contingencies: **3364.52 tons**



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Weight growth

The weight growth between the reports is approx. 144.8 tons, i.e. 4.7% increase.

The following project changes were decided or monitored during the construction phase of module M35:

- Hydrochlorination package: 10 tons
- Cladding walls around Gas metering platform: 25 tons
- Roof/shield above metering sampling points: 5 tons
- Increase in deck thickness in trolley route areas: 5 tons
- Substantial increase in number of pipe supports: 30 tons
- Equipment increases, piping, electro, instrument, errors in weight estimation: approx. 70 tons

The load-out analysis and transportation analyses were revised and updated with the new weights, see previous sections in this design resume.

The lifting analysis was not revised prior to lift. This was due to the change of lifting operation, (from offshore lift from barge to offshore lift from deck of M7000), resulted in that DAF could be reduced from a offshore lift to a inshore lift. This move were checked to compensate for the weight growth.



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References
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2.15 Structural Drawings: Frøy M35 - Structural Drawing Index

See attached drawing list, FF-22-21-00-1000 Rev 05D.

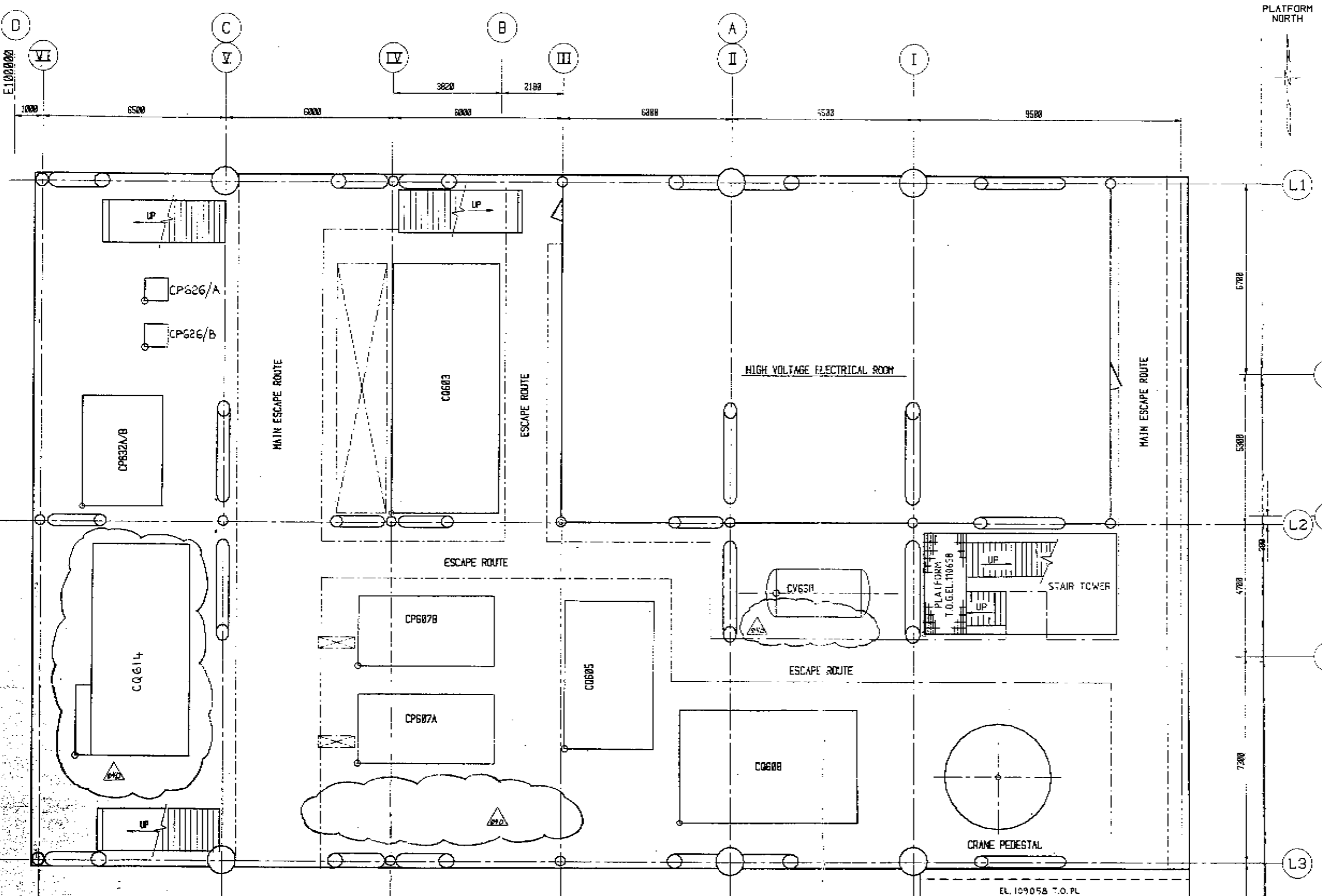


FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUMÉ	RE-FD-22-00-0029
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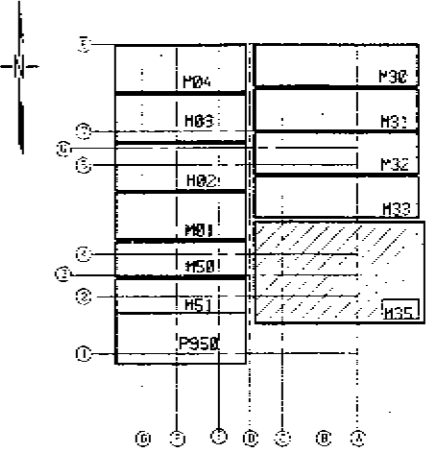
2.16 Equipment Layout Drawings, Frøy M35

See attached drawings.



**MAIN DECK
T.O.S. EL109058**

EQUIPMENT LIST				
EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEVn
CQ614	FROXY OIL METERING	105700	102300	109058
CP607A	WATER INJECTION PUMP	109650	112300	109058
CP607B	WATER INJECTION PUMP	113100	112300	109058
CP626/A	PRE BOOSTER PUMP SKID	129953	104610	109058
CP632A/B	VACUUM PUMP SKID	118700	102500	109058
CQ603	WATER INJ. FINE FILT. PACK.	118500	113500	109058
CQ605	WATER INJ. CHEM. INJ. PACKAGE	110200	119600	109058
CQ608	PROCESS CHEM. INJ. PACKAGE	107550	123750	109058
CV630	PROD WATER DEGASS TANK	115700	127100	111558
CP626/B	PRE BOOSTER PUMP	124353	104610	109058



**KEY PLAN
TCP2 - MODULES**

- HOLDS.**
- 1.
 - 2.
 - 3.
 - 4.
 - 5.

LEGEND


o - EQUIPMENT ORIGIN SYMBOL

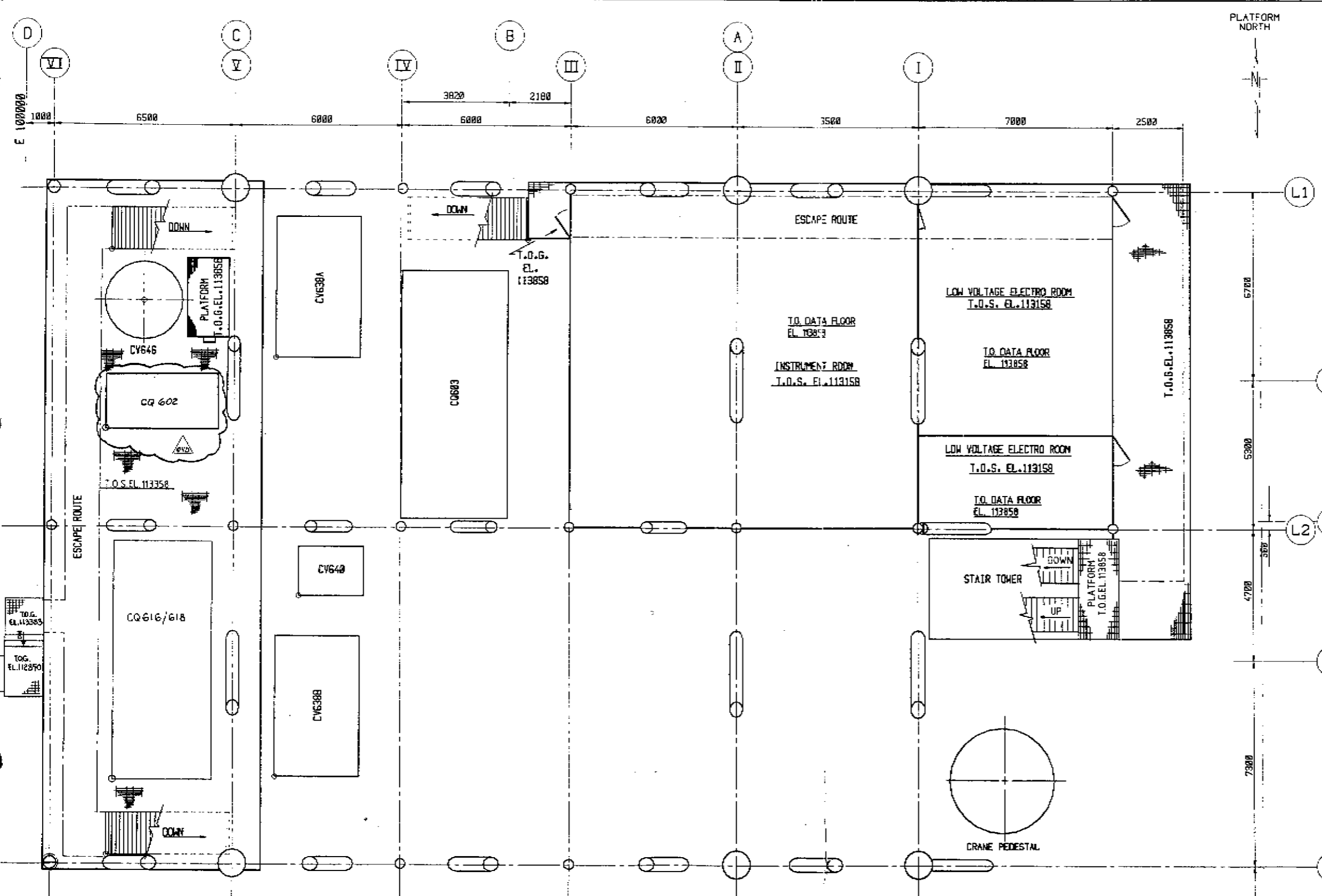
FF-22-00-00-1801 MODULE NOS MEZZANINE DECK

REFERENCE DRAWINGS

NO	DATE	DESCRIPTION	BY	CHKD	APPD
04D	02/02	ISSUED FOR ONSHORE CONST.	HN	ESU	JOT
03D	01/22	ISSUED FOR ONSHORE CONST.	TGC	ESU	JOT
02D	01/14	ISSUED FOR ONSHORE CONST.	SEK	JOT	JOT
01D	01/14	APPROVED FOR ONSHORE CONST.	GER	JOT	JOT
00B	01/14	ISSUED FOR COMMENTS	HN	ESU	JOT
00A	01/14	ISSUED FOR TDC	HN	JOT	JOT

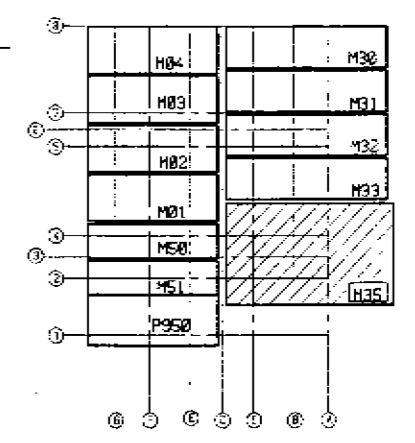
VERITEC


 Size: **A1** Installation: **TCP2** System: **GENERAL**
 Job no.: **FD041**
 Scale: **1/75**
 FRIGG FIELD FF-22-00-00-1801 040



MEZZANINE DECK
T.O.S. EL. 113358

EQUIPMENT LIST				
EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEVn
CV646	LUBE OIL RESERVOIR	115740	109845	118258
CV638A	REC. CDN. OIL METERING	109200	103200	113358
CV638B	LILLEFRIGG OIL METER	109200	103200	113358
CQ602	ELECTRO CLORINATION FILTER	121700	102900	113358
CV638A	LUBE OIL RESERVOIR	124200	109000	114808
CV638B	LUBE OIL RESERVOIR	109300	109000	114808
CV646	3 STAGE DEAERATOR TOWER	126200	104250	113358



KEY PLAN
TCP2 - MODULES

- HOLDS**
- 1.
 - 2.
 - 3.

LEGEND
D-EQUIPMENT ORIGIN SYMBOL

FF-22-00-00-1003 MODULE 35S INTERMEDIATE DECK
FF-22-00-00-1001 MODULE 35S MAIN DECK

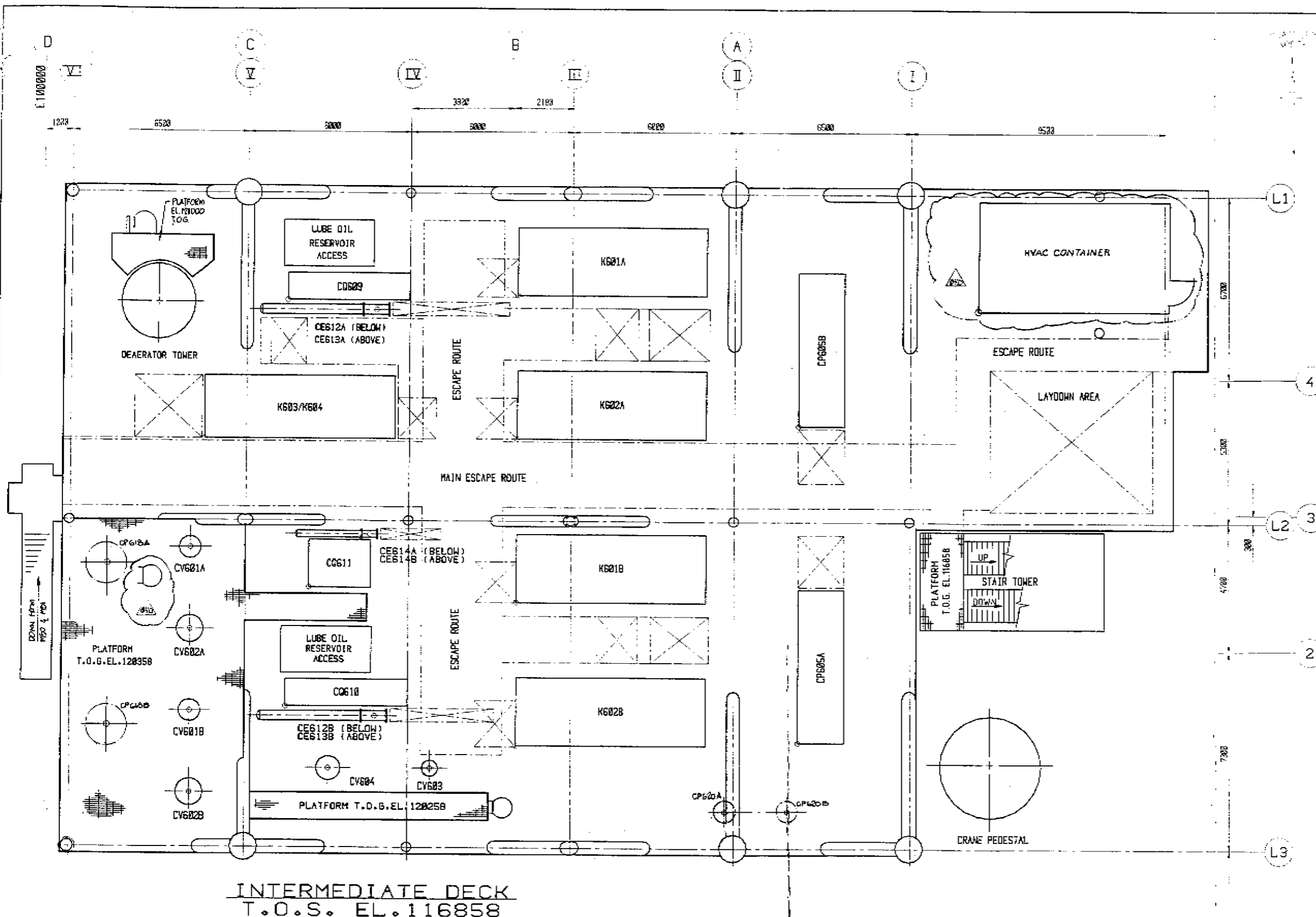
REFERENCE DRAWINGS

REV	DATE	DESCRIPTION	BY	CHKD	APP'D	DATE
001		ISSUED FOR ONSHORE CONSTR.	HN	ESU	JOT	HP
002		REISSUED FOR ONSHORE CONSTR.	HN	ESU	JOT	HP
003		REISSUED FOR ONSHORE CONSTR.	HN	ESU	JOT	HP
004		APPROVED FOR ONSHORE CONSTR.	HN	ESU	JOT	HP
005		ISSUED FOR COMMENTS	HN	ESU	JOT	HP
006		ISSUED FOR IDC	HN	JOT	HP	HOA

VERITEC



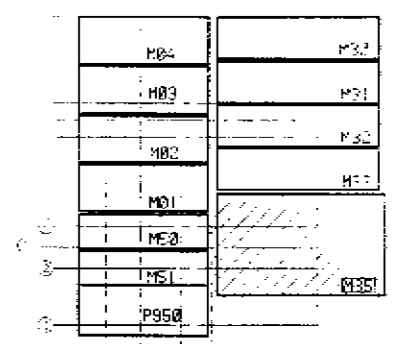
FF-22-00-00-1002-001
Size: A1
Installation System: GENERAL
Job no.: FD041
Scale: 1/75
FRØY PROJECT
EQUIPMENT LAYOUT
MODULE 35
MEZZANINE DECK



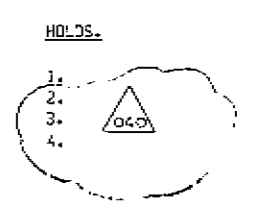
INTERMEDIATE DECK
T.O.S. EL. 116858

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CE612A	LUBE OIL HEAT EXCHANGER	125920	112300	119508
CE612B	LUBE OIL HEAT EXCHANGER	111020	112300	119508
CE613A	LUBE OIL HEAT EXCHANGER	125920	112300	118018
CE613B	LUBE OIL HEAT EXCHANGER	111820	112300	118018
CE614A	LUBE OIL HEAT EXCHANGER	117700	112100	117452
CE614B	LUBE OIL HEAT EXCHANGER	117700	112100	118303
CP605A	OIL EXPORT PUMP	110075	127900	116858
CP605B	OIL EXPORT PUMP	121700	127800	116858
CP619A	OIL TRANSFER PUMP	106250	102411	116858
CP619B	OIL TRANSFER PUMP	110700	102411	116858
CP620A	RECYCLED COND PUMPS	107504	105200	116858
CP620B	RECYCLED COND PUMPS	107504	107454	116858
CG609	LUBE OIL SKID	1126270	109000	116858

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
KG01A	HVAC CONTAINER	125950	134575	116858
KG01B	LUBE OIL SKID	111370	109000	116858
CG611	LUBE OIL SKID	115740	109845	116858
CV601A	1ST STAGE SUCTION SCRUBBER	117200	105500	116858
CV601B	1ST STAGE SUCTION SCRUBBER	111200	105500	116858
CV602A	2ND STAGE SUCTION SCRUBBER	114200	105500	116858
CV602B	2ND STAGE SUCTION SCRUBBER	108200	105500	116858
CV603	1ST FUEL GAS COMP. S.SCR.	109100	114245	116858
CV604	2ND FUEL GAS COMP. S.SCR.	109100	110600	116858
KG01A	1ST STAGE GAS COMPRESSOR	128450	117500	116858
KG01B	1ST STAGE GAS COMPRESSOR	115200	117500	116858
KG02A	2ND STAGE GAS COMPRESSOR	121200	117500	116858
KG02B	2ND STAGE GAS COMPRESSOR	109950	117500	116858
KG03/KG04	1ST/2ND FUEL GAS COMP.	121200	106000	116858



KEY PLAN
TCP2 - MODULES



LEGEND
o - EQUIPMENT ORIGIN SYMBOL

FF-22-00-00-1000 MODULE 35 WEATHER DECK
FF-22-00-00-1000 MODULE 35 MEZZANINE DECK
DRAWING NO. INTERMEDIATE DECK

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION	BY	CHKD.	APP'D.
001	11/20/00	ISSUED FOR COMMENTS	HW	ESU	HP
002	11/20/00	ISSUED FOR TBC	HW	DOT	HP

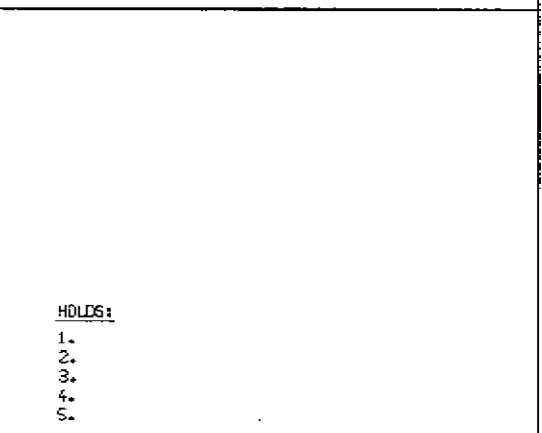
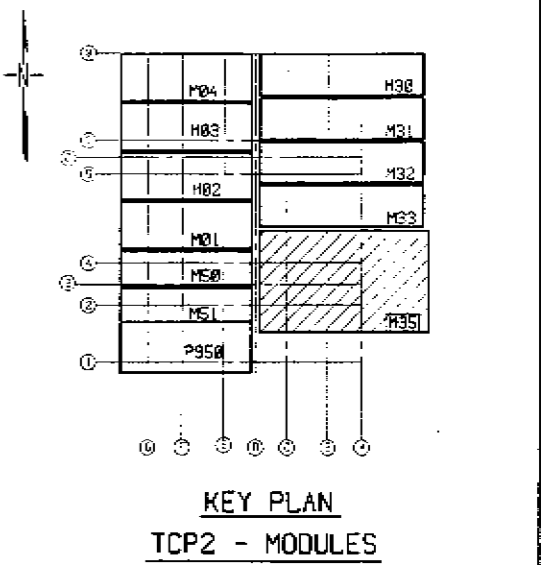
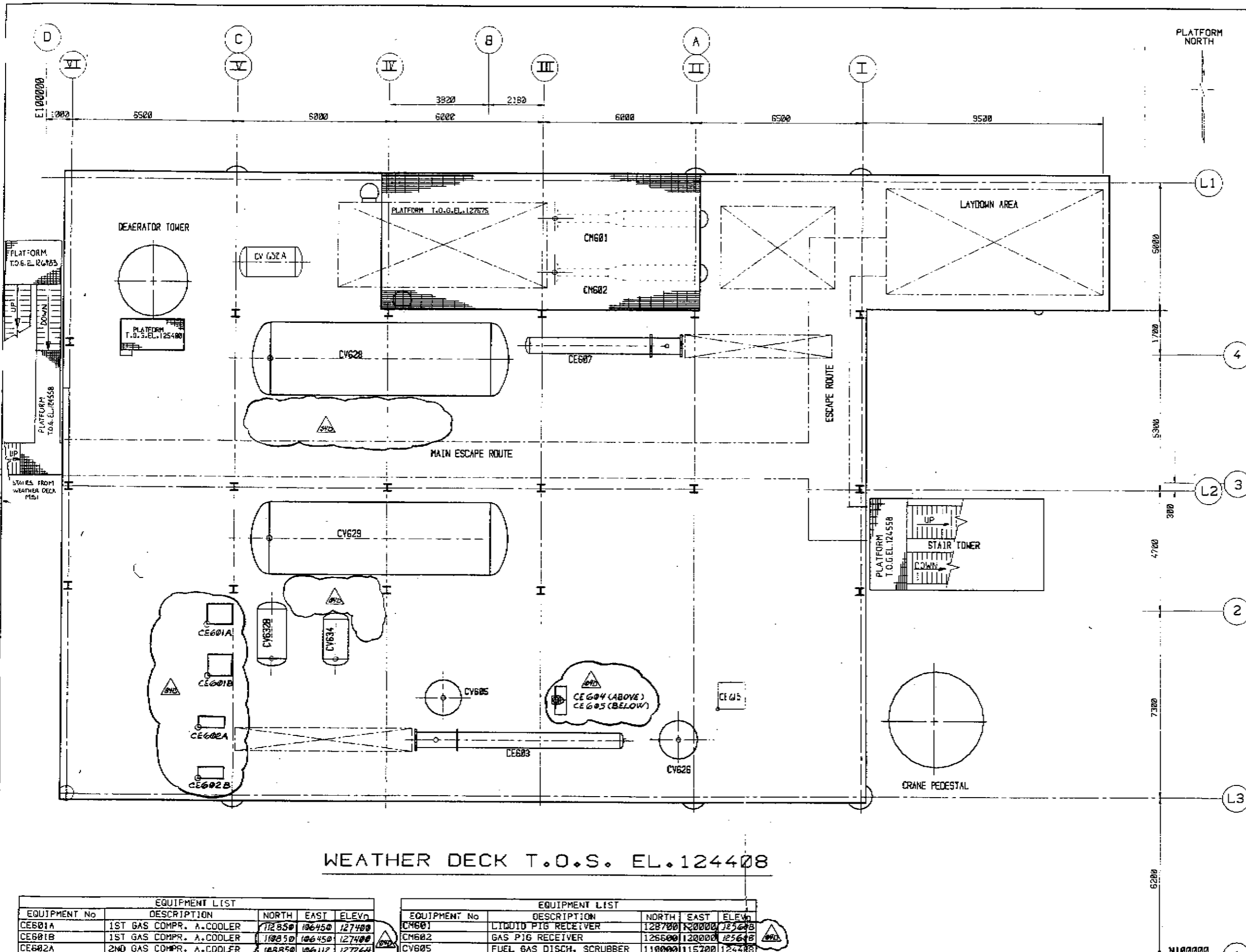
Contractor: **VERITEC**

Project: **FR0Y PROJECT**
Equipment Layout
Module 35
Intermediate Deck

Scale: 1/75

Sheet: **A1 TCP2 GENERAL**

FRIGG FIELD FF-22-00-00-223 740



LEGEND
 ○ - EQUIPMENT ORIGIN SYMBOL

HOLDS:
 1.
 2.
 3.
 4.
 5.

NO.	DATE	DESCRIPTION
FF-22-00-00-1005		MODULE 35 LAYDOWN/METERING PLATFORM
FF-22-00-00-1006		MODULE 35 INTERMEDIATE DECK

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION	BY	CHKD	APP'D	DATE
010		ISSUED FOR ONSHORE CONSTR.	GER	JOT	HH	
020		ISSUED FOR ONSHORE CONSTR.	GER	JOT	HH	
030		ISSUED FOR COMMENT	HH	JOT	HH	
040		ISSUED FOR IDC	HH	JOT	HH	

WEATHER DECK T.O.S. EL. 124408

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CE601A	1ST GAS COMPR. A.COOLER	112850	106450	127400
CE601B	1ST GAS COMPR. A.COOLER	110850	106450	127400
CE602A	2ND GAS COMPR. A.COOLER	108850	106112	127264
CE602B	2ND GAS COMPR. A.COOLER	106850	106112	127264
CE603	1ST FUEL GAS COM.A.COOLER	108950	115412	125958
CE604	FUEL GAS/GAS HEAT EXCH.	110000	120100	127375
CE605	2ND FUEL GAS COM.A.COOLER	110000	120205	125752
CE607	OIL INLET HEATER	123750	125134	125908
CE615	GAS INLET HEATER	126000	126400	125819

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CE601	LITUID PIG RECEIVER	128700	120000	125648
CE602	GAS PIG RECEIVER	126500	120000	125648
CV605	FUEL GAS DISCH. SCRUBBER	110000	115700	124408
CV626	GAS SEPARATOR	100400	124900	124408
CV628	1 ST. STAGE OIL SEPARATOR	123200	106900	127005
CV629	2 ND. STAGE OIL SEPARATOR	116200	106900	127005
CV632A	RUNDOWN TANK	126303	106900	125543
CV632B	RUNDOWN TANK	111500	109000	125543
CV634	RUNDOWN TANK	111500	111500	125543

VERITEC

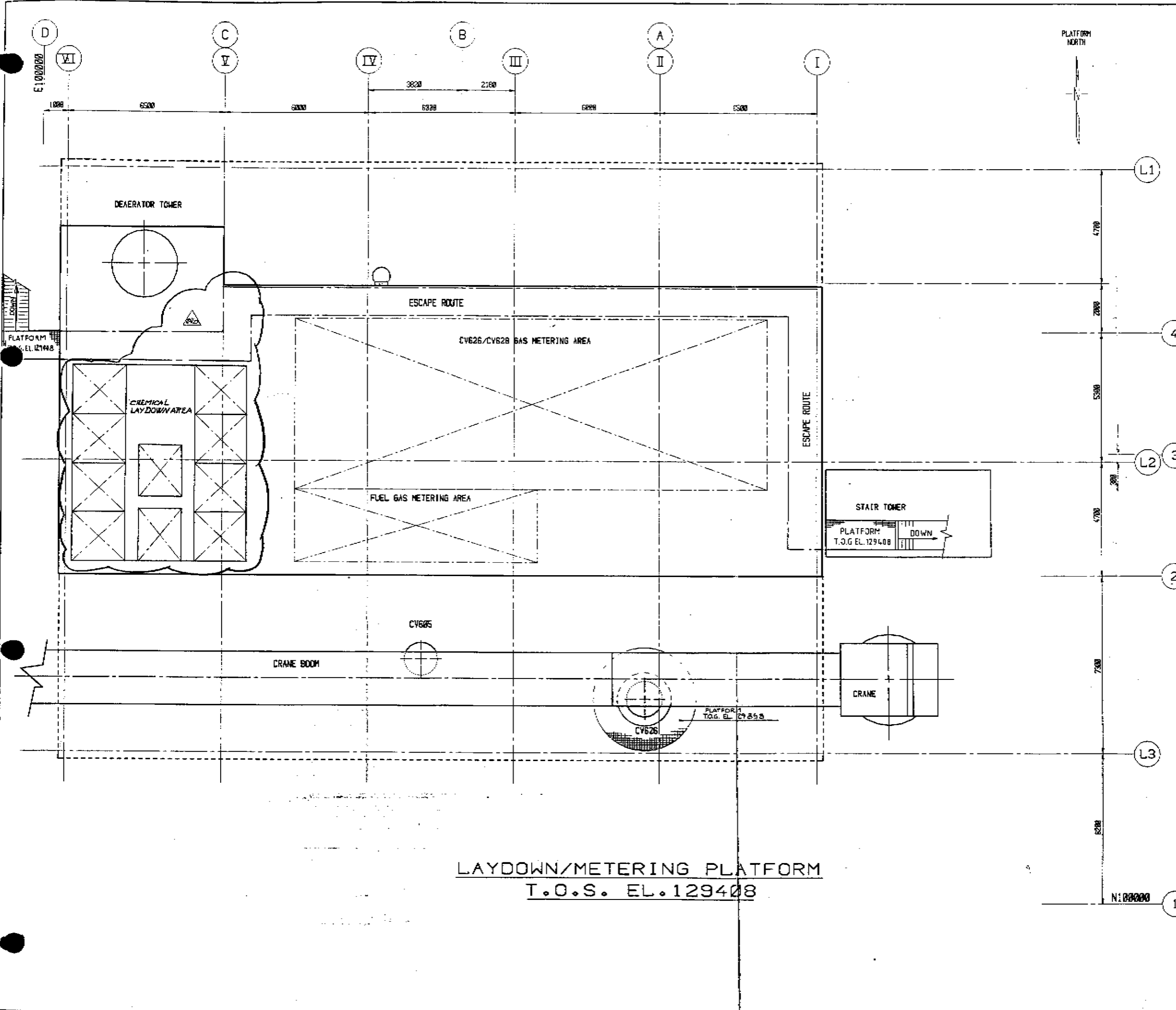
OFF petroleum north of's project (FF-22-00-00-1000)

Scale: 1/75

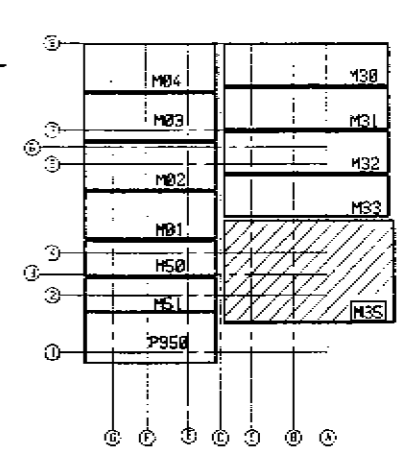
FD041

GENERAL

FRBY PROJECT EQUIPMENT LAYOUT MODULE 35 WEATHER DECK



LAYDOWN/METERING PLATFORM
T.O.S. EL. 129408



KEY PLAN
TCP2 - MODULES

- HOLDS.
- 1.
 - 2.
 3. SIZE OF CHEMICAL LAYDOWN AREA
 4. PLATFORM CV 626

LEGEND
o - EQUIPMENT ORIGIN SYMBOL

REV.	DATE	DESCRIPTION	BY	CHKD	APPD	PROJ. CHG.	REV. AUTH.	DATE
010	12/10/84	ISSUED FOR COMMENTS	HM	ESU	JOT	HDA	AJ	8/8
008	12/10/84	ISSUED FOR COMMENTS	HM	ESU	JOT	HDA	AJ	8/8
007	12/10/84	APPROVED FOR ONSHORE CONSTR.	GEK	JOT	HM	HDA	AJ	8/8
006	12/10/84	REISSUED FOR ONSHORE CONSTR.	GEK	JOT	HM	HDA	AJ	8/8
005	12/10/84	REISSUED FOR ONSHORE CONSTR.	HM	ESU	SAB	HDA	HP	8/8
004	12/10/84	REISSUED FOR ONSHORE CONSTR.	HM	ESU	SAB	HDA	HP	8/8

FRIGG FIELD

VERITEC

W.P. petroleum range a/s p.a.-box 101 481 Stavanger

Size	A1	Location	TCP2	System	GENERAL
Job no.	FDD41	FRØY PROJECT EQUIPMENT LAYOUT MODULE 35			
Scale	1/75	LAYDOWN/METERING PLATFORM			
Draw no.	FF-22-00-00-1005	Rev.	040	Drawn	



FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUME	RE-FD-22-00-0029
SECTION III - FRØY TIE-IN	Date effective : May 1995
VOLUME I - MODULE M35	Revision No. : 01G
	Date revised :
BOOK 1 of 1	Page : 63

References
See chapter 2.4

2.17 Equipment List
Frøy Tie-In Project

See attached Master Equipment list, EQ-FF-22-06-1000 Rev. 06B.



DNV VERITEC

ELF PETROLEUM NORGE AS

FRØY INTEGRATION WORK ON TCP2 DETAILED ENGINEERING CONTRACT FD041

TITLE: MASTER EQUIPMENT LIST

DOC. NO.: EQ-FF-22-06-1000

Rev	Date	Description	By	Ckd	App'd	Proj Eng	Client	
06B	10.12.93	Issued for Information with General Update	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>		

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM-LOCATION	PACKAGE NO	DRY-WEIGHT (tonnes)	OPER.-WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
52-GG-01A	52-GG-01A	GAS GENERATOR	INTE	MA-027	13,500	13,500	N.A	16000	N.A	N.A	1.35 x 4.79 (D x L)	
52-GG-01B	52-GG-01B	GAS GENERATOR	INTE	MA-027	13,500	13,500	N.A	16000	N.A	N.A	1.35 x 4.79 (D x L)	
CE601A	CE601A	1ST STAGE AFTERCOOLER	M35-W	MA-005	1,360	1,448	1615	3082	60/12	-20/170, -20/170	1.22 x 0.80 x 1.13	COMPACT
CE601B	CE601B	1ST STAGE AFTERCOOLER	M35-W	MA-005	1,360	1,448	1615	3082	60/12	-20/170, -20/170	1.22 x 0.80 x 1.13	COMPACT
CE602A	CE602A	2ND STAGE AFTERCOOLER	M35-W	MA-005	1,900	2,013	824	4615	150/12	-20/135, -20/135	1.17 x 0.95 x 1.61	COMPACT
CE602B	CE602B	2ND STAGE AFTERCOOLER	M35-W	MA-005	1,900	2,013	824	4615	150/12	-20/135, -20/135	1.17 x 0.95 x 1.61	COMPACT
CE603	CE603	1ST STAGE FUEL GAS AFTERCOOLER	M35-W	MA-006	5,310	7,675	1712	1611	18.5/12	-20/135, -20/135	0.65 x 7.13 (D x L)	SHELL & TUBE
CE604	CE604	FUEL GAS/GAS HEAT EXCHANGER	M35-W	MA-005	0,220	0,233	704	71.5	27/27	-20/135, -20/135	0.75 x 0.37 x 0.62	COMPACT
CE605	CE605	2ND STAGE FUEL GAS AFTERCOOLER	M35-W	MA-005	1,720	1,795	800	3050	27/12	-20/130, -20/130	1.22 x 0.95 x 1.12	COMPACT
CE607	CE607	FROY OIL INLET HEATER	M35-W	MA-006	5,750	7,085	456	5600	28/18.5	-20/205, -20/205	0.74 x 5.30 (D x L)	SHELL & TUBE
CE615	CE615	FROY GAS INLET HEATER	M35-W	MA-005	0,520	0,540	174	878	28/149	-30/205, -30/205	0.87 x 0.53 x 0.91	COMPACT
CM601	CM601	FROY OIL PIG RECEIVER	M35-W	MA-019	2,726	3,666	N.A	N.A	149.0	-10.0/30.0	7.20 x 0.80 x 1.06	
CM602	CM602	FROY GAS PIG RECEIVER	M35-W	MA-019	2,733	3,673	N.A	N.A	149.0	-30.0/35.0	7.20 x 0.80 x 1.06	
CM660	CM660	1 TONNE SWL CHAIN HOIST	M35	MA-031	0,011	0,011	N.A	N.A	N.A	N.A	N.A	
CM661	CM661	1 TONNE SWL GEARED TROLLEY	M35	MA-031	0,025	0,025	N.A	N.A	N.A	N.A	N.A	
CM662	CM662	3 TONNE SWL CHAIN HOIST	M35	MA-031	0,017	0,017	N.A	N.A	N.A	N.A	N.A	
CM663	CM663	3 TONNE SWL GEARED TROLLEY	M35	MA-031	0,045	0,045	N.A	N.A	N.A	N.A	N.A	
CM664	CM664	5 TONNE SWL CHAIN HOIST	M35	MA-031	0,049	0,049	N.A	N.A	N.A	N.A	N.A	
CM665	CM665	5 TONNE GEARED TROLLEY	M35	MA-031	0,045	0,045	N.A	N.A	N.A	N.A	N.A	
CM666	CM666	10 TONNE CHAIN HOIST	M35	MA-031	0,083	0,083	N.A	N.A	N.A	N.A	N.A	
CM667	CM667	10 TONNE GEARED TROLLEY	M35	MA-031	0,112	0,112	N.A	N.A	N.A	N.A	N.A	
CP503A	CM624A	MOTOR FOR CP503A	INTE	MA-025			N.A	70	N.A	N.A	INCL. IN CP503A	
	CP503A	OIL BOOSTER PUMP	INTE	MA-025	1,532	1,600	229	N.A	10.0	5.0/80.0	1.10 x 0.75 x 1.97	
CP503B	CM624B	MOTOR FOR CP503B	INTE	MA-025			N.A	70	N.A	N.A	INCL. IN CP503B	
	CP503B	OIL BOOSTER PUMP	INTE	MA-025	1,532	1,600	229	N.A	10.0	5.0/50.0	1.10 x 0.75 x 1.97	
CP503C	CM624C	MOTOR FOR CP503C	INTE	MA-025			N.A	70	N.A	N.A	INCL. IN CP503C	
	CP503C	OIL BOOSTER PUMP	INTE	MA-025	1,532	1,600	229	N.A	10.0	5.0/50.0	1.10 x 0.75 x 1.97	
CP605A	CE617A	MOTOR COOLER FOR CM620A	M35-I	MA-015			N.A	N.A	N.A	N.A	INCL. IN CPC05A	
	CE618A	MOTOR COOLER FOR CM620A	M35-I	MA-015			N.A	N.A	N.A	N.A	INCL. IN CP605A	
	CM620A	MOTOR FOR CP605A	M35-I	MA-015			N.A	1100	N.A	N.A	INCL. IN CP605A	
	CP605A	OIL EXPORT PUMP	M35-I	MA-015	14,500	15,500	438	N.A	99.3	-20.0/55.0	5.63 x 1.70 x 2.45	
CP605B	CE617B	MOTOR COOLER FOR CM620B	M35-I	MA-015			N.A	N.A	N.A	N.A	INCL. IN CP605B	
	CE618B	MOTOR COOLER FOR CM620B	M35-I	MA-015			N.A	N.A	N.A	N.A	INCL. IN CP605B	
	CM620B	MOTOR FOR CP605B	M35-I	MA-015			N.A	1100	N.A	N.A	INCL. IN CP605B	
	CP605B	OIL EXPORT PUMP	M35-I	MA-015	14,500	15,500	438	N.A	99.3	-20.0/55.0	5.63 x 1.70 x 2.45	
CP606A	CM627A	MOTOR FOR CP606A	INTE	MA-010			N.A	175	N.A	N.A	INCL. IN CP605A	
	CP606A	WATER INJECTION FEED PUMP	INTE	MA-010	3,252	3,300	530	N.A	12.5	10.0/35.0	2.80 x 1.20 x 1.08	
CP606B	CM627B	MOTOR FOR CP606B	INTE	MA-010			N.A	175	N.A	N.A	INCL. IN CP605B	
	CP606B	WATER INJECTION FEED PUMP	INTE	MA-010	3,252	3,300	530	N.A	12.5	10.0/35.0	2.80 x 1.20 x 1.08	
CP607A	CE616A	L/O COOLER FOR CP607A	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607A	
	CH604A	L/O HEATER FOR CP607A	M35-M	MA-009			N.A	3	N.A	N.A	INCL. IN CP607A	
	CM621A	MOTOR FOR CP607A	M35-M	MA-009			N.A	1900	N.A	N.A	INCL. IN CP607A	
	CM634A	GEARBOX FOR CP607A	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607A	
	CM635A	MAIN COUPLING FOR CP607A	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607A	
	CM639A	MOTOR FOR CP655A	M35-M	MA-009			N.A	8.6	N.A	N.A	INCL. IN CP607A	

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
	CP607A	WATER INJECTION PUMP	M35-M	MA-009	17,200	18,700	240	N.A	205.0	50.0	4.60 x 2.10 x 3.10	
	CP630A	BOOSTER STAGE OF CP607A	M35-M	MA-009			240	N.A	N.A	N.A	INCL. IN CP607A	
	CP654A	L/O PUMP FOR CP607A	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607A	
	CP655A	AUXILIARY PUMP FOR CP607A	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607A	
	CV654A	L/O FILLING FILTER FOR CP607A	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607A	
CP607B	CE616B	L/O COOLER FOR CP607B	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607B	
	CH604B	L/O HEATER FOR CP607B	M35-M	MA-009			N.A	3	N.A	N.A	INCL. IN CP607B	
	CM621B	MOTOR FOR CP607B	M35-M	MA-009			N.A	1900	N.A	N.A	INCL. IN CP607B	
	CM634B	GEAR BOX FOR CP607B	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607B	
	CM635B	MAIN COUPLING FOR CP607B	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607B	
	CM639B	MOTOR FOR CP655B	M35-M	MA-009			N.A	8.6	N.A	N.A	INCL. IN CP607B	
	CP607B	WATER INJECTION PUMP	M35-M	MA-009	17,200	18,700	240	N.A	205.0	50.0	4.60 x 2.10 x 3.10	
	CP630B	BOOSTER STAGE OF CP607B	M35-M	MA-009			240	N.A	N.A	N.A	INCL. IN CP607B	
	CP654B	L/O PUMP FOR CP607B	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607B	
	CP655B	AUXILIARY PUMP FOR CP607B	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607B	
	CV645B	L/O FILLING FILTER FOR CP607B	M35-M	MA-009			N.A	N.A	N.A	N.A	INCL. IN CP607B	
CP609A	CM644A	MOTOR FOR CP609A	INTE	MA-017			N.A	26	N.A	N.A	INCL. IN CP609A	
	CP609A	RECIRCULATING PUMP	INTE	MA-017	1,288	1,300	15	N.A	20.0	60.0	4.25 x 0.48 x 0.84	
CP609B	CM644B	MOTOR FOR CP609B	INTE	MA-017			N.A	26	N.A	N.A	INCL. IN CP609B	
	CP609B	RECIRCULATING PUMP	INTE	MA-017	1,288	1,300	15	N.A	20.0	60.0	4.25 x 0.48 x 0.84	
CP615A	CM630A	MOTOR FOR CP615A	FLAR	MA-033			N.A	1.3	N.A	N.A	INCL. IN CP615A	
	CP615A	KNOCK OUT DRUM PUMP	FLAR	MA-033	0,205	0,215	10	N.A	19.2	-6.0/50.0	1.10 x 0.41 x 0.32	
CP615B	CM630B	MOTOR FOR CP615B	FLAR	MA-033			N.A	1.3	N.A	N.A	INCL. IN CP615B	
	CP615B	KNOCK-OUT DRUM PUMP	FLAR	MA-033	0,205	0,215	10	N.A	19.2	-6.0/50.0	1.10 x 0.41 x 0.32	
CP618A	CM631A	MOTOR FOR CP618A	M35-I	MA-028			N.A	160	N.A	N.A	INCL. IN CP618A	
	CP618A	FRY OIL TRANSFER PUMP	M35-I	MA-028	2,920	3,000	417	N.A	23.5	-10.0/75.0	1.15 x 1.15 x 2.95	
CP618B	CM631B	MOTOR FOR CP618B	M35-I	MA-028			N.A	160	N.A	N.A	INCL. IN CP618B	
	CP618B	FRY OIL TRANSFER PUMP	M35-I	MA-028	2,920	3,000	417	N.A	23.5	-10.0/75.0	1.15 x 1.15 x 2.95	
CP619A	CM632A	MOTOR FOR CP619A	M52	MA-034			N.A	75	N.A	N.A	INCL. IN CP619A	
	CP619A	LILLE FRIGG CONDENSATE PUMP	M52	MA-034	3,150	3,500	73	N.A	74.0	-20.0/100.0	0.89 x 0.70 x 5.59	VER. BARREL (CAN)
CP619B	CM632B	MOTOR FOR CP619B	M52	MA-034			N.A	75	N.A	N.A	INCL. IN CP619B	
	CP619B	LILLE FRIGG CONDENSATE PUMP	M52	MA-034	3,150	3,500	73	N.A	74.0	-20.0/100.0	0.89 x 0.70 x 5.59	VER. BARREL (CAN)
CP620A	CM643A	MOTOR FOR CP620A	M35-I	MA-016			N.A	35	N.A	N.A	INCL. IN CP620A	
	CP620A	RECYCLED CONDENSATE PUMP	M35-I	MA-016	0,538	0,540	47	N.A	33.0	-20.0/45.0	0.56 x 0.73 x 1.65	
CP620B	CM643B	MOTOR FOR CP620B	M35-I	MA-016			N.A	35	N.A	N.A	INCL. IN CP620B	
	CP620B	RECYCLED CONDENSATE PUMP	M35-I	MA-016	0,538	0,540	47	N.A	30.7	-20.0/45.0	0.56 x 0.73 x 1.65	
CP653A	CM645A	MOTOR FOR CP653A	INTE	MA-035			N.A	10	N.A	N.A	INCL. IN CP653A	
	CP653A	GENERATOR COOLING PUMP	INTE	MA-035	0,990	1,000	126	N.A	7.8	-10.0/30.0	1.95 x 0.88 x 0.90	
CP653B	CM645B	MOTOR FOR CP653B	INTE	MA-035			N.A	10	N.A	N.A	INCL. IN CP653B	
	CP653B	GENERATOR COOLING PUMP	INTE	MA-035	0,990	1,000	126	N.A	7.8	-10.0/30.0	1.95 x 0.88 x 0.90	
CQ602	CM648A	MOTOR FOR K648A	M35-Z	MA-012			N.A	3.3	N.A	N.A	INCL. IN CQ602	
	CM648B	MOTOR FOR K648B	M35-Z	MA-012			N.A	3.3	N.A	N.A	INCL. IN CQ602	
	CM649A	HYPOCHLORITE ELECTROLYSER	M35-Z	MA-012			10.8	55	10.0	-10.0/40.0	INCL. IN CQ602	
	CM649B	HYPOCHLORITE ELECTROLYSER	M35-Z	MA-012			10.8	55	10.0	-10.0/40.0	INCL. IN CQ602	
	CQ602	ELECTRO CHLORINATION PACKAGE	M35-Z	MA-012	3,400	4,400	10.8	N.A	10.0	-10.0/40.0	4.00 x 2.00 x 2.50	

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS		
CQ603	CV615	DEGASSING TANK	M35-Z	MA-012			N.A	N.A	ATMOS.	-10.0/40.0	INCL. IN CQ602			
	CV657	SEAWATER FILTER	M35-Z	MA-012			10.8	N.A	10.0	-10.0/40.0	INCL. IN CQ602			
	K648A	AIR BLOWER	M35-Z	MA-012			450	N.A	N.A	N.A	INCL. IN CQ602			
	K648B	AIR BLOWER	M35-Z	MA-012			450	N.A	N.A	N.A	INCL. IN CQ602			
	CM628A	MOTOR FOR CP613A	M35-M	MA-008				N.A	1.5	N.A	N.A	INCL. IN CQ603		
	CM628B	MOTOR FOR CP613B	M35-M	MA-008				N.A	1.5	N.A	N.A	INCL. IN CQ603		
	CP613A	ACID PUMP - DUTY	M35-M	MA-008				0.3	N.A	10.0	-10.0/60.0	INCL. IN CQ603		
	CP613B	ACID PUMP - STANDBY	M35-M	MA-008				0.3	N.A	10.0	-10.0/60.0	INCL. IN CQ603		
	Q6603	WATER INJECTION FINE FILTER PACKAGE	M35-M	MA-008		30,600	52,600	480	N.A	10.0	-10.0/60.0	8.80 x 3.75 x 5.55		
	CV611	ACID DRY TANK	M35-M	MA-008				N.A	N.A	4.0	-10.0/60.0	INCL. IN CQ603		
	CV613	AIR DISTRIBUTION HEADER	M35-M	MA-008				N.A	N.A	10.0	-10.0/60.0	INCL. IN CQ603		
	CV619A	WATER INJECTION FINE FILTER	M35-M	MA-008				240	N.A	10.0	-10.0/60.0	INCL. IN CQ603		
	CQ604	CV619B	WATER INJECTION FINE FILTER	M35-M	MA-008			240	N.A	10.0	-10.0/60.0	INCL. IN CQ603		
CV619C		WATER INJECTION FINE FILTER	M35-M	MA-008			240	N.A	10.0	-10.0/60.0	INCL. IN CQ603			
CV620		GAS CYCLONE	M35-M	MA-008				N.A	N.A	3.5	-10.0/75.0	INCL. IN CQ603		
CM622		2ND STAGE EJECTOR	M35-M	MA-011				N.A	N.A	3.5	-10.0/35.0	INCL. IN CP632A		
CM623		3RD STAGE EJECTOR	M35-M	MA-011				N.A	N.A	3.5	-10.0/35.0	INCL. IN CP632A		
CM626A		MOTOR FOR CP632A	M35-M	MA-011				N.A	64	N.A	N.A	INCL. IN CP632A		
CM626B		MOTOR FOR CP632B	M35-M	MA-011				N.A	64	N.A	N.A	INCL. IN CP632A		
CM633A		MOTOR FOR CP626A	M35-M	MA-011				N.A	58	N.A	N.A	INCL. IN CP626A		
CM633B		MOTOR FOR CP626B	M35-M	MA-011				N.A	58	N.A	N.A	INCL. IN CP626A		
CP626A		PRE BOOSTER PUMP - DUTY	M35-M	MA-011		1,446	1,506	488	N.A	6.0	-10.0/35.0	0.80 x 0.80 x 2.50		
CP626B		PRE BOOSTER PUMP - STANDBY	M35-M	MA-011		1,446	1,506	488	N.A	6.0	-10.0/35.0	0.80 x 0.80 x 2.50		
CP632A		VACUUM PUMP - DUTY	M35-M	MA-011		6,560	6,810	937	N.A	3.5	-10.0/35.0	3.90 x 3.10 x 1.78		
CP632B		VACUUM PUMP - STANDBY	M35-M	MA-011				937	N.A	3.5	-10.0/35.0	INCL. IN CP632A		
Q6604	WATER INJECTION DEAERATION PACKAGE	M35	MA-011				480	N.A	N.A	N.A	SEE ABOVE & BELOW			
CQ605	CV646	DEAERATION TOWER	M35-I	MA-011			35,924	55,275	480	N.A	VAC./5.	-10.0/35.0	2.75I.D x 16.30T/T	
	CV647	SEPARATOR	M35-M	MA-011				N.A	N.A	0.07	-10.0/35.0	INCL. IN CP632A		
	CM625A	MOTOR FOR CHEMICAL INJECTION PUMPS	M35-M	MA-013				N.A	1.5	N.A	N.A	INCL. IN CQ605		
	CM625B	MOTOR FOR CHEMICAL INJECTION PUMPS	M35-M	MA-013				N.A	1.5	N.A	N.A	INCL. IN CQ605		
	CP621A	BACTERICIDE INJECTION PUMP (CONT.)	M35-M	MA-013				0.024	N.A	19.0	N.A	INCL. IN CQ605		
	CP621B	BACTERICIDE INJECTION PUMP (CONT.)	M35-M	MA-013				0.024	N.A	19.0	N.A	INCL. IN CQ605		
	CP622A	ANTI-FOAM INJECTION PUMP	M35-M	MA-013				0.005	N.A	19.0	N.A	INCL. IN CQ605		
	CP622B	ANTI-FOAM INJECTION PUMP	M35-M	MA-013				0.005	N.A	19.0	N.A	INCL. IN CQ605		
	CP623A	BACTERICIDE INJECTION PUMP (BATCH)	M35-M	MA-013				0.385	N.A	19.0	N.A	INCL. IN CQ605		
	CP623B	BACTERICIDE INJECTION PUMP (BATCH)	M35-M	MA-013				0.385	N.A	19.0	N.A	INCL. IN CQ605		
	CP624A	SCALE INHIBITOR PUMP	M35-M	MA-013				0.010	N.A	19.0	N.A	INCL. IN CQ605		
	CP624B	SCALE INHIBITOR PUMP	M35-M	MA-013				0.010	N.A	19.0	N.A	INCL. IN CQ605		
	CP625A	OXYGEN SCAVENGER INJECTION PUMP	M35-M	MA-013				0.005	N.A	19.0	N.A	INCL. IN CQ605		
CP625B	OXYGEN SCAVENGER INJECTION PUMP	M35-M	MA-013				0.005	N.A	19.0	N.A	INCL. IN CQ605			
Q6605	CHEMICAL INJ'N TO INJECTION WATER	M35-M	MA-013		10,000	28,000	N.A	N.A	N.A	N.A	5.20 x 3.25 x 3.25			
CV621	BACTERICIDE TANK (CONT.)	M35-M	MA-013				4,000	N.A	NOTE	-20.0/35.0	INCL. IN CQ605	TANK FULL OF		
CV622	ANTI-FOAM TANK	M35-M	MA-013				1,000	N.A	NOTE	-20.0/35.0	INCL. IN CQ605	WATER OR LIQUID		
CV623	BACTERICIDE TANK (BATCH)	M35-M	MA-013				5,000	N.A	NOTE	-20.0/35.0	INCL. IN CQ605	WHICHEVER IS		
CV624	SCALE INHIBITOR TANK	M35-M	MA-013				2,500	N.A	NOTE	-20.0/35.0	INCL. IN CQ605	HEAVIER + 0.3M		

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER. - WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS	
CQ608	CV625	OXYGEN SCAVENGER TANK	M35-M	MA-013			1.000	N.A	NOTE	-20.0/35.0	INCL.IN CQ605	NOTE	
	CM629A	MOTOR FOR CHEMICAL INJECTION PUMP	M35-M	MA-026			N.A	0.75	N.A	N.A	INCL.IN CQ608		
	CM629B	MOTOR FOR CHEMICAL INJECTION PUMP	M35-M	MA-026			N.A	0.75	N.A	N.A	INCL.IN CQ608		
	CP647A	CORROSION INHIBITOR PUMP LP	M35-M	MA-026			0.007	N.A	23.0	N.A	INCL.IN CQ608		
	CP647B	CORROSION INHIBITOR PUMP LP	M35-M	MA-026			0.007	N.A	23.0	N.A	INCL.IN CQ608		
	CP648A	WAX INHIBITOR PUMP	M35-M	MA-026			0.070	N.A	23.0	N.A	INCL.IN CQ608		
	CP648B	WAX INHIBITOR PUMP	M35-M	MA-026			0.070	N.A	23.0	N.A	INCL.IN CQ608		
	CP649A	CORROSION INHIBITOR PUMP HP	M35-M	MA-026			0.036	N.A	23.0	N.A	INCL.IN CQ608		
	CP649B	CORROSION INHIBITOR PUMP HP	M35-M	MA-026			0.036	N.A	23.0	N.A	INCL.IN CQ608		
	CP650A	DEMULSFIER PUMP	M35-M	MA-026			0.021	N.A	23.0	N.A	INCL.IN CQ608		
	CP650B	DEMULSFIER PUMP	M35-M	MA-026			0.021	N.A	23.0	N.A	INCL.IN CQ608		
	CP651A	ANTI-FOAM PUMP	M35-M	MA-026			0.003	N.A	23.0	N.A	INCL.IN CQ608		
	CP651B	ANTI-FOAM PUMP	M35-M	MA-026			0.003	N.A	23.0	N.A	INCL.IN CQ608		
	CP652A	FLOCCULENT PUMP	M35-M	MA-026			0.010	N.A	23.0	N.A	INCL.IN CQ608		
	CP652B	FLOCCULENT PUMP	M35-M	MA-026			0.010	N.A	23.0	N.A	INCL.IN CQ608		
	CQ608		CHEMICAL INJECTION TO MAIN PROCESS	M35-M	MA-026	12,500	38,020	N.A	N.A	N.A	N.A	6.30 x 3.50 x 3.13	
	CV648	WAX INHIBITOR TANK	M35-M	MA-026			11.80	N.A	NOTE	-9.0/38.0	INCL.IN CQ608	TANK FULL OF	
	CV649	CORROSION INHIBITOR TANK	M35-M	MA-026			6.300	N.A	NOTE	-9.0/38.0	INCL.IN CQ608	WATER OR LIQUID	
	CV650	DEMULSFIER TANK	M35-M	MA-026			3.600	N.A	NOTE	-9.0/38.0	INCL.IN CQ608	WHICHEVER IS	
	CV651	ANTI-FOAM TANK	M35-M	MA-026			0.500	N.A	NOTE	-9.0/38.0	INCL.IN CQ608	HEAVIER + 0.3M	
CV652	FLOCCULENT TANK	M35-M	MA-026			1.600	N.A	NOTE	-9.0/38.0	INCL.IN CQ608	NOTE		
CQ612	CM637	FLARE IGNITION PACKAGE	FLAR	MA-030	0,835	0,835	HOLD	HOLD	N.A	N.A	1.87 x 0.70 x 1.90		
	CM638	FLARE TIP PACKAGE	FLAR	MA-030	2,615	2,615	HOLD	N.A	N.A	N.A	2.90 x 3.00(D x L)		
	CM642	PROPANE SKID	FLAR	MA-030	0,745	1,000	HOLD	N.A	N.A	N.A	1.25 x 1.45 x 2.73		
	CQ650	FLARE TIP RADIATION SHIELD PANELS	FLAR	MA-030	4,370	4,370	N.A	N.A	N.A	N.A	7.00 x 8.00 x 0.05		
	CQ612	FLARE PACKAGE	FLAR	MA-030			N.A	N.A	N.A	N.A	N.A		
CQ625		MECHANICAL HANDLING PACKAGE	M35	MA-031	0,900	0,900	N.A	HOLD	N.A	N.A	HOLD		
CV601A	CV601A	1ST STAGE SUCTION SCRUBBER	M35-I	MA-003	2,500	2,950	214.92	N.A	35.0	-20.0/90.0	0.991.D x 1.995T/T	VERTICAL	
CV601B	CV601B	1ST STAGE SUCTION SCRUBBER	M35-I	MA-003	2,500	2,950	214.92	N.A	35.0	-20.0/90.0	0.991.D x 1.995T/T	VERTICAL	
CV602A	CV602A	2ND STAGE SUCTION SCRUBBER	M35-I	MA-003	3,400	3,900	29.33	N.A	60.0	-20.0/70.0	0.901.D x 2.815T/T	VERTICAL	
CV602B	CV602B	2ND STAGE SUCTION SCRUBBER	M35-I	MA-003	3,400	3,900	29.33	N.A	60.0	-20.0/70.0	0.901.D x 2.815T/T	VERTICAL	
CV603	CV603	FUEL GAS SUCTION SCRUBBER	M35-I	MA-003	2,100	2,500	2368.96	N.A	18.5	-20.0/75.0	0.901.D x 1.845T/T	VERTICAL	
CV604	CV604	FUEL GAS INTERSTAGE SCRUBBER	M35-I	MA-003	2,600	3,300	305.24	N.A	18.5	-20.0/70.0	1.001.D x 3.000T/T	VERTICAL	
CV605	CV605	FUEL GAS DISCHARGE SCRUBBER	M35-W	MA-003	3,800	6,800	7.04	N.A	27.0	-20.0/55.0	1.371.D x 4.450T/T	VERTICAL	
CV616	CB611	HP FLARE KNOCK OUT DRUM HEATER	FLAR	MA-022		3.1		201	28.0	-20.0/205.0	INCL.IN CV616		
	CV616	HP FLARE KNOCK OUT DRUM	FLAR	MA-022	14,100	21,675	69560	N.A	13.6	-65.0/50.0	3.001.D x 8.60T/T		
CV626	CB610	FROY GAS SEPARATOR HEATER	M35-W	MA-022		3.5		85.64	28.0	-30.0/250.0	INCL.IN CV626	COIL	
	CV626	FROY GAS SEPARATOR	M35-W	MA-022	26,500	31,200	1780	N.A	149.0	-30.0/35.0	1.521.D x 5.200T/T	VERTICAL	
CV628	CV628	FROY OIL 1ST STAGE SEPARATOR	M35-W	MA-022	22,000	60,000	1813	N.A	18.5	-10.0/75.0	2.801.D x 8.600T/T	HORIZONTAL	
CV629	CV629	FROY OIL 2ND STAGE SEPARATOR	M35-W	MA-022	22,000	60,000	2482	N.A	18.5	-10.0/75.0	2.801.D x 8.600T/T	HORIZONTAL	
CV630	CV630	PRODUCED WATER DEGASSING DRUM	M35-M	MA-022	4,300	10,800	200	N.A	3.7	-10.0/80.0	1.701.D x 3.000T/T	HORIZONTAL	
K601A	CM605A	ELECTRIC MOTOR DRIVER FOR K601A	M35-I	MA-001			N.A	2850	N.A	N.A	INCL.IN K601A		
	CM611A	GEARBOX FOR K601A	M35-I	MA-001			N.A	N.A	N.A	N.A	INCL.IN K601A		
	CM614A	LOW SPEED COUPLING FOR K601A	M35-I	MA-001			N.A	N.A	N.A	N.A	INCL.IN K601A		
	CM615A	HIGH SPEED COUPLING FOR K601A	M35-I	MA-001			N.A	N.A	N.A	N.A	INCL.IN K601A		

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS	
K601A/K602A	CV641A	SEAL GAS FILTER FOR K601A	M35-I	MA-001			N.A	N.A	90.0	146.0	INCL. IN K601A		
	CV642A	SEAL GAS FILTER FOR K601A	M35-I	MA-001			N.A	N.A	90.0	146.0	INCL. IN K601A		
	K601A	1ST STAGE PROCESS GAS COMPRESSOR	M35-I	MA-001	31,865	32,535	3478	2850	130.0	-45.0/170.0	7.00 x 2.50 x 3.20		
	CB612A	LUBE OIL HEAT EXCHANGER FOR CQ609	M35-I	MA-001				N.A	12.0	80.0	INCL. CQ609		
	CB613A	LUBE OIL HEAT EXCHANGER FOR CQ609	M35-I	MA-001				N.A	12.0	80.0	INCL. CQ609		
	CH601A	MAIN LUBE OIL HEATER FOR CQ609	M35-I	MA-001				20	N.A	N.A	INCL. IN CQ609		
	CH602A	STANDBY LUBE OIL HEATER FOR CQ609	M35-I	MA-001				30	N.A	N.A	INCL. IN CQ609		
	CM608A	ELECTRIC MOTOR DRIVER FOR CP627A	M35-I	MA-001				47	N.A	N.A	INCL. IN CQ609		
	CM609A	ELECTRIC MOTOR DRIVER FOR CP628A	M35-I	MA-001				47	N.A	N.A	INCL. IN CQ609		
	CP627A	MAIN LUBE OIL PUMP FOR CQ609	M35-I	MA-001				35	N.A	12.0	80.0	INCL. IN CQ609	
	CP628A	STANDBY LUBE OIL PUMP FOR CQ609	M35-I	MA-001				35	N.A	12.0	80.0	INCL. IN CQ609	
	CQ609	LUBE OIL SKID FOR K601A/K602A	M35-I	MA-001	4,800	5,900	N.A	N.A	N.A	N.A	4.56 x 1.67 x 3.30		
	CV632A	RUNDOWN TANK FOR CQ609	M35-W	MA-001	0,750	2,800	N.A	N.A	ATMOS.	65.0	2.48 x 1.15 x 1.79		
	CV635A	OIL FILTER FOR CQ609	M35-I	MA-001				N.A	12.0	65.0	INCL. IN CQ609		
CV636A	OIL FILTER FOR CQ609	M35-I	MA-001				N.A	12.0	65.0	INCL. IN CQ609			
K601B	CV638A	LUBE OIL RESERVOIR FOR CQ609	M35-Z	MA-001	7,200	20,000	N.A	N.A	ATMOS.	70.0	5.00 x 3.00 x 4.30		
	CM605B	ELECTRIC MOTOR DRIVER FOR K601B	M35-I	MA-001				2850	N.A	N.A	INCL. IN K601B		
	CM611B	GEARBOX FOR K601B	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K601B		
	CM614B	LOW SPEED COUPLING FOR K601B	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K601B		
	CM615B	HIGH SPEED COUPLING FOR K601B	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K601B		
	CV641B	SEAL GAS FILTER FOR K601B	M35-I	MA-001				N.A	90.0	146.0	INCL. IN K601B		
	CV642B	SEAL GAS FILTER FOR K601B	M35-I	MA-001				N.A	90.0	146.0	INCL. IN K601B		
	K601B	1ST STAGE PROCESS GAS COMPRESSOR	M35-I	MA-001	31,865	32,535	3478	2850	130.0	-45.0/170.0	7.00 x 2.50 x 3.20		
	CB612B	LUBE OIL HEAT EXCHANGER FOR CQ610	M35-I	MA-001				N.A	12.0	80.0	INCL. CQ610		
	CB613B	LUBE OIL HEAT EXCHANGER FOR CQ610	M35-I	MA-001				N.A	12.0	80.0	INCL. CQ610		
K601B/K602B	CH601B	MAIN LUBE OIL HEATER FOR CQ610	M35-I	MA-001				20	N.A	N.A	INCL. IN CQ610		
	CH602B	STANDBY LUBE OIL HEATER FOR CQ610	M35-I	MA-001				30	N.A	N.A	INCL. IN CQ610		
	CM608B	ELECTRIC MOTOR DRIVER FOR CP627B	M35-I	MA-001				47	N.A	N.A	INCL. IN CQ610		
	CM609B	ELECTRIC MOTOR DRIVER FOR CP628B	M35-I	MA-001				47	N.A	N.A	INCL. IN CQ610		
	CP627B	MAIN LUBE OIL PUMP FOR CQ610	M35-I	MA-001				35	N.A	12.0	80.0	INCL. IN CQ610	
	CP628B	STANDBY LUBE OIL PUMP FOR CQ610	M35-I	MA-001				35	N.A	12.0	80.0	INCL. IN CQ610	
	CQ610	LUBE OIL SKID FOR K601B/K602B	M35-I	MA-001	4,800	5,900	N.A	N.A	N.A	N.A	4.56 x 1.67 x 3.30		
	CV632B	RUNDOWN TANK FOR CQ610	M35-W	MA-001	0,750	2,800	N.A	N.A	ATMOS.	65.0	2.48 x 1.15 x 1.79		
	CV635B	OIL FILTER FOR CQ610	M35-I	MA-001				N.A	12.0	65.0	INCL. IN CQ610		
	CV636B	OIL FILTER FOR CQ610	M35-I	MA-001				N.A	12.0	65.0	INCL. IN CQ610		
	CV638B	LUBE OIL RESERVOIR FOR CQ610	M35-Z	MA-001	7,200	20,000	N.A	N.A	ATMOS.	70.0	5.00 x 3.00 x 4.30		
	K602A	CM606A	ELECTRIC MOTOR DRIVER FOR K602A	M35-I	MA-001				2850	N.A	N.A	INCL. IN K602A	
		CM612A	GEARBOX FOR K602A	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K602A	
		CM616A	LOW SPEED COUPLING FOR K602A	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K602A	
CM617A		HIGH SPEED COUPLING FOR K602A	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K602A		
CV643A		SEAL GAS FILTER FOR K602A	M35-I	MA-001				N.A	150.0	103.0	INCL. IN K602A		
CV644A		SEAL GAS FILTER FOR K602A	M35-I	MA-001				N.A	150.0	103.0	INCL. IN K602A		
K602A		2ND STAGE PROCESS GAS COMPRESSOR	M35-I	MA-001	31,865	32,535	1450	2850	150.0	-45.0/120.0	7.00 x 2.50 x 3.20		
CM606B		ELECTRIC MOTOR DRIVER FOR K602B	M35-I	MA-001				2850	N.A	N.A	INCL. IN K602B		
K602B	CM612B	GEARBOX FOR K602B	M35-I	MA-001				N.A	N.A	N.A	INCL. IN K602B		

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
	CM616B	LOW SPEED COUPLING FOR K602B	M35-I	MA-001			N.A	N.A	N.A	N.A	INCL. IN K602B	
	CM617B	HIGH SPEED COUPLING FOR K602B	M35-I	MA-001			N.A	N.A	N.A	N.A	INCL. IN K602B	
	CV643B	SEAL GAS FILTER FOR K602B	M35-I	MA-001			N.A	N.A	150.0	103.0	INCL. IN K602B	
	CV644B	SEAL GAS FILTER FOR K602B	M35-I	MA-001			N.A	N.A	150.0	103.0	INCL. IN K602B	
K603/4	K602B	2ND STAGE PROCESS GAS COMPRESSOR	M35-I	MA-001	31,865	32,535	1450	2850	150.0	-45.0/120.0	7.00 x 2.50 x 3.20	
	CB614A	LUBE OIL HEAT EXCHANGER FOR CQ611	M35-I	MA-002			N.A	N.A	12.0	80.0	INCL. CQ611	
	CB614B	LUBE OIL HEAT EXCHANGER FOR CQ611	M35-I	MA-002			N.A	N.A	12.0	80.0	INCL. CQ611	
	CH603	LUBE OIL HEATER FOR CQ611	M35-I	MA-002			N.A	10	N.A	N.A	INCL. IN CQ611	
	CM607	ELECTRIC MOTOR DRIVER FOR K603/4	M35-I	MA-002			N.A	1850	N.A	N.A	INCL. IN K603/4	
	CM610A	ELECTRIC MOTOR DRIVER FOR CP629A	M35-I	MA-002			N.A	11	N.A	N.A	INCL. IN CQ611	
	CM610B	ELECTRIC MOTOR DRIVER FOR CP629B	M35-I	MA-002			N.A	11	N.A	N.A	INCL. IN CQ611	
	CM613	GEARBOX FOR K603/4	M35-I	MA-002			N.A	N.A	N.A	N.A	INCL. IN K603/4	
	CM618	LOW SPEED COUPLING FOR K603/4	M35-I	MA-002			N.A	N.A	N.A	N.A	INCL. IN K603/4	
	CM619	HIGH SPEED COUPLING FOR K603/4	M35-I	MA-002			N.A	N.A	N.A	N.A	INCL. IN K603/4	
	CP629A	MAIN LUBE OIL PUMP FOR CQ611	M35-I	MA-002			17.4	N.A	12.0	80.0	INCL. IN CQ611	
	CP629B	STANDBY LUBE OIL PUMP FOR CQ611	M35-I	MA-002			17.4	N.A	12.0	80.0	INCL. IN CQ611	
	CQ611	LUBE OIL SKID FOR K603/4	M35-I	MA-002	4,269	7,369	N.A	N.A	N.A	N.A	2.30 x 1.75 x 3.00	
	CV634	RUNDOWN TANK FOR CQ611	M35-W	MA-002	0,290	0,410	N.A	N.A	ATMOS.	65.0	0.591.0 x 1.400T/T	
	CV637A	OIL FILTER FOR CQ611	M35-I	MA-002			N.A	N.A	12.0	80.0	INCL. IN CQ611	
	CV637B	OIL FILTER FOR CQ611	M35-I	MA-002			N.A	N.A	12.0	80.0	INCL. IN CQ611	
	CV640	LUBE OIL RESERVOIR FOR CQ611	M35-Z	MA-002			N.A	N.A	ATMOS.	70.0	INCL. IN CQ611	
	CV645A	SEAL GAS FILTER FOR K603/4	M35-I	MA-002			N.A	N.A	15.0	132.0	INCL. IN K603/4	
	CV645B	SEAL GAS FILTER FOR K603/4	M35-I	MA-002			N.A	N.A	15.0	132.0	INCL. IN K603/4	
K603/4	K603/4	1ST & 2ND STAGE FUEL GAS COMPRESSOR	M35-I	MA-002	30,922	31,148	7953	1850	27.0	-45.0/130.0	7.00 x 2.30 x 3.19	

249 item(s).

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
CQ614	CQ614	FROY OIL METERING	M35-M	IA-016	11,000	12,200	N.A	HOLD	29.0	-10.0/75.0	7.50 x 3.50 x 3.00	
CQ615	CM656A	MOTOR FOR CP656A	M35-M	IA-016			N.A	HOLD	N.A	N.A	INCL. IN CP656A	
	CM656B	MOTOR FOR CP656B	M35-M	IA-016			N.A	HOLD	N.A	N.A	INCL. IN CP656B	
	CP656A	FROY OIL METERING SAMPLING PUMP	M35-M	IA-016				HOLD	N.A	HOLD	HOLD	
	CP656B	FROY OIL METERING SAMPLING PUMP	M35-M	IA-016				HOLD	N.A	HOLD	HOLD	
	CQ615	FROY OIL SAMPLING SKID	M35-M	IA-016	1,200	1,300	N.A	HOLD	29.0	-10.0/75.0	4.50 x 0.50 x 3.00	
CQ616	CQ616	LILLE FRIGG CONDENSATE METERING	M35-Z	IA-016	7,000	7,400	N.A	HOLD	89.0	-20.0/100.0	8.50 x 3.50 x 3.00	
CQ617	CM657A	MOTOR FOR CP657A	M35-Z	IA-016			N.A	HOLD	N.A	N.A	INCL. IN CP657A	
	CM657B	MOTOR FOR CP657B	M35-Z	IA-016			N.A	HOLD	N.A	N.A	INCL. IN CP657B	
	CP657A	L.F.COND.METERING SAMPLING PUMP	M35-Z	IA-016				HOLD	N.A	HOLD	HOLD	
	CP657B	L.F.COND.METERING SAMPLING PUMP	M35-Z	IA-016				HOLD	N.A	HOLD	HOLD	
	CQ617	L.F.CONDENSATE SAMPLING SKID	M35-Z	IA-016	0,700	0,800	N.A	HOLD	89.0	-20.0/100.0		INCL. IN CQ616
CQ618	CQ618	RECYCLED CONDENSATE METERING SKID	M35-Z	IA-016	7,000	7,400	N.A	HOLD	40.5	-20.0/45.0		INCL. IN CQ616
CQ619	CM658A	MOTOR FOR CP658A	M35-Z	IA-016			N.A	HOLD	N.A	N.A	INCL. IN CP658A	
	CM658B	MOTOR FOR CP658B	M35-Z	IA-016			N.A	HOLD	N.A	N.A	INCL. IN CP658B	
	CP658A	RECYCLED COND.METERING SAMPLING PUM	M35-Z	IA-016				HOLD	N.A	HOLD	HOLD	
	CP658B	RECYCLED COND.METERING SAMPLING PUM	M35-Z	IA-016				HOLD	N.A	HOLD	HOLD	
	CQ619	RECYCLED CONDENSATE SAMPLING SKID	M35-Z	IA-016	0,700	0,800	N.A	HOLD	40.5	-20.0/45.0		INCL. IN CQ616
CQ620	CQ620	FROY GAS METERING	M35-L	IA-018	7,700	8,100	N.A	N.A	149.0	-30.0/75.0	0.20 x 13.0 (D x E)	
CQ621	CQ621	FROY GAS SAMPLING SKID	M35-L	IA-018	0,500	0,600	N.A	N.A	149.0	-30.0/75.0	0.90 x 1.20 x 1.50	
CQ622	CQ622	FROY FLASH GAS METERING	M35-Z	IA-018	2,300	2,950	N.A	N.A	27.0	-20.0/55.0	0.20 x 12.6 (D x E)	
CQ623	CQ623	FROY FLASH GAS SAMPLING SKID	M35-L	IA-018	0,500	0,600	N.A	N.A	27.0	-20.0/55.0	0.90 x 1.20 x 1.50	
CQ624	CQ624	FROY FUEL GAS METERING	M35-L	IA-018	1,000	1,100	N.A	N.A	18.5	-10.0/75.0	0.75 x 6.00 (D x L)	
CQ626	RB608	PCU-A (PCMS)	M35	IA-001	0,350	0,350	N.A	3183VA	N.A	N.A	0.62 x 0.76 x 2.21	
	RB609	PCU-A TERMINATION CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.61 x 0.76 x 2.21	
	RB610	PCU-A TERMINATION CABINET 2	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.62 x 0.76 x 2.21	
	RB611	PCU-B (PCMS)	M35	IA-001	0,350	0,350	N.A	3447VA	N.A	N.A	0.62 x 0.76 x 2.21	
	RB612	PCU-B TERMINATION CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.61 x 0.76 x 2.21	
	RB613	PCU-B TERMINATION CABINET 2	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.62 x 0.76 x 2.21	
	RB614	PCU-C (PCMS)	M35	IA-001	0,350	0,350	N.A	1852VA	N.A	N.A	0.62 x 0.76 x 2.21	
	RB615	PCU-C TERMINATION CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.61 x 0.76 x 2.21	
	RB616	SCU (ISS)	M35	IA-001	0,350	0,350	N.A	2052VA	N.A	N.A	0.62 x 0.76 x 2.21	
	RB617	SCU-TERMINATION CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.61 x 0.76 x 2.21	
	RB618	SCU-TERMINATION CABINET 2	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.61 x 0.76 x 2.21	
	RB619	SCU-TERMINATION CABINET 3	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.62 x 0.76 x 2.21	
	RB620	WATER INJ./OIL EXPORT PUMPS VIBR.MO	M35	IA-001	0,350	0,350	N.A	275VA	N.A	N.A	0.80 x 0.76 x 2.21	
	RB621	MCC-PCU (PCMS)	M35	IA-001	0,350	0,350	N.A	703VA	N.A	N.A	0.62 x 0.76 x 2.21	
	RB622	PCU-C TERMINATION CABINET 2	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.62 x 0.76 x 2.21	
	RB623	MCC-PCU TERMINATION CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.61 x 0.76 x 2.21	
	RB624	MCC-PCU TERMINATION CABINET 2	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.62 x 0.76 x 2.21	
CQ627	RB600	PCU-D GAS COMPRESSION TRAIN A	M35	IA-001	0,350	0,350	N.A	4528VA	N.A	N.A	0.61 x 0.80 x 2.15	
	RB601	PCU-D GAS COMP.TRAIN A TERM.CABINET	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	1.62 x 0.80 x 2.15	
	RB602	PCU-E GAS COMP.COMMON FACILITY	M35	IA-001	0,350	0,350	N.A	3377VA	N.A	N.A	0.61 x 0.80 x 2.15	
	RB603	PCU-E TERMINATION CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	1.62 x 0.80 x 2.15	
	RB604	PCU-F GAS COMP.TRAIN B	M35	IA-001	0,350	0,350	N.A	4528VA	N.A	N.A	0.61 x 0.80 x 2.15	

PLATFORM : TCP2

FRØY INTEGRATION WORK ON TCP2 - DETAILED ENGINEERING

RUNDATE : 10/12/93

DISCIPLINE : INSTRUMENT

MASTER EQUIPMENT LIST

PAGE : 8

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
	RB605	PCU-F GAS COMP. TRAIN B TERM. CABINET	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	1.62 x 0.80 x 2.15	
	RB606	PCU-G FUEL GAS COMPRESSION	M35	IA-001	0,350	0,350	N.A	4408VA	N.A	N.A	0.61 x 0.80 x 2.15	
	RB607	PCU-G FUEL GAS COMP. TERM. CABINET 1	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	1.62 x 0.80 x 2.15	
	RB625	PCU-F GAS COMP. TRAIN B TERM. CABINET	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	1.62 x 0.80 x 2.15	
	RB626	PCU-G FUEL GAS COMP. TERM. CABINET 2	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	0.81 x 0.80 x 2.15	
	RB627	PCU-D GAS COMP. TRAIN A TERM. CABINET	M35	IA-001	0,350	0,350	N.A	N.A	N.A	N.A	1.62 x 0.80 x 2.15	

51 item(s).

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
BB-M35	BB-M35	BATTERY BANK UPS	M35-M	EA-014	3,750	3,750	N.A	N.A	N.A	N.A	2.60 x 0.70 x 1.70	
CBB-A	CBB-A	CAPACITOR BANK	M35-M	EA-013	2,520	2,520	N.A	2750	N.A	N.A	2.67 x 1.50 x 2.08	
CBB-B	CBB-B	CAPACITOR BANK	M35-M	EA-013	2,520	2,520	N.A	2750	N.A	N.A	2.67 x 1.50 x 2.08	
Q602-DB337	Q602-DB33	ELECTRICAL CHLORINATION PANEL	M35-M	MA-012	0,060	0,060	N.A	N.A	N.A	N.A	1.01 x 0.44 x 0.82	
Q602-T1	Q602-T1	ELECTRICAL CHLORINATION TRANSFORMER	M35-M	MA-012	0,680	0,680	N.A	N.A	N.A	N.A	1.03 x 0.59 x 0.99	
DB330	DB330	HEAT TRACING PANEL	M35-Z	EA-004			N.A	N.A	N.A	N.A	INCL. IN LV-DB-M35	
DB331	DB331	LIGHTING AND SMALL POWER PANEL	M35-Z	EA-004			N.A	N.A	N.A	N.A	INCL. IN LV-DB-M35	
DB333	DB333	HVAC CONTROL PANEL	M35-Z	EA-004			N.A	N.A	N.A	N.A	INCL. IN LV-DB-M35	
DBEM-332	DBEM-332	EMERG. LIGHTING & SMALL POWER PANEL	M35-Z	EA-004			N.A	N.A	N.A	N.A	INCL. IN LV-DB-M35	
HV-PD FRØY	HV-PD FRØY	24KV ISOLATION CIRCUIT BREAKER	M35-M	EA-006	1,000	1,000	N.A	N.A	N.A	N.A	2.15 x 1.07 x 2.53	
HV-PD-M35	HV-DB-M35	START BUS	M35-M	EA-002			N.A	N.A	N.A	N.A	INCL. IN HV-PD-M35	
	HV-PD-M35	5.5KV MAIN SWITCHBOARD AND MCC	M35-M	EA-002	44,000	44,000	N.A	N.A	N.A	N.A	16.0 x 3.96 x 2.51	
IB-BB-M35	IB-BB-M35	BATTERY ISOLATOR BREAKER	M35-M	EA-014	0,160	0,160	N.A	N.A	N.A	N.A	0.48 x 0.41 x 0.80	
LV-DB-334	LV-DB-334	110/24V DC DISTRIBUTION PANEL	M35-M	EA-002	0,280	0,280	N.A	N.A	N.A	N.A	0.70 x 0.60 x 2.20	
LV-DB-335	LV-DB-335	230V AC DISTRIBUTION PANEL	M35-M	EA-002	0,230	0,230	N.A	N.A	N.A	N.A	0.70 x 0.60 x 2.20	
LV-DB-M35	LV-DB-M35	380V MAIN SWITCHBOARD	M35-Z	EA-004	8,400	8,400	N.A	N.A	N.A	N.A	4.70 x 4.68 x 2.30	"U" SHAPE
LV-DBEM-M35	LV-DBEM-M3	380V EMERGENCY SWITCHBOARD	M35-Z	EA-004	1,000	1,000	N.A	N.A	N.A	N.A	2.40 x 0.80 x 2.30	
ST-01	ST-01	7.5MW START TRANSFORMER	M35-M	EA-007	1,850	1,850	N.A	7500	N.A	N.A	1.47 x 0.95 x 1.82	
ST-02	ST-02	7.5MW START TRANSFORMER	M35-M	EA-007	1,850	1,850	N.A	7500	N.A	N.A	1.47 x 0.95 x 1.82	
T25	T25	1.5MVA TRANSFORMER	M35-M	EA-005	4,095	4,095	N.A	1500	N.A	N.A	2.25 x 1.14 x 2.59	
T26	T26	1.5MVA TRANSFORMER	M35-M	EA-005	4,095	4,095	N.A	1500	N.A	N.A	2.25 x 1.14 x 2.59	
T27	NER003	NEUTRAL EARTH RESISTOR	M35-M	EA-005	0,370	0,370	N.A	N.A	N.A	N.A	1.30 x 0.86 x 0.97	
	T27	2.5MVA TRANSFORMER	M35-M	EA-005	7,235	7,235	N.A	2500	N.A	N.A	2.75 x 1.35 x 2.90	
UPS-M35	UPS-M35	UPS	M35-M	EA-002	1,400	1,400	N.A	60	N.A	N.A	2.15 x 0.65 x 1.95	INCL. DIST. BOARD

24 item(s).

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
68.V06.19	68.V06.19	FOAM SKID DELUGE VAL.68.X06.19	M35-W	LC-001	3,216	3,216	N.A	N.A	N.A	N.A	1.45 x 1.45 x 1.35	
68.V06.20	68.V06.20	FOAM SKID DELUGE VAL.68.X06.20	M35-W	LC-001	3,216	3,216	N.A	N.A	N.A	N.A	1.45 x 1.45 x 1.35	
68.V06.23	68.V06.23	FOAM SKID 68.X06.23 DELUGE VALVE	INTE	LC-001	4,442	4,442	N.A	N.A	N.A	N.A	1.70 x 1.70 x 1.35	
68.V06.24	68.V06.24	FOAM SKID 68.X06.24 DELUGE VALVE	INTE	LC-001	4,442	4,442	N.A	N.A	N.A	N.A	1.70 x 1.70 x 1.35	
68.V09.4	68.V09.4	FOAM SKID FOR MONITOR	M35-W	LC-006	1,000	1,000	N.A	N.A	N.A	N.A	1.00 x 1.00 x 1.55	
68.V09.5	68.V09.5	FOAM SKID FOR MONITOR	M35-W	LC-006	1,000	1,000	N.A	N.A	N.A	N.A	1.00 x 1.00 x 1.55	
68.V09.6	68.V09.6	FOAM SKID FOR MONITOR	M35-L	LC-006	1,000	1,000	N.A	N.A	N.A	N.A	1.00 x 1.00 x 1.55	
68.X06.15/16L	68X06.15LC	DELUGE REL.PANEL 68.X06.15/16 LCP	M35-M	LC-001	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X06.17/18L	68X06.17LC	DELUGE REL.PANEL 68.X06.17/18 LCP	M35-I	LC-001	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X06.19/20L	68X06.19LC	DELUGE REL.PANEL 68.X06.19/20 LCP	M35-I	LC-001	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X06.21/22L	68X06.21LC	DELUGE REL.PANEL 68.X06.21/22 LCP	M35-I	LC-001	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X06.23/24L	68X06.23LC	DELUGE REL.PANEL 68.X06.23/24 LCP	INTE	LC-001	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X06.25/26L	68X09.25LC	DELUGE REL.PANEL 68.X06.25/26 LCP	INTE	LC-001	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X09.4	68.X09.4	FOAM MONITOR WEATHER DECK EAST	M35-W	LC-006	0,200	0,200	N.A	N.A	N.A	N.A	1.01 x 1.01 x 1.89	
68.X09.4LCP	68.X09.4LC	CONTROL PANEL MONITOR 68.X09.4	M35-W	LC-006	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X09.5	68.X09.5	FOAM MONITOR WEATHER DECK WEST	M35-W	LC-006	0,200	0,200	N.A	N.A	N.A	N.A	1.01 x 1.01 x 1.89	
68.X09.5LCP	68.X09.5LC	CONTROL PANEL MONITOR 68.X09.5	M35-W	LC-006	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X09.6	68.X09.6	FOAM MONITOR LAYD./METER.PLATF.WEST	M35-L	LC-006	0,200	0,200	N.A	N.A	N.A	N.A	1.01 x 1.01 x 1.89	
68.X09.6LCP	68.X09.6LC	CONTROL PANEL MONITOR 68.X09.6	M35-L	LC-006	0,118	0,118	N.A	N.A	N.A	N.A	1.17 x 0.33 x 1.00	
68.X09.7	68.X09.7	FIRE MONITOR	INTE	LC-006	0,055	0,055	N.A	N.A	N.A	N.A	0.70 x 0.70 x 1.09	
FH23	FH23	FIRE HOSEREEL MAIN DECK EAST	M35-M	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH24	FH24	FIRE HOSEREEL MAIN DECK CENTRE	M35-M	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH25	FH25	FIRE HOSEREEL MAIN DECK WEST	M35-M	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH26	FH26	FIRE HOSEREEL MAIN DECK SOUTH WEST	M35-M	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH27	FH27	FIRE HOSEREEL INTE.DECK WEST	M35-I	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH28	FH28	FIRE HOSEREEL INTE.DECK EAST	M35-I	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH29	FH29	FIRE HOSEREEL LAYD./METER.PLATFORM	M35-L	LC-002	0,144	0,144	N.A	N.A	N.A	N.A	0.95 x 0.65 x 1.29	
FH30	FH30	FOAM HOSEREEL MAIN DECK EAST	M35-M	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH31	FH31	FOAM HOSEREEL MAIN DECK NORTH WEST	M35-M	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH32	FH32	FOAM HOSEREEL MEZZANINE DECK NORTH	M35-Z	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH33	FH33	FOAM HOSEREEL MEZZANINE DECK SOUTH	M35-Z	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH34	FH34	FOAM HOSEREEL INTERME.DECK EAST	M35-I	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH35	FH35	FOAM HOSEREEL INTERME.DECK SOUTH	M35-I	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH36	FH36	FOAM HOSEREEL INTERME.DECK CENTRE	M35-I	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH37	FH37	FOAM HOSEREEL INTERME.DECK WEST	M35-I	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH38	FH38	FOAM HOSEREEL WEATHER DECK EAST	M35-W	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH39	FH39	FOAM HOSEREEL WEATHER DECK SOUTH	M35-W	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH40	FH40	FOAM HOSEREEL WEATHER DECK WEST	M35-W	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH41	FH41	FOAM HOSEREEL WEATHER DECK CENTRE	M35-W	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	
FH42	FH42	FOAM HOSEREEL LAYD./METER.PLATF.EAS	M35-L	LC-002	0,225	0,225	N.A	N.A	N.A	N.A	1.00 x 0.93 x 1.29	

40 item(s).

EQUIPMENT No.	TAG No.	ITEM DESCRIPTION	ITEM- LOCATION	PACKAGE NO	DRY- WEIGHT (tonnes)	OPER.- WEIGHT (tonnes)	CAPACITY (m3/HR)	POWER INSTALLED (kW)	DESIGN PRESSURE (barg)	DESIGN TEMPERATURE (deg C)	DIMENSIONS L x W x H (m)	REMARKS
	BD CQ25 02	BALANCING DAMPER	M35-I	HA-002	0,015	0,015	950	N.A	N.A	N.A	0.30 x 0.30 x 0.15	
	BD CQ25 03	BALANCING DAMPER	M35-I	HA-002	0,015	0,015	600	N.A	N.A	N.A	0.30 x 0.30 x 0.15	
	BD CQ25 04	BALANCING DAMPER	M35-I	HA-002	0,030	0,030	3000	N.A	N.A	N.A	0.30 x 0.60 x 0.25	
	BD CQ25 05	BALANCING DAMPER	M35-I	HA-002	0,045	0,045	7700	N.A	N.A	N.A	0.30 x 0.80 x 0.40	
	EH CQ25 01	ELECTRICAL HEATER	M35-I	HA-002	0,060	0,060	3000	13	N.A	N.A	0.60 x 0.60 x 0.25	
	FD CQ25 01	FIRE DAMPER	M35-I	HA-002	0,040	0,040	950	N.A	N.A	N.A	0.30 x 0.30 x 0.15	
	FD CQ25 02	FIRE DAMPER	M35-I	HA-002	0,040	0,040	600	N.A	N.A	N.A	0.30 x 0.30 x 0.15	
	FD CQ25 03	FIRE DAMPER	M35-I	HA-002	0,060	0,060	3000	N.A	N.A	N.A	0.30 x 0.60 x 0.25	
	FD CQ25 04	FIRE DAMPER	M35-I	HA-002	0,080	0,080	7700	N.A	N.A	N.A	0.30 x 0.80 x 0.40	
	FD CQ25 05	FIRE DAMPER	M35-I	HA-002	0,045	0,045	850	N.A	N.A	N.A	0.30 x 0.30 x 0.20	
	FD CQ25 06	FIRE DAMPER	M35-I	HA-002	0,045	0,045	540	N.A	N.A	N.A	0.30 x 0.30 x 0.20	
	FD CQ25 07	FIRE DAMPER	M35-I	HA-002	0,950	0,950	2700	N.A	N.A	N.A	0.30 x 0.50 x 0.50	
	FD CQ25 08	FIRE DAMPER	M35-I	HA-002	0,110	0,110	6930	N.A	N.A	N.A	0.30 x 0.80 x 0.40	
	PD CQ25 02	PRESSURE CONTROL DAMPER	M35-I	HA-002	0,030	0,030	850	N.A	N.A	N.A	0.30 x 0.30 x 0.20	
	PD CQ25 03	PRESSURE CONTROL DAMPER	M35-I	HA-002	0,030	0,030	540	N.A	N.A	N.A	0.30 x 0.30 x 0.20	
	PD CQ25 04	PRESSURE CONTROL DAMPER	M35-I	HA-002	0,056	0,056	6930	N.A	N.A	N.A	0.30 x 0.80 x 0.40	
	PD CQ25 05	PRESSURE CONTROL DAMPER	M35-I	HA-002	0,050	0,050	2700	N.A	N.A	N.A	0.30 x 0.50 x 0.50	
	WL CQ25 03	WEATHER LOUVRE	M51	*	0,030	0,030	5870	N.A	N.A	N.A	500 x 1200	SUPPL'D BY COMT
CQ25 01	AF CQ25 01	AIR FILTER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	AF CQ25 02	AIR FILTER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	CC CQ25 01	COOLING COIL	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	CS CQ25 01	FILTER COALESCER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	CS CQ25 02	FILTER COALESCER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	FN CQ25 01	CENTRIFUGAL FAN	M35-I	HA-002			13300	15	N.A	N.A	INCL. IN CQ25 02	
	FN CQ25 02	CENTRIFUGAL FAN	M35-I	HA-002			13300	15	N.A	N.A	INCL. IN CQ25 02	
	SA CQ25 01	SOUND ATTENUATOR	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	SP CQ25 01	AUTOMATIC SHUT-OFF DAMPER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	SP CQ25 02	AUTOMATIC SHUT-OFF DAMPER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	SP CQ25 03	AUTOMATIC SHUT-OFF DAMPER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	SP CQ25 04	AUTOMATIC SHUT-OFF DAMPER	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	WL CQ25 01	WEATHER LOUVRE	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	WL CQ25 02	WEATHER LOUVRE	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
CQ25 02	BD CQ25 01	BALANCING DAMPER	M35-I	HA-002			1050	N.A	N.A	N.A	INCL. IN CQ25 02	
	BD CQ25 06	BALANCING DAMPER	M35-I	HA-002			950	N.A	N.A	N.A	INCL. IN CQ25 02	
	CQ25 01	AIR SUPPLY UNIT	M35-I	HA-002			13300	N.A	N.A	N.A	INCL. IN CQ25 02	
	CQ25 02	HVAC CONTAINER	M35-I	HA-002	16,250	16,250	13300	N.A	N.A	N.A	8.40 x 4.50 x 5.00	
	SP CQ25 05	AUTOMATIC SHUT-OFF DAMPER	M35-I	HA-002			950	N.A	N.A	N.A	INCL. IN CQ25 02	



FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUMÉ	RE-FD-22-00-0029
SECTION III - FRØY TIE-IN VOLUME 1 - MODULE M35 BOOK 1 of 1	Date effective : May 1995
	Revision No. : 01G
	Date revised :
	Page : 64

References
See chapter 2.4

FABRICATION RESUMÉ, CONTENTS

- 3.0 FABRICATION RESUMÉ
- 3.1 M35 DRAWINGS
- 3.2 DISCREPANCIES FROM DESIGN
- 3.3 DISCREPANCIES FROM SPECIFICATIONS
- 3.4 DEFECTS AND REPAIRS
- 3.5 CORROSION PROTECTION
- 3.6 WEIGHT REPORT, M35
- 3.7 MODULE GEOMETRY, AS-BUILT DIMENSIONS



FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUMÉ	RE-FD-22-00-0029
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	Date revised :
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References
See chapter 2.4

3.0 FABRICATION RESUMÉ

3.1 M35 Drawings

Main steel layout drawing: FF-22-21-02-1001

Equipment layout drawings.

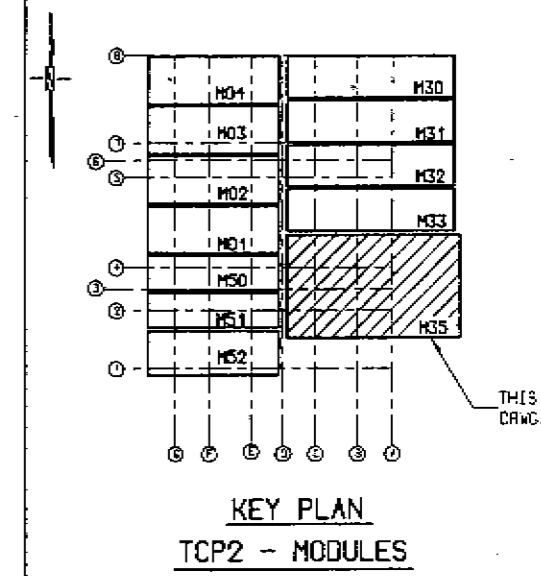
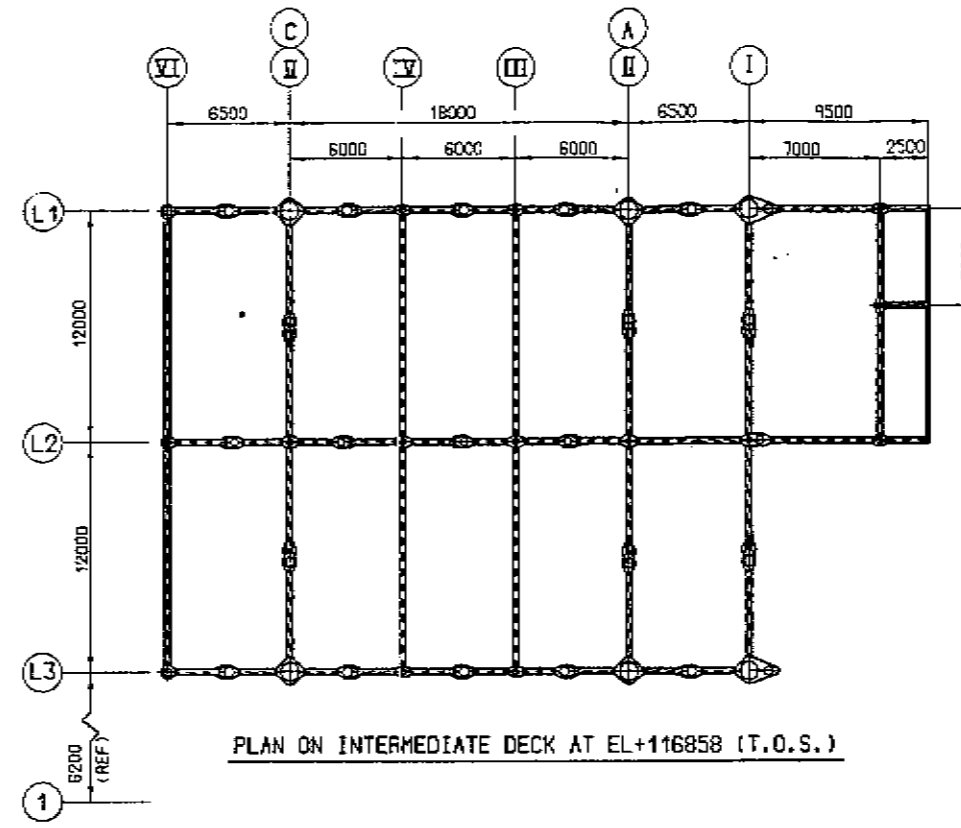
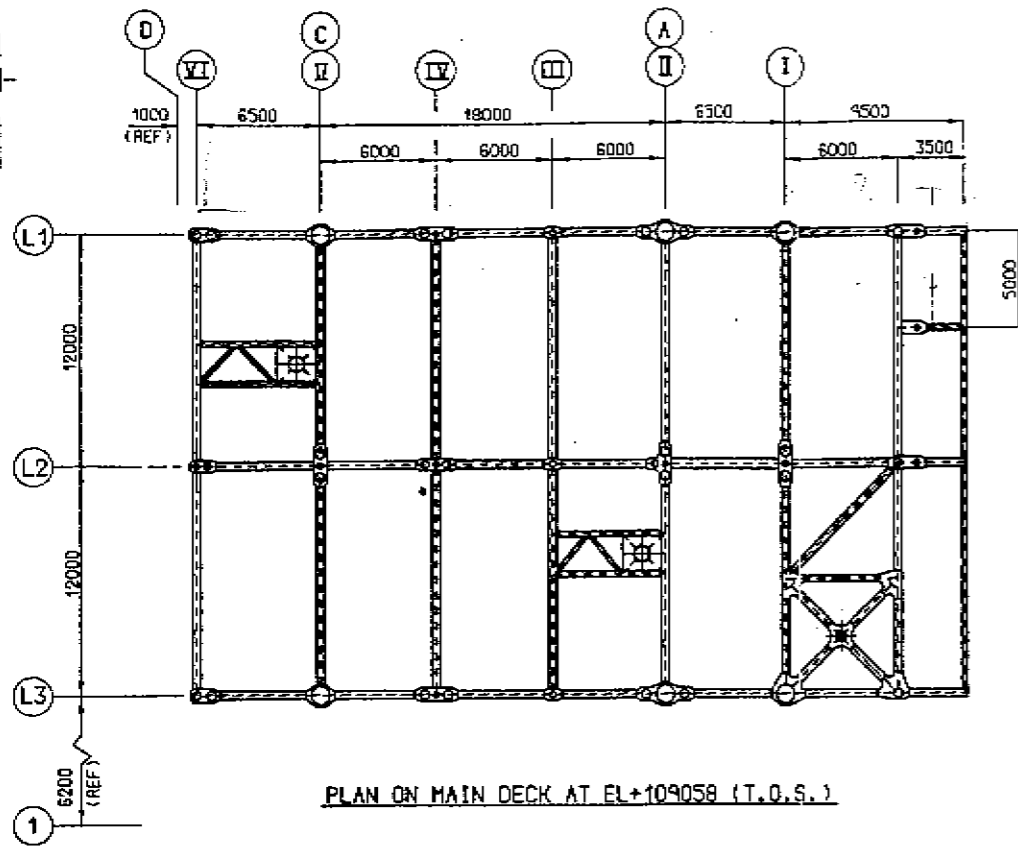
Ref. sect. 2.16

Changes in Main Steel Drawings due to 3. Party Design Verification

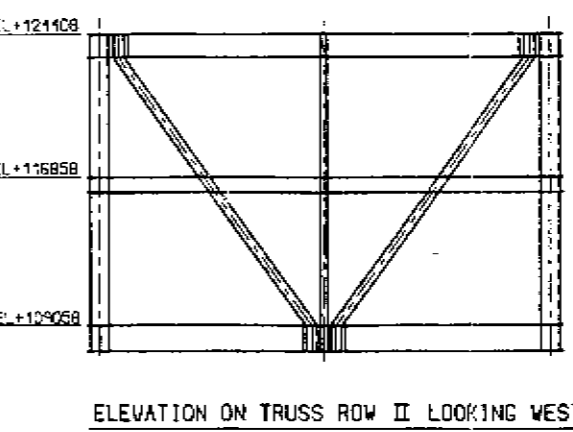
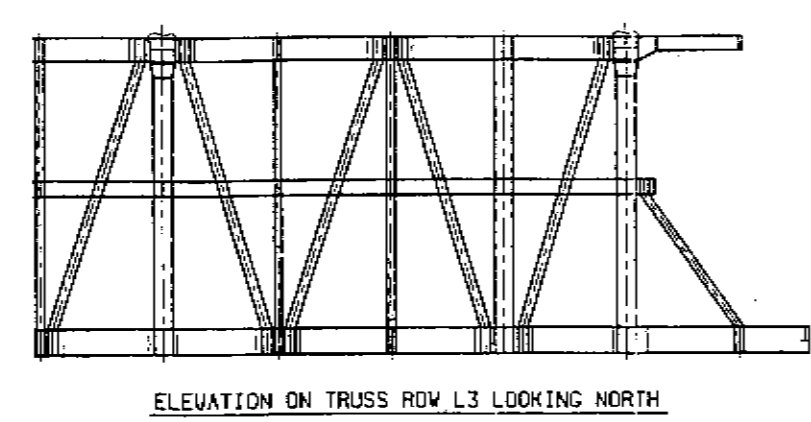
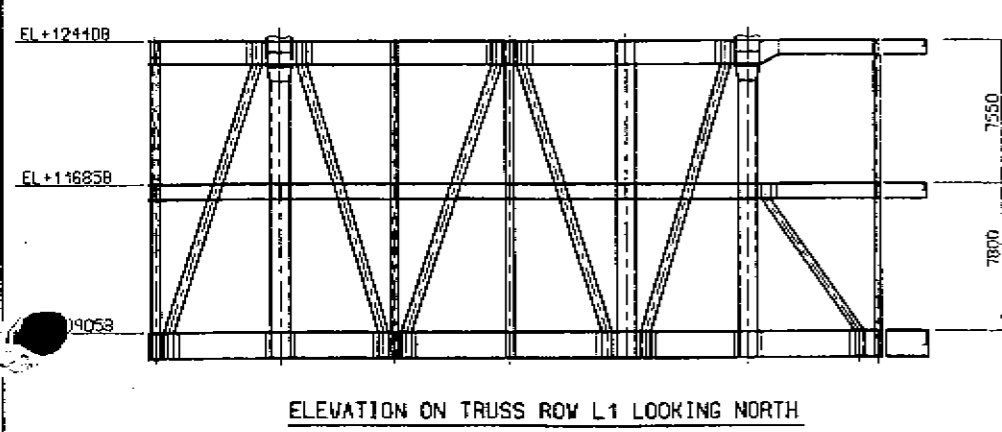
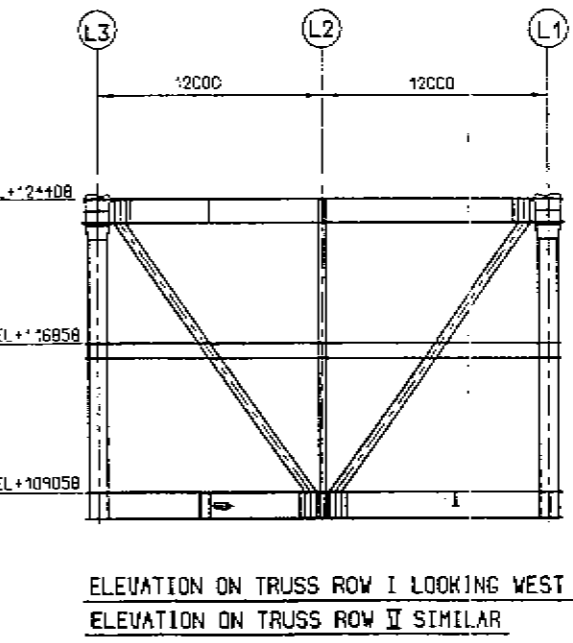
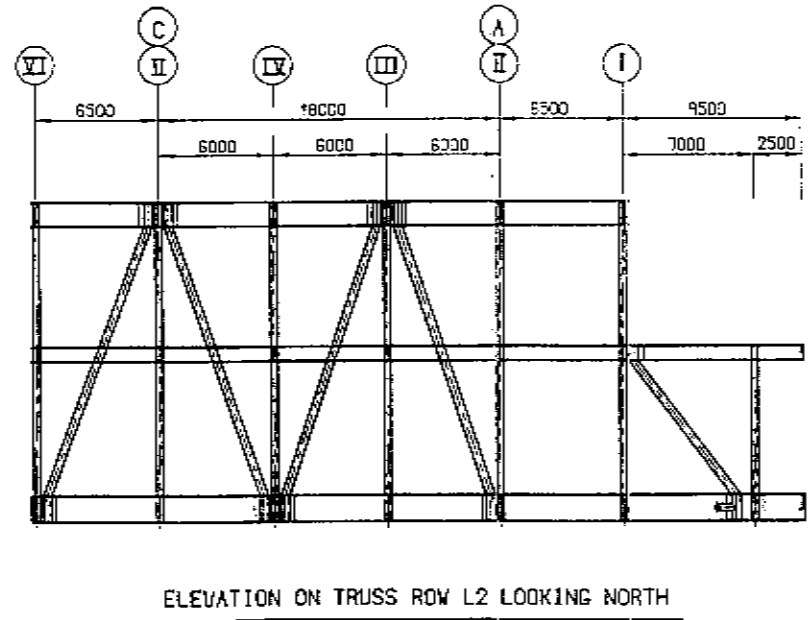
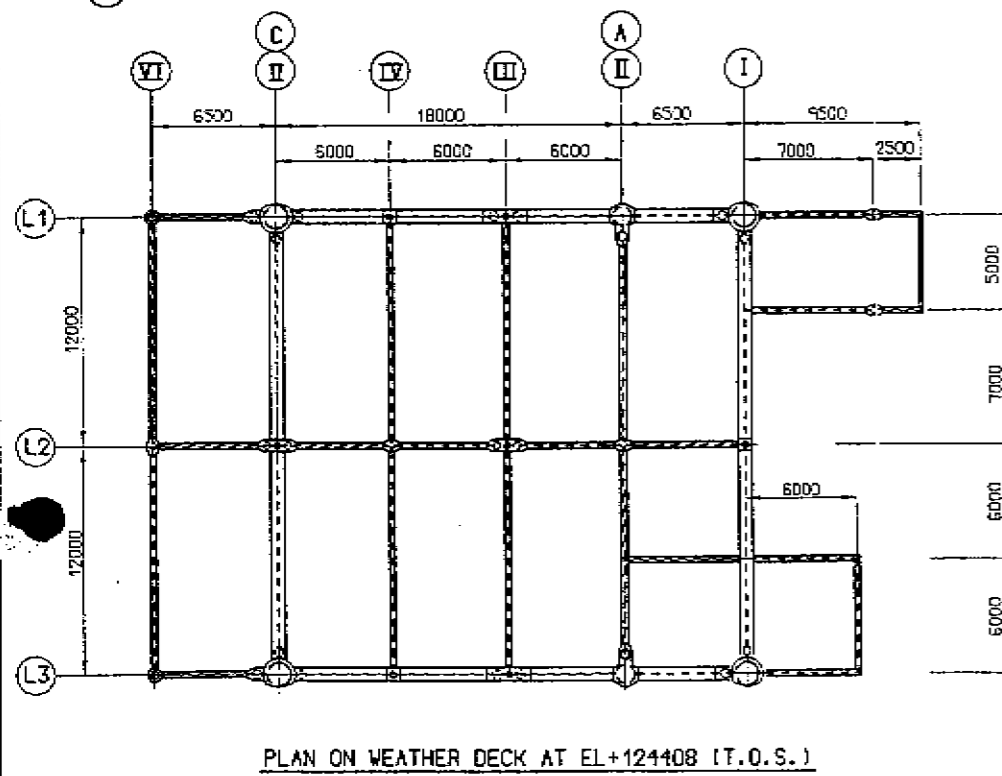
Revision/changes to Grootint shop drawings:

E1-313-304-B
E1-313-306-C
E1-331-103-C
E1-331-104-C
E1-331-107-D
E1-331-108-D
E1-331-109-C
E1-332-114-B
E1-333-104-C
E1-333-107-C

A set of the final revision of the above mentioned drawings is found attached.



- NOTES :
- FOR GENERAL NOTES REFER TO DWG. NO. 10-21-1011
 - ALL STEELWORK ON THIS DRAWING TO BE CLASSIFIED AS PRIMARY STEEL.



NO.	DATE	DESCRIPTION	BY	CHECKED	APP'D
FF-22-21-02-1011		MAIN STEEL WEATHER DECK			
FF-22-21-02-1010		MAIN STEEL INTERMEDIATE DECK			
FF-22-21-02-1009		MAIN STEEL MAIN DECK			
FF-22-21-02-1007		MAIN STEEL TRUSS ROW II			
FF-22-21-02-1006		MAIN STEEL TRUSS ROW III			
FF-22-21-02-1005		MAIN STEEL TRUSS ROW I			
FF-22-21-02-1004		MAIN STEEL TRUSS ROW L3			
FF-22-21-02-1003		MAIN STEEL TRUSS ROW L2			
FF-22-21-02-1002		MAIN STEEL TRUSS ROW L1			
FF-22-21-02-1000		STRUCTURAL DRAWING INDEX			
10-21-1011		GENERAL NOTES			
DRAWING NO.	DESCRIPTION				

REFERENCE DRAWINGS

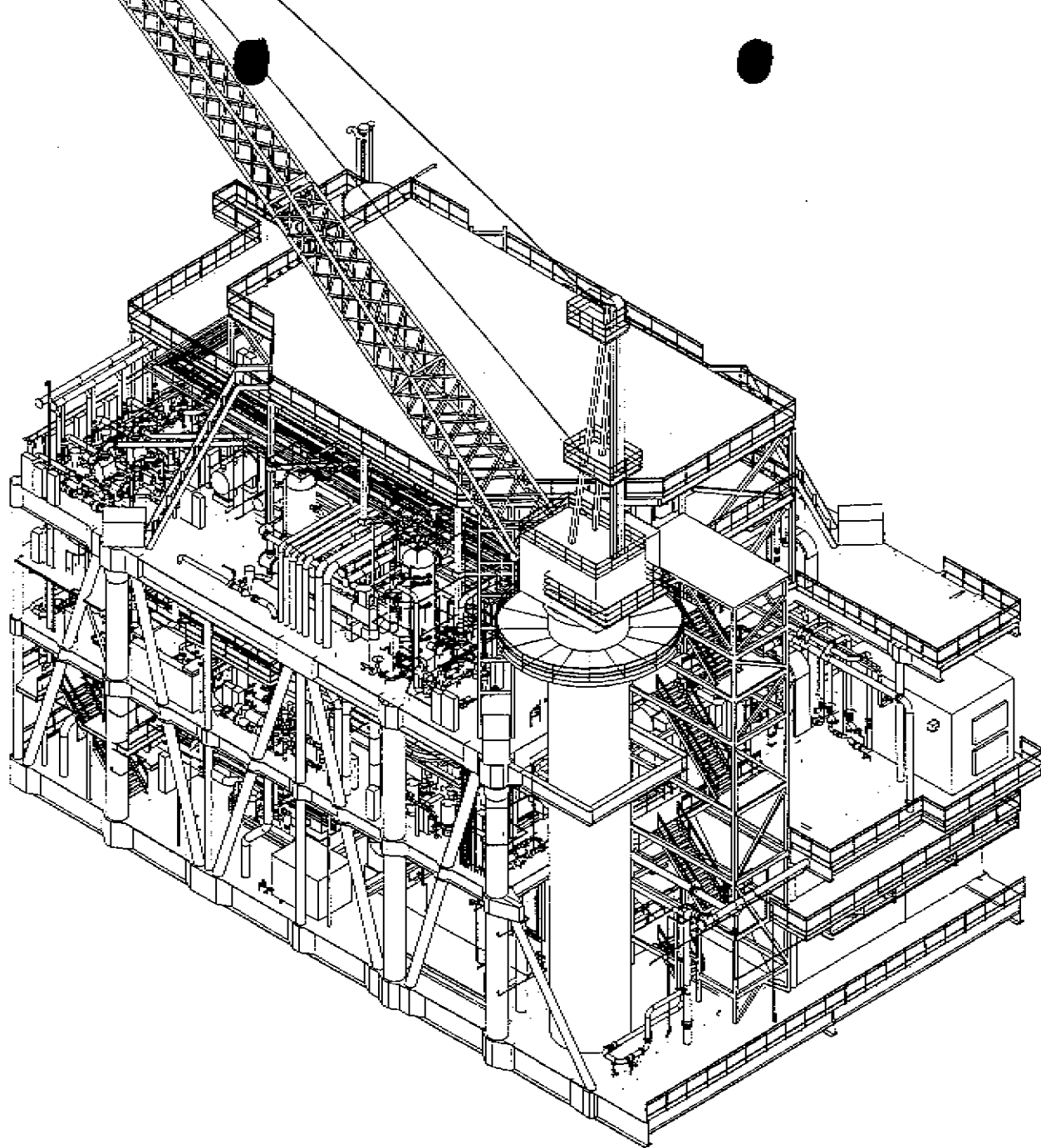
NO.	DATE	DESCRIPTION	BY	CHECKED	APP'D
010	01/93	HOLD REMOVED 2 MEMBERS MODIFIED	J.P.	J.P.	J.P.
020	03/93	APPROVED FOR ONSHORE CONSTRUCTION	J.P.	J.P.	J.P.
018	01/98	ISSUED FOR APPROVAL	J.P.	J.P.	J.P.
024	12/92	ISSUED FOR DEC	J.P.	J.P.	J.P.

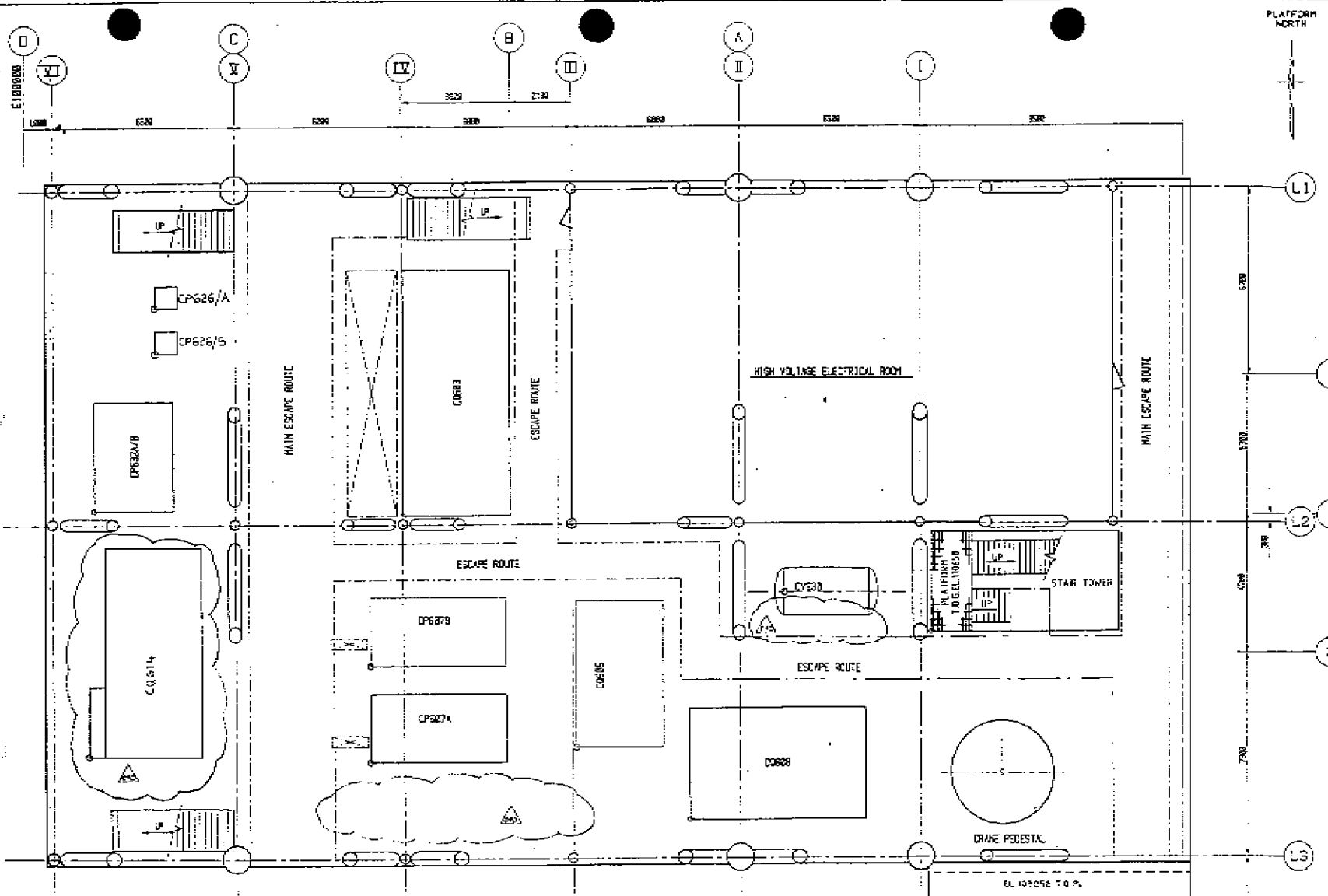
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PROJECT: FRØY PROJECT
MODULE M35
MAIN STEEL
GENERAL ARRANGEMENT

Scale: 1:200

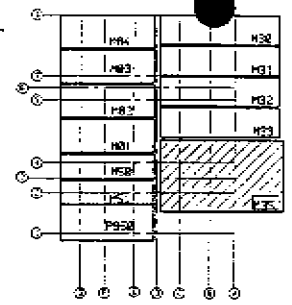
FRIGG FIELD FF-22-21-02-1001 030





MAIN DECK
T.O.S. EL109058

EQUIPMENT LIST			
EQUIPMENT No	DESCRIPTION	NORTH	EAST ELEV.
CQ614	FRZY OIL METERING	105700	102338 | 109358
CP627A	WATER INJECTION PUMP	111570	112358 | 109358
CP627B	WATER INJECTION PUMP	113180	112358 | 109358
CP626A	PRE BOOSTER PUMP SKID	125715	104510 | 109358
CP626B	VACUUM PUMP SKID	118700	102588 | 109358
CD603	WATER (N.J. FINE FILT. PKCH.)	118500	113588 | 109358
CD605	WATER (N.J. CHEM. INJ. PACKAGE)	118370	113588 | 109358
CD608	PROCESS CHEM. (N.J. PACKAGE)	118750	113758 | 109358
CV638	PROD WATER DEGASS TANK	115700	127100 | 111558
CP626/S	PRE BOOSTER PUMP	118545	104510 | 109358



KEY PLAN
TCP2 - MODULES

- HOLDS
- 1.
 - 2.
 - 3.
 - 4.
 - 5.

LEGEND

o - EQUIPMENT DESIGN SYMBOL

FF-22-88-182 MODULE HOSE METERING SKID
DRAWING NO. DESCRIPTION

REFERENCE DRAWINGS

NO.	DESCRIPTION	DATE	BY	CHKD.	APP.

VERITEC

ALL PERTINENT RANGE AND SCOPE ARE SHOWN ON THIS DRAWING

DATE: 1/75

PROJECT: FRZY PROJECT

MODULE LAYOUT

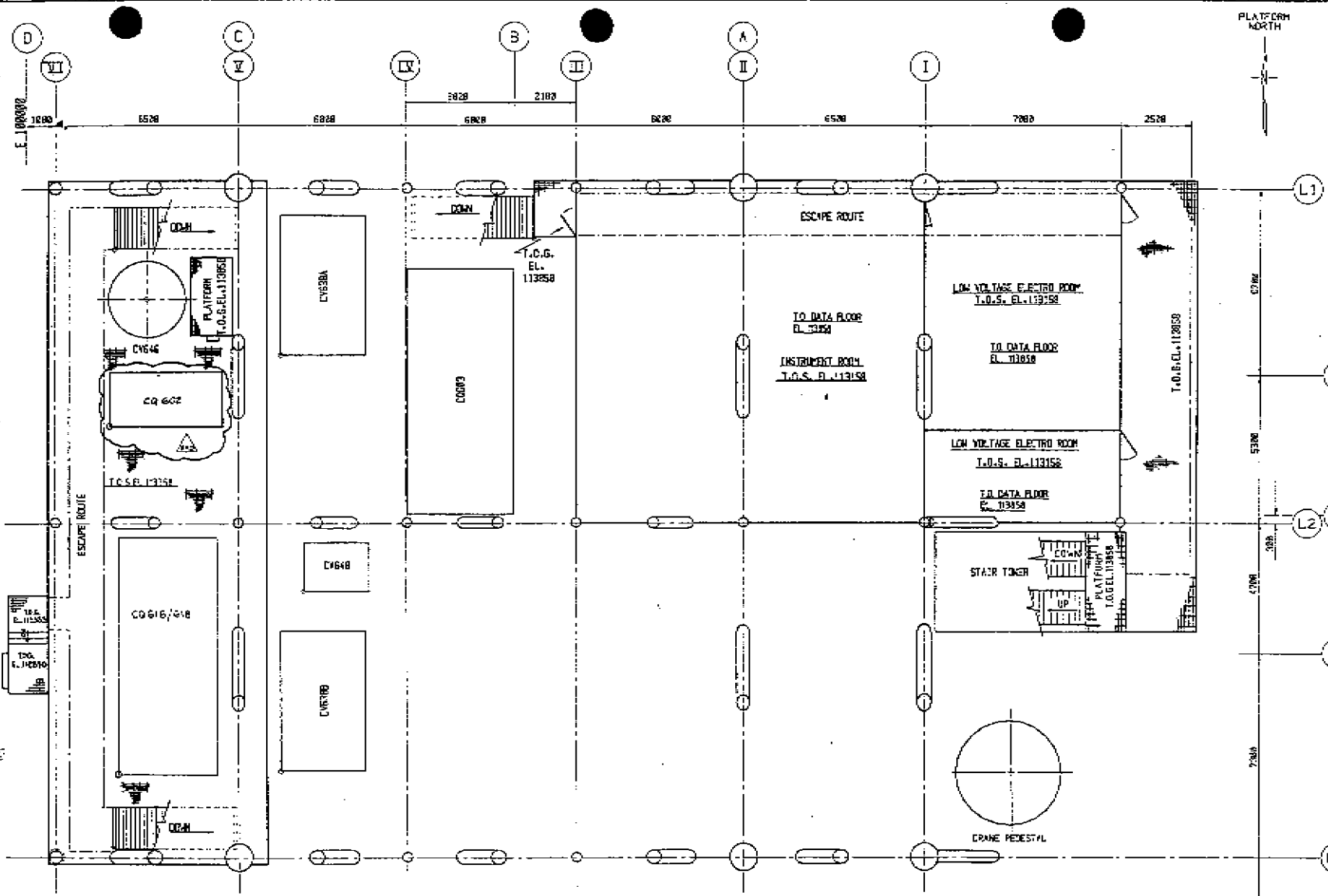
MODULE 3S

MAIN DECK

FRIGG FIELD

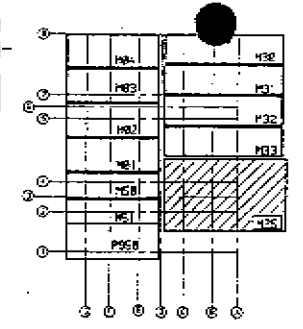
FF-22-88-1881

9-D



MEZZANINE DECK
T.O.S. EL. 113358

EQUIPMENT LIST			
EQUIPMENT No	DESCRIPTION	NORTH	EAST
CV648	LUBE OIL RESERVOIR	115748	129345
CV647	REC. CON. OIL METERING		
CV646	MILLER'S OIL METER	189288	103228
CV682	ELECTRO CHLORINATION FILTER	127788	102308
CV638A	LUBE OIL RESERVOIR	1124288	109388
CV638B	LUBE OIL RESERVOIR	109388	109388
CV646	3 STAGE DEAERATOR TOWER	1126288	104258



KEY PLAN
TCP2 - MODULES

SCALE
1
2
3

LEGEND
C-EQUIPMENT DESIGN SYMBOL

FF-22-88-80-1801 MIDDLE XRC INTERMEDIATE DECK
FF-22-88-80-1801 MIDDLE XRC MAIN DECK

REFERENCE DRAWINGS

NO.	DESCRIPTION	DATE	BY	CHKD.	APP.
1	ISSUED FOR CONVENT				
2	ISSUED FOR CONVENT				
3	ISSUED FOR CONVENT				
4	ISSUED FOR CONVENT				
5	ISSUED FOR CONVENT				
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9	ISSUED FOR CONVENT				
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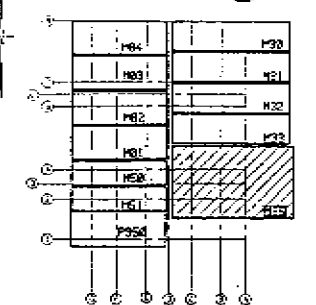
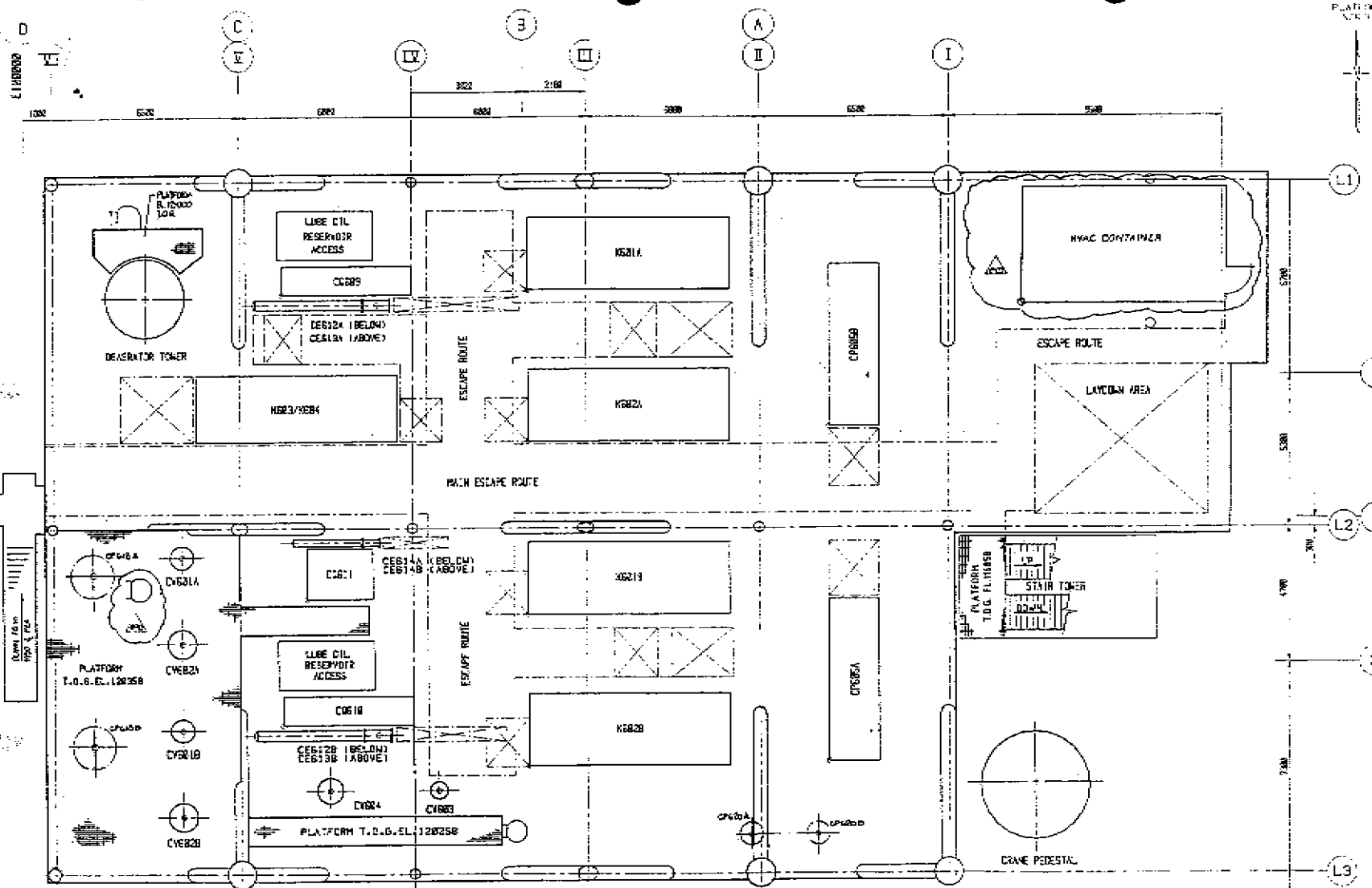
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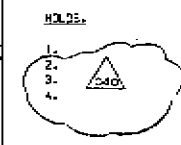
FF-22-88-80-1801 MIDDLE XRC INTERMEDIATE DECK
FF-22-88-80-1801 MIDDLE XRC MAIN DECK

DATE: 1/77S

PROJECT: FRYB PROJECT
EQUIPMENT LAYOUT
MODULE 35
MEZZANINE DECK



KEY PLAN
TCP2 - MODULES



REFERENCE DRAWINGS

NO.	DESCRIPTION	DATE	BY	CHKD.
FR-22-20-08-108	MODULE 35 - GATE 1 DECK			
FR-22-20-08-109	MODULE 35 - GATE 2 DECK			

INTERMEDIATE DECK
T.O.S. EL. 116858

EQUIPMENT LIST

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CEB12A	LUBE OIL HEAT EXCHANGER	1125320	1112300	116550
CEB12B	LUBE OIL HEAT EXCHANGER	1113320	1112300	116550
CEB13A	LUBE OIL HEAT EXCHANGER	125320	112300	116550
CEB13B	LUBE OIL HEAT EXCHANGER	111820	112300	116550
CEB14A	LUBE OIL HEAT EXCHANGER	117780	112100	117450
CEB14B	LUBE OIL HEAT EXCHANGER	117780	112100	117450
CV601A	OIL EXPORT PUMP	118075	127800	116850
CV602A	OIL EXPORT PUMP	121700	127800	116850
CV603A	OIL TRANSFER PUMP	116650	107411	116850
CV604A	OIL TRANSFER PUMP	110700	107411	116850
CV605A	RECYCLED COND PUMPS	107500	125200	116850
CV606A	RECYCLED COND PUMPS	107500	127300	116850
CV607A	LUBE OIL SKID	1125270	112900	116850

EQUIPMENT LIST

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CV608A	LUBE OIL SKID	1111370	109800	116850
CV609A	LUBE OIL SKID	1115740	109845	116850
CV610A	1ST STAGE SUCTION SCRUBBER	117280	105500	116850
CV611A	1ST STAGE SUCTION SCRUBBER	111280	105500	116850
CV612A	2ND STAGE SUCTION SCRUBBER	114280	105500	116850
CV613A	2ND STAGE SUCTION SCRUBBER	108200	105500	116850
CV614A	1ST FUEL GAS COMP. S. SCR.	109100	114845	116850
CV615A	2ND FUEL GAS COMP. S. SCR.	109100	110600	116850
CV616A	1ST STAGE GAS COMPRESSOR	125450	117500	116850
CV617A	2ST STAGE GAS COMPRESSOR	115200	117500	116850
CV618A	12 ND STAGE GAS COMPRESSOR	121200	117500	116850
CV619A	12 ND STAGE GAS COMPRESSOR	109950	117500	116850
CV620A	1ST/2ND FUEL GAS COMP.	121200	106000	116850

VERITEC

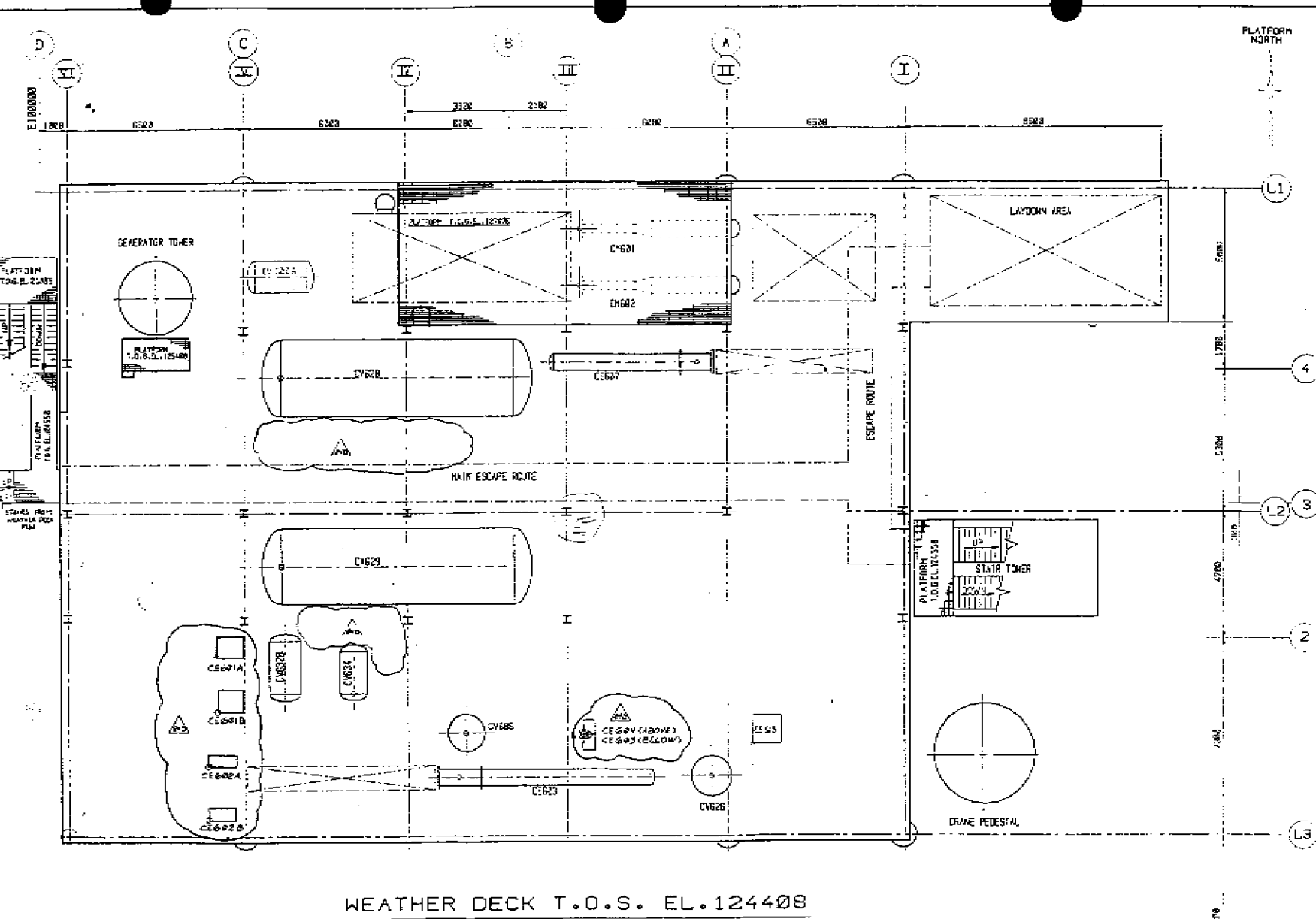
self petroleum range 8/5 process (GMS) tanks

NO.	DESCRIPTION	DATE	BY	CHKD.
A1	TCP2	GENERAL		

FRBY PROJECT
EQUIPMENT LAYOUT
MODULE 35
INTERMEDIATE DECK

FRIGG FIELD

FF-22-20-08-1083 240



WEATHER DECK T.O.S. EL.124408

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CE621A	1ST GAS COMPR. A. COOLER	112.550	106.453	127408
CE621B	1ST GAS COMPR. A. COOLER	106.538	106.453	127408
CE622A	2ND GAS COMPR. J. COOLER	106.538	106.412	127264
CE622B	2ND GAS COMPR. J. COOLER	106.538	106.412	127264
CE623	1ST FUEL GAS COMP. A. COOLER	118.350	115.421	125588
CE624	FUEL GAS/GAS COMP. EXCH.	111.063	113.180	127312
CE625	2ND FUEL GAS COMP. A. COOLER	113.000	113.000	125732
CE627	OIL INLET HEATER	123.750	125.734	125908
CE628	GAS INLET HEATER	123.750	125.734	125908

EQUIPMENT No	DESCRIPTION	NORTH	EAST	ELEV.
CE631	LOADING PIG RECEIVER	123.734	126.000	125588
CE632	GAS PIG RECEIVER	126.682	126.000	125648
CE635	FUEL GAS DISCH. SCRUBBER	110.000	115.700	124408
CE626	GAS SEPARATOR	108.438	112.400	124408
CE628	1 ST. STAGE OIL SEPARATOR	123.288	118.900	127065
CE629	2 NO. STAGE OIL SEPARATOR	116.288	118.900	127065
CE632A	RUNDOWN TANK	123.311	126.988	125588
CE632B	RUNDOWN TANK	123.150	126.988	125588
CE634	RUNDOWN TANK	111.588	115.888	125588

KEY PLAN
TCP2 - MODULES

EL. 1251

- 1.
- 2.
- 3.
- 4.

LEGEND
o - EQUIPMENT ORIGIN SYMBOL

REFERENCE DRAWINGS

NO.	DESCRIPTION	DATE	BY	CHKD.	APP'D.
1	ISSUED FOR CONSTRUCTION	10/1/75	...	...	...
2	ISSUED FOR ANCHOR CONSTRUCTION	10/1/75	...	...	...
3	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
4	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
5	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
6	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
7	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
8	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
9	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...
10	ISSUED FOR SHIP CONSTRUCTION	10/1/75	...	...	...

VERITEC

self petroleum merge s/s

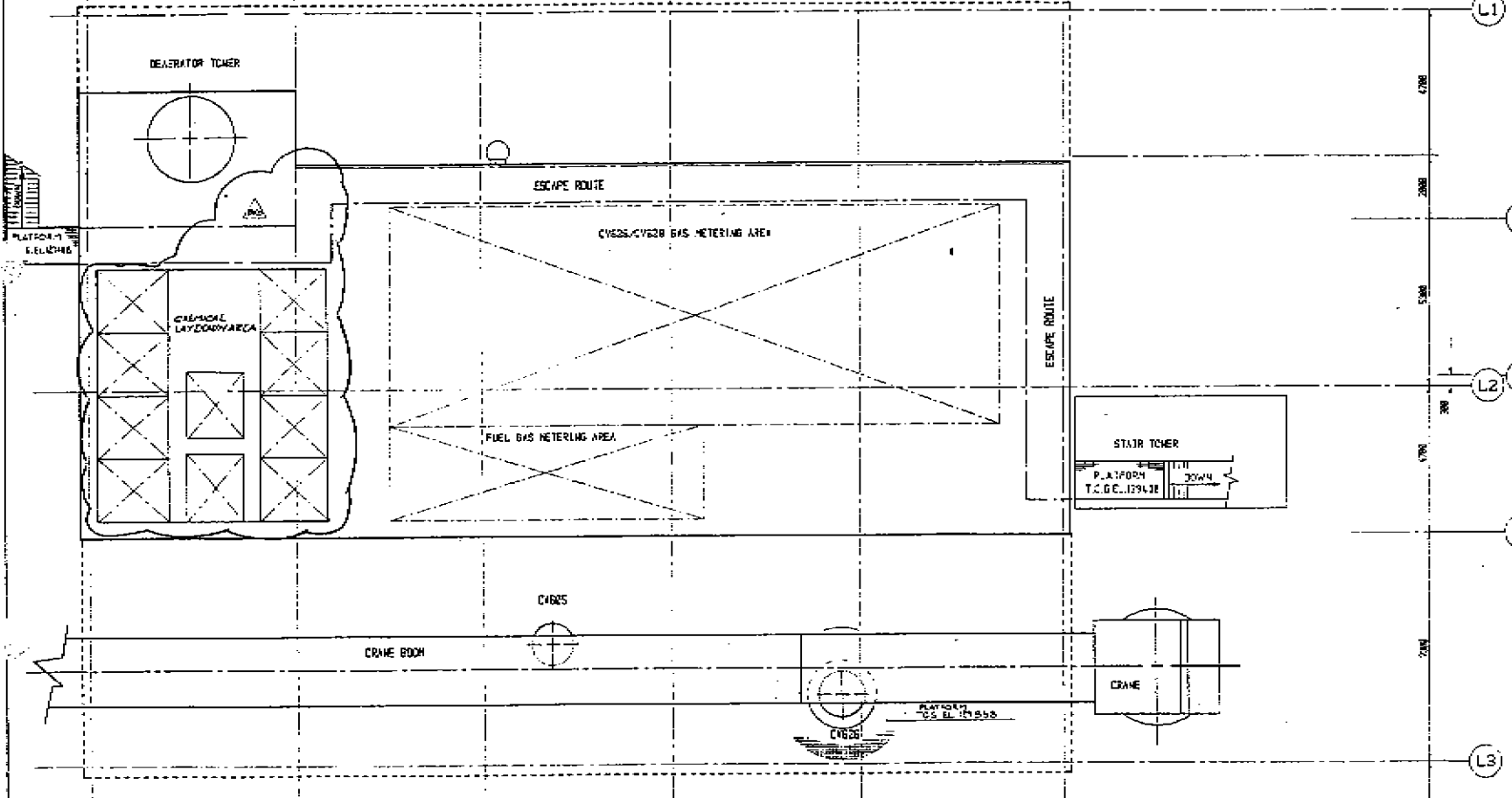
GENERAL

PROJECT: FRBY PROJECT
EQUIPMENT LAYOUT
MODULES 35
WEATHER DECK

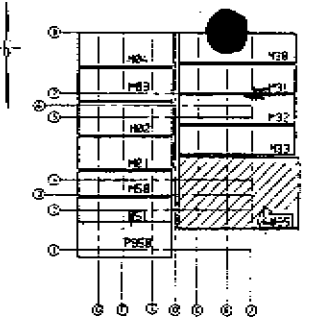
FDB41
1/75

FRISG FIELD FF-22-02-00-1884 @vc

E100000
 1500 3000 4500 6000 7500 9000
 D C B A E C
 VI LV III II I



LAYDOWN/METERING PLATFORM
 T.O.S. EL. 129408



KEY PLAN
 TCP2 - MODULES

- NOTES
- 1.
 - 2.
 3. SIZE OF CHEMICAL LAYDOWN AREA
 4. PLATFORM CY 620

LEGEND
 □ - EQUIPMENT GREEN SYMBOL

FF-22-00-00-1885 MODULE 35 HEADER DETAIL
 DRAWING NO. 11775

REFERENCE DRAWINGS											
NO.	DATE	DESCRIPTION	REV.	BY	CHKD.	APP'D.	DATE	NO.	DATE	DESCRIPTION	REV.
001	05/01/85	ISSUED FOR GENERAL CONSTRUCTION	1	...	...	...	...	...	...	...	...
002	05/01/85	REVISED FOR GENERAL CONSTRUCTION	2	...	...	...	...	...	...	...	...
003	05/01/85	ISSUED FOR GENERAL CONSTRUCTION	3	...	...	...	...	...	...	...	...
004	05/01/85	ISSUED FOR GENERAL CONSTRUCTION	4	...	...	...	...	...	...	...	...
005	05/01/85	ISSUED FOR GENERAL CONSTRUCTION	5	...	...	...	...	...	...	...	...

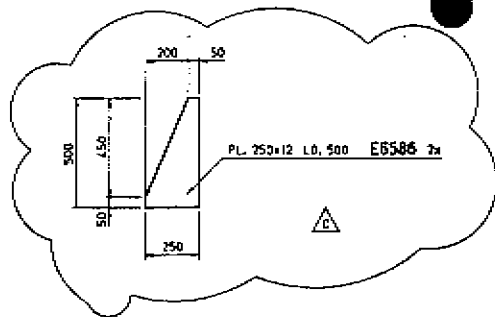
N182888

VERITEC

self preservation range etc. etc. etc.

NO.	1	DESCRIPTION	GENERAL
PROJECT NO.	FR2Y PROJECT		
MODULE NO.	EQUIPMENT LAYOUT		
MODULE 35			
DESCRIPTION	LAYDOWN/METERING PLATFORM		

FR2Y FIELD FF-22-00-00-1885 340



IN THIS DRAWING ARE USED:
 ITEM No. L2001-L2006
 WELD No. E6586-E6588
 WELD No. 001-014
 TEMPLATE No. 1-2
 B.O. MATERIAL
 B.O. BOLTS

ITEM	NO.	DESCRIPTION	WEIGHT

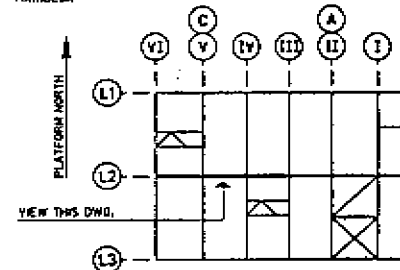
GENERAL NOTES

- ALL MATERIAL TO BE TYPE HS20 GRADE II U.L.G.
- ALL SHARP EDGES TO BE ROUNDED (MIN. R=2 mm)
- LENGTH OF BEAMS, SIZES OF PLATES CALCULATED ACCORDING FABRICATION PROCEDURE.
- ALL FILLET WELDS SHOWN ARE THROAT SIZE AND NOT LEG SIZE.



KEY PLAN

MAINDECK



REF. SHOP DWG.'S		REF. DESIGN DWG.'S	
B02001	BRACE CUTTING SKETCH	FF-22-21-02-1003	TRUSS LINE L2
B02002	BRACE CUTTING SKETCH		
B02003	BRACE CUTTING SKETCH		
B02004	BRACE CUTTING SKETCH		
B02005	BRACE CUTTING SKETCH		
B02006	BRACE CUTTING SKETCH		

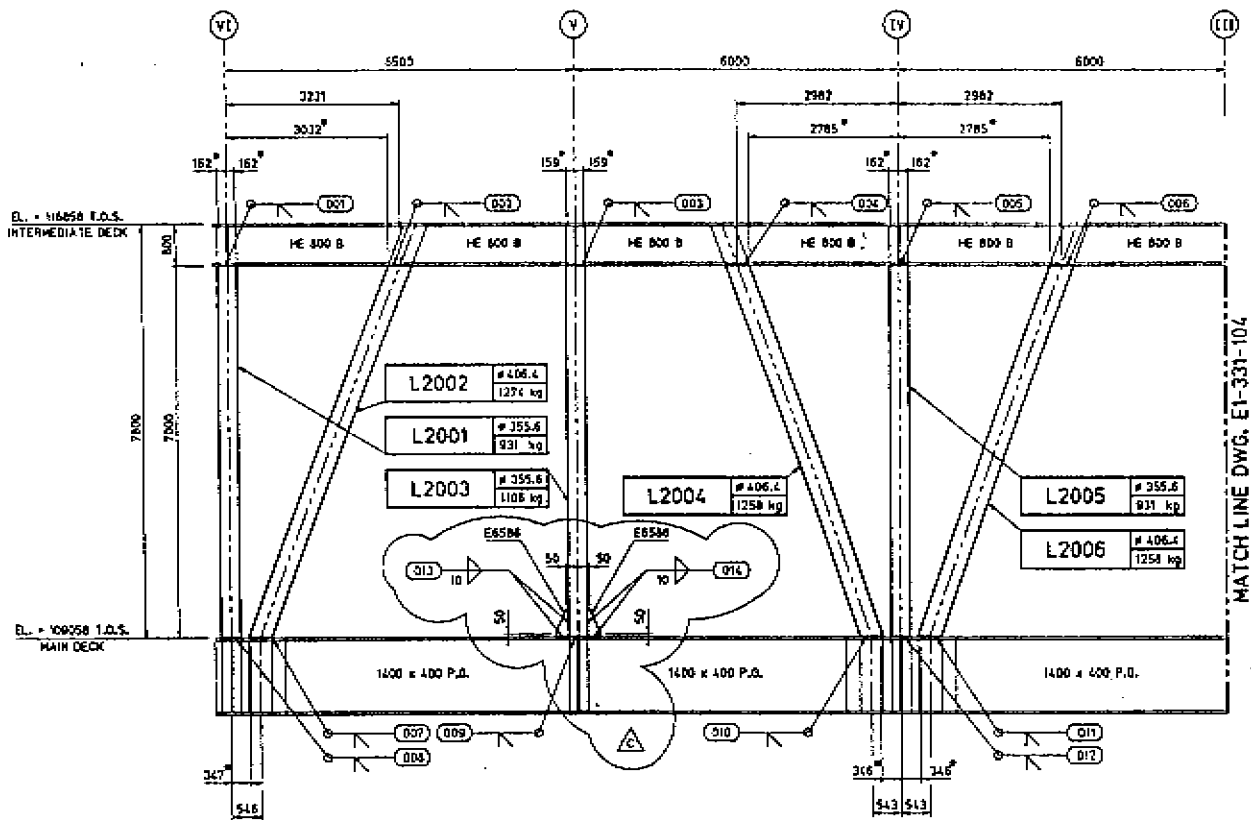
REV.	DATE	BY	CHKD.	DESCRIPTION	APPROVED	DATE
C	28-10-81			STIFFENERS ADDED		
B	15-07-81			FOR CONSTRUCTION		
A	21-8-81			FOR REVIEW		

PROJECT: ELF PETROLEUM NORGE - FROY PROJECT

SHEET: MODULE M35 - TRUSS LINE L2
 MAIN DECK TO INTERMEDIATE DECK SHEET 1

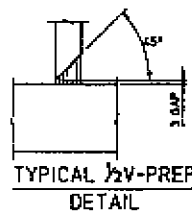
GROOTINT B.V.
 THE HOLLANDS
 THE NETHERLANDS
 TEL. 040-20000
 FAX 040-20000
 P.O. BOX 10000
 3300 AA ROTTERDAM

DRAWN BY: 93009
 SCALE: 1:50
 SHEET NO.: E1-331-103
 DATE: 1-10-81



**TRUSS ROW L2
 MAIN DECK TO INTERMEDIATE DECK**

NOTE:
 DIMENSIONS MARKED THIS ▶
 ARE RELATED TO INSIDE
 DIAMETER BRACE

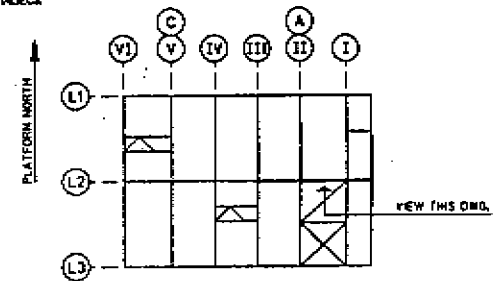


IN THIS DRAWING ARE USED:
 ITEM NO. L2007-L2012
 ITEM NO. E7001-E7003
 WELD NO. 001-018
 TEMPLATE NO. 1-2
 B.D. MATERIAL
 B.D. BOLTS

ITEM NO.	DESCRIPTION	WEIGHT

GENERAL NOTES
 - ALL MATERIAL TO BE TYPE HS20 GRADE II (L.M.D.)
 - ALL SHARP EDGES TO BE ROUNDED 1 MM, R+2 mm 1.
 - LENGTH OF BEAMS, SIZES OF PLATES CALCULATED ACCORDING FABRICATION PROCEDURE.
 - ALL FLEET WELDS SHOWN ARE THROAT SIZE AND NOT LEG SIZE.

KEY PLAN
 MAINDECK



REF. SHOP DWG.'S	REF. DESIGN DWG.'S
BCL2007 BRACE CUTTING SKETCH	FF-22-21-02-1003 TRUSS LINE L2
BCL2008 BRACE CUTTING SKETCH	
BCL2009 BRACE CUTTING SKETCH	
BCL2010 BRACE CUTTING SKETCH	
BCL2011 BRACE CUTTING SKETCH	
BCL2012 BRACE CUTTING SKETCH	

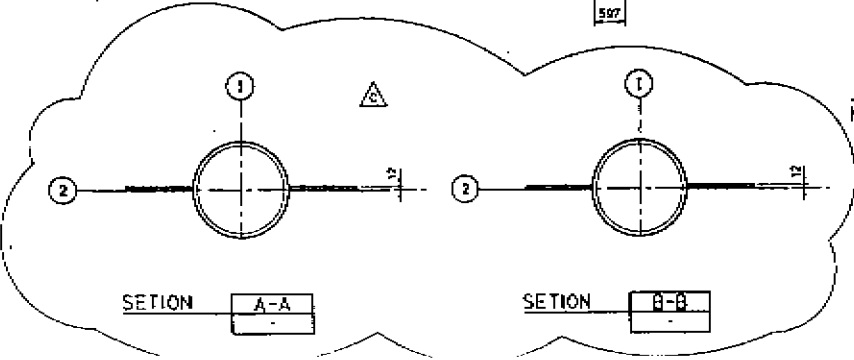
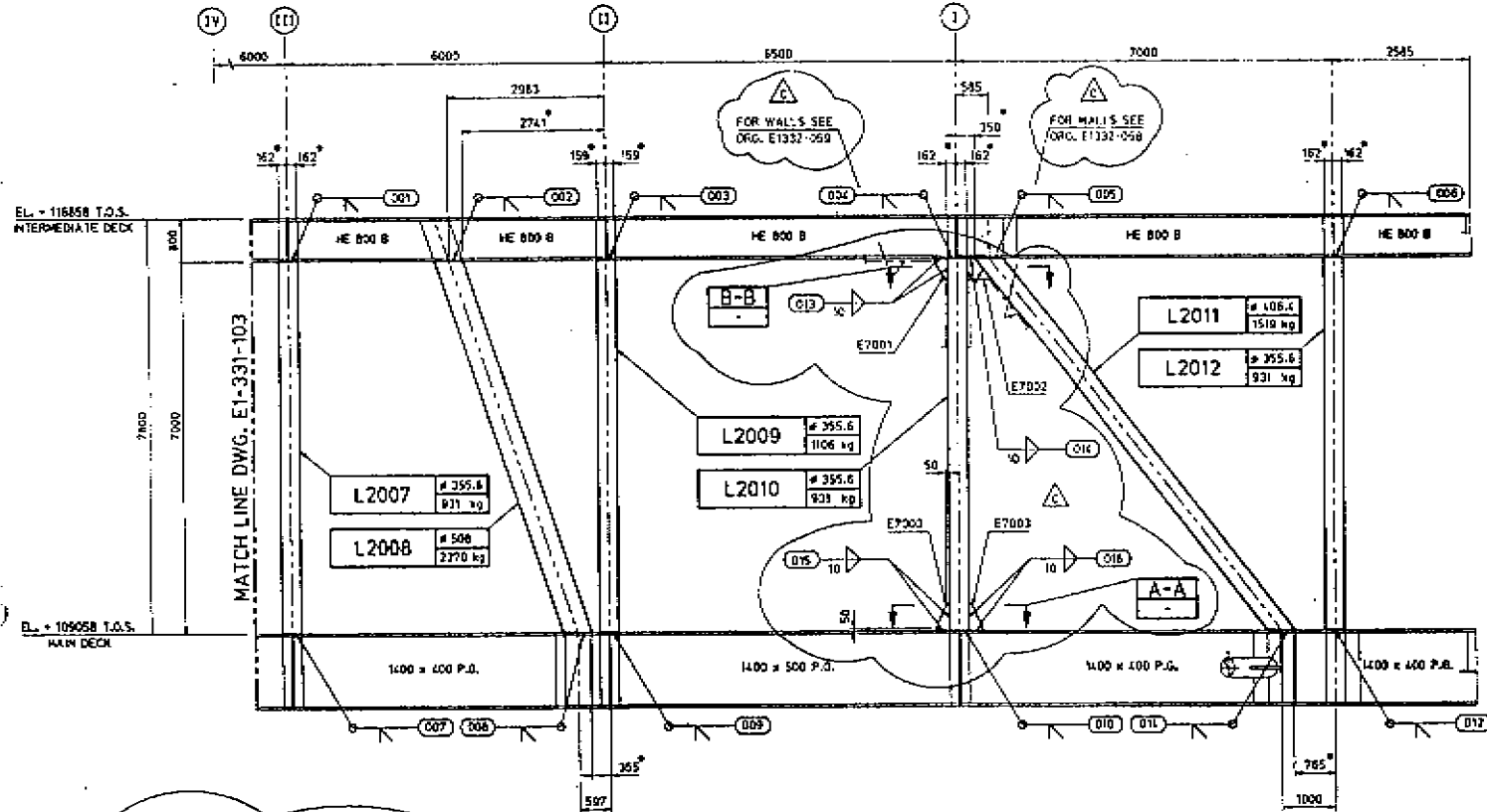
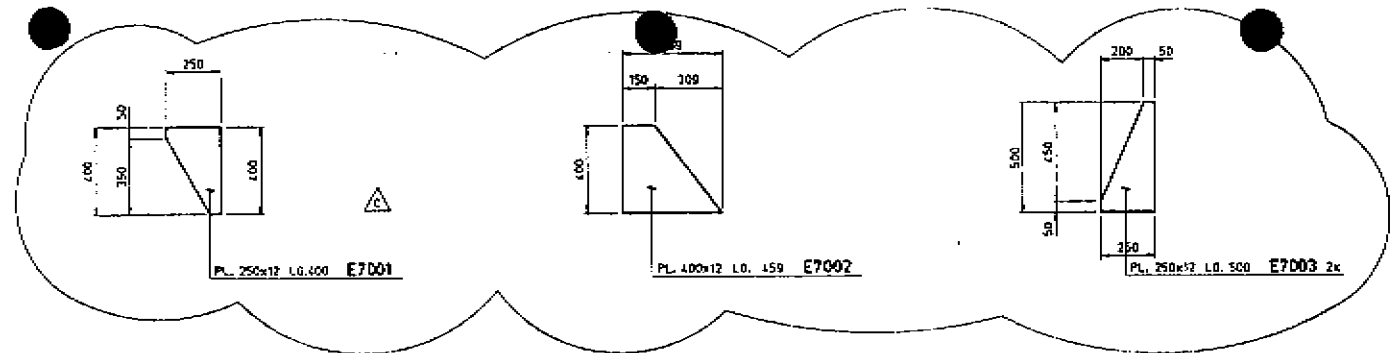
REV.	DATE	BY	DESCRIPTION	APPROVED BY	DATE
C	29-10-92		STIFFENERS ADDED		
B	15-07-92		FOR CONSTRUCTION		
A	24-6-92		FOR REVIEW		

ELF PETROLEUM NORGE - FROY PROJECT

MODULE M35 - TRUSS LINE L2
MAIN DECK TO INTERMEDIATE DECK SHEET 2

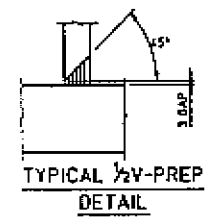
GROOTINT B.V.

PROJECT NO. 93009
 DRAWING NO. E1-3 3 1- 104
 SCALE 1:50



TRUSS ROW L2
 MAIN DECK TO INTERMEDIATE DECK

NOTE:
 DIMENSIONS MARKED THIS WAY ARE RELATED TO INSIDE DIAMETER BRACE

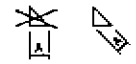


SHIPPED LOOSE ITEMS			
ITEM NO.	NO.	DESCRIPTION	WEIGHT

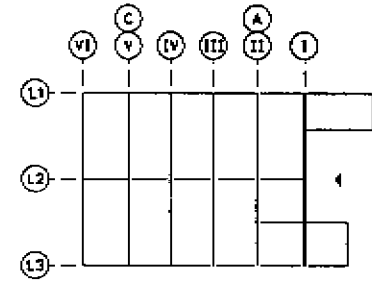
IN THIS DRAWING ARE USED:
 ITEM NO. R1001-R1008
 WELD NO. E6581-E6581
 WELD NO. 001-007
 TEMPLATE NO. 1-1
 B.O. MATERIAL
 B.O. BOLTS

= BRACE NO.

- GENERAL NOTES**
- ALL MATERIAL TO BE TYPE S235 GRADE II U.M.O.
 - ALL SHARP EDGES TO BE ROUNDED 1 MM R=2 MM R.
 - LENGTH OF BEAMS, SIZES OF PLATES CALCULATED ACCORDING FABRICATION PROCEDURE.
 - ALL FLEET WELDS SHOWN ARE THROAT SIZE AND NOT LED SIZE.



KEY PLAN
 WEATHER DECK



REF. SHOP DWG.'S	REF. DESIGN DWG.'S
BCR1001 BRACE CUTTING SKETCH	F22-21-02-1005 TRUSS ROW I
BCR1002 BRACE CUTTING SKETCH	F22-21-02-1009 MAIN DECK MAIN STEEL
BCR1003 BRACE CUTTING SKETCH	F22-21-02-1060 DECKING ARRANGEMENT
BCR1007 BRACE CUTTING SKETCH	
BCR1008 BRACE CUTTING SKETCH	

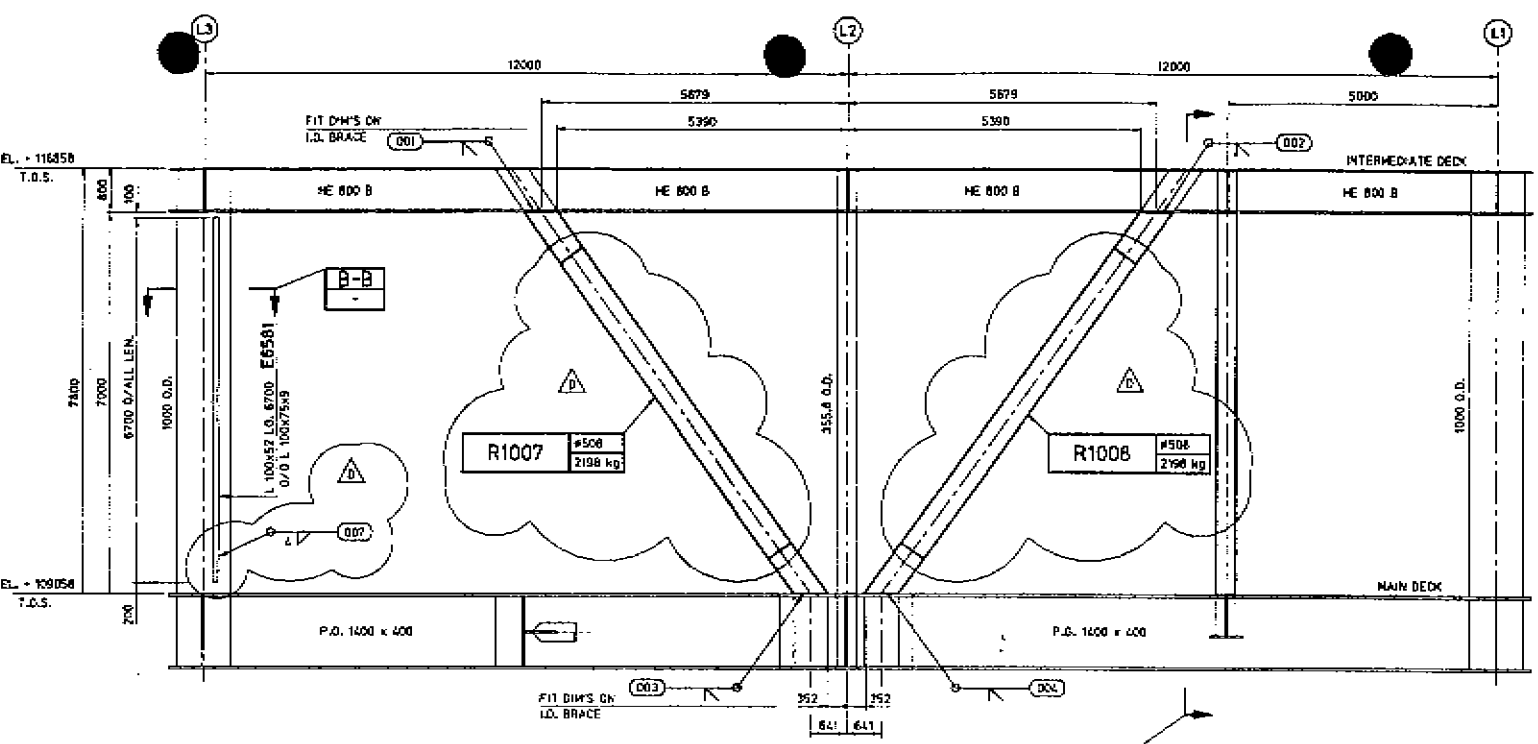
NO.	DATE	BY	CHKD BY	DESCRIPTION
D	15-11-93			REVISED AS INDICATED
C	07-10-93			POS. E6581 ADDED
B	15-07-93			FOR CONSTRUCTION
A	14-06-93	BY		FOR REVIEW

PROJECT: **ELF PETROLEUM NORGE - FRØY PROJECT**

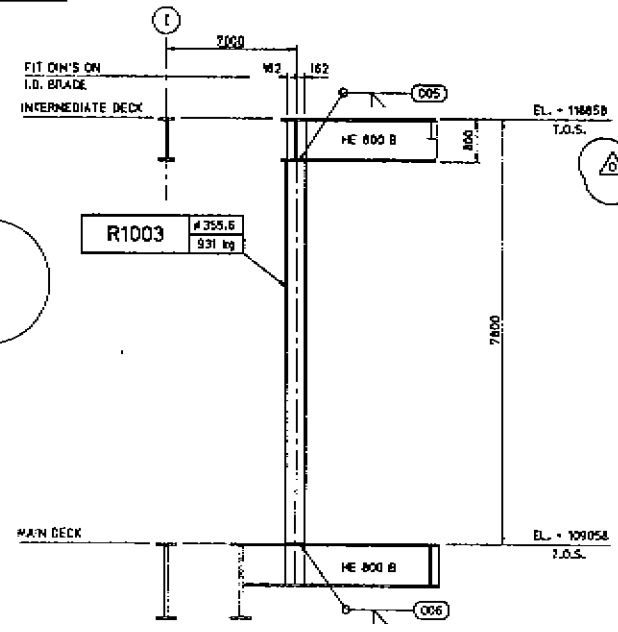
SUBJECT: **MODULE M35 - TRUSS ROW I MAIN DECK TO INTERMEDIATE DECK**

GROOTINT B.V.
 THE NETHERLANDS
 TEL: 015-292020
 FAX: 015-292021

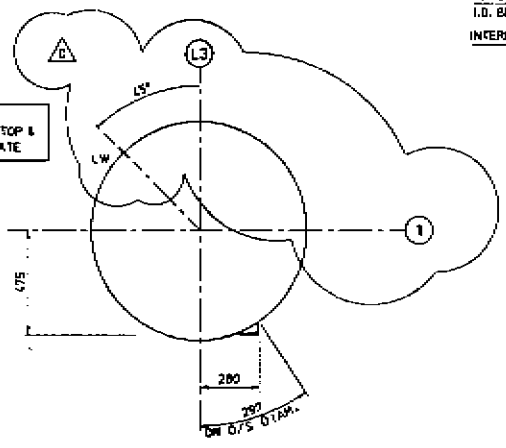
SCALE: 1:50
 PROJECT NO.: 93009
 DRAWING NO.: E1-3 3 1- 107
 SHEET NO.: D



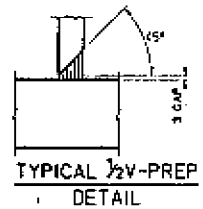
TRUSS ROW I
 MAIN DECK TO INTERMEDIATE DECK



SECTION A-A

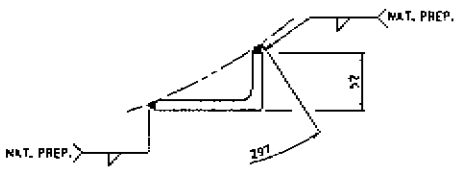


SECTION B-B

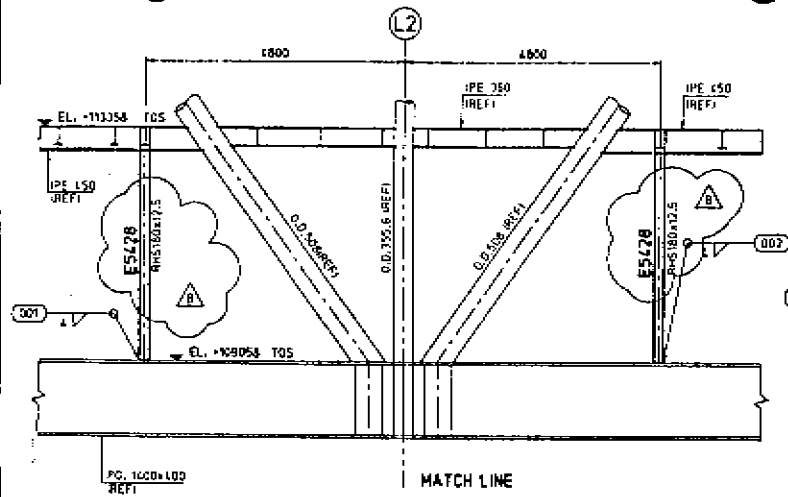


TYPICAL 1/2V-PREP DETAIL

NOTE:
 ANGLE TO BE SEALED TOP & BOTTOM WITH 4mm PLATE

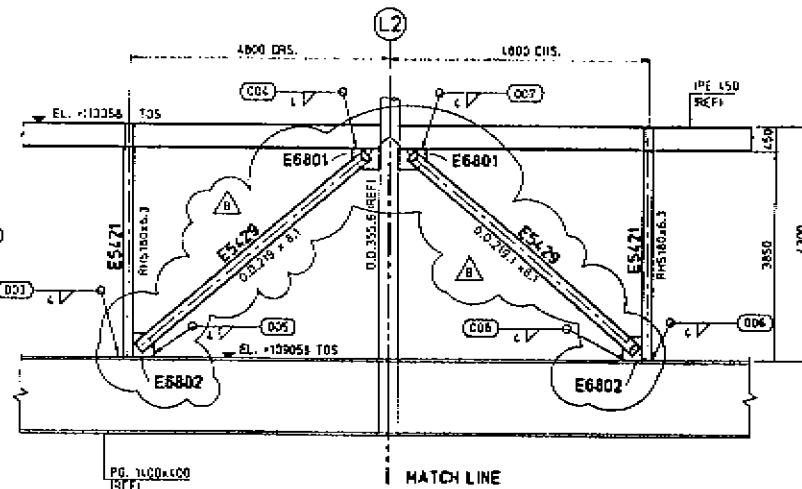


TYPICAL DETAIL



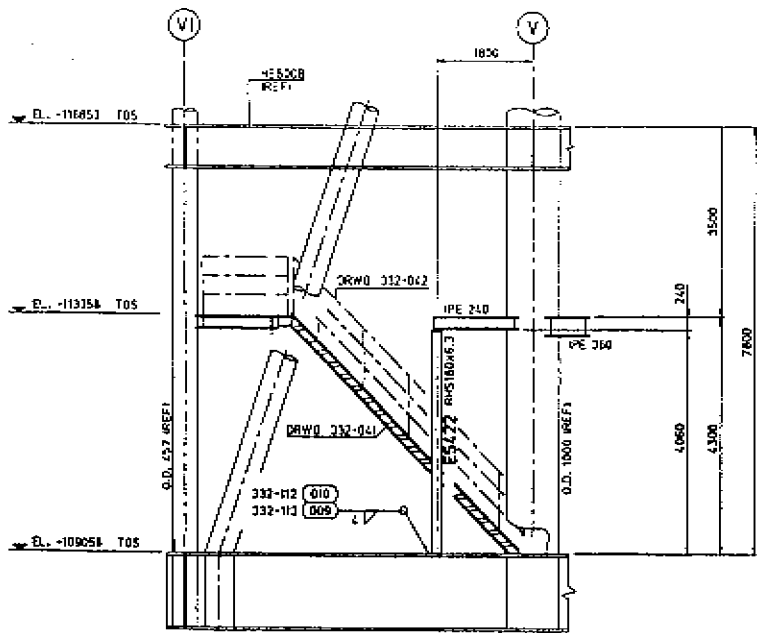
SECTION A-A
332-112

SECTION A-A
332-113



SECTION B-B
332-112

SECTION B-B
332-113



SECTION C-C
332-112

SECTION C-C
332-113

IN THIS DRAWING ARE USED:
ITEM No.
WELD No. 001-010
TEMPLATE No.
B.D. MATERIAL
D.O. BOLTS

SHOWN LOOSE ITEMS		
ITEM	DESCRIPTION	WEIGHT

GENERAL NOTES

- ALL MATERIAL TO BE TYPE U.N.D.
- ALL SHARP EDGES TO BE ROUNDED 1 MIN. R=2 mm L
- LENGTH OF BEAMS, SIZES OF PLATES CALCULATED ACCORDING FABRICATION PROCEDURE.
- ALL FILLET WELDS SHOWN ARE THROAT SIZE AND NOT LED SIZE.



REF. SHOP DWG.'S		REF. DESIGN DWG.'S	
E1-3-3-2-010	POS. NO. E5428 - E5429	PF-22-21-02-1001	PLAN MEZZANINE DECK WEST
E1-3-3-2-010	POS. NO. E6801 - E6802	PF-22-21-02-1002	ELEVATIONS MEZZANINE DECK WEST
E1-3-3-2-112	PLAN PART I		
E1-3-3-2-113	PLAN PART II		

REV.	DATE	BY	DESCRIPTION	APPROVED ENGINEER	CHECKED
B	13-10-93		REVISED AS INDICATED		
A	18-08-93		FOR CONSTRUCTION		

PROJECT
ELF PETROLEUM NORGE - FROY PROJECT

SUBJECT
MEZZANINE DECK WEST ELEVATIONS

	HOOVER 2 3000 LM OPHANEN THE NETHERLANDS TEL. 0161-20000 FAX 0161-20012	THE LEEUWENHEDEN 11 5700 AN OORDHOUT THE NETHERLANDS TEL. 0161-20010 FAX 0161-20012
	GROOTINT B.V.	

PROJECT	NO. 03000	DATE	1993	SCALE	1:50
DRAWN BY			CHECKED BY		
PROJECT MANAGER			SUPERVISOR		
E1-3-3-2-114 B					



FRØY TIE-IN DESIGN - FABRICATION - INSTALLATION RESUMÉ	Ref. No.: RE-FD-22-00-0029
SECTION III - FRØY TIE-IN VOLUME I - MODULE M35 BOOK 1 of 1	Date effective : May 1995
	Revision No. : 01G
	Date revised : Page : 66

References
See chapter 2.4

3.2 Discrepancies from design

2.2.1 Main structure

Module M35 is fabricated in accordance with AFC drawings, (Approved For Construction). Any revisions to the AFC drawings were implemented without repair work carried out.

3.3 Discrepancies from specifications

Module M35 was fabricated in accordance with the specifications approved by and for the project.

3.4 Defects and repairs

No major repair works were carried out during the fabrication of th module M35.

3.5 Corrosion protection

The corrosion protection was performed by application of paint film barrier, and the application was performed in accordance with Elf coating specification and paint supplier's requirements and recommendations.

3.6 WEIGHT REPORT, M35

See reference /34/ in section 2.4 References.

Attached is a summary list of the predicted weights.

ELF NORGE FROY M35

LIFT

LIFT WEIGHT PREDICTION BASED ON WEIGHED WEIGHT

21-12-1994

		Weight kg	North mm	West mm	
Weighed weight 17/9/94		2875000	23250	12850	
Substract scaffolding		-53887	22737	12414	
Substract fabrication aids		-31602	22524	11795	
Weights to be installed After weighing					
Equipment insulation	AR	8178	23200	12500	
2.5 MVA Transformer	EI	7235	24650	-4800	
Miscell. bulk	EI	1000	12396	120365	
HVAC	HV	0			
Loss Control	LC	0			
Mechanical	MC	134813	11973	-3000	Crane in lift position (South)
	MC	7000	13200	12500	Hydro cyclones
PI	PI	5000	22550	16078	Miscellaneous piping
		5738	21985	13211	Commissioning fluids
		125000	23200	12500	Slings
Deviations additions					
Additional pipesupports	PI	2790	22530	16010	
Platform CV650	ST	2049	15000	15500	SI 264
Gasmetering shelter	ST	16319	23200	13000	SI 354
Access plat. weatherdeck	ST	703	13850	26000	SI 469
Protection 12" FW line	ST	870	29200	-9000	SI 388
Access ramp	ST	684	29200	12450	SI 396
Temporary generator	TE	2500	27800	-8750	
Scaffolding		10000	23200	12500	
GRAND TOTAL		3219188	22765	12174	
WEIGHT REPORT 14-11-94		3282878	22899	12030	Lift weight excl. contingancies
WEIGHT REPORT 14-11-94		3396300	22899	12030	Lift weight incl. contingancies



FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUMÉ	RE-FD-22-00-0029
SECTION III - FRØY TIE-IN VOLUME 1 - MODULE M35 BOOK 1 of 1	Date effective : May 1995
	Revision No. : 01G
	Date revised :
	Page : 67

References
See chapter 2.4

3.7 MODULE GEOMETRY, AS-BUILT DIMENSIONS

See attached sheets for as-built dimensions.



Blom A/s

Bloms Oppmåling

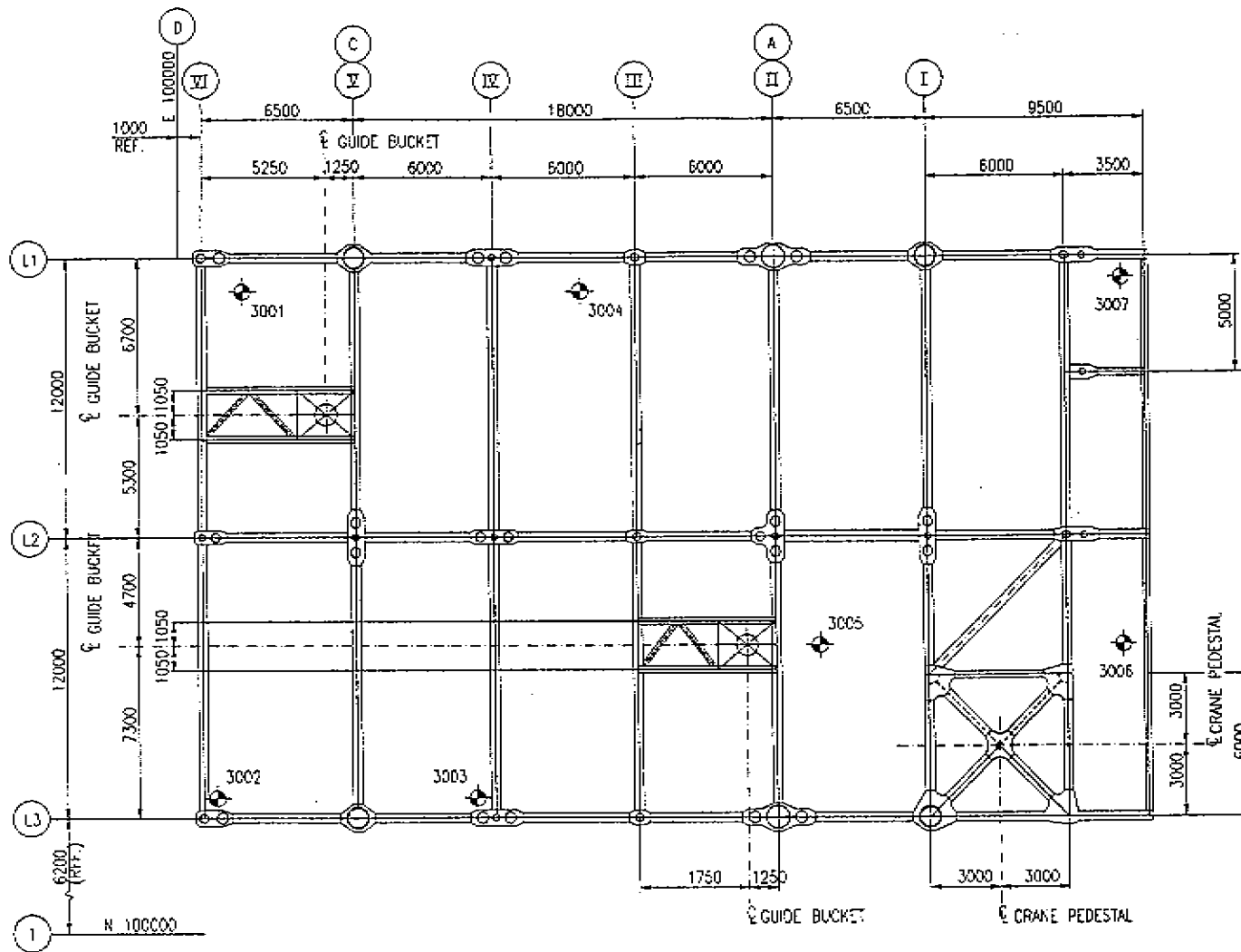
DIMENSIONAL CONTROL

Report no.	Rev.	Sheet	of
94/04/002-L-017/APX.01	0	1	4
Contract/Job no.		WO/Coll off no.	
099-2274-37000		_____	
Prepared by	Checked by		
B.GRØTTING	RC for HAK		
Approved by	Date		
RC	20.09.94.		
Ref. drawing no.			Rev.

Client	AKER OFFSHORE PARTNER
Project	FRØY PROJECT
Location	MODULE M 35, GROOTINT B/V ZWIJNDRECHT, HOLLAND
Subject	REFERENCE POINTS - COORDINATE LIST

List of Reference points surveyed on M35:

Point	North	East	Elevation	
3001	128.603	102.305	109.059	main deck
3002	107.331	101.079	109.064	main deck
3003	107.496	118.759	109.046	main deck
3004	129.250	117.293	109.044	main deck
3005	113.685	127.587	109.039	main deck
3006	113.824	140.569	109.064	main deck
3007	129.573	140.804	109.056	main deck
3008	121.529	140.713	116.850	interm. deck
3009	118.399	115.695	116.827	interm. deck
3010	128.117	115.644	116.831	interm. deck
3011	129.154	101.769	116.854	interm. deck
3012	120.056	103.083	116.837	interm. deck
3013	110.831	103.657	116.836	interm. deck
3014	128.589	102.347	124.405	weather deck
3015	117.111	102.415	124.395	weather deck
3016	127.695	129.501	124.392	weather deck
3017	107.705	129.498	124.402	weather deck
3018	129.108	140.797	124.411	weather deck



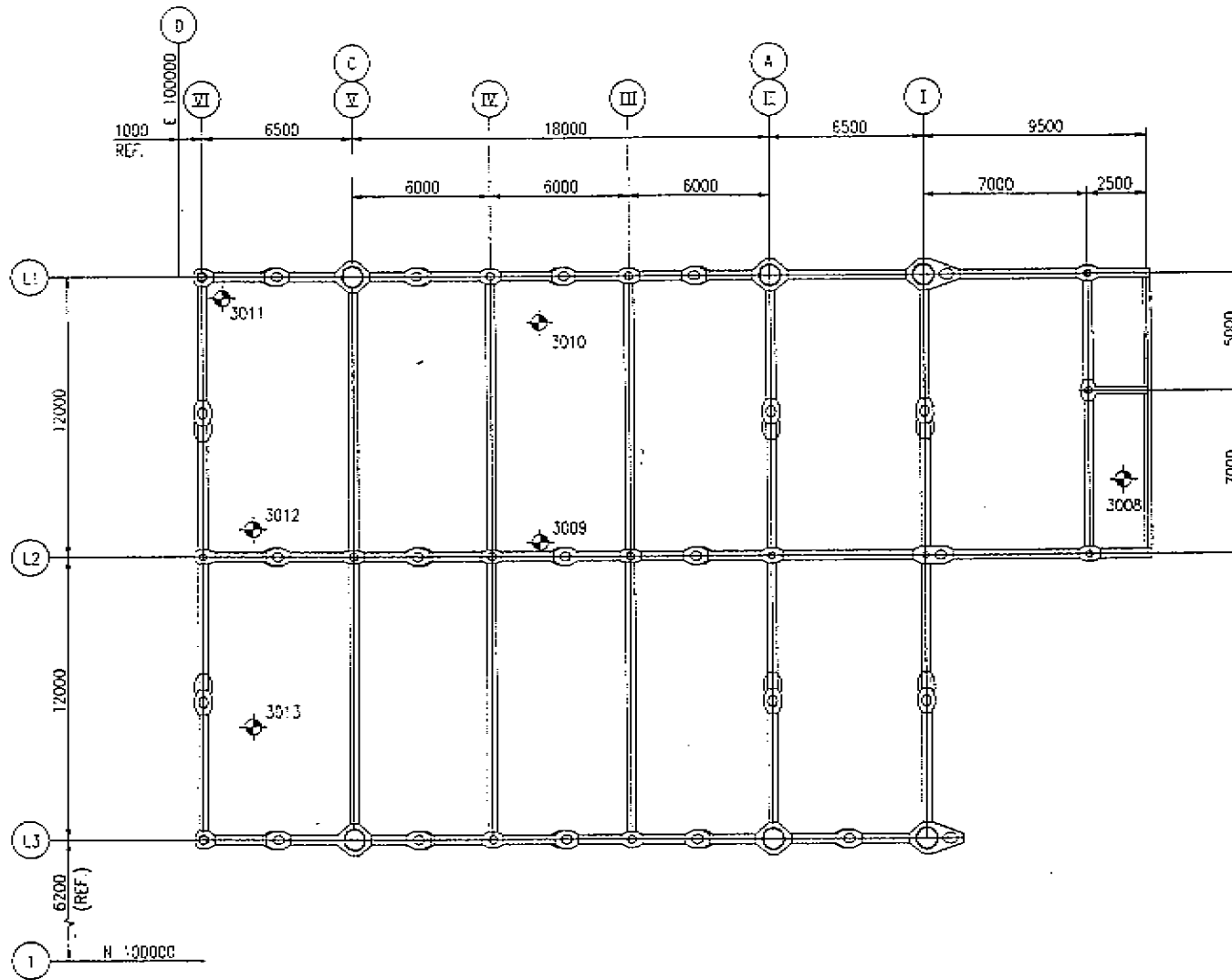
PLAN ON MAIN DECK AT EL+109058 (T.O.S.)



Blom A/S
Bloms Oppmåling

DIMENSIONAL CONTROL

Report no. 94/04/002-L-017/APX.01	Rev. 0	Sheet 2	of 4
Client AKER OFFSHORE PARTNER		Contract/Job no. 099-2274-37008	WO/Contract no.
Project FR3Y PROJECT	Prepared by B.GRØTTING	Checked by <i>[Signature]</i>	
Location MODULE M 35, GROCIANT B/V ZWINDRECHT, HOLLAND	Approved by RC	Date 20.09.94	
Subject REFERENCE POINTS ON MAIN DECK	Rel. drawing no.		Rev.



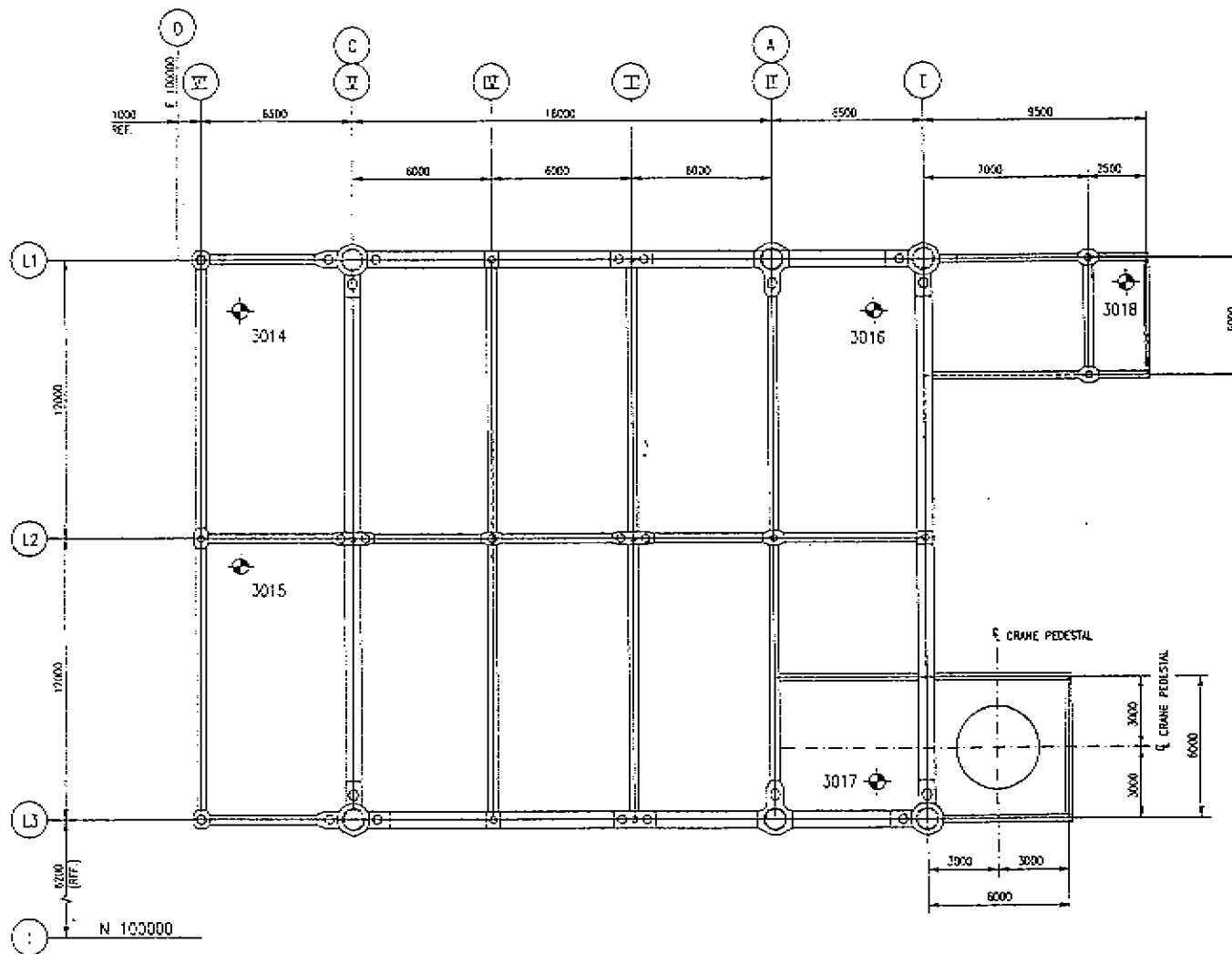
PLAN ON INTERMEDIATE DECK AT EL+116858 (T.O.S.)



Blom A/s
Bloms Opmåling

DIMENSIONAL CONTROL

Client	AKER OFFSHORE PARTNER	Report no.	94/04/002-L-017/APX.1	Rev.	0	Sheet	3	of	4
Project	FRØY PROJECT	Contract/Job no.	099-2274-37000	Prepared by	B. GRØTTING	Checked by			
Location	MOULE M 35, GROOTINT B/V ZWIJNDRECHT, HOLLAND	Approved by	RC	Date	20 09 94	Ref. drawing no.	Rev.		
Subject	REFERENCE POINTS ON INTERMEDIATE DECK								



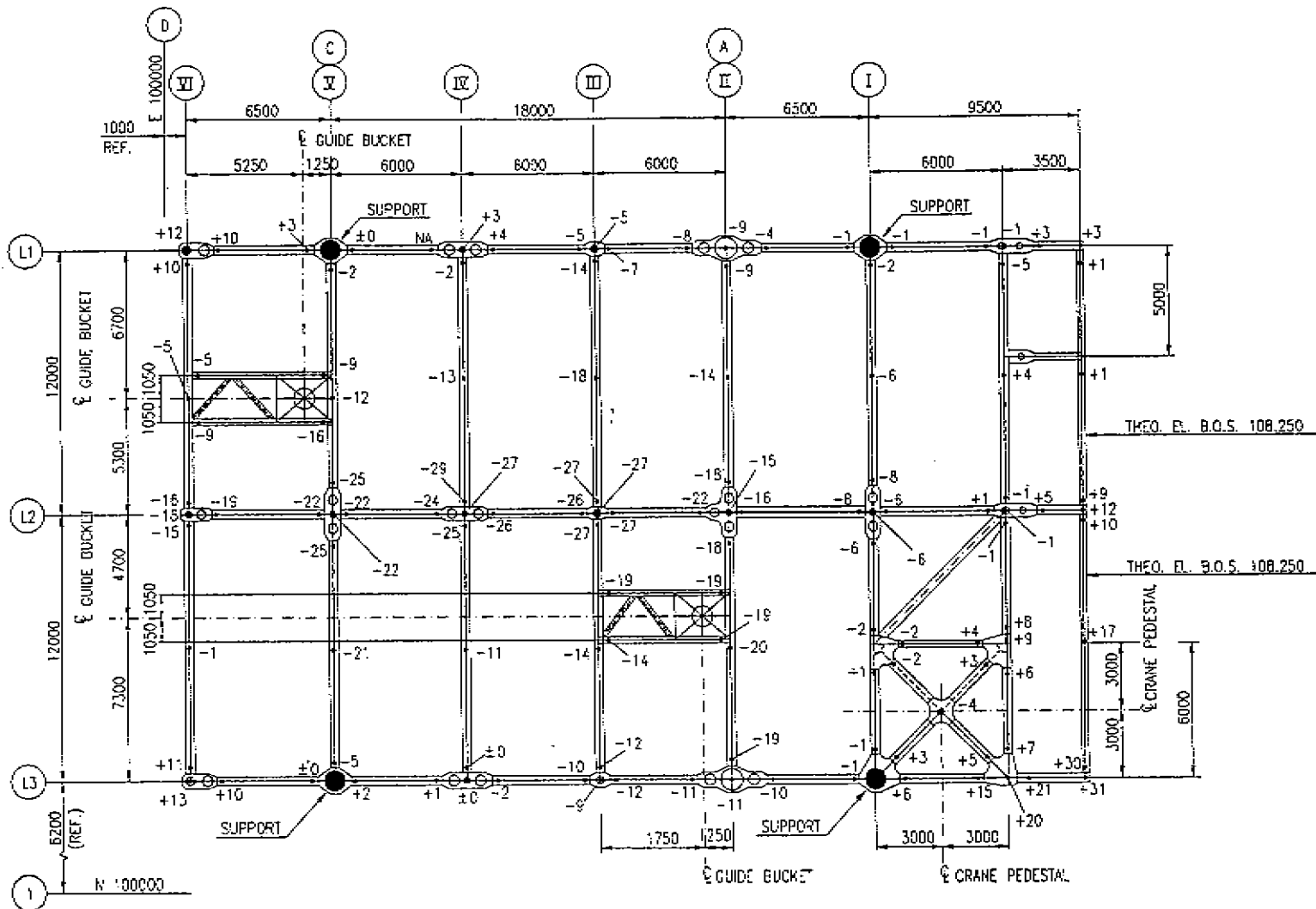
PLAN ON WEATHER DECK AT FL+12440B (T.O.S.)



Blom A/s
Bloms Opmåling

DIMENSIONAL CONTROL

Report no.	Rev.	Sheet	of
94/04/002-L-017/APX.1	0	4	4
Contract/Job no.	No/Call off no.		
099-2274-37000			
Client	Prepared by	Checked by	
AKER OFFSHORE PARTNER	B.GRÖTTING	<i>[Signature]</i>	
Project	Approved by	Date	
FROY PROJECT	RC	20.09.94.	
Location	Ref. drawing no.	Rev.	
MODULE M 35, GROOTINT B/V ZIJNDRECHT, HOLLAND			
Subject	REFERENCE POINTS ON WEATHER DECK		



PLAN ON MAIN DECK AT E: +109058 (T.O.S.)

NOTES

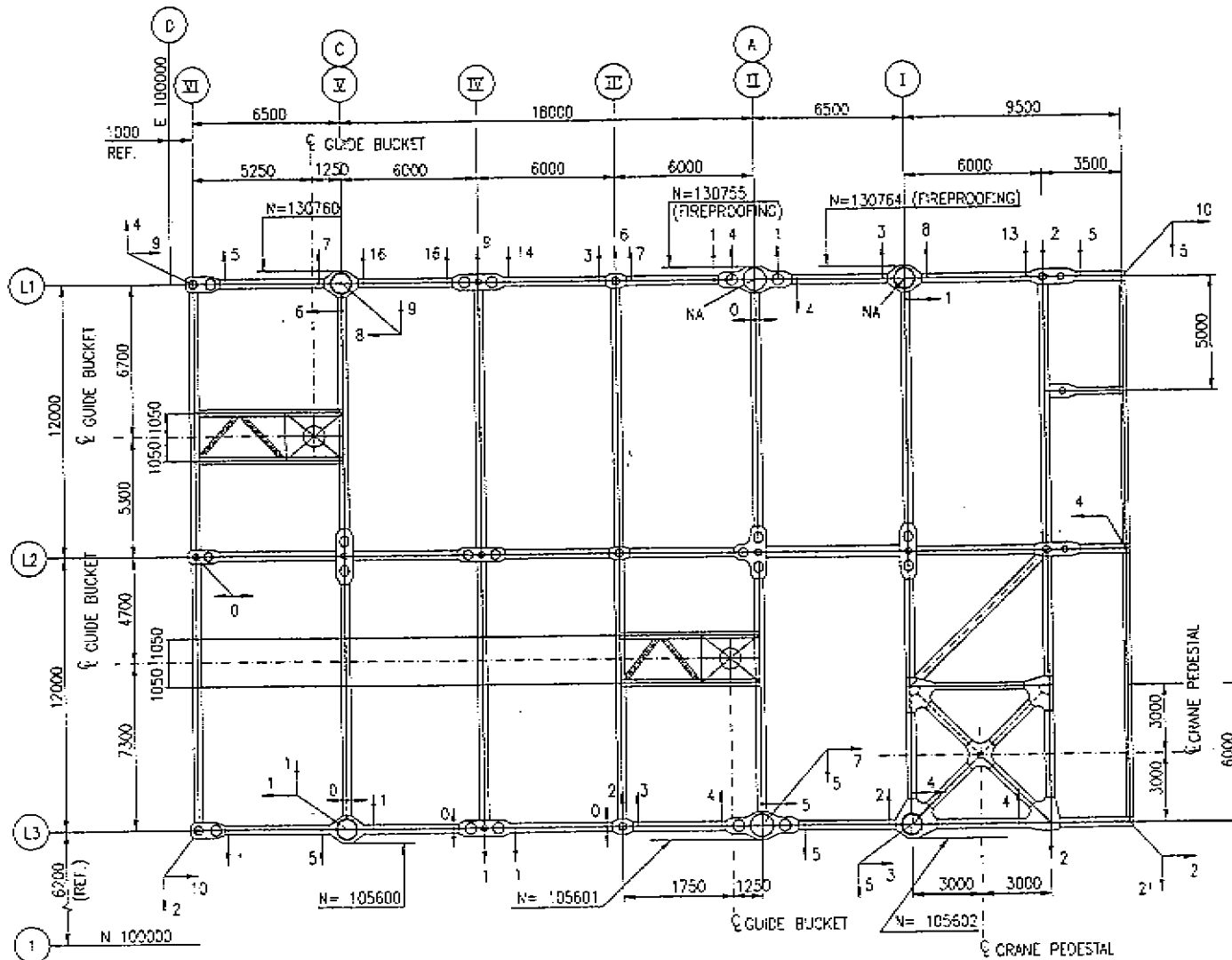
DEVIATIONS FROM THEORETICAL ELEVATION: - AS SUPPORTED SURVEY ON BOTTOM OF STEEL (THEO. EL. 107550)



Blom A/s
Bloms Oppmåling

DIMENSIONAL CONTROL

Report no. 94/04/002-017/APP.4	Rev. 0	Sheet 1	of 4
Client AKER OFFSHORE PARTNER	Contract/Job no. 099-2274-37000	WD/Cell no.	
Project FR2Y PROJECT	Prepared by B.GRÖTTING.	Checked by	
Location MODULE V 35, GROOTINT B/V ZWIJNDRECHT, HOLLAND	Approved by RC	Date 19.09.94	
Subject ELEVATIONS MAIN DECK - SARG NG/F00GINS	Ref. drawing no. FF-22-21-02-1009	Rev. 04F	



PLAN ON MAIN DECK AT EL+109058 (T.O.S.)



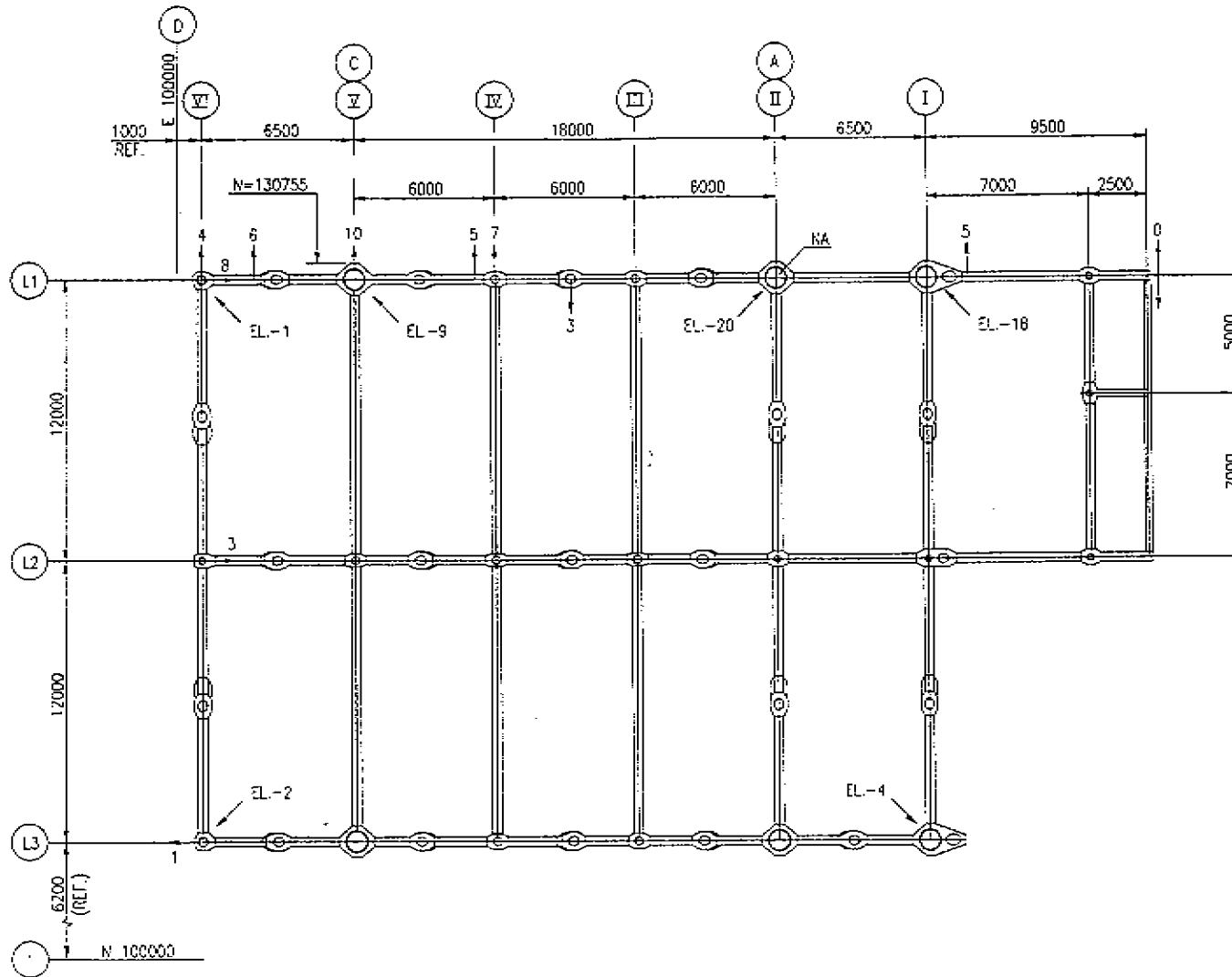
Blom A/S
Bloms Oppmåling

DIMENSIONAL CONTROL

Report no.	Rev.	Sheet	of
94/04/002-L-017	APP.04 0	2	4
Client	AKER OFFSHORE PARTNER	Contract/sub no.	099-2274-37000
Project	FRZY PROJECT	Prepared by	B. GRÖTTING
Location	MODULE V 35, GROOFT NT B/V ZWIJNDRECHT, HOLLAND	Approved by	RC
Subject	POSITION OF MAIN STRUCTURE MAIN DECK	Date	20.05.94
		Rev.	CAT

NOTE:
FOR ELEVATIONS SEE SHEET 1 OF 4 APP.04

CITE024K



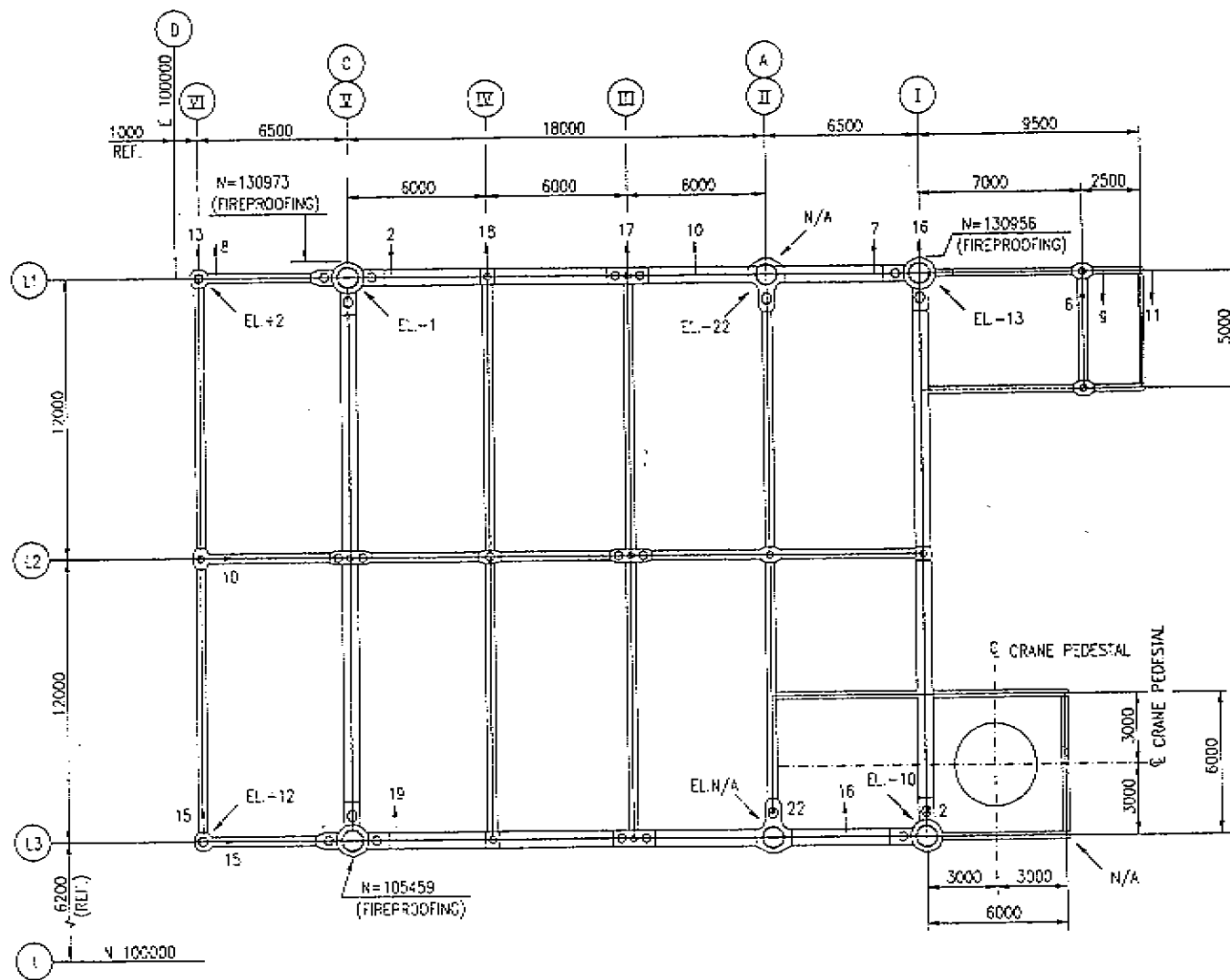
PLAN ON INTERMEDIATE DECK AT EL.+116856 (T.O.S.)



Blom A/s
Bloms Oppmåling

DIMENSIONAL CONTROL

Report no.	94/D4/002-017/APX.4	Rev.	C	Sheet	3	of	4	
Contract/job no.	099-2274-37000			WO/Call all no.				
Client	AKER OFFSHORE PARTNER							
Project	F99Y PROJECT			Prepared by	B CRÖTTING			
Location	MODULE V 35, CROTTING B/V ZWIJMBRECHT, HOLLAND			Approved by	RC		Date	20.09.94
Subject	POSITION/ELEVATION OF MAN STRUCT. INTERM. DECK			Ref. drawing no.	FF-22-21-02-1010		Rev.	04E



PLAN ON WEATHER DECK AT EL+124408 (T.O.S.)



Blom A/s
Bloms Opmåling

DIMENSIONAL CONTROL

Client	AKER OFFSHORE PARTNER	Report no.	94/04/002-017/APX.4	Rev.	0	Sheet	4	of	4
Project	FRØY PROJECT	Contract/Job no.	099-2274-37000		WO/Call off no.				
Location	MODULE N 25, GROOTINT B/V ZWIJNDRECHT, HOLLAND	Prepared by	B. GRÖTTING		Checked by	<i>[Signature]</i>			
Subject	POSITION/ELEVATION OF MAIN STRUCT WEATHER DECK	Approved by	<i>RC</i>		Date	20.09.94			
		ref. drawing no.	FF-22-2'-02-101		Rev.	05F			



FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUMÈ	RE-FD-22-00-0029
SECTION III - FRØY TIE-IN	Date effective : May 1995
VOLUME 1 - MODULE M35	Revision No. : 01G
BOOK 1 of 1	Date revised :
	Page : 68

References
See chapter 2.4

INSTALLATION RESUMÈ, CONTENTS

4.0 INSTALLATION RESUMÈ

RE-FF-22-21-4058 Frigg Modules Installation Resumé



elf

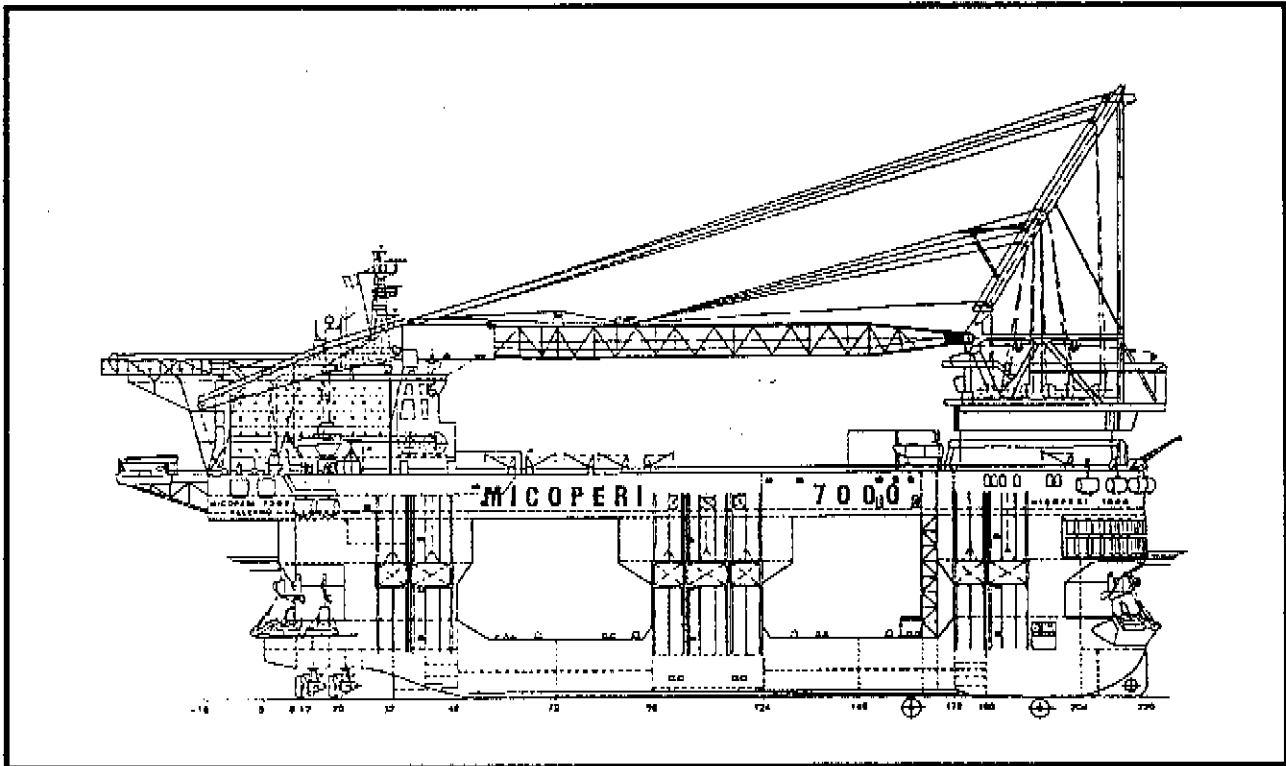
Saipem UK Limited



Saipem

FRØY PROJECT

TRANSPORTATION AND INSTALLATION
OF TEMPLATE, JACKET AND TOPSIDES



FRIGG MODULES INSTALLATION RESUMÉ

Document Number
RE - FF22 / 21 / 4058

PROJECT
CONTRACT
No.FD 037

SAIPEM
PROJECT
No.943100



elf



Saipem

FRØY PROJECT

CONTRACT FD 037

OFFSHORE INSTALLATION OF FRØY WELLHEAD
PLATFORM AND FRIGG MODULE

PROJECT DOCUMENTATION

DOCUMENT NUMBER

RE-FF22/21/4058

DOCUMENT SUBJECT

FRIGG MODULES

INSTALLATION RESUMÉ

00A	15.2.95	Issued for Approval				
Revision Number	Date	Issue Type	Prepared by	Checked by	Project Approved	Company Approved

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1.0 INTRODUCTION

This resumé highlights the primary activities carried out during the offshore operations for the Frigg tie-in modules. The installations were carried out in separate operations in September 1994 and January 1995.

"As-installed" dossiers have been compiled which contain, in detail, all the relevant aspects of the installations carried out by Saipem. Details included in these documents (Ref. RE-FF22/21/4055 and 4056) are daily reports, logs, certificates, records, NDE reports etc. A summary of the "As-installed" dossiers is included in section 10.0.

2.0 GENERAL DESCRIPTION

2.1 Operation Sequence

The operation sequence for each phase is detailed in the Jacket and Topsides Installation Manual, Volume 6, Topsides Installation Operations : Phase 1 and Volume 7, Topsides Installation Operations : Phase 2. Transfer of the flareboom, M35 and P970 onto the M7000 is detailed in Volume 4, Transportation.

The overall sequence and the installation is summarised as follows:

- a) Flareboom transferred from cargo barge S42 to M7000 in Åmøyfjord.
- b) M7000 mobilised to Frigg Field for Phase 1.
- c) Flareboom lifted off M7000 deck, upended and installed on Frigg TCP2 platform.
- d) M7000 demobilised from Frigg Field.
- e) M35 transferred from Smitbarge 2 to M7000 in Botlek.
- f) P970 transferred from S/V Viking Fighter to M7000 in Botlek.
- g) M7000 mobilised to Frigg field for Phase 2.
- h) Pancakes P969 and P946 lifted off TCP2 and transferred to M7000 deck.
- i) M35 lifted off M7000 deck and installed on TCP2.
- j) M35 South bumper and guide removed from M35/TCP2.
- k) Pancake P970 lifted off M7000 deck and installed on TCP2.
- l) M7000 completed crane replacement work.
- m) P969 burner boom removed and seafastened to M7000 deck.
- n) M7000 demobilised from Frigg Field.
- o) P946, P969 and burner boom backloaded to Elf supply vessel in Åmøyfjord.

2.0 GENERAL DESCRIPTION

2.2 Installation Schedule

The "as-built" installation schedules are included overleaf. These show the offshore activities, covering the period from the M7000 sailing to the Frigg field to demobilisation from the field, for each operation.

SAIPEN UK : ELF PETROLEUM NORGE A/S : FRIGG FLARE AND TP1/QP CRANES INSTALLATION

ACTIVITY	Month		SEP94		OCT94		NOV94		DEC94		JAN95		FEB95		MAR95		APR95	
	Day	Time	Day	Time	Day	Time	Day	Time	Day	Time	Day	Time	Day	Time	Day	Time	Day	Time
A100																		
A105																		
A110																		
A115																		
A120																		
A125																		
A135																		
B100																		
B105																		
B110																		
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B155																		
B160																		
B165																		
B170																		
B175																		
B180																		
B185																		
B190																		
B195																		
B200																		
B205																		
B210																		
B215																		
B220																		

Legend:

ACT INBT

STANDBY

Page : 1 of 1

Today's Date : 12 OCT 1994

Project : FROYAS B3

Plotfile : FROYAS B3 . PLT

Report Code : ASBUILT

Plan/Control : PL/943100/505/01

Doc No : SUKL Contract No : 943100

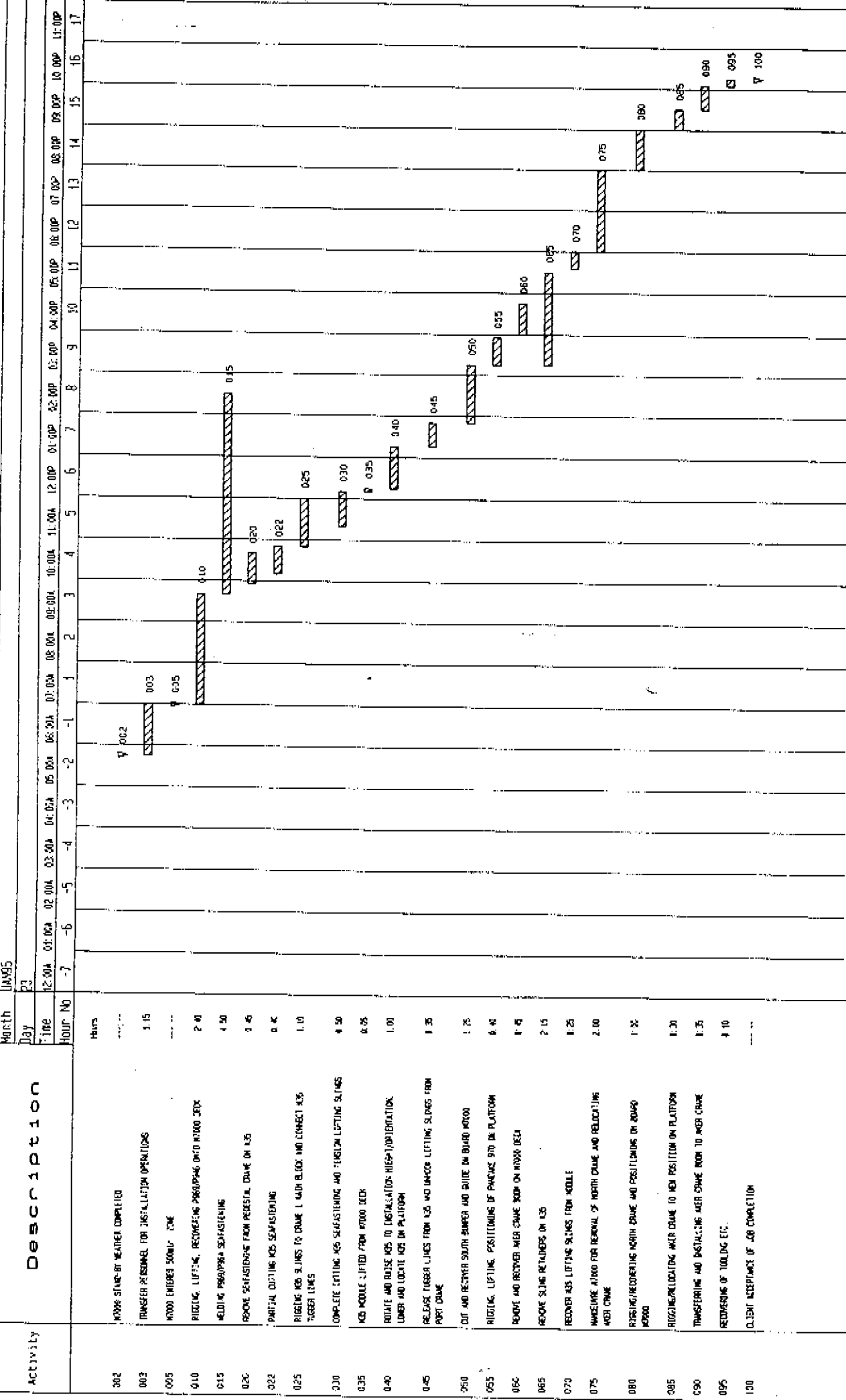
Issue No : 01

Planning Eng. : V. R. Møse

Checked By : *[Signature]*

Approved By : *[Signature]*

SAIP/UK : ELF PETROLEUM NORGE A - FRIGG FIELD : MODULE M35 AS INSTALLED PROGRAMME



Activity	Description	Hour	Day
002	WORK START BY WEATHER COMPLETED	---	---
003	TRANSFER PERSONNEL FOR INSTALLATION OPERATIONS	1.15	---
005	W000 ENTERED SMOOTY ZONE	2.40	---
010	PIEDING, LIFTING, RECOVERING PROGRAMME ONTO W000 DECK	4.50	---
015	WELDING PROGRAMME SEPARATING	0.46	---
020	REMOVE SEPARATING FROM PERIPHERAL DRIVE ON L25	0.42	---
025	PARTIAL CUTTING W05 SEPARATING	1.10	---
030	PIEDING W05 SLINGS TO CRANE 1 WITH BLOCK AND CONNECT W05 TUBER LINES	1.10	---
035	COMPLETE CUTTING W05 SEPARATING AND TUBER LIFTING SLINGS	4.50	---
040	W05 MODULE LIFTED FROM W000 DECK	0.05	---
045	ROTATE AND HOIST W05 TO INSTALLATION HORIZONTAL ORIENTATION LOWER AND LOCATE W05 ON PLATFORM	1.00	---
050	RELEASE TUBER LINES FROM L25 AND UNHOOK LIFTING SLINGS FROM PORT CRANE	1.35	---
055	CUT AND RETIEVE SOUTH BUMPER AND GUIDE ON BOARD W000	1.25	---
060	PIEDING, LIFTING, POSITIONING OF PROGRAMME ON PLATFORM	4.40	---
065	REMOVE AND RECOVER W05 CRANE ROOM ON W000 DECK	1.40	---
070	REMOVE SLING RETIERS ON L25	2.15	---
075	RECOVER W05 LIFTING SLINGS FROM MOBILE	1.25	---
080	W05 CRANE AT RIG FOR REMOVAL OF NORTH CRANE AND RELOCATING W05 CRANE	2.10	---
085	PIEDING/RECOVERING NORTH CRANE AND POSITIONING ON BOARD W000	1.30	---
090	RELOCATING W05 CRANE TO NEW POSITION ON PLATFORM	1.30	---
095	TRANSFERING AND INSTALLING W05 CRANE ROOM TO W05 CRANE	1.35	---
100	RECOVERING OF TOOLING ETC.	4.10	---
100	IDENT ACCEPTANCE OF JOB COMPLETION	---	---

Legend:
 ACTUAL

Page 1 of 1
 Today's Date: 09FEB95
 Project: FROYASB5
 Profile: FROYASB5 PLT
 Report Code: ASBUILT1
 Plan/Control: ACT908

Doc No: 943100
 SUKL Contract No: 943100
 Issue No: 01
 Planning Eng: J MCCARTHY
 Checked By:
 Approved By:

2.0 GENERAL DESCRIPTION

2.3 Key Dates

Activity	Date
Flareboom transferred to M7000	3.9.94
M7000 departed Åmøyfjord for Frigg field, Phase 1	12.9.94
Flareboom installation completed	18.9.94
M7000 demobilised from Frigg field	18.9.94
P970 transferred to M7000	5.1.95
M35 transferred to M7000	6.1.95
M7000 departed Botlek for Frigg Field, Phase 2	12.1.95
M7000 ready for M35 installation following bad weather	23.1.95
P946 and P969 removed from TCP2	23.1.95
M35 Installed on TCP2	23.1.95
P970 installed on TCP2	23.1.95
M7000 demobilised from Frigg field	24.1.95

2.0 GENERAL DESCRIPTION

2.4 Activity Distribution

2.4.1 Flareboom Activities

Description	Duration (Days)	%
Work time	0.2*	4.1
Extra work time	0.0	0.0
Weather standby	3.2	65.3
Sailing time	1.5	30.6
Standby time	<u>0.0</u>	<u>0.0</u>
TOTAL TIME	<u>4.9</u>	<u>100.0</u>

* Includes transfer to M7000 deck.

2.4.2 M35 Activities

Description	Duration (Days)	%
Work time	3.1*	22.5
Extra work time	0.0	0.0
Weather standby	7.2	52.2
Sailing time	3.5	25.3
Standby time	<u>0.0</u>	<u>0.0</u>
Total Time	<u>13.8</u>	<u>100.0</u>

* Includes transfer to M7000 deck.

2.0 GENERAL DESCRIPTION

2.4 Activity Distribution (cont)

2.4.3 Pancake Activities

Description	Duration (Days)	%
Work time	0.9*	100.0
Extra work time	0.0	0.0
Weather standby	0.0+	0.0
Sailing time	0.0+	0.0
Standby time	<u>0.0</u>	<u>0.0</u>
Total Time	<u>0.9</u>	<u>100.0</u>

* Excludes transfer to M7000 deck.

+ Sailing and weather down time allocated to M35.

2.5 Subcontractors

Subcontractors	Service
Fugro UDI	Positioning
AIB Vincotte	NDT
Oceanroutes UK	Weather Forecasting

2.6 Sites

Kvaerner, Egersund	Flareboom
Grootint, Zwijndrecht	M35

3.0 ENGINEERING REFERENCE DOCUMENTS

A copy of the Engineering Reference Document Register, document No:
SP-FR22/90/4050 is included overleaf.



Saipem

ENGINEERING REFERENCE DOCUMENT REGISTER

Form No. : 740-1

Document No. :

SP-FR22/90/4050

Rev. : 00C

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CLIENT :

ELF

PROJECT :

FRØY - FD037

Date :

23.6.94

Document Number	Rev.	Date	Document Title
1. General NPD		1/94	Acts, Regulations and Provision for the Petroleum Activity.
SP-FR22/21/0052	01C	6/92	Environmental Conditions Specifications
2. Grillage/Seafastening Design DNV VMO RP2		6/85	Standard for Insurance Warranty Surveys in Marine Operations - Sea Transportation
NS 3472E (2nd Edition)		6/84	Steel Structures Design Rules
DNV Classification Notes No. 30.1		5/92	Buckling Strength Analysis of Mobile Offshore Units
SGC 2120-TR1	0	12/90	Loadout and Seafastening of Structures for Offshore Transportation
SGC 2120-TR2	0	12/90	Sea-Transportation of Offshore Structures
SP-FR22/00/0054	01C	6/92	Specification for Jacket Transportation and Installation
S-10/21/0001	04G	4/92	Topsides Structural Design Specification
014/INDI/JR	0	12/86	Noble Denton International: General Guidelines for Marine Transportation
SP-FR22/00/4004 (MLG/12.00/Spec/202)	0	4/86	Criteria for Module Transportation and Seafastening
3. Tow and Safety DNV VMO RP2		6/85	Standard for Insurance Warranty Surveys in Marine Operations - Sea Transportation
SGC 2120 TR2	0	12/90	Sea-Transportation of Offshore Structures
SP-FR22/00/0054	01C	6/92	Specification for Jacket Transportation and Installation
014/INDI/JR	0	12/86	Noble Denton International: General Guidelines for Marine Transportation
SP-FR22/00/4004 (MLG/12.00/Spec/202)	0	4/86	Criteria for Module Transportation and Seafastening

Prepared By

Approved For Use By

Notes

Name : D. Nalywajko

Name : W. MCGUIRE

Signed :

Signed :

Date : 23.6.94

Date : 29.6.94



Saipem

ENGINEERING REFERENCE DOCUMENT REGISTER

Form No. 740-1
Document No. :
SP-FR22/90/4050
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Date :

23.6.94

Document Number	Rev.	Date	Document Title
4. Rigging Design			
DNV VMO RP5		6/85	Standard for Insurance Warranty Surveys in Marine Operations - Lifting
PM20		10/87	HSE Guidance Notes - Cable Laid Slings and Grommets.
SP-FR22/00/4005 (SUKL/0000/CRI/203)	00A (1)	1/93 (9/91)	Criteria for Single Crane Lift Systems
SP-FR22/00/4006 (SUKL/0000/CRI/207)	00A (3)	1/93 (9/91)	Criteria for Design of Lift Points
SP-FR22/00/4007 (SUKL/0000/CRI/208)	00A (3)	1/93 (9/91)	Criteria for Sling and Grommet Design
SP-FR22/00/4008 (SUKL/0000/CRI/209)	00A (1)	1/93 (8/92)	Criteria for the Laydown of Rigging
SP-FR22/00/4010 (SUKL/0000/CRI/302)	00A (0)	1/93 (1/91)	Criteria for Handling Procedures for Large Diameter Cable Laid Slings
SP-FR22/00/4012 (QCE-SPE-1510)	00A (3)	1/93 (5/92)	Technical Specification for Wire Rope Slings
SP-FR22/00/4013 (QCE-SPE-1520)	00A (2)	1/93 (5/92)	Technical Specification for Cable Laid Wire Rope Slings
SP-FR22/00/4014 (QCE-SPE-1530)	00A (1)	1/93 (5/92)	Technical Specification for Cable Laid Grommets
5. Bumper/Guide Design			
NS 3472E (2nd Edition)		6/84	Steel Structures Design Rules
SP-FR22/00/4009 (SUKL/0000/CRI/301)	00A (2)	1/93 (10/91)	Criteria for Guidance Systems for Setting Modules on Fixed Installations
6. Loadout			
SP-FR22/00/0052	01C	6/92	Specification for Jacket Loadout
SP-FR22/00/0053	01C	6/92	Specification for Barge Handling and Mooring
SP-FR22/00/0055	01C	6/92	Specification for Deck Loadout
SGC2120 - TR1	0	12/90	Loadout and Seafastening of Structures for Offshore Transportation
SP-FR22/00/4003 (MLG/12.00/Spec/201)	00A (0)	1/93 (2/86)	Criteria for Loadout of Modules onto Floating Cargo Barges



Saipem

ENGINEERING REFERENCE DOCUMENT REGISTER

Form No. : 740-1

Document No. :

SP-FR22/90/4050

Rev. : 00C

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CLIENT :

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PROJECT :

FRØY - FD037

Date :

23.6.94

Document Number	Rev.	Date	Document Title
7. Mooring Analysis			
NMD		8/86	Guidelines on Positioning Systems for Mobile Offshore Units
DNV Part 6, CH.2		7/89	Rules for Classification of Mobile Offshore Units
DNV VMO RP6		6/85	Standard for Insurance Warranty Surveys in Marine Operations - Transport and Positioning of Mobile Offshore Units
8. Piling			
API RP 2A	20	7/93	Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms
SP-FD00/21/0002	01C	8/92	Driveability Studies for Piles or Conductor Pipes
SP-FR22/00/4002 (MLG/12.00/Spec/105)	00A (0)	1/93 (4/86)	Criteria for Pile and Follower Design Handling and Installation
9. Procedure Manuals			
SP-FR22/00/0051	01C	6/92	Specification for Deck Transportation and Installation Manuals
SP-FR22/00/0054			Specification for Jacket Transportation and Installation
SP-FR22/00/0056	01C	6/92	Specification for Installation Procedure Manuals
SGC 2120 - P01	0	10/90	Installation of Offshore Steel Platforms

4.0 TRANSPORTATION SUMMARY

4.1 Cargo Barges

The flareboom and M35 were transported using the following cargo barges:

S42	(123.3m x 30.1m)	-	Flareboom
Smitbarge 2	(91.4m x 30.5m)	-	M35

4.2 Tugs

The tugs used for the main operations were:

Vessel	Usage
Smit Lloyd 91	Flareboom
Eerland 12,23,26 & 28	
Smit-Denemarken	M35 – River Tow

4.3 Supply Vessel

Pancake P970 was transported to Åmøyfjord by Elf on the S/V Viking Fighter.

5.0 FLAREBOOM INSTALLATION SUMMARY

5.1 General

The Flareboom installation took place over a period of 2 hours, commencing following a period of bad weather on completion of TP1 and QP crane replacement on 18 September 1994. The flareboom was transferred onto the M7000 deck for transportation to the field on 3 September 1994.

The flareboom was installed with the M7000 in D.P. mode adjacent to the TCP2 platform east face.

5.2 Transfer onto M7000

The flareboom was transferred onto the M7000 deck, complete with grillage, in Åmøyfjord by tandem crane operation.

5.3 Flareboom Lift

The flareboom was lifted off the M7000 deck by tandem crane operation, upended and installed using the second auxiliary hook of the port (No. 1) crane. The recorded hook load for installation was 360 tonnes.

6.0 PANCAKE OPERATIONS SUMMARY

6.1 General

The offshore pancake operations took place over a period of 4 hours, commencing final arrival at the Frigg TCP2 platform on 23 January 1995, following an extended period of bad weather.

The offshore pancake operations were performed with the M7000 on DP Mode adjacent to the TCP2 platform east face.

6.2 P970 Transfer onto M7000

Pancake P970 was transferred onto the M7000 deck in Botlek using the whip hook of the port (No. 1) crane. Note: this operation took place late on the 5 January 1995 and has not been recorded on the M7000 Daily Work Progress Reports, which started on 6 January 1995.

6.3 P969 and P946 Removal

Pancakes P969 and P946 were lifted off TCP2 and transferred to the M7000 deck using the second auxiliary hook of the port (No. 1) crane. This was the first operation at TCP2 to enable installation of M35.

6.4 P970 Installation

Pancake P970 was lifted off the M7000 deck and installed on TCP2, adjacent and to the south of M35, using the whip hook of the port (No. 1) crane.

This operation was carried out immediately after the removal of the M35 south bumper/guide.

6.0 PANCAKE OPERATIONS

6.5 P969 Burnerboom Removal

The burnerboom was removed from pancake P969 when on the M7000 deck and seafastened independently for transportation to Stavanger.

7.0 M35 INSTALLATION SUMMARY

7.1 General

The M35 installation took place over a period of 9.5 hours, commencing after the removal of pancakes P969 and P946 on 23 January 1995.

The M35 installation was performed with the M7000 on DP mode to platform east.

7.2 Transfer Onto M7000

M35 was transferred onto the M7000 deck in Botlek, together with its grillage, using the main hook of the port crane.

7.3 M35 Lift

M35 was lifted off the grillage on the M7000 deck and installed on TCP2 using the main hook of the port (No. 1) crane. The recorded lift weight was 3150T.

7.4 South Bumper/Guide Removal

The M35 south bumper/guide were removed, immediately after set down of M35 and prior to installation of P970, using the whip hook of the port crane.

8.0 NDE SUMMARY

All NDE reports are contained in section 7.0 of each 'As-Installed Dossier'.

The NDE consisted of visual, MPI and UT examinations and was performed by AIB Vincotte as subcontractors to Saipem.

9.0 DEVIATIONS

9.1 Repair of P970 Handrailing (Site Instruction : 001/95/MP)

Elf issued a site instruction for the M7000 to repair damage to the P970 handrailing, sustained prior to arrival at M7000.

9.2 MPI P970 Lift Point Welds (Site Instruction : 002/95/MP)

Elf issued a site instruction for the M7000 to carry out MPI on the P970 lift point welds following transfer onto the M7000.

10.0 "AS-INSTALLED" DOSSIER REFERENCE SUMMARY

Following are the contents list of the "as-installed" dossiers, for the Frigg Modifications, Phases 1 and 2, issued under separate cover. The document numbers are RE-FF22/21/4055 and 4056.

**ELF FRØY PROJECT – FD037
FRIGG MODULES INSTALLATION RESUMÉ
DOCUMENT NO. RE–FF22/21/4058**

**ELF FRØY PROJECT - FD037
FRIGG MODIFICATIONS (PHASE 1) "AS-INSTALLED" DOSSIER
DOCUMENT No. RE - FF22 / 21 / 4055**

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- 1.0 INTRODUCTION**
 - 1.1 Summary of Contents**
 - 1.2 As-built Installation Schedule**

- 2.0 GENERAL**
 - 2.1 Technical Queries/Concession Requests**
 - 2.2 Site Instructions**
 - 2.3 Stage Acceptance Certificates**
 - 2.4 Checklists**
 - 2.5 Daily Progress Reports**
 - 2.6 Inspection Plans**
 - 2.7 Non Conformance's**
 - 2.8 Extra Work Report**
 - 2.9 Weather Reports**

- 3.0 PREPARATION AND POSITIONING ACTIVITIES**
 - 3.1 Positioning Subcontractor Readiness Review**
 - 3.2 Positioning Subcontractor Daily / Weekly Reports**
 - 3.3 M7000 & General Preparation Checks**

- 4.0 INSTALLATION**
 - 4.1 DP Trials**
 - 4.2 Lift Reports**
 - 4.3 DP Daily Reports**

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- 5.0 WELDING/CUTTING DOCUMENTATION
 - 5.1 List of Qualified Welders
 - 5.2 Weld Procedure Specifications
 - 5.3 Electrode Certificates and Record Sheets

- 6.0 NDT DOCUMENTATION
 - 6.1 NDT Personnel Certificates
 - 6.2 NDT Subcontractor Readiness Review
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 - 7.1 Activity Worksheets & Records
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- 8.0 MISCELLANEOUS ACTIVITIES
 - 8.1 Inspection & Test Equipment Calibration Data
 - 8.2 Accident & Near Miss Reports
 - 8.3 Damage Reports

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- 5.0 WELDING/CUTTING DOCUMENTATION
 - 5.1 List of Qualified Welders
 - 5.2 Weld Procedure Specifications
 - 5.3 Electrode Certificates.

- 6.0 NDT DOCUMENTATION
 - 6.1 NDT Personnel Certificates
 - 6.2 NDT Subcontractor Readiness Review
 - 6.3. NDT Subcontractor Daily / Weekly Reports

- 7.0 WELDING / CUTTING ACTIVITY RECORDS
 - 7.1 Activity Worksheets & Records
 - 7.2 N.D.T. Reports

- 8.0 MISCELLANEOUS ACTIVITIES
 - 8.1 Inspection & Test Equipment Calibration Data
 - 8.2 Accident & Near Miss Reports
 - 8.3 Damage Reports

ELF FRØY PROJECT - FD037
FRIGG MODULES INSTALLATION RESUMÉ
DOCUMENT NO. RE-FF22/21/4058

11.0 DRAWING LIST

A list of drawings produced by Saipem for the Frigg Modules Installation is given below:

11.1 Flareboom

Drawing No.	Title
FF22/21/00/4041.001	Tow Route and Sheltered Areas for Flareboom
FF22/21/00/4041.002	Towing Equipment for Barge S42
FF22/21/00/4041.003	Layout of Flareboom on Barge
FF22/21/02/4043.003	Arrangement & Details of Seafastening Cut Lines and Access for Flareboom
FF22/21/00/4090.001	Flareboom Lifting and Upending over M7000 deck
FF22/21/00/4090.002	Flareboom Upending Guides on M7000 deck
FF22/21/00/4091.001	Flareboom Rigging Laydown on Cargo Barge
FF22/21/00/4091.002	Flareboom Rigging for Upending
FF22/21/00/4092.001,2	Flareboom Transfer from Barge to M7000
FF22/21/00/4092.003	Layout of Flareboom and Cranes on M7000 Deck
FF22/21/00/4093.004	Seafastening Details for Flareboom on M7000
FF22/21/00/4093.001,2	Installation of Flareboom by M7000 from Platform South
FF22/21/00/4093.003	Flareboom Installation Sequence
FF22/21/00/4093.004	Flareboom Installation Summary
FF22/21/00/4094.001	Inclinometer Arrangement and Details
FF22/21/00/4141.004	M7000 Crane Movements for Flare Installation and QP/TP1 Crane Replacement

11.0 DRAWING LIST

11.2 M35

Drawing No.	Title
FF22/21/00/4033.001	Tow Route and Sheltered Areas for M35 on M7000
FF22/21/00/4033.002	Towing Equipment on Smitbarge 2
FF22/21/00/4033.003	Layout of M35 on Smitbarge 2
FF22/21/00/4033.004	Tow Route of M35 from Fab. Yard to Botlek.
FF22/21/00/4033.005,6&8	Clearances through Botlek and Spijkenisser bridges
FF22/21/00/4033.007	Layout of M35, Pancakes, Cranes & Equipment on M7000 Deck
FF22/21/02/4036.001-6	Arrangement and Details of Grillage for M35 on Smitbarge 2
FF22/21/02/4037.001-3	Arrangement and Details of Seafastenings for M35 on Smitbarge 2.
FF22/21/02/4038.001-6	Arrangement and Details of Grillage/Seafastenings for M35 on M7000
FF22/21/00/4082.001,2	M35 Rigging Laydown
FF22/21/00/4082.003,4	M35 Handling Sequence
FF22/21/00/4083.001,2	M35 Transfer from Barge to M7000
FF22/21/00/4084.001,2	Installation of M35 by M7000 from Platform East
FF22/21/00/4084.003,4	M35 Lift from M7000
FF22/21/00/4085.001	M35 Installation Summary
FF22/21/00/4124.001	G.A. of Tie-in Works on TCP2 Platform Phase 2
FF22/21/00/4132.001	Frigg Field Site Plan for TCP2 Removals/Installation

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- 1.0 INTRODUCTION**
 - 1.1 Summary of Contents**
 - 1.2 As-built Installation Schedule**

- 2.0 GENERAL**
 - 2.1 Technical Queries/Concession Requests**
 - 2.2 Site Instructions**
 - 2.3 Stage Acceptance Certificates**
 - 2.4 Checklists**
 - 2.5 Daily Progress Reports**
 - 2.6 Inspection Plans**
 - 2.7 Non Conformance's**
 - 2.8 Extra Work Report**
 - 2.9 Weather Reports**

- 3.0 PREPARATION AND POSITIONING ACTIVITIES**
 - 3.1 Positioning Subcontractor Readiness Review**
 - 3.2 Positioning Subcontractor Daily / Weekly Reports**
 - 3.3 M7000 & General Preparation Checks**

- 4.0 INSTALLATION**
 - 4.1 DP Trials**
 - 4.2 Lift Reports**
 - 4.3 DP Daily Reports**

11.0 DRAWING LIST

11.2 M35 (cont)

Drawing No.	Title
FF22/21/00/4132.002,3	M7000 Crane Movements for Removal/Replacement of TCP2 Cranes/Pancakes and M35
FF22/21/00/4182.001,2	Arrangement of Bumpers and Guides for M35 Installation

11.3 PANCAKES

FF22/21/00/4125.001	P946 Rigging Laydown
FF22/21/00/4125.002,3	Removal of P946 from Platform East
FF22/21/00/4125.004	Details of P946 Seafastening on M7000
FF22/21/00/4127.001	P969 Rigging Laydown
FF22/21/00/4127.002,3	Removal of P969 from Platform East
FF22/21/00/4127.004	Details of P969 Setdown on M7000
FF22/21/00/4127.005	Details of P969 Seafastening on M7000
FF22/21/00/4129.001	P970 Rigging Laydown
FF22/21/00/4129.002	GA of Bumpers and Guides for P970 Installation
FF22/21/00/4129.003, 4	Installation of P970 from Platform East
FF22/21/00/4129.005	Details of P970 Setdown Guides and Seafastening on M7000
FF22/21/00/4130.001,2	Arrangement and Details of Grillage/Seafastening for P970 on Supply Vessel

**ELF FRØY PROJECT – FD037
FRIGG MODULES INSTALLATION RESUMÉ
DOCUMENT NO. RE–FF22/21/4058**

12.0 DOCUMENT LIST

A list of the documents produced by Saipem, and included in the Completion Dossier, relating to the Frigg Modules installation is given below.

12.1 Specifications

Document No.	Description
SP–FR22/00/4004	Criteria for Module Transportation and Seafastening
SP–FR22/00/4005	Criteria for Single Crane Lift Systems for SSCV M7000
SP–FR22/00/4006	Criteria for Design of Lifting Points
SP–FR22/00/4007	Criteria for Sling and Grommet Design for SSCV M7000
SP–FR22/00/4009	Criteria for Guidance System for Setting Modules on Fixed Installation

12.2 Procedures

Document No.	Description
PR–FR22/00/4035	Qualification of Welding Procedures Specification
PR–FR22/00/4036	Qualification of Welders
PR–FR22/00/4070	Project Welding Procedures

ELF FRØY PROJECT - FD037
FRIGG MODULES INSTALLATION RESUMÉ
DOCUMENT NO. RE-FF22/21/4058

12.0 DOCUMENT LIST

12.3 Manuals

Document No.	Description
MA-FR22/22/4050	Installation Manual Vol. 1 Project Emergency Information
MA-FR22/22/4051	Installation Manual Vol. 2 Quality Control
MA-FR22/22/4052	Installation Manual Vol. 3 Marine Operations Procedures
MA-FR22/22/4053	Installation Manual Vol. 4 Transportation
MA-FR22/22/4055	Installation Manual Vol. 6 Topsides Installation Operations : Phase 1
MA-FR22/22/4056	Installation Manual Vol. 7 Topsides Installation Operations : Phase 2.
MA-FR22/22/4058	Installation Manual Vol. 9 "A3 Drawing File"

12.4 Design Reports

Document No.	Description
RE-FR22/00/4042	SSCV M7000 Details
RE-FR22/21/4055	Formal Lifting Studies
RE-FF22/21/4003	M35 Tow and Safety Report
RE-FF22/21/4004	Flare Tow and Safety Report
RE-FF22/21/4005	M35 Grillage and Seafastening Final Design Report

12.0 DOCUMENT LIST

12.4 Design Reports (cont)

RE-FF22/21/4006	Miscellaneous Grillage and Seafastening Design Report
RE-FF22/21/4021	M35 Rigging Design Report
RE-FF22/21/4022	Flareboom Rigging Design Report
RE-FF22/21/4024	P970 Rigging Design Report
RE-FF22/21/4025	Miscellaneous Rigging Design Report
RE-FF22/21/4055	Frigg Modifications "As-Installed" dossier:Phase 1
RE-FF22/21/4056	Frigg Modifications "As-Installed" dossier:Phase 2
RE-FF22/21/4057	Frigg Modifications Risk Analysis
SR-FF22/90/4011	Hazop Study Report for Frigg Modifications - Phase 1
SR-FF22/90/4012	Hazop Study Report for Frigg Modifications - Phase 2



FRØY TIE-IN	Ref. No.:
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SECTION III - FRØY TIE-IN VOLUME 1 - MODULE M35 BOOK 1 of 1	Date effective : May 1995
	Revision No. : 01G
	Date revised :
	Page : 69

References
See chapter 2.4

SECTION 5.0 LIST OF NCR/DEVIATION REPORTS

5.1 Design phase

List of NCR/Deviation reports:

NC-FF-22-21-1016	Earthquake analyses	Design phase
NC-FF-22-21-1038	Main structural steel	Procurement
NC-FF-22-21-1039	Secondary steel	Procurement
NC-FF-22-21-1040	Structural steel tubulars	Procurement
NC-FF-22-21-1042	Cast padears	Procurement



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References
See chapter 2.4

5.2 Fabrication phase

Attached is a list of the NCRs from Grootint BV Zwijndrecht, Holland.

Elf/BASIS/PROJ/95575
Report Id : REP4

PROJECT Database - REP4 - *FD054-GROOTINT M35*

Page : 1
Date : 95/03/06

! TYPE!	DOCUMENT IDENTIFICATION	VENDOR NUMBER	REV!	REVD	TITLE	S	COMC	SHN!	T	VDRL!
! NC !	FD 22 21 0059	!	! 000!	940209!	GROOTINT SITE QUERY ST0006, REGARDING WAVER ON BEAM SPLICE (ELF SPEC S 10 21 0002 REV 01G) : APPROVED	!	!	GROOT !	001!	4 !
! NC !	FD 22 25 0060	!	! 000!	940209!	MISPRINTS AND INSUFFICIENT INFORMATION AS REGARDS ACCEPT CRITERIA FOR NDE, TWO PAGES HAVE BEEN CORRECTED AND TRANSMITTED TO GROOTINT. (REF: ELF SPEC. S 10 25 0001) : APPROVED	!	!	GROOT !	001!	4 !
! NC !	FD 22 20 0061	!	! 000!	931221!	SPOOLS LISTED IN ATTACHED GROOTING NCR 009 REV.0 HAVE BEEN FABRICATED FROM MATERIALS THAT ARE NOT COMPLYING WITH ELF SPECIFICATION S 10 20 0002; APPROVED	!	!	GROOT !	001!	4 !
! NC !	FD 22 00 0062	!	! 000!	931221!	SPOOLS LISTED IN ATTACHED GROOTING NCR 010 REV.0 HAVE BEEN PRE FABRICATED FROM STAINLESS MATERIAL THAT IS NOT COMPLYING WITH ELF SPECIFICATION: APPROVED	!	!	GROOT !	001!	4 !
! NC !	FD 22 21 0063	!	! 000!	931221!	DIMENSIONAL CONTROL OF NODES L3/III, L1/III, L3/II AND L1/II WEATHER DECK, REVEALED TOP AND BOTTOM FLANGES OUT OF TOLERANCE, REF. ATTACHED NON COMPLIANCE REPORT 005 AND 011 FROM GROOTINT: APPROVED	!	!	GROOT !	001!	4 !
! NC !	FD 22 21 0064	!	! 000!	931221!	FR#Y M35 DIMENSIONAL CONTROL OF DECK FRAMING MAIN DECK, REVEALED BOTTOM FLANGES OUT OF TOLERANCE, REF. ATTACHED NON COMPLIANCE REPORT 001 AND 003 FROM GROOTINT: APPROVED	!	!	GROOT !	001!	4 !

! TYPE !	DOCUMENT IDENTIFICATION	! VENDOR NUMBER	! REV !	REVD	TITLE	! S !	COMC	! SHN !	T !	VDRL !
! NC !	FD 22 21 0065	!	! 000 !	931221 !	M35 FR4Y DIMENSIONAL CONTROL OF DECK FRAMING, INTERMEDIATE DECK, REVEALED PLATE GIRDER/NODE FLANGE CONNECTIONS OUT OF TOLERANCE REF. ATTACHED NON COMPLIANCE REPORT 002 AND 007 FROM GROOTINT: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 21 0066	!	! 000 !	931221 !	DISTANCE BETWEEN STRUCTURAL WELDS FOUND TO BE LESS THAN REQ REQUIREMENTS OF 75MM (ELF SPECIFICATION S 10 21 0002 REV.02G) REF. ATTACHED NON COMPLIANCE REPORTS 004,006 AND 008 FROM GROOTINT: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 21 0067	!	! 000 !	931221 !	WEIGHT OF NODES OUT OF TOLERANCE INTERMEDIATE DECK, L1/I AND L3/I, REF. ATTACHED NON COMPLIANCE REPORT 012 FROM GROOTINT: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 20 0068	!	! 000 !	931221 !	IMPACT TESTING: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 00 0069	!	! 000 !	940704 !	8" NB PIPE (MTO ITEM 86) HEAT NO. 386248 RELEASED FOR FABRICATION WITHOUT MATERIAL CERTIFICATE BEING AVAILABLE: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 00 0070	!	! 000 !	940503 !	REF. ATTACHED AUDIT REPORT E 93024: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 00 0071	!	! 000 !	940505 !	SITE ORIGINATED PUNCHLIST PROCEDURE FOR EQUIPMENT/MATERIALS PR FF 22 00 0009 AND MAIN FABRICATORS SPECIFICATION: APPROVED	!	GROOT	! 001 !	4 !	!
! NC !	FD 22 20 0131	!	! 000 !	940829 !	REF. SPEC. SP FF 22 20 0003 : APPROVED	!	GROOT	! 001 !	A4 !	!

Elf/BASIS/PROJ/95351
Report Id : REP4

PROJECT Database - REP4

Page : 1
Date : 95/03/06

! TYPE !	DOCUMENT IDENTIFICATION	! VENDOR NUMBER	! REV !	REVD	! TITLE	! S !	! CONC !	! SHN !	T	! VDRL !
! NC !	! FD 22 20 0132	!	! 000 !	941117!	ISOMETRIC DRAWINGS/P&ID PROCESS GAS LINES : APPROVED	!	! GROOT !	001!	A4!	!



FRØY TIE-IN	Ref. No.:
DESIGN - FABRICATION - INSTALLATION RESUMÈ	RE-FD-22-00-0029
SECTION III - FRØY TIE-IN VOLUME 1 - MODULE M35	Date effective : May 1995
	Revision No. : 01G
	Date revised :
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References
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5.3 Installation phase

Not applicable



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	Date revised :
BOOK 1 of 1	Page : 72

References
See chapter 2.4

6.0 AREAS OF SIGNIFICANCE FOR INSPECTION AND MAINTENANCE

List of Structural Drawings showing areas requiring periodical inspection:

MONORAILS AND LIFTING LUGS

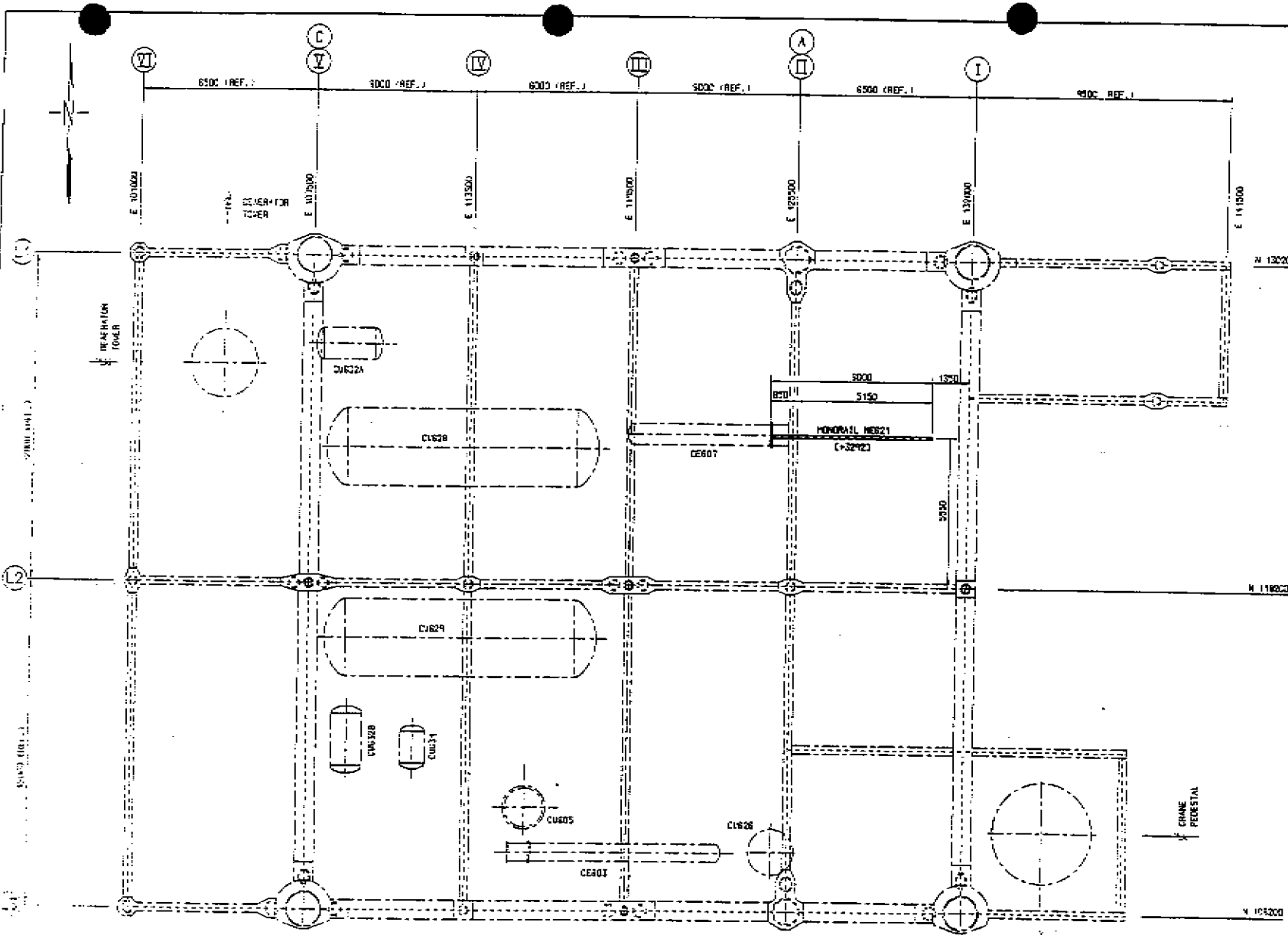
Drawing No.	Areas requiring inspection
FF-22-21-02-1148	Monorail for Main deck,
FF-22-21-02-1149	Monorail for Intermediate deck
FF-22-21-02-1150	Monorail for Weather deck
FF-22-21-02-1204	Lifting lugs for Mezz. deck

The detail drawings of the monorails shown on above mentioned arrangement drawings are as follows:

- 1148; Monorail detail drawings: FF-22-21-02-1179
FF-22-21-02-1205
FF-22-21-02-1206

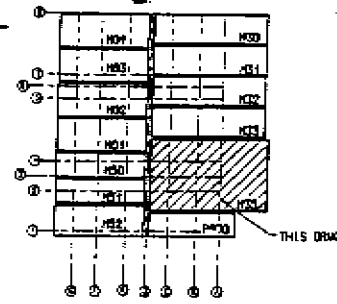
- 1149; Monorail detail drawings: FF-22-21-02-1058
FF-22-21-02-1059
FF-22-21-02-1205
FF-22-21-02-1207
FF-22-21-02-1204

- 1150; Monorail detail drawing: FF-22-21-02-1059



FOR DETAILS OF MONORAIL M221
REFER TO Dwg. No. FF-22-21-02-1259

PLAN ON WEATHER DECK AT EL. +124408 T.O. PLT.



KEY PLAN
TCP2 - MODULES

- NOTES :
- FOR GENERAL NOTES REFER TO DWG. No. FF-22-21-00-1000 SHEET 2.
 - ELEVATIONS SHOWN IN BRACKETETS ON MONORAIL ARE TO TOP OF STEEL OF MONORAIL.

NO.	DESCRIPTION	DATE
FF-22-21-02-1044	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1045	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1046	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1047	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1048	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1049	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1050	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1051	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1052	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1053	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1054	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1055	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1056	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1057	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1058	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1059	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1060	CRANE PEDESTAL - CRANE SIZE PLAN	

NO.	DESCRIPTION	DATE
FF-22-21-02-1061	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1062	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1063	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1064	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1065	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1066	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1067	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1068	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1069	CRANE PEDESTAL - CRANE SIZE PLAN	
FF-22-21-02-1070	CRANE PEDESTAL - CRANE SIZE PLAN	

VERITEC

157 MILLIKEN DRIVE AND SUITE 400-001 BOSTON, MA 02116

PROJECT: TCP2 STRUCTURAL

DATE: 01/11/83

SCALE: 1/4" = 1'-0"

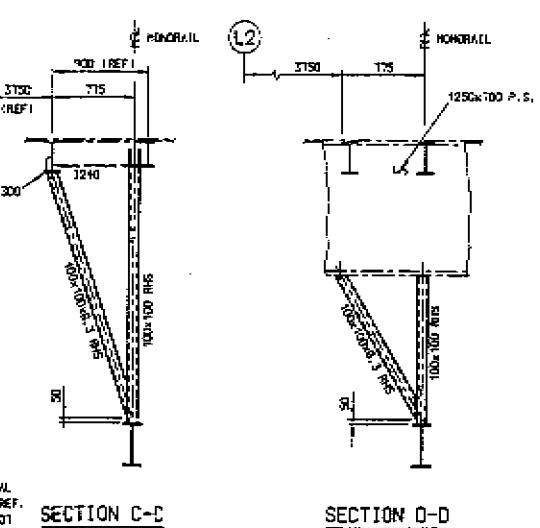
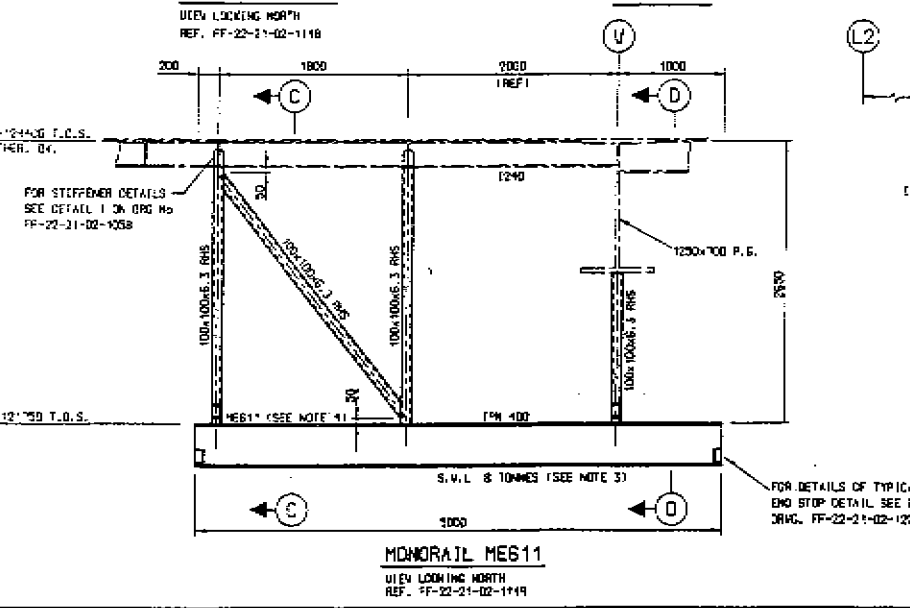
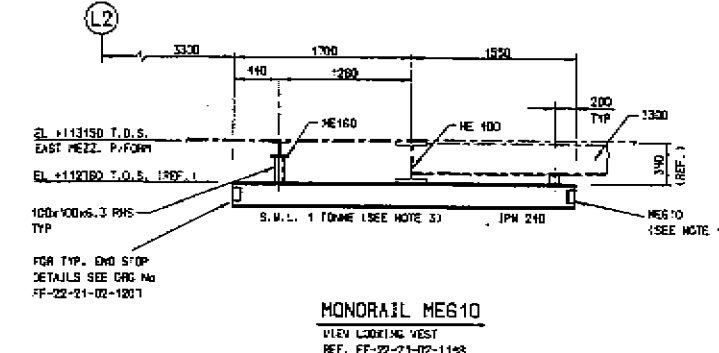
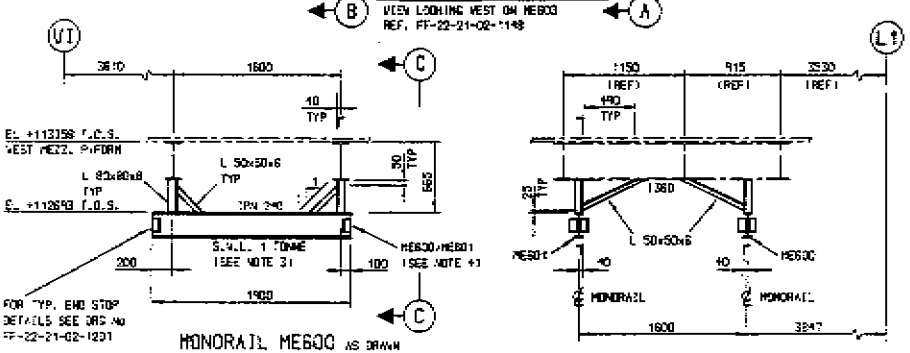
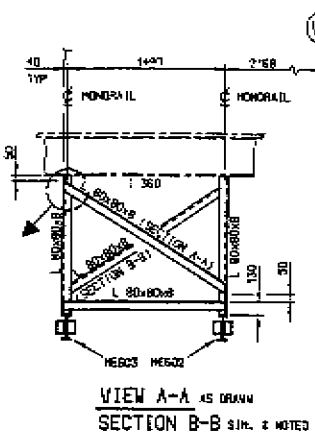
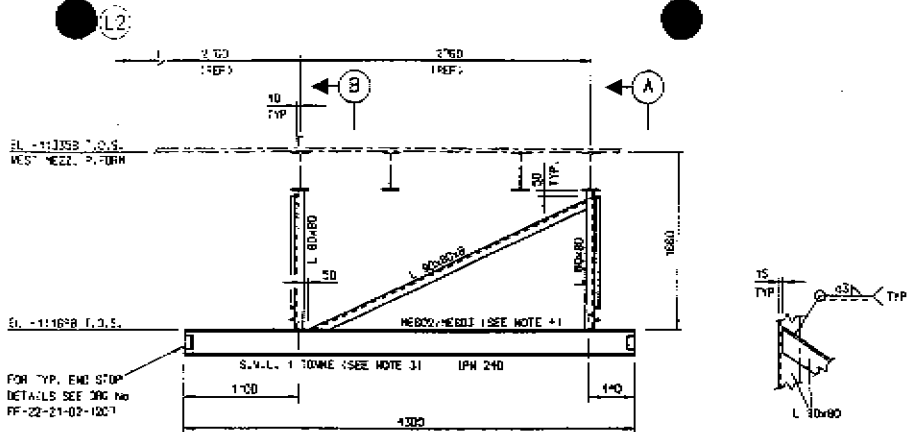
DESIGNED BY: J. J. FIELD

CHECKED BY: J. J. FIELD

DATE: 01/11/83

PROJECT NO.: FF-22-21-02-1150

DWG NO.: 1



- NOTES:**
- FOR GENERAL NOTES REFER TO DRG No. FF-22-21-02-1000 SHEET 2.
 - ALL STEELWORK THIS DRAWING TO BE CLASSIFIED AS PRIMARY STRUCTURAL STEEL.
 - MONORAILS TO BE PAINTED YELLOW IN ACCORDANCE WITH SPECIFICATION No. 100000IG CODE BK. 1021 AND MARKED AS BELOW:
"1.0 TONNE SWL" FOR MONORAIL ME600/ME601/ME602/ME603 & ME610 AND "8.0 TONNES SWL" FOR MONORAIL ME611 WITH PAINTED LETTERS BOTH SIDES
LETTER HEIGHT: 100MM
LETTER COLOUR: BLACK
 - MONORAIL TO BE MARKED WITH RESPECTIVE IDENTIFICATION I.E. "ME611", "ME602", "ME603", "ME601" OR "ME610" WITH PAINTED LETTERS.
LETTERS HEIGHT: 50MM
LETTER COLOUR: BLACK
 - ALL MATERIAL TO BE S20 GRADE ST U.W.O.
 - ALL WELDS TO BE FULL PENETRATION U.W.O.
 - FOR TYPICAL CONNECTION DETAILS SEE DRG.No. FF-22-21-02-1038 & FF-22-21-02-1074.
 - ALL MATERIAL THIS DRAWING TO BE FABRICATOR SUPPLY.

REFERENCE DRAWINGS	
NO.	DESCRIPTION
FF-22-21-02-078	SECONDARY STEEL TYPICAL JOINT DETAILS SHEET 1
FF-22-21-02-079	SECONDARY STEEL TYPICAL JOINT DETAILS SHEET 2
FF-22-21-02-080	SECONDARY STEEL TYPICAL JOINT DETAILS SHEET 3
FF-22-21-02-081	SECONDARY STEEL WEST WEZZ. BRG. PLAN
FF-22-21-02-082	SECONDARY STEEL EAST WEZZ. BRG. PLAN
FF-22-21-02-083	GENERAL NOTES
FF-22-21-02-1000-01	STRUCTURAL DRAWING 2007
FF-22-21-02-1000-02	RESUME

REV.	DATE	BY	CHK.	DESCRIPTION

		VERITEC <small>VERITEC (Pty) Ltd. 100000IG Code Bk. 1021</small>	
		No. A1	Title STRUCTURAL
		FRBY PROJECT MODULE M33 MONORAIL DETAILS SHEET 1	
		Date 1-25	Drawn by FF-22-21-02-1205



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References
See chapter 2.4

OTHER STRUCTURES

Crane Pedestal

CM7 Crane pedestal. The pedestal is supported at two locations, on Main deck and on Weather deck. All details including welds to be periodical inspected.

See attached drawing FF-22-00-29-0101 rec. 07F "Pedestal Arrangement".

Main deck

Module M35 support M35E node is recommended to be periodical inspected due to the high load concentration in this node.

Ref. drawing FF-22-21-02-1003
See attached drawing FF-22-21-02-1023

Truss row I.2; Node No. 49
Joint Details; Detail 49

