Base Load Power Hub (BLPH)

BLPH Platform In-Service Analysis

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

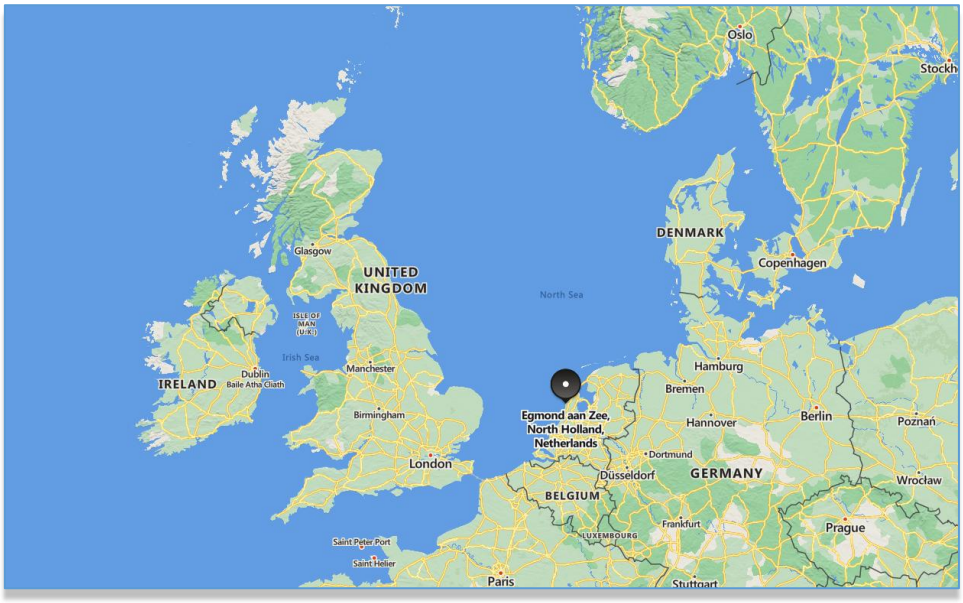


Figure 1.1 - HOLLANDSE KUST NOORD WIND PARK Location Map

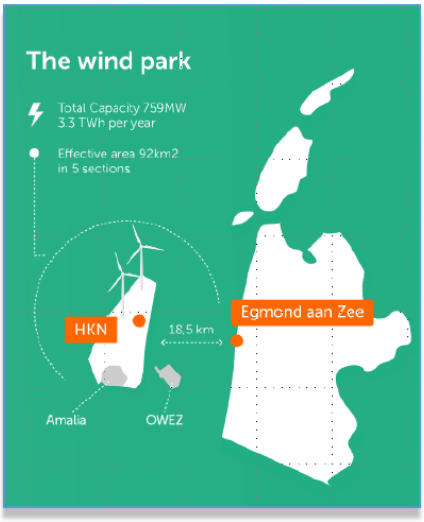


Figure 1.2 - Wind Park Details

The wind farm consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

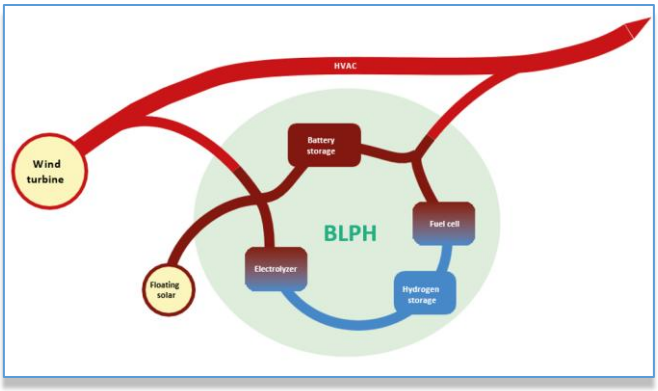


Figure 1.3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The objective of this report is to present the results of the In-Service Analysis performed for the Topside and Transition Piece (TP) of the BLPH platform.

The analysis has been performed in compliance with the requirements, criteria and parameters reported in the Structural Design Premises, Ref./23/.

All structural analyses have been carried out using the structural analysis program SACS, the proprietary software developed by Bentley, Ref. /53/.

Dedicated reports, with structural analyses performed with ANSYS, Ref. /54/, have been carried out using FEM models on Transition Piece, flange and special joints, Ref. /31/, /32/ and /33/. Structural checks of secondary structures, including plating and grating, are reported in a dedicated report, Ref. /34/.

Structural Code checks are performed according to EN ISO 19902 for tubular members and tubular joints, Ref./7/, and according to Eurocode 3 for non-tubular structural elements, Ref./9/.

The International System of Units (SI) has been used in all engineering assessments and calculations.

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3 REFERENCES

3.1 CODES AND STANDARDS

Doc. No.	Description
/1/ BS EN ISO 19900	General requirements for offshore structures - 2019
/2/ BS EN ISO 19901-1	Specific requirements for offshore structures - Part 1: Metocean design and operating considerations - 2015
/3/ BS EN ISO 19901-2	Seismic design procedures and criteria
/4/ BS EN ISO 19901-3	Specific requirements for offshore structures – Part 3: Topsides structure - 2014
/5/ BS EN ISO 19901-5	Specific requirements for offshore structures – Part 5: Weight Management - 2021
/6/ BS EN ISO 19901-6	Specific requirements for offshore structures – Part 6: Marine Operations – 2009
/7/ BS EN ISO 19902	Petroleum and natural gas industries - Fixed steel offshore structures – 2020
/8/ ISO 19906:2019	Petroleum and natural gas industries – Arctic offshore structures
/9/ UNI EN 1993-1-1	Design of steel structures - Part 1-1: General rules and rules for buildings
/10/ DNVGL-ST-N001	DNV GL - Marine operation and marine warranty - 2021
/11/ EN 1991-1-3:2003 & A1:2015	EN, Eurocode 1 – Actions on Structures – Part 1-3: General actions – Snow loads - Incorporating corrigenda December 2004 and March 2009, December 2015.
/12/ DNV-ST-0145	DNV, Offshore substations
/13/ DNV-RP-C201	DNV, Buckling Strength of Plated Structures, October 2010.
/14/ DNV-RP-C203	DNV GL, Fatigue design of offshore steel structures, September 2019 and Amendment January 2020
/15/ DNV-RP-C204	DNVGL-RP-C204 Design against accidental loads – 2019
/16/ DNV-RP-C205	DNV GL - Environmental conditions and environmental loads - September 2019, amended September 2021.
/17/ DNV-OS-C101	Design of offshore steel structures, general LRFD method, 2021
/18/ DNV-ST-0126	Support structures for wind turbine, 2018
/19/ DNV-ST-0378	Standard for offshore and platform lifting appliance

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3.2 COMPANY SPECIFICATIONS

Doc. No.	Description
/20/ DEP 37.19.00.12	Gen - Offshore Topsides Structures
/21/ DEP 37.19.00.30	Gen - Fixed Steel Offshore Structures (Adoption of IOGP S-631-11, Amendments / Supplements to ISO 19902:2020).
/22/ DEP 37.81.10.19	Gen - Marine Operations Requirements – Loadout, Transportation and Installation of Offshore Structures (Amendments / Supplements to ISO 19901-6)

3.3 PROJECT DOCUMENTS

Doc. No.	Description
/23/ 123A90-DDL-ST-SP-90017	Structural Design Basis
/24/ 123A90-DDL-MD-RE-01006	Monthly Weight Report – rev. July 24
/25/ 123A90-DDL-PP-DS-70070	Plot Plans
/26/ Pending	Handling Philosophy Report
/27/ 123A90-DDL-ST-SP-90018	Structural Material Specification for Topside and TP
/28/ 123A90-DDL-ST-SP-90118	Structural Material Specification for Flange and Bolts
/29/ 123A90-DDL-SAF-RE-30020	Fire and Explosion Risk Analysis (FERA)
/30/ 123A90-DDL-TI-SP-99014	Specification for TP, Topside and Caissons Transportation and Installation
/31/ 123A90-DDL-ST-RE-90007	BLPH Platform - FE Analyses
/32/ 123A90-DDL-ST-RE-90013	TP-MP Flange Connection Verification
/33/ 123A90-DDL-ST-RE-90005	BLPH Platform – Topside Joint Check Design Report
/34/ 123A90-DDL-ST-RE-90006	BLPH Platform – Secondary Structures Design Report
/35/ 123A90-DDL-ST-TN-90119	Evaluating ISO and DNV approaches
/36/ 123A90-DDL-ST-RE-90120	BLPH platform – Structural verification against accidental loads

3.4 OTHER DOCUMENTS

Doc. No.	Description
/37/ K559–2254-ST-PHI-001	BLPH Structural Topsides Design & Installation Philosophy, Rev.1, 09 December 2022

/38/ K559–2254-ST-REP-001	BLPH Structural Topsides and Transition Piece Design and Analysis Report, Rev.0, 27 February 2023
/39/ 144671-VOOW-TF-ENG-REP-1011	Design Basis Part C, Re.4, 05-07-2021
/40/ SR.20.01165	Meteocean criteria for Hollandse Kust Noord Wind Farm zone (shell), Rev A03, 05-02-2021
/41/ K559–2254-WC-REP-001	BLPH Weight Control Report, Rev.2, 17 March 2023
/42/ 144671-VOOW-TF-ENG-REP-1051	Design Basis Part C for BLPH, Rev. 3, 28 June 2022
/43/ 144671-VOOW-TF-ENG-REP-1052	Wave Loads and Effects for BLPH, Rev. 0, 16 December 2021
/44/ 144671-VOOW-TF-ENG-REP-1016	Wave Run-up Study, Rev.2, 29 November 2021
/45/ 144671-VOOW-TF-ENG-REP-1103	Wave Impact Analysis, Rev.1, 7 May 2021
/46/ 144671-VOOW-TF-ENG-REP-1053	Axial Pile Capacity Assessment for BLPH, Rev.3, 07 July 2022
/47/ 144671-VOOW-TF-ENG-REP-1054	Foundation Load Document for BLPH, Rev.1, 07 April 2022
/48/ 144671-VOOW-TF-ENG-REP-1055	Design Verification Primary Steel for BLPH, Rev.1, 13 April 2022
/49/ 144671-VOOW-TF-ENG-REP-1056	Ship Impact for BLPH, Rev.0, 07 March 2022
/50/ 144671-VOOW-TF-ENG-REP-1502	Main Access Platform – Wave Run-up Braces
/51/ 144671-VOOW-GEN-SUR-REP-0074	Foundation As-built Survey CW70 HNA6
/52/ K559-2254-PM-PLN-003	Basic Design Engineering Package, Rev2, 06 July 2023

3.5 SOFTWARE

Doc. No.	Description
/53/ SACS	Structural Analysis Computer System – BENTLEY Inc- v15
/54/ ANSYS	Ansys Simulation Platform – ANSYS Inc

4 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY)	Crosswind
CONTRACTOR (CTR)	ROSETTI MARINO S.p.A.
PROJECT	HOLLANDSE KUST NOORD WIND PARK Project
T&I CONTRACTOR	DEME
ALS	Accidental Limit State
BEB	Best Estimate Bathymetry
BESS	Battery Energy Storage System
BG	Box Girder
BLPH	Base Load Power Hub
Ce	Snow Exposure Coefficient
CF	Caisson Frame
CL	Concentrated Load
CoG	Centre of Gravity
CTV	Crew Transfer Vessel
CW	CrossWind
DAF	Dynamic Amplification Factor
DFF	Damage Fatigue Factors
DLB	Ductility Level Blast
DNV	Det Norske Veritas
DOP	Dropped Object Protection
DP	Dynamic Positioning
El.	Elevation
EPCI	Engineering Procurement Construction and Installation
FEED	Front End Engineering Design
HAT	Highest Astronomical Tide
HKN	Hollandse Kust Noord
ICCP	Impressed Current Corrosion Protection
LAT	Lowest Astronomical Tide

LRFD	Load and Resistance Factor Design
MSL	Mean Sea Level
MP	Monopile
NTE	Not-to-Exceed
OD	Outside Diameter
PAU	Pre-Assembled Unit (H2 Vessels)
PG	Plate Girder
PV	Photovoltaic
SCE	Safety Critical Equipment
sk	Characteristic Value of Snow on the Ground/Platform
SGSI	Shell Global Solutions International
SHL	Static Hook Load
T&I	Transport & Installation
ToS	Top of Steel
TP	Transition Piece
TSO	Transmission System Operator
SLB	Strength Level Blast
UC	Unity Check
UDL	Uniformly Distributed Load
VIV	Vortex Induced Vibration
VOOW	Van Oord Offshore Wind
WTG	Wind Turbine Generator
W2W	Walk to Work

Table 4.1 - Definitions and Abbreviations

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5 SUMMARY AND CONCLUSIONS

The analyses performed show that the Topsides and Transition Piece framings, as configured, can withstand all possible combinations of environmental and operational loads imposed to the structure, consistently with the probability of their simultaneous occurrence. Scope of the report is the:

- Structural check of the BLPH platform including TP and connecting flange against operating, extreme and accidental loads.
- Deflection check
- Primary beams local check
- Calculation and the comparison of the resultant actions at flange level (interface TP-MP) with the NTE forces received as input at the interface level, see sec.13.2.

5.1 WEIGHT RESULTANTS

COG location comparison between structural model for In-Service Analysis and WCR, ref. /24/ is reported in following tables. According to the Design Basis, /23/ the NTE in operating conditions should be < 2400 t including TP, with centre of gravity within a radius of 1.5m from MP centreline, and with maximum CoG position of at El. +28.00 m LAT.

SACS-WCR - Permanent & Variable Loads Comparison		
Load Comb.	**Fz [kN]**	**Fz [t]**
SACS (lcomb STAT)	-23575.8	-2400
WCR	-23161.4	-2361
D		+39

COG NOMINAL POSITION			
CASE	x [m]	y [m]	z [m]
COG_SACS (lcomb STAT)	0.34	0.45	27.92
COG_WCR	0.20	0.30	27.80
D	0.14	0.15	0.11
Topside Main Dimension	16.00	40.00	17.66
D (%)	0.9%	0.4%	0.6%

Table 5.1 – SACS-WCR CoG comparison – SACS ref. system, see 10.2.2

BLPH - TOPSIDE (with live load and snow) + TRANSITION PIECE (TP) + CAISSON - Summary by Phase

Phase Code	Phase Description	Base Wt. (t)	Center of Gravity			Factored Wt. (t)	Center of Gravity			Design Net Wt. (t)	Center of Gravity			Design Gross (Expected) Wt. (t)	Center of Gravity		
			Northing (m)	Easting (m)	Elevation (m)		Northing (m)	Easting (m)	Elevation (m)		Northing (m)	Easting (m)	Elevation (m)		Northing (m)	Easting (m)	Elevation (m)
OP	Operating weight (Dry + Contents)	2136	20,3	8,3	27,8	2361	20,2	8,3	27,8	2361	20,2	8,3	27,8	2361	20,2	8,3	27,8

Table 5.2 – WCR Table, ref. /24/ - WCR reference system

5.2 REACTION FORCES

5.2.1 Internal Forces of Topside – TP interface elements

Maximum internal forces of structural members at TP-Topside interface are reported in the following tables.

5.2.1.1 Factored Load Combinations (member local reference system)

	MEMBER	MEMBER END	GROUP	LOAD CASE	Fx [kN]	Fy [kN]	Fz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]	REMARK
ALL LC	TA44-TU03	TU03	TPS	E44F	**-1394**	2159	2726	38	-1260	-1543	MAX Fx
	TA44-TU03	TU03	TPS	O12B	**-9721**	1668	2998	86	-1622	-3166	min Fx - MAX Fxy
	TA44-TU03	TU03	TPS	E13E	-5377	**3075**	2573	-28	-1171	-2379	MAX Fy
	TC44-TU04	TU04	TPS	E33A	-5098	**-3022**	2372	-18	-1077	2422	min Fy
	TA44-TU03	TU03	TPS	O12G	-8689	2240	**3939**	99	-1736	-3164	MAX Fz
	TA24-TU02	TU02	TPS	E13C	-3324	1316	**-3830**	-217	1776	-2032	min Fz
	TA44-TU03	TU03	TPS	E44G	-1940	1152	3084	120	-1380	-1514	min Fxy
	TA44-TU03	TU03	TPS	O12A	-9607	1564	3379	116	-1692	-3165	MAX Fxz
	TA44-TU03	TU03	TPS	E44E	-1816	2450	1739	-44	-1055	-1564	min Fxz
	TA44-TU03	TU03	TPS	O12F	-8424	2625	3791	62	-1685	-3164	MAX Fyz
	TA44-TU03	TU03	TPS	E34B	-6014	-91	594	23	-796	-1771	min Fyz
	TA44-TU03	TU03	TPS	E23H	-5243	425	3422	**189**	-1656	-2026	MAX Mx
	TA24-TU02	TU02	TPS	E13B	-4560	247	-3353	**-236**	1720	-2006	min Mx
	TA24-TU02	TU02	TPS	O12C	-5380	1530	-3825	-191	**2063**	-2713	MAX My - MAX Mxy
	TA44-TU03	TU03	TPS	O22H	-7288	1517	3748	145	**-1992**	-2796	min My
	TC44-TU04	TU04	TPS	O32C	-8907	-1919	2500	-104	-1318	**3210**	MAX Mz - MAX Mxz
	TA44-TU03	TU03	TPS	O12C	-9530	2078	2855	37	-1535	**-3175**	min Mz
	TA24-TU02	TU02	TPS	E44G	-5667	984	-353	75	501	-1984	min Mxy
	TA44-TU03	TU03	TPS	E44A	-4282	-578	1567	121	-1176	-1495	min Mxz
	TA44-TU03	TU03	TPS	O12H	-9179	1801	3768	122	-1739	-3164	MAX Myz
	TA44-TU03	TU03	TPS	E44C	-4158	721	222	-43	-851	-1545	min Myz

Table 5.3- Internal Forces of Topside -TP interface elements - ULS Factored Load Combinations

5.2.1.2 Un-Factored Load Combinations (member local reference system)

	MEMBER	MEMBER END	GROUP	LOAD CASE	Fx [kN]	Fy [kN]	Fz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]	REMARK
ALL LC	TC24-TU01	TU01	TPS	EA1B	**-2586**	-1995	-2790	36	1513	1986	MAX Fx - min Fxy
	TA44-TU03	TU03	TPS	EA1B	**-7765**	708	1740	55	-1130	-2335	min Fx - MAX Fxz - MAX Fxy
	TA44-TU03	TU03	TPS	EA1E	-5749	**2618**	2549	-2	-1188	-2369	MAX Fy
	TC44-TU04	TU04	TPS	EA3A	-5470	**-2566**	2345	-41	-1084	2414	min Fy
	TA44-TU03	TU03	TPS	EA1G	-5840	1711	**3482**	112	-1415	-2334	MAX Fz - MAX Myz
	TA24-TU02	TU02	TPS	EA1C	-3661	1259	**-3407**	-183	**1671**	-2044	min Fz - MAX Mxy - MAX My
	TC24-TU01	TU01	TPS	EA1A	-2876	-2167	-2184	3	1347	2015	min Fxz
	TA44-TU03	TU03	TPS	EA1F	-5456	2415	3234	55	-1331	-2355	MAX Fyz
	TC44-TU04	TU04	TPS	EA2D	-5457	-432	1389	-93	-1169	2058	min Fyz
	TA44-TU03	TU03	TPS	EA2H	-5220	702	3131	**154**	-1585	-2037	MAX Mx
	TA24-TU02	TU02	TPS	EA1B	-4524	511	-3076	**-197**	1632	-2026	min Mx
	TA44-TU03	TU03	TPS	EA2G	-4385	1493	3467	130	**-1609**	-2051	min My
	TC44-TU04	TU04	TPS	OA3C	-6746	-1442	1877	-81	-1006	**2427**	MAX Mz - MAX Mxz
	TA24-TU02	TU02	TPS	EA2F	-5796	1955	-1805	4	970	**-2400**	min Mz
	TC44-TU04	TU04	TPS	EA1C	-6513	-1325	1148	-41	-862	2350	min Mxy
	TC24-TU01	TU01	TPS	EA1D	-3861	-598	-2688	93	1575	1953	min Mxz
	TA44-TU03	TU03	TPS	EA4C	-5322	1185	1264	-5	-1151	-2008	min Myz

Table 5.4 - Internal Forces of Topside -TP interface elements - Un-Factored Load Combinations

Direct comparison between the results of Rev.01 and the previous ones (Rev.00) is presented in Section 13.1.1.3

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5.2.2 Monopile Forces at Interface elevation (el. +17.05m)

Maximum reaction at TP-MP flange are reported in the next Tables.

5.2.2.1 Factored Load Combinations (global reference system)

JOINT	Rx [kN]				Ry [kN]				Rz [kN]				MOMENT(X) [kNm]				MOMENT(Y) [kNm]				MOMENT(Z) [kNm]			
	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND
TMIJ	6869	E13E	-6869	E13A	6389	E13G	-6389	E13C	31445	O12A	19381	E24A	100070	E13C	-94416	E24G	84212	E44E	-88609	E13A	3350	E13G	-3350	E13C

Table 5.5 – Reactions at MP-TP interface level (el.+17.05m) – ULS Factored Load Combinations

5.2.2.2 Unfactored Load Combinations (global reference system)

JOINT	Rx [kN]				Ry [kN]				Rz [kN]				MOMENT(X) [kNm]				MOMENT(Y) [kNm]				MOMENT(Z) [kNm]			
	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND
TMIJ	4804	EA1E	-4804	EA1A	4448	EA1G	-4448	EA1C	23761	OA1A	23605	EA1A	79239	EA1C	-63332	EA2G	56993	EA3E	-66185	EA1A	2361	EA1G	-2361	EA1C

Table 5.6 - Reactions at MP-TP interface level (el.+17.05m) – Un-Factored Load Combinations

Direct comparison between the results of Rev.01 and the previous ones (Rev.00) is presented in section 13.1.2.3.

5.3 CHECKS OF MAXIMUM LOADS FOR MONOPILE FOUNDATION

The comparison between total reactions for SLS, ULS A and ULS B as per ref. /42/ and corresponding combinations of basic load conditions as per sec.11 and 12 is provided in following tables, showing load ratios lower than 1.0.

Load combinations ULS A and B from basic load conditions of current In-Service analysis are only reported for comparison and not used for structural, since ISO 19902 provides different load combinations factors for structural checks.

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SLS UNFACTORED LOAD COMBINATION RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	Mxy [kN]	Fxy [kN]	Mz [kN]	Fz [kN]	LF
Permanent	52565	-	-	24611	1
Icing	9442	-	-	4405	1
Variable	7515	-	-	3443	1
Wave	89616	4467	-	1746	1
Wind	13639	1247	2480	-	1
TOT	172777	5714	2480	34205	

rev. 01

SACS UNFACTORED LOAD COMBINATIONS RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	Mxy [kN]	Fxy [kN]	Mz [kN]	Fz [kN]	LF
Permanent	33755	-	-	23576	1.00
Icing	260	-	-	1353	1.00
Variable	16066	-	-	1203	1.00
Wave	58935	3834	-	-	1.00
Wind	12078	1149	1688	-	1.00
TOT	121095	4982	1688.3	26132	
Ratio TOT Loads	0.70	0.87	0.68	0.76	

ULS A - FACTORED LOAD COMBINATION RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	Mxy [kN]	Fxy [kN]	Mz [kN]	Fz [kN]	LF
Permanent	52565	-	-	24611	1
Icing	9442	-	-	4405	1
Variable	7515	-	-	3443	1
Wave	89616	4467	-	1746	1
Wind	13639	1247	2480	-	1
TOT LIMITING	156992	3999	1736	40776	
TOT	156992	4000	1736	40776	
REPORT 144671-VOOW-TF-ENG-REP-1054	157233	3999	1736	44466	

SACS FACTORED LOAD COMBINATIONS USL A RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	Mxy [kN]	Fxy [kN]	Mz [kN]	Fz [kN]	LF
Permanent	33755	-	-	23576	1.30
Icing	260	-	-	1353	0.70
Variable	16066	-	-	1203	1.30
Wave	58935	3834	-	-	0.70
Wind	12078	1149	1688	-	0.70
TOT	114659	3488	1182	33160	
Ratio = TOT / TOT Limiting Loads	0.73	0.87	0.68	0.81	

ULS B - FACTORED LOAD COMBINATION RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	Mxy [kN]	Fxy [kN]	Mz [kN]	Fz [kN]	LF
Permanent	52565	-	-	24611	1
Icing	9442	-	-	4405	1
Variable	7515	-	-	3443	1
Wave	89616	4467	-	1746	1
Wind	13639	1247	2480	-	1
TOT LIMITING	206586	7428	3224	34205	
TOT	206586	7428	3224	36051	
REPORT 144671-VOOW-TF-ENG-REP-1054	207034	7428	3224	34205	

SACS FACTORED LOAD COMBINATIONS USL B RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	Mxy [kN]	Fxy [kN]	Mz [kN]	Fz [kN]	LF
Permanent	33755	-	-	23576	1.00
Icing	260	-	-	1353	1.30
Variable	16066	-	-	1203	1.00
Wave	58935	3834	-	-	1.30
Wind	12078	1149	1688	-	1.30
TOT	142477	6477	2195	26538	
Ratio TOT Loads	0.69	0.87	0.68	0.78	

Table 5.7 – Comparison between SLS, ULS A and ULS B load combinations resultants from ref. /47/ and respective combinations as per In-Service Analysis.

5.4 MEMBER CHECKS

Structural members with maximum Unity Check (UC) are detailed in the following table.

MEMBER	GROUP	DESCRIPTION	SECTION	COMBINATION	UC
L210-L003	B31	Plate Girder Lower Deck	PG31	O22C	0.92
U233-U001	B12	Plate Girder Lower Deck	PG02	O22H	0.89
L048-L210	B01	Plate Girder Lower Deck	PG01	O22C	0.87
TA44-TU03	TPS	Topside / TP interface Colums	800 x 40	O12G	0.86
L014-L059	B03	Plate Girder Lower Deck	PG03	O32D	0.83
L015-L076	B31	Plate Girder Lower Deck	PG31	O32G	0.82
L011-L040	B03	Plate Girder Lower Deck	PG03	O32C	0.81
U017-U018	B14	Plate Girder Upper Deck	PG04	O12A	0.81
TC44-TU04	TPS	Topside / TP interface Colums	800 x 40	O32H	0.81
L00B-Y000	IP3	Topside access stair	IPE330	O22C	0.79

Table 5.8 – Member UC Summary

5.5 TUBULAR JOINT CHECKS

Structural tubular joints with maximum Unity Checks (UC) for punching shear are detailed in the following table.

JOINT	DESCRIPTION	CHORD	BRACE	COMBINATION	UC
0002	Upper Deck - X joint – Row A	406.4 x 20.62	406.4 x 15.88	O12E	0.595
U015	Upper Deck - Rows C-4	800 x 30	406.4 x 12.7	O32C	0.541
U003	Upper Deck - Rows A-2	800 x 30	406.4 x 12.7	O22H	0.523
U045	Upper Deck – Row A – Crane pedestal	700 x 30	406.4 x 20.62	O12A	0.506
U005	Upper Deck - Rows C-2	800 x 30	406.4 x 12.7	O42F	0.503
L156	Lower Deck – Row A	700 x 30	406.4 x 20.62	O12H	0.491
D004	Bracing - Main Diagonal Row C	550 x 20	323.9 x 12.7	O32C	0.441
D006	Bracing - Main Diagonal Row A	550 x 20	323.9 x 12.7	O12C	0.437
U013	Upper Deck - Rows A-4	800 x 30	406.4 x 15.88	O12B	0.412
L013	Lower Deck – Row A-4	800 x 40	406.4 x 20.62	O12A	0.392

Table 5.9 – Tubular joint UC Summary

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6 PLATFORM DESCRIPTION

6.1 LOCATION AND ORIENTATION

The wind farm consists of 69 x 11.5 MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile, located on coordinates E 590719.1, N 5841602.3, is reserved for installing the platform accommodating the BLPH.

The above co-ordinates are referenced to ETRS89 / UTM zone 31N global coordinate system.

Platform (Topsides) north is rotated 25° towards west with reference to True North so that the monopile main access platform is orthogonal to the Topsides, as per fig.6.1.

6.2 BLPH TOPSIDE AND TRANSITION PIECE

The BLPH Topside comprises of two main deck levels with overall deck plan dimensions of 40 m x 16 m, excluding external walkways, laydown areas and stairs, with an overall deck height of 7 m between decks. There are currently 6 hydrogen storage vessels which lie horizontally, aligned north - south, within the PAU structure located above the upper deck.

The Topsides layout is shown in fig. 6.1.

The Topsides in unmanned and there is no helideck. Main access is via Walk to Work (W2W) vessel with W2W platforms provided on the lower deck. Ladder access to sea for small Crew Transfer Vessel (CTV) access is also provided.

Main Deck elevations are:

- Target top of TP, El. + 22.310 m;
- Lower Deck, El. + 23.310 m ToS;
- Upper Deck, El. + 30.310 m ToS.

The PAU steel module 12m x 9m for the storage of n.6 H2 Vessels with 60t each, is located on top of Topside Upper Deck.

The connection of Topside with Monopile is realized through a Transition Piece (TP) structure. The interface level between the Monopile and the Topsides is at El.+17.050m relative to LAT.

TP is composed by a central column with an outer diameter of 7m and Four (4) boxed girders with height ranging from 2.5 m to 1.4 m, oriented along the main diagonals of the TP and accommodating at their ends 4 tubular receptacles for supporting the Topside. The four diagonal arms of the TP are connected along the perimeter by other four (4) boxed girders forming a stiff deck 16m x 16m with TOS. El. +21.71m from LAT.

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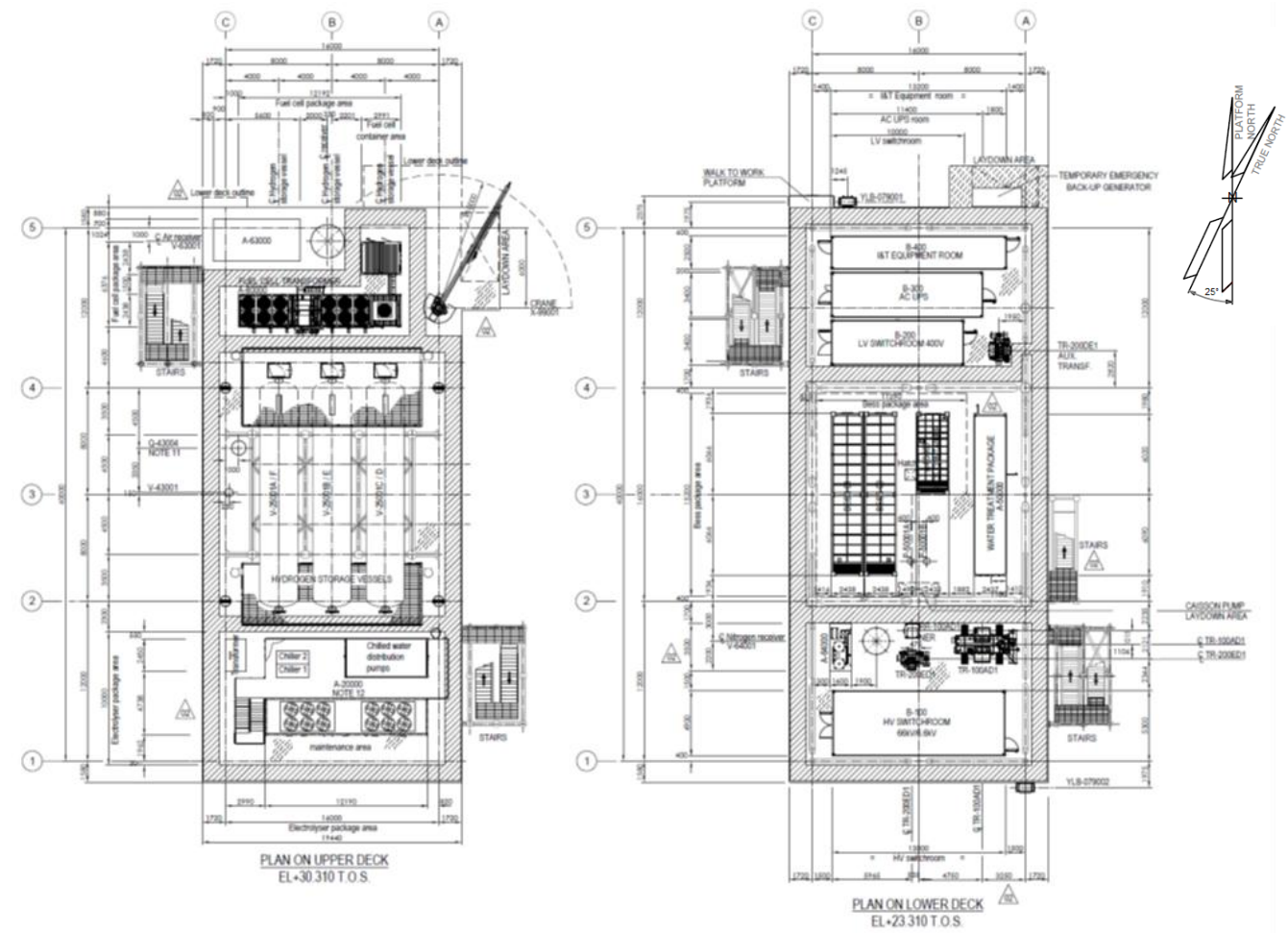


Figure 6.1 - Base Load Power Hub Plot Plan

6.3 MONOPILE-TOPSIDES INTERFACE

The interface level between Monopile and Topsides (comprising TP) is at El.+17.050 m relative to LAT, as per Ref. /37/and /42/ and reported in Figure 6.2.

The TP will be connected to the monopile in offshore. The connection for applied TP in-place condition loads is within CONTRACTOR's scope and is checked in a dedicated report, ref. /32/.

VOOW has developed serviceability and ultimate limit state design forces and moments on the BLPH monopile, ref./47/, not to be exceeded. Comparison and checks against current design forces is given in sec. 13.2

The monopile has been surveyed on 29 May 2023 showing as-built interface connection as reported in Design Basis, Ref./23/.

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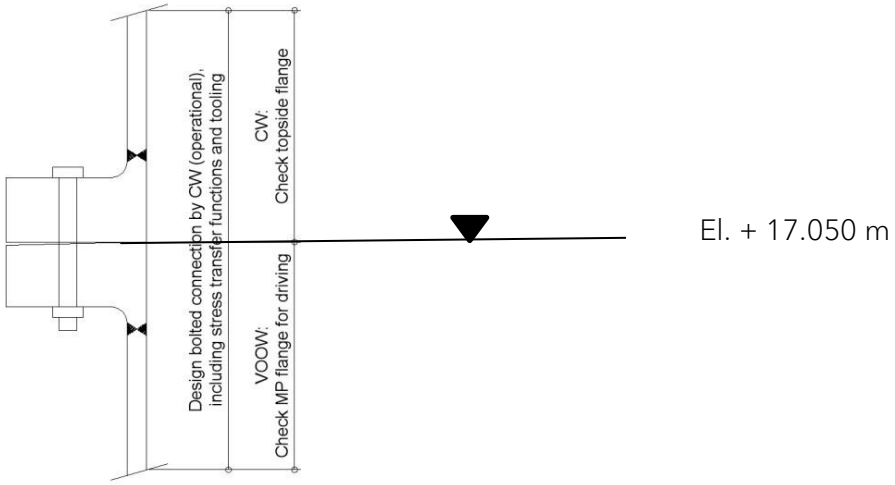


Figure 6.2– Monopile-to-Transition Piece Flange

7 DESIGN DATA

Design Data are herein collected according to Monopile and BLPH Feed Design, Ref. /37/and /42/.

7.1 DESIGN LIFE

Despite the operational life of the platform is 2 years, a total design life of 25.5 years is required, as per following Table 7.1, from Ref. /37/.

Description	Mode	Duration (years)
Construction Phase	Monopile Only	2.5
Operational Life	Monopile + Topsides	2.0
Non-Operational Life[1]	Monopile + Topsides	21.0
Total Design Life		25.5
Note: Topside assumed to be decommissioned and removed after 2 years, although this will be reviewed by CW.		

Table 7.1- Design Life

The monopile installation has been completed in 2023, with removal and decommissioning planned for 2048.

7.2 DATUM

Elevations are refenced to LAT unless noted otherwise.

7.3 WATER LEVELS

Mean Sea Level (MSL) is 1.1 m above LAT, Ref./37/ and /42/.

Sea Level Rise (SLR) is: SLR= maximum 0.3 m by 2050 (>25 years), ref./39/.

Tidal water levels are given in Table 7.2. Maximum and minimum water levels for a range of return periods are provided in Table 7.3.

Tidal Value	Relative to LAT	Relative to MSL
Highest Astronomical Tide	2.2	1.0
Mean High Water Spring	1.9	0.8
Mean High Water Neap	1.6	0.5
Mean Sea Level	1.1	0
Mean Low Water Neap	0.6	-0.5
Mean Low Water Spring	0.3	-0.9
Lowest Astronomical Tide	0	-1.1

Table 7.2 - Extreme Tidal Levels, Ref./37/and /42/.

Extreme Water Level	Return period						
	1	2	5	10	50	100	1,000
Max	3.2	3.4	3.5	3.7	4.0	4.1	4.5
Min	-0.5	-0.6	-0.7	-0.8	-1.0	-1.1	-1.4

Table 7.3 - Extreme Water Levels including Storm Surge, Ref./37/and /42/

7.4 MARINE GROWTH

Table 7.4 shows the recommended maximum marine growth according to Ref./39/. Structures within the scope of present document are located above marine growth maximum level. Therefore, no marine growth is taken into account for Topside and Transition Piece structural analysis.

Level [m] LAT		Thickness	Density
From	To	[mm]	[mm]
HAT	LAT	150	1325
LAT	-6.0	150-50	1325
-6.0	Seabed	50	1325

Table 7.4- Marine Growth

7.5 WIND DATA

Omni-Directional wind speed data are reported in Table 7.5 , from Ref./37/and /42/.

Averaging Time	Return period (years)						
	1	2	5	10	50	100	1000
1hr	31.8	33.4	35.1	36.4	39.1	40.1	43.4
10 min	33.7	35.5	37.4	38.8	41.7	42.9	46.5
3s	39.4	41.6	44.1	45.9	49.7	51.1	56.0

Table 7.5 - Omni-Directional Wind velocities [m/s] at 125 m MSL

Wind speeds are provided at 125m MSL. Wind speeds at any specified averaging time or elevation, will be calculated according to following equations, Ref./2/:

$U(z, t) = U(z) * [1 - 0.41 * Iu(z) * \ln(t/t0)]$

$U(z) =$ 1-hour mean wind speed given by:

$U(z) = U0 * [1 + C * \ln(z/zr)]$

$C = 0.0573 * (1 + 0.15 * U0)^{1/2}$

I_u = $0.06 * [1 + 0.043 * U0] * (z/zr)^{-0.22}$

U0 = 1-hour average at the reference elevation, zr

zr = 10 m above sea level.

Directional exceedance data for wind is presented in Figure 7.1. The wind predominantly blows from the south- west.

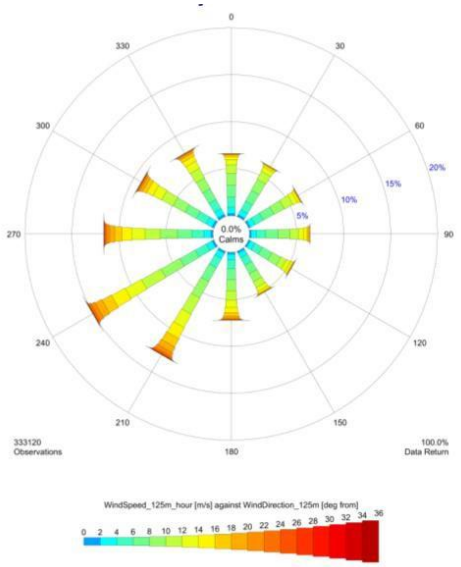


Figure 7.1 - Mean Hourly Wind Speed Distribution at 125 m MSL

7.6 TEMPERATURE & METEOROLOGICAL DATA

Description	Unit	Value
Ambient Conditions		
Ambient Temperature (min/nom/max) – hourly @ +10m	°C	-8.4 / 10.5 / 25.0
Atmospheric Pressure (nominal) – hourly @ +10m	mbar	1013.7
Specific Humidity (min/nom/max) – hourly @ +10m	x 10^{-3}	4.2/6.5/9.5
Wind Conditions		
Annual average wind speed (at 100 m)	m/s	9.56
Extreme Wind Speed for 1-Year Recurrence Period (at 100 m)	m/s	33.1
Extreme Wind Speed for 50-Year Recurrence Period (at 100 m)	m/s	41.0
Marine Conditions		
Sea Water Temperature (min/max)	°C	1.3 / 20.2
Average Sea Water Density	kg/m^3	1025

Table 7.6 – Meteorological and Oceanographic Data (source HKN2018 data @1979-2018), ref./51/.

7.6.1 Rain Fall

Rain Fall [mm]													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Min	14.1	18.1	9.1	1.2	10.3	17.3	6.2	20.7	27.2	43.0	22.2	28.1	646.6
Mean	75.0	62.5	48.6	39.6	47.4	47.9	58.2	73.0	91.0	102.7	108.5	89.3	843.6
Max	143.2	119.4	106.4	79.8	92.7	117.9	160.7	154.7	178.6	188.7	179.3	138.1	1056.1

Table 7.7 - Rain Fall, ref. /52/

7.7 SNOW DATA

Snow loads will be calculated in accordance with FEED, Ref. /37/:

- The Snow Exposure Coefficient (Ce) for every site in the Netherlands and Dutch Continental Shelf is Ce = 1.0.
- The Characteristic Value of Snow Load on the Ground/Platform (sk) shall be taken as sk = 0.7 kN/m^2.
- In the Netherlands including, its Continental Shelf, no exceptional snow loads need to be considered.

7.8 ICE ACCRETION DATA

Atmospheric and marine ice accretion are specified in Table 7.8. Ice from sea spay and rain / snow will be considered separately, i.e., are not concurrent. According to Ref./43/, icing on top of marine growth is considered very conservative, therefore icing will be applied only in the areas above marine growth.

Height	Sea Spray		Ice by Rain/Snow	
rel. to LAT	Thickness	Density	Thickness	Density
[m]	[mm]	[Kg/m^3]	[mm]	[Kg/m^3]
0 – 12.7	100	850	30	700
12.7 - 72.7	Linear 100 to 0	850	30	700

Table 7.8 - Ice Accretion on the Topside, Ref./37/and /42/

7.9 BATHYMETRY

The area consists of a static and a dynamic bathymetry, where the dynamic part consists of moving sand banks and dunes. Following seabed levels from FEED data, Ref./37/, will be used as input parameters for the structural detail design:

- Lowest Seabed Level: this is the lowest possible seabed level during the lifetime of the wind park until 2048;

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- Highest Seabed Level: This is the highest possible seabed level during the lifetime of the wind park until 2048;
- Best Estimate Bathymetry (BEB): This is the best estimate seabed level during the lifetime of the wind park until 2048. The BEB is expected to have, on average, the smallest overall error.

The seabed levels (water depths) in 2023 (installation) to 2048 (decommissioning) are shown in Table 7.9.

Year	Lowest Seabed	Highest Seabed	Best Estimate
2023	-21.6	-20.0	-21.0
2048	-22.2	-20.0	-21.4

Table 7.9 - Seabed Level (m) relative to LAT

7.10 AIR GAP

The air gap calculation is reported in Structural Design Basis, Ref./23/. It is noted that wave run-up forms a large part of the air gap. The lowest elevation of the TP support arms is El.+19.18m LAT and it is therefore above the impact elevation for wave 50-y and 100-years.

7.11 LEG GREEN

Based on the offshore survey results and as-built surveys of the completed topsides, green leg lengths will be cut and prepare (bevel) the tops of the tubulars for welding. Only part penetration welds are required.

The TP will be fabricated to best suit the installed monopile position.

7.12 WAVES AND CURRENT

Waves and current characteristics are recalled from Ref./39/,/40/, /42/ and /43/. Following Normal Sea State (NSS), Extreme Sea State (ESS) and Impact Sea State (ISS) will be considered in structural analyses.

7.12.1 Normal Sea State (NSS)

From ref. Ref./43/, significant wave height with recurrence period of 1 year and associated peak period are:

- $H_{s,1y}$ = 5.6m;
- T_p = 10.0s.

In Ref./42/ the omnidirectional the most severe Normal Sea State (NSS) as shown in Table 7.10 is provided and will be considered in structural analyses.

Hs [m]	Tp [s]	WL [m]	V_{Cavg} [m/s]	$V_{c;SWL}$ [m/s]
6.44	10.17	2.47	0.30	0.99

Vc_{avg} = total depth averaged current (tidal + wind)
$V_{c;SWL}$ = total current (tidal + wind) at Still Water Level

Table 7.10 – Most severe NSS load case for omni-directional wave

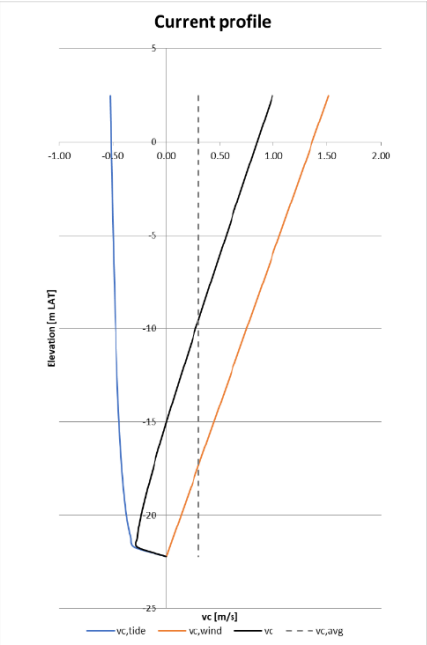


Table 7.11 - Current profile for NSS for $v_{wind,2hr,125\,[m]\,MSL}$ = 35 m/s:

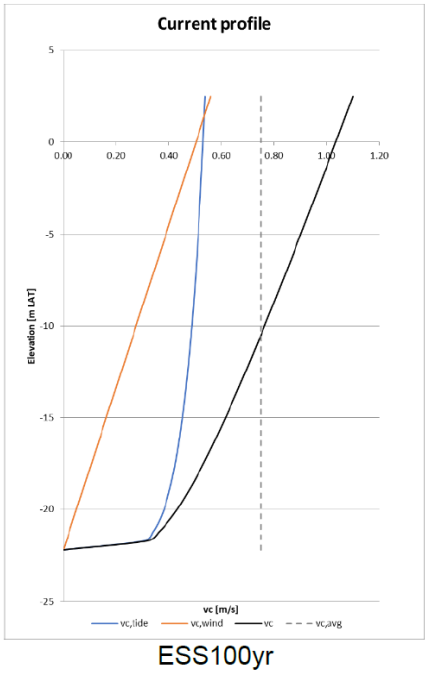
7.12.2 Extreme Sea State (ESS)

In Ref./42/ the omnidirectional Extreme Sea State (ESS) as shown in Table 7.10 is provided and will be considered in structural analyses.

RP [years]	Hs [m]	Tp [s]	WLmin [m]	WLmax [m]	Vc_{avg} [m/s]	Vc_{SWL} [m/s]	H_{mp} [m]	T_{Hmp_min} [s]	T_{Hmp_avg} [s]	T_{Hmp_max} [s]
50	7.3	11.5	2.5	3.6	0.75	1.1	14.0	10.54	11.71	12.88
100	7.6	11.8	2.5	3.6	0.75	1.1	14.5	10.70	11.89	13.08

Vcavg = total depth averaged current (tidal + wind)
Vc;SWL = total current (tidal + wind) at Still Water Level

Table 7.12 – ESS load cases



ESS100yr

Table 7.13 -Current profile for ESS (100 yr)

7.12.3 Impact Sea State (ISS)

The maximum 50 years wave from Table 7.12 is considered for slamming wave impact calculations according to Ref./43/.

7.12.4 Wave and Current Equivalent static acceleration

According to FEED, Ref./37/, and Foundation Load Document for BLPH, Ref./47/, the inertial loading due to wave and current actions on the monopile have to be considered for TP and Topside structural design and check, since not directly invested by these environmental loads. Maximum accelerations at El.+28 m LAT reported in Table 11.20 will be applied to permanent and variable loads to evaluate wave inertial forces.

Case	Location	Elevation (LAT) [m]	Sea State	Max acceleration [m/s2]
Operational	Topsides CoG	28	Normal	0.67
Extreme	Topsides CoG	28	Extreme	1.61

Table 7.14 - Topsides Accelerations from Hydrodynamic Loadings on Monopile

7.13 DRAG AND INERTIA COEFFICIENTS

Hydrodynamic coefficients for unshielded circular cylinders as per ISO code, Ref./7/, is given in Table 7.15. An additional 5% increase factor is applied to all Cd/Cm to account for minor appurtenances and anodes where applicable.

Surface of component	Cd	Cm
smooth	0,65	1,6
rough	1,05	1,2

Table 7.15 - Drag and Inertia Coefficients

7.14 CORROSION ALLOWANCE

No corrosion thickness allowance shall be added to any Topside and Transition piece structure above interface level at el.+17.05, as painting and coating system shall provide necessary protection.

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8 MATERIALS

8.1 STRUCTURAL STEEL PROPERTIES

For the structural analyses, steel types and grades to be used for the platform structures are summarised in /23/ and specified in /27/. The material selection criteria are based on the requirements of ISO 19906:2019, ISO 19902:2020 and ISO 19901-3:2014. The materials are in accordance with the EN standard 10225:2019 and 10025:2019 and are suitable for plates, rolled sections and welded / seamless tubulars.

			EN10025-3	ISO EN 19902:2020						
Design Class	**Complexity**	**SQL**	**Hot rolled bar**	**Plates and Welded Tubular**	**Sections**	**SMLS pipes**	**THK**	**CVN inpact test**	**Material Designation**	**List of Options (EN10225-1 to -4) & EN10025-3**
DC1 TP to monopile flange connection	High	**I** **(Z properties)**	EN 10025 S420 NL	NA	NA	NA	t > 50	-40	DC1-I-420-40_Z	1, 2, 3, 4, 6, 12, 18, 24, 30
DC1 Complex lift-nodes and element connection to topside, Lift points, main complex joints	High	**I** **(Z properties)**	NA	EN 10225 S420 QLO / ML	NA	NA	25 < t <= 50	-40	DC1-I-420-40_Z DC1-I-460-40_Z	2, 7, 8, 11, 12, 17, 18
							t > 50	-40		
DC2 simple joints, primary deck girders and beams of Topside and TP, column and diagonal to lift points, main columns, Davit crane support, Bolts	Low	**II**	NA	EN 10225 S420 QLO / MLO	NA	NA	t < = 12	0	NA	-
							12 < t <= 25	-20	DC2-II-420-20 / DC2-II-460-20	2, 7, 8, 11 17 for t > 40mm
							25 < t <= 50	-40	DC2-II-420-40 DC2-II-460-40	
							t > 50	-40		
DC3 all other columns and diagonals, stiffeners, Secondary deck beams, Grillage and sea fastening	High	**II**	NA	EN 10225 S355 NLO / MLO	EN 10025 S355 MLO	EN 10225 S355 NLHHO / QLHHO API 5L X52	t < = 12	0	DC3-II-355-0 / DC3-II-X52-0	2, 7, 8 11 for plate 17 for t > 40mm
							12 < t <= 25	-20	DC3-II-355-20 / DC3-II-X52-20	
							25 < t <= 50	-40	DC3-II-355-40 / DC3-II-X52-40	
							t > 50	-40		
DC4 Equipment and vessel supports, modules supports, equipment fixing bolts	Low	**III**	NA	EN 10025 S355 J2	EN 10025 S355 J2	API 5L X52 EN 10210 S355 J2H	t < = 12	0	DC4-III-355-0 / DC4-III-X52-0 / DC4-III-X60-0	-
							12 < t <= 25	0		
DC5 floor plating, grating, Walkw ays, stairs, handrails	Any	**IV**	NA	EN 10025 S235 JR EN 10025 S275 J0 EN 10025 S355 J0	EN 10025 S235 JR EN 10025 S275 J0 EN 10025 S355 J0	API 5L Gr.B EN 10210 S235 JRH / EN 10210 S275 J0H / EN 10210 S355 J0H	t < = 12	10	DC5-IV-235-10 / DC5-IV-275-10 / DC5-IV-355-10 / DC5-IV-GRB-10	-
							12 < t <= 25	10		

Table 8.1 – Material Selection, Ref/27/, and requested Options

Mechanical properties for structural materials are presented in Table 6.8, Table 6.9 and Table 6.10.

- Young's Modulus = 205,000 N/mm^2
- Density = 7850 kg/m^3
- Poisson's Ratio = 0.3

Thickness (mm)	Min. Tensile Strength (N/mm^2)	Min. Yield Strength (N/mm2)	Steel Type (1)
t > 250	460	320	I
Note: 1) Type I steel has Z (through the thickness) properties.			

Table 8.2 – Mechanical properties of Hot rolled bar

Thickness (mm)	Min. Tensile Strength (N/mm²)	Min. Yield Strength (N/mm2)	Steel Type (1)
t ≤ 16	500	420	I & II
16 < t ≤ 40	500	400	I & II
40 < t ≤ 63	480	390	I & II
63 < t ≤ 100	480	380	I & II
Note: 1) Type I steel has Z (through the thickness) properties.			

Table 8.3 – Mechanical properties of Plates

Thickness (mm)	Min. Tensile Strength (N/mm²)	Min. Yield Strength (N/mm2)	Steel Type
t ≤ 20	460	355	III
20 < t ≤ 40	460	345	III

Table 8.4 – Mechanical properties of Structural Seamless Tubulars

Thickness (mm)	Min. Tensile Strength (N/mm2)	Min. Yield Strength (N/mm2)	Steel Type
t ≤ 16	460/360	355/275	IV
16 < t ≤ 40	460	345	IV

Table 8.5 – Mechanical properties for Structural Sections

8.2 PLATING

Plate thicknesses for primary structural steel starts at a minimum of 10 mm and increase in 5 mm steps Secondary steel lower and upper deck plates are 8 mm thick and 10mm for laydown areas for Dropped Object Protection (DOP).

Blast walls are not to be provided on a hydrogen processing facility, as free ventilation and free explosion venting is more important, and supportable, than obstruction walls.

8.3 GRATING

Grating are characterized by bearing bars 30 mm x 5 mm and mesh 30 mm x 50 mm.

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9 DESIGN CRITERIA AND REQUIREMENTS

9.1 GENERAL

Structures in SOW is designed in accordance with limit states approach of ISO codes 19901 and 19902, Refs./2/, /4/ and /7/. For non-tubular sections, Eurocode, Ref./9/, is adopted. Member forces and moments derived from the global analyses are used for checking member strength and stability, and joint strength.

Different design limit states are defined and will be satisfied by the design:

- the Serviceability Limit State (SLS), corresponding to the criteria applicable to normal use or durability;
- the Ultimate Limit State (ULS), corresponding to the ultimate capacity for carrying loads;
- the Accidental Limit State (ALS) corresponding to damage due to an accidental event;

The general requirement of ISO code is that, for the structure as a whole and for each component, the following is satisfied:

$$R_d = \frac{R_k}{\gamma_M} > \gamma_F F_r = F_d$$

Where:

- R_d is the design resistance;
- R_k is the characteristic resistance;
- γ_M is the partial resistance factor reported in section 0;
- F_d is the design value of action;
- F_r is the characteristic value of action;
- γ_F is the partial action factor reported in Sec.9.4.

Design according to the provisions for load and resistance factor design (LRFD) of EC3, ref. /9/ shall be performed in accordance with following equation:

$$R_u \leq \phi R_n$$

Where:

- R_u = required strength using LRFD load combinations
- R_n = nominal strength
- ϕ = resistance factor reported in Sec.0
- ϕ Rn = design strength.

9.2 PARTIAL RESISTANCE FACTORS

9.2.1 Partial Resistance Factors for Tubular Sections:

The partial resistance factors for tubular sections from ISO 19902, Ref./7/, are listed below.

Resistance factor	Value	Definition
$\gamma_{R,t}$	1.05	Partial resistance factor for axial tensile strength
$\gamma_{R,c}$	1.18	Partial resistance factor for axial compressive strength
$\gamma_{R,b}$	1.05	Partial resistance factor for bending strength
$\gamma_{R,v}$	1.05	Partial resistance factor for shear strength
$\gamma_{R,h}$	1.25	Partial resistance factor for hoop buckling strength

Table 9.1- Resistance Factors for Tubular Sections

9.2.2 Partial Resistance Factors for Non-tubular Sections

Referring to ISO 19901-3, Ref./4/, section 8, to be consistent with ISO 19900 inherent the level of safety, a "building code correspondence factor" is to be applied to the EC partial factors.

The partial resistance factors for non-tubular sections from Eurocode 3, Ref./9/, are listed below.

Resistance factor	Value	Definition
Resistance of members and cross sections		
γ_{M0}	1.10*	Cross-section resistance to excessive yield strain including local buckling
γ_{M1}	1.10*	Resistance of unstable elements measured during element inspection
γ_{M2}	1.25	Tensile cross-section resistance to mechanical breakdown
Resistance of connections		
γ_{M2}	1.25	Bolts, rivets, pins, welds and slabs on supporting surface
γ_{M3}	1.25	Sliding resistance at Ultimate Limit State Category C
$\gamma_{M3,SER}$	1.10	Sliding resistance at Serviceability Limit State
γ_{M4}	1.10	Injection bolt collapse resistance
γ_{M5}	1.10	Resistance of connections in open lattice trusses
$\gamma_{M6,SER}$	1.00	Resistance of pins at Serviceability Limit State

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γ_{M7}	1.10	Preload of high strength bolts

Table 9.2- Resistance for Non Tubular Section

These resistance factors apply to the design of members and are not applicable to local details, such as padeyes. Reference should be made to ISO 19902 for a full listing of partial resistance factors and to Eurocode 3, Ref./9/, for welds and bolts design resistance factors.

Note *: The correspondence factor has been considered by increasing the Partial safety factor $\gamma M0 = \gamma M1$ from 1.00 to 1.10 in SACS input file. That safety factors from Eurocode 3 (UNI-EN-1993-1-3) are greater than or equal to safety factors from ISO19902:

$\gamma M0 = \gamma M1 = 1.10$ (UNI-EN-1993-1-3) ≥ yR,t (=1.05); yR,c (=1.10); yR,b (=1.05); yR,v (=1.05) (ISO19902)

9.2.3 Partial Resistance Factors for Tubular Joints Check

The partial resistance factors for tubular joints checks are provided in following table, ref. /7/.

Resistance factor	Value	Definition
$\gamma_{R,j}$	1.05	Partial resistance factor for joints
$\gamma_{z,j}$	1.17	Additional partial resistance factor for members during joint pre-strain collapse

Table 9.3 - Resistance Factors for Tubular Joints

9.2.4 Partial Resistance Factors for Accidental Limit State Actions

All partial resistance factors for the abnormal / accidental limit state conditions are set equal to 1.00.

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9.3 LOAD CLASSIFICATIONS

Design loads are classified as either global or local within ISO 19901-3, Ref. /4/ and ISO 19902, Ref./7/ and summarized in Table 9.4.

Load Type	ISO Designation	Description
Permanent (Dead)	G1	Structure self-weight; Equipment & piping dry weight; Any actions due to misalignment of structures such as between the topside and TP
Permanent (Dead)	G2	permanent action imposed on the topsides structure by self-weight of equipment and other objects that remain constant for long periods of time, but which can change from one mode of operation to another, or during a mode of operation, bulk loads
Variable (Live)	Q1	Equipment & piping contents weight; Superimposed area loads (see Section 11.2); Ice and snow accretions
Variable (Live)	Q2	Crane hook loads; Liquids in pipes and process vessels for pressure testing; Machine operations
Environmental (extreme)	Ee	Extreme quasi-static action due to wind, waves and current (eg.100-yr storm wind)
Environmental (operational)	Eo	1-yr storm wind
Inertial Response (operational)	Do	Equivalent quasi-static action representing dynamic response caused by the Eo wave condition
Inertial Response (extreme)	Do	Equivalent quasi-static action representing dynamic response caused by the Ee wave condition
Pressure (accidental)	-	Blast
Inertial (accidental)	-	Ship impact on monopile
Impact Energy (accidental)	-	Dropped Object
Transient	T	Transient Loads for Pre-Service Analyses

Table 9.4 - ISO Loads Classification

9.4 PARTIAL ACTION FACTORS

9.4.1 Partial Action Factors for In-Service Analysis

Partial action factors to be applied for the operating conditions in compliance with ISO codes are reported in Table 9.5.

Load combination		Dead load		Live load		Environmental load	Wave dynamics
		G1	G2	Q1	Q2	Eo / Ee	Do / De
		$\gamma_{f,G1}$	$\gamma_{f,G2}$	$\gamma_{f,Q1}$	$\gamma_{f,Q2}$	$\gamma_{f,Eo}$ / $\gamma_{f,Ee}$	$\gamma_{f,D}$
Operating Gravity / Buoyancy		1.3	1.3	1.5	1.5	-	-
Operating Storm		1.3	1.3	1.5	1.5	1.22	1.25
Extreme Storm (100 years)	Max Compression	1.0	1.0	1.0	-	1.35	1.25
	Max Tension	0.9	0.9	0.8	-	1.35	1.25

Table 9.5 – Partial Action Factors for the In-Service Analysis

9.4.2 Partial Action Factors for Serviceability Limit States

All partial action factors for Serviceability Limit States conditions are set equal to 1.0.

9.4.3 Partial Action Factors for Accidental Limit States

All Partial Resistance Factors for Accidental Limit States conditions are set equal to 1.0.

9.5 ACCEPTANCE CRITERIA

The maximum member Unity Check (UC) will be less than unity.

9.6 SPAN LIMITS

Maximum allowable beam span limits are provided in Table 9.6.

Structural Component	Member Length / Member Height
Primary members	18
Members carrying sensitive machinery / vessels	15
All other members	22
Deck plate and stringers	30

Table 9.6 - Maximum Allowable Beam Span Limits

On the BLPH topsides, 1 m deep Plate Girders (PGs) will be used with a span to depth ratio of 16, which is considered acceptable as the PGs will be continuous over the long span. The TP arms will be Box Girders

(BGs). BGs are preferred as they have better corrosion resistance, torsional strength and are robust in a potential wave slam load application.

9.7 SERVICEABILITY LIMITS

ISO 19901-3, Ref./4/, states structural member deflections under serviceability conditions must not impair the serviceability of the structure. Corresponding deflection limits are presented in Table 9.7.

Condition	Limit for Δ_{max}	Limit for Δ_2
Deck Beams	L / 200	L / 300
Cantilever Beams	L / 100	L / 150
Deck plate thickness	-	2t or b/150 whichever is smaller

Where:

L = span of the beam, length of the cantilever;

t = deck plate thickness;

b = stiffener spacing;

D_{max} = final deflected shape = $D_1+D_2-D_0$;

D_0 = any pre-camber (hogging) prior to the addition of any permanent or variable actions;

D_1 = deflection from permanent actions after applying the actions;

D_2 = deflection from the variable actions and any time-dependent deformations from permanent actions.

Table 9.7- Limiting Values for Vertical Deflection

10 STRUCTURAL ANALYSIS

The Topsides analysis will consider permanent, variable and environmental loads (operating and extreme wind and wave inertial loads including snow and ice).

Topsides support is provided by 4 leg supports on the top ends of the TP arms. The pins have 'leg green' which is provided to ensure the Topside sits at the correct elevation and is levelled after installation – see Sec.7.11. Topside In-Service applicable design scenarios (operating and extreme) and respective partial action factors for both ULS and SLS are reported in Sec.9.

Wave run-up loads on the monopile are considered in /43/, /44/, /45/ and /50/ where loads and pressures on the WTG platform at Elevation (El.) +16.910 m Lowest Astronomical Tide (LAT) (top of grating) have been calculated.

As calculated in structural design basis, ref. /23/, the wave crest elevation due to run-up effect does not impact Topside beams nor TP arms at the edges and therefore will be ignored in global analyses. Indeed, the shield effect of main access platform at El.+16.910m protects the TP beams at connection with monopile structure. Even if we do not consider the shield effect generated by MAP the vertical wave pressure can be generated by wave run-up in extreme waves will be relative small compared with the vertical downward force acting on TP arms. Structural verification of MAP against wave run-up is shown in Ref. /50/.

Ship impact loads on the monopile generate accelerations on the Topsides – see Sec. 11.6.1. For the topsides design these accelerations and resulting inertial forces will be compared against sea transport and in-service wave accelerations to evaluate which governs. The ship impact inertial loads will be combined with Permanent, Variable and Operating Wind loads according to partial action factors of ALS.

10.1 STRUCTURAL MODEL

10.1.1 Structural Model Description

The software SACS™, ref./53/, is used for all global analyses of the structures in the SoW.

The structural models of the Topside, TP and caissons is representative of the actual structure and shall include the following:

- main structural components: all primary framing members such as columns, truss braces, topside girders, floor bracing and members supporting large and heavy equipment;
- structural components which presence generates significant environmental loads;
- deck plating is modelled using plate finite elements with shear resistance. Flooring beams are not included in SACS model and in grated areas no account is taken of any additional stiffness due to the grating itself;

- secondary members are modelled where they are significant in consideration of load paths and/or overall stiffness and/or contribute to structural capacity. For example: beams supporting heavy equipment and/or large vessels;
- dummy elements to take into account the proper restraints and CoG location of heavy equipment and to consider the correct CoG position of the item.
- Other secondary and tertiary structures are, in general, not modelled. Their effect on primary steel (such as local loading or buckling restraint) and corresponding loads have been considered within the modelled supporting structures.

Structural members like beams, columns, braces, etc. are modelled with proper cross-sectional properties correct lengths. Member groups, section properties and wireframe schemes of joints' and member groups' assignments are provided in Appendices. Also member ends' restraints and constraints, if any, reflecting the actual released / restrained degrees of freedom are shown.

Material property assignments account for varying member thickness and steel type. Member offsets and eccentricities are modelled to take into account all secondary moment effects at a beam/brace intersection.

The Topsides and TP joints are modelled at the TOS elevation for each plan level. Vertical member offsets have been incorporated to adjust the ends of the plan members to the centrelines of the sections.

The member slenderness are defined considering the following effective length factors for in-plane (Ky) and out-of-plane (Kz):

• Braced legs: Ky = 1.0, Kz = 1.0;

• X-bracings: Ky = 0.9, Kz = 0.8 of the total length or 0.9 of the longer segment length if the opposite ones are in tension;

• Floor beams: Ky = 1.0, Kz = 1.0;

• Cantilever beams: Ky = 2.0, Kz = 2.0.

Further and more detailed guidance on the selection of effective length factors for member stability checks are given in ISO 19902, ref./7/, and Eurocode 3, Ref./9/. The deck beams out-of-plane effective length (Lz) have been set equal to 1.00 m for the beams supporting, and then restrained by, the secondary floor beams. The beams unbraced length (Lb), governing the buckling length of the compressed flange, have been set equal to the beam length. Based on the moment diagram of the beam resulting from the analyses, this length Lb has been revised where resulting the discriminant parameter of the beam checks. Lb's are shown in APPENDIX B.

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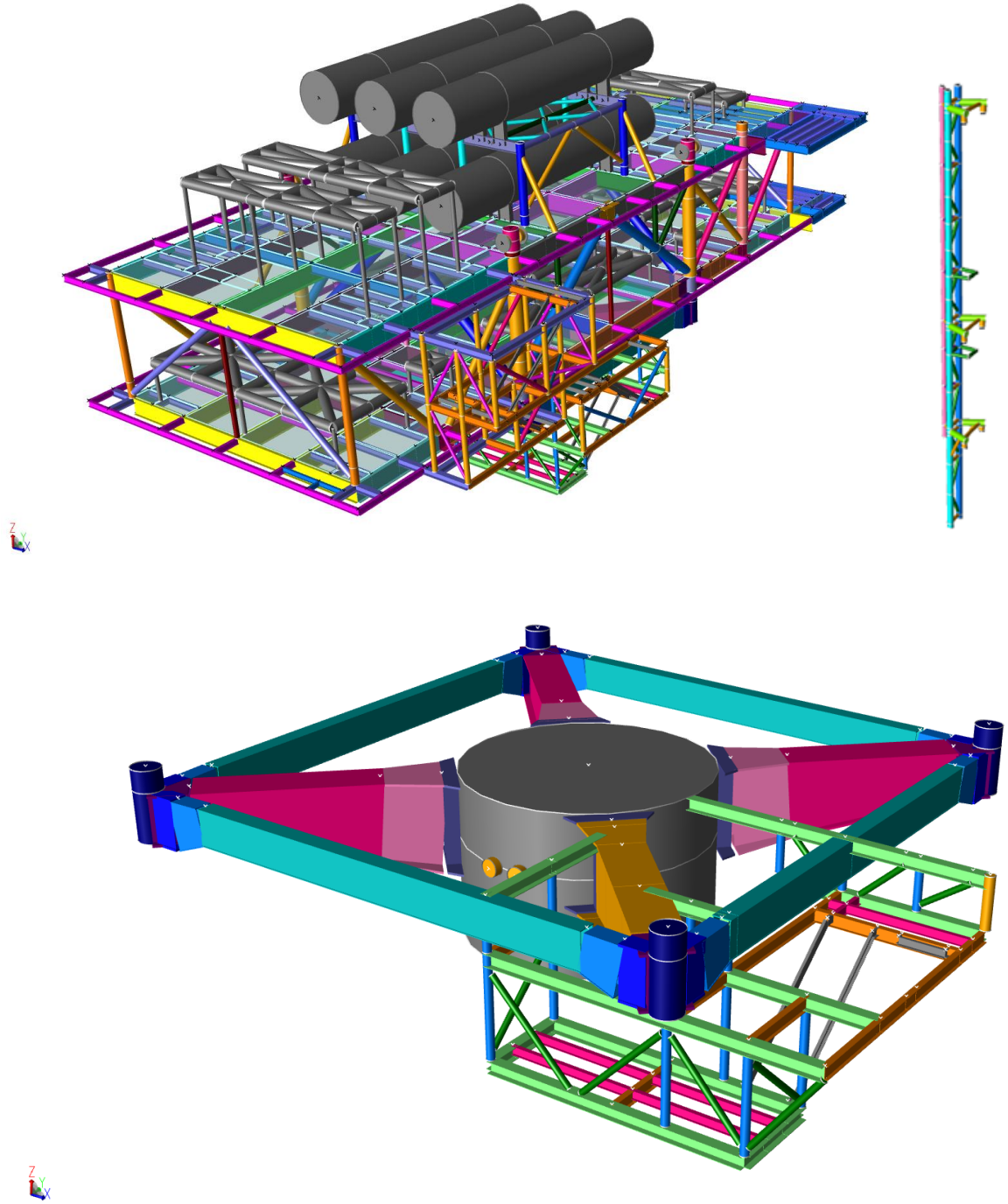


Figure 10.1 – Topside, TP and Caisson Frame SACS integrated structural model

10.1.2 Coordinate System

The model geometry is referred to a right-handed orthogonal Cartesian coordinate system with the origin located at the centre of the foundation structure at level +0.0 m relative to LAT. The X-axis is positive toward East, the Y-axis is positive toward North and the Z-axis is positive upward.

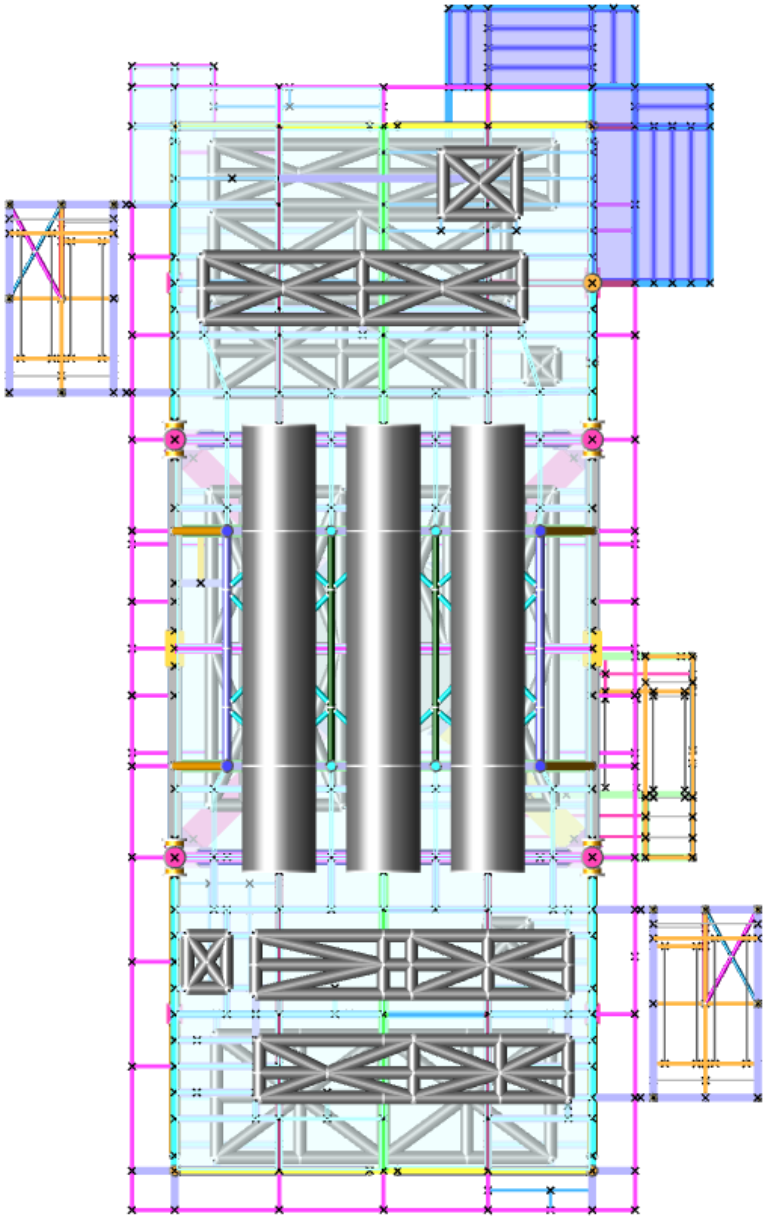


Figure 10.2 - BLPH Topsides Structural Model - Top View

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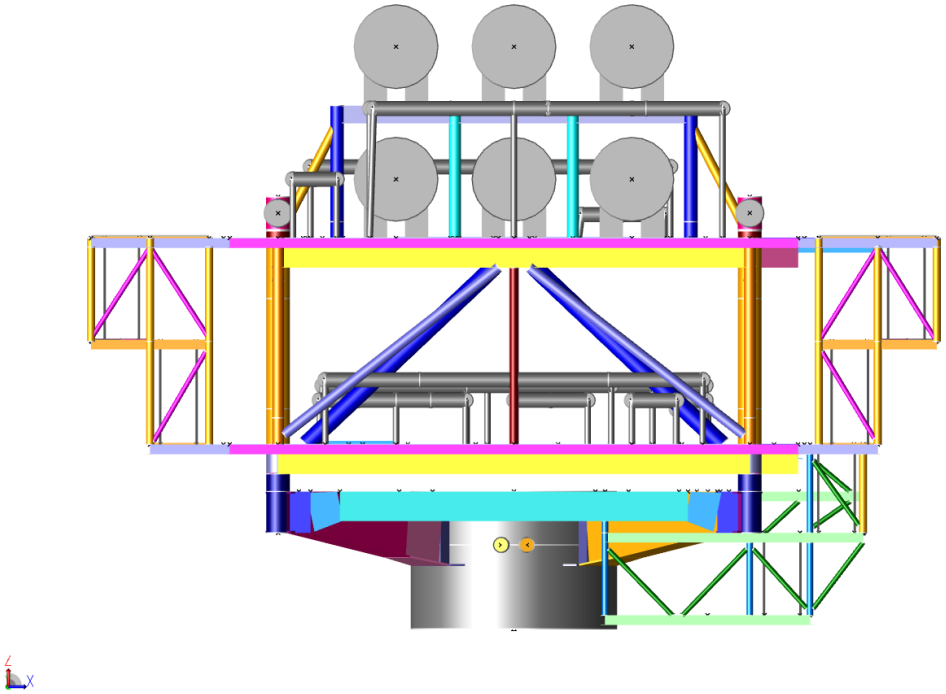


Figure 10.3- BLPH Topsides Structural Model - Lateral View from South

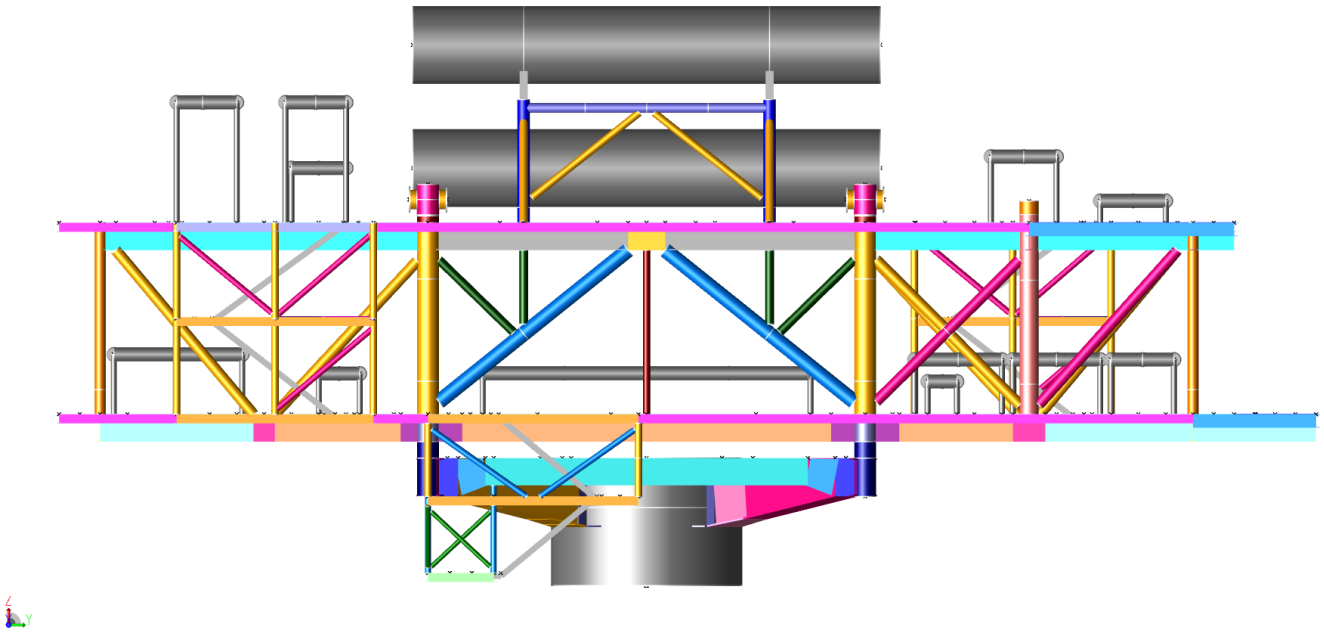


Figure 10.4 - BLPH Topsides Structural Model - Lateral View from East to West

10.1.3 Boundary Conditions

10.1.3.1 Topside – Transition Piece connection

The Topside is supported by Transition Piece in correspondence of four points. The connection between Topside and TP has been modelled through four tubular beam elements with proper cross-sectional properties (800mm x 40mm) and no release at member's end joints. In following figure member's end joints and local axes are reported with reference to global SACS model's reference system. Detailed check of this connection is shown in ref. /33/ using FEM model.

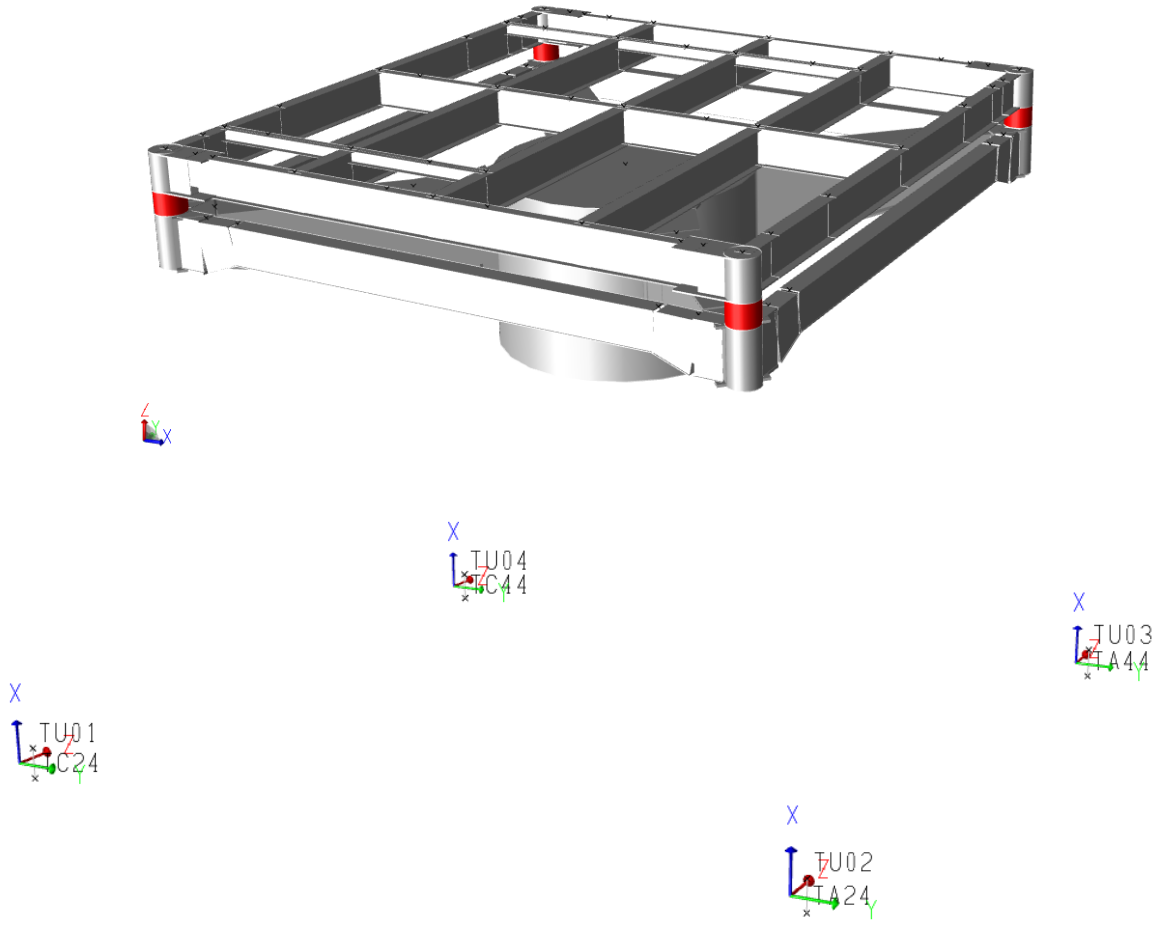


Figure 10.5 – Topside – TP connection elements (end joints and local axes)

10.1.3.2 Transition Piece – Monopile Flanged Connection

The BLPH Topside and TP integrated structural model is considered fully restrained at interface level (el.+17.05m) with Monopile flanged connection. Detailed check of TP using FEM analysis is presented in report /31/ and flange FEM verification in report /32/.

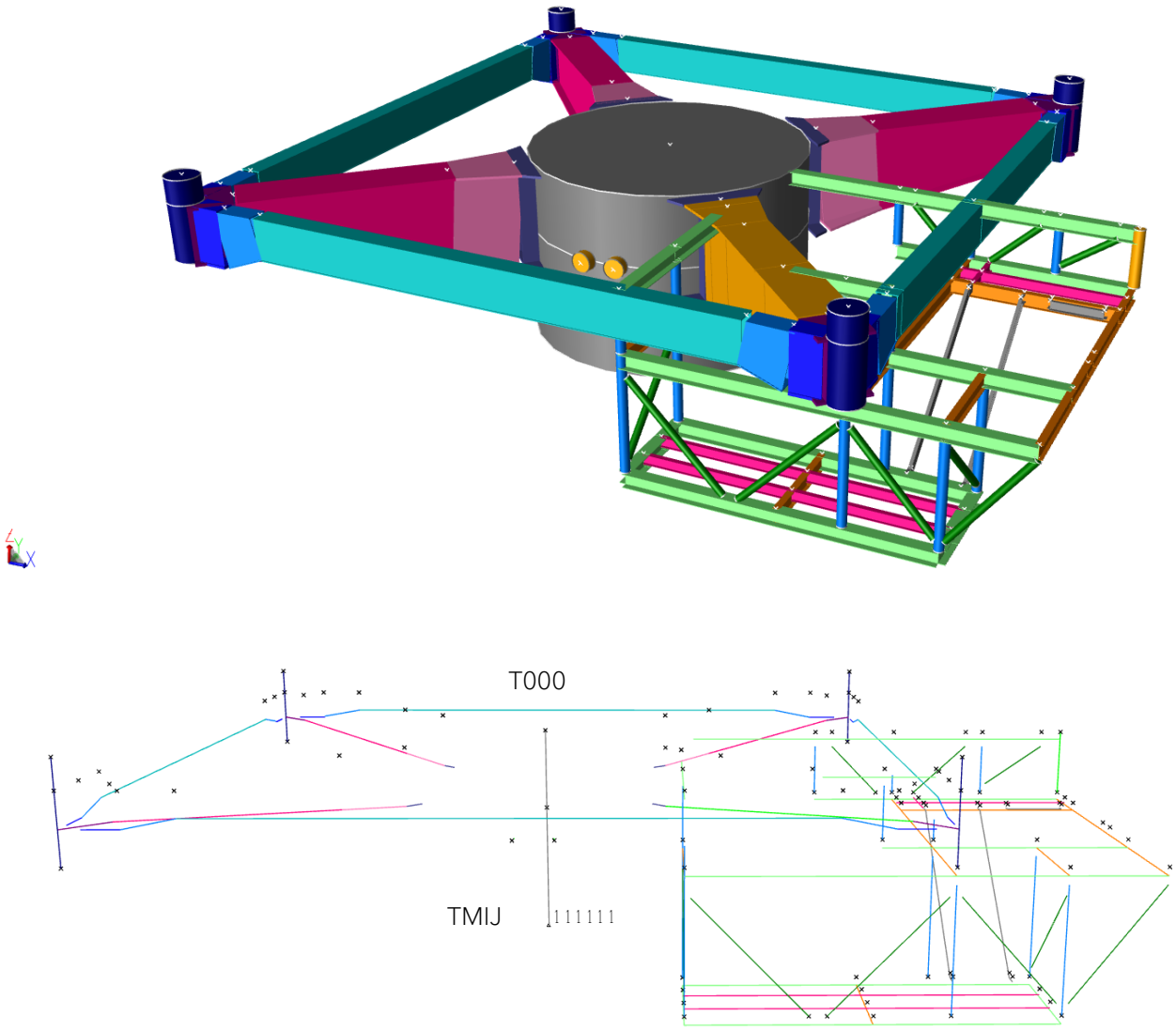


Figure 10.6 – TP SACS model

11 BASIC LOAD CASES

All the design loads have defined according to the Weight Control Report and Plot Plans, Ref./24/ and /25/, in terms of weights, CoG position and contingency factors. The datum for weight reporting is different to that for the SACS structural analysis. The origin for the weight reporting is at gridline intersection C1 at LAT.

11.1 PERMANENT ACTIONS

11.1.1 Modelled structural dead weights

Dead weights of the modelled structures have been automatically evaluated by SACS and included in following basic load conditions.

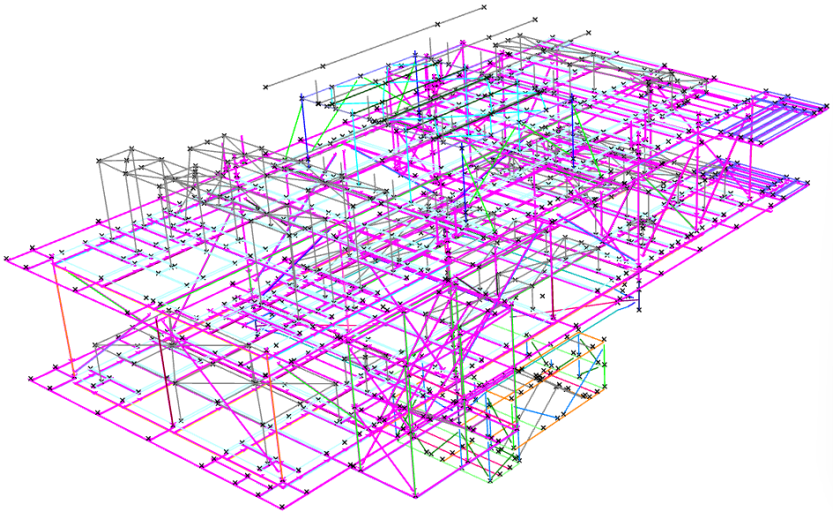
All BLPH are above maximum sea water level, therefore no buoyancy is applied. Total modelled structures' weights are included within basic load condition DEAZ = DZTO + DZPU + DZTP representing respectively Topside, PAU and Transition Piece modelled weights..

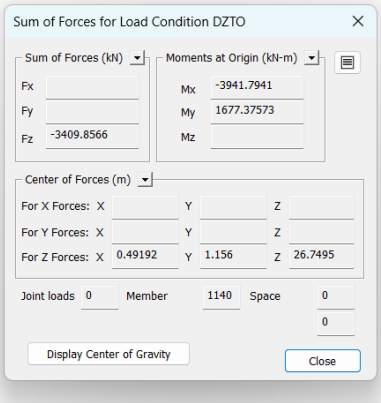
Loads were validated by comparison with WCR.

- Load condition DEAZ: Modelled structures total weight

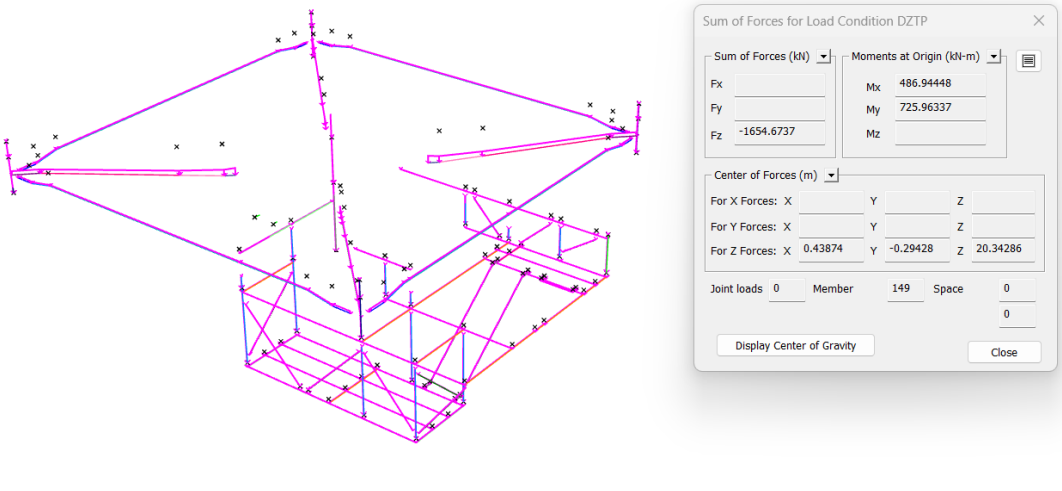
  DEAZ = DZTO + DZPU + DZTP

- Load condition DZTO: TOPSIDE MODELLED WEIGHT





- Load condition DZTP: TRANSITION PIECE MODELLED WEIGHT



- Load condition DZPU: PAU MODELLED WEIGHT

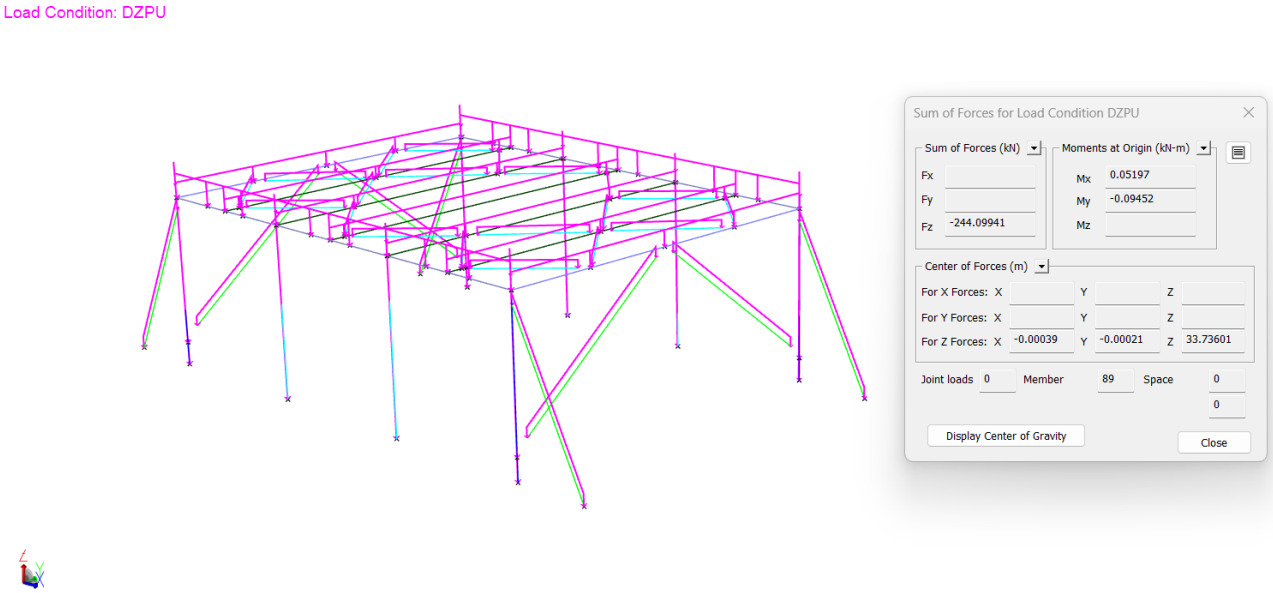


Figure 11.1 – Topside basic load conditions forming DEAZ

11.1.2 Not-modelled structural dead weights

Following basic Load conditions have been defined for not modelled structural dead weights.

- Load condition WFLO: FLOORING AND GRATING PERMANENT LOADS

Flooring and grating weights have been defined in SACS load combination WFLO according to calculations reported in following table.

PLATING & GRATING GRAVITY WEIGHTS - WFLO							
g_grat =	0.500	kN/m2	GRATING 30X50 - 30X5				
g_plat 8mm =	0.650	kN/m2	PLATING THK=8mm				
g_plat 10mm =	0.800	kN/m2	PLATING THK=10mm				
LOAD ID	**Dim.**		**EL.**	**W**	**W tot**	**Description**	**TEKLA**
	x	**y**	**z**				
[-]	**[m]**	**[m]**	**[m]**	**[kN]**	**[kN]**		**[kN]**
L_GR_0.5	1.640	42.250	23.310	69.3	92.2	Lower deck grating	88.3
L_GR_0.5	15.300	1.500	23.310	23.0			
U_GR_0.5	1.640	43.000	30.310	35.3	88.4	Upper Deck grating	73.6
U_GR_0.5	1.640	35.500	30.310	29.1			
U_GR_0.5	16.000	1.500	30.310	24.0			
L_P10	7.000	3.000	23.310	16.8	16.8	Lower Deck flooring 10mm	17.6
U_P10	4.500	7.500	30.310	27.0	27.0	Upper Deck flooring 10mm	29.4
L_P8	12.900	4.700	23.310	39.4	416.0	Lower Deck Plating 8mm in Equipment area	400.0
	5.000	4.300	23.310	14.0			
	4.950	12.200	23.310	39.3			
	2.450	6.100	23.310	9.7			
	11.200	9.540	23.310	69.5			
	16.000	40.000	23.310	244.2		Lower Deck Plating 8mm	
U_P8	12.200	2.440	30.310	19.3	416.0	Upper Deck Plating 8mm in Equipment area	400.0
	12.000	4.820	30.310	37.6			
	16.000	40.000	30.310	359.1		Upper Deck Plating 8mm	
STGR_0.5				27.1	27.1	tower stairs grating	26.5
STGR_TP				31.3	31.3	TP -tower stairs grating	23.0
SACS LOAD CONDITION				**WFLO**	**1114.8**	**Total Flooring & grating structural weight**	**1058.4**

Table 11.1 – Load Condition WFLO: Plating and grating weights' calculation

Table has been validated by comparison with TEKLA model and WCR.

Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Secondary and Tertiary Structure									109,997			123,196	
TP		TP flooring stair (grating)		AFC		19,681	8,582	20,320	1,921	1,921	12%	2,152	2,152
TP		TP stabbing guides		AFC		19,000	9,000	21,800	2,536	2,536	12%	2,840	2,840
TS-LD		Flooring lower deck (grating +		AFC		20,936	8,381	23,310	51,379	51,379	12%	57,545	57,545
TS-UD		Flooring upper deck (grating +		AFC		20,936	8,381	30,310	51,564	51,564	12%	57,752	57,752
TS-LD		Flooring stairs (grating)		AFC		20,936	8,381	26,810	2,595	2,595	12%	2,907	2,907

Table 11.2 – Plating and Grating from WCR

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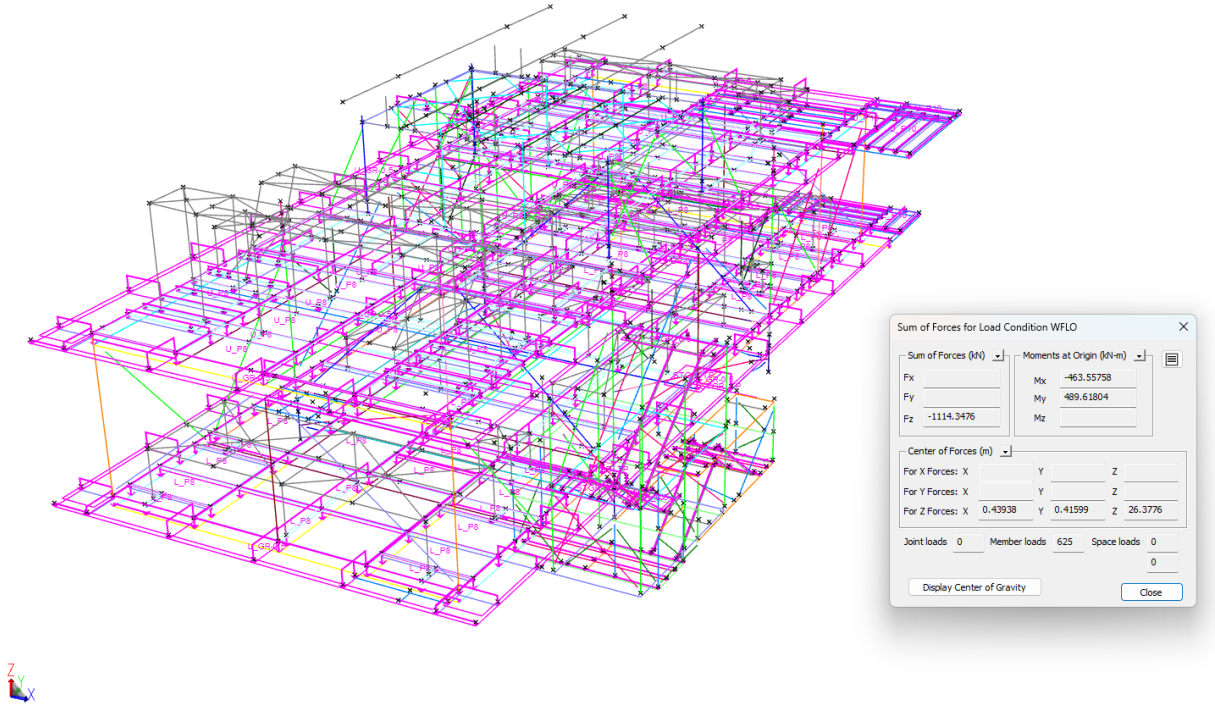


Figure 11.2 – Topside basic load conditions WFLO

- Load condition WPER: SECONDARY STRUCTURES PERMANENT LOADS

Not modelled structural weights have been defined in SACS load condition WPER as per following table, based on WCR, ref./24/.

PERMANENT STRUCTURAL WEIGHTS - WPER						
LOAD ID	Dim.		EL.	W	W tot	Description
	x	y	z			
[-]	[m]	[m]	[m]	[kN]	[kN]	
DAV_CR	8	14	31.1	58	58	DAVIT Crane
ACCSTS			30.31	350	350	PAU Access Stairs
HAND_L			23.31	43.2	43.2	Handrail Lower deck
HAND_U			30.31	45	45.0	Handrail Upper deck
HANDHD			23.31 / 30.31	51.5	51.1	Heavy Duty Handrail U&LD
HAND_ST			23.31 / 30.310	33.9	33.9	Tower Stairs Handrail
1 kN/m2W			23.31	37.8	37.8	not-modelled walkways sec. beams LD
U1kN/m2W			30.31	37.8	37.8	not-modelled walkways sec. beams UD
PF_BOTFL			17.05	90	90	Bottom MP Flange Weight
HR_ST_TP			19.6	19.3	19.3	Handrail TP stair
ST_GUIDE			22	40	40	Stabbing Guides
ACCWLK_T			18	10	10	Access stair to inside MP
C_FRAME			19.9	360	360	CAISSON FRAME + pump string
SACS LOAD CONDITION				**WPER**	**1176.1**	**Not Modelled Permanent Structural Weights**

Table 11.3 – Load Condition WPER

Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Secondary and Tertiary Structure									114,300				
TP		temporary handrails / inst AIDS		AFC		20,000	8,000	22,500	6,000	6,000	12%	6,720	6,720
TS-UD		PAU service stairs/access ptfs		AFC		21,500	8,000	35,000	36,300	36,300	12%	40,656	40,656
TS-LD		CONT BULK (overall + inside TP)		AFC		20,000	8,000	25,733	30,000	30,000	12%	33,600	33,600
TS-UD	X-99001	Crane Davit		AFC		34,000	16,000	31,310	6,000	6,000	12%	6,720	6,720
TP		caisson frame		AFC		16,300	8,000	19,900	36,000	36,000	12%	40,320	40,320

Table 11.4 – Permanent loads from WCR

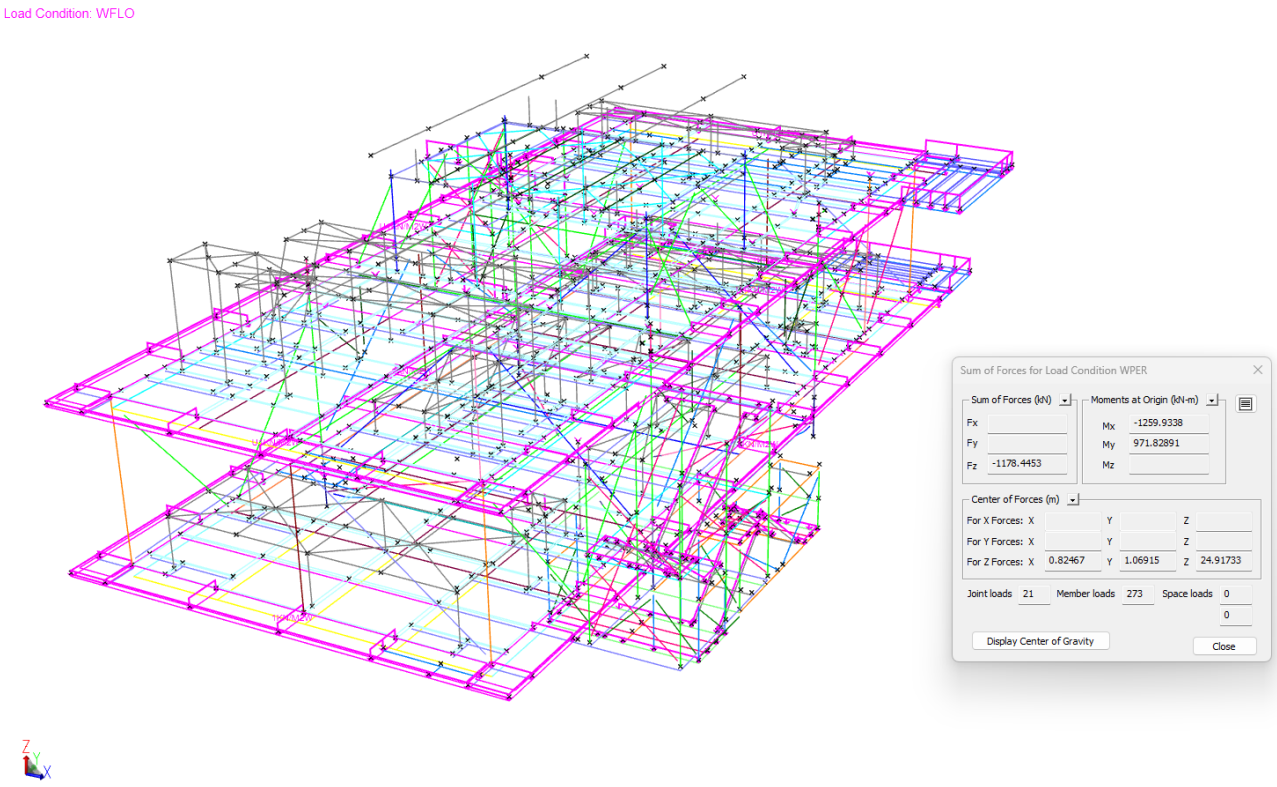


Figure 11.3 – Topside basic load conditions WPER

11.1.3 Equipment Dry weights and other disciplines' bulk loads

These loads include dry weight of all platform process/utility mechanical equipment and electrical & instrumentation equipment and other objects permanently mounted on the structure that do not change with the mode of operation. Equipment loads have been modelled in SACS as uniform or concentrated loads at proper location. For main equipment, dummy structural elements have been included in the global model to account for equipment's CoG location as per WCR and Plot Plans.

- Load condition MECD: EQUIPMENTS' DRY WEIGHTS (contingency included)

Equipment dry weights at Upper and Lower Deck, already including 12% contingency for mechanical discipline and 15% contingency for electrical one, have been included in load condition MECD.

EQUIPMENT WEIGHTS										
Loc.	DISC	DESCRIPTION	TAG	Wdry [t]	Wdry [kN]	Wcontent [t]	Wcontent [kN]	contingency [%]	Wdry [kN]	Wcontent [kN]
UD	MEC	H2 STORAGE VESSEL	V-25001A/F	352.20	3455.08	1.50	14.72	12%	3869.69	16.48
UD	MEC	ELECTROLYSER	A-20000	135.30	1327.29	11.50	112.82	12%	1486.57	126.35
UD	MEC	TRANSFORMER	A-20000-T	8.20	80.44	1.00	9.81	12%	90.10	10.99
UD	MEC	FUEL CELL	A-80000A+B	34.02	333.73	5.00	49.05	12%	373.77	54.94
UD	MEC	FUEL CELL TRANSF	A-80000-C	7.14	70.02	1.00	9.81	12%	78.43	10.99
UD	MEC	AIR SYSTEM	A-63000	10.80	105.95			12%	118.66	
UD	MEC	AIR RECEIVER	V-63001	7.42	72.79			12%	81.53	
UD	MEC	HYDROGEN VENT KO DRUM	V-43001	0.78	7.65	0.50	4.91	12%	8.57	5.49
UD	MEC	HYDROGEN VENT HEATER	H-43002	1.30	12.75	0.75	7.36	12%	14.28	8.24
UD	MEC	HYDROGEN VENT	Q-43004	3.40	33.35	1.00	9.81	12%	37.36	10.99
			TOT UD	560.56	5499.06	22.25	218.27		6158.95	244.47
LD	MEC	Nitrogen package	A-64000	7.50	73.58	1.00	9.81	12%	82.40	10.99
LD	MEC	N2 RECEIVER	V-64001	4.00	39.24			12%	43.95	
LD	MEC	BESS (PCS CONTAINER)	A-85000	15.00	147.15	3.00	29.43	12%	164.81	32.96
LD	MEC	BESS (BC1)	A-85001	35.00	343.35	5.00	49.05	12%	384.55	54.94
LD	MEC	BESS (BC2)	A-85002	35.00	343.35	5.00	49.05	12%	384.55	54.94
LD	MEC	WATER treatment package	A-50000	10.50	103.01	5.50	53.96	12%	115.37	60.43
LD	MEC	seawater lift pump A / B	P-50001 A/B	3.25	31.88	10.00	98.10	12%	35.71	109.87
LD	MEC	LIFE RAFT	YLB-079002	5.50	53.96			12%	60.43	
LD	MEC	NER	RR-100AD1	0.38	3.73			12%	4.18	
LD	MEC	Solar TRAFO	TR-200ED1	3.34	32.77	1.00	9.81	15%	37.68	11.28
LD	MEC	TRANSFORMER AUX 6.6/0.4kV	TR-200DE1	5.05	49.54	1.50	14.72	15%	56.97	16.92
LD	MEC	MAIN TRANSFORMER 66kV/6.6kV	TR-100AD1	22.75	223.18	3.00	29.43	15%	256.65	33.84
			TOT LD	147.27	1444.72	35.00	343.35		1627.25	386.17
TP	MEC	waste water tank	T-55001	0.00	0.00	17.60	172.66	12%	0.00	193.37
TP	MEC	ICCP		0.28	2.70	0.00	0.00	12%	3.02	0.00
			TOT TP	0.28	2.70	17.60	172.66		3.02	193.37
				TOT MECD	**6946.5**		734.3		7789.2	

Table 11.5 - Equipment dry and content weights

The above numbers are taken from vendor/suppliers documents and cross-checked with WCR.

Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Mechanical									686,082				
TS-LD	RR-100AD1-NER	Neutral Earthing Resistor		AFC		9,765	7,525	24,300	380	380	12%	426	426
TS-UD	V-25001 A	Hydrogen storage vessel	Datasheet 1723001756-MAC-DA-00004	AFC		19,800	4,000	32,035	58,700	58,900	12%	65,744	65,968
TS-UD	V-25001 B	Hydrogen storage vessel	Datasheet 1723001756-MAC-DA-00004	AFC		19,800	8,000	32,035	58,700	58,900	12%	65,744	65,968
TS-UD	V-25001 C	Hydrogen storage vessel	Datasheet 1723001756-MAC-DA-00004	AFC		19,800	12,000	32,035	58,700	58,900	12%	65,744	65,968
TS-UD	V-25001 D	Hydrogen storage vessel	Datasheet 1723001756-MAC-DA-00004	AFC		19,800	12,000	36,535	58,700	58,900	12%	65,744	65,968
TS-UD	V-25001 E	Hydrogen storage vessel	Datasheet 1723001756-MAC-DA-00004	AFC		19,800	8,000	36,535	58,700	58,900	12%	65,744	65,968
TS-UD	V-25001 F	Hydrogen storage vessel	Datasheet 1723001756-MAC-DA-00004	AFC		19,800	4,000	36,535	58,700	58,900	12%	65,744	65,968
TS-UD	A-80000-C	Fuel cell package (transformer)		AFC		33,819	3,298	31,750	7,138	7,138	12%	7,995	7,995
TS-UD	A-80000-A	Fuel cell pakage (40ft container)		AFC		37,757	11,697	31,930	23,262	23,262	12%	26,053	26,053
TS-UD	A-80000-B	Fuel cell pakage (flatbed)		AFC		33,819	9,894	31,034	10,757	10,757	12%	12,048	12,048
TS-UD	A-20000	Electrolyser		AFC		4,850	7,590	33,700	135,300	146,800	12%	151,536	164,416
TS-UD	A-20000	Transformer on electrolyser package area		AFC		7,925	750	33,700	8,200	8,200	12%	9,184	9,184
TS-LD	A-85000	BESS (PCS Container)		AFC		23,010	9,219	24,400	15,000	15,000	12%	16,800	16,800
TS-LD	A-85001	BESS (Battery Container 1)		AFC		20,000	2,635	24,400	35,000	35,000	12%	39,200	39,200
TS-LD	A-85002	BESS (Battery Container 2)		AFC		20,000	5,073	24,400	35,000	35,000	12%	39,200	39,200
TS-UD	-	EQUIPMENT CONTENT		AFC		21,200	9,000	30,000	0	24,400	12%	0	27,328
TP	T-55001	Waste Water Tank		AFC		23,000	7,797	17,500	4,366	17,600	12%	4,890	19,712
TP		ICCP		AFC		20,000	8,000	17,500	275	275	12%	308	308
TS-LD	A50003	Sea Water Coarse Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	7	20	12%	8	22
TS-LD	H50001	Electric Heater	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	155	180	12%	174	202
TS-LD	S50001	Sea Water Sand Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	250	300	12%	280	336
TS-LD	P50002A	Backwash Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	25	12%	22	28
TS-LD	P50002B	Backwash Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	25	12%	22	28
TS-LD	P50003A	SW Booster Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	25	12%	22	28
TS-LD	P50003B	SW Booster Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	25	12%	22	28
TS-LD	S50002A	SW 1St. Cartridge Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	18	35	12%	20	39
TS-LD	S50002B	SW 1St. Cartridge Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	18	35	12%	20	39
TS-LD	S50003A	SW 2ND. Cartridge Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	18	35	12%	20	39
TS-LD	S50003B	SW 2ND. Cartridge Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	18	35	12%	20	39
TS-LD	P50004A	Hight Pressure Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	50	55	12%	56	62
TS-LD	P50004B	Hight Pressure Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	50	55	12%	56	62
TS-LD	A50007A	Sea Water Reverse Osmosis Unit	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	60	120	12%	67	134
TS-LD	A50007B	Sea Water Reverse Osmosis Unit	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	60	120	12%	67	134
TS-LD	S50004	Softening Filter	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	35	125	12%	39	140
TS-LD	S50010	UV Sterilizer	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	15	50	12%	17	56
TS-LD	T50002	Caustic Soda Dosing Tank	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	80	12%	22	90
TS-LD	P50005A	Caustic Soda Dosing Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50005B	Caustic Soda Dosing Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	T50003	Antiscalant Dosing Tank	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	80	12%	22	90
TS-LD	P50006A	Antiscalant Dosing Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50006B	Antiscalant Dosing Pump	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	T50004	Non-Oxidant Biocide Dosing Tank	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	30	130	12%	34	146
TS-LD	P50007A	Non-Oxidant Biocide Dosing Pump - Container Inlet	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50007B	Non-Oxidant Biocide Dosing Pump - Container Inlet	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50008A	Non-Oxidant Biocide Dosing Pump - B.L. TP005	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50008B	Non-Oxidant Biocide Dosing Pump - B.L. TP005	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50010A	Non-Oxidant Biocide Dosing Pump - B.L. TP006	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	P50010B	Non-Oxidant Biocide Dosing Pump - B.L. TP006	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	2	3	12%	2	3
TS-LD	-	PLC	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	1,800	1,800	12%	2,016	2,016
TS-UD	A-63000	Intrument air package including air receiver	Datasheet 1724000428-MAC-DA-00005	AFC		39,000	5,260	24,310	18,220	18,220	12%	20,406	20,406
TS-UD	H-43002	Hydrogen vent heater		AFC		20,000	500	31,310	1,300	1,300	12%	1,456	1,456
TS-UD	V-43001	Hydrogen vent KO drum	Datasheet 1724000163-MAC-DA-00004	AFC	3,450	20,150	250	32,210	780	1,015	12%	874	1,137
TS-LD	P-50001A	Seawater lift pump A		AFC		15,000	-7,400	22,000	1,620	1,620	12%	1,814	1,814
TS-LD	P-50001B	Seawater lift pump B		AFC		15,000	8,600	22,000	1,620	1,620	12%	1,814	1,814
TS-LD	P50009A	Fresh Water Pump A	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	25	12%	22	28
TS-LD	P50009B	Fresh Water Pump B	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	20	25	12%	22	28
TS-UD	Q-43004	Hydrogen vent	Datasheet 1724000887-MAC-DS-00006	AFC		23,500	1,000	36,000	3,400	3,400	12%	3,808	3,808
TS-LD	T50006	Filtered Water Tank	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	300	3,300	12%	336	3,696
TS-LD	T50008	Fresh Water Tank	GA drawing 1724000448-MAC-DA-00005	AFC		18,450	12,355	24,632	200	2,200	12%	224	2,464
TS-LD	YLB-079001	Life raft		AFC		41,975	2,645	23,310	2,750	2,750	12%	3,080	3,080
TS-LD	YLB-079002	Life raft		AFC		-1,975	16,000	23,310	2,750	2,750	12%	3,080	3,080
TS-LD	A-64000	Nitrogen generation package including N2 receiver	Datasheet 1724000437-MAC-DA-00005	AFC		8,315	1,015	24,410	11,500	12,200	12%	12,880	13,664
TS-UD		Skid compressors + dryers + filters		AFC		14,000	11,500	32,000	5,000	5,000	12%	5,600	5,600
CS		Mechanical equip		AFC		19,000	8,000	10,850	1,000	1,000	12%	1,120	1,120

Table 11.6 - Mechanical & electrical weights from WCR

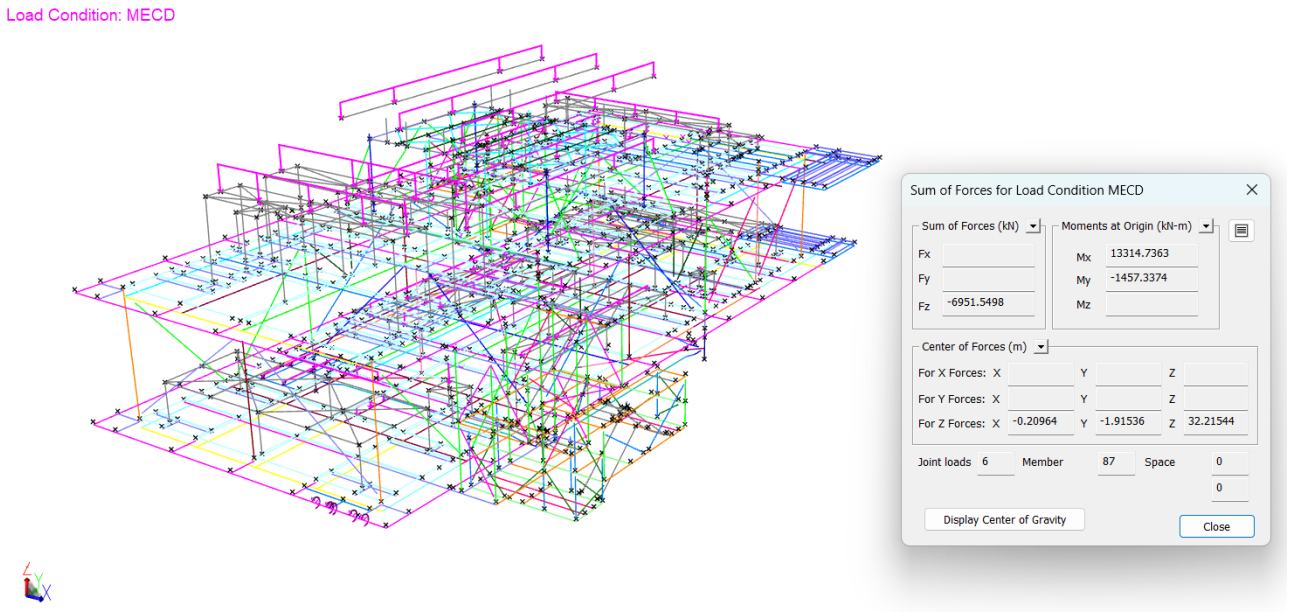


Figure 11.4 – Topside basic load conditions MECD

- Load condition TECH: Technical Rooms Weights

Considers the weights of the four technical rooms, including architectural, structure, safety etc.

TECHNICAL ROOM WEIGHS										
LD	OTHER	B100 HV/MV SWITCHROOM	B-100	48.1	471.9	0.00	0.0	15%	542.6	0.00
LD	OTHER	LV-SWITCHROOM	B-200	41.1	403.2	0.00	0.0	15%	463.7	0.00
LD	OTHER	Electrical Filter Room	B-300	43.1	422.8	0.00	0.0	15%	486.2	0.00
LD	OTHER	I&T EQUIPMENT ROOM	B-400	28.1	275.7	0.00	0.0	15%	317.0	0.00
			TOT	160.4	1573.5		0.0		1809.6	0

Table 11.7 - Load Condition TECH: Technical room weights

B-100

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Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Primary Structure									48,066	48,066		42,145	42,145
TS-LD		HV - MV (B-100) Module Structure		AFC		2,850	8,000	25,300	18,883	18,883	10%	20,771	20,771
Secondary and Tertiary Structure													
TS-LD		HV - MV (B-100) Variuous		AFC		2,850	8,000	25,300	500	500	12%	560	560
Mechanical													
Piping													
Electrical													
TS-LD	HNA6-AFA70	66kV SWITCHGEAR (GIS)	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	2,600	2,600	15%	2,990	2,990
TS-LD	SG-100D1	6.6kV SWITCHGEAR	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	7,400	7,400	15%	8,510	8,510
TS-LD	UP-200F1	DC UPS PANEL	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	500	500	15%	575	575
TS-LD	BA-200F1	DC UPS BATTERY RACK	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	522	522	15%	600	600
TS-LD	CB-200F1	ISOLATOR FOR DC UPS	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	100	100	15%	115	115
TS-LD	CP-100E1	66kV SWITCHGEAR LOCAL CONTROL PANEL	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	2,100	2,100	15%	2,415	2,415
TS-LD	B100-HSB-001	DISTRIBUTION & HVAC PANEL - HV MV ROOM	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	400	400	15%	460	460
TS-LD	-	SERVICE TROLLEY FOR 6.6kV SWITCHGEAR	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	70	70	15%	81	81
TS-LD	-	TOOL BOX	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	20	20	15%	23	23
TS-LD	-	TABLE	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	50	50	15%	58	58
TS-LD	HHU-77001A	AIR HANDLING UNIT A	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	140	140	15%	161	161
TS-LD	HHU-77001B	AIR HANDLING UNIT B	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	140	140	15%	161	161
TS-LD	HSS-77-001	SPACE HEATER 1	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	5	5	15%	6	6
TS-LD	HSS-77-002	SPACE HEATER 2	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	5	5	15%	6	6
TS-LD	HSS-77-003	SPACE HEATER 3	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	5	5	15%	6	6
TS-LD		ELECTRICAL & INSTR BULKS		AFC		20,000	8,000	25,430	5,516	5,516	15%	25,374	25,374
Instrumentation & Telecom													
TS-LD		HV - MV (B-100) Instr. Equipment+cables		AFC		2,850	8,000	25,300	500	500	15%	575	575
Architectural													
TS-LD		HV - MV (B-100) Module Architectural		AFC		2,850	8,000	25,300	6,000	6,000	15%	6,900	6,900
TS-LD		ARCHITECTURAL BULKS		AFC		20,000	8,000	26,500	625	625	15%	2,875	2,875
Safety & Fire Gas													
TS-LD	-	HV - MV (B-100) - Electric Safety Kit	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	20	20	15%	23	23
TS-LD	-	PORTABLE EXTINGUISHER (CO2) 5Kg	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	20	20	15%	23	23
TS-LD	-	PORTABLE EXTINGUISHER (CO2) 5Kg	GA drawing 1724000049-AR-DA-00014 - HV SWITCHROOM 66kV/6.6 kV (B-100)	AFC		2,850	8,000	25,300	20	20	15%	23	23
TS-LD		SAFETY BULKS		AFC		20,000	8,000	25,500	1,925	1,925	15%	8,855	8,855

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Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Primary Structure									41,066	41,066		74,134	74,134
TS-LD		400V LV (B-200) Module Structure		AFC		31,400	6,400	26,300	17,800	17,800	10%	19,580	19,580
Secondary and Tertiary Structure													
TS-LD		400V LV (B-200) Variuous		AFC		31,400	6,400	26,300	985	985	12%	1,103	1,103
Mechanical													
Piping													
Electrical													
TS-LD	SG-200N1	400V SWITCHGEAR	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	4,900	4,900	15%	5,635	5,635
TS-LD	DP-200N1	DISTRIBUTION BOARD FOR LIGHTING AND SMALL POWER	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	600	600	15%	690	690
TS-LD	CH-200N1	CCP PANEL	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	250	250	15%	288	288
TS-LD	SG-200D2	ACB PANEL FOR SOLAR PACKAGE	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	1,000	1,000	15%	1,150	1,150
TS-LD	B200-HSB-001	DISTRIBUTION & HVAC PANEL - LV ROOM	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	400	400	15%	460	460
TS-LD	-	TOOL BOX	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	20	20	15%	23	23
TS-LD	-	TABLE	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	50	50	15%	58	58
TS-LD	HHU-77003	AIR HANDLING UNIT A	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	140	140	15%	161	161
TS-LD	HHU-77004	AIR HANDLING UNIT B	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	140	140	15%	161	161
TS-LD	HSS-77-001	SPACE HEATER 1	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	5	5	15%	6	6
TS-LD	HSS-77-002	SPACE HEATER 2	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	5	5	15%	6	6
TS-LD	HSS-77-003	SPACE HEATER 3	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	5	5	15%	6	6
TS-LD		ELECTRICAL & INSTR BULKS		AFC		20,000	8,000	25,430	5,516	5,516	15%	25,374	25,374
Instrumentation & Telecom													
TS-LD		HV - MV (B-200) Instr. Equipment+cables		AFC		31,400	6,400	26,300	500	500	15%	575	575
Architectural													
TS-LD		400V LV (B-200) Module Architectural		AFC		31,400	6,400	26,300	6,000	6,000	15%	6,900	6,900
TS-LD		ARCHITECTURAL BULKS		AFC		20,000	8,000	26,500	625	625	15%	2,875	2,875
Safety & Fire Gas													
TS-LD		HV - MV (B-200) Safety Equipment		AFC		31,400	6,400	26,300	160	160	15%	184	184
TS-LD		PORTABLE EXTINGUISHER (CO2) 5 kg	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	20	20	15%	23	23
TS-LD		PORTABLE EXTINGUISHER (CO2) 5 kg	GA drawing 1724000049-AR-DA-00015 - LV SWITCHROOM 400V (B-200)	AFC		31,400	6,400	26,300	20	20	15%	23	23
TS-LD		SAFETY BULKS		AFC		20,000	8,000	25,500	1,925	1,925	15%	8,855	8,855

B-300														
Title	WEIGHT CONTROL REPORT													
Rev.	3													
Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Primary Structure									43,066	43,066		76,564	76,564
TS-LD		AC-UPS (B-300) Module Structure		AFC		35,000	7,100	25,300	15,500	15,500	10%	17,050	17,050
Secondary and Tertiary Structure													
TS-LD		AC-UPS (B-300) Variuous		AFC		35,000	7,100	25,300	496	496	12%	556	556
Mechanical													
Piping													
Electrical													
TS-LD	UP-200F3	AC UPS 35 kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	2,258	2,258	15%	2,597	2,597
TS-LD	UP-200F4	AC UPS 15kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	1,530	1,530	15%	1,760	1,760
TS-LD	BA-200F3A	BATTERY RACK GEL VRLA 7y AC UPS 35kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	914	914	15%	1,051	1,051
TS-LD	BA-200F3B	BATTERY RACK GEL VRLA 7y AC UPS 35kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	914	914	15%	1,051	1,051
TS-LD	BA-200F4A	BATTERY RACK GEL VRLA 7y AC UPS 15kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	3,429	3,429	15%	3,943	3,943
TS-LD	BA-200F4B	BATTERY RACK GEL VRLA 7y AC UPS 15kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	3,429	3,429	15%	3,943	3,943
TS-LD	CB-200F3A	ISOLATOR BOX AC UPS 35kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	100	100	15%	115	115
TS-LD	CB-200F3B	ISOLATOR BOX AC UPS 35kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	100	100	15%	115	115
TS-LD	CB-200F4A	ISOLATOR BOX AC UPS 15kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	100	100	15%	115	115
TS-LD	CB-200F4B	ISOLATOR BOX AC UPS 15kVA	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	100	100	15%	115	115
TS-LD	NC-200F2	NAVAID PANEL	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	500	500	15%	575	575
TS-LD	BA-200F2	BATTERY BOX NAVAID	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	325	325	15%	374	374
TS-LD	CB-200F2	ISOLATOR BOX NAVAID	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	70	70	15%	81	81
TS-LD	-	EYE WASH STATION	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	5	5	15%	6	6
TS-LD	BC-200F2	BATTERY CHARGER NAVAID	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	500	500	15%	575	575
TS-LD	HHU-77003A	AIR HANDLING UNIT A	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	140	140	15%	161	161
TS-LD	HHU-77003B	AIR HANDLING UNIT B	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	140	140	15%	161	161
TS-LD	HHS-77003A	SPACE HEATER A	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	5	5	15%	6	6
TS-LD	HHS-77003B	SPACE HEATER B	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	5	5	15%	6	6
TS-LD		ELECTRICAL & INSTR BULKS		AFC		20,000	8,000	25,430	5,516	5,516	15%	25,374	25,374
Instrumentation & Telecom													
TS-LD		AC-UPS (B-300) Instr. Equipment+cables		AFC		35,000	7,100	25,300	300	300	15%	345	345
Architectural													
TS-LD		AC-UPS (B-300) Module Architectural		AFC		35,000	7,100	25,300	4,000	4,000	15%	4,600	4,600
TS-LD		ARCHITECTURAL BULKS		AFC		20,000	8,000	26,500	625	625	15%	2,875	2,875
Safety & Fire Gas													
TS-LD		AC-UPS (B-300) Safety Equipment		AFC		35,000	7,100	25,300	100	100	15%	115	115
TS-LD	-	PORTABLE EXTINGUISHER (CO2) 5 kg	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	20	20	15%	23	23
TS-LD	-	PORTABLE EXTINGUISHER (CO2) 5 kg	GA drawing 1724000049-AR-DA-00016 - AC UPS (B-300)	AFC		35,000	7,100	25,300	20	20	15%	23	23
TS-LD		SAFETY BULKS		AFC		20,000	8,000	25,500	1,925	1,925	15%	8,855	8,855

B-400														
Title	WEIGHT CONTROL REPORT													
Rev.	3													
Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Primary Structure									28,066	28,066		50,469	50,469
TS-LD		AC-UPS ITER (B-400) Module Structure		AFC		38,150	8,000	25,300	12,500	12,500	10%	13,750	13,750
Secondary and Tertiary Structure													
TS-LD		AC-UPS ITER (B-400) Variuous		AFC		38,150	8,000	25,300	335	335	12%	375	375
Mechanical													
Piping													
Electrical													
TS-LD	B400-SRV-001	SERVER CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-NET-001	NETWORK CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-EMCS-001	EMCS SYSTEM CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-PCS-001	PCS SYSTEM CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-PCS-002	PCS MARSHALLING CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-FGS-001	FGS SYSTEM CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-FGS-002	FGS MARSHALLING CABINET 1	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-FGS-003	FGS MARSHALLING CABINET 2	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD	B400-SIS-001	SIS SYSTEM/MARSHALLING CABINET	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	250	250	15%	288	288
TS-LD		TABLE	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	50	50	15%	58	58
TS-LD	HHU-77004A	AIR HANDLING UNIT A	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	140	140	15%	161	161
TS-LD	HHU-77004B	AIR HANDLING UNIT B	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	140	140	15%	161	161
TS-LD	HHS-77004A	SPACE HEATER A	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	5	5	15%	6	6
TS-LD	HHS-77004B	SPACE HEATER B	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	5	5	15%	6	6
TS-LD		ELECTRICAL & INSTR BULKS		AFC		20,000	8,000	25,430	5,516	5,516	15%	25,374	25,374
Instrumentation & Telecom													
TS-LD		AC-UPS ITER (B-400) Instr. Tel. Equipment+cables		AFC		38,150	8,000	25,300	1,500	1,500	15%	1,725	1,725
Architectural													
TS-LD		AC-UPS ITER (B-400) Module Architectural		AFC		38,150	8,000	25,300	3,000	3,000	15%	3,450	3,450
TS-LD		ARCHITECTURAL BULKS		AFC		20,000	8,000	26,500	625	625	15%	2,875	2,875
Safety & Fire Gas													
TS-LD		AC-UPS ITER (B-400) Safety Equipment		AFC		38,150	8,000	25,300	35	35	15%	40	40
TS-LD	-	PORTABLE EXTINGUISHER (CO2) 5 kg	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	20	20	15%	23	23
TS-LD	-	PORTABLE EXTINGUISHER (CO2) 5 kg	GA drawing 1724000049-AR-DA-00017 - I&T EQUIPMENT ROOM (B-400)	AFC		38,150	8,000	25,300	20	20	15%	23	23
TS-LD		SAFETY BULKS		AFC		20,000	8,000	25,500	1,925	1,925	15%	8,855	8,855

Table 11.8 - Technical rooms weights from WCR

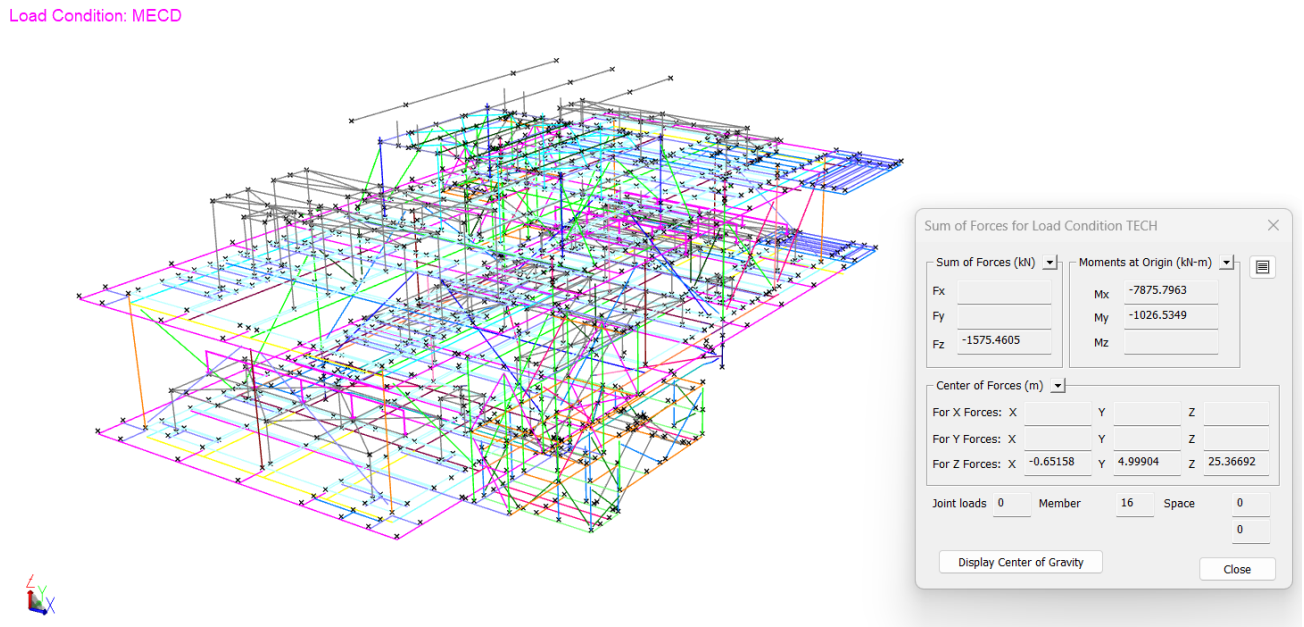


Figure 11.5 – Topside basic load conditions TECH

- <u>Load Condition BULK: AUXILIARY LOAD CONDITION FOR BULK LOADS CONTINGENCY</u>

Load condition BULK includes weights resulting from a uniform distributed load of 1 kN/m2 at BLPH Upper and Lower Deck, excluding external walkways.

This auxiliary load condition has been defined to account for all disciplines' bulk load (structural, architectural, electrical, instrumentation, HVAC, piping, mechanical, fire and safety).

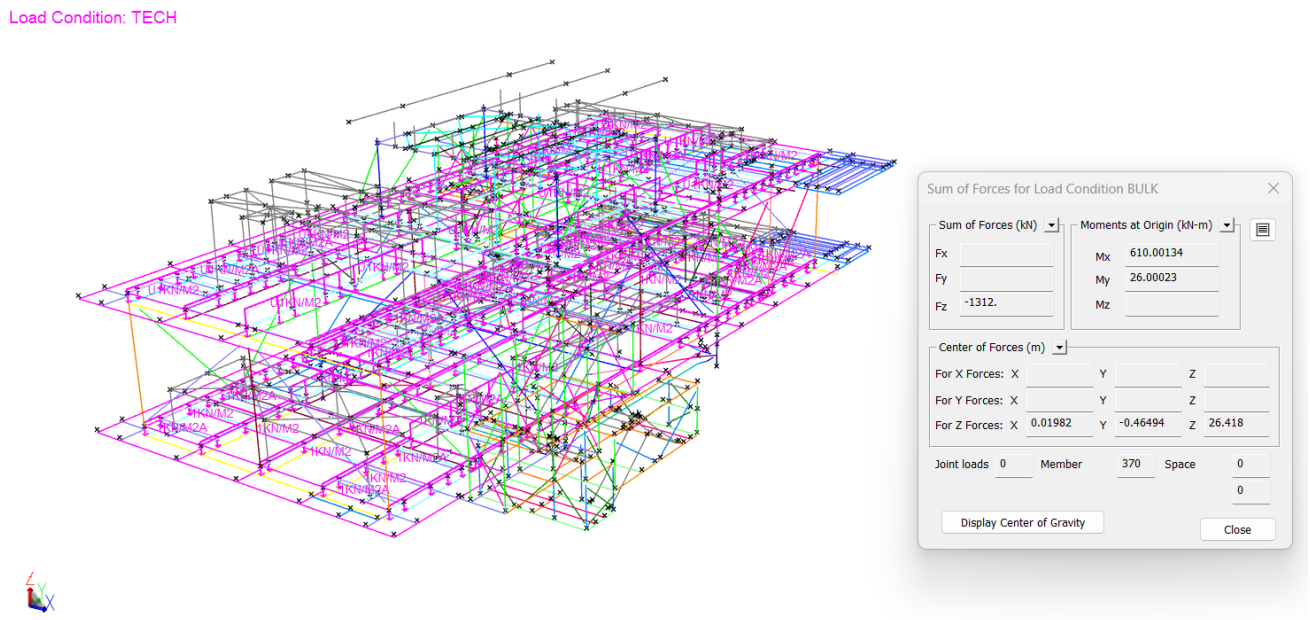


Figure 11.6 – Topside basic load conditions BULK

- <u>Load condition PIPE: Piping Weights</u>

PIPING WEIGHS										
LD	PIP	Distributed LD		1.76	17.3		0.0	12%	19.4	0.00
UD	PIP	Distributed UD		0.35	3.4		0.0	12%	3.8	0.00
LD-UD	PIP	BULK LOAD		17.20	168.7		0.0	12%	189.0	0.00
			TOT	19.31	189.4		0.0		212.2	0

Table 11.9 - Load Condition PIPE: Piping weights

PIPE = 0.145 * BULK = 190 kN

Piping													
Title	WEIGHT CONTROL REPORT												
Rev.	3												
Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity				Base Weight		Weight Contingency [%]	Factored Weight	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Piping									19,311	19,311		21,628	21,628
TS-UD	25-BDV-022	Split Body Floating Ball Valve	Datasheet D240062-01	AFC		30,000	4,055	34,574	41	41	12%	46	46
TS-UD	25-BDV-005	Split Body Floating Ball Valve	Datasheet D240062-02	AFC		27,500	2,425	39,500	169	169	12%	189	189
TS-UD	25-BDV-007	Split Body Floating Ball Valve	Datasheet D240062-03	AFC		27,500	6,595	39,500	169	169	12%	189	189
TS-UD	25-BDV-010	Split Body Floating Ball Valve	Datasheet D240062-04	AFC		27,500	10,600	39,500	169	169	12%	189	189
TS-UD	25-BDV-013	Split Body Floating Ball Valve	Datasheet D240062-05	AFC		27,500	10,620	34,500	169	169	12%	189	189
TS-UD	25-BDV-016	Split Body Floating Ball Valve	Datasheet D240062-06	AFC		27,500	6,670	35,100	169	169	12%	189	189
TS-UD	25-BDV-019	Split Body Floating Ball Valve	Datasheet D240062-07	AFC		27,500	2,700	34,910	169	169	12%	189	189
TS-UD	25-SDV-001	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		13,700	2,655	35,300	41	41	12%	46	46
TS-UD	64-SDV-001	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		13,700	2,655	35,300	41	41	12%	46	46
TS-UD	25-XV-004	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		14,500	5,210	35,250	41	41	12%	46	46
TS-UD	25-XV-006	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		28,000	3,970	39,000	41	41	12%	46	46
TS-UD	25-XV-008	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		14,500	9,200	35,250	41	41	12%	46	46
TS-UD	25-XV-009	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		28,000	7,900	39,000	41	41	12%	46	46
TS-UD	25-XV-011	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		14,500	13,200	35,250	41	41	12%	46	46
TS-UD	25-XV-012	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		28,000	11,955	39,150	40	40	12%	45	45
TS-UD	25-XV-014	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		14,500	13,300	30,700	41	41	12%	46	46
TS-UD	25-XV-015	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		28,000	11,900	34,500	41	41	12%	46	46
TS-UD	25-XV-017	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		14,500	9,200	30,810	41	41	12%	46	46
TS-UD	25-XV-018	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		28,000	7,900	34,500	41	41	12%	46	46
TS-UD	25-XV-020	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		14,500	5,300	30,810	41	41	12%	46	46
TS-UD	25-XV-021	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		28,000	3,900	34,500	41	41	12%	46	46
TS-UD	25-XV-024	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		13,800	2,400	35,210	41	41	12%	46	46
TS-UD	80-XV-001	Split Body Floating Ball Valve	Datasheet D240062-08	AFC		26,000	5,360	34,480	40	40	12%	45	45
TS-UD	25-SDV-023	Split Body Floating Ball Valve	Datasheet D240062-09	AFC		29,300	1,800	30,970	54	54	12%	60	60
TS-LD	50-XV-001	Split Body Floating Ball Valve	Datasheet D240062-24	AFC		14,625	7,900	24,190	134	134	12%	150	150
TS-LD	50-XV-003	Split Body Floating Ball Valve	Datasheet D240062-26	AFC		14,625	9,000	24,190	134	134	12%	150	150
TS-LD	50-XV-002	Split Body Floating Ball Valve	Datasheet D240062-25	AFC		14,000	7,700	24,175	40	40	12%	45	45
TS-LD	50-XV-004	Split Body Floating Ball Valve	Datasheet D240062-27	AFC		14,000	8,900	24,180	40	40	12%	45	45
TS-LD		PIPING BULKS		AFC		20,000	8,000	25,500	17,200	17,200	12%	19,264	19,264

Table 11.10 - Piping weights from WCR

- Load condition EQSP: EQUIPMENT SUPPORTS WEIGHT

Equipment supports weights have been included in load condition EQSP. Equipment's support weights are considered the base plates and stiffeners, including bolts or twist-lock mechanism and the tertiary not modelled beams not part of Vendor's supply. The modelled weight of those items Is equal to 10 t, additional 15 ton is the weight of twist locks and bolts. On the safe side, this number has been assumed more than double in calculation and equal to the 5% of equipment weight (= about 50t, including dry and content weights and neglecting waste water tank content).

EQSP = [(MECD*1.00 + TECH*1.00 + PIPE*1.00)+MECC*1.00 – WWTcontent *1.00] * 5%

Equipment Weights Description	SACS			
	LOADCN	Fz [kN]	cont	Fz_gross [kN]
Mechanical Equipment Dry Weight (MECH+ELE)	MECD	6951.6	12%	7785.7
Other Disciplines' Equipment Dry Weights	TECH+PIP	1765.5	15%	2030.3
Total Equipments Dry Weights		8717.1		9816.1
Total Equipment Content Weights	MECC	553.8	12%	620.3

Equipment support Load Condition		LOADCN	Fz [kN]	cont	Fz_gross [kN]
Equipment Support	5%	EQSP	454.91	5%	477.66

Table 11.11 – EQSP weights

11.1.4 Permanent Actions Basic Load Combination

- Load combination DEAC: DEAD WEIGHTS CONTINGENCIES

Auxiliary load combination DEAC has been defined to account for different contingencies of modelled structural elements for Topside, Transition Piece and PAU structures to match the WCR. In particular, loads contingencies equal to 14.5%, 25% and 3% have been assumed for Topside, Transition Piece and PAU modelled structures respectively. These contingency account for cross check with WCR.

Area Code	Tag No.	Item Description	Note	Project Status	Center of Gravity (Local System of Reference) [mm]				Base Weight [kg]		Weight Contingency [%]	Factored Weight [kg]	
					Item's height	x	y	z	Dry	Operating Condition		Dry	Operating Condition
Primary Structure									638,485			705,416	
TP		Transition Piece primary beams		AFC		19,681	8,582	20,320	198,864	198,864	10%	218,750	218,750
TS-LD		Lower Deck - primary beams +		AFC		20,936	8,381	22,810	86,949	86,949	10%	95,643	95,643
TS-UD		Upper Deck - primary beams +		AFC		20,936	8,381	29,810	107,285	107,285	10%	118,014	118,014
TS-LD		Structure elevations		AFC		20,936	8,381	26,810	58,180	58,180	10%	63,998	63,998
TS-UD		Lifting Trunnions		AFC		20,936	8,381	31,210	7,547	7,547	10%	8,302	8,302
TS-UD		PAU (H2 storage vessel structure)		AFC		20,000	8,000	34,150	25,567	25,567	10%	28,123	28,123
Secondary and Tertiary Structure													
TP		TP stair (without grating)		AFC		19,681	8,582	20,320	15,952	15,952	12%	17,866	17,866
TS-LD		Lower Deck - Secondary beams +		AFC		20,936	8,381	22,810	52,010	52,010	12%	58,251	58,251
TS-UD		Upper Deck - Secondary beams +		AFC		20,936	8,381	29,810	57,784	57,784	12%	64,718	64,718
TS-LD		Topside access stairs (n.2)		AFC		20,000	8,000	26,741	28,349	28,349	12%	31,750	31,750

Table 11.12 - Permanent Actions – excerpt from WCR

With ref to section 11.1.1:

```
                                  ************* SEASTATE LOAD CASE CENTER REPORT *************
                                                  RELATIVE TO STRUCTURAL ORIGIN
LOAD          ********* X - DIRECTION *********      ********* Y - DIRECTION *********      ********* Z - DIRECTION *********
LABEL         FORCE       X         Y         Z      FORCE       X         Y         Z      FORCE       X         Y         Z
                (KN)      (M)       (M)       (M)      (KN)      (M)       (M)       (M)      (KN)      (M)       (M)       (M)

DZPU            0.00                                   0.00                                 -244.10     -0.00     -0.00     33.74
DZTO            0.00                                   0.00                                -3415.42      0.50      1.13     26.75
DZTP            0.00                                   0.00                                -1679.95      0.60     -0.36     20.37
```

DZTO = 3415.42 kN WCR = 3905.40 kN ratio = +1.145
DZTP = 1679.95 kN WCR = 2107.34 kN ratio = +1.250
DZPU = 244.12 kN WCR = 250.81 kN ratio = +1.027

Auxiliary Basic Load Combination DEAC		
Basic Load case	Description	Load Factor
DZTO	topside modelled weight	0.145
DZTP	Transition piece modelled weight	0.25
DZPU	PAU modelled weight	0.03

Table 11.13 – Load Combination DEAC

- Load combination G001: PERMANENT BASIC LOAD COMBINATIONS

Permanent actions basic load cases have been combined in load combination G001 accounting for different weight contingencies (based on WCR) of basic load conditions.

Permanent Basic Load combination G001		
Basic Load case	Description	Load Factor
DEAZ	Modelled structural Element weight	1.10
DEAC	Modelled structural Element CONTINGENCY weight	1.00
WFLO	Flooring & grating permanent loads	1.12
WPER	Permanent not modelled loads	1.12
MECD	Equipment dry weight (+ contingency)	1.12
TECH	Technical rooms dry weight (incl. safety/ele and + contingency)	1.15
EQSP	Equipment support weight	1.00
PIPE	Piping Loads	1.12
BULK	Bulk loads contingency (1 kN/m2 no ext walkways)	1.00

Table 11.14 - Permanent Actions - Basic Load Combination G001

Following SACS excerpt details the basic load conditions and load combination G001 resultant, accounting for gross permanent weights.

```
                                    ************* SEASTATE LOAD CASE CENTER REPORT *************
                                                    RELATIVE TO STRUCTURAL ORIGIN
LOAD          ********* X - DIRECTION *********      ********* Y - DIRECTION *********      ********* Z - DIRECTION *********
LABEL         FORCE       X         Y         Z       FORCE       X         Y         Z       FORCE       X         Y         Z
                (KN)      (M)       (M)       (M)       (KN)      (M)       (M)       (M)       (KN)      (M)       (M)       (M)

DEAZ          -0.00     30.11     33.27     22.98       0.00      8.83    -71.87     12.05    -5339.23     0.50      0.62     25.06
DEAC           0.00                                     0.00                                   -922.55     0.54      0.44     23.91

WFLO           0.00                                     0.00                                  -1115.13     0.46      0.39     26.38
WPER           0.00                                     0.00                                  -1178.45     0.82      1.07     24.92

MECD           0.00                                     0.00                                  -6951.55    -0.21     -1.92     32.22
TECH           0.00                                     0.00                                  -1575.46    -0.65      5.00     25.37
BULK           0.00                                     0.00                                  -1304.00     0.02     -0.39     26.40
PIPE           0.00                                     0.00                                   -189.08     0.02     -0.39     26.40
EQSP           0.00                                     0.00                                   -484.10    -0.37      0.03     29.26

G001          -0.00     30.11     33.27     22.98       0.00      8.83    -71.87     12.05   -20961.89     0.10     -0.02     27.96
```

11.2 VARIABLE ACTIONS

11.2.1 Equipment content weights

Equipment mechanical content weights at Upper and Lower Deck, not including 12% contingency foreseen by WCR.

- Load condition MECC: EQUIPMENT CONTENT WEIGHTS (contingency not included)

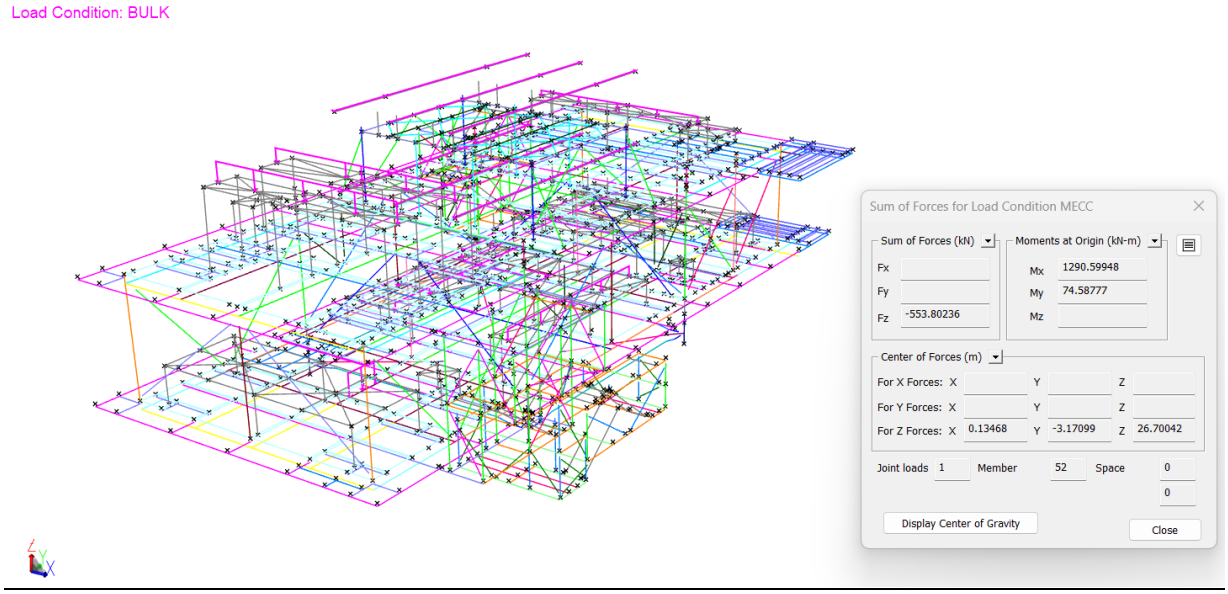


Figure 11.7 – Topside basic load conditions MECC

11.2.2 Live loads

For global design analyses only superimposed area loads on laydown platforms are to be considered in load combinations. Area loads for local design are indicated in section 9.2.2 of Design Basis ref./23/, and checks presented in section 13.3.4 here after.

- Load condition LILD: LIVE LOADS LAY-DOWN AREAS (15KN/M2)

  According to ref./23/, for global design analyses (e.g. In-Service) only superimposed area loads on laydown platforms (q=15 kN/m^2) have been considered and applied in load condition LILD:

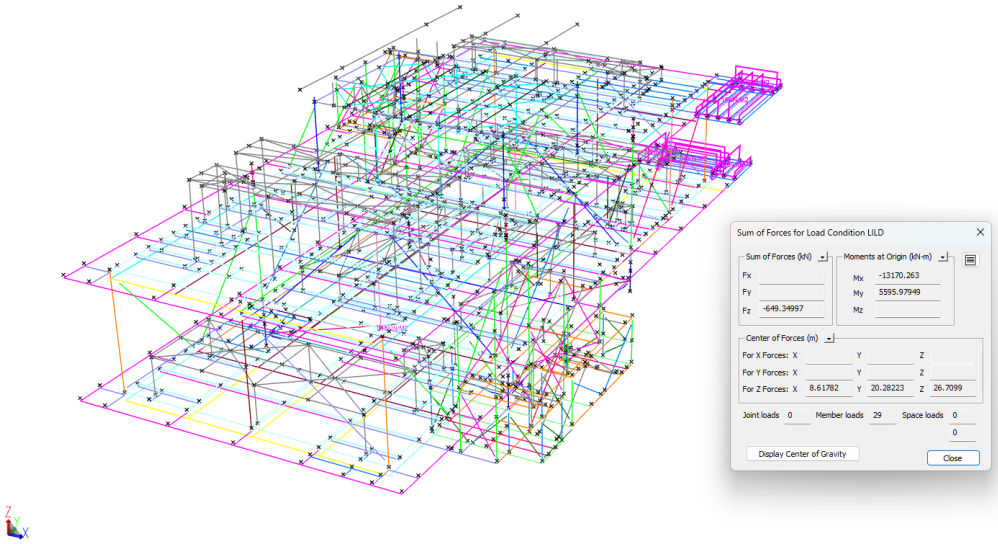


Figure 11.8 – Topside basic load conditions LILD

11.2.3 Ice and snow loads

Snow and ice build-up data on the platform are presented in Sec.7.7 and 7.8

Three cases are to be considered:

1) Snow load build-up on horizontal surfaces (0.7 kN/m2 as per sec. 7.7).
2) Ice build-up on horizontal surfaces due to sea-spray (850 kg/m3 as per sec. 7.8). Build up is only considered on the windward side of the platform.
3) Atmospheric build-up ice (30 mm thickness as per sec. 7.8) , on horizontal and vertical surfaces, due to snow and rain at 700 kg/m3 .

According to FEED, Ref. /38/, snow loads build-up on horizontal surfaces (case 1) and atmospheric build-up of 30 mm thick ice, on horizontal and vertical surfaces, due to snow and rain (case 3) are considered concurrent, though not accumulative on horizontal surfaces. Ice build-up on horizontal surfaces due to sea-spray (case 2) is only considered on the windward side of the platform and as a separate load case, not concurrent with Snow load (case1) and atmospheric build-up (case3).

- <u>Load condition QSIL: SNOW AND ICE VARIABLE LOADS</u>

Snow and Ice loads have been applied in load condition QSIL as uniformly distributed loads at upper deck (849kN – 62% of total load), lower deck (357 kN – 27% of total load), PAU structure (90 kN – 7% of total load) and tower stairs (52 kN – 4% of total load).

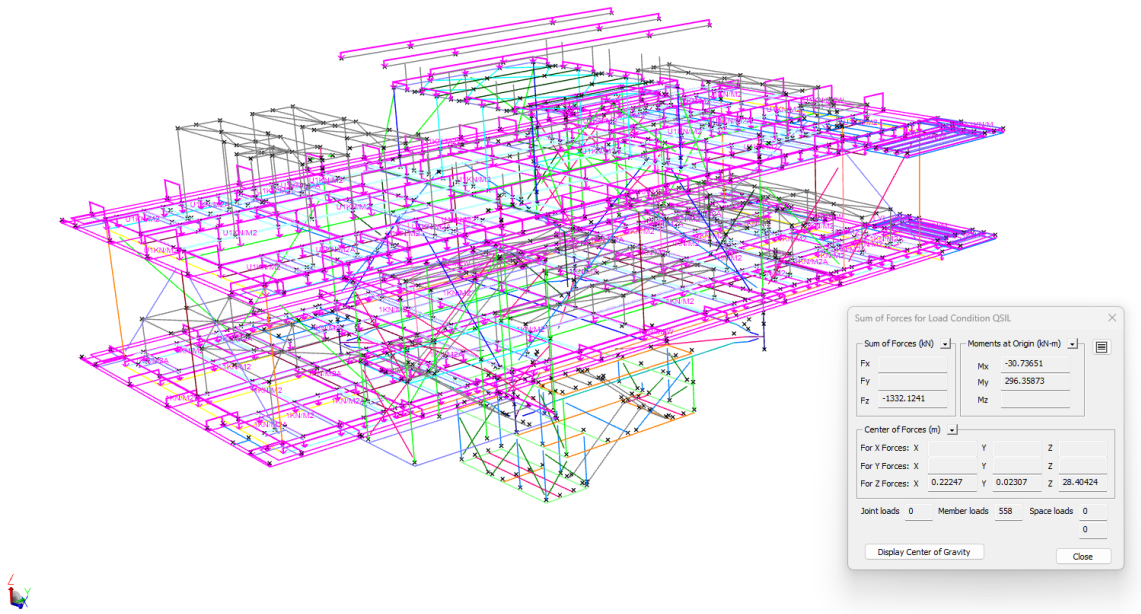


Figure 11.9 – Topside basic load conditions QSIL

11.2.4 Variable Actions Basic Load Combinations

Variable actions basic load cases have been combined in load combinations Q001 and Q002 accounting for different variable loads scenarios of BLPH Platform.

Variable Loads Basic Load Combination Q001		
Basic Load cases	Description	Load Factors
MECC	EQUIPMENT CONTENT LOADS (CONT EXCL)	1.120
LILD	LIVE LOADS LAY-DOWN AREAS (15KN/M2)	1.000
QSIL	SNOW AND ICE VARIABLE LOADS	1.000

Variable Loads Basic Load Combination Q002		
Basic Load cases	Description	Load Factors
MECC	EQUIPMENT CONTENT LOADS (CONT EXCL)	1.120

Table 11.15 – Variable Actions - Basic Load Combinations

Following excerpt of SACS output details the basic load cases and combinations accounting for variable loads.

```
                                  ************* SEASTATE LOAD CASE CENTER REPORT *************
                                                  RELATIVE TO STRUCTURAL ORIGIN
LOAD          ********* X - DIRECTION *********      ********* Y - DIRECTION *********      ********* Z - DIRECTION *********
LABEL         FORCE       X         Y         Z       FORCE       X         Y         Z       FORCE       X         Y         Z
                (KN)      (M)       (M)       (M)       (KN)      (M)       (M)       (M)       (KN)      (M)       (M)       (M)

LILD           0.00                                     0.00                                  -649.35     8.62     20.28     26.71
```

```
MECC        0.00                0.00                -553.80     0.13    -3.17    26.70
QSIL        0.00                0.00               -1324.51     0.22     0.07    28.40

Q001        0.00                0.00               -2594.11     2.30     4.36    27.57
Q002        0.00                0.00                -620.26     0.13    -3.17    26.70
```

11.2.5 Davit Crane variable loads

According to Design Basis report, Davit crane capacity is 1 ton at 10m radius and 3.5 tons at 5m, fully revolving and suitable for offboard lift. The structural checks is carried out according to DNV-ST-0378, Ref./19/.

Crane self weight = 6 ton is already included in WPER combination, and treated as permanent load.

Actions are given at deck interface (+300mm from UD) factored with DAF = 1.7.

Moments and forces according to DNV ST-0378:

- Chapter 4.2.2 - Case I (Crane working without wind)
- Dyn. factor (Mode 2): 1.7 (offshore lift, lifting from CTV)
- SF = 1.0 no operator on board – section 8.2.2.4. according to ISO, CF = 1.3 assumed in combinations

Load at deck interface

MAX FORCE ON DECK	
F_{Vmax}	−120[kN]
F_{Rmax}	15[kN]
M_{Zmax}	±45[kNm]
M_{Rmax}	520[kNm]

Forces on the table are calculated with 3.5[t]x5[m] outreach.
Forces to be applied at deck level in center of adapter.
DAF= 1.7 (Outboard Lift in Offshore)
Contingency Factor=1.05 (included)
F_{Vmax}: vertical load on deck.
F_{Rmax}: max radial load on deck in any direction (plane x-y)
M_{Zmax}: max Torsion moment in z direction.
M_{Rmax}: max tilting moment (perp. to the boom line)

ACTIONS & COEFF FROM REMAZEL								
	Moments and forces acc. DNV ST-0378, Chapter 4.2.2: **Case I** (Crane working without wind):							
	Mb	(dyn):	520	kNm				
	Mt	(dyn):	45	kNm				
	Fv	(dyn):	120	kN				
	SF1 = 1.0		No operator on crane	(sect. 8.2.2.4)	According to ISO, SF = 1.3 assumed in calculation			
	Dyn. factor (Mode 2): **1.7**			(from CTV)	already included in the above values			
	Crane in resting condition (summed up to extreme comb with factor 1.0 * 1.3)							
	WPER	Fz =	**-60**	kN	Crane Weight at crane pedestal			
	CRAR	Mx =	**-120.0**	kNm	Bending Moment at crane pedestal in resting condition			
3.5t@5m mode 2	Additional Lifting loads (summed up to in-service comb with factor 1.5*1.3)					DAF	1.7	incl.
	CRAZ	Fz=	**-120.00**	kN	axial force at crane pedestal DYN calculated			
	CRAX	My=	**520.00**	kNm	Bending Moment at crane pedestal DYN calculated			
	CRAY	Mx=	**520.00**	kNm	Bending Moment at crane pedestal DYN calculated			
	TORS	Mz=	**45.00**	kNm				
1t@10m mode 2	Additional Lifting loads (summed up to in-service comb with factor 1.5*1.3)					DAF	1.7	incl.
	CRAZ	Fz=	**-80.00**	kN	axial force at crane pedestal DYN calculated			
	CRAX	My=	**380.00**	kNm	Bending Moment at crane pedestal DYN calculated			
	CRAY	Mx=	**380.00**	kNm	Bending Moment at crane pedestal DYN calculated			
	TORS	Mz=	**45.00**	kNm				
	worst condition = 3.5t @ 5m offshore							

Table 11.16 – Variable Actions – Davit Crane

Crane loads will be applied in 8 directions (see Figure 11.10) with combination factor = 1.5*1.3 for in service combinations (operative) and 1.0*1.3 for extreme combinations (resting) summed up to permanent, live and environmental actions. Ref to section 12 and APPENDIX E for details.

11.3 WCR – STRUCTURAL MODEL COMPARISON

Load combination STAT considers all the permanent factored loads and maximum variable loads and is defined as per following table.

WCR Comparison - Load Combination STAT		
Basic Load cases	Description	Load Factors
G001	BLPH TOPSIDES PERMANENT LOADS	1.000
Q001	BLPH TOPSIDES VARIABLE LOADS	1.000

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********				********* Y - DIRECTION *********				********* Z - DIRECTION ********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
STAT	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92

COG location comparison between current structural model for In-Service Analysis and WCR is reported in following tables.

SACS-WCR - Permanent & Variable Loads Comparison		
Load Comb.	**Fz [kN]**	**Fz [t]**
SACS (lcomb STAT)	-23171.2	-2362
WCR		-2361

COG NOMINAL POSITION			
CASE	x [m]	y [m]	z [m]
COG_SACS (lcomb STAT)	0.34	0.45	27.92
COG_WCR	0.20	0.30	27.80
D	0.14	0.15	0.12
Topside Main Dimension	16.00	40.00	17.66
D (%)	0.9%	0.4%	0.6%

Table 11.17 – SACS-WCR CoG comparison – SACS ref. system, see 10.2.2

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11.4 ENVIRONMENTAL LOADS

The following environmental loads have been considered:

- Wind static equivalent loads;
- Wave and current inertial loads.

11.4.1 Wind loads

In-Service wind loads have been computed considering 1-year return period for Operating conditions and 100-years return period for Extreme environmental conditions.

The equivalent static wind force, F_{wind}, acting on the structures has been calculated according to Refs. /2/and /7/:

$$F_{wind} = \frac{1}{2}\ \rho_a\ U_w\ C_S\ A_r$$

Where:

ρ = air density (1.225kg/m^3)
A = area of the object (m^2)
U = wind speed (m/s)
Cs = shape coefficient

The 3 s gust wind speed has been conservatively considered for maximum quasi-static global actions on structures. A shape coefficient Cs=1 has been considered for overall projected area of structures in global In-service analyses. Wind loads are assumed concurrent with wave and current inertial loads.

Operating and Extreme wind speed and pressure at different structure elevation have been calculated from wind data reported in section 7.5 and reported in following tables.

OPERATING WIND							
U_{w0} [m/sec]	z [m]	C	$U_{w,1h}$ (z) [m/sec]	t [sec]	I_u (z)	$U_{w,T}$ (z) [m/sec]	wind pressure p [kN/m^2]
24.83	10.000	0.125	24.83	3600	0.124	24.83	0.38
24.83	10.000	0.125	24.83	600	0.124	27.10	0.45
24.83	10.000	0.125	24.83	5	0.124	33.14	0.67
24.83	10.000	0.125	24.83	3	0.124	33.79	0.70
24.83	125.000	0.125	32.65	3	0.071	39.40	0.95
24.83	10.000	0.125	24.83	3	0.124	33.79	0.70
24.83	23.310	0.125	27.45	3	0.103	35.67	0.78
24.83	26.810	0.125	27.88	3	0.100	35.98	0.79
24.83	30.310	0.125	28.26	3	0.097	36.25	0.80
24.83	31.810	0.125	28.41	3	0.096	36.36	0.81
24.83	36.210	0.125	28.81	3	0.093	36.64	0.82
24.83	38.310	0.125	28.99	3	0.092	36.77	0.83
24.83	40.910	0.125	29.19	3	0.091	36.91	0.83
24.83	21.500	0.125	27.20	3	0.105	35.49	0.77

Figure 11.11 - Wind Operating velocity and pressure at different BLPH elevations

EXTREME WIND							
U_{w0} [m/sec]	z [m]	C	$U_{w,1h}$ (z) [m/sec]	t [sec]	I_u (z)	$U_{w,T}$ (z) [m/sec]	wind pressure p [kN/m^2]
30.86	10.000	0.136	30.86	3600	0.140	30.86	0.58
30.86	10.000	0.136	30.86	600	0.140	34.02	0.71
30.86	10.000	0.136	30.86	5	0.140	42.48	1.11
30.86	10.000	0.136	30.86	3	0.140	43.38	1.15
30.86	125.000	0.136	41.45	3	0.080	51.10	1.60
30.86	10.000	0.136	30.86	3	0.140	43.38	1.15
30.86	23.310	0.136	34.41	3	0.116	46.00	1.30
30.86	26.810	0.136	34.99	3	0.112	46.42	1.32
30.86	30.310	0.136	35.51	3	0.109	46.80	1.34
30.86	31.810	0.136	35.71	3	0.108	46.94	1.35
30.86	36.210	0.136	36.25	3	0.105	47.34	1.37
30.86	38.310	0.136	36.49	3	0.104	47.51	1.38
30.86	40.910	0.136	36.76	3	0.102	47.71	1.39
30.86	21.500	0.136	34.07	3	0.118	45.75	1.28

Figure 11.12 - Wind Extreme velocity and pressure at different BLPH elevations

The ratio between the operative and wextreme wind force is $51.5^2/39.4^2 = 1.682$

Operating wind forces and respective resultants along global X and Y directions have been calculated as per following tables.

Operating Wind Global forces X direction (Positive / Negative)									
Load Condition	**Location**	**Descr.**	**L [m]**	**H [m]**	**N**	**A [m2]**	**max el.**	**p [kN/m2]**	**F [kN]**
WOPX / WONX	BELOW LOWER DECK	walkways N	1.5	1	1	1.5	23.31	0.78	1.2
		center	40	1	1	40	23.31	0.78	31.2
		laydown	4.5	1	1	5	23.31	0.78	3.5
	BETWEEN DECKS	walkways N	1.5	1.5	1	2.25	26.81	0.79	1.8
		center	32.8	7	1	229.6	26.81	0.79	182.0
		laydown	4.5	1.5	1	6.75	26.81	0.79	5.4
	ABOVE UPPER DECK	walkways	1.5	1.5	2	4.5	31.81	0.81	3.6
		center	14	1.5	1	21	31.81	0.81	17.0
		fuel cell	3	6.4	1	19.2	36.71	0.82	15.8
		Pau	16	8	1	128	38.31	0.83	106.0
		Elogen	7	9	1	63	39.31	0.83	52.2
	STAIRS	stairs	7.2	3.5	1	25.2	25.06	0.78	19.6
			7.2	3.5	1	25.2	28.56	0.79	20.0
	PAU	(from AUTOCAD propmass area)				102.06758	21.5	0.77	78.6
							TOT		**537.8**
							LCOMB WOPA/ WOPE		**538.5**

Operating Wind Global Forces Y direction (Positive / Negative)									
Load Condition	**Location**	**Descr.**	**L [m]**	**H [m]**	**N**	**A [m2]**	**max el.**	**p [kN/m2]**	**F [kN]**
WOPY / WONY	BELOW LOWER DECK	walkways	1.64	1	2	3.28	23.31	0.78	2.56
		center	16	1	1	16	23.31	0.78	12.47
	BETWEEN DECKS	walkways	1.64	1.5	2	4.92	26.81	0.79	3.90
		center	16	7	1	112	26.81	0.79	88.80
	ABOVE UPPER DECK	walkways	1.64	1.5	2	4.92	31.81	0.81	3.98
		center	16	6.4	1	102.4	36.71	0.82	84.21
		laydown	2.86	1.5	1	4.29	31.81	0.81	3.47
	STAIRS	stairs	3.6	3.5	2	25.2	25.06	0.78	19.64
		stairs	3.6	3.5	2	25.2	28.56	0.79	19.98
		stairs	3.6	1.5	2	10.8	31.81	0.81	8.74
	PAU	(from AUTOCAD propmass area)				102.06758	21.5	0.77	78.59
						TOT			**326.35**
						LCOMB WOPC / WOPG			**327.35**

Table 11.18 - Operating Wind Forces along X and Y direction

Extreme wind forces and respective resultants along global X and Y directions have been calculated as per following tables.

Operating Wind Global forces X direction (Positive / Negative)									
Load Condition	**Location**	**Descr.**	**L [m]**	**H [m]**	**N**	**A [m2]**	**max el.**	**p [kN/m2]**	**F [kN]**
WOPX / WONX	BELOW LOWER DECK	walkways N	1.5	1	1	1.5	23.31	0.78	1.2
		center	40	1	1	40	23.31	0.78	31.2
		laydown	4.5	1	1	5	23.31	0.78	3.5
	BETWEEN DECKS	walkways N	1.5	1.5	1	2.25	26.81	0.79	1.8
		center	32.8	7	1	229.6	26.81	0.79	182.0
		laydown	4.5	1.5	1	6.75	26.81	0.79	5.4
	ABOVE UPPER DECK	walkways	1.5	1.5	2	4.5	31.81	0.81	3.6
		center	14	1.5	1	21	31.81	0.81	17.0
		fuel cell	3	6.4	1	19.2	36.71	0.82	15.8
		Pau	16	8	1	128	38.31	0.83	106.0
		Elogen	7	9	1	63	39.31	0.83	52.2
		Crane	10	7	1	70	37.31	0.82	57.6
	STAIRS	stairs	7.2	3.5	1	25.2	25.06	0.78	19.6
			7.2	3.5	1	25.2	28.56	0.79	20.0
	PAU	(from AUTOCAD propmass area)				102.06758	21.5	0.77	78.6

TOT	**595.4**
LCOMB WOPX	**596.7**

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Operating Wind Global Forces Y direction (Positive / Negative)									
Load Condition	**Location**	**Descr.**	**L [m]**	**H [m]**	**N**	**A [m2]**	**max el.**	**p [kN/m2]**	**F [kN]**
WOPY / WONY	BELOW LOWER DECK	walkways	1.64	1.5	2	4.92	23.31	0.78	3.83
		center	16	1.2	1	19	23.31	0.78	14.96
	BETWEEN DECKS	walkways	1.64	1.5	2	4.92	26.81	0.79	3.90
		center	16	7	1	112	26.81	0.79	88.80
	ABOVE UPPER DECK	walkways	1.64	1.5	2	4.92	31.81	0.81	3.98
		center	16	6.4	1	102.4	36.71	0.82	84.21
		laydown	3	1.5	1	4.5	31.81	0.81	3.64
		Crane	3	7	1	21	37.31	0.82	17.3
	STAIRS	stairs	3.6	3.5	2	25.2	25.06	0.78	19.64
		stairs	3.6	3.5	2	25.2	28.56	0.79	19.98
		stairs	3.6	1.5	2	10.8	31.81	0.81	8.74
	PAU	(from AUTOCAD propmass area)				144	21.5	0.77	110.88

TOT	**379.9**
LCOMB WOPY	**382.4**

Table 11.19 - Extreme Wind Forces along X and Y direction

Wind forces have been applied at main structural joints at upper and lower deck and in correspondence of dummy elements simulating main equipment above upper deck, if subjected to wind loads.

Wind forces have been split 50% for upwind and 50% for downwind areas.

Sixteen load conditions have been defined for wind loads, considering 8 wind directions 45° spaced, both for Operating (load cases WOPA-H) and Extreme conditions (load cases WEXA-H), in accordance with the requirements of ISO 19902, Ref. /7/ and Structural Design Premises, Ref./23/.

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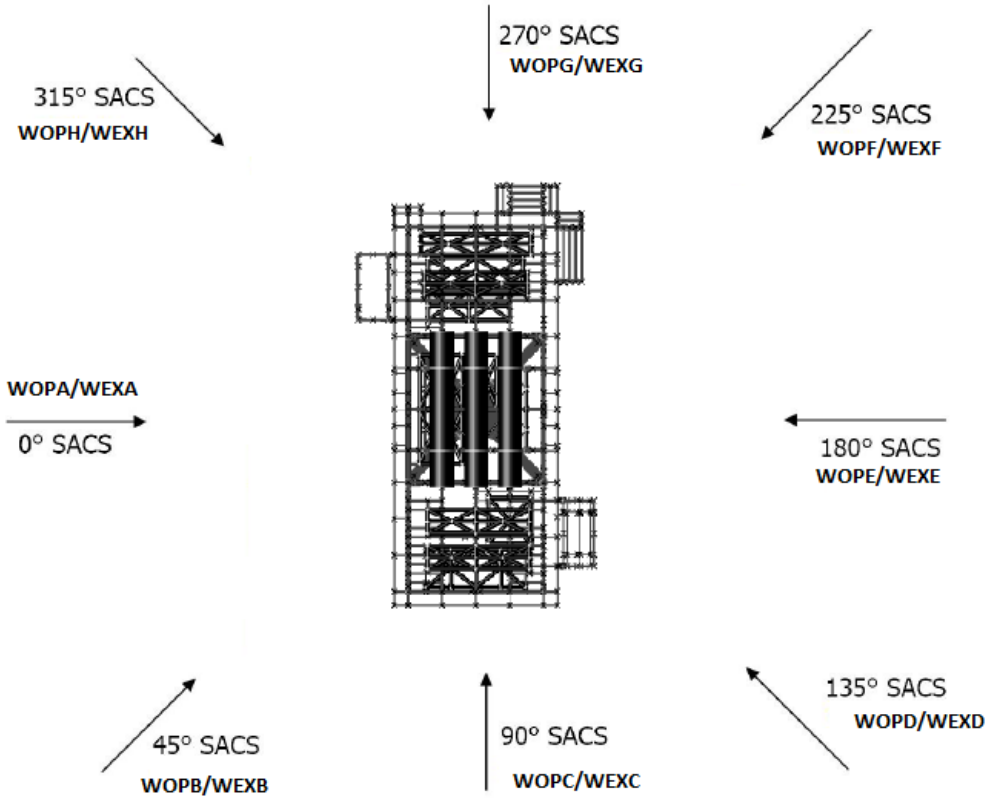
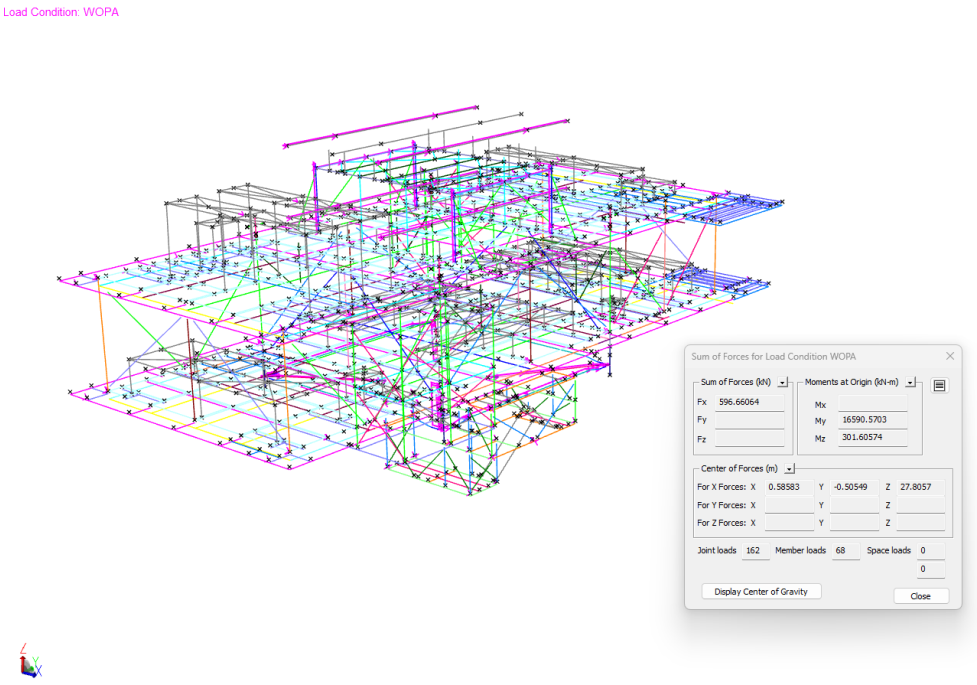


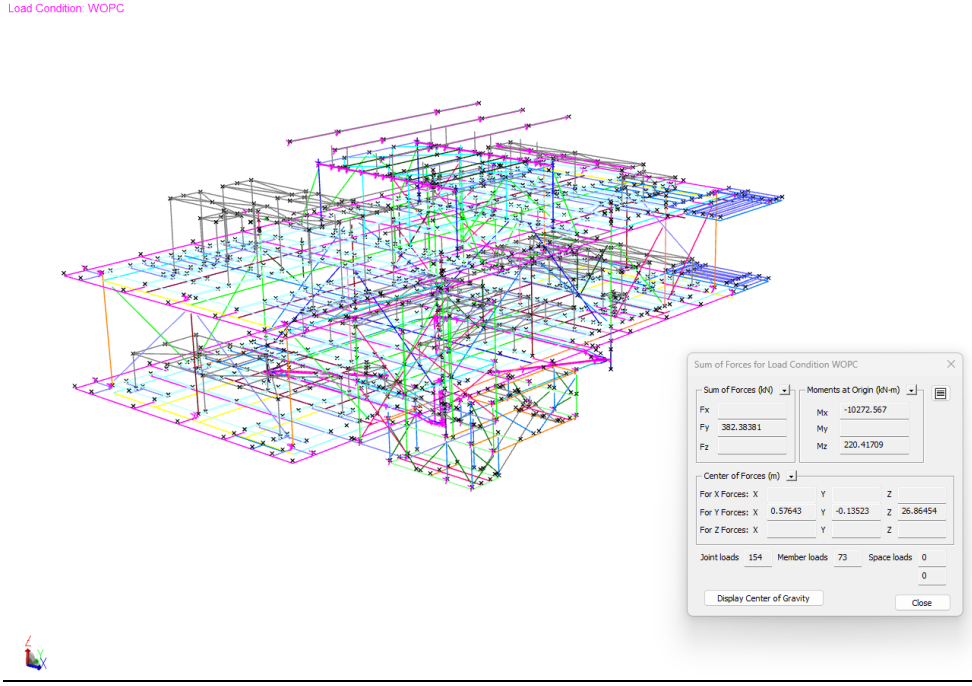
Figure 11.13 - Operating and Extreme Wind Load Combinations

Four load cases are reported in the following as example.

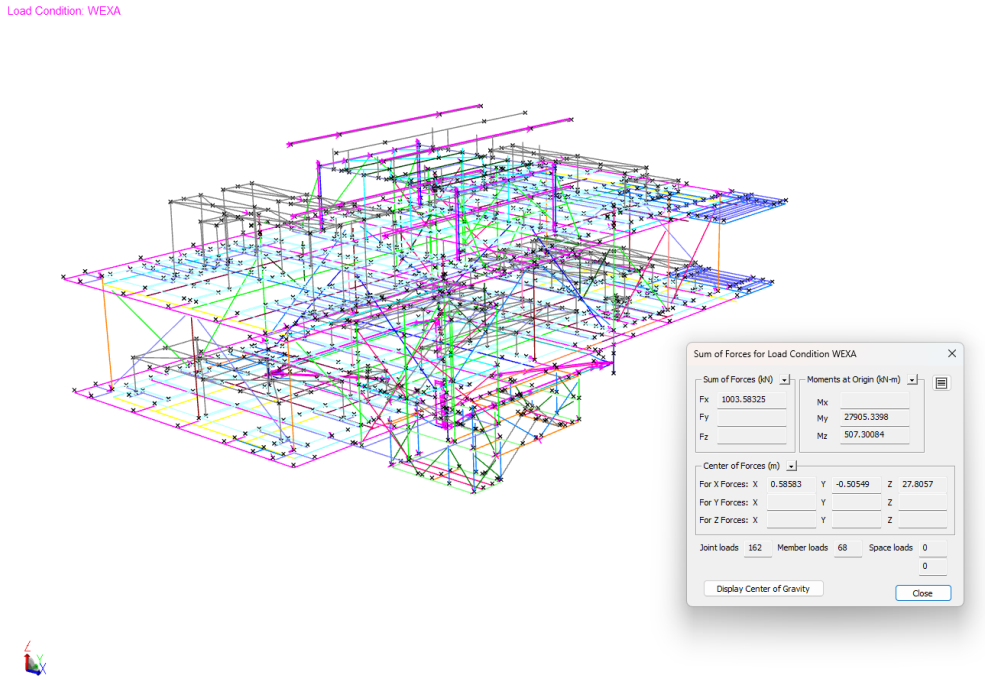
- Load condition WOPA: Operating Wind Loads Positive X direction



- Load condition WOPC: Operating Wind Loads Positive Y direction



- Load condition WEXA: Extreme Wind Loads Positive X direction



- Load condition WEXC: Extreme Wind Loads Positive Y direction

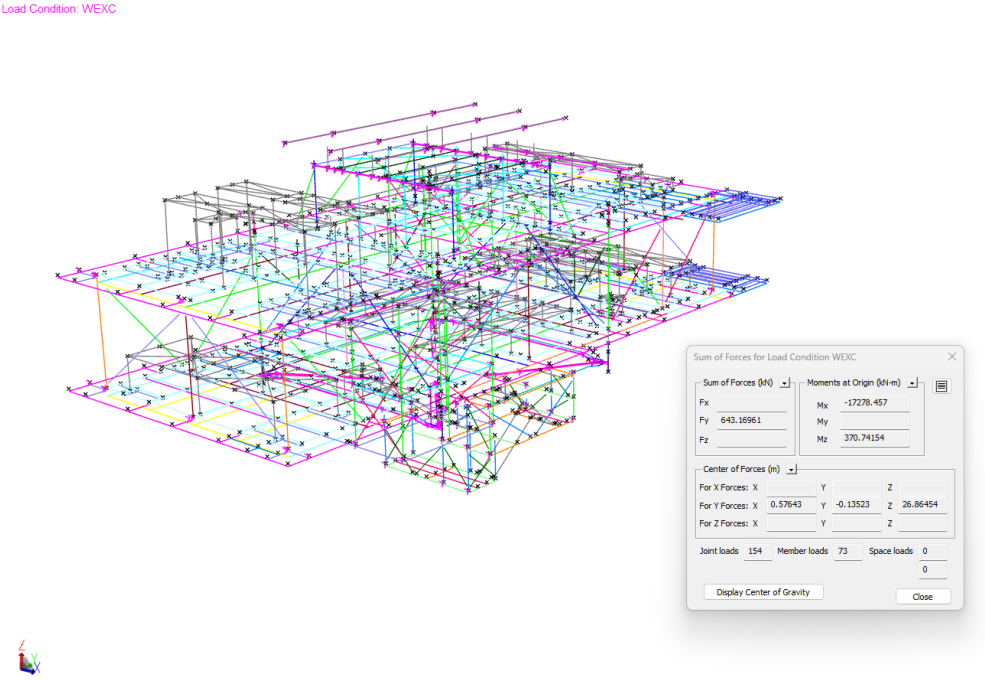


Figure 11.14 -Wind Load Basic Conditions

Unfactored 100-yr wind loads at the monopile interface, El.+17.050 m LAT, should not exceed Ref. /47/ and /37/:

- Shear = 1247 kN;
- Moment = 13639 kNm.

Wind loads from current detail engineering design have been checked to be within the aforementioned limits in sec. 13.2.

11.4.2 Hydrodynamic Inertial loads

Static equivalent inertial loads for BLPH Topside structures due to hydrodynamic loads on Monopile have been computed from acceleration at Topsides CoG, as per Sec. 7.12.4 and here below recalled, and load combination STAT, accounting for total permanent and variable loads.

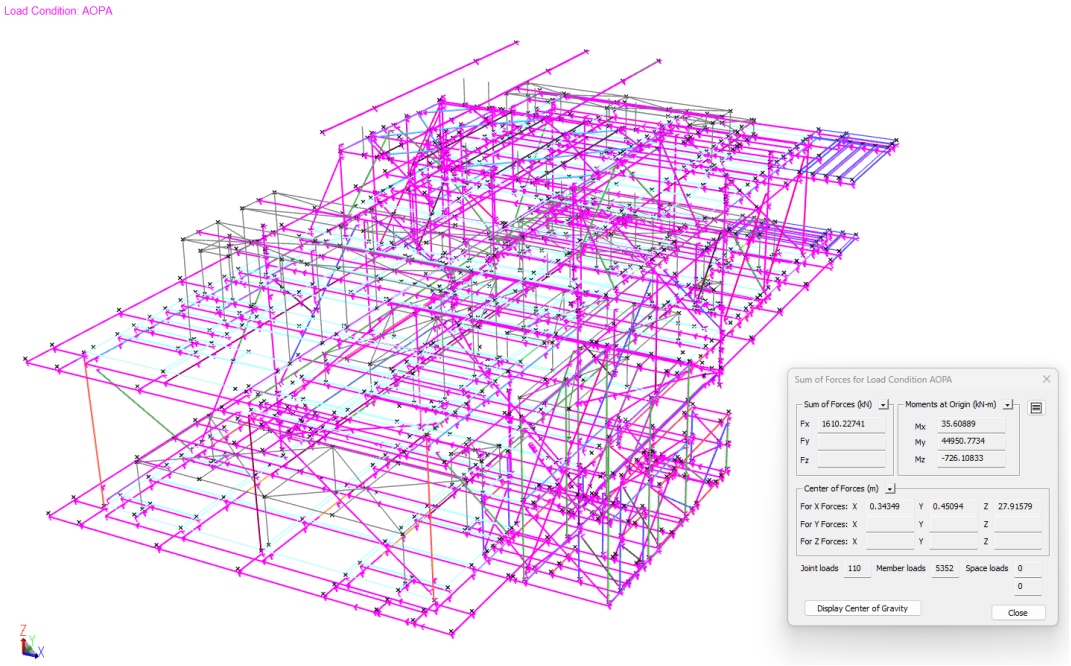
Case	Location	Elevation (LAT) [m]	Sea State	Max acceleration [m/s2]
Operational	Topsides CoG	28	Normal	0.67
Extreme	Topsides CoG	28	Extreme	1.61

Table 11.20 - Topsides Accelerations from Wave Loading on Monopile

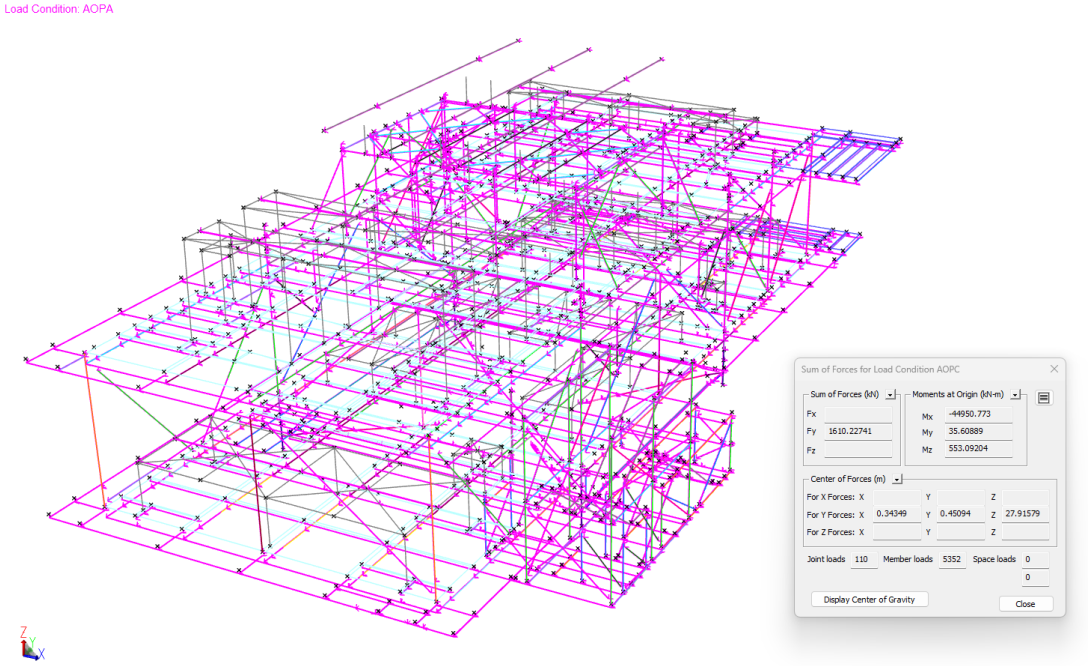
Sixteen load conditions have been defined for hydrodynamic inertial loads, considering 8 directions 45° spaced, both for Operating (load cases AOPA-H) and Extreme conditions (load cases AEXA-H), in accordance with Structural Design Premises, Ref./23/.

Four load cases are reported in the following as example.

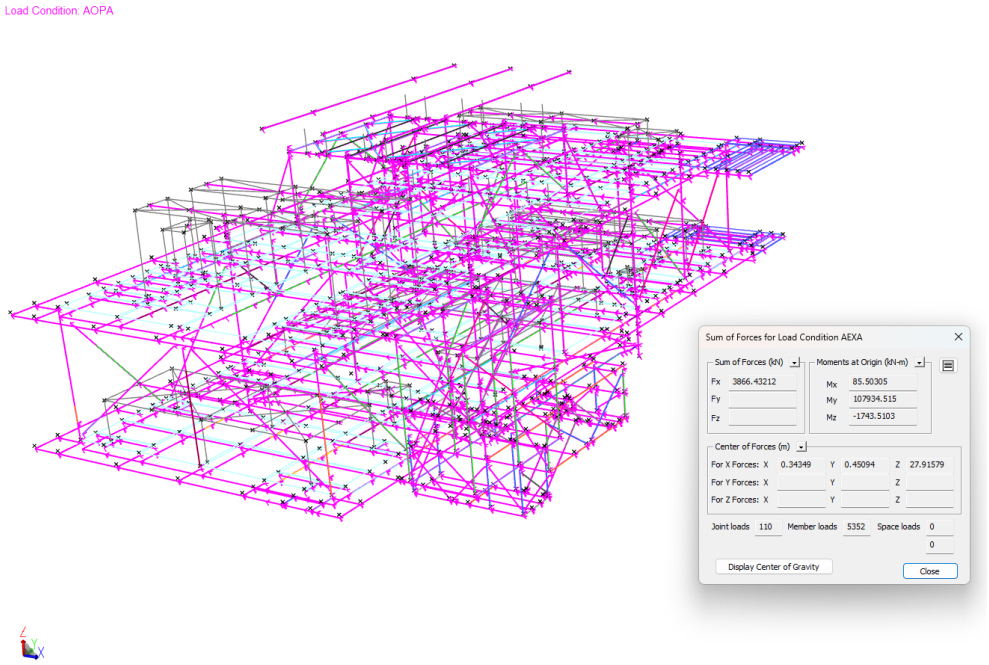
- Load condition AOPA: Operating hydrodynamic Inertial Loads Positive X direction



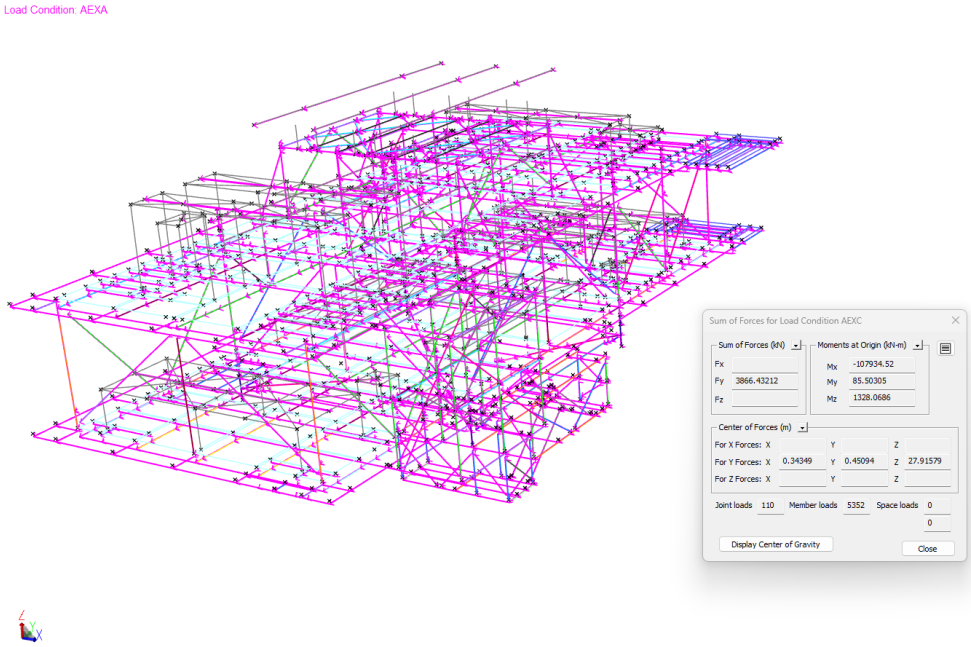
- Load condition AOPC: Operating hydrodynamic Inertial Loads Positive Y-direction



- Load condition AEXA: Extreme hydrodynamic Inertial Loads Positive X direction



- Load condition AEXC: Extreme hydrodynamic Inertial Loads Positive Y direction



11.4.3 Environmental Basic Load Cases

Environmental basic load cases are detailed in following excerpt of SACS output.

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********				********* Y - DIRECTION *********				********* Z - DIRECTION *********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
WOPX	596.66	0.59	-0.51	27.81	0.00				0.00			
WOPY	0.00				382.38	0.58	-0.14	26.86	0.00			
WOPA	596.66	0.59	-0.51	27.81	0.00				0.00			
WOPB	421.84	0.59	-0.51	27.81	270.35	0.58	-0.14	26.86	0.00			
WOPC	0.00				382.38	0.58	-0.14	26.86	0.00			
WOPD	-421.84	0.59	-0.51	27.81	270.35	0.58	-0.14	26.86	0.00			
WOPE	-596.66	0.59	-0.51	27.81	0.00				0.00			
WOPF	-421.84	0.59	-0.51	27.81	-270.35	0.58	-0.14	26.86	0.00			
WOPG	0.00				-382.38	0.58	-0.14	26.86	0.00			
WOPH	421.84	0.59	-0.51	27.81	-270.35	0.58	-0.14	26.86	0.00			
WEXA	996.42	0.59	-0.51	27.81	0.00				0.00			
WEXB	704.47	0.59	-0.51	27.81	451.48	0.58	-0.14	26.86	0.00			
WEXC	0.00				638.58	0.58	-0.14	26.86	0.00			
WEXD	-704.47	0.59	-0.51	27.81	451.48	0.58	-0.14	26.86	0.00			
WEXE	-996.42	0.59	-0.51	27.81	0.00				0.00			
WEXF	-704.47	0.59	-0.51	27.81	-451.48	0.58	-0.14	26.86	0.00			
WEXG	0.00				-638.58	0.58	-0.14	26.86	0.00			
WEXH	704.47	0.59	-0.51	27.81	-451.48	0.58	-0.14	26.86	0.00			
AOPX	1608.87	0.34	0.46	27.91	0.00				0.00			
AOPY	0.00				1608.87	0.34	0.46	27.91	0.00			
AOPA	1608.87	0.34	0.46	27.91	0.00				0.00			
AOPB	1137.47	0.34	0.46	27.91	1137.47	0.34	0.46	27.91	0.00			
AOPC	0.00				1608.87	0.34	0.46	27.91	0.00			
AOPD	-1137.47	0.34	0.46	27.91	1137.47	0.34	0.46	27.91	0.00			
AOPE	-1608.87	0.34	0.46	27.91	0.00				0.00			
AOPF	-1137.47	0.34	0.46	27.91	-1137.47	0.34	0.46	27.91	0.00			
AOPG	0.00				-1608.87	0.34	0.46	27.91	0.00			
AOPH	1137.47	0.34	0.46	27.91	-1137.47	0.34	0.46	27.91	0.00			
AEXX	3863.17	0.34	0.46	27.91	0.00				0.00			
AEXY	0.00				3863.17	0.34	0.46	27.91	0.00			
AEXA	3863.17	0.34	0.46	27.91	0.00				0.00			
AEXB	2731.26	0.34	0.46	27.91	2731.26	0.34	0.46	27.91	0.00			
AEXC	0.00				3863.17	0.34	0.46	27.91	0.00			
AEXD	-2731.26	0.34	0.46	27.91	2731.26	0.34	0.46	27.91	0.00			
AEXE	-3863.17	0.34	0.46	27.91	0.00				0.00			
AEXF	-2731.26	0.34	0.46	27.91	-2731.26	0.34	0.46	27.91	0.00			
AEXG	0.00				-3863.17	0.34	0.46	27.91	0.00			
AEXH	2731.26	0.34	0.46	27.91	-2731.26	0.34	0.46	27.91	0.00			

11.5 COG SHIFT LOAD CONDITIONS

For the purpose of Topside and TP detail design In-service analyses, the topsides CoG location is considered to be within a CoG tolerance envelope of 5% the distance between the structure length and breadth:

- Longitudinal Cog shift envelope (along global X axis; E-W direction) = 5% x 16 m = 0.8 m (±0.4m);
- Transversal Cog shift envelope (along global Y axis; N-S direction) = 5% x 40 m = 2 m (±1.0m).

CoG shift (from WCR position) is obtained by applying suitable couples made by vertical upward and downward forces applied at the upper deck corner joints of the structural model (joints U010, U008, U020, U018). Four load cases with 0kN vertical resultant have been defined, one for each CoG shifted position, to produce the shifting of CoG in combination with load combination STAT (load combination comprehensive of total BLPH permanent and Variable loads) without increasing the global weight resultant:

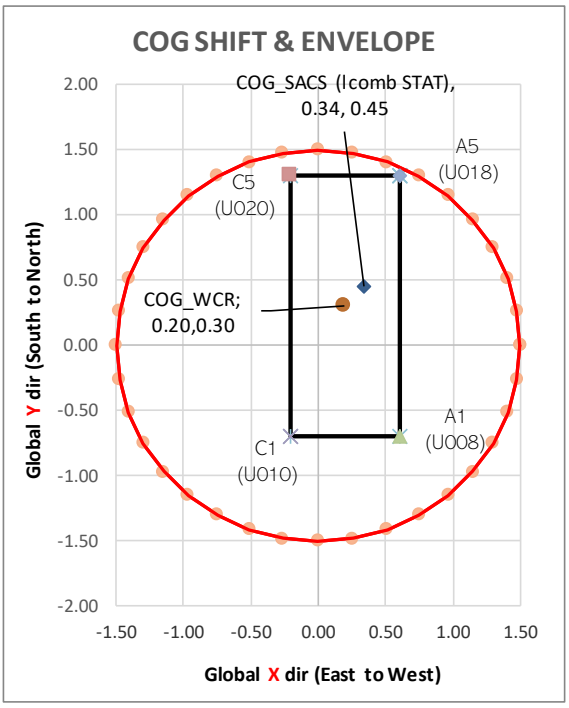
- POS. 1 - Cog shift toward intersection between rows A and 4: load condition SHA5;
- POS. 2 - Cog shift toward intersection between rows A and 2: load condition SHA1;
- POS. 3 - Cog shift toward intersection between rows C and 4: load condition SHC5;
- POS. 4 - Cog shift toward intersection between rows C and 2: load condition SHC1.

To check the correct execution of CoG shifting the following four load cases have been defined:

- G1A5 = SHA5 + STAT
- G1A1 = SHA1+ STAT
- G1C5 = SHC5 + STAT
- G1C1 = SHC1 + STAT

The original CoG position from WCR and the four shifted positions are reported in following tables and figure, with the indication of the vertical forces at corner joints for each load condition.

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W = -23576 kN

X and Y = SACS ref. system

COG NOMINAL POSITION			
CASE	x [m]	y [m]	z [m]
COG_SACS (Icomb STAT)	0.34	0.45	27.92
COG_WCR	0.20	0.30	27.80
COG shift Values			
Shift toward	x [m]	y [m]	POS
A5	0.40	1.00	1
A1	0.40	-1.00	2
C5	-0.40	1.00	3
C1	-0.40	-1.00	4

COG SHIFT FROM WCR VALUE			
Shift toward	x [m]	y [m]	POS
A5	0.60	1.30	1
A1	0.60	-0.70	2
C5	-0.20	1.30	3
C1	-0.20	-0.70	4

SACS FORCES for COG shifting				
COG Position	1	2	3	4
COG SHIFT toward	A5	A1	C5	C1
Fz [kN] @ joint U008	58.94	-530.46	648.33	58.94
Fz [kN] @ joint U010	442.05	-147.35	-147.35	-736.74
Fz [kN] @ joint U020	-58.94	530.46	-648.33	-58.94
Fz [kN] @ joint U018	-442.05	147.35	147.35	736.74
Load condition	SHA5	SHA1	SHC5	SHC1

Figure 11.15 - CoG shifting - Forces and Positions

Following excerpt from SACS output provide the CoG shifting as per Figure 11.15.

```
                                  ************* SEASTATE LOAD CASE CENTER REPORT *************
                                                  RELATIVE TO STRUCTURAL ORIGIN
LOAD        ********* X - DIRECTION *********      ********* Y - DIRECTION *********      ********* Z - DIRECTION *********
LABEL       FORCE       X         Y         Z      FORCE       X         Y         Z      FORCE       X         Y         Z
              (KN)      (M)       (M)       (M)      (KN)      (M)       (M)       (M)      (KN)      (M)       (M)       (M)
G1A1        -0.00     30.11     33.27     22.98      0.00      8.83    -71.87     12.05  -23575.83     0.60     -0.70     27.92
G1A5        -0.00     30.11     33.27     22.98      0.00      8.83    -71.87     12.05  -23575.83     0.60      1.30     27.92
G1C1        -0.00     30.11     33.27     22.98      0.00      8.83    -71.87     12.05  -23575.83    -0.20     -0.70     27.92
G1C5        -0.00     30.11     33.27     22.98      0.00      8.83    -71.87     12.05  -23575.83    -0.20      1.30     27.92

SHA5         0.00                                    0.00                                  COUPLE
SHA1         0.00                                    0.00                                  COUPLE
SHC5         0.00                                    0.00                                  COUPLE
SHC1         0.00                                    0.00                                  COUPLE
```

11.6 ACCIDENTAL LOADS

11.6.1 Ship Impact

The effects of unintended (accidental) ship impact have been investigated for the BLPH, Ref. /49/. The accelerations at Topside CoG due to ship impact are reported here below in Table 11.21 as per Design Basis, ref./23/.

Maximum and minimum accelerations at Topsides CoG resulting from ship impact scenario investigated for BLPH are lower than the In-service accelerations due to extreme hydrodynamic loads, see sec. 7.12.4, and therefore not governing the design.

Moreover, load combination factors for Accidental Limit State are lower than those for ULS. No further analysis for Ship impact case is needed.

Location	Elevation (LAT)	Min acceleration	Max acceleration	Min displacement	Max displacement
	[m]	[m/s^2]	[m/s^2]	[mm]	[mm]
Interface level	17.05	-2.3	3.0	-11	10
Topsides CoG	28.00	-1.1	1.2	-10	11

Table 11.21 - Topsides Accelerations and Displacements from Ship Impact

12 LOAD COMBINATIONS

12.1 IN-SERVICE LOAD COMBINATIONS

Basic Load cases and load combinations detailed in chapter 11, have been combined together to define the final Load Combinations to be used in the global analysis, according to Partial Action Factor as per sec. 9.4.1 for all the five positions of CoG.

12.2 ULS LOAD COMBINATIONS

A total of 125 ULS load combinations according to ISO 19902 In-Service Design Situations have been defined as per following tables.

ISO 19902 ULS LOAD COMBINATIONS

COG NOMINAL POSITION		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
	OPERATING	ON10	1.30	.				1.50																										
		ON2A	1.30					1.50		1.22								1.25									1.95							
		ON2B	1.30					1.50			1.22								1.25									1.95							
		ON2C	1.30					1.50				1.22								1.25								1.95						
		ON2D	1.30					1.50					1.22								1.25								1.95					
		ON2E	1.30					1.50						1.22								1.25								1.95				
		ON2F	1.30					1.50							1.22								1.25								1.95			
		ON2G	1.30					1.50								1.22								1.25									1.95	
		ON2H	1.30					1.50									1.22								1.25									1.95
	EXTREME	EN3A	1.00					1.00		1.35								1.45								1.30								
		EN3B	1.00					1.00			1.35								1.45								1.30								
		EN3C	1.00					1.00				1.35								1.45							1.30								
		EN3D	1.00					1.00					1.35								1.45						1.30								
		EN3E	1.00					1.00						1.35								1.45					1.30								
		EN3F	1.00					1.00							1.35								1.45				1.30								
		EN3G	1.00					1.00								1.35								1.45			1.30								
		EN3H	1.00					1.00									1.35								1.45		1.30								
		EN4A	0.90						0.80	1.35								1.45									0.90								
		EN4B	0.90						0.80		1.35								1.45								0.90								
		EN4C	0.90						0.80			1.35								1.45							0.90								
		EN4D	0.90						0.80				1.35								1.45						0.90								
		EN4E	0.90						0.80					1.35								1.45					0.90								
		EN4F	0.90						0.80						1.35								1.45				0.90								
		EN4G	0.90						0.80							1.35								1.45			0.90								
		EN4H	0.90						0.80								1.35								1.45		0.90								

COG POS 1 TOWARD A5		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
	OPERATING	O110	1.30	1.30				1.50																										
		O12A	1.30	1.30				1.50		1.22								1.25									1.95							
		O12B	1.30	1.30				1.50			1.22								1.25									1.95							
		O12C	1.30	1.30				1.50				1.22								1.25								1.95						
		O12D	1.30	1.30				1.50					1.22								1.25								1.95					
		O12E	1.30	1.30				1.50						1.22								1.25								1.95				
		O12F	1.30	1.30				1.50							1.22								1.25								1.95			
		O12G	1.30	1.30				1.50								1.22								1.25									1.95	
		O12H	1.30	1.30				1.50									1.22								1.25									1.95
	EXTREME	E13A	1.00	1.00				1.00		1.35								1.45								1.30								
		E13B	1.00	1.00				1.00			1.35								1.45								1.30								
		E13C	1.00	1.00				1.00				1.35								1.45							1.30								
		E13D	1.00	1.00				1.00					1.35								1.45						1.30								
		E13E	1.00	1.00				1.00						1.35								1.45					1.30								
		E13F	1.00	1.00				1.00							1.35								1.45				1.30								
		E13G	1.00	1.00				1.00								1.35								1.45			1.30								
		E13H	1.00	1.00				1.00									1.35								1.45		1.30								
		E14A	0.90	0.90					0.80	1.35								1.45									0.90								
		E14B	0.90	0.90					0.80		1.35								1.45								0.90								
		E14C	0.90	0.90					0.80			1.35								1.45							0.90								
		E14D	0.90	0.90					0.80				1.35								1.45						0.90								
		E14E	0.90	0.90					0.80					1.35								1.45					0.90								
		E14F	0.90	0.90					0.80						1.35								1.45				0.90								
		E14G	0.90	0.90					0.80							1.35								1.45			0.90								
		E14H	0.90	0.90					0.80								1.35								1.45		0.90								

COG POS 2 TOWARD A1

	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
	O210	1.30		1.30			1.50																										
OPERATING	O22A	1.30		1.30			1.50		1.22								1.25									1.95							
	O22B	1.30		1.30			1.50			1.22								1.25									1.95						
	O22C	1.30		1.30			1.50				1.22								1.25									1.95					
	O22D	1.30		1.30			1.50					1.22								1.25									1.95				
	O22E	1.30		1.30			1.50						1.22								1.25									1.95			
	O22F	1.30		1.30			1.50							1.22								1.25									1.95		
	O22G	1.30		1.30			1.50								1.22								1.25									1.95	
	O22H	1.30		1.30			1.50									1.22								1.25									1.95

	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR
	E23A	1.00		1.00			1.00		1.35								1.45								1.30
	E23B	1.00		1.00			1.00			1.35								1.45								1.30
	E23C	1.00		1.00			1.00				1.35								1.45							1.30
	E23D	1.00		1.00			1.00					1.35								1.45						1.30
	E23E	1.00		1.00			1.00						1.35								1.45					1.30
	E23F	1.00		1.00			1.00							1.35								1.45				1.30
	E23G	1.00		1.00			1.00								1.35								1.45			1.30
	E23H	1.00		1.00			1.00									1.35								1.45		1.30
EXTREME	E24A	0.90		0.90				0.80	1.35								1.45								0.90
	E24B	0.90		0.90				0.80		1.35								1.45								0.90
	E24C	0.90		0.90				0.80			1.35								1.45							0.90
	E24D	0.90		0.90				0.80				1.35								1.45						0.90
	E24E	0.90		0.90				0.80					1.35								1.45					0.90
	E24F	0.90		0.90				0.80						1.35								1.45				0.90
	E24G	0.90		0.90				0.80							1.35								1.45			0.90
	E24H	0.90		0.90				0.80								1.35								1.45	0.90

COG POS 3 TOWARD C5

	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
	O310	1.30			1.30		1.50																										
OPERATING	O32A	1.30			1.30		1.50		1.22								1.25									1.95							
	O32B	1.30			1.30		1.50			1.22								1.25									1.95						
	O32C	1.30			1.30		1.50				1.22								1.25									1.95					
	O32D	1.30			1.30		1.50					1.22								1.25									1.95				
	O32E	1.30			1.30		1.50						1.22								1.25									1.95			
	O32F	1.30			1.30		1.50							1.22								1.25									1.95		
	O32G	1.30			1.30		1.50								1.22								1.25									1.95	
	O32H	1.30			1.30		1.50									1.22								1.25									1.95

	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR
	E33A	1.00			1.00		1.00		1.35								1.45								1.30
	E33B	1.00			1.00		1.00			1.35								1.45							1.30
	E33C	1.00			1.00		1.00				1.35								1.45						1.30
	E33D	1.00			1.00		1.00					1.35								1.45					1.30
	E33E	1.00			1.00		1.00						1.35								1.45				1.30
	E33F	1.00			1.00		1.00							1.35								1.45			1.30
	E33G	1.00			1.00		1.00								1.35								1.45		1.30
	E33H	1.00			1.00		1.00									1.35								1.45	1.30
EXTREME	E34A	0.90			0.90			0.80	1.35								1.45								0.90
	E34B	0.90			0.90			0.80		1.35								1.45							0.90
	E34C	0.90			0.90			0.80			1.35								1.45						0.90
	E34D	0.90			0.90			0.80				1.35								1.45					0.90
	E34E	0.90			0.90			0.80					1.35								1.45				0.90
	E34F	0.90			0.90			0.80						1.35								1.45			0.90
	E34G	0.90			0.90			0.80							1.35								1.45		0.90
	E34H	0.90			0.90			0.80								1.35								1.45	0.90

COG POS 4 TOWARD C1

	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
	O410	1.30				1.30	1.50																										
OPERATING	O42A	1.30				1.30	1.50		1.22								1.25									1.95							
	O42B	1.30				1.30	1.50			1.22								1.25									1.95						
	O42C	1.30				1.30	1.50				1.22								1.25									1.95					
	O42D	1.30				1.30	1.50					1.22								1.25									1.95				
	O42E	1.30				1.30	1.50						1.22								1.25									1.95			
	O42F	1.30				1.30	1.50							1.22								1.25									1.95		
	O42G	1.30				1.30	1.50								1.22								1.25									1.95	
	O42H	1.30				1.30	1.50									1.22								1.25									1.95

	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	Q002	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR
	E43A	1.00				1.00	1.00		1.35								1.45								1.30
	E43B	1.00				1.00	1.00			1.35								1.45							1.30
	E43C	1.00				1.00	1.00				1.35								1.45						1.30
	E43D	1.00				1.00	1.00					1.35								1.45					1.30
	E43E	1.00				1.00	1.00						1.35								1.45				1.30
	E43F	1.00				1.00	1.00							1.35								1.45			1.30
	E43G	1.00				1.00	1.00								1.35								1.45		1.30
	E43H	1.00				1.00	1.00									1.35								1.45	1.30
EXTREME	E44A	0.90				0.90		0.80	1.35								1.45								0.90
	E44B	0.90				0.90		0.80		1.35								1.45							0.90
	E44C	0.90				0.90		0.80			1.35								1.45						0.90
	E44D	0.90				0.90		0.80				1.35								1.45					0.90
	E44E	0.90				0.90		0.80					1.35								1.45				0.90
	E44F	0.90				0.90		0.80						1.35								1.45			0.90
	E44G	0.90				0.90		0.80							1.35								1.45		0.90
	E44H	0.90				0.90		0.80								1.35								1.45	0.90

Table 12.1 – ISO ULS Load combinations

12.3 SLS LOAD COMBINATIONS

A total of 9 SLS load combinations according to ISO 19902 have been defined as per following table.

ISO 19902 SLS LOAD COMBINATIONS

COG NOMINAL POSITION	OPERATING	LCOMB	G001	Q001	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR
		DN10	1.00	1.00																	1.00
		DN2A	1.00	1.00	1.00								1.00								1.00
		DN2B	1.00	1.00		1.00								1.00							1.00
		DN2C	1.00	1.00			1.00								1.00						1.00
		DN2D	1.00	1.00				1.00								1.00					1.00
		DN2E	1.00	1.00					1.00								1.00				1.00
		DN2F	1.00	1.00						1.00								1.00			1.00
		DN2G	1.00	1.00							1.00								1.00		1.00
		DN2F	1.00	1.00								1.00								1.00	1.00

Table 12.2 – ISO SLS Load combinations

12.4 UNFACTORED LOAD COMBINATIONS

Following further 85 un-factored Load Combinations have been defined to evaluate actual reaction forces, according to Allowable Working Stress design approach. These combinations were not used for structural checks and have been computed only as a reference for actions comparison.

Note: factor 1.3 in crane load condition does not represent combination factor but safety factor, see 11.2.5.

COG NOMINAL POS	OPERATING	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
		OAN1	1.00	.				1.00																	1.30								
		OANA	1.00					1.00	1.00								1.00									1.30								
		OANB	1.00					1.00		1.00								1.00									1.30							
		OANC	1.00					1.00			1.00								1.00									1.30						
		OAND	1.00					1.00				1.00								1.00									1.30				
		OANE	1.00					1.00					1.00								1.00									1.30			
		OANF	1.00					1.00						1.00								1.00									1.30		
		OANG	1.00					1.00							1.00								1.00										1.30	
		OANH	1.00					1.00								1.00								1.00										1.30
		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR								
		EANA	1.00					1.00	1.00								1.00								1.30								
		EANB	1.00					1.00		1.00								1.00							1.30								
		EANC	1.00					1.00			1.00								1.00						1.30								
		EAND	1.00					1.00				1.00								1.00					1.30								
		EANE	1.00					1.00					1.00								1.00				1.30								
		EANF	1.00					1.00						1.00								1.00			1.30								
		EANG	1.00					1.00							1.00								1.00		1.30								
		EANH	1.00					1.00								1.00								1.00	1.30								

COG POS 1 TOWARD A5	OPERATING	LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
		OA11	1.00	1.00				1.00																	1.30								
		OA1A	1.00	1.00				1.00	1.00								1.00									1.30							
		OA1B	1.00	1.00				1.00		1.00								1.00									1.30							
		OA1C	1.00	1.00				1.00			1.00								1.00									1.30						
		OA1D	1.00	1.00				1.00				1.00								1.00									1.30				
		OA1E	1.00	1.00				1.00					1.00								1.00									1.30			
		OA1F	1.00	1.00				1.00						1.00								1.00									1.30		
		OA1G	1.00	1.00				1.00							1.00								1.00										1.30	
		OA1H	1.00	1.00				1.00								1.00								1.00										1.30
		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR								
		EA1A	1.00	1.00				1.00	1.00								1.00								1.30								
		EA1B	1.00	1.00				1.00		1.00								1.00							1.30								
		EA1C	1.00	1.00				1.00			1.00								1.00						1.30								
		EA1D	1.00	1.00				1.00				1.00								1.00					1.30								
		EA1E	1.00	1.00				1.00					1.00								1.00				1.30								
		EA1F	1.00	1.00				1.00						1.00								1.00			1.30								
		EA1G	1.00	1.00				1.00							1.00								1.00		1.30								
		EA1H	1.00	1.00				1.00								1.00								1.00	1.30								

		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
COG POS 2 TOWARD A1	OPERATING	OA21	1.00		1.00			1.00																	1.30								
		OA2A	1.00		1.00			1.00	1.00								1.00									1.30								
		OA2B	1.00		1.00			1.00		1.00								1.00									1.30							
		OA2C	1.00		1.00			1.00			1.00								1.00									1.30						
		OA2D	1.00		1.00			1.00				1.00								1.00											1.30			
		OA2E	1.00		1.00			1.00					1.00									1.00									1.30			
		OA2F	1.00		1.00			1.00						1.00									1.00										1.30	
		OA2G	1.00		1.00			1.00							1.00									1.00									1.30	
		OA2H	1.00		1.00			1.00								1.00									1.00									1.30

		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR
	EXTREME	EA2A	1.00		1.00			1.00	1.00								1.00								1.30
		EA2B	1.00		1.00			1.00		1.00								1.00							1.30
		EA2C	1.00		1.00			1.00			1.00								1.00							1.30
		EA2D	1.00		1.00			1.00				1.00								1.00						1.30
		EA2E	1.00		1.00			1.00					1.00								1.00					1.30
		EA2F	1.00		1.00			1.00						1.00								1.00				1.30
		EA2G	1.00		1.00			1.00							1.00								1.00			1.30
		EA2H	1.00		1.00			1.00								1.00								1.00		1.30

		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
COG POS 3 TOWARD C5	OPERATING	OA31	1.00			1.00		1.00																	1.30								
		OA3A	1.00			1.00		1.00	1.00								1.00									1.30								
		OA3B	1.00			1.00		1.00		1.00								1.00									1.30							
		OA3C	1.00			1.00		1.00			1.00								1.00									1.30						
		OA3D	1.00			1.00		1.00				1.00								1.00											1.30			
		OA3E	1.00			1.00		1.00					1.00									1.00									1.30			
		OA3F	1.00			1.00		1.00						1.00									1.00										1.30	
		OA3G	1.00			1.00		1.00							1.00									1.00									1.30	
		OA3H	1.00			1.00		1.00								1.00									1.00									1.30

		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR
	EXTREME	EA3A	1.00			1.00		1.00	1.00								1.00								1.30
		EA3B	1.00			1.00		1.00		1.00								1.00							1.30
		EA3C	1.00			1.00		1.00			1.00								1.00							1.30
		EA3D	1.00			1.00		1.00				1.00								1.00						1.30
		EA3E	1.00			1.00		1.00					1.00								1.00					1.30
		EA3F	1.00			1.00		1.00						1.00								1.00				1.30
		EA3G	1.00			1.00		1.00							1.00								1.00			1.30
		EA3H	1.00			1.00		1.00								1.00								1.00		1.30

		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WOPA	WOPB	WOPC	WOPD	WOPE	WOPF	WOPG	WOPH	AOPA	AOPB	AOPC	AOPD	AOPE	AOPF	AOPG	AOPH	CRAR	CRAA	CRAB	CRAC	CRAD	CRAE	CRAF	CRAG	CRAH
COG POS 4 TOWARD C1	OPERATING	OA41	1.00				1.00	1.00																	1.30								
		OA4A	1.00				1.00	1.00	1.00								1.00									1.30								
		OA4B	1.00				1.00	1.00		1.00								1.00									1.30							
		OA4C	1.00				1.00	1.00			1.00								1.00									1.30						
		OA4D	1.00				1.00	1.00				1.00								1.00											1.30			
		OA4E	1.00				1.00	1.00					1.00									1.00									1.30			
		OA4F	1.00				1.00	1.00						1.00									1.00										1.30	
		OA4G	1.00				1.00	1.00							1.00									1.00									1.30	
		OA4H	1.00				1.00	1.00								1.00									1.00									1.30

		LCOMB	G001	SHA5	SHA1	SHC5	SHC1	Q001	WEXA	WEXB	WEXC	WEXD	WEXE	WEXF	WEXG	WEXH	AEXA	AEXB	AEXC	AEXD	AEXE	AEXF	AEXG	AEXH	CRAR
	EXTREME	EA4A	1.00				1.00	1.00	1.00								1.00								1.30
		EA4B	1.00				1.00	1.00		1.00								1.00							1.30
		EA4C	1.00				1.00	1.00			1.00								1.00							1.30
		EA4D	1.00				1.00	1.00				1.00								1.00						1.30
		EA4E	1.00				1.00	1.00					1.00								1.00					1.30
		EA4F	1.00				1.00	1.00						1.00								1.00				1.30
		EA4G	1.00				1.00	1.00							1.00								1.00			1.30
		EA4H	1.00				1.00	1.00								1.00								1.00		1.30

Table 12.3 – Unfactored Load combinations

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12.5 LOAD COMBINATIONS SUMMARY

Following excerpt from SACS output provide the Load Combinations resultants.

12.5.1 ULS LOAD COMBINATIONS – RESULTANTS

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********				********* Y - DIRECTION *********				********* Z - DIRECTION *********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
ON10	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-31168.93	0.38	0.51	27.91
ON2A	2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	0.43	0.61	27.93
ON2B	1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	0.43	0.61	27.93
ON2C	-0.00	30.11	33.27	22.98	2508.54	0.48	0.50	27.76	-31402.93	0.43	0.61	27.93
ON2D	-1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	0.43	0.61	27.93
ON2E	-2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	0.43	0.61	27.93
ON2F	-1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	0.43	0.61	27.93
ON2G	-0.00	30.11	33.27	22.98	-2450.04	0.30	0.18	27.68	-31402.93	0.43	0.61	27.93
ON2H	1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	0.43	0.61	27.93
EN3A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
EN3B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	0.34	0.45	27.92
EN3C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-23575.83	0.34	0.45	27.92
EN3D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	0.34	0.45	27.92
EN3E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
EN3F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	0.34	0.45	27.92
EN3G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-23575.83	0.34	0.45	27.92
EN3H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	0.34	0.45	27.92
EN4A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	0.10	-0.11	27.93
EN4B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	0.10	-0.11	27.93
EN4C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-19372.89	0.10	-0.11	27.93
EN4D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	0.10	-0.11	27.93
EN4E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	0.10	-0.11	27.93
EN4F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	0.10	-0.11	27.93
EN4G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-19372.89	0.10	-0.11	27.93
EN4H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	0.10	-0.11	27.93

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********				********* Y - DIRECTION *********				********* Z - DIRECTION *********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
O110	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-31168.93	0.63	1.35	27.91
O12A	2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	0.69	1.44	27.93
O12B	1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	0.69	1.44	27.93
O12C	-0.00	30.11	33.27	22.98	2508.54	0.48	0.50	27.76	-31402.93	0.69	1.44	27.93
O12D	-1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	0.69	1.44	27.93
O12E	-2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	0.69	1.44	27.93
O12F	-1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	0.69	1.44	27.93
O12G	-0.00	30.11	33.27	22.98	-2450.04	0.30	0.18	27.68	-31402.93	0.69	1.44	27.93
O12H	1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	0.69	1.44	27.93
E13A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.60	1.30	27.92
E13B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	0.60	1.30	27.92
E13C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-23575.83	0.60	1.30	27.92
E13D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	0.60	1.30	27.92
E13E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.60	1.30	27.92
E13F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	0.60	1.30	27.92
E13G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-23575.83	0.60	1.30	27.92
E13H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	0.60	1.30	27.92
E14A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	0.39	0.82	27.93
E14B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	0.39	0.82	27.93
E14C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-19372.89	0.39	0.82	27.93
E14D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	0.39	0.82	27.93
E14E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	0.39	0.82	27.93
E14F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	0.39	0.82	27.93
E14G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-19372.89	0.39	0.82	27.93
E14H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	0.39	0.82	27.93

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD LABEL	X - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)	Y - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)	Z - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)
O210	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-31168.93	0.63	-0.62	27.91
O22A	2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	0.69	-0.51	27.93
O22B	1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	0.69	-0.51	27.93
O22C	-0.00	30.11	33.27	22.98	2508.54	0.48	0.50	27.76	-31402.93	0.69	-0.51	27.93
O22D	-1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	0.69	-0.51	27.93
O22E	-2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	0.69	-0.51	27.93
O22F	-1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	0.69	-0.51	27.93
O22G	-0.00	30.11	33.27	22.98	-2450.04	0.30	0.18	27.68	-31402.93	0.69	-0.51	27.93
O22H	1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	0.69	-0.51	27.93
E23A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.60	-0.70	27.92
E23B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	0.60	-0.70	27.92
E23C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-23575.83	0.60	-0.70	27.92
E23D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	0.60	-0.70	27.92
E23E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.60	-0.70	27.92
E23F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	0.60	-0.70	27.92
E23G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-23575.83	0.60	-0.70	27.92
E23H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	0.60	-0.70	27.92
E24A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	0.39	-1.37	27.93
E24B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	0.39	-1.37	27.93
E24C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-19372.89	0.39	-1.37	27.93
E24D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	0.39	-1.37	27.93
E24E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	0.39	-1.37	27.93
E24F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	0.39	-1.37	27.93
E24G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-19372.89	0.39	-1.37	27.93
E24H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	0.39	-1.37	27.93

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD LABEL	X - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)	Y - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)	Z - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)
O310	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-31168.93	-0.15	1.35	27.91
O32A	2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	-0.09	1.44	27.93
O32B	1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	-0.09	1.44	27.93
O32C	-0.00	30.11	33.27	22.98	2508.54	0.48	0.50	27.76	-31402.93	-0.09	1.44	27.93
O32D	-1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	-0.09	1.44	27.93
O32E	-2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	-0.09	1.44	27.93
O32F	-1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	-0.09	1.44	27.93
O32G	-0.00	30.11	33.27	22.98	-2450.04	0.30	0.18	27.68	-31402.93	-0.09	1.44	27.93
O32H	1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	-0.09	1.44	27.93
E33A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	1.30	27.92
E33B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	-0.20	1.30	27.92
E33C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-23575.83	-0.20	1.30	27.92
E33D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	-0.20	1.30	27.92
E33E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	1.30	27.92
E33F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	-0.20	1.30	27.92
E33G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-23575.83	-0.20	1.30	27.92
E33H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	-0.20	1.30	27.92
E34A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	-0.49	0.82	27.93
E34B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	-0.49	0.82	27.93
E34C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-19372.89	-0.49	0.82	27.93
E34D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	-0.49	0.82	27.93
E34E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	-0.49	0.82	27.93
E34F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	-0.49	0.82	27.93
E34G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-19372.89	-0.49	0.82	27.93
E34H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	-0.49	0.82	27.93

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD LABEL	X - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)	Y - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)	Z - DIRECTION FORCE (KN)	X (M)	Y (M)	Z (M)
O410	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-31168.93	-0.15	-0.62	27.91

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O42A	2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	-0.09	-0.51	27.93
O42B	1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	-0.09	-0.51	27.93
O42C	-0.00	30.11	33.27	22.98	2508.54	0.48	0.50	27.76	-31402.93	-0.09	-0.51	27.93
O42D	-1958.36	0.49	0.34	27.92	1732.18	0.30	0.18	27.68	-31402.93	-0.09	-0.51	27.93
O42E	-2769.96	0.49	0.34	27.92	0.00	8.83	-71.87	12.05	-31402.93	-0.09	-0.51	27.93
O42F	-1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	-0.09	-0.51	27.93
O42G	-0.00	30.11	33.27	22.98	-2450.04	0.30	0.18	27.68	-31402.93	-0.09	-0.51	27.93
O42H	1958.36	0.49	0.34	27.92	-1732.18	0.30	0.18	27.68	-31402.93	-0.09	-0.51	27.93
E43A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	-0.70	27.92
E43B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	-0.20	-0.70	27.92
E43C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-23575.83	-0.20	-0.70	27.92
E43D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-23575.83	-0.20	-0.70	27.92
E43E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	-0.70	27.92
E43F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	-0.20	-0.70	27.92
E43G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-23575.83	-0.20	-0.70	27.92
E43H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-23575.83	-0.20	-0.70	27.92
E44A	6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	-0.49	-1.37	27.93
E44B	4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	-0.49	-1.37	27.93
E44C	-0.00	30.11	33.27	22.98	6474.60	0.37	0.37	27.77	-19372.89	-0.49	-1.37	27.93
E44D	-4921.54	0.39	0.26	27.89	4577.54	0.37	0.37	27.77	-19372.89	-0.49	-1.37	27.93
E44E	-6961.16	0.39	0.26	27.89	0.00	8.83	-71.87	12.05	-19372.89	-0.49	-1.37	27.93
E44F	-4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	-0.49	-1.37	27.93
E44G	-0.00	30.11	33.27	22.98	-6474.60	0.37	0.37	27.77	-19372.89	-0.49	-1.37	27.93
E44H	4921.54	0.39	0.26	27.89	-4577.54	0.37	0.37	27.77	-19372.89	-0.49	-1.37	27.93

12.5.2 SLS LOAD COMBINATIONS - RESULTANTS

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********			********* Y - DIRECTION *********				********* Z - DIRECTION *********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
DN10	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
DN2A	2206.89	0.41	0.19	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
DN2B	1560.27	0.41	0.19	27.89	1408.78	0.39	0.34	27.71	-23575.83	0.34	0.45	27.92
DN2C	-0.00	30.11	33.27	22.98	1992.61	0.39	0.34	27.71	-23575.83	0.34	0.45	27.92
DN2D	-1560.27	0.41	0.19	27.89	1408.78	0.39	0.34	27.71	-23575.83	0.34	0.45	27.92
DN2E	-2206.89	0.41	0.19	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
DN2F	-1560.27	0.41	0.19	27.89	-1408.78	0.39	0.34	27.71	-23575.83	0.34	0.45	27.92
DN2G	-0.00	30.11	33.27	22.98	-1992.61	0.39	0.34	27.71	-23575.83	0.34	0.45	27.92

12.5.3 UNFACTORED LOAD COMBINATIONS - RESULTANTS

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********			********* Y - DIRECTION *********				********* Z - DIRECTION *********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
OAN1	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
OANA	2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	0.39	0.54	27.94
OANB	1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	0.39	0.54	27.94
OANC	-0.00	30.11	33.27	22.98	2012.11	0.46	0.47	27.75	-23731.83	0.39	0.54	27.94
OAND	-1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	0.39	0.54	27.94
OANE	-2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	0.39	0.54	27.94
OANF	-1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	0.39	0.54	27.94
OANG	-0.00	30.11	33.27	22.98	-1973.11	0.31	0.20	27.68	-23731.83	0.39	0.54	27.94
OANH	1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	0.39	0.54	27.94
EANA	4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
EANB	3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	0.34	0.45	27.92
EANC	-0.00	30.11	33.27	22.98	4509.60	0.38	0.37	27.77	-23575.83	0.34	0.45	27.92
EAND	-3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	0.34	0.45	27.92
EANE	-4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.34	0.45	27.92
EANF	-3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	0.34	0.45	27.92
EANG	-0.00	30.11	33.27	22.98	-4509.60	0.38	0.37	27.77	-23575.83	0.34	0.45	27.92
EANH	3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	0.34	0.45	27.92

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********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD LABEL	******** X - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)	******** Y - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)	******** Z - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)
OA11	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-23575.83	0.60	1.30	27.92
OA1A	2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	0.65	1.38	27.94
OA1B	1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	0.65	1.38	27.94
OA1C	-0.00	30.11	33.27	22.98	2012.11	0.46	0.47	27.75	-23731.83	0.65	1.38	27.94
OA1D	-1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	0.65	1.38	27.94
OA1E	-2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	0.65	1.38	27.94
OA1F	-1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	0.65	1.38	27.94
OA1G	-0.00	30.11	33.27	22.98	-1973.11	0.31	0.20	27.68	-23731.83	0.65	1.38	27.94
OA1H	1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	0.65	1.38	27.94
EA1A	4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.60	1.30	27.92
EA1B	3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	0.60	1.30	27.92
EA1C	-0.00	30.11	33.27	22.98	4509.60	0.38	0.37	27.77	-23575.83	0.60	1.30	27.92
EA1D	-3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	0.60	1.30	27.92
EA1E	-4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	0.60	1.30	27.92
EA1F	-3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	0.60	1.30	27.92
EA1G	-0.00	30.11	33.27	22.98	-4509.60	0.38	0.37	27.77	-23575.83	0.60	1.30	27.92
EA1H	3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	0.60	1.30	27.92

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD LABEL	******** X - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)	******** Y - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)	******** Z - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)
OA21	0.00				0.00				-23548.35	0.63	-0.70	28.05
OA2A	2147.89	0.30	0.37	28.08	0.00				-23548.35	0.63	-0.70	28.05
OA2B	1518.56	0.30	0.37	28.08	1368.35	0.33	0.58	27.87	-23548.35	0.63	-0.70	28.05
OA2C	0.00				1935.43	0.33	0.58	27.87	-23548.35	0.63	-0.70	28.05
OA2D	-1518.56	0.30	0.37	28.08	1368.35	0.33	0.58	27.87	-23548.35	0.63	-0.70	28.05
OA2E	-2147.89	0.30	0.37	28.08	0.00				-23548.35	0.63	-0.70	28.05
OA2F	-1518.56	0.30	0.37	28.08	-1368.35	0.33	0.58	27.87	-23548.35	0.63	-0.70	28.05
OA2G	0.00				-1935.43	0.33	0.58	27.87	-23548.35	0.63	-0.70	28.05
OA2H	1518.56	0.30	0.37	28.08	-1368.35	0.33	0.58	27.87	-23548.35	0.63	-0.70	28.05
EA2A	4765.11	0.32	0.45	28.08	0.00				-23548.35	0.63	-0.70	28.05
EA2B	3368.94	0.32	0.45	28.08	3118.09	0.34	0.60	27.91	-23548.35	0.63	-0.70	28.05
EA2C	0.00				4410.30	0.34	0.60	27.91	-23548.35	0.63	-0.70	28.05
EA2D	-3368.94	0.32	0.45	28.08	3118.09	0.34	0.60	27.91	-23548.35	0.63	-0.70	28.05
EA2E	-4765.11	0.32	0.45	28.08	0.00				-23548.35	0.63	-0.70	28.05
EA2F	-3368.94	0.32	0.45	28.08	-3118.09	0.34	0.60	27.91	-23548.35	0.63	-0.70	28.05
EA2G	0.00				-4410.30	0.34	0.60	27.91	-23548.35	0.63	-0.70	28.05
EA2H	3368.94	0.32	0.45	28.08	-3118.09	0.34	0.60	27.91	-23548.35	0.63	-0.70	28.05

********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD LABEL	******** X - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)	******** Y - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)	******** Z - DIRECTION ******** FORCE (KN)	X (M)	Y (M)	Z (M)
OA31	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-23575.83	-0.20	1.30	27.92
OA3A	2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	-0.14	1.38	27.94
OA3B	1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	-0.14	1.38	27.94
OA3C	-0.00	30.11	33.27	22.98	2012.11	0.46	0.47	27.75	-23731.83	-0.14	1.38	27.94
OA3D	-1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	-0.14	1.38	27.94
OA3E	-2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	-0.14	1.38	27.94
OA3F	-1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	-0.14	1.38	27.94
OA3G	-0.00	30.11	33.27	22.98	-1973.11	0.31	0.20	27.68	-23731.83	-0.14	1.38	27.94
OA3H	1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	-0.14	1.38	27.94
EA3A	4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	1.30	27.92
EA3B	3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	-0.20	1.30	27.92
EA3C	-0.00	30.11	33.27	22.98	4509.60	0.38	0.37	27.77	-23575.83	-0.20	1.30	27.92
EA3D	-3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	-0.20	1.30	27.92
EA3E	-4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	1.30	27.92
EA3F	-3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	-0.20	1.30	27.92
EA3G	-0.00	30.11	33.27	22.98	-4509.60	0.38	0.37	27.77	-23575.83	-0.20	1.30	27.92
EA3H	3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	-0.20	1.30	27.92

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********** SEASTATE LOAD CASE CENTER REPORT **********
RELATIVE TO STRUCTURAL ORIGIN

LOAD	********* X - DIRECTION *********				********* Y - DIRECTION *********				********* Z - DIRECTION *********			
LABEL	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)	FORCE (KN)	X (M)	Y (M)	Z (M)
OA41	-0.00	30.11	33.27	22.98	0.00	8.83	-71.87	12.05	-23575.83	-0.20	-0.70	27.92
OA4A	2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	-0.14	-0.60	27.94
OA4B	1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	-0.14	-0.60	27.94
OA4C	-0.00	30.11	33.27	22.98	2012.11	0.46	0.47	27.75	-23731.83	-0.14	-0.60	27.94
OA4D	-1574.06	0.48	0.31	27.91	1394.99	0.31	0.20	27.68	-23731.83	-0.14	-0.60	27.94
OA4E	-2226.39	0.48	0.31	27.91	0.00	8.83	-71.87	12.05	-23731.83	-0.14	-0.60	27.94
OA4F	-1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	-0.14	-0.60	27.94
OA4G	-0.00	30.11	33.27	22.98	-1973.11	0.31	0.20	27.68	-23731.83	-0.14	-0.60	27.94
OA4H	1574.06	0.48	0.31	27.91	-1394.99	0.31	0.20	27.68	-23731.83	-0.14	-0.60	27.94
EA4A	4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	-0.70	27.92
EA4B	3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	-0.20	-0.70	27.92
EA4C	-0.00	30.11	33.27	22.98	4509.60	0.38	0.37	27.77	-23575.83	-0.20	-0.70	27.92
EA4D	-3443.10	0.39	0.25	27.89	3188.29	0.38	0.37	27.77	-23575.83	-0.20	-0.70	27.92
EA4E	-4870.01	0.39	0.25	27.89	0.00	8.83	-71.87	12.05	-23575.83	-0.20	-0.70	27.92
EA4F	-3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	-0.20	-0.70	27.92
EA4G	-0.00	30.11	33.27	22.98	-4509.60	0.38	0.37	27.77	-23575.83	-0.20	-0.70	27.92
EA4H	3443.10	0.39	0.25	27.89	-3188.29	0.38	0.37	27.77	-23575.83	-0.20	-0.70	27.92

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13 ANALYSIS RESULTS

This section presents the results of the performed In-Service analysis in terms of:

- Reaction forces at Transition Piece-Topside interface connection level;
- Reaction forces at Transition Piece-Monopile interface connection level;
- Structural checks of structural members;
- Structural checks of tubular connections.

13.1 REACTION FORCES

Maximum internal forces of structural members at TP-Topside interface are reported in the following tables with reference to factored and Unfactored In-Service Load Combinations. Full set of internal forces are given in APPENDIX C.

13.1.1 Internal Forces of Topside – TP interface elements

13.1.1.1 Factored Load Combinations

	MEMBER	MEMBER END	GROUP	LOAD CASE	Fx [kN]	Fy [kN]	Fz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]	REMARK
ALL LC	TA44-TU03	TU03	TPS	E44F	**-1394**	2159	2726	38	-1260	-1543	MAX Fx
	TA44-TU03	TU03	TPS	O12B	**-9721**	1668	2998	86	-1622	-3166	min Fx - MAX Fxy
	TA44-TU03	TU03	TPS	E13E	-5377	**3075**	2573	-28	-1171	-2379	MAX Fy
	TC44-TU04	TU04	TPS	E33A	-5098	**-3022**	2372	-18	-1077	2422	min Fy
	TA44-TU03	TU03	TPS	O12G	-8689	2240	**3939**	99	-1736	-3164	MAX Fz
	TA24-TU02	TU02	TPS	E13C	-3324	1316	**-3830**	-217	1776	-2032	min Fz
	TA44-TU03	TU03	TPS	E44G	-1940	1152	3084	120	-1380	-1514	min Fxy
	TA44-TU03	TU03	TPS	O12A	-9607	1564	3379	116	-1692	-3165	MAX Fxz
	TA44-TU03	TU03	TPS	E44E	-1816	2450	1739	-44	-1055	-1564	min Fxz
	TA44-TU03	TU03	TPS	O12F	-8424	2625	3791	62	-1685	-3164	MAX Fyz
	TA44-TU03	TU03	TPS	E34B	-6014	-91	594	23	-796	-1771	min Fyz
	TA44-TU03	TU03	TPS	E23H	-5243	425	3422	**189**	-1656	-2026	MAX Mx
	TA24-TU02	TU02	TPS	E13B	-4560	247	-3353	**-236**	1720	-2006	min Mx
	TA24-TU02	TU02	TPS	O12C	-5380	1530	-3825	-191	**2063**	-2713	MAX My - MAX Mxy
	TA44-TU03	TU03	TPS	O22H	-7288	1517	3748	145	**-1992**	-2796	min My
	TC44-TU04	TU04	TPS	O32C	-8907	-1919	2500	-104	-1318	**3210**	MAX Mz - MAX Mxz
	TA44-TU03	TU03	TPS	O12C	-9530	2078	2855	37	-1535	**-3175**	min Mz
	TA24-TU02	TU02	TPS	E44G	-5667	984	-353	75	501	-1984	min Mxy
	TA44-TU03	TU03	TPS	E44A	-4282	-578	1567	121	-1176	-1495	min Mxz
	TA44-TU03	TU03	TPS	O12H	-9179	1801	3768	122	-1739	-3164	MAX Myz
	TA44-TU03	TU03	TPS	E44C	-4158	721	222	-43	-851	-1545	min Myz

SET 1	TC24-TU01	TU01	TPS	O12B	**-4212**	-2056	-3207	54	1916	2625	MAX Fx - min Fxy
	TA44-TU03	TU03	TPS	O12B	**-9721**	1668	2998	86	-1622	-3166	min Fx - MAX Fxy
	TA44-TU03	TU03	TPS	O12E	-8539	**2730**	3411	32	-1616	-3166	MAX Fy
	TC44-TU04	TU04	TPS	O32A	-7907	**-2620**	3015	-84	-1415	3189	min Fy
	TA44-TU03	TU03	TPS	O12G	-8689	2240	**3939**	99	-1736	-3164	MAX Fz
	TA24-TU02	TU02	TPS	O12C	-5380	1530	**-3825**	-191	**2063**	-2713	min Fz - MAX Mxy - MAX My
	TA44-TU03	TU03	TPS	O12A	-9607	1564	3379	116	-1692	-3165	MAX Fxz
	TC24-TU01	TU01	TPS	O12A	-4329	-2161	-2884	35	1830	2637	min Fxz
	TA44-TU03	TU03	TPS	O12F	-8424	2625	3791	62	-1685	-3164	MAX Fyz
	TC44-TU04	TU04	TPS	O22D	-6444	-1260	2377	-105	-1627	2755	min Fyz
	TA44-TU03	TU03	TPS	O22H	-7288	1517	3748	**145**	**-1992**	-2796	MAX Mx - min My
	TA24-TU02	TU02	TPS	O12B	-5947	1116	-3599	**-194**	2028	-2709	min Mx
	TC44-TU04	TU04	TPS	O32C	-8907	-1919	2500	-104	-1318	**3210**	MAX Mz - MAX Mxz
	TA44-TU03	TU03	TPS	O12C	-9530	2078	2855	37	-1535	**-3175**	min Mz
	TC44-TU04	TU04	TPS	O12C	-8124	-1917	2223	-70	-1255	3121	min Mxy
	TC24-TU01	TU01	TPS	O12C	-4400	-1691	-3332	72	1983	2602	min Mxz
	TA44-TU03	TU03	TPS	O12H	-9179	1801	3768	122	-1739	-3164	MAX Myz
	TC24-TU01	TU01	TPS	O12G	-5256	-1509	-2368	42	1745	2636	min Myz

SET 2	TA44-TU03	TU03	TPS	E44F	**-1394**	2159	2726	38	-1260	-1543	MAX Fx
	TA44-TU03	TU03	TPS	E13B	**-8265**	338	1413	56	-1087	-2331	min Fx - MAX Fxz - MAX Fxy
	TA44-TU03	TU03	TPS	E13E	-5377	**3075**	2573	-28	-1171	-2379	MAX Fy
	TC44-TU04	TU04	TPS	E33A	-5098	**-3022**	2372	-18	-1077	2422	min Fy
	TA44-TU03	TU03	TPS	E13G	-5501	1777	**3918**	137	-1496	-2329	MAX Fz
	TA24-TU02	TU02	TPS	E13C	-3324	1316	**-3830**	-217	**1776**	-2032	min Fz - MAX Mxy - MAX My
	TA44-TU03	TU03	TPS	E44G	-1940	1152	3084	120	-1380	-1514	min Fxy
	TA44-TU03	TU03	TPS	E44E	-1816	2450	1739	-44	-1055	-1564	min Fxz
	TA44-TU03	TU03	TPS	E13F	-4954	2784	3559	55	-1375	-2358	MAX Fyz
	TA44-TU03	TU03	TPS	E34B	-6014	-91	594	23	-796	-1771	min Fyz
	TA44-TU03	TU03	TPS	E23H	-5243	425	3422	**189**	-1656	-2026	MAX Mx
	TA24-TU02	TU02	TPS	E13B	-4560	247	-3353	**-236**	1720	-2006	min Mx
	TA44-TU03	TU03	TPS	E23G	-4046	1559	3902	155	**-1690**	-2046	min My
	TC44-TU04	TU04	TPS	E33B	-6257	-2391	1411	-17	-888	**2438**	MAX Mz - MAX Mxz
	TA24-TU02	TU02	TPS	E23F	-5762	2219	-1527	44	881	**-2420**	min Mz
	TA24-TU02	TU02	TPS	E44G	-5667	984	-353	75	501	-1984	min Mxy
	TA44-TU03	TU03	TPS	E44A	-4282	-578	1567	121	-1176	-1495	min Mxz
	TA24-TU02	TU02	TPS	E23C	-4778	1525	-3830	-200	1520	-2317	MAX Myz
	TA44-TU03	TU03	TPS	E44C	-4158	721	222	-43	-851	-1545	min Myz

Table 13.1 - Maximum internal forces of structural members at TP-Topside interface – Factored Load Combinations

13.1.1.2 Unfactored Load Combinations

	MEMBER	MEMBER END	GROUP	LOAD CASE	Fx [kN]	Fy [kN]	Fz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]	REMARK
ALL LC	TC24-TU01	TU01	TPS	EA1B	**-2586**	-1995	-2790	36	1513	1986	MAX Fx - min Fxy
	TA44-TU03	TU03	TPS	EA1B	**-7765**	708	1740	55	-1130	-2335	min Fx - MAX Fxz - MAX Fxy
	TA44-TU03	TU03	TPS	EA1E	-5749	**2618**	2549	-2	-1188	-2369	MAX Fy
	TC44-TU04	TU04	TPS	EA3A	-5470	**-2566**	2345	-41	-1084	2414	min Fy
	TA44-TU03	TU03	TPS	EA1G	-5840	1711	**3482**	112	-1415	-2334	MAX Fz - MAX Myz
	TA24-TU02	TU02	TPS	EA1C	-3661	1259	**-3407**	-183	**1671**	-2044	min Fz - MAX Mxy - MAX My
	TC24-TU01	TU01	TPS	EA1A	-2876	-2167	-2184	3	1347	2015	min Fxz
	TA44-TU03	TU03	TPS	EA1F	-5456	2415	3234	55	-1331	-2355	MAX Fyz
	TC44-TU04	TU04	TPS	EA2D	-5457	-432	1389	-93	-1169	2058	min Fyz
	TA44-TU03	TU03	TPS	EA2H	-5220	702	3131	**154**	-1585	-2037	MAX Mx
	TA24-TU02	TU02	TPS	EA1B	-4524	511	-3076	**-197**	1632	-2026	min Mx
	TA44-TU03	TU03	TPS	EA2G	-4385	1493	3467	130	**-1609**	-2051	min My
	TC44-TU04	TU04	TPS	OA3C	-6746	-1442	1877	-81	-1006	**2427**	MAX Mz - MAX Mxz
	TA24-TU02	TU02	TPS	EA2F	-5796	1955	-1805	4	970	**-2400**	min Mz
	TC44-TU04	TU04	TPS	EA1C	-6513	-1325	1148	-41	-862	2350	min Mxy
	TC24-TU01	TU01	TPS	EA1D	-3861	-598	-2688	93	1575	1953	min Mxz
	TA44-TU03	TU03	TPS	EA4C	-5322	1185	1264	-5	-1151	-2008	min Myz

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SET 1	TC24-TU01	TU01	TPS	OA1B	**-3203**	-1567	-2427	40	1450	1991	MAX Fx - min Fxy
	TA44-TU03	TU03	TPS	OA1B	**-7289**	1214	2212	63	-1222	-2378	min Fx - MAX Fxy
	TA44-TU03	TU03	TPS	OA1E	-6346	**2068**	2549	23	-1222	-2381	MAX Fy
	TC44-TU04	TU04	TPS	OA3A	-5954	**-2004**	2294	-65	-1084	2412	min Fy
	TA44-TU03	TU03	TPS	OA1G	-6456	1672	**2970**	76	-1319	-2377	MAX Fz - MAX Myz
	TA24-TU02	TU02	TPS	OA1C	-4069	1172	**-2901**	-145	**1557**	-2057	min Fz - MAX Mxy - MAX My
	TA44-TU03	TU03	TPS	OA1A	-7192	1128	2517	88	-1279	-2376	MAX Fxz
	TC24-TU01	TU01	TPS	OA1A	-3302	-1651	-2167	26	1380	2001	min Fxz
	TA44-TU03	TU03	TPS	OA1F	-6249	1982	2853	48	-1278	-2379	MAX Fyz
	TC44-TU04	TU04	TPS	OA2D	-4862	-922	1784	-82	-1243	2076	min Fyz
	TA44-TU03	TU03	TPS	OA2H	-5392	1100	2815	**111**	**-1513**	-2092	MAX Mx - min My
	TA24-TU02	TU02	TPS	OA1B	-4513	838	-2726	**-148**	1531	-2053	min Mx
	TC44-TU04	TU04	TPS	OA3C	-6746	-1442	1877	-81	-1006	**2427**	MAX Mz - MAX Mxz
	TA44-TU03	TU03	TPS	OA1C	-7131	1542	2099	27	-1157	**-2386**	min Mz
	TC44-TU04	TU04	TPS	OA1C	-6144	-1440	1663	-54	-958	2358	min Mxy
	TC24-TU01	TU01	TPS	OA1C	-3361	-1273	-2527	55	1502	1974	min Mxz
	TC24-TU01	TU01	TPS	OA1G	-4048	-1127	-1753	31	1310	2001	min Myz

SET 2	TC24-TU01	TU01	TPS	EA1B	**-2586**	-1995	-2790	36	1513	1986	MAX Fx - min Fxy
	TA44-TU03	TU03	TPS	EA1B	**-7765**	708	1740	55	-1130	-2335	min Fx - MAX Fxz - MAX Fxy
	TA44-TU03	TU03	TPS	EA1E	-5749	**2618**	2549	-2	-1188	-2369	MAX Fy
	TC44-TU04	TU04	TPS	EA3A	-5470	**-2566**	2345	-41	-1084	2414	min Fy
	TA44-TU03	TU03	TPS	EA1G	-5840	1711	**3482**	112	-1415	-2334	MAX Fz - MAX Myz
	TA24-TU02	TU02	TPS	EA1C	-3661	1259	**-3407**	-183	**1671**	-2044	min Fz - MAX Mxy - MAX My
	TC24-TU01	TU01	TPS	EA1A	-2876	-2167	-2184	3	1347	2015	min Fxz
	TA44-TU03	TU03	TPS	EA1F	-5456	2415	3234	55	-1331	-2355	MAX Fyz
	TC44-TU04	TU04	TPS	EA2D	-5457	-432	1389	-93	-1169	2058	min Fyz
	TA44-TU03	TU03	TPS	EA2H	-5220	702	3131	**154**	-1585	-2037	MAX Mx
	TA24-TU02	TU02	TPS	EA1B	-4524	511	-3076	**-197**	1632	-2026	min Mx
	TA44-TU03	TU03	TPS	EA2G	-4385	1493	3467	130	**-1609**	-2051	min My
	TC44-TU04	TU04	TPS	EA3B	-6277	-2126	1677	-40	-953	**2425**	MAX Mz - MAX Mxz
	TA24-TU02	TU02	TPS	EA2F	-5796	1955	-1805	4	970	**-2400**	min Mz
	TC44-TU04	TU04	TPS	EA1C	-6513	-1325	1148	-41	-862	2350	min Mxy
	TC24-TU01	TU01	TPS	EA1D	-3861	-598	-2688	93	1575	1953	min Mxz
	TA44-TU03	TU03	TPS	EA4C	-5322	1185	1264	-5	-1151	-2008	min Myz

Table 13.2 - Maximum internal forces of structural members at TP-Topside interface – Un-Factored Load Combinations

13.1.1.3 Rev 01 & Rev. 00 Comparison of Results

The table 13.3 presents the comparison between the internal forces at TP-Topside interface obtained in Rev.00 (green) and the new forces as per Rev. 01 (orange).

01	MEMBER	MEMBER END	GROUP	LOAD CASE	Fx [kN]	Δ%	Fy [kN]	Δ%	Fz [kN]	Δ%	Mx [kNm]	Δ%	My [kNm]	Δ%	Mz [kNm]	Δ%	REMARK
ALL LC	TA44-TU03	TU03	TPS	E44F	**-1394**	0.1	2159		2726		38		-1260		-1543		MAX Fx
	TA44-TU03	TU03	TPS	O12B	**-9721**	2.3	1668		2998		86		-1622		-3166		min Fx - MAX Fxy
	TA44-TU03	TU03	TPS	E13E	-5377		**3075**	5.7	2573		-28		-1171		-2379		MAX Fy
	TC44-TU04	TU04	TPS	E13A	-5098		**-3022**	4.5	2372		-18		-1077		2422		min Fy
	TA44-TU03	TU03	TPS	O12G	-8689		2240		**3939**	2.5	99		-1736		-3164		MAX Fz
	TA24-TU02	TU02	TPS	E13C	-3324		1316		**-3830**	1.6	-217		1776		-2032		min Fz
	TA44-TU03	TU03	TPS	E44G	-1940		1152		3084		120		-1380		-1514		min Fxy
	TA44-TU03	TU03	TPS	E44E	-1816		2450		1739		-44		-1055		-1564		min Fxz
	TA44-TU03	TU03	TPS	O12F	-8424		2625		3791		62		-1685		-3164		MAX Fyz
	TA44-TU03	TU03	TPS	E34B	-6014		-91		594		23		-796		-1771		min Fyz
	TA44-TU03	TU03	TPS	E23H	-5243		425		3422		**189**	-27.7	-1656		-2026		MAX Mx
	TA24-TU02	TU02	TPS	E13B	-4560		247		-3353		**-236**	-20.7	1720		-2006		min Mx
	TA24-TU02	TU02	TPS	O12C	-5380		1530		-3825		-191		**2063**	-4.4	-2713		MAX My - MAX Mxy
	TA44-TU03	TU03	TPS	O22H	-7288		1517		3748		145		**-1992**	4.6	-2796		min My
	TC44-TU04	TU04	TPS	O32C	-8907		-1919		2500		-104		-1318		**3210**	-3.4	MAX Mz - MAX Mxz
	TA44-TU03	TU03	TPS	O12C	-9530		2078		2855		37		-1535		**-3175**	-1.2	min Mz
	TA24-TU02	TU02	TPS	E44G	-5667		984		-353		75		501		-1984		min Mxy
	TA44-TU03	TU03	TPS	E44H	-9179		1801		3768		122		-1739		-3164		min Mxz
	TA44-TU03	TU03	TPS	O12H	-4158		721		222		-43		-851		-1545		MAX Myz
00	**MEMBER**	**MEMBER END**	**GROUP**	**LOAD CASE**	**Fx [kN]**		**Fy [kN]**		**Fz [kN]**		**Mx [kNm]**		**My [kNm]**		**Mz [kNm]**		**REMARK**
ALL LC	TA44-TU03	TU03	TPS	E44F	**-1393**		2049		2689		70		-1305		-1610		MAX Fx
	TA44-TU03	TU03	TPS	O12B	**-9502**		1291		2774		171		-1365		-3199		min Fx - MAX Fxz - MAX Fxy
	TA44-TU03	TU03	TPS	E33E	-4763		**2900**		2269		10		-1019		-2369		MAX Fy
	TC44-TU04	TU04	TPS	E33A	-5035		**-2887**		2361		-60		-1098		2535		min Fy
	TA44-TU03	TU03	TPS	E13G	-5492		1567		**3841**		190		-1381		-2406		MAX Fz
	TA24-TU02	TU02	TPS	E13C	-3614		1266		**-3770**		-250		1839		-1969		min Fz
	TA44-TU03	TU03	TPS	E44G	-1948		1013		3059		153		-1408		-1594		min Fxy
	TA44-TU03	TU03	TPS	E44E	-1817		2344		1688		-3		-1095		-1622		min Fxz
	TA44-TU03	TU03	TPS	E13F	-4936		2603		3471		106		-1278		-2423		MAX Fyz
	TA44-TU03	TU03	TPS	E44C	-4185		554		165		22		-836		-1611		min Fyz - min Myz
	TA44-TU03	TU03	TPS	E23H	-5260		202		3358		**242**		-1566		-2115		MAX Mx
	TA24-TU02	TU02	TPS	E13B	-4861		192		-3264		**-285**		1786		-1950		min Mx
	TA24-TU02	TU02	TPS	O12C	-5786		1460		-3698		-262		**2155**		-2610		MAX My - MAX Mxy
	TC44-TU04	TU04	TPS	O42G	-5998		-1611		3536		-222		**-1899**		2932		min My
	TC44-TU04	TU04	TPS	O32B	-8269		-2113		2644		-158		-1377		**3321**		MAX Mz - MAX Mxz
	TA44-TU03	TU03	TPS	O12E	-8335		2422		3232		129		-1426		**-3212**		min Mz
	TC24-TU01	TU01	TPS	E24G	-5898		-726		-335		-17		569		1988		min Mxy
	TA44-TU03	TU03	TPS	E44A	-4316		-777		1536		179		-1148		-1582		min Mxz
	TC44-TU04	TU04	TPS	O32G	-7869		-1858		3530		-214		-1576		3293		MAX Myz

Table 13.3 - Internal forces of structural members at TP-Topside interface – Comparison – Factored Load Combinations

The columns Δ% show the percentual increase or decrease of internal forces in structural members connecting TP to topside. Values in red mean the forces obtained in new revision of the in-service analysis are greater than the old ones, while values in green that new forces are lower than the previous ones.

The maximum increase results to be lower than 6% in shear, less than 2.5% in vertical action and 5% in moment. The increase in shear is due to the increased windage area used in rev. 01. Based on the above, the verification of TP performed in reports /31/ and /32/ are considered valid being performed with NTE weight of platform in operating condition equal to 2400 t greater than the WCR.

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13.1.2 Reactions at Monopile - Transition Piece Connection Interface

Maximum load resultants at MP-TP connection (joint TMIJ) are reported in the following tables for factored and Unfactored In-Service Load Combinations. The full set of base reactions is given in APPENDIX D.

13.1.2.1 Factored Load Combinations

JOINT	Rx [kN]				Ry [kN]				Rz [kN]				MOMENT(X) [kNm]				MOMENT(Y) [kNm]				MOMENT(Z) [kNm]			
	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND
TMIJ	6869	E13E	-6869	E13A	6389	E13G	-6389	E13C	31445	O12A	19381	E24A	100070	E13C	-94416	E24G	84212	E44E	-88609	E13A	3350	E13G	-3350	E13C

Table 13.4 - Reactions at MP-TP interface level (el.+17.05m) – ULS Factored Load Combinations

13.1.2.2 Unfactored Load Combinations

JOINT	Rx [kN]				Ry [kN]				Rz [kN]				MOMENT(X) [kNm]				MOMENT(Y) [kNm]				MOMENT(Z) [kNm]			
	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND
TMIJ	4804	EA1E	-4804	EA1A	4448	EA1G	-4448	EA1C	23761	OA1A	19381	EA1A	79239	EA1C	-63332	EA2G	56993	EA3E	-66185	EA1A	2361	EA1G	-2361	EA1C

Table 13.5 - Reactions at MP-TP interface level (el.+17.05m) – Un-Factored Load Combinations

13.1.2.3 Rev 01 & Rev. 00 Comparison of Results

The table 13.6 presents the comparison between themaximum resultants at TP-MP connection (joint TMIJ) obtained in Rev.00 (green) and the new forces as per Rev. 01 (orange).

Rev. 01																								
JOINT	Rx [kN]				Ry [kN]				Rz [kN]				MOMENT(X) [kNm]				MOMENT(Y) [kNm]				MOMENT(Z) [kNm]			
	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND
TMIJ	6869	E13E	-6869	E13A	6389	E13G	-6389	E13C	31445	O12A	19381	E24A	100070	E13C	-94416	E24G	84212	E44E	-88609	E13A	3350	E13G	-3350	E13C
Rev. 00																								
JOINT	Rx [kN]				Ry [kN]				Rz [kN]				MOMENT(X) [kNm]				MOMENT(Y) [kNm]				MOMENT(Z) [kNm]			
	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND	MAX	LCOND	MIN	LCOND
TMIJ	6819	EN3E	-6819	EN3A	6340	EN3G	-6340	EN3C	31116	ON10	19381	E14A	100249	E13C	-95449	E24G	84128	E34E	-90005	E13A	3762	EN3H	-3762	E33D
variation Δ%																								
	1		1		1		1		1		0		0		-1		0		-2		-12		-12	

Table 13.6 - Reactions at MP-TP interface level (el.+17.05m) – Comparison – Factored Load Combinations

The columns Δ% show the percentual increase or decrease of internal forces in structural members connecting MP to TP. Values in red mean the forces obtained in new revision of in-service analysis are greater than the old ones, while values in green that new forces are lower than the previous ones. The maximum increase results to be lower than 1% and therefore the verification of TP performed in report /33/ is considered valid also considering the analyses performed with NTE weight of platform in operating condition equal to 2400 t and therefore bigger than WCR.

13.2 CHECKS OF MAXIMUM LOADS FOR MONOPILE FOUNDATION

In this section the maximum allowable loads for each defined load category coming from "Foundation Load Document for BLPH", ref./47/, reported in Table 13.7, have been compared to correspondent loads or reactions as per structural In-Service analysis.

Load resultants comparison:

Load comparison is provided with reference to un-factored basic load conditions (SLS), since in ref./47/ different load combination factors from ISO19902, have been considered for ULS.

SLS UNFACTORED LOAD COMBINATION – from Ref./47/					
Basic Load Category	**Mxy [kNm]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	52565	-	-	24611	1.00
Icing	9442	-	-	4405	1.00
Variable	7515	-	-	3443.31	1.00
Wave	89616	4467	-	1746	1.00
Wind	13984	1247	2480	-	1.00
TOT	**173122**	**5714**	**2480**	**34205**	

Table 13.7- SLS un-factored load combination from ref. /47/

The comparison is detailed for each basic load category (Permanent, Icing, Variable, Wave and Wind loads) with maximum load ratio calculation (= current In-Service Analysis load / Foundation Calculation report load).

Permanent Loads	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**
BLPH In service - Detail Design (Cog Shift)	30312			20983
144671-VOOW-TF-ENG-REP-1054	52565	-	-	24611
Maximum loads ratio (<1.0)	**0.57**	**-**	**-**	**0.85**

Variable Loads	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**
MECC + LILD	16066	-	-	1203
144671-VOOW-TF-ENG-REP-1054	7515	-	-	3443
Maximum loads ratio (<1.0)	**2.14**	**-**	**-**	**0.35**

Variable loads considered in ref./47/ are larger but more centered compared to present design and comparison in the following provide an Mxy resultant ratio > 1.0. However, the combination of Permanent Loads and Variable loads is compliant with limiting values as per ref./47/.

Permanent + Variables Loads	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**
BLPH In service - Detail Design (G1A5)	33755	-	-	23576
144671-VOOW-TF-ENG-REP-1054	60080	-	-	28054
Maximum loads ratio (<1.0)	**0.56**	**-**	**-**	**0.84**

Wind Extreme Forces	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**

BLPH In service - Detail Design	12078	1149	1688
144671-VOOW-TF-ENG-REP-1054	13639	1247	2480
Maximum loads ratio (<1.0)	**0.89**	**0.92**	**0.68**

Wave Extreme Forces	**Mxy [kN]**	**Fxy [kN]**	**Fz [kN]**
BLPH In service - Detail Design	58935	3834	0
144671-VOOW-TF-ENG-REP-1054	89616	4467	1746
Maximum loads ratio (<1.0)	**0.66**	**0.86**	**0.00**

Table 13.8 - SLS un-factored basic load cases resultant comparison with ref. /47/ and maximum loads ratio calculation

Total reactions comparison:

The comparison between total reactions for SLS, ULS A and ULS B as per ref./47/ and corresponding combinations of basic load conditions as per sec.11 and 12 is provided in following tables, showing load ratios lower than 1.0.

Load combinations ULS A and B from Sacs basic load conditions are only reported for comparison and not used for structural checks, since ISO 19902 provides different load combinations factors for structural checks.

SLS UNFACTORED LOAD COMBINATION RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	52565	-	-	24611	1
Icing	9442	-	-	4405	1
Variable	7515	-	-	3443	1
Wave	89616	4467	-	1746	1
Wind	13639	1247	2480	-	1
TOT	**172777**	**5714**	**2480**	**34205**	

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SACS UNFACTORED LOAD COMBINATIONS RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	33755	-	-	23576	1.00
Icing	260	-	-	1353	1.00
Variable	16066	-	-	1203	1.00
Wave	58935	3834	-	-	1.00
Wind	12078	1149	1688	-	1.00
TOT	**121095**	**4982**	**1688.3**	**26132**	
Ratio TOT Loads	**0.70**	**0.87**	**0.68**	**0.76**	

ULS A - FACTORED LOAD COMBINATION RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	52565	-	-	24611	1
Icing	9442	-	-	4405	1
Variable	7515	-	-	3443	1
Wave	89616	4467	-	1746	1
Wind	13639	1247	2480	-	1
TOT LIMITING	**156992**	**3999**	**1736**	**40776**	
TOT	**156992**	**4000**	**1736**	**40776**	
REPORT 144671-VOOW-TF-ENG-REP-1054	157233	3999	1736	**44466**	

SACS FACTORED LOAD COMBINATIONS USL A RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	33755	-	-	23576	1.30
Icing	260	-	-	1353	0.70
Variable	16066	-	-	1203	1.30
Wave	58935	3834	-	-	0.70
Wind	12078	1149	1688	-	0.70
TOT	**114659**	**3488**	**1182**	**33160**	
Ratio = TOT / TOT Limiting Loads	**0.73**	**0.87**	**0.68**	**0.81**	

ULS B - FACTORED LOAD COMBINATION RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	52565	-	-	24611	1
Icing	9442	-	-	4405	1
Variable	7515	-	-	3443	1
Wave	89616	4467	-	1746	1
Wind	13639	1247	2480	-	1
TOT LIMITING	**206586**	**7428**	**3224**	**34205**	
TOT	**206586**	**7428**	**3224**	**36051**	
REPORT 144671-VOOW-TF-ENG-REP-1054	207034	7428	3224	**34205**	

SACS FACTORED LOAD COMBINATIONS USL B RESULTANTS @ INTERFACE LEVEL (+17.05m)					
Basic Load Category	**Mxy [kN]**	**Fxy [kN]**	**Mz [kN]**	**Fz [kN]**	**LF**
Permanent	33755	-	-	23576	1.00
Icing	260	-	-	1353	1.30
Variable	16066	-	-	1203	1.00
Wave	58935	3834	-	-	1.30
Wind	12078	1149	1688	-	1.30
TOT	**142477**	**6477**	**2195**	**26538**	
Ratio TOT Loads	**0.69**	**0.87**	**0.68**	**0.78**	

Table 13.9 – Comparison between SLS, ULS A and ULS B load combinations resultants from ref. /47/ and respective combinations as per In-Service Analysis.

See Appendix F for detailed explanation.

13.3 STRUCTURAL CHECKS

The results of the performed analysis in terms of members' Unity Check (UC) and Joints' Punching Shear Unity Checks are detailed in the following.

13.3.1 ULS Member checks

All members were checked according to ISO 19902 and Eurocode 3, Ref./7/and /9/, respectively for tubular and non-tubular elements. Members' code checks are reported in the following and show that the structure can withstand all In-Service load combinations, with utilization factors below 1.0.

Maximum member UC's are reported in following SACS excerpt and figures.

SACS-IV MEMBER UNITY CHECK RANGE SUMMARY

GROUP II - UNITY CHECKS GREATER THAN 0.70 AND LESS THAN 0.90

MEMBER	GROUP ID	MAXIMUM COMBINED UNITY CK	LOAD COND NO.	DIST FROM END	AXIAL STRESS N/MM2	BENDING STRESS Y N/MM2	BENDING STRESS Z N/MM2	SHEAR FORCE FY KN	SHEAR FORCE FZ KN	KLY/RY	KLZ/RZ	SECOND-HIGHEST UNITY CHECK	SECOND-HIGHEST LOAD COND	THIRD-HIGHEST UNITY CHECK	THIRD-HIGHEST LOAD COND
L048-L210	B01	0.867	O22C	1.0	-71.40	-89.93	28.02	144.67	-402.12	15.1	72.5	0.865	O22B	0.849	O22A
L076-L029	B01	0.787	O32F	0.0	-80.21	-83.58	-18.56	131.44	393.79	15.1	24.2	0.785	O32G	0.765	O32E
L111-L080	B01	0.717	O12H	0.4	-82.47	61.27	8.83	35.37	265.03	15.1	24.2	0.714	O12G	0.695	O12A
L168-LD06	B01	0.777	O42D	0.7	-68.76	-77.07	-11.50	-28.45	-249.34	15.1	72.5	0.771	O42C	0.763	O42E
L262-L048	B01	0.780	O22B	0.5	-77.53	-48.71	-23.84	18.69	-227.45	15.1	72.5	0.773	O22A	0.773	O22C
L519-L168	B01	0.703	O42D	1.0	-78.40	-46.99	4.01	-1.20	-218.88	15.1	72.5	0.696	O42E	0.688	O42C
L011-L040	B03	0.808	O32C	0.0	-11.76	-137.18	-17.98	12.48	475.16	30.1	96.6	0.801	O32B	0.795	O32A
L014-L059	B03	0.826	O32D	0.0	-17.86	-120.07	3.93	-4.61	367.39	30.1	96.6	0.824	O32E	0.823	O32C
L216-L001	B03	0.706	O42G	1.0	-11.63	-105.02	-9.40	-4.91	-322.98	30.1	96.6	0.703	O22G	0.702	O42H
L522-L004	B03	0.709	O42F	1.0	-18.98	-97.34	-1.35	2.38	-288.39	30.1	96.6	0.702	O42G	0.697	O42E
L025-L017	B04	0.781	O32H	1.0	-8.97	-82.42	-26.85	-14.48	-140.77	31.7	129.5	0.781	O32A	0.774	O32G
U233-U001	B12	0.890	O22H	2.0	2.02	-223.97	2.36	3.13	-1000.53	29.1	22.7	0.890	O42H	0.886	O22A
U017-U018	B14	0.808	O12A	4.0	-10.46	-167.56	-27.68	-4.82	-236.63	21.1	86.4	0.808	O12H	0.805	ON2A
L015-L076	B31	0.820	O32G	0.0	-60.45	-83.62	-74.48	133.33	406.95	14.5	21.7	0.820	O32F	0.798	O32H
L521-L005	B31	0.719	O42D	1.0	-53.23	-73.88	-26.27	-33.38	-272.42	14.5	65.2	0.715	O42C	0.704	O42E
L050-U170	D05	0.751	O42G	7.8	-161.38	-44.79	-1.33	0.51	-21.65	56.2	56.2	0.750	O42F	0.740	O42H
L154-U152	D05	0.739	O32E	0.0	-162.89	37.86	1.40	-1.21	-9.10	56.2	56.2	0.738	O32C	0.736	O32D
L00B-Y000	IP3	0.789	O22C	0.0	-0.61	-0.41	252.76	-67.86	46.78	26.3	12.7	0.753	O22D	0.744	O22B
TA24-TU02	TPS	0.785	O22D	0.0	-74.18	222.50	-256.14	2200.66	-3654.70	4.5	4.5	0.784	O22C	0.776	O22E
TA44-TU03	TPS	0.857	O12G	0.0	-91.07	-237.17	-260.78	2240.47	3939.52	4.5	4.5	0.857	O12F	0.848	O12E
TC24-TU01	TPS	0.774	O42B	0.0	-71.77	216.59	257.83	-2300.73	-3476.28	4.5	4.5	0.771	O42C	0.766	O42A
TC44-TU04	TPS	0.807	O32H	0.0	-81.63	-202.84	271.58	-2516.59	3363.36	4.5	4.5	0.804	O32G	0.800	O32A

SACS-IV MEMBER UNITY CHECK RANGE SUMMARY

GROUP III - UNITY CHECKS GREATER THAN 0.90 AND LESS THAN 999.00

MEMBER	GROUP ID	MAXIMUM COMBINED UNITY CK	LOAD COND NO.	DIST FROM END	AXIAL STRESS N/MM2	BENDING STRESS Y N/MM2	BENDING STRESS Z N/MM2	SHEAR FORCE FY KN	SHEAR FORCE FZ KN	KLY/RY	KLZ/RZ	SECOND-HIGHEST UNITY CHECK	SECOND-HIGHEST LOAD COND	THIRD-HIGHEST UNITY CHECK	THIRD-HIGHEST LOAD COND
L210-L003	B31	0.921	O22C	1.0	-55.27	-87.64	85.24	144.67	-414.51	14.5	65.2	0.915	O22B	0.891	O22A

The maximum UC value is equal to 0.921 on member L210-L003 for load combination O22C, in a girder beam located at lower deck.

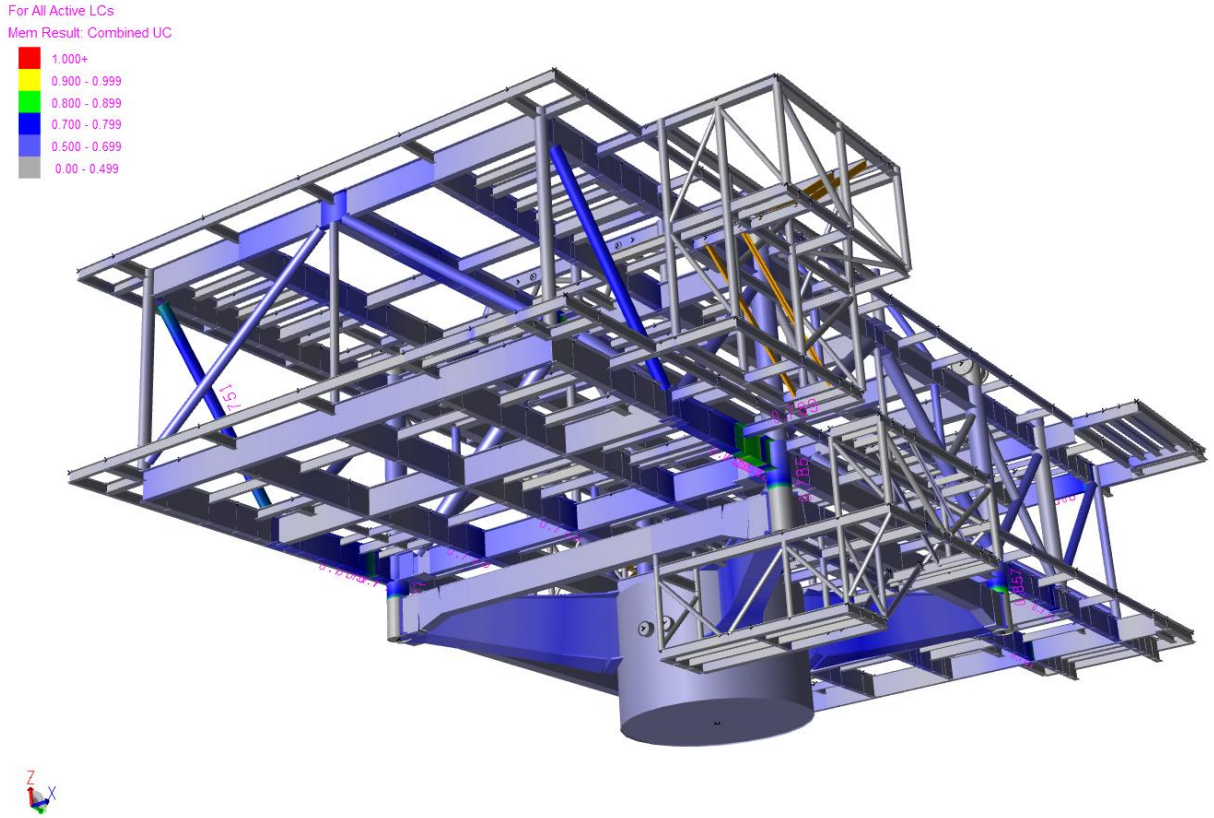


Figure 13.1 - Topside Structural Model 3D view - UC>0.7

Note: access stairs north and south are detailed checked, considering live load, in /34/.

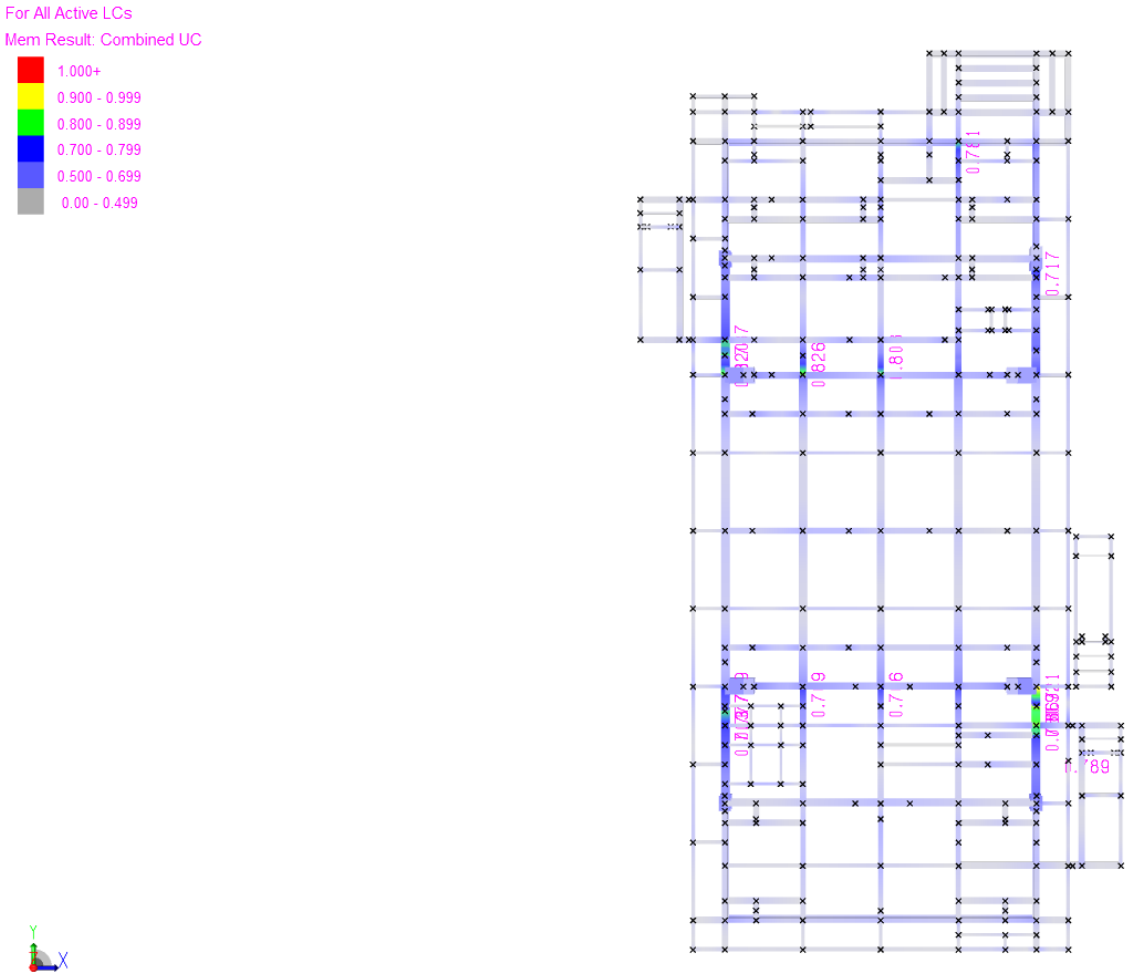


Figure 13.2 - Lower Deck - Member UC>0.7

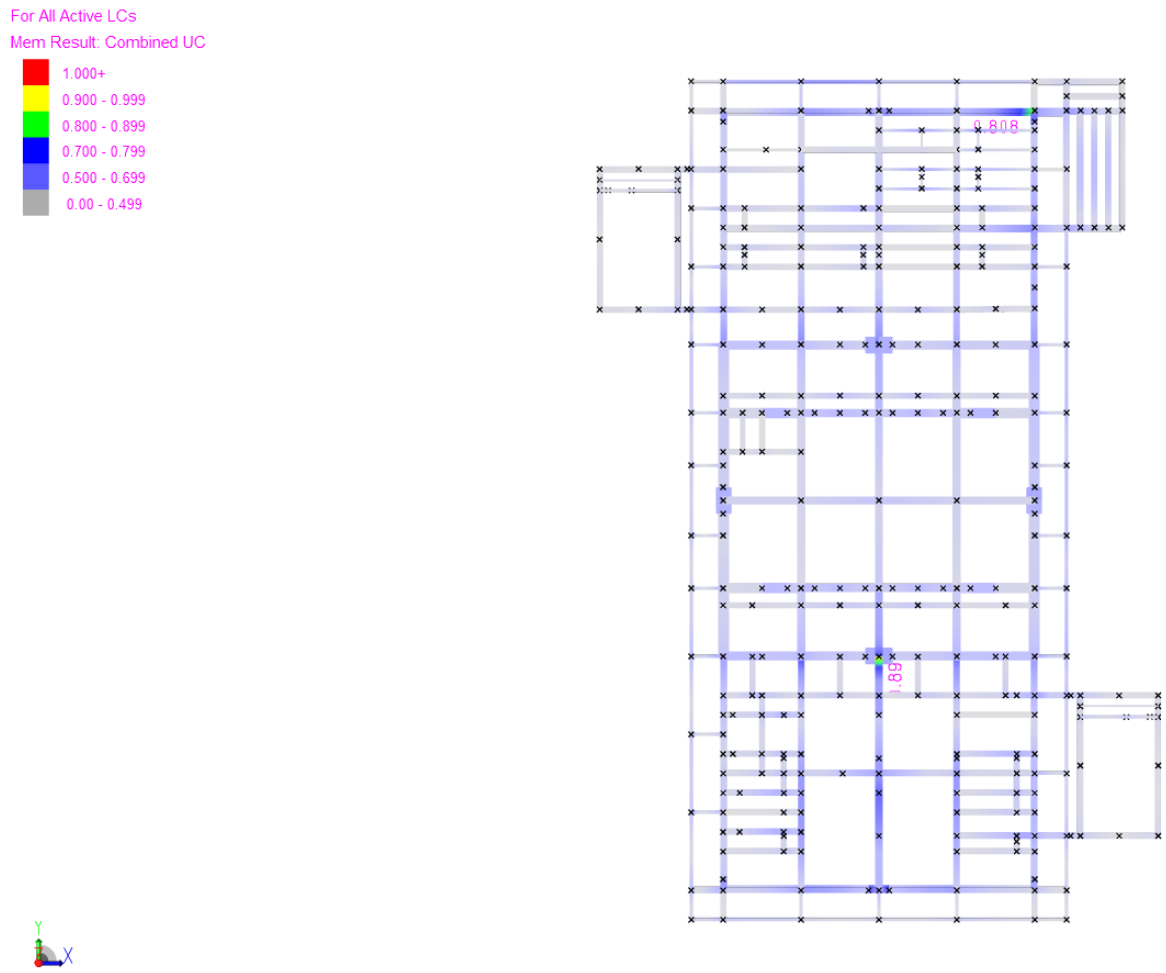


Figure 13.3 - Upper Deck - Member UC>0.7

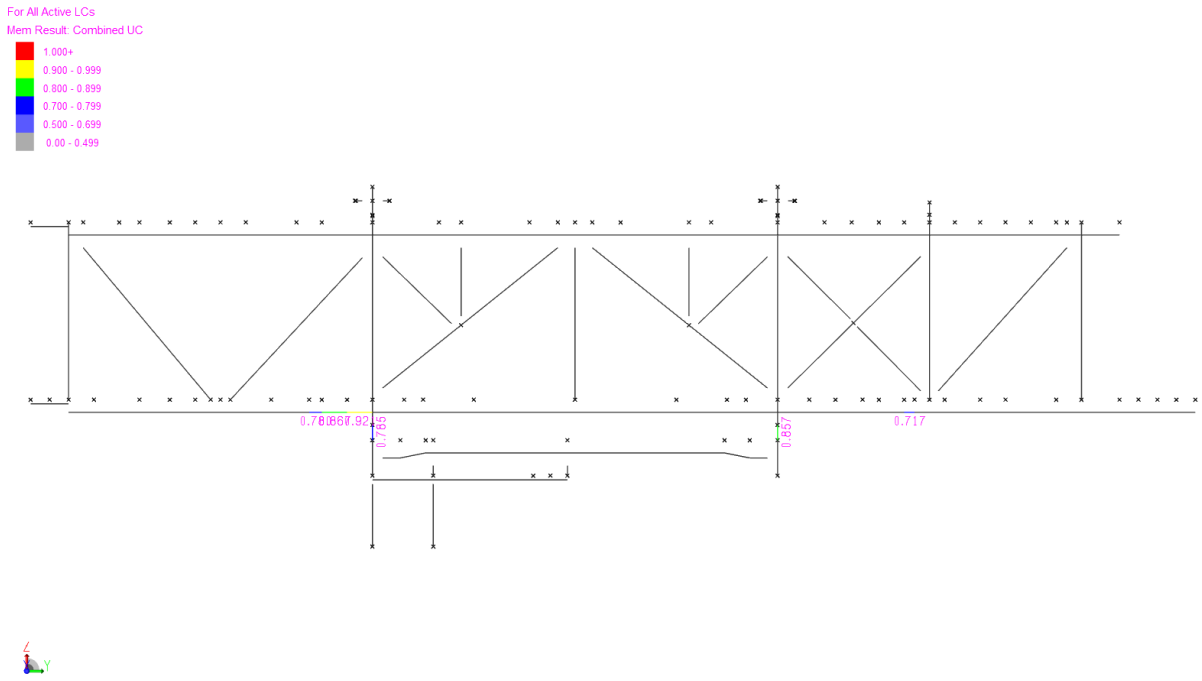


Figure 13.4 - Row A - UC>0.7

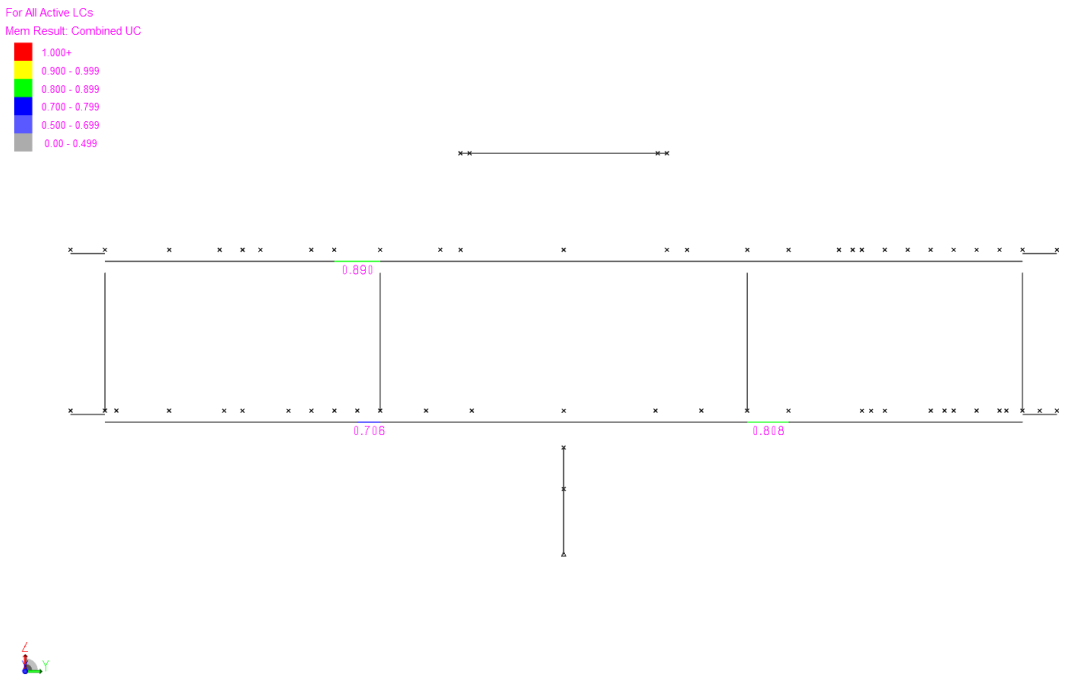


Figure 13.5 - Row B - UC>0.7

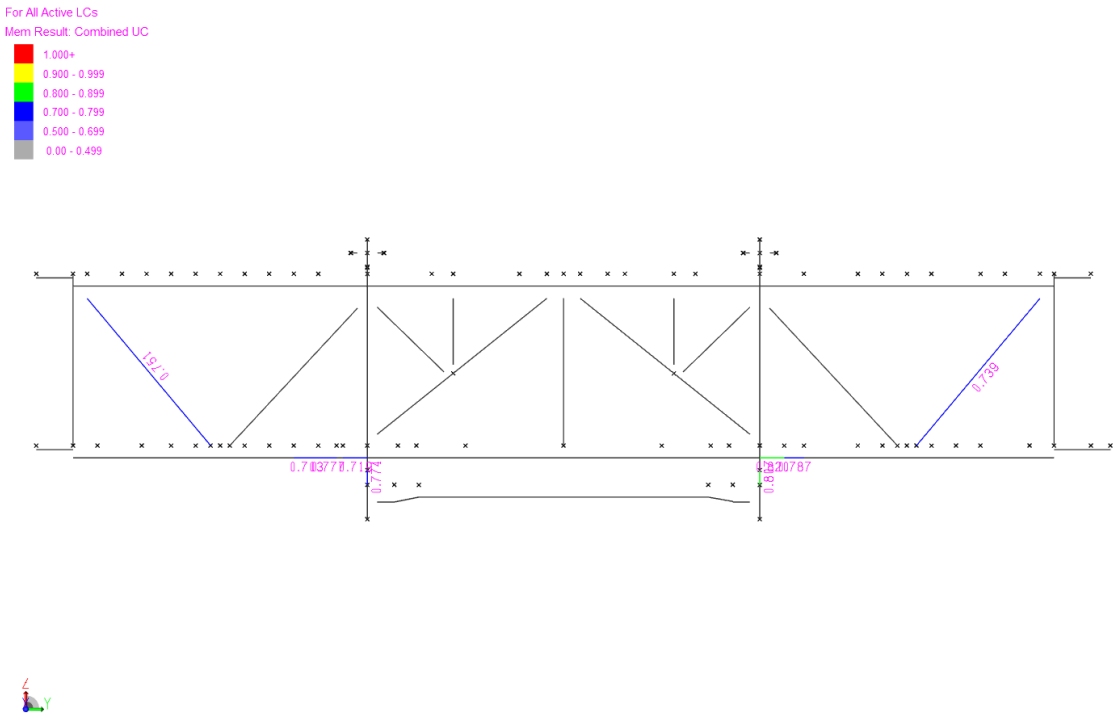


Figure 13.6 - Row C - UC>0.7

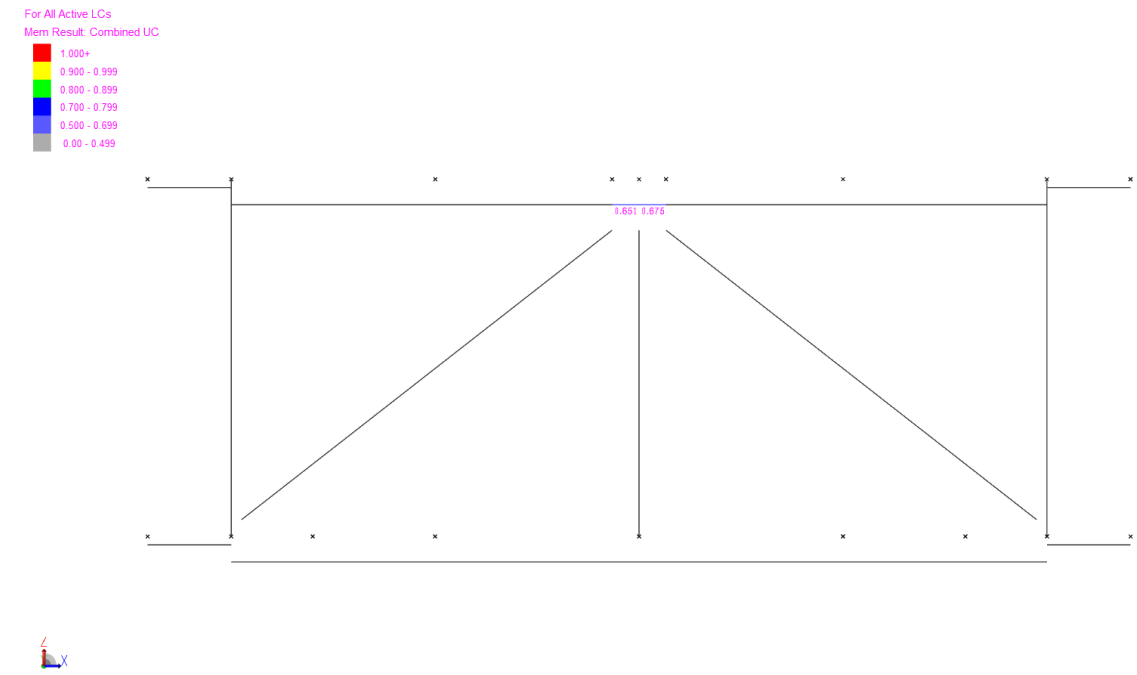


Figure 13.7 - Row 1- UC>0.5

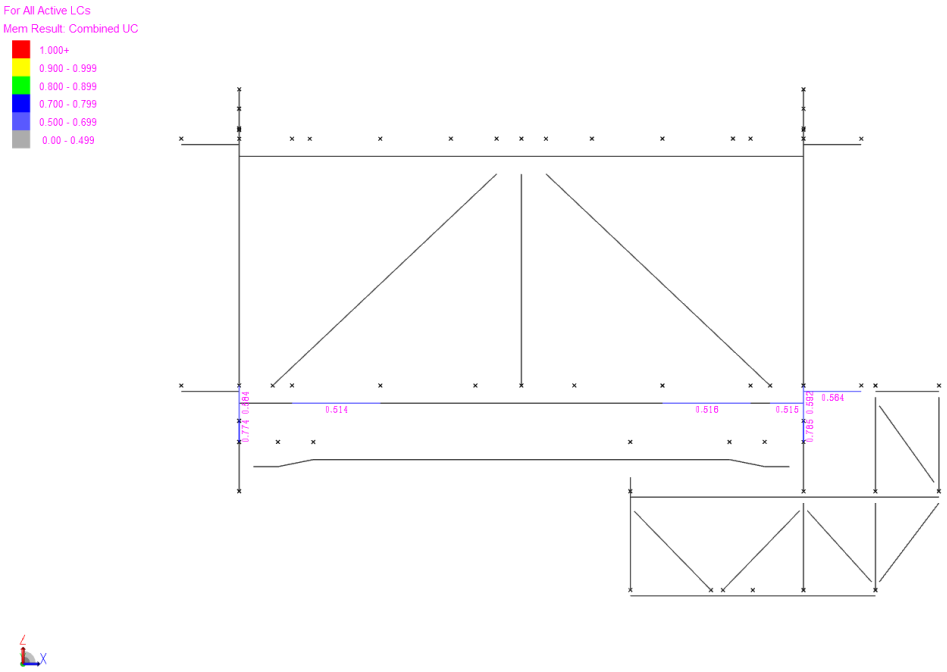


Figure 13.8 - Row 2 – UC>0.5

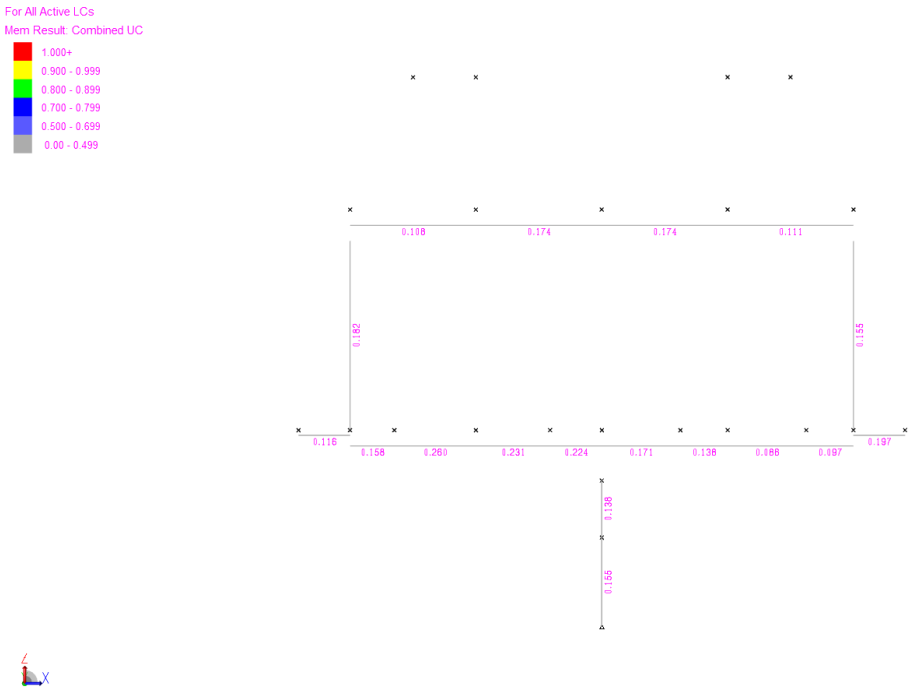


Figure 13.9 - Row 3 - UC>0.0

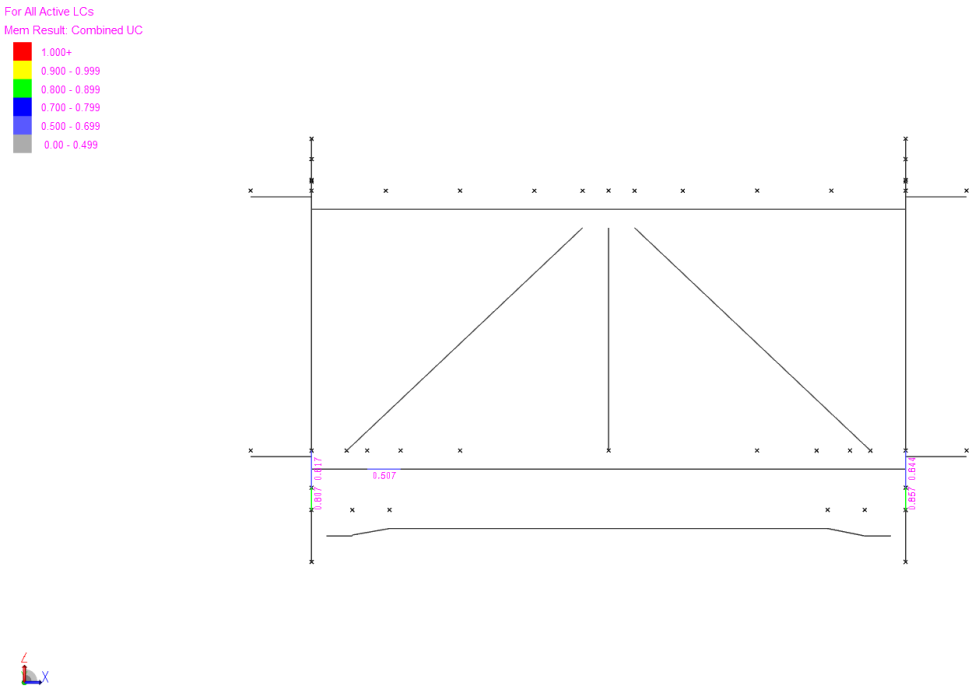


Figure 13.10 – Row 4 – UC>0.5

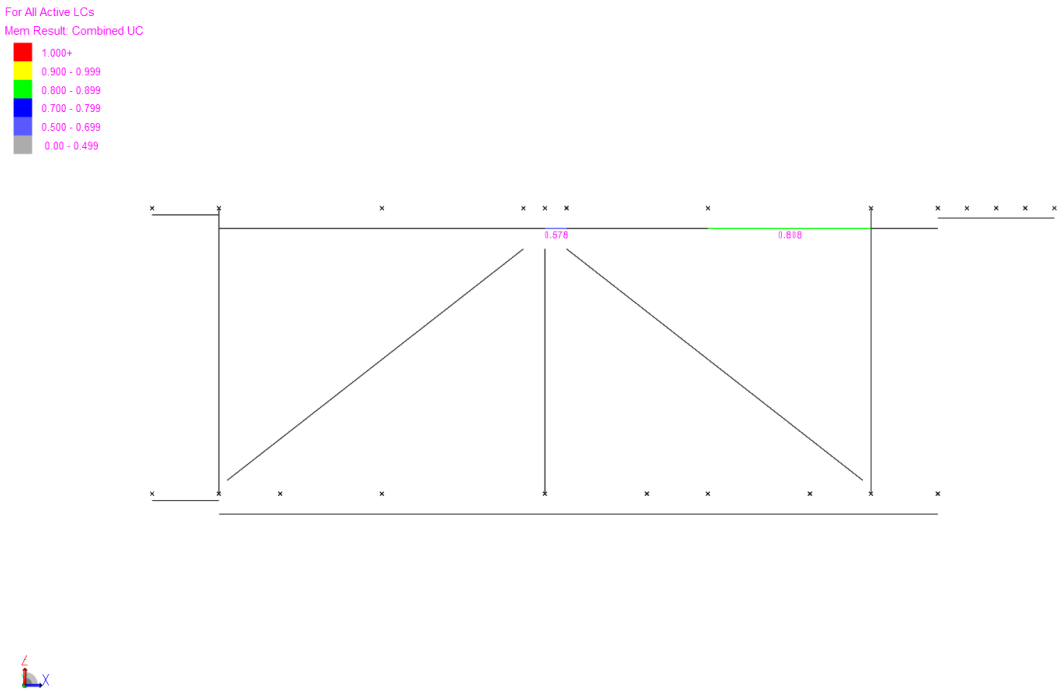


Figure 13.11 - Row 5 - UC>0.5

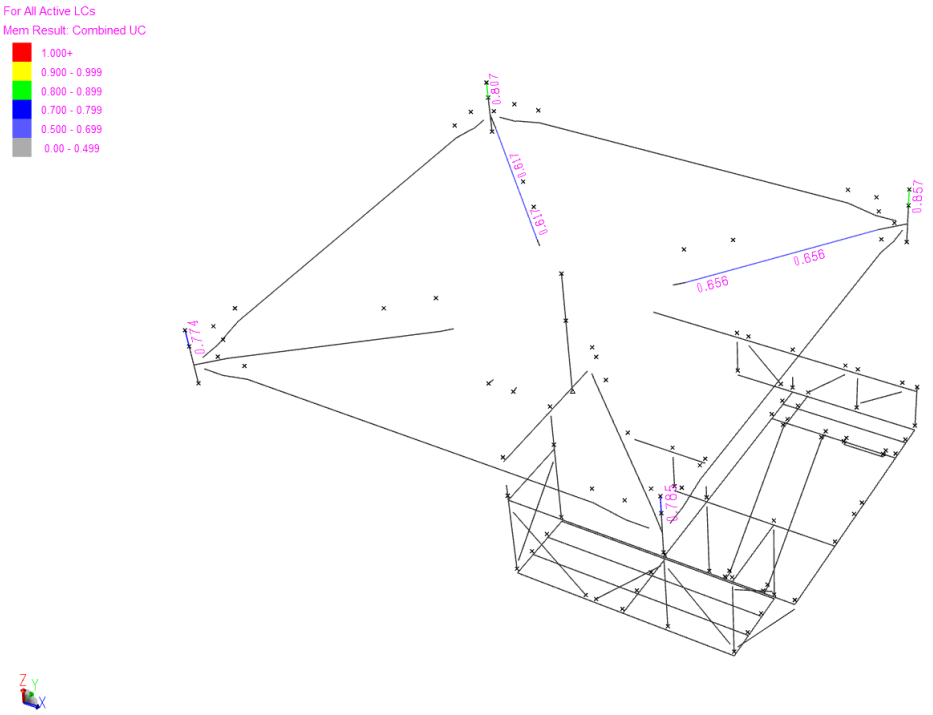


Figure 13.12 - Transition Piece - UC>0.6

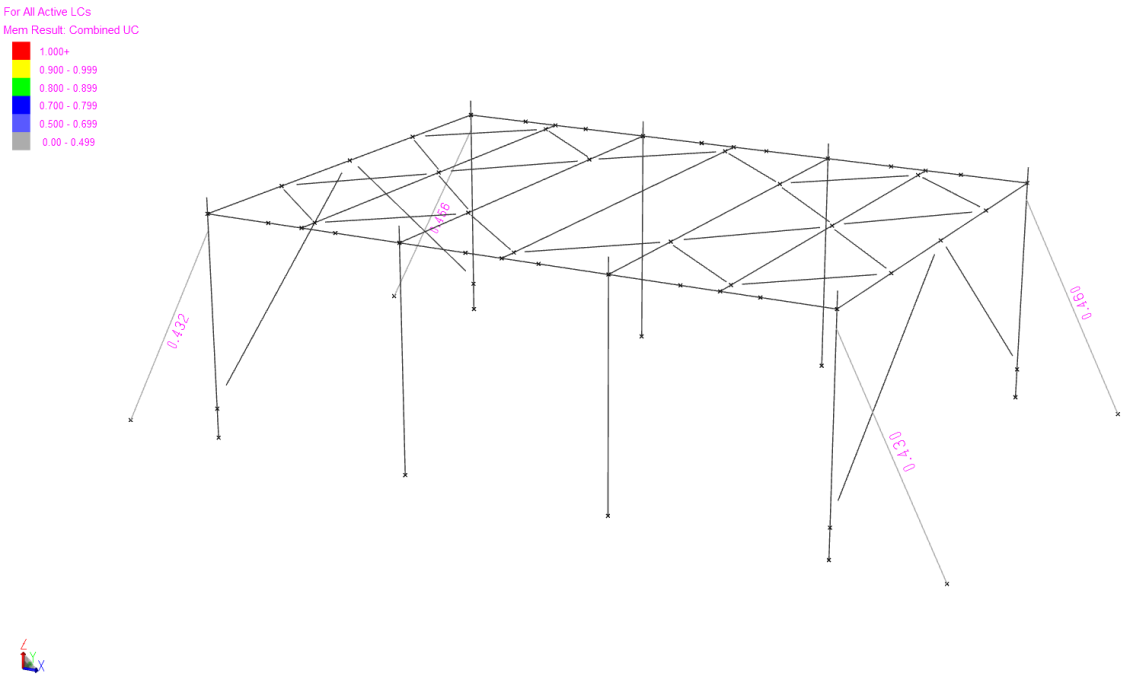


Figure 13.13 -PAU Structure – UC>0.4

Maximum UC per member's group are reported in following SACS excerpt.

* * * M E M B E R G R O U P S U M M A R Y * * *
ISO 19902:2020 / EC3:2005

GRUP ID	CRITICAL MEMBER	LOAD COND	MAX. UNITY CHECK	DIST FROM END M	* APPLIED STRESSES * AXIAL N/MM2	BEND-Y N/MM2	BEND-Z N/MM2	*** ALLOWABLE STRESSES *** AXIAL N/MM2	EULER N/MM2	BEND-Y N/MM2	BEND-Z N/MM2	CRIT COND	EFFECTIVE LENGTHS KLY M	KLZ M	CM * VALUES * Y	Z
B01	L048-L210	O22C	0.87	1.0	-71.4	-89.9	28.0	176.3	385.2	217.9	582.6	BN+COM	6.00	6.00	0.86	0.46
B02	L181-L011	O32C	0.63	2.0	-12.5	-105.6	-8.8	133.3	246.4	199.5	1133.8	BN+COM	16.00	8.00	0.74	0.40
B03	L014-L059	O32D	0.83	0.0	-17.9	-120.1	3.9	121.6	216.7	177.8	1080.6	BN+COM	12.00	6.00	0.87	0.40
B04	L025-L017	O32H	0.78	1.0	-9.0	-82.4	-26.9	76.7	120.6	129.7	942.1	BN+COM	12.00	6.00	0.91	0.49
B05	L225-L018	O42F	0.58	1.0	-0.5	-90.6	24.2	109.0	187.0	166.2	889.2	BN+COM	6.00	6.00	0.93	0.60
B06	U004-U244	O42F	0.27	0.0	15.1	-87.9	5.1	363.6	1441.0	403.6	553.9	BN+AX	16.00	3.50	0.00	0.00
B07	U256-U013	O12C	0.23	2.6	57.0	-26.9	-1.6	363.6	4193.0	405.0	555.1	BN+AX	8.00	2.62	0.00	0.00
B09	H228-UP03	O12A	0.26	1.3	10.7	-38.6	6.2	363.6	1497.6	399.0	550.9	WSHBUC	16.00	4.00	0.00	0.00
B10	L194-L022	O22A	0.26	2.6	15.9	85.2	-0.6	363.6	487.5	266.8	570.0	LATBUC	16.00	4.00	0.00	0.00
B12	U233-U001	O22H	0.89	2.0	2.0	-224.0	2.4	363.6	2390.0	249.3	559.5	LATBUC	12.00	2.00	0.00	0.00
B13	U184-U004	O42F	0.69	2.0	16.4	-150.0	20.1	363.6	216.7	192.5	570.0	LATBUC	12.00	6.00	0.00	0.00
B14	U017-U018	O12A	0.81	4.0	-10.5	-167.6	-27.7	142.4	271.3	235.4	1225.0	BN+COM	8.00	4.00	0.69	0.40
B15	U153-U018	O12E	0.62	0.0	-23.0	-91.4	-10.2	109.0	187.0	245.3	298.8	BN+COM	12.00	6.00	0.40	0.99
B20	U041-U075	E13C	0.35	0.7	10.5	-36.0	0.0	363.6	3585.1	397.0	549.8	SHEAR	8.00	4.50	0.00	0.00
B21	U001-U072	E23A	0.37	0.7	-20.0	-39.1	-3.2	363.6	4963.0	399.8	551.4	SHEAR	8.00	4.00	0.53	0.85
B22	L203-L003	O22A	0.51	0.9	1.3	-81.2	4.7	363.6	5763.9	401.3	552.2	WSHBUC	8.00	4.00	0.00	0.00
B23	L206-L208	O12E	0.26	0.0	30.2	-40.9	-1.5	363.6	5548.4	391.8	547.6	WSHBUC	8.00	4.00	0.00	0.00
B31	L210-L003	O22C	0.92	1.0	-55.3	-87.6	85.2	170.6	476.5	224.3	414.7	BN+COM	6.00	6.00	0.89	0.68
B32	L113-L153	O32E	0.54	0.0	-33.2	-51.7	1.6	363.6	9670.7	406.0	556.2	WSHBUC	6.00	2.00	0.60	0.48
C03	L021-U078	O32D	0.18	0.0	24.2	25.1	-74.7	338.1	482.6	448.2	448.2	TN+BN	6.00	6.00	0.85	0.85
C05	L018-U018	O32D	0.30	0.9	88.7	-94.0	18.2	338.1	808.7	438.3	438.3	TN+BN	7.00	7.00	0.85	0.85
C06	U015-PEC4	E13A	0.00	0.0	-0.3	-0.3	0.0	.3E+03	.2E+05	.5E+03	.5E+03	ACBI	2.80	2.80	0.85	0.85
C07	U045-CR01	O12A	0.20	0.0	-5.2	0.0	102.7	.3E+03	.4E+05	.5E+03	.5E+03	ACBI	1.60	1.60	0.85	0.85
C08	CR01-CR03	O12A	0.34	0.0	-7.6	0.0	146.0	.3E+03	.5E+05	.4E+03	.4E+03	ACBI	1.60	1.60	0.85	0.85
C11	L156-U045	O22E	0.11	7.0	11.1	3.7	-55.7	381.0	1703.8	506.1	506.1	TN+BN	7.00	7.00	0.85	0.85
C20	L015-U015	O32C	0.35	1.2	-80.1	-43.4	-36.9	327.7	3330.5	461.8	461.8	ACBI	7.00	7.00	0.85	0.85
CF1	0001-CF02	O12A	0.07	0.0	0.1	-13.2	0.9	.3E+03	.3E+06	.5E+03	.5E+03	SHEAR	0.45	0.45	0.85	0.85
CT7	PFC4-PGC4	O12B	0.00	0.0	-0.2	0.0	0.0	.3E+03	.2E+05	.5E+03	.5E+03	ACBI	2.80	2.80	0.85	0.85
CT8	PSC4-PGC4	O12A	0.00	0.2	0.0	-0.1	-0.0	.4E+03	.6E+05	.5E+03	.5E+03	SHEAR	1.37	1.37	0.85	0.85
CT9	SSC4-PSC4	O12A	0.00	0.0	0.0	-0.0	0.0	.4E+03	.6E+05	.6E+03	.6E+03	SHEAR	1.37	1.37	0.85	0.85
D01	L015-D004	O32C	0.48	0.0	-89.0	-93.3	-19.5	296.1	878.3	498.6	498.6	ACBI	9.00	9.00	0.85	0.85
D02	L020-U057	O22E	0.49	0.0	-90.0	-28.0	-4.9	216.1	350.5	446.0	446.0	ACBI	9.22	9.22	0.85	0.85
D03	D006-U022	O12C	0.46	2.7	-86.4	-63.6	-55.4	292.0	3352.8	447.5	447.5	ACBI	2.71	2.71	0.85	0.85
D04	L203-U072	O22A	0.34	0.0	-97.3	-5.7	-10.3	305.2	1116.1	490.8	490.8	ACBI	8.74	8.74	0.85	0.85
D05	L050-U170	O42G	0.75	7.8	-161.4	-44.8	-1.3	254.4	639.6	438.3	438.3	ACBI	7.83	7.83	0.85	0.85

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D06	L156-0002	O12C	0.23	0.0	100.8	38.3	40.0	338.1	3038.3	447.5	447.5	TN+BN	3.57	3.57	0.85	0.85
D16	L001-U001	O12C	0.15	6.0	48.3	-56.9	-8.1	338.1	655.4	456.2	456.2	TN+BN	6.00	6.00	0.85	0.85
D36	L156-U153	O12C	0.55	0.0	-129.0	-11.0	-14.1	255.5	654.4	452.6	452.6	ACBI	7.59	7.59	0.85	0.85
HA3	SC08-T000	O22H	0.35	2.8	7.6	-100.8	11.7	322.7	532.6	338.6	487.7	BN+AX	2.80	4.60	0.00	0.00
IP2	SM17-SM23	E23H	0.11	0.7	-6.8	8.7	-29.4	322.7	3220.0	344.3	496.2	BN+AX	1.35	0.67	0.60	0.60
IP3	L00B-Y000	O22C	0.79	0.0	-0.6	-0.4	252.8	322.7	2934.8	322.7	322.7	BN+AX	3.60	0.45	0.59	0.51
M01	TMIJ-0001	E13B	0.15	0.0	-16.6	32.8	27.5	301.4	4865.8	366.6	366.6	ACBI	50.00	50.00	0.85	0.85
PB1	H232-P103	O12B	0.36	1.3	-26.1	-79.3	7.2	244.0	2535.2	324.1	690.3	BN+COM	4.00	2.00	0.52	0.63
PC2	U00G-U00L	O32E	0.20	4.5	-17.4	-71.1	-9.3	274.1	1109.9	447.5	447.5	ACBI	5.90	5.90	0.85	0.85
PC3	UP03-P003	O12A	0.23	0.0	25.7	2.3	98.8	338.1	1397.4	448.6	448.6	TN+BN	5.90	5.90	0.85	0.85
PD1	P149-P107	E14C	0.10	0.0	-10.6	1.0	18.3	157.7	207.4	455.9	455.9	ACBI	9.00	0.40	0.85	0.85
PD2	P119-P120	E23G	0.09	2.5	-14.9	-17.8	4.5	284.0	1763.6	455.8	455.8	ACBI	2.48	2.48	0.85	0.85
PD3	P001-P111	E23G	0.17	0.0	-24.9	-30.5	19.3	257.5	685.6	450.8	450.8	ACBI	5.01	5.01	0.85	0.85
PL1	P122-P112	E13C	0.06	0.4	-10.9	9.5	1.3	280.2	1439.5	450.0	450.0	ACBI	4.50	4.50	0.85	0.85
S01	U049-U107	O12H	0.48	0.0	-3.7	-151.3	-9.7	313.6	1100.0	337.0	476.8	BN+AX	9.00	0.71	0.84	0.40
S02	U274-U287	E33C	0.44	1.1	-0.6	75.7	-103.3	322.7	1212.5	344.3	496.2	BN+AX	4.00	1.10	0.60	0.60
S03	L003-L078	O22D	0.56	0.0	-1.8	-120.5	102.8	322.7	947.0	345.1	496.3	BN+AX	3.30	1.64	0.58	0.40
S04	L048-L065	O22C	0.62	0.0	-5.2	-111.7	135.1	322.7	2168.2	338.7	487.7	BN+AX	4.40	1.64	0.65	0.57
S07	M205-M208	E23G	0.09	0.0	3.3	1.5	51.4	322.7	266.4	389.0	690.6	BN+AX	2.00	2.00	0.00	0.00
SF1	U022-P103	O12B	0.46	4.4	-104.9	-38.7	8.6	277.7	1285.0	447.5	447.5	ACBI	4.37	4.37	0.85	0.85
ST1	L00H-N038	O32F	0.18	0.0	-12.3	-29.9	-62.8	280.2	1438.8	445.2	445.2	ACBI	3.50	3.50	0.85	0.85
ST2	M00P-U13B	O22G	0.09	4.5	24.6	-8.9	-34.9	338.1	567.9	446.7	446.7	TN+BN	4.45	4.45	0.85	0.85
ST3	SM01-SL02	O22H	0.08	0.0	-11.7	13.9	-12.6	255.7	657.2	455.2	455.2	ACBI	3.12	3.12	0.85	0.85
ST4	SM32-SU12	E23H	0.03	0.0	-0.5	-1.9	3.7	.3E+03	.1E+05	.5E+03	.5E+03	SHEAR	1.27	1.27	0.85	0.85
ST5	SM06-SC04	O22A	0.27	1.1	12.5	-0.0	119.3	338.1	2413.3	451.0	451.0	TN+BN	2.14	1.07	0.85	0.85
ST6	L11D-US06	O22A	0.14	0.0	-19.3	-7.3	-9.0	178.0	451.1	313.6	313.6	ACBI	3.77	3.77	0.85	0.85
ST7	M00Q-M204	E13C	0.08	0.0	-5.3	3.1	19.8	196.5	1059.2	314.8	314.8	ACBI	2.06	2.06	0.85	0.85
T00	T000-TA41	O12B	0.59	0.4	-11.8	-188.8	-0.6	316.7	9501.0	343.3	912.6	BN+COM	16.00	8.00	0.98	0.99
T01	SC09-T022	E13B	0.25	6.2	-7.7	-64.3	9.6	166.4	296.2	327.4	810.7	BN+COM	16.00	16.00	0.67	0.40
T02	TA41-TA42	O12B	0.66	1.6	-18.9	-227.7	-1.0	345.5	6214.4	380.1	526.4	BN+AX	16.00	8.00	0.90	0.96
T03	TA42-TA43	O12B	0.66	0.0	-18.9	-227.7	-1.0	345.5	3787.9	380.2	526.5	BN+AX	16.00	8.00	0.60	0.90
T04	TA43-TA44	O12A	0.56	0.0	-20.6	0.3	-1.1	344.0	2716.3	387.9	521.9	SHEAR	16.00	8.00	0.60	0.57
T05	T022-T019	E13B	0.27	0.0	-8.1	-64.3	8.7	180.8	337.9	315.1	365.5	BN+COM	16.00	16.00	0.98	0.89
T06	TA24-T028	E23H	0.17	0.0	-3.1	-24.1	16.1	140.9	260.3	281.6	276.0	BN+COM	16.00	16.00	0.95	0.91
T07	T028-T029	E23H	0.23	1.0	-6.1	-54.4	10.7	180.8	337.9	316.1	399.2	BN+COM	16.00	16.00	0.95	0.82
T2A	TA21-TA2A	O22C	0.55	0.5	-19.5	-138.3	10.2	257.4	6786.7	324.1	283.2	BN+COM	16.00	8.00	0.97	0.97
T2B	TA2A-TA22	O22H	0.59	1.1	-17.9	-198.1	2.8	314.0	5575.2	377.3	916.3	BN+COM	16.00	8.00	0.92	0.87
T3A	TA22-TA2B	O22H	0.58	0.0	-18.0	-198.1	2.8	345.5	4006.3	380.2	526.5	BN+AX	16.00	8.00	0.80	0.61
T3B	TA2B-TA23	O22H	0.47	2.4	-22.2	1.5	-0.7	345.5	3682.4	388.8	524.4	SHEAR	16.00	8.00	0.60	0.59
TPS	TA44-TU03	O12G	0.86	0.0	-91.1	-237.2	-260.8	.3E+03	.1E+06	.5E+03	.5E+03	ACBI	1.20	1.20	0.85	0.85

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TS1 TU03-L013 O12B	0.64	0.0	-101.8	-93.9	-183.1	.3E+03	.1E+06	.5E+03	.5E+03	ACBI	1.00	1.00	0.85	0.85
UN2 SS03-SM12 O22B	0.31	0.9	-7.3	21.4	-4.3	121.6	266.4	90.2	467.5	LATBUC	4.95	2.00	0.81	0.96
VHE 0003-0004 E33A	0.06	1.0	0.3	11.5	-11.0	322.7	1883.0	358.8	491.5	BN+AX	2.00	2.00	0.00	0.00

13.3.2 ULS Joint checks

All tubular joints punching shear checks and strength checks are detailed in following SACS excerpt and provide utilization factors lower than 1.0, according to ISO19902, ref./7/.

* * J O I N T C A N S U M M A R Y * *
(UNITY CHECK ORDER)

	ORIGINAL					LOAD DESIGN					STRENGTH ANALYSIS		
JOINT	DIAMETER (CM)	THICKNESS (CM)	YLD STRS (N/MM2)	LOAD UC	STRN UC	DIAMETER (CM)	THICKNESS (CM)	YLD STRS (N/MM2)	LOAD UC	STRN UC	BRACE JOINT	LOAD CASE
0002	40.640	2.062	355.000	0.595	0.696	40.640	2.062	355.000	0.595	0.696	L156	O12E
U015	80.000	3.000	400.000	0.541	0.633	80.000	3.000	400.000	0.541	0.633	L113	O32C
U003	80.000	3.000	400.000	0.523	0.612	80.000	3.000	400.000	0.523	0.612	L033	O22H
U045	70.000	3.000	400.000	0.506	0.592	70.000	3.000	400.000	0.506	0.592	0002	O12A
U005	80.000	3.000	400.000	0.503	0.589	80.000	3.000	400.000	0.503	0.589	L110	O42F
L156	70.000	3.000	400.000	0.491	0.575	70.000	3.000	400.000	0.491	0.575	U153	O12H
D004	55.000	2.000	400.000	0.441	0.516	55.000	2.000	400.000	0.441	0.516	U023	O32C
D006	55.000	2.000	400.000	0.437	0.511	55.000	2.000	400.000	0.437	0.511	U022	O12C
U013	80.000	3.000	400.000	0.412	0.482	80.000	3.000	400.000	0.412	0.482	0002	O12B
L013	80.000	4.000	400.000	0.392	0.459	80.000	4.000	400.000	0.392	0.459	0002	O12A
D003	55.000	2.000	400.000	0.367	0.430	55.000	2.000	400.000	0.367	0.430	U040	O42G
L015	80.000	4.000	400.000	0.335	0.392	80.000	4.000	400.000	0.335	0.392	D004	O32C
D005	55.000	2.000	400.000	0.320	0.375	55.000	2.000	400.000	0.320	0.375	U021	O22G
L005	80.000	4.000	400.000	0.284	0.332	80.000	4.000	400.000	0.284	0.332	D003	E44G
L008	40.640	2.144	355.000	0.271	0.317	40.640	2.144	355.000	0.271	0.317	U069	O42A
P103	45.720	1.905	355.000	0.266	0.311	45.720	1.905	355.000	0.266	0.311	U022	O12B
P104	45.720	1.905	355.000	0.263	0.308	45.720	1.905	355.000	0.263	0.308	U023	O12D
L018	40.640	2.144	355.000	0.262	0.307	40.640	2.144	355.000	0.262	0.307	U067	O32B
L020	40.640	2.144	355.000	0.257	0.301	40.640	2.144	355.000	0.257	0.301	U057	O22F
L010	40.640	2.144	355.000	0.251	0.294	40.640	2.144	355.000	0.251	0.294	U068	O22F
P101	45.720	1.905	355.000	0.247	0.289	45.720	1.905	355.000	0.247	0.289	U040	O22F
P102	45.720	1.905	355.000	0.246	0.287	45.720	1.905	355.000	0.246	0.287	U021	O42H
L003	80.000	4.000	400.000	0.242	0.283	80.000	4.000	400.000	0.242	0.283	D005	E24G
P112	35.500	1.588	355.000	0.155	0.181	35.500	1.588	355.000	0.155	0.181	P003	E13C
P111	35.500	1.588	355.000	0.153	0.179	35.500	1.588	355.000	0.153	0.179	P004	E13C
P120	35.500	1.588	355.000	0.118	0.138	35.500	1.588	355.000	0.118	0.138	P119	E13G
P121	35.500	1.588	355.000	0.116	0.136	35.500	1.588	355.000	0.116	0.136	P119	E13C
P122	35.500	1.588	355.000	0.116	0.136	35.500	1.588	355.000	0.116	0.136	P118	E43G
P123	35.500	1.588	355.000	0.115	0.135	35.500	1.588	355.000	0.115	0.135	P118	E33C
P137	27.310	1.588	355.000	0.082	0.095	27.310	1.588	355.000	0.082	0.095	P119	E13G
P119	27.310	1.588	355.000	0.081	0.095	27.310	1.588	355.000	0.081	0.095	P120	E23G
P118	27.310	1.588	355.000	0.079	0.092	27.310	1.588	355.000	0.079	0.092	P122	E43G
P138	27.310	1.588	355.000	0.077	0.091	27.310	1.588	355.000	0.077	0.091	P118	E43G
P139	27.310	1.588	355.000	0.076	0.089	27.310	1.588	355.000	0.076	0.089	P118	E33C
P140	27.310	1.588	355.000	0.072	0.084	27.310	1.588	355.000	0.072	0.084	P119	E23C
U00J	40.640	1.588	355.000	0.069	0.081	40.640	1.588	355.000	0.069	0.081	P140	E14G
U00I	40.640	1.588	355.000	0.065	0.076	40.640	1.588	355.000	0.065	0.076	P139	E43G
U00K	40.640	1.588	355.000	0.041	0.048	40.640	1.588	355.000	0.041	0.048	P138	E24C
U00L	40.640	1.588	355.000	0.038	0.045	40.640	1.588	355.000	0.038	0.045	P137	E43C

Maximum joint UC is detailed in the following.

(UNITY CHECK ORDER)

COMM JNT	CHRD JNT	BRCE JNT	CHORD O.D. CM	CHORD WT CM	EFFT. CHORD FY N/MM2	EFFT. LNGTH M	JNT TYP	GAP CM	BRACE O.D. CM	BRACE WT CM	BRACE ANGLE DEG	LOAD CASE	ACTING STRESSES *CHORD** STRESS N/MM2	CHORD FA N/MM2	BRACE OPB N/MM2	PUNCHING SHEAR IPB N/MM2	ALLOWABLE STRESSES FA N/MM2	OPB N/MM2	IPB N/MM2	UNITY CHECK
0002	U045	L156	40.64	2.062	355.0		X		40.64	1.588	89.94	O12A	114.84	101.25	8.97	30.60	194.50	255.78	339.24	0.564
							X					O12B	111.58	101.18	6.37	28.27	194.34	257.10	340.99	0.552
							X					O12C	116.17	101.18	5.50	37.55	194.36	255.37	338.70	0.554
							X					O12D	106.76	99.53	14.25	27.79	194.13	258.89	343.37	0.574
							X					O12E	108.13	98.92	20.19	29.92	194.21	258.33	342.63	0.595

13.3.3 SLS Deflection Checks

Deflection checks are performed for all the primary topside beams considering the SLS load combinations.

The results of the deflection checks are presented in the followings SACS excerpt in terms of ratios between beam span and vertical deflection for the critical combinations.

********** SPAN DEFLECTION SUMMARY REPORT **********

SPAN ID	CANT	BEGIN JOINT	END JOINT	SPAN LENGTH M	LOCAL Y DIRECTION MAX. LOAD CASE	LOCAL Y DIRECTION MAXIMUM DEFL. CM	LOCAL Y DIRECTION DISTANCE ALONG SPAN M	LOCAL Y DIRECTION DEFL/SPAN RATIO	LOCAL Y DIRECTION SPAN/DEFL RATIO	LOCAL Z DIRECTION MAX. LOAD CASE	LOCAL Z DIRECTION MAXIMUM DEFL. CM	LOCAL Z DIRECTION DISTANCE ALONG SPAN M	LOCAL Z DIRECTION DEFL/SPAN RATIO	LOCAL Z DIRECTION SPAN/DEFL RATIO
FH001	NO	SL13	SL15	4.91	DN2H	0.063	1.49	0.0001	7752.5	DN2G	0.02	3.41	0.0000	26966.1
FH002	NO	SL03	SL05	2.28	DN2A	0.008	0.82	0.0000	29276.7	DN2B	0.00	1.54	0.0000	88790.9
FH003	NO	SL01	SL02	2.28	DN2G	0.033	0.98	0.0001	7009.4	DN2D	0.00	1.10	0.0000	124460.9
FH004	NO	SL18	SL06	2.40	DN2H	0.012	1.74	0.0001	19307.9	DN2C	0.00	1.13	0.0000	62843.3
FH005	NO	SL05	SL06	2.04	DN2F	0.021	1.10	0.0001	9873.7	DN2B	0.00	1.41	0.0000	77705.9
FH006	NO	SL13	SL01	2.40	DN2H	0.010	1.85	0.0000	24191.4	DN2G	0.01	1.27	0.0000	42187.1
FH007	NO	SL15	SL18	2.04	DN2H	0.031	1.00	0.0002	6476.9	DN2G	0.01	0.62	0.0000	34907.4
FH008	NO	SL02	SL03	0.34	DN2F	0.000	0.11	0.0000	1116112.4	DN2A	0.00	0.23	0.0000	526255.5
FI002	NO	SL07	SL08	3.47	DN10	0.000	0.00	0.0000		DN2F	0.02	1.74	0.0001	16195.8
FI005	NO	SL14	SL04	2.40	DN2G	0.030	0.46	0.0001	7983.7	DN2G	0.01	1.21	0.0000	27315.0
SH001	YES	TL02	SM04	3.84	DN2C	0.283	3.84	0.0004	2710.7	DN2A	0.74	3.84	0.0010	1032.6
SH002	YES	SM07	SM09	3.84	DN2C	0.284	3.84	0.0004	2702.2	DN2A	1.06	3.84	0.0014	721.2
SH005	NO	SM06	SM07	1.00	DN2G	0.002	0.52	0.0000	64204.4	DN2A	0.00	0.76	0.0000	92175.1
SH007	NO	SC04	TA2B	1.20	DN2G	0.000	0.50	0.0000	515802.6	DN2A	0.01	0.50	0.0001	14216.6
SH008	YES	SM27	SM31	3.84	DN2C	0.285	3.84	0.0004	2692.4	DN2A	1.52	3.84	0.0020	505.3
SH009	NO	SM01	TL02	4.91	DN2C	0.032	3.14	0.0001	15547.8	DN2H	0.04	1.67	0.0001	13697.0
SH010	NO	SC02	SC01	2.40	DN2B	0.003	1.03	0.0000	77096.1	DN2G	0.02	1.03	0.0001	15086.9
SH011	NO	SC02	TA2A	2.00	DN2A	0.002	0.86	0.0000	132414.0	DN2G	0.02	0.86	0.0001	10199.8
SH013	NO	SM26	SM25	1.42	DN2B	0.002	0.70	0.0000	64632.8	DN2A	0.00	0.58	0.0000	44481.3
SH014	NO	SC08	T000	2.80	DN2C	0.012	1.62	0.0000	22592.6	DN2A	0.13	1.54	0.0005	2205.9
SH015	NO	SC09	SC10	1.42	DN2C	0.004	0.68	0.0000	33503.8	DN2G	0.01	0.58	0.0001	15742.5
SI001	NO	SM10	SM04	3.60	DN2E	0.072	1.13	0.0002	4971.9	DN2H	0.01	1.70	0.0000	25795.3
SI002	NO	SM08	SM03	2.40	DN2G	0.017	0.50	0.0001	14440.0	DN2G	0.00	1.39	0.0000	104098.4
SI003	NO	TL02	SM07	2.40	DN2G	0.021	0.55	0.0001	11225.7	DN2G	0.01	0.62	0.0000	25633.1
SI004	NO	SM07	SM27	5.30	DN2F	0.085	3.52	0.0002	6256.9	DN2H	0.06	3.83	0.0001	9126.7
SI005	NO	SM05	SM01	2.40	DN2B	0.017	1.61	0.0001	14329.3	DN2B	0.02	1.13	0.0001	15666.0
SI006	NO	SM31	SM11	3.60	DN2G	0.068	1.75	0.0002	5302.3	DN2C	0.03	1.62	0.0001	13948.4
SI007	NO	SM22	SM24	3.84	DN2H	0.036	1.60	0.0001	10638.6	DN2D	0.02	1.97	0.0001	16019.3
SI008	NO	SM17	SM29	1.35	DN2H	0.005	0.67	0.0000	24705.8	DN2H	0.00	0.67	0.0000	37447.5
SI009	NO	SM21	SM16	3.84	DN2G	0.046	2.25	0.0001	8425.3	DN2D	0.04	1.79	0.0001	9814.2
STU1	NO	SS02	SM18	4.95	DN2E	0.921	4.67	0.0019	537.7	DN2C	0.17	2.60	0.0003	2908.0
STU2	NO	SS01	SM17	4.95	DN2E	0.902	4.67	0.0018	549.6	DN2C	0.15	2.16	0.0003	3390.0
STU3	NO	SM20	SS06	5.14	DN2A	1.003	4.85	0.0020	512.3	DN2G	0.16	2.51	0.0003	3233.0
STU4	NO	SM19	SS05	5.14	DN2A	0.984	4.85	0.0019	521.8	DN2G	0.19	2.74	0.0004	2697.3
TI001	NO	SU12	SU11	1.80	DN2D	0.009	0.45	0.0000	20059.1	DN2A	0.00	1.04	0.0000	215313.2
TI002	NO	SU12	SU02	7.70	DN2B	0.109	2.10	0.0001	7038.0	DN2E	0.08	4.17	0.0001	9320.7
TI003	NO	SU01	SU11	7.70	DN2B	0.110	5.64	0.0001	7018.2	DN2G	0.14	3.49	0.0002	5319.5
TI004	NO	SU01	SU02	1.80	DN2B	0.012	1.33	0.0001	15318.6	DN2B	0.00	0.74	0.0000	155304.0
TU002	NO	SU08	SU07	1.80	DN2G	0.040	0.71	0.0002	4513.9	DN2E	0.01	0.96	0.0000	24771.6
B001	NO	L010	L152	6.00	DN2D	0.024	4.37	0.0000	25115.4	DN2C	0.05	3.28	0.0001	11145.8
B002	NO	L152	L005	6.00	DN2A	0.023	2.52	0.0000	25985.6	DN2C	0.09	3.59	0.0001	6744.9
B003	NO	L005	L021	8.00	DN2B	0.078	2.40	0.0001	10273.5	DN2C	0.07	5.52	0.0001	11163.0
B004	NO	L021	L015	8.00	DN2H	0.065	5.54	0.0001	12392.2	DN2C	0.12	5.68	0.0002	6567.2
B005	NO	L015	L113	5.61	DN2A	0.100	2.99	0.0002	5601.3	DN2G	0.07	2.26	0.0001	8054.2
B006	NO	L153	L020	6.00	DN2E	0.017	1.14	0.0000	35123.5	DN2G	0.09	2.94	0.0001	6974.8
B007	NO	L009	L004	12.00	DN2E	0.039	1.27	0.0000	30629.5	DN2C	0.13	4.38	0.0001	9166.7
B008	NO	L004	L014	16.00	DN2D	0.045	8.00	0.0000	35397.2	DN2D	0.40	7.80	0.0002	4045.5
B009	NO	L014	L019	12.00	DN2B	0.041	6.20	0.0000	29362.7	DN2F	0.33	7.30	0.0003	3685.4
B010	NO	L006	L001	12.00	DN2A	0.023	8.73	0.0000	51247.5	DN2C	0.30	4.74	0.0002	4031.2
B011	NO	L001	L011	16.00	DN2A	0.020	2.58	0.0000	80206.9	DN2A	0.32	7.88	0.0002	5077.0
B012	NO	L011	L016	12.00	DN2A	0.075	4.14	0.0001	15980.8	DN2G	0.45	7.74	0.0004	2665.7
B013	NO	L007	L002	12.00	DN2G	0.054	7.42	0.0000	22206.6	DN2C	0.20	5.20	0.0002	6144.4
B014	NO	L002	L012	16.00	DN2F	0.053	8.56	0.0000	30158.0	DN2A	0.15	8.00	0.0001	10780.1
B015	NO	L012	L017	12.00	DN2A	0.080	9.49	0.0001	15015.9	DN2D	0.11	9.27	0.0001	10501.7
B016	NO	L126	L003	6.00	DN2E	0.109	3.52	0.0002	5509.9	DN2C	0.09	3.68	0.0001	6728.5
B017	NO	L003	L013	16.00	DN2F	0.148	12.94	0.0001	10817.7	DN2D	0.23	7.20	0.0001	6843.6
B019	NO	L013	L156	6.00	DN2E	0.068	2.66	0.0001	8788.6	DN2G	0.05	1.62	0.0001	12589.9
B020	NO	L156	L018	6.00	DN2A	0.022	2.15	0.0000	26986.2	DN2C	0.18	3.16	0.0003	3334.6
C001	YES	L061	L010	1.50	DN2B	0.093	1.50	0.0003	3241.8	DN2G	0.18	1.50	0.0006	1712.0
C002	YES	L020	L092	2.30	DN2H	0.022	2.30	0.0000	20755.4	DN2C	0.52	2.30	0.0011	890.8
C003	YES	L093	L095	2.30	DN2D	0.044	2.30	0.0001	10498.9	DN2C	0.46	2.30	0.0010	989.5
C004	YES	L089	L088	4.50	DN2D	0.114	4.50	0.0001	7865.2	DN2C	1.95	4.50	0.0022	460.5
C005	YES	L017	L129	4.50	DN2D	0.104	4.50	0.0001	8681.3	DN2C	1.86	4.50	0.0021	483.0
C006	YES	L018	L087	4.50	DN2D	0.143	4.50	0.0002	6273.6	DN2C	2.20	4.50	0.0024	409.8
C007	YES	L018	L081	1.64	DN2D	0.019	1.64	0.0001	17627.0	DN2E	0.26	1.64	0.0008	1261.3
C008	YES	L048	L11F	2.34	DN2C	0.235	1.85	0.0005	1993.5	DN2A	0.53	1.85	0.0011	878.6
C009	YES	L00D	L11E	2.34	DN2C	0.198	2.34	0.0004	2361.6	DN2A	0.10	2.34	0.0002	4926.2
C020	YES	L008	L071	1.64	DN2C	0.102	1.64	0.0003	3225.8	DN2E	0.07	1.64	0.0002	4463.3
C010	YES	L070	L008	1.50	DN2G	0.048	1.49	0.0002	6262.9	DN2G	0.24	1.50	0.0008	1256.9

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B021	NO	L152	L126	16.00	DN2H	0.049	10.17	0.0000	32467.7	DN2C	0.94	8.04	0.0006	1693.3
B022	NO	L204	L001	7.05	DN2C	0.026	2.85	0.0000	26720.9	DN2A	0.26	3.59	0.0004	2710.2
B023	NO	L001	L203	7.05	DN2C	0.037	4.22	0.0001	18856.8	DN2E	0.20	3.37	0.0003	3503.2
B024	NO	L021	L028	16.00	DN2G	0.018	10.20	0.0000	89010.3	DN2A	0.87	6.24	0.0005	1831.2
B025	NO	L206	L011	7.05	DN2G	0.028	2.75	0.0000	25309.1	DN2A	0.30	3.53	0.0004	2378.6
B026	NO	L011	L205	7.05	DN2G	0.030	3.68	0.0000	23687.5	DN2E	0.17	3.36	0.0002	4124.7
B027	NO	L153	L156	16.00	DN2C	0.066	2.70	0.0000	24392.0	DN2G	1.13	7.50	0.0007	1415.4
B028	NO	L020	L016	8.00	DN2E	0.035	4.00	0.0000	23039.4	DN2A	0.04	4.76	0.0000	21225.8
B029	NO	L016	L018	8.00	DN2E	0.074	2.28	0.0001	10858.9	DN2D	0.37	3.73	0.0005	2149.7
C011	YES	L099	L020	1.64	DN2D	0.011	1.64	0.0000	30443.6	DN2A	0.09	1.64	0.0003	3619.1
C012	YES	L00H	L029	2.34	DN2E	0.196	2.16	0.0004	2385.9	DN2E	0.42	2.34	0.0009	1113.2
C013	YES	L00K	L131	2.34	DN2D	0.084	2.34	0.0002	5587.3	DN2A	0.14	2.34	0.0003	3299.5
S001	NO	L023	L069	4.00	DN2G	0.039	1.67	0.0001	10227.2	DN2G	0.09	1.77	0.0002	4680.8
S003	NO	L160	L159	4.00	DN2C	0.008	1.67	0.0000	47494.8	DN2D	0.14	1.82	0.0004	2770.6
S004	NO	L074	L024	4.00	DN2G	0.035	2.40	0.0001	11556.8	DN2G	0.09	2.23	0.0002	4585.6
S005	NO	L161	L00D	4.00	DN2D	0.005	2.84	0.0000	74132.8	DN2C	0.04	2.52	0.0001	9545.3
S007	NO	L169	L188	4.00	DN2C	0.007	2.45	0.0000	57783.8	DN2B	0.15	2.18	0.0004	2751.5
S011	NO	L212	L215	4.00	DN2C	0.036	2.44	0.0001	11065.0	DN2G	0.20	1.86	0.0005	1963.8
S012	NO	L213	L214	4.00	DN2C	0.024	2.42	0.0001	16941.5	DN2C	0.20	2.15	0.0005	1983.3
S013	NO	L185	L186	4.00	DN2C	0.046	1.64	0.0001	8673.5	DN2F	0.12	1.82	0.0003	3327.4
S014	NO	L186	L187	4.00	DN2G	0.028	2.12	0.0001	14066.6	DN2A	0.13	2.15	0.0003	3121.9
S015	NO	L184	L180	4.00	DN2G	0.047	1.67	0.0001	8547.0	DN2D	0.13	1.85	0.0003	3147.3
S016	NO	L180	L181	4.00	DN2C	0.026	2.10	0.0001	15671.0	DN2A	0.11	2.05	0.0003	3701.8
S017	NO	L181	L182	4.00	DN2C	0.022	2.33	0.0001	18412.2	DN2C	0.09	2.40	0.0002	4663.0
S019	NO	L029	L039	4.00	DN2G	0.051	1.65	0.0001	7882.7	DN2C	0.08	1.18	0.0002	5001.9
S020	NO	L039	L040	4.00	DN2H	0.012	2.58	0.0000	32507.5	DN2H	0.29	2.21	0.0007	1375.0
S021	NO	L036	L172	4.00	DN2G	0.015	1.65	0.0000	26489.8	DN2E	0.16	1.65	0.0004	2448.1
S022	NO	L172	L173	4.00	DN2C	0.006	2.88	0.0000	65703.3	DN2H	0.33	2.40	0.0008	1211.4
S023	NO	L174	L111	4.00	DN2D	0.006	1.95	0.0000	62713.0	DN2G	0.02	1.00	0.0001	18593.2
S024	NO	L173	L174	4.00	DN2C	0.016	1.42	0.0000	24907.4	DN2C	0.04	2.94	0.0001	10870.3
S124	NO	L220	L221	4.00	DN2C	0.005	1.50	0.0000	74858.1	DN2C	0.06	1.57	0.0001	7222.4
S025	NO	L223	L127	4.00	DN2G	0.009	0.70	0.0000	44869.5	DN2E	0.03	2.78	0.0001	13593.6
S026	NO	L131	L145	4.00	DN2C	0.013	1.84	0.0000	30421.5	DN2F	0.05	1.61	0.0001	7711.1
S027	NO	L222	L155	4.00	DN2G	0.024	2.43	0.0001	16386.8	DN2H	0.15	2.10	0.0004	2690.5
S029	NO	L025	L225	4.00	DN2C	0.022	2.60	0.0001	18020.4	DN2C	0.18	2.12	0.0005	2169.6
B030	NO	L008	L126	6.00	DN2D	0.037	3.38	0.0001	16176.9	DN2C	0.06	3.23	0.0001	9593.2
B031	NO	L010	L006	8.00	DN2G	0.045	2.51	0.0001	17854.4	DN2A	0.09	5.28	0.0001	9180.2
B032	NO	L006	L008	8.00	DN2G	0.042	5.63	0.0001	19267.6	DN2F	0.11	2.96	0.0001	7293.5
C014	YES	L103	L010	1.64	DN2E	0.063	1.64	0.0002	5183.5	DN2A	0.09	1.64	0.0003	3592.4
C015	YES	L115	L104	1.64	DN2F	0.041	1.64	0.0001	7993.0	DN2A	0.23	1.64	0.0007	1403.3
C016	YES	L063	L006	1.50	DN2B	0.033	1.50	0.0001	9138.0	DN2G	0.09	1.50	0.0003	3416.3
C017	YES	L016	L091	1.50	DN2E	0.074	1.50	0.0002	4035.7	DN2C	0.20	1.50	0.0007	1480.7
T001	NO	U010	U006	8.00	DN2H	0.062	3.60	0.0001	12964.0	DN2F	0.31	4.00	0.0004	2622.0
T002	NO	U006	U008	8.00	DN2H	0.060	3.93	0.0001	13380.1	DN2A	0.24	4.00	0.0003	3300.9
T003	NO	U005	U003	16.00	DN2C	0.066	8.00	0.0000	24095.1	DN2C	0.58	5.12	0.0004	2736.3
T004	NO	U137	U130	8.00	DN2C	0.039	2.95	0.0000	20418.6	DN2E	0.33	4.66	0.0004	2425.1
T023	NO	U130	U138	8.00	DN2A	0.034	2.24	0.0000	23611.5	DN2G	0.09	4.06	0.0001	9284.4
T005	NO	U040	U00A	8.00	DN2C	0.028	2.79	0.0000	29026.6	DN2A	0.20	5.41	0.0003	3958.5
T015	NO	U00A	U021	8.00	DN2C	0.028	5.19	0.0000	28348.4	DN2E	0.20	2.55	0.0002	4095.5
T006	NO	U078	U041	16.00	DN2C	0.051	10.04	0.0000	31324.4	DN2D	0.94	8.00	0.0006	1700.4
T007	NO	U029	U00C	4.00	DN2C	0.015	2.00	0.0000	27489.9	DN2A	0.12	2.00	0.0003	3427.2
T016	NO	U00C	U022	8.00	DN2G	0.011	6.00	0.0000	72536.3	DN2E	0.19	2.53	0.0002	4120.7
T008	NO	U015	U013	16.00	DN2G	0.032	4.30	0.0000	49595.5	DN2A	0.49	5.20	0.0003	3249.8
T010	NO	U020	U016	8.00	DN2A	0.037	3.44	0.0000	21535.0	DN2H	0.32	4.07	0.0004	2474.9
T011	NO	U016	U018	8.00	DN2C	0.031	4.16	0.0000	25685.2	DN2H	0.20	5.68	0.0003	3974.8
T012	NO	U010	U005	12.00	DN2A	0.093	3.47	0.0001	12900.0	DN2D	0.12	4.82	0.0001	10321.1
T013	NO	U005	U078	8.00	DN2F	0.022	4.07	0.0000	36051.9	DN2C	0.09	3.88	0.0001	9342.0
T009	NO	U078	U015	8.00	DN2D	0.029	4.12	0.0000	27949.6	DN2G	0.06	4.08	0.0001	13243.8
T014	NO	U015	U020	12.00	DN2D	0.045	6.46	0.0000	26477.5	DN2G	0.16	7.42	0.0001	7274.5
T017	NO	U008	U003	12.00	DN2H	0.091	2.77	0.0001	13133.8	DN2B	0.51	5.14	0.0004	2356.1
T018	NO	U009	U004	12.00	DN2F	0.094	7.32	0.0001	12710.0	DN2D	0.69	5.20	0.0006	1744.1
T019	NO	U004	U014	16.00	DN2E	0.034	13.15	0.0000	47051.3	DN2A	0.27	8.62	0.0002	6033.4
T020	NO	U014	U019	12.00	DN2A	0.035	9.43	0.0000	34126.8	DN2G	0.17	7.70	0.0001	6921.5
T021	NO	U007	U002	12.00	DN2A	0.122	7.52	0.0001	9854.0	DN2B	0.59	5.21	0.0005	2038.4
T025	NO	U001	U011	16.00	DN2A	0.030	6.69	0.0000	52945.1	DN2D	0.56	9.57	0.0004	2844.8
T026	NO	U002	U012	16.00	DN2A	0.048	12.95	0.0000	33282.0	DN2E	0.30	8.94	0.0002	5337.0
T030	NO	U003	U013	16.00	DN2A	0.060	11.26	0.0000	26495.7	DN2C	0.13	4.66	0.0001	12196.9
T031	NO	U011	U016	12.00	DN2A	0.062	8.79	0.0001	19509.7	DN2G	0.25	7.46	0.0002	4739.3
T032	NO	U012	U017	12.00	DN2A	0.056	6.00	0.0000	21553.5	DN2C	0.21	3.87	0.0002	5810.0
T033	NO	U013	U018	12.00	DN2E	0.066	9.33	0.0001	18317.1	DN2B	0.22	7.04	0.0002	5392.7
T036	YES	U048	U051	1.50	DN2C	0.013	1.33	0.0000	23373.0	DN2C	0.55	1.50	0.0018	544.8
T037	YES	U049	U050	1.50	DN2C	0.020	1.50	0.0001	15053.4	DN2C	0.59	1.50	0.0020	511.6
T034	NO	U046	U049	6.00	DN2E	0.066	3.39	0.0001	9062.1	DN2C	0.07	3.93	0.0001	8540.2
T035	NO	U047	U048	6.00	DN2A	0.029	2.52	0.0000	20771.2	DN2G	0.04	2.76	0.0001	14256.8
UC001	YES	U00E	U010	1.64	DN2H	0.236	1.64	0.0007	1388.5	DN2A	0.28	1.64	0.0008	1177.3
UC002	YES	U025	U010	1.50	DN2G	0.125	1.50	0.0004	2406.7	DN2G	0.14	1.50	0.0005	2170.6
UC003	YES	U028	U008	1.50	DN2C	0.064	1.50	0.0002	4679.0	DN2C	0.13	1.50	0.0004	2378.3
UC004	YES	U008	U032	1.64	DN2C	0.141	1.64	0.0004	2332.6	DN2E	0.23	1.64	0.0007	1416.8
UC005	YES	U096	U13A	2.34	DN2C	0.165	2.34	0.0004	2829.4	DN2E	0.26	2.34	0.0006	1767.0
UC006	YES	U116	U13B	2.34	DN2C	0.179	2.14	0.0004	2614.4	DN2A	0.40	2.34	0.0008	1181.7
UC007	YES	U00M	U064	2.34	DN2B	0.115	2.31	0.0002	4053.8	DN2E	0.32	2.34	0.0007	1467.7
UC008	YES	U00N	U058	2.34	DN2H	0.070	2.34	0.0001	6733.7	DN2A	0.12	2.34	0.0003	3936.3
UC009	YES	U056	U020	1.64	DN2G	0.022	1.64	0.0001	14621.5	DN2A	0.30	1.64	0.0009	1105.5
UC010	YES	U020	U054	1.50	DN2C	0.014	1.50	0.0000	20862.7	DN2C	0.23	1.50	0.0008	1324.6
UC011	YES	U018	U052	1.50	DN2G	0.039	1.50	0.0001	7711.9	DN2C	0.34	1.50	0.0011	891.3
UC012	YES	U018	U048	4.50	DN2G	0.095	1.64	0.0001	9429.6	DN2A	1.86	4.50	0.0021	482.8

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UC013	YES	U045	U047	4.50	DN2C	0.082	3.23	0.0001	10970.6	DN2A	0.95	4.50	0.0011	943.4
T124	NO	U023	U029	4.00	DN2G	0.012	2.09	0.0000	32098.6	DN2F	0.06	2.00	0.0002	6257.2
T125	NO	U508	U507	4.00	DN2C	0.025	2.00	0.0001	15718.8	DN2H	0.04	1.78	0.0001	10630.9
UC015	YES	U027	U006	1.50	DN2G	0.039	1.50	0.0001	7631.3	DN2C	0.35	1.50	0.0012	853.5
UC016	YES	U016	U053	1.50	DN2G	0.035	1.50	0.0001	8471.5	DN2C	0.25	1.50	0.0008	1220.2
US001	NO	U124	U031	4.00	DN2G	0.013	3.12	0.0000	30528.5	DN2F	0.04	3.11	0.0001	9094.9
US002	NO	U082	U084	4.00	DN2C	0.016	2.23	0.0000	24591.3	DN2F	0.22	2.30	0.0006	1780.6
US003	NO	U094	U171	4.00	DN2C	0.003	3.11	0.0000	135801.0	DN2F	0.00	3.11	0.0000	129870.0
US004	NO	U135	U126	4.00	DN2C	0.017	2.05	0.0000	23815.2	DN2D	0.18	2.30	0.0004	2276.3
US005	NO	U172	U174	4.00	DN2C	0.027	3.11	0.0001	14615.0	DN2F	0.13	2.25	0.0003	2991.4
US006	NO	U139	U132	4.00	DN2D	0.009	1.42	0.0000	44258.5	DN2D	0.19	2.37	0.0005	2135.4
US007	NO	U185	U184	4.00	DN2G	0.021	1.08	0.0001	19346.3	DN2C	0.14	1.99	0.0004	2834.5
US032	NO	U184	U233	4.00	DN2F	0.038	2.00	0.0001	10445.2	DN2H	0.07	2.00	0.0002	5371.5
US033	NO	U233	U188	4.00	DN2H	0.038	2.00	0.0001	10492.2	DN2F	0.07	2.12	0.0002	5528.3
US034	NO	U188	U116	4.00	DN2G	0.024	2.50	0.0001	16446.1	DN2A	0.08	2.75	0.0002	5120.5
US035	NO	U283	U274	4.00	DN2C	0.022	2.70	0.0001	17954.2	DN2D	0.45	2.09	0.0011	886.8
US036	NO	U282	U276	4.00	DN2G	0.373	2.24	0.0009	1073.8	DN2F	0.28	2.07	0.0007	1426.7
US037	NO	U286	U285	1.00	DN2E	0.010	0.53	0.0001	10147.1	DN2F	0.01	0.60	0.0001	9814.3
US038	NO	U289	U288	1.00	DN2A	0.009	0.55	0.0001	10539.7	DN2H	0.01	0.60	0.0001	9018.3
US029	NO	U510	U509	1.00	DN2B	0.001	0.41	0.0000	77928.1	DN2G	0.01	0.78	0.0001	12892.7
US030	NO	U149	U150	4.00	DN2F	0.009	2.26	0.0000	42192.4	DN2A	0.04	2.32	0.0001	10876.2
US031	NO	U090	U045	4.00	DN2A	0.007	1.08	0.0000	54932.4	DN2A	0.06	2.38	0.0001	7005.7
US019	NO	U161	U103	4.00	DN2G	0.004	2.03	0.0000	103429.6	DN2G	0.02	1.30	0.0001	16117.3
US020	NO	U190	U191	4.00	DN2G	0.018	1.10	0.0000	22605.4	DN2G	0.09	1.77	0.0002	4314.0
US021	NO	U191	U192	4.00	DN2F	0.004	3.20	0.0000	112577.6	DN2G	0.14	2.34	0.0004	2822.5
US023	NO	U193	U162	4.00	DN2G	0.018	1.87	0.0000	22479.3	DN2G	0.08	1.57	0.0002	5098.1
US008	NO	U178	U179	4.00	DN2G	0.030	2.52	0.0001	13537.8	DN2H	0.05	2.12	0.0001	8353.7
US009	NO	U123	U096	4.00	DN2G	0.027	2.49	0.0001	14755.0	DN2G	0.19	2.37	0.0005	2084.6
US010	NO	U182	U183	4.00	DN2A	0.014	3.08	0.0000	27624.9	DN2C	0.11	2.24	0.0003	3537.2
US011	NO	U128	U136	4.00	DN2H	0.008	3.08	0.0000	49085.3	DN2C	0.10	2.34	0.0003	3810.7
US012	NO	U175	U177	4.00	DN2C	0.009	3.08	0.0000	45781.1	DN2A	0.25	3.08	0.0006	1616.6
US016	NO	U158	U159	4.00	DN2G	0.014	1.48	0.0000	27587.8	DN2C	0.02	1.33	0.0000	23930.7
US017	NO	U159	U160	4.00	DN2B	0.002	2.37	0.0000	266039.7	DN2G	0.07	3.20	0.0002	5357.1
US018	NO	U271	U261	1.00	DN2C	0.000	0.37	0.0000	316089.1	DN2G	0.02	0.60	0.0002	5516.9
US024	NO	U060	U155	4.00	DN2G	0.004	1.00	0.0000	102675.1	DN2C	0.08	1.80	0.0002	5319.0
US025	NO	U155	U156	4.00	DN2G	0.001	3.20	0.0000	269327.1	DN2C	0.22	2.34	0.0006	1799.9
US027	NO	U157	U154	4.00	DN2B	0.020	1.87	0.0001	19607.5	DN2C	0.13	1.60	0.0003	3066.6
US039	NO	U517	U505	4.00	DN2C	0.015	2.20	0.0000	27501.0	DN10	0.02	2.20	0.0000	25051.0
US040	NO	U243	U244	4.00	DN2C	0.004	1.90	0.0000	113536.0	DN2H	0.04	1.87	0.0001	9657.1
US041	NO	U244	U245	4.00	DN2C	0.002	2.00	0.0000	176315.2	DN10	0.07	2.00	0.0002	5534.3
US042	NO	U245	U246	4.00	DN2C	0.003	2.04	0.0000	115141.1	DN2B	0.07	1.98	0.0002	5533.4
US043	NO	U246	U247	4.00	DN2C	0.004	2.50	0.0000	104744.5	DN2F	0.04	2.15	0.0001	10022.1
US044	NO	U252	U253	4.00	DN2G	0.003	2.02	0.0000	117968.8	DN2H	0.07	2.00	0.0002	5534.3
US045	NO	U253	U254	4.00	DN2G	0.003	1.96	0.0000	134592.1	DN2A	0.13	2.00	0.0003	2986.1
US051	NO	U254	U255	4.00	DN2C	0.003	2.00	0.0000	144922.5	DN10	0.13	2.00	0.0003	2986.1
US046	NO	U255	U256	4.00	DN2G	0.002	1.96	0.0000	167068.9	DN2C	0.07	2.00	0.0002	5534.3
US047	NO	U064	U087	4.00	DN2G	0.003	1.38	0.0000	115610.1	DN2C	0.06	1.28	0.0002	6385.5
US048	NO	U087	U262	4.00	DN2C	0.002	2.00	0.0000	203228.3	DN2B	0.13	2.00	0.0003	3034.4
US049	NO	U262	U263	4.00	DN2C	0.003	2.00	0.0000	125822.4	DN10	0.13	2.00	0.0003	3034.3
US050	NO	U263	U264	4.00	DN2H	0.009	2.20	0.0000	44356.4	DN2C	0.07	2.00	0.0002	5630.2

13.3.4 Primary Member Checks

For global design analyses (e.g. In-Service) only superimposed area loads on laydown platforms were considered in load combinations. Area loads for local design are to be considered as per Table 13.8 below, as indicated in section 9.2.2 of Design Basis.

Area Use	Deck Flooring & Stringers	
	UDL (kN / m2)	CL (kN)
General Laydown and Storage Areas	15	22.5 (+10.0 for pipe support allowance)
Floor Areas in Deck	Actual equip. +5.0 in open areas or 15.0	22.5 (+10.0 for pipe support allowance)
Temporary Refuge	5	5
Walkways, Stairs and Access Platforms	4.5	4.5

Table 13.10 - Superimposed area loads for local checks

Primary deck beams are locally checked, for both lower and upper deck, combining the dead weights with the distributed and concentrated live loads. The checks are performed considering the beams simply supported at both ends. The results are reported in the following sections divided by beam kinds for each floor.

Secondary beams local checks are presented in /34/.

Plan at elevation +30.310

The following figure shows the primary beams – and their properties – considere at elevation +30.310m.

The selected sections cover all the primary beams of the UD, as they are characterised by the smallest resistant section associated with the largest span.

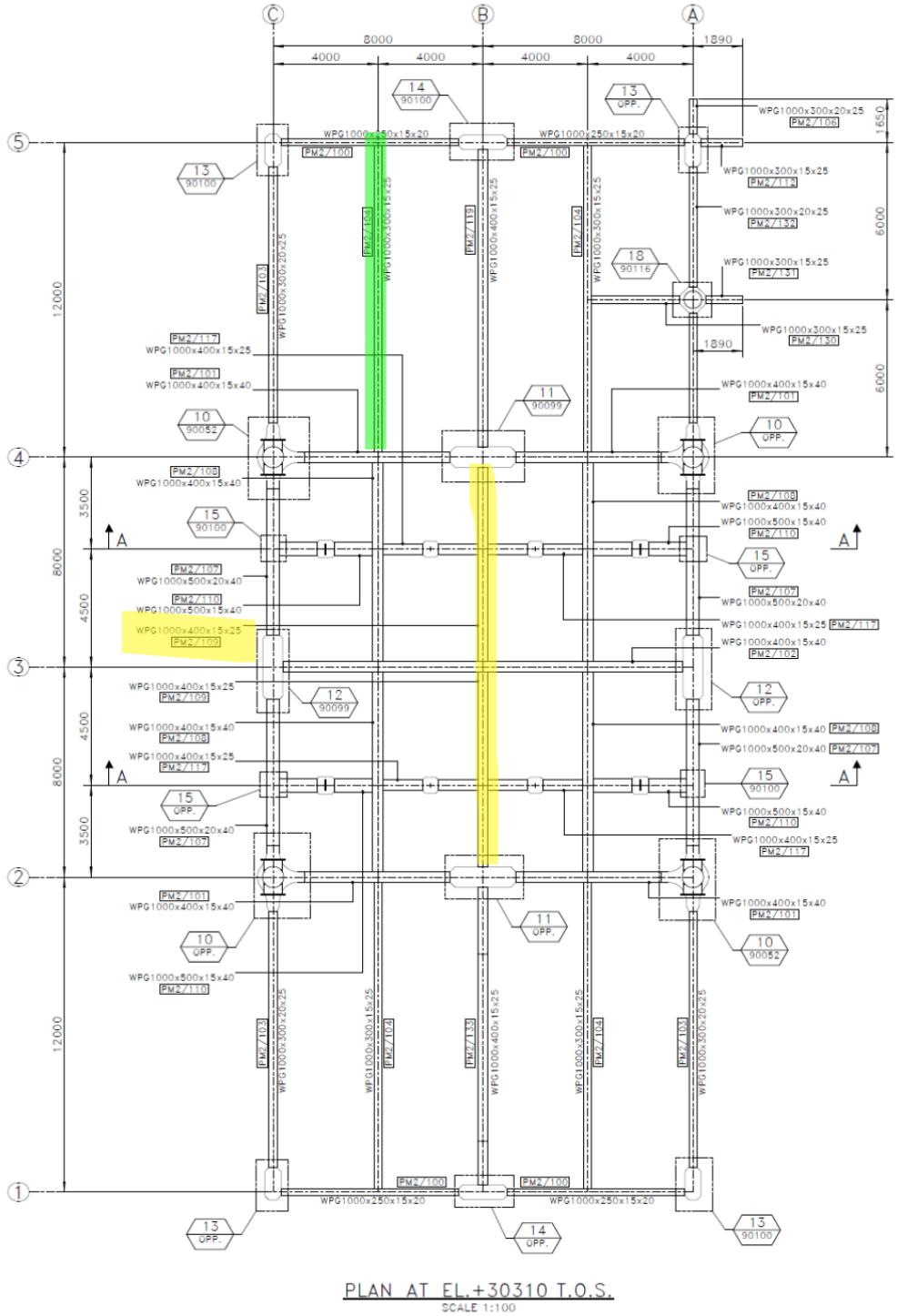


Figure 13.14 -Primary Beams checked at El. +30.310m - UD

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BEAM CHECK UNDER DISTRIBUTED LOAD								
DESCRIPTION:	UD - WPG1000x400x15x25						- MAX UC = 0.78	
DATA								
Shape:			WPG1000x400x15x25					
f_y =			400	MPa	Plate yield strength			
I =			5.826E+09	mm	Moment of inertia			
W_{el} =			1.17E+07	mm^3	Elastic section modulus			
W_{pl} =			1.31E+07	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			16.000	m	Beam span			
b =			4.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
q_Q =			15.00	kN/m^2	Variable distributed load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = (\gamma_{f,G} q_G + \gamma_{f,Q} q_Q) b$ =			103.0	kN/m	Total factored distributed load			
$p_2 = (q_G + q_Q) b$ =			70.0	kN/m	Total unfactored distributed load			
$p_Q = q_Q b$ =			60.0	kN/m	Variable unfactored distributed load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			1		Support - Support			
BENDING CHECK								
M_{ed} =	1 / 8	$p_1 L^2$ =	3296.0	kNm	Design bending moment			
$M_{c,Rd} = W_{el} f_y / \gamma_{M0}$ =			4776.1	kNm	> M_{Ed} - UC =	0.69	- Bending check	
SHEAR CHECK								
V_{ed} =	1 / 2	$p_1 L$ =	824	kN	Design shear force			
$V_{c,Rd} = A_v (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.26	- Shear check	
DEFLECTION CHECK								
f =	5 / 384	$p_2 L^4 / E I$ =	48.8	mm	Maximum deflection			
L / f =			328		> 200 - UC =	0.61	- Deflection check	
f =	5 / 384	$p_Q L^4 / E I$ =	41.8	mm	Maximum deflection			
L / f =			382		> 300 - UC =	0.78	- Deflection check	

BEAM CHECK UNDER CONCENTRATED LOAD								
DESCRIPTION:	UD - WPG1000x400x15x25						- MAX UC = 0.14	
DATA								
Shape:			WPG1000x400x15x25					
f_y =			400	MPa	Plate yield strength			
I =			5.826E+09	mm	Moment of inertia			
W_{el} =			1.17E+07	mm^3	Elastic section modulus			
W_{pl} =			1.31E+07	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			16.000	m	Beam span			
b =			4.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
F_Q =			32.50	kN	Variable concentrated load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = \gamma_{f,G} q_G b$ =			13.0	kN/m	Factored distributed load			
$p_2 = q_G b$ =			10.0	kN/m	Unfactored distributed load			
$F_1 = \gamma_{f,Q} F_Q$ =			48.8	kN	Factored concentrated load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			1		Support - Support			
BENDING CHECK								
$M_{ed} = p_1 L^2 / 8 + F_1 L / 4$ =			611.0	kNm	Design bending moment			
$M_{c,Rd} = W_{el} f_y / \gamma_{M0}$ =			4237.0	kNm	> M_{Ed} - UC =	0.14	- Bending check	
SHEAR CHECK								
$V_{ed} = p_1 L / 2 + F_1$ =			153	kN	Design shear force			
$V_{c,Rd} = A_v (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.05	- Shear check	
DEFLECTION CHECK								
$f = (5 / 384\ p_2 L^4 + F_Q L^3 / 48) / E I$ =			9.2	mm	Maximum deflection			
L / f =			1731		> 200 - UC =	0.12	- Deflection check	
$f = (F_Q L^3 / 48) / E I$ =			2.3	mm	Maximum deflection			
L / f =			7058		> 300 - UC =	0.04	- Deflection check	

Table 13.11 – PG 1000x400x15x25 – L=16m

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BEAM CHECK UNDER DISTRIBUTED LOAD								
DESCRIPTION:	UD - WPG1000x300x15x25						- MAX UC = 0.47	
DATA								
Shape:			WPG1000x300x15x25					
f_y =			400	MPa	Plate yield strength			
I =			4.637E+09	mm	Moment of inertia			
W_{el} =			9.27E+06	mm^3	Elastic section modulus			
W_{pl} =			1.07E+07	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			12.000	m	Beam span			
b =			4.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
q_Q =			15.00	kN/m^2	Variable distributed load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = (\gamma_{f,G} q_G + \gamma_{f,Q} q_Q) b$ =			103.0	kN/m	Total factored distributed load			
$p_2 = (q_G + q_Q) b$ =			70.0	kN/m	Total unfactored distributed load			
$p_Q = q_Q b$ =			60.0	kN/m	Variable unfactored distributed load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			1		Support - Support			
BENDING CHECK								
M_{ed} =	1 / 8	$p_1 L^2$ =	1854.0	kNm	Design bending moment			
$M_{c,Rd} = W_{el} f_y / \gamma_{M0}$ =			3889.8	kNm	> M_{Ed} - UC =	0.48	- Bending check	
SHEAR CHECK								
V_{ed} =	1 / 2	$p_1 L$ =	618	kN	Design shear force			
$V_{c,Rd} = A_v (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.20	- Shear check	
DEFLECTION CHECK								
f =	5 / 384	$p_2 L^4 / E I$ =	19.4	mm	Maximum deflection			
L / f =			618		> 200 - UC =	0.32	- Deflection check	
f =	5 / 384	$p_Q L^4 / E I$ =	16.6	mm	Maximum deflection			
L / f =			721		> 300 - UC =	0.42	- Deflection check	

BEAM CHECK UNDER CONCENTRATED LOAD								
DESCRIPTION:	UD - WPG1000x300x15x25						- MAX UC = 0.11	
DATA								
Shape:			WPG1000x300x15x25					
f_y =			400	MPa	Plate yield strength			
I =			4.637E+09	mm	Moment of inertia			
W_{el} =			9.27E+06	mm^3	Elastic section modulus			
W_{pl} =			1.07E+07	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			12.000	m	Beam span			
b =			4.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
F_Q =			32.50	kN	Variable concentrated load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = \gamma_{f,G} q_G b$ =			13.0	kN/m	Factored distributed load			
$p_2 = q_G b$ =			10.0	kN/m	Unfactored distributed load			
$F_1 = \gamma_{f,Q} F_Q$ =			48.8	kN	Factored concentrated load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			1		Support - Support			
BENDING CHECK								
$M_{ed} = p_1 L^2 / 8 + F_1 L / 4$ =			380.3	kNm	Design bending moment			
$M_{c,Rd} = W_{el} f_y / \gamma_{M0}$ =			3372.6	kNm	> M_{Ed} - UC =	0.11	- Bending check	
SHEAR CHECK								
$V_{ed} = p_1 L / 2 + F_1$ =			127	kN	Design shear force			
$V_{c,Rd} = A_v (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.04	- Shear check	
DEFLECTION CHECK								
$f = (5 / 384\ p_2 L^4 + F_Q L^3 / 48) / E I$ =			4.0	mm	Maximum deflection			
L / f =			3020		> 200 - UC =	0.07	- Deflection check	
$f = (F_Q L^3 / 48) / E I$ =			1.2	mm	Maximum deflection			
L / f =			9988		> 300 - UC =	0.03	- Deflection check	

Table 13.12 – PG 1000x300x15x25 – L=12m

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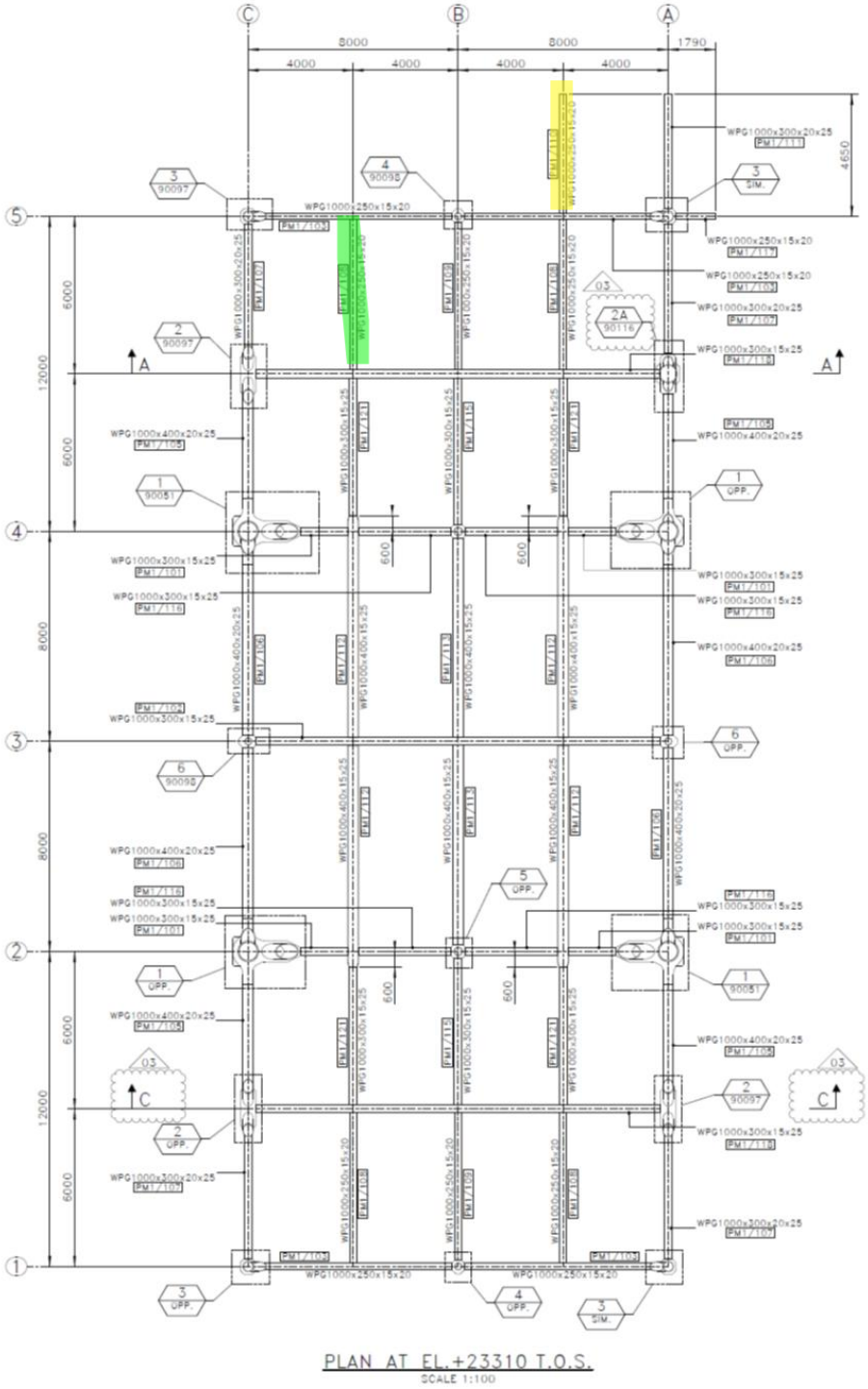


Figure 13.15 -Primary Beams checked at El. +23.310m - LD

BEAM CHECK UNDER DISTRIBUTED LOAD								
DESCRIPTION:	LD - WPG1000x250x15x20						- MAX UC = 0.18	
DATA								
Shape:			WPG1000x250x15x20					
f_y =			400	MPa	Plate yield strength			
I =			3.507E+09	mm	Moment of inertia			
W_{el} =			7.01E+06	mm^3	Elastic section modulus			
W_{pl} =			8.36E+06	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			4.650	m	Beam span			
b =			2.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
q_Q =			15.00	kN/m^2	Variable distributed load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = (\gamma_{f,G} q_G + \gamma_{f,Q} q_Q) b$ =			51.5	kN/m	Total factored distributed load			
$p_2 = (q_G + q_Q) b$ =			35.0	kN/m	Total unfactored distributed load			
$p_Q = q_Q b$ =			30.0	kN/m	Variable unfactored distributed load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			4		Fixed - Free			
BENDING CHECK								
M_{ed} =	1 / 2	$p_1 L^2$ =	556.8	kNm	Design bending moment			
$M_{c,Rd} = W_{el} f_y / \gamma_{M0}$ =			3038.5	kNm	> M_{Ed} - UC =	0.18	- Bending check	
SHEAR CHECK								
V_{ed} =	1 / 1	$p_1 L$ =	239	kN	Design shear force			
$V_{c,Rd} = A_v (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.08	- Shear check	
DEFLECTION CHECK								
f =	1 / 8	$p_2 L^4 / E I$ =	2.8	mm	Maximum deflection			
L / f =			1674		> 200 - UC =	0.12	- Deflection check	
f =	1 / 8	$p_Q L^4 / E I$ =	2.4	mm	Maximum deflection			
L / f =			1953		> 300 - UC =	0.15	- Deflection check	

BEAM CHECK UNDER CONCENTRATED LOAD								
DESCRIPTION:	LD - WPG1000x250x15x25						- MAX UC = 0.11	
DATA								
Shape:			WPG1000x250x15x20					
f_y =			400	MPa	Plate yield strength			
I =			3.507E+09	mm	Moment of inertia			
W_{el} =			7.01E+06	mm^3	Elastic section modulus			
W_{pl} =			8.36E+06	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			4.650	m	Beam span			
b =			2.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
F_Q =			32.50	kN	Variable concentrated load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = \gamma_{f,G} q_G b$ =			6.5	kN/m	Factored distributed load			
$p_2 = q_G b$ =			5.0	kN/m	Unfactored distributed load			
$F_1 = \gamma_{f,Q} F_Q$ =			48.8	kN	Factored concentrated load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			4		Fixed - Free			
BENDING CHECK								
$M_{ed} = p_1 L^2 / 2 + F_1 L$ =			297.0	kNm	Design bending moment			
$M_{c,Rd} = W_{el} f_y / \gamma_{M0}$ =			2550.7	kNm	> M_{Ed} - UC =	0.12	- Bending check	
SHEAR CHECK								
$V_{ed} = p_1 L + F_1$ =			79	kN	Design shear force			
$V_{c,Rd} = A_v (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.03	- Shear check	
DEFLECTION CHECK								
$f = (5 / 384\ p_2 L^4 + F_Q L^3 / 3) / E I$ =			1.5	mm	Maximum deflection			
L / f =			3059		> 200 - UC =	0.07	- Deflection check	
$f = (F_Q L^3 / 3) / E I$ =			1.5	mm	Maximum deflection			
L / f =			3144		> 300 - UC =	0.10	- Deflection check	

Table 13.13 – PG 1000x250x15x20 – L=4.65m

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

BEAM CHECK UNDER DISTRIBUTED LOAD								
DESCRIPTION:	LD - WPG1000x250x15x20						- MAX UC = 0.15	
DATA								
Shape:			WPG1000x250x15x20					
f_y =			400	MPa	Plate yield strength			
I =			3.507E+09	mm	Moment of inertia			
W_{el} =			7.01E+06	mm^3	Elastic section modulus			
W_{pl} =			8.36E+06	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			6.000	m	Beam span			
b =			4.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
q_Q =			15.00	kN/m^2	Variable distributed load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = (\gamma_{f,G}\, q_G + \gamma_{f,Q}\, q_Q)\, b$ =			103.0	kN/m	Total factored distributed load			
$p_2 = (q_G + q_Q)\, b$ =			70.0	kN/m	Total unfactored distributed load			
$p_Q = q_Q\, b$ =			60.0	kN/m	Variable unfactored distributed load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			1		Support - Support			
BENDING CHECK								
M_{ed} =	1 / 8	$p_1\, L^2$ =	463.5	kNm	Design bending moment			
$M_{c,Rd} = W_{el}\, f_y / \gamma_{M0}$ =			3038.5	kNm	> M_{Ed} - UC =	0.15	- Bending check	
SHEAR CHECK								
V_{ed} =	1 / 2	$p_1\, L$ =	309	kN	Design shear force			
$V_{c,Rd} = A_v\, (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.10	- Shear check	
DEFLECTION CHECK								
f =	5 / 384	$p_2\, L^4 / E\, I$ =	1.6	mm	Maximum deflection			
L / f =			3741		> 200 - UC =	0.05	- Deflection check	
f =	5 / 384	$p_Q\, L^4 / E\, I$ =	1.4	mm	Maximum deflection			
L / f =			4365		> 300 - UC =	0.07	- Deflection check	

BEAM CHECK UNDER CONCENTRATED LOAD								
DESCRIPTION:	LD - WPG1000x250x15x20						- MAX UC = 0.05	
DATA								
Shape:			WPG1000x250x15x20					
f_y =			400	MPa	Plate yield strength			
I =			3.507E+09	mm	Moment of inertia			
W_{el} =			7.01E+06	mm^3	Elastic section modulus			
W_{pl} =			8.36E+06	mm^3	Plastic section modulus			
A_v =			15000	mm^2	Shear area			
L =			6.000	m	Beam span			
b =			4.000	m	Beam spacing			
q_G =			2.50	kN/m^2	Permanent distributed load			
F_Q =			32.50	kN	Variable concentrated load			
$\gamma_{f,G}$ =			1.30		Permanent load factor			
$\gamma_{f,Q}$ =			1.50		Variable load factor			
$p_1 = \gamma_{f,G}\, q_G\, b$ =			13.0	kN/m	Factored distributed load			
$p_2 = q_G\, b$ =			10.0	kN/m	Unfactored distributed load			
$F_1 = \gamma_{f,Q}\, F_Q$ =			48.8	kN	Factored concentrated load			
γ_{M0} =			1.10		Strength resistance factor			
Restraint scheme			1		Support - Support			
BENDING CHECK								
$M_{ed} = p_1\, L^2 / 8 + F_1\, L / 4$ =			131.6	kNm	Design bending moment			
$M_{c,Rd} = W_{el}\, f_y / \gamma_{M0}$ =			2550.7	kNm	> M_{Ed} - UC =	0.05	- Bending check	
SHEAR CHECK								
$V_{ed} = p_1\, L / 2 + F_1$ =			88	kN	Design shear force			
$V_{c,Rd} = A_v\, (f_y / \sqrt{3}) / \gamma_{M0}$ =			3149	kN	> VEd - UC =	0.03	- Shear check	
DEFLECTION CHECK								
$f = (5 / 384\, p_2\, L^4 + F_Q\, L^3 / 48) / E\, I$ =			0.4	mm	Maximum deflection			
L / f =			14029		> 200 - UC =	0.01	- Deflection check	
$f = (F_Q\, L^3 / 48) / E\, I$ =			0.2	mm	Maximum deflection			
L / f =			30216		> 300 - UC =	0.01	- Deflection check	

Table 13.14 – PG 1000x250x15x20 – L=6m

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APPENDIX A – MEMBER GROUPS AND SECTION PROPERTIES

TECON - BLPH TOPSIDE & TRANSITION PIECE - IN-SERVICE ANALYSIS rev.1

Member Group Report

Name	Section	OD (cm)	WT (cm)	E (kN/cm2)	G (kN/cm2)	Fy (kN/cm2)	Ky	Kz	SPC	SAM	F	Density (tonne/m3)	Length (m)	Section
B01	PG01			20500.000	7885.000	40.000	1.00	1.00				7.850		
B02	PG02			20500.000	7885.000	40.000	1.00	1.00				7.850		
B03	PG03			20500.000	7885.000	40.000	1.00	1.00				7.850		
B04	PG04			20500.000	7885.000	40.000	1.00	1.00				7.850		
B05	PG05			20500.000	7885.000	40.000	1.00	1.00				7.850		
B06	PG06			20500.000	7885.000	40.000	1.00	1.00				7.850		
B07	PG07			20500.000	7885.000	40.000	1.00	1.00				7.850		
B09	PG09			20500.000	7885.000	40.000	1.00	1.00				7.850		
B10	PG10			20500.000	7885.000	40.000	1.00	1.00				7.850		
B12	PG02			20500.000	7885.000	40.000	1.00	1.00				7.850		
B13	PG03			20500.000	7885.000	40.000	1.00	1.00				7.850		
B14	PG04			20500.000	7885.000	40.000	1.00	1.00				7.850		
B15	PG05			20500.000	7885.000	40.000	1.00	1.00				7.850		
B20	PG20			20500.000	7885.000	40.000	1.00	1.00				7.850		
B21	PG21			20500.000	7885.000	40.000	1.00	1.00				7.850		
B22	PG22			20500.000	7885.000	40.000	1.00	1.00				7.850		
B23	PG23			20500.000	7885.000	40.000	1.00	1.00				7.850		
B31	PG31			20500.000	7885.000	40.000	1.00	1.00				7.850		
B32	PG32			20500.000	7885.000	40.000	1.00	1.00				7.850		
C03		27.300	1.113	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
C05		40.640	2.144	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850	0.90	
C05		40.640	1.270	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
C06		80.000	3.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
C07		70.000	3.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
C08		70.000	2.000	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
C11		70.000	3.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850	1.10	
C11		70.000	2.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
C11		70.000	3.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850	2.10	
C20		80.000	4.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850	1.21	
C20		80.000	2.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
C20		80.000	3.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850	2.05	
CF1		50.800	2.500	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
CT7		82.000	4.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
CT8		70.000	3.500	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
CT9		95.000	47.400	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
D01		55.000	2.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
D02		35.560	1.270	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
D03		32.390	1.270	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
D04		60.000	2.000	20500.000	7885.000	40.000	1.00	1.00		0.50		7.850		
D05		40.640	1.270	20500.000	7886.000	35.500	1.00	1.00		0.50		7.850		
D06		40.640	1.588	20500.000	7886.000	35.500	1.00	1.00		0.50		7.850		
D16		32.390	1.905	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
D36		40.640	2.062	20500.000	7886.000	35.500	1.00	1.00		0.50		7.850		
DU1	HEA800			20500.000	7885.000	40.000	1.00	1.00				9.99999905-6		
DU2		284.000	2.000	20500.000	7885.000	40.000	1.00	1.00		0.50		9.99999905-6		
DU3		21.910	1.000	205.000	79.000	40.000	1.00	1.00		0.50		9.99999905-6		
DU4		50.800	2.540	205.000	79.000	40.000	1.00	1.00		0.50		9.99999905-6		
HA3	HEA340			20500.000	7722.000	35.500	1.00	1.00				7.850		
IP2	IPE240			20500.000	7722.000	35.500	1.00	1.00				7.850		
IP3	IPE330			20500.000	7722.000	35.500	1.00	1.00				7.850		
M01		700.000	6.500	20500.000	7885.000	38.000	1.00	1.00		0.50		7.850		
PB1	HE600B			20500.000	7885.000	34.500	1.00	1.00				7.850		
PC2		40.640	1.588	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
PC3		45.720	1.905	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
PD1		27.310	1.588	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
PD2		21.910	1.270	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
PD3		27.310	1.270	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
PL1		35.500	1.588	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
S01	HE500A			20500.000	7885.000	34.500	1.00	1.00				7.850		
S02	IPE240			20500.000	7885.000	35.500	1.00	1.00				7.850		
S03	IPE330			20500.000	7885.000	35.500	1.00	1.00				7.850		
S04	HE340A			20500.000	7885.000	35.500	1.00	1.00				7.850		
S07	UPN220			20500.000	7885.000	35.500	1.00	1.00				7.850		
SF1		32.390	1.270	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
ST1		27.310	0.927	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
ST2		21.910	0.818	20500.000	7885.000	35.500	1.00	1.00		0.50		7.850		
ST3		16.830	0.952	20500.000	7722.000	35.500	1.00	1.00		0.50		7.850		
ST4		27.310	1.270	20500.000	7722.000	35.500	1.00	1.00		0.50		7.850		
ST5		21.910	1.031	20500.000	7722.000	35.500	1.00	1.00		0.50		7.850		
ST6		16.830	0.711	20000.000	7722.000	24.800	1.00	1.00		0.50		7.849		
ST7		14.130	0.655	20000.000	7722.000	24.800	1.00	1.00		0.50		7.849		
T00	TPBG02A			20500.000	7885.000	38.000	1.00	1.00				7.850		TPBG02B
T01	TPBG01			20500.000	7885.000	40.000	1.00	1.00				7.850		
T02	TPBG02B			20500.000	7885.000	38.000	1.00	1.00				7.850		TPBG03A
T03	TPBG03A			20500.000	7885.000	38.000	1.00	1.00				7.850		TPBG03B

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T04	TPBG03B			20500.000	7885.000	38.000	1.00	1.00		7.850	
T05	TPBG01A			20500.000	7885.000	40.000	1.00	1.00		7.850	TPBG01B
T06	TPBG01C			20500.000	7885.000	38.000	1.00	1.00		7.850	
T07	TPBG01B			20500.000	7885.000	40.000	1.00	1.00		7.850	TPBG01A
T2A	TPBG02B			20500.000	7885.000	38.000	1.00	1.00		7.850	TPBG02C
T2B	TPBG02C			20500.000	7885.000	38.000	1.00	1.00		7.850	TPBG03A
T3A	TPBG03A			20500.000	7885.000	38.000	1.00	1.00		7.850	TPBG03C
T3B	TPBG03C			20500.000	7885.000	38.000	1.00	1.00		7.850	TPBG03B
TPS		80.000	4.000	20500.000	7885.000	40.000	1.00	1.00	0.50	7.850	
TS1		80.000	4.000	20500.000	7885.000	40.000	1.00	1.00	0.50	7.850	
UN2	UPN220			20500.000	7722.000	27.500	1.00	1.00		7.850	
VHE	VHESEC			20500.000	7885.000	35.500	1.00	1.00		7.850	

Member Section Report

Section	Type	AX(cm2)	J(cm4)	IY(cm4)	IZ(cm4)	A(cm)	B(cm)	C(cm)	D(cm)	E(cm)	F(cm)
CPAD	CON *	735.133	1119791.2	559895.62	559895.62	82.000	3.000	80.000	3.000	4.000	
HE500A	WF	197.500	309.300	86970.000	10370.000	30.000	2.300	49.000	1.200	2.700	
PG01	PLG *	390.000	551.140	618312.50	26730.001	40.000	2.500	100.000	2.000		
PG02	PLG *	342.500	452.849	582588.50	26693.384	40.000	2.500	100.000	1.500		
PG03	PLG *	292.500	348.683	463734.37	11276.719	30.000	2.500	100.000	1.500		
PG04	PLG *	244.000	198.460	350725.34	5235.333	25.000	2.000	100.000	1.500		
PG05	PLG *	340.000	446.973	499458.31	11313.334	30.000	2.500	100.000	2.000		
PG06	PLG *	458.000	1550.254	835042.68	42692.539	40.000	4.000	100.000	1.500		
PG07	PLG *	584.000	2022.513	1051914.7	83394.671	50.000	4.000	100.000	2.000		
PG09	PLG *	538.000	1976.921	1019469.4	83359.210	50.000	4.000	100.000	1.500		
PG10	PLG *	292.500	348.683	463734.37	11276.719	30.000	2.500	100.000	1.500		
PG20	PLG *	784.000	3089.179	1512981.3	281311.34	75.000	4.000	100.000	2.000		
PG21	PLG *	870.000	3397.574	1637640.1	341453.12	80.000	4.000	100.000	2.500		
PG22	PGD *	916.000	606003.37	1670085.3	524390.31	80.000	4.000	100.000	1.500		51.500
PG23	PLG *	778.000	3256.920	1572749.5	341359.18	80.000	4.000	100.000	1.500		1.000
PG31	PLG *	504.000	1595.846	867488.00	42728.000	40.000	4.000	100.000	2.000		
PG32	PLG *	495.000	769.890	867906.25	94638.757	61.000	2.500	100.000	2.000		
TPBG01	PGD *	630.000	512780.15	880062.43	236129.98	50.000	2.500	100.000	2.000		44.000
TPBG01A	PGD *	630.000	512780.15	880062.43	236129.98	50.000	2.500	100.000	2.000		44.000
TPBG01B	PGD *	770.000	747123.18	1829728.7	303936.62	50.000	2.500	135.000	2.000		44.000
TPBG01C	PGD *	1158.000	868535.06	3581198.2	381457.96	50.000	6.500	140.000	2.000		44.000
TPBG02A	PGD *	4427.000	7234740.0	52115124.	15339738.	230.000	6.500	252.500	3.000		77.500
TPBG02B	PGD *	3769.200	7225476.0	42160956.	8413853.0	179.400	6.500	252.500	3.000		77.500
TPBG02C	PGD *	3495.750	6957579.5	36027176.	6699583.5	162.090	6.500	244.430	3.000		77.500
TPBG03A	PGD *	2830.800	6307045.0	23341494.	3781138.5	120.000	6.500	224.800	3.000		77.500
TPBG03B	PGD *	2322.000	3560255.2	7980361.5	3016762.2	120.000	6.500	140.000	3.000		77.500
TPBG03C	PGD *	2575.080	4918580.5	14463366.	3396967.0	120.000	6.500	182.180	3.000		77.500
VHESEC	WF *	105.000	55.327	20868.748	3908.750	25.000	1.500	33.000	1.000		

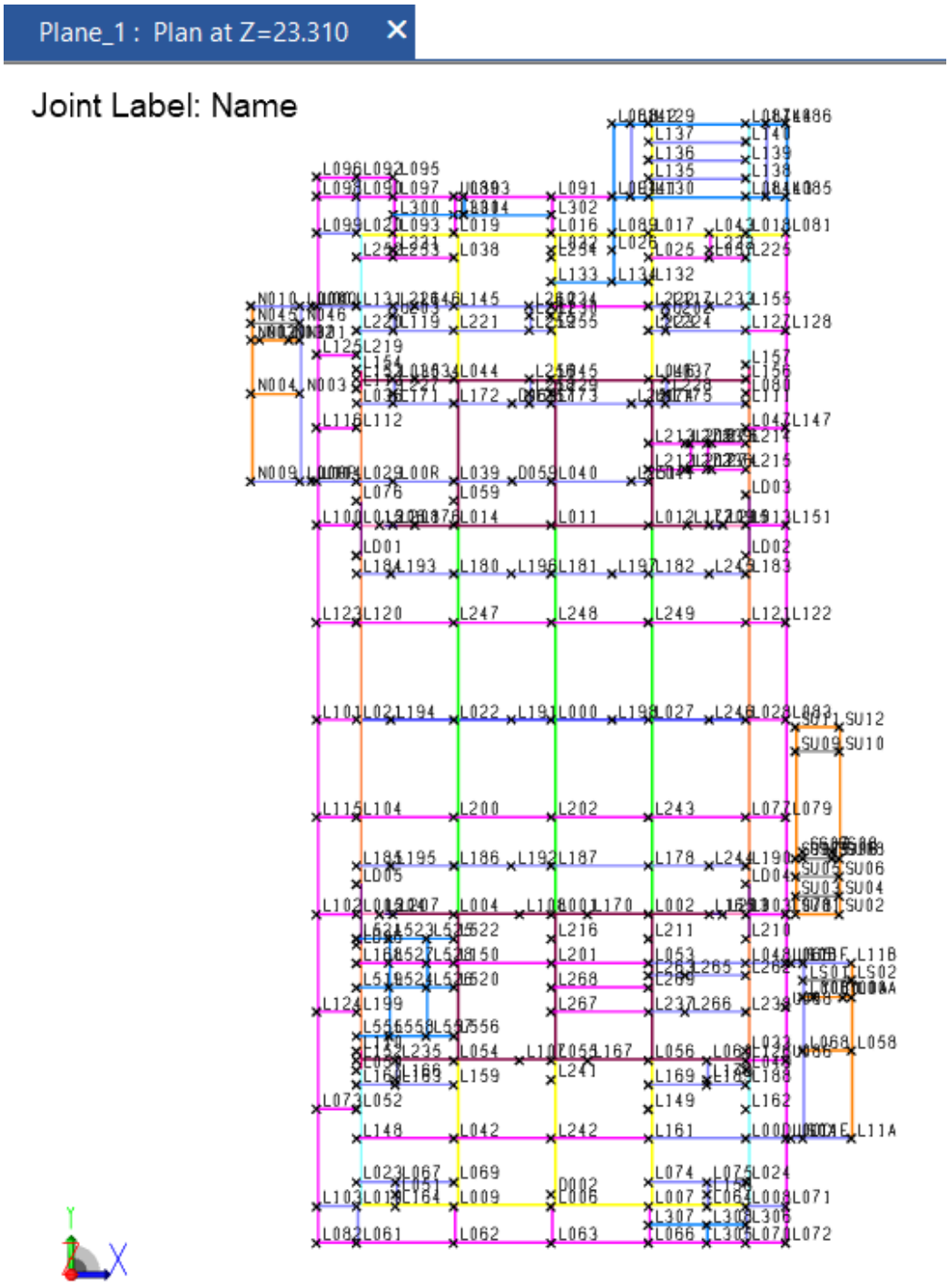
An * indicates that AX, J, IY and IZ are computed values, not user defined.

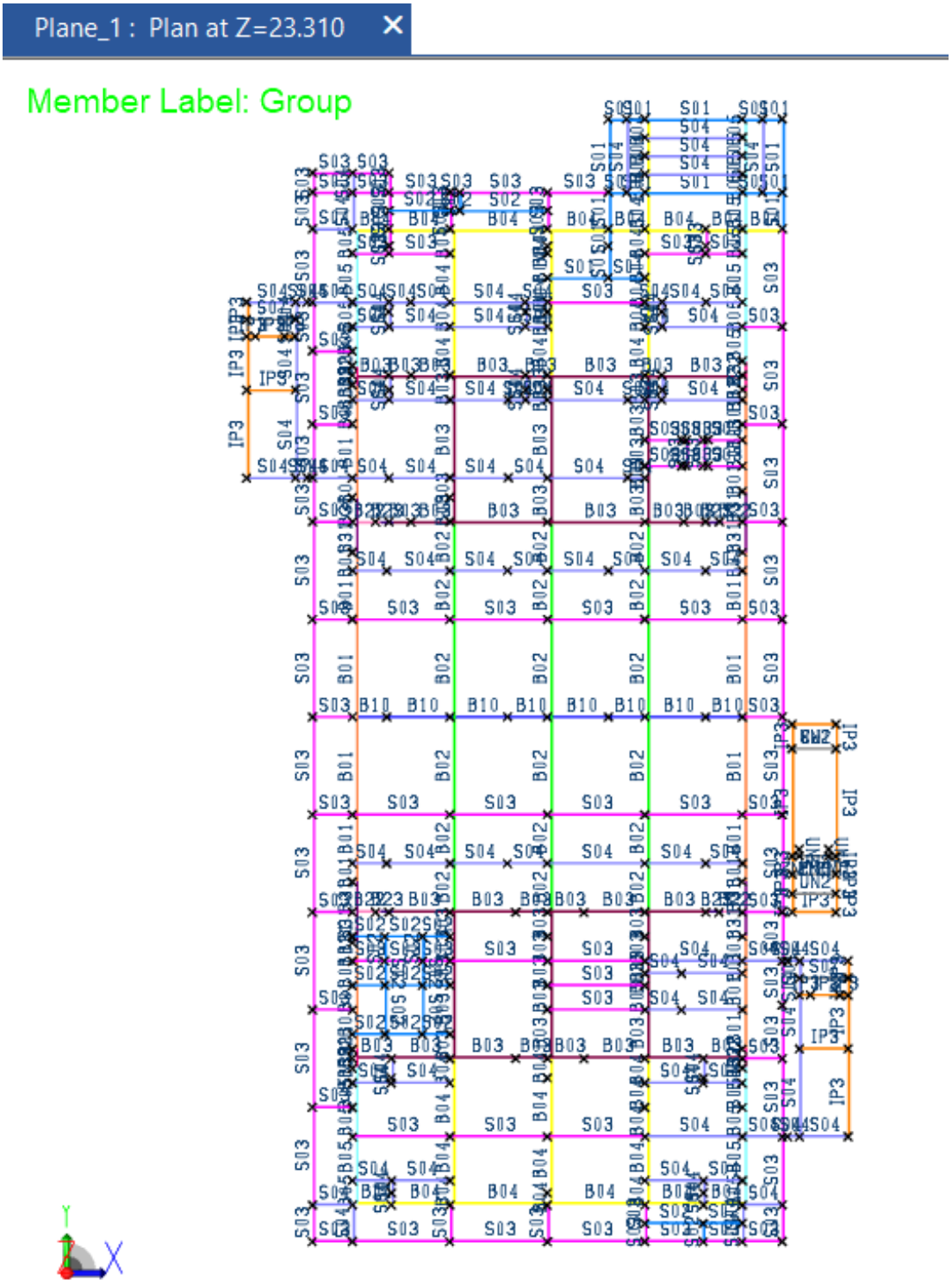
Plate Group Report

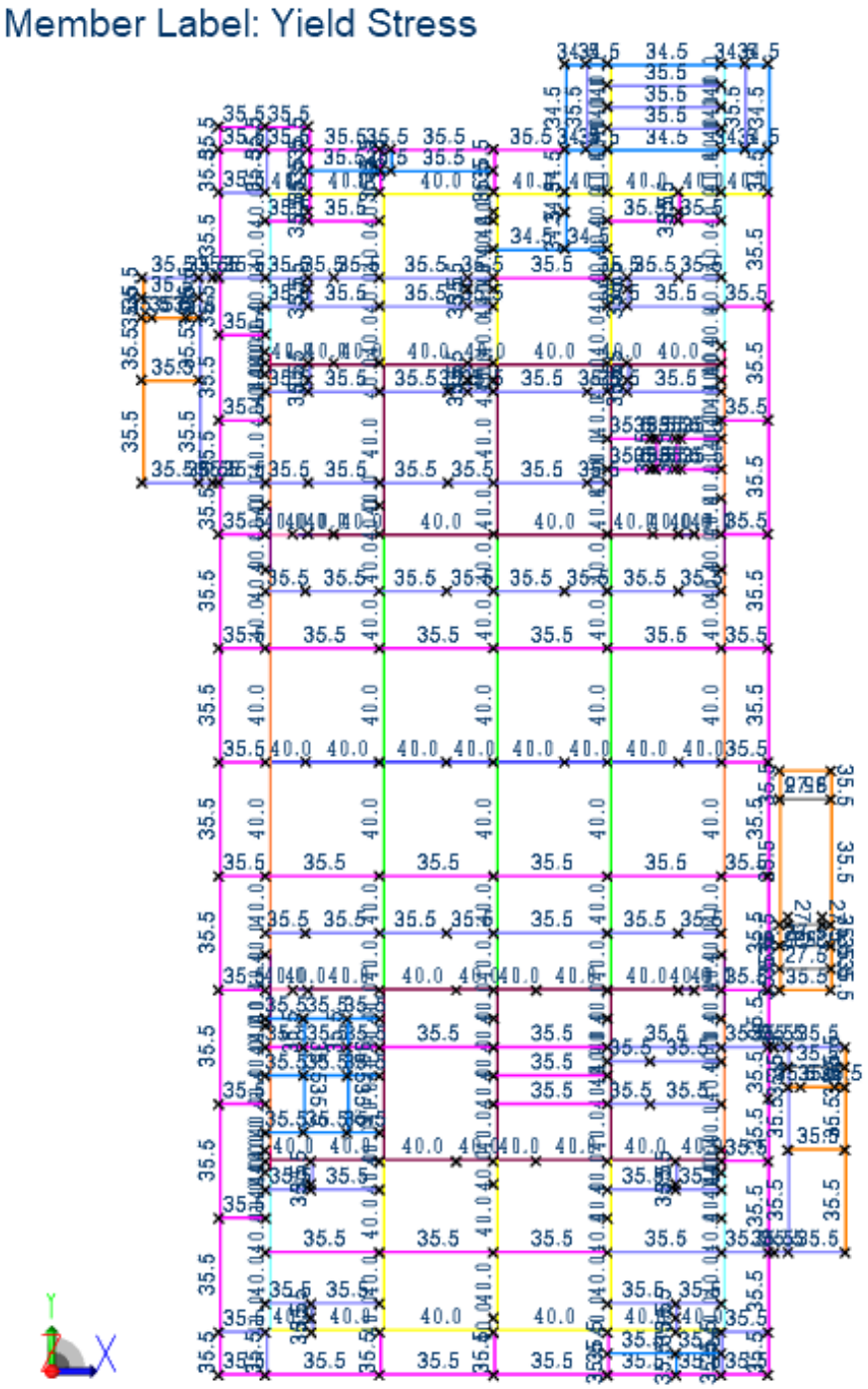
Name	Z Thickness (cm)	M	E (kN/cm2)	U	Fy (kN/cm2)	Z Offset (cm)	Section	Spacing (cm)	L	T	Density (tonne/m3)
P08	0.800	S	20500.000	0.300	35.500						10.0000029-5
P10	1.000	S	20500.000	0.300	35.500						10.0000029-5

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APPENDIX B - WIREFRAME SCHEMES

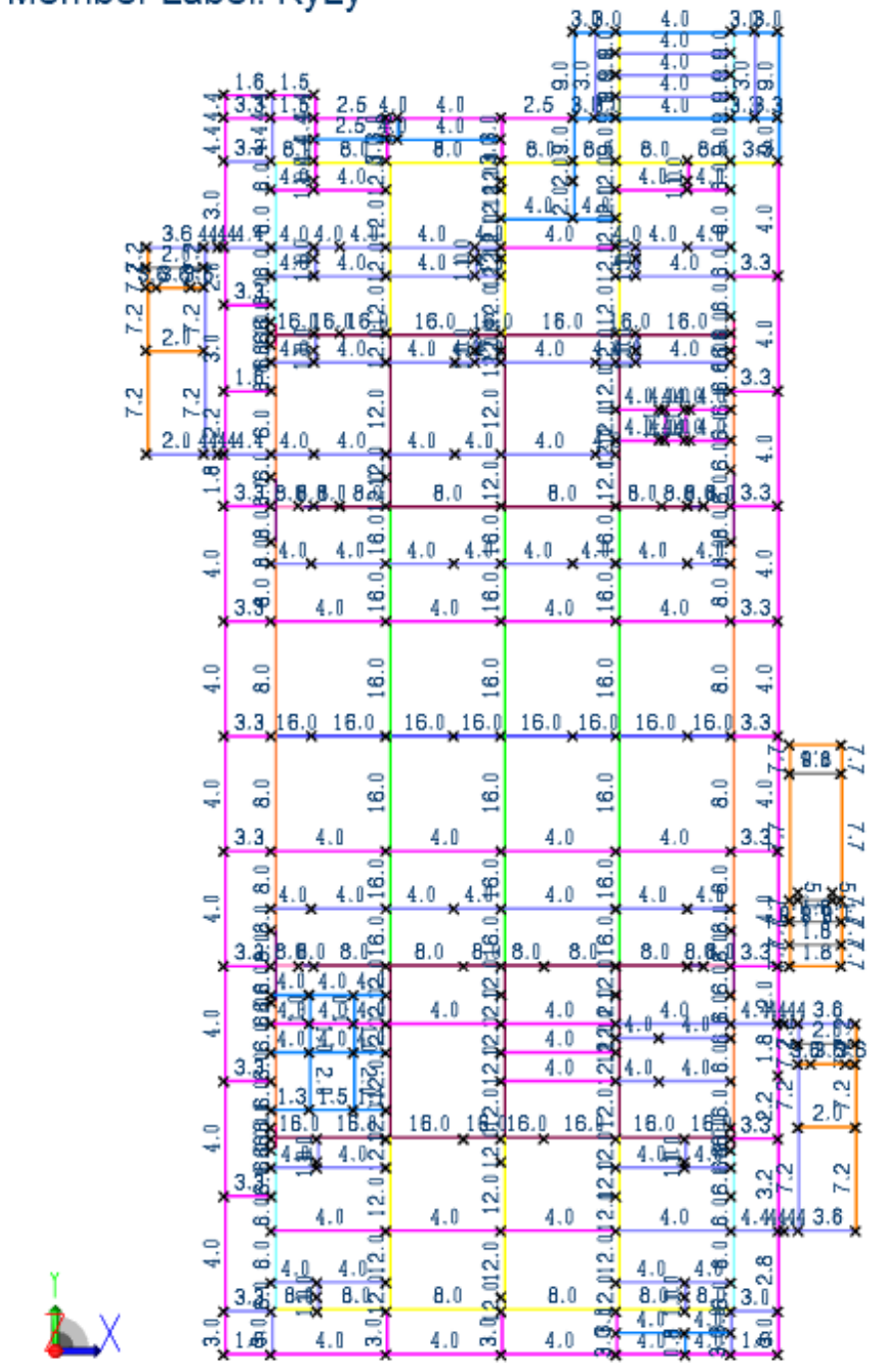



Plane_1 : Plan at Z=23.310
Member Label: Group
Y
X



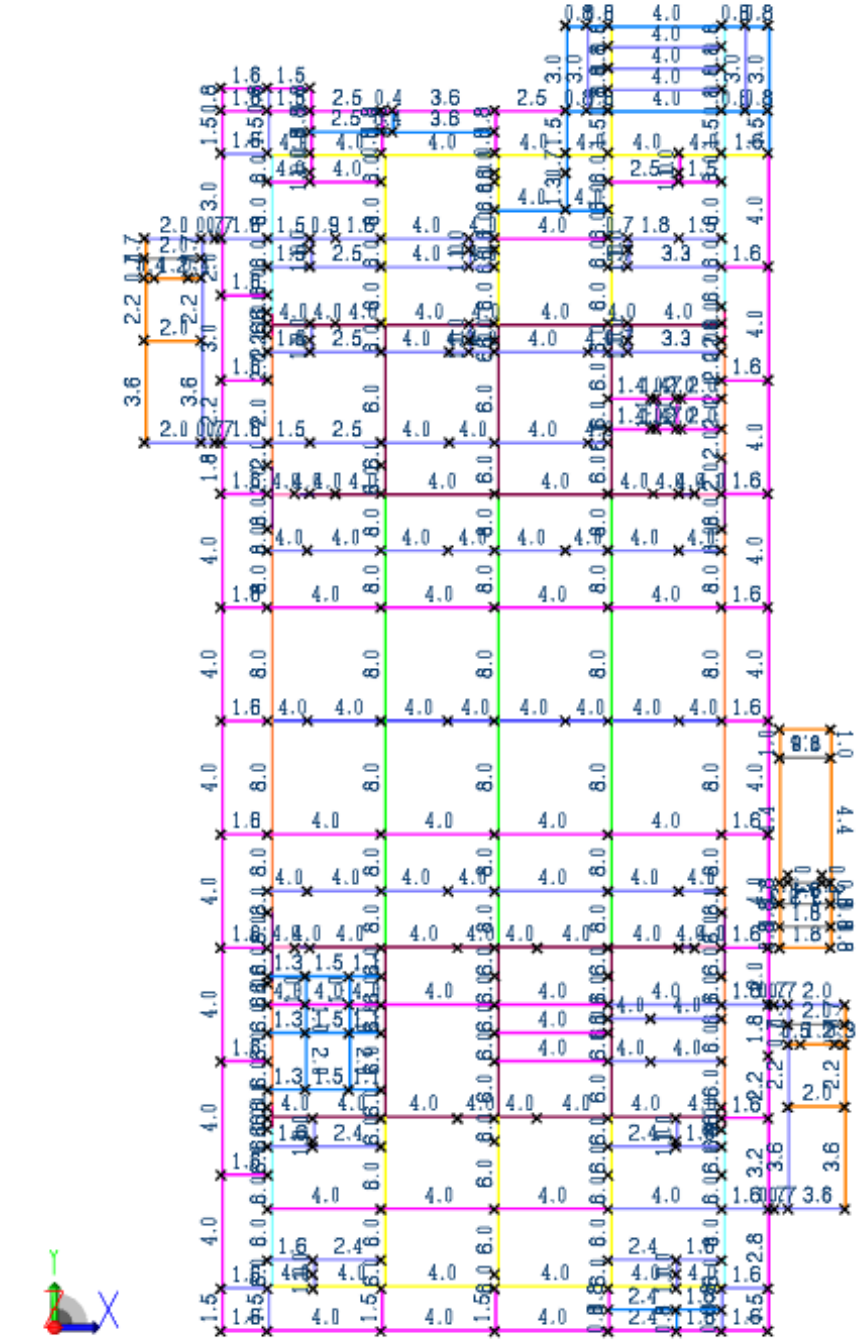
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Member Label: KyLy

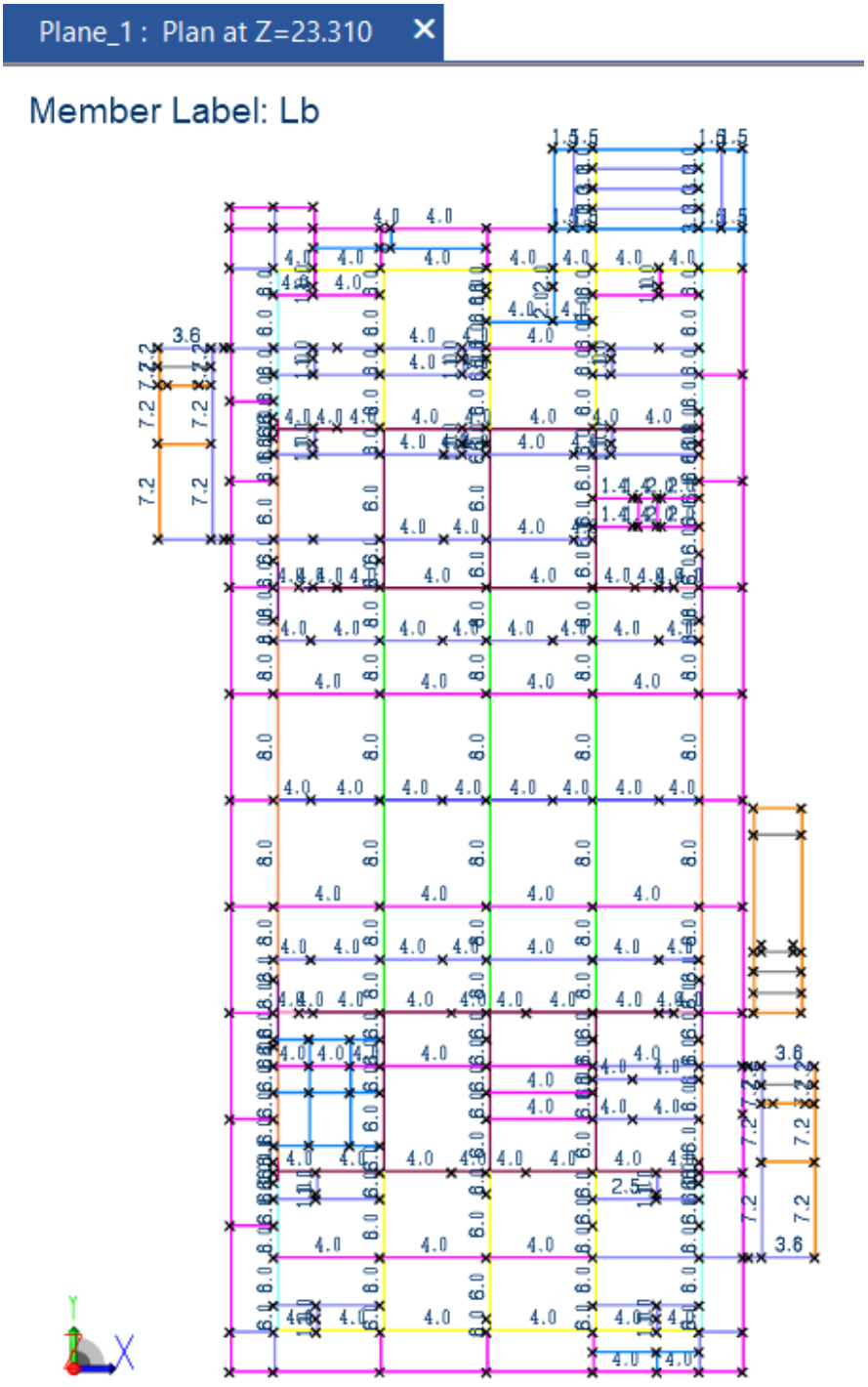


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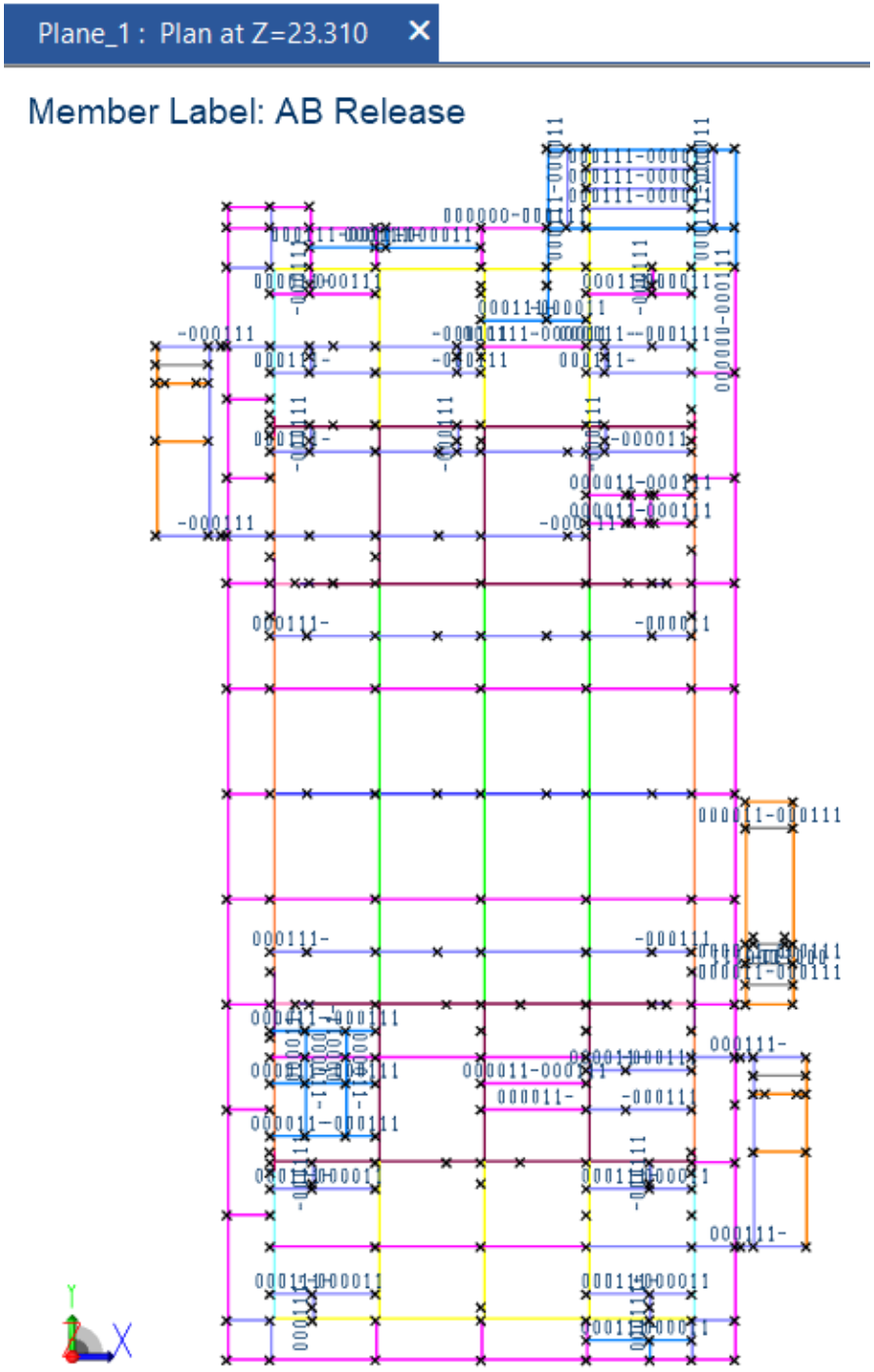
Member Label: KzLz



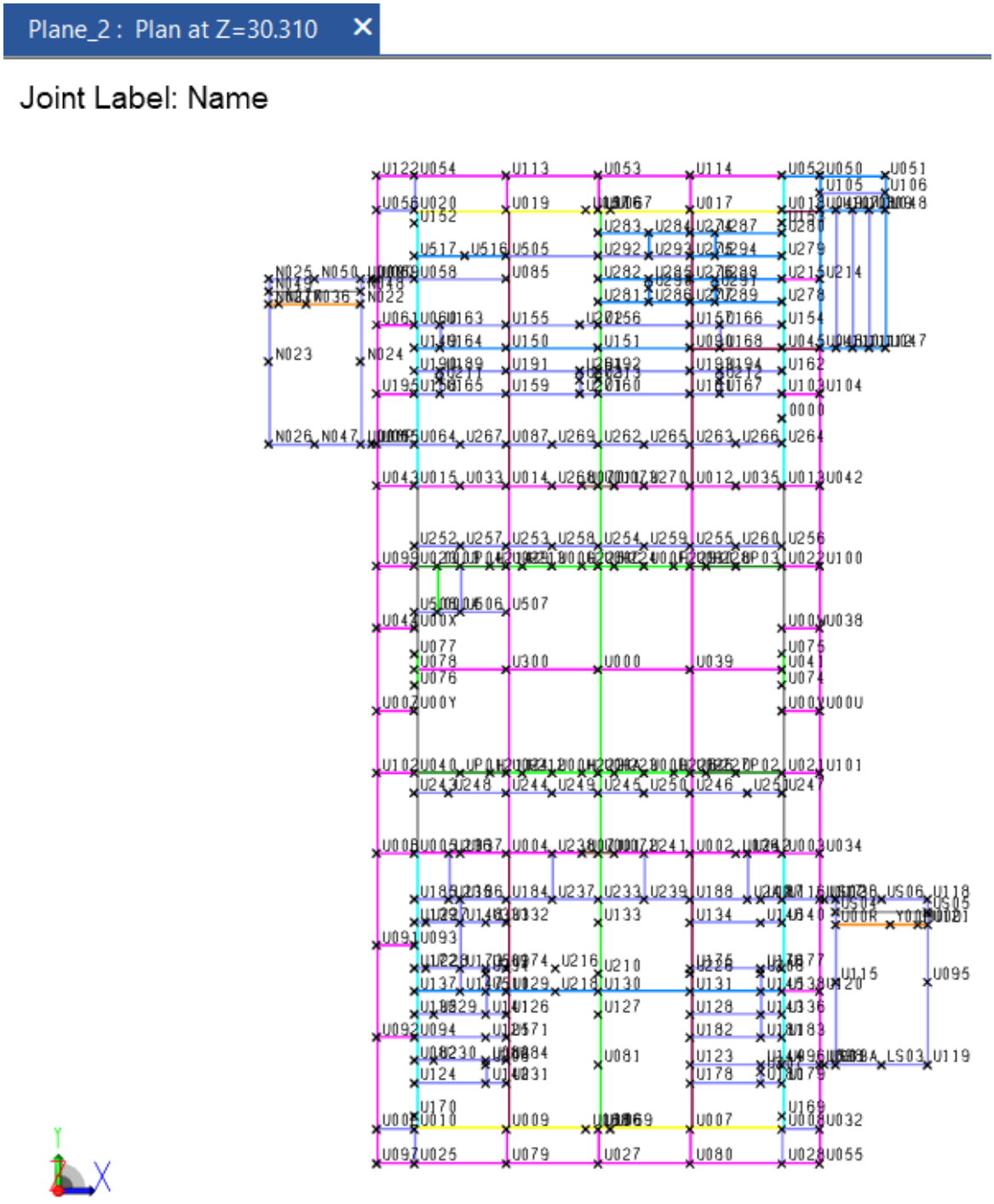
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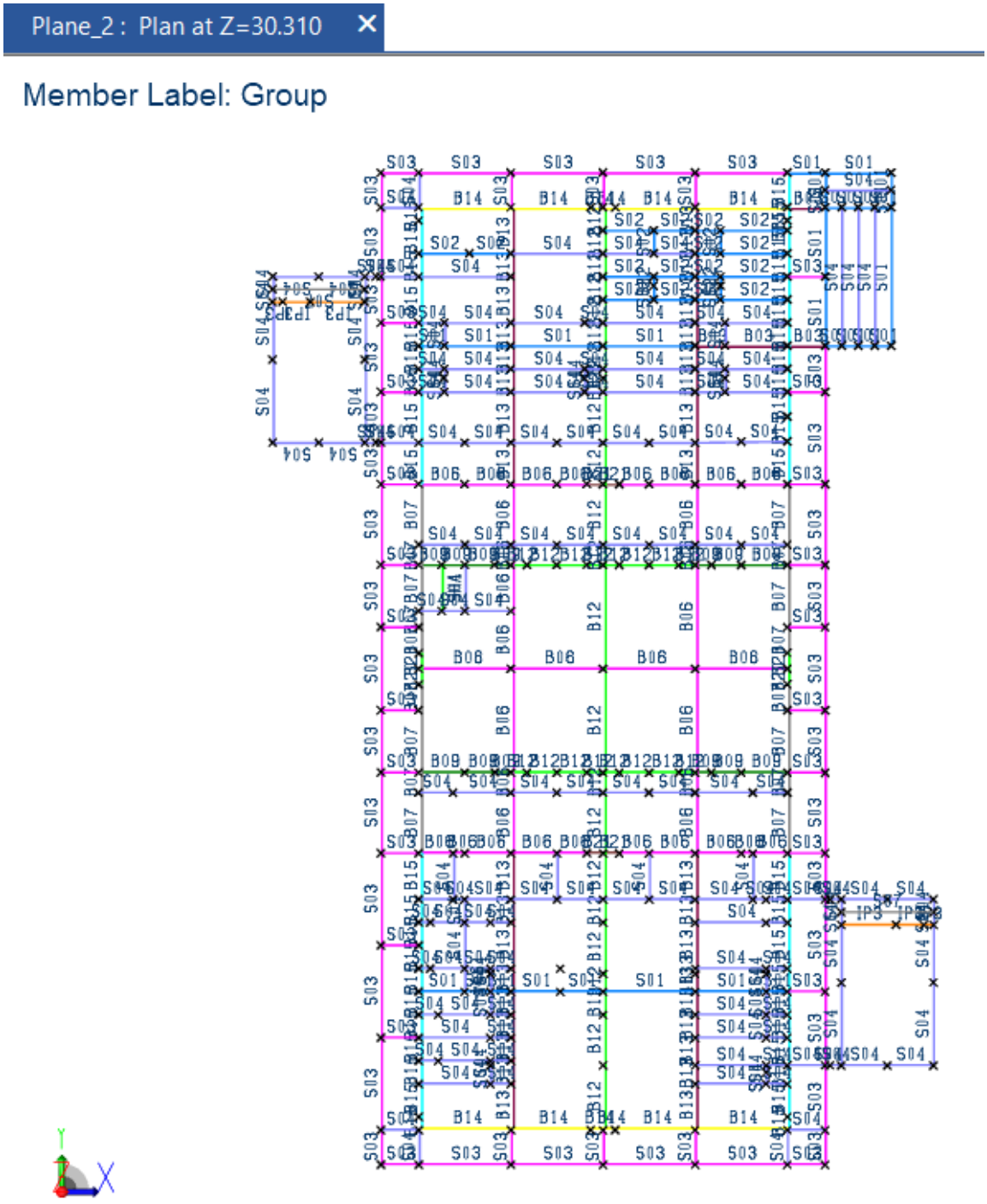


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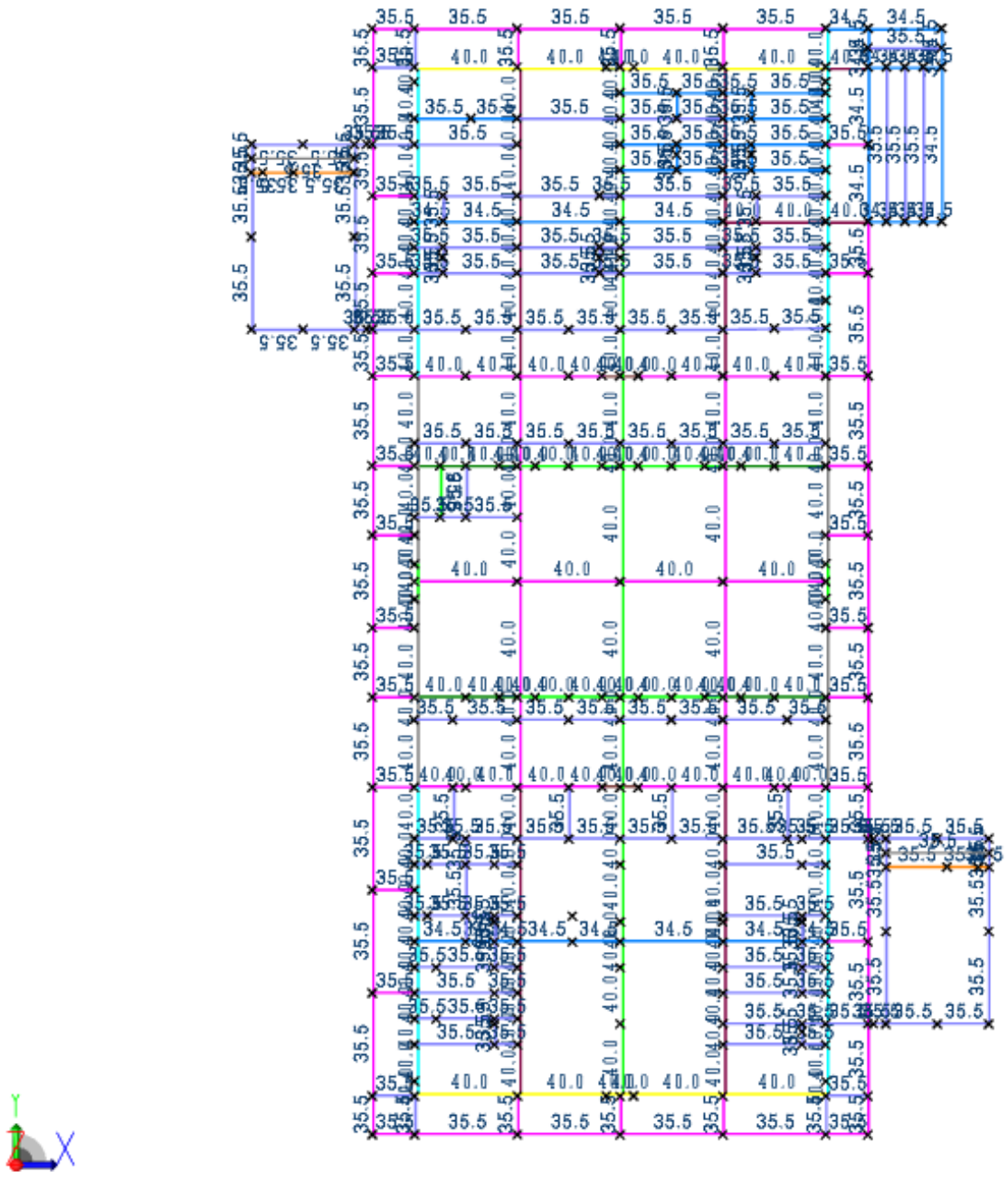


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Plane_2 : Plan at Z=30.310
Joint Label: Name

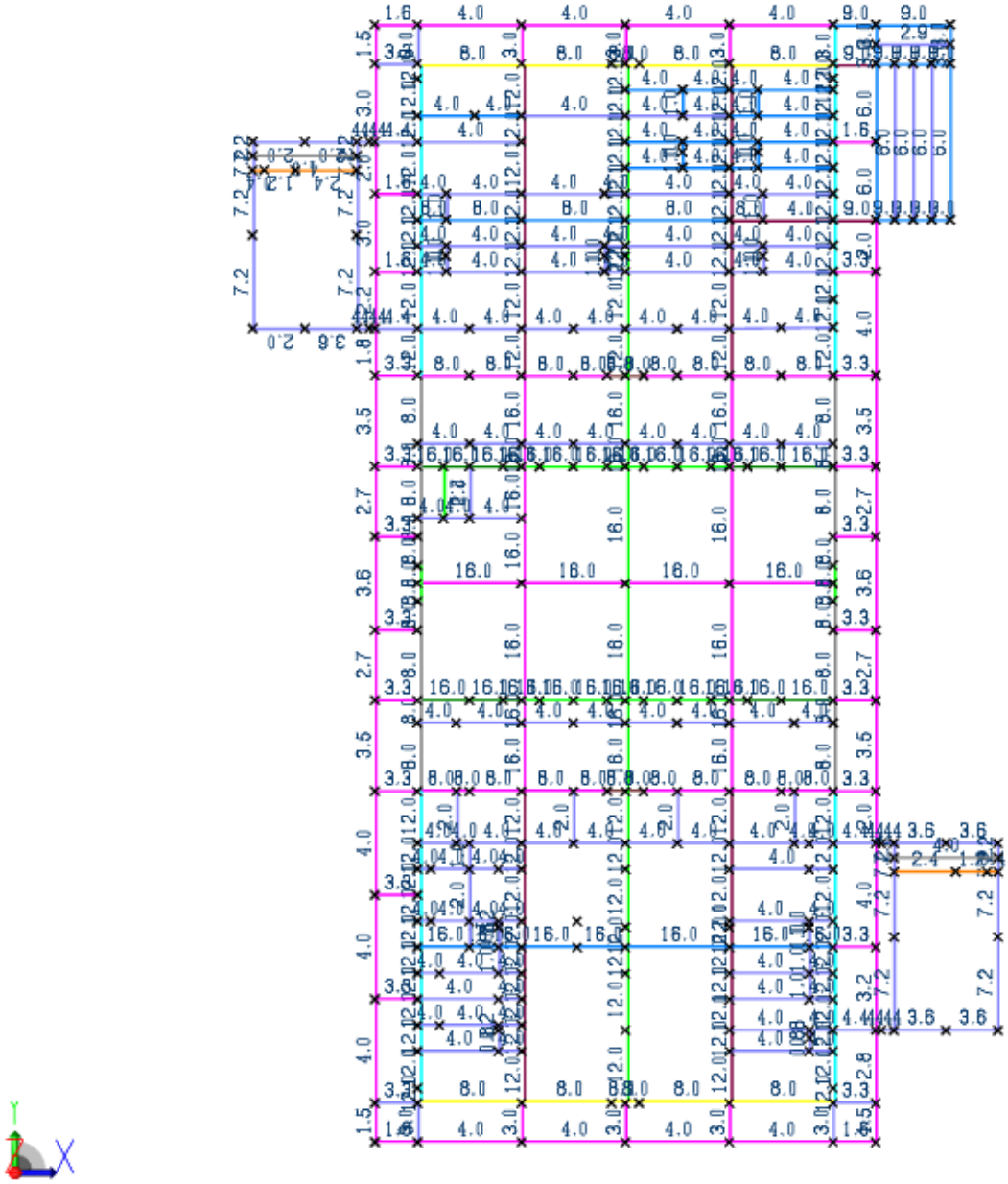

Plane_2 : Plan at Z=30.310
Member Label: Group
Y
X

Member Label: Yield Stress



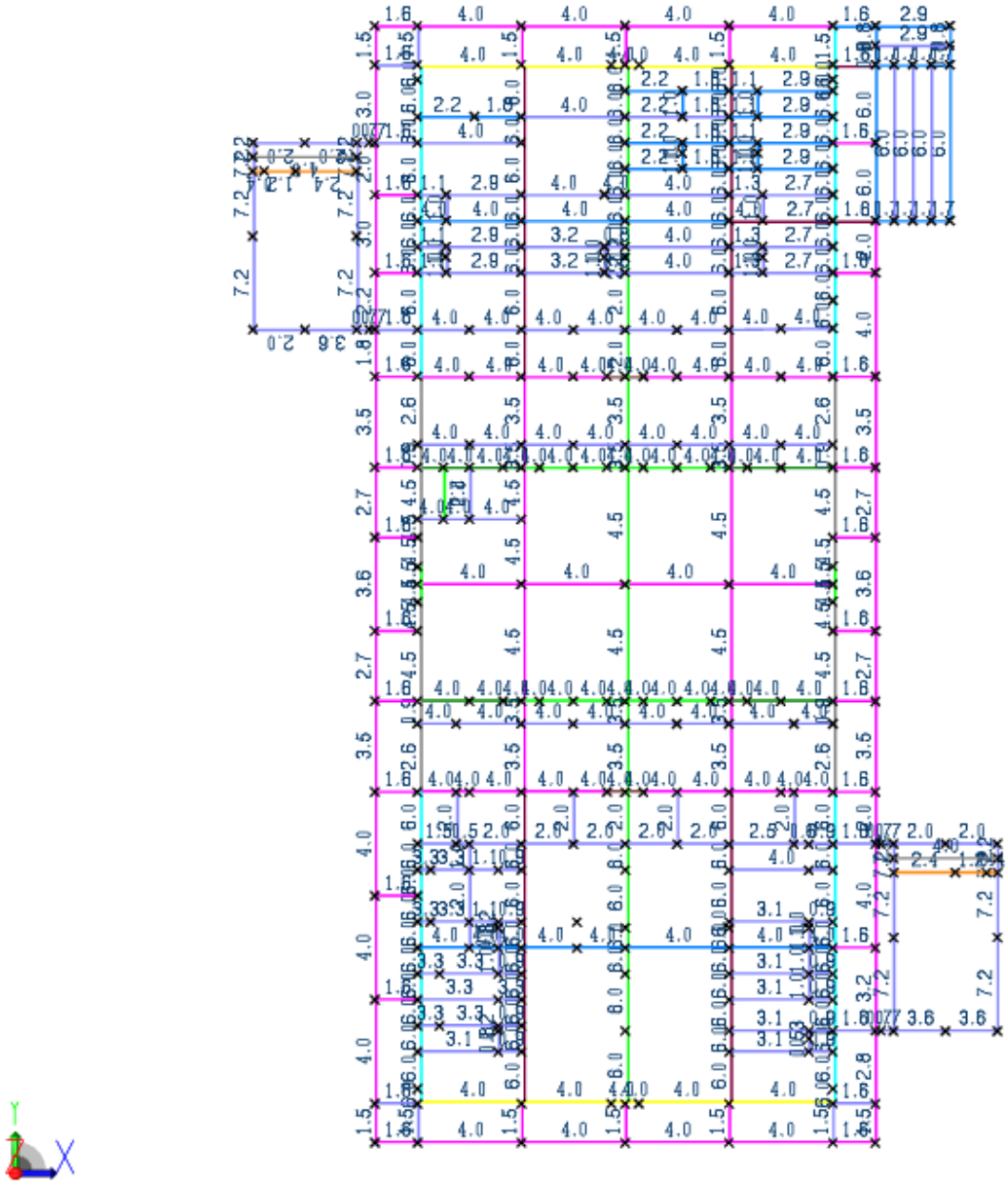
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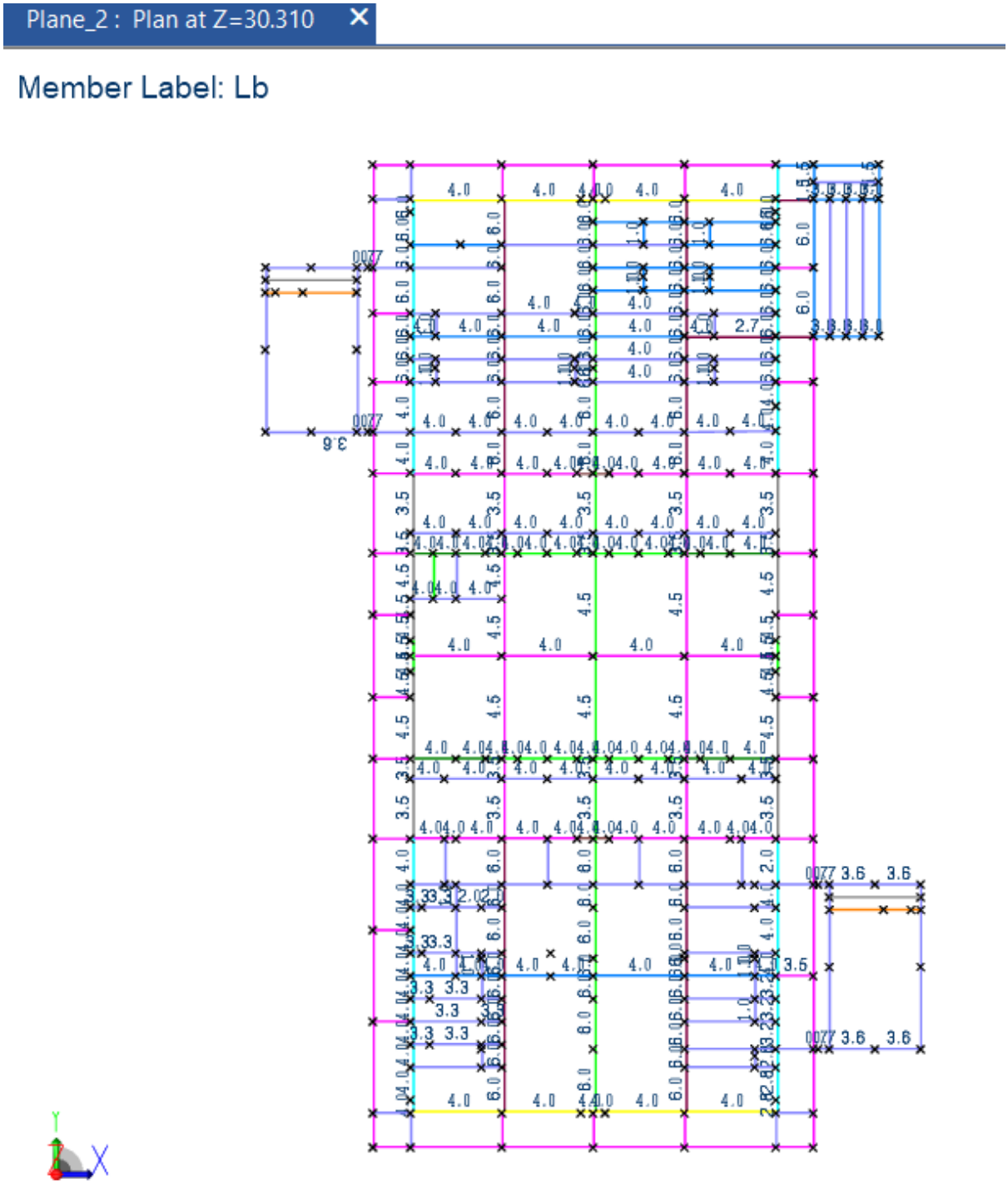
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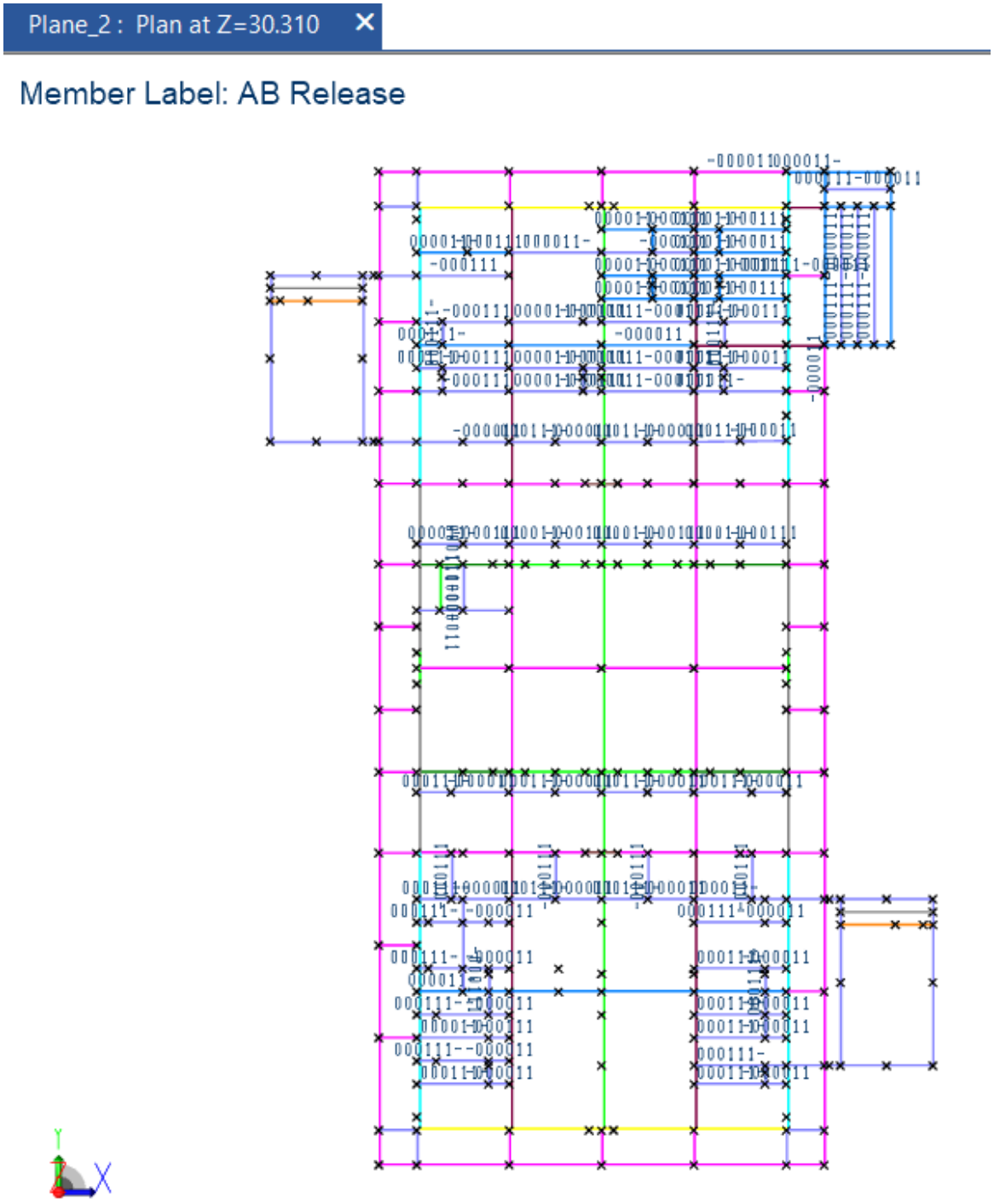


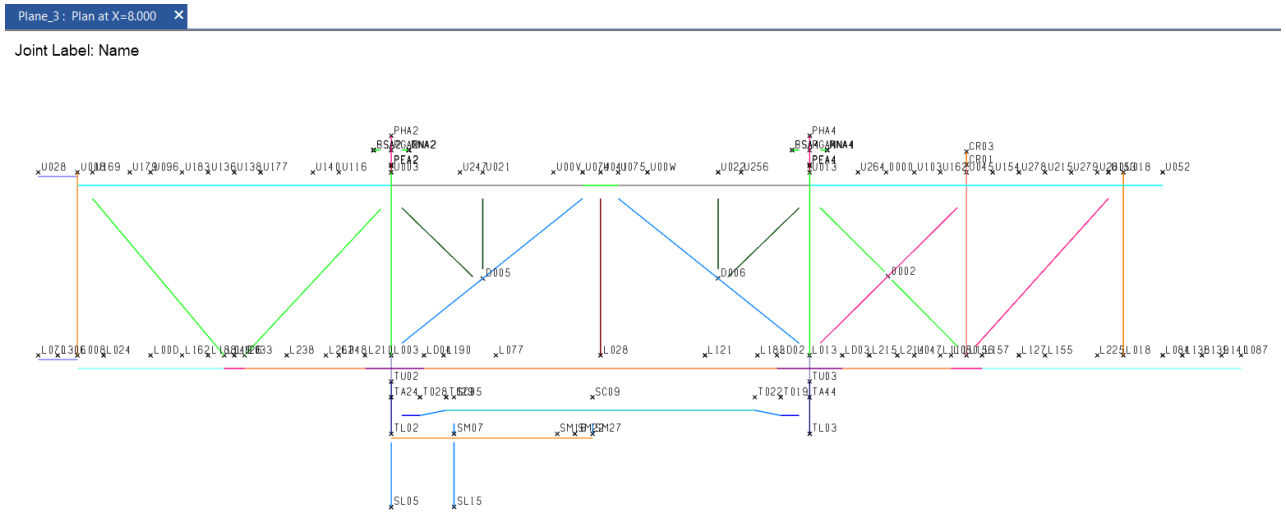
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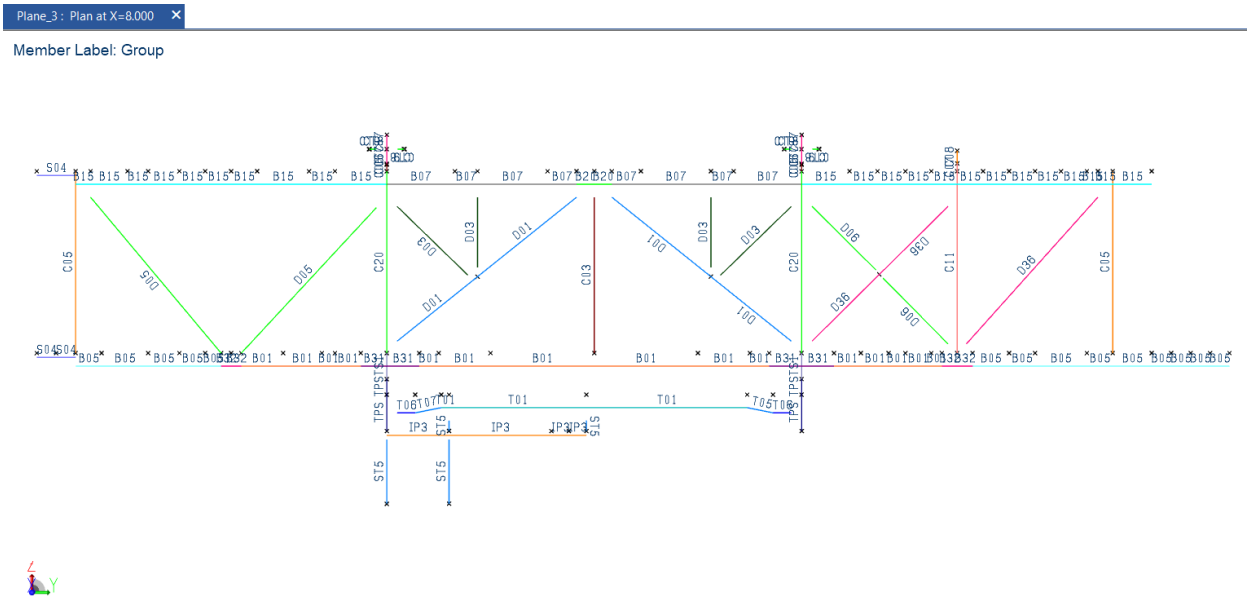
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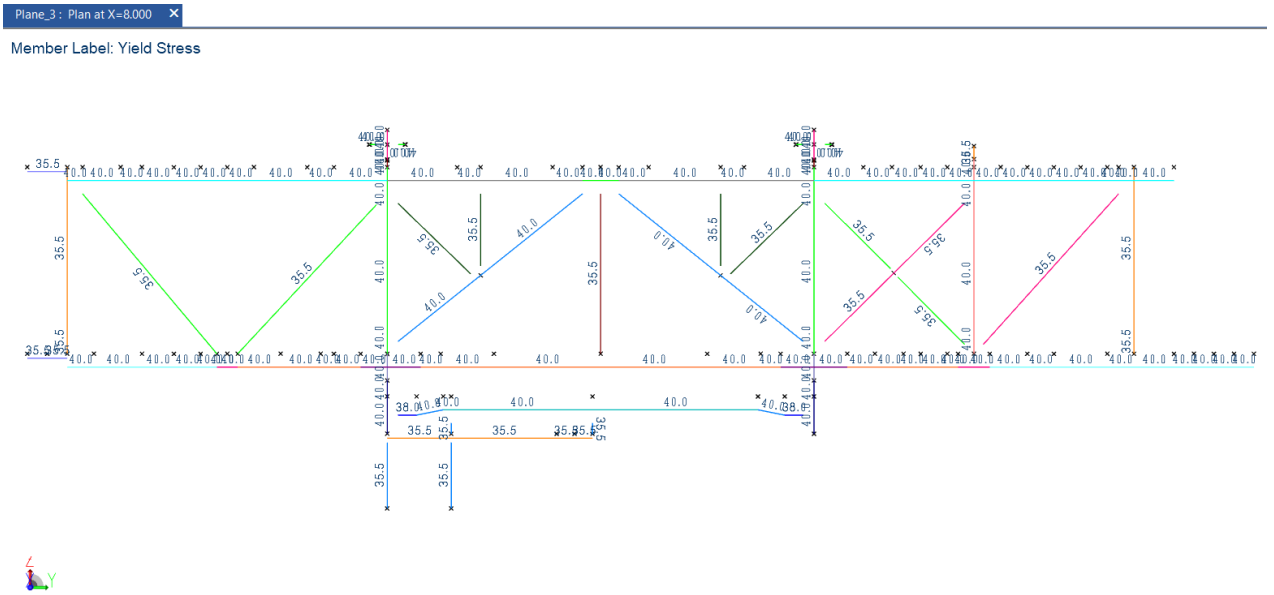


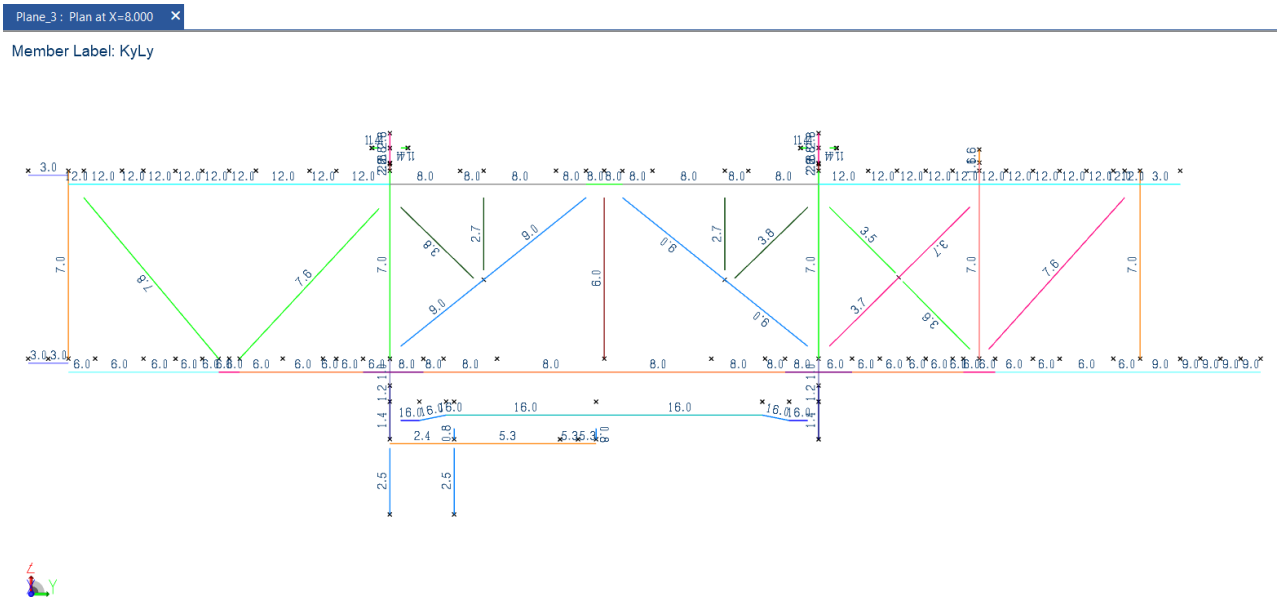

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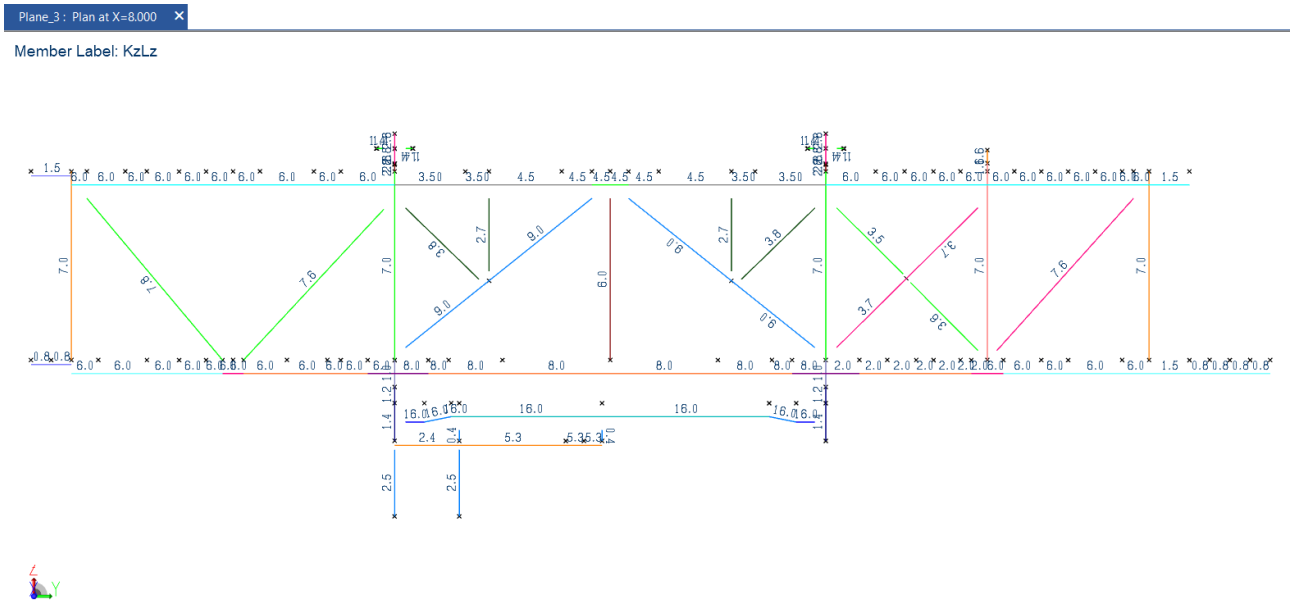

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Member Label: AB Release
Y
X

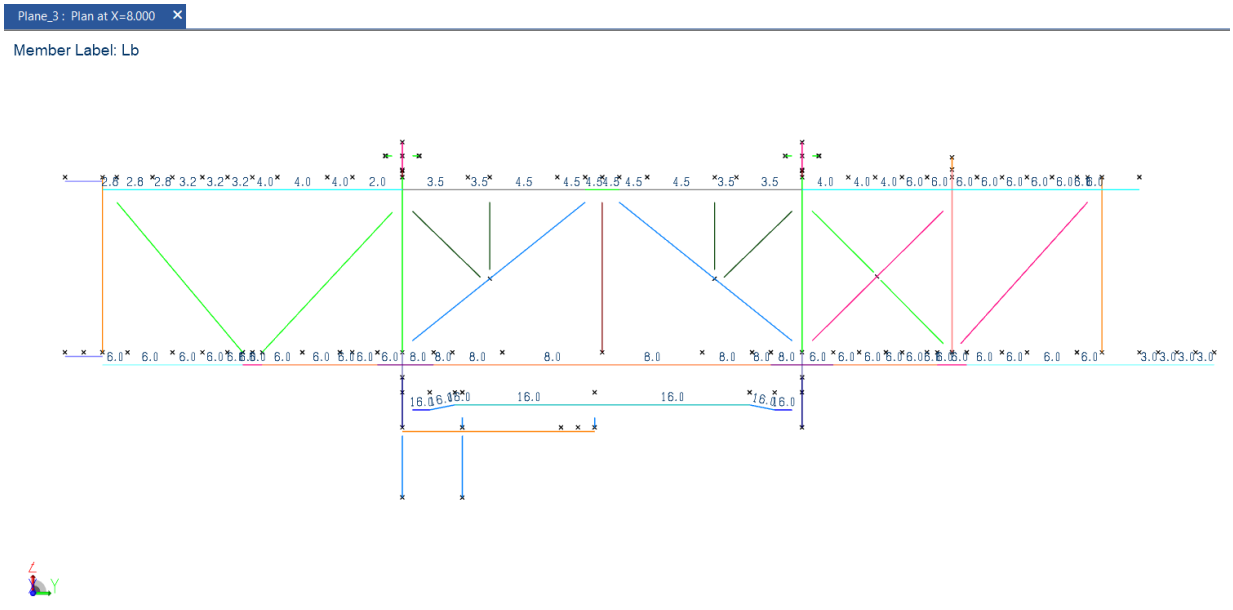

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Joint Label: Name

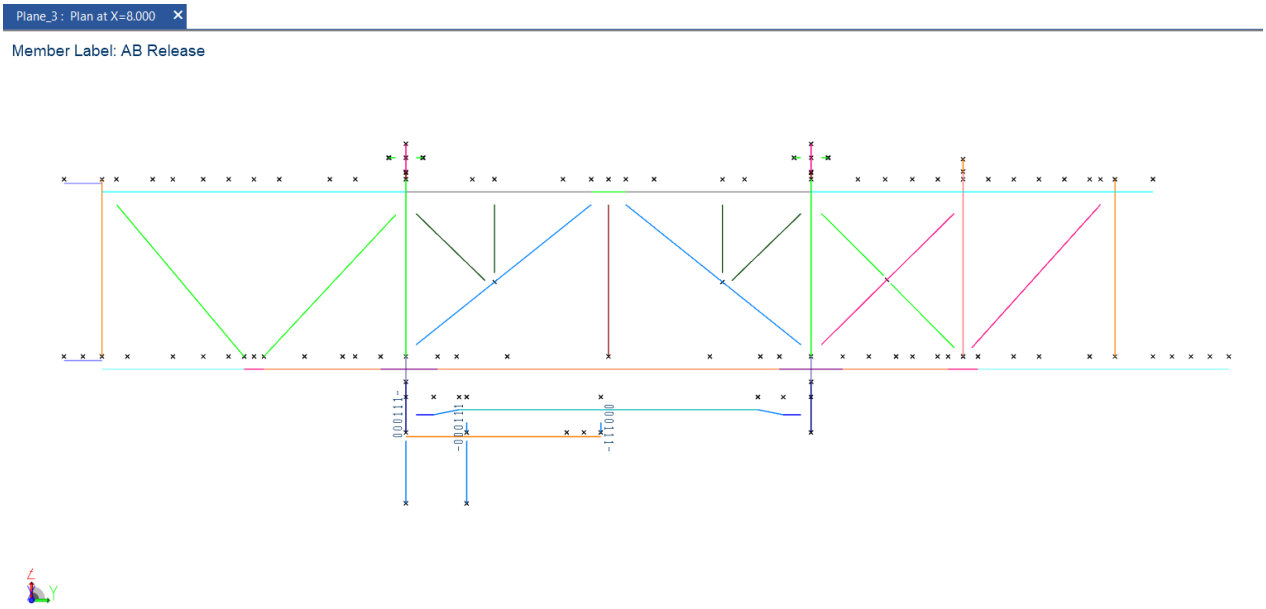

Plane_3 : Plan at X=8.000
Member Label: Group

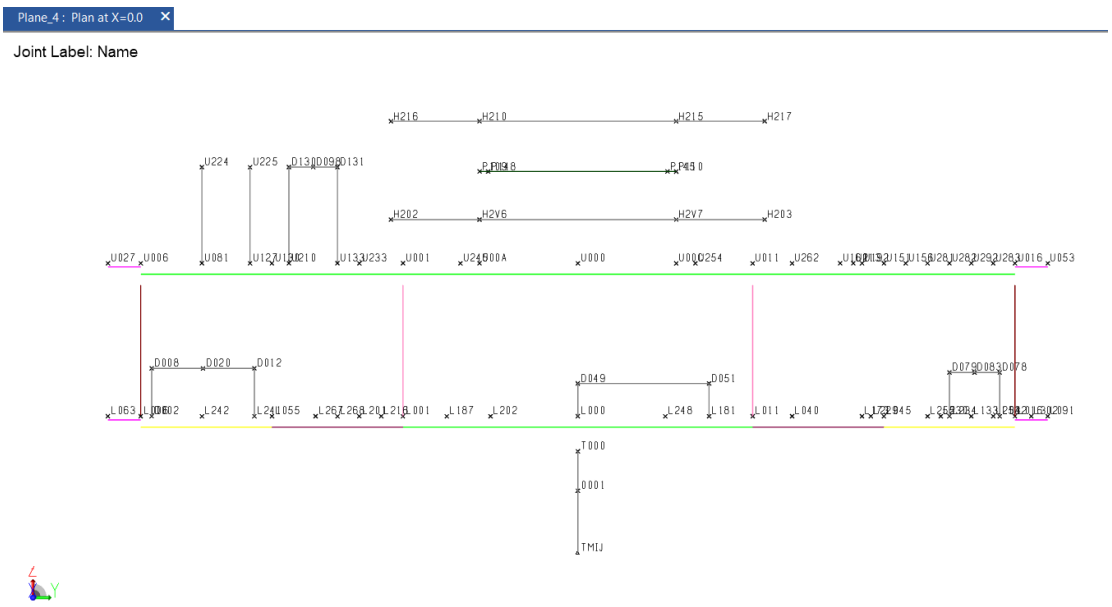

Plane_3 : Plan at X=8.000
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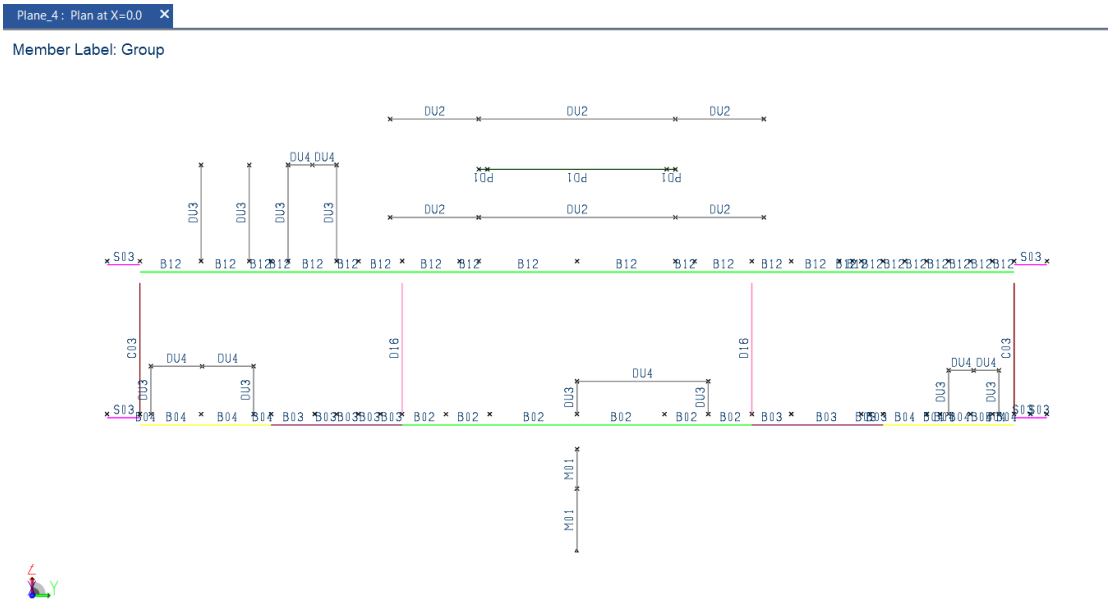

Plane_3 : Plan at X=8.000
Member Label: KyLy

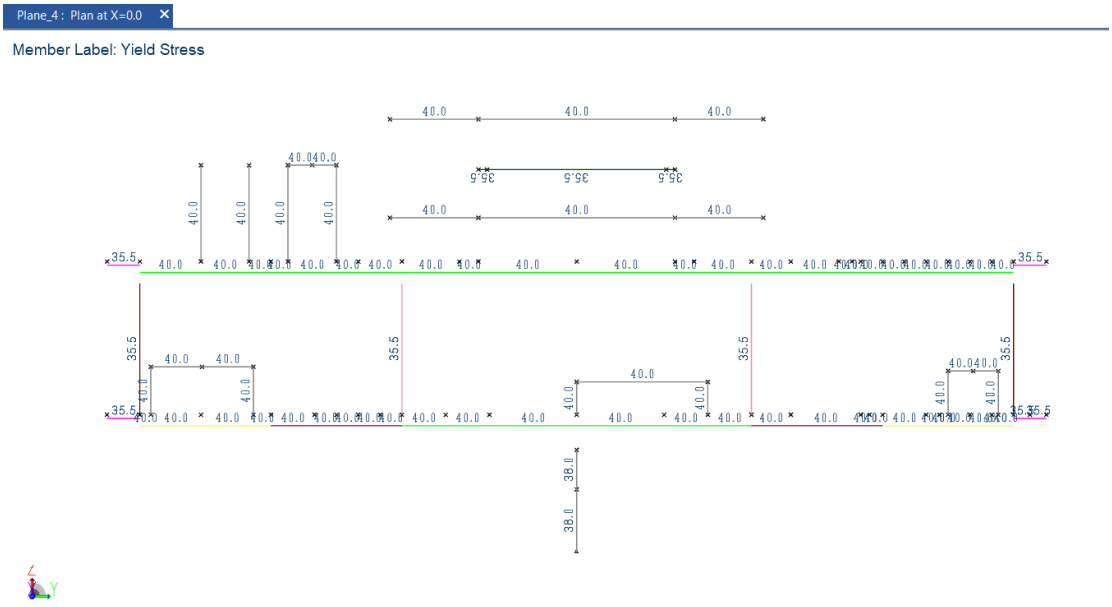

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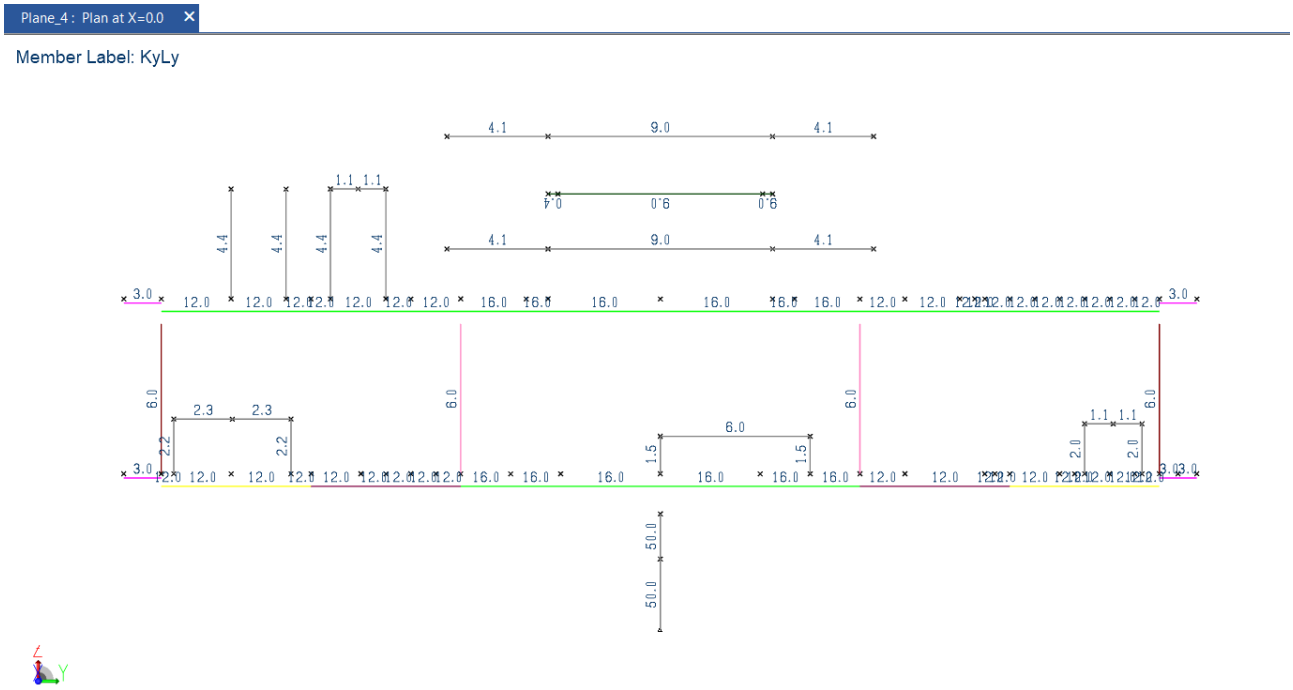

Plane_3 : Plan at X=8.000
Member Label: Lb

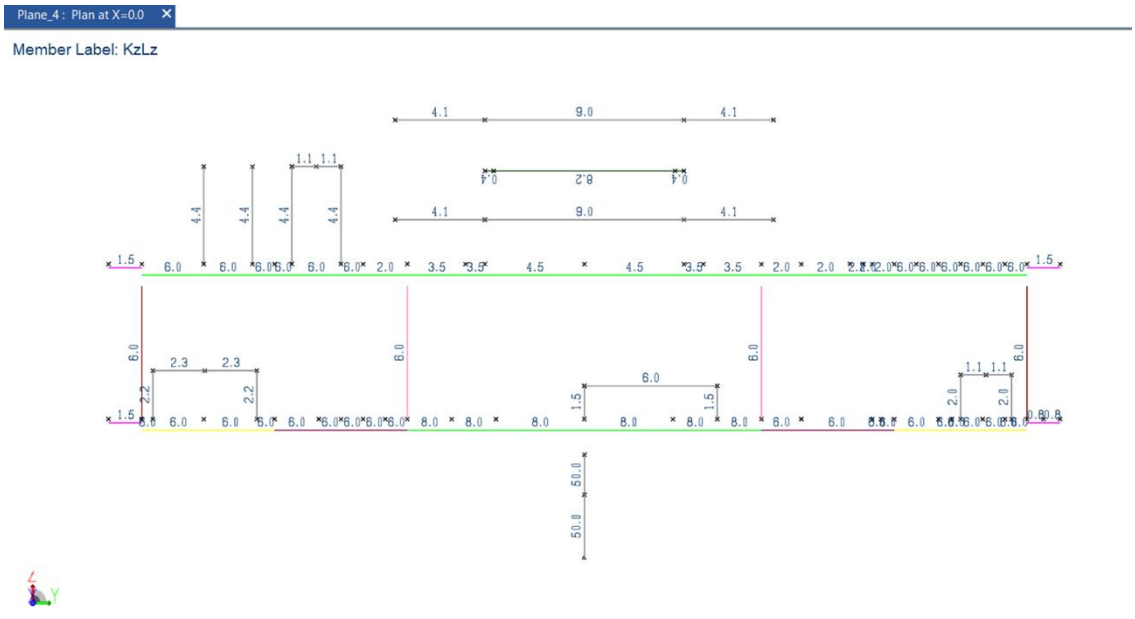

Plane_3 : Plan at X=8.000
Member Label: AB Release

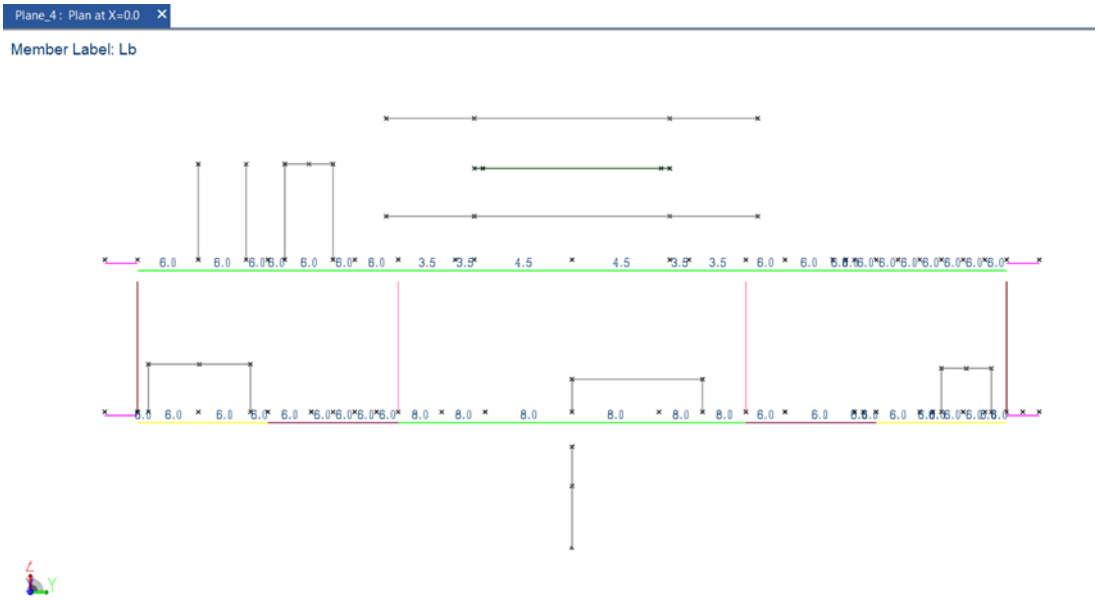

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Joint Label: Name

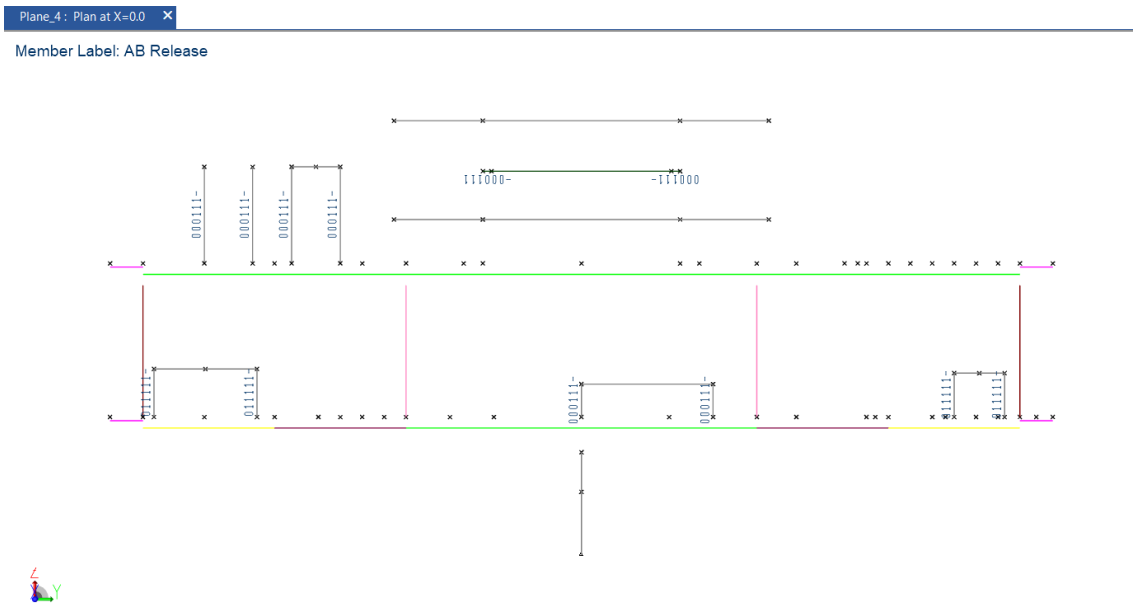

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Member Label: Group

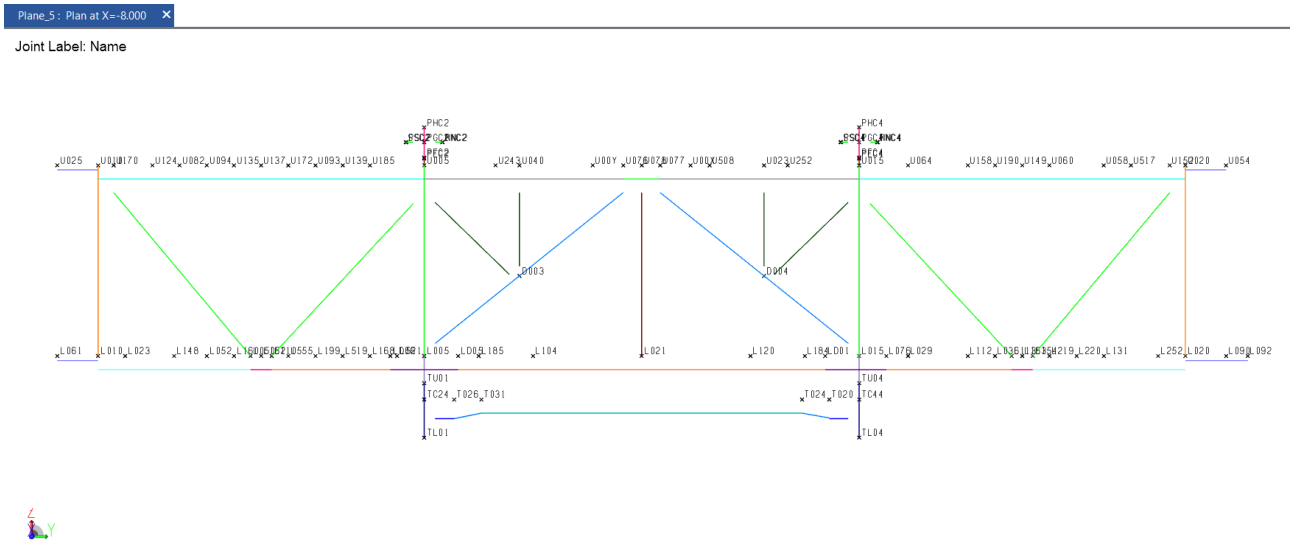

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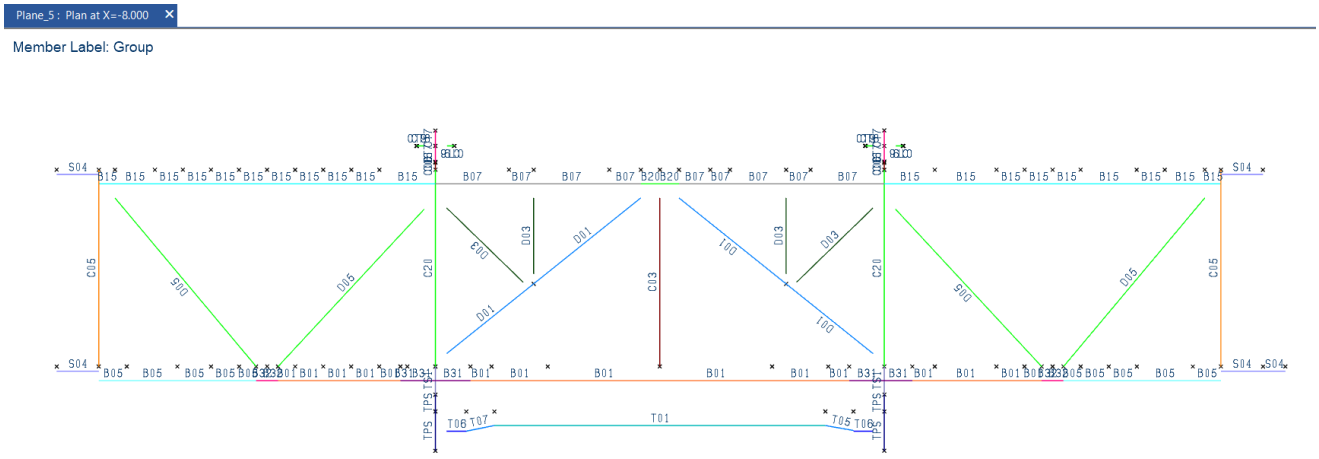

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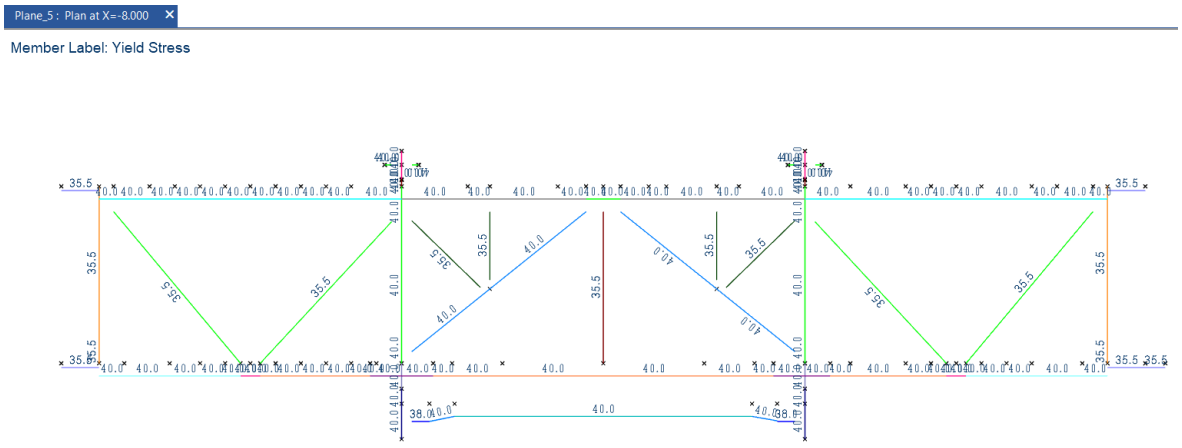

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Member Label: KzLz


Plane_4 : Plan at X=0.0
Member Label: Lb

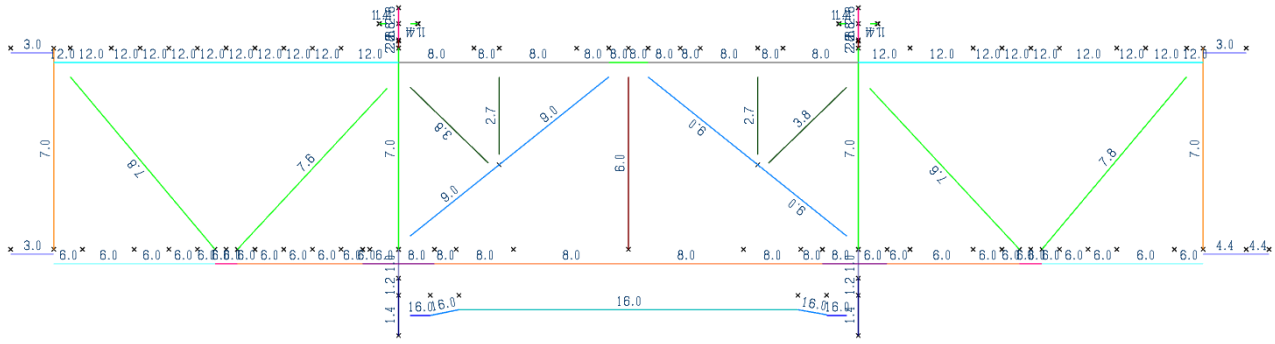

Plane_4 : Plan at X=0.0
Member Label: AB Release


Plane_5 : Plan at X=-8.000
Joint Label: Name


Plane_5 : Plan at X=-8.000
Member Label: Group


Plane_5 : Plan at X=-8.000
Member Label: Yield Stress

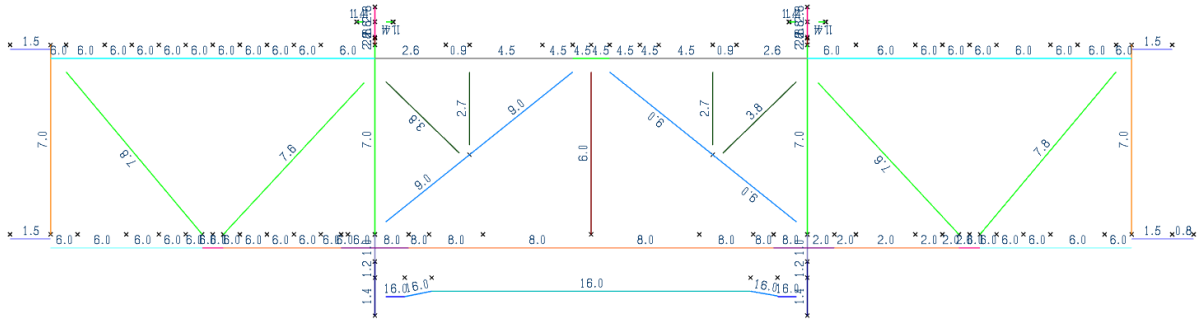
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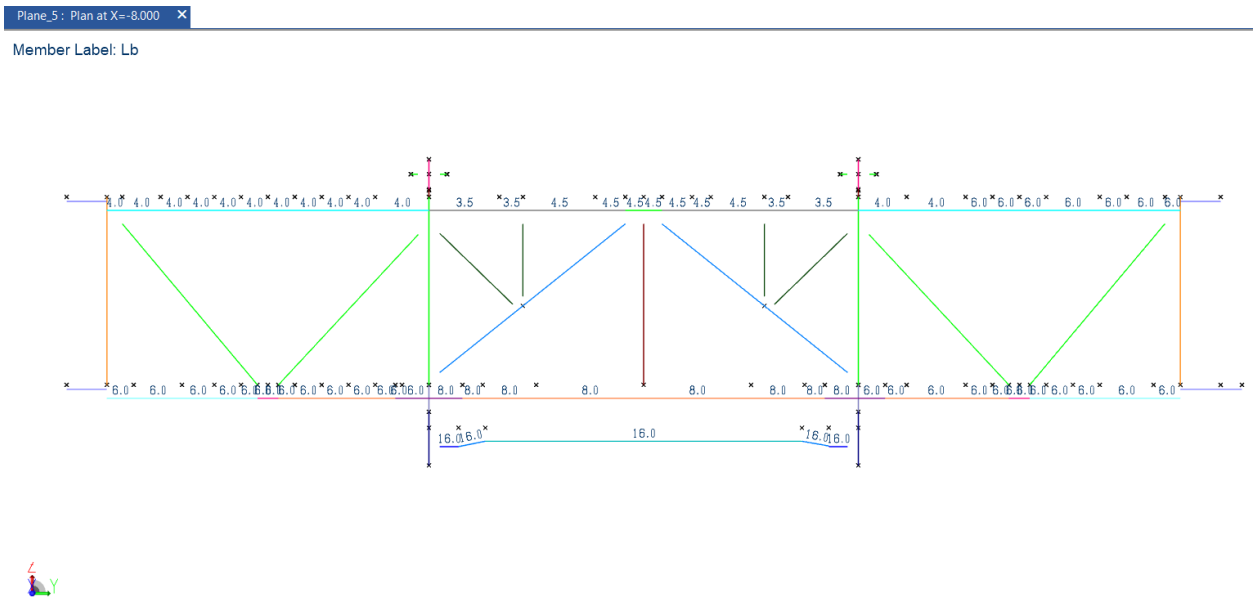


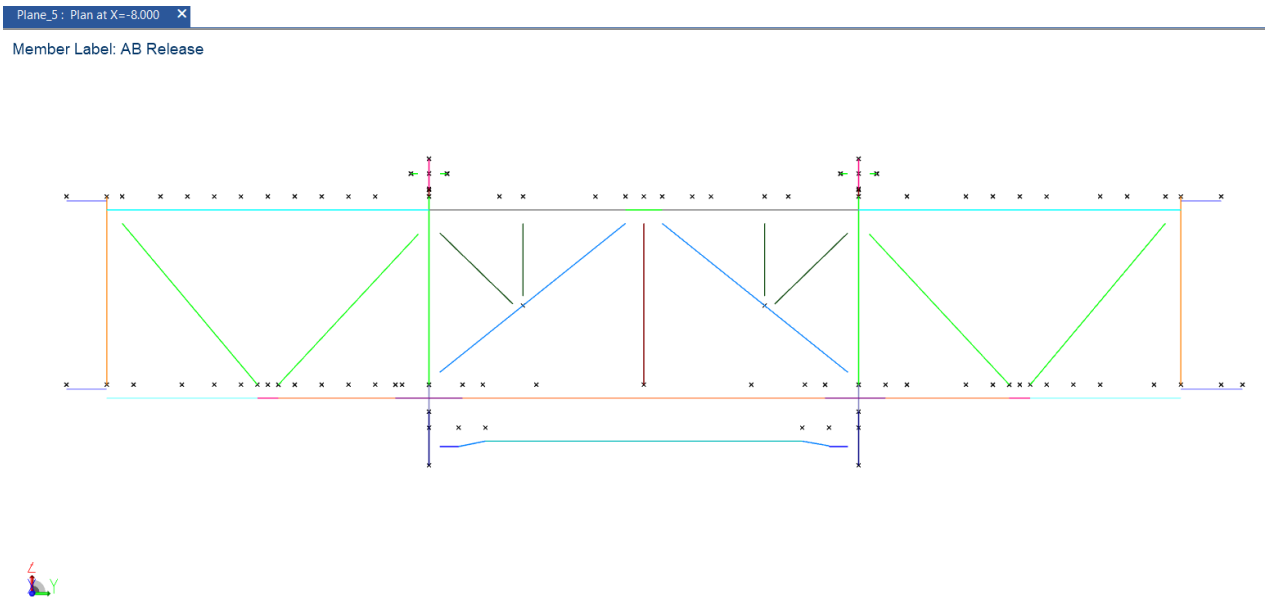
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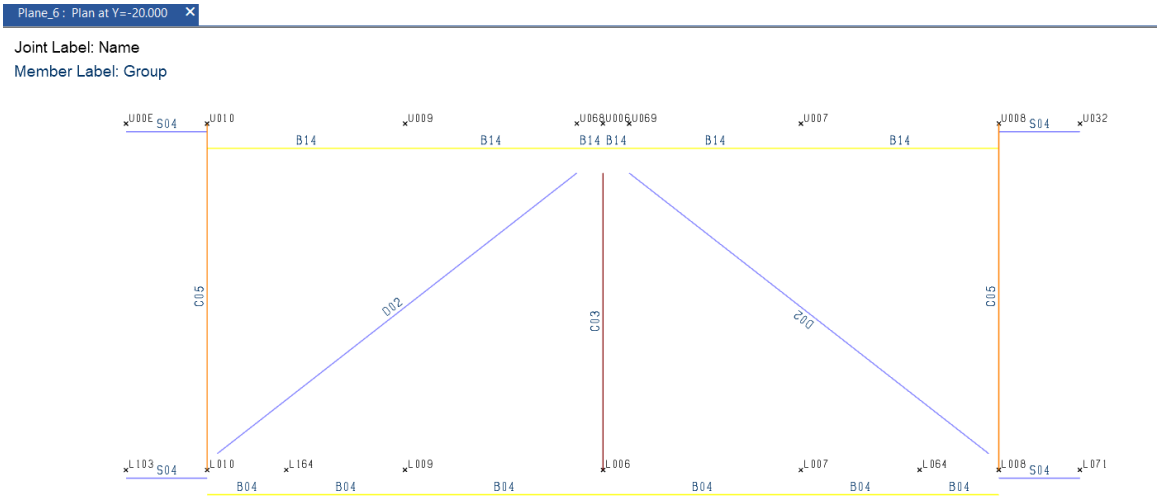
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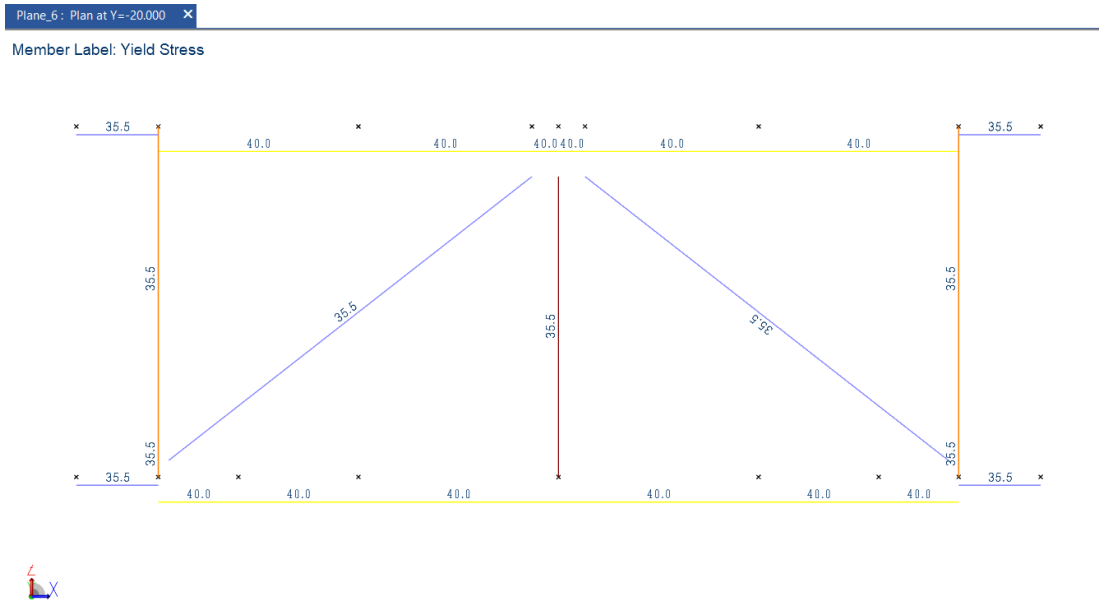


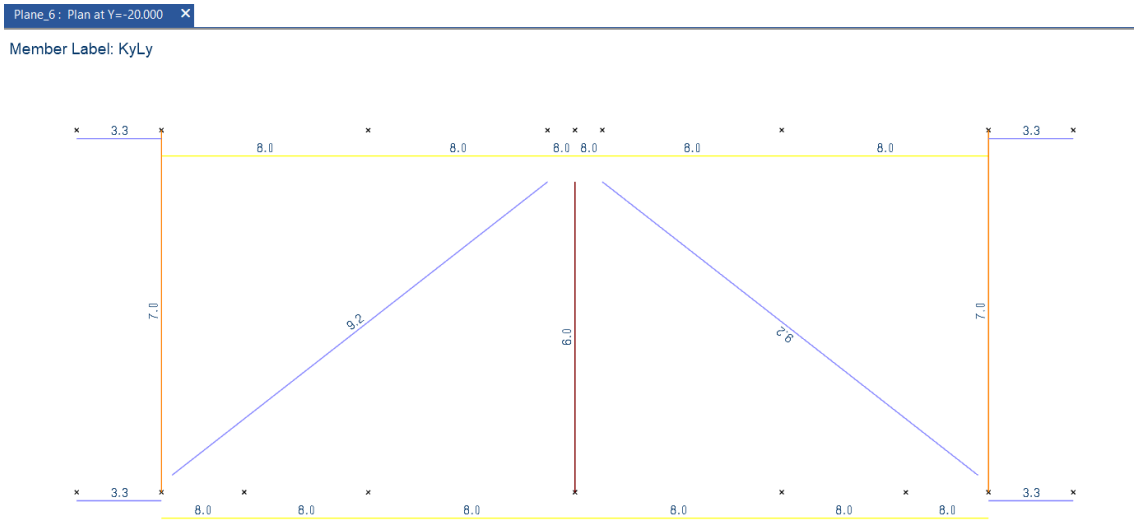


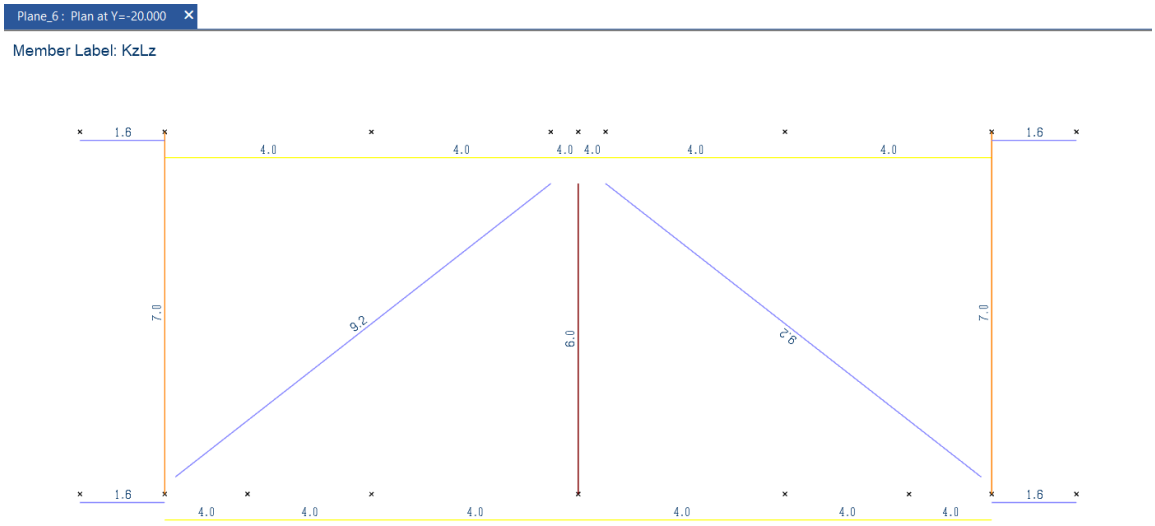

Plane_5 : Plan at X=-8.000
Member Label: Lb

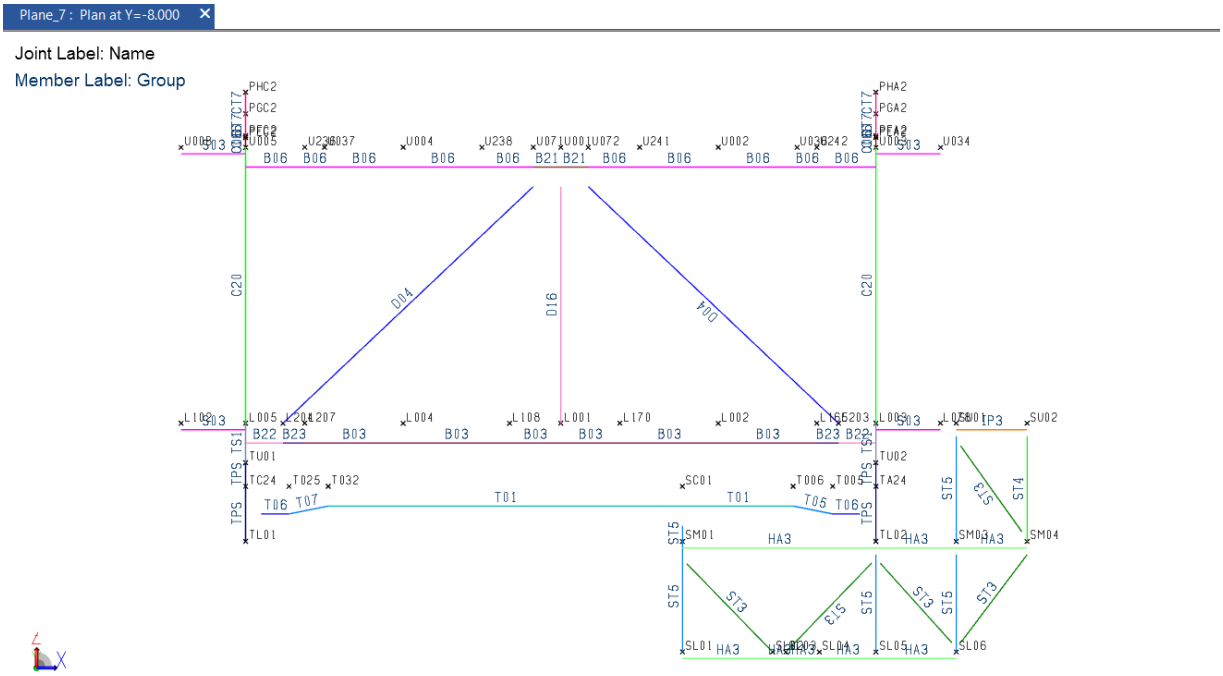

Plane_5 : Plan at X=-8.000
Member Label: AB Release

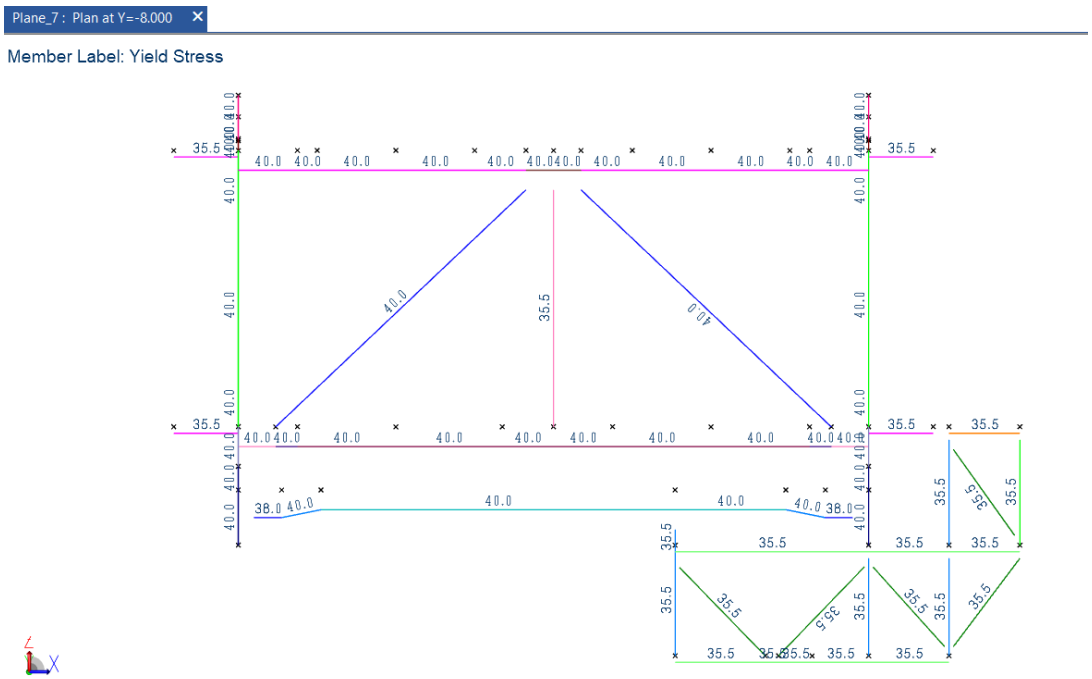

Plane_6 : Plan at Y=-20.000
Joint Label: Name
Member Label: Group
U00E S04
U010
U009
U068 U006 U069
U007
U008 S04
U032
B14
C05
D02
C03
D00
L103 S04
L010
L164
L009
L006
L007
L064
L008 S04
L071
B04

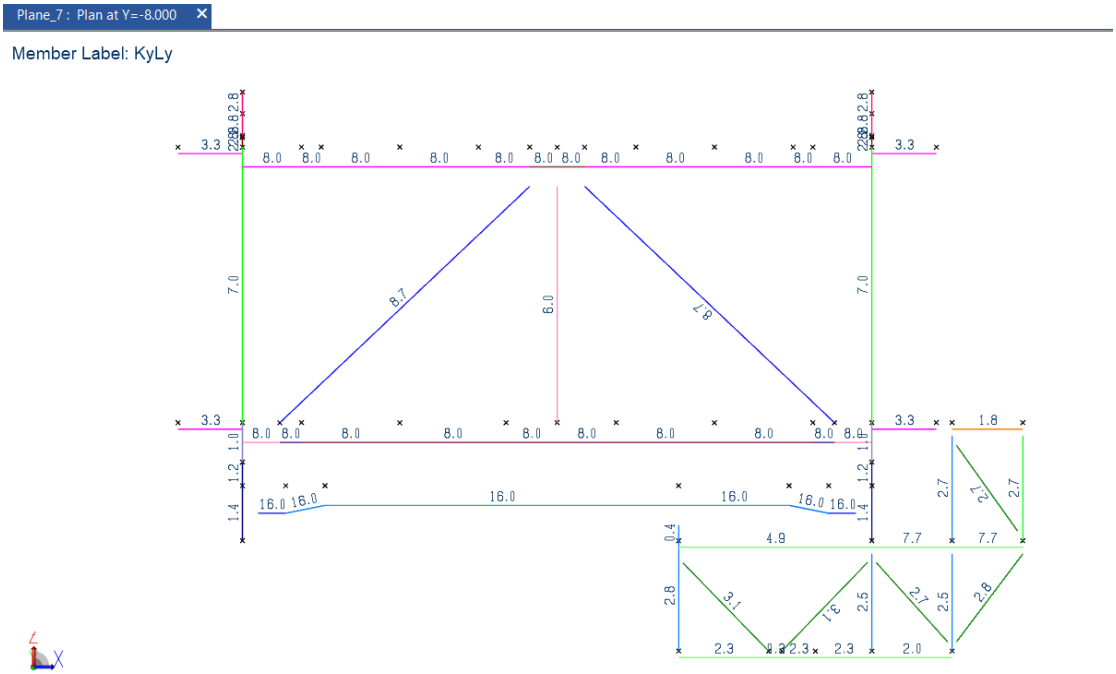

Plane_6 : Plan at Y=-20.000
Member Label: Yield Stress
35.5
40.0

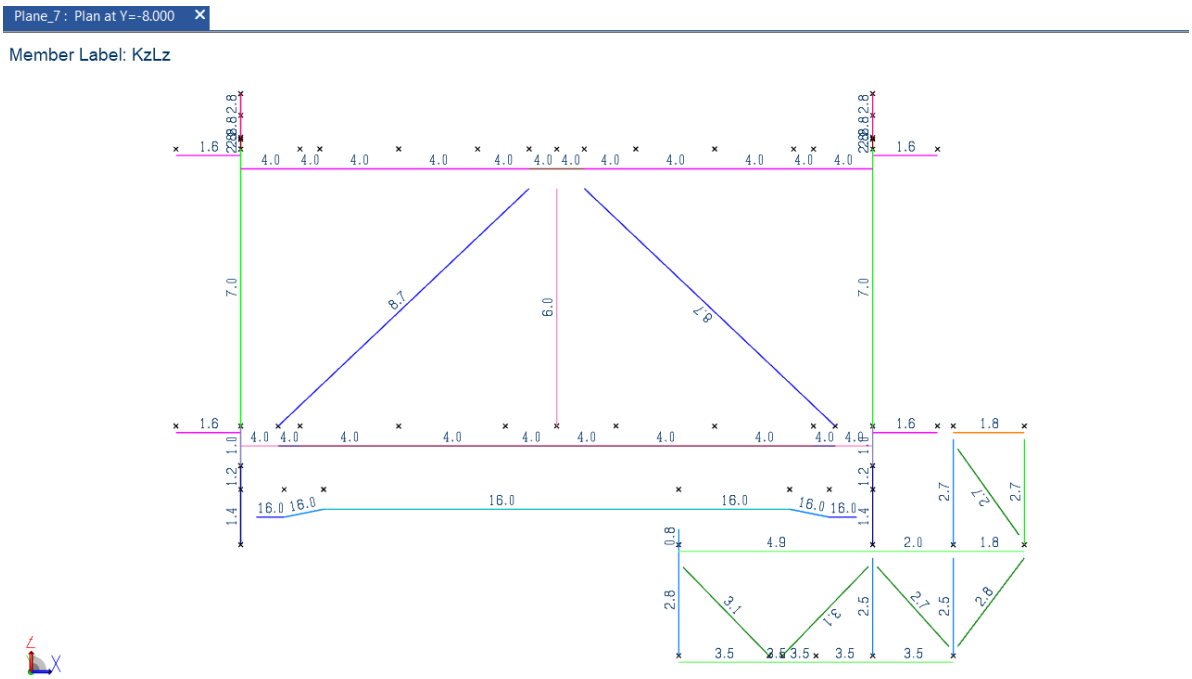

Plane_6 : Plan at Y=-20.000
Member Label: KyLy
3.3
8.0
7.0
9.2
6.0

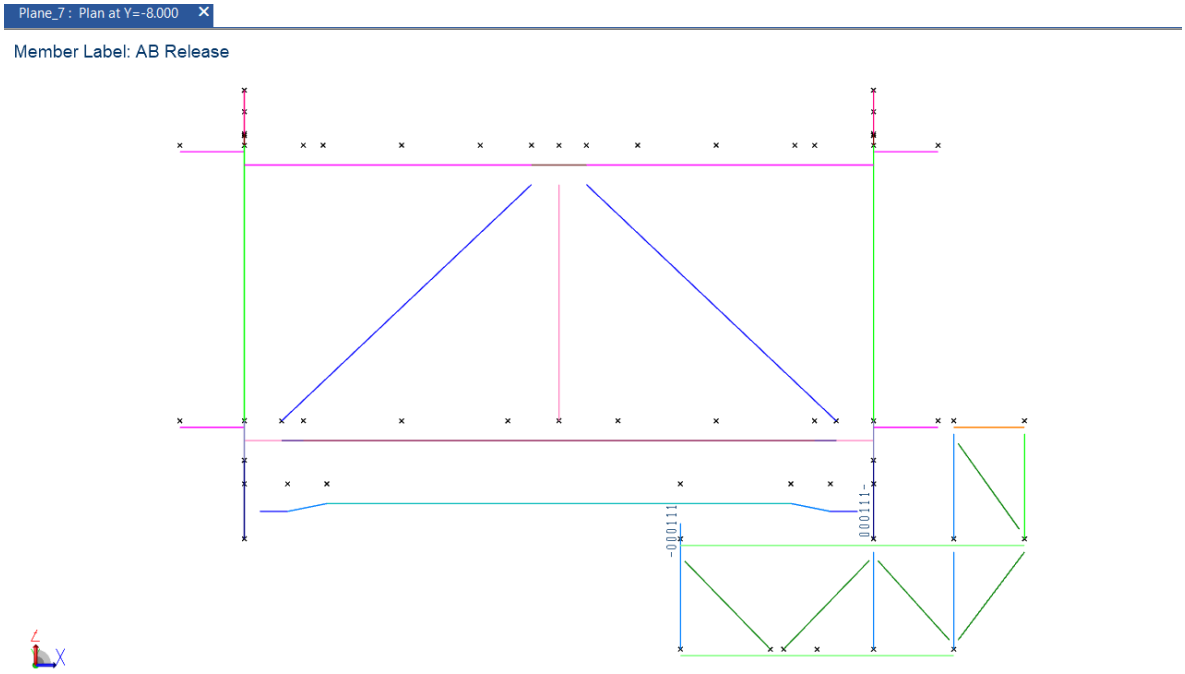

Plane_6 : Plan at Y=-20.000
Member Label: KzLz
1.6
4.0
7.0
9.2
6.0

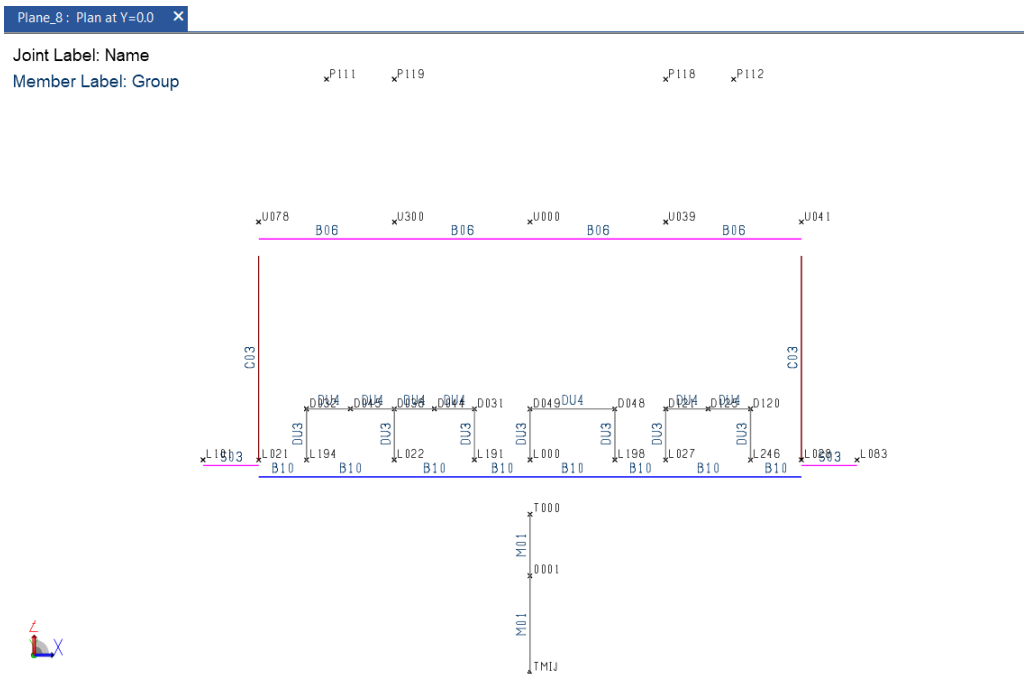

Plane_7 : Plan at Y=-8.000
Joint Label: Name
Member Label: Group

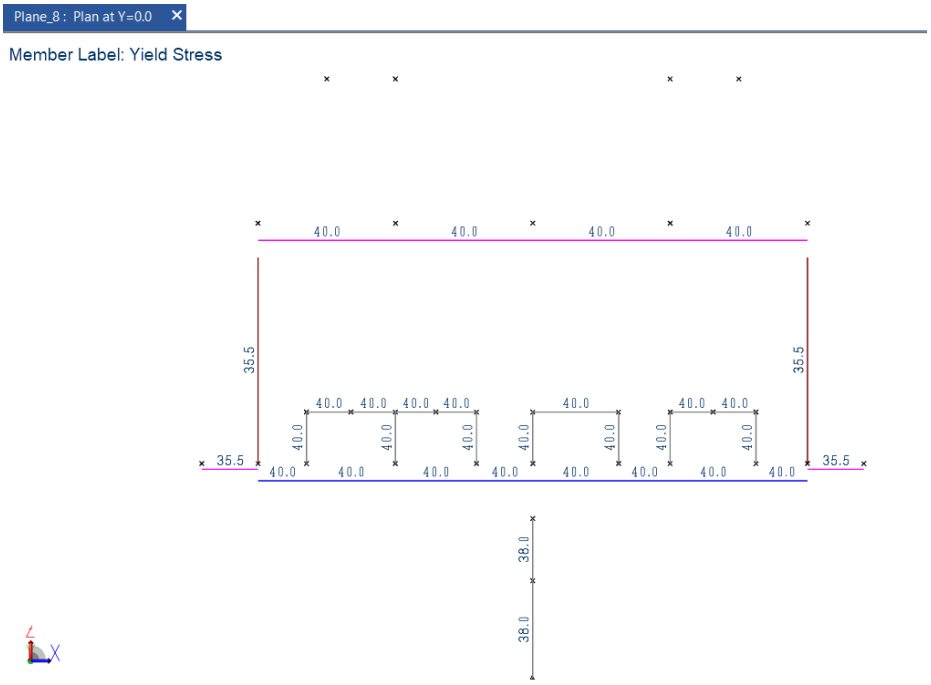

Plane_7 : Plan at Y=-8.000
Member Label: Yield Stress

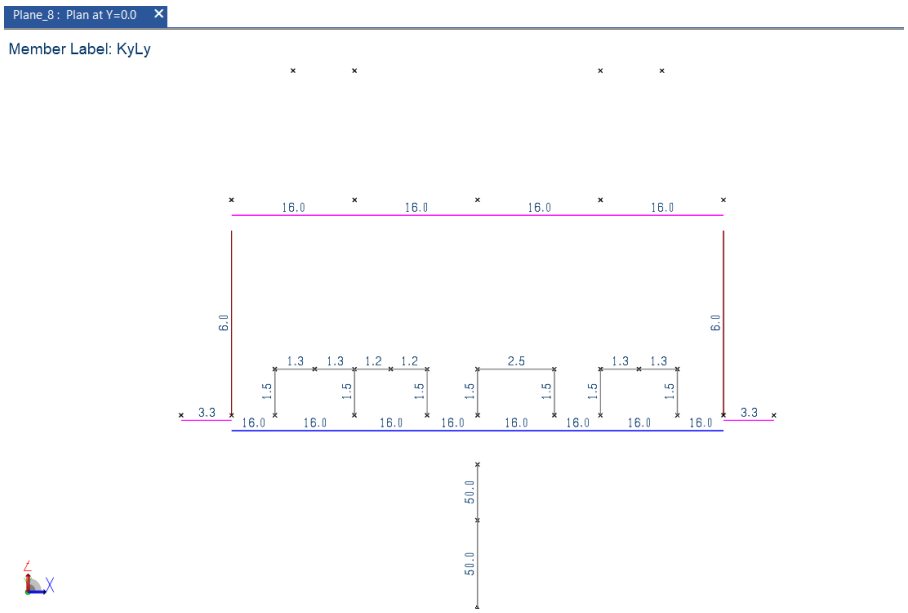

Plane_7 : Plan at Y=-8.000
Member Label: KyLy

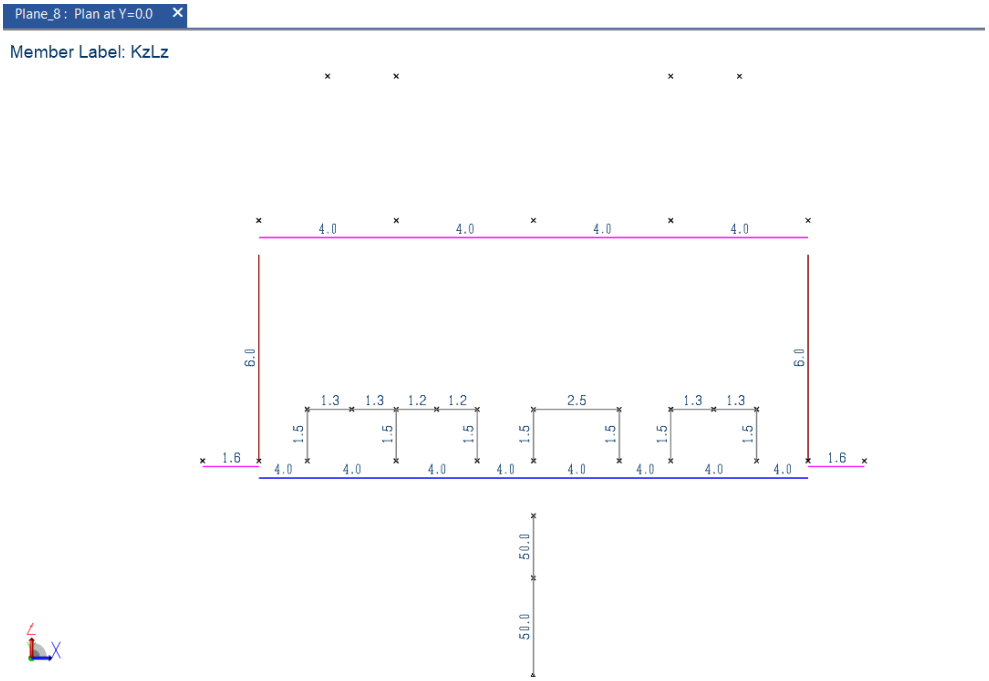

Plane_7 : Plan at Y=-8.000
Member Label: KzLz

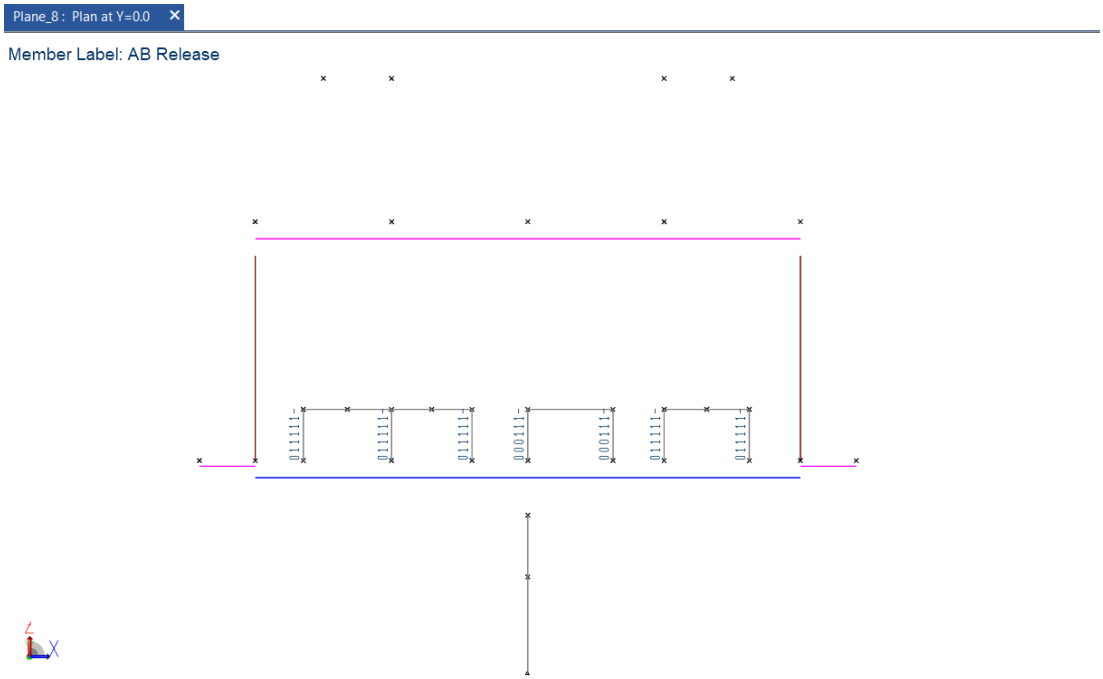

Plane_7 : Plan at Y=-8.000
Member Label: AB Release

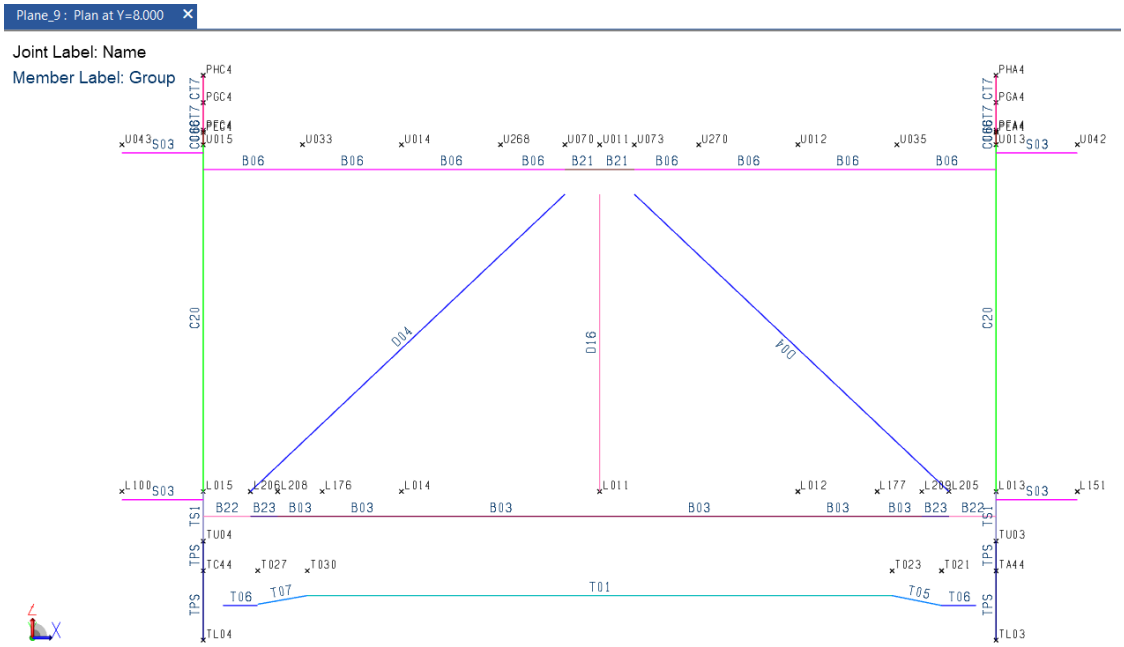

Plane_8 : Plan at Y=0.0
Joint Label: Name
Member Label: Group
P111
P119
P118
P112
U078
U300
U000
U039
U041
B06
C03
DU4
DU3
D031
D049
D048
D120
L021
L194
L022
L191
L000
L198
L027
L246
L083
B10
T000
M01
D001
TMIJ

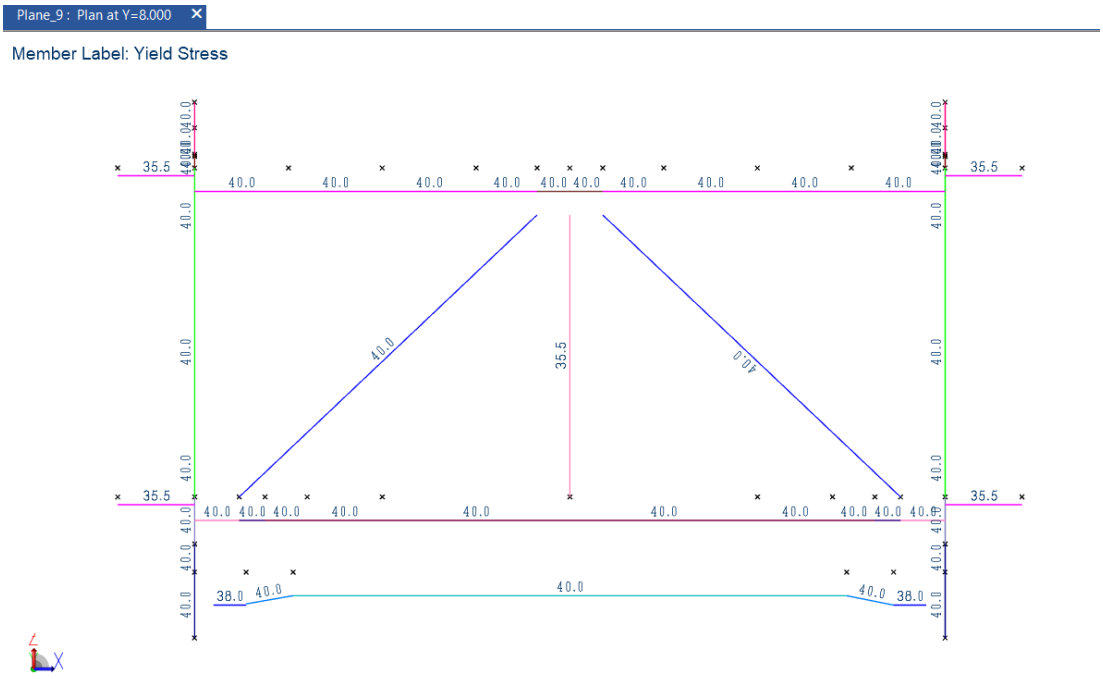

Plane_8 : Plan at Y=0.0
Member Label: Yield Stress
40.0
35.5
38.0

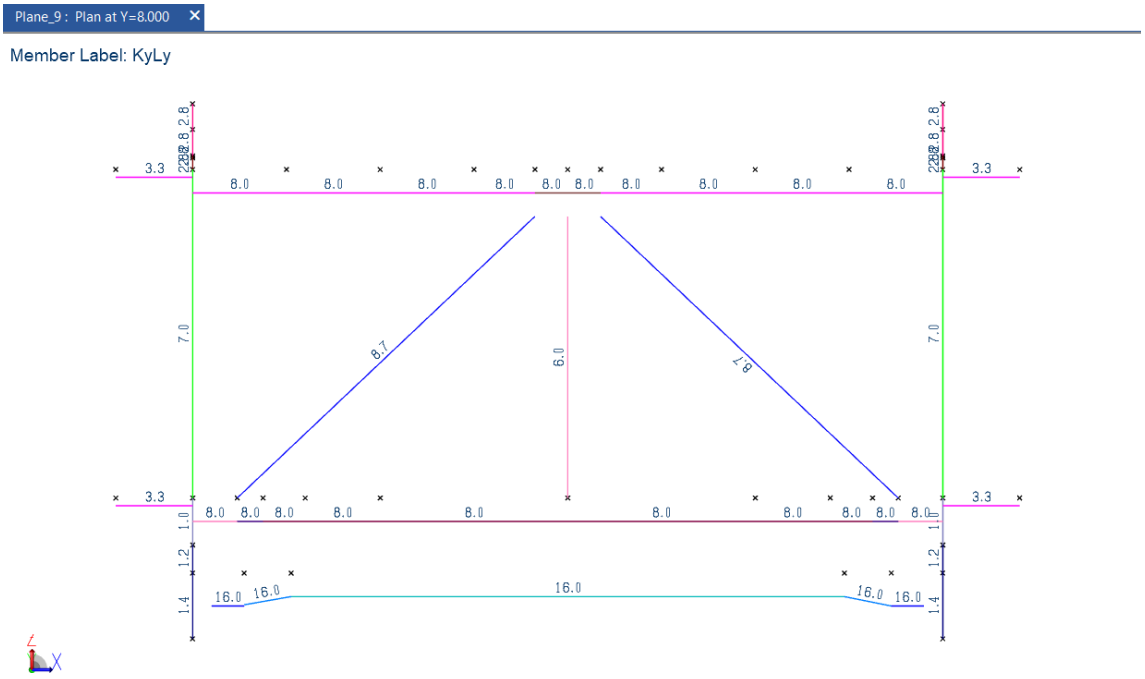

Plane_8 : Plan at Y=0.0
Member Label: KyLy
16.0
6.0
3.3
1.3
1.2
2.5
1.5
50.0

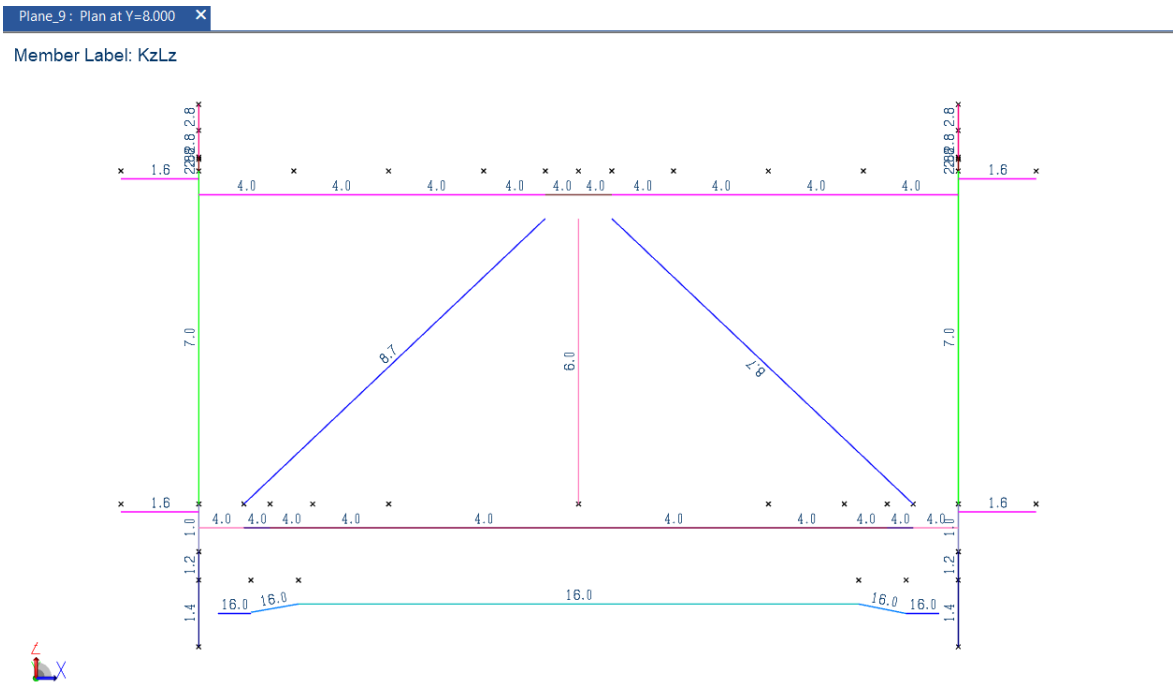

Plane_8 : Plan at Y=0.0
Member Label: KzLz
4.0
6.0
1.3
1.2
2.5
1.5
1.6
50.0

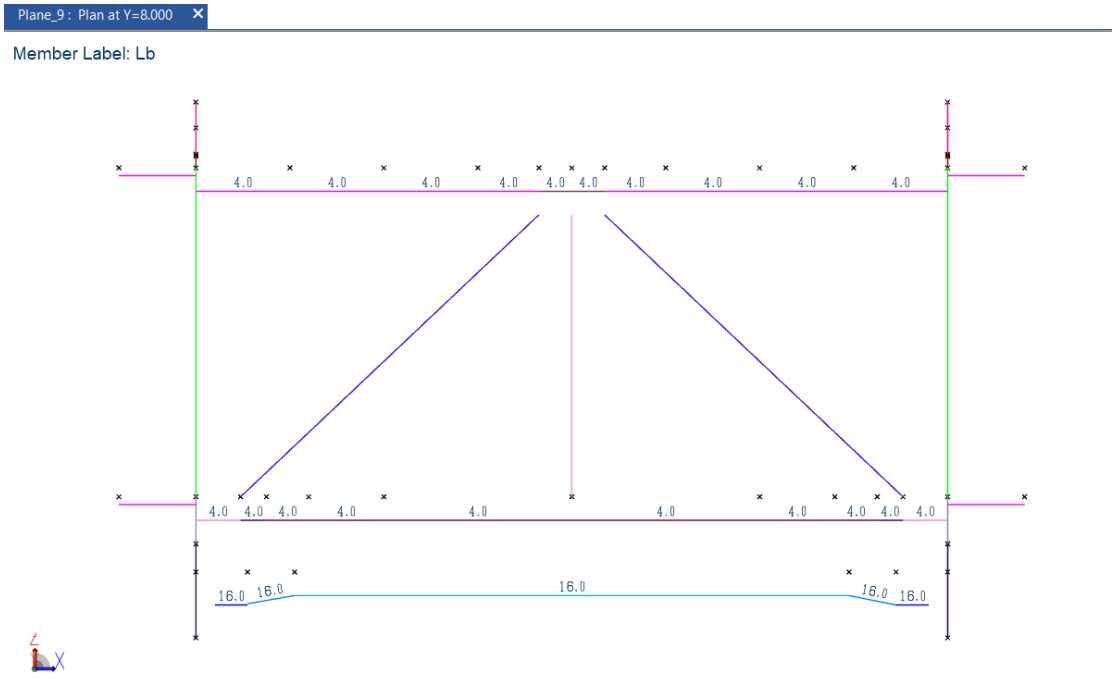

Plane_8 : Plan at Y=0.0
Member Label: AB Release

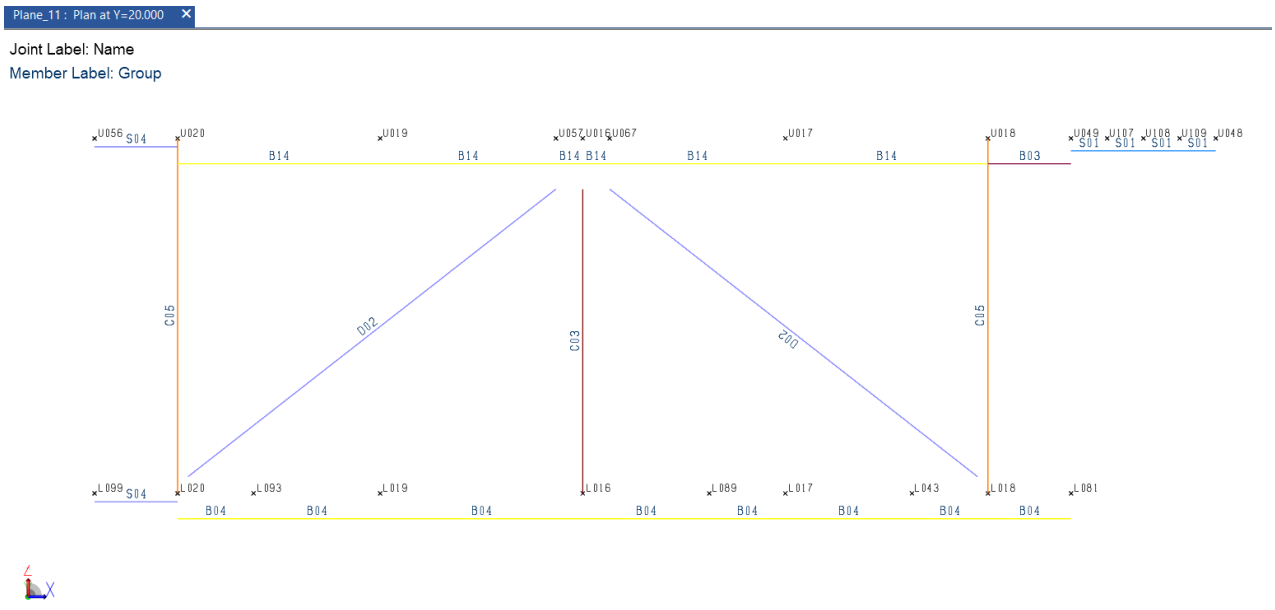

Plane_9 : Plan at Y=8.000
Joint Label: Name
Member Label: Group
PHC4
PGC4
PEC4
PHA4
PGA4
PEA4
U043
S03
U015
U033
U014
U268
U070
U011
U073
U270
U012
U035
U013
U042
C0617 C17
B06
B21
C20
D04
D16
L100
L015
L206
L208
L176
L014
L011
L012
L177
L209
L205
L151
B22
B23
B03
TS1
TPS
TU04
TC44
T027
T030
T023
T021
TA44
T06
T07
T01
T05
TL04
TL03


Plane_9 : Plan at Y=8.000
Member Label: Yield Stress
40.0
35.5
38.0


Plane_9 : Plan at Y=8.000
Member Label: KyLy
3.3
8.0
7.0
8.7
6.0
1.0
1.2
1.4
16.0

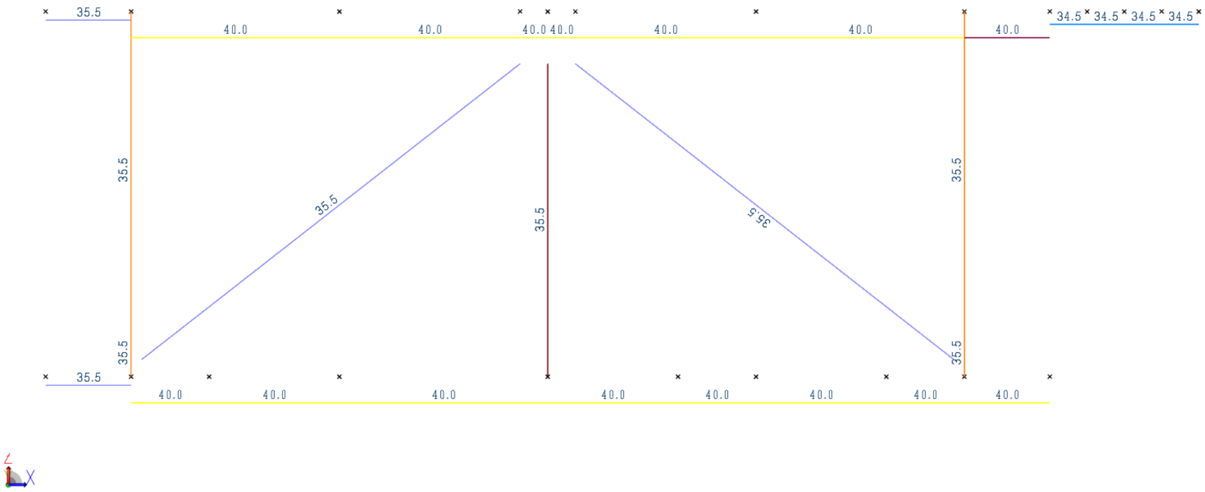

Plane_9 : Plan at Y=8.000
Member Label: KzLz
1.6
4.0
7.0
8.7
6.0
1.0
1.2
1.4
16.0


Plane_9 : Plan at Y=8.000
Member Label: Lb
4.0
16.0

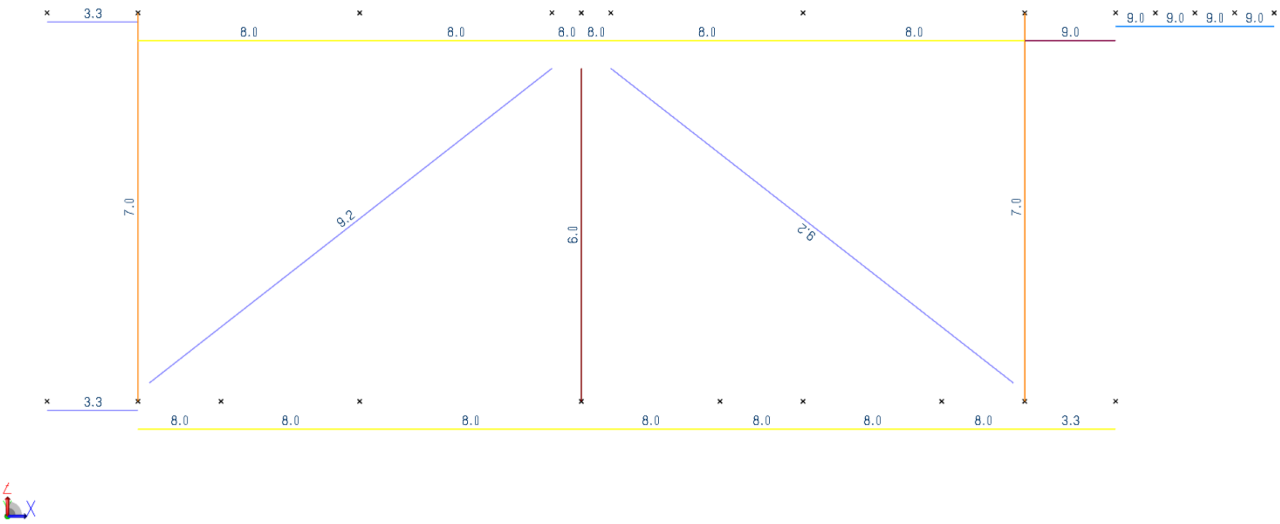

Plane_11 : Plan at Y=20.000
Joint Label: Name
Member Label: Group
B14
B03
B04
C05
C03
D02

Plane_11 : Plan at Y=20.000

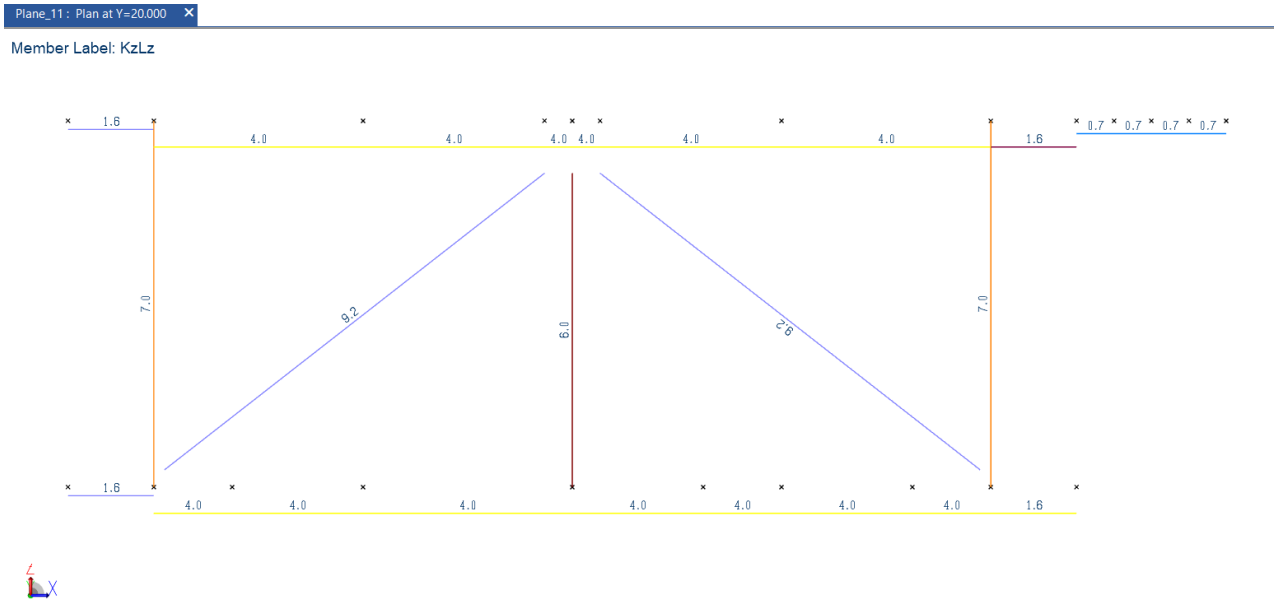
Member Label: Yield Stress

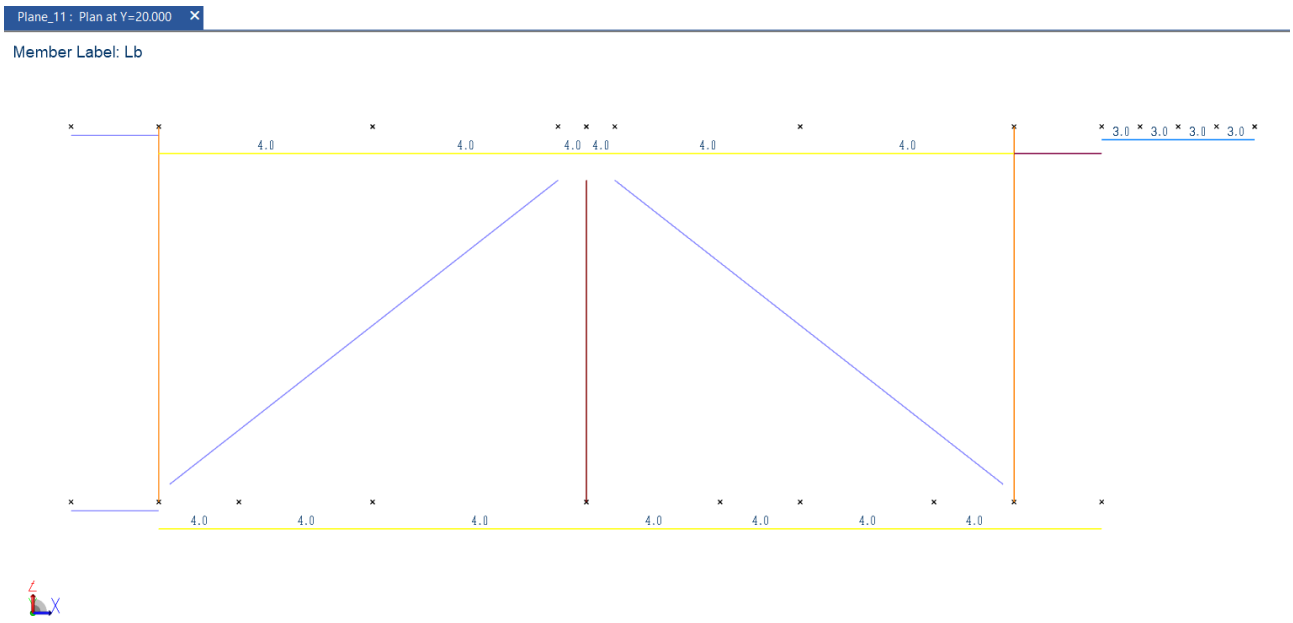


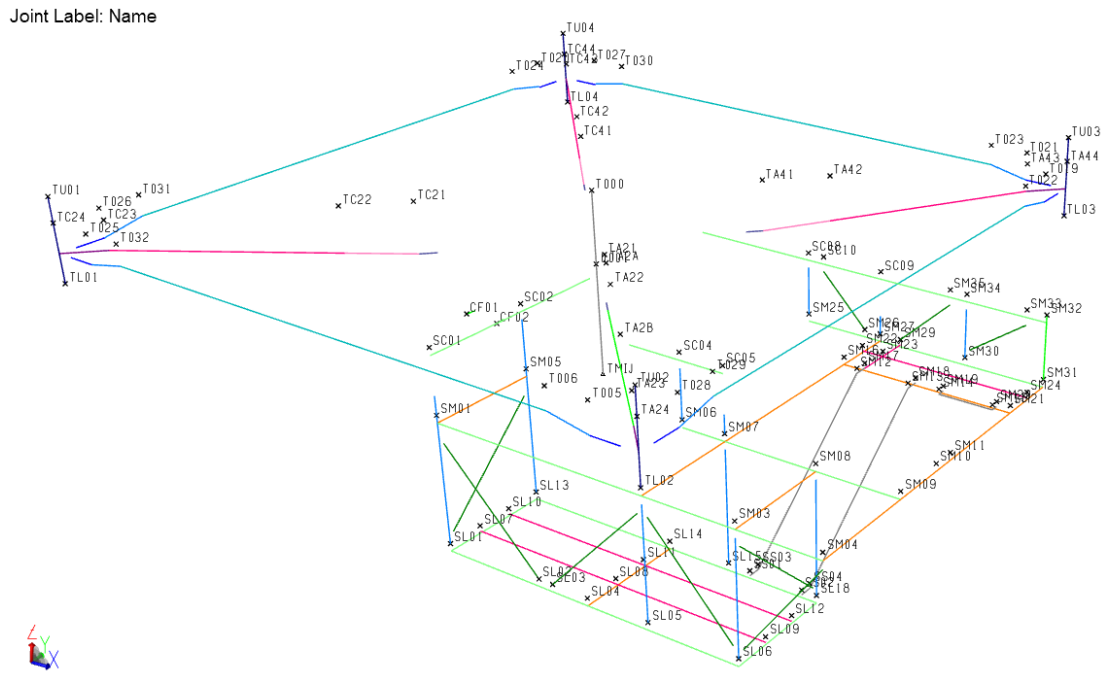
Member Label: KyLy

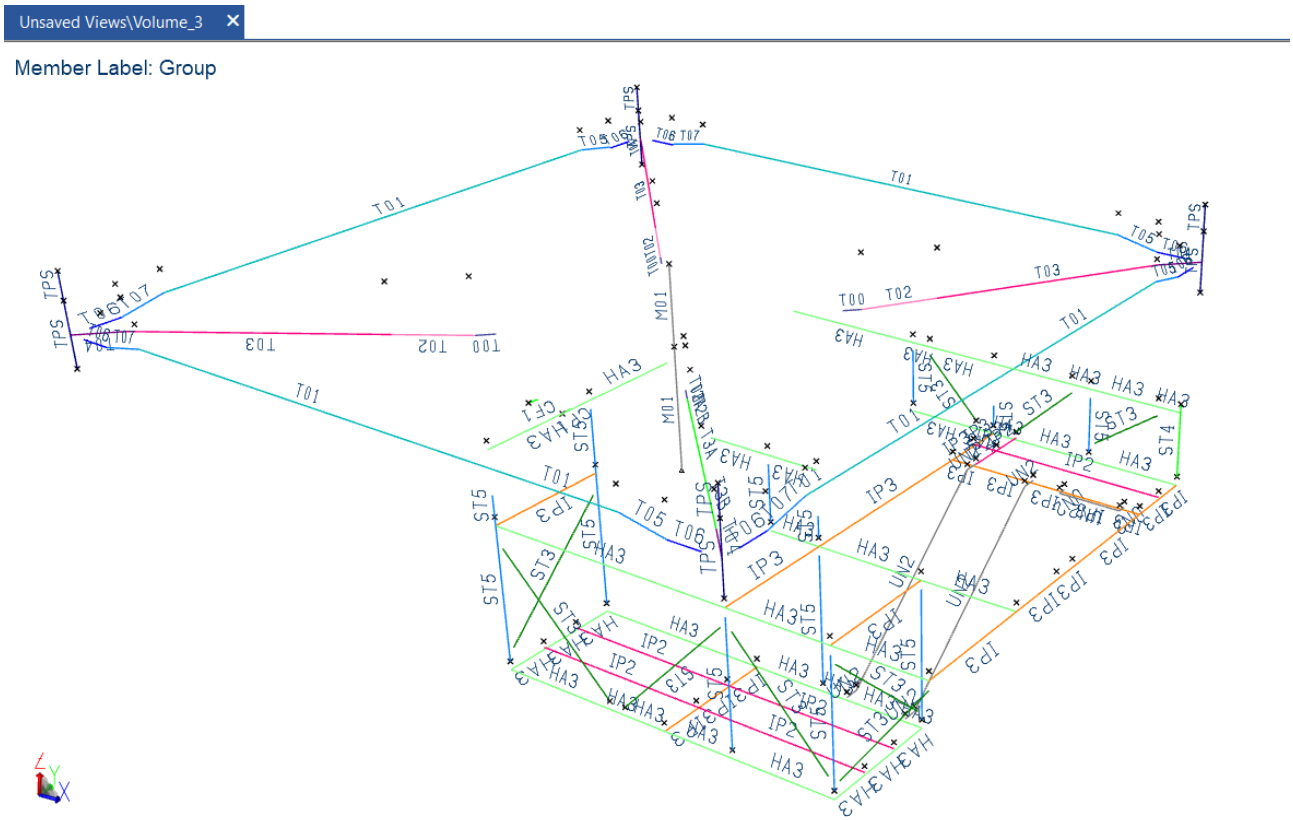


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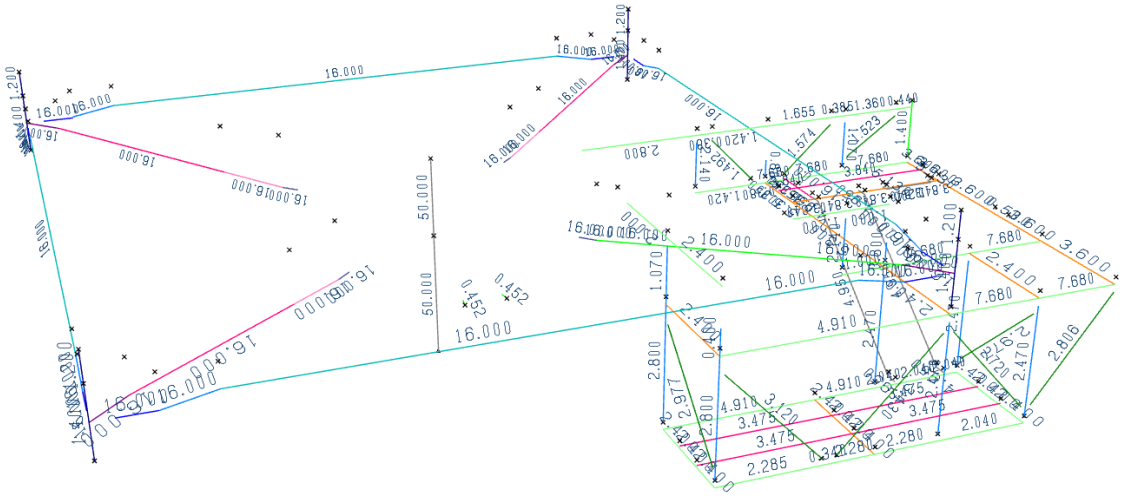

Plane_11 : Plan at Y=20.000
Member Label: KzLz
1.6
4.0
4.0
4.0
4.0
4.0
4.0
1.6
0.7
0.7
0.7
0.7
7.0
9.2
6.0
2.6
7.0
1.6
4.0
4.0
4.0
4.0
4.0
4.0
4.0
1.6


Plane_11 : Plan at Y=20.000
Member Label: Lb
4.0
4.0
4.0
4.0
4.0
4.0
3.0
3.0
3.0
3.0
4.0
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4.0
4.0
4.0

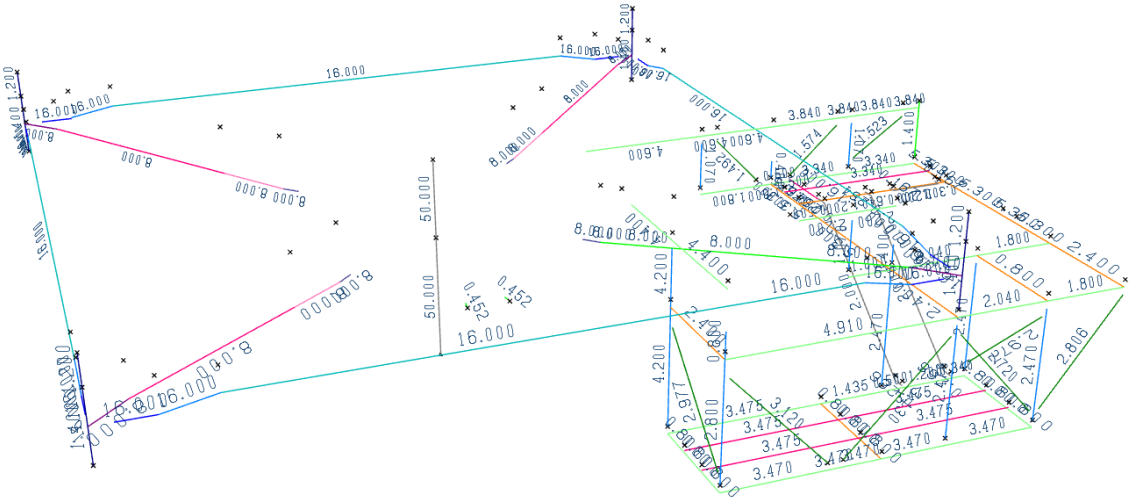

Joint Label: Name


Unsaved Views\Volume_3
Member Label: Group

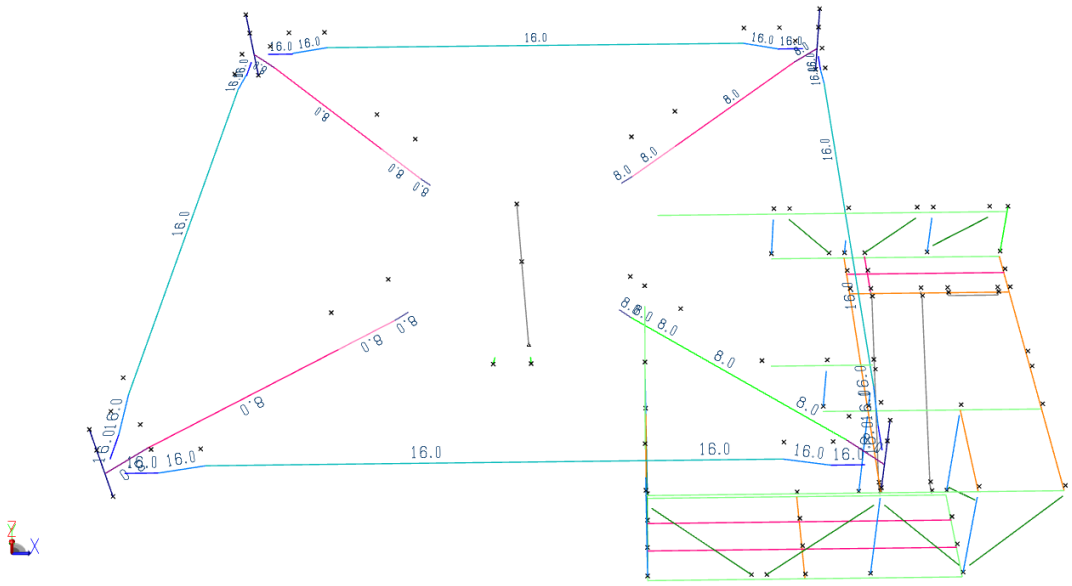
Member Label: KyLy



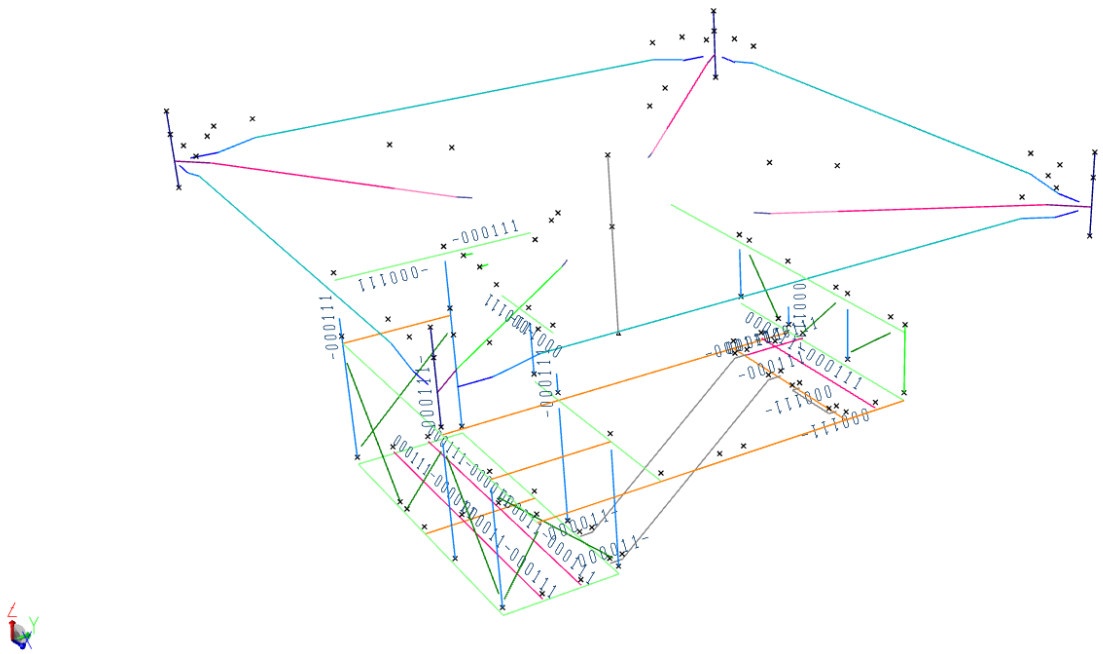
Member Label: KzLz

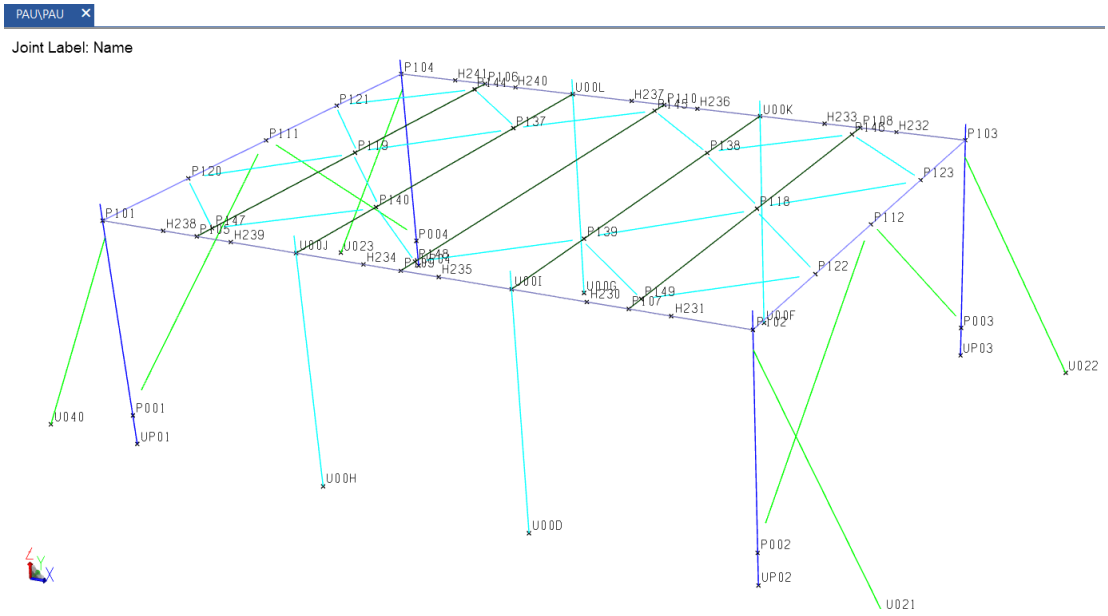


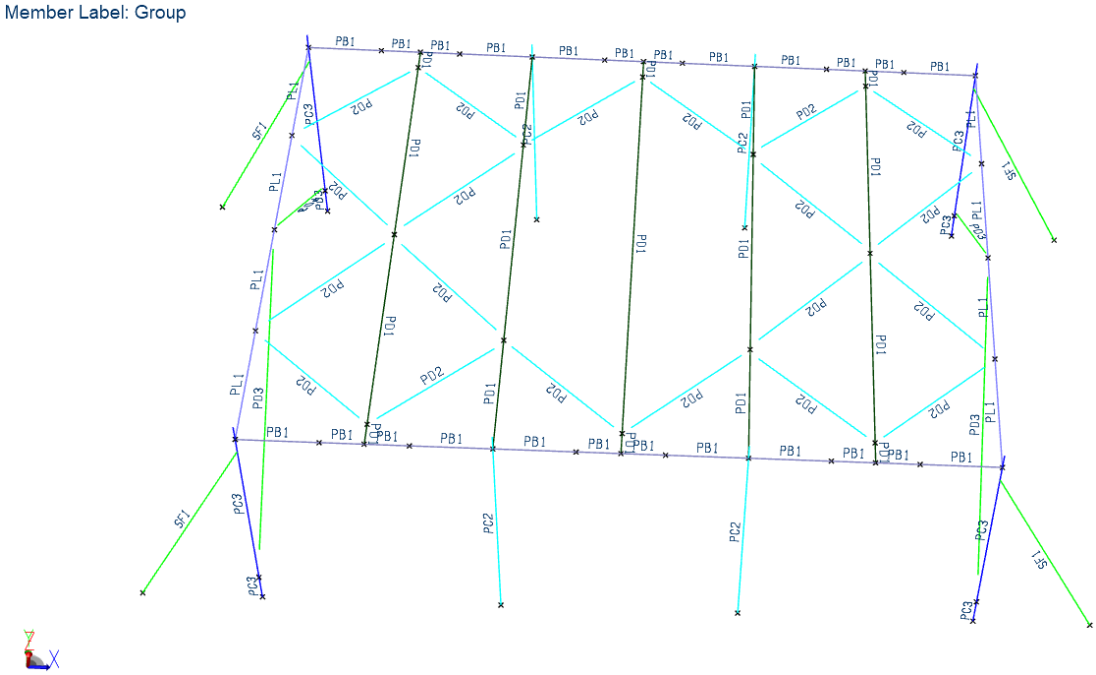
Member Label: Lb



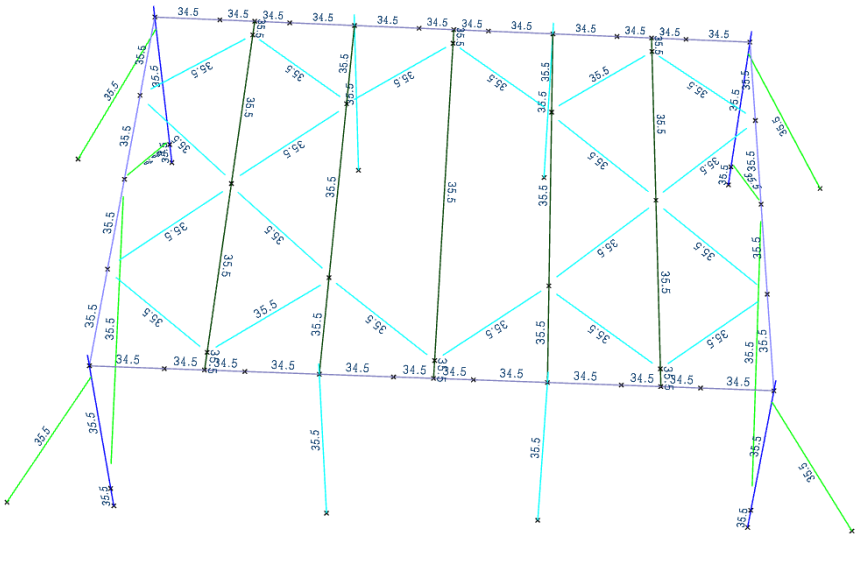
Member Label: AB Release



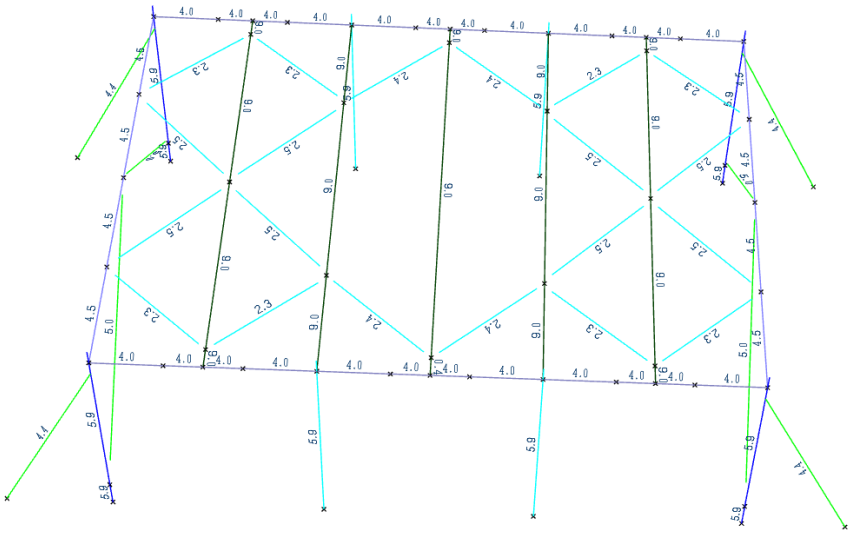

PAU\PAU
Joint Label: Name
P104
P121
P111
P120
P101
P137
P140
P004
P139
P138
P118
P123
P103
P112
P122
P003
UP03
U022
P001
UP01
U040
U00H
U00D
P002
UP02
U021


Member Label: Group
PB1
PL1
PD1
PD2
PD3
PC2
PC3
SF1

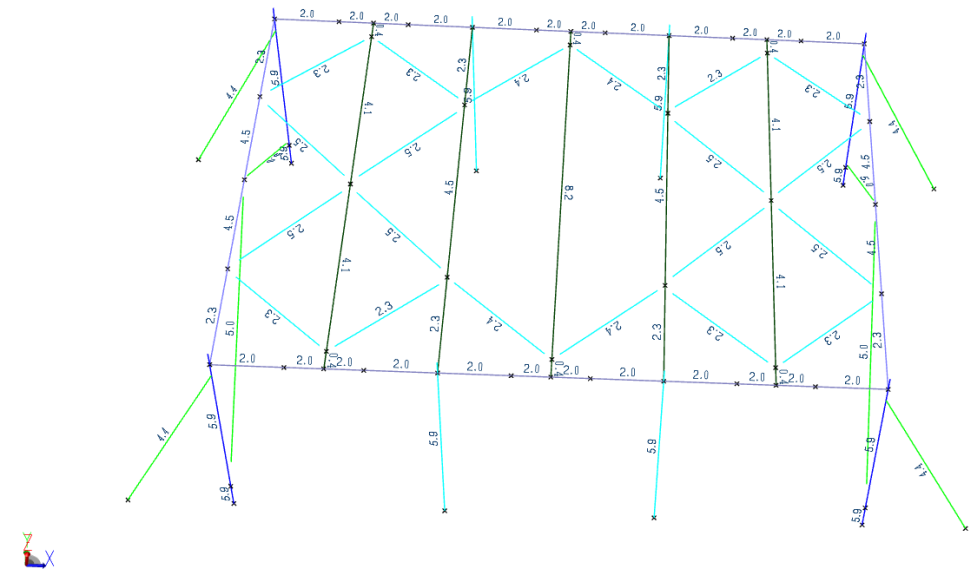
Member Label: Yield Stress



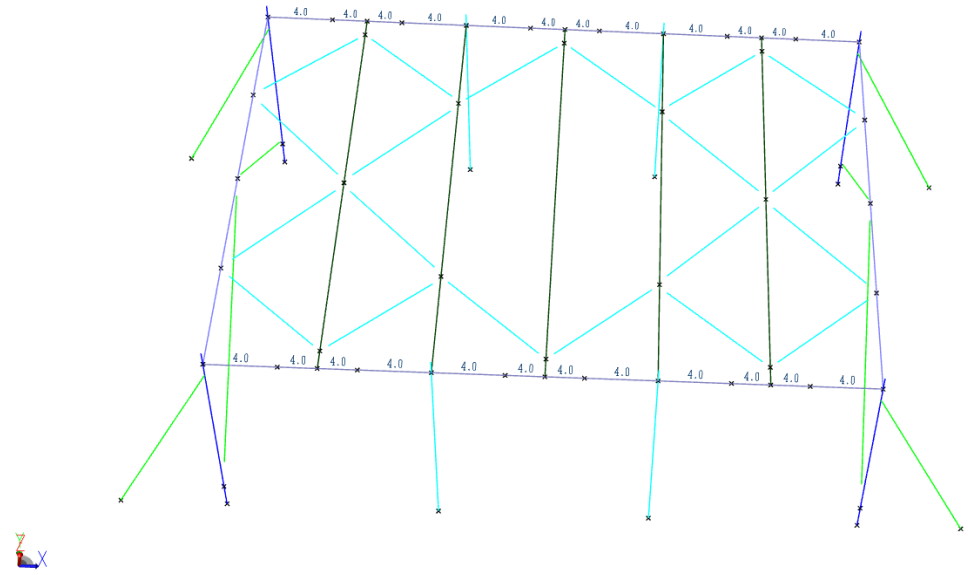
Member Label: KyLy

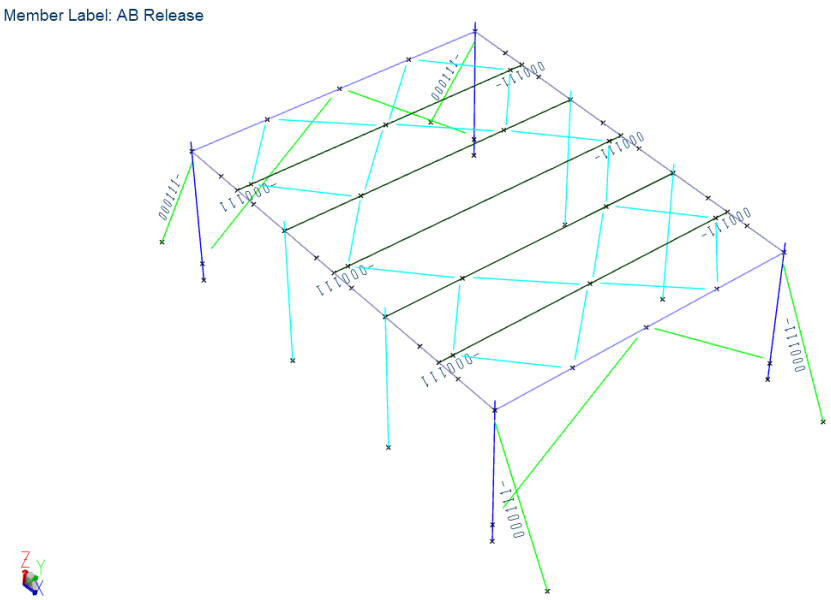


Member Label: KzLz



Member Label: Lb




Member Label: AB Release
Z
Y
X

APPENDIX C – INTERNAL FORCES OF TOPSIDE-TP INTERFACE ELEMENTS

I. FACTORED LOAD COMBINATIONS

SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TA24-TU02	TA24	TPS	DN2A	-5274.20	764.58	-2347.65	-113.07	2732.00	-2613.01
			DN2B	-4915.72	937.58	-2655.37	-130.57	2986.24	-2712.95
			DN2C	-4528.20	1275.19	-2798.49	-123.43	3088.66	-2923.34
			DN2D	-4338.71	1579.71	-2693.03	-95.83	2979.11	-3120.97
			DN2E	-4458.06	1672.83	-2400.91	-63.94	2721.90	-3190.13
			DN2F	-4816.54	1499.83	-2093.19	-46.45	2467.65	-3090.19
			DN2G	-5204.06	1162.22	-1950.07	-53.58	2365.24	-2879.80
			DN2H	-5393.55	857.70	-2055.53	-81.18	2474.79	-2682.17
			E13A	-5727.45	-307.72	-2341.94	-178.89	2898.17	-1833.65
			E13B	-4565.71	245.78	-3354.17	-236.41	3731.85	-2154.03
			E13C	-3330.29	1316.17	-3831.18	-217.02	4074.01	-2822.16
			E13D	-2745.08	2276.55	-3493.07	-132.05	3723.78	-3446.75
			E13E	-3152.30	2564.66	-2538.39	-31.29	2886.75	-3662.10
			E13F	-4314.05	2011.14	-1526.17	26.22	2053.07	-3341.71
			E13G	-5549.48	940.76	-1049.15	6.84	1710.91	-2673.59
			E13H	-6134.67	-19.63	-1387.27	-78.13	2061.14	-2049.00
			E14A	-5072.19	-456.68	-1827.11	-151.37	2286.84	-1422.35
			E14B	-3910.45	96.83	-2839.34	-208.88	3120.53	-1742.74
			E14C	-2675.03	1167.22	-3316.36	-189.50	3462.69	-2410.87
			E14D	-2089.83	2127.60	-2978.24	-104.53	3112.46	-3035.46
			E14E	-2497.04	2415.71	-2023.57	-3.77	2275.43	-3250.81
			E14F	-3658.79	1862.19	-1011.34	53.74	1441.75	-2930.42
			E14G	-4894.22	791.81	-534.32	34.36	1099.58	-2262.30
			E14H	-5479.42	-168.58	-872.45	-50.61	1449.82	-1637.70
			E23A	-7181.49	-98.61	-2341.70	-161.51	2642.27	-2243.53
			E23B	-6019.75	454.90	-3353.93	-219.03	3475.96	-2563.92
			E23C	-4784.33	1525.29	-3830.94	-199.65	3818.12	-3232.05
			E23D	-4199.13	2485.67	-3492.83	-114.67	3467.89	-3856.64
			E23E	-4606.34	2773.78	-2538.15	-13.91	2630.85	-4071.99
			E23F	-5768.09	2220.26	-1525.93	43.60	1797.18	-3751.60
			E23G	-7003.52	1149.88	-1048.91	24.22	1455.01	-3083.48
			E23H	-7588.71	189.49	-1387.03	-60.75	1805.24	-2458.88
			E24A	-6380.83	-268.47	-1826.89	-135.73	2056.53	-1791.25
			E24B	-5219.08	285.04	-2839.12	-193.24	2890.22	-2111.64
			E24C	-3983.66	1355.42	-3316.14	-173.86	3232.38	-2779.76
			E24D	-3398.46	2315.81	-2978.02	-88.89	2882.15	-3404.36
			E24E	-3805.68	2603.91	-2023.35	11.87	2045.12	-3619.71
			E24F	-4967.42	2050.40	-1011.12	69.38	1211.44	-3299.32
			E24G	-6202.85	980.02	-534.10	50.00	869.27	-2631.20
			E24H	-6788.05	19.63	-872.23	-34.97	1219.51	-2006.60
			E33A	-5137.57	-303.52	-2139.52	-150.59	2723.53	-1770.55
			E33B	-3975.83	249.99	-3151.75	-208.10	3557.22	-2090.94
			E33C	-2740.41	1320.37	-3628.77	-188.72	3899.38	-2759.07
			E33D	-2155.20	2280.76	-3290.65	-103.75	3549.15	-3383.66
			E33E	-2562.42	2568.86	-2335.98	-2.99	2712.12	-3599.01
			E33F	-3724.17	2015.35	-1323.76	54.53	1878.44	-3278.62
			E33G	-4959.59	944.97	-846.74	35.15	1536.27	-2610.50
			E33H	-5544.79	-15.42	-1184.86	-49.83	1886.51	-1985.90
			E34A	-4541.30	-452.89	-1644.94	-125.90	2129.67	-1365.57
			E34B	-3379.56	100.62	-2657.17	-183.41	2963.36	-1685.96
			E34C	-2144.13	1171.00	-3134.18	-164.03	3305.52	-2354.08
			E34D	-1558.93	2131.39	-2796.07	-79.06	2955.29	-2978.68
			E34E	-1966.15	2419.49	-1841.39	21.70	2118.26	-3194.03
			E34F	-3127.89	1865.98	-829.17	79.22	1284.58	-2873.64
			E34G	-4363.32	795.60	-352.15	59.84	942.41	-2205.52
			E34H	-4948.52	-164.79	-690.27	-25.14	1292.65	-1580.92
			E43A	-6591.59	-94.41	-2139.28	-133.21	2467.64	-2180.44
			E43B	-5429.85	459.10	-3151.51	-190.72	3301.33	-2500.82
			E43C	-4194.42	1529.48	-3628.53	-171.34	3643.49	-3168.95
			E43D	-3609.22	2489.87	-3290.41	-86.37	3293.26	-3793.54
			E43E	-4016.44	2777.98	-2335.74	14.39	2456.22	-4008.90
			E43F	-5178.18	2224.46	-1323.52	71.90	1622.55	-3688.51
			E43G	-6413.61	1154.08	-846.49	52.52	1280.38	-3020.38
			E43H	-6998.81	193.69	-1184.62	-32.45	1630.61	-2395.79
			E44A	-5849.92	-264.69	-1644.72	-110.26	1899.37	-1734.47
			E44B	-4688.18	288.82	-2656.95	-167.77	2733.05	-2054.85

	E44C	-3452.76	1359.20	-3133.97	-148.39	3075.21	-2722.98
	E44D	-2867.55	2319.59	-2795.85	-63.42	2724.99	-3347.57
	E44E	-3274.77	2607.69	-1841.18	37.35	1887.95	-3562.93
	E44F	-4436.52	2054.18	-828.95	94.86	1054.27	-3242.54
	E44G	-5671.94	983.80	-351.93	75.48	712.11	-2574.41
	E44H	-6257.14	23.41	-690.06	-9.50	1062.34	-1949.82
	EN3A	-6152.62	-217.65	-2276.47	-162.33	2733.16	-1987.11
	EN3B	-4990.88	335.86	-3288.70	-219.84	3566.84	-2307.50
	EN3C	-3755.46	1406.24	-3765.71	-200.46	3909.00	-2975.62
	EN3D	-3170.26	2366.63	-3427.60	-115.49	3558.78	-3600.22
	EN3E	-3577.47	2654.73	-2472.92	-14.72	2721.74	-3815.57
	EN3F	-4739.22	2101.22	-1460.70	42.79	1888.06	-3495.18
	EN3G	-5974.65	1030.84	-983.68	23.41	1545.90	-2827.06
	EN3H	-6559.85	70.45	-1321.80	-61.57	1896.13	-2202.46
	EN4A	-5455.82	-375.46	-1767.81	-136.44	2137.88	-1560.68
	EN4B	-4294.08	178.05	-2780.04	-193.96	2971.57	-1881.07
	EN4C	-3058.66	1248.43	-3257.06	-174.58	3313.73	-2549.19
	EN4D	-2473.46	2208.82	-2918.94	-89.60	2963.50	-3173.79
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	EN4F	-4042.42	1943.41	-952.04	68.67	1292.79	-3068.75
	EN4G	-5277.85	873.03	-475.02	49.29	950.62	-2400.63
	EN4H	-5863.04	-87.36	-813.15	-35.68	1300.85	-1776.03
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	O12B	-5954.34	1115.63	-3599.14	-193.67	4187.75	-3378.36
	O12C	-5387.89	1529.77	-3825.37	-191.02	4357.96	-3630.75
	O12D	-5194.39	1928.81	-3655.02	-151.16	4178.90	-3894.89
	O12E	-5308.21	2042.13	-3311.24	-114.09	3876.47	-3976.98
	O12F	-5736.98	1818.44	-2944.31	-94.64	3577.70	-3845.00
	O12G	-6229.39	1388.99	-2769.10	-104.18	3457.55	-3576.40
	O12H	-6496.93	1005.27	-2888.43	-137.15	3586.55	-3328.47
	O22A	-8273.37	1163.80	-3231.89	-151.63	3556.32	-3779.24
	O22B	-7844.59	1387.48	-3598.83	-171.08	3855.08	-3911.22
	O22C	-7278.15	1801.62	-3825.06	-168.43	4025.30	-4163.60
	O22D	-7084.64	2200.66	-3654.70	-128.56	3846.23	-4427.74
	O22E	-7198.47	2313.98	-3310.93	-91.49	3543.80	-4509.83
	O22F	-7627.24	2090.30	-2943.99	-72.04	3245.04	-4377.86
	O22G	-8119.65	1660.84	-2768.78	-81.59	3124.88	-4109.26
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	O32A	-5616.26	897.41	-2969.07	-137.43	3661.96	-3164.37
	O32B	-5187.49	1121.09	-3336.00	-156.88	3960.72	-3296.34
	O32C	-4621.05	1535.23	-3562.23	-154.23	4130.94	-3548.73
	O32D	-4427.54	1934.27	-3391.88	-114.36	3951.87	-3812.87
	O32E	-4541.36	2047.59	-3048.10	-77.29	3649.44	-3894.96
	O32F	-4970.13	1823.91	-2681.17	-57.84	3350.68	-3762.98
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	O42C	-6511.27	1807.08	-3561.92	-131.63	3798.28	-4081.58
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	O42G	-7352.77	1666.30	-2505.64	-44.80	2897.86	-4027.23
	O42H	-7620.31	1282.58	-2624.98	-77.77	3026.87	-3779.30
	ON2A	-6937.24	1009.26	-3146.55	-152.66	3673.82	-3446.19
	ON2B	-6508.47	1232.94	-3513.48	-172.11	3972.58	-3578.17
	ON2C	-5942.02	1647.08	-3739.72	-169.46	4142.79	-3830.55
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	ON2E	-5862.34	2159.44	-3225.58	-92.53	3661.30	-4176.78
	ON2F	-6291.11	1935.76	-2858.65	-73.08	3362.54	-4044.81
	ON2G	-6783.52	1506.30	-2683.44	-82.62	3242.38	-3776.21
	ON2H	-7051.06	1122.58	-2802.78	-115.59	3371.39	-3528.28
TU02	DN2A	-5268.24	764.99	-2347.65	-113.07	1323.41	-2154.14
	DN2B	-4909.76	937.87	-2655.08	-130.57	1393.11	-2150.32
	DN2C	-4522.25	1275.19	-2798.09	-123.43	1409.69	-2158.23
	DN2D	-4332.76	1579.42	-2692.74	-95.83	1363.38	-2173.24
	DN2E	-4452.11	1672.42	-2400.91	-63.94	1281.36	-2186.56
	DN2F	-4810.58	1499.54	-2093.48	-46.45	1211.66	-2190.38
	DN2G	-5198.10	1162.22	-1950.48	-53.58	1195.08	-2182.47
	DN2H	-5387.59	857.99	-2055.82	-81.18	1241.39	-2167.46
	E13A	-5721.49	-306.31	-2341.94	-178.89	1493.01	-2017.85
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	E13C	-3324.33	1316.17	-3829.77	-217.02	1775.73	-2032.46
	E13D	-2739.13	2275.55	-3492.07	-132.05	1628.25	-2081.12
	E13E	-3146.35	2563.24	-2538.39	-31.29	1363.72	-2123.74
	E13F	-4308.09	2010.14	-1527.17	26.22	1137.07	-2135.33
	E13G	-5543.52	940.76	-1050.57	6.84	1080.99	-2109.13
	E13H	-6128.72	-18.63	-1388.27	-78.13	1228.48	-2060.47
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	E14B	-3905.09	97.83	-2838.34	-208.88	1417.23	-1684.34

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E14E	-2491.68	2414.29	-2023.57	-3.77	1061.29	-1801.82
E14F	-3653.43	1861.19	-1012.35	53.74	834.64	-1813.41
E14G	-4888.86	791.81	-535.74	34.36	778.56	-1787.21
E14H	-5474.06	-167.58	-873.45	-50.61	926.05	-1738.55
E23A	-7175.54	-97.19	-2341.70	-161.51	1237.25	-2302.27
E23B	-6013.80	455.90	-3352.93	-219.03	1463.90	-2290.68
E23C	-4778.37	1525.29	-3829.53	-199.65	1519.98	-2316.88
E23D	-4193.17	2484.67	-3491.82	-114.67	1372.50	-2365.54
E23E	-4600.39	2772.36	-2538.15	-13.91	1107.97	-2408.16
E23F	-5762.13	2219.26	-1526.93	43.60	881.32	-2419.75
E23G	-6997.56	1149.88	-1050.33	24.22	825.24	-2393.55
E23H	-7582.76	190.49	-1388.03	-60.75	972.73	-2344.89
E24A	-6375.47	-267.05	-1826.89	-135.73	960.40	-1951.91
E24B	-5213.73	286.04	-2838.12	-193.24	1187.05	-1940.32
E24C	-3978.30	1355.42	-3314.72	-173.86	1243.13	-1966.51
E24D	-3393.10	2314.81	-2977.02	-88.89	1095.64	-2015.18
E24E	-3800.32	2602.50	-2023.35	11.87	831.11	-2057.79
E24F	-4962.06	2049.40	-1012.13	69.38	604.47	-2069.38
E24G	-6197.49	980.02	-535.52	50.00	548.39	-2043.19
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E33A	-5131.61	-302.10	-2139.52	-150.59	1439.82	-1952.24
E33B	-3969.87	250.99	-3150.75	-208.10	1666.47	-1940.65
E33C	-2734.45	1320.37	-3627.35	-188.72	1722.55	-1966.85
E33D	-2149.25	2279.76	-3289.65	-103.75	1575.06	-2015.51
E33E	-2556.46	2567.44	-2335.98	-2.99	1310.53	-2058.13
E33F	-3718.21	2014.35	-1324.76	54.53	1083.89	-2069.72
E33G	-4953.64	944.97	-848.15	35.15	1027.81	-2043.52
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E34A	-4535.94	-451.48	-1644.94	-125.90	1142.71	-1636.88
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E34G	-4357.96	795.60	-353.57	59.84	730.70	-1728.16
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E43A	-6585.63	-92.99	-2139.28	-133.21	1184.07	-2236.65
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E43C	-4188.47	1529.48	-3627.11	-171.34	1466.80	-2251.26
E43D	-3603.27	2488.87	-3289.41	-86.37	1319.32	-2299.92
E43E	-4010.48	2776.56	-2335.74	14.39	1054.79	-2342.54
E43F	-5172.23	2223.46	-1324.52	71.90	828.14	-2354.13
E43G	-6407.66	1154.08	-847.91	52.52	772.06	-2327.94
E43H	-6992.85	194.69	-1185.62	-32.45	919.55	-2279.27
E44A	-5844.56	-263.27	-1644.72	-110.26	912.54	-1892.85
E44B	-4682.82	289.82	-2655.95	-167.77	1139.19	-1881.26
E44C	-3447.40	1359.20	-3132.55	-148.39	1195.26	-1907.46
E44D	-2862.20	2318.59	-2794.85	-63.42	1047.78	-1956.12
E44E	-3269.41	2606.28	-1841.18	37.35	783.25	-1998.74
E44F	-4431.16	2053.18	-829.95	94.86	556.60	-2010.33
E44G	-5666.59	983.80	-353.35	75.48	500.52	-1984.13
E44H	-6251.78	24.41	-691.06	-9.50	648.01	-1935.47
EN3A	-6146.67	-216.23	-2276.47	-162.33	1367.28	-2117.28
EN3B	-4984.93	336.86	-3287.70	-219.84	1593.93	-2105.68
EN3C	-3749.50	1406.24	-3764.30	-200.46	1650.00	-2131.88
EN3D	-3164.30	2365.63	-3426.60	-115.49	1502.52	-2180.55
EN3E	-3571.52	2653.31	-2472.92	-14.72	1237.99	-2223.16
EN3F	-4733.27	2100.22	-1461.70	42.79	1011.34	-2234.75
EN3G	-5968.69	1030.84	-985.10	23.41	955.27	-2208.56
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EN4A	-5450.46	-374.04	-1767.81	-136.44	1077.20	-1785.53
EN4B	-4288.72	179.05	-2779.04	-193.96	1303.84	-1773.94
EN4C	-3053.30	1248.43	-3255.64	-174.58	1359.92	-1800.14
EN4D	-2468.10	2207.82	-2917.94	-89.60	1212.44	-1848.80
EN4E	-2875.31	2495.51	-1964.27	11.16	947.91	-1891.41
EN4F	-4037.06	1942.41	-953.05	68.67	721.26	-1903.01
EN4G	-5272.49	873.03	-476.44	49.29	665.18	-1876.81
EN4H	-5857.68	-86.36	-814.15	-35.68	812.67	-1828.15
O12A	-6375.37	892.45	-3232.21	-174.22	1949.66	-2711.07
O12B	-5946.60	1115.99	-3598.78	-193.67	2028.38	-2708.88
O12C	-5380.15	1529.77	-3824.86	-191.02	2062.90	-2712.89
O12D	-5186.65	1928.45	-3654.66	-151.16	1986.00	-2737.71
O12E	-5300.47	2041.62	-3311.24	-114.09	1889.73	-2751.85
O12F	-5729.24	1818.09	-2944.67	-94.64	1811.01	-2754.04
O12G	-6221.65	1388.99	-2769.60	-104.18	1795.94	-2743.01
O12H	-6489.19	1005.63	-2888.79	-137.15	1853.39	-2725.21
O22A	-8265.62	1164.31	-3231.89	-151.63	1617.19	-3080.81
O22B	-7836.85	1387.84	-3598.47	-171.08	1695.90	-3078.62

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O22E	-7190.73	2313.48	-3310.93	-91.49	1557.25	-3121.60
O22F	-7619.50	2089.94	-2944.35	-72.04	1478.54	-3123.79
O22G	-8111.91	1660.84	-2769.29	-81.59	1463.46	-3112.75
O22H	-8379.45	1277.48	-2888.48	-114.56	1520.91	-3094.95
O32A	-5608.52	897.92	-2969.07	-137.43	1880.52	-2625.77
O32B	-5179.75	1121.45	-3335.64	-156.88	1959.24	-2623.58
O32C	-4613.30	1535.23	-3561.72	-154.23	1993.76	-2627.59
O32D	-4419.80	1933.91	-3391.52	-114.36	1916.86	-2652.42
O32E	-4533.62	2047.09	-3048.10	-77.29	1820.59	-2666.56
O32F	-4962.39	1823.55	-2681.53	-57.84	1741.87	-2668.75
O32G	-5454.80	1394.45	-2506.47	-67.39	1726.80	-2657.71
O32H	-5722.35	1011.09	-2625.65	-100.36	1784.25	-2639.91
O42A	-7498.75	1169.77	-2968.75	-114.84	1548.05	-2995.51
O42B	-7069.98	1393.30	-3335.33	-134.28	1626.76	-2993.32
O42C	-6503.53	1807.08	-3561.41	-131.63	1661.28	-2997.33
O42D	-6310.02	2205.76	-3391.20	-91.77	1584.39	-3022.15
O42E	-6423.85	2318.94	-3047.79	-54.70	1488.11	-3036.29
O42F	-6852.62	2095.40	-2681.21	-35.25	1409.40	-3038.48
O42G	-7345.03	1666.30	-2506.15	-44.80	1394.33	-3027.45
O42H	-7612.57	1282.94	-2625.34	-77.77	1451.78	-3009.65
ON2A	-6929.50	1009.77	-3146.55	-152.66	1785.89	-2840.49
ON2B	-6500.73	1233.30	-3513.12	-172.11	1864.60	-2838.30
ON2C	-5934.28	1647.08	-3739.21	-169.46	1899.12	-2842.31
ON2D	-5740.77	2045.76	-3569.00	-129.59	1822.23	-2867.13
ON2E	-5854.60	2158.94	-3225.58	-92.53	1725.95	-2881.27
ON2F	-6283.37	1935.40	-2859.01	-73.08	1647.24	-2883.46
ON2G	-6775.78	1506.30	-2683.95	-82.62	1632.17	-2872.43
ON2H	-7043.32	1122.94	-2803.13	-115.59	1689.62	-2854.63

SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TA44-TU03	TA44	TPS	DN2A	-6189.81	991.72	2379.86	80.13	-2732.02	-2786.71
			DN2B	-6314.53	1084.59	2080.96	55.46	-2489.88	-2849.07
			DN2C	-6138.40	1400.62	1975.24	31.07	-2388.96	-3048.31
			DN2D	-5764.41	1754.79	2124.79	21.24	-2488.50	-3267.78
			DN2E	-5411.70	1939.67	2441.86	31.72	-2730.05	-3378.94
			DN2F	-5286.98	1846.80	2740.75	56.38	-2972.18	-3316.59
			DN2G	-5463.12	1530.76	2846.47	80.78	-3073.10	-3117.34
			DN2H	-5837.11	1176.60	2696.92	90.61	-2973.57	-2897.88
			E13A	-7848.48	45.45	2400.05	137.90	-2731.54	-2337.62
			E13B	-8271.18	337.00	1412.34	55.83	-1934.41	-2533.49
			E13C	-7724.48	1345.29	1053.58	-26.62	-1599.01	-3167.16
			E13D	-6528.06	2479.99	1534.46	-61.14	-1922.20	-3867.62
			E13E	-5382.96	3076.55	2572.79	-27.55	-2714.28	-4224.64
			E13F	-4960.27	2785.00	3560.49	54.52	-3511.40	-4028.77
			E13G	-5506.96	1776.71	3919.26	136.98	-3846.81	-3395.10
			E13H	-6703.39	642.01	3438.37	171.49	-3523.61	-2694.64
			E14A	-6141.19	-375.69	1771.61	124.09	-2144.93	-1582.18
			E14B	-6563.89	-84.14	783.90	42.02	-1347.80	-1778.06
			E14C	-6017.19	924.15	425.14	-40.43	-1012.40	-2411.73
			E14D	-4820.77	2058.84	906.03	-74.95	-1335.59	-3112.18
			E14E	-3675.67	2655.41	1944.35	-41.36	-2127.67	-3469.21
			E14F	-3252.98	2363.86	2932.06	40.71	-2924.79	-3273.33
			E14G	-3799.67	1355.57	3290.82	123.17	-3260.20	-2639.66
			E14H	-4996.10	220.87	2809.93	157.69	-2937.00	-1939.21
			E23A	-6393.91	-172.52	2384.43	155.90	-2916.78	-1923.75
			E23B	-6816.60	119.03	1396.72	73.83	-2119.65	-2119.62
			E23C	-6269.91	1127.32	1037.96	-8.62	-1784.25	-2753.30
			E23D	-5073.49	2262.02	1518.84	-43.14	-2107.45	-3453.75
			E23E	-3928.39	2858.58	2557.17	-9.55	-2899.52	-3810.78
			E23F	-3505.70	2567.03	3544.88	72.52	-3696.64	-3614.90
			E23G	-4052.39	1558.74	3903.64	154.97	-4032.05	-2981.23
			E23H	-5248.82	424.04	3422.75	189.49	-3708.85	-2280.78
			E24A	-4832.07	-571.87	1757.55	140.29	-2311.65	-1209.70
			E24B	-5254.77	-280.32	769.84	58.22	-1514.52	-1405.57
			E24C	-4708.08	727.97	411.08	-24.23	-1179.11	-2039.24
			E24D	-3511.65	1862.67	891.97	-58.75	-1502.31	-2739.70
			E24E	-2366.56	2459.23	1930.29	-25.16	-2294.38	-3096.73
			E24F	-1943.87	2167.68	2918.00	56.91	-3091.50	-2900.85
			E24G	-2490.55	1159.39	3276.76	139.36	-3426.92	-2267.18
			E24H	-3686.98	24.70	2795.87	173.88	-3103.71	-1566.72
			E33A	-7243.01	37.23	2187.98	116.66	-2514.31	-2268.66
			E33B	-7665.71	328.78	1200.27	34.59	-1717.18	-2464.54

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E33C	-7119.02	1337.07	841.51	-47.86	-1381.77	-3098.21
E33D	-5922.60	2471.77	1322.39	-82.38	-1704.97	-3798.66
E33E	-4777.50	3068.33	2360.72	-48.79	-2497.04	-4155.69
E33F	-4354.81	2776.78	3348.43	33.28	-3294.17	-3959.81
E33G	-4901.49	1768.49	3707.19	115.74	-3629.58	-3326.14
E33H	-6097.93	633.80	3226.30	150.26	-3306.37	-2625.69
E34A	-5596.27	-383.09	1580.75	104.98	-1949.42	-1520.12
E34B	-6018.97	-91.54	593.04	22.91	-1152.29	-1715.99
E34C	-5472.27	916.75	234.28	-59.54	-816.88	-2349.67
E34D	-4275.85	2051.45	715.16	-94.06	-1140.08	-3050.12
E34E	-3130.75	2648.01	1753.49	-60.47	-1932.15	-3407.15
E34F	-2708.06	2356.46	2741.19	21.60	-2729.28	-3211.27
E34G	-3254.75	1348.17	3099.96	104.05	-3064.69	-2577.60
E34H	-4451.18	213.47	2619.07	138.57	-2741.48	-1877.15
E43A	-5788.47	-180.74	2172.36	134.66	-2699.55	-1854.80
E43B	-6211.16	110.81	1184.65	52.59	-1902.42	-2050.68
E43C	-5664.47	1119.11	825.89	-29.86	-1567.01	-2684.35
E43D	-4468.05	2253.80	1306.78	-64.38	-1890.21	-3384.80
E43E	-3322.95	2850.37	2345.10	-30.79	-2682.28	-3741.83
E43F	-2900.26	2558.82	3332.81	51.28	-3479.40	-3545.95
E43G	-3446.95	1550.53	3691.57	133.73	-3814.82	-2912.28
E43H	-4643.38	415.83	3210.68	168.25	-3491.61	-2211.83
E44A	-4287.17	-579.26	1566.69	121.17	-2116.13	-1147.65
E44B	-4709.87	-287.71	578.98	39.10	-1319.00	-1343.52
E44C	-4163.18	720.58	220.22	-43.35	-983.60	-1977.19
E44D	-2966.75	1855.28	701.11	-77.87	-1306.80	-2677.65
E44E	-1821.66	2451.84	1739.43	-44.28	-2098.87	-3034.67
E44F	-1398.97	2160.29	2727.14	37.79	-2895.99	-2838.80
E44G	-1945.65	1152.00	3085.90	120.25	-3231.40	-2205.13
E44H	-3142.08	17.30	2605.02	154.77	-2908.20	-1504.67
EN3A	-7034.59	-49.53	2325.07	138.64	-2739.48	-2139.74
EN3B	-7457.29	242.02	1337.36	56.57	-1942.35	-2335.61
EN3C	-6910.60	1250.31	978.60	-25.88	-1606.95	-2969.28
EN3D	-5714.17	2385.01	1459.49	-60.40	-1930.14	-3669.74
EN3E	-4569.08	2981.58	2497.81	-26.81	-2722.22	-4026.76
EN3F	-4146.39	2690.03	3485.52	55.26	-3519.34	-3830.89
EN3G	-4693.07	1681.74	3844.28	137.71	-3854.75	-3197.22
EN3H	-5889.51	547.04	3363.40	172.23	-3531.55	-2496.76
EN4A	-5407.71	-461.47	1703.61	124.76	-2152.24	-1403.71
EN4B	-5830.41	-169.92	715.89	42.69	-1355.11	-1599.58
EN4C	-5283.72	838.37	357.14	-39.76	-1019.71	-2233.25
EN4D	-4087.29	1973.06	838.02	-74.28	-1342.90	-2933.71
EN4E	-2942.20	2569.63	1876.35	-40.68	-2134.98	-3290.73
EN4F	-2519.51	2278.08	2864.05	41.38	-2932.10	-3094.86
EN4G	-3066.19	1269.79	3222.82	123.84	-3267.51	-2461.19
EN4H	-4262.63	135.09	2741.93	158.36	-2944.31	-1760.73
O12A	-9614.32	1563.24	3378.59	116.41	-3718.81	-4102.69
O12B	-9728.99	1667.98	2997.99	86.41	-3421.36	-4166.66
O12C	-9537.92	2078.33	2854.64	37.42	-3247.88	-4421.90
O12D	-8974.22	2493.12	3020.58	26.90	-3381.57	-4662.16
O12E	-8546.75	2730.33	3410.54	32.24	-3662.53	-4803.55
O12F	-8432.08	2625.59	3791.14	62.25	-3959.98	-4739.59
O12G	-8697.13	2240.47	3939.52	99.32	-4099.74	-4507.88
O12H	-9186.85	1800.45	3768.55	121.75	-3999.77	-4244.08
O22A	-7723.37	1279.87	3358.29	139.80	-3959.62	-3564.66
O22B	-7838.04	1384.62	2977.68	109.80	-3662.17	-3628.63
O22C	-7646.97	1794.97	2834.33	60.81	-3488.69	-3883.87
O22D	-7083.27	2209.75	3000.27	50.30	-3622.38	-4124.13
O22E	-6655.81	2446.97	3390.24	55.64	-3903.34	-4265.52
O22F	-6541.14	2342.22	3770.84	85.64	-4200.80	-4201.56
O22G	-6806.18	1957.11	3919.22	122.72	-4340.55	-3969.85
O22H	-7295.90	1517.09	3748.25	145.14	-4240.59	-3706.05
O32A	-8827.21	1552.55	3102.90	88.80	-3436.40	-4013.05
O32B	-8941.88	1657.29	2722.30	58.80	-3138.95	-4077.01
O32C	-8750.81	2067.65	2578.94	9.81	-2965.47	-4332.25
O32D	-8187.11	2482.43	2744.88	-0.71	-3099.16	-4572.52
O32E	-7759.65	2719.65	3134.85	4.63	-3380.12	-4713.91
O32F	-7644.98	2614.90	3515.45	34.64	-3677.58	-4649.94
O32G	-7910.02	2229.78	3663.83	71.71	-3817.33	-4418.23
O32H	-8399.74	1789.76	3492.86	94.14	-3717.36	-4154.44
O42A	-6936.29	1269.19	3082.60	112.19	-3677.21	-3475.03
O42B	-7050.97	1373.94	2701.99	82.19	-3379.76	-3538.99
O42C	-6859.90	1784.29	2558.64	33.20	-3206.28	-3794.23
O42D	-6296.20	2199.07	2724.58	22.69	-3339.97	-4034.50
O42E	-5868.73	2436.29	3114.55	28.03	-3620.93	-4175.89
O42F	-5754.06	2331.54	3495.15	58.03	-3918.39	-4111.92
O42G	-6019.11	1946.43	3643.53	95.10	-4058.14	-3880.22
O42H	-6508.83	1506.41	3472.56	117.53	-3958.18	-3616.42
ON2A	-8554.85	1439.33	3280.36	117.38	-3729.37	-3844.90
ON2B	-8669.52	1544.08	2899.76	87.38	-3431.92	-3908.86

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	ON2C	-8478.45	1954.43	2756.41	38.39	-3258.44	-4164.10
	ON2D	-7914.76	2369.21	2922.35	27.87	-3392.13	-4404.37
	ON2E	-7487.29	2606.43	3312.31	33.21	-3673.09	-4545.76
	ON2F	-7372.62	2501.68	3692.91	63.21	-3970.55	-4481.79
	ON2G	-7637.67	2116.57	3841.29	100.29	-4110.30	-4250.08
	ON2H	-8127.39	1676.55	3670.32	122.72	-4010.33	-3986.29
TU03	DN2A	-6183.86	992.13	2379.86	80.13	-1304.10	-2191.56
	DN2B	-6308.58	1084.88	2081.25	55.46	-1241.22	-2198.23
	DN2C	-6132.44	1400.62	1975.65	31.07	-1203.70	-2207.94
	DN2D	-5758.45	1754.50	2125.08	21.24	-1213.54	-2215.00
	DN2E	-5405.74	1939.26	2441.86	31.72	-1264.94	-2215.27
	DN2F	-5281.03	1846.51	2740.47	56.38	-1327.82	-2208.60
	DN2G	-5457.16	1530.76	2846.07	80.78	-1365.35	-2198.89
	DN2H	-5831.15	1176.89	2696.63	90.61	-1355.51	-2191.83
	E13A	-7842.52	46.87	2400.05	137.90	-1291.52	-2309.92
	E13B	-8265.22	338.00	1413.34	55.83	-1086.71	-2330.99
	E13C	-7718.53	1345.29	1054.99	-26.62	-966.44	-2359.99
	E13D	-6522.10	2478.99	1535.46	-61.14	-1001.23	-2379.93
	E13E	-5377.01	3075.14	2572.79	-27.55	-1170.61	-2379.14
	E13F	-4954.32	2784.00	3559.49	54.52	-1375.41	-2358.07
	E13G	-5501.00	1776.71	3917.84	136.98	-1495.69	-2329.07
	E13H	-6697.44	643.02	3437.37	171.49	-1460.89	-2309.14
	E14A	-6135.83	-374.28	1771.61	124.09	-1081.97	-1807.17
	E14B	-6558.53	-83.14	784.90	42.02	-877.16	-1828.24
	E14C	-6011.83	924.15	426.56	-40.43	-756.89	-1857.24
	E14D	-4815.41	2057.84	907.03	-74.95	-791.68	-1877.18
	E14E	-3670.31	2653.99	1944.35	-41.36	-961.06	-1876.39
	E14F	-3247.63	2362.86	2931.06	40.71	-1165.86	-1855.32
	E14G	-3794.31	1355.57	3289.41	123.17	-1286.14	-1826.32
	E14H	-4990.74	221.87	2808.93	157.69	-1251.34	-1806.39
	E23A	-6387.95	-171.10	2384.43	155.90	-1486.13	-2026.84
	E23B	-6810.65	120.03	1397.72	73.83	-1281.32	-2047.91
	E23C	-6263.96	1127.32	1039.38	-8.62	-1161.05	-2076.90
	E23D	-5067.53	2261.02	1519.85	-43.14	-1195.84	-2096.84
	E23E	-3922.44	2857.17	2557.17	-9.55	-1365.22	-2096.06
	E23F	-3499.75	2566.03	3543.88	72.52	-1570.02	-2074.99
	E23G	-4046.43	1558.74	3902.23	154.97	-1690.30	-2045.99
	E23H	-5242.86	425.05	3421.75	189.49	-1655.50	-2026.05
	E24A	-4826.71	-570.45	1757.55	140.29	-1257.12	-1552.40
	E24B	-5249.41	-279.32	770.84	58.22	-1052.31	-1573.46
	E24C	-4702.72	727.97	412.50	-24.23	-932.03	-1602.46
	E24D	-3506.29	1861.67	892.97	-58.75	-966.83	-1622.40
	E24E	-2361.20	2457.82	1930.29	-25.16	-1136.21	-1621.61
	E24F	-1938.51	2166.68	2917.00	56.91	-1341.01	-1600.54
	E24G	-2485.19	1159.39	3275.35	139.36	-1461.29	-1571.55
	E24H	-3681.62	25.70	2794.87	173.88	-1426.49	-1551.61
	E33A	-7237.06	38.65	2187.98	116.66	-1201.52	-2245.90
	E33B	-7659.76	329.78	1201.27	34.59	-996.72	-2266.97
	E33C	-7113.06	1337.07	842.92	-47.86	-876.44	-2295.97
	E33D	-5916.64	2470.77	1323.39	-82.38	-911.24	-2315.91
	E33E	-4771.54	3066.92	2360.72	-48.79	-1080.61	-2315.12
	E33F	-4348.85	2775.78	3347.42	33.28	-1285.42	-2294.05
	E33G	-4895.54	1768.49	3705.77	115.74	-1405.69	-2265.05
	E33H	-6091.97	634.80	3225.30	150.26	-1370.90	-2245.11
	E34A	-5590.91	-381.68	1580.75	104.98	-1000.97	-1749.55
	E34B	-6013.61	-90.54	594.04	22.91	-796.17	-1770.62
	E34C	-5466.91	916.75	235.69	-59.54	-675.89	-1799.62
	E34D	-4270.49	2050.44	716.16	-94.06	-710.68	-1819.56
	E34E	-3125.39	2646.59	1753.49	-60.47	-880.06	-1818.77
	E34F	-2702.71	2355.46	2740.19	21.60	-1084.86	-1797.70
	E34G	-3249.39	1348.17	3098.54	104.05	-1205.14	-1768.70
	E34H	-4445.82	214.47	2618.07	138.57	-1170.35	-1748.76
	E43A	-5782.51	-179.32	2172.36	134.66	-1396.13	-1962.82
	E43B	-6205.21	111.81	1185.65	52.59	-1191.33	-1983.89
	E43C	-5658.52	1119.11	827.31	-29.86	-1071.05	-2012.89
	E43D	-4462.09	2252.80	1307.78	-64.38	-1105.84	-2032.82
	E43E	-3317.00	2848.95	2345.10	-30.79	-1275.22	-2032.04
	E43F	-2894.31	2557.82	3331.81	51.28	-1480.02	-2010.97
	E43G	-3440.99	1550.53	3690.16	133.73	-1600.30	-1981.97
	E43H	-4637.42	416.83	3209.68	168.25	-1565.51	-1962.03
	E44A	-4281.81	-577.85	1566.69	121.17	-1176.12	-1494.78
	E44B	-4704.51	-286.71	579.98	39.10	-971.32	-1515.85
	E44C	-4157.82	720.58	221.64	-43.35	-851.04	-1544.84
	E44D	-2961.39	1854.27	702.11	-77.87	-885.83	-1564.78
	E44E	-1816.30	2450.42	1739.43	-44.28	-1055.21	-1564.00
	E44F	-1393.61	2159.29	2726.14	37.79	-1260.01	-1542.93
	E44G	-1940.29	1152.00	3084.49	120.25	-1380.29	-1513.93
	E44H	-3136.72	18.30	2604.01	154.77	-1345.50	-1493.99
	EN3A	-7028.64	-48.11	2325.07	138.64	-1344.44	-2169.03
	EN3B	-7451.34	243.02	1338.36	56.57	-1139.64	-2190.10

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EN3C	-6904.64	1250.31	980.02	-25.88	-1019.36	-2219.10
EN3D	-5708.22	2384.01	1460.49	-60.40	-1054.15	-2239.04
EN3E	-4563.12	2980.16	2497.81	-26.81	-1223.53	-2238.25
EN3F	-4140.43	2689.02	3484.52	55.26	-1428.33	-2217.18
EN3G	-4687.12	1681.74	3842.87	137.71	-1548.61	-2188.18
EN3H	-5883.55	548.04	3362.39	172.23	-1513.82	-2168.24
EN4A	-5402.35	-460.06	1703.61	124.76	-1130.08	-1680.17
EN4B	-5825.05	-168.92	716.90	42.69	-925.28	-1701.23
EN4C	-5278.36	838.37	358.55	-39.76	-805.00	-1730.23
EN4D	-4081.93	1972.06	839.02	-74.28	-839.79	-1750.17
EN4E	-2936.84	2568.21	1876.35	-40.68	-1009.17	-1749.38
EN4F	-2514.15	2277.08	2863.05	41.38	-1213.97	-1728.31
EN4G	-3060.83	1269.79	3221.40	123.84	-1334.25	-1699.32
EN4H	-4257.27	136.09	2740.93	158.36	-1299.46	-1679.38
O12A	-9606.57	1563.74	3378.59	116.41	-1691.66	-3164.60
O12B	-9721.25	1668.34	2998.35	86.41	-1622.46	-3165.76
O12C	-9530.17	2078.33	2855.15	37.42	-1534.95	-3174.90
O12D	-8966.48	2492.76	3020.94	26.90	-1569.12	-3166.40
O12E	-8539.01	2729.83	3410.54	32.24	-1616.21	-3165.51
O12F	-8424.34	2625.23	3790.78	62.25	-1685.41	-3164.35
O12G	-8689.39	2240.47	3939.02	99.32	-1736.18	-3163.60
O12H	-9179.11	1800.81	3768.20	121.75	-1738.75	-3163.71
O22A	-7715.63	1280.38	3358.29	139.80	-1944.65	-2796.59
O22B	-7830.30	1384.98	2978.04	109.80	-1875.45	-2797.75
O22C	-7639.23	1794.97	2834.84	60.81	-1787.95	-2806.89
O22D	-7075.53	2209.39	3000.63	50.30	-1822.11	-2798.39
O22E	-6648.06	2446.46	3390.24	55.64	-1869.21	-2797.50
O22F	-6533.40	2341.86	3770.48	85.64	-1938.41	-2796.33
O22G	-6798.44	1957.11	3918.71	122.72	-1989.18	-2795.59
O22H	-7288.16	1517.45	3747.89	145.14	-1991.75	-2795.69
O32A	-8819.47	1553.06	3102.90	88.80	-1574.67	-3081.37
O32B	-8934.14	1657.65	2722.66	58.80	-1505.47	-3082.53
O32C	-8743.07	2067.65	2579.45	9.81	-1417.96	-3091.67
O32D	-8179.37	2482.07	2745.24	-0.71	-1452.12	-3083.17
O32E	-7751.90	2719.14	3134.85	4.63	-1499.22	-3082.28
O32F	-7637.24	2614.54	3515.09	34.64	-1568.42	-3081.11
O32G	-7902.28	2229.78	3663.32	71.71	-1619.19	-3080.37
O32H	-8392.00	1790.12	3492.50	94.14	-1621.76	-3080.47
O42A	-6928.55	1269.70	3082.60	112.19	-1827.66	-2713.36
O42B	-7043.22	1374.30	2702.35	82.19	-1758.46	-2714.53
O42C	-6852.16	1784.29	2559.15	33.20	-1670.95	-2723.66
O42D	-6288.46	2198.71	2724.94	22.69	-1705.12	-2715.17
O42E	-5860.99	2435.78	3114.55	28.03	-1752.21	-2714.27
O42F	-5746.32	2331.18	3494.79	58.03	-1821.41	-2713.11
O42G	-6011.37	1946.43	3643.02	95.10	-1872.18	-2712.36
O42H	-6501.09	1506.77	3472.20	117.53	-1874.75	-2712.47
ON2A	-8547.11	1439.84	3280.36	117.38	-1761.16	-2981.15
ON2B	-8661.78	1544.44	2900.12	87.38	-1691.96	-2982.31
ON2C	-8470.71	1954.43	2756.92	38.39	-1604.45	-2991.44
ON2D	-7907.02	2368.85	2922.71	27.87	-1638.62	-2982.95
ON2E	-7479.55	2605.92	3312.31	33.21	-1685.71	-2982.05
ON2F	-7364.88	2501.33	3692.55	63.21	-1754.91	-2980.89
ON2G	-7629.92	2116.57	3840.79	100.29	-1805.68	-2980.14
ON2H	-8119.65	1676.91	3669.96	122.72	-1808.25	-2980.25

SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) (KN)	FORCE(Y) (KN)	FORCE(Z) (KN)	MOMENT(X) (KN-M)	MOMENT(Y) (KN-M)	MOMENT(Z) (KN-M)
TC24-TU01	TC24	TPS	DN2A	-4178.67	-1706.53	-2208.28	24.86	2606.24	3166.79
			DN2B	-4055.39	-1627.23	-2473.60	38.90	2838.86	3106.57
			DN2C	-4243.58	-1332.53	-2566.83	55.76	2936.79	2918.53
			DN2D	-4633.19	-994.96	-2433.20	65.55	2842.52	2712.77
			DN2E	-4995.93	-812.22	-2151.13	62.54	2611.41	2609.79
			DN2F	-5119.21	-891.52	-1885.81	48.49	2378.79	2670.01
			DN2G	-4931.02	-1186.22	-1792.59	31.64	2280.87	2858.05
			DN2H	-4541.41	-1523.79	-1926.21	21.85	2375.13	3063.81
			E13A	-2495.69	-2593.81	-2216.79	-13.58	2658.17	3582.01
			E13B	-2075.71	-2348.36	-3089.14	33.88	3420.01	3393.32
			E13C	-2656.73	-1418.21	-3389.33	87.17	3735.44	2798.04
			E13D	-3899.00	-347.92	-2941.01	115.06	3419.30	2144.72
			E13E	-5074.61	235.67	-2007.28	101.24	2657.18	1815.94
			E13F	-5494.58	-9.78	-1134.92	53.78	1895.34	2004.63
			E13G	-4913.57	-939.93	-834.74	0.49	1579.91	2599.91
			E13H	-3671.29	-2010.22	-1283.05	-27.40	1896.05	3253.24
			E14A	-2124.73	-2330.71	-1758.24	-21.51	2113.82	3119.32

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E14B	-1704.75	-2085.27	-2630.59	25.95	2875.66	2930.63
E14C	-2285.77	-1155.12	-2930.77	79.24	3191.09	2335.36
E14D	-3528.04	-84.83	-2482.46	107.13	2874.95	1682.03
E14E	-4703.65	498.77	-1548.72	93.31	2112.83	1353.26
E14F	-5123.62	253.32	-676.37	45.85	1350.99	1541.95
E14G	-4542.61	-676.84	-376.18	-7.44	1035.56	2137.22
E14H	-3300.33	-1747.13	-824.50	-35.33	1351.70	2790.55
E23A	-3930.05	-2787.08	-2220.27	-31.37	2409.58	3979.19
E23B	-3510.07	-2541.64	-3092.62	16.09	3171.41	3790.51
E23C	-4091.09	-1611.48	-3392.80	69.38	3486.85	3195.23
E23D	-5333.36	-541.19	-2944.49	97.27	3170.71	2541.90
E23E	-6508.97	42.40	-2010.76	83.45	2408.59	2213.13
E23F	-6928.94	-203.05	-1138.40	35.99	1646.75	2401.82
E23G	-6347.93	-1133.20	-838.22	-17.30	1331.32	2997.10
E23H	-5105.65	-2203.49	-1286.53	-45.19	1647.46	3650.43
E24A	-3415.65	-2504.66	-1761.37	-37.52	1890.09	3476.79
E24B	-2995.67	-2259.21	-2633.72	9.94	2651.92	3288.10
E24C	-3576.69	-1329.06	-2933.90	63.23	2967.35	2692.82
E24D	-4818.96	-258.77	-2485.59	91.12	2651.22	2039.50
E24E	-5994.57	324.82	-1551.85	77.30	1889.09	1710.72
E24F	-6414.54	79.37	-679.50	29.84	1127.26	1899.41
E24G	-5833.53	-850.78	-379.31	-23.45	811.82	2494.69
E24H	-4591.25	-1921.07	-827.63	-51.35	1127.96	3148.02
E33A	-3088.16	-2588.16	-2420.47	9.27	2832.95	3645.11
E33B	-2668.18	-2342.72	-3292.82	56.74	3594.79	3456.42
E33C	-3249.20	-1412.56	-3593.00	110.03	3910.22	2861.15
E33D	-4491.46	-342.28	-3144.69	137.92	3594.08	2207.82
E33E	-5667.08	241.32	-2210.96	124.10	2831.96	1879.05
E33F	-6087.05	-4.13	-1338.60	76.63	2070.12	2067.74
E33G	-5506.04	-934.28	-1038.42	23.35	1754.69	2663.01
E33H	-4263.76	-2004.57	-1486.73	-4.55	2070.83	3316.34
E34A	-2657.95	-2325.63	-1941.55	-0.94	2271.12	3176.11
E34B	-2237.97	-2080.19	-2813.90	46.52	3032.96	2987.43
E34C	-2818.99	-1150.03	-3114.08	99.81	3348.39	2392.15
E34D	-4061.26	-79.74	-2665.77	127.70	3032.25	1738.82
E34E	-5236.87	503.85	-1732.03	113.88	2270.13	1410.05
E34F	-5656.84	258.40	-859.68	66.42	1508.30	1598.74
E34G	-5075.83	-671.75	-559.49	13.13	1192.86	2194.01
E34H	-3833.55	-1742.04	-1007.81	-14.76	1509.00	2847.34
E43A	-4522.50	-2781.43	-2423.95	-8.52	2584.37	4042.29
E43B	-4102.51	-2535.99	-3296.30	38.95	3346.20	3853.60
E43C	-4683.53	-1605.83	-3596.48	92.24	3661.63	3258.33
E43D	-5925.80	-535.55	-3148.17	120.13	3345.49	2605.00
E43E	-7101.41	48.05	-2214.44	106.31	2583.37	2276.23
E43F	-7521.38	-197.40	-1342.08	58.84	1821.54	2464.92
E43G	-6940.37	-1127.55	-1041.89	5.55	1506.10	3060.19
E43H	-5698.10	-2197.84	-1490.21	-22.34	1822.24	3713.52
E44A	-3948.87	-2499.58	-1944.68	-16.96	2047.40	3533.58
E44B	-3528.88	-2254.13	-2817.03	30.51	2809.23	3344.89
E44C	-4109.90	-1323.98	-3117.21	83.80	3124.66	2749.62
E44D	-5352.17	-253.69	-2668.90	111.69	2808.52	2096.29
E44E	-6527.78	329.91	-1735.17	97.87	2046.40	1767.51
E44F	-6947.75	84.45	-862.81	50.40	1284.57	1956.20
E44G	-6366.74	-845.70	-562.63	-2.88	969.13	2551.48
E44H	-5124.47	-1915.99	-1010.94	-30.78	1285.27	3204.81
EN3A	-3296.75	-2674.11	-2284.69	-13.69	2609.67	3771.17
EN3B	-2876.77	-2428.67	-3157.04	33.77	3371.50	3582.49
EN3C	-3457.79	-1498.51	-3457.22	87.06	3686.93	2987.21
EN3D	-4700.06	-428.23	-3008.91	114.95	3370.79	2333.88
EN3E	-5875.67	155.37	-2075.18	101.13	2608.67	2005.11
EN3F	-6295.64	-90.08	-1202.82	53.67	1846.84	2193.80
EN3G	-5714.63	-1020.23	-902.64	0.38	1531.40	2789.07
EN3H	-4472.35	-2090.52	-1350.95	-27.51	1847.54	3442.40
EN4A	-2846.67	-2402.99	-1819.14	-21.63	2069.86	3289.70
EN4B	-2426.69	-2157.54	-2691.50	25.83	2831.69	3101.02
EN4C	-3007.71	-1227.39	-2991.68	79.12	3147.12	2505.74
EN4D	-4249.98	-157.10	-2543.37	107.01	2830.99	1852.41
EN4E	-5425.59	426.49	-1609.63	93.19	2068.87	1523.64
EN4F	-5845.56	181.04	-737.27	45.73	1307.03	1712.33
EN4G	-5264.55	-749.11	-437.09	-7.56	991.59	2307.60
EN4H	-4022.27	-1819.40	-885.40	-35.45	1307.74	2960.93
O12A	-4336.56	-2161.74	-2884.18	35.46	3560.21	3933.47
O12B	-4219.61	-2056.82	-3206.97	53.69	3840.07	3858.59
O12C	-4407.44	-1691.44	-3332.03	71.94	3982.10	3616.55
O12D	-4980.77	-1256.27	-3147.09	85.73	3841.06	3360.61
O12E	-5413.17	-1029.40	-2799.48	80.78	3561.62	3229.12
O12F	-5530.11	-1134.32	-2476.69	62.55	3281.77	3304.00
O12G	-5263.36	-1509.33	-2367.72	41.72	3165.38	3541.26
O12H	-4768.94	-1934.88	-2536.58	30.51	3280.78	3801.98
O22A	-6201.22	-2412.99	-2888.70	12.33	3237.04	4449.82

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	O22B	-6084.28	-2308.08	-3211.49	30.56	3516.89	4374.93
	O22C	-6272.11	-1942.69	-3336.55	48.82	3658.93	4132.89
	O22D	-6845.44	-1507.52	-3151.61	62.60	3517.89	3876.96
	O22E	-7277.83	-1280.66	-2804.00	57.65	3238.45	3745.46
	O22F	-7394.77	-1385.57	-2481.21	39.42	2958.60	3820.34
	O22G	-7128.02	-1760.58	-2372.24	18.60	2842.21	4057.60
	O22H	-6633.61	-2186.13	-2541.10	7.38	2957.60	4318.32
	O32A	-5106.76	-2154.40	-3148.96	65.17	3787.43	4015.51
	O32B	-4989.82	-2049.48	-3471.75	83.40	4067.28	3940.62
	O32C	-5177.65	-1684.10	-3596.80	101.65	4209.31	3698.58
	O32D	-5750.98	-1248.93	-3411.87	115.44	4068.27	3442.65
	O32E	-6183.37	-1022.06	-3064.26	110.49	3788.83	3311.15
	O32F	-6300.31	-1126.98	-2741.47	92.26	3508.98	3386.03
	O32G	-6033.56	-1501.99	-2632.49	71.44	3392.59	3623.29
	O32H	-5539.15	-1927.54	-2801.35	60.22	3507.99	3884.01
	O42A	-6971.40	-2405.65	-3153.48	42.04	3464.26	4531.84
	O42B	-6854.46	-2300.73	-3476.28	60.27	3744.12	4456.96
	O42C	-7042.29	-1935.35	-3601.33	78.53	3886.15	4214.92
	O42D	-7615.62	-1500.18	-3416.39	92.31	3745.11	3958.98
	O42E	-8048.01	-1273.31	-3068.78	87.36	3465.67	3827.49
	O42F	-8164.95	-1378.23	-2745.99	69.13	3185.82	3902.37
	O42G	-7898.21	-1753.24	-2637.02	48.31	3069.43	4139.63
	O42H	-7403.79	-2178.79	-2805.88	37.09	3184.83	4400.35
	ON2A	-5379.36	-2266.13	-2972.16	35.29	3496.71	4179.58
	ON2B	-5262.41	-2161.22	-3294.95	53.52	3776.56	4104.70
	ON2C	-5450.25	-1795.84	-3420.00	71.77	3918.60	3862.66
	ON2D	-6023.58	-1360.66	-3235.06	85.55	3777.56	3606.72
	ON2E	-6455.97	-1133.80	-2887.46	80.60	3498.12	3475.22
	ON2F	-6572.91	-1238.72	-2564.67	62.37	3218.27	3550.11
	ON2G	-6306.16	-1613.72	-2455.69	41.55	3101.88	3787.36
	ON2H	-5811.75	-2039.27	-2624.55	30.33	3217.27	4048.09
TU01	DN2A	-4172.72	-1706.12	-2208.28	24.86	1281.28	2143.00
	DN2B	-4049.43	-1626.94	-2473.31	38.90	1354.79	2130.32
	DN2C	-4237.62	-1332.53	-2566.42	55.76	1396.81	2119.01
	DN2D	-4627.23	-995.24	-2432.91	65.55	1382.69	2115.71
	DN2E	-4989.97	-812.63	-2151.13	62.54	1320.74	2122.33
	DN2F	-5113.25	-891.81	-1886.10	48.49	1247.22	2135.01
	DN2G	-4925.06	-1186.22	-1792.99	31.64	1205.20	2146.32
	DN2H	-4535.45	-1523.51	-1926.50	21.85	1219.32	2149.62
	E13A	-2489.73	-2592.39	-2216.79	-13.58	1328.10	2026.15
	E13B	-2069.75	-2347.36	-3088.14	33.88	1566.82	1984.61
	E13C	-2650.77	-1418.21	-3387.91	87.17	1702.27	1947.12
	E13D	-3893.04	-348.92	-2940.01	115.06	1655.00	1935.66
	E13E	-5068.65	234.26	-2007.28	101.24	1452.81	1956.92
	E13F	-5488.62	-10.78	-1135.92	53.78	1214.09	1998.47
	E13G	-4907.61	-939.93	-836.15	0.49	1078.64	2035.95
	E13H	-3665.33	-2009.22	-1284.05	-27.40	1125.92	2047.41
	E14A	-2119.37	-2329.30	-1758.24	-21.51	1058.88	1721.32
	E14B	-1699.39	-2084.27	-2629.59	25.95	1297.61	1679.78
	E14C	-2280.41	-1155.12	-2929.36	79.24	1433.05	1642.29
	E14D	-3522.68	-85.83	-2481.46	107.13	1385.78	1630.83
	E14E	-4698.29	497.35	-1548.72	93.31	1183.60	1652.09
	E14F	-5118.26	252.31	-677.37	45.85	944.87	1693.64
	E14G	-4537.25	-676.84	-377.60	-7.44	809.42	1731.12
	E14H	-3294.97	-1746.12	-825.50	-35.33	856.70	1742.58
	E23A	-3924.10	-2785.67	-2220.27	-31.37	1077.42	2307.37
	E23B	-3504.11	-2540.63	-3091.62	16.09	1316.14	2265.83
	E23C	-4085.13	-1611.48	-3391.39	69.38	1451.59	2228.34
	E23D	-5327.40	-542.20	-2943.49	97.27	1404.32	2216.89
	E23E	-6503.01	40.98	-2010.76	83.45	1202.14	2238.15
	E23F	-6922.98	-204.05	-1139.40	35.99	963.41	2279.69
	E23G	-6341.97	-1133.20	-839.63	-17.30	827.96	2317.18
	E23H	-5099.70	-2202.49	-1287.53	-45.19	875.24	2328.63
	E24A	-3410.29	-2503.24	-1761.37	-37.52	833.27	1974.42
	E24B	-2990.31	-2258.21	-2632.72	9.94	1071.99	1932.88
	E24C	-3571.33	-1329.06	-2932.48	63.23	1207.44	1895.39
	E24D	-4813.60	-259.77	-2484.59	91.12	1160.17	1883.93
	E24E	-5989.21	323.41	-1551.85	77.30	957.98	1905.19
	E24F	-6409.18	78.37	-680.50	29.84	719.26	1946.73
	E24G	-5828.17	-850.78	-380.73	-23.45	583.81	1984.22
	E24H	-4585.89	-1920.07	-828.63	-51.35	631.09	1995.68
	E33A	-3082.20	-2586.75	-2420.47	9.27	1380.68	2092.64
	E33B	-2662.22	-2341.71	-3291.82	56.74	1619.40	2051.10
	E33C	-3243.24	-1412.56	-3591.59	110.03	1754.85	2013.61
	E33D	-4485.51	-343.28	-3143.69	137.92	1707.57	2002.15
	E33E	-5661.12	239.90	-2210.96	124.10	1505.39	2023.41
	E33F	-6081.09	-5.13	-1339.60	76.63	1266.67	2064.96
	E33G	-5500.08	-934.28	-1039.83	23.35	1131.22	2102.44
	E33H	-4257.80	-2003.57	-1487.73	-4.55	1178.49	2113.90
	E34A	-2652.59	-2324.22	-1941.55	-0.94	1106.20	1781.16

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E34B	-2232.61	-2079.18	-2812.90	46.52	1344.92	1739.62
E34C	-2813.63	-1150.03	-3112.66	99.81	1480.37	1702.13
E34D	-4055.90	-80.75	-2664.77	127.70	1433.09	1690.67
E34E	-5231.51	502.43	-1732.03	113.88	1230.91	1711.93
E34F	-5651.48	257.40	-860.68	66.42	992.19	1753.48
E34G	-5070.47	-671.75	-560.91	13.13	856.74	1790.96
E34H	-3828.19	-1741.04	-1008.81	-14.76	904.02	1802.42
E43A	-4516.54	-2780.02	-2423.95	-8.52	1130.00	2373.86
E43B	-4096.56	-2534.98	-3295.30	38.95	1368.72	2332.32
E43C	-4677.58	-1605.83	-3595.07	92.24	1504.17	2294.83
E43D	-5919.85	-536.55	-3147.17	120.13	1456.90	2283.37
E43E	-7095.46	46.63	-2214.44	106.31	1254.71	2304.63
E43F	-7515.43	-198.40	-1343.08	58.84	1015.99	2346.18
E43G	-6934.42	-1127.55	-1043.31	5.55	880.54	2383.66
E43H	-5692.14	-2196.84	-1491.21	-22.34	927.82	2395.12
E44A	-3943.51	-2498.16	-1944.68	-16.96	880.59	2034.26
E44B	-3523.52	-2253.13	-2816.03	30.51	1119.31	1992.72
E44C	-4104.54	-1323.98	-3115.80	83.80	1254.76	1955.23
E44D	-5346.81	-254.69	-2667.90	111.69	1207.49	1943.77
E44E	-6522.42	328.49	-1735.17	97.87	1005.30	1965.03
E44F	-6942.39	83.45	-863.81	50.40	766.58	2006.58
E44G	-6361.38	-845.70	-564.04	-2.88	631.13	2044.06
E44H	-5119.11	-1914.99	-1011.94	-30.78	678.41	2055.52
EN3A	-3290.80	-2672.70	-2284.69	-13.69	1238.85	2167.13
EN3B	-2870.82	-2427.67	-3156.04	33.77	1477.58	2125.59
EN3C	-3451.83	-1498.51	-3455.81	87.06	1613.03	2088.10
EN3D	-4694.10	-429.23	-3007.91	114.95	1565.75	2076.64
EN3E	-5869.71	153.95	-2075.18	101.13	1363.57	2097.90
EN3F	-6289.69	-91.08	-1203.82	53.67	1124.85	2139.45
EN3G	-5708.68	-1020.23	-904.05	0.38	989.40	2176.93
EN3H	-4466.40	-2089.52	-1351.95	-27.51	1036.67	2188.39
EN4A	-2841.31	-2401.57	-1819.14	-21.63	978.38	1848.34
EN4B	-2421.33	-2156.54	-2690.49	25.83	1217.10	1806.79
EN4C	-3002.35	-1227.39	-2990.26	79.12	1352.55	1769.31
EN4D	-4244.62	-158.10	-2542.37	107.01	1305.27	1757.85
EN4E	-5420.23	425.08	-1609.63	93.19	1103.09	1779.11
EN4F	-5840.20	180.04	-738.28	45.73	864.37	1820.65
EN4G	-5259.19	-749.11	-438.51	-7.56	728.92	1858.14
EN4H	-4016.91	-1818.40	-886.40	-35.45	776.19	1869.60
O12A	-4328.81	-2161.23	-2884.18	35.46	1829.71	2636.59
O12B	-4211.87	-2056.47	-3206.61	53.69	1916.00	2624.61
O12C	-4399.70	-1691.44	-3331.52	71.94	1983.04	2601.69
O12D	-4973.03	-1256.63	-3146.73	85.73	1952.92	2606.75
O12E	-5405.43	-1029.91	-2799.48	80.78	1881.94	2611.32
O12F	-5522.37	-1134.68	-2477.05	62.55	1795.65	2623.30
O12G	-5255.62	-1509.33	-2368.22	41.72	1744.60	2635.66
O12H	-4761.20	-1934.52	-2536.94	30.51	1758.73	2641.16
O22A	-6193.48	-2412.48	-2888.70	12.33	1503.83	3002.18
O22B	-6076.54	-2307.72	-3211.13	30.56	1590.11	2990.20
O22C	-6264.37	-1942.69	-3336.04	48.82	1657.16	2967.28
O22D	-6837.70	-1507.88	-3151.25	62.60	1627.04	2972.34
O22E	-7270.09	-1281.17	-2804.00	57.65	1556.05	2976.91
O22F	-7387.03	-1385.93	-2481.57	39.42	1469.77	2988.89
O22G	-7120.28	-1760.58	-2372.74	18.60	1418.72	3001.25
O22H	-6625.87	-2185.77	-2541.46	7.38	1432.84	3006.75
O32A	-5099.02	-2153.89	-3148.96	65.17	1898.06	2723.02
O32B	-4982.08	-2049.12	-3471.39	83.40	1984.34	2711.04
O32C	-5169.91	-1684.10	-3596.30	101.65	2051.39	2688.12
O32D	-5743.24	-1249.28	-3411.51	115.44	2021.27	2693.18
O32E	-6175.63	-1022.57	-3064.26	110.49	1950.28	2697.76
O32F	-6292.57	-1127.34	-2741.83	92.26	1864.00	2709.74
O32G	-6025.82	-1501.99	-2633.00	71.44	1812.95	2722.10
O32H	-5531.41	-1927.18	-2801.71	60.22	1827.07	2727.60
O42A	-6963.66	-2405.14	-3153.48	42.04	1572.18	3088.61
O42B	-6846.72	-2300.38	-3475.92	60.27	1658.46	3076.63
O42C	-7034.55	-1935.35	-3600.82	78.53	1725.51	3053.71
O42D	-7607.88	-1500.54	-3416.03	92.31	1695.39	3058.77
O42E	-8040.27	-1273.82	-3068.78	87.36	1624.40	3063.35
O42F	-8157.21	-1378.59	-2746.35	69.13	1538.12	3075.33
O42G	-7890.46	-1753.24	-2637.53	48.31	1487.07	3087.69
O42H	-7396.05	-2178.43	-2806.24	37.09	1501.20	3093.19
ON2A	-5371.62	-2265.63	-2972.16	35.29	1713.42	2820.05
ON2B	-5254.67	-2160.86	-3294.59	53.52	1799.71	2808.08
ON2C	-5442.50	-1795.84	-3419.49	71.77	1866.75	2785.16
ON2D	-6015.84	-1361.02	-3234.70	85.55	1836.63	2790.22
ON2E	-6448.23	-1134.31	-2887.46	80.60	1765.65	2794.79
ON2F	-6565.17	-1239.08	-2565.03	62.37	1679.36	2806.77
ON2G	-6298.42	-1613.72	-2456.20	41.55	1628.31	2819.13
ON2H	-5804.01	-2038.91	-2624.91	30.33	1642.44	2824.63

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MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TC44-TU04	TC44	TPS	DN2A	-4930.23	-1897.20	2176.07	-56.20	-2468.72	3379.68
			DN2B	-5287.28	-1701.06	1883.43	-56.10	-2235.48	3266.91
			DN2C	-5662.74	-1343.29	1742.86	-67.99	-2132.71	3049.04
			DN2D	-5836.61	-1033.41	1836.85	-84.93	-2220.73	2853.67
			DN2E	-5707.23	-952.85	2110.19	-96.98	-2447.85	2795.18
			DN2F	-5350.19	-1148.99	2402.83	-97.09	-2681.08	2907.96
			DN2G	-4974.72	-1506.76	2543.40	-85.19	-2783.85	3125.83
			DN2H	-4800.85	-1816.64	2449.41	-68.26	-2695.84	3321.20
			E13A	-4501.30	-3021.71	2158.68	8.51	-2323.35	4165.50
			E13B	-5660.32	-2390.02	1196.78	10.30	-1557.76	3803.20
			E13C	-6861.42	-1243.25	743.74	-31.18	-1224.26	3106.23
			E13D	-7400.78	-253.03	1065.42	-91.65	-1518.59	2482.76
			E13E	-6963.04	0.91	1972.88	-135.70	-2267.94	2297.83
			E13F	-5804.02	-630.78	2934.79	-137.49	-3033.53	2660.13
			E13G	-4602.91	-1777.55	3387.83	-96.02	-3367.03	3357.10
			E13H	-4063.56	-2767.77	3066.14	-35.54	-3072.70	3980.57
			E14A	-3332.70	-2714.71	1813.73	11.27	-2002.91	3547.21
			E14B	-4491.73	-2083.02	851.83	13.06	-1237.32	3184.92
			E14C	-5692.83	-936.25	398.80	-28.42	-903.82	2487.94
			E14D	-6232.18	53.97	720.48	-88.89	-1198.15	1864.47
			E14E	-5794.45	307.92	1627.94	-132.94	-1947.50	1679.54
			E14F	-4635.42	-323.77	2589.84	-134.73	-2713.09	2041.84
			E14G	-3434.32	-1470.55	3042.88	-93.25	-3046.60	2738.82
			E14H	-2894.97	-2460.77	2721.20	-32.78	-2752.27	3362.28
			E23A	-3067.46	-2819.58	2177.53	-1.58	-2571.16	3772.80
			E23B	-4226.49	-2187.90	1215.63	0.22	-1805.57	3410.50
			E23C	-5427.59	-1041.12	762.60	-41.26	-1472.07	2713.53
			E23D	-5966.94	-50.90	1084.28	-101.74	-1766.40	2090.06
			E23E	-5529.21	203.04	1991.74	-145.78	-2515.75	1905.13
			E23F	-4370.18	-428.65	2953.64	-147.58	-3281.34	2267.43
			E23G	-3169.08	-1575.42	3406.68	-106.10	-3614.84	2964.40
			E23H	-2629.73	-2565.64	3085.00	-45.62	-3320.51	3587.87
			E24A	-2042.25	-2532.79	1830.70	2.19	-2225.94	3193.78
			E24B	-3201.28	-1901.11	868.80	3.99	-1460.35	2831.48
			E24C	-4402.38	-754.33	415.76	-37.49	-1126.85	2134.51
			E24D	-4941.73	235.89	737.44	-97.97	-1421.18	1511.04
			E24E	-4504.00	489.83	1644.91	-142.01	-2170.53	1326.11
			E24F	-3344.98	-141.86	2606.81	-143.81	-2936.12	1688.41
			E24G	-2143.87	-1288.63	3059.85	-102.33	-3269.63	2385.38
			E24H	-1604.52	-2278.85	2738.17	-41.85	-2975.29	3008.85
			E33A	-5104.17	-3023.34	2372.01	-18.29	-2499.72	4235.24
			E33B	-6263.20	-2391.65	1410.11	-16.50	-1734.13	3872.94
			E33C	-7464.30	-1244.88	957.07	-57.98	-1400.62	3175.96
			E33D	-8003.65	-254.66	1278.75	-118.46	-1694.95	2552.50
			E33E	-7565.92	-0.72	2186.21	-162.50	-2444.31	2367.57
			E33F	-6406.89	-632.41	3148.12	-164.30	-3209.90	2729.87
			E33G	-5205.79	-1779.18	3601.16	-122.82	-3543.40	3426.84
			E33H	-4666.44	-2769.40	3279.48	-62.34	-3249.07	4050.31
			E34A	-3875.29	-2716.18	2005.73	-12.85	-2161.64	3609.98
			E34B	-5034.32	-2084.49	1043.83	-11.06	-1396.05	3247.68
			E34C	-6235.42	-937.72	590.80	-52.54	-1062.55	2550.70
			E34D	-6774.77	52.51	912.48	-113.01	-1356.88	1927.23
			E34E	-6337.04	306.45	1819.94	-157.06	-2106.23	1742.30
			E34F	-5178.01	-325.24	2781.84	-158.85	-2871.82	2104.60
			E34G	-3976.91	-1472.01	3234.88	-117.37	-3205.33	2801.58
			E34H	-3437.56	-2462.24	2913.20	-56.90	-2911.00	3425.05
			E43A	-3670.36	-2821.22	2390.87	-28.38	-2747.52	3842.54
			E43B	-4829.39	-2189.53	1428.96	-26.58	-1981.93	3480.24
			E43C	-6030.49	-1042.76	975.93	-68.06	-1648.43	2783.27
			E43D	-6569.84	-52.54	1297.61	-128.54	-1942.76	2159.80
			E43E	-6132.11	201.41	2205.07	-172.58	-2692.11	1974.87
			E43F	-4973.08	-430.28	3166.98	-174.38	-3457.70	2337.17
			E43G	-3771.98	-1577.06	3620.02	-132.90	-3791.21	3034.14
			E43H	-3232.63	-2567.28	3298.33	-72.42	-3496.87	3657.61
			E44A	-2584.86	-2534.27	2022.71	-21.93	-2384.67	3256.55
			E44B	-3743.89	-1902.58	1060.80	-20.13	-1619.08	2894.25
			E44C	-4944.98	-755.80	607.77	-61.61	-1285.58	2197.27
			E44D	-5484.34	234.42	929.45	-122.09	-1579.91	1573.81
			E44E	-5046.61	488.36	1836.91	-166.13	-2329.26	1388.88
			E44F	-3887.58	-143.33	2798.81	-167.93	-3094.85	1751.18
			E44G	-2686.48	-1290.10	3251.85	-126.45	-3428.36	2448.15
			E44H	-2147.13	-2280.32	2930.17	-65.97	-3134.02	3071.62
			EN3A	-4088.94	-2936.50	2236.08	-4.46	-2485.71	4021.55
			EN3B	-5247.97	-2304.81	1274.18	-2.67	-1720.12	3659.25

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	EN3C	-6449.07	-1158.04	821.14	-44.15	-1386.62	2962.28
	EN3D	-6988.42	-167.82	1142.82	-104.63	-1680.95	2338.81
	EN3E	-6550.69	86.12	2050.29	-148.67	-2430.30	2153.88
	EN3F	-5391.67	-545.57	3012.19	-150.47	-3195.89	2516.18
	EN3G	-4190.56	-1692.34	3465.23	-108.99	-3529.40	3213.15
	EN3H	-3651.21	-2682.56	3143.55	-48.51	-3235.06	3836.62
	EN4A	-2960.61	-2637.87	1883.35	-0.43	-2149.29	3417.40
	EN4B	-4119.63	-2006.18	921.44	1.37	-1383.70	3055.10
	EN4C	-5320.73	-859.41	468.41	-40.11	-1050.20	2358.13
	EN4D	-5860.09	130.81	790.09	-100.59	-1344.53	1734.66
	EN4E	-5422.35	384.75	1697.55	-144.63	-2093.88	1549.73
	EN4F	-4263.33	-246.94	2659.45	-146.43	-2859.47	1912.03
	EN4G	-3062.22	-1393.71	3112.49	-104.95	-3192.97	2609.00
	EN4H	-2522.87	-2383.93	2790.81	-44.47	-2898.64	3232.47
	O12A	-7130.74	-2618.24	2737.80	-49.56	-2995.08	4670.43
	O12B	-7561.78	-2370.41	2378.53	-49.84	-2718.32	4527.09
	O12C	-8131.47	-1916.66	2222.21	-69.61	-2588.26	4271.02
	O12D	-8315.34	-1522.03	2351.94	-91.89	-2730.89	4020.68
	O12E	-8196.59	-1418.26	2700.18	-109.04	-3012.86	3954.14
	O12F	-7765.55	-1666.09	3059.43	-108.76	-3289.62	4097.49
	O12G	-7274.84	-2120.13	3219.34	-91.24	-3399.11	4366.61
	O12H	-7011.99	-2514.47	3086.03	-66.72	-3277.05	4603.90
	O22A	-5266.75	-2355.48	2762.31	-62.67	-3317.23	4159.92
	O22B	-5697.80	-2107.65	2403.05	-62.95	-3040.47	4016.57
	O22C	-6267.48	-1653.89	2246.72	-82.72	-2910.41	3760.51
	O22D	-6451.35	-1259.27	2376.45	-104.99	-3053.04	3510.16
	O22E	-6332.60	-1155.50	2724.69	-122.15	-3335.01	3443.63
	O22F	-5901.56	-1403.33	3083.95	-121.87	-3611.77	3586.97
	O22G	-5410.86	-1857.37	3243.85	-104.35	-3721.26	3856.10
	O22H	-5148.01	-2251.71	3110.54	-79.82	-3599.20	4093.39
	O32A	-7914.48	-2620.36	3015.13	-84.40	-3224.36	4761.08
	O32B	-8345.52	-2372.53	2655.87	-84.68	-2947.60	4617.74
	O32C	-8915.21	-1918.78	2499.54	-104.45	-2817.54	4361.68
	O32D	-9099.08	-1524.15	2629.27	-126.73	-2960.16	4111.33
	O32E	-8980.33	-1420.38	2977.51	-143.88	-3242.13	4044.80
	O32F	-8549.29	-1668.21	3336.77	-143.61	-3518.89	4188.14
	O32G	-8058.58	-2122.25	3496.67	-126.08	-3628.39	4457.26
	O32H	-7795.73	-2516.59	3363.36	-101.56	-3506.33	4694.55
	O42A	-6050.52	-2357.60	3039.64	-97.51	-3546.51	4250.58
	O42B	-6481.57	-2109.77	2680.38	-97.79	-3269.74	4107.24
	O42C	-7051.25	-1656.02	2524.05	-117.56	-3139.69	3851.17
	O42D	-7235.12	-1261.39	2653.78	-139.84	-3282.31	3600.83
	O42E	-7116.38	-1157.62	3002.02	-156.99	-3564.28	3534.29
	O42F	-6685.33	-1405.45	3361.28	-156.71	-3841.04	3677.64
	O42G	-6194.63	-1859.49	3521.18	-139.19	-3950.54	3946.76
	O42H	-5931.78	-2253.83	3387.88	-114.67	-3828.47	4184.05
	ON2A	-6593.27	-2507.25	2838.35	-66.46	-3206.51	4482.92
	ON2B	-7024.31	-2259.43	2479.09	-66.73	-2929.75	4339.58
	ON2C	-7593.99	-1805.67	2322.76	-86.51	-2799.69	4083.52
	ON2D	-7777.86	-1411.05	2452.49	-108.78	-2942.32	3833.17
	ON2E	-7659.12	-1307.28	2800.73	-125.93	-3224.29	3766.64
	ON2F	-7228.07	-1555.10	3159.99	-125.66	-3501.05	3909.98
	ON2G	-6737.37	-2009.15	3319.89	-108.13	-3610.54	4179.10
	ON2H	-6474.52	-2403.49	3186.58	-83.61	-3488.48	4416.39
TU04	DN2A	-4924.28	-1896.79	2176.07	-56.20	-1163.08	2241.49
	DN2B	-5281.32	-1700.78	1883.71	-56.10	-1105.34	2246.36
	DN2C	-5656.78	-1343.29	1743.27	-67.99	-1086.87	2243.06
	DN2D	-5830.65	-1033.70	1837.14	-84.93	-1118.53	2233.53
	DN2E	-5701.27	-953.26	2110.19	-96.98	-1181.73	2223.35
	DN2F	-5344.23	-1149.27	2402.54	-97.09	-1239.47	2218.48
	DN2G	-4968.77	-1506.76	2542.99	-85.19	-1257.94	2221.78
	DN2H	-4794.90	-1816.35	2449.12	-68.26	-1226.28	2231.31
	E13A	-4495.34	-3020.29	2158.68	8.51	-1028.14	2352.91
	E13B	-5654.37	-2389.02	1197.78	10.30	-839.39	2369.50
	E13C	-6855.46	-1243.25	745.16	-31.18	-777.59	2360.28
	E13D	-7394.82	-254.03	1066.42	-91.65	-879.03	2330.65
	E13E	-6957.09	-0.50	1972.88	-135.70	-1084.21	2297.95
	E13F	-5798.06	-631.78	2933.79	-137.49	-1272.96	2281.37
	E13G	-4596.96	-1777.55	3386.41	-96.02	-1334.77	2290.58
	E13H	-4057.61	-2766.77	3065.14	-35.54	-1233.32	2320.22
	E14A	-3327.34	-2713.29	1813.73	11.27	-914.67	1918.82
	E14B	-4486.37	-2082.02	852.83	13.06	-725.93	1935.41
	E14C	-5687.47	-936.25	400.21	-28.42	-664.12	1926.19
	E14D	-6226.82	52.97	721.48	-88.89	-765.57	1896.56
	E14E	-5789.09	306.50	1627.94	-132.94	-970.74	1863.87
	E14F	-4630.06	-324.78	2588.84	-134.73	-1159.49	1847.28
	E14G	-3428.96	-1470.55	3041.47	-93.25	-1221.30	1856.49
	E14H	-2889.61	-2459.77	2720.20	-32.78	-1119.85	1886.13
	E23A	-3061.51	-2818.17	2177.53	-1.58	-1264.64	2081.48
	E23B	-4220.53	-2186.89	1216.63	0.22	-1075.89	2098.07

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E23C	-5421.63	-1041.12	764.01	-41.26	-1014.08	2088.85
E23D	-5960.99	-51.90	1085.28	-101.74	-1115.53	2059.22
E23E	-5523.26	201.62	1991.74	-145.78	-1320.71	2026.53
E23F	-4364.23	-429.65	2952.64	-147.58	-1509.46	2009.94
E23G	-3163.13	-1575.42	3405.27	-106.10	-1571.26	2019.15
E23H	-2623.78	-2564.64	3084.00	-45.62	-1469.82	2048.79
E24A	-2036.89	-2531.38	1830.70	2.19	-1127.52	1674.53
E24B	-3195.92	-1900.10	869.80	3.99	-938.77	1691.12
E24C	-4397.02	-754.33	417.18	-37.49	-876.96	1681.91
E24D	-4936.37	234.89	738.44	-97.97	-978.41	1652.27
E24E	-4498.64	488.41	1644.91	-142.01	-1183.59	1619.58
E24F	-3339.62	-142.86	2605.81	-143.81	-1372.34	1602.99
E24G	-2138.51	-1288.63	3058.43	-102.33	-1434.15	1612.21
E24H	-1599.16	-2277.85	2737.17	-41.85	-1332.70	1641.84
E33A	-5098.22	-3021.92	2372.01	-18.29	-1076.51	2421.66
E33B	-6257.24	-2390.65	1411.11	-16.50	-887.76	2438.25
E33C	-7458.34	-1244.88	958.49	-57.98	-825.96	2429.04
E33D	-7997.70	-255.66	1279.75	-118.46	-927.40	2399.40
E33E	-7559.97	-2.13	2186.21	-162.50	-1132.58	2366.71
E33F	-6400.94	-633.41	3147.12	-164.30	-1321.33	2350.12
E33G	-5199.84	-1779.18	3599.74	-122.82	-1383.14	2359.33
E33H	-4660.48	-2768.40	3278.48	-62.34	-1281.69	2388.97
E34A	-3869.93	-2714.76	2005.73	-12.85	-958.21	1980.70
E34B	-5028.96	-2083.49	1044.83	-11.06	-769.46	1997.29
E34C	-6230.06	-937.72	592.21	-52.54	-707.65	1988.07
E34D	-6769.41	51.50	913.48	-113.01	-809.10	1958.44
E34E	-6331.68	305.03	1819.94	-157.06	-1014.27	1925.75
E34F	-5172.65	-326.24	2780.84	-158.85	-1203.02	1909.16
E34G	-3971.55	-1472.01	3233.47	-117.37	-1264.83	1918.37
E34H	-3432.20	-2461.23	2912.20	-56.90	-1163.38	1948.01
E43A	-3664.41	-2819.80	2390.87	-28.38	-1313.00	2150.24
E43B	-4823.44	-2188.53	1429.97	-26.58	-1124.26	2166.83
E43C	-6024.53	-1042.76	977.34	-68.06	-1062.45	2157.62
E43D	-6563.89	-53.54	1298.61	-128.54	-1163.90	2127.98
E43E	-6126.16	199.99	2205.07	-172.58	-1369.07	2095.29
E43F	-4967.13	-431.29	3165.97	-174.38	-1557.82	2078.70
E43G	-3766.03	-1577.06	3618.60	-132.90	-1619.63	2087.91
E43H	-3226.68	-2566.28	3297.33	-72.42	-1518.18	2117.55
E44A	-2579.50	-2532.85	2022.71	-21.93	-1171.05	1736.42
E44B	-3738.53	-1901.58	1061.80	-20.13	-982.30	1753.01
E44C	-4939.62	-755.80	609.18	-61.61	-920.49	1743.79
E44D	-5478.98	233.42	930.45	-122.09	-1021.94	1714.16
E44E	-5041.25	486.94	1836.91	-166.13	-1227.12	1681.47
E44F	-3882.22	-144.33	2797.81	-167.93	-1415.87	1664.88
E44G	-2681.12	-1290.10	3250.44	-126.45	-1477.67	1674.09
E44H	-2141.77	-2279.32	2929.17	-65.97	-1376.23	1703.73
EN3A	-4082.99	-2935.09	2236.08	-4.46	-1144.06	2260.08
EN3B	-5242.02	-2303.81	1275.18	-2.67	-955.31	2276.67
EN3C	-6443.11	-1158.04	822.56	-44.15	-893.51	2267.45
EN3D	-6982.47	-168.82	1143.83	-104.63	-994.95	2237.82
EN3E	-6544.74	84.71	2050.29	-148.67	-1200.13	2205.13
EN3F	-5385.71	-546.57	3011.19	-150.47	-1388.88	2188.54
EN3G	-4184.61	-1692.34	3463.81	-108.99	-1450.69	2197.75
EN3H	-3645.26	-2681.56	3142.55	-48.51	-1349.24	2227.39
EN4A	-2955.25	-2636.46	1883.35	-0.43	-1019.28	1835.11
EN4B	-4114.27	-2005.18	922.45	1.37	-830.53	1851.70
EN4C	-5315.37	-859.41	469.82	-40.11	-768.73	1842.48
EN4D	-5854.73	129.81	791.09	-100.59	-870.17	1812.85
EN4E	-5417.00	383.34	1697.55	-144.63	-1075.35	1780.16
EN4F	-4257.97	-247.94	2658.45	-146.43	-1264.10	1763.57
EN4G	-3056.86	-1393.71	3111.08	-104.95	-1325.91	1772.78
EN4H	-2517.51	-2382.93	2789.81	-44.47	-1224.46	1802.42
O12A	-7123.00	-2617.73	2737.80	-49.56	-1352.41	3099.64
O12B	-7554.04	-2370.05	2378.89	-49.84	-1291.09	3104.95
O12C	-8123.73	-1916.66	2222.72	-69.61	-1254.78	3121.03
O12D	-8307.60	-1522.39	2352.30	-91.89	-1319.62	3107.35
O12E	-8188.85	-1418.77	2700.18	-109.04	-1392.75	3103.04
O12F	-7757.81	-1666.45	3059.08	-108.76	-1454.07	3097.73
O12G	-7267.10	-2120.13	3218.83	-91.24	-1467.66	3094.53
O12H	-7004.25	-2514.11	3085.67	-66.72	-1425.54	3095.33
O22A	-5259.01	-2354.97	2762.31	-62.67	-1659.85	2746.79
O22B	-5690.06	-2107.29	2403.41	-62.95	-1598.54	2752.09
O22C	-6259.74	-1653.89	2247.23	-82.72	-1562.23	2768.18
O22D	-6443.61	-1259.63	2376.81	-104.99	-1627.06	2754.50
O22E	-6324.86	-1156.01	2724.69	-122.15	-1700.20	2750.18
O22F	-5893.82	-1403.68	3083.59	-121.87	-1761.51	2744.87
O22G	-5403.12	-1857.37	3243.34	-104.35	-1775.11	2741.68
O22H	-5140.26	-2251.35	3110.18	-79.82	-1732.99	2742.47
O32A	-7906.74	-2619.85	3015.13	-84.40	-1415.29	3189.02
O32B	-8337.78	-2372.17	2656.23	-84.68	-1353.97	3194.33

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O32C	-8907.46	-1918.78	2500.05	-104.45	-1317.66	3210.41
O32D	-9091.33	-1524.51	2629.63	-126.73	-1382.50	3196.73
O32E	-8972.59	-1420.89	2977.51	-143.88	-1455.63	3192.42
O32F	-8541.54	-1668.57	3336.41	-143.61	-1516.95	3187.11
O32G	-8050.84	-2122.25	3496.16	-126.08	-1530.54	3183.92
O32H	-7787.99	-2516.23	3363.00	-101.56	-1488.42	3184.71
O42A	-6042.78	-2357.09	3039.64	-97.51	-1722.73	2836.17
O42B	-6473.83	-2109.41	2680.74	-97.79	-1661.41	2841.48
O42C	-7043.51	-1656.02	2524.56	-117.56	-1625.10	2857.57
O42D	-7227.38	-1261.75	2654.14	-139.84	-1689.94	2843.88
O42E	-7108.63	-1158.13	3002.02	-156.99	-1763.07	2839.57
O42F	-6677.59	-1405.81	3360.92	-156.71	-1824.39	2834.26
O42G	-6186.89	-1859.49	3520.67	-139.19	-1837.98	2831.07
O42H	-5924.04	-2253.47	3387.52	-114.67	-1795.86	2831.86
ON2A	-6585.52	-2506.74	2838.35	-66.46	-1503.51	2978.73
ON2B	-7016.57	-2259.07	2479.45	-66.73	-1442.19	2984.04
ON2C	-7586.25	-1805.67	2323.27	-86.51	-1405.88	3000.12
ON2D	-7770.12	-1411.41	2452.85	-108.78	-1470.72	2986.44
ON2E	-7651.38	-1307.78	2800.73	-125.93	-1543.85	2982.12
ON2F	-7220.33	-1555.46	3159.63	-125.66	-1605.17	2976.81
ON2G	-6729.63	-2009.15	3319.38	-108.13	-1618.76	2973.62
ON2H	-6466.78	-2403.13	3186.22	-83.61	-1576.64	2974.41

II. UN-FACTORED LOAD COMBINATIONS

SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TA24-TU02	TA24	TPS	EA1A	-5339.54	123.94	-2373.37	-157.13	2898.04	-2108.48
			EA1B	-4530.07	510.34	-3077.13	-197.12	3477.93	-2332.07
			EA1C	-3667.15	1258.61	-3408.14	-183.23	3715.28	-2799.02
			EA1D	-3256.42	1930.51	-3172.17	-123.56	3470.76	-3235.86
			EA1E	-3538.06	2132.66	-2507.80	-53.09	2887.89	-3386.81
			EA1F	-4347.54	1746.25	-1804.05	-13.10	2308.00	-3163.21
			EA1G	-5210.46	997.99	-1473.03	-26.99	2070.65	-2696.27
			EA1H	-5621.18	326.09	-1709.00	-86.66	2315.17	-2259.43
			EA2A	-6793.58	333.06	-2373.13	-139.75	2642.14	-2518.36
			EA2B	-5984.11	719.46	-3076.88	-179.74	3222.03	-2741.96
			EA2C	-5121.19	1467.72	-3407.90	-165.85	3459.38	-3208.91
			EA2D	-4710.46	2139.63	-3171.93	-106.18	3214.86	-3645.75
			EA2E	-4992.10	2341.78	-2507.56	-35.71	2631.99	-3796.70
			EA2F	-5801.58	1955.37	-1803.81	4.28	2052.10	-3573.10
			EA2G	-6664.50	1207.11	-1472.79	-9.61	1814.75	-3106.16
			EA2H	-7075.22	535.21	-1708.76	-69.28	2059.28	-2669.32
			EA3A	-4749.66	128.14	-2170.95	-128.83	2723.40	-2045.39
			EA3B	-3940.19	514.55	-2874.71	-168.82	3303.29	-2268.98
			EA3C	-3077.27	1262.81	-3205.73	-154.93	3540.65	-2735.93
			EA3D	-2666.54	1934.71	-2969.76	-95.26	3296.12	-3172.77
			EA3E	-2948.18	2136.86	-2305.39	-24.78	2713.26	-3323.72
			EA3F	-3757.65	1750.45	-1601.63	15.20	2133.37	-3100.12
			EA3G	-4620.57	1002.19	-1270.61	1.32	1896.01	-2633.18
			EA3H	-5031.30	330.29	-1506.59	-58.35	2140.54	-2196.34
			EA4A	-6203.68	337.26	-2170.71	-111.45	2467.51	-2455.27
			EA4B	-5394.20	723.66	-2874.47	-151.44	3047.40	-2678.87
			EA4C	-4531.29	1471.92	-3205.49	-137.55	3284.75	-3145.81
			EA4D	-4120.56	2143.83	-2969.52	-77.88	3040.23	-3582.65
			EA4E	-4402.19	2345.98	-2305.15	-7.41	2457.36	-3733.60
			EA4F	-5211.67	1959.57	-1601.39	32.58	1877.47	-3510.00
			EA4G	-6074.59	1211.31	-1270.37	18.69	1640.12	-3043.06
			EA4H	-6485.32	539.41	-1506.35	-40.97	1884.65	-2606.22
			EANA	-5765.79	214.18	-2307.48	-140.55	2732.52	-2262.17
			EANB	-4956.32	600.59	-3011.24	-180.54	3312.41	-2485.77
			EANC	-4093.40	1348.85	-3342.26	-166.65	3549.77	-2952.72
			EAND	-3682.67	2020.75	-3106.28	-106.98	3305.24	-3389.55
			EANE	-3964.31	2222.90	-2441.91	-36.50	2722.38	-3540.51
			EANF	-4773.79	1836.49	-1738.16	3.49	2142.49	-3316.91
			EANG	-5636.71	1088.23	-1407.14	-10.40	1905.13	-2849.97
			EANH	-6047.43	416.33	-1643.11	-70.07	2149.66	-2413.13
			OA11	-4438.80	1128.30	-2440.59	-105.11	2892.96	-2747.64
			OA1A	-4866.28	658.72	-2429.67	-131.77	2924.81	-2450.81
			OA1B	-4519.26	837.48	-2726.55	-147.71	3167.21	-2555.90
			OA1C	-4075.16	1171.58	-2901.58	-144.66	3297.99	-2760.29

	OA1D	-3913.35	1490.01	-2769.95	-113.30	3159.84	-2970.37
	OA1E	-4009.26	1581.67	-2491.05	-83.10	2914.39	-3037.04
	OA1F	-4356.28	1402.91	-2194.16	-67.17	2671.98	-2931.95
	OA1G	-4751.02	1058.60	-2053.15	-74.81	2574.58	-2716.75
	OA1H	-4962.19	750.39	-2150.77	-101.57	2679.35	-2517.48
	OA21	-5892.84	1337.42	-2440.35	-87.73	2637.07	-3157.53
	OA2A	-6320.32	867.84	-2429.42	-114.39	2668.91	-2860.70
	OA2B	-5973.30	1046.60	-2726.31	-130.33	2911.31	-2965.79
	OA2C	-5529.21	1380.70	-2901.34	-127.28	3042.09	-3170.18
	OA2D	-5367.39	1699.13	-2769.71	-95.92	2903.94	-3380.26
	OA2E	-5463.30	1790.79	-2490.81	-65.73	2658.49	-3446.93
	OA2F	-5810.32	1612.03	-2193.92	-49.79	2416.09	-3341.84
	OA2G	-6205.06	1267.72	-2052.91	-57.43	2318.68	-3126.64
	OA2H	-6416.23	959.50	-2150.52	-84.20	2423.45	-2927.37
	OA31	-3848.92	1132.50	-2238.17	-76.81	2718.33	-2684.55
	OA3A	-4276.40	662.92	-2227.25	-103.47	2750.17	-2387.72
	OA3B	-3929.38	841.69	-2524.14	-119.41	2992.57	-2492.81
	OA3C	-3485.28	1175.78	-2699.17	-116.36	3123.36	-2697.20
	OA3D	-3323.47	1494.21	-2567.54	-85.00	2985.21	-2907.28
	OA3E	-3419.38	1585.88	-2288.64	-54.80	2739.75	-2973.95
	OA3F	-3766.40	1407.11	-1991.75	-38.86	2497.35	-2868.86
	OA3G	-4161.13	1062.81	-1850.74	-46.51	2399.94	-2653.66
	OA3H	-4372.31	754.59	-1948.35	-73.27	2504.72	-2454.39
	OA41	-5302.94	1341.62	-2237.93	-59.43	2462.44	-3094.43
	OA4A	-5730.42	872.04	-2227.01	-86.09	2494.28	-2797.60
	OA4B	-5383.40	1050.80	-2523.90	-102.03	2736.68	-2902.70
	OA4C	-4939.30	1384.90	-2698.92	-98.98	2867.46	-3107.08
	OA4D	-4777.48	1703.33	-2567.30	-67.62	2729.32	-3317.16
	OA4E	-4873.39	1794.99	-2288.40	-37.42	2483.86	-3383.83
	OA4F	-5220.41	1616.23	-1991.51	-21.48	2241.46	-3278.74
	OA4G	-5615.15	1271.92	-1850.50	-29.13	2144.05	-3063.54
	OA4H	-5826.33	963.70	-1948.11	-55.89	2248.83	-2864.27
	OAN1	-4865.05	1218.54	-2374.70	-88.53	2727.45	-2901.34
	OANA	-5292.53	748.96	-2363.78	-115.19	2759.29	-2604.51
	OANB	-4945.51	927.72	-2660.66	-131.12	3001.70	-2709.60
	OANC	-4501.41	1261.82	-2835.69	-128.08	3132.48	-2913.99
	OAND	-4339.60	1580.25	-2704.06	-96.72	2994.33	-3124.07
	OANE	-4435.51	1671.91	-2425.16	-66.52	2748.87	-3190.74
	OANF	-4782.53	1493.15	-2128.28	-50.58	2506.47	-3085.65
	OANG	-5177.27	1148.84	-1987.27	-58.23	2409.07	-2870.45
	OANH	-5388.44	840.63	-2084.88	-84.99	2513.84	-2671.18
TU02	EA1A	-5333.58	124.92	-2373.37	-157.13	1474.02	-2033.82
	EA1B	-4524.11	511.04	-3076.44	-197.12	1631.86	-2025.66
	EA1C	-3661.19	1258.61	-3407.17	-183.23	1670.69	-2043.86
	EA1D	-3250.46	1929.82	-3171.48	-123.56	1567.66	-2077.76
	EA1E	-3532.10	2131.68	-2507.80	-53.09	1383.21	-2107.51
	EA1F	-4341.58	1745.56	-1804.74	-13.10	1225.37	-2115.67
	EA1G	-5204.50	997.99	-1474.00	-26.99	1186.54	-2097.48
	EA1H	-5615.23	326.78	-1709.69	-86.66	1289.57	-2063.57
	EA2A	-6787.63	334.03	-2373.13	-139.75	1218.27	-2318.24
	EA2B	-5978.15	720.15	-3076.19	-179.74	1376.11	-2310.08
	EA2C	-5115.24	1467.72	-3406.93	-165.85	1414.94	-2328.27
	EA2D	-4704.51	2138.94	-3171.24	-106.18	1311.91	-2362.18
	EA2E	-4986.14	2340.80	-2507.56	-35.71	1127.46	-2391.93
	EA2F	-5795.62	1954.68	-1804.50	4.28	969.62	-2400.09
	EA2G	-6658.54	1207.11	-1473.76	-9.61	930.79	-2381.90
	EA2H	-7069.27	535.90	-1709.45	-69.28	1033.81	-2347.99
	EA3A	-4743.70	129.12	-2170.95	-128.83	1420.83	-1968.21
	EA3B	-3934.23	515.24	-2874.02	-168.82	1578.68	-1960.05
	EA3C	-3071.31	1262.81	-3204.75	-154.93	1617.51	-1978.24
	EA3D	-2660.58	1934.02	-2969.07	-95.26	1514.48	-2012.15
	EA3E	-2942.22	2135.88	-2305.39	-24.78	1330.03	-2041.90
	EA3F	-3751.70	1749.76	-1602.32	15.20	1172.18	-2050.06
	EA3G	-4614.62	1002.19	-1271.59	1.32	1133.35	-2031.86
	EA3H	-5025.35	330.98	-1507.28	-58.35	1236.38	-1997.96
	EA4A	-6197.72	338.23	-2170.71	-111.45	1165.08	-2252.62
	EA4B	-5388.25	724.35	-2873.78	-151.44	1322.93	-2244.46
	EA4C	-4525.33	1471.92	-3204.51	-137.55	1361.76	-2262.66
	EA4D	-4114.60	2143.14	-2968.83	-77.88	1258.73	-2296.56
	EA4E	-4396.24	2345.00	-2305.15	-7.41	1074.28	-2326.31
	EA4F	-5205.72	1958.88	-1602.08	32.58	916.43	-2334.47
	EA4G	-6068.64	1211.31	-1271.35	18.69	877.60	-2316.28
	EA4H	-6479.36	540.10	-1507.04	-40.97	980.63	-2282.37
	EANA	-5759.84	215.16	-2307.48	-140.55	1348.04	-2133.37
	EANB	-4950.36	601.28	-3010.55	-180.54	1505.88	-2125.21
	EANC	-4087.45	1348.85	-3341.28	-166.65	1544.71	-2143.41
	EAND	-3676.72	2020.06	-3105.59	-106.98	1441.68	-2177.31
	EANE	-3958.35	2221.92	-2441.91	-36.50	1257.23	-2207.07
	EANF	-4767.83	1835.80	-1738.85	3.49	1099.39	-2215.23
	EANG	-5630.75	1088.23	-1408.12	-10.40	1060.56	-2197.03

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EANH	-6041.48	417.02	-1643.80	-70.07	1163.59	-2163.12
OA11	-4432.85	1128.30	-2440.59	-105.11	1428.61	-2070.67
OA1A	-4860.32	659.13	-2429.67	-131.77	1467.01	-2055.46
OA1B	-4513.30	837.77	-2726.26	-147.71	1531.37	-2053.33
OA1C	-4069.21	1171.58	-2901.17	-144.66	1557.17	-2057.34
OA1D	-3907.39	1489.72	-2769.66	-113.30	1497.96	-2076.46
OA1E	-4003.30	1581.27	-2491.05	-83.10	1419.76	-2088.16
OA1F	-4350.32	1402.62	-2194.45	-67.17	1355.40	-2090.29
OA1G	-4745.06	1058.60	-2053.56	-74.81	1342.57	-2081.59
OA1H	-4956.23	750.67	-2151.05	-101.57	1388.81	-2067.16
OA21	-5886.89	1337.42	-2440.35	-87.73	1172.86	-2355.08
OA2A	-6314.37	868.25	-2429.42	-114.39	1211.26	-2339.87
OA2B	-5967.35	1046.89	-2726.02	-130.33	1275.61	-2337.75
OA2C	-5523.25	1380.70	-2900.93	-127.28	1301.42	-2341.76
OA2D	-5361.43	1698.84	-2769.42	-95.92	1242.21	-2360.87
OA2E	-5457.34	1790.38	-2490.81	-65.73	1164.01	-2372.58
OA2F	-5804.36	1611.74	-2194.21	-49.79	1099.65	-2374.71
OA2G	-6199.10	1267.72	-2053.32	-57.43	1086.81	-2366.01
OA2H	-6410.28	959.79	-2150.81	-84.20	1133.06	-2351.58
OA31	-3842.97	1132.50	-2238.17	-76.81	1375.43	-2005.05
OA3A	-4270.44	663.33	-2227.25	-103.47	1413.82	-1989.84
OA3B	-3923.42	841.97	-2523.85	-119.41	1478.18	-1987.72
OA3C	-3479.33	1175.78	-2698.76	-116.36	1503.98	-1991.73
OA3D	-3317.51	1493.92	-2567.25	-85.00	1444.77	-2010.84
OA3E	-3413.42	1585.47	-2288.64	-54.80	1366.57	-2022.55
OA3F	-3760.44	1406.83	-1992.04	-38.86	1302.22	-2024.68
OA3G	-4155.18	1062.81	-1851.15	-46.51	1289.38	-2015.98
OA3H	-4366.35	754.88	-1948.64	-73.27	1335.62	-2001.55
OA41	-5296.98	1341.62	-2237.93	-59.43	1119.68	-2289.47
OA4A	-5724.46	872.45	-2227.01	-86.09	1158.08	-2274.26
OA4B	-5377.44	1051.09	-2523.61	-102.03	1222.43	-2272.13
OA4C	-4933.34	1384.90	-2698.52	-98.98	1248.24	-2276.15
OA4D	-4771.53	1703.04	-2567.01	-67.62	1189.03	-2295.26
OA4E	-4867.44	1794.58	-2288.40	-37.42	1110.83	-2306.97
OA4F	-5214.46	1615.94	-1991.80	-21.48	1046.47	-2309.09
OA4G	-5609.20	1271.92	-1850.91	-29.13	1033.63	-2300.39
OA4H	-5820.37	963.99	-1948.40	-55.89	1079.88	-2285.96
OAN1	-4859.10	1218.54	-2374.70	-88.53	1302.64	-2170.22
OANA	-5286.57	749.37	-2363.78	-115.19	1341.03	-2155.01
OANB	-4939.55	928.01	-2660.38	-131.12	1405.39	-2152.88
OANC	-4495.46	1261.82	-2835.29	-128.08	1431.19	-2156.90
OAND	-4333.64	1579.96	-2703.78	-96.72	1371.98	-2176.01
OANE	-4429.55	1671.51	-2425.16	-66.52	1293.78	-2187.72
OANF	-4776.57	1492.86	-2128.56	-50.58	1229.42	-2189.84
OANG	-5171.31	1148.84	-1987.67	-58.23	1216.59	-2181.15
OANH	-5382.49	840.91	-2085.17	-84.99	1262.83	-2166.72

SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) (KN)	FORCE(Y) (KN)	FORCE(Z) (KN)	MOMENT(X) (KN-M)	MOMENT(Y) (KN-M)	MOMENT(Z) (KN-M)
TA44-TU03	TA44	TPS	EA1A	-7478.65	503.22	2425.37	112.37	-2728.18	-2622.48
			EA1B	-7771.27	707.34	1739.12	55.41	-2174.04	-2759.60
			EA1C	-7387.87	1411.53	1490.81	-1.70	-1941.19	-3202.36
			EA1D	-6552.62	2203.50	1826.27	-25.47	-2166.32	-3691.53
			EA1E	-5754.96	2619.44	2548.64	-2.03	-2717.27	-3940.63
			EA1F	-5462.34	2415.33	3234.89	54.93	-3271.41	-3803.51
			EA1G	-5845.74	1711.14	3483.20	112.04	-3504.26	-3360.75
			EA1H	-6680.99	919.16	3147.74	135.81	-3279.12	-2871.58
			EA2A	-6024.08	285.25	2409.76	130.36	-2913.42	-2208.61
			EA2B	-6316.70	489.37	1723.50	73.40	-2359.28	-2345.73
			EA2C	-5933.29	1193.56	1475.19	16.30	-2126.43	-2788.49
			EA2D	-5098.05	1985.53	1810.65	-7.48	-2351.57	-3277.67
			EA2E	-4300.39	2401.47	2533.02	15.97	-2902.51	-3526.77
			EA2F	-4007.77	2197.36	3219.27	72.93	-3456.65	-3389.65
			EA2G	-4391.17	1493.17	3467.58	130.03	-3689.50	-2946.88
			EA2H	-5226.42	701.19	3132.12	153.81	-3464.36	-2457.71
			EA3A	-6873.19	495.01	2213.30	91.13	-2510.94	-2553.52
			EA3B	-7165.81	699.12	1527.05	34.17	-1956.80	-2690.64
			EA3C	-6782.40	1403.31	1278.74	-22.94	-1723.96	-3133.41
			EA3D	-5947.15	2195.29	1614.20	-46.71	-1949.09	-3622.58
			EA3E	-5149.49	2611.22	2336.57	-23.27	-2500.03	-3871.68
			EA3F	-4856.87	2407.11	3022.82	33.69	-3054.17	-3734.56
			EA3G	-5240.28	1702.92	3271.13	90.80	-3287.02	-3291.79
			EA3H	-6075.52	910.94	2935.67	114.57	-3061.89	-2802.62
			EA4A	-5418.64	277.04	2197.69	109.12	-2696.18	-2139.66
			EA4B	-5711.26	481.15	1511.43	52.16	-2142.04	-2276.78

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	EA4C	-5327.85	1185.34	1263.12	-4.94	-1909.19	-2719.55
	EA4D	-4492.61	1977.32	1598.58	-28.72	-2134.33	-3208.72
	EA4E	-3694.95	2393.26	2320.95	-5.27	-2685.27	-3457.82
	EA4F	-3402.33	2189.14	3007.20	51.69	-3239.41	-3320.70
	EA4G	-3785.73	1484.95	3255.52	108.79	-3472.26	-2877.93
	EA4H	-4620.98	692.98	2920.05	132.57	-3247.13	-2388.76
	EANA	-6663.68	407.92	2349.81	113.11	-2736.30	-2424.17
	EANB	-6956.30	612.03	1663.56	56.15	-2182.16	-2561.29
	EANC	-6572.90	1316.22	1415.25	-0.95	-1949.32	-3004.06
	EAND	-5737.65	2108.20	1750.70	-24.73	-2174.45	-3493.23
	EANE	-4939.99	2524.13	2473.07	-1.28	-2725.40	-3742.33
	EANF	-4647.37	2320.02	3159.33	55.68	-3279.54	-3605.21
	EANG	-5030.77	1615.83	3407.64	112.78	-3512.38	-3162.45
	EANH	-5866.02	823.85	3072.18	136.56	-3287.25	-2673.27
	OA11	-6616.80	1561.33	2487.00	55.17	-2722.72	-3281.56
	OA1A	-7197.66	1128.04	2516.58	87.65	-2788.59	-3052.99
	OA1B	-7295.08	1213.88	2212.16	63.47	-2549.17	-3106.38
	OA1C	-7137.25	1541.64	2098.82	26.71	-2416.44	-3310.74
	OA1D	-6697.38	1878.81	2235.03	18.06	-2522.54	-3508.54
	OA1E	-6352.24	2068.54	2548.93	23.42	-2750.91	-3621.82
	OA1F	-6254.82	1982.71	2853.36	47.59	-2990.33	-3568.44
	OA1G	-6461.97	1671.77	2970.05	76.42	-3100.58	-3379.77
	OA1H	-6852.53	1317.78	2830.49	93.00	-3016.96	-3166.27
	OA21	-5162.23	1343.36	2471.39	73.16	-2907.97	-2867.69
	OA2A	-5743.09	910.07	2500.97	105.64	-2973.83	-2639.12
	OA2B	-5840.51	995.90	2196.54	81.47	-2734.41	-2692.51
	OA2C	-5682.68	1323.66	2083.20	44.70	-2601.68	-2896.87
	OA2D	-5242.80	1660.84	2219.41	36.06	-2707.78	-3094.67
	OA2E	-4897.67	1850.57	2533.31	41.41	-2936.16	-3207.96
	OA2F	-4800.25	1764.74	2837.74	65.59	-3175.57	-3154.57
	OA2G	-5007.40	1453.80	2954.43	94.41	-3285.82	-2965.90
	OA2H	-5397.96	1099.81	2814.87	111.00	-3202.21	-2752.41
	OA31	-6011.34	1553.11	2274.93	33.93	-2505.49	-3212.60
	OA3A	-6592.20	1119.82	2304.51	66.41	-2571.35	-2984.04
	OA3B	-6689.62	1205.66	2000.09	42.23	-2331.94	-3037.42
	OA3C	-6531.79	1533.42	1886.75	5.47	-2199.20	-3241.78
	OA3D	-6091.91	1870.59	2022.96	-3.18	-2305.30	-3439.59
	OA3E	-5746.78	2060.33	2336.86	2.18	-2533.68	-3552.87
	OA3F	-5649.36	1974.49	2641.29	26.35	-2773.09	-3499.48
	OA3G	-5856.51	1663.56	2757.98	55.18	-2883.34	-3310.81
	OA3H	-6247.07	1309.56	2618.42	71.76	-2799.73	-3097.32
	OA41	-4556.79	1335.15	2259.32	51.93	-2690.73	-2798.74
	OA4A	-5137.65	901.86	2288.90	84.40	-2756.59	-2570.18
	OA4B	-5235.07	987.69	1984.47	60.23	-2517.17	-2623.56
	OA4C	-5077.24	1315.45	1871.13	23.46	-2384.44	-2827.92
	OA4D	-4637.36	1652.62	2007.34	14.82	-2490.54	-3025.73
	OA4E	-4292.23	1842.36	2321.24	20.17	-2718.92	-3139.01
	OA4F	-4194.81	1756.53	2625.67	44.35	-2958.33	-3085.62
	OA4G	-4401.96	1445.59	2742.36	73.17	-3068.58	-2896.95
	OA4H	-4792.52	1091.59	2602.80	89.76	-2984.97	-2683.46
	OAN1	-5801.84	1466.03	2411.44	55.91	-2730.85	-3083.25
	OANA	-6382.69	1032.73	2441.02	88.39	-2796.71	-2854.69
	OANB	-6480.12	1118.57	2136.60	64.22	-2557.30	-2908.07
	OANC	-6322.28	1446.33	2023.26	27.45	-2424.56	-3112.43
	OAND	-5882.41	1783.50	2159.47	18.81	-2530.66	-3310.24
	OANE	-5537.28	1973.24	2473.37	24.16	-2759.04	-3423.52
	OANF	-5439.86	1887.40	2777.79	48.34	-2998.45	-3370.13
	OANG	-5647.01	1576.47	2894.49	77.16	-3108.71	-3181.46
	OANH	-6037.56	1222.47	2754.93	93.75	-3025.09	-2967.97
TU03	EA1A	-7472.70	504.20	2425.37	112.37	-1272.96	-2320.25
	EA1B	-7765.31	708.03	1739.81	55.41	-1130.36	-2334.99
	EA1C	-7381.91	1411.53	1491.78	-1.70	-1046.42	-2355.45
	EA1D	-6546.66	2202.81	1826.96	-25.47	-1070.36	-2369.64
	EA1E	-5749.00	2618.47	2548.64	-2.03	-1188.09	-2369.26
	EA1F	-5456.38	2414.64	3234.20	54.93	-1330.69	-2354.53
	EA1G	-5839.78	1711.14	3482.23	112.04	-1414.63	-2334.07
	EA1H	-6675.03	919.85	3147.05	135.81	-1390.69	-2319.87
	EA2A	-6018.12	286.23	2409.76	130.36	-1467.57	-2037.16
	EA2B	-6310.74	490.06	1724.19	73.40	-1324.97	-2051.90
	EA2C	-5927.34	1193.56	1476.17	16.30	-1241.03	-2072.36
	EA2D	-5092.09	1984.84	1811.34	-7.48	-1264.97	-2086.56
	EA2E	-4294.43	2400.50	2533.02	15.97	-1382.70	-2086.18
	EA2F	-4001.81	2196.67	3218.58	72.93	-1525.30	-2071.44
	EA2G	-4385.21	1493.17	3466.61	130.03	-1609.25	-2050.98
	EA2H	-5220.46	701.88	3131.43	153.81	-1585.30	-2036.79
	EA3A	-6867.23	495.98	2213.30	91.13	-1182.96	-2256.23
	EA3B	-7159.85	699.81	1527.74	34.17	-1040.37	-2270.96
	EA3C	-6776.45	1403.31	1279.71	-22.94	-956.42	-2291.42
	EA3D	-5941.20	2194.60	1614.89	-46.71	-980.37	-2305.62
	EA3E	-5143.54	2610.25	2336.57	-23.27	-1098.10	-2305.24

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EA3F	-4850.92	2406.42	3022.13	33.69	-1240.70	-2290.50
EA3G	-5234.32	1702.92	3270.16	90.80	-1324.64	-2270.04
EA3H	-6069.57	911.63	2934.98	114.57	-1300.69	-2255.85
EA4A	-5412.68	278.02	2197.69	109.12	-1377.57	-1973.15
EA4B	-5705.30	481.84	1512.12	52.16	-1234.97	-1987.88
EA4C	-5321.90	1185.34	1264.10	-4.94	-1151.03	-2008.34
EA4D	-4486.65	1976.63	1599.27	-28.72	-1174.98	-2022.54
EA4E	-3688.99	2392.28	2320.95	-5.27	-1292.71	-2022.16
EA4F	-3396.37	2188.45	3006.51	51.69	-1435.30	-2007.42
EA4G	-3779.77	1484.95	3254.54	108.79	-1519.25	-1986.96
EA4H	-4615.02	693.67	2919.36	132.57	-1495.30	-1972.77
EANA	-6657.73	408.89	2349.81	113.11	-1326.42	-2179.13
EANB	-6950.35	612.72	1664.25	56.15	-1183.82	-2193.87
EANC	-6566.94	1316.22	1416.22	-0.95	-1099.88	-2214.33
EAND	-5731.70	2107.51	1751.40	-24.73	-1123.82	-2228.52
EANE	-4934.04	2523.16	2473.07	-1.28	-1241.55	-2228.15
EANF	-4641.42	2319.33	3158.64	55.68	-1384.15	-2213.41
EANG	-5024.82	1615.83	3406.67	112.78	-1468.09	-2192.95
EANH	-5860.07	824.54	3071.49	136.56	-1444.15	-2178.75
OA11	-6610.85	1561.33	2487.00	55.17	-1230.53	-2344.76
OA1A	-7191.71	1128.45	2516.58	87.65	-1278.64	-2376.04
OA1B	-7289.13	1214.16	2212.45	63.47	-1221.79	-2377.97
OA1C	-7131.30	1541.64	2099.22	26.71	-1157.03	-2385.76
OA1D	-6691.42	1878.52	2235.31	18.06	-1181.44	-2381.34
OA1E	-6346.29	2068.14	2548.93	23.42	-1221.56	-2380.82
OA1F	-6248.87	1982.42	2853.07	47.59	-1278.41	-2378.90
OA1G	-6456.02	1671.77	2969.64	76.42	-1318.68	-2376.70
OA1H	-6846.58	1318.06	2830.20	93.00	-1318.76	-2375.52
OA21	-5156.28	1343.36	2471.39	73.16	-1425.14	-2061.67
OA2A	-5737.14	910.48	2500.97	105.64	-1473.25	-2092.96
OA2B	-5834.56	996.19	2196.83	81.47	-1416.41	-2094.88
OA2C	-5676.72	1323.66	2083.61	44.70	-1351.64	-2102.67
OA2D	-5236.85	1660.55	2219.70	36.06	-1376.05	-2098.26
OA2E	-4891.72	1850.17	2533.31	41.41	-1416.17	-2097.74
OA2F	-4794.30	1764.45	2837.45	65.59	-1473.02	-2095.81
OA2G	-5001.45	1453.80	2954.02	94.41	-1513.29	-2093.62
OA2H	-5392.00	1100.09	2814.58	111.00	-1513.37	-2092.44
OA31	-6005.38	1553.11	2274.93	33.93	-1140.53	-2280.73
OA3A	-6586.24	1120.23	2304.51	66.41	-1188.65	-2312.02
OA3B	-6683.67	1205.94	2000.38	42.23	-1131.80	-2313.94
OA3C	-6525.83	1533.42	1887.15	5.47	-1067.03	-2321.73
OA3D	-6085.96	1870.30	2023.24	-3.18	-1091.44	-2317.32
OA3E	-5740.82	2059.92	2336.86	2.18	-1131.57	-2316.80
OA3F	-5643.40	1974.21	2641.00	26.35	-1188.41	-2314.88
OA3G	-5850.55	1663.56	2757.57	55.18	-1228.68	-2312.68
OA3H	-6241.11	1309.85	2618.13	71.76	-1228.77	-2311.50
OA41	-4550.84	1335.15	2259.32	51.93	-1335.14	-1997.65
OA4A	-5131.70	902.26	2288.90	84.40	-1383.25	-2028.94
OA4B	-5229.12	987.98	1984.76	60.23	-1326.41	-2030.86
OA4C	-5071.28	1315.45	1871.54	23.46	-1261.64	-2038.65
OA4D	-4631.41	1652.34	2007.63	14.82	-1286.05	-2034.24
OA4E	-4286.28	1841.95	2321.24	20.17	-1326.17	-2033.72
OA4F	-4188.86	1756.24	2625.38	44.35	-1383.02	-2031.79
OA4G	-4396.01	1445.59	2741.95	73.17	-1423.29	-2029.60
OA4H	-4786.56	1091.88	2602.51	89.76	-1423.38	-2028.42
OAN1	-5795.88	1466.03	2411.44	55.91	-1283.99	-2203.64
OANA	-6376.74	1033.14	2441.02	88.39	-1332.10	-2234.93
OANB	-6474.16	1118.85	2136.88	64.22	-1275.25	-2236.85
OANC	-6316.33	1446.33	2023.66	27.45	-1210.49	-2244.64
OAND	-5876.45	1783.21	2159.75	18.81	-1234.90	-2240.23
OANE	-5531.32	1972.83	2473.37	24.16	-1275.02	-2239.70
OANF	-5433.90	1887.12	2777.51	48.34	-1331.87	-2237.78
OANG	-5641.05	1576.47	2894.08	77.16	-1372.14	-2235.59
OANH	-6031.61	1222.76	2754.64	93.75	-1372.22	-2234.40

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SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TC24-TU01	TC24	TPS	EA1A	-2882.01	-2168.36	-2184.00	3.47	2657.45	3316.11
			EA1B	-2591.48	-1996.16	-2790.55	36.34	3187.46	3183.97
			EA1C	-2999.29	-1345.48	-2999.91	73.61	3407.44	2767.75
			EA1D	-3866.97	-597.29	-2689.10	93.44	3188.26	2311.13
			EA1E	-4686.10	-189.77	-2040.52	84.23	2658.58	2081.54
			EA1F	-4976.63	-361.98	-1433.97	51.36	2128.57	2213.68
			EA1G	-4568.82	-1012.65	-1224.60	14.09	1908.59	2629.91
			EA1H	-3701.14	-1760.85	-1535.41	-5.74	2127.77	3086.52
			EA2A	-4316.37	-2361.64	-2187.48	-14.32	2408.85	3713.30
			EA2B	-4025.84	-2189.43	-2794.03	18.55	2938.86	3581.16
			EA2C	-4433.65	-1538.76	-3003.39	55.82	3158.85	3164.93
			EA2D	-5301.33	-790.56	-2692.58	75.65	2939.67	2708.32
			EA2E	-6120.46	-383.04	-2044.00	66.44	2409.99	2478.73
			EA2F	-6410.99	-555.25	-1437.44	33.57	1879.98	2610.87
			EA2G	-6003.18	-1205.93	-1228.08	-3.70	1659.99	3027.10
			EA2H	-5135.50	-1954.12	-1538.89	-23.53	1879.18	3483.71
			EA3A	-3474.48	-2162.72	-2387.68	26.33	2832.23	3379.22
			EA3B	-3183.95	-1990.51	-2994.22	59.20	3362.24	3247.08
			EA3C	-3591.76	-1339.84	-3203.58	96.47	3582.22	2830.85
			EA3D	-4459.44	-591.64	-2892.78	116.29	3363.04	2374.24
			EA3E	-5278.57	-184.12	-2244.20	107.09	2833.36	2144.65
			EA3F	-5569.10	-356.33	-1637.64	74.21	2303.35	2276.78
			EA3G	-5161.29	-1007.01	-1428.28	36.94	2083.37	2693.01
			EA3H	-4293.61	-1755.20	-1739.09	17.12	2302.55	3149.63
			EA4A	-4908.82	-2355.99	-2391.15	8.54	2583.64	3776.40
			EA4B	-4618.29	-2183.78	-2997.70	41.41	3113.65	3644.26
			EA4C	-5026.10	-1533.11	-3207.06	78.68	3333.63	3228.03
			EA4D	-5893.78	-784.91	-2896.26	98.50	3114.45	2771.42
			EA4E	-6712.91	-377.39	-2247.67	89.30	2584.78	2541.83
			EA4F	-7003.43	-549.60	-1641.12	56.42	2054.76	2673.97
			EA4G	-6595.63	-1200.28	-1431.76	19.15	1834.78	3090.19
			EA4H	-5727.94	-1948.47	-1742.57	-0.67	2053.96	3546.81
			EANA	-3684.16	-2248.67	-2251.67	3.34	2608.60	3505.43
			EANB	-3393.63	-2076.46	-2858.22	36.21	3138.61	3373.29
			EANC	-3801.44	-1425.79	-3067.58	73.48	3358.59	2957.06
			EAND	-4669.13	-677.60	-2756.78	93.31	3139.41	2500.44
			EANE	-5488.26	-270.08	-2108.19	84.10	2609.74	2270.85
			EANF	-5778.78	-442.29	-1501.64	51.22	2079.72	2402.99
			EANG	-5370.97	-1092.96	-1292.28	13.96	1859.74	2819.22
			EANH	-4503.29	-1841.15	-1603.08	-5.87	2078.92	3275.84
			OA11	-3784.05	-1179.07	-2112.26	43.85	2658.01	2698.83
			OA1A	-3307.80	-1651.26	-2167.34	25.58	2680.10	2991.69
			OA1B	-3209.14	-1567.60	-2427.60	40.10	2906.23	2931.38
			OA1C	-3366.95	-1273.31	-2526.91	55.17	3017.66	2737.70
			OA1D	-3815.99	-925.19	-2381.07	66.09	2907.73	2531.74
			OA1E	-4166.15	-742.63	-2101.52	62.35	2682.21	2426.42
			OA1F	-4264.81	-826.29	-1841.26	47.83	2456.08	2486.73
			OA1G	-4054.39	-1127.00	-1752.67	31.05	2361.75	2677.22
			OA1H	-3657.96	-1468.69	-1887.79	21.84	2454.59	2886.37
			OA21	-5218.42	-1372.34	-2115.73	26.06	2409.42	3096.02
			OA2A	-4742.16	-1844.53	-2170.82	7.79	2431.51	3388.88
			OA2B	-4643.50	-1760.87	-2431.08	22.31	2657.64	3328.57
			OA2C	-4801.31	-1466.58	-2530.39	37.38	2769.07	3134.89
			OA2D	-5250.35	-1118.47	-2384.55	48.30	2659.14	2928.93
			OA2E	-5600.51	-935.90	-2105.00	44.56	2433.62	2823.61
			OA2F	-5699.17	-1019.56	-1844.74	30.04	2207.49	2883.91
			OA2G	-5488.75	-1320.27	-1756.15	13.26	2113.16	3074.41
			OA2H	-5092.32	-1661.97	-1891.27	4.05	2206.00	3283.56
			OA31	-4376.52	-1173.42	-2315.93	66.71	2832.79	2761.93
			OA3A	-3900.27	-1645.61	-2371.02	48.44	2854.88	3054.79
			OA3B	-3801.61	-1561.95	-2631.28	62.96	3081.02	2994.49
			OA3C	-3959.42	-1267.66	-2730.59	78.03	3192.45	2800.80
			OA3D	-4408.46	-919.55	-2584.75	88.95	3082.51	2594.84
			OA3E	-4758.62	-736.98	-2305.20	85.20	2857.00	2489.52
			OA3F	-4857.28	-820.65	-2044.94	70.68	2630.86	2549.83
			OA3G	-4646.86	-1121.35	-1956.35	53.90	2536.53	2740.32
			OA3H	-4250.43	-1463.05	-2091.47	44.69	2629.37	2949.47
			OA41	-5810.86	-1366.69	-2319.41	48.92	2584.21	3159.11
			OA4A	-5334.61	-1838.88	-2374.49	30.65	2606.30	3451.97
			OA4B	-5235.95	-1755.22	-2634.76	45.17	2832.43	3391.67
			OA4C	-5393.76	-1460.93	-2734.07	60.24	2943.86	3197.98
			OA4D	-5842.80	-1112.82	-2588.22	71.16	2833.92	2992.02
			OA4E	-6192.96	-930.25	-2308.68	67.41	2608.41	2886.71
			OA4F	-6291.62	-1013.92	-2048.41	52.89	2382.28	2947.01

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	OA4G	-6081.20	-1314.62	-1959.82	36.11	2287.94	3137.50
	OA4H	-5684.77	-1656.32	-2094.95	26.90	2380.78	3346.65
	OAN1	-4586.21	-1259.37	-2179.93	43.72	2609.17	2888.14
	OANA	-4109.95	-1731.57	-2235.01	25.45	2631.26	3181.00
	OANB	-4011.29	-1647.90	-2495.28	39.97	2857.39	3120.69
	OANC	-4169.10	-1353.61	-2594.59	55.04	2968.82	2927.01
	OAND	-4618.15	-1005.50	-2448.74	65.96	2858.88	2721.05
	OANE	-4968.31	-822.93	-2169.19	62.21	2633.37	2615.73
	OANF	-5066.97	-906.60	-1908.93	47.70	2407.24	2676.04
	OANG	-4856.54	-1207.30	-1820.34	30.92	2312.90	2866.53
	OANH	-4460.11	-1549.00	-1955.46	21.70	2405.74	3075.68
TU01	EA1A	-2876.05	-2167.39	-2184.00	3.47	1347.05	2015.39
	EA1B	-2585.53	-1995.47	-2789.86	36.34	1513.34	1986.49
	EA1C	-2993.34	-1345.48	-2998.93	73.61	1607.79	1960.46
	EA1D	-3861.02	-597.98	-2688.41	93.44	1575.01	1952.55
	EA1E	-4680.15	-190.75	-2040.52	84.23	1434.27	1967.39
	EA1F	-4970.67	-362.67	-1434.66	51.36	1267.99	1996.29
	EA1G	-4562.87	-1012.65	-1225.58	14.09	1173.53	2022.32
	EA1H	-3695.18	-1760.16	-1536.10	-5.74	1206.32	2030.23
	EA2A	-4310.42	-2360.66	-2187.48	-14.32	1096.37	2296.62
	EA2B	-4019.89	-2188.74	-2793.33	18.55	1262.66	2267.72
	EA2C	-4427.70	-1538.76	-3002.41	55.82	1357.11	2241.68
	EA2D	-5295.38	-791.25	-2691.89	75.65	1324.33	2233.78
	EA2E	-6114.51	-384.02	-2044.00	66.44	1183.60	2248.61
	EA2F	-6405.03	-555.94	-1438.14	33.57	1017.31	2277.51
	EA2G	-5997.23	-1205.93	-1229.06	-3.70	922.85	2303.54
	EA2H	-5129.54	-1953.43	-1539.58	-23.53	955.64	2311.45
	EA3A	-3468.52	-2161.74	-2387.68	26.33	1399.63	2081.88
	EA3B	-3177.99	-1989.82	-2993.53	59.20	1565.91	2052.98
	EA3C	-3585.81	-1339.84	-3202.61	96.47	1660.37	2026.95
	EA3D	-4453.49	-592.33	-2892.09	116.29	1627.58	2019.04
	EA3E	-5272.62	-185.10	-2244.20	107.09	1486.85	2033.88
	EA3F	-5563.14	-357.02	-1638.33	74.21	1320.56	2062.78
	EA3G	-5155.33	-1007.01	-1429.26	36.94	1226.11	2088.81
	EA3H	-4287.65	-1754.51	-1739.78	17.12	1258.89	2096.72
	EA4A	-4902.86	-2355.01	-2391.15	8.54	1148.95	2363.10
	EA4B	-4612.33	-2183.09	-2997.01	41.41	1315.24	2334.20
	EA4C	-5020.14	-1533.11	-3206.09	78.68	1409.69	2308.17
	EA4D	-5887.82	-785.60	-2895.57	98.50	1376.91	2300.26
	EA4E	-6706.95	-378.37	-2247.67	89.30	1236.17	2315.10
	EA4F	-6997.48	-550.29	-1641.81	56.42	1069.89	2344.00
	EA4G	-6589.67	-1200.28	-1432.74	19.15	975.43	2370.03
	EA4H	-5721.99	-1947.78	-1743.26	-0.67	1008.22	2377.94
	EANA	-3678.21	-2247.69	-2251.67	3.34	1257.60	2156.52
	EANB	-3387.68	-2075.77	-2857.53	36.21	1423.89	2127.62
	EANC	-3795.49	-1425.79	-3066.60	73.48	1518.34	2101.59
	EAND	-4663.17	-678.29	-2756.09	93.31	1485.55	2093.68
	EANE	-5482.30	-271.05	-2108.19	84.10	1344.82	2108.52
	EANF	-5772.83	-442.98	-1502.33	51.22	1178.54	2137.42
	EANG	-5365.02	-1092.96	-1293.26	13.96	1084.08	2163.45
	EANH	-4497.33	-1840.46	-1603.77	-5.87	1116.87	2171.36
	OA11	-3778.10	-1179.07	-2112.26	43.85	1390.66	1991.39
	OA1A	-3301.85	-1650.85	-2167.34	25.58	1379.70	2001.05
	OA1B	-3203.18	-1567.31	-2427.31	40.10	1449.76	1990.91
	OA1C	-3360.99	-1273.31	-2526.50	55.17	1501.64	1973.72
	OA1D	-3810.04	-925.48	-2380.78	66.09	1479.18	1976.54
	OA1E	-4160.20	-743.03	-2101.52	62.35	1421.31	1980.72
	OA1F	-4258.86	-826.58	-1841.54	47.83	1351.24	1990.87
	OA1G	-4048.43	-1127.00	-1753.07	31.05	1310.03	2001.02
	OA1H	-3652.00	-1468.41	-1888.08	21.84	1321.83	2005.24
	OA21	-5212.46	-1372.34	-2115.73	26.06	1139.98	2272.61
	OA2A	-4736.21	-1844.13	-2170.82	7.79	1129.02	2282.28
	OA2B	-4637.55	-1760.58	-2430.79	22.31	1199.08	2272.14
	OA2C	-4795.36	-1466.58	-2529.98	37.38	1250.96	2254.94
	OA2D	-5244.40	-1118.75	-2384.26	48.30	1228.50	2257.76
	OA2E	-5594.56	-936.31	-2105.00	44.56	1170.63	2261.95
	OA2F	-5693.22	-1019.85	-1845.02	30.04	1100.57	2272.09
	OA2G	-5482.79	-1320.27	-1756.55	13.26	1059.35	2282.25
	OA2H	-5086.37	-1661.68	-1891.56	4.05	1071.15	2286.46
	OA31	-4370.57	-1173.42	-2315.93	66.71	1443.24	2057.88
	OA3A	-3894.31	-1645.21	-2371.02	48.44	1432.28	2067.55
	OA3B	-3795.65	-1561.66	-2630.99	62.96	1502.34	2057.40
	OA3C	-3953.46	-1267.66	-2730.18	78.03	1554.22	2040.21
	OA3D	-4402.51	-919.83	-2584.46	88.95	1531.75	2043.03
	OA3E	-4752.67	-737.39	-2305.20	85.20	1473.88	2047.22
	OA3F	-4851.33	-820.93	-2045.22	70.68	1403.82	2057.36
	OA3G	-4640.90	-1121.35	-1956.75	53.90	1362.60	2067.51
	OA3H	-4244.47	-1462.76	-2091.76	44.69	1374.41	2071.73
	OA41	-5804.91	-1366.69	-2319.41	48.92	1192.56	2339.10
	OA4A	-5328.65	-1838.48	-2374.49	30.65	1181.60	2348.77

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OA4B	-5229.99	-1754.93	-2634.47	45.17	1251.66	2338.62
OA4C	-5387.80	-1460.93	-2733.66	60.24	1303.54	2321.43
OA4D	-5836.84	-1113.10	-2587.94	71.16	1281.08	2324.25
OA4E	-6187.00	-930.66	-2308.68	67.41	1223.21	2328.43
OA4F	-6285.66	-1014.20	-2048.70	52.89	1153.14	2338.58
OA4G	-6075.24	-1314.62	-1960.23	36.11	1111.93	2348.73
OA4H	-5678.81	-1656.03	-2095.24	26.90	1123.73	2352.95
OAN1	-4580.25	-1259.37	-2179.93	43.72	1301.21	2132.52
OANA	-4104.00	-1731.16	-2235.01	25.45	1290.25	2142.18
OANB	-4005.34	-1647.61	-2494.99	39.97	1360.31	2132.04
OANC	-4163.15	-1353.61	-2594.18	55.04	1412.19	2114.85
OAND	-4612.19	-1005.79	-2448.45	65.96	1389.73	2117.67
OANE	-4962.35	-823.34	-2169.19	62.21	1331.85	2121.85
OANF	-5061.01	-906.88	-1909.22	47.70	1261.79	2132.00
OANG	-4850.59	-1207.30	-1820.75	30.92	1220.58	2142.15
OANH	-4454.16	-1548.71	-1955.75	21.70	1232.38	2146.37

SACS-IV SYSTEM MEMBER FORCES AND MOMENTS

MEMBER NUMBER	MEMBER END	GROUP ID	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TC44-TU04	TC44	TPS	EA1A	-4872.71	-2565.55	2131.99	-13.95	-2315.30	3883.99
			EA1B	-5680.10	-2125.00	1463.15	-12.85	-1782.86	3631.22
			EA1C	-6518.61	-1324.65	1147.23	-41.45	-1550.52	3144.65
			EA1D	-6896.90	-633.25	1369.61	-83.02	-1754.67	2709.23
			EA1E	-6593.80	-455.57	1999.68	-113.19	-2275.43	2579.91
			EA1F	-5786.41	-896.12	2668.52	-114.29	-2807.88	2832.67
			EA1G	-4947.90	-1696.47	2984.45	-85.69	-3040.21	3319.25
			EA1H	-4569.61	-2387.88	2762.07	-44.13	-2836.06	3754.66
			EA2A	-3438.88	-2363.43	2150.85	-24.04	-2563.11	3491.29
			EA2B	-4246.27	-1922.88	1482.01	-22.94	-2030.67	3238.52
			EA2C	-5084.78	-1122.53	1166.08	-51.54	-1798.33	2751.95
			EA2D	-5463.07	-431.12	1388.47	-93.10	-2002.48	2316.53
			EA2E	-5159.97	-253.45	2018.54	-123.28	-2523.24	2187.20
			EA2F	-4352.58	-694.00	2687.38	-124.38	-3055.69	2439.97
			EA2G	-3514.07	-1494.35	3003.31	-95.78	-3288.02	2926.54
			EA2H	-3135.78	-2185.75	2780.92	-54.21	-3083.87	3361.96
			EA3A	-5475.59	-2567.18	2345.33	-40.75	-2491.67	3953.72
			EA3B	-6282.97	-2126.63	1676.49	-39.65	-1959.22	3700.95
			EA3C	-7121.48	-1326.28	1360.56	-68.25	-1726.89	3214.38
			EA3D	-7499.78	-634.88	1582.94	-109.82	-1931.04	2778.97
			EA3E	-7196.67	-457.20	2213.02	-139.99	-2451.80	2649.64
			EA3F	-6389.29	-897.75	2881.86	-141.10	-2984.25	2902.41
			EA3G	-5550.78	-1698.10	3197.78	-112.49	-3216.58	3388.98
			EA3H	-5172.48	-2389.51	2975.40	-70.93	-3012.43	3824.40
			EA4A	-4041.78	-2365.06	2364.18	-50.84	-2739.47	3561.03
			EA4B	-4849.17	-1924.51	1695.34	-49.74	-2207.03	3308.26
			EA4C	-5687.68	-1124.16	1379.42	-78.34	-1974.70	2821.69
			EA4D	-6065.97	-432.75	1601.80	-119.90	-2178.84	2386.27
			EA4E	-5762.87	-255.08	2231.87	-150.08	-2699.61	2256.94
			EA4F	-4955.48	-695.63	2900.71	-151.18	-3232.05	2509.71
			EA4G	-4116.97	-1495.98	3216.64	-122.58	-3464.38	2996.29
			EA4H	-3738.68	-2187.39	2994.26	-81.02	-3260.24	3431.70
			EANA	-4459.28	-2480.18	2209.34	-26.95	-2477.94	3739.76
			EANB	-5266.66	-2039.63	1540.50	-25.85	-1945.49	3486.99
			EANC	-6105.17	-1239.28	1224.58	-54.45	-1713.16	3000.41
			EAND	-6483.46	-547.87	1446.96	-96.01	-1917.31	2565.00
			EANE	-6180.36	-370.20	2077.03	-126.19	-2438.07	2435.67
			EANF	-5372.98	-810.75	2745.87	-127.29	-2970.52	2688.44
			EANG	-4534.46	-1611.10	3061.80	-98.69	-3202.85	3175.01
			EANH	-4156.17	-2302.51	2839.41	-57.13	-2998.70	3610.43
			OA11	-5733.26	-1510.56	2065.84	-63.57	-2295.37	3231.95
			OA1A	-5357.17	-2002.43	2080.42	-38.42	-2283.84	3544.87
			OA1B	-5705.43	-1803.67	1791.20	-38.61	-2059.70	3430.01
			OA1C	-6149.55	-1439.91	1662.95	-53.77	-1955.46	3221.97
			OA1D	-6302.20	-1123.71	1765.20	-71.42	-2065.41	3021.57
			OA1E	-6201.26	-1040.67	2043.64	-84.83	-2291.93	2967.16
			OA1F	-5853.00	-1239.42	2332.86	-84.64	-2516.08	3082.02
			OA1G	-5461.54	-1603.38	2463.49	-70.97	-2606.60	3298.76
			OA1H	-5256.24	-1919.38	2358.86	-51.83	-2510.36	3490.46
			OA21	-4299.42	-1308.44	2084.69	-73.66	-2543.18	2839.25
			OA2A	-3923.34	-1800.30	2099.27	-48.50	-2531.65	3152.16
			OA2B	-4271.60	-1601.55	1810.05	-48.69	-2307.51	3037.31
			OA2C	-4715.72	-1237.78	1681.81	-63.86	-2203.27	2829.27
			OA2D	-4868.37	-921.59	1784.05	-81.50	-2313.22	2628.87
			OA2E	-4767.43	-838.54	2062.50	-94.91	-2539.74	2574.46
			OA2F	-4419.17	-1037.30	2351.72	-94.72	-2763.89	2689.32

	OA2G	-4027.71	-1401.25	2482.35	-81.06	-2854.41	2906.06
	OA2H	-3822.40	-1717.26	2377.72	-61.91	-2758.17	3097.75
	OA31	-6336.13	-1512.19	2279.17	-90.37	-2471.74	3301.68
	OA3A	-5960.05	-2004.06	2293.75	-65.22	-2460.21	3614.60
	OA3B	-6308.31	-1805.31	2004.53	-65.41	-2236.07	3499.74
	OA3C	-6752.43	-1441.54	1876.29	-80.57	-2131.83	3291.70
	OA3D	-6905.08	-1125.35	1978.53	-98.22	-2241.78	3091.31
	OA3E	-6804.14	-1042.30	2256.97	-111.63	-2468.30	3036.90
	OA3F	-6455.88	-1241.05	2546.19	-111.44	-2692.45	3151.76
	OA3G	-6064.42	-1605.01	2676.82	-97.78	-2782.97	3368.50
	OA3H	-5859.11	-1921.01	2572.20	-78.63	-2686.73	3560.19
	OA41	-4902.32	-1310.07	2298.03	-100.46	-2719.54	2908.99
	OA4A	-4526.24	-1801.93	2312.61	-75.30	-2708.02	3221.90
	OA4B	-4874.50	-1603.18	2023.39	-75.49	-2483.87	3107.05
	OA4C	-5318.62	-1239.42	1895.14	-90.66	-2379.64	2899.01
	OA4D	-5471.27	-923.22	1997.38	-108.30	-2489.59	2698.61
	OA4E	-5370.33	-840.18	2275.83	-121.71	-2716.11	2644.20
	OA4F	-5022.07	-1038.93	2565.05	-121.53	-2940.25	2759.06
	OA4G	-4630.61	-1402.89	2695.68	-107.86	-3030.78	2975.80
	OA4H	-4425.30	-1718.89	2591.05	-88.71	-2934.54	3167.50
	OAN1	-5319.82	-1425.19	2143.19	-76.57	-2458.01	3087.71
	OANA	-4943.74	-1917.05	2157.77	-51.41	-2446.48	3400.63
	OANB	-5291.99	-1718.30	1868.55	-51.60	-2222.34	3285.77
	OANC	-5736.11	-1354.54	1740.30	-66.77	-2118.10	3077.74
	OAND	-5888.76	-1038.34	1842.54	-84.42	-2228.05	2877.34
	OANE	-5787.82	-955.30	2120.99	-97.82	-2454.57	2822.93
	OANF	-5439.57	-1154.05	2410.21	-97.64	-2678.72	2937.79
	OANG	-5048.10	-1518.00	2540.84	-83.97	-2769.24	3154.53
	OANH	-4842.80	-1834.01	2436.21	-64.82	-2673.00	3346.22
TU04	EA1A	-4866.76	-2564.58	2131.99	-13.95	-1036.11	2344.95
	EA1B	-5674.14	-2124.31	1463.84	-12.85	-904.76	2356.43
	EA1C	-6512.65	-1324.65	1148.21	-41.45	-861.90	2349.86
	EA1D	-6890.95	-633.94	1370.30	-83.02	-932.70	2329.08
	EA1E	-6587.84	-456.55	1999.68	-113.19	-1075.63	2306.27
	EA1F	-5780.46	-896.81	2667.83	-114.29	-1206.97	2294.79
	EA1G	-4941.94	-1696.47	2983.47	-85.69	-1249.84	2301.36
	EA1H	-4563.65	-2387.19	2761.38	-44.13	-1179.03	2322.14
	EA2A	-3432.93	-2362.45	2150.85	-24.04	-1272.60	2073.53
	EA2B	-4240.31	-1922.19	1482.70	-22.94	-1141.26	2085.00
	EA2C	-5078.82	-1122.53	1167.06	-51.54	-1098.39	2078.43
	EA2D	-5457.12	-431.81	1389.16	-93.10	-1169.20	2057.65
	EA2E	-5154.01	-254.42	2018.54	-123.28	-1312.12	2034.84
	EA2F	-4346.63	-694.69	2686.69	-124.38	-1443.47	2023.37
	EA2G	-3508.11	-1494.35	3002.33	-95.78	-1486.33	2029.94
	EA2H	-3129.82	-2185.06	2780.23	-54.21	-1415.53	2050.72
	EA3A	-5469.64	-2566.21	2345.33	-40.75	-1084.48	2413.71
	EA3B	-6277.02	-2125.94	1677.18	-39.65	-953.13	2425.18
	EA3C	-7115.53	-1326.28	1361.54	-68.25	-910.26	2418.61
	EA3D	-7493.82	-635.57	1583.63	-109.82	-981.07	2397.84
	EA3E	-7190.72	-458.18	2213.02	-139.99	-1123.99	2375.03
	EA3F	-6383.33	-898.44	2881.17	-141.10	-1255.34	2363.55
	EA3G	-5544.82	-1698.10	3196.81	-112.49	-1298.21	2370.12
	EA3H	-5166.53	-2388.82	2974.71	-70.93	-1227.40	2390.90
	EA4A	-4035.83	-2364.08	2364.18	-50.84	-1320.97	2142.29
	EA4B	-4843.21	-1923.82	1696.03	-49.74	-1189.62	2153.76
	EA4C	-5681.72	-1124.16	1380.39	-78.34	-1146.76	2147.19
	EA4D	-6060.02	-433.44	1602.49	-119.90	-1217.56	2126.41
	EA4E	-5756.91	-256.06	2231.87	-150.08	-1360.49	2103.60
	EA4F	-4949.53	-696.32	2900.02	-151.18	-1491.83	2092.13
	EA4G	-4111.01	-1495.98	3215.66	-122.58	-1534.70	2098.70
	EA4H	-3732.72	-2186.70	2993.56	-81.02	-1463.89	2119.48
	EANA	-4453.32	-2479.20	2209.34	-26.95	-1152.34	2251.94
	EANB	-5260.70	-2038.94	1541.19	-25.85	-1020.99	2263.42
	EANC	-6099.22	-1239.28	1225.55	-54.45	-978.13	2256.85
	EAND	-6477.51	-548.56	1447.65	-96.01	-1048.93	2236.07
	EANE	-6174.40	-371.18	2077.03	-126.19	-1191.86	2213.26
	EANF	-5367.02	-811.44	2745.18	-127.29	-1323.20	2201.79
	EANG	-4528.51	-1611.10	3060.82	-98.69	-1366.07	2208.36
	EANH	-4150.21	-2301.82	2838.72	-57.13	-1295.26	2229.13
	OA11	-5727.30	-1510.56	2065.84	-63.57	-1055.87	2325.61
	OA1A	-5351.22	-2002.02	2080.42	-38.42	-1035.60	2343.53
	OA1B	-5699.48	-1803.39	1791.49	-38.61	-984.89	2347.89
	OA1C	-6143.60	-1439.91	1663.36	-53.77	-957.57	2358.03
	OA1D	-6296.25	-1124.00	1765.48	-71.42	-1006.21	2347.26
	OA1E	-6195.31	-1041.08	2043.64	-84.83	-1065.75	2342.64
	OA1F	-5847.05	-1239.71	2332.57	-84.64	-1116.45	2338.28
	OA1G	-5455.58	-1603.38	2463.08	-70.97	-1128.64	2336.74
	OA1H	-5250.28	-1919.09	2358.58	-51.83	-1095.13	2338.92
	OA21	-4293.47	-1308.44	2084.69	-73.66	-1292.36	2054.19
	OA2A	-3917.39	-1799.89	2099.27	-48.50	-1272.09	2072.11

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OA2B	-4265.64	-1601.26	1810.34	-48.69	-1221.39	2076.46
OA2C	-4709.76	-1237.78	1682.21	-63.86	-1194.07	2086.60
OA2D	-4862.41	-921.88	1784.34	-81.50	-1242.71	2075.83
OA2E	-4761.47	-838.95	2062.50	-94.91	-1302.25	2071.21
OA2F	-4413.22	-1037.58	2351.43	-94.72	-1352.95	2066.86
OA2G	-4021.75	-1401.25	2481.94	-81.06	-1365.13	2065.31
OA2H	-3816.45	-1716.97	2377.43	-61.91	-1331.63	2067.49
OA31	-6330.18	-1512.19	2279.17	-90.37	-1104.23	2394.37
OA3A	-5954.10	-2003.65	2293.75	-65.22	-1083.96	2412.29
OA3B	-6302.35	-1805.02	2004.82	-65.41	-1033.26	2416.65
OA3C	-6746.47	-1441.54	1876.69	-80.57	-1005.94	2426.78
OA3D	-6899.12	-1125.63	1978.82	-98.22	-1054.58	2416.01
OA3E	-6798.18	-1042.71	2256.97	-111.63	-1114.12	2411.40
OA3F	-6449.92	-1241.34	2545.91	-111.44	-1164.82	2407.04
OA3G	-6058.46	-1605.01	2676.42	-97.78	-1177.00	2405.50
OA3H	-5853.16	-1920.73	2571.91	-78.63	-1143.50	2407.67
OA41	-4896.37	-1310.07	2298.03	-100.46	-1340.73	2122.95
OA4A	-4520.29	-1801.53	2312.61	-75.30	-1320.46	2140.87
OA4B	-4868.55	-1602.90	2023.67	-75.49	-1269.76	2145.22
OA4C	-5312.67	-1239.42	1895.55	-90.66	-1242.43	2155.36
OA4D	-5465.31	-923.51	1997.67	-108.30	-1291.07	2144.59
OA4E	-5364.38	-840.59	2275.83	-121.71	-1350.61	2139.97
OA4F	-5016.12	-1039.22	2564.76	-121.53	-1401.31	2135.62
OA4G	-4624.65	-1402.89	2695.27	-107.86	-1413.50	2134.07
OA4H	-4419.35	-1718.60	2590.76	-88.71	-1379.99	2136.25
OAN1	-5313.86	-1425.19	2143.19	-76.57	-1172.10	2232.60
OANA	-4937.78	-1916.65	2157.77	-51.41	-1151.83	2250.52
OANB	-5286.04	-1718.01	1868.83	-51.60	-1101.12	2254.88
OANC	-5730.16	-1354.54	1740.71	-66.77	-1073.80	2265.02
OAND	-5882.81	-1038.63	1842.83	-84.42	-1122.44	2254.25
OANE	-5781.87	-955.70	2120.99	-97.82	-1181.98	2249.63
OANF	-5433.61	-1154.34	2409.92	-97.64	-1232.68	2245.27
OANG	-5042.15	-1518.00	2540.43	-83.97	-1244.87	2243.73
OANH	-4836.84	-1833.72	2435.92	-64.82	-1211.36	2245.91

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APPENDIX D – REACTIONS AT MP-TP CONNECTION INTERFACE

I. FACTORED LOAD COMBINATIONS

SACS-IV SYSTEM FIXED JOINTS REACTION FORCES AND MOMENTS

JOINT NUMBER	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TMIJ	DN2A	-2173.516	0.000	23605.201	11418.436	-31482.730	19.757
	DN2B	-1536.674	-1387.131	23605.201	26234.240	-24597.096	-774.370
	DN2C	0.000	-1961.997	23605.201	32395.184	-7932.006	-1115.049
	DN2D	1536.671	-1387.131	23605.201	26284.592	8753.895	-802.314
	DN2E	2173.512	-0.000	23605.201	11489.654	15689.895	-19.758
	DN2F	1536.671	1387.127	23605.201	-3326.095	8804.247	774.366
	DN2G	0.000	1961.991	23605.201	-9487.038	-7860.788	1115.051
	DN2H	-1536.674	1387.127	23605.201	-3376.446	-24546.744	802.310
	E13A	-6868.925	0.000	23605.197	31369.615	-88609.141	755.063
	E13B	-4856.332	-4516.764	23605.197	79889.594	-66844.000	-1834.389
	E13C	0.000	-6388.631	23605.197	100070.148	-14150.122	-3349.624
	E13D	4856.324	-4516.764	23605.197	80064.906	38616.297	-2902.031
	E13E	6868.932	-0.000	23605.197	31617.576	60557.047	-754.863
	E13F	4856.324	4516.756	23605.197	-16902.262	38791.602	1834.332
	E13G	-0.000	6388.636	23605.197	-37083.129	-13902.161	3349.637
	E13H	-4856.332	4516.756	23605.197	-17077.568	-66668.703	2901.974
	E14A	-6868.925	0.000	19380.547	16473.613	-81929.141	755.063
	E14B	-4856.332	-4516.764	19380.547	64993.586	-60164.000	-1834.389
	E14C	0.000	-6388.631	19380.547	85174.156	-7470.115	-3349.624
	E14D	4856.324	-4516.764	19380.547	65168.895	45296.301	-2902.031
	E14E	6868.932	-0.000	19380.547	16721.572	67237.055	-754.863
	E14F	4856.324	4516.756	19380.547	-31798.264	45471.609	1834.332
	E14G	-0.000	6388.636	19380.547	-51979.133	-7222.154	3349.637
	E14H	-4856.332	4516.756	19380.547	-31973.568	-59988.688	2901.974
	E23A	-6868.925	0.000	23605.197	-15782.272	-88609.141	755.063
	E23B	-4856.332	-4516.764	23605.197	32737.709	-66844.008	-1834.389
	E23C	0.000	-6388.631	23605.197	52918.270	-14150.122	-3349.624
	E23D	4856.324	-4516.764	23605.197	32913.012	38616.297	-2902.031
	E23E	6868.932	-0.000	23605.197	-15534.312	60557.047	-754.863
	E23F	4856.324	4516.756	23605.197	-64054.148	38791.602	1834.332
	E23G	-0.000	6388.636	23605.197	-84235.023	-13902.161	3349.637
	E23H	-4856.332	4516.756	23605.197	-64229.457	-66668.703	2901.974
	E24A	-6868.925	0.000	19380.529	-25963.006	-81929.102	755.063
	E24B	-4856.332	-4516.764	19380.529	22556.973	-60163.965	-1834.389
	E24C	0.000	-6388.631	19380.529	42737.531	-7470.083	-3349.624
	E24D	4856.324	-4516.764	19380.529	22732.277	45296.340	-2902.031
	E24E	6868.932	-0.000	19380.529	-25715.047	67237.086	-754.863
	E24F	4856.324	4516.756	19380.529	-74234.883	45471.641	1834.332
	E24G	-0.000	6388.636	19380.529	-94415.758	-7222.123	3349.637
	E24H	-4856.332	4516.756	19380.529	-74410.188	-59988.656	2901.974
	E33A	-6868.925	0.000	23605.197	31369.215	-69748.555	755.063
	E33B	-4856.332	-4516.764	23605.197	79889.195	-47983.410	-1834.389
	E33C	0.000	-6388.631	23605.197	100069.758	4710.473	-3349.624
	E33D	4856.324	-4516.764	23605.197	80064.492	57476.895	-2902.031
	E33E	6868.932	-0.000	23605.197	31617.174	79417.641	-754.863
	E33F	4856.324	4516.756	23605.197	-16902.660	57652.195	1834.332
	E33G	-0.000	6388.636	23605.197	-37083.531	4958.434	3349.637
	E33H	-4856.332	4516.756	23605.197	-17077.969	-47808.102	2901.974
	E34A	-6868.925	0.000	19380.539	16473.312	-64954.578	755.063
	E34B	-4856.332	-4516.764	19380.539	64993.293	-43189.438	-1834.389
	E34C	0.000	-6388.631	19380.539	85173.852	9504.444	-3349.624
	E34D	4856.324	-4516.764	19380.539	65168.594	62270.863	-2902.031
	E34E	6868.932	-0.000	19380.539	16721.271	84211.609	-754.863
	E34F	4856.324	4516.756	19380.539	-31798.564	62446.172	1834.332
	E34G	-0.000	6388.636	19380.539	-51979.434	9752.405	3349.637
	E34H	-4856.332	4516.756	19380.539	-31973.869	-43014.133	2901.974
	E43A	-6868.925	0.000	23605.197	-15781.871	-69748.555	755.063
	E43B	-4856.332	-4516.764	23605.197	32738.107	-47983.410	-1834.389
	E43C	0.000	-6388.631	23605.197	52918.668	4710.472	-3349.624
	E43D	4856.324	-4516.764	23605.197	32913.414	57476.887	-2902.031
	E43E	6868.932	-0.000	23605.197	-15533.910	79417.641	-754.863
	E43F	4856.324	4516.756	23605.197	-64053.746	57652.195	1834.332
	E43G	-0.000	6388.636	23605.197	-84234.617	4958.433	3349.637
	E43H	-4856.332	4516.756	23605.197	-64229.055	-47808.102	2901.974
	E44A	-6868.925	0.000	19380.545	-25962.904	-64954.535	755.063
	E44B	-4856.332	-4516.764	19380.545	22557.072	-43189.391	-1834.389

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E44C	0.000	-6388.631	19380.545	42737.637	9504.493	-3349.624
E44D	4856.324	-4516.764	19380.545	22732.379	62270.914	-2902.031
E44E	6868.932	-0.000	19380.545	-25714.943	84211.656	-754.863
E44F	4856.324	4516.756	19380.545	-74234.781	62446.215	1834.332
E44G	-0.000	6388.636	19380.545	-94415.648	9752.452	3349.637
E44H	-4856.332	4516.756	19380.545	-74410.094	-43014.086	2901.974
EN3A	-6868.925	0.000	23605.201	11366.066	-82479.398	755.063
EN3B	-4856.332	-4516.764	23605.201	59886.047	-60714.262	-1834.389
EN3C	0.000	-6388.631	23605.201	80066.609	-8020.377	-3349.624
EN3D	4856.324	-4516.764	23605.201	60061.352	44746.043	-2902.031
EN3E	6868.932	-0.000	23605.201	11614.027	66686.789	-754.863
EN3F	4856.324	4516.756	23605.201	-36905.809	44921.352	1834.332
EN3G	-0.000	6388.636	23605.201	-57086.676	-7772.417	3349.637
EN3H	-4856.332	4516.756	23605.201	-37081.113	-60538.953	2901.974
EN4A	-6868.925	0.000	19380.543	-1562.081	-76412.328	755.063
EN4B	-4856.332	-4516.764	19380.543	46957.895	-54647.184	-1834.389
EN4C	0.000	-6388.631	19380.543	67138.461	-1953.305	-3349.624
EN4D	4856.324	-4516.764	19380.543	47133.207	50813.113	-2902.031
EN4E	6868.932	-0.000	19380.543	-1314.121	72753.859	-754.863
EN4F	4856.324	4516.756	19380.543	-49833.957	50988.422	1834.332
EN4G	-0.000	6388.636	19380.543	-70014.828	-1705.344	3349.637
EN4H	-4856.332	4516.756	19380.543	-50009.262	-54471.883	2901.974
O12A	-2728.838	-0.000	31445.375	46370.926	-52014.961	363.443
O12B	-1929.288	-1705.485	31445.375	63807.328	-43045.133	-491.659
O12C	0.000	-2470.786	31445.375	73909.453	-21338.328	-1702.365
O12D	1929.283	-1705.485	31445.375	63870.266	394.486	-1005.629
O12E	2728.841	-0.000	31445.375	46459.949	9427.351	-363.478
O12F	1929.283	1705.479	31445.375	29023.648	457.425	491.604
O12G	0.000	2412.288	31445.375	21771.354	-21249.305	1058.884
O12H	-1929.288	1705.479	31445.375	28960.707	-42982.195	1005.574
O22A	-2728.838	-0.000	31445.367	-14926.566	-52014.977	363.443
O22B	-1929.288	-1705.485	31445.367	2509.837	-43045.152	-491.659
O22C	0.000	-2470.786	31445.367	12611.955	-21338.344	-1702.365
O22D	1929.283	-1705.485	31445.367	2572.776	394.469	-1005.629
O22E	2728.841	-0.000	31445.367	-14837.544	9427.334	-363.478
O22F	1929.283	1705.479	31445.367	-32273.844	457.408	491.604
O22G	0.000	2412.288	31445.367	-39526.137	-21249.320	1058.884
O22H	-1929.288	1705.479	31445.367	-32336.783	-42982.215	1005.574
O32A	-2728.838	-0.000	31445.367	46370.426	-27496.178	363.443
O32B	-1929.288	-1705.485	31445.367	63806.836	-18526.355	-491.659
O32C	0.000	-2470.786	31445.367	73908.953	3180.453	-1702.365
O32D	1929.283	-1705.485	31445.367	63869.773	24913.268	-1005.629
O32E	2728.841	-0.000	31445.367	46459.449	33946.133	-363.478
O32F	1929.283	1705.479	31445.367	29023.146	24976.207	491.604
O32G	0.000	2412.288	31445.367	21770.855	3269.476	1058.884
O32H	-1929.288	1705.479	31445.367	28960.211	-18463.416	1005.574
O42A	-2728.838	-0.000	31445.369	-14926.065	-27496.162	363.443
O42B	-1929.288	-1705.485	31445.369	2510.338	-18526.338	-491.659
O42C	0.000	-2470.786	31445.369	12612.457	3180.469	-1702.365
O42D	1929.283	-1705.485	31445.369	2573.276	24913.283	-1005.629
O42E	2728.841	-0.000	31445.369	-14837.044	33946.148	-363.478
O42F	1929.283	1705.479	31445.369	-32273.346	24976.223	491.604
O42G	0.000	2412.288	31445.369	-39525.641	3269.491	1058.884
O42H	-1929.288	1705.479	31445.369	-32336.283	-18463.398	1005.574
ON2A	-2728.838	-0.000	31445.371	20319.412	-44046.250	363.443
ON2B	-1929.288	-1705.485	31445.371	37755.812	-35076.426	-491.659
ON2C	0.000	-2470.786	31445.371	47857.934	-13369.620	-1702.365
ON2D	1929.283	-1705.485	31445.371	37818.754	8363.193	-1005.629
ON2E	2728.841	-0.000	31445.371	20408.434	17396.059	-363.478
ON2F	1929.283	1705.479	31445.371	2972.134	8426.133	491.604
ON2G	0.000	2412.288	31445.371	-4280.161	-13280.597	1058.884
ON2H	-1929.288	1705.479	31445.371	2909.195	-35013.488	1005.574

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II. UN-FACTORED LOAD COMBINATIONS

FIXED JOINTS REACTION FORCES AND MOMENTS REPORT

SACS-IV SYSTEM FIXED JOINTS REACTION FORCES AND MOMENTS

JOINT NUMBER	LOAD CASE	FORCE(X) KN	FORCE(Y) KN	FORCE(Z) KN	MOMENT(X) KN-M	MOMENT(Y) KN-M	MOMENT(Z) KN-M
TMIJ	EA1A	-4804.109	0.000	23605.197	31444.092	-66184.711	454.973
	EA1B	-3396.506	-3144.974	23605.197	65199.668	-50962.715	-1347.627
	EA1C	0.000	-4448.335	23605.197	79238.945	-14111.646	-2361.107
	EA1D	3396.506	-3144.974	23605.197	65320.566	22789.531	-1990.960
	EA1E	4804.114	-0.000	23605.197	31615.098	38132.539	-454.871
	EA1F	3396.506	3144.969	23605.197	-2140.460	22910.436	1347.623
	EA1G	0.000	4448.339	23605.197	-16179.883	-13940.638	2361.126
	EA1H	-3396.506	3144.969	23605.197	-2261.362	-50841.809	1990.957
	EA2A	-4804.109	0.000	23605.197	-15707.797	-66184.711	454.973
	EA2B	-3396.506	-3144.974	23605.197	18047.779	-50962.715	-1347.627
	EA2C	0.000	-4448.335	23605.197	32087.064	-14111.646	-2361.107
	EA2D	3396.506	-3144.974	23605.197	18168.680	22789.531	-1990.960
	EA2E	4804.114	-0.000	23605.197	-15536.790	38132.539	-454.871
	EA2F	3396.506	3144.969	23605.197	-49292.348	22910.436	1347.623
	EA2G	0.000	4448.339	23605.197	-63331.770	-13940.638	2361.126
	EA2H	-3396.506	3144.969	23605.197	-49413.246	-50841.809	1990.957
	EA3A	-4804.109	0.000	23605.197	31443.689	-47324.113	454.973
	EA3B	-3396.506	-3144.974	23605.197	65199.270	-32102.113	-1347.627
	EA3C	0.000	-4448.335	23605.197	79238.547	4748.949	-2361.107
	EA3D	3396.506	-3144.974	23605.197	65320.164	41650.129	-1990.960
	EA3E	4804.114	-0.000	23605.197	31614.697	56993.137	-454.871
	EA3F	3396.506	3144.969	23605.197	-2140.859	41771.031	1347.623
	EA3G	0.000	4448.339	23605.197	-16180.283	4919.956	2361.126
	EA3H	-3396.506	3144.969	23605.197	-2261.761	-31981.213	1990.957
	EA4A	-4804.109	0.000	23605.197	-15707.396	-47324.113	454.972
	EA4B	-3396.506	-3144.974	23605.197	18048.180	-32102.119	-1347.627
	EA4C	0.000	-4448.335	23605.197	32087.465	4748.949	-2361.107
	EA4D	3396.506	-3144.974	23605.197	18169.080	41650.129	-1990.960
	EA4E	4804.114	-0.000	23605.197	-15536.389	56993.137	-454.871
	EA4F	3396.506	3144.969	23605.197	-49291.945	41771.031	1347.623
	EA4G	0.000	4448.339	23605.197	-63331.367	4919.956	2361.126
	EA4H	-3396.506	3144.969	23605.197	-49412.844	-31981.215	1990.957
	EANA	-4804.109	0.000	23605.201	11404.541	-60054.965	454.973
	EANB	-3396.506	-3144.974	23605.201	45160.117	-44832.969	-1347.627
	EANC	0.000	-4448.335	23605.201	59199.402	-7981.901	-2361.107
	EAND	3396.506	-3144.974	23605.201	45281.016	28919.279	-1990.960
	EANE	4804.114	-0.000	23605.201	11575.549	44262.285	-454.871
	EANF	3396.506	3144.969	23605.201	-22180.008	29040.180	1347.623
	EANG	0.000	4448.339	23605.201	-36219.434	-7810.894	2361.126
	EANH	-3396.506	3144.969	23605.201	-22300.908	-44712.062	1990.957
	OA11	0.000	-0.000	23605.197	31529.596	-14026.142	-0.000
	OA1A	-2193.016	0.000	23761.201	33521.980	-39810.445	234.257
	OA1B	-1550.461	-1373.344	23761.201	47666.145	-32646.469	-471.063
	OA1C	0.000	-1981.498	23761.201	55448.699	-15309.749	-1329.549
	OA1D	1550.457	-1373.344	23761.201	47716.496	2047.777	-802.303
	OA1E	2193.012	-0.000	23761.201	33593.199	9262.131	-234.261
	OA1F	1550.457	1373.341	23761.201	19449.078	2098.127	471.071
	OA1G	0.000	1942.491	23761.201	13566.479	-15238.530	900.551
	OA1H	-1550.461	1373.341	23761.201	19398.727	-32596.121	802.310
	OA21	0.000	-0.000	23605.197	-15622.294	-14026.144	-0.000
	OA2A	-2193.016	0.000	23761.201	-13629.907	-39810.445	234.257
	OA2B	-1550.461	-1373.344	23761.201	514.257	-32646.469	-471.063
	OA2C	0.000	-1981.498	23761.201	8296.815	-15309.749	-1329.549
	OA2D	1550.457	-1373.344	23761.201	564.608	2047.776	-802.303
	OA2E	2193.012	-0.000	23761.201	-13558.688	9262.131	-234.261
	OA2F	1550.457	1373.341	23761.201	-27702.811	2098.127	471.071
	OA2G	0.000	1942.491	23761.201	-33585.406	-15238.530	900.551
	OA2H	-1550.461	1373.341	23761.201	-27753.158	-32596.121	802.310
	OA31	0.000	-0.000	23605.197	31529.193	4834.453	-0.000
	OA3A	-2193.016	0.000	23761.201	33521.582	-20949.852	234.257
	OA3B	-1550.461	-1373.344	23761.201	47665.746	-13785.875	-471.063
	OA3C	0.000	-1981.498	23761.201	55448.305	3550.846	-1329.549
	OA3D	1550.457	-1373.344	23761.201	47716.094	20908.371	-802.303
	OA3E	2193.012	-0.000	23761.201	33592.797	28122.725	-234.261
	OA3F	1550.457	1373.341	23761.201	19448.678	20958.723	471.071
	OA3G	0.000	1942.491	23761.201	13566.080	3622.065	900.551
	OA3H	-1550.461	1373.341	23761.201	19398.328	-13735.524	802.310
	OA41	0.000	-0.000	23605.197	-15621.893	4834.452	-0.000

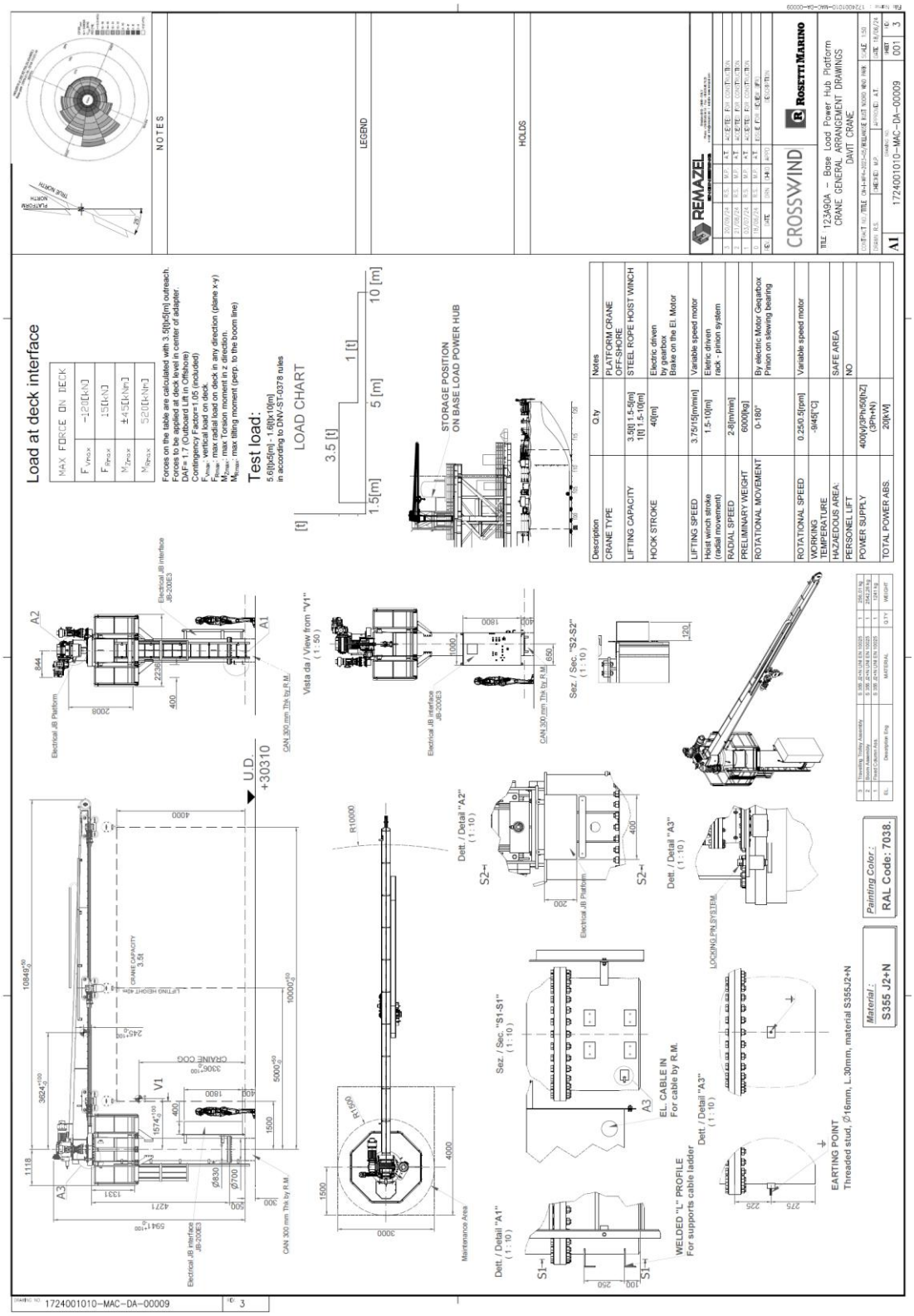
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OA4C	0.000	-1981.498	23761.201	8297.218	3550.846	-1329.549
OA4D	1550.457	-1373.344	23761.201	565.010	20908.371	-802.303
OA4E	2193.012	-0.000	23761.201	-13558.287	28122.725	-234.261
OA4F	1550.457	1373.341	23761.201	-27702.408	20958.721	471.071
OA4G	0.000	1942.491	23761.201	-33585.008	3622.064	900.551
OA4H	-1550.461	1373.341	23761.201	-27752.760	-13735.524	802.310
OAN1	0.000	-0.000	23605.201	11490.047	-7896.397	-0.000
OANA	-2193.016	0.000	23761.201	13482.433	-33680.699	234.257
OANB	-1550.461	-1373.344	23761.201	27626.596	-26516.725	-471.063
OANC	0.000	-1981.498	23761.201	35409.152	-9180.003	-1329.549
OAND	1550.457	-1373.344	23761.201	27676.947	8177.521	-802.303
OANE	2193.012	-0.000	23761.201	13553.650	15391.875	-234.261
OANF	1550.457	1373.341	23761.201	-590.470	8227.873	471.071
OANG	0.000	1942.491	23761.201	-6473.068	-9108.785	900.551
OANH	-1550.461	1373.341	23761.201	-640.821	-26466.375	802.310

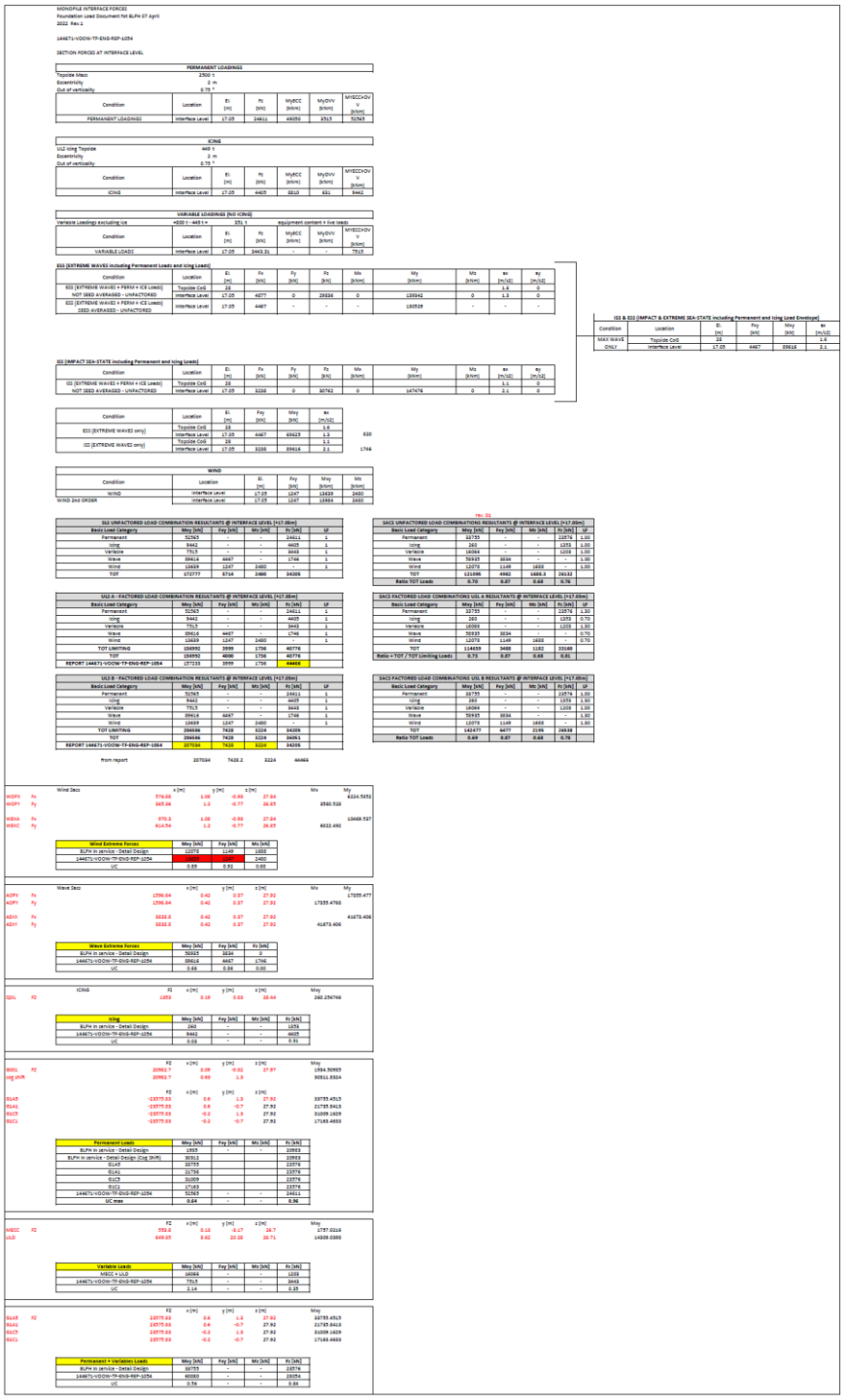
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APPENDIX E – DAVIT CRANE SPECIFICATION

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NOTES
LEGEND
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Load at deck interface
MAX FORCE ON DECK
Test load:
LOAD CHART
STORAGE POSITION ON BASE LOAD POWER HUB
Description
CRANE TYPE
LIFTING CAPACITY
HOOK STROKE
LIFTING SPEED
RADIAL SPEED
PRELIMINARY WEIGHT
ROTATIONAL MOVEMENT
ROTATIONAL SPEED
WORKING TEMPERATURE
HAZAEDOUS AREA
PERSONEL LIFT
POWER SUPPLY
TOTAL POWER ABS
REMAZEL
CROSSWIND
ROSETTI MARINO
TITLE 123A90A – Base Load Power Hub Platform
CRANE GENERAL ARRANGEMENT DRAWINGS
DAVIT CRANE
1724001010–MAC–DA–00009
Painting Color :
RAL Code: 7038.
Material :
S355 J2+N
WELDED "L" PROFILE
For supports cable ladder
EARTING POINT
Threaded stud, Ø16mm, L.30mm, material S355J2+N
EL. CABLE IN
For cable by R.M.
LOCKING PIN SYSTEM

APPENDIX F – MAXIMUM LOADS FOR MONOPILE FOUNDATION



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