ULTIMATE STRENGTH ANALYSIS OF STEEL JACKET PLATFORM

By

AHMAD FAWWAZ BIN AHMAD SOHAIMI

FINAL PROJECT REPORT

Submitted to the Civil Engineering Programme
in Partial Fulfillment of the Requirements
for the Degree
Bachelor of Engineering (Hons)
(Civil Engineering)

Supervisor: Assoc. Prof. Dr Narayanan Sambu Potty

Universiti Teknologi Petronas
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

Study on Ultimate Strength of Steel Jacket Platform

by

Ahmad Fawwaz Bin Ahmad Sohaimi

A project dissertation submitted to the
Civil Engineering Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF ENGINEERING (Hons)
(CIVIL ENGINEERING)

Approved by,

(Assoc. Prof. Dr Narayanan Sambu Potty)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

June 2010

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

AHMAD FAWWAZ BIN AHMAD SOHAIMI

ABSTRACT

Currently, there are about more than 80% of offshore platform around Malaysia's block field aged 30-40years which beyond the original design life of 25 years. With the several numbers of the platform services beyond the original design life, structural assessments need to conduct the gauge platform performance throughout for the extended years. There was 2 common method widely used, simplified ultimate strength analysis and static pushover analysis. Simplified ultimate strength defined as when any of member, joint, pile steel strength and pile soil bearing capacity reaches its ultimate capacity. That result the overview of the platform ultimate strength. Static pushover analysis generally concentrates on RSR (Reserve Strength Ratio) and REF (Reserve Resistance Factor) for the ultimate strength. The report summarizes two parts of analysis, first the study of ultimate strength of different leg jacket platform and the second part is the bracing configuration study. The analyses were a non-linear analysis where the load will distribute to an alternative of the steel framework until the structure collapse under allocated condition. It is found that a platform with more legs has higher ultimate strength compared to less number of legs. Hence a bigger jacket platform with eight legs has much stiffen than smaller platform and mostly installed at rough area. Another part of analysis of bracing configuration study where X-bracing contributes highest rigidity to the whole platform by retaining the platform until the highest load reported compare to another configuration.

AKNOWLEDGEMENT

Throughout the progress of my Final Year Project, I would like to acknowledge my family for always being there to provide moral support to me and also provided their knowledge on the respected field in order for me to input to the FYP as additional information. Also to all individuals that has helped in any way, but whose name is not mentioned here

The next acknowledgement would be tribute towards my Final Year Project supervisor which is Assoc. Prof Dr. Narayanan Sambu Potty in assisting and supervising throughout the FYP progress. During the progress of the FYP, Dr. Narayanan provided lots of feedback that is related to the project as well as provided his valuable experience on the subject. He also introduced to me the aspects needed to do my FYP and the methods which are to be used to analyze the project so that the needed result can be obtained. Besides that, Dr. Narayanan always provides with several reading journal paper and also encounter problem based on the project. More on that, he also suggest and recommend on method to improve to the validity and quality. Other than that, to the Final Year Research Project Coordinator, Dr Mohamed Hasnain Isa and Ms Husna Takaijudin for providing and organizing important workshop related to project and also engineering practice.

The next acknowledgement would be diverted to the various staff in my Internship host company which is RNZ (M) Integrated Sdn.Bhd. but most of the credit would be given to my supervisor at the host company which is Ms. Sapiah Sheik Husin provided I mostly with the knowledge needed to cope with the SACS software and the specific detail upon collapse analysis. But most of all she provided a lot of guidance as well as the opportunity to use the data which is obtained from my internship to use as the data needed to analyze the parameters that are being used to obtain the ultimate strength of offshore jacket platforms.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

RON	Research Octane Number
SACS	Structural Analysis Computer System
API	American Petroleum Institute
AISC	American Institute of Steel Construction
PTS	Petronas Technical Specification
WSD	Working Stress Design
MSL	Mean Sea Level
FOS	Factor of Safety
ULR	Ultimate Linear to Ratio
LRFD	Load Resistance Factored Design
SUS	Simplified Ultimate Strength
RSR	Reserve Strength Ratio
REF	Reserve Resistance Factor
RF	Redundancy Factor
DSR	Damage Strength Rating
FE	Finite Element
Hmax	Individual Maximum Wave Height
Tass	Associated Wave Period for Hmax
HAT	Highest Astronomical Tides
LAT	Lowest Astronomical Tides
MSI	Musculoskeletal injuries
HSE	Health, Safety & Environment
OSHA	Occupational Safety Health Act

CHAPTER 1
INTRODUCTION

1.0 BACKGOUND OF STUDY

Offshore structure used for oil and gas extraction under the seabed. Common functions provide a safe, dry working environment for the equipment and personnel who operate the platform. Offshore structures are of 2 categories namely fixed platform and floating platform. Examples of a fixed platform are, steel-jacket platform, jack-up and compliant tower while example of floating platform are spar, semi-submersible and FPSO. These platforms been designed for criteria location for the design life. But many platforms in Malaysia aged about 30-40years old. As example, PETRONAS platform located offshore Kerteh which has been under operation for about 30 years and some of the very early platforms are still in service. Over the last 10 years or so, various structural integrity assessments have been carried out on the platforms to gauge its safety and usability. Some of these platforms have been analyzed using pushover analysis while others have not been analyzed at all. It is the intention of this research to analyze some of the platforms, which have not been analyzed in detail, in order to define maintenance and up gradation requirements for their continued utilization. Obtaining latest metocean data and related SACS input file (model) for different type of jacket platform in the Malaysian region from RNZ Integrated(M) Sdn. Bhd. Using different type of jacket platform, analyze for ultimate strength and further research on the reliability of the existing structure.

1.1 PROBLEM STATEMENT

The increasing of oil price and demand has lead to the increasing oil production. The oil companies are competing for these purposes. They have expanded their aged jacket platform to certain year to extract oil that still remains under the seabed. Various structural integrity assessments carried out to check for platforms performance throughout the expanded design life.

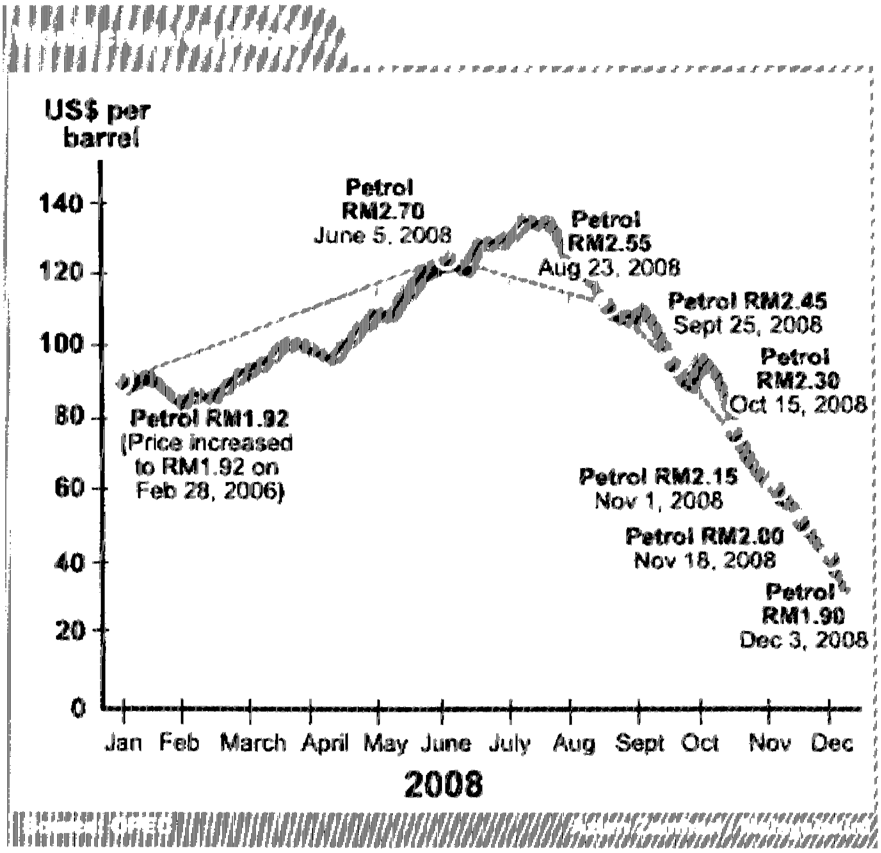


Figure1.1: Malaysia Petrol Price Chart in 2008 (source: Malaysiakini)

As shown in figure how a price and demand of crude oil of the worldwide. The statistics nowadays shows that the demand of oil as the primary sources of power rely boost up the price and also demand. The trend illustrate by the figure were affected by the political issues regarding the oil price in Malaysia. Looking at the rough picture, today the oil price for the RON 97 had been increased to RM 2.00/ litre. For the worldwide, the oil price suspected will increase to certain number due to the reserve oil block field. As result, the offshore structures with over design life are still in serving of extracting oil and gas to cater for the demand.

With the current oil price worldwide drop to certain number, an exploration of a new oil reservoir is costly compared with the maintaining the existing structure. In managing the cost expenditure, some oil operators spend upon the maintenance of existed old platform for extracting process. This competitive pressure and regulatory constrain are placing increasing demand on effective ultimate strength analysis method develop by researcher to meet with the demand. A study of progressive collapse load upon selected platform in order to study the behaviour of a different legged platform for data comparison.

1.2 OBJECTIVES OF THE PROJECT

- The develop SACS input file and collapse input file for ultimate strength check of an offshore structure in the Malaysian region.
- To evaluate and compare the ultimate strength of different legged platform.
- To evaluate the differences in term of bracing framework with respect to collapse loading.

1.3 SCOPE OF PROJECT

The scopes of studies involved SACS modeling of existing structure to check for structural integrity. The scope of the project relies on module below:

- Performing SACS Full Plastic Collapse Analysis
- API, 'Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms - Working Stress Design', API RP2A-WSD 21st Edition, December 2000.
- Petronas, 'Design of Fixed Offshore Structures', PTS 20.073, December 1983 and 'Supplementary to PTS 20.073', Rev. 4, August 2005.
- AISC, 'Manual of Steel Construction – Allowable Stress Design', AISC-ASD 9th Edition 1989.

All the environmental conditions which includes wave, wind and current conforming to the selected load cases and combinations used in the original design report shall be reviewed and updated based on the latest available metocean data. Through non-linear analysis of SACS Collapse module, evaluate the difference between working stress design and load resistance factor design. Design limitation based on data received from RNZ (M) Integrated Sdn. Bhd. Metocean data and other relevant input follow as per design. SACS input file were retain as per design basis. Only minor command introduce in the file for the purpose of non-linear analysis of Full Plastic Collapse Analysis.

Reference code of API RP2A-WSD, PTS 20.073 and AISC utilizes in part of modelling with the update information. The code provide a reference in load factor, member and joint design, environmental data, corrosion study and other related information regarding jacket structure.

1.4 RELEVANCY OF THE PROJECT

This project is relevant to the study of Design of Offshore Structure as well as the study of Ocean and Coastal Engineering. This project is also relevant to the recent issued regarding the oil industry in the country.

The project is feasible as it utilizes a program called SACS 5.2 Executive (Structural Analysis Computer System) and analyzes the data which can be obtained from the projects "Provision for Structural Integrity and Spectral Fatigue Analysis for Five (5) Platforms for Petronas Carigali Sdn Bhd Peninsular Malaysia Operations (PCSB-PMO)". Microsoft Excel as a tool for other type of formulation, in term of wave attack angle, wind speed computation and output data synchronization for the purpose of user friendly.

CHAPTER 2
LITERATURE REVIEW

2.0 INTRODUCTION

Review for the study was taken abundantly from journals, books and the internet. Basically, spot to be highlighted for the study of ultimate strength or capacity of a steel jacket platform. Here are some notes taken for the study:

2.1 GENERAL INFORMATION OF JACKET PLATFORM

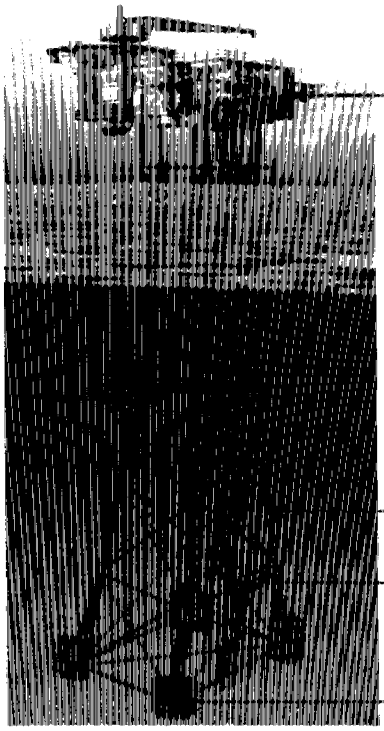


Figure 2.1: Typical Jacket Platform

The figure illustrate example of jacket platform with 4-legged. Majority of the structure installed in shallow water area (30m-500m). The platform categorize into 2 parts:

- Substructure
- Superstructure

Substructure located below mean sea level (MSL) and consists of jacket leg, member, trusses, conductor, anode, caissons and more according to its design. Superstructure for above MSL where locate main deck, cellar deck, helideck, equipment and more with reference to platform function.

2.1.1 Substructure (Jacket)

The jacket (substructure) provide protective layer around the pipes for oil extraction from under the seabed. The jackets also serve as template for initial deriving of pile (the pile driven through the jacket leg).Jacket platform are consists of an open tubular steel space-frame construction and supported by file foundation. Jackets, the tower-like braced tubular structures, generally perform two functions:
The jacket takes loadings from environmental and topside and transfer the load the foundation through pile installed within the jacket leg. The size of jacket leg varying from 11m - 20m diameter to cater for the design load at different depth and location. Jacket platform differentiate through its leg. Basically there were three (3), four (4), six (6), eight (8) and sixteen (16) legs. Bracing within the jacket structure designed to cater for load paths and responsible for the structure redundancy. The world record was the Shell's Bullwinkle platform installed in 1991 with water depth of 412m.The installation methods for the jacket and the piles have a profound impact on the design.

2.1.2 Pile Foundation

The jacket foundation is provided by open-ended tubular steel piles, with diameters up to 2m. The piles are driven approximately 40-80 m, and in some cases 120 m deep into the seabed. The piles driven depend on the soil types at the area, deeper penetration needed for softer soil to avoid settlement of the platform foundation.

Difference design and types specify for each speciality. Generally there were three (3) main design of piling use in the industry. See Figure 2.2 for the illustration of piling. The three type of piling as follows:

Pile-through-leg	Pile inserted within the jacket leg member. The piles penetrate into the soil through jacket leg by hammering from the tip of jacket leg member.
Skirt piles	Pile is installed in guides attached to the jacket leg. Skirt piles can be grouped in clusters around each of the jacket legs.
Vertical skirt piles	Directly installed in the pile sleeve at the jacket base; all other guides are deleted

Table 1: Pile description

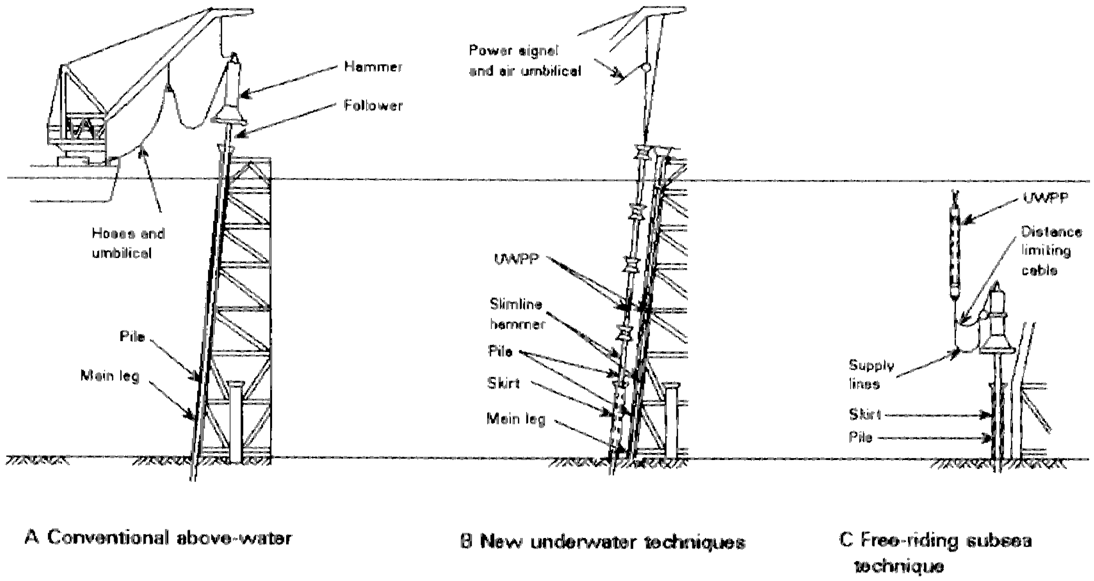


Figure 2.2: Jacket foundation types with conventional and new pile – driving technique

2.1.3 Corrosion Protection

For below MSL, a sacrificial anode (approximate 3 KN each) consists of a zinc/aluminium bar cast about a steel tube and welded on to the structures cathodic protection. As for design, total anodes weight attaches approximately about 5% of the self weight jacket steelwork. Wall thickness of jacket leg at splash zone increase by 12mm to cater corrosion effect due to air and sea water at splash zone, approximately in range of (-3m till 3m) of MSL.

2.1.4 Topsides

Topside or superstructure located above mean sea level with an appropriate air gap. The structure supported by jacket leg connected to the top of piles which extend to seabed and driven into soil for rigidity. The structure made of tubular steel, wide flange, plate girder and other steel member properties. Located equipment for mean of functions listed as follows:

- well control
- support for well work-over equipment
- separation of gas, oil and non-transportable components in the raw product,
- support for pumps/compressors required to transport the product ashore
- power generation
- Accommodation for operating and maintenance staff (manned platform)

Topsides design characterize by two(2) difference properties, which integrated and modularized topside which are positioned either on jacket leg.

Various structural integrity assessments have been carried out upon the jacket platforms around offshore Malaysia field block to gauge its safety and usability for the extended service. Some of these platforms have been analyzed to pushover status to gauge its performance. Research done by several individual or parties result in varies method of determining an aged platform performance. Therefore the literature review discusses the analysis or methods develop by researcher to get the ultimate capacity of a platform. Those analyses are as below:-

- Simplified ultimate strength analysis
- Static Pushover Analysis

2.2 SIMPLIFIED ULTIMATE STRENGTH ANALYSIS

Assessment for an aged structure involves analysis of design basis check, design level analysis and ultimate strength analysis. Checking for the ultimate strength with respect to API RP2A. The indication such as excessive deformation or resistance to total collapse may provide better measure to judge the structure integrity. The structure strength determine from static pushover analysis and cyclic loading for severe storm condition. SACS Collapse program relate the deflection, direct stiffness to solve for geometric and material non-linearity associated with the ultimate load capacity of a structure.

API RP2A-LRFD develop based on reliability based calibration which the platform checked for combined action of extreme wave (storm condition), current and wind that account for joint probability off-occurrence. Define partial FOS=1.35 for the condition. Computed the wave forces with respect to the drag and inertia coefficients (Cd and Cm):

Smooth Cd = 0.65, Cm = 1.60

Rough Cd = 1.05, Cm = 1.20

The code also gives equations for calculating load-resistance factor for cylindrical members under tension, compression, bending, shear and etc, including combine loads. The load resistance factor for combined axial tension and bending can be calculated using the provide equation:

$$1-\cos\left[\frac{\{\Pi(f1)\}}{\{2\phi Fy\}}\right]+\frac{[(fby)^2+(fbz)^2]^{1/2}}{(\phi bFbn)}\leq 1.0$$

Where,

f_{by} = bending stress about member y-axis (in-plane)

f_{bz} = bending stress about member z-axis (out-plane)

F_{bn} = nominal bending

F_y = yield strengths

F_t = axial tensile stress

Φ_t =Ø resistance factor for axial tensile strength (=0.95)

Φ_b = resistance factor for bending strength (=0.95)

The load-resistance factor for combined axial compression and bending can be calculated from the equations.

$$\frac{(fc)}{(2\phi c Fcn)} + \left\{\frac{1}{(2\phi b Fbn)}\right\}\left[\left\{\frac{(Cmy\, fby)}{\left(1-\frac{fe}{(\phi c Fey)}\right)}\right\}^{2}\right]^{½} \leq 1.0$$

And

$$1-\cos\left[\frac{\{\Pi(f1)\}}{\{2\phi Fy\}}\right] + \frac{\left[(fby)^2+(fbz)^2\right]^{½}}{(\phi b Fbn)} \leq 1.0$$

$$Fc < \phi c Fxc$$

Where,

C_{my} = reduction factor corresponding to the member y-axis

C_{mz} = reduction factor corresponding to the member z-axis

F_{ey} = Euler buckling strength corresponding to the member y-axis

F_{ez} = Euler buckling strength corresponding to the member z-axis

$F_{ey} = Fy / \lambda y^2$

$F_{ez} = Fz / \lambda z^2$

λ = column slenderness parameter for member in respective axes

F_{cn} = nominal axial compressive strength

F_c = axial compressive stress due to factored load

Φc = resistance factor for axial compressive strength, 0.85

The load resistance factor should be less than equal to 1.0. The equations for strength checks of tubular joints are also given in API RP2A-LRFD.

For assessment of existing platforms, the criteria depend on the category of the platform, which consider life safety, and consequences of failure. Krieger, *et al* has recommended two factors for ultimate strength checks for existing platforms namely:

- Ultimate to Linear Ratio (ULR)
- Reserve Strength Ratio (RSR)

ULR defined that a ratio of the ultimate resistance load to that causing a unity check of 1.0 in the original design and RSR defined as the ration of the ultimate strength load to the 20th edition (100-year) design load. For manned platforms with or without significant environmental impact, a ULR of 1.8 and RSR of 1.6 are recommended, while platforms of minimum consequence a ULR of 1.6 and RSR of 0.8 are recommended

Simplified Ultimate Strength (SUS) is generally estimated based on the smallest of the four base shear values obtained when the first of the following component classes reach its ultimate capacity:-

a. joints
b. members
c. pile steel strength
d. pile soil bearing capacity

The platform base shear values that satisfy each of these conditions are determined from a linear analysis by using respective API RP2A-LRFD equations with the load and resistance.

In simplified approach, a linear static global analysis of the structure is performed for forces due to the combined action of gravity loads and extreme wave loads (100-year return period) and associated current and wind effects. The structure is loaded with series of monotonically increasing environmental load conditions from all directions of interest. Member and joint forces are obtained from the analysis and for each load condition the strength checks are made for the members, joint and etc using API RP2A-LRFD. The load is increased after each stage until any component of the structure fails or reaches its ultimate strength. The platform attains ultimate strength when any member or joints reach its ultimate capacity. The first member/joint failure is obtained and the load factor corresponding to this is calculated as ratio of the base shears corresponding to the first member failure and the 100-year environmental load. The analysis is further performed by removing the failed member from the model, if alternative load paths are available to bypass a failed member. The analysis is terminated when there is no alternative load path or deformation of the structure exceeds beyond a limit from a functional considerations. The reserve strength ratio is then calculated as the ratio of the base shears corresponding to collapse load and first member failure. Full ultimate strength analysis using non-linearity can be restored to if the simplified ultimate strength analysis does not meet the requirements for requalification.

The analysis conducted upon API RP2A-LRFD that recommends using linear wave theory and Morrison equation to conduct series of calculation regarding wave and current to the structural member. Yield stress of steel member retaining as per design basis requirement. Base shear for first member failure obtained from each attack angle to get the factor of first member failure, factor for collapse load and reserve strength ratio. The output data synchronize into several categories listed as follows:

- Lateral load for 100-year storm condition
- First member failure load, Pmf
- Factor for first member failure
- Collapse load, Pu
- Factor for collapse load
- Deformation corresponding to Pmf
- Deformation corresponding to Pu
- Reserve strength ratio

All the values taken from the output data expect for factor and ratio where the values originate from respective value. The formulas for the factors given as follows:

$$Factor\ for\ first\ member\ failure = \frac{First\ member\ failure\ load, Pmf}{Lateral\ load\ for\ 100 - year\ storm\ condition}$$

$$Factor\ for\ collapse\ load = \frac{Collapse\ load, Pu}{Lateral\ load\ for\ 100 - year\ storm\ condition}$$

$$\text{Re}\,serve\ strength\ ratio = \frac{Factor\ for\ collapse\ load}{Factor\ for\ first\ member\ failure}$$

Another approach proposed by Vannan et al where a linear static in place analysis done by performing increasing environmental loading until first member or other component failure occurs. Unity check reported above 1.0 allocated as the ultimate strength of the structure. Other simplified methods introduce by Bea and Mortazavi prove to be reasonable estimates platform load capacity relative to results obtains from detailed static pushover analysis.

2.3 STATIC PUSHOVER ANALYSIS

A research conducted regarding the response of jacket structure to any subjected load especially extreme condition (100-year return period storm wave) to estimate to ultimate strength of tubular framed structure. In order word the check for reserve capacity of the structure. An elastic frame analysis is performed, typically with the elements rigidly connected. November 1993, an API preliminary draft for RP 2A-WSD Section 17.0 for the assessment of existing platforms was circulated, in which a sequence of analysis from screening, through design level to ultimate strength assessment is advocated to demonstrate structural adequacy. At the ultimate strength level it is proposed that a platform may be assessed using inelastic, static pushover analysis.

The research begins with Lloyd and Clawson (1984) discussing sources of reserve and residual strength of 'frame behaviour'. Continue on with Marshall (1979) entitled behaviour of elastic element and ultimate strength system. Marshall and Bea (1976) demonstrated reserve safety factor and Kallaby and Millman (1975) for inelastic analysis energy absorption capacity of the Maui A platform under earthquake loading. Recent investigation shows that static pushover analysis generally suffices to demonstrate a structure's resistance to the cyclic loading of the full storm.

Trends for lighter, lift able jackets and new concepts for deepwater provide additional impetus to the study. Fewer members in the splash zone may increase the risk to topsides safety in the event of impact, and the deletion of members with the low elastic utilisations to save weight reduces the capacity for redistribution structural configuration along the alternative load paths. Comparative calculation of reserve capacity for different structural configurations can help ensure that levels of reserve strength and safety embodied within the older designs are maintained. Therefore there has been requirement to develop an understanding and the corresponding analytical tools to be able to predict system reserves beyond individual component failure capacities, in order to demonstrate integrity in the event of such extreme loading scenarios occurring.

Reserve strength defined as the ability of structure to sustain loads in excess of the design value. Introduce the term RSR (Reserve Strength Ratio) (Titus and Banon, 1988) and REF (Reserve Resistance Factor) (Lloyd and Clawson, 1984).

$$RSR = \frac{Ultimare\ Platform\ Resistance}{Design\ Load}$$

$$REF = \frac{Environmental\ Load\ at\ Collapse\,(undamaged)}{Design\ Environmental\ Load}$$

Fixed offshore structure spread load to a network of path result that a failure at a single member does not necessary lead to catastrophic structural collapse. Measuring redundancy explain in 2 ways, redundancy factor (RF) and damaged strength rating (DSR). Measurements are load case dependent and any structure may exhibit very different redundancy properties for different loading direction.

Reserve strength evaluated by applying the maximum loading from the extreme event and performing 'pushover' analysis. For and extreme storm, the environmental loading is cyclic, imposed on an underlying dominant direction. The maximum wave is unlikely to be an isolated event, but will be a peak in series of extreme loads. The possibility of cyclic degradation of components which have failed, or approaching failure even though overall structure resistance may remain adequate, therefore needs to be considered. Basic ideas of static pushover analysis is where a single load is applied to any specific location while cyclic analysis is a 'storm load' sequence of particular amplitude applied to the structure. Shakedown effects studied using non-linear FE analysis at SINTEF (Hellan et al, 1991) in provision of low cycle-high stress fatigue. Published in 1993, relies studies of North Sea Jackets, recommend that an extreme event static analysis generally suffices to demonstrate structure's resistance to the cyclic loading of a full storm. The study continues from SINTEF to Shell Research at the Offshore Mechanics and Artic Engineering Conference in 1993 (Stewart er al, Stewart and Tromns, Eberg et al and Hellan et al).

Under loading, structure convert into elasto-plastic range yielding occurs reducing the stiffness and introducing permanent plastic deformations. Under cyclic load, the yields repeats and result in three (3) different forms of response:

- Low cycle fatigue

- Incremental collapse
- Shakedown

2.4 JACKET BRACING FRAMEWORK

SOH C.K (1990), Complexity of an offshore structure rely on the fabrication process where the location of yard to the site (oil block). A preliminary and detail design need to cater the critical activities during bringing the structure from yard to the site. Combination of load-out, lifting and transportation process generate a load that putting the structure in extreme condition where the design will be tested upon the critical joint or member section. For load-out and lifting procedure will be monitored carefully at the barge but during transportation on a barge, there are more uncontrolled variable of sea behaviour. In order to counter with the variable an effective preliminary and final design are needed to gauge the structure performance with respect to storm condition. The procedure in design breakdown into point below:

- Selection of appropriate elevation and member size
- Number of leg and the inclined angle
- Horizontal framing (nos)
- Bracing framing system
- Location of support structure and appurtenances

Main differences in any jacket structure are the features listed above. These features were meant for optimum design of an offshore structure according to its allocated oil block. Rough environment block needed a stronger substructure to hold the whole structure against any extreme condition. An optimum design defined as the whole substructure system in term of size, number of legged and bracing system.

In designing an appropriate, optimum or cost effective substructure system, a series of study had been done on the environmental condition of the specified area. Using the storm condition as the design benchmark in measuring the response of the structure against an extreme may occurred in the area. There are several factors affecting the substructure design, but the main highlighted component is the bracing framework of the structure. Bracing provide a load paths for all the loads to be shared by other member in avoiding a local member failure and result in collapse if the member reach ultimate yield. Bracing framework fabrication generates significant features in term of:

- Cost and time
- Strength

For cost, complexity and more rigid framework requires more steel and thus result in more welding needed forming the bond within the framework. Preparing joint can for member intersections requires more cost where the wall thickness of affected member has to increase to retain the cumulative generated. With more steel, the structure becomes heavier and heavy duty crane is needed to operating lifting procedure. Larger crane consume more energy than the conventional and this resulted in using more resources than usual. Making a complex framework is time-consuming and more manpower needed in attaching and welding the member to fabricate the framework system. In term of strength, a heavy, complex and rigid bracing framework provide a stronger substructure in achieving higher factor of safety. As for cost, time versus strength, an appropriate design for a jacket structure depending on site location and storm condition.

Nelson A (2003), five (5) common bracing configurations applied to the substructure as shown in Figure 2.3:

- X – bracing
- Diamond bracing
- Inverted K – bracing
- K – bracing
- Single diagonal bracing

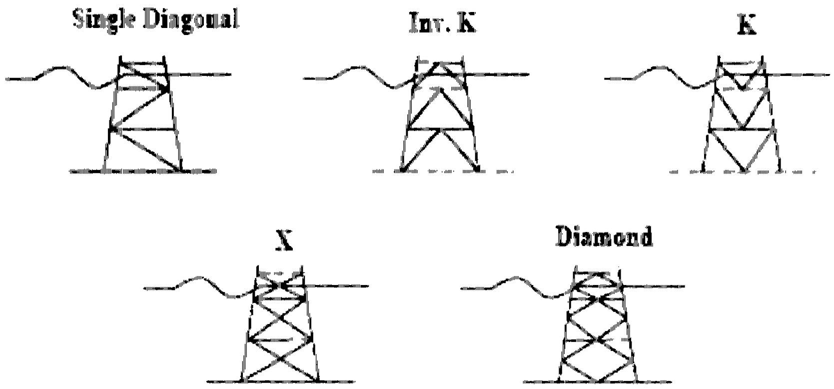


Figure 2.3: Bracing framework schemes

2.5 RELATED ENGINEERING SOFTWARES

Generally, there are two (2) softwares commonly used in designing an offshore platform. The first one SACS (Structural Analysis Computer System) and the other one is USFOS. Usfos, software owned, developed and maintained by Marintek that enhanced in term of progressive collapse analysis of space frame structure. Other than that, functioning for predicting both resistance of structure subject to accidental loads and the residual strength of damaged structure after such loads. The applications listed as follows:

- Pushover analysis
- Accidental loads
- Ship collision
- Fire and explosion
- Reassessment
- Design

Some main features of the program:-

- Buckling and post buckling behaviour
- Local buckling
- Joint flexibility and ultimate strength
- Fracture
- Etc

The output results are performed in Graphical User Interface (GUI). The results are presented as colour fringes on images of the structure, deformed configurations, XYplots and in tables. The structure response and collapse process may be visualized step by step and highly stressed and critical members are easily identified.

SACS®, Structural Analysis Computer System is an integrated structural analysis software package used by the commercial industry world wide. Developed by Engineering Dynamics, Inc., this is the most comprehensive design and analysis package offered to both the offshore and the general structure design industries. Established by three engineers in 1973, EDI converted aerospace-oriented analytical techniques and computer programs into a single integrated *Structural Analysis Computer System* (SACS). In 1974, SACS was made available to private industry on a commercial basis. The system systematically gained worldwide acceptance in the offshore industry, eventually becoming the most widely used computer software for design and analysis of offshore structures. Today, EDI offers the most comprehensive design and analysis software package to both the offshore and the general structure design industries in the form of SACS. The SACS systems is used on every continent and are available as single user and network installations using Windows 9 xs, NT and XP.

SACS software provide user with the capability of large array modelling of a structure from simple two dimensional (2D) space frame analyses to complex three dimensional (3D) finite element analysis. It also features nonlinear static analysis when coupled with PSI module or dynamic response analysis when coupled with the Dynpac, Wave Responses and Dynamic Responses module.

The software provide broad of analysis from linear analysis to complex analysis. The software divides into 3 modules, namely the pre-processor module Pre, the solver module Solve and the post-processor, Post. The Post module separate into several categories as follows:

- Member Check Code
- Member Check location
- Output Report
- Redesign Parameter

The post module features can be directly specified with the documents follows:

- Member check code including: AISC, API RP2A-WSD, API RP2A-LRFD, Norwegian Petroleum Directorate and Danish Offshore
- API and DNV hydrostatic collapse analysis
- API and 2V Bulletins
- Euler buckling check for segmented member
- Automatic member redesign
- Allowable stiffness modifier
- Finite element code check and stiffener stress output

2.6 STATISTICAL T-TEST

William M.K. (2006), the t-test statistic analyze whether a two groups data are statistically different from each other. The main feature of the test is to compare the means of two groups selected. Following a normal distribution data or figure of the statistic, provides significant value between the selected data groups. Significance is a statistical term that describes the difference or relationship between the data. Significance value can vary depending on the data scale selected. With the scale a relationship between the data can be compared and tested.

Microsoft Excel (2003), data analysis features provide several of statistic analysis method called the Analysis ToolPak. With data and parameters, series of complex statistic computation computed using programmed spreadsheet assign for each statistic method. The tool provides appropriate statistical or engineering macro functions and then displays the results in an output table. There are several statistical analysis provided in MS Excel as follows:

- ANOVA
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variance
- Fourier Analysis
- Histogram

- Moving Averages
- Random Number Generation
- Rank and Percentile
- Regression
- Sampling
- t-Test
- z-Test

For the research, utilize the procedure using t-Test in managing the data output generates by the SACS software. The test provides in three (3) of analysis tools that features in different assumptions in evaluating the set of data. The analyses tools as follows:

- t-Test: Two-Sample Assuming Equal Variances
- t-Test: Two-Sample Assuming Unequal Variances
- t-Test: Paired Two Sample For Means

2.6.1 t-Test: Two-Sample Assuming Equal Variances

As referred to 'homoscedastic" test, this type of tool performs analysis of two-sample with the assumption the two data sets came from distributions with the same variances. The final result of the statistic is to determine whether the samples are come from distributions with equal population means.

2.6.2 t-Test: Two-Sample Assuming Unequal Variances

The assumption of the two data sets came from distributions with unequal variances. It is referred to as a heteroscedastic t-test. Use this test when the there are distinct subjects in the two samples. Use the Paired test, described below, when there is a single set of subjects and the two samples represent measurements for each subject before and after a treatment.

The following formula is used to determine the statistic value t.

$$t' = \frac{x - y - \Delta_0}{\sqrt{\frac{S_1^2}{m} + \frac{S_2^2}{m}}}$$

The following formula is used to calculate the degrees of freedom, df. Due to different and precise engineering data, a value needed to calculate at least in four (4) decimal places in retaining the accurate calculation. The degree of freedom will provide the final answer in set of nearest integers for the purpose of simple and neat graphical presentation.

$$df = \frac{\left(\frac{S_1^2}{m} + \frac{S_2^2}{n}\right)^2}{\frac{\left(\frac{S_1^2}{m}\right)^2}{m-1} + \frac{\left(\frac{S2^2}{n}\right)^2}{n-1}}$$

2.6.3 t-Test: Paired Two Sample for Means

Another acronym for this type of tool is paired t-test. With a data regenerate from an equal population means, the test provide a test to a paired of groups data. In other word, the samples can be analyze for before and after effect where if it came from the same set of means. Accumulated measure of the spread of data about the mean, derived from the following formula.

$$S^2 = \frac{n_1 S_1^2 + n_1 S_1^2}{n_1 + n_2 - 2}$$

2.6.4 Analyzing Statistics

In determining the significant of the data, there are two sets of result interpreted as follows:

Statistic is higher than the critical value	Statistic is lower than the critical value
Significant value of compared data	The selected data is insignificant
Reject null hypothesis	Accept null hypothesis

Table 2: t-Test characteristic

CHAPTER 3
METHODOLOGY/PROJECT WORK

3.0 METHODOLOGY/PROJECT WORK

The methodology of the research describe in two (2) phase:

- Full Plastic Collapse Analysis of Different Legged Platform
- Bracing Configuration Study

Investigations of the steel-jacket as the shallow water platform are to be done. A thorough search will be made through the internet, from the libraries and receive from RNZ (M) Integrated SDN BHD to collect all available information on the regarding the steel-jacket platform in offshore context. Collections of technical details regarding various platform SACS input file to compare their performances in the form of ultimate check when they are subjected to incremental loads. Simple linear static analysis and collapse analysis will be carried out for the selected model. The results of the analysis will be objectively compared with the actual performance data. Refer Appendix A for Gantt chart of the study.

3.0.1 Platform Overview

3.0.1.1 Platform A

Platform A is a four (4) pile-through-leg drilling platform installed in 1979 and located at Bekok field. It is supported by four piles. The piles are 54" Ø (137.16 cm). The platform supports twelve (12) numbers of 24" Ø (60.96 cm) conductors, two (2) numbers of riser pipes, three (3) numbers of pipe caisson, one (1) number of boatlanding on the Platform South face and two (2) boatlandings on the Platform West face. The topside comprises of the Upper Deck (EL +19202), Lower Deck (EL+12192). The water depth is 70.71 m. Details of the structure and its configuration are summarized as below:

Structure Function	:	Drilling Platform
Installation Date	:	1979
TAD Rig	:	Jack-Up
Water Depth (MSL)	:	70.71 m (209.56 ft)
No. of Piles	:	4
Pile penetration below mudline	:	79.25 m
Number of Conductor	:	12 nos (66.0 cm Ø)
Number of Anode	:	136
Number of Boatlanding	:	3
Number of Caissons	:	3
Number of Riser	:	2
Number of Riser Guard	:	1

Table 3: Platform A description

A 3-dimensional view of the platform A platform is shown in Appendix B.1

3.0.1.2 Platform B

Platform B is a three (3) pile-through-leg platform installed in 1977 and located at Betty field. It is supported by three piles. The piles are 30" Ø (76.20 cm). The platform supports four (4) numbers of 10.75" Ø (27.31 cm) risers, one (1) number of boatlanding. Details are summarized as below:

Structure Function	:	Storage Platform
Installation Date	:	1977
Water Depth (MSL)	:	70.93 m (236 ft)
No. of Piles	:	3
Pile penetration below mudline	:	68.00 m
Number of Anode	:	136
Number of Boatlanding	:	1
Number of Riser	:	4

Table 4: Platform B descriptions

A 3-dimensional view of the platform B is shown in Appendix B.1

3.0.1.3 Platform C

Platform C is an eight (8) pile-through-leg drilling platform installed in 1979 and located at Bekok field. It is supported by 8 piles. The piles are 54" Ø (137.16 cm). The platform supports thirty two (32) numbers of 24" Ø (60.96 cm) conductors, ten (10) numbers of riser pipes, one (1) pipe caisson, and one (1) number of boatlanding. The topside comprises of the Upper Deck (EL +21184), Lower Deck (EL+14021). The water depth is 67.21 m. Details of the structure and its configuration are summarized as below:

Structure Function	:	Drilling Platform
Installation Date	:	1979
TAD Rig	:	Jack-Up
Water Depth (MSL)	:	67.21 m (209.56 ft)
No. of Piles	:	8
Pile penetration below mudline	:	109.73 m
Number of Conductor	:	32 nos (66.0 cm Ø)
Number of Boatlanding	:	1
Number of Caisson	:	1
Number of Risers	:	10
Number of Riser Guards	:	2

Table 5: Platform C descriptions

A 3-dimensional view of the platform C is shown in Appendix B.1

3.1 METHODOLOGY FLOW CHART

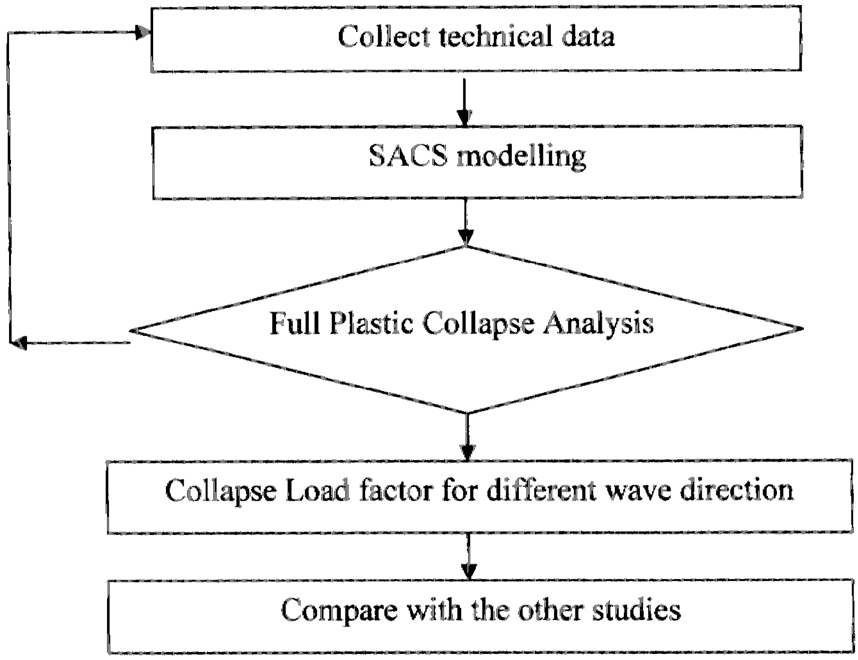


Figure 3.1 Flow chart of full plastic collapse analysis

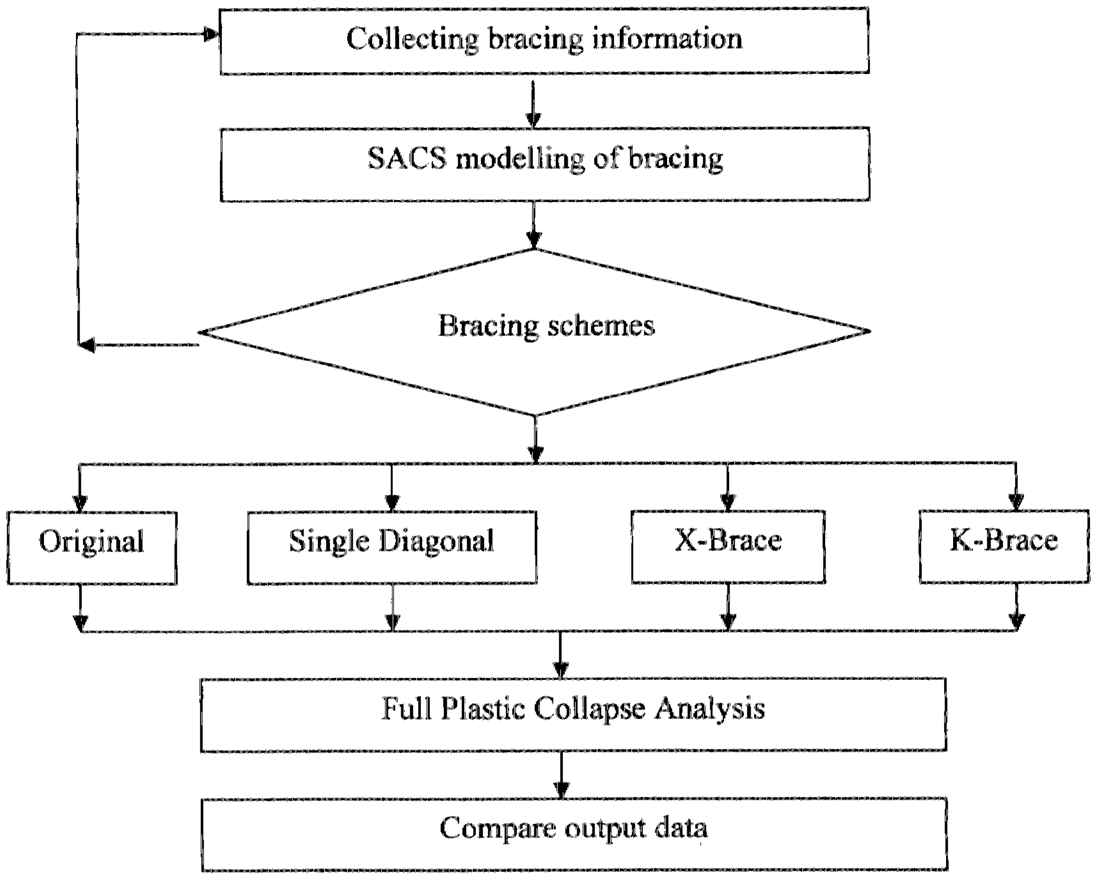


Figure 3.2: Flow chart of bracing configuration study

3.2 FULL PLASTIC COLLAPE ANALYSIS FOR DIFFERENT LEGGED PLATFORM

SACS modelling commence on platform A, B and C by adjusting the original model reference the site visit finding and latest drawing. The dead and live load of the SACS retained as per design basis. Minor adjustment made to the model in term of latest metocean data for the area. Latest data of maximum wave height (Hmax), associate period (Tass), wind speed, current speed and tidal height, HAT and LAT introduce to the model. The environmental loading impact to the platform cater for eight (8) which define in figure below. Only storm condition applied to the platform according to the metocan data as for maximum load acting to the structure. Using stokes's 5th theory define in API RP2A-WSD page 14 for wave/current loading computation. For the purpose of analysis, eight (8) models created for platform A and platform C while twelve (12) models were prepared for platform B since the leg arrangement is tripod and 12 direction need to be covered. Refer Appendix B.3 for reference code regarding wave.

The SACS Collapse module is a non-linear finite element analysis system for structures. Solve for the geometric and non-linear material by associating with the ultimate load capacity by using large, deflection, iterative, direct stiffness solution technique. The method was, the member divide in to several sub-segments along the length and sub-areas to define the cross section. The method allow for gradual plasticification along the member length. Tubular connection flexibility, capacity and failure revise as empirically.

The linear analysis model modified to be suitable for collapse analysis. Design the model to cater for only storm condition wave/current in order to get the strength of the structure in maximum loading criteria, analyze the model for SACS COLLAPSE analysis. The model revises from the linear static analysis part, where the same models will be using for collapse analysis. The directions of wave/current for the models define in Appendix B.4. Design collapse input file according to design basis for load sequence and load increment. Retain the other properties in the collapse input file as per default design. See Appendix B.5 for the collapse input file for the analysis.

The SACS model modified to localize wave, current attack angle for respective direction. For a tripod leg jacket model, 12 models generate to cater for all 12 attack angle as defined in the metocean data. For the remaining four and eight legs platform designed to cater only eight directions as defined in respective metocean data. The main issued to analyze for all direction to evaluate which direction contribute the highest load to collapse. A series of incremental load defined in collapse input file will generate collapse load by utilizing the module of FULL PLASTIC COLLAPSE ANALYSIS in the SACS software. Upon completing the analysis, interprets the output data for:

- Base shear and overturning moment
- Basic load case summary
- Load combination summary
- First member failure load
- Collapse load

Develop factor for first member fail and reserve strength ratio based on base shear and collapse load according the respective output. Using the collapse view module to view out the platform collapsed with its properties. Extract the data mentioned above to determine the structure ultimate strength with respect to its attack direction.

3.3 BRACING CONFIGURATION STUDY

Improvising the original project by commend on remodelling the jacket bracing arrangement. As existence in design basis that, there was another type of bracing arrangement as follows:

- X bracing
- Y bracing
- Single diagonal bracing
- K bracing
- Diamond bracing

These types of bracing provide different share of all load transferred. As for the issues, the original model of platform A and will be remodelled to cater for all type of bracing. Utilizing linear analysis, this new bracing design will undergo stability check in term of UC value of the respective bracing. Allowable value of UC<1.0 indicate that the new designs are acceptable for the collapse analysis.

Modelling the sacs input file (model) of platform A in term of structural bracing framework. Using the identical bracing properties of:

- Size
- Shape
- Wall thickness

New set of bracing framework design for the platforms for all faces designated by Row A, Row B, Row 1 and Row 2. All 4 faces defined as per drawing represent the no of leg of the platform. In modelling, retaining the same member properties for the new bracing member in order to analyze the strength of the structure using the same bracing size but differ in framework schemes. Adding new joint for allocated at the critical location especially modelling for X-bracing and K-bracing where the member intersection at the middle. Refer Appendix B.6 for the view of bracing configuration of platform A.

Applying the non-linear analysis method, a series of incremental load defined in collapse input file will generate collapse load by yielding the steel characteristic to plastic yield. The non-linear analysis computed the load share by the other bracing due to the load paths created by the framework. As for SACS software using module of Full Plastic Collapse Analysis to compute as non-linear until the structure has no alternative load paths available, member reach plasticity and structure collapsed. Upon completing the analysis, interprets the output data for:

- Base shear and overturning moment
- Collapse Solution Summary
- Collapse Load
- Maximum deflection
- RSR

With all bracing model been analyze and compare, a study of the behaviour of the jacket structure with response to the collapse load by the affect of bracing framework strength. All the output from all bracing model tabulate and compare the different in maximum load needed to make the respective member fails.

3.4 HAZARD ANALYSIS

Modelling and analysis using computer software invites glare effect to the eyes and also induced MSI (Musculoskeletal injuries) that include muscles, bones, tendons, blood vessels, nerves and other soft tissues. Spend quite time at a workstation without proper ergonomics apparatus will induced severe damaged to the body. As precaution set up the workstation according to HSE recommendation, OSHA (1994) as follows:

Lights	**Furniture**
• Video display devices: 300-400 lux (30-40 foot candles) • Retain image quality • Shield from direct or intense/bright light: use drapes, dark film, louvers. • Minimize glare; use screen filters • Desktop which have matte finish or dark in color, are less visually fatiguing than those of glossy, reflective finish	• Adjustable height • Able to support body • Table tops: 27 ins high for typing and 29 ins from other tasks • Leg room:27 ins x 27 ins • Height adjustable chairs: ▪ 15-20 ins above the floor ▪ Seat pan 16 ins wide minimum, 18-19 ins preferred ▪ Seat padding should not compress more than one ins when seated

Table 6: Hazard analysis

CHAPTER 4

RESULTS & DISCUSSIONS

4.0 PLATFORM A, B AND C ULTIMATE STRENGTH

Upon completion on all three platforms mentioned above, the result of respective models been interpret and resulted in table and diagrams illustrated below.

Platform	Wave Direction (deg)	First Member Fail Load (kN)	Collapse Load (kN)	RSR	Factor For Collapse
B	0.00	3298.68	4136.79	1.25	2.39
	30.00	4017.31	4331.39	1.08	2.60
	60.00	3207.17	4020.10	1.25	2.27
	90.00	2678.52	3956.14	1.48	2.31
	120.00	3296.41	5142.96	1.56	2.91
	150.00	3522.15	4260.86	1.21	2.56
	180.00	3299.57	3880.84	1.18	2.24
	210.00	2775.55	4262.99	1.54	2.56
	240.00	3208.95	3618.19	1.13	2.04
	270.00	4134.51	4491.81	1.09	2.62
	300.00	3300.51	3736.09	1.13	2.11
	330.00	2694.31	4287.16	1.59	2.57
A	0.00	9230.77	9488.49	1.03	4.05
	42.11	7844.51	9174.21	1.17	3.35
	90.00	12226.07	12974.80	1.06	2.18
	137.89	8140.04	9489.52	1.17	2.76
	180.00	10582.18	11465.45	1.08	3.17
	222.11	8396.79	10078.17	1.20	2.54
	270.00	10746.32	11690.44	1.09	5.72
	317.89	7944.94	9018.19	1.14	4.10
C	0.00	30781.52	31730.06	1.03	9.69
	65.00	33858.24	34839.44	1.03	5.10
	90.00	32464.96	37317.46	1.15	3.00
	115.00	34632.22	38437.97	1.11	4.74
	180.00	32551.37	35644.39	1.10	9.52
	245.00	6809.40	6809.40	1.00	1.56
	270.00	30910.52	31968.74	1.03	6.68
	295.00	26443.94	32003.96	1.21	7.16

Table 7: Summarization for different legged structure

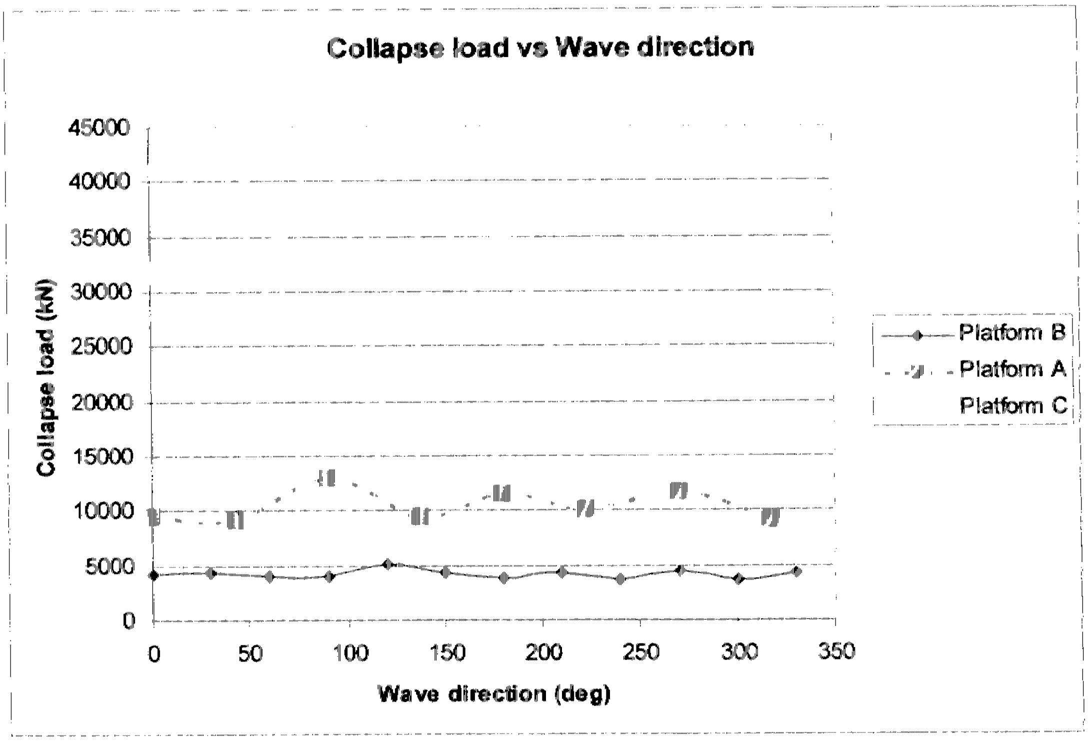


Figure 4.1: Graph comparison of collapse load for respective models

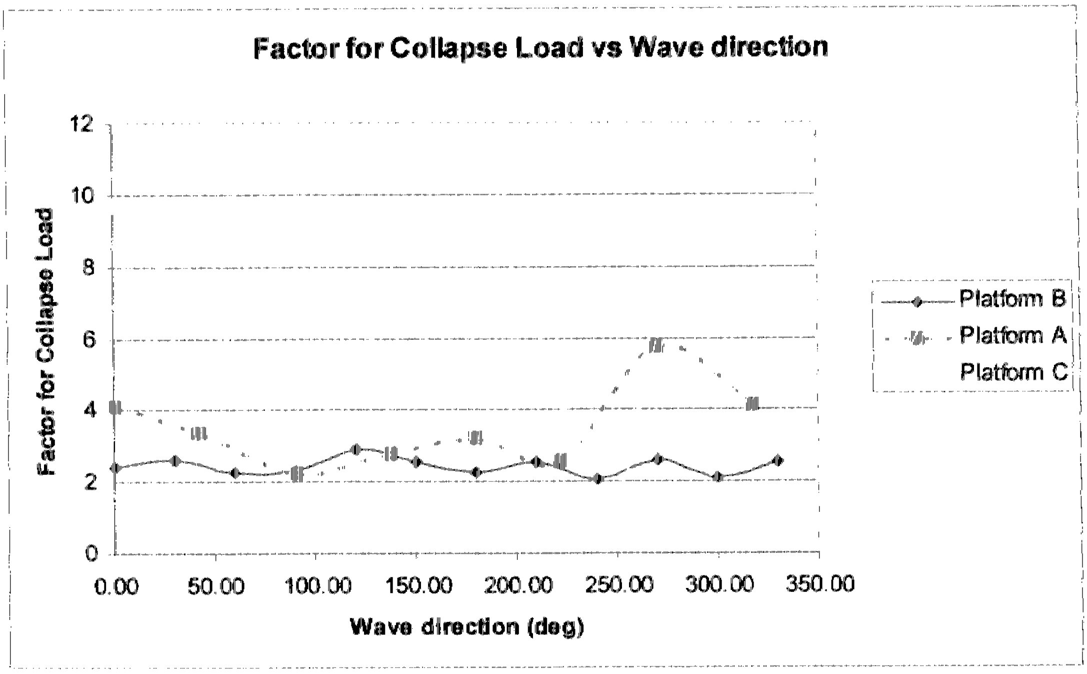


Figure 4.2: Graph comparison of factor for collapse load for respective models

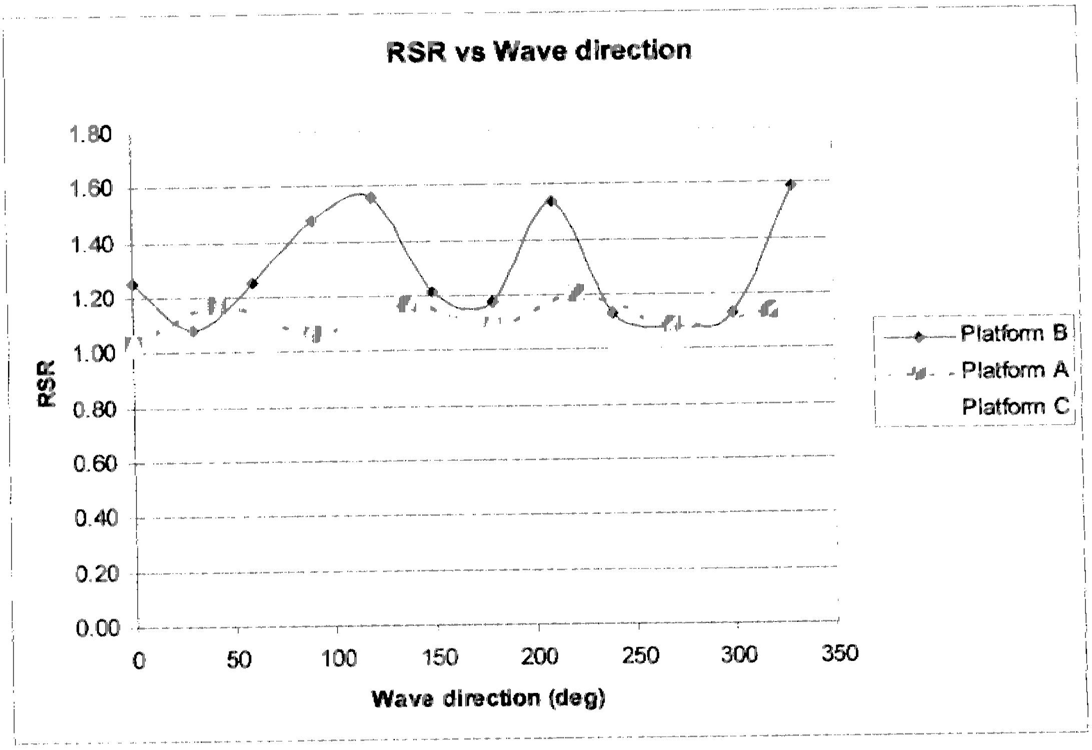


Figure 4.3: Graph comparison of RSR for respective models

By referring to all diagrams above, clearly illustrate that the number of jacket leg affected the collapse loads. Supporting rule for the statement is the existence of alternative load paths created through jacket leg member and jacket bracing provide more stiffness to the structure. Based on the first clearly indicate a comparison between the respective load needed for structure collapse with respect to number of legs and location. Furthermore, the trend of the graph shows that platform C with eight legged structure needed more extra load compared to platform A with 4 legs and platform C, tripod type. More leg, meaning more structure welded to make up a complex, rigid and strong substructure system. The theory of having complex and bigger structure proves by the behaviour of platform C in retaining the structure against incremental load until collapse. RSR diagram indicate that platform C with tripod leg resulted in more strength reserve compared to more redundant structure. The design was made for three leg jacket structure to have more reserve strength before the structure reach critical point of ultimate load.

Observing the table and first figure regarding the collapse load to the wave direction, a tabulate data of respective information regarding the critical attack angle of wave direction to the structure:

Platform	Wave attack angle (deg)	
	Minimum	Maximum
B	90.00	270.00
A	42.11	90.00
C	245.00	115.00

Table 8: Collapse load with respect to wave direction

The maximum column of the tabulate data interprets that the structure can retain to highest load before it collapse. Vice versa to the sentence meant that, the base shear force generated by the wave at the angle is much less than the other direction. The minimum column of the tabulate data illustrates the critical angle to the structure where minimum load required for the structure the fails. In other word, fewer loads needed to make the structure tremble, fail and collapse. The structure at the angle face having a weak spot where the wave generated forces can weaken the structure rigidity on the affected faces and disperse the affect to other area an thus resulting global collapse.

A study regarding the relationship of the individual wave generated forces to the collapse load. The variable where highest individual base shear will contribute to the collapse load at the angle. Refer to Appendix C.1 for comparison the base shear generated by respective attack angle for each platforms. For platform C the highest base shear generated at the angle of 300 deg to the platform. Differently interpret by the non-linear analysis where the minimum load for structure to collapse at the angle of 90 deg while at 270 deg, more load needed. More on that, for platform A, the highest reported base shear at 90 deg where the result was parallel to the final value where higher load is needed for the structure to fail. Lastly, platform C metocean data report that angle of 90 deg is the critical wave forces but different measured by the analysis where to structure is not critical when attack by the angle.

For different legged platforms, different behaviour, response and rigidity of the structure acted upon the incremental load. Complexity and rigidity is the main criteria for a platform to have a definite ultimate strength.

4.1 BRACING CONFIGURATION STUDY

Upon completion on all three bracings schemes for platform A, the result of respective models been interpret and resulted in table and diagrams illustrated below. The entire diagrams purposely to compare and differentiate the behaviour of platform A structure with the different type of bracing framework. Refer appendices of overall analysis.

Configuration	Wave Direction (deg)	First Member Fail Load (kN)	Collapse Load (kN)	RSR	Factor for Collapse
Design Basis	0.00	9230.77	9488.49	1.03	4.05
	42.11	7844.51	9174.21	1.17	3.35
	90.00	12226.07	12974.80	1.06	2.18
	137.89	8140.04	9489.52	1.17	2.76
	180.00	10582.18	11465.45	1.08	3.17
	222.11	8396.79	10078.17	1.20	2.54
	270.00	10746.32	11690.44	1.09	5.72
	317.89	7944.94	9018.19	1.14	4.10
X-Bracing	0.00	10410.32	10630.12	1.02	4.27
	42.11	8311.26	9144.72	1.10	3.15
	90.00	11604.26	15280.47	1.32	2.44
	137.89	8449.42	10042.01	1.19	2.75
	180.00	11397.21	11584.19	1.02	3.02
	222.11	8049.95	10862.32	1.35	2.58
	270.00	10816.69	12445.34	1.15	5.76
	317.89	7960.63	9885.51	1.24	4.24
Single Diagonal	0.00	9215.76	9493.51	1.03	4.06
	42.11	7826.34	9029.29	1.15	3.31
	90.00	10424.99	11221.38	1.08	1.89
	137.89	8296.00	9125.70	1.10	2.66
	180.00	10557.71	11097.71	1.05	3.08
	222.11	8568.37	10600.58	1.24	2.68
	270.00	9683.77	9751.93	1.01	4.79
	317.89	7929.77	9527.65	1.20	4.34

Table 9: Bracing summarize data

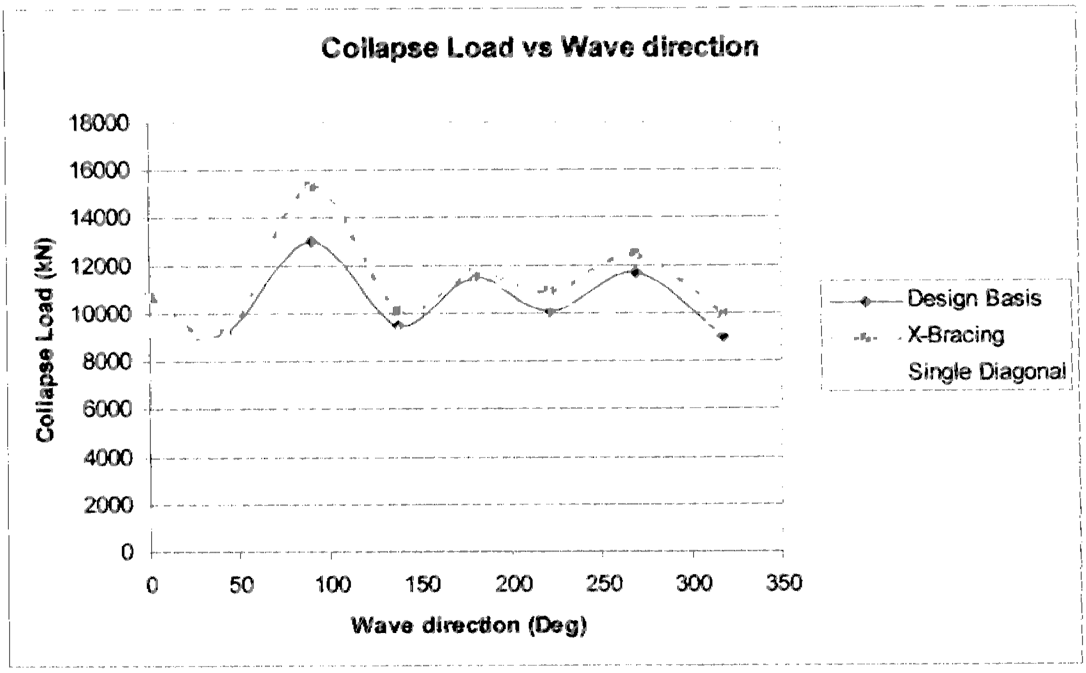


Figure 4.4: Graph comparison of collapse load for respective bracing

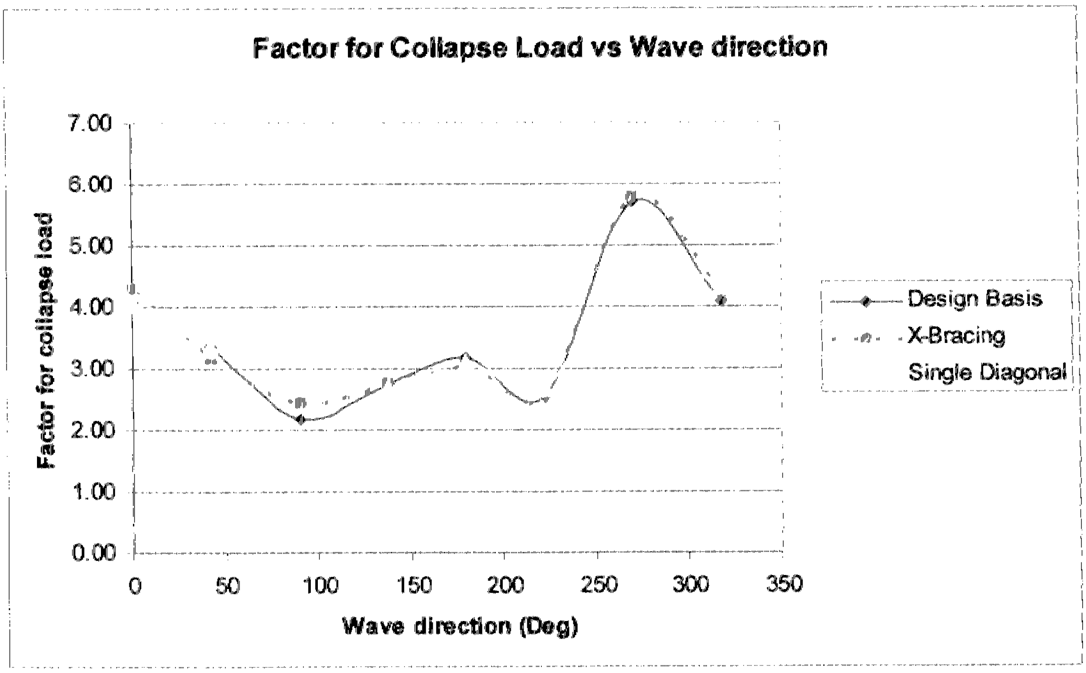


Figure 4.5: Graph comparison of factor for collapse load for respective bracing

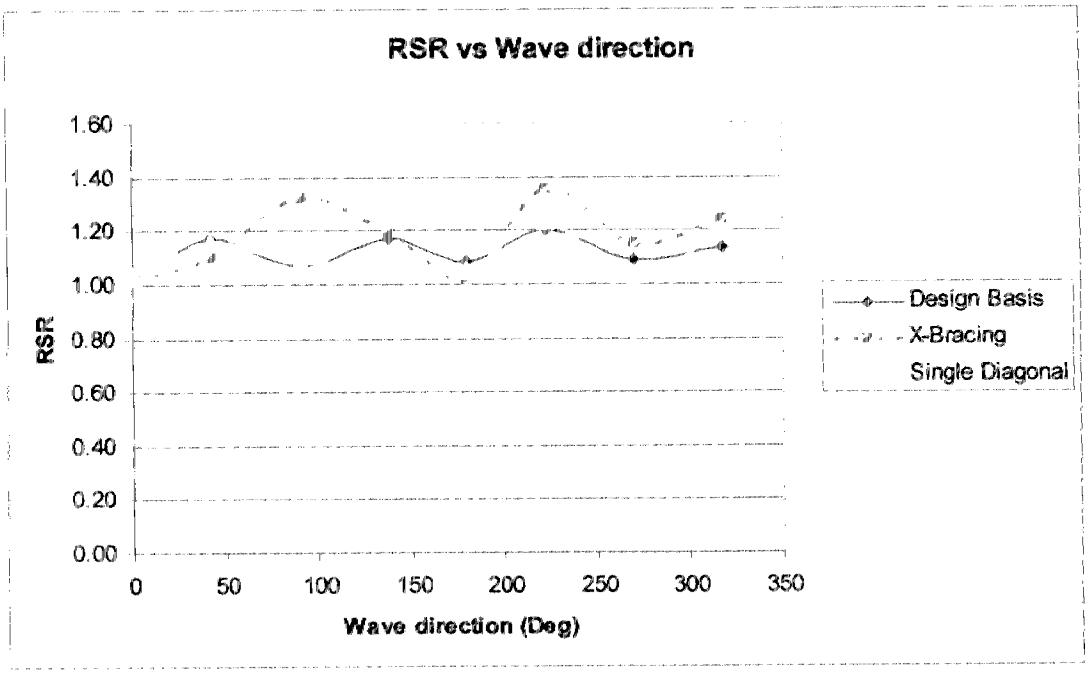


Figure 4.6: Graph comparison of RSR for respective bracing

By observing and studying all diagrams above, clearly illustrate that the X-bracing provide more stiffness the platform A compared to other type. X-bracing scheme provide more steel framework that provides more load paths and redundancy to the substructure. At the angle of 90 degree, clearly shown that the collapse load for all types resulted the similar peak but different in several factor. Individually, platform A response to have the ultimate collapse load at 90 degree with the same as highest base shear reported at 90 degree in the previous analysis. Lesser ultimate load showed by single diagonal bracing where less framework line created by a single cross member indicate that low in the available load paths for load to be shared by the other bracing. RSR diagram indicate that the X-bracing resulted in more strength reserve compared to the other bracing schemes. The bracing provide more reserve strength before the structure reach critical point of ultimate load. By comparing all three (3) figures above, the design basis performance reported between X-brace and Single diagonal brace.

Observing the table and figures regarding the collapse load in term of bracing configurations to the wave direction, a summarize data regarding performance of respective bracing schemes of platform A:

Bracing Configuration	Collapse Load (kN)		RSR	
	Minimum (direction)	Maximum (direction)	Minimum (direction)	Maximum (direction)
Design Basis	9018.19 (317.89°)	12974.80 (90.00°)	1.03 (0.00°)	1.20 (222.11°)
X-bracing	9144.72 (42.11°)	15280.47 (90.00°)	1.02 (180.00°)	1.35 (222.11°)
Single Diagonal Bracing	9029.29 (42.11°)	11221.38 (90.00°)	1.01 (270.00°)	1.20 (317.89°)

Table 10: Bracing configuration summarization results

With the summarize data, the platform more stiffness for incoming wave at 90 degree. The situation is where higher load computed to make the structure collapse from the 90 direction than the other directions. The situation supported by all bracing configurations provide with the highest load at wave direction of 90 degree which are parallel to individual base shear generated.

Interpreting the tabulate data above, a polar in term of strength of each bracing clearly shown by the single diagonal is the weakest, X-bracing provide highest rigidity while the original or design basis in between of the two braces. These circumstances indicate that the design for platform A is adequate and effective to the environmental area of the site location. As for conclusion, the original design of platform A is cost effective and suitable with the surrounding area.

Due to leg arrangement of platform A at ROW B, the other bracing of K-bracing, Inverted K-bracing and Diamond bracing are inappropriate. The problem is where Launch Cradle that used for sliding the jacket onto barge installed to the structure. With the launch cradle attach to the substructure, there was no horizontal member framing at designed elevation. The horizontal was offset by several dimensions to cater the launch cradle framing. With one face of the jacket structure not suitable for the remaining bracing, conclude for not affecting the original jacket structure by adding horizontal member for K-member can intersect. Refer Appendix B.6 for detail.

4.2 STATICTISAL ANALYSIS

Statistical analysis commence on the data of the analyses to evaluate its effectiveness and significances. Variable of data need a statistic analysis to determine the data significance and determine the outliers data for better accurate results. Using t-test to evaluate t-stat and t critical 2-tail. Refer Appendix C.5 for the results.

4.2.1 Platform A, B and C collapse comparison

Utilizing t-test in the Microsoft Excel, all variable in the graph tested for validity of data distribution. Based on Appendix C.5 all resulted in significant data difference due to different type of leg arrangement resulted more dispersed data compared to the same model data. With highest t-Stat reported at -6.72 and the computed t Critical two-tail, 2.36, the t-test indicate significant data disperse by the three platforms. As shown by tabulate result, the data between platform A, B and C are widely dispersed from each other. As conclusion, clear different performance between all platforms.

4.2.2 Bracing Configuration

Using the data of RSR column, refer to Appendix C.5 for the output computed by t test of Microsoft Excel. The t Critical two-tail was reported as 2.36 while the highest t-Stat computed at 1.87 by the relationship between x-bracing and single diagonal bracing. With t-Stat in range of coupling ± 2.36 of the normal distribution, the overall data of the analysis is insignificant. The data is not dispersed and within the normal distribution. In order way, there were no outliers in the data for analysis part B.

The situation is where the usage of the same platform with characteristic of the same environment data but only different in bracing framework resulted in less spread data. There was a limit created by the overall platforms with respect to the RSR value. Regardless the difference in bracing framework, the overall data computed is within the range for concluded as insignificant.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 CONCLUSION

Platforms beyond design life need an assessment for the ultimate capacity check for further service extracting crude oil under the seabed. An effective method carried out to check for the platform reliability in next few years of the extended services. For the first part of analysis, clearly can conclude that larger no of legs affect to overall strength where platform C an eight-legged platforms result highest ultimate load compared to the other 4-legs and tripod. For the overall result, the Reserve Strength Ratio (RSR) ranging from 1.0 to 1.6 while the collapse load factor range from 2.0 till 6.0. The highest ultimate load reported at platform C with 38437.97 kN at wave angle of 115°. The highest RSR for the first part of the project computed at 1.59 of platform B at 330° direction..

The first part of the analysis achieve to first two objectives stated before. By completing the analysis of platforms A, B and C which entitled or represents the major and common platforms installed in the country. The location of each platform at different oil blocks in the region mainly to check the environment factor effect on the structures. With platform A and C located offshore Kerteh and platform B offshore Bintulu are sufficient to cater the differences between the two environment conditions. With all the technical data and SACS model acquired, commencing on developing the SACS collapse input file as command or coding in defining the incremental load, exclude the topsides member as defined as elastic through out the collapse analysis and other properties in fulfilling the second objective by generating result though the SACS software.

Difference properties of each selected platforms of three, four and eight legs provide the performance of each structure with respects to environment and maximum load. The study of the effect resulted by 8-legged structure compare to the others provide significance difference in term on how the platform response to such extreme loading. With the local storm condition applied and incremental load, the selected structures were tested until collapse. Furthermore, by interpreting and evaluating the data computed with the Full Plastic Collapse Analysis module, the differences in term how 8-legged, 4-legged and 3-legged jacket structure response to such incremental load define in the module. The results been evaluated to measure the ultimate strength of different legged platform in order to achieve the stated objective.

The second part of the project consist the study of bracing configuration of a jacket substructure to the collapse load. The introduction of the second part which consisting of the effect of bracing framework to the ultimate load in order to improvise the project validity, quality and data. As mentioned in theory of literature review and practical in the methodology section, the study scope includes developing a set of bracing framework system of a model in organizing a systematic approach on a single platform but differ in the bracing framework of the substructure.

In order of fulfilling the third and final objective, platform A been selected and undergone series of modification in term of bracing schemes. As conclusion the highest collapse load achieved with X-bracing model at 15820.47 kN of load before the structure collapse. Maximum RSR computed at 1.32, wave attack angle of 90 degree. For overall view of platform A bracing schemes, the RSR ranging from 1.01 to 1.35 while the collapse load factor from 2.18 to 5.76. Excluding the bracing type K-bracing, Inverted K-bracing and Diamond bracing due to no horizontal member at specified elevation due to the installed launch cradle for transportation and lifting procedure

5.1 RECOMMENDATION

As for recommendations for the future studies, collapse analysis for API RP2A-LRFD needed to be compare with the WSD design in term of the same method of analysis. With different code, the results expected to be similar but slightly different in behaviour of the load paths and method of computation. API RP2A-LRFD approach to solution by governing the load factor in computing and it's also came with difference constant such as drag, inertia and others. Comparison with the LRFD and WSD code can make up factors which differentiate one code to another. Furthermore, the trend of highly utilize the LRFD code in analyzing the collapse load fully demanding the comparison in which code provide better accuracy and also cost effective for maintenance factor.

The other suggestions for improving the project by analyze the models for Linear Static Analysis that also known as the Simplified Ultimate Strength (SUS) Analysis. This version of analysis comprising the same procedure by increment the load combination of storm wave until one the component fail or meets capacity:

- joints
- members
- pile steel strength
- pile soil bearing capacity

Then the analysis furthered by removing these fails components to allow alternative load paths existed in the framework. Then the analysis completed when the software cannot find solution meaning no load paths available or exceed deformation. The corresponding data is the collapse load where the analysis terminate and the base shear generated by the directional waves. As the analysis being studied and applied in the industry, the demand to check the analysis performance compared to the non-linear analysis of full plastic collapse. With these data, a comparison can develop a factor to specify the margin resulted by each methods.

For the second part, in order to have better data comparison all type of conventional bracing should be tested and evaluated. The exclusion of K-bracing, Inverted K-bracing and Diamond bracing in the analysis resulted in narrowed option where X-bracing resulted stronger strength compared to original design and single diagonal. In order to rectify with the issues, selecting similar platform which appropriate for the bracings mentioned above. Other than that, a comparison with another legged platform significantly provide data on how bracing configuration affecting the whole structure strength. Usable platform B and C are recommended for bracing configuration study. Taking the overall data, a study on how leg affecting the bracing schemes performance.

For the last recommendation in improving the project, comparing the results gain from SACS software to another related offshore-structures software as example USFOS. Comparing the data generate by both software can enhanced the specific utilization and speciality. Checking on how both software responses to such analysis conducted by a user. USFOS speciality in progressive collapse analysis of space frame structure, but SACS also provide the module for full plastic collapse analysis. More on that, referring and concentrating on the software how much margin develop by using the model for the same type of analysis. Study on how SACS software differs from USFOS software in solving the progressive collapse analysis.

CHAPTER 6

ECONOMIC BENEFIT

In order to measure the feasibility of the project, a study of project objectives and results for the purpose in industry interests and benefits. Content from introduction part, literature review, methodology, results and discussion will be utilized in order to meet with industry demand. A relationship between two bodies to forecast and predict the availability and requirements in order to meet with demand and also benefits. The related research methodology and results are the primary content in developing the interest of project to the industry demand.

Several business elements and other that relevant to the economic values recognised and verify throughout the project. Among the main output is mainly regarding the jacket platform design and fabrication. In order to achieved or meet an effective design, desirable cost and strength, a comparative investigation upon the case study commenced upon three (3) difference platform in order get a benchmark value or structure behaviour. In order to predict to behaviour of an offshore structure with respect to extreme condition is applicable for generate or introducing the factor of safety or reserve strength ratio. The purpose of benchmarking the model in the project is mainly to study and compare the difference of current and previous practices in term of design and fabrication in term of cost, time and effectiveness.

Relating the data output of several analyses, the data of an extreme condition of a specific location established. Accordance to metocean data and SACS output, values of base shear computed at respective direction. The software allows user to compare which direction generate large force to the structure. With these data, counter measure of reinforcing the face or integrity management upon the critical side of the platform.

As recommendation, further studies into the project potentially generate the reliability index of an aged structure. Due to large number of aged structure offshore Malaysia's field, the questionable issues of the current strength of the platform beyond the pre-determined life-span. Currently, more than 80% of offshore platform around Malaysia's block field aged 30-40 years which is beyond the original design life of 25 years. Upon Structural Integrity Management (SMI), a lot of analysis and improvising the platform to enhanced the platform capacity and usability due to extended service. The SMI mainly to check the platform current performance, the critical member and joint, installing new equipment and modification needed. As reliability index provide factor or ratio that enable user or operator to estimate the platform reliability even though already undergone grouting or other modification.

There are a lot of bracing schemes widely used in any jacket structure for substructure arrangements. Difference bracing provide different strength and differentiate the behaviour of a structure to another with respect to extreme condition. The strongest and costly bracing is the X-bracing that resulted in higher strength compared to other as per case study. A cost effective bracing scheme is needed which is suitable with the environmental condition of the area. Comparison study of all type of bracing configuration reveals the behaviour of the structure.

The other benefit of the project is more method, code reference and also software applicable for establishing relationship and also comparison. Other design may utilize different code reference to assist the structure. Difference code may affect the final result slightly difference to other by a factor. The issues of WSD and LRFD code in purpose of checking ultimate load to the platform. The other issue is the difference between outputs of simplified ultimate strength to the static pushover analysis in determines the collapse value. Develop comparison software of SACS and USFOS in determining the collapse load.

CHAPTER 6

REFERENCES

1) American Petroleum Institute 'Assessment of Existing Platforms- Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms'. Supplement 1, Section 17 RP2A, 20t Edition.
2) American Petroleum Institute, July 1, 1993, API RP2A-LRFD. 'Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms' – Load and Resistance Factor Design, 1st Edition,
3) BC Gerwick,1986: Construction of offshore structure John Wiley & Sons, New York
4) Bea RG and Mortazavi MM, 'Simplified Evaluation of the Capacities of Template Type Offshore Platforms', Proceedings of the Fifth International Offshore and Polar Engineering Conference, The Hague, The Netherlands, June 1995.
5) DS Ramachandra Murthy, S Seetharaman, G Velkannan and R Rajkumar: Simplified Ultimate Strength Analysis for Assessment of Steel Offshore Platforms.
6) Engineering Dynamics INC, IDE, SACS, 2006 – Supplemental manual of SACS 5.2 release 6.
7) HM Bolt, CJ Billington and JK Ward,1996: 'A review of the Ultimate Strength of Tubular Framed Structures'
8) HS Westlake, FJ Puskar, PE O'Bonnor, and JR Bucknell, 2006: 'The Role of Ultimate Strength Assessments in The Structural Integrity Management (SIM) of Offshore Structure'. Offshore Technology Conference, Houston, Texas USA
9) JD. Stear and RG. Bea: Evaluating Simplified Analysis Approaches for Estimating the Load Capacities of Gulf of Mexico Jacket-Type Platform.

10) Kallaby J and Millman DN, 1974: Inelastic analysis of fixed offshore platforms for earthquake loading. Offshore Technology Conference, Paper No OTC 2357, Houston

11) Lloyd, JR and Clawson WC, 1984: Reserve and residual strength of pile founded, offshore platforms. National Research Council, National Academy Press, Washington.

12) Marshall PW, 1979: Strategy for monitoring, inspection and repair for fixed offshore structures. Behaviour of Offshore Structure Conference, London.

13) Marshal PW and Bea RG, 1976: Failure modes for offshore platforms. Behaviour of Offshore Structures Conference, Trondheim

14) MS Excel, 2003: Manual of T-test

15) Nelson A, 2003: Technical performance measure for North Sea jacket structure, EQE International Limited, Health Safety Executive 2003.

16) RNZ, 2009, 'Structural Integrity Assessment Basis for Provision of Updating SACS Model and Static Inplace Analysis for 5 PMO Platforms for PETRONAS Carigali Sdn. Bhd, Peninsular Malaysia Operation (PCSB-PMO)', Doc. No.: P3112-ST-DB-0001.

17) SINTEF, USFOS, 1994 – A computer Program for Progressive Collapse Analysis of Steel Offshore Structures, Users Manual v7.0

18) SOH C.K and SOH A.K, February 1990: A knowledge Based Approach to the design of offshore structure.

19) WJ Graft,1981: Introduction to Offshore Structure, Gilf Publishing Company, Houston

20) William M.K. Trochim, 2006: The T-Test

CHAPTER 7

APPENDICES

APPENDIX A	PROJECT CHART FLOW
APPENDIX B	SACS MODELING
APPENDIX C	SACS OUTPUT DATA

APPENDIX A

GANTT CHART OF THE PROJECT

Final Year Project 1

No	Detail/Week	1	2	3	4	5	6	7	8	9	Mid-Semester Break	10	11	12	13	14
1	Selection of Project Topic	■	■													
2	Preliminary Research Work (Related Article/Journal)		■	■	■											
3	Article/Journal Summarization				■	■	■									
4	Literature Review drafting					■	■	■								
5	Submission of Progress Report							■								
6	SACS Collapse module training			■	■	■	■	■								
7	SACS modeling								■	■		■	■	■	■	
8	SACS ouput analysis								■	■		■	■	■	■	
9	Submission of Interim Report Final Draft															■
10	Weekly meeting with supervisor	■	■	■	■	■	■	■	■	■		■	■	■	■	■
11	FYP Workshop															
	1. FYP1 briefing	■														
	2. IEM Talk			■												
	3. Technical Writing				■											
	4. IRC Workshop				■											
	5. Laboratory Workshop					■										
	6. Referencing Workshop								■							
	7. Poster presentation												■			
	8. Session with HOD													■		
	9. HSE Workshop														■	

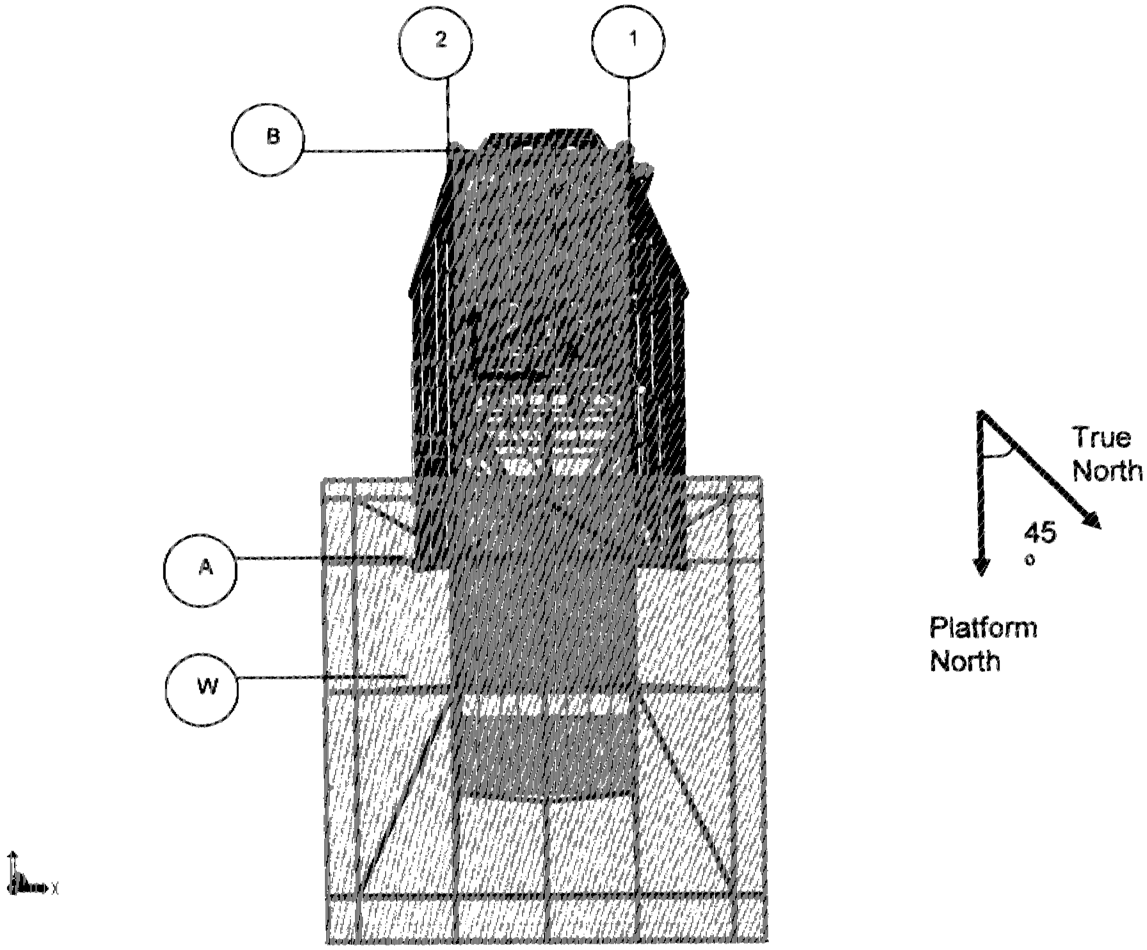
Final Year Project 2

No	Detail/Week	1	2	3	4	5	6	7	Mid-Semester Break	9	10	11	12	13	14	15	16
1	Bev A modeling																
2	Bev A collapse analysis																
3	Tiong A modeling																
4	Tiong A collapse analysis																
5	Submission of Progress Report																
6	Jacket Bracing configuration study																
7	Bekok B bracing modification																
8	Bracing data interpretation																
9	Poster preparation																
10	Submission of Dissertation Report																
11	Weekly meeting with supervisor																
12	Statistic Workshop																
13	Graduate School Workshop																
14	Poster Exhibition																
15	Implementation of IBS project																
16	Oral Presentation																

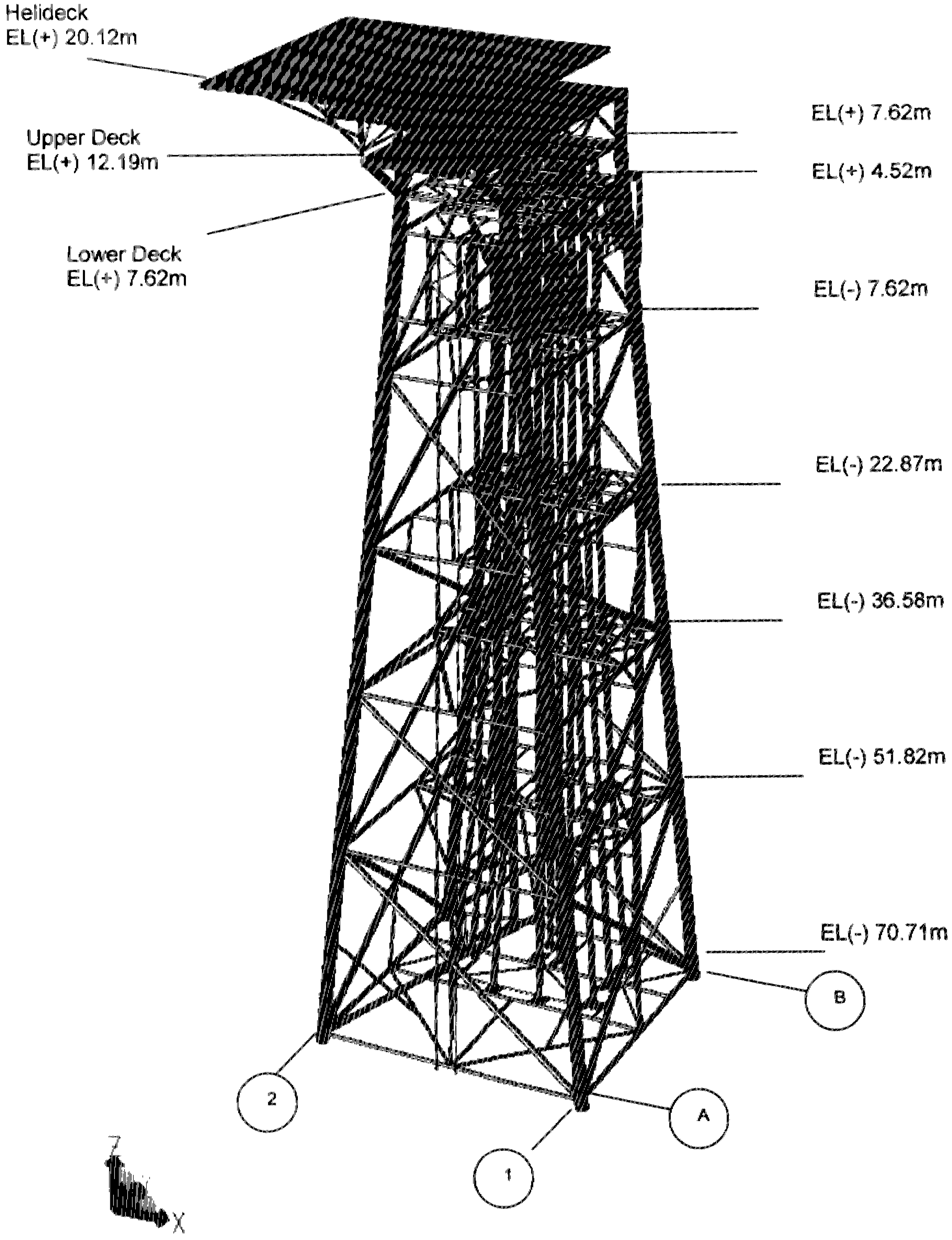
APPENDIX B

APPENDIX B.1

A) PLATFORM A 3D VIEW

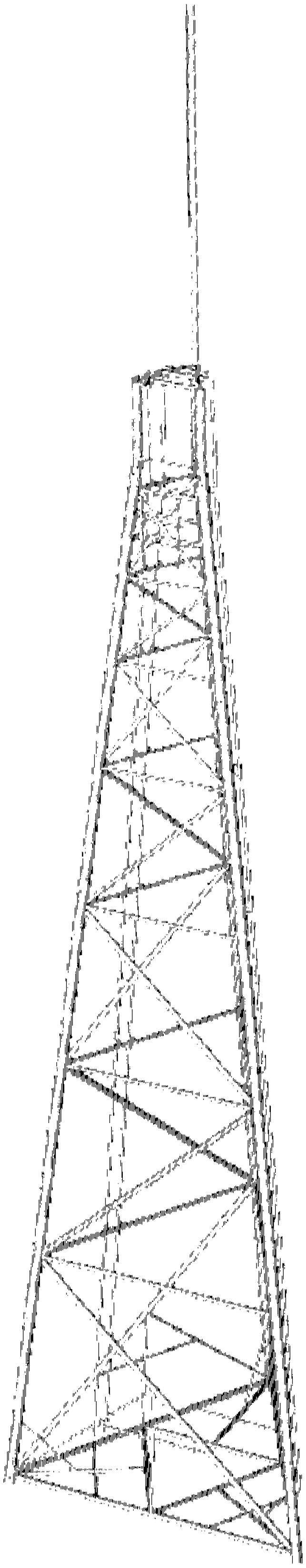


2
1
B
A
W
x
True
North
45
o
Platform
North


Helideck
EL(+) 20.12m
Upper Deck
EL(+) 12.19m
Lower Deck
EL(+) 7.62m
EL(+) 7.62m
EL(+) 4.52m
EL(-) 7.62m
EL(-) 22.87m
EL(-) 36.58m
EL(-) 51.82m
EL(-) 70.71m
B
2
A
1
Z
X

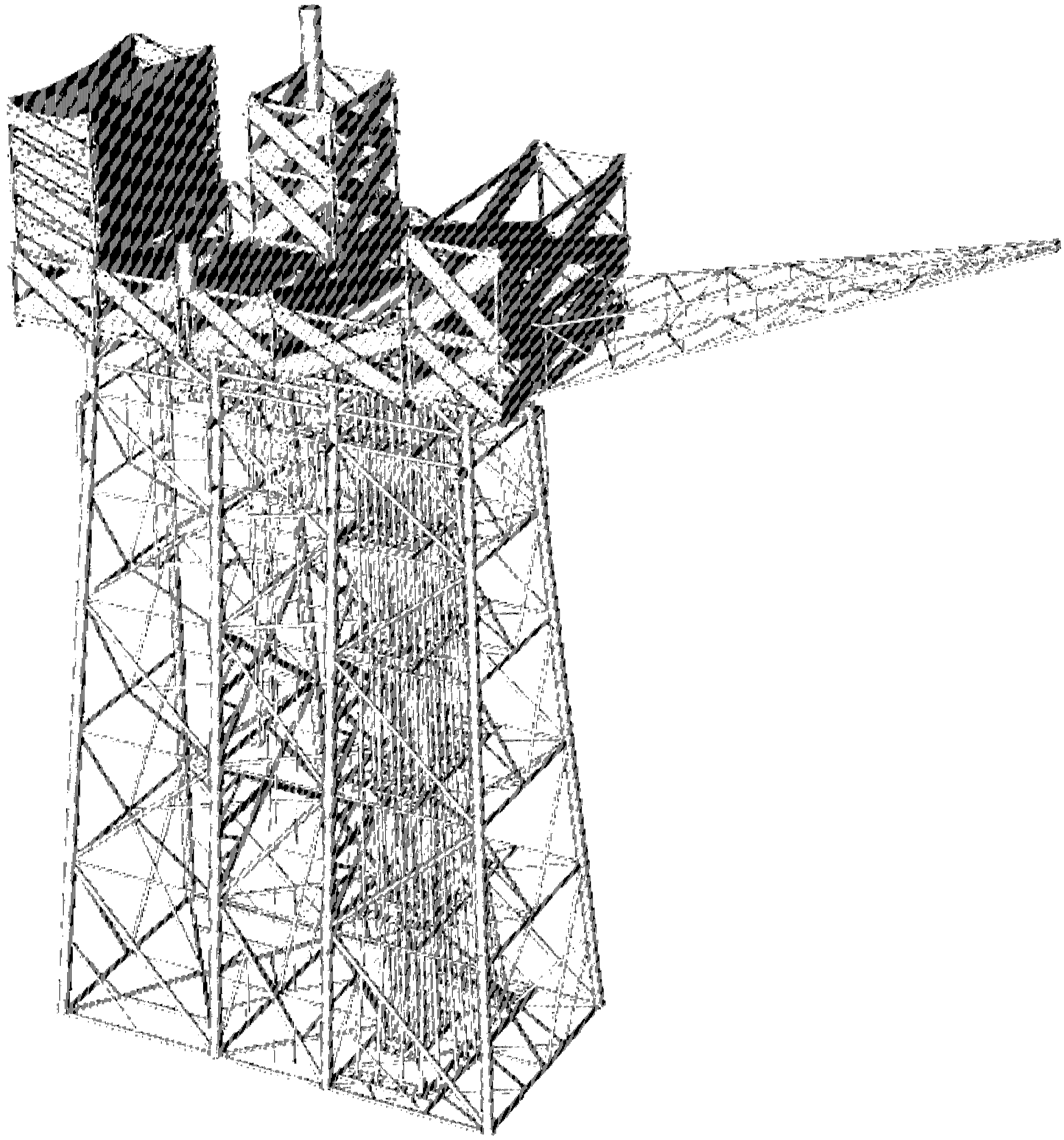
APPENDIX B.1

B) PLATFORM B 3D VIEW



APPENDIX B.1

C) PLATFORM C 3D VIEW



APPENDIX B.2

A) PMO METOCEAN DATA

Table B.2.1: Wave data for Platform A

Wave Parameter	100-Year Directional Wave (deg)							
	0	42.11	90	137.89	180	222.11	270	317.89
Maximum Height, Hmax (m)	6.3	6.3	11.4	7.6	7.6	7.6	5.0	6.3
Associated Period, Tass (s)	7.3	7.3	9.3	8.4	8.4	8.4	6.6	7.3

Table B.2.2: Wave data for Platform C

Wave Parameter	100-Year Directional Wave (deg)							
	0	65	90	115	180	245	270	295
Maximum Height, Hmax (m)	5.8	7.3	10.1	8.2	5.8	5.8	5.8	5.8
Associated Period, Tass (s)	8.0	8.5	10.0	9.0	8.0	8.0	8.0	8.0

APPENDIX B.2

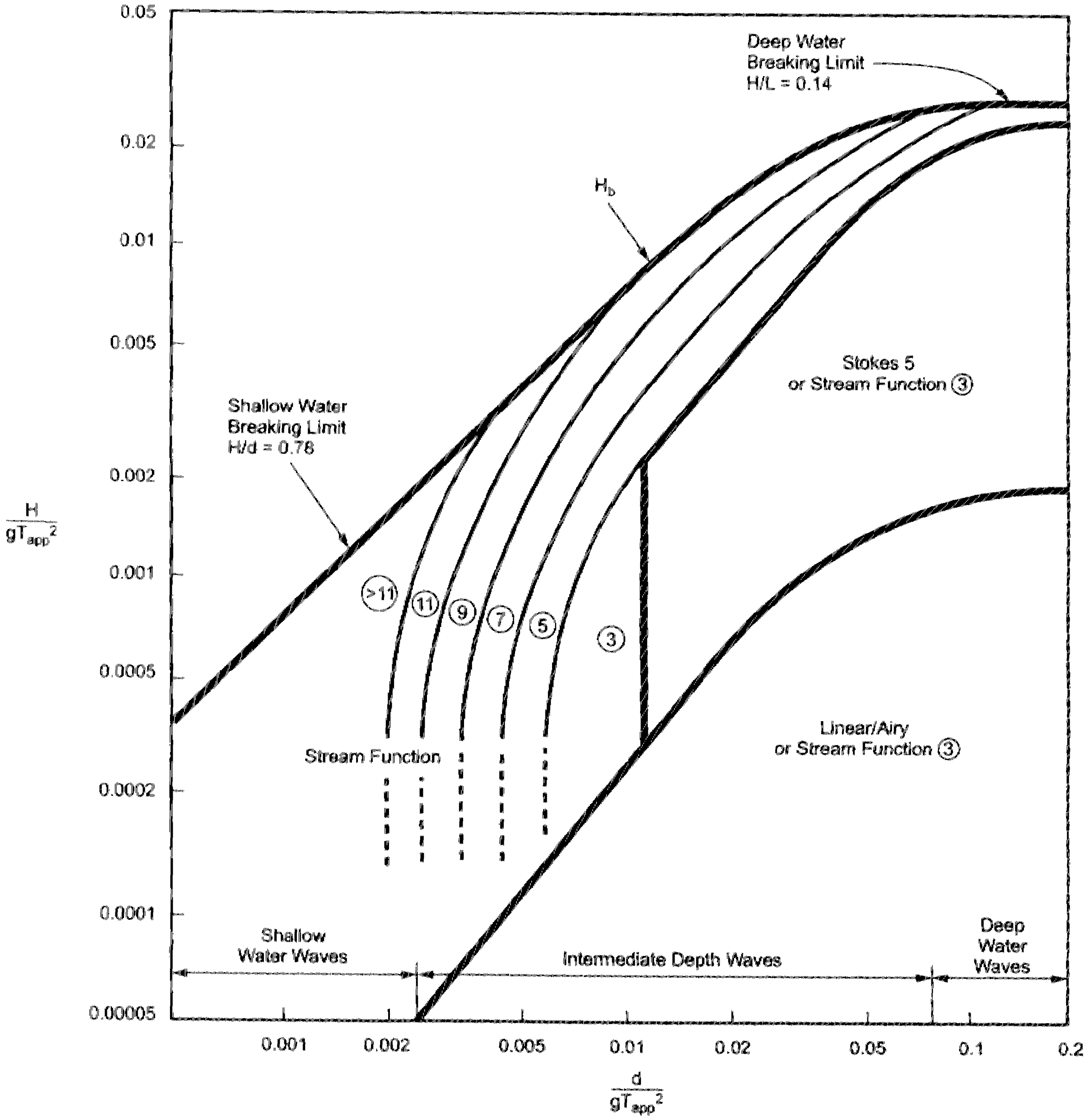
B) SKO METOCEAN DATA

Table B.2.1: Wave data for Platform B

Wave Parameter	100-Year Directional Wave							
	N	NE	E	SE	S	SW	W	NW
Maximum Height, Hmax (m)	10.0	9.0	5.1	5.1	5.1	6.9	9.0	10.0
Associated Period, Tass (s)	9.7	9.4	8.3	8.3	8.3	8.6	9.4	9.7

APPENDIX B.3

API RP2A WAVE THEORY



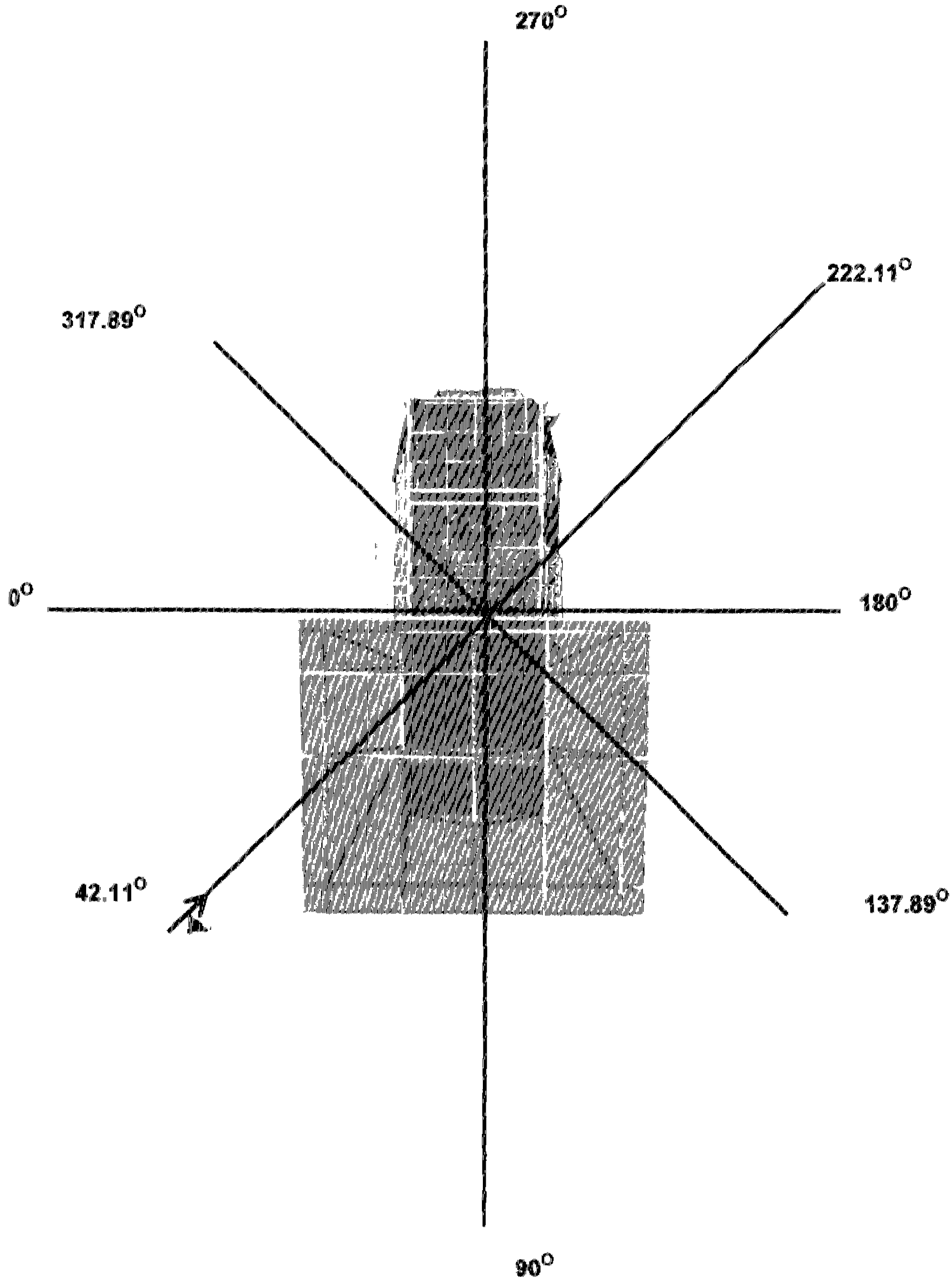
H/gT_{app}^2: Dimensionless wave steepness
d/gT_{app}^2: Dimensionless relative depth
H: Wave height
H_b: Breaking wave height
d: Mean water depth
T_{app}: Wave period
g: Acceleration of gravity

Figure 2.3.1-3—Regions of Applicability of Stream Function, Stokes V, and Linear Wave Theory (From Atkins, 1990; Modified by API Task Group on Wave Force Commentary)

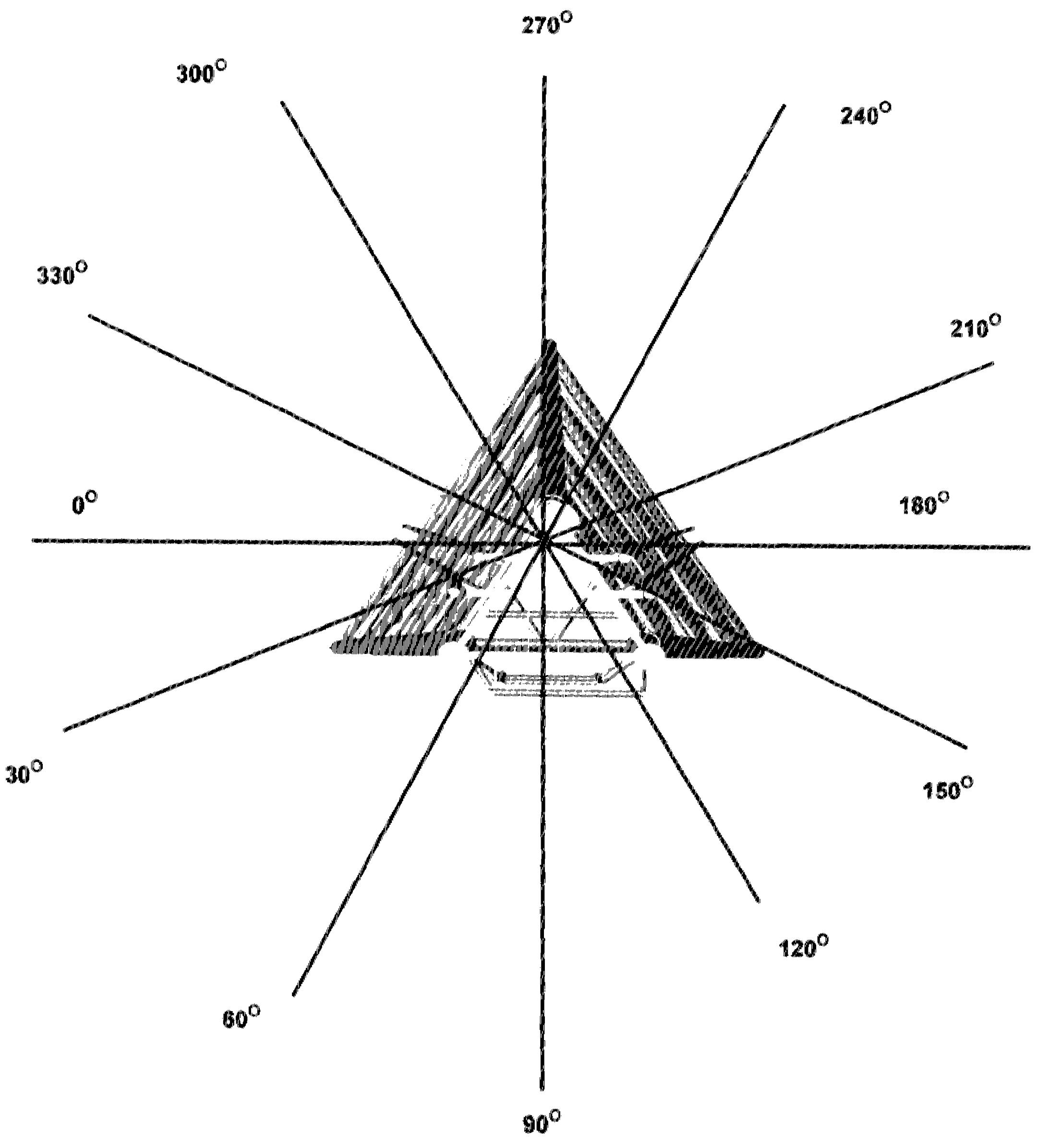
APPENDIX B.4

WAVE/CURRENT ATTACK ANGLE

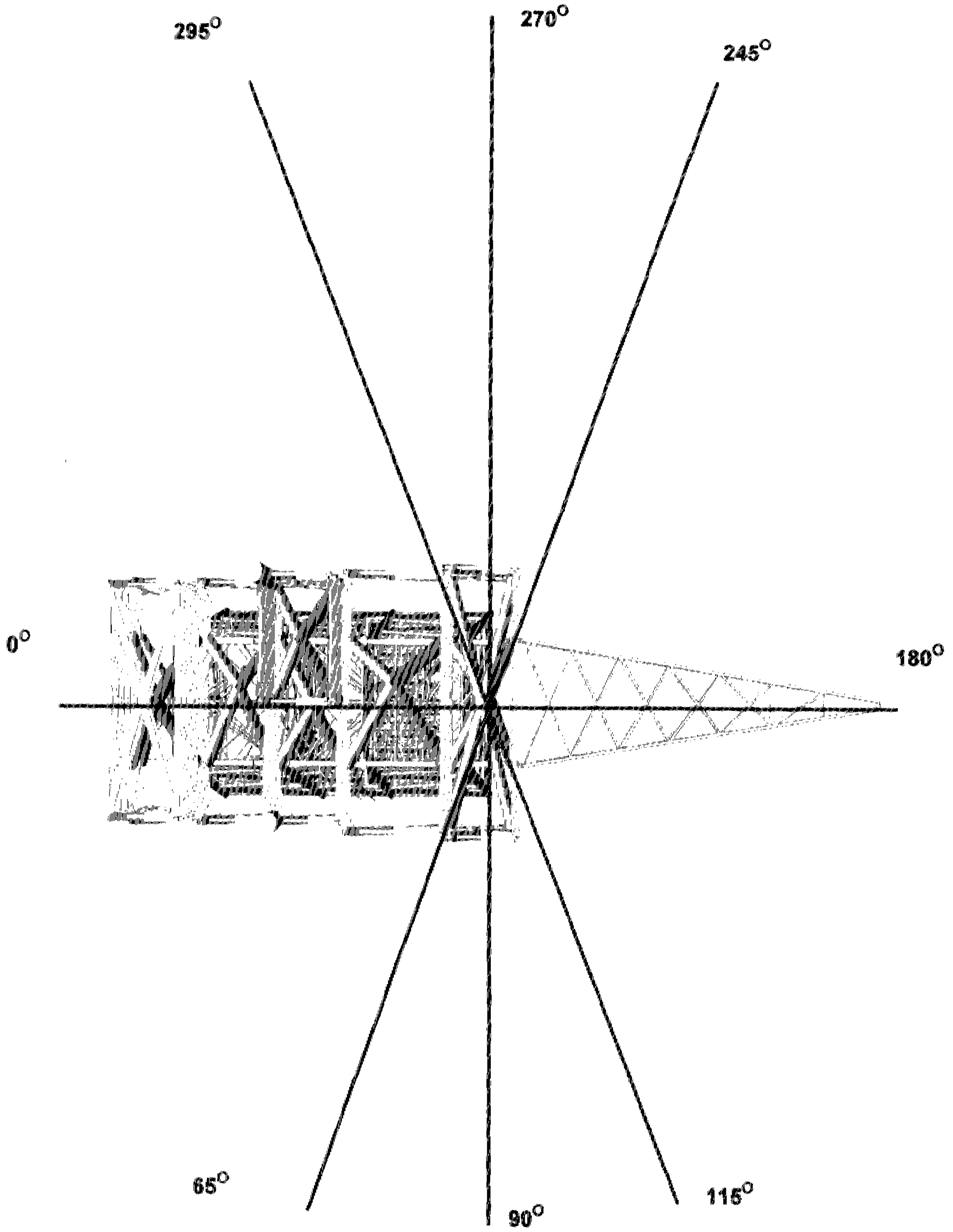
Title	Wave/current attack angle
Platform	Platform A
Appendix	B.4



Title	Wave/current attack angle
Platform	Platform B
Appendix	B.4



Title	Wave/current attack angle
Platform	Platform C
Appendix	B.4



APPENDIX B.5

COLLAPSE INPUT FILE

Platform A

```
CLPOPT    40  8 40      CN  LBJFPPJS       SFMG   0.010.001 0.011000.0.002
CLPRPT P1R1M1MP  J1SMMSPW
LDSEQ LS1        CLPS   1   0.5   1.0 100 100        5.
GRPELA      BB0 BB1 BB2 BB3 BB4 BB5 BB6 BB7 BB8 BB9 BC1 BC2 C1  C2  C3
GRPELA      H10 H11 H12 HB1 HB2 HB3 HB4 HC1 HC2 HC3 HH0 HH1 HH2 HH3 HH4
GRPELA      HH5 HH6 HH7 HH8 HH9 HT0 HT1 HT2 HT3 HT4 HT5 HT6 HT7 HT8 HT9
GRPELA      HV1 HW  LB1 LB2 LB3 LB4 LB5 LB6 T1  T2  T3  T4  T5  T6  T9
GRPELA      TR1 TR2 TR3 WB1 WB2 WB3 WB4 WB5 WB6 WB7 WB8 WB9 WBB WC1 WC2
GRPELA      WC3 WC4 WC5 WC6 WT1 WT2 WT3 WT4 WT5 WT6 WT7 WT8 WT9 BC3 BC4
GRPELA      W.B AA1 AT2 AT2 AT3 AT4 AT5 AT6 AT7 AT8 AT9 ATT ATU CGF CN1
GRPELA      CN2 CN3 CN4 CN5 CN6 CN7 LB1 LB2 LB3 LB4 LB5 LB6 RR1 RR2 WBB
PGRELA    CDP  LAP  PL1  UDP  UP1
END
```

Platform B

```
CLPOPT    40  8 40      CN  LBJFPPJS       SFMG   0.010.001 0.011000.0.002
CLPRPT P1R1M1MP  J1SMMSPW
LDSEQ LS1        CLPS   1   0.5   1.0 100 100        5.
END
```

Platform C

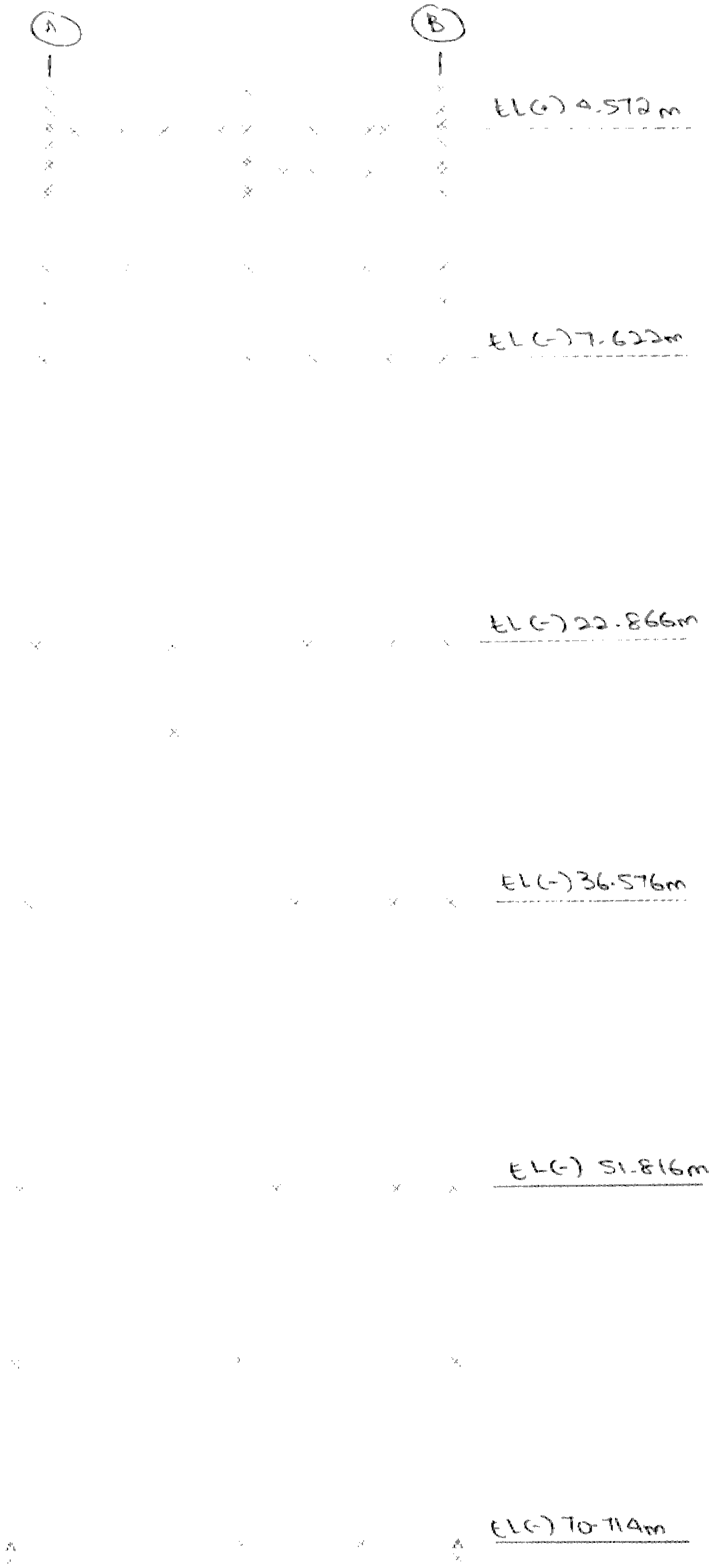
```
CLPOPT    40  8 40      CN  LBJFPPJS       SFMG   0.010.001 0.011000.0.002
CLPRPT P1R1M1MP  J1SMMSPW
LDSEQ LS1        CLPS   1   0.5   1.0 100 100   0.5   10.
GRPELA      MD1 MD2 MOD FBD FB1 DUM PC1 CN2 CN3 CN4 CN5 CN6 CN7 CN8 W.B
GRPELA      W.C
END
```

APPENDIX B.6

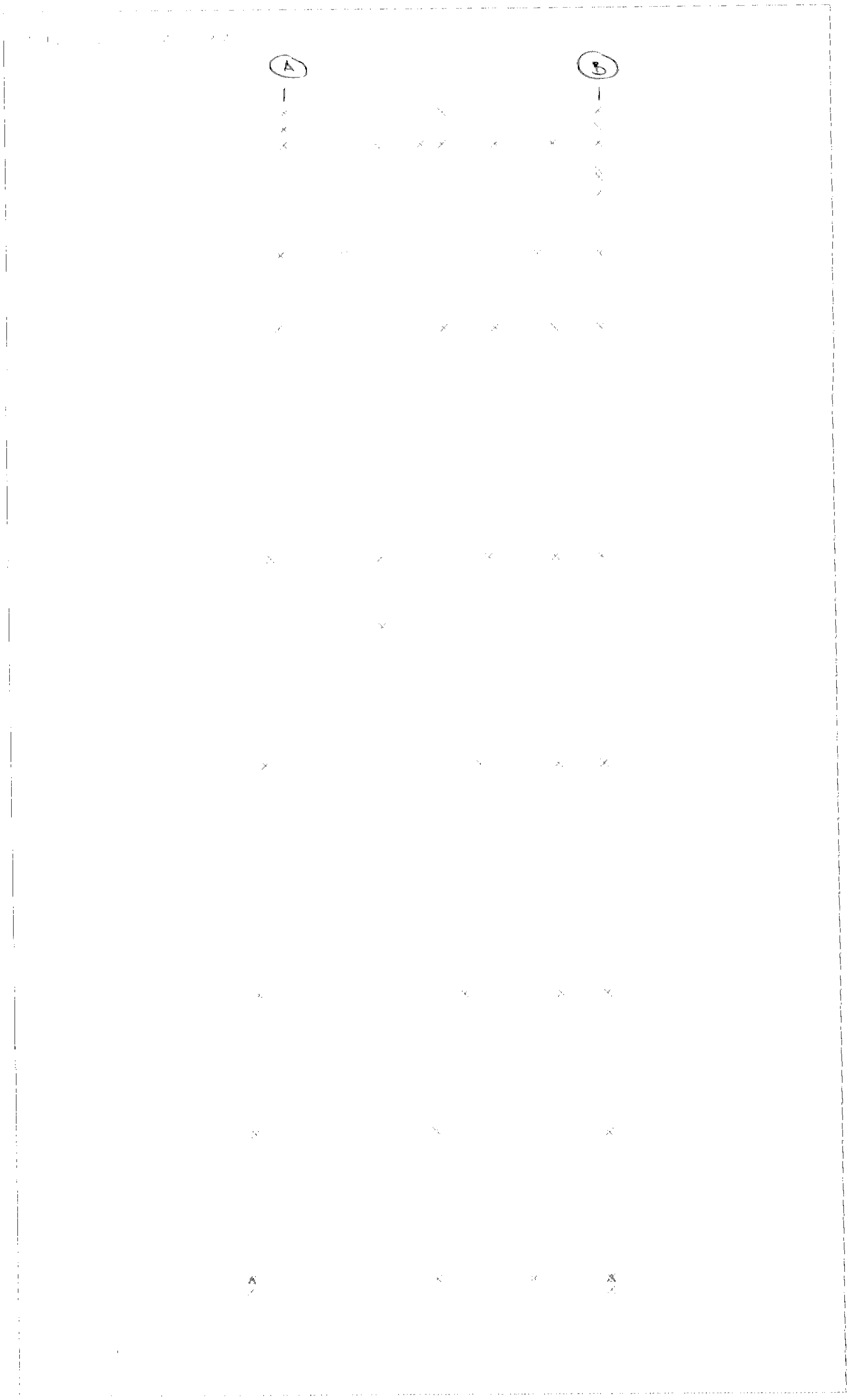
BRACING SCHEMES

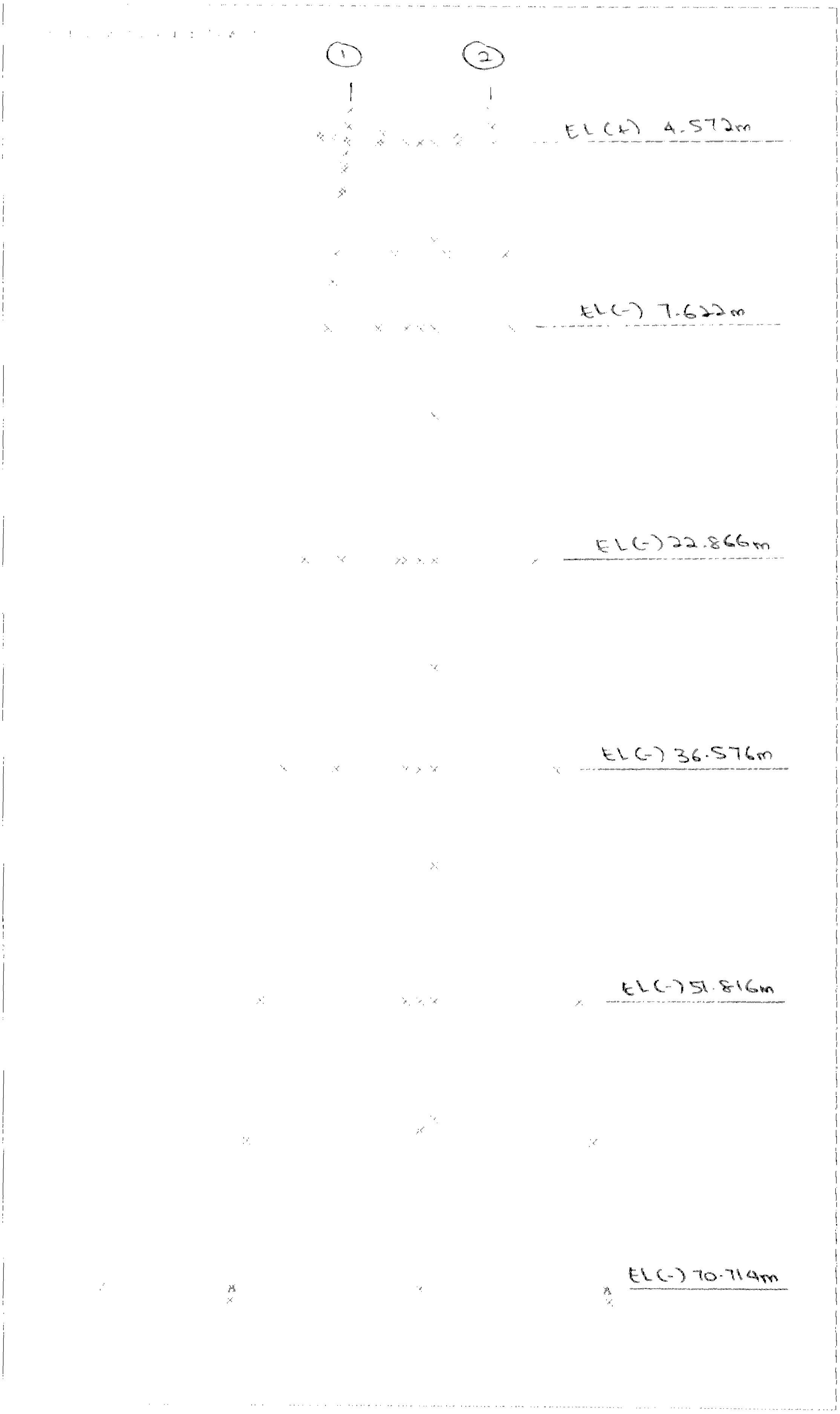
APPENDIX B.6

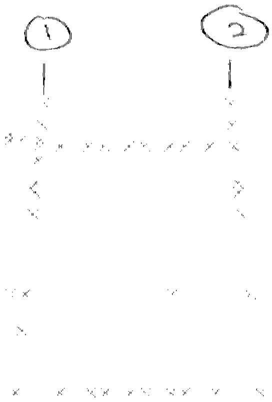
A) DESIGN BASIS



A
B
EL(-)4.572m
EL(-)7.622m
EL(-)22.866m
EL(-)36.576m
EL(-)51.816m
EL(-)70.714m

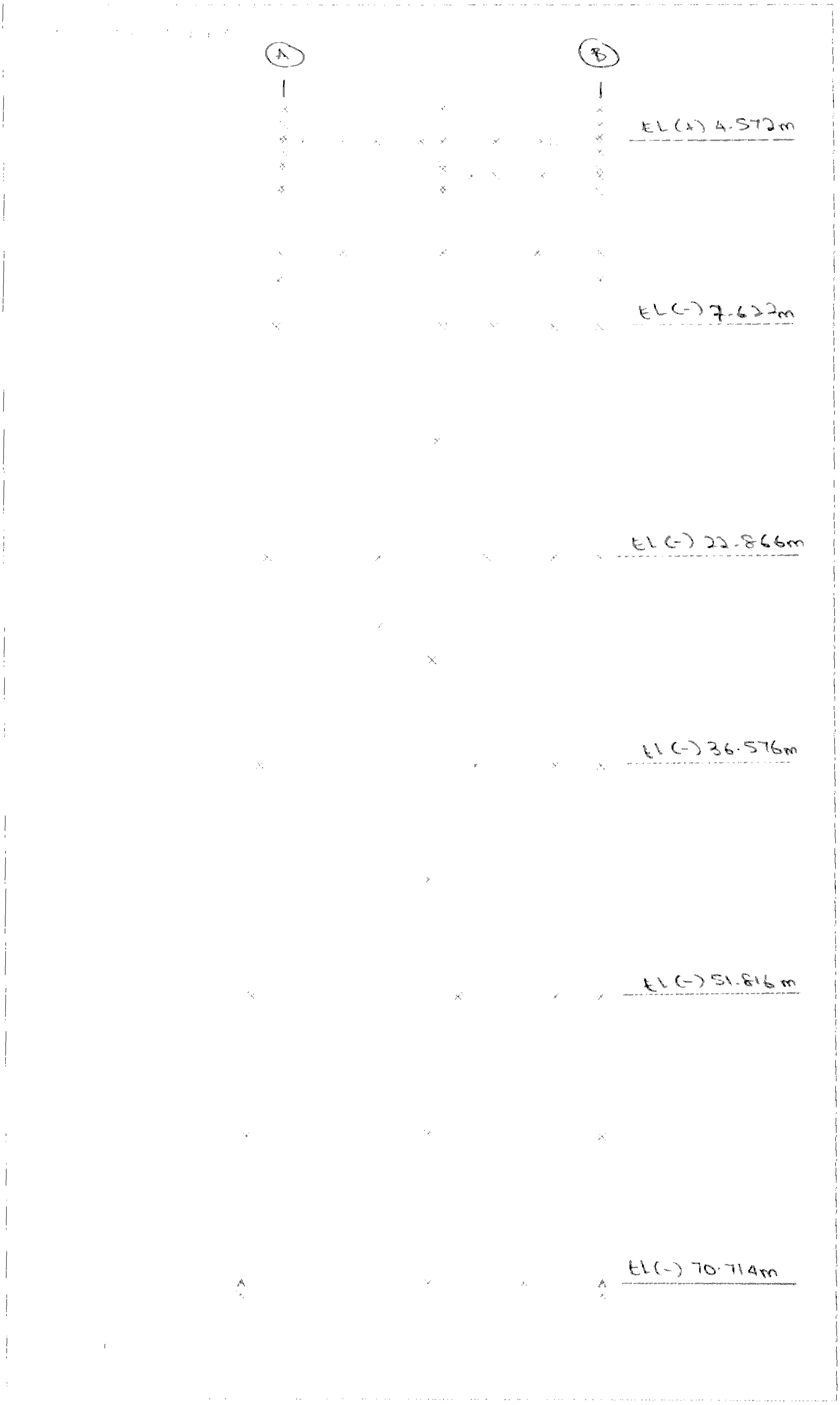

A
B


1
2
EL(+) 4.572m
EL(-) 7.622m
EL(-) 22.866m
EL(-) 36.576m
EL(-) 51.816m
EL(-) 70.714m

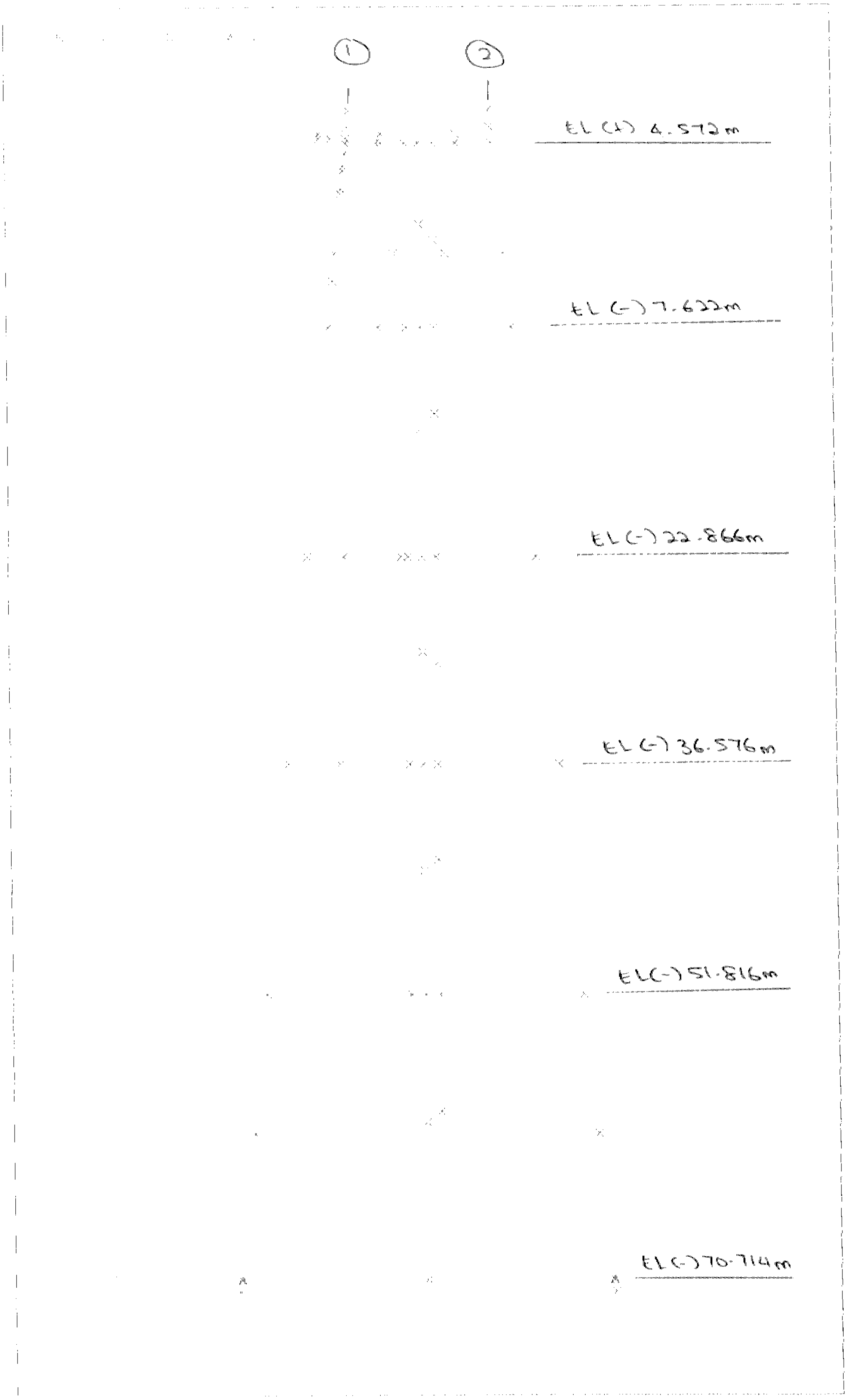

1
2

APPENDIX B.6

B) X-BRACING


A
B
EL (+) 4.572m
EL (-) 7.622m
EL (-) 22.866m
EL (-) 36.576m
EL (-) 51.816m
EL (-) 70.714m

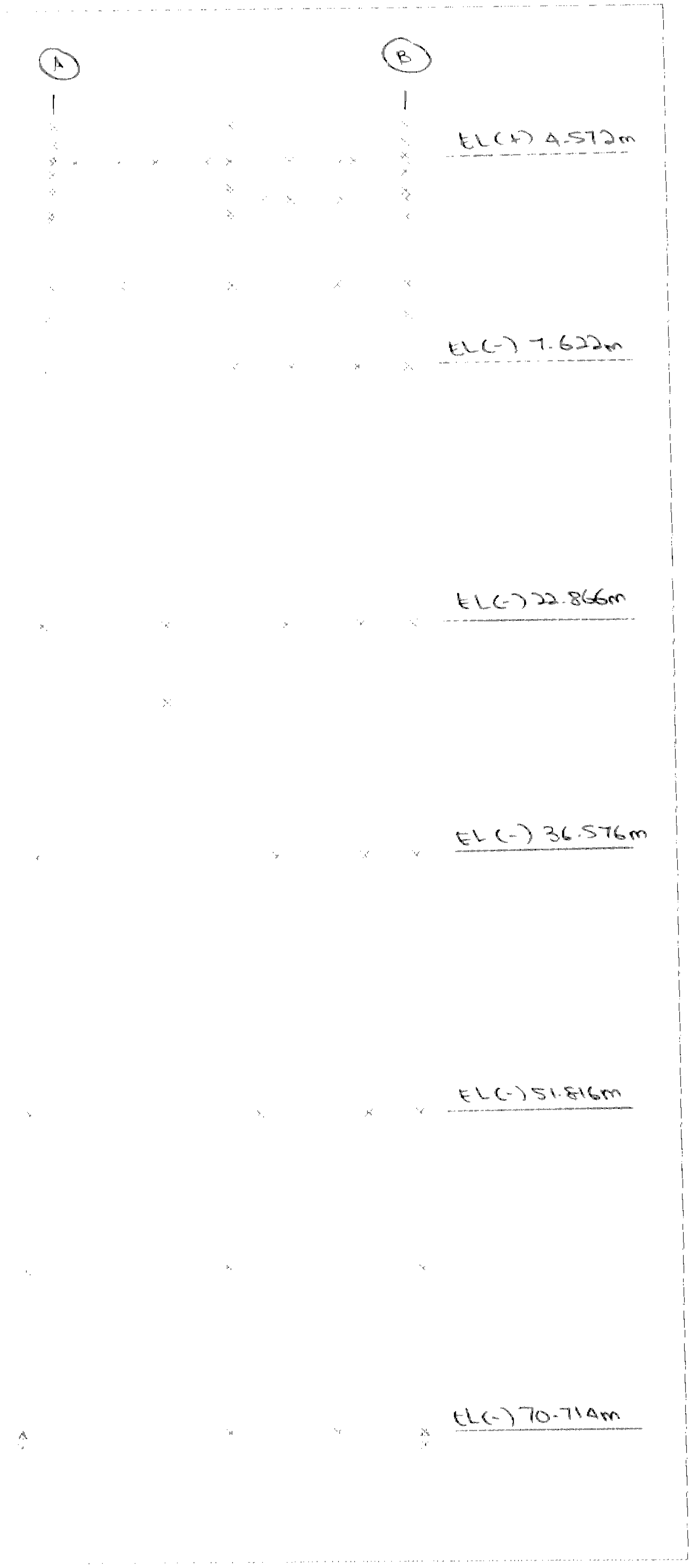

A
B


1
2
EL (+) 4.572m
EL (-) 7.622m
EL (-) 22.866m
EL (-) 36.576m
EL(-) 51.816m
EL(-) 70.714m

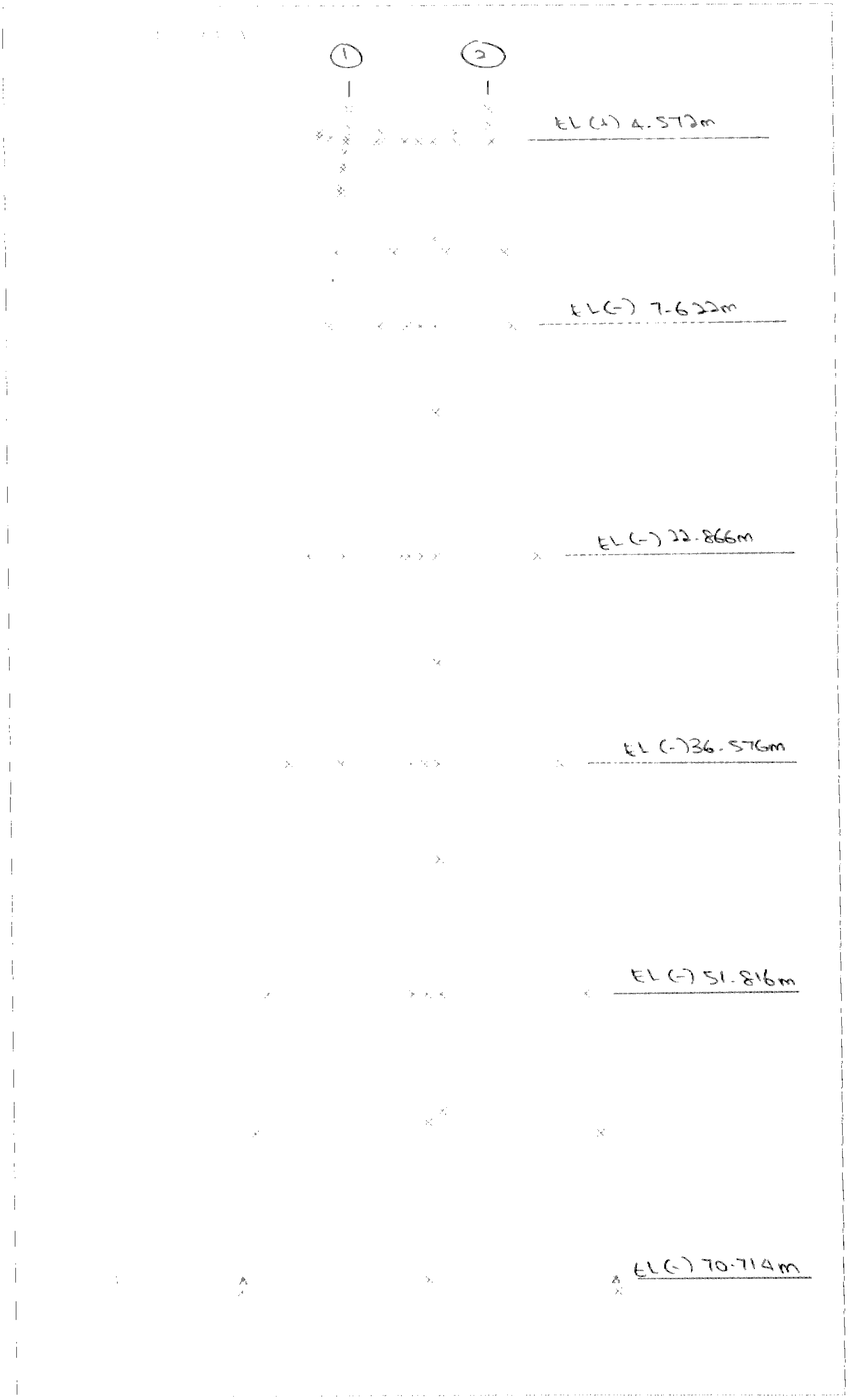

1
2

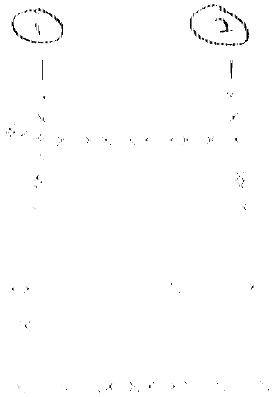
APPENDIX B.6

C) SINGLE DIAGONAL BRACING


A
B
EL(+) 4.572m
EL(-) 7.622m
EL(-) 22.866m
EL(-) 36.576m
EL(-) 51.816m
EL(-) 70.714m

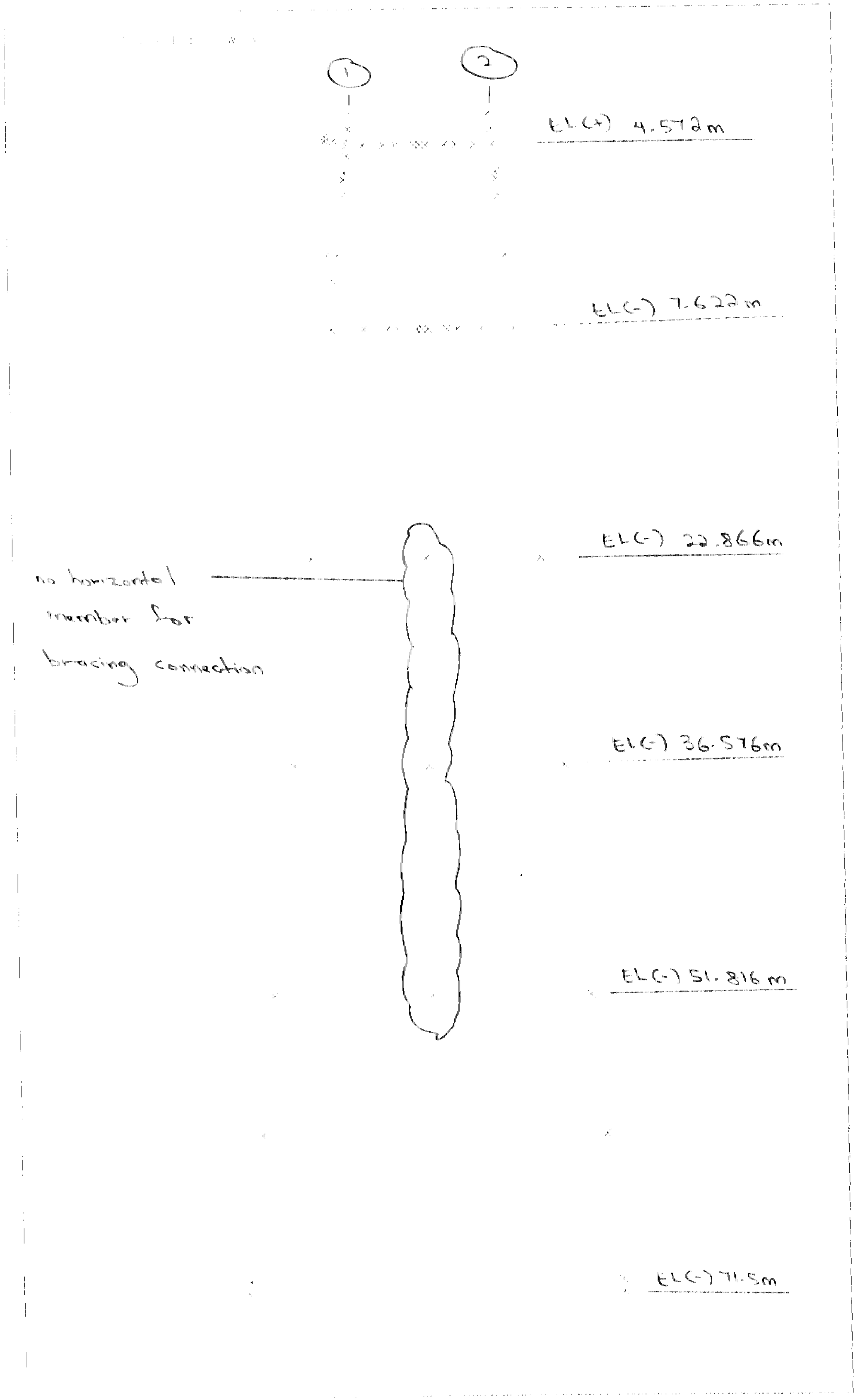

A
B


1
2
EL (+) 4.572m
EL (-) 7.622m
EL (-) 22.866m
EL (-) 36.576m
EL (-) 51.816m
EL (-) 70.714m


1
2

APPENDIX B.7

PLATFORM A K-BRACING PROBLEM


1
2
EL(+) 4.572m
EL(-) 7.622m
EL(-) 22.866m
no horizontal member for bracing connection
EL(-) 36.576m
EL(-) 51.816m
EL(-) 71.5m

APPENDIX C

APPENDIX C.1

BASIC LOAD CASE SUMMARY

APPENDIX C.1

A) PLATFORM A

0 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	2343.861	12.021	-131.725	-919.131	137316	-4230	0	0

BASE SHEAR **2343.89 KN**
OVERTURNING MOMENT **137319 KN-M**

42.11 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	2069.664	1792.19	-156.673	-101744	117985	-3585	0	0

BASE SHEAR **2737.78 KN**
OVERTURNING MOMENT **155796 KN-M**

90 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	4.512	5958.8	-446.409	-342472	566.674	2381.2	0	0

BASE SHEAR **5958.8 KN**
OVERTURNING MOMENT **342472 KN-M**

137.89 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	-2603.964	2254.1	-182.276	-126804	-146654	6397.9	0	0

BASE SHEAR **3444.07 KN**
OVERTURNING MOMENT **193873 KN-M**

180 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	-3616.522	8.039	-62.949	-485.079	-204112	6274.8	0	0

BASE SHEAR 3616.53 KN
OVERTURNING MOMENT 204112 KN-M

222.11 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	-3026.835	-2577	-39.562	142775	-168190	4960.2	0	0

BASE SHEAR 3975.24 KN
OVERTURNING MOMENT 220619 KN-M

270 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD	LOAD	FX	FY	FZ	MX	MY	MZ	DEAD	BOUYANCY
CASE	LABEL							LOAD	
		(KN)	(KN)	(KN)	(KN-M)	(KN-M)	(KN-M)	(KN)	(KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	-0.173	-2043.8	-9.149	112977	-78.247	-582.5	0	0

BASE SHEAR 2043.84 KN
OVERTURNING MOMENT 112977 KN-M

317.89 DEG

SEASTATE BASIC LOAD CASE SUMMARY
REALTIVE TO MUDLINE ELEVATION

LOAD	LOAD	FX	FY	FZ	MX	MY	MZ	DEAD	BOUYANCY
CASE	LABEL							LOAD	
		(KN)	(KN)	(KN)	(KN-M)	(KN-M)	(KN-M)	(KN)	(KN)
1	1	0	-0.004	-7555.792	8004.73	1565.62	0	20087	12531.61
2	2	0	0	-3690.873	-27084.5	117.613	0	0	0
3	3	0	0	-896.628	11997.2	-17.479	0	0	0
4	4	0	0	-554.484	2681.48	-232.77	0	0	0
5	5	0	0	-88.96	1464.73	0	0	0	0
6	6	0	0	-240.935	4185.64	0	0	0	0
7	7	0	0	-639.039	10352.6	-183.34	0	0	0
8	8	0	0	-466.248	1876.04	-5.467	0	0	0
9	9	0	0	-381.952	1359.35	-348.66	0	0	0
10	10	0	0	-399.092	366.972	53.356	0	0	0
11	11	108.99	0	0	0	9372.12	1272.9	0	0
12	12	0	61.824	0	-5163.02	0	0	0	0
13	13	0	0	0	0	977.501	0	0	0
14	14	0	0	0	-974.018	-18.143	0	0	0
15	15	0	0	-151.232	490.182	611.712	0	0	0
16	16	0	0.14	0	-854.79	0	0	0	0
17	100	1666.946	-1436.8	-49.595	82520.9	96268.6	-4178	0	0

BASE SHEAR 2200.71 KN
OVERTURNING MOMENT 126796 KN-M

APPENDIX C.1

B) PLATFORM B

0 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	1729.448	0.817	-20.268	-43.479	84248.52	-451.158	0	0

Base Shear 1729.448 KN
Overturning Moment 84248.53 KN-M

30 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	20	0	0	0	0	0	0	0	0
21	100	1433.036	848.232	-18.951	-44420.5	74528.24	-272.995	0	0

Base Shear 1664.242 KN
Overturning Moment 86761.97 KN-M

60 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	870.378	1539.713	-14.42	-75957.42	42404.62	-60.962	0	0

Base Shear 1768.693 KN
Overturning Moment 86992.42 KN-M

90 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	-0.392	1712.928	-26.264	-90279.21	-43.817	0.968	0	0

Base Shear 1712.928 KN
Overturning Moment 90279.22 KN-M

120 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	-871.174	1540.159	-17.243	-75952.54	-42498.8	70.272	0	0

Base Shear 1769.473 KN
Overturning Moment 87034.11 KN-M

150 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	-1434.237	846.138	-18.752	-44358.67	-74635.63	292.861	0	0

Base Shear 1665.228 KN
Overturning Moment 86822.63 KN-M

180 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	-1729.941	1.311	-17.276	-18.783	-84283.04	456.065	0	0

Base Shear 1729.941 KN
Overturning Moment 84283.04 KN-M

210 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	-1433.949	-845.971	-27.759	44415.64	-74626.91	280.036	0	0

Base Shear 1664.895 KN
Overturning Moment 86844.25 KN-M

240 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	-869.027	-1541.813	-15.601	76040.34	-42373.26	62.365	0	0

Base Shear 1769.857 KN
Overturning Moment 87049.56 KN-M

270 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	1.176	-1715.552	-12.378	90399.77	106.002	6.213	0	0

Base Shear 1715.552 KN
Overturning Moment 90399.83 KN-M

300 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	870.264	-1543.076	-12.643	76093.23	42499.33	-61.657	0	0

Base Shear 1771.565 KN
Overturning Moment 87157.17 KN-M

330 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	0	0	-1742.768	-130.103	-2.465	0	3143.794	1401.026
2	2	0	0	-401.648	-324.613	-30.646	0	0	0
3	3	0	0	-94.325	20.274	0	0	0	0
4	4	0	0	0	0	0	0	0	0
5	5	0	0	0	0	0	0	0	0
6	6	19.5	0	0	0	1628.542	-0.02	0	0
7	7	12.145	0	0	0	1168.995	-29.869	0	0
8	8	0	22.5	0	-1879.087	0	0	0	0
9	9	0	12.145	0	-859.121	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	11	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0
13	13	0	0	0	0	0	0	0	0
14	14	0	0	0	0	0	0	0	0
15	15	0	0	0	0	0	0	0	0
16	16	0	0	0	0	0	0	0	0
17	17	0	0	0	0	0	0	0	0
18	18	0	0	0	0	0	0	0	0
19	19	0	0	0	0	0	0	0	0
20	100	1434.307	-847.227	-27.72	44460.6	74669.44	-285.598	0	0

Base Shear 1665.842 KN
Overturning Moment 86903.8 KN-M

APPENDIX C.1

C) PLATFORM C

0 deg

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	3272.917	-138.688	48.629	6460.609	157933.2	-1151.046	0	0

BASE SHEAR 3275.854 KN
OVERTURNING MOMENT 158065.2 KN-M

65 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	2003.297	6537.204	-341.862	-362201.1	106738.1	29685.84	0	0

BASE SHEAR 6837.268 KN
OVERTURNING MOMENT 377601.2 KN-M

90 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	-449.589	12451.11	-609.837	-674823.9	-17611.53	57954.25	0	0

BASE SHEAR 12459.22 KN
OVERTURNING MOMENT 675053.6 KN-M

115 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	-3111.851	7490.794	-448.211	-397515.4	-153990	36023.64	0	0

BASE SHEAR 8111.449 KN
OVERTURNING MOMENT 426299.7 KN-M

180 DEG

SEASTATE BASIC LOAD CASE SUMMARY
RELATIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	-3709.154	512.145	44.166	-24747.74	-183839.9	3707.86	0	0

BASE SHEAR 3744.345 KN
OVERTURNING MOMENT 185498.2 KN-M

245 DEG

SEASTATE BASIC LOAD CASE SUMMARY
RELATIVE TO MUDLINE ELEVATION

LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	-1523.64	-4077.495	-96.909	221108.1	-75227.88	-16086.08	0	0

BASE SHEAR 4352.866 KN
OVERTURNING MOMENT 233555.2 KN-M

180 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	-3709.154	512.145	44.166	-24747.74	-183839.9	3707.86	0	0

BASE SHEAR 3744.345 KN
OVERTURNING MOMENT 185498.2 KN-M

245 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	-1523.64	-4077.495	-96.909	221108.1	-75227.88	-16086.08	0	0

BASE SHEAR 4352.866 KN
OVERTURNING MOMENT 233555.2 KN-M

270 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	153.954	-4782.235	-275.377	260650.2	7885.17	-19253.19	0	0

BASE SHEAR 4784.712 KN
OVERTURNING MOMENT 260769.4 KN-M

295 DEG

SEASTATE BASIC LOAD CASE SUMMARY RELATIVE TO MUDLINE ELEVATION									
LOAD CASE	LOAD LABEL	FX (KN)	FY (KN)	FZ (KN)	MX (KN-M)	MY (KN-M)	MZ (KN-M)	DEAD LOAD (KN)	BUOYANCY (KN)
1	1	-0.001	-0.002	-21550.17	602.065	91823.97	-0.036	53292.47	31742.344
2	2	-0.001	-0.003	-21341.38	913.463	92086.56	-0.038	53292.45	31951.346
3	3	0	0	-5993.295	12694.13	10106.8	0	0	0
4	4	0	0	521.589	-1882.398	-1800.032	0	0	0
5	5	0	0	-1025.357	1015.729	706.716	0	0	0
6	6	0	0	-29662.7	-33156.4	46953.47	0	0	0
7	7	0	0	-11373.35	-15079.5	159451.4	0	0	0
8	8	0	0	-19362.62	-14889.95	-264298.3	0	0	0
9	9	0	0	0	0	0	0	0	0
10	10	0	0	0	0	0	0	0	0
11	29	2467.033	-0.336	-6.44	34.155	223544.1	-1915.494	0	0
12	30	-0.336	1459.773	-1.892	-130311.5	-25.831	-1878.116	0	0
13	60	0	0	-5337.798	0.001	-34166.18	0	0	0
14	61	0	0	-981	0	-6279.183	0	0	0
15	62	0	0	0	0	39280.79	0	0	0
16	63	0	0	0	39280.79	0	0	0	0
17	100	1829.113	-4078.759	-151.393	218746.6	89854.16	-20656.04	0	0

BASE SHEAR 4470.115 KN
OVERTURNING MOMENT 236482.2 KN-M

APPENDIX C.2

COLLAPSE OUTPUT SUMMARY

APPENDIX C.2

A) PLATFORM A

0 deg

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	39	-10.734	993V	DY	0.01105	9945	RY	4	993V	DZ	-1224.2	-6.29	7759.05
2	CLPS	1	39	-20.985	993V	DY	0.02221	9945	RY	4	993V	DZ	-2443.94	-13.15	15519.35
3	100	0.05	39	-21.581	993V	DY	0.02147	9945	RY	4	993V	DZ	-2560.96	-13.73	15526.06
4	100	0.1	39	-22.173	993V	DY	-0.021	993G	RZ	4	993V	DZ	-2677.97	-14.31	15532.76
5	100	0.15	19	-22.764	993V	DY	-0.0218	993G	RZ	4	993V	DZ	-2794.99	-14.89	15539.46
6	100	0.2	11	-23.352	993V	DY	-0.0226	993G	RZ	4	993V	DZ	-2912.01	-15.47	15546.16
7	100	0.25	5	-23.937	993V	DY	-0.0235	9940	RZ	4	993V	DZ	-3029.02	-16.04	15552.86
8	100	0.3	5	-24.52	993V	DY	-0.0243	9940	RZ	4	993V	DZ	-3146.04	-16.62	15559.56
9	100	0.35	5	-25.1	993V	DY	-0.0251	9940	RZ	4	993V	DZ	-3263.06	-17.19	15566.26
10	100	0.4	5	-25.678	993V	DY	-0.0259	9940	RZ	4	993V	DZ	-3380.07	-17.76	15572.95
11	100	0.45	7	-26.253	993V	DY	-0.0267	9940	RZ	4	993V	DZ	-3497.09	-18.33	15579.65
12	100	0.5	9	-26.825	993V	DY	-0.0275	9940	RZ	4	993V	DZ	-3614.11	-18.9	15586.34
13	100	0.55	9	-27.396	993V	DY	-0.0283	9940	RZ	4	993V	DZ	-3731.12	-19.47	15593.04
14	100	0.6	9	-27.963	993V	DY	-0.0291	9940	RZ	4	993V	DZ	-3848.14	-20.04	15599.73
15	100	0.65	9	-28.529	993V	DY	-0.0299	9940	RZ	4	993V	DZ	-3965.16	-20.6	15606.42
16	100	0.7	9	-29.092	993V	DY	-0.0306	9940	RZ	4	993V	DZ	-4082.18	-21.17	15613.11
17	100	0.75	11	-29.652	993V	DY	-0.0314	9940	RZ	4	993V	DZ	-4199.19	-21.73	15619.79
18	100	0.8	13	-30.21	993V	DY	-0.0322	9940	RZ	4	993V	DZ	-4316.21	-22.29	15626.48
19	100	0.85	15	-30.765	993V	DY	-0.033	9940	RZ	4	993V	DZ	-4433.23	-22.85	15633.16
20	100	0.9	23	-31.318	993V	DY	-0.0337	9940	RZ	4	993V	DZ	-4550.25	-23.41	15639.85
21	100	0.95	39	-31.868	993V	DY	-0.0345	9940	RZ	4	993V	DZ	-4667.27	-23.96	15646.53
22	100	1	39	32.511	993U	DX	-0.0353	9940	RZ	4	993V	DZ	-4784.28	-24.52	15653.21
23	100	1.05	3	33.244	993U	DX	-0.036	9940	RZ	4	993V	DZ	-4901.3	-25.07	15659.89
24	100	1.1	39	33.978	993U	DX	-0.0368	993E	RZ	4	993V	DZ	-5018.32	-25.62	15666.57
25	100	1.15	3	34.709	993U	DX	-0.0375	993E	RZ	4	993V	DZ	-5135.34	-26.18	15673.24
26	100	1.2	39	35.439	993U	DX	-0.0383	993E	RZ	4	993V	DZ	-5252.36	-26.73	15679.92
27	100	1.25	39	36.204	993O	DX	-0.039	993E	RZ	4	993V	DZ	-5369.38	-27.27	15686.59
28	100	1.3	39	37.038	993O	DX	-0.0398	993E	RZ	4	993V	DZ	-5486.4	-27.82	15693.27
29	100	1.35	39	37.871	993O	DX	-0.0405	993E	RZ	4	993V	DZ	-5603.42	-28.37	15699.94
30	100	1.4	39	38.704	993O	DX	-0.0412	993E	RZ	4	993V	DZ	-5720.43	-28.91	15706.61
31	100	1.45	39	39.535	993O	DX	-0.042	993E	RZ	4	993V	DZ	-5837.45	-29.46	15713.28
32	100	1.5	39	40.365	993O	DX	-0.0427	993E	RZ	4	993V	DZ	-5954.47	-30	15719.95
33	100	1.55	39	41.394	9936	DX	-0.0434	993E	RZ	4	993V	DZ	-6071.49	-30.54	15726.61
34	100	1.6	39	42.493	9936	DX	-0.0441	993E	RZ	4	993V	DZ	-6188.51	-31.08	15733.28
35	100	1.65	39	43.591	9936	DX	-0.0448	993E	RZ	4	993V	DZ	-6305.53	-31.62	15739.94
36	100	1.7	39	44.689	9936	DX	-0.0455	993E	RZ	4	993V	DZ	-6422.55	-32.15	15746.6
37	100	1.75	39	45.785	9936	DX	-0.0463	993E	RZ	4	993V	DZ	-6539.57	-32.69	15753.26
38	100	1.8	39	46.881	9936	DX	-0.047	993E	RZ	4	993V	DZ	-6656.59	-33.22	15759.92
39	100	1.85	39	47.975	9936	DX	-0.0477	993E	RZ	4	993V	DZ	-6773.61	-33.76	15766.58
40	100	1.9	39	49.069	9936	DX	-0.0484	993E	RZ	4	993V	DZ	-6890.62	-34.29	15773.24
41	100	1.95	39	50.162	9936	DX	-0.0491	993E	RZ	4	993V	DZ	-7007.64	-34.82	15779.89
42	100	2	39	51.254	9936	DX	-0.0497	993E	RZ	4	993V	DZ	-7124.66	-35.35	15786.55
43	100	2.05	39	52.345	9936	DX	-0.0504	993E	RZ	4	993V	DZ	-7241.68	-35.88	15793.2
44	100	2.1	39	53.435	9936	DX	-0.0511	993E	RZ	4	993V	DZ	-7358.7	-36.41	15799.85
45	100	2.15	39	54.524	9936	DX	-0.0518	993E	RZ	4	993V	DZ	-7475.72	-36.93	15806.5
46	100	2.2	39	55.614	9936	DX	-0.0525	993E	RZ	4	993V	DZ	-7592.74	-37.46	15813.15
47	100	2.25	39	56.702	9936	DX	-0.0532	993E	RZ	4	993V	DZ	-7709.76	-37.98	15819.8
48	100	2.3	39	57.79	9936	DX	-0.0538	993E	RZ	4	993V	DZ	-7826.78	-38.5	15826.44
49	100	2.35	39	58.878	9936	DX	-0.0545	993E	RZ	4	993V	DZ	-7943.8	-39.02	15833.08
50	100	2.4	39	59.966	9936	DX	-0.0552	993E	RZ	4	993V	DZ	-8060.81	-39.54	15839.73
51	100	2.45	39	61.075	9936	DX	-0.0558	993E	RZ	4	993V	DZ	-8177.81	-40.04	15846.38
52	100	2.5	39	62.174	9936	DX	-0.0565	993E	RZ	4	993V	DZ	-8294.82	-40.56	15853.03
53	100	2.55	39	63.283	9936	DX	-0.0571	993E	RZ	4	993V	DZ	-8411.83	-41.07	15859.67
54	100	2.6	39	64.41	9936	DX	-0.0578	993E	RZ	4	993V	DZ	-8528.84	-41.58	15866.32
55	100	2.65	39	65.556	9936	DX	-0.0585	993E	RZ	4	993V	DZ	-8645.84	-42.09	15872.97
56	100	2.7	39	66.722	9936	DX	-0.0591	993E	RZ	4	993V	DZ	-8762.83	-42.6	15879.62
57	100	2.75	39	67.93	9936	DX	-0.0598	993E	RZ	4	993V	DZ	-8879.8	-43.1	15886.28
58	100	2.8	39	69.17	9936	DX	-0.0604	993E	RZ	4	993V	DZ	-8996.77	-43.6	15892.95
59	100	2.85	39	70.443	9936	DX	-0.061	993E	RZ	4	993V	DZ	-9113.75	-44.11	15899.62
60	100	2.9	39	86.571	4153	DX	-0.06	993E	RZ	4	993V	DZ	-9230.85	-45.34	15906.88
61	100	2.95	39	140.287	4053	DX	-0.0648	993E	RZ	4	993V	DZ	-9325.25	-44.52	15930.85
62	100	3	39	186.188	4053	DX	0.21317	1273	RY	4	993V	DZ	-9415.82	-40.22	15956.64
63	100	3.05	26	234.367	4053	DX	-1.3698	1457	RY	4	993V	DZ	-9488.23	-70.8	15991.3

42 11 deg

COLLAPSE SOLUTION SUMMARY															
INCR	LOAD CASE	LOAD FACTOR	NO. LOOPS	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	39	20.126	993V	DY	0.01658	993E	RZ	4	993V	DZ	-1060.69	-911.18	7771.48
2	CLPS	1	39	39.745	993V	DY	0.03295	993E	RZ	4	993V	DZ	-2118.64	-1821.58	15544.12
3	100	0.05	39	42.1	993V	DY	0.03464	993E	RZ	4	993V	DZ	-2221.92	-1910.97	15552.06
4	100	0.1	39	44.45	993V	DY	0.03633	993E	RZ	4	993V	DZ	-2325.21	-2000.36	15560
5	100	0.15	39	46.795	993V	DY	0.03801	993E	RZ	4	993V	DZ	-2428.48	-2089.75	15567.94
6	100	0.2	39	49.135	993V	DY	0.03969	993E	RZ	4	993V	DZ	-2531.75	-2179.14	15575.87
7	100	0.25	39	51.471	993V	DY	0.04137	993E	RZ	4	993V	DZ	-2635.02	-2268.54	15583.81
8	100	0.3	39	53.801	993V	DY	0.04304	993E	RZ	4	993V	DZ	-2738.26	-2357.93	15591.74
9	100	0.35	39	56.127	993V	DY	0.04471	993E	RZ	4	993V	DZ	-2841.53	-2447.32	15599.67
10	100	0.4	39	58.448	993V	DY	0.04637	993E	RZ	4	993V	DZ	-2944.78	-2536.72	15607.6
11	100	0.45	39	60.764	993V	DY	0.04803	993E	RZ	4	993V	DZ	-3048.02	-2626.11	15615.53
12	100	0.5	39	63.075	993V	DY	0.04968	993E	RZ	4	993V	DZ	-3151.26	-2715.51	15623.45
13	100	0.55	39	65.38	993V	DY	0.05133	993E	RZ	4	993V	DZ	-3254.49	-2804.9	15631.38
14	100	0.6	39	67.681	993V	DY	0.05296	993E	RZ	4	993V	DZ	-3357.71	-2894.3	15639.3
15	100	0.65	39	69.976	993V	DY	0.05462	993E	RZ	4	993V	DZ	-3460.93	-2983.7	15647.22
16	100	0.7	39	72.267	993V	DY	0.05625	993E	RZ	4	993V	DZ	-3564.14	-3073.09	15655.14
17	100	0.75	39	74.552	993V	DY	0.05789	993E	RZ	4	993V	DZ	-3667.35	-3162.49	15663.06
18	100	0.8	39	76.832	993V	DY	0.05951	993E	RZ	4	993V	DZ	-3770.55	-3251.88	15670.98
19	100	0.85	39	79.106	993V	DY	0.06114	993E	RZ	4	993V	DZ	-3873.75	-3341.28	15678.9
20	100	0.9	39	81.375	993V	DY	0.06275	993E	RZ	4	993V	DZ	-3976.94	-3430.68	15686.81
21	100	0.95	39	83.639	993V	DY	0.06437	993E	RZ	4	993V	DZ	-4080.12	-3520.08	15694.73
22	100	1	39	85.897	993V	DY	0.06598	993E	RZ	4	993V	DZ	-4183.3	-3609.47	15702.64
23	100	1.05	39	88.15	993V	DY	0.06758	993E	RZ	4	993V	DZ	-4286.47	-3698.87	15710.55
24	100	1.1	39	90.397	993V	DY	0.06918	993E	RZ	4	993V	DZ	-4389.64	-3788.27	15718.46
25	100	1.15	39	92.639	993V	DY	0.07078	993E	RZ	4	993V	DZ	-4492.8	-3877.66	15726.37
26	100	1.2	39	94.875	993V	DY	0.07237	993E	RZ	4	993V	DZ	-4595.96	-3967.06	15734.28
27	100	1.25	39	97.105	993V	DY	0.07396	993E	RZ	4	993V	DZ	-4699.11	-4056.46	15742.19
28	100	1.3	39	99.33	993V	DY	0.07554	993E	RZ	4	993V	DZ	-4802.25	-4145.85	15750.09
29	100	1.35	39	101.55	993V	DY	0.07712	993E	RZ	4	993V	DZ	-4905.39	-4235.25	15758
30	100	1.4	39	103.764	993V	DY	0.07869	993E	RZ	4	993V	DZ	-5008.52	-4324.64	15765.9
31	100	1.45	39	105.974	993V	DY	0.08026	993E	RZ	4	993V	DZ	-5111.65	-4414.04	15773.8
32	100	1.5	39	108.18	993V	DY	0.08182	993E	RZ	4	993V	DZ	-5214.77	-4503.43	15781.7
33	100	1.55	39	110.386	993V	DY	0.08338	993E	RZ	4	993V	DZ	-5317.88	-4592.82	15789.6
34	100	1.6	39	112.542	993V	DY	0.08493	993E	RZ	4	993V	DZ	-5421.01	-4682.23	15797.49
35	100	1.65	39	115.064	993V	DY	0.08658	993E	RZ	4	993V	DZ	-5523.87	-4771.55	15805.48
36	100	1.7	39	116.864	993V	DY	0.08808	993E	RZ	4	993V	DZ	-5627.17	-4861.14	15813.25
37	100	1.75	39	118.974	993V	DY	0.08953	993E	RZ	4	993V	DZ	-5730.34	-4950.43	15821.17
38	100	1.8	39	120.338	993V	DY	0.09127	993E	RZ	4	993V	DZ	-5833.59	-5040.67	15828.68
39	100	1.85	39	124.146	993V	DY	0.09254	993E	RZ	4	993V	DZ	-5935.94	-5128.45	15837.44
40	100	1.9	39	127.483	993V	DY	0.09396	993E	RZ	4	993V	DZ	-6038.18	-5216.66	15846.11
41	100	1.95	39	130.218	993V	DY	0.09542	993E	RZ	4	993V	DZ	-6139.42	-5304.96	15855.17
42	100	2	39	141.183	993V	DY	0.1049	1442	RY	4	993V	DZ	-6228.97	-5383.56	15874.16
43	100	2.05	39	123.437	993V	DY	0.0988	1442	RY	4	993V	DZ	-6339.89	-5487.48	15874.25
44	100	2.1	39	154.551	993V	DY	0.12721	1442	RY	4	993V	DZ	-6426.2	-5553.35	15898.61
45	100	2.15	39	153.422	993V	DY	0.17242	2648	RY	4	993V	DZ	-6535.43	-5647.14	15902.24
46	100	2.2	39	132.686	993V	DY	0.29656	1165	RZ	4	993V	DZ	-6646.9	-5752.63	15900.54
47	100	2.25	39	154.666	993V	DY	0.17627	2648	RY	4	993V	DZ	-6738.01	-5824.74	15921.32
48	100	2.3	39	149.244	993V	DY	-0.1397	2647	RX	4	993V	DZ	-6843.71	-5920.58	15925.39
49	100	2.35	4	159.476	993V	DY	0.79898	1473	RY	4	993V	DZ	-6939.54	-6000.75	15939.68

90 deg

COLLAPSE SOLUTION SUMMARY															
INCR	LOAD CASE	LOAD FACTOR	NO. LOOPS	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	37	102.127	993V	DY	0.09548	993E	RZ	4	993V	DZ	2.99	-3006.31	7916.66
2	CLPS	1	39	193.009	993V	DY	0.18371	993E	RZ	4	993V	DZ	15.72	-6003.55	15835.56
3	100	0.05	39	201.613	993V	DY	0.19177	993E	RZ	4	993V	DZ	17.41	-6300.27	15858.15
4	100	0.1	39	210.021	993V	DY	0.19964	993E	RZ	4	993V	DZ	19.16	-6596.96	15880.74
5	100	0.15	39	218.231	993V	DY	0.20731	993E	RZ	4	993V	DZ	20.99	-6893.63	15903.34
6	100	0.2	39	226.243	993V	DY	0.21478	993E	RZ	4	993V	DZ	22.88	-7190.26	15925.96
7	100	0.25	39	234.056	993V	DY	0.22205	993E	RZ	4	993V	DZ	24.83	-7486.87	15948.57
8	100	0.3	39	241.677	993V	DY	0.22912	993E	RZ	4	993V	DZ	26.83	-7783.44	15971.2
9	100	0.35	39	249.105	993V	DY	0.23598	993E	RZ	4	993V	DZ	28.89	-8079.99	15993.84
10	100	0.4	39	256.346	993V	DY	0.24265	993E	RZ	4	993V	DZ	30.99	-8376.52	16016.48
11	100	0.45	39	263.402	993V	DY	0.24912	993E	RZ	4	993V	DZ	33.14	-8673.01	16039.14
12	100	0.5	39	270.283	993V	DY	0.2554	993E	RZ	4	993V	DZ	35.34	-8969.48	16061.81
13	100	0.55	39	276.994	993V	DY	0.26149	993E	RZ	4	993V	DZ	37.58	-9265.92	16084.48
14	100	0.6	39	283.552	993V	DY	0.2674	993E	RZ	4	993V	DZ	39.85	-9562.33	16107.18
15	100	0.65	39	289.977	993V	DY	0.27313	993E	RZ	4	993V	DZ	42.16	-9858.68	16129.9
16	100	0.7	39	296.38	993V	DY	0.27864	993E	RZ	4	993V	DZ	44.46	-10155	16152.65
17	100	0.75	39	302.577	993V	DY	0.28409	993E	RZ	4	993V	DZ	46.92	-10451.2	16175.45
18	100	0.8	39	307.154	993V	DY	0.28914	993E	RZ	4	993V	DZ	49.05	-10748.4	16197.6
19	100	0.85	39	314.045	993V	DY	0.29465	993E	RZ	4	993V	DZ	52.48	-11043.9	16220.83
20	100	0.9	39	317.898	993V	DY	0.29944	993E	RZ	4	993V	DZ	54.29	-11340.9	16243
21	100	0.95	39	322.846	993V	DY	0.30405	993E	RZ	4	993V	DZ	56.69	-11638.5	16265.01
22	100	1	39	328.122	993V	DY	0.30889	993E	RZ	4	993V	DZ	59.57	-11933.9	16288.23
23	100	1.05	39	339.518	993V	DY	0.31348	993E	RZ	4	993V	DZ	62.02	-12225.9	16314.14
24	100	1.1	39	345.223	993V	DY	0.31834	993E	RZ	4	993V	DZ	63.46	-12521.5	16337.25
25	100	1.15	39	572.434	993V	DY	0.41945	2707	RY	4	993V	DZ	53.23	-12686.7	16458.95
26	100	1.2	6	603.765	993V	DY	0.40653	2707	RY	4	993V	DZ	52.07	-12974.7	16489.15

137.89 deg

COLLAPSE SOLUTION SUMMARY															
INCR	LOAD CASE	LOAD FACTOR	NO. LOOPS	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	27	41.98	9947	DY	0.042	993E	RZ	4	993V	DZ	1328.88	-1140.25	7783.76
2	CLPS	1	39	84.916	9947	DY	0.08565	993E	RZ	4	993V	DZ	2657.36	-2275.76	15567.63
3	100	0.05	39	89.153	9947	DY	0.09011	993E	RZ	4	993V	DZ	2787.57	-2387.98	15576.83
4	100	0.1	39	93.383	9947	DY	0.09458	993E	RZ	4	993V	DZ	2917.79	-2500.2	15586.04
5	100	0.15	39	97.605	9947	DY	0.09904	993E	RZ	4	993V	DZ	3048.02	-2612.41	15595.25
6	100	0.2	39	101.816	9947	DY	0.10351	993E	RZ	4	993V	DZ	3178.27	-2724.61	15604.47
7	100	0.25	39	106.015	9947	DY	0.10797	993E	RZ	4	993V	DZ	3308.54	-2836.81	15613.7
8	100	0.3	39	110.202	9947	DY	0.11243	993E	RZ	4	993V	DZ	3438.82	-2948.99	15622.93
9	100	0.35	39	114.373	9947	DY	0.11687	993E	RZ	4	993V	DZ	3569.11	-3061.17	15632.17
10	100	0.4	39	118.527	9947	DY	0.12131	993E	RZ	4	993V	DZ	3699.42	-3173.33	15641.42
11	100	0.45	39	122.663	9947	DY	0.12574	993E	RZ	4	993V	DZ	3829.75	-3285.49	15650.67
12	100	0.5	39	126.779	9947	DY	0.13016	993E	RZ	4	993V	DZ	3960.08	-3397.64	15659.93
13	100	0.55	39	130.873	9947	DY	0.13456	993E	RZ	4	993V	DZ	4090.43	-3509.78	15669.19
14	100	0.6	39	134.943	9947	DY	0.13895	993E	RZ	4	993V	DZ	4220.8	-3621.91	15678.46
15	100	0.65	39	138.988	9947	DY	0.14332	993E	RZ	4	993V	DZ	4351.18	-3734.03	15687.74
16	100	0.7	39	143.106	993V	DY	0.14767	993E	RZ	4	993V	DZ	4481.57	-3846.14	15697.03
17	100	0.75	39	147.319	993V	DY	0.15199	993E	RZ	4	993V	DZ	4611.97	-3958.24	15706.32
18	100	0.8	39	151.502	993V	DY	0.15629	993E	RZ	4	993V	DZ	4742.38	-4070.33	15715.61
19	100	0.85	39	155.652	993V	DY	0.16057	993E	RZ	4	993V	DZ	4872.81	-4182.42	15724.91
20	100	0.9	39	159.767	993V	DY	0.16481	993E	RZ	4	993V	DZ	5003.25	-4294.49	15734.22
21	100	0.95	39	163.847	993V	DY	0.16903	993E	RZ	4	993V	DZ	5133.7	-4406.56	15743.54
22	100	1	39	167.89	993V	DY	0.17321	993E	RZ	4	993V	DZ	5264.16	-4518.62	15752.86
23	100	1.05	39	171.896	993V	DY	0.17736	993E	RZ	4	993V	DZ	5394.63	-4630.67	15762.19
24	100	1.1	39	175.824	993V	DY	0.18149	993E	RZ	4	993V	DZ	5525.14	-4742.72	15771.51
25	100	1.15	39	179.967	993V	DY	0.18542	993E	RZ	4	993V	DZ	5655.39	-4854.74	15780.94
26	100	1.2	39	183.429	993V	DY	0.18972	993E	RZ	4	993V	DZ	5786.25	-4966.77	15790.14
27	100	1.25	39	186.679	993V	DY	0.19341	993E	RZ	4	993V	DZ	5916.82	-5079.52	15799.22
28	100	1.3	39	191.255	993V	DY	0.19763	993E	RZ	4	993V	DZ	6047.17	-5190.72	15808.93
29	100	1.35	39	196.268	993V	DY	0.2016	993E	RZ	4	993V	DZ	6176.8	-5301.64	15819.06
30	100	1.4	39	197.807	993V	DY	0.20597	993E	RZ	4	993V	DZ	6308.42	-5414.4	15827.68
31	100	1.45	39	201.315	993V	DY	0.209	993E	RZ	4	993V	DZ	6438.62	-5527.45	15836.81
32	100	1.5	39	204.416	993V	DY	0.21306	993E	RZ	4	993V	DZ	6569.61	-5639.43	15845.99
33	100	1.55	39	208.093	993V	DY	0.21687	993E	RZ	4	993V	DZ	6700.13	-5751.24	15855.46
34	100	1.6	39	208.99	993V	DY	0.2206	993E	RZ	4	993V	DZ	6830.66	-5864.41	15864.37
35	100	1.65	39	210.214	993V	DY	0.22499	993E	RZ	4	993V	DZ	6958.94	-5975.09	15875.82
36	100	1.7	39	225.071	993V	DY	-0.3424	1159	RZ	4	993V	DZ	7081.31	-6078.19	15892.46
37	100	1.75	34	254.818	993V	DY	-2.9293	1459	RY	4	993V	DZ	7206.15	-6174.33	15910.08

222.11 deg

COLLAPSE SOLUTION SUMMARY													
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	12	-44.931	993V	DY	-0.0345	9937	RZ	4	993V	DZ	1540.97	1300.83	7711.06
2	CLPS	1	26	-90.593	993V	DY	-0.07	993Z	RZ	4	993V	DZ	3082.81	2595.27	15419.49
3	100	0.05	8	-94.783	993V	DY	-0.0735	993Z	RZ	4	993V	DZ	3234.29	2723.61	15421.17
4	100	0.1	8	-98.978	993V	DY	-0.0771	993Z	RZ	4	993V	DZ	3385.77	2851.94	15422.85
5	100	0.15	8	-103.18	993V	DY	-0.0807	993Z	RZ	4	993V	DZ	3537.27	2980.27	15424.53
6	100	0.2	8	-107.38	993V	DY	-0.0843	993Z	RZ	4	993V	DZ	3688.78	3108.58	15426.2
7	100	0.25	8	-111.59	993V	DY	-0.0879	993Z	RZ	4	993V	DZ	3840.31	3236.88	15427.87
8	100	0.3	8	-115.8	993V	DY	-0.0915	993Z	RZ	4	993V	DZ	3991.85	3365.18	15429.54
9	100	0.35	8	-120.01	993V	DY	-0.0951	993Z	RZ	4	993V	DZ	4143.4	3493.46	15431.2
10	100	0.4	8	-124.21	993V	DY	-0.0987	993E	RZ	4	993V	DZ	4294.96	3621.74	15432.86
11	100	0.45	8	-128.42	993V	DY	-0.1024	993E	RZ	4	993V	DZ	4446.54	3750	15434.52
12	100	0.5	8	-132.62	993V	DY	-0.106	993E	RZ	4	993V	DZ	4598.12	3878.26	15436.17
13	100	0.55	8	-136.82	993V	DY	-0.1096	993E	RZ	4	993V	DZ	4749.72	4006.51	15437.82
14	100	0.6	8	-141.01	993V	DY	-0.1133	993E	RZ	4	993V	DZ	4901.33	4134.74	15439.47
15	100	0.65	10	-145.2	993V	DY	-0.1169	993E	RZ	4	993V	DZ	5052.96	4262.97	15441.12
16	100	0.7	10	-149.38	993V	DY	-0.1206	993E	RZ	4	993V	DZ	5204.59	4391.19	15442.76
17	100	0.75	10	-153.55	993V	DY	-0.1242	993E	RZ	4	993V	DZ	5356.23	4519.39	15444.4
18	100	0.8	12	-157.7	993V	DY	-0.1278	993E	RZ	4	993V	DZ	5507.89	4647.59	15446.03
19	100	0.85	12	-161.85	993V	DY	-0.1315	993E	RZ	4	993V	DZ	5659.55	4775.78	15447.67
20	100	0.9	39	-166.03	993V	DY	-0.1351	993E	RZ	4	993V	DZ	5811.2	4903.92	15449.32
21	100	0.95	39	-170.19	993V	DY	-0.1387	993E	RZ	4	993V	DZ	5962.86	5032.01	15450.98
22	100	1	39	-173.33	993V	DY	-0.1422	993E	RZ	4	993V	DZ	6114.73	5160.92	15452.22
23	100	1.05	39	-177.17	993V	DY	-0.1461	993E	RZ	4	993V	DZ	6267.01	5288.6	15453.78
24	100	1.1	39	-183.24	993V	DY	-0.1497	993E	RZ	4	993V	DZ	6417.18	5415.34	15456.47
25	100	1.15	39	-187.79	993V	DY	-0.1533	993E	RZ	4	993V	DZ	6568.82	5543.23	15458.31
26	100	1.2	39	-189.45	993V	DY	-0.1571	993E	RZ	4	993V	DZ	6720.9	5672.26	15459.22
27	100	1.25	39	-194.63	993V	DY	-0.1604	993E	RZ	4	993V	DZ	6870.49	5799.02	15461.89
28	100	1.3	39	-201.72	993V	DY	-0.1654	993E	RZ	4	993V	DZ	7017.34	5921.11	15467.01
29	100	1.35	39	-208.27	993V	DY	-0.1689	993E	RZ	4	993V	DZ	7166.17	6046.81	15470.83
30	100	1.4	39	-249.52	993V	DY	-0.174	993E	RZ	4	993V	DZ	7296.45	6143.38	15495.29
31	100	1.45	39	-234.45	993V	DY	-0.1799	993E	RZ	4	993V	DZ	7450.38	6274.65	15492.99
32	100	1.5	39	-295.82	993V	DY	-0.2526	1451	RY	4	993V	DZ	7574.29	6345.92	15531.22
33	100	1.55	6	-296.42	993V	DY	-0.4309	1351	RX	4	993V	DZ	7726.05	6471.3	15534.35

270 deg

COLLAPSE SOLUTION SUMMARY													
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	39	-46.783	993V	DY	-0.0389	993E	RZ	4	993V	DZ	1.78	1051.04	7696.64
2	CLPS	1	24	-92.937	993V	DY	-0.0772	993E	RZ	4	993V	DZ	7.04	2098.32	15392.38
3	100	0.05	4	-97.088	993V	DY	-0.081	993E	RZ	4	993V	DZ	7.42	2200.21	15392.72
4	100	0.1	6	-101.23	993V	DY	-0.0847	993E	RZ	4	993V	DZ	7.82	2302.11	15393.06
5	100	0.15	6	-105.37	993V	DY	-0.0885	993E	RZ	4	993V	DZ	8.23	2404	15393.4
6	100	0.2	6	-109.49	993V	DY	-0.0922	993E	RZ	4	993V	DZ	8.65	2505.89	15393.74
7	100	0.25	6	-113.6	993V	DY	-0.0959	993E	RZ	4	993V	DZ	9.09	2607.78	15394.07
8	100	0.3	6	-117.7	993V	DY	-0.0996	993E	RZ	4	993V	DZ	9.54	2709.67	15394.41
9	100	0.35	6	-121.79	993V	DY	-0.1033	993E	RZ	4	993V	DZ	10	2811.55	15394.74
10	100	0.4	8	-125.86	993V	DY	-0.107	993E	RZ	4	993V	DZ	10.48	2913.43	15395.07
11	100	0.45	6	-129.92	993V	DY	-0.1107	993E	RZ	4	993V	DZ	10.96	3015.3	15395.4
12	100	0.5	8	-133.96	993V	DY	-0.1144	993E	RZ	4	993V	DZ	11.46	3117.17	15395.72
13	100	0.55	8	-137.99	993V	DY	-0.118	993E	RZ	4	993V	DZ	11.97	3219.04	15396.05
14	100	0.6	8	-142	993V	DY	-0.1217	993E	RZ	4	993V	DZ	12.49	3320.9	15396.37
15	100	0.65	8	-145.99	993V	DY	-0.1253	993E	RZ	4	993V	DZ	13.02	3422.76	15396.69
16	100	0.7	8	-149.96	993V	DY	-0.1289	993E	RZ	4	993V	DZ	13.57	3524.62	15397.02
17	100	0.75	10	-153.91	993V	DY	-0.1325	993E	RZ	4	993V	DZ	14.12	3626.47	15397.34
18	100	0.8	10	-157.84	993V	DY	-0.1361	993E	RZ	4	993V	DZ	14.69	3728.32	15397.65
19	100	0.85	10	-161.75	993V	DY	-0.1396	993E	RZ	4	993V	DZ	15.26	3830.17	15397.97
20	100	0.9	10	-165.63	993V	DY	-0.1432	993E	RZ	4	993V	DZ	15.85	3932.01	15398.29
21	100	0.95	12	-169.49	993V	DY	-0.1467	993E	RZ	4	993V	DZ	16.45	4033.85	15398.6
22	100	1	12	-173.33	993V	DY	-0.1502	993E	RZ	4	993V	DZ	17.06	4135.69	15398.92
23	100	1.05	14	-177.14	993V	DY	-0.1536	993E	RZ	4	993V	DZ	17.67	4237.52	15399.23
24	100	1.1	14	-180.92	993V	DY	-0.1571	993E	RZ	4	993V	DZ	18.3	4339.35	15399.54
25	100	1.15	16	-184.68	993V	DY	-0.1605	993E	RZ	4	993V	DZ	18.93	4441.17	15399.85
26	100	1.2	18	-188.4	993V	DY	-0.1639	993E	RZ	4	993V	DZ	19.58	4542.99	15400.16
27	100	1.25	22	-192.1	993V	DY	-0.1673	993E	RZ	4	993V	DZ	20.23	4644.81	15400.47
28	100	1.3	26	-195.77	993V	DY	-0.1706	993E	RZ	4	993V	DZ	20.89	4746.63	15400.78
29	100	1.35	30	-199.42	993V	DY	-0.1739	993E	RZ	4	993V	DZ	21.56	4848.44	15401.09
30	100	1.4	39	-203.03	993V	DY	-0.1772	993E	RZ	4	993V	DZ	22.23	4950.24	15401.4
31	100	1.45	39	-206.61	993V	DY	-0.1804	993E	RZ	4	993V	DZ	22.92	5052.04	15401.71
32	100	1.5	39	-210.16	993V	DY	-0.1837	993E	RZ	4	993V	DZ	23.61	5153.84	15402.01
33	100	1.55	39	-213.67	993V	DY	-0.1869	993E	RZ	4	993V	DZ	24.31	5255.64	15402.32
34	100	1.6	39	-217.16	993V	DY	-0.19	993E	RZ	4	993V	DZ	25.01	5357.43	15402.63
35	100	1.65	39	-220.61	993V	DY	-0.1931	993E	RZ	4	993V	DZ	25.72	5459.22	15402.93

COLLAPSE SOLUTION SUMMARY

INCR	LOAD CASE	LOAD FACTOR	NO. LOOPS	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
36	100	1.7	39	-224.04	993V	DY	-0.1962	993E	RZ	4	993V	DZ	26.44	5561.01	15403.24
37	100	1.75	39	-227.42	993V	DY	-0.1993	993E	RZ	4	993V	DZ	27.17	5662.79	15403.54
38	100	1.8	39	-230.78	993V	DY	-0.2023	993E	RZ	4	993V	DZ	27.9	5764.57	15403.85
39	100	1.85	39	-234.11	993V	DY	-0.2053	993E	RZ	4	993V	DZ	28.63	5866.34	15404.15
40	100	1.9	39	-237.4	993V	DY	-0.2083	993E	RZ	4	993V	DZ	29.37	5968.12	15404.46
41	100	1.95	39	-240.66	993V	DY	-0.2112	993E	RZ	4	993V	DZ	30.12	6069.89	15404.76
42	100	2	39	-243.88	993V	DY	-0.2141	993E	RZ	4	993V	DZ	30.87	6171.65	15405.07
43	100	2.05	39	-247.08	993V	DY	-0.217	993E	RZ	4	993V	DZ	31.63	6273.42	15405.37
44	100	2.1	39	-250.24	993V	DY	-0.2198	993E	RZ	4	993V	DZ	32.39	6375.18	15405.67
45	100	2.15	39	-253.37	993V	DY	-0.2226	993E	RZ	4	993V	DZ	33.15	6476.93	15405.98
46	100	2.2	39	-256.46	993V	DY	-0.2253	993E	RZ	4	993V	DZ	33.92	6578.69	15406.28
47	100	2.25	39	-259.53	993V	DY	-0.2281	993E	RZ	4	993V	DZ	34.7	6680.44	15406.59
48	100	2.3	39	-262.56	993V	DY	-0.2308	993E	RZ	4	993V	DZ	35.47	6782.19	15406.89
49	100	2.35	39	-265.57	993V	DY	-0.2334	993E	RZ	4	993V	DZ	36.25	6883.93	15407.2
50	100	2.4	39	-268.54	993V	DY	-0.236	993E	RZ	4	993V	DZ	37.04	6985.68	15407.5
51	100	2.45	39	-271.46	993V	DY	-0.2386	993E	RZ	4	993V	DZ	37.83	7087.42	15407.8
52	100	2.5	39	-274.39	993V	DY	-0.2412	993E	RZ	4	993V	DZ	38.62	7189.15	15408.11
53	100	2.55	39	-277.27	993V	DY	-0.2437	993E	RZ	4	993V	DZ	39.41	7290.89	15408.41
54	100	2.6	39	-280.13	993V	DY	-0.2462	993E	RZ	4	993V	DZ	40.21	7392.62	15408.72
55	100	2.65	39	-282.95	993V	DY	-0.2487	993E	RZ	4	993V	DZ	41.01	7494.35	15409.02
56	100	2.7	39	-285.74	993V	DY	-0.2511	993X	RZ	4	993V	DZ	41.81	7596.08	15409.33
57	100	2.75	39	-288.51	993V	DY	-0.2536	993X	RZ	4	993V	DZ	42.62	7697.81	15409.64
58	100	2.8	39	-291.25	993V	DY	-0.256	993X	RZ	4	993V	DZ	43.42	7799.53	15409.94
59	100	2.85	39	-293.96	993V	DY	-0.2583	993X	RZ	4	993V	DZ	44.23	7901.25	15410.25
60	100	2.9	39	-296.65	993V	DY	-0.2607	993X	RZ	4	993V	DZ	45.05	8002.98	15410.56
61	100	2.95	39	-299.3	993V	DY	-0.263	993X	RZ	4	993V	DZ	45.86	8104.68	15410.86
62	100	3	39	-301.94	993V	DY	-0.2652	993X	RZ	4	993V	DZ	46.68	8206.39	15411.17
63	100	3.05	39	-304.54	993V	DY	-0.2675	993X	RZ	4	993V	DZ	47.49	8308.1	15411.48
64	100	3.1	39	-307.13	993V	DY	-0.2697	993X	RZ	4	993V	DZ	48.31	8409.81	15411.79
65	100	3.15	39	-309.68	993V	DY	-0.2719	993X	RZ	4	993V	DZ	49.14	8511.52	15412.1
66	100	3.2	39	-312.22	993V	DY	-0.2741	993X	RZ	4	993V	DZ	49.96	8613.22	15412.41
67	100	3.25	39	-314.73	993V	DY	-0.2762	993X	RZ	4	993V	DZ	50.79	8714.92	15412.72
68	100	3.3	39	-317.22	993V	DY	-0.2783	993X	RZ	4	993V	DZ	51.61	8816.62	15413.03
69	100	3.35	39	-319.68	993V	DY	-0.2804	993X	RZ	4	993V	DZ	52.44	8918.32	15413.34
70	100	3.4	39	-322.13	993V	DY	-0.2825	993X	RZ	4	993V	DZ	53.27	9020.01	15413.65
71	100	3.45	39	-324.56	993V	DY	-0.2846	993X	RZ	4	993V	DZ	54.1	9121.69	15413.97
72	100	3.5	39	-326.97	993V	DY	-0.2866	993X	RZ	4	993V	DZ	54.94	9223.38	15414.29
73	100	3.55	39	-329.36	993V	DY	-0.2886	993X	RZ	4	993V	DZ	55.77	9325.05	15414.61
74	100	3.6	39	-331.74	993V	DY	-0.2905	993X	RZ	4	993V	DZ	56.61	9426.72	15414.93
75	100	3.65	39	-334.1	993V	DY	-0.2925	993X	RZ	4	993V	DZ	57.44	9528.39	15415.26
76	100	3.7	39	-336.45	993V	DY	-0.2944	993X	RZ	4	993V	DZ	58.28	9630.05	15415.59
77	100	3.75	39	-338.78	993V	DY	-0.2963	993X	RZ	4	993V	DZ	59.12	9731.7	15415.93
78	100	3.8	39	-341.1	993V	DY	-0.2982	993X	RZ	4	993V	DZ	59.96	9833.35	15416.26
79	100	3.85	39	-343.42	993V	DY	-0.3001	993X	RZ	4	993V	DZ	60.75	9934.98	15416.62
80	100	3.9	39	-345.58	993V	DY	-0.3019	993X	RZ	4	993V	DZ	61.76	10036.68	15416.9
81	100	3.95	39	-347.99	993V	DY	-0.3037	993X	RZ	4	993V	DZ	62.41	10138.23	15417.31
82	100	4	39	-350.06	993V	DY	-0.3056	993X	RZ	4	993V	DZ	63.59	10239.97	15417.58
83	100	4.05	39	-352.41	993V	DY	-0.3072	993X	RZ	4	993V	DZ	63.89	10341.53	15417.98
84	100	4.1	39	-354.73	993V	DY	-0.3092	993X	RZ	4	993V	DZ	65.5	10443.07	15418.38
85	100	4.15	39	-357	993V	DY	-0.3108	993X	RZ	4	993V	DZ	66.14	10544.61	15418.79
86	100	4.2	39	-359.68	993V	DY	-0.3125	993X	RZ	4	993V	DZ	66.58	10645.83	15419.43
87	100	4.25	39	-363.27	993V	DY	-0.3142	993X	RZ	4	993V	DZ	67.58	10746.11	15420.71
88	100	4.3	39	-363.43	993V	DY	-0.3157	993X	RZ	4	993V	DZ	67.3	10848.99	15420.14
89	100	4.35	39	-364.63	993V	DY	-0.3176	993X	RZ	4	993V	DZ	69.3	10951.37	15419.98
90	100	4.4	39	-367.36	993V	DY	-0.3193	993X	RZ	4	993V	DZ	70.25	11051.9	15420.87
91	100	4.45	39	-367.03	993V	DY	-0.3214	993X	RZ	4	993V	DZ	71.76	11155.73	15419.72
92	100	4.5	39	-370.37	993V	DY	-0.3224	993X	RZ	4	993V	DZ	71.78	11256.28	15420.94
93	100	4.55	39	-374.76	993V	DY	-0.3245	993X	RZ	4	993V	DZ	75.12	11357.45	15422.08
94	100	4.6	39	-374.17	993V	DY	-0.3256	993X	RZ	4	993V	DZ	74.46	11459.68	15421.59
95	100	4.65	39	-376.16	993V	DY	-0.3272	993X	RZ	4	993V	DZ	75.49	11560.01	15422.7
96	100	4.7	39	-390.18	993V	DY	-0.3285	993X	RZ	4	993V	DZ	75.72	11652.42	15430.24
97	100	4.75	39	-449.53	993V	DY	-0.3311	993X	RZ	4	993V	DZ	74.27	11698.89	15477.58
98	100	4.8	15	-606.69	993V	DY	-1.5748	1457	RX	4	993V	DZ	87.27	11690.11	15254.37

COLLAPSE SOLUTION SUMMARY															
				MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	LOAD CASE	LOAD FACTOR	NO. LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	30	-43.445	993V	DY	-0.0395	993E	RZ	4	993V	DZ	-858.49	733.29	7717.59
2	CLPS	1	22	-85.162	993V	DY	-0.0774	993E	RZ	4	993V	DZ	-1712.48	1465.21	15435.79
3	100	0.05	6	-88.837	993V	DY	-0.081	993E	RZ	4	993V	DZ	-1795.4	1536.92	15438.34
4	100	0.1	6	-92.495	993V	DY	-0.0846	993E	RZ	4	993V	DZ	-1878.3	1608.64	15440.88
5	100	0.15	6	-96.136	993V	DY	-0.0882	993E	RZ	4	993V	DZ	-1961.2	1680.36	15443.43
6	100	0.2	6	-99.76	993V	DY	-0.0917	993E	RZ	4	993V	DZ	-2044.08	1752.08	15445.97
7	100	0.25	8	-103.37	993V	DY	-0.0953	993E	RZ	4	993V	DZ	-2126.95	1823.8	15448.52
8	100	0.3	6	-106.95	993V	DY	-0.0988	993E	RZ	4	993V	DZ	-2209.82	1895.53	15451.06
9	100	0.35	8	-110.52	993V	DY	-0.1023	993E	RZ	4	993V	DZ	-2292.67	1967.26	15453.61
10	100	0.4	8	-114.07	993V	DY	-0.1058	993E	RZ	4	993V	DZ	-2375.52	2038.99	15456.16
11	100	0.45	8	-117.59	993V	DY	-0.1092	993E	RZ	4	993V	DZ	-2458.35	2110.72	15458.71
12	100	0.5	8	-121.1	993V	DY	-0.1127	993E	RZ	4	993V	DZ	-2541.17	2182.45	15461.26
13	100	0.55	10	-124.58	993V	DY	-0.1161	993E	RZ	4	993V	DZ	-2623.99	2254.19	15463.81
14	100	0.6	10	-128.05	993V	DY	-0.1195	993E	RZ	4	993V	DZ	-2706.79	2325.93	15466.37
15	100	0.65	10	-131.49	993V	DY	-0.1229	993E	RZ	4	993V	DZ	-2789.59	2397.67	15468.92
16	100	0.7	10	-134.91	993V	DY	-0.1262	993E	RZ	4	993V	DZ	-2872.37	2469.41	15471.48
17	100	0.75	12	-138.3	993V	DY	-0.1295	993E	RZ	4	993V	DZ	-2955.15	2541.15	15474.03
18	100	0.8	14	-141.67	993V	DY	-0.1328	993E	RZ	4	993V	DZ	-3037.92	2612.89	15476.59
19	100	0.85	14	-145.02	993V	DY	-0.1361	993E	RZ	4	993V	DZ	-3120.68	2684.63	15479.15
20	100	0.9	16	-148.34	993V	DY	-0.1394	993E	RZ	4	993V	DZ	-3203.43	2756.38	15481.71
21	100	0.95	18	-151.64	993V	DY	-0.1426	993E	RZ	4	993V	DZ	-3286.17	2828.13	15484.28
22	100	1	22	-154.91	993V	DY	-0.1458	993E	RZ	4	993V	DZ	-3368.9	2899.87	15486.84
23	100	1.05	26	-158.16	993V	DY	-0.149	993E	RZ	4	993V	DZ	-3451.63	2971.62	15489.41
24	100	1.1	32	-161.38	993V	DY	-0.1521	993E	RZ	4	993V	DZ	-3534.34	3043.37	15491.97
25	100	1.15	39	-164.57	993V	DY	-0.1552	993E	RZ	4	993V	DZ	-3617.05	3115.12	15494.54
26	100	1.2	24	-167.74	993V	DY	-0.1583	993E	RZ	4	993V	DZ	-3699.75	3186.87	15497.11
27	100	1.25	9	-170.88	993V	DY	-0.1614	993E	RZ	4	993V	DZ	-3782.45	3258.62	15499.69
28	100	1.3	39	-173.99	993V	DY	-0.1644	993E	RZ	4	993V	DZ	-3865.13	3330.38	15502.26
29	100	1.35	39	-177.08	993V	DY	-0.1675	993E	RZ	4	993V	DZ	-3947.81	3402.13	15504.84
30	100	1.4	39	-180.14	993V	DY	-0.1704	993E	RZ	4	993V	DZ	-4030.49	3473.88	15507.41
31	100	1.45	39	-183.17	993V	DY	-0.1734	993E	RZ	4	993V	DZ	-4113.15	3545.64	15509.99
32	100	1.5	39	-186.17	993V	DY	-0.1763	993E	RZ	4	993V	DZ	-4195.81	3617.39	15512.57
33	100	1.55	39	-189.15	993V	DY	-0.1792	993E	RZ	4	993V	DZ	-4278.46	3689.15	15515.16
34	100	1.6	39	-192.09	993V	DY	-0.1821	993E	RZ	4	993V	DZ	-4361.11	3760.9	15517.74
35	100	1.65	39	-195.01	993V	DY	-0.1849	993E	RZ	4	993V	DZ	-4443.75	3832.66	15520.33
36	100	1.7	39	-197.9	993V	DY	-0.1877	993E	RZ	4	993V	DZ	-4526.38	3904.42	15522.91
37	100	1.75	39	-200.77	993V	DY	-0.1905	993E	RZ	4	993V	DZ	-4609.01	3976.17	15525.5
38	100	1.8	39	-203.6	993V	DY	-0.1932	993X	RZ	4	993V	DZ	-4691.63	4047.93	15528.1
39	100	1.85	39	-206.41	993V	DY	-0.196	993X	RZ	4	993V	DZ	-4774.25	4119.69	15530.69
40	100	1.9	39	-209.18	993V	DY	-0.1987	993X	RZ	4	993V	DZ	-4856.86	4191.45	15533.29
41	100	1.95	39	-211.93	993V	DY	-0.2013	993X	RZ	4	993V	DZ	-4939.47	4263.2	15535.88
42	100	2	39	-214.66	993V	DY	-0.204	993X	RZ	4	993V	DZ	-5022.07	4334.96	15538.48
43	100	2.05	39	-217.35	993V	DY	-0.2066	993X	RZ	4	993V	DZ	-5104.66	4406.72	15541.09
44	100	2.1	39	-220.02	993V	DY	-0.2092	993X	RZ	4	993V	DZ	-5187.25	4478.48	15543.69
45	100	2.15	39	-222.66	993V	DY	-0.2117	993X	RZ	4	993V	DZ	-5269.84	4550.24	15546.3
46	100	2.2	39	-225.28	993V	DY	-0.2143	993X	RZ	4	993V	DZ	-5352.41	4621.99	15548.91
47	100	2.25	39	-227.89	993V	DY	-0.2168	993X	RZ	4	993V	DZ	-5434.98	4693.73	15551.53
48	100	2.3	39	-230.47	993V	DY	-0.2192	993X	RZ	4	993V	DZ	-5517.53	4765.45	15554.16
49	100	2.35	39	-233.22	993V	DY	-0.2217	993X	RZ	4	993V	DZ	-5599.93	4837.13	15556.84
50	100	2.4	39	-234.62	993V	DY	-0.224	993X	RZ	4	993V	DZ	-5683.06	4909.45	15559.1
51	100	2.45	39	-237.41	993V	DY	-0.2265	993X	RZ	4	993V	DZ	-5765.31	4981.2	15561.78
52	100	2.5	39	-239.81	993V	DY	-0.2288	993X	RZ	4	993V	DZ	-5848.02	5052.77	15564.45
53	100	2.55	39	-241.96	993V	DY	-0.2312	993X	RZ	4	993V	DZ	-5930.47	5124.93	15566.9
54	100	2.6	39	-246.22	993V	DY	-0.2332	993X	RZ	4	993V	DZ	-6011.58	5194.53	15570.76
55	100	2.65	39	-246.35	993V	DY	-0.2355	993X	RZ	4	993V	DZ	-6093.65	5266.96	15573.16
56	100	2.7	39	-249.42	993V	DY	-0.2365	993X	RZ	4	993V	DZ	-6170.87	5333.74	15578.96
57	100	2.75	39	-264.49	993V	DY	-0.2387	993X	RZ	4	993V	DZ	-6246.8	5396.39	15587.5
58	100	2.8	39	-267.29	993V	DY	-0.2398	993X	RZ	4	993V	DZ	-6329.95	5466.43	15590.78
59	100	2.85	39	-257.43	993V	DY	-0.2431	993X	RZ	4	993V	DZ	-6416.6	5547.2	15588.01
60	100	2.9	39	-279.1	993V	DY	-0.2451	993X	RZ	4	993V	DZ	-6489.3	5604.55	15600.54
61	100	2.95	39	-270.2	993V	DY	-0.2475	993X	RZ	4	993V	DZ	-6570.05	5682.52	15603.02
62	100	3	39	-320.17	993V	DY	0.49126	1357	RY	4	993V	DZ	-6623.5	5714.52	15632.46
63	100	3.05	39	-311.19	993V	DY	-0.2485	993X	RZ	4	993V	DZ	-6703	5790.47	15634.52
64	100	3.1	39	-365.62	993V	DY	1.17749	1257	RX	4	993V	DZ	-6747.52	5811.37	15670.9
65	100	3.15	9	-368	993V	DY	-0.3777	1455	RY	4	993V	DZ	-6831.76	5686.83	15672.58

APPENDIX C.2

B) PLATFORM B

0 deg

COLLAPSE SOLUTION SUMMARY															
LOAD	LOAD	NO.	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR CM	CASE DIGITS	FACTOR KN	LOOPS KN	DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	12.406	18	DX	-0.03152	42	RZ	3	1030	DX	-875.58	-0.41	1183.17
2	CLPS	1	39	24.849	18	DX	-0.06328	42	RZ	3	1030	DX	-1751.14	-0.81	2366.33
3	100	0.05	39	26.113	18	DX	-0.06638	42	RZ	3	1030	DX	-1837.11	-0.85	2367.45
4	100	0.1	39	27.303	18	DX	-0.0695	42	RZ	3	1030	DX	-1923.1	-0.93	2368.54
5	100	0.15	39	28.552	51	DX	-0.07268	42	RZ	3	1030	DX	-2009.08	-0.94	2369.46
6	100	0.2	39	29.803	51	DX	-0.07557	42	RZ	3	1030	DX	-2095.04	-1	2370.52
7	100	0.25	39	31.048	51	DX	-0.07869	42	RZ	3	1030	DX	-2181.02	-1.01	2371.47
8	100	0.3	39	32.445	51	DX	-0.08195	42	RZ	3	1030	DX	-2266.95	-1	2372.58
9	100	0.35	39	33.621	51	DX	-0.08537	42	RZ	3	1030	DX	-2352.94	-1.06	2373.78
10	100	0.4	39	34.864	51	DX	-0.08819	42	RZ	3	1030	DX	-2438.91	-1.14	2374.83
11	100	0.45	39	36.084	51	DX	-0.09118	42	RZ	3	1030	DX	-2524.91	-1.14	2375.75
12	100	0.5	39	37.29	51	DX	-0.09412	42	RZ	3	1030	DX	-2610.89	-1.19	2376.51
13	100	0.55	39	38.58	51	DX	-0.09774	42	RZ	3	1030	DX	-2696.86	-1.19	2377.51
14	100	0.6	39	39.786	51	DX	-0.10037	42	RZ	3	1030	DX	-2782.86	-1.28	2378.52
15	100	0.65	39	41.032	51	DX	-0.10384	42	RZ	3	1030	DX	-2868.81	-1.3	2379.62
16	100	0.7	39	42.243	51	DX	-0.10685	42	RZ	3	1030	DX	-2954.8	-1.31	2380.83
17	100	0.75	39	43.542	51	DX	-0.11026	42	RZ	3	1030	DX	-3040.76	-1.34	2381.75
18	100	0.8	39	44.764	51	DX	-0.11366	42	RZ	3	1030	DX	-3126.75	-1.46	2382.61
19	100	0.85	39	46.125	51	DX	-0.1162	42	RZ	4	7010	DY	-3212.72	-1.47	2383.69
20	100	0.9	39	47.27	51	DX	-0.11944	42	RZ	3	1030	DX	-3298.68	-1.43	2384.66
21	100	0.95	39	48.515	51	DX	-0.12242	42	RZ	3	1030	DX	-3384.68	-1.56	2385.63
22	100	1	39	49.841	51	DX	-0.12621	42	RZ	3	1030	DX	-3470.62	-1.62	2387.07
23	100	1.05	39	51.018	51	DX	-0.13002	42	RZ	3	1030	DX	-3556.61	-1.65	2387.97
24	100	1.1	39	52.442	51	DX	-0.13384	42	RZ	3	1030	DX	-3642.51	-1.45	2388.88
25	100	1.15	39	53.625	51	DX	-0.13743	42	RZ	3	1030	DX	-3728.51	-1.64	2390.28
26	100	1.2	39	61.125	12	DX	-0.14101	42	RZ	3	1030	DX	-3814.45	-1.53	2391.78
27	100	1.25	39	55.977	51	DX	-0.14303	42	RZ	3	1030	DX	-3900.41	-1.53	2391.86
28	100	1.3	39	58.152	12	DX	-0.14734	42	RZ	3	1030	DX	-3986.47	-1.84	2393.62
29	100	1.35	39	58.728	51	DX	-0.15125	42	RZ	3	1030	DX	-4072.44	-1.69	2393.72
30	100	1.4	39	574.46	251	DX	0.29405	7020	RY	3	1030	DX	-4136.71	-26.4	2439.31

30 DEG

COLLAPSE SOLUTION SUMMARY															
LOAD	LOAD	NO.	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR CM	CASE DIGITS	FACTOR KN	LOOPS KN	DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	9.349	251	DX	-0.04855	50	RZ	3	1030	DX	-730.93	-431.43	1182.54
2	CLPS	1	39	17.566	251	DX	-0.09756	50	RZ	3	1030	DX	-1461.92	-862.88	2365.16
3	100	0.05	39	18.847	251	DX	-0.10256	50	RZ	3	1030	DX	-1533.27	-904.99	2366.16
4	100	0.1	39	18.065	251	DX	-0.10716	50	RZ	3	1030	DX	-1604.65	-947.14	2367.07
5	100	0.15	39	18.433	251	DX	-0.11224	50	RZ	3	1030	DX	-1675.98	-989.26	2368.03
6	100	0.2	39	20.593	251	DX	-0.11666	50	RZ	3	1030	DX	-1747.35	-1031.41	2369.08
7	100	0.25	39	20.376	251	DX	-0.12185	50	RZ	3	1030	DX	-1818.7	-1073.51	2370
8	100	0.3	39	28.194	251	DX	-0.12661	50	RZ	3	1030	DX	-1890.02	-1115.65	2371.31
9	100	0.35	39	22.143	251	DX	-0.13145	50	RZ	3	1030	DX	-1961.4	-1157.75	2371.98
10	100	0.4	39	24.814	251	DX	-0.13801	50	RZ	3	1030	DX	-2032.74	-1199.88	2373.04
11	100	0.45	39	26.223	251	DX	-0.14127	50	RZ	3	1030	DX	-2104.11	-1242	2374.03
12	100	0.5	39	23.142	18	DX	-0.14605	50	RZ	3	1030	DX	-2175.49	-1284.14	2374.82
13	100	0.55	39	23.797	18	DX	-0.15055	50	RZ	3	1030	DX	-2246.84	-1326.32	2375.72
14	100	0.6	39	24.706	18	DX	-0.15669	50	RZ	3	1030	DX	-2318.13	-1368.27	2376.79
15	100	0.65	39	25.449	18	DX	-0.16111	50	RZ	3	1030	DX	-2389.48	-1410.42	2377.74
16	100	0.7	39	32.236	12	DX	-0.16574	50	RZ	3	1030	DX	-2460.86	-1452.59	2379.08
17	100	0.75	39	33.569	251	DX	-0.17054	50	RZ	3	1030	DX	-2532.29	-1494.77	2380.12
18	100	0.8	39	27.683	18	DX	-0.17438	50	RZ	3	1030	DX	-2603.78	-1537.06	2380.58
19	100	0.85	39	28.412	18	DX	-0.18012	50	RZ	3	1030	DX	-2675.05	-1579.15	2381.51
20	100	0.9	39	29.321	18	DX	-0.18444	50	RZ	3	1030	DX	-2746.52	-1621.27	2382.42
21	100	0.95	39	31.172	251	DX	-0.19002	50	RZ	3	1030	DX	-2817.72	-1663.07	2383.67
22	100	1	39	30.629	28	DX	-0.19263	50	RZ	3	1030	DX	-2888.91	-1705.36	2384.62
23	100	1.05	39	31.635	18	DX	-0.19905	50	RZ	3	1030	DX	-2960.6	-1747.63	2385.28
24	100	1.1	39	34.472	12	DX	-0.20573	50	RZ	3	1030	DX	-3031.91	-1789.32	2386.54
25	100	1.15	39	35.752	12	DX	-0.21294	50	RZ	3	1030	DX	-3103.29	-1831.24	2387.26
26	100	1.2	39	34.822	251	DX	-0.21532	50	RZ	3	1030	DX	-3174.47	-1873.68	2388.74
27	100	1.25	39	45.677	12	DX	-0.21977	50	RZ	3	1030	DX	-3245.94	-1915.84	2390.23
28	100	1.3	39	35.248	18	DX	-0.22203	50	RZ	3	1030	DX	-3317.29	-1958.42	2390.79
29	100	1.35	39	38.583	9010	DX	-0.23153	50	RZ	3	1030	DX	-3389.05	-1999.61	2390.36
30	100	1.4	39	46.457	9010	DX	-0.23805	50	RZ	3	1030	DX	-3460.19	-2041.05	2391.72
31	100	1.45	39	39.726	251	DX	-0.23845	50	RZ	3	1030	DX	-3531.27	-2084.42	2394
32	100	1.5	39	60.186	7505	DY	-0.23942	50	RZ	3	1030	DX	-3601.85	-2126.63	2394.06
33	100	1.55	38	144.99	7110	DX	-0.22153	50	RZ	3	1030	DX	-3728.11	-2205.03	2386.9

60 deg

COLLAPSE SOLUTION SUMMARY															
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	10.802	42	DY	-0.06281	50	RZ	3	1030	DX	-443.07	-783.46	1180.25
2	CLPS	1	39	21.572	51	DY	-0.12537	50	RZ	3	1030	DX	-886.18	-1566.91	2360.55
3	100	0.05	39	22.728	51	DY	-0.13137	50	RZ	3	1030	DX	-929.42	-1643.4	2361.44
4	100	0.1	39	23.642	28	DY	-0.13725	50	RZ	3	1030	DX	-972.66	-1719.93	2362.01
5	100	0.15	39	24.623	51	DY	-0.14403	50	RZ	3	1030	DX	-1016.01	-1796.53	2362.78
6	100	0.2	39	25.799	28	DY	-0.14973	50	RZ	3	1030	DX	-1059.22	-1873.04	2363.52
7	100	0.25	39	26.875	51	DY	-0.15588	50	RZ	3	1030	DX	-1102.52	-1949.63	2364.37
8	100	0.3	39	28.145	44	DY	-0.1627	50	RZ	3	1030	DX	-1145.81	-2026.14	2365.3
9	100	0.35	39	29.067	51	DY	-0.16842	50	RZ	3	1030	DX	-1189.13	-2102.73	2365.64
10	100	0.4	39	30.094	28	DY	-0.17446	50	RZ	3	1030	DX	-1232.38	-2179.3	2366.63
11	100	0.45	39	31.152	28	DY	-0.18031	50	RZ	3	1030	DX	-1275.58	-2255.78	2367.19
12	100	0.5	39	32.312	51	DY	-0.18758	50	RZ	3	1030	DX	-1318.96	-2332.27	2367.95
13	100	0.55	39	33.389	51	DY	-0.19349	50	RZ	3	1030	DX	-1382.33	-2408.95	2368.55
14	100	0.6	39	34.433	51	DY	-0.19896	50	RZ	3	1030	DX	-1405.48	-2485.42	2369.57
15	100	0.65	39	35.455	28	DY	-0.20499	50	RZ	3	1030	DX	-1448.69	-2561.93	2370.19
16	100	0.7	39	36.842	51	DY	-0.21234	50	RZ	3	1030	DX	-1492.11	-2638.43	2370.96
17	100	0.75	39	38.075	51	DY	-0.21982	50	RZ	3	1030	DX	-1535.4	-2714.77	2371.7
18	100	0.8	39	39.25	51	DY	-0.22679	50	RZ	3	1030	DX	-1579.01	-2791.54	2372
19	100	0.85	39	39.664	28	DY	-0.22821	50	RZ	3	1030	DX	-1621.77	-2868.32	2373.71
20	100	0.9	39	41.71	51	DY	-0.24134	50	RZ	3	1030	DX	-1665.81	-2944.5	2373.33
21	100	0.95	39	42.752	51	DY	-0.24757	50	RZ	3	1030	DX	-1709.14	-3021.07	2374.07
22	100	1	39	47.289	46	DY	-0.25861	50	RZ	3	1030	DX	-1752.86	-3097.2	2374.51
23	100	1.05	39	44.152	51	DY	-0.25717	50	RZ	3	1030	DX	-1795.45	-3174.36	2375.99
24	100	1.1	39	46.299	44	DY	-0.26501	50	RZ	3	1030	DX	-1838.95	-3250.85	2376.63
25	100	1.15	39	172.366	40	DY	-0.31399	50	RZ	3	1030	DX	-1885.04	-3323.66	2382.74
26	100	1.2	18	1040.05	7660	DY	-1.35723	7660	RZ	3	1030	DX	-2127.37	-3411.08	2418.4

90 deg

COLLAPSE SOLUTION SUMMARY															
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	12.689	44	DY	-0.04878	50	RZ	3	1030	DX	0.18	-870.23	1186.25
2	CLPS	1	39	22.555	44	DY	-0.09746	50	RZ	3	1030	DX	0.31	-1740.46	2372.68
3	100	0.05	39	25.999	44	DY	-0.10216	50	RZ	3	1030	DX	0.35	-1825.77	2374.12
4	100	0.1	39	24.093	44	DY	-0.10652	50	RZ	3	1030	DX	0.43	-1911	2375.41
5	100	0.15	39	27.167	44	DY	-0.11211	50	RZ	3	1030	DX	0.36	-1996.29	2376.79
6	100	0.2	39	26.291	44	DY	-0.11682	50	RZ	3	1030	DX	0.35	-2081.6	2378.11
7	100	0.25	39	27.818	44	DY	-0.1215	50	RZ	3	1030	DX	0.42	-2166.86	2379.5
8	100	0.3	39	32.566	44	DY	-0.1266	50	RZ	3	1030	DX	0.41	-2252.16	2380.98
9	100	0.35	39	29.325	44	DY	-0.13123	50	RZ	3	1030	DX	0.41	-2337.47	2382.21
10	100	0.4	39	30.615	44	DY	-0.13598	50	RZ	3	1030	DX	0.47	-2422.73	2383.58
11	100	0.45	39	32.05	44	DY	-0.14079	50	RZ	3	1030	DX	0.48	-2508.02	2384.97
12	100	0.5	39	32.058	44	DY	-0.14576	50	RZ	3	1030	DX	0.45	-2593.32	2386.3
13	100	0.55	39	36.736	44	DY	-0.1507	50	RZ	3	1030	DX	0.46	-2678.52	2387.79
14	100	0.6	39	36.122	44	DY	-0.15553	50	RZ	3	1030	DX	0.52	-2763.81	2389.08
15	100	0.65	39	39.947	44	DY	-0.16104	50	RZ	3	1030	DX	0.43	-2849.15	2390.5
16	100	0.7	39	42.802	44	DY	-0.16704	50	RZ	3	1030	DX	0.3	-2934.38	2391.81
17	100	0.75	39	46.09	44	DY	-0.17143	50	RZ	3	1030	DX	0.36	-3019.66	2393.26
18	100	0.8	39	49.914	44	DY	-0.17752	50	RZ	3	1030	DX	0.28	-3104.92	2394.65
19	100	0.85	39	51.199	44	DY	-0.18261	50	RZ	3	1030	DX	0.25	-3190.19	2395.97
20	100	0.9	39	55.462	44	DY	-0.18831	50	RZ	3	1030	DX	0.18	-3275.44	2397.4
21	100	0.95	39	57.492	44	DY	-0.19367	50	RZ	3	1030	DX	0.14	-3360.7	2398.72
22	100	1	39	57.686	44	DY	-0.19892	50	RZ	3	1030	DX	-0.03	-3446.06	2399.92
23	100	1.05	39	63.898	44	DY	-0.20416	50	RZ	3	1030	DX	-0.07	-3531.3	2401.46
24	100	1.1	39	64.067	44	DY	-0.20891	50	RZ	3	1030	DX	-0.02	-3616.5	2402.72
25	100	1.15	39	80.575	44	DY	-0.22646	50	RZ	3	1030	DX	-1.62	-3701.3	2403.73
26	100	1.2	39	81.295	44	DY	-0.21882	50	RZ	3	1030	DX	-0.13	-3787.14	2406.05
27	100	1.25	39	640.491	251	DY	-0.34747	7030	RX	3	1030	DX	1.5	-3871.03	2452.82
28	100	1.3	3	1178.67	251	DY	-0.82751	7030	RZ	3	1030	DX	2.68	-3956.14	2459.69

120 deg

COLLAPSE SOLUTION SUMMARY															
LOAD	LOAD	NO.	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR CM	CASE DIGITS	FACTOR KN	LOOPS KN	DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	10.769	42	DY	-0.03068	50	RZ	3	1030	DX	443.41	-783.69	1181.67
2	CLPS	1	39	21.57	42	DY	-0.0612	50	RZ	3	1030	DX	886.87	-1567.36	2363.45
3	100	0.05	39	22.661	42	DY	-0.0642	50	RZ	3	1030	DX	930.18	-1643.92	2364.36
4	100	0.1	39	23.72	42	DY	-0.06719	50	RZ	3	1030	DX	973.46	-1720.49	2365.13
5	100	0.15	39	24.833	42	DY	-0.07047	50	RZ	3	1030	DX	1016.78	-1797.08	2366.09
6	100	0.2	39	25.945	42	DY	-0.07383	50	RZ	3	1030	DX	1060.04	-1873.65	2367.16
7	100	0.25	39	26.982	42	DY	-0.07663	50	RZ	3	1030	DX	1103.4	-1950.21	2367.81
8	100	0.3	39	28.094	42	DY	-0.07973	50	RZ	3	1030	DX	1146.72	-2026.79	2368.69
9	100	0.35	39	29.192	42	DY	-0.08306	50	RZ	3	1030	DX	1189.98	-2103.39	2369.78
10	100	0.4	39	30.244	42	DY	-0.08575	50	RZ	3	1030	DX	1233.33	-2179.92	2370.45
11	100	0.45	39	31.36	42	DY	-0.08922	50	RZ	3	1030	DX	1276.62	-2256.51	2371.43
12	100	0.5	39	32.468	42	DY	-0.09218	50	RZ	3	1030	DX	1319.91	-2333.08	2372.25
13	100	0.55	39	33.556	42	DY	-0.0955	50	RZ	3	1030	DX	1363.2	-2409.64	2373.34
14	100	0.6	39	34.618	42	DY	-0.09838	50	RZ	3	1030	DX	1406.51	-2486.21	2374.15
15	100	0.65	39	35.685	42	DY	-0.10077	50	RZ	3	1030	DX	1449.93	-2562.76	2375.27
16	100	0.7	39	36.791	42	DY	-0.10432	50	RZ	3	1030	DX	1493.23	-2639.35	2375.73
17	100	0.75	39	37.851	42	DY	-0.10673	50	RZ	3	1030	DX	1536.59	-2715.9	2376.65
18	100	0.8	39	38.968	42	DY	-0.11019	50	RZ	3	1030	DX	1579.77	-2792.49	2377.51
19	100	0.85	39	40.069	42	DY	-0.11354	50	RZ	3	1030	DX	1623.2	-2869.07	2378.25
20	100	0.9	39	41.151	42	DY	-0.11716	50	RZ	3	1030	DX	1666.49	-2945.65	2379.22
21	100	0.95	39	42.271	42	DY	-0.12079	50	RZ	3	1030	DX	1709.59	-3022.2	2380.16
22	100	1	39	43.331	42	DY	-0.12371	50	RZ	3	1030	DX	1752.96	-3098.79	2381.11
23	100	1.05	39	44.599	42	DY	-0.12922	50	RZ	3	1030	DX	1795.83	-3175.4	2381.95
24	100	1.1	39	45.566	42	DY	-0.13155	50	RZ	3	1030	DX	1839.45	-3251.9	2382.74
25	100	1.15	39	46.545	42	DY	-0.13379	50	RZ	3	1030	DX	1882.6	-3328.45	2383.61
26	100	1.2	39	50.877	23	DY	-0.13478	50	RZ	3	1030	DX	1926.67	-3404.97	2385.12
27	100	1.25	39	50.565	44	DY	-0.13919	50	RZ	3	1030	DX	1969.27	-3481.57	2385.51
28	100	1.3	39	62.139	44	DY	-0.14425	50	RZ	3	1030	DX	2012.44	-3558.26	2387.28
29	100	1.35	39	55.937	44	DY	-0.1459	50	RZ	3	1030	DX	2055.93	-3634.71	2387.27
30	100	1.4	39	59.907	44	DY	-0.15099	50	RZ	3	1030	DX	2099.14	-3711.28	2388.31
31	100	1.45	39	64.276	32	DY	-0.15338	50	RZ	3	1030	DX	2142.73	-3787.85	2389.25
32	100	1.5	39	72.673	32	DY	-0.15837	50	RZ	3	1030	DX	2185.58	-3864.42	2390.61
33	100	1.55	39	72.984	32	DY	-0.16222	50	RZ	3	1030	DX	2228.88	-3940.94	2390.94
34	100	1.6	39	88.595	32	DY	-0.16642	50	RZ	3	1030	DX	2272.06	-4017.5	2392.53
35	100	1.65	39	91.697	32	DY	-0.17001	50	RZ	3	1030	DX	2315.35	-4094.06	2392.99
36	100	1.7	39	95.587	32	DY	-0.17394	50	RZ	3	1030	DX	2358.58	-4170.64	2393.75
37	100	1.75	39	107.634	32	DY	-0.17774	50	RZ	3	1030	DX	2401.59	-4247.24	2395.43
38	100	1.8	39	113.496	32	DY	-0.1798	50	RZ	3	1030	DX	2445.35	-4323.57	2396.05
39	100	1.85	39	122.696	32	DY	-0.18391	50	RZ	3	1030	DX	2488.43	-4400.06	2397.06
40	100	1.9	25	474.532	251	DY	-2.54401	217	RX	3	1030	DX	2531.4	-4476.84	2435.93

150 deg

COLLAPSE SOLUTION SUMMARY															
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	-10.309	251	DX	0.00263	4013	RZ	3	1030	DX	731.54	-431.4	1182.46
2	CLPS	1	39	-16.828	251	DX	0.00496	20	RY	3	1030	DX	1463.09	-862.8	2364.97
3	100	0.05	39	-23.32	251	DX	-0.00691	6020	RY	3	1030	DX	1534.46	-904.94	2366.14
4	100	0.1	39	-20.381	251	DX	0.00536	4013	RZ	3	1030	DX	1605.89	-947.07	2366.97
5	100	0.15	39	-19.022	251	DX	0.00542	4013	RZ	3	1030	DX	1677.26	-989.19	2367.87
6	100	0.2	39	-26.205	251	DX	-0.00621	7615	RY	3	1030	DX	1748.66	-1031.34	2369.09
7	100	0.25	39	-21.043	251	DX	0.00656	4013	RZ	3	1030	DX	1820.16	-1073.45	2369.85
8	100	0.3	39	-19.998	51	DX	0.0062	4013	RZ	3	1030	DX	1891.57	-1115.57	2370.65
9	100	0.35	39	-22.094	251	DX	0.00747	4013	RZ	3	1030	DX	1963.01	-1157.69	2371.81
10	100	0.4	39	-23.802	251	DX	0.00764	4013	RZ	3	1030	DX	2034.43	-1199.82	2372.79
11	100	0.45	39	-22.826	251	DX	-0.00698	5130	RZ	3	1030	DX	2105.62	-1241.98	2373.59
12	100	0.5	39	-23.142	51	DX	-0.00663	5130	RZ	3	1030	DX	2177.27	-1284.12	2374.42
13	100	0.55	39	-23.92	51	DX	-0.00678	5130	RZ	3	1030	DX	2248.5	-1326.24	2375.51
14	100	0.6	39	-25.075	51	DX	0.01056	8021	RZ	3	1030	DX	2319.66	-1368.41	2376.33
15	100	0.65	39	-32.437	251	DX	-0.00868	7615	RY	3	1030	DX	2391.28	-1410.52	2377.86
16	100	0.7	39	-26.294	51	DX	-0.00804	5130	RZ	3	1030	DX	2462.58	-1452.65	2378.47
17	100	0.75	39	-26.919	51	DX	0.00806	4013	RZ	3	1030	DX	2534.4	-1494.77	2379.29
18	100	0.8	39	-36.856	44	DX	0.0184	8041	RZ	3	1030	DX	2605.08	-1536.96	2380.6
19	100	0.85	39	-32.07	251	DX	-0.01507	8120	RX	3	1030	DX	2677.45	-1578.89	2381.9
20	100	0.9	39	-30.13	51	DX	0.01723	9020	RX	3	1030	DX	2747.66	-1621.27	2381.87
21	100	0.95	39	-30.774	51	DX	0.01632	9020	RX	3	1030	DX	2819.39	-1663.43	2382.69
22	100	1	39	-31.583	51	DX	0.01731	9020	RX	3	1030	DX	2890.73	-1705.57	2383.65
23	100	1.05	39	-32.211	51	DX	-0.0138	8225	RY	3	1030	DX	2962.29	-1747.66	2384.62
24	100	1.1	39	-46.69	44	DX	-0.01769	8225	RY	3	1030	DX	3033.48	-1789.85	2386.68
25	100	1.15	39	-34.207	51	DX	0.02206	9020	RX	3	1030	DX	3104.57	-1831.98	2386.44
26	100	1.2	39	-33.921	51	DX	0.00975	4013	RZ	3	1030	DX	3176.79	-1873.87	2388.22
27	100	1.25	39	-34.35	51	DX	0.01287	4013	RZ	3	1030	DX	3248.19	-1915.93	2389.17
28	100	1.3	39	-39.264	44	DX	-0.01663	7625	RY	3	1030	DX	3319.08	-1958.29	2390.03
29	100	1.35	39	45.038	9020	DY	0.03256	9020	RX	3	1030	DX	3389.88	-2000.59	2389.95
30	100	1.4	39	-37.273	51	DX	-0.01315	8225	RY	3	1030	DX	3462.66	-2042.45	2391.6
31	100	1.45	39	-39.741	44	DX	-0.01557	7625	RY	3	1030	DX	3533.14	-2084.59	2393.04
32	100	1.5	39	-42.372	4013	DX	0.02823	8520	RX	3	1030	DX	3604.13	-2127.01	2393.03
33	100	1.55	37	295.575	8041	DY	-0.37213	8041	RZ	3	1030	DX	3667.73	-2168.57	2394.28

180 deg

COLLAPSE SOLUTION SUMMARY															
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	-12.422	18	DX	0.03178	50	RZ	3	1030	DX	875.83	-0.68	1181.68
2	CLPS	1	39	-24.867	18	DX	0.06329	50	RZ	3	1030	DX	1751.63	-1.36	2363.36
3	100	0.05	39	-26.115	18	DX	0.06641	50	RZ	3	1030	DX	1837.62	-1.42	2364.22
4	100	0.1	39	-27.425	18	DX	0.06884	50	RZ	3	1030	DX	1923.61	-1.49	2365.12
5	100	0.15	39	-28.67	18	DX	0.07216	50	RZ	3	1030	DX	2009.59	-1.57	2366.17
6	100	0.2	39	-29.883	18	DX	0.07521	50	RZ	3	1030	DX	2095.61	-1.63	2367.01
7	100	0.25	39	-31.15	18	DX	0.07823	50	RZ	3	1030	DX	2181.63	-1.68	2367.68
8	100	0.3	39	-32.331	18	DX	0.08175	50	RZ	3	1030	DX	2267.64	-1.75	2368.46
9	100	0.35	39	-33.802	18	DX	0.08411	50	RZ	3	1030	DX	2353.57	-1.82	2369.47
10	100	0.4	39	-34.833	18	DX	0.08805	50	RZ	3	1030	DX	2439.55	-1.87	2370.33
11	100	0.45	39	-36.053	18	DX	0.09121	50	RZ	3	1030	DX	2525.64	-1.95	2371.24
12	100	0.5	39	-37.368	18	DX	0.09347	50	RZ	3	1030	DX	2611.58	-2.02	2372.01
13	100	0.55	39	-38.726	18	DX	0.09662	50	RZ	3	1030	DX	2697.63	-2.07	2372.8
14	100	0.6	39	-39.713	18	DX	0.10091	50	RZ	3	1030	DX	2783.61	-2.12	2373.81
15	100	0.65	39	-40.899	18	DX	0.1054	50	RZ	3	1030	DX	2869.68	-2.17	2374.96
16	100	0.7	39	-42.512	18	DX	0.1049	50	RZ	3	1030	DX	2955.4	-2.28	2375.57
17	100	0.75	39	-43.421	18	DX	0.11145	50	RZ	3	1030	DX	3041.69	-2.3	2376.84
18	100	0.8	39	-44.706	18	DX	0.11427	50	RZ	3	1030	DX	3127.29	-2.35	2377.23
19	100	0.85	39	-46.065	18	DX	0.11499	50	RZ	3	1030	DX	3213.66	-2.47	2378.01
20	100	0.9	39	-47.645	18	DX	0.11438	50	RZ	3	1030	DX	3299.57	-2.6	2378.54
21	100	0.95	39	-48.808	18	DX	0.11844	50	RZ	3	1030	DX	3385.68	-2.65	2379.43
22	100	1	39	-49.813	18	DX	0.12371	50	RZ	3	1030	DX	3471.59	-2.65	2380.6
23	100	1.05	39	-52.152	18	DX	0.11251	42	RZ	3	1030	DX	3557.17	-2.95	2380.68
24	100	1.1	39	-53.271	18	DX	0.11676	42	RZ	3	1030	DX	3643.4	-2.98	2381.65
25	100	1.15	39	-56.397	12	DX	0.13426	50	RZ	3	1030	DX	3729.62	-2.82	2384.35
26	100	1.2	20	-390.73	9020	DX	0.58143	9020	RY	3	1030	DX	3880.84	-3.27	2383.51

210 deg

COLLAPSE SOLUTION SUMMARY															
				MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	-11.605	251	DX	0.04899	50	RZ	3	1030	DX	731.36	431.3	1186.97
2	CLPS	1	39	-23.439	251	DX	0.09784	50	RZ	3	1030	DX	1462.63	862.59	2374.13
3	100	0.05	39	-22.088	251	DX	0.10296	50	RZ	3	1030	DX	1534.03	904.74	2375.53
4	100	0.1	39	-23.756	251	DX	0.10797	50	RZ	3	1030	DX	1605.39	946.86	2376.98
5	100	0.15	39	-24.548	251	DX	0.11261	50	RZ	3	1030	DX	1676.79	988.99	2378.38
6	100	0.2	39	-22.646	251	DX	0.11733	50	RZ	3	1030	DX	1748.21	1031.13	2379.74
7	100	0.25	39	-27.388	251	DX	0.12141	50	RZ	3	1030	DX	1819.55	1073.23	2381.31
8	100	0.3	39	-25.124	251	DX	0.12654	50	RZ	3	1030	DX	1890.97	1115.39	2382.61
9	100	0.35	39	-28.213	251	DX	0.13099	50	RZ	3	1030	DX	1962.32	1157.5	2384.07
10	100	0.4	39	-25.84	251	DX	0.13691	50	RZ	3	1030	DX	2033.72	1199.64	2385.46
11	100	0.45	39	-29.518	251	DX	0.14117	50	RZ	3	1030	DX	2105.06	1241.75	2386.93
12	100	0.5	39	-29.188	251	DX	0.14484	50	RZ	3	1030	DX	2176.5	1283.86	2388.43
13	100	0.55	39	-30.402	22	DX	0.14996	50	RZ	3	1030	DX	2247.87	1326.01	2389.84
14	100	0.6	39	-34.137	12	DX	0.15505	50	RZ	3	1030	DX	2319.21	1368.15	2391.33
15	100	0.65	39	-30.461	12	DX	0.16051	50	RZ	3	1030	DX	2390.57	1410.27	2392.72
16	100	0.7	39	-33.137	22	DX	0.16505	50	RZ	3	1030	DX	2461.96	1452.43	2394.06
17	100	0.75	39	-36.442	22	DX	0.16876	50	RZ	3	1030	DX	2533.39	1494.56	2395.38
18	100	0.8	39	-38.085	22	DX	0.17344	50	RZ	3	1030	DX	2604.74	1536.7	2396.88
19	100	0.85	39	-40.298	22	DX	0.17753	50	RZ	3	1030	DX	2676.1	1578.81	2398.28
20	100	0.9	39	-43.38	22	DX	0.1819	50	RZ	3	1030	DX	2747.46	1620.97	2399.79
21	100	0.95	39	-44.402	22	DX	0.18487	50	RZ	3	1030	DX	2818.97	1663.06	2401.01
22	100	1	39	-47.203	13	DX	0.19014	50	RZ	3	1030	DX	2890.37	1705.16	2402.42
23	100	1.05	39	-51.624	13	DX	0.19541	50	RZ	3	1030	DX	2961.63	1747.34	2403.84
24	100	1.1	39	-55.478	13	DX	0.19912	50	RZ	3	1030	DX	3033.05	1789.46	2405.44
25	100	1.15	39	-55.32	13	DX	0.20141	50	RZ	3	1030	DX	3104.61	1831.52	2406.74
26	100	1.2	39	-60.265	13	DX	0.20712	50	RZ	3	1030	DX	3175.78	1873.7	2408.12
27	100	1.25	39	-63.267	13	DX	0.21222	50	RZ	3	1030	DX	3247.21	1915.85	2409.48
28	100	1.3	39	-69.165	13	DX	0.21635	50	RZ	3	1030	DX	3318.6	1957.96	2410.99
29	100	1.35	39	-71.858	13	DX	0.22106	50	RZ	3	1030	DX	3389.92	2000.14	2412.36
30	100	1.4	39	-81.221	13	DX	0.22586	50	RZ	3	1030	DX	3461.21	2042.28	2414.17
31	100	1.45	39	-94.975	13	DX	0.2297	50	RZ	3	1030	DX	3532.6	2084.36	2415.85
32	100	1.5	39	-93.377	13	DX	0.23533	50	RZ	3	1030	DX	3603.87	2126.52	2417.19
33	100	1.55	37	-488.23	251	DX	0.2704	50	RZ	3	1030	DX	3670.15	2168.66	2461.35

240 deg

COLLAPSE SOLUTION SUMMARY															
				MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	-10.846	42	DY	0.06304	50	RZ	3	1030	DX	442.31	784.5	1180.86
2	CLPS	1	39	-21.812	42	DY	0.12619	50	RZ	3	1030	DX	884.54	1569.02	2361.75
3	100	0.05	39	-22.837	42	DY	0.13253	50	RZ	3	1030	DX	927.72	1645.66	2362.54
4	100	0.1	39	-23.951	42	DY	0.13828	50	RZ	3	1030	DX	970.95	1722.33	2363.55
5	100	0.15	39	-25.13	42	DY	0.14484	50	RZ	3	1030	DX	1014.1	1799.03	2364.11
6	100	0.2	39	-26.133	42	DY	0.1513	50	RZ	3	1030	DX	1057.28	1875.61	2364.89
7	100	0.25	39	-27.338	42	DY	0.15662	50	RZ	3	1030	DX	1100.5	1952.33	2365.71
8	100	0.3	39	-28.376	42	DY	0.16363	50	RZ	3	1030	DX	1143.59	2029	2366.79
9	100	0.35	39	-29.466	42	DY	0.17014	50	RZ	3	1030	DX	1186.77	2105.7	2367.38
10	100	0.4	39	-30.657	42	DY	0.17569	50	RZ	3	1030	DX	1230.12	2182.24	2368.2
11	100	0.45	39	-31.671	42	DY	0.18227	50	RZ	3	1030	DX	1273.26	2258.86	2368.92
12	100	0.5	39	-32.787	42	DY	0.18854	50	RZ	3	1030	DX	1316.35	2335.65	2369.92
13	100	0.55	39	-34.064	42	DY	0.1944	50	RZ	3	1030	DX	1359.61	2412.32	2370.45
14	100	0.6	39	-34.981	42	DY	0.20054	50	RZ	3	1030	DX	1402.72	2488.98	2371.83
15	100	0.65	39	-36.027	42	DY	0.20698	50	RZ	3	1030	DX	1445.84	2565.68	2372.84
16	100	0.7	39	-37.285	42	DY	0.21308	50	RZ	3	1030	DX	1489.01	2642.32	2373.32
17	100	0.75	39	-38.494	42	DY	0.21827	50	RZ	3	1030	DX	1532.4	2718.94	2373.89
18	100	0.8	39	-39.259	42	DY	0.2261	50	RZ	3	1030	DX	1575.26	2795.7	2374.64
19	100	0.85	39	-40.673	42	DY	0.22979	50	RZ	3	1030	DX	1618.86	2872.11	2375.38
20	100	0.9	39	-41.873	42	DY	0.23578	50	RZ	3	1030	DX	1661.83	2949.05	2376.02
21	100	0.95	39	-43.213	42	DY	0.2418	50	RZ	3	1030	DX	1705.41	3025.45	2376.73
22	100	1	17	-97.237	7110	DY	0.25742	50	RZ	3	1030	DX	1762.63	3159.82	2376.69

330 deg

COLLAPSE SOLUTION SUMMARY															
LOAD INCR CM	LOAD CASE DIGITS	NO. FACTOR KN	NO. LOOPS KN	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
				DEFL. KN	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX	FY	FZ
1	CLPS	0.5	39	11.443	251	DX	-0.00288	40	RY	3	1030	DX	-731.53	431.94	1186.96
2	CLPS	1	39	21.149	251	DX	-0.00528	40	RY	3	1030	DX	-1463.06	863.89	2374.12
3	100	0.05	39	21.069	251	DX	-0.00533	40	RY	3	1030	DX	-1534.46	906.07	2375.53
4	100	0.1	39	21.975	251	DX	-0.00534	40	RY	3	1030	DX	-1605.87	948.29	2376.91
5	100	0.15	39	24.481	251	DX	0.00573	7615	RY	3	1030	DX	-1677.25	990.47	2378.37
6	100	0.2	39	24.272	251	DX	0.00565	7615	RY	3	1030	DX	-1748.66	1032.65	2379.81
7	100	0.25	39	25.63	251	DX	-0.00641	4013	RZ	3	1030	DX	-1820.08	1074.85	2381.2
8	100	0.3	39	26.278	251	DX	0.0063	7615	RY	3	1030	DX	-1891.51	1117.05	2382.87
9	100	0.35	39	27.325	251	DX	0.00662	7615	RY	3	1030	DX	-1962.83	1159.23	2384.11
10	100	0.4	39	27.079	251	DX	-0.00658	4013	RZ	3	1030	DX	-2034.31	1201.41	2385.51
11	100	0.45	39	30.942	32	DX	0.00754	7615	RY	3	1030	DX	-2105.71	1243.62	2386.97
12	100	0.5	39	27.824	251	DX	0.00684	7615	RY	3	1030	DX	-2177.12	1285.79	2388.33
13	100	0.55	39	29.137	251	DX	0.00792	7010	RY	3	1030	DX	-2248.53	1327.95	2389.79
14	100	0.6	39	31.603	32	DX	0.00761	7615	RY	3	1030	DX	-2319.89	1370.19	2391.24
15	100	0.65	39	32.468	32	DX	0.00805	7615	RY	3	1030	DX	-2391.28	1412.4	2392.68
16	100	0.7	39	33.039	32	DX	-0.0089	4013	RZ	3	1030	DX	-2462.58	1454.58	2394.05
17	100	0.75	39	37.57	32	DX	0.00943	7615	RY	3	1030	DX	-2534.09	1496.88	2395.48
18	100	0.8	39	38.63	32	DX	0.00968	7615	RY	3	1030	DX	-2605.38	1539.02	2396.9
19	100	0.85	39	39.092	32	DX	0.00946	7615	RY	3	1030	DX	-2676.77	1581.18	2398.35
20	100	0.9	39	44.938	32	DX	0.01093	7615	RY	3	1030	DX	-2748.16	1623.58	2399.71
21	100	0.95	39	44.433	33	DX	0.01035	7615	RY	3	1030	DX	-2819.58	1665.57	2401.28
22	100	1	39	46.89	32	DX	0.01114	7615	RY	3	1030	DX	-2891.02	1707.87	2402.83
23	100	1.05	39	52.59	33	DX	0.01226	7615	RY	3	1030	DX	-2962.44	1750.05	2404.44
24	100	1.1	39	55.319	33	DX	0.01251	7615	RY	3	1030	DX	-3033.68	1792.41	2405.83
25	100	1.15	39	58.684	33	DX	-0.01511	2121	RZ	3	1030	DX	-3104.75	1834.51	2407.16
26	100	1.2	39	67.436	33	DX	-0.01795	2121	RZ	3	1030	DX	-3176.06	1876.78	2408.81
27	100	1.25	39	63.353	12	DX	-0.01923	2121	RZ	3	1030	DX	-3247.82	1918.69	2410
28	100	1.3	39	70.025	12	DX	-0.03141	2121	RZ	3	1030	DX	-3318.77	1961.1	2411.41
29	100	1.35	39	84.705	12	DX	-0.06802	2121	RZ	3	1030	DX	-3389.98	2003.7	2412.81
30	100	1.4	39	96.124	12	DX	-0.08868	2121	RZ	3	1030	DX	-3460.72	2045.95	2414.53
31	100	1.45	39	98.942	12	DX	-0.09702	2121	RZ	3	1030	DX	-3531.81	2088.2	2415.38
32	100	1.5	39	123.9	12	DX	-0.11116	2121	RZ	3	1030	DX	-3602.87	2130.08	2418.89
33	100	1.55	39	462.379	251	DX	0.28271	7020	RX	3	1030	DX	-3677.46	2171.07	2458.42
34	100	1.6	2	694.704	17	DX	0.58018	7021	RX	3	1030	DX	-3545.99	2409.5	2475.86

APPENDIX C.2

C) PLATFORM C

0 deg

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	29	-418.73	7004	DZ	0.07811	7020	RY	2	7005	DY	-4511.72	136.61	48855.73
2	CLPS	1	13	-696.78	7004	DZ	0.12751	7020	RY	2	7005	DY	-9013.13	273.39	97713.68
3	100	0.5	2	-697.02	7004	DZ	0.12753	7020	RY	2	7005	DY	-10642.4	340.86	97686.73
4	100	0.59	1	-697.05	7004	DZ	0.12754	7020	RY	2	7005	DY	-10951.9	353.68	97681.63
5	100	0.69	2	-697.1	7004	DZ	0.12754	7020	RY	2	7005	DY	-11261.5	366.5	97676.54
6	100	0.78	1	-697.15	7004	DZ	0.12755	7020	RY	2	7005	DY	-11571	379.32	97671.46
7	100	0.88	2	-697.2	7004	DZ	0.12755	7020	RY	2	7005	DY	-11880.6	392.14	97666.38
8	100	0.97	2	-697.25	7004	DZ	0.12756	7020	RY	2	7005	DY	-12190.1	404.96	97661.32
9	100	1.07	4	-697.29	7004	DZ	0.12756	7020	RY	2	7005	DY	-12499.7	417.78	97656.26
10	100	1.17	1	-697.33	7004	DZ	0.12757	7020	RY	2	7005	DY	-12809.2	430.6	97651.21
11	100	1.26	2	-697.38	7004	DZ	0.12757	7020	RY	2	7005	DY	-13118.8	443.42	97646.17
12	100	1.35	1	-697.42	7004	DZ	0.12757	7020	RY	2	7005	DY	-13428.3	456.24	97641.13
13	100	1.45	2	-697.47	7004	DZ	0.12758	7020	RY	2	7005	DY	-13737.9	469.06	97636.1
14	100	1.54	1	-697.51	7004	DZ	0.12758	7020	RY	2	7005	DY	-14047.4	481.88	97631.08
15	100	1.64	2	-697.56	7004	DZ	0.12759	7020	RY	2	7005	DY	-14357	494.69	97626.07
16	100	1.74	1	-697.6	7004	DZ	0.12759	7020	RY	2	7005	DY	-14666.6	507.51	97621.06
17	100	1.83	2	-697.65	7004	DZ	0.1276	7020	RY	2	7005	DY	-14976.1	520.33	97616.07
18	100	1.93	1	-697.69	7004	DZ	0.1276	7020	RY	2	7005	DY	-15285.7	533.15	97611.08
19	100	2.02	2	-697.74	7004	DZ	0.12761	7020	RY	2	7005	DY	-15595.2	545.97	97606.1
20	100	2.12	1	-697.79	7004	DZ	0.12761	7020	RY	2	7005	DY	-15904.8	558.79	97601.12
21	100	2.21	2	-697.84	7004	DZ	0.12762	7020	RY	2	7005	DY	-16214.3	571.61	97596.16
22	100	2.3	2	-697.89	7004	DZ	0.12762	7020	RY	2	7005	DY	-16523.9	584.43	97591.2
23	100	2.4	2	-697.93	7004	DZ	0.12763	7020	RY	2	7005	DY	-16833.4	597.25	97586.25
24	100	2.5	4	-697.97	7004	DZ	0.12763	7020	RY	2	7005	DY	-17143	610.07	97581.31
25	100	2.59	1	-698.02	7004	DZ	0.12763	7020	RY	2	7005	DY	-17452.5	622.89	97576.37
26	100	2.69	2	-698.07	7004	DZ	0.12764	7020	RY	2	7005	DY	-17762.1	635.7	97571.45
27	100	2.78	1	-698.11	7004	DZ	0.12764	7020	RY	2	7005	DY	-18071.6	648.52	97566.52
28	100	2.88	2	-698.16	7004	DZ	0.12765	7020	RY	2	7005	DY	-18381.2	661.34	97561.62
29	100	2.97	1	-698.2	7004	DZ	0.12765	7020	RY	2	7005	DY	-18690.8	674.16	97556.71
30	100	3.06	2	-698.25	7004	DZ	0.12766	7020	RY	2	7005	DY	-19000.3	686.98	97551.82
31	100	3.16	1	-698.29	7004	DZ	0.12766	7020	RY	2	7005	DY	-19309.9	699.8	97546.92
32	100	3.25	2	-698.34	7004	DZ	0.12767	7020	RY	2	7005	DY	-19619.4	712.62	97542.05
33	100	3.35	1	-698.38	7004	DZ	0.12767	7020	RY	2	7005	DY	-19929	725.44	97537.17
34	100	3.44	2	-698.43	7004	DZ	0.12768	7020	RY	2	7005	DY	-20238.5	738.25	97532.31
35	100	3.54	1	-698.48	7004	DZ	0.12768	7020	RY	2	7005	DY	-20548.1	751.07	97527.45
36	100	3.63	2	-698.53	7004	DZ	0.12769	7020	RY	2	7005	DY	-20857.6	763.89	97522.6
37	100	3.73	2	-698.58	7004	DZ	0.12769	7020	RY	2	7005	DY	-21167.2	776.71	97517.76
38	100	3.83	2	-698.63	7004	DZ	0.1277	7020	RY	2	7005	DY	-21476.7	789.53	97512.93
39	100	3.92	4	-698.67	7004	DZ	0.1277	7020	RY	2	7005	DY	-21786.3	802.35	97508.1
40	100	4.02	1	-698.71	7004	DZ	0.1277	7020	RY	2	7005	DY	-22095.8	815.17	97503.28
41	100	4.11	2	-698.76	7004	DZ	0.12771	7020	RY	2	7005	DY	-22405.4	827.98	97498.47
42	100	4.21	1	-698.8	7004	DZ	0.12771	7020	RY	2	7005	DY	-22715	840.8	97493.66
43	100	4.3	2	-698.85	7004	DZ	0.12772	7020	RY	2	7005	DY	-23024.5	853.62	97488.87
44	100	4.39	1	-698.89	7004	DZ	0.12772	7020	RY	2	7005	DY	-23334.1	866.44	97484.08
45	100	4.49	2	-698.95	7004	DZ	0.12773	7020	RY	2	7005	DY	-23643.6	879.26	97479.31
46	100	4.58	1	-698.99	7004	DZ	0.12773	7020	RY	2	7005	DY	-23953.2	892.07	97474.53
47	100	4.68	2	-699.04	7004	DZ	0.12774	7020	RY	2	7005	DY	-24262.7	904.89	97469.77
48	100	4.78	1	-699.08	7004	DZ	0.12774	7020	RY	2	7005	DY	-24572.3	917.71	97465.01
49	100	4.87	2	-699.13	7004	DZ	0.12775	7020	RY	2	7005	DY	-24881.8	930.53	97460.27
50	100	4.96	1	-699.18	7004	DZ	0.12775	7020	RY	2	7005	DY	-25191.4	943.35	97455.52
51	100	5.06	2	-699.23	7004	DZ	0.12776	7020	RY	2	7005	DY	-25500.9	956.16	97450.8
52	100	5.16	1	-699.26	7004	DZ	0.12776	7020	RY	2	7005	DY	-25810.5	968.98	97446.07
53	100	5.25	2	-699.31	7004	DZ	0.12776	7020	RY	2	7005	DY	-26120	981.8	97441.36
54	100	5.34	2	-699.35	7004	DZ	0.12777	7020	RY	2	7005	DY	-26429.6	994.62	97436.66
55	100	5.44	2	-699.4	7004	DZ	0.12777	7020	RY	2	7005	DY	-26739.1	1007.43	97431.96
56	100	5.54	4	-699.44	7004	DZ	0.12778	7020	RY	2	7005	DY	-27048.6	1020.25	97427.28
57	100	5.63	2	-699.49	7004	DZ	0.12778	7020	RY	2	7005	DY	-27358.2	1033.07	97422.6
58	100	5.72	2	-699.53	7004	DZ	0.12779	7020	RY	2	7005	DY	-27667.7	1045.89	97417.94
59	100	5.82	2	-699.57	7004	DZ	0.12779	7020	RY	2	7005	DY	-27977.2	1058.7	97413.29
60	100	5.92	3	-699.6	7004	DZ	0.12779	7020	RY	2	7005	DY	-28286.7	1071.52	97408.67
61	100	6.01	3	-699.64	7004	DZ	0.1278	7020	RY	2	7005	DY	-28596.2	1084.33	97404.06
62	100	6.11	3	-699.66	7004	DZ	0.1278	7020	RY	2	7005	DY	-28905.7	1097.15	97399.46
63	100	6.2	4	-699.69	7004	DZ	0.1278	7020	RY	2	7005	DY	-29215.1	1109.96	97394.94
64	100	6.29	6	-699.7	7004	DZ	0.1278	7020	RY	2	7005	DY	-29524.5	1122.77	97390.45
65	100	6.39	5	-699.71	7004	DZ	0.1278	7020	RY	2	7005	DY	-29833.9	1135.59	97385.98
66	100	6.49	7	-699.7	7004	DZ	0.1278	7020	RY	2	7005	DY	-30143.2	1148.4	97381.57
67	100	6.58	8	-699.68	7004	DZ	0.12779	7020	RY	2	7005	DY	-30452.4	1161.21	97377.23
68	100	6.67	39	-698.97	7004	DZ	0.1277	7020	RY	2	7005	DY	-30759.1	1174.05	97374.84
69	100	6.77	39	-695.63	7004	DZ	0.12728	7020	RY	2	7005	DY	-31052.6	1186.88	97383.61
70	100	6.87	39	-694.45	7004	DZ	0.12714	7020	RY	2	7005	DY	-31344.1	1199.7	97393.87
71	100	6.96	39	-679.89	7004	DZ	0.12497	7020	RY	2	7005	DY	-31474.4	1214.56	97539.24
72	100	7.05	39	-641.4	7004	DZ	-0.1769	1638	RZ	2	7005	DY	-31486.2	1241.89	97661.23
73	100	7.15	4	-633.34	7004	DZ	-0.5892	2342	RX	2	7005	DY	-31704.8	1265.16	97728.72

65 deg

COLLAPSE SOLUTION SUMMARY														
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	29	-418.47	7004	DZ	0.07808	7026	RY	2	7005	DY	-2247.8	-3991.34	48694.34
2	CLPS	1	13	-696.27	7004	DZ	0.12752	7026	RY	2	7005	DY	-4487.68	-7976.41	97390.63
3	100	0.05	1	-696.28	7004	DZ	0.12753	7026	RY	2	7005	DY	-4587.44	-8302.2	97407.56
4	100	0.1	2	-696.3	7004	DZ	0.12753	7026	RY	2	7005	DY	-4687.2	-8627.97	97424.51
5	100	0.15	1	-696.32	7004	DZ	0.12753	7026	RY	2	7005	DY	-4786.96	-8953.77	97441.46
6	100	0.2	2	-696.34	7004	DZ	0.12753	7026	RY	2	7005	DY	-4886.71	-9279.54	97458.43
7	100	0.25	1	-696.36	7004	DZ	0.12753	7026	RY	2	7005	DY	-4986.47	-9605.33	97475.4
8	100	0.3	2	-696.38	7004	DZ	0.12754	7026	RY	2	7005	DY	-5086.23	-9931.11	97492.38
9	100	0.35	1	-696.4	7004	DZ	0.12754	7026	RY	2	7005	DY	-5185.99	-10256.9	97509.37
10	100	0.4	2	-696.42	7004	DZ	0.12754	7026	RY	2	7005	DY	-5285.75	-10582.7	97526.37
11	100	0.45	1	-696.44	7004	DZ	0.12754	7026	RY	2	7005	DY	-5385.51	-10908.5	97543.37
12	100	0.5	2	-696.46	7004	DZ	0.12754	7026	RY	2	7005	DY	-5485.26	-11234.2	97560.39
13	100	0.55	1	-696.48	7004	DZ	0.12754	7026	RY	2	7005	DY	-5585.03	-11560	97577.41
14	100	0.6	2	-696.5	7004	DZ	0.12755	7026	RY	2	7005	DY	-5684.78	-11885.8	97594.45
15	100	0.65	1	-696.52	7004	DZ	0.12755	7026	RY	2	7005	DY	-5784.54	-12211.6	97611.49
16	100	0.7	2	-696.54	7004	DZ	0.12755	7026	RY	2	7005	DY	-5884.3	-12537.4	97628.55
17	100	0.75	1	-696.56	7004	DZ	0.12755	7026	RY	2	7005	DY	-5984.06	-12863.2	97645.6
18	100	0.8	2	-696.59	7004	DZ	0.12755	7026	RY	2	7005	DY	-6083.82	-13188.9	97662.68
19	100	0.85	2	-696.61	7004	DZ	0.12756	7026	RY	2	7005	DY	-6183.57	-13514.7	97679.76
20	100	0.9	4	-696.63	7004	DZ	0.12756	7026	RY	2	7005	DY	-6283.33	-13840.5	97696.85
21	100	0.95	1	-696.64	7004	DZ	0.12756	7026	RY	2	7005	DY	-6383.1	-14166.3	97713.94
22	100	1	2	-696.67	7004	DZ	0.12756	7026	RY	2	7005	DY	-6482.85	-14492.1	97731.05
23	100	1.05	1	-696.68	7004	DZ	0.12756	7026	RY	2	7005	DY	-6582.61	-14817.9	97748.16
24	100	1.1	2	-696.71	7004	DZ	0.12757	7026	RY	2	7005	DY	-6682.37	-15143.6	97765.29
25	100	1.15	1	-696.73	7004	DZ	0.12757	7026	RY	2	7005	DY	-6782.13	-15469.4	97782.41
26	100	1.2	2	-696.75	7004	DZ	0.12757	7026	RY	2	7005	DY	-6881.89	-15795.2	97799.56
27	100	1.25	1	-696.77	7004	DZ	0.12757	7026	RY	2	7005	DY	-6981.65	-16121	97816.71
28	100	1.3	2	-696.79	7004	DZ	0.12757	7026	RY	2	7005	DY	-7081.41	-16446.8	97833.87
29	100	1.35	1	-696.81	7004	DZ	0.12757	7026	RY	2	7005	DY	-7181.17	-16772.6	97851.04
30	100	1.4	2	-696.83	7004	DZ	0.12758	7026	RY	2	7005	DY	-7280.93	-17098.3	97868.22
31	100	1.45	1	-696.86	7004	DZ	0.12758	7026	RY	2	7005	DY	-7380.69	-17424.1	97885.4
32	100	1.5	2	-696.88	7004	DZ	0.12758	7026	RY	2	7005	DY	-7480.44	-17749.9	97902.6
33	100	1.55	1	-696.9	7004	DZ	0.12758	7026	RY	2	7005	DY	-7580.21	-18075.7	97919.8
34	100	1.6	2	-696.92	7004	DZ	0.12758	7026	RY	2	7005	DY	-7679.96	-18401.5	97937.02
35	100	1.65	1	-696.94	7004	DZ	0.12759	7026	RY	2	7005	DY	-7779.73	-18727.3	97954.23
36	100	1.7	2	-696.97	7004	DZ	0.12759	7026	RY	2	7005	DY	-7879.48	-19053	97971.47
37	100	1.75	2	-696.99	7004	DZ	0.12759	7026	RY	2	7005	DY	-7979.24	-19378.8	97988.71
38	100	1.8	4	-697.01	7004	DZ	0.12759	7026	RY	2	7005	DY	-8079	-19704.6	98005.96
39	100	1.85	1	-697.03	7004	DZ	0.12759	7026	RY	2	7005	DY	-8178.76	-20030.4	98023.21
40	100	1.9	2	-697.05	7004	DZ	0.1276	7026	RY	2	7005	DY	-8278.52	-20356.2	98040.49
41	100	1.95	1	-697.07	7004	DZ	0.1276	7026	RY	2	7005	DY	-8378.28	-20682	98057.76
42	100	2	2	-697.1	7004	DZ	0.1276	7026	RY	2	7005	DY	-8478.04	-21007.7	98075.05
43	100	2.05	1	-697.12	7004	DZ	0.1276	7026	RY	2	7005	DY	-8577.8	-21333.5	98092.34
44	100	2.1	2	-697.14	7004	DZ	0.1276	7026	RY	2	7005	DY	-8677.56	-21659.3	98109.65
45	100	2.15	1	-697.16	7004	DZ	0.12761	7026	RY	2	7005	DY	-8777.32	-21985.1	98126.95
46	100	2.2	2	-697.19	7004	DZ	0.12761	7026	RY	2	7005	DY	-8877.08	-22310.9	98144.28
47	100	2.25	1	-697.21	7004	DZ	0.12761	7026	RY	2	7005	DY	-8976.84	-22636.7	98161.6
48	100	2.3	2	-697.23	7004	DZ	0.12761	7026	RY	2	7005	DY	-9076.6	-22962.4	98178.95
49	100	2.35	2	-697.26	7004	DZ	0.12761	7026	RY	2	7005	DY	-9176.36	-23288.2	98196.3
50	100	2.4	2	-697.28	7004	DZ	0.12762	7026	RY	2	7005	DY	-9276.12	-23614	98213.65
51	100	2.45	2	-697.3	7004	DZ	0.12762	7026	RY	2	7005	DY	-9375.88	-23939.8	98231.02
52	100	2.5	4	-697.33	7004	DZ	0.12762	7026	RY	2	7005	DY	-9475.64	-24265.6	98248.4
53	100	2.55	6	-697.35	7004	DZ	0.12762	7026	RY	2	7005	DY	-9575.4	-24591.3	98265.78
54	100	2.6	6	-697.38	7004	DZ	0.12762	7026	RY	2	7005	DY	-9675.16	-24917.1	98283.18
55	100	2.65	6	-697.4	7004	DZ	0.12763	7026	RY	2	7005	DY	-9774.92	-25242.9	98300.58
56	100	2.7	6	-697.42	7004	DZ	0.12763	7026	RY	2	7005	DY	-9874.68	-25568.7	98317.99
57	100	2.75	10	-697.45	7004	DZ	0.12763	7026	RY	2	7005	DY	-9974.44	-25894.5	98335.42
58	100	2.8	10	-697.47	7004	DZ	0.12763	7026	RY	2	7005	DY	-10074.2	-26220.2	98352.85
59	100	2.85	14	-697.5	7004	DZ	0.12764	7026	RY	2	7005	DY	-10174	-26546	98370.29
60	100	2.9	26	-697.52	7004	DZ	0.12764	7026	RY	2	7005	DY	-10273.7	-26871.8	98387.74
61	100	2.95	39	-697.54	7004	DZ	0.12764	7026	RY	2	7005	DY	-10373.5	-27197.6	98405.21
62	100	3	39	-697.57	7004	DZ	0.12764	7026	RY	2	7005	DY	-10473.2	-27523.3	98422.68
63	100	3.05	39	-697.59	7004	DZ	0.12764	7026	RY	2	7005	DY	-10573	-27849.1	98440.16
64	100	3.1	39	-697.62	7004	DZ	0.12765	7026	RY	2	7005	DY	-10672.8	-28174.9	98457.64
65	100	3.15	39	-697.62	7004	DZ	0.12765	7026	RY	2	7005	DY	-10772.5	-28500.7	98475.13
66	100	3.2	39	-697.59	7004	DZ	0.12764	7026	RY	2	7005	DY	-10872.5	-28826.6	98492.52
67	100	3.25	39	-697.35	7004	DZ	0.12762	7026	RY	2	7005	DY	-10972.6	-29152.6	98509.79
68	100	3.3	39	-697.45	7004	DZ	0.12763	7026	RY	2	7005	DY	-11072.4	-29478.4	98527.29
69	100	3.35	39	-697.32	7004	DZ	0.12761	7026	RY	2	7005	DY	-11172.3	-29804.3	98544.76
70	100	3.4	39	-697.53	7004	DZ	0.12764	7026	RY	2	7005	DY	-11271.8	-30129.9	98562.42
71	100	3.45	39	-697.25	7004	DZ	0.1276	7026	RY	2	7005	DY	-11372	-30455.9	98579.71
72	100	3.5	39	-697.46	7004	DZ	0.12763	7026	RY	2	7005	DY	-11471.6	-30781.5	98597.41
73	100	3.55	39	-697.27	7004	DZ	0.12761	7026	RY	2	7005	DY	-11571.6	-31107.4	98614.89
74	100	3.6	39	-697.46	7004	DZ	0.12763	7026	RY	2	7005	DY	-11671.1	-31432.8	98632.67
75	100	3.65	39	-699.24	7004	DZ	0.1278	7026	RY	2	7005	DY	-11767.5	-31747.5	98656.52
76	100	3.7	39	-699.88	7004	DZ	0.12786	7026	RY	2	7005	DY	-11866.6	-32065.1	98682.48
77	100	3.75	39	-701.13	7004	DZ	0.12798	7026	RY	2	7005	DY	-11964.5	-32378.5	98714.73
78	100	3.8	20	833.141	7004	DY	0.41888	881	RX	2	7005	DY	-12030	-32696.6	98774.37

90 deg

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	28	-394.29	7004	DZ	0.07364	7026	RY	2	7005	DY	204.1	-6936.95	49207.51
2	CLPS	1	11	-658.69	7004	DZ	0.1208	7026	RY	2	7005	DY	404.88	-13861	98418.38
3	100	0.05	2	-658.7	7004	DZ	0.1208	7026	RY	2	7005	DY	427.3	-14481	98449.18
4	100	0.1	4	-658.7	7004	DZ	0.1208	7026	RY	2	7005	DY	449.72	-15101	98480.02
5	100	0.15	2	-658.71	7004	DZ	0.1208	7026	RY	2	7005	DY	472.14	-15721	98510.88
6	100	0.2	2	-658.72	7004	DZ	0.1208	7026	RY	2	7005	DY	494.57	-16341	98541.77
7	100	0.25	2	-658.73	7004	DZ	0.1208	7026	RY	2	7005	DY	516.99	-16961	98572.7
8	100	0.3	2	-658.74	7004	DZ	0.1208	7026	RY	2	7005	DY	539.41	-17580.9	98603.65
9	100	0.35	2	-658.75	7004	DZ	0.1208	7026	RY	2	7005	DY	561.83	-18200.9	98634.64
10	100	0.4	2	-658.76	7004	DZ	0.1208	7026	RY	2	7005	DY	584.25	-18820.9	98665.65
11	100	0.45	2	-658.77	7004	DZ	0.1208	7026	RY	2	7005	DY	606.67	-19440.9	98696.7
12	100	0.5	2	-658.79	7004	DZ	0.1208	7026	RY	2	7005	DY	629.09	-20060.9	98727.78
13	100	0.55	2	-658.8	7004	DZ	0.1208	7026	RY	2	7005	DY	651.51	-20680.9	98758.88
14	100	0.6	4	-658.81	7004	DZ	0.1208	7026	RY	2	7005	DY	673.92	-21300.8	98790.02
15	100	0.65	2	-658.82	7004	DZ	0.1208	7026	RY	2	7005	DY	696.34	-21920.8	98821.19
16	100	0.7	2	-658.83	7004	DZ	0.12081	7026	RY	2	7005	DY	718.76	-22540.8	98852.39
17	100	0.75	2	-658.84	7004	DZ	0.12081	7026	RY	2	7005	DY	741.18	-23160.8	98883.62
18	100	0.8	2	-658.86	7004	DZ	0.12081	7026	RY	2	7005	DY	763.6	-23780.8	98914.88
19	100	0.85	2	-658.87	7004	DZ	0.12081	7026	RY	2	7005	DY	786.02	-24400.8	98946.17
20	100	0.9	2	-658.88	7004	DZ	0.12081	7026	RY	2	7005	DY	808.44	-25020.7	98977.49
21	100	0.95	2	-658.9	7004	DZ	0.12081	7026	RY	2	7005	DY	830.86	-25640.7	99008.85
22	100	1	2	-658.91	7004	DZ	0.12081	7026	RY	2	7005	DY	853.27	-26260.7	99040.23
23	100	1.05	4	-658.92	7004	DZ	0.12081	7026	RY	2	7005	DY	875.69	-26880.6	99071.65
24	100	1.1	3	-658.94	7004	DZ	0.12081	7026	RY	2	7005	DY	898.11	-27500.6	99103.11
25	100	1.15	3	-658.96	7004	DZ	0.12081	7026	RY	2	7005	DY	920.53	-28120.6	99134.59
26	100	1.2	3	-658.97	7004	DZ	0.12081	7026	RY	2	7005	DY	942.96	-28740.5	99166.11
27	100	1.25	4	-658.99	7004	DZ	0.12082	7026	RY	2	7005	DY	965.38	-29360.4	99197.67
28	100	1.3	7	-659.01	7004	DZ	0.12082	7026	RY	2	7005	DY	987.8	-29980.4	99229.26
29	100	1.35	5	-659.03	7004	DZ	0.12082	7026	RY	2	7005	DY	1010.23	-30600.3	99260.89
30	100	1.4	9	-659.05	7004	DZ	0.12082	7026	RY	2	7005	DY	1032.86	-31220.1	99292.57
31	100	1.45	10	-659.08	7004	DZ	0.12082	7026	RY	2	7005	DY	1055.1	-31839.9	99324.31
32	100	1.5	39	-660.12	7004	DZ	0.12092	7026	RY	2	7005	DY	1079.52	-32447	99360.58
33	100	1.55	39	-660.86	7004	DZ	0.12099	7026	RY	2	7005	DY	1103.02	-33055.1	99402.09
34	100	1.6	39	-661.86	7004	DZ	0.12109	7026	RY	2	7005	DY	1126.67	-33661.6	99446.16
35	100	1.65	39	-662.2	7004	DZ	-0.1226	437	RZ	2	7005	DY	1149.49	-34277.8	99481.07
36	100	1.7	39	-662.32	7004	DZ	0.12114	7026	RY	2	7005	DY	1171.88	-34897.3	99512.86
37	100	1.75	39	-662.71	7004	DZ	-0.1234	437	RZ	2	7005	DY	1194.69	-35512.6	99549.4
38	100	1.8	39	-663.57	7004	DZ	-0.1219	437	RZ	2	7005	DY	1217.62	-36120.4	99589.88
39	100	1.85	39	-666.41	7004	DZ	-0.1577	437	RZ	2	7005	DY	1243.12	-36713	99641.92
40	100	1.9	23	-674.73	7004	DZ	-0.1636	433	RZ	2	7005	DY	1272.41	-37295.8	99694.04

115 deg

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	27	-368.89	7004	DZ	0.06897	7026	RY	2	7005	DY	2765.83	-4466.48	48740.75
2	CLPS	1	12	-617.89	7004	DZ	0.11348	7026	RY	2	7005	DY	5527.07	-8924.96	97483
3	100	0.05	1	-617.87	7004	DZ	0.11347	7026	RY	2	7005	DY	5682.17	-9298.13	97505.35
4	100	0.1	1	-617.85	7004	DZ	0.11347	7026	RY	2	7005	DY	5837.27	-9671.28	97527.71
5	100	0.15	1	-617.84	7004	DZ	0.11347	7026	RY	2	7005	DY	5992.37	-10044.4	97550.09
6	100	0.2	1	-617.82	7004	DZ	0.11347	7026	RY	2	7005	DY	6147.47	-10417.6	97572.48
7	100	0.25	1	-617.8	7004	DZ	0.11347	7026	RY	2	7005	DY	6302.57	-10790.7	97594.88
8	100	0.3	1	-617.79	7004	DZ	0.11347	7026	RY	2	7005	DY	6457.67	-11163.9	97617.3
9	100	0.35	1	-617.77	7004	DZ	0.11346	7026	RY	2	7005	DY	6612.76	-11537.1	97639.72
10	100	0.4	1	-617.76	7004	DZ	0.11346	7026	RY	2	7005	DY	6767.86	-11910.2	97662.16
11	100	0.45	1	-617.74	7004	DZ	0.11346	7026	RY	2	7005	DY	6922.96	-12283.4	97684.62
12	100	0.5	1	-617.73	7004	DZ	0.11346	7026	RY	2	7005	DY	7078.06	-12656.5	97707.08
13	100	0.55	1	-617.71	7004	DZ	0.11346	7026	RY	2	7005	DY	7233.15	-13029.7	97729.56
14	100	0.6	1	-617.7	7004	DZ	0.11346	7026	RY	2	7005	DY	7388.25	-13402.8	97752.06
15	100	0.65	1	-617.68	7004	DZ	0.11345	7026	RY	2	7005	DY	7543.35	-13776	97774.56
16	100	0.7	1	-617.67	7004	DZ	0.11345	7026	RY	2	7005	DY	7698.44	-14149.1	97797.08
17	100	0.75	1	-617.65	7004	DZ	0.11345	7026	RY	2	7005	DY	7853.54	-14522.3	97819.61
18	100	0.8	1	-617.64	7004	DZ	0.11345	7026	RY	2	7005	DY	8008.64	-14895.4	97842.15
19	100	0.85	1	-617.62	7004	DZ	0.11345	7026	RY	2	7005	DY	8163.73	-15268.6	97864.71
20	100	0.9	2	-617.61	7004	DZ	0.11344	7026	RY	2	7005	DY	8318.82	-15641.7	97887.28
21	100	0.95	1	-617.6	7004	DZ	0.11344	7026	RY	2	7005	DY	8473.92	-16014.9	97909.86
22	100	1	2	-617.59	7004	DZ	0.11344	7026	RY	2	7005	DY	8629.02	-16388	97932.46
23	100	1.05	4	-617.57	7004	DZ	0.11344	7026	RY	2	7005	DY	8784.11	-16761.2	97955.07
24	100	1.1	1	-617.56	7004	DZ	0.11344	7026	RY	2	7005	DY	8939.21	-17134.4	97977.68
25	100	1.15	2	-617.54	7004	DZ	0.11344	7026	RY	2	7005	DY	9094.3	-17507.5	98000.32
26	100	1.2	1	-617.53	7004	DZ	0.11344	7026	RY	2	7005	DY	9249.4	-17880.7	98022.96
27	100	1.25	2	-617.52	7004	DZ	0.11343	7026	RY	2	7005	DY	9404.49	-18253.8	98045.62
28	100	1.3	2	-617.5	7004	DZ	0.11343	7026	RY	2	7005	DY	9559.59	-18627	98068.29
29	100	1.35	2	-617.49	7004	DZ	0.11343	7026	RY	2	7005	DY	9714.68	-19000.1	98090.98
30	100	1.4	2	-617.48	7004	DZ	0.11343	7026	RY	2	7005	DY	9869.78	-19373.3	98113.67
31	100	1.45	1	-617.46	7004	DZ	0.11343	7026	RY	2	7005	DY	10024.88	-19746.4	98136.38
32	100	1.5	2	-617.45	7004	DZ	0.11343	7026	RY	2	7005	DY	10179.97	-20119.6	98159.11
33	100	1.55	2	-617.44	7004	DZ	0.11342	7026	RY	2	7005	DY	10335.06	-20492.7	98181.84
34	100	1.6	2	-617.43	7004	DZ	0.11342	7026	RY	2	7005	DY	10490.16	-20865.9	98204.59
35	100	1.65	2	-617.41	7004	DZ	0.11342	7026	RY	2	7005	DY	10645.25	-21239	98227.35
36	100	1.7	2	-617.4	7004	DZ	0.11342	7026	RY	2	7005	DY	10800.34	-21612.2	98250.12
37	100	1.75	2	-617.39	7004	DZ	0.11342	7026	RY	2	7005	DY	10955.44	-21985.3	98272.91
38	100	1.8	2	-617.38	7004	DZ	0.11342	7026	RY	2	7005	DY	11110.53	-22358.5	98295.71
39	100	1.85	2	-617.36	7004	DZ	0.11342	7026	RY	2	7005	DY	11265.63	-22731.6	98318.52
40	100	1.9	3	-617.35	7004	DZ	0.11341	7026	RY	2	7005	DY	11420.72	-23104.8	98341.35
41	100	1.95	2	-617.34	7004	DZ	0.11341	7026	RY	2	7005	DY	11575.81	-23477.9	98364.19
42	100	2	3	-617.33	7004	DZ	0.11341	7026	RY	2	7005	DY	11730.91	-23851.1	98387.04
43	100	2.05	4	-617.32	7004	DZ	0.11341	7026	RY	2	7005	DY	11886	-24224.2	98409.9
44	100	2.1	4	-617.31	7004	DZ	0.11341	7026	RY	2	7005	DY	12041.09	-24597.4	98432.78
45	100	2.15	4	-617.3	7004	DZ	0.11341	7026	RY	2	7005	DY	12196.19	-24970.5	98455.67
46	100	2.2	6	-617.29	7004	DZ	0.11341	7026	RY	2	7005	DY	12351.28	-25343.7	98478.58
47	100	2.25	6	-617.28	7004	DZ	0.1134	7026	RY	2	7005	DY	12506.37	-25716.8	98501.5
48	100	2.3	6	-617.27	7004	DZ	0.1134	7026	RY	2	7005	DY	12661.47	-26089.9	98524.43
49	100	2.35	8	-617.26	7004	DZ	0.1134	7026	RY	2	7005	DY	12816.56	-26463.1	98547.38
50	100	2.4	7	-617.25	7004	DZ	0.1134	7026	RY	2	7005	DY	12971.66	-26836.2	98570.34
51	100	2.45	14	-617.24	7004	DZ	0.1134	7026	RY	2	7005	DY	13126.75	-27209.3	98593.31
52	100	2.5	30	-617.23	7004	DZ	0.1134	7026	RY	2	7005	DY	13281.85	-27582.4	98616.3
53	100	2.55	39	-617.22	7004	DZ	0.1134	7026	RY	2	7005	DY	13436.94	-27955.5	98639.31
54	100	2.6	39	-617.21	7004	DZ	0.11339	7026	RY	2	7005	DY	13592.04	-28328.6	98662.32
55	100	2.65	39	-617.2	7004	DZ	0.11339	7026	RY	2	7005	DY	13747.13	-28701.7	98685.36
56	100	2.7	39	-617.2	7004	DZ	0.11339	7026	RY	2	7005	DY	13902.27	-29074.8	98708.39
57	100	2.75	39	-617.2	7004	DZ	0.11339	7026	RY	2	7005	DY	14057.36	-29447.9	98731.46
58	100	2.8	39	-617.27	7004	DZ	0.1134	7026	RY	2	7005	DY	14212.93	-29821.1	98754.27
59	100	2.85	39	-617.3	7004	DZ	0.11341	7026	RY	2	7005	DY	14368.05	-30194.2	98777.32
60	100	2.9	39	-617.3	7004	DZ	0.11341	7026	RY	2	7005	DY	14523.33	-30567.1	98800.42
61	100	2.95	39	-617.33	7004	DZ	0.11341	7026	RY	2	7005	DY	14678.45	-30940	98823.56
62	100	3	39	-618.39	7004	DZ	0.11351	7026	RY	2	7005	DY	14835.23	-31293.9	98852.15
63	100	3.05	39	-619.46	7004	DZ	0.11361	7026	RY	2	7005	DY	14991.19	-31645.6	98891.99
64	100	3.1	39	-619.78	7004	DZ	0.11365	7026	RY	2	7005	DY	15146.75	-32013.5	98918.19
65	100	3.15	39	-619.91	7004	DZ	0.11366	7026	RY	2	7005	DY	15301.9	-32385.3	98942.18
66	100	3.2	39	-620.29	7004	DZ	0.11371	7026	RY	2	7005	DY	15456.07	-32756.8	98966.23
67	100	3.25	39	-620.16	7004	DZ	0.11368	7026	RY	2	7005	DY	15611.95	-33127.8	98991.2
68	100	3.3	39	-620.53	7004	DZ	0.11373	7026	RY	2	7005	DY	15765.93	-33496.7	99017.64
69	100	3.35	39	-621.22	7004	DZ	0.11378	7026	RY	2	7005	DY	15918.45	-33854.7	99049.98
70	100	3.4	39	-622.72	7004	DZ	0.11393	7026	RY	2	7005	DY	16071.69	-34209.4	99085.17
71	100	3.45	39	-628.3	7004	DZ	0.12548	437	RZ	2	7005	DY	16216.11	-34527.1	99125.05
72	100	3.5	20	-654.77	7004	DZ	0.12629	138	RZ	2	7005	DY	16352.7	-34786	99166.15

180 deg

COLLAPSE SOLUTION SUMMARY														
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	27	-369.05	7004	DZ	0.06899	7020	RY	2	7005	DY	3059.61	-256.49	48384.79
2	CLPS	1	12	-618.21	7004	DZ	0.11347	7026	RY	2	7005	DY	6104.01	-511.79	96771.9
3	100	1	3	-617.73	7004	DZ	0.11342	7026	RY	2	7005	DY	9802.57	-1022.56	96721.66
4	100	1.08	1	-617.69	7004	DZ	0.11342	7026	RY	2	7005	DY	10098.47	-1063.43	96717.68
5	100	1.16	1	-617.66	7004	DZ	0.11341	7026	RY	2	7005	DY	10394.35	-1104.29	96713.72
6	100	1.24	1	-617.62	7004	DZ	0.11341	7026	RY	2	7005	DY	10690.23	-1145.15	96709.76
7	100	1.32	1	-617.58	7004	DZ	0.11341	7026	RY	2	7005	DY	10986.12	-1186.01	96705.8
8	100	1.4	1	-617.54	7004	DZ	0.1134	7026	RY	2	7005	DY	11282	-1226.87	96701.88
9	100	1.48	1	-617.51	7004	DZ	0.1134	7026	RY	2	7005	DY	11577.89	-1267.73	96697.92
10	100	1.56	1	-617.47	7004	DZ	0.11339	7026	RY	2	7005	DY	11873.77	-1308.6	96693.99
11	100	1.64	1	-617.43	7004	DZ	0.11339	7026	RY	2	7005	DY	12169.65	-1349.46	96690.06
12	100	1.72	1	-617.39	7004	DZ	0.11339	7026	RY	2	7005	DY	12465.54	-1390.32	96686.15
13	100	1.8	2	-617.35	7004	DZ	0.11338	7026	RY	2	7005	DY	12761.41	-1431.18	96682.24
14	100	1.88	4	-617.32	7004	DZ	0.11338	7026	RY	2	7005	DY	13057.3	-1472.04	96678.33
15	100	1.96	1	-617.28	7004	DZ	0.11338	7026	RY	2	7005	DY	13353.19	-1512.9	96674.43
16	100	2.04	1	-617.24	7004	DZ	0.11337	7026	RY	2	7005	DY	13649.07	-1553.77	96670.54
17	100	2.12	1	-617.2	7004	DZ	0.11337	7026	RY	2	7005	DY	13944.95	-1594.63	96666.66
18	100	2.2	1	-617.17	7004	DZ	0.11337	7026	RY	2	7005	DY	14240.84	-1635.49	96662.78
19	100	2.28	1	-617.13	7004	DZ	0.11336	7026	RY	2	7005	DY	14536.72	-1676.35	96658.91
20	100	2.36	1	-617.09	7004	DZ	0.11336	7026	RY	2	7005	DY	14832.6	-1717.21	96655.05
21	100	2.44	1	-617.05	7004	DZ	0.11335	7026	RY	2	7005	DY	15128.49	-1758.07	96651.19
22	100	2.52	1	-617.02	7004	DZ	0.11335	7026	RY	2	7005	DY	15424.37	-1798.93	96647.34
23	100	2.6	1	-616.98	7004	DZ	0.11335	7026	RY	2	7005	DY	15720.25	-1839.79	96643.5
24	100	2.68	1	-616.94	7004	DZ	0.11334	7026	RY	2	7005	DY	16016.13	-1880.66	96639.67
25	100	2.76	1	-616.9	7004	DZ	0.11334	7026	RY	2	7005	DY	16312.02	-1921.52	96635.84
26	100	2.84	1	-616.87	7004	DZ	0.11333	7026	RY	2	7005	DY	16607.9	-1962.38	96632.02
27	100	2.92	1	-616.83	7004	DZ	0.11333	7026	RY	2	7005	DY	16903.78	-2003.24	96628.2
28	100	3	1	-616.79	7004	DZ	0.11333	7026	RY	2	7005	DY	17199.66	-2044.1	96624.39
29	100	3.08	1	-616.76	7004	DZ	0.11332	7026	RY	2	7005	DY	17495.55	-2084.96	96620.59
30	100	3.16	1	-616.72	7004	DZ	0.11332	7026	RY	2	7005	DY	17791.43	-2125.82	96616.8
31	100	3.24	1	-616.68	7004	DZ	0.11332	7026	RY	2	7005	DY	18087.31	-2166.68	96613.01
32	100	3.32	1	-616.64	7004	DZ	0.11331	7026	RY	2	7005	DY	18383.19	-2207.54	96609.23
33	100	3.4	1	-616.61	7004	DZ	0.11331	7026	RY	2	7005	DY	18679.07	-2248.41	96605.46
34	100	3.48	1	-616.57	7004	DZ	0.1133	7026	RY	2	7005	DY	18974.96	-2289.27	96601.69
35	100	3.56	1	-616.53	7004	DZ	0.1133	7026	RY	2	7005	DY	19270.84	-2330.13	96597.93
36	100	3.64	1	-616.49	7004	DZ	0.1133	7026	RY	2	7005	DY	19566.72	-2370.99	96594.18
37	100	3.72	1	-616.46	7004	DZ	0.11329	7026	RY	2	7005	DY	19862.6	-2411.85	96590.43
38	100	3.8	1	-616.42	7004	DZ	0.11329	7026	RY	2	7005	DY	20158.48	-2452.71	96586.69
39	100	3.88	1	-616.38	7004	DZ	0.11329	7026	RY	2	7005	DY	20454.36	-2493.57	96582.96
40	100	3.96	1	-616.34	7004	DZ	0.11328	7020	RY	2	7005	DY	20750.24	-2534.43	96579.23
41	100	4.04	1	-616.31	7004	DZ	0.11328	7020	RY	2	7005	DY	21046.13	-2575.29	96575.51
42	100	4.12	1	-616.27	7004	DZ	0.11327	7020	RY	2	7005	DY	21342.01	-2616.15	96571.8
43	100	4.2	2	-616.23	7004	DZ	0.11327	7020	RY	2	7005	DY	21637.88	-2657.01	96568.1
44	100	4.28	4	-616.19	7004	DZ	0.11327	7020	RY	2	7005	DY	21933.76	-2697.87	96564.4
45	100	4.36	1	-616.16	7004	DZ	0.11326	7020	RY	2	7005	DY	22229.65	-2738.74	96560.71
46	100	4.44	1	-616.12	7004	DZ	0.11326	7020	RY	2	7005	DY	22525.53	-2779.6	96557.02
47	100	4.52	1	-616.09	7004	DZ	0.11326	7020	RY	2	7005	DY	22821.41	-2820.46	96553.35
48	100	4.6	1	-616.05	7004	DZ	0.11325	7020	RY	2	7005	DY	23117.29	-2861.32	96549.68
49	100	4.68	1	-616.01	7004	DZ	0.11325	7020	RY	2	7005	DY	23413.17	-2902.18	96546.01
50	100	4.76	1	-615.97	7004	DZ	0.11324	7020	RY	2	7005	DY	23709.05	-2943.04	96542.36
51	100	4.84	1	-615.94	7004	DZ	0.11324	7020	RY	2	7005	DY	24004.93	-2983.9	96538.71
52	100	4.92	1	-615.9	7004	DZ	0.11324	7020	RY	2	7005	DY	24300.81	-3024.76	96535.06
53	100	5	1	-615.86	7004	DZ	0.11323	7020	RY	2	7005	DY	24596.69	-3065.62	96531.43
54	100	5.08	1	-615.83	7004	DZ	0.11323	7020	RY	2	7005	DY	24892.57	-3106.48	96527.8
55	100	5.16	1	-615.79	7004	DZ	0.11323	7020	RY	2	7005	DY	25188.45	-3147.34	96524.17
56	100	5.24	1	-615.75	7004	DZ	0.11322	7020	RY	2	7005	DY	25484.33	-3188.2	96520.56
57	100	5.32	1	-615.72	7004	DZ	0.11322	7020	RY	2	7005	DY	25780.21	-3229.06	96516.95
58	100	5.4	1	-615.68	7004	DZ	0.11321	7020	RY	2	7005	DY	26076.09	-3269.93	96513.35
59	100	5.48	1	-615.65	7004	DZ	0.11321	7020	RY	2	7005	DY	26371.97	-3310.78	96509.76
60	100	5.56	1	-615.61	7004	DZ	0.11321	7020	RY	2	7005	DY	26667.84	-3351.64	96506.17
61	100	5.64	1	-615.57	7004	DZ	0.1132	7020	RY	2	7005	DY	26963.72	-3392.5	96502.59
62	100	5.72	2	-615.54	7004	DZ	0.1132	7020	RY	2	7005	DY	27259.58	-3433.36	96499.03
63	100	5.8	2	-615.5	7004	DZ	0.1132	7020	RY	2	7005	DY	27555.45	-3474.22	96495.47
64	100	5.88	2	-615.47	7004	DZ	0.11319	7020	RY	2	7005	DY	27851.32	-3515.07	96491.91
65	100	5.96	2	-615.43	7004	DZ	0.11319	7020	RY	2	7005	DY	28147.19	-3555.93	96488.37
66	100	6.04	2	-615.4	7004	DZ	0.11319	7020	RY	2	7005	DY	28443.06	-3596.78	96484.83
67	100	6.12	2	-615.37	7004	DZ	0.11318	7020	RY	2	7005	DY	28738.92	-3637.64	96481.3
68	100	6.2	4	-615.33	7004	DZ	0.11318	7020	RY	2	7005	DY	29034.78	-3678.49	96477.78
69	100	6.28	4	-615.3	7004	DZ	0.11318	7020	RY	2	7005	DY	29330.63	-3719.34	96474.27
70	100	6.36	2	-615.27	7004	DZ	0.11317	7020	RY	2	7005	DY	29626.49	-3760.19	96470.77
71	100	6.44	4	-615.24	7004	DZ	0.11317	7020	RY	2	7005	DY	29922.33	-3801.04	96467.28
72	100	6.52	4	-615.21	7004	DZ	0.11317	7020	RY	2	7005	DY	30218.16	-3841.89	96463.8
73	100	6.6	4	-615.19	7004	DZ	0.11316	7020	RY	2	7005	DY	30513.98	-3882.73	96460.35
74	100	6.68	6	-615.16	7004	DZ	0.11316	7020	RY	2	7005	DY	30809.8	-3923.56	96456.9
75	100	6.76	4	-615.13	7004	DZ	0.11316	7020	RY	2	7005	DY	31105.6	-3964.4	96453.47
76	100	6.84	4	-615.11	7004	DZ	0.11316	7020	RY	2	7005	DY	31401.38	-4005.23	96450.06
77	100	6.92	6	-615.09	7004	DZ	0.11315	7020	RY	2	7005	DY	31697.14	-4046.05	96446.67

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
78	100	7	6	-615.07	7004	DZ	0.11315	7020	RY	2	7005	DY	31992.89	-4086.86	96443.3
79	100	7.08	8	-615.06	7004	DZ	0.11315	7020	RY	2	7005	DY	32288.61	-4127.66	96439.96
80	100	7.16	8	-615.05	7004	DZ	0.11315	7020	RY	2	7005	DY	32584.3	-4168.46	96436.64
81	100	7.24	13	-615.05	7004	DZ	0.11315	7020	RY	2	7005	DY	32879.94	-4209.24	96433.37
82	100	7.32	13	-615.05	7004	DZ	0.11315	7020	RY	2	7005	DY	33175.52	-4249.99	96430.15
83	100	7.4	15	-615.07	7004	DZ	0.11315	7020	RY	2	7005	DY	33471.01	-4290.69	96426.98
84	100	7.48	17	-615.09	7004	DZ	0.11316	7020	RY	2	7005	DY	33766.44	-4331.4	96423.87
85	100	7.56	19	-615.12	7004	DZ	0.11316	7020	RY	2	7005	DY	34061.79	-4372.09	96420.82
86	100	7.64	21	-615.19	7004	DZ	0.11317	7020	RY	2	7005	DY	34356.89	-4412.68	96417.92
87	100	7.72	21	-615.3	7004	DZ	0.11318	7020	RY	2	7005	DY	34651.59	-4453.15	96415.26
88	100	7.8	28	-615.57	7004	DZ	0.11321	7020	RY	2	7005	DY	34945.13	-4493.34	96413.22
89	100	7.88	39	-616.95	7004	DZ	0.11335	7020	RY	2	7005	DY	35229.13	-4531.78	96416.06
90	100	7.96	39	-639.02	7004	DZ	0.11565	7026	RY	2	7005	DY	35404.15	-4567.45	96463.98
91	100	8.04	39	-723.34	7005	DZ	-0.1434	202	RY	2	7005	DY	35237.67	-4589.9	96669.78
92	100	8.12	4	-753.19	7004	DZ	-0.1682	293	RY	2	7005	DY	35333.69	-4696.02	95110.97

245 deg

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	27	-369.16	7004	DZ	0.06904	7020	RY	2	7005	DY	1969.56	2762.61	48563.78
2	CLPS	1	32	-611.63	7004	DZ	0.49623	5833	RZ	2	7005	DY	3918.12	5569.23	97127.23

270 deg

COLLAPSE SOLUTION SUMMARY															
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION		
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
1	CLPS	0.5	28	-394.24	7004	DZ	0.07367	7020	RY	2	7005	DY	-96.96	3114.42	49037.02
2	CLPS	1	11	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-198.01	6225.14	98074.71
3	100	0.07	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-208.63	6558.66	98093.59
4	100	0.14	4	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-219.25	6892.19	98112.48
5	100	0.21	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-229.87	7225.72	98131.38
6	100	0.28	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-240.5	7559.24	98150.29
7	100	0.35	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-251.12	7892.77	98169.21
8	100	0.42	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-261.74	8226.3	98188.13
9	100	0.49	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-272.36	8559.83	98207.07
10	100	0.56	2	-658.52	7004	DZ	0.12078	7020	RY	2	7005	DY	-282.99	8893.35	98226.01
11	100	0.63	2	-658.53	7004	DZ	0.12078	7020	RY	2	7005	DY	-293.61	9226.88	98244.95
12	100	0.7	2	-658.53	7004	DZ	0.12078	7020	RY	2	7005	DY	-304.23	9560.41	98263.91
13	100	0.77	2	-658.53	7004	DZ	0.12078	7020	RY	2	7005	DY	-314.86	9893.94	98282.88
14	100	0.84	2	-658.53	7004	DZ	0.12078	7020	RY	2	7005	DY	-325.48	10227.46	98301.85
15	100	0.91	2	-658.53	7004	DZ	0.12078	7020	RY	2	7005	DY	-336.1	10560.99	98320.83
16	100	0.98	2	-658.53	7004	DZ	0.12078	7020	RY	2	7005	DY	-346.72	10894.52	98339.82
17	100	1.05	2	-658.54	7004	DZ	0.12078	7020	RY	2	7005	DY	-357.35	11228.05	98358.81
18	100	1.12	2	-658.54	7004	DZ	0.12078	7020	RY	2	7005	DY	-367.97	11561.57	98377.82
19	100	1.19	2	-658.54	7004	DZ	0.12078	7020	RY	2	7005	DY	-378.59	11895.1	98396.83
20	100	1.26	2	-658.54	7004	DZ	0.12078	7020	RY	2	7005	DY	-389.22	12228.63	98415.85
21	100	1.33	2	-658.54	7004	DZ	0.12078	7020	RY	2	7005	DY	-399.84	12562.16	98434.88
22	100	1.4	2	-658.54	7004	DZ	0.12078	7020	RY	2	7005	DY	-410.46	12895.69	98453.91
23	100	1.47	2	-658.55	7004	DZ	0.12078	7020	RY	2	7005	DY	-421.09	13229.21	98472.96
24	100	1.54	2	-658.55	7004	DZ	0.12078	7020	RY	2	7005	DY	-431.71	13562.74	98492.01
25	100	1.61	2	-658.55	7004	DZ	0.12078	7020	RY	2	7005	DY	-442.33	13896.27	98511.07
26	100	1.68	2	-658.55	7004	DZ	0.12078	7020	RY	2	7005	DY	-452.95	14229.8	98530.14
27	100	1.75	4	-658.56	7004	DZ	0.12078	7020	RY	2	7005	DY	-463.58	14563.33	98549.21
28	100	1.82	2	-658.56	7004	DZ	0.12078	7020	RY	2	7005	DY	-474.2	14896.85	98568.3
29	100	1.89	2	-658.56	7004	DZ	0.12078	7020	RY	2	7005	DY	-484.82	15230.38	98587.39
30	100	1.96	2	-658.57	7004	DZ	0.12078	7020	RY	2	7005	DY	-495.45	15563.91	98606.49
31	100	2.03	2	-658.57	7004	DZ	0.12078	7020	RY	2	7005	DY	-506.07	15897.44	98625.6
32	100	2.1	2	-658.57	7004	DZ	0.12078	7020	RY	2	7005	DY	-516.69	16230.96	98644.71
33	100	2.17	2	-658.57	7004	DZ	0.12078	7020	RY	2	7005	DY	-527.32	16564.49	98663.84
34	100	2.24	2	-658.58	7004	DZ	0.12078	7020	RY	2	7005	DY	-537.94	16898.02	98682.97
35	100	2.31	2	-658.58	7004	DZ	0.12078	7020	RY	2	7005	DY	-548.56	17231.55	98702.11
36	100	2.38	2	-658.58	7004	DZ	0.12078	7020	RY	2	7005	DY	-559.19	17565.08	98721.25
37	100	2.45	2	-658.59	7004	DZ	0.12078	7020	RY	2	7005	DY	-569.81	17898.61	98740.41
38	100	2.52	2	-658.59	7004	DZ	0.12078	7020	RY	2	7005	DY	-580.43	18232.13	98759.57
39	100	2.59	4	-658.6	7004	DZ	0.12078	7020	RY	2	7005	DY	-591.06	18565.66	98778.75
40	100	2.66	2	-658.6	7004	DZ	0.12078	7020	RY	2	7005	DY	-601.68	18899.19	98797.93
41	100	2.73	2	-658.6	7004	DZ	0.12078	7020	RY	2	7005	DY	-612.31	19232.72	98817.11
42	100	2.8	2	-658.61	7004	DZ	0.12078	7020	RY	2	7005	DY	-622.93	19566.25	98836.31
43	100	2.87	2	-658.61	7004	DZ	0.12078	7020	RY	2	7005	DY	-633.55	19899.77	98855.51
44	100	2.94	2	-658.61	7004	DZ	0.12078	7020	RY	2	7005	DY	-644.18	20233.3	98874.72
45	100	3.01	2	-658.62	7004	DZ	0.12078	7020	RY	2	7005	DY	-654.8	20566.83	98893.94
46	100	3.08	2	-658.62	7004	DZ	0.12078	7020	RY	2	7005	DY	-665.42	20900.36	98913.17
47	100	3.15	2	-658.62	7004	DZ	0.12078	7020	RY	2	7005	DY	-676.05	21233.89	98932.41
48	100	3.22	2	-658.63	7004	DZ	0.12078	7020	RY	2	7005	DY	-686.67	21567.41	98951.65
49	100	3.29	2	-658.63	7004	DZ	0.12078	7020	RY	2	7005	DY	-697.29	21900.94	98970.9
50	100	3.36	2	-658.64	7004	DZ	0.12078	7020	RY	2	7005	DY	-707.92	22234.47	98990.16
51	100	3.43	4	-658.64	7004	DZ	0.12078	7020	RY	2	7005	DY	-718.54	22567.99	99009.43
52	100	3.5	2	-658.65	7004	DZ	0.12078	7020	RY	2	7005	DY	-729.17	22901.52	99028.71
53	100	3.57	2	-658.65	7004	DZ	0.12078	7020	RY	2	7005	DY	-739.79	23235.04	99047.99
54	100	3.64	2	-658.66	7004	DZ	0.12078	7020	RY	2	7005	DY	-750.41	23568.57	99067.28
55	100	3.71	2	-658.66	7004	DZ	0.12078	7020	RY	2	7005	DY	-761.04	23902.09	99086.59
56	100	3.78	2	-658.67	7004	DZ	0.12078	7020	RY	2	7005	DY	-771.66	24235.61	99105.89
57	100	3.85	2	-658.67	7004	DZ	0.12078	7020	RY	2	7005	DY	-782.28	24569.13	99125.21
58	100	3.92	2	-658.68	7004	DZ	0.12078	7020	RY	2	7005	DY	-792.9	24902.65	99144.54
59	100	3.99	2	-658.68	7004	DZ	0.12078	7020	RY	2	7005	DY	-803.53	25236.17	99163.88
60	100	4.06	2	-658.69	7004	DZ	0.12078	7020	RY	2	7005	DY	-814.15	25569.68	99183.22
61	100	4.13	2	-658.69	7004	DZ	0.12078	7020	RY	2	7005	DY	-824.77	25903.19	99202.57
62	100	4.2	4	-658.7	7004	DZ	0.12078	7020	RY	2	7005	DY	-835.39	26236.7	99221.94
63	100	4.27	2	-658.71	7004	DZ	0.12078	7020	RY	2	7005	DY	-846.01	26570.21	99241.31
64	100	4.34	3	-658.71	7004	DZ	0.12078	7020	RY	2	7005	DY	-856.63	26903.71	99260.69
65	100	4.41	3	-658.72	7004	DZ	0.12078	7020	RY	2	7005	DY	-867.25	27237.22	99280.06
66	100	4.48	3	-658.73	7004	DZ	0.12078	7020	RY	2	7005	DY	-877.87	27570.71	99299.47
67	100	4.55	3	-658.73	7004	DZ	0.12078	7020	RY	2	7005	DY	-888.49	27904.21	99318.88
68	100	4.62	4	-658.74	7004	DZ	0.12078	7020	RY	2	7005	DY	-899.11	28237.69	99338.3
69	100	4.69	4	-658.74	7004	DZ	0.12078	7020	RY	2	7005	DY	-909.73	28571.17	99357.74
70	100	4.76	4	-658.75	7004	DZ	0.12078	7020	RY	2	7005	DY	-920.34	28904.63	99377.18
71	100	4.83	6	-658.76	7004	DZ	0.12078	7020	RY	2	7005	DY	-930.96	29238.08	99396.64
72	100	4.9	6	-658.77	7004	DZ	0.12078	7020	RY	2	7005	DY	-941.57	29571.52	99416.11
73	100	4.97	7	-658.78	7004	DZ	0.12078	7020	RY	2	7005	DY	-952.18	29904.93	99435.6
74	100	5.04	9	-658.79	7004	DZ	0.12078	7020	RY	2	7005	DY	-962.78	30238.31	99455.11
75	100	5.11	9	-658.8	7004	DZ	0.12078	7020	RY	2	7005	DY	-973.37	30571.64	99474.65
76	100	5.18	39	-659.34	7004	DZ	0.12084	7020	RY	2	7005	DY	-982.4	30894.9	99496.03
77	100	5.25	39	-659.93	7005	DZ	0.1209	7020	RY	2	7005	DY	-991.73	31221.18	99519.4
78	100	5.32	39	-660.72	7005	DZ	0.12098	7020	RY	2	7005	DY	-1000.74	31542.29	99550.76
79	100	5.39	32	-701.59	7005	DZ	1.60073	5748	RX	2	7005	DY	-1014.27	31952.65	99510.77

295 deg

COLLAPSE SOLUTION SUMMARY																
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION			
INCR	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF		FX KN	FY KN	FZ KN
1	CLPS	0.5	27	-389.16	7004	DZ	0.06902	7020	RY	2	7005	DY		301.35	2762.39	48590.16
2	CLPS	1	12	-618.4	7004	DZ	0.11352	7020	RY	2	7005	DY		601.05	5521.58	97180.98
3	100	0.07	2	-618.42	7004	DZ	0.11353	7020	RY	2	7005	DY		473.55	5805.93	97191.14
4	100	0.14	2	-618.44	7004	DZ	0.11353	7020	RY	2	7005	DY		346.05	6090.27	97201.31
5	100	0.21	2	-618.45	7004	DZ	0.11353	7020	RY	2	7005	DY		218.54	6374.62	97211.49
6	100	0.28	2	-618.47	7004	DZ	0.11353	7020	RY	2	7005	DY		91.04	6658.97	97221.68
7	100	0.35	2	-618.49	7004	DZ	0.11353	7020	RY	2	7005	DY		-36.46	6943.32	97231.87
8	100	0.42	2	-618.51	7004	DZ	0.11353	7020	RY	2	7005	DY		-163.96	7227.67	97242.07
9	100	0.49	2	-618.53	7004	DZ	0.11354	7020	RY	2	7005	DY		-291.47	7512.01	97252.28
10	100	0.56	2	-618.54	7004	DZ	0.11354	7020	RY	2	7005	DY		-418.97	7796.36	97262.49
11	100	0.63	2	-618.56	7004	DZ	0.11354	7020	RY	2	7005	DY		-546.47	8080.71	97272.71
12	100	0.7	4	-618.58	7004	DZ	0.11354	7020	RY	2	7005	DY		-673.97	8365.06	97282.94
13	100	0.77	2	-618.59	7004	DZ	0.11354	7020	RY	2	7005	DY		-801.46	8649.41	97293.18
14	100	0.84	2	-618.61	7004	DZ	0.11354	7020	RY	2	7005	DY		-928.98	8933.75	97303.42
15	100	0.91	2	-618.63	7004	DZ	0.11354	7020	RY	2	7005	DY		-1056.48	9218.1	97313.68
16	100	0.98	2	-618.65	7004	DZ	0.11355	7020	RY	2	7005	DY		-1183.98	9502.45	97323.93
17	100	1.05	2	-618.66	7004	DZ	0.11355	7020	RY	2	7005	DY		-1311.49	9786.8	97334.2
18	100	1.12	2	-618.68	7004	DZ	0.11355	7020	RY	2	7005	DY		-1438.99	10071.15	97344.47
19	100	1.19	2	-618.7	7004	DZ	0.11355	7020	RY	2	7005	DY		-1566.49	10355.5	97354.75
20	100	1.26	2	-618.72	7004	DZ	0.11355	7020	RY	2	7005	DY		-1693.99	10639.84	97365.04
21	100	1.33	2	-618.74	7004	DZ	0.11355	7020	RY	2	7005	DY		-1821.5	10924.19	97375.33
22	100	1.4	2	-618.76	7004	DZ	0.11356	7020	RY	2	7005	DY		-1949	11208.54	97385.63
23	100	1.47	2	-618.77	7004	DZ	0.11356	7020	RY	2	7005	DY		-2076.5	11492.89	97395.94
24	100	1.54	2	-618.79	7004	DZ	0.11356	7020	RY	2	7005	DY		-2204.01	11777.24	97406.26
25	100	1.61	2	-618.81	7004	DZ	0.11356	7020	RY	2	7005	DY		-2331.51	12061.59	97416.58
26	100	1.68	2	-618.83	7004	DZ	0.11356	7020	RY	2	7005	DY		-2459.01	12345.94	97426.91
27	100	1.75	4	-618.85	7004	DZ	0.11356	7020	RY	2	7005	DY		-2586.51	12630.29	97437.25
28	100	1.82	2	-618.86	7004	DZ	0.11356	7020	RY	2	7005	DY		-2714.02	12914.63	97447.6
29	100	1.89	2	-618.88	7004	DZ	0.11357	7020	RY	2	7005	DY		-2841.52	13198.98	97457.95
30	100	1.96	2	-618.9	7004	DZ	0.11357	7020	RY	2	7005	DY		-2969.02	13483.33	97468.31
31	100	2.03	2	-618.92	7004	DZ	0.11357	7020	RY	2	7005	DY		-3096.53	13767.68	97478.67
32	100	2.1	2	-618.94	7004	DZ	0.11357	7020	RY	2	7005	DY		-3224.03	14052.03	97489.05
33	100	2.17	2	-618.96	7004	DZ	0.11357	7020	RY	2	7005	DY		-3351.53	14336.38	97499.43
34	100	2.24	2	-618.98	7004	DZ	0.11357	7020	RY	2	7005	DY		-3479.03	14620.73	97509.82
35	100	2.31	2	-619	7004	DZ	0.11358	7020	RY	2	7005	DY		-3606.54	14905.08	97520.21
36	100	2.38	2	-619.02	7004	DZ	0.11358	7020	RY	2	7005	DY		-3734.04	15189.42	97530.62
37	100	2.45	2	-619.04	7004	DZ	0.11358	7020	RY	2	7005	DY		-3861.54	15473.77	97541.03
38	100	2.52	2	-619.06	7004	DZ	0.11358	7020	RY	2	7005	DY		-3989.05	15758.12	97551.44
39	100	2.59	2	-619.08	7004	DZ	0.11358	7020	RY	2	7005	DY		-4116.55	16042.47	97561.87
40	100	2.66	2	-619.1	7004	DZ	0.11359	7020	RY	2	7005	DY		-4244.05	16326.82	97572.3
41	100	2.73	4	-619.11	7004	DZ	0.11359	7020	RY	2	7005	DY		-4371.55	16611.17	97582.74
42	100	2.8	2	-619.13	7004	DZ	0.11359	7020	RY	2	7005	DY		-4499.06	16895.52	97593.18
43	100	2.87	2	-619.15	7004	DZ	0.11359	7020	RY	2	7005	DY		-4626.56	17179.87	97603.64
44	100	2.94	2	-619.17	7004	DZ	0.11359	7020	RY	2	7005	DY		-4754.06	17464.22	97614.1
45	100	3.01	2	-619.19	7004	DZ	0.11359	7020	RY	2	7005	DY		-4881.57	17748.57	97624.57
46	100	3.08	2	-619.21	7004	DZ	0.11359	7020	RY	2	7005	DY		-5009.07	18032.92	97635.04
47	100	3.15	2	-619.23	7004	DZ	0.1136	7020	RY	2	7005	DY		-5136.57	18317.27	97645.52
48	100	3.22	2	-619.25	7004	DZ	0.1136	7020	RY	2	7005	DY		-5264.08	18601.61	97656.01
49	100	3.29	2	-619.27	7004	DZ	0.1136	7020	RY	2	7005	DY		-5391.58	18885.96	97666.51
50	100	3.36	2	-619.29	7004	DZ	0.1136	7020	RY	2	7005	DY		-5519.08	19170.31	97677.01
51	100	3.43	2	-619.31	7004	DZ	0.1136	7020	RY	2	7005	DY		-5646.59	19454.66	97687.52
52	100	3.5	2	-619.33	7004	DZ	0.11361	7020	RY	2	7005	DY		-5774.09	19739.01	97698.04
53	100	3.57	2	-619.35	7004	DZ	0.11361	7020	RY	2	7005	DY		-5901.59	20023.36	97708.57
54	100	3.64	2	-619.37	7004	DZ	0.11361	7020	RY	2	7005	DY		-6029.09	20307.71	97719.1
55	100	3.71	2	-619.39	7004	DZ	0.11361	7020	RY	2	7005	DY		-6156.6	20592.06	97729.64
56	100	3.78	2	-619.41	7004	DZ	0.11361	7020	RY	2	7005	DY		-6284.1	20876.41	97740.19
57	100	3.85	4	-619.43	7004	DZ	0.11361	7020	RY	2	7005	DY		-6411.6	21160.76	97750.74
58	100	3.92	2	-619.45	7004	DZ	0.11362	7020	RY	2	7005	DY		-6539.11	21445.1	97761.31
59	100	3.99	2	-619.47	7004	DZ	0.11362	7020	RY	2	7005	DY		-6666.61	21729.45	97771.87
60	100	4.06	2	-619.49	7004	DZ	0.11362	7020	RY	2	7005	DY		-6794.11	22013.8	97782.45
61	100	4.13	2	-619.51	7004	DZ	0.11362	7020	RY	2	7005	DY		-6921.62	22298.15	97793.04
62	100	4.2	3	-619.53	7004	DZ	0.11362	7020	RY	2	7005	DY		-7049.12	22582.49	97803.63
63	100	4.27	3	-619.56	7004	DZ	0.11362	7020	RY	2	7005	DY		-7176.62	22866.83	97814.23
64	100	4.34	3	-619.57	7004	DZ	0.11363	7020	RY	2	7005	DY		-7304.12	23151.18	97824.84
65	100	4.41	3	-619.6	7004	DZ	0.11363	7020	RY	2	7005	DY		-7431.63	23435.52	97835.45
66	100	4.48	5	-619.61	7004	DZ	0.11363	7020	RY	2	7005	DY		-7559.13	23719.86	97846.07
67	100	4.55	10	-619.64	7004	DZ	0.11363	7020	RY	2	7005	DY		-7686.63	24004.2	97856.7
68	100	4.62	39	-619.66	7004	DZ	0.11363	7020	RY	2	7005	DY		-7814.13	24288.54	97867.34
69	100	4.69	39	-619.68	7004	DZ	0.11363	7020	RY	2	7005	DY		-7941.63	24572.88	97877.98
70	100	4.76	39	-619.7	7004	DZ	0.11364	7020	RY	2	7005	DY		-8069.14	24857.21	97888.64
71	100	4.83	39	-619.72	7004	DZ	0.11364	7020	RY	2	7005	DY		-8196.64	25141.54	97899.3
72	100	4.9	2	-619.74	7004	DZ	0.11364	7020	RY	2	7005	DY		-8324.14	25425.88	97909.96
73	100	4.97	2	-619.77	7004	DZ	0.11364	7020	RY	2	7005	DY		-8451.64	25710.21	97920.64
74	100	5.04	2	-619.79	7004	DZ	0.11364	7020	RY	2	7005	DY		-8579.14	25994.54	97931.32
75	100	5.11	2	-619.81	7004	DZ	0.11365	7020	RY	2	7005	DY		-8706.64	26278.87	97942.02
76	100	5.18	3	-619.83	7004	DZ	0.11365	7020	RY	2	7005	DY		-8834.14	26563.19	97952.72
77	100	5.25	2	-619.85	7004	DZ	0.11365	7020	RY	2	7005	DY		-8961.64	26847.52	97963.42

COLLAPSE SOLUTION SUMMARY																
	LOAD	LOAD	NO.	MAXIMUM DEFLECTION			MAXIMUM ROTATION			SOLUTION DATA			REACTION SUMMATION			
INCH	CASE	FACTOR	LOOPS	DEFL. CM	JOINT	DOF	ROT.	JOINT	DOF	MAX. DIGITS	JOINT	DOF	FX KN	FY KN	FZ KN
78	100	5.32	3	-619.88	7004	DZ	0.11365	7020	RY	2	7005	DY	-9089.14	27131.83	97974.14
79	100	5.39	14	-619.9	7004	DZ	0.11365	7020	RY	2	7005	DY	-9216.64	27416.14	97984.87
80	100	5.46	38	-619.92	7004	DZ	0.11365	7020	RY	2	7005	DY	-9344.14	27700.45	97995.6
81	100	5.53	27	-619.94	7004	DZ	-0.1173	3336	RX	2	7005	DY	-9471.64	27984.76	98006.34
82	100	5.6	10	-619.97	7004	DZ	-0.12	3336	RX	2	7005	DY	-9599.13	28269.06	98017.09
83	100	5.67	8	-619.99	7004	DZ	-0.1209	3336	RX	2	7005	DY	-9726.63	28553.35	98027.86
84	100	5.74	24	-620.01	7004	DZ	-0.1243	3336	RX	2	7005	DY	-9854.12	28837.58	98038.65
85	100	5.81	35	-620.04	7004	DZ	-0.1286	3336	RX	2	7005	DY	-9981.6	29121.76	98049.46
86	100	5.88	13	-620.07	7004	DZ	-0.1306	3336	RX	2	7005	DY	-10109.1	29405.9	98060.31
87	100	5.95	39	-620.21	7004	DZ	-0.1345	3336	RX	2	7005	DY	-10236	29685.2	98073.1
88	100	6.02	39	-621.13	7006	DZ	-0.1411	3336	RX	2	7005	DY	-10361.2	29953.26	98087.32
89	100	6.09	20	-621.25	7006	DZ	0.86487	3336	RX	2	7005	DY	-10488.7	30236.42	98098.06

APPENDIX C.3

TABULATE DATA OF BOTH METHOD

APPENDIX C.3

A) PLATFORM A,B & C COLLAPSE DATA COMPARISON

Table C.3.A.1: Platform A Collapse Solution Data

Wave Direction (deg)	Lateral load for 100-year storm condition, kN	First member failure load Pmf, kN	Factor for first member failure	Collapse load, Pu, kN	Factor for collapse load	Deformation corresponding to Pmf, mm	Deformation corresponding to Pu, mm	Reserve strength ratio
0.00	2343.89	9230.77	3.94	9488.49	4.05	865.70	2343.67	1.03
42.11	2737.78	7844.51	2.87	9174.21	3.35	1241.46	1594.76	1.17
90.00	5958.80	12226.07	2.05	12974.80	2.18	3395.18	6037.65	1.06
137.89	3444.07	8140.04	2.36	9489.52	2.76	1962.68	2548.18	1.17
180.00	3616.53	10582.18	2.93	11465.45	3.17	1156.08	1428.93	1.08
222.11	3975.24	8396.79	2.11	10078.17	2.54	-1832.43	-2964.16	1.20
270.00	2043.84	10746.32	5.26	11690.44	5.72	-3632.69	-6066.90	1.09
317.89	2200.71	7944.94	3.61	9018.19	4.10	-2462.19	-3680.00	1.14

Table C.3.A.2: Platform C Collapse Solution Data

Wave Direction (deg)	Lateral load for 100-year storm condition, kN	First member failure load Pmf, kN	Factor for first member failure	Collapse load, Pu, kN	Factor for collapse load	Deformation corresponding to Pmf, mm	Deformation corresponding to Pu, mm	Reserve strength ratio
0.00	3275.85	30781.52	9.40	31730.06	9.69	-6989.71	-6333.36	1.03
65.00	6837.27	33858.24	4.95	34839.44	5.10	-6992.43	8331.41	1.03
90.00	12459.22	32464.96	2.61	37317.46	3.00	-6601.16	-6747.33	1.15
115.00	8111.45	34632.22	4.27	38437.97	4.74	-6183.94	-6547.74	1.11
180.00	3744.34	32551.37	8.69	35644.39	9.52	-6150.58	-7531.91	1.10
245.00	4352.87	6809.40	1.56	6809.40	1.56	-6116.25	-6116.25	1.00
270.00	4784.71	30910.52	6.46	31968.74	6.68	-6593.40	-7015.91	1.03
295.00	4470.12	26443.94	5.92	32003.96	7.16	-6197.23	-6212.48	1.21

Table C.3.A.3: Platform B Collapse Solution Data

Wave Direction (deg)	Lateral load for 100-year storm condition, kN	First member failure load Pmf, kN	Factor for first member failure	Collapse load, Pu, kN	Factor for collapse load	Deformation corresponding to Pmf, mm	Deformation corresponding to Pu, mm	Reserve strength ratio
0.00	1729.45	3298.68	1.91	4136.79	2.39	472.70	5744.60	1.25
30.00	1664.24	4017.31	2.41	4331.39	2.60	464.57	1449.90	1.08
60.00	1768.69	3207.17	1.81	4020.10	2.27	392.50	10400.47	1.25
90.00	1712.93	2678.52	1.56	3956.14	2.31	367.36	11786.73	1.48
120.00	1769.47	3296.41	1.86	5142.96	2.91	400.69	4745.32	1.56
150.00	1665.23	3522.15	2.12	4260.86	2.56	-466.90	2955.75	1.21
180.00	1729.94	3299.57	1.91	3880.84	2.24	-476.45	-3907.27	1.18
210.00	1664.90	2775.55	1.67	4262.99	2.56	-304.81	-4882.29	1.54
240.00	1769.86	3208.95	1.81	3618.19	2.04	-392.59	-972.37	1.13
270.00	1715.55	4134.51	2.41	4491.81	2.62	-546.71	1074.09	1.09
300.00	1771.57	3300.51	1.86	3736.09	2.11	-398.44	43976.37	1.13
330.00	1665.84	2694.31	1.62	4287.16	2.57	316.03	6947.04	1.59

Note:

$$Factor\ for\ first\ member\ failure = \frac{First\ member\ failure\ load,\ Pmf}{Lateral\ load\ for\ 100-year\ storm\ condition}$$

$$Factor\ for\ collapse\ load = \frac{Collapse\ load,\ Pu}{Lateral\ load\ for\ 100-year\ storm\ condition}$$

$$Reserve\ strength\ ratio = \frac{Factor\ for\ collapse\ load}{Factor\ for\ first\ member\ failure}$$

APPENDIX C.3

B) BRACING CONFIGURATION

Table C.3.B.1: Design Basis Configuration

Wave Direction (deg)	Lateral load for 100-year storm condition, kN	First member failure load Pmf, kN	Factor for first member failure	Collapse load, Pu, kN	Factor for collapse load	Deformation corresponding to Pmf, mm	Deformation corresponding to Pu, mm	Reserve strength ratio
0.00	2343.89	9230.77	3.94	9488.49	4.05	865.70	2343.67	1.03
42.11	2737.78	7844.51	2.87	9174.21	3.35	1241.46	1594.76	1.17
90.00	5958.80	12226.07	2.05	12974.80	2.18	3395.18	6037.65	1.06
137.89	3444.07	8140.04	2.36	9489.52	2.76	1962.68	2548.18	1.17
180.00	3616.53	10582.18	2.93	11465.45	3.17	1156.08	1428.93	1.08
222.11	3975.24	8396.79	2.11	10078.17	2.54	-1832.43	-2964.16	1.20
270.00	2043.84	10746.32	5.26	11690.44	5.72	-3632.69	-6066.90	1.09
317.89	2200.71	7944.94	3.61	9018.19	4.10	-2462.19	-3680.00	1.14

Table C.3.B.2: X-bracing Collapse Solution Data

Wave Direction (deg)	Lateral load for 100-year storm condition, kN	First member failure load Pmf, kN	Factor for first member failure	Collapse load, Pu, kN	Factor for collapse load	Deformation corresponding to Pmf, mm	Deformation corresponding to Pu, mm	Reserve strength ratio
0.00	2488.41	10410.32	4.18	10630.12	4.27	915.02	1289.61	1.02
42.11	2902.09	8311.26	2.86	9144.72	3.15	1173.81	1598.01	1.10
90.00	6261.25	11604.26	1.85	15280.47	2.44	3100.37	4417.47	1.32
137.89	3654.16	8449.42	2.31	10042.01	2.75	1801.86	2542.70	1.19
180.00	3832.05	11397.21	2.97	11584.19	3.02	-1159.44	-1234.57	1.02
222.11	4210.38	8049.95	1.91	10862.32	2.58	-1651.55	-3275.69	1.35
270.00	2159.37	10816.69	5.01	12445.34	5.76	-3490.34	-5267.47	1.15
317.89	2334.09	7960.63	3.41	9885.51	4.24	-2356.80	-12339.85	1.24

Table C.3.B.3: Single Diagonal Bracing Data

Wave Direction (deg)	Lateral load for 100-year storm condition, kN	First member failure load Pmf, kN	Factor for first member failure	Collapse load, Pu, kN	Factor for collapse load	Deformation corresponding to Pmf, mm	Deformation corresponding to Pu, mm	Reserve strength ratio
0.00	2339.53	9215.76	3.94	9493.51	4.06	755.15	2260.15	1.03
42.11	2731.50	7826.34	2.87	9029.29	3.31	1280.09	1658.62	1.15
90.00	5943.88	10424.99	1.75	11221.38	1.89	3094.95	4881.69	1.08
137.89	3436.15	8296.00	2.41	9125.70	2.66	2000.4	2520.5	1.10
180.00	3607.46	10557.71	2.93	11097.71	3.08	-1186.26	-1249.66	1.05
222.11	3962.67	8568.37	2.16	10600.58	2.68	-1910.94	-4258.11	1.24
270.00	2037.12	9683.77	4.75	9751.93	4.79	-4116.2	-4866.89	1.01
317.89	2195.89	7929.77	3.61	9527.65	4.34	-2481.84	-4467.35	1.20

Note:

$$Factor\ for\ first\ member\ failure = \frac{First\ member\ failure\ load, Pmf}{Lateral\ load\ for\ 100-year\ storm\ condition}$$

$$Factor\ for\ collapse\ load = \frac{Collapse\ load, Pu}{Lateral\ load\ for\ 100-year\ storm\ condition}$$

$$\mathrm{Re}\, serve\ strength\ ratio = \frac{Factor\ for\ collapse\ load}{Factor\ for\ first\ member\ failure}$$

APPENDIX C.4

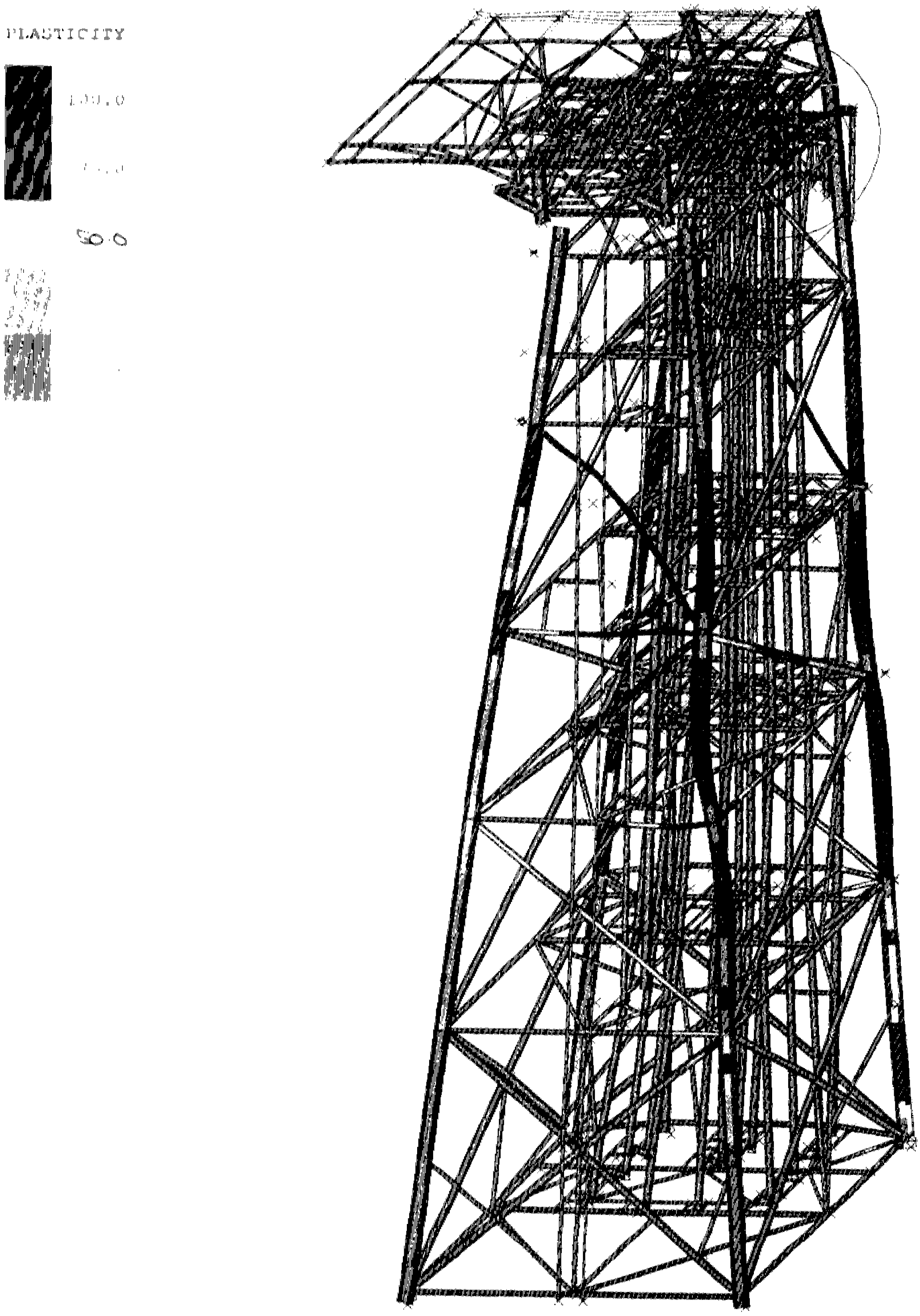
COLLAPSE RESTART FILE

APPENDIX C.4

A) PLATFORM A

0 deg

LOAD STEP 63 LOAD FACTOR 3.05 BASE SHEAR 9488.49 DEFL. FACTOR 1.00



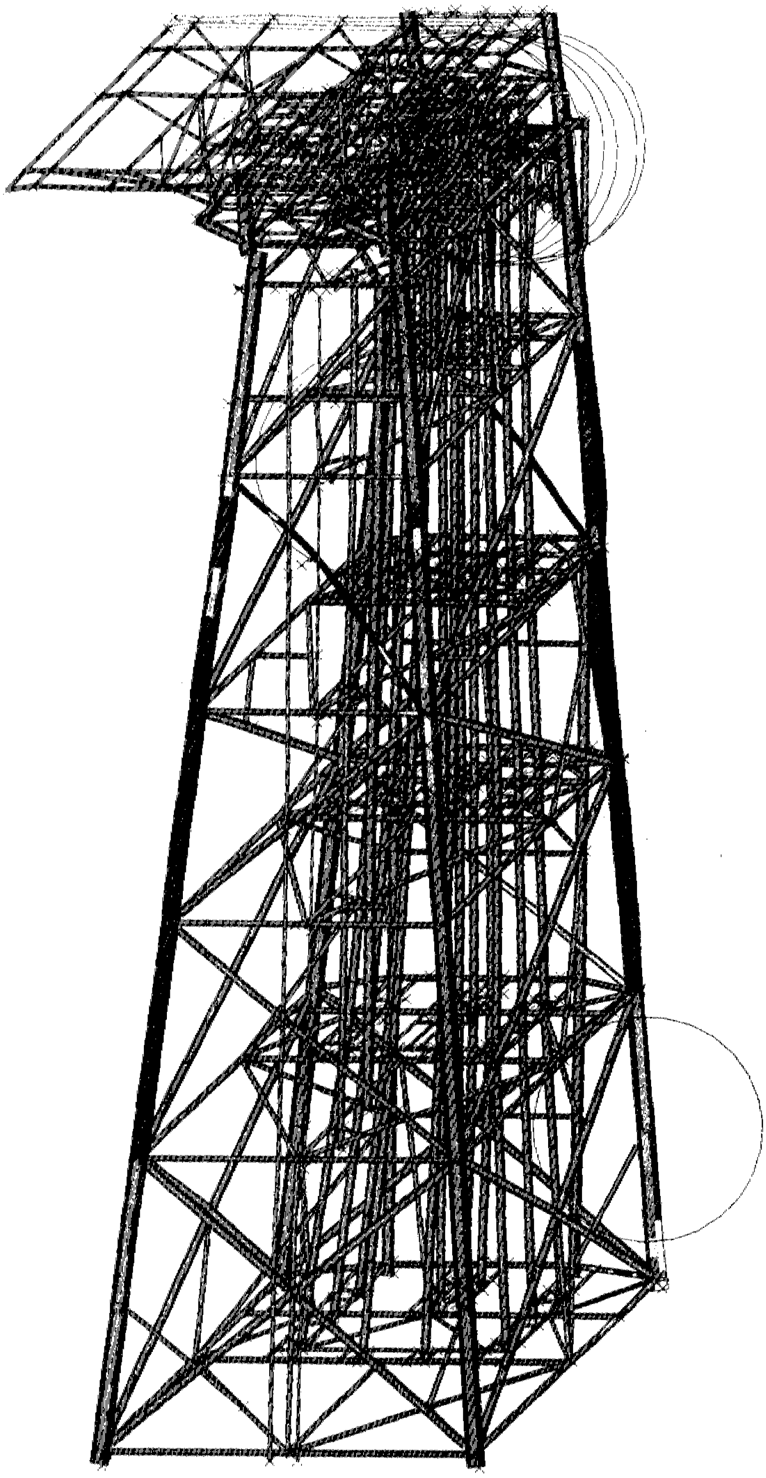
42.11 deg

LOAD STEP 49 LOAD FACTOR 2.35 BASE SHEAR 9174.21 DEFL. FACTOR 1.00

PLASTICITY

100.0

50.0

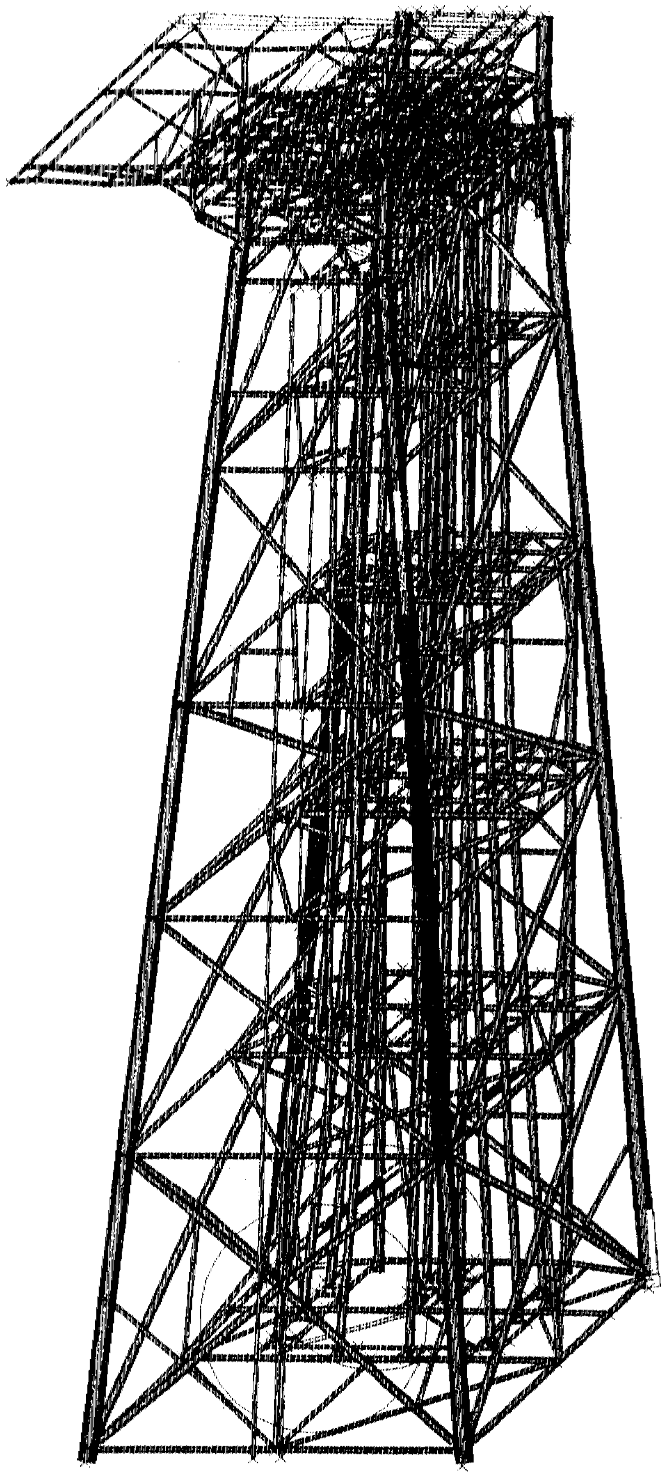


137.89 deg

LOAD STEP 37 LOAD FACTOR 1.75 BASE SHEAR 9489.52 DEFL. FACTOR 1.00

PLASTICITY

50.0

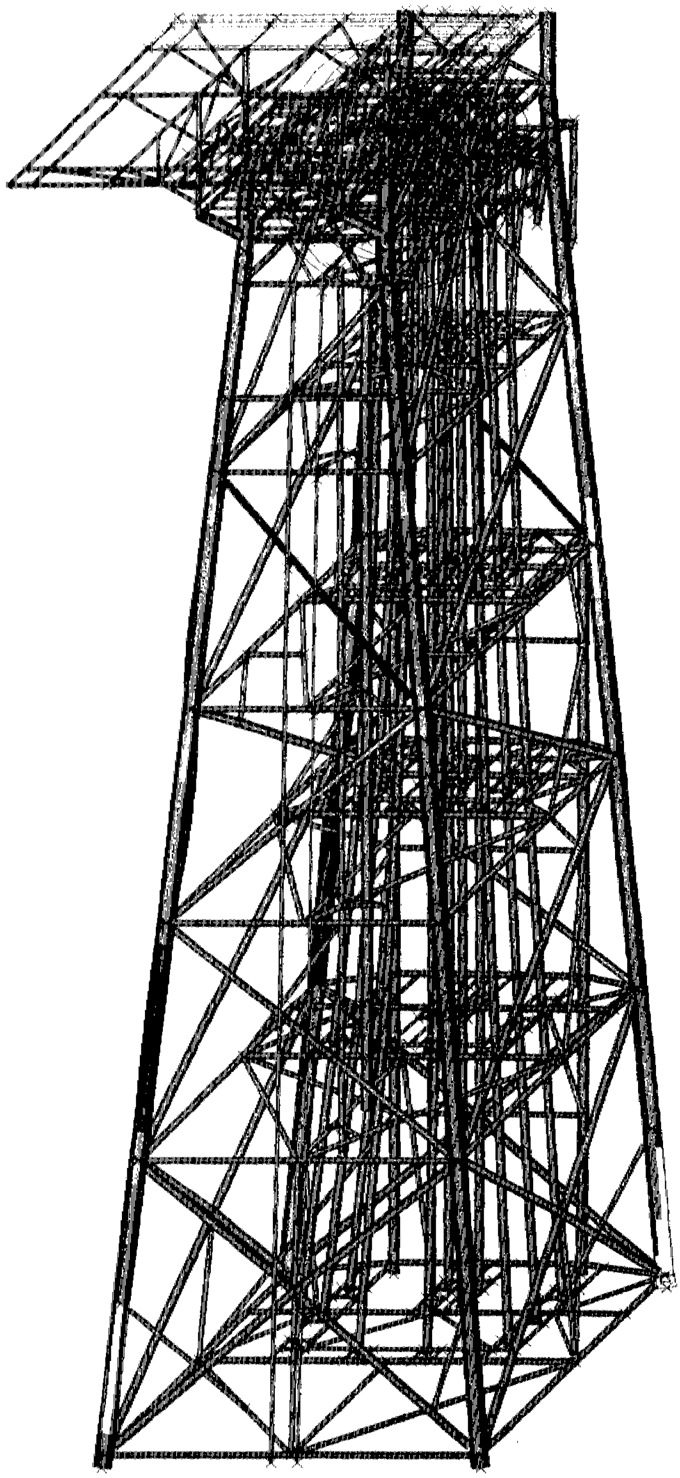


180 deg

LOAD STEP 45 LOAD FACTOR 2.15 BASE SHEAR11465.45 DEFL. FACTOR 1.00

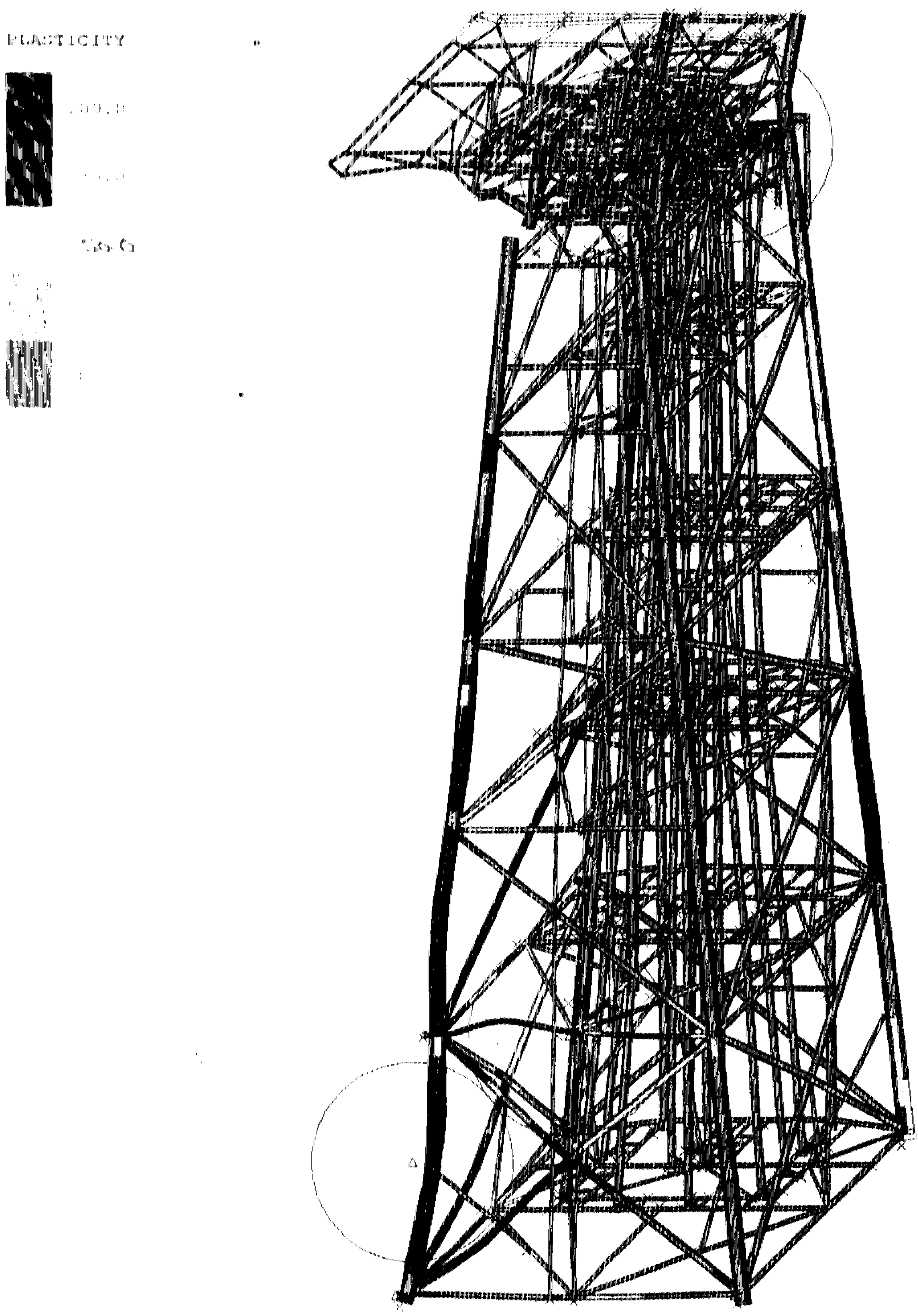
PLASTICITY

50.0



332 11 deg

LOAD STEP 33 LOAD FACTOR 1.55 BASE SHEAR10078.17 DEFL. FACTOR 1.00

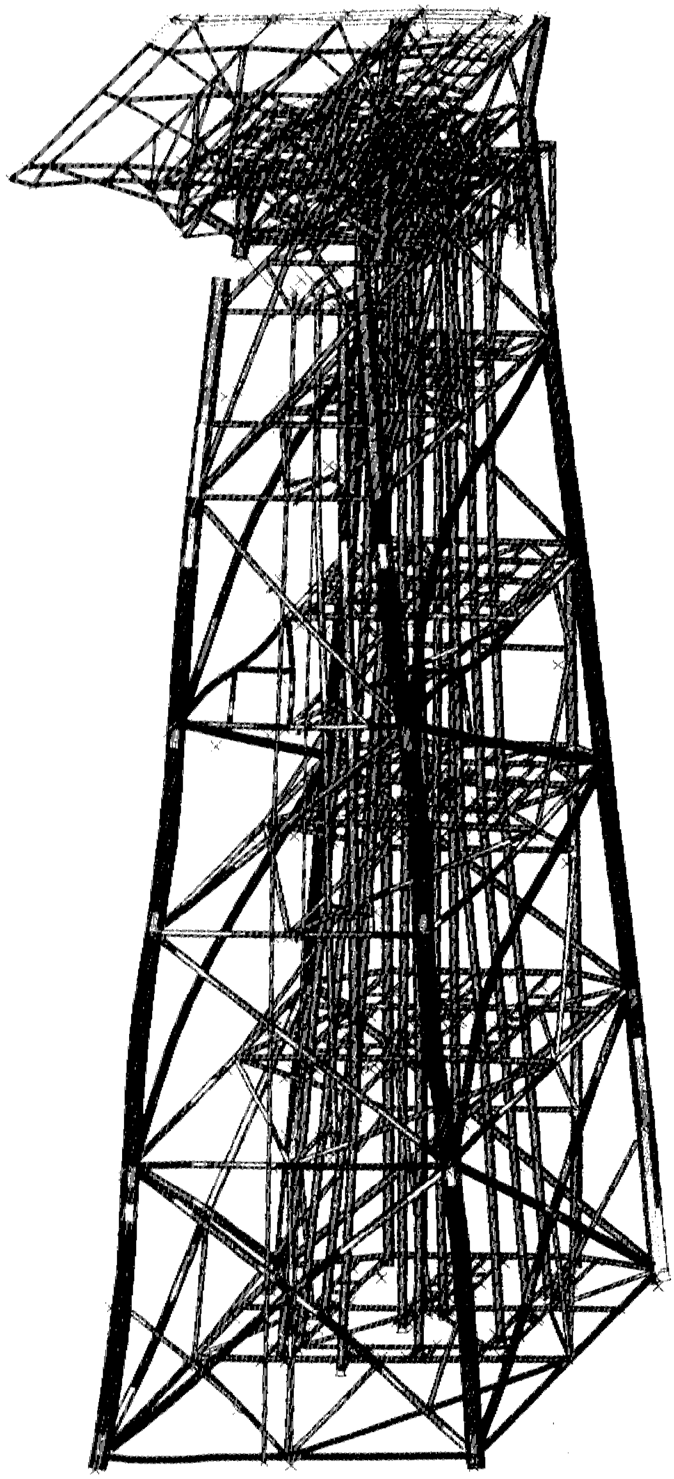


270 deg

LOAD STEP 98 LOAD FACTOR 4.80 BASE SHEAR11690.44 DEFL. FACTOR 1.00

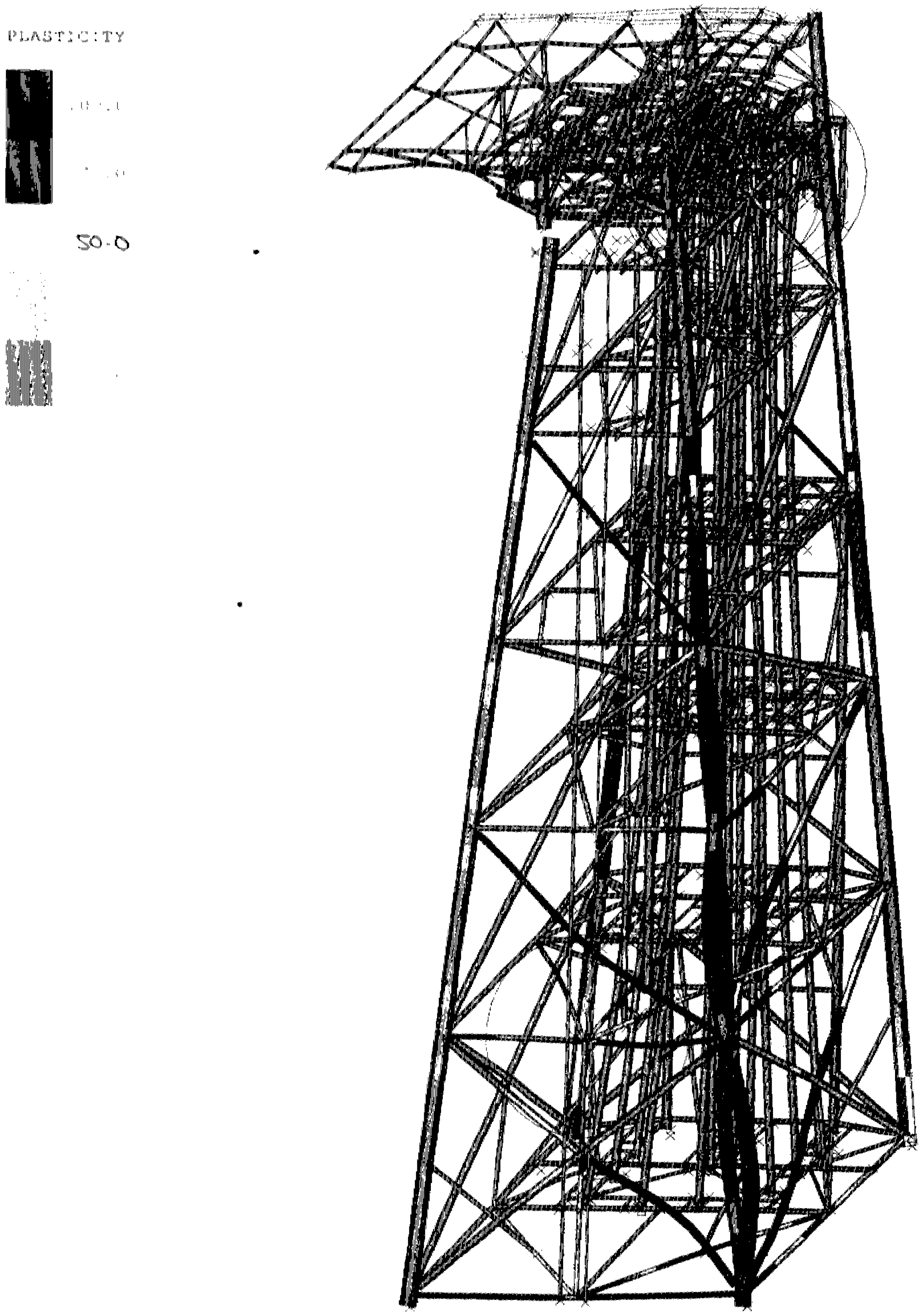
PLASTICITY

50 0



311.89 deg

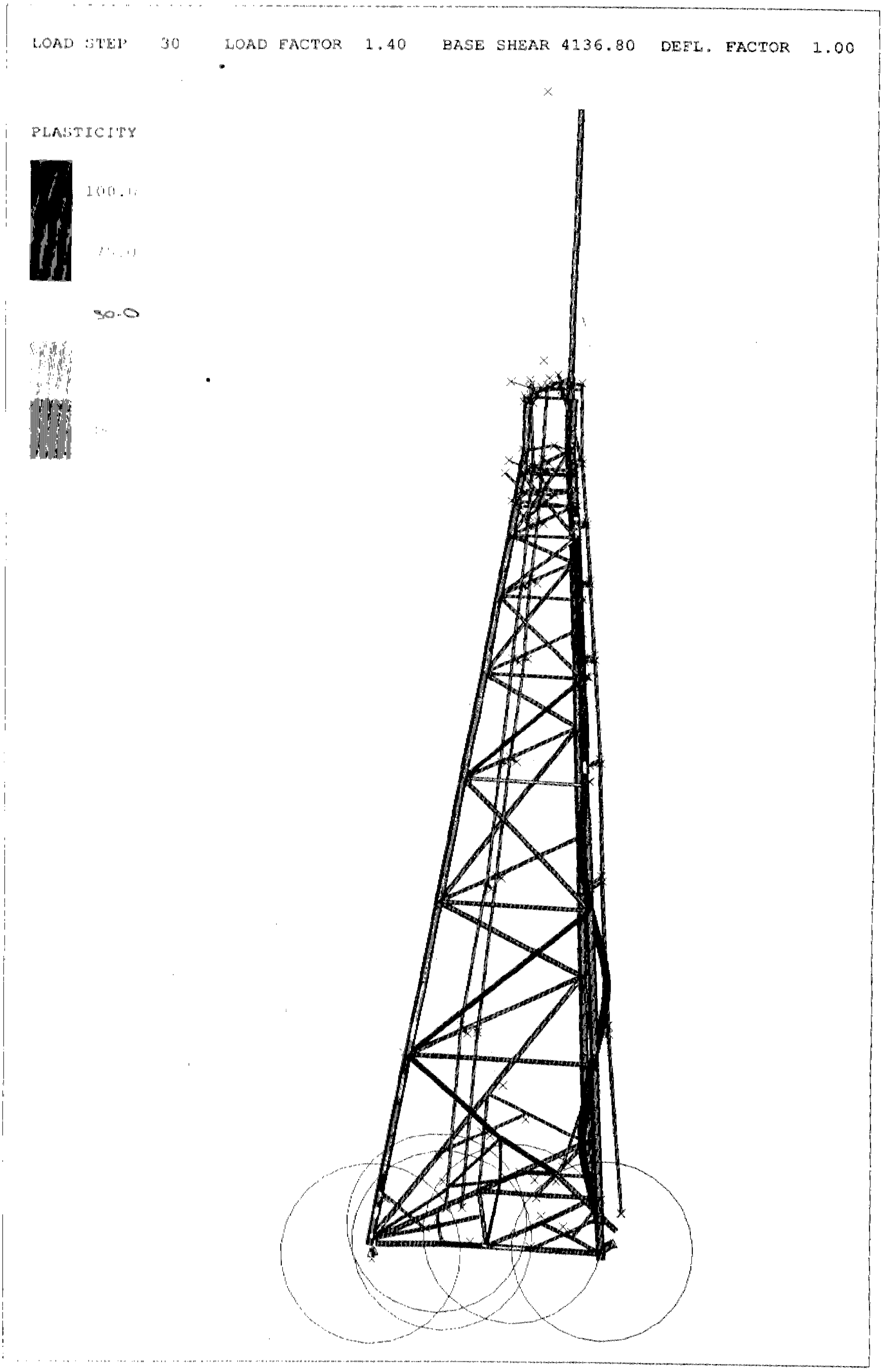
LOAD STEP 65 LOAD FACTOR 3.15 BASE SHEAR 9018.19 DEFL. FACTOR 1.00



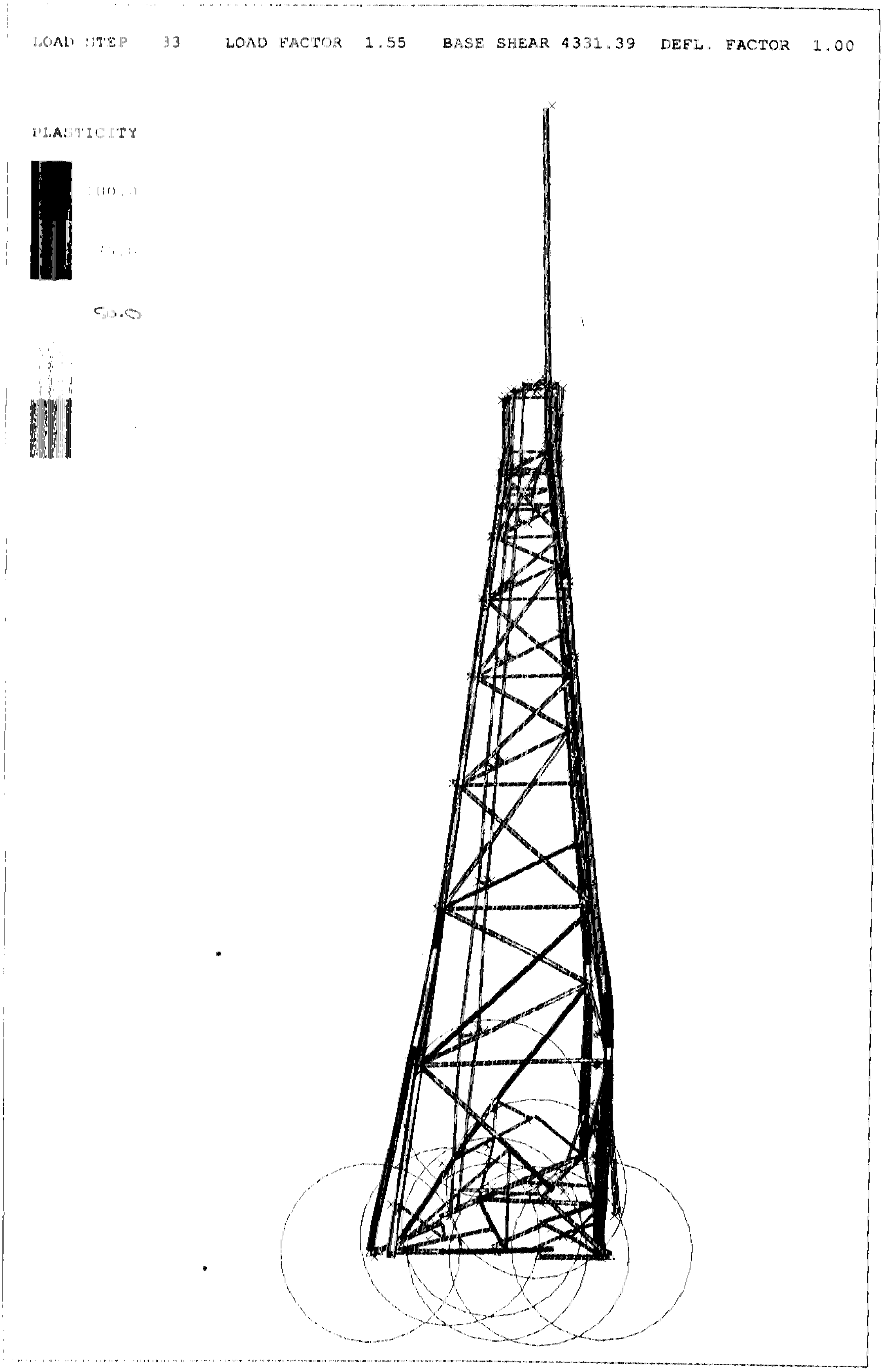
APPENDIX C.4

B) PLATFORM B

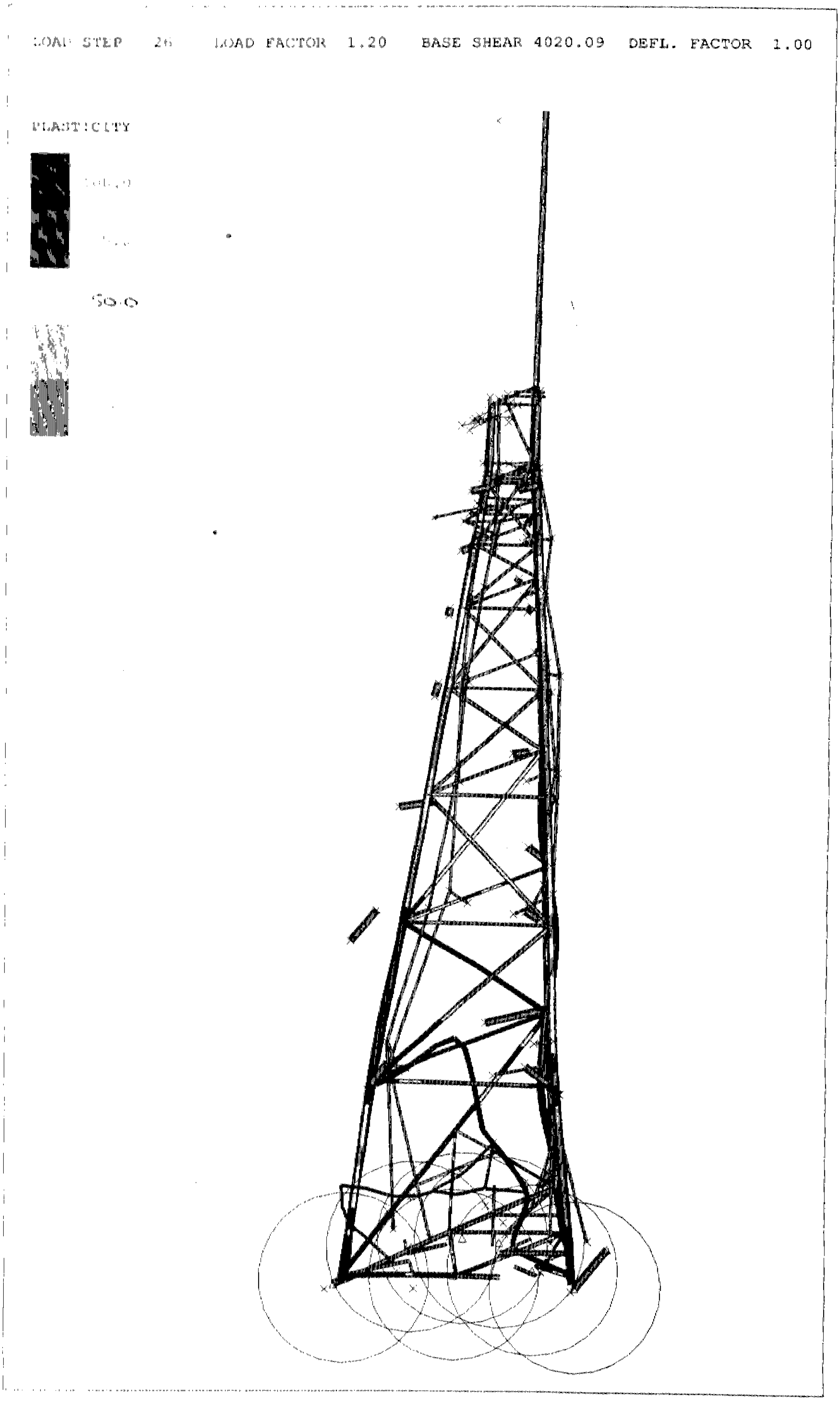
0 deg


LOAD STEP 30
LOAD FACTOR 1.40
BASE SHEAR 4136.80
DEFL. FACTOR 1.00
PLASTICITY
100.0
50.0

50 deg

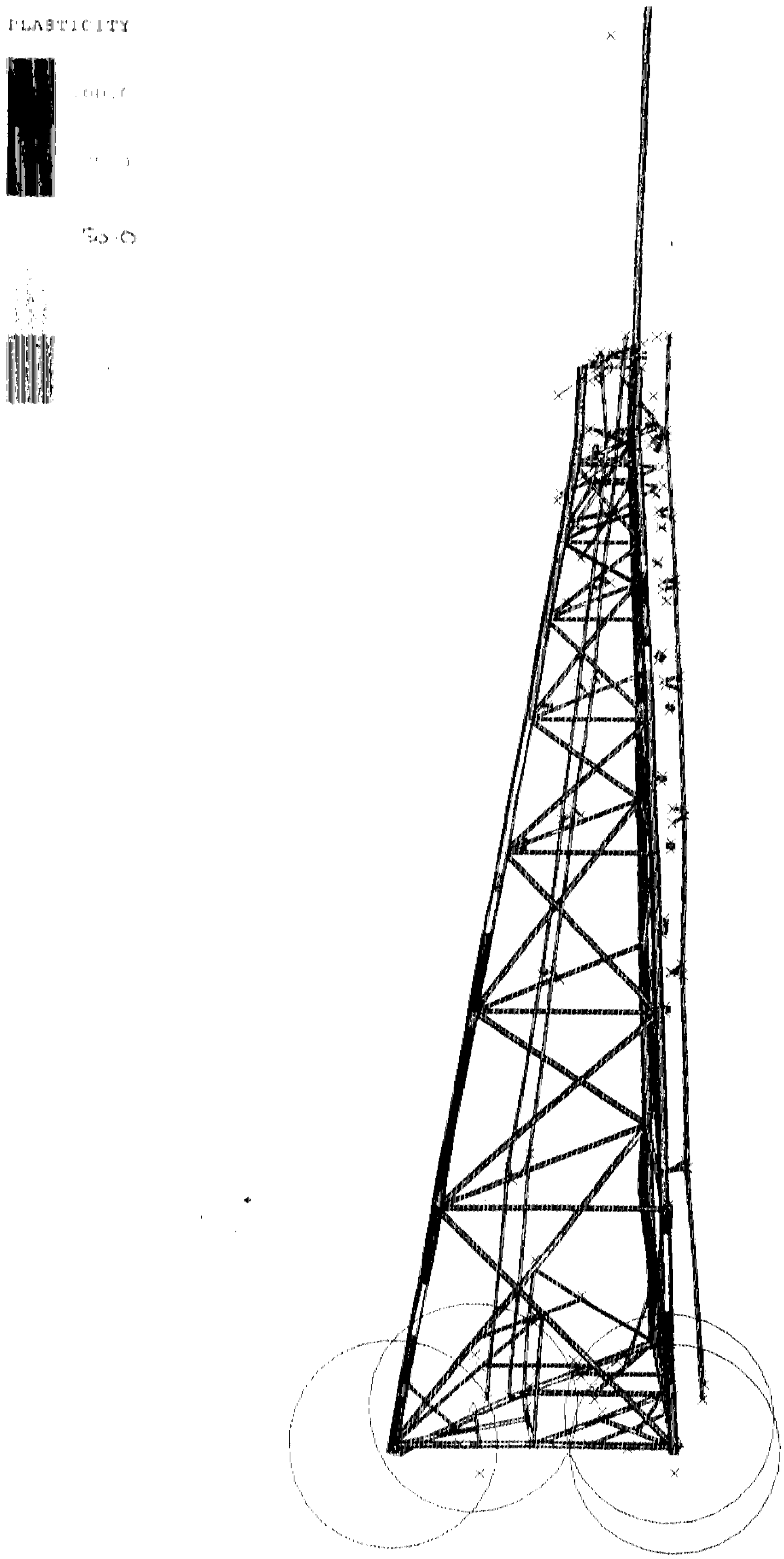

LOAD STEP 33 LOAD FACTOR 1.55 BASE SHEAR 4331.39 DEFL. FACTOR 1.00
PLASTICITY
100.0
50.0

60 deg

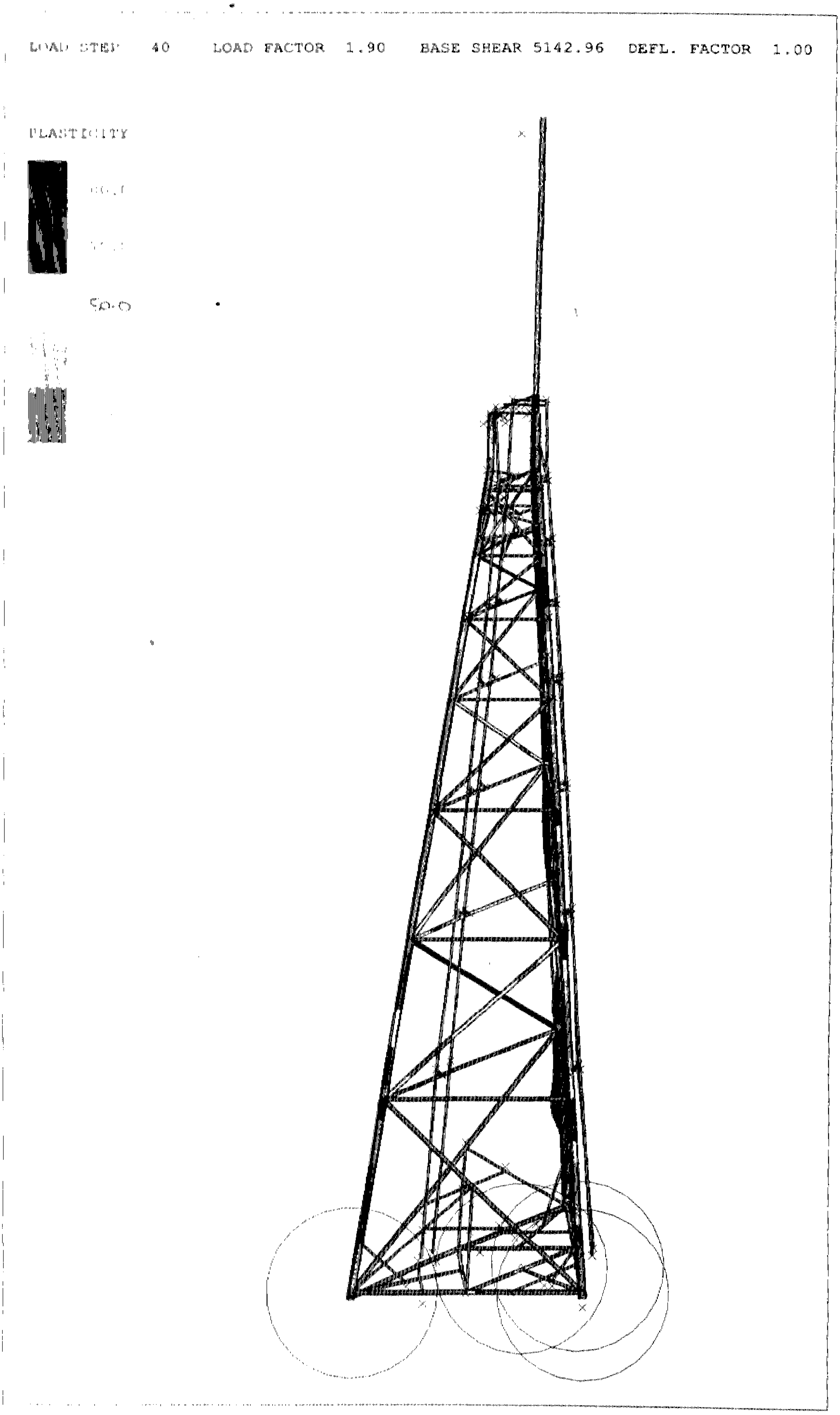

LOAD STEP 26 LOAD FACTOR 1.20 BASE SHEAR 4020.09 DEFL. FACTOR 1.00
PLASTICITY
50.0

'10 Aug

LOAD STEP 28 LOAD FACTOR 1.30 BASE SHEAR 3956.14 DEFL. FACTOR 1.00



120 deg

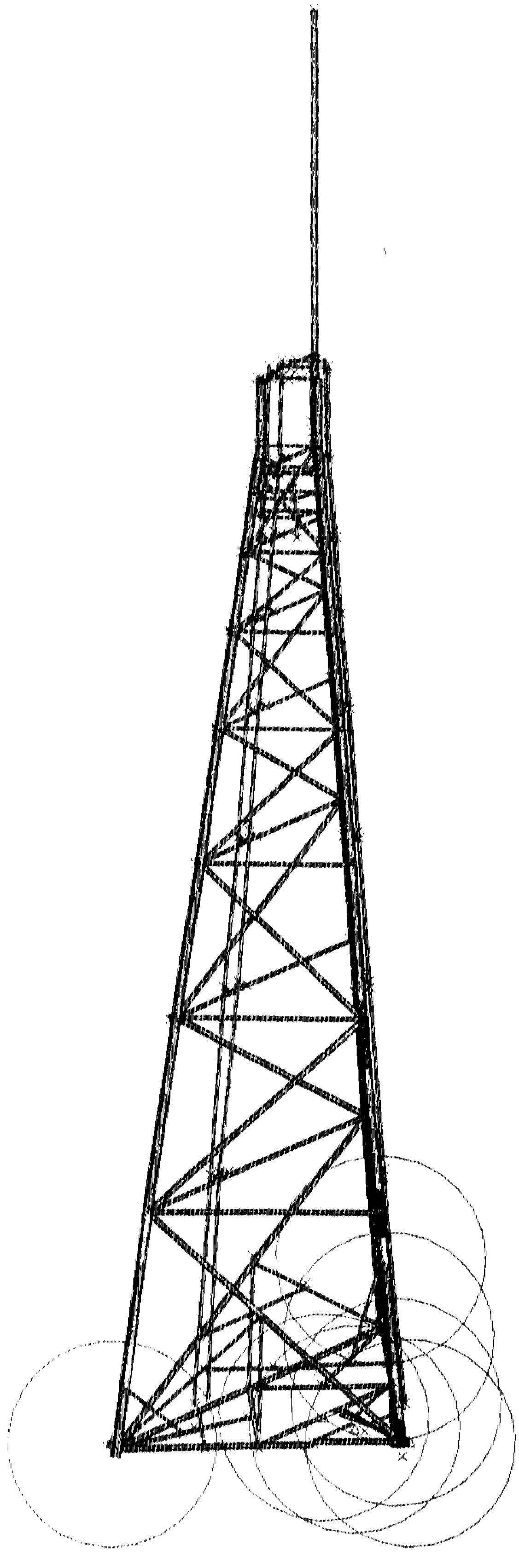

LOAD STEP 40 LOAD FACTOR 1.90 BASE SHEAR 5142.96 DEFL. FACTOR 1.00
PLASTICITY
50.0

150 deg

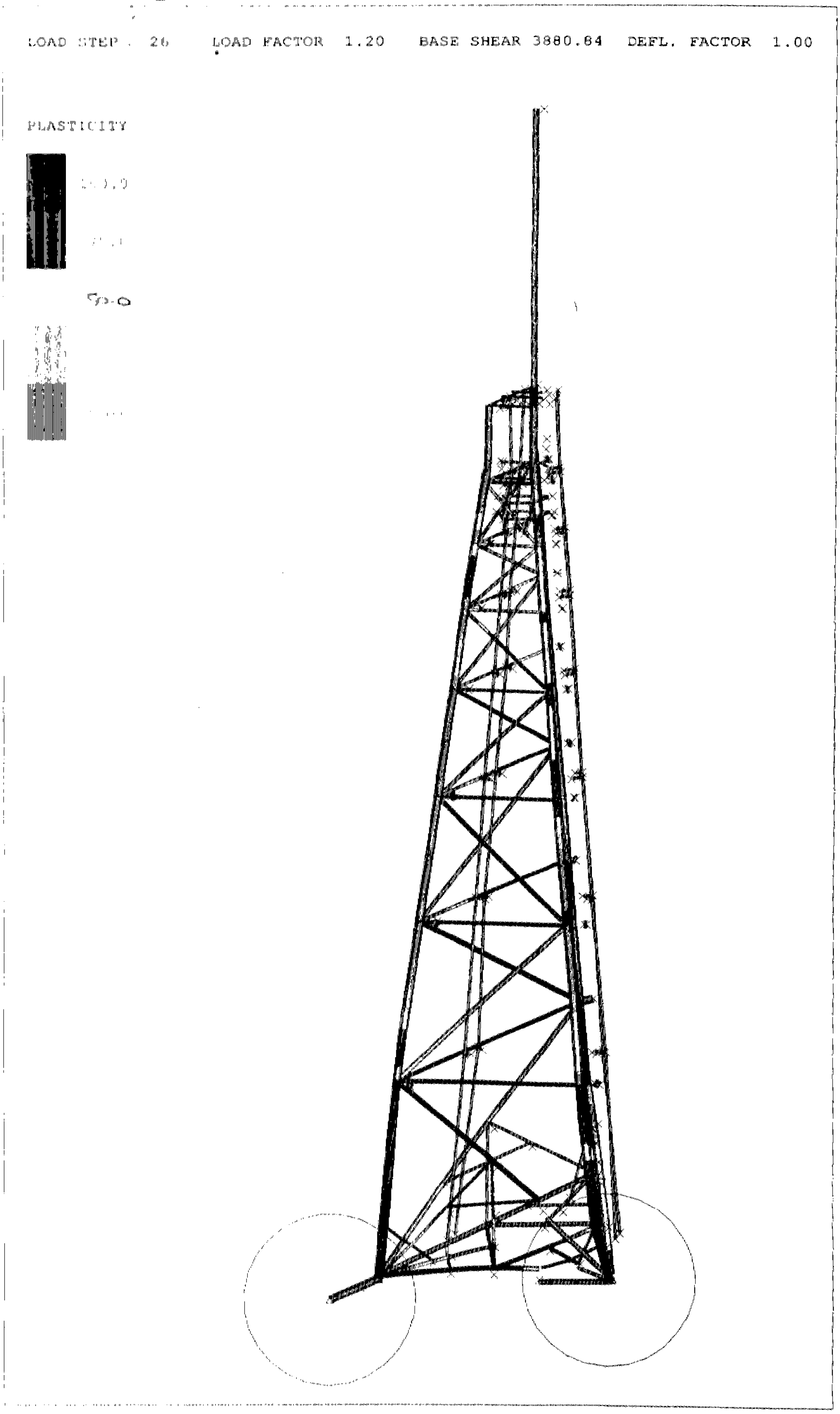
LOAD STEP 33 LOAD FACTOR 1.55 BASE SHEAR 4260.86 DEFL. FACTOR 1.00

PLASTICITY

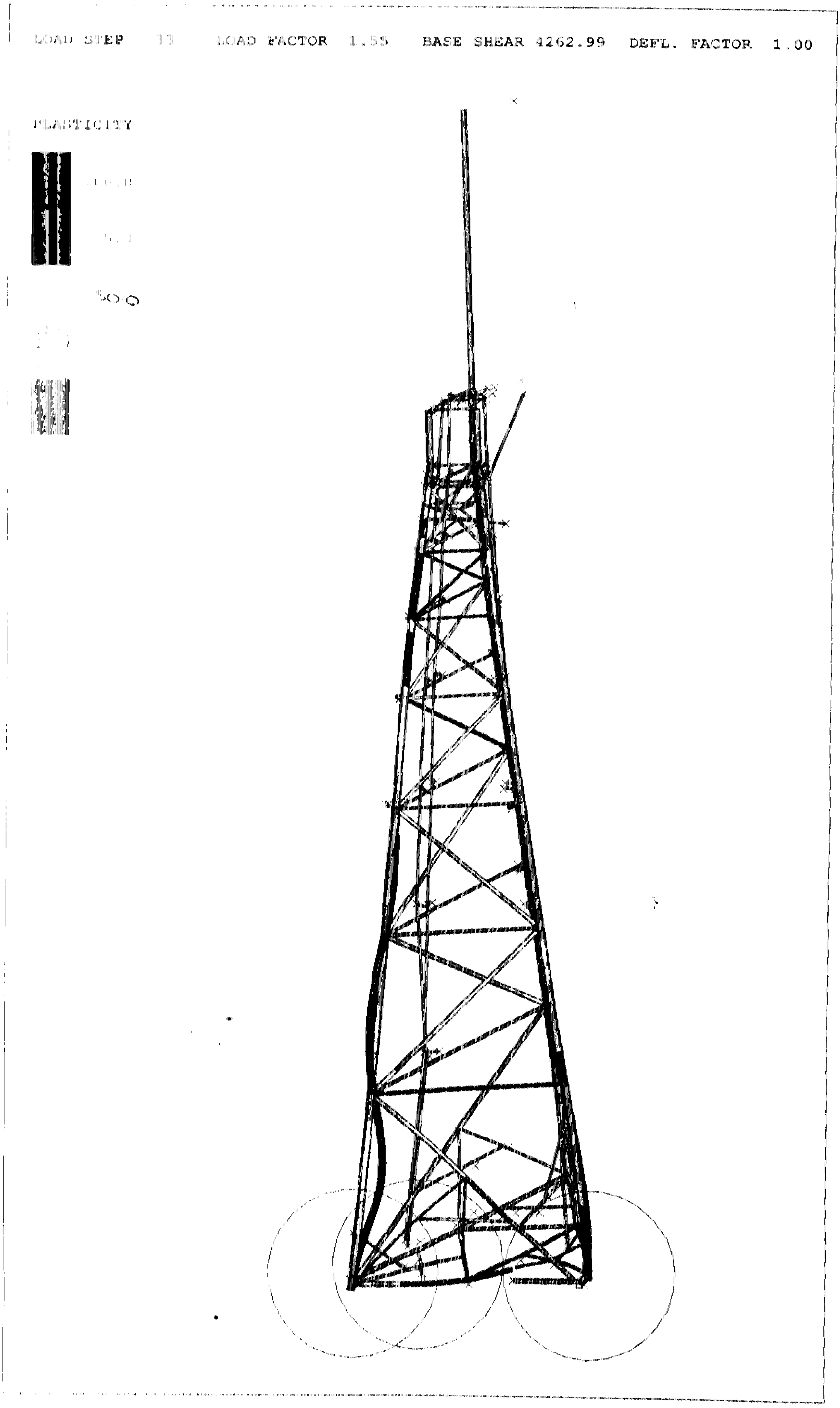
50.0



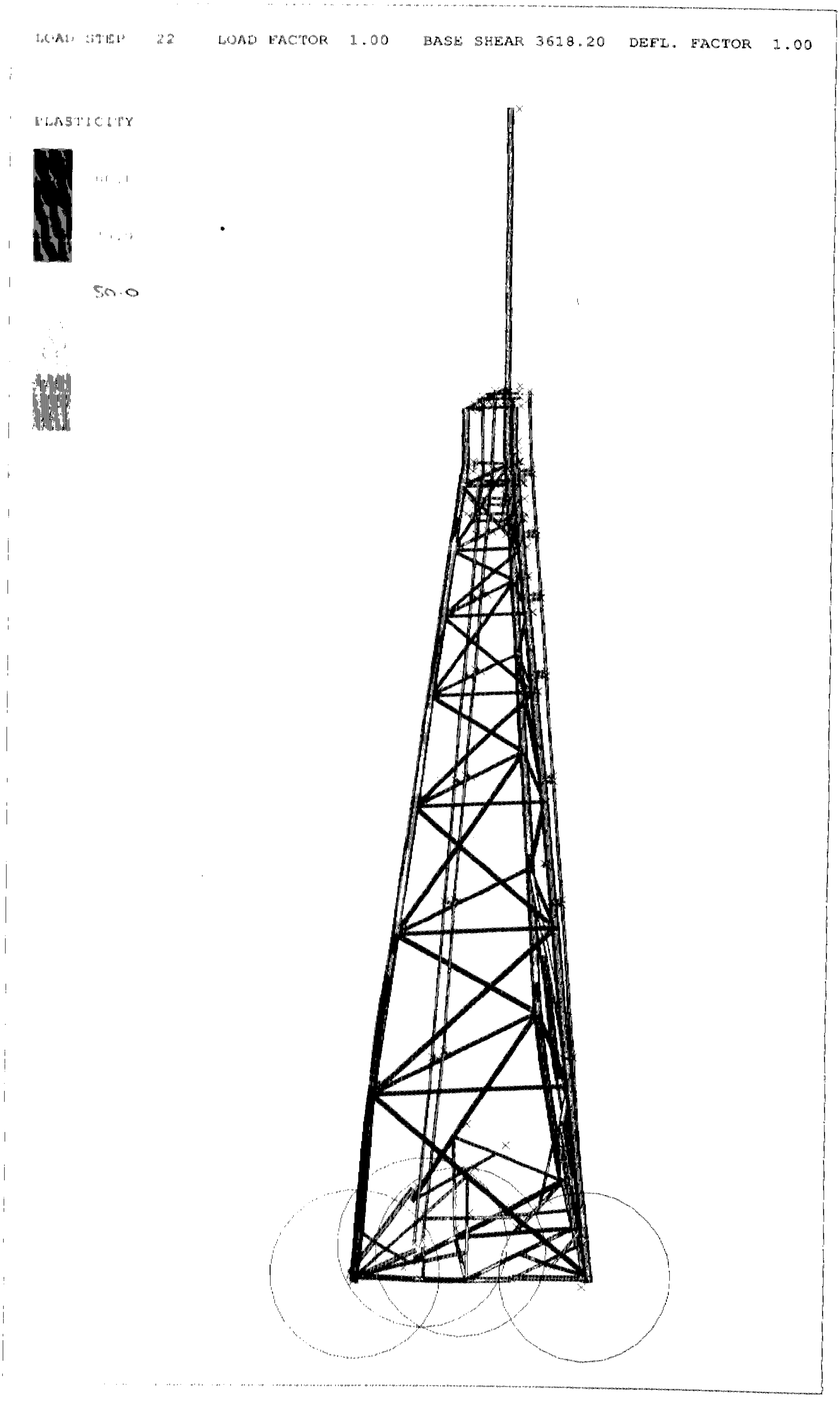
180 deg


LOAD STEP . 26
LOAD FACTOR 1.20
BASE SHEAR 3880.84
DEFL. FACTOR 1.00
PLASTICITY
50.0

210 deg

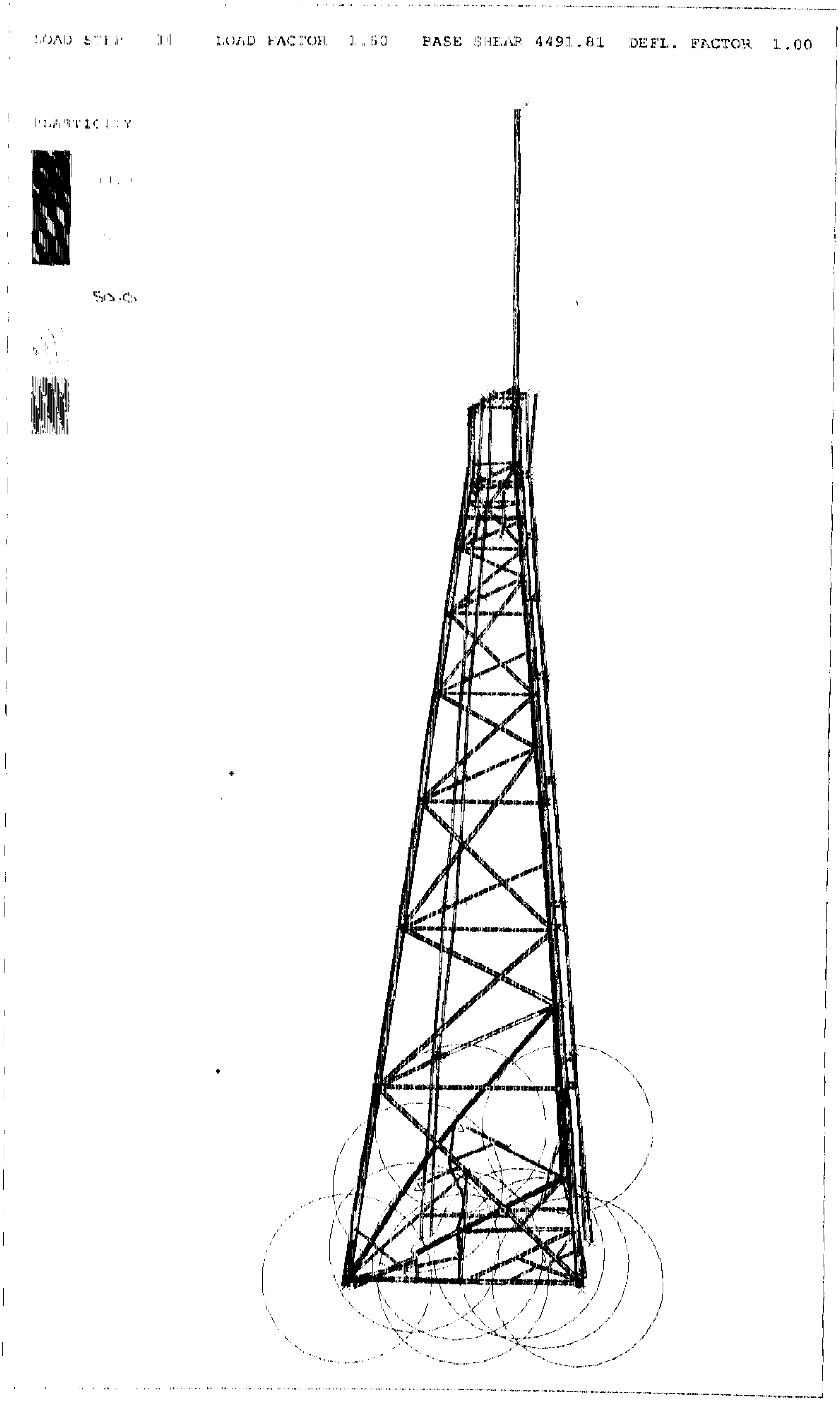

LOAD STEP 33
LOAD FACTOR 1.55
BASE SHEAR 4262.99
DEFL. FACTOR 1.00
PLASTICITY

270 deg

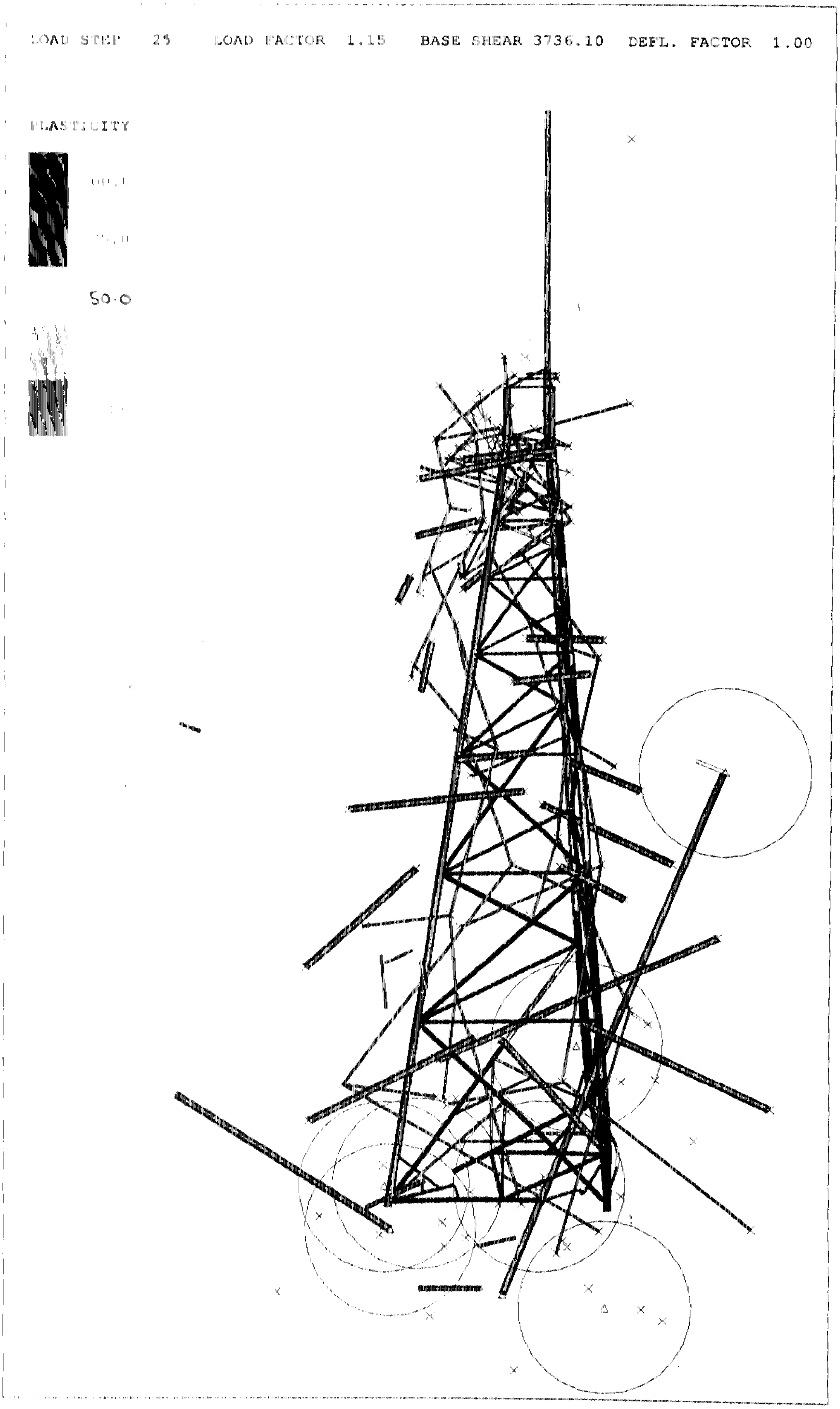


LOAD STEP 22
LOAD FACTOR 1.00
BASE SHEAR 3618.20
DEFL. FACTOR 1.00
PLASTICITY
50.0

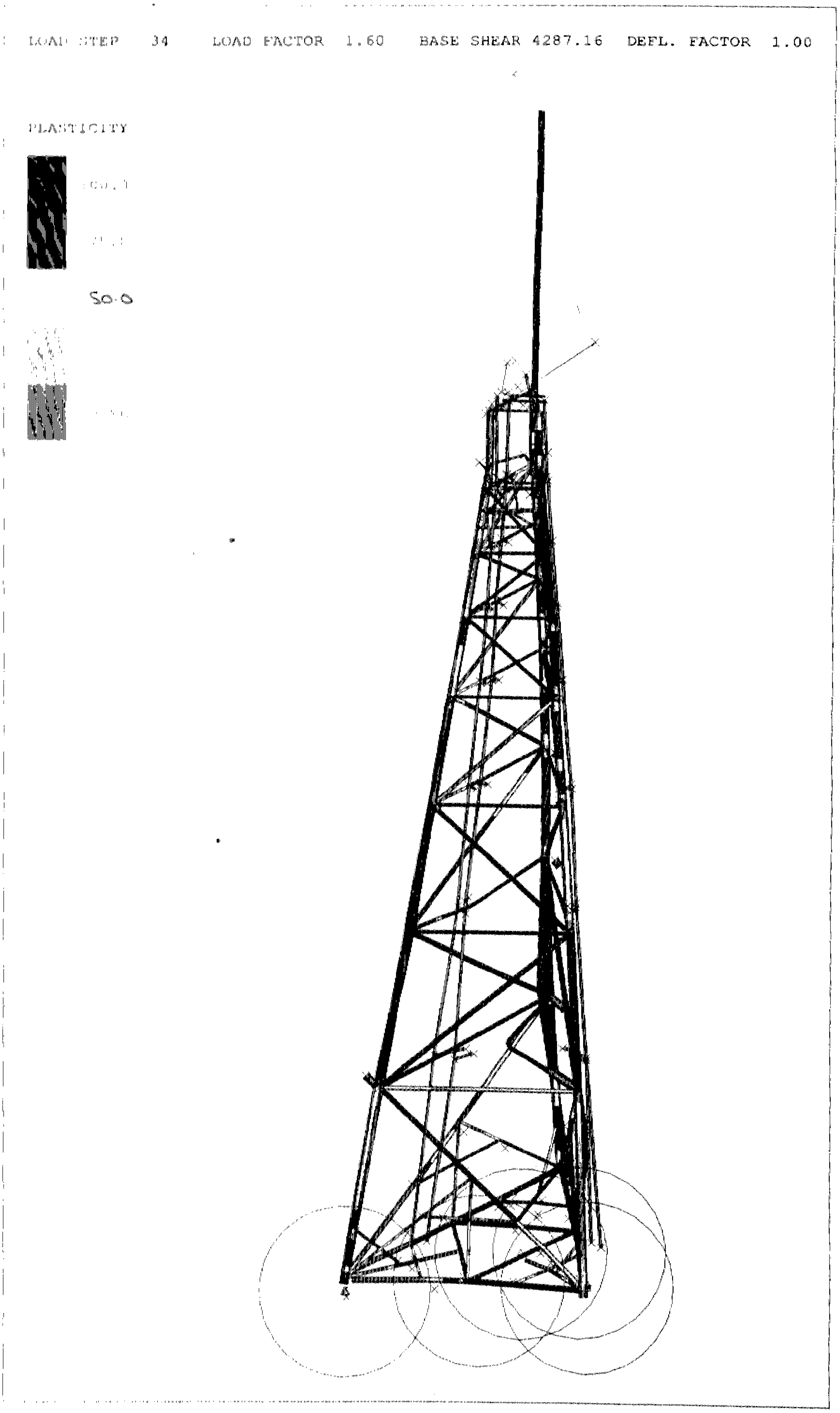
210 deg


LOAD STEP 34 LOAD FACTOR 1.60 BASE SHEAR 4491.81 DEFL. FACTOR 1.00
PLASTICITY
50.0

300 deg


LOAD STEP 25 LOAD FACTOR 1.15 BASE SHEAR 3736.10 DEFL. FACTOR 1.00
PLASTICITY
50.0

330 deg

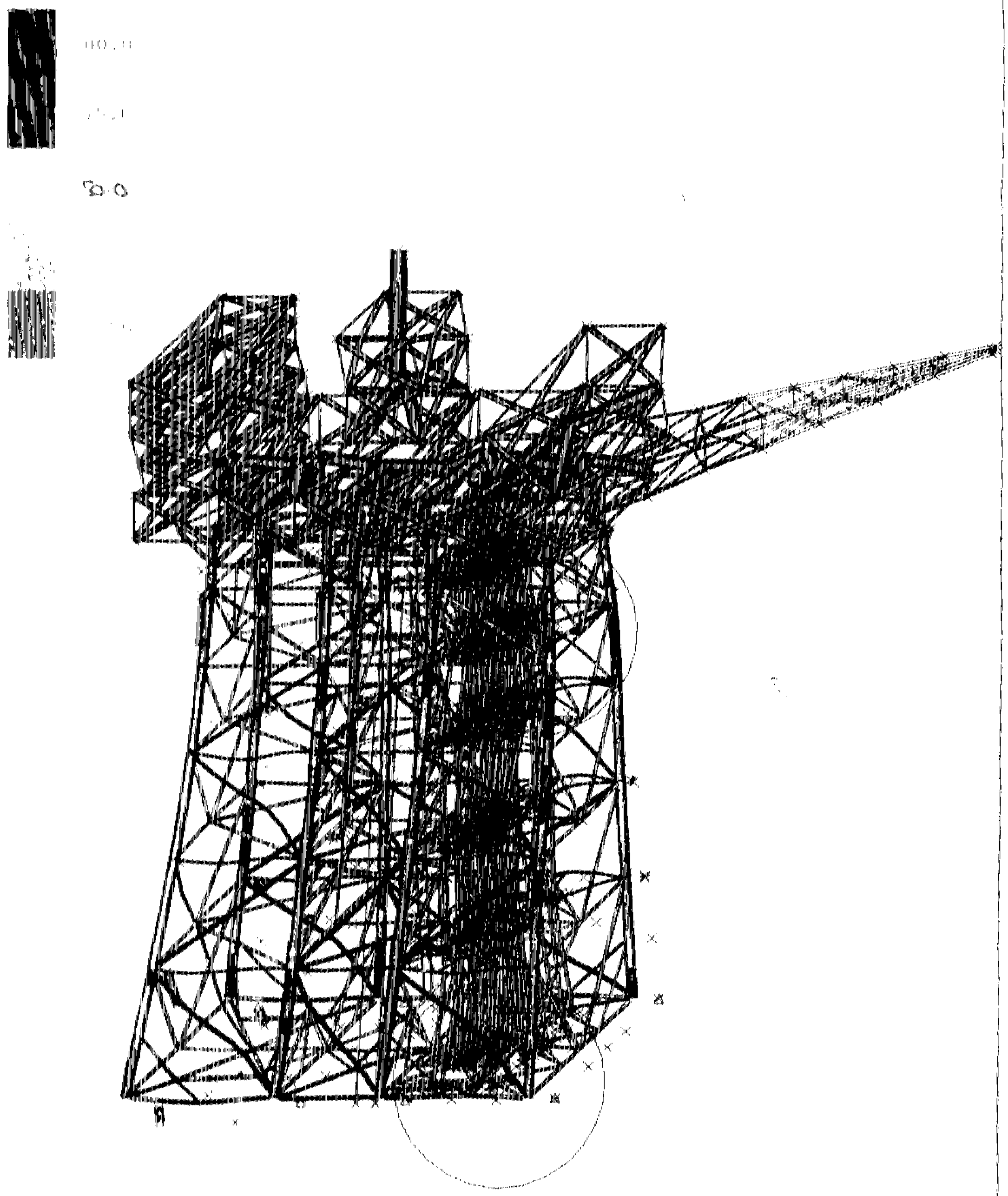

LOAD STEP 34
LOAD FACTOR 1.60
BASE SHEAR 4287.16
DEFL. FACTOR 1.00
PLASTICITY
50.0

APPENDIX C.4

C) PLATFORM C

LOAD STEP 73 LOAD FACTOR 7.15 BASE SHEAR31730.06 DEFL. FACTOR 1.00

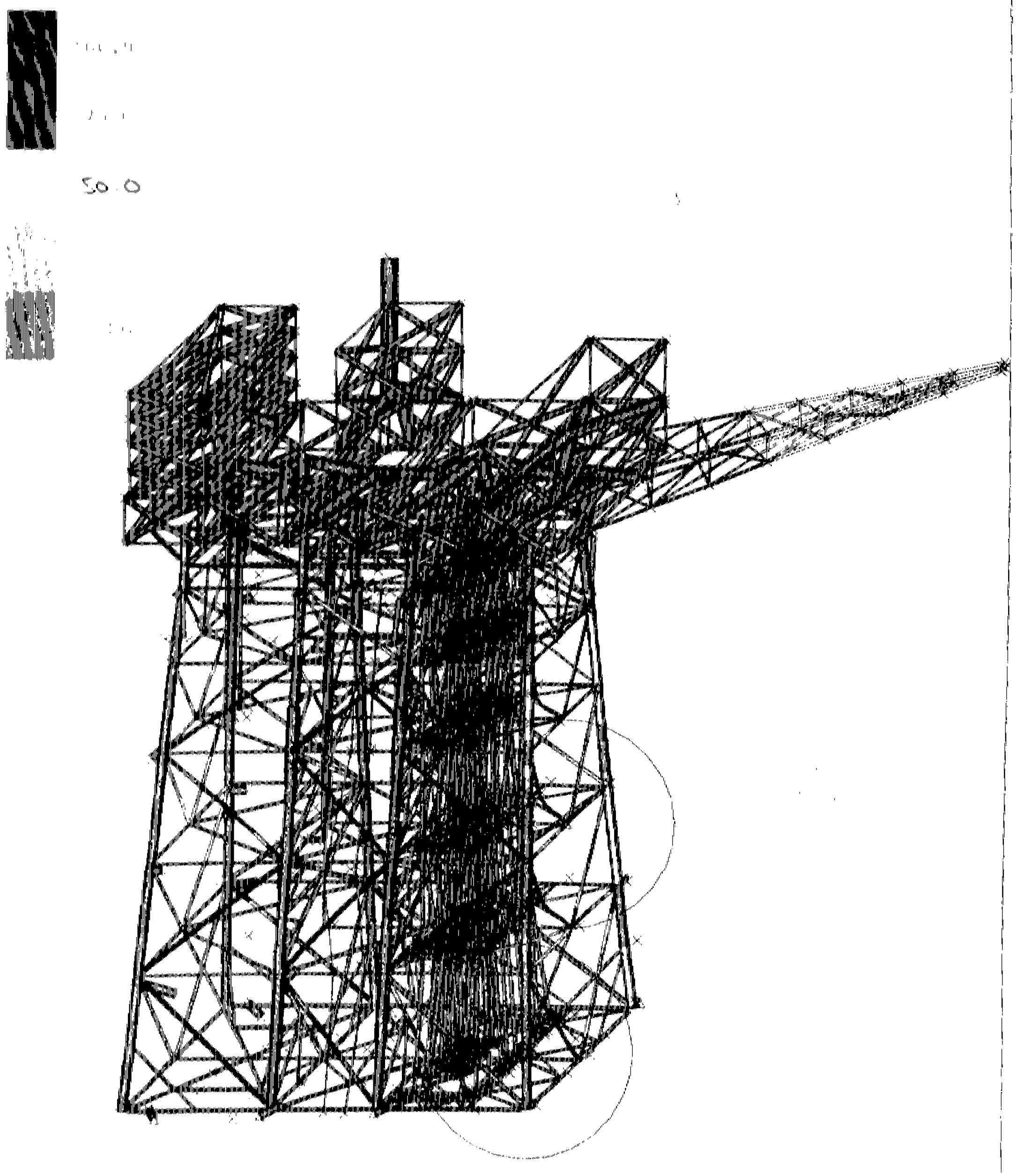
PLASTICITY



65 deg

LOAD STEP 78 LOAD FACTOR 3.80 BASE SHEAR34839.46 DEFL. FACTOR 1.00

PLASTICITY

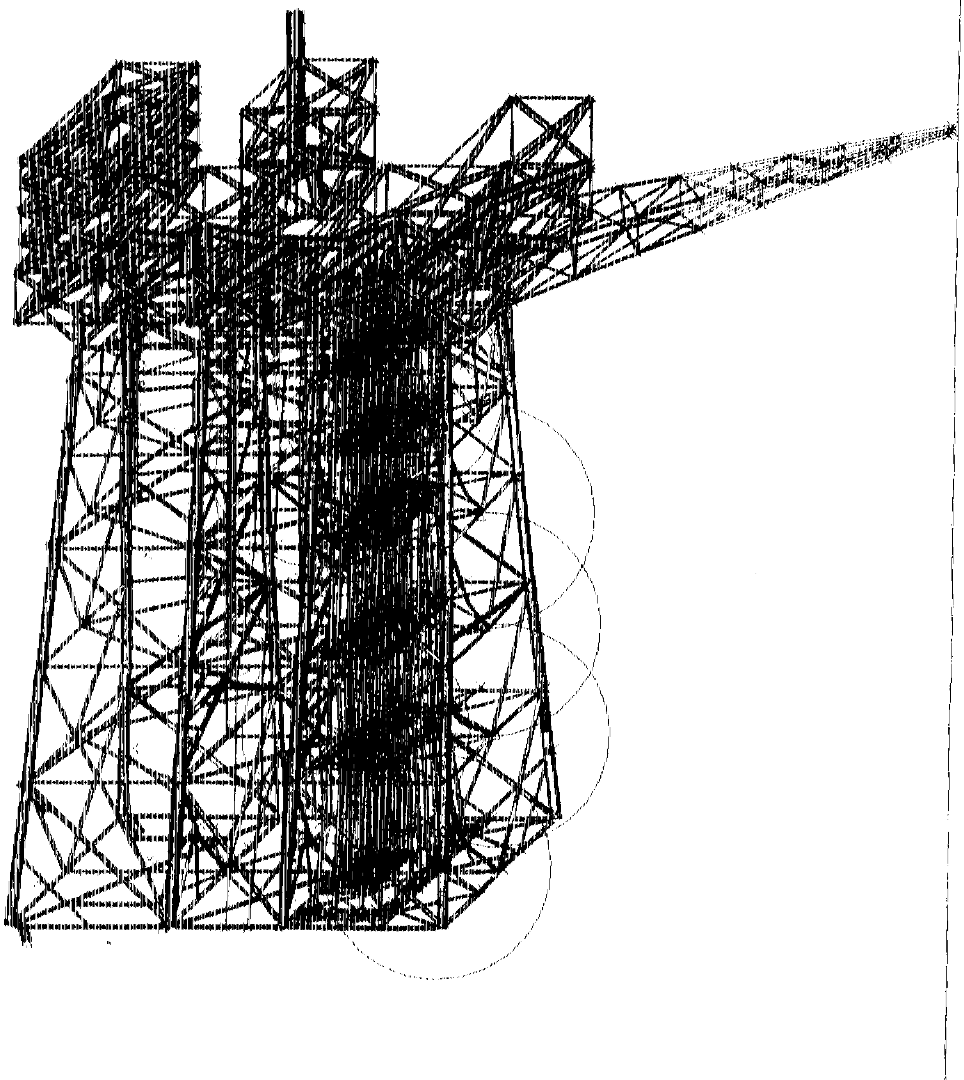


115 deg

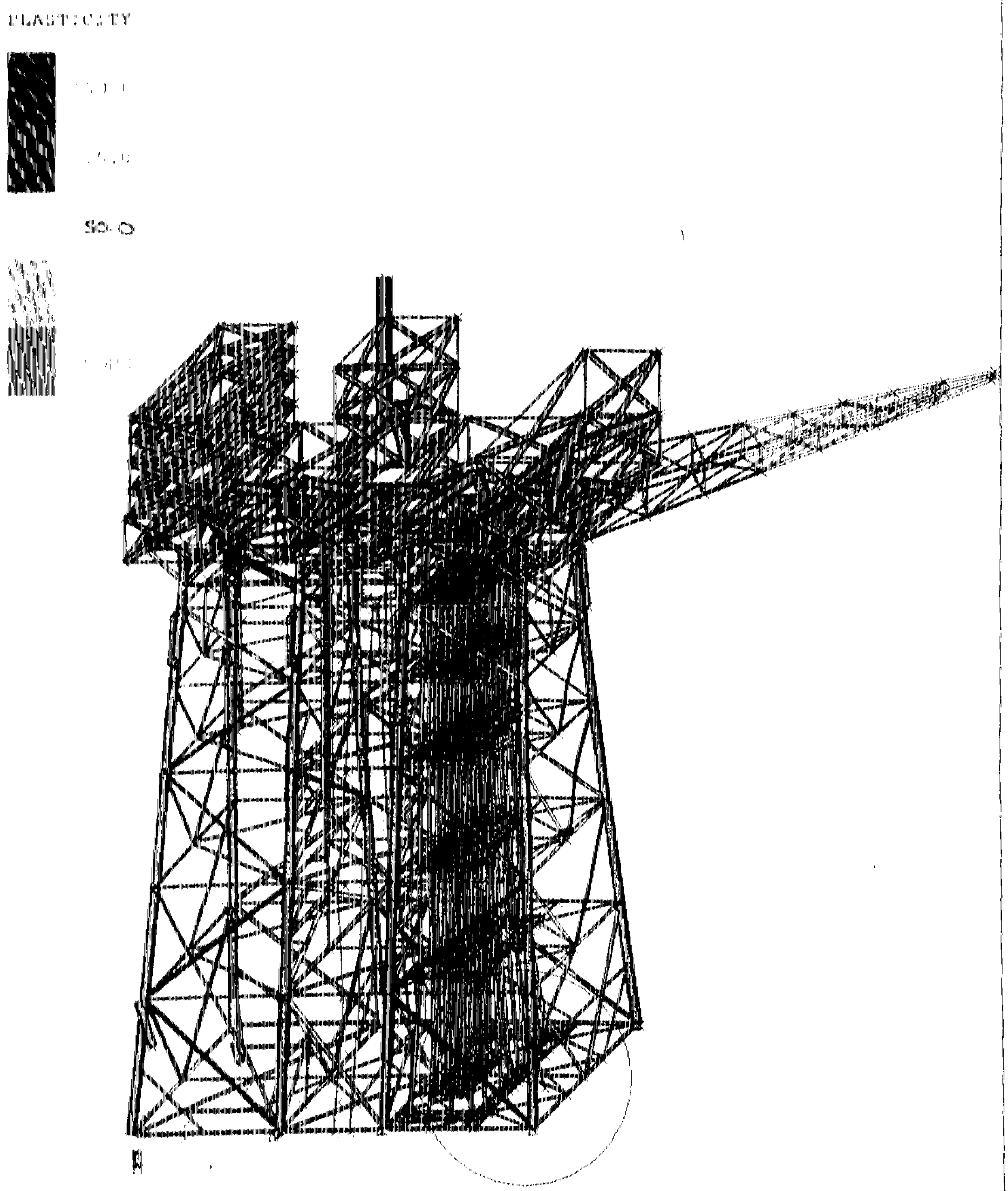
LOAD STEP 72 LOAD FACTOR 3.50 BASE SHEAR38437.97 DEFL. FACTOR 1.00

PLASTICITY

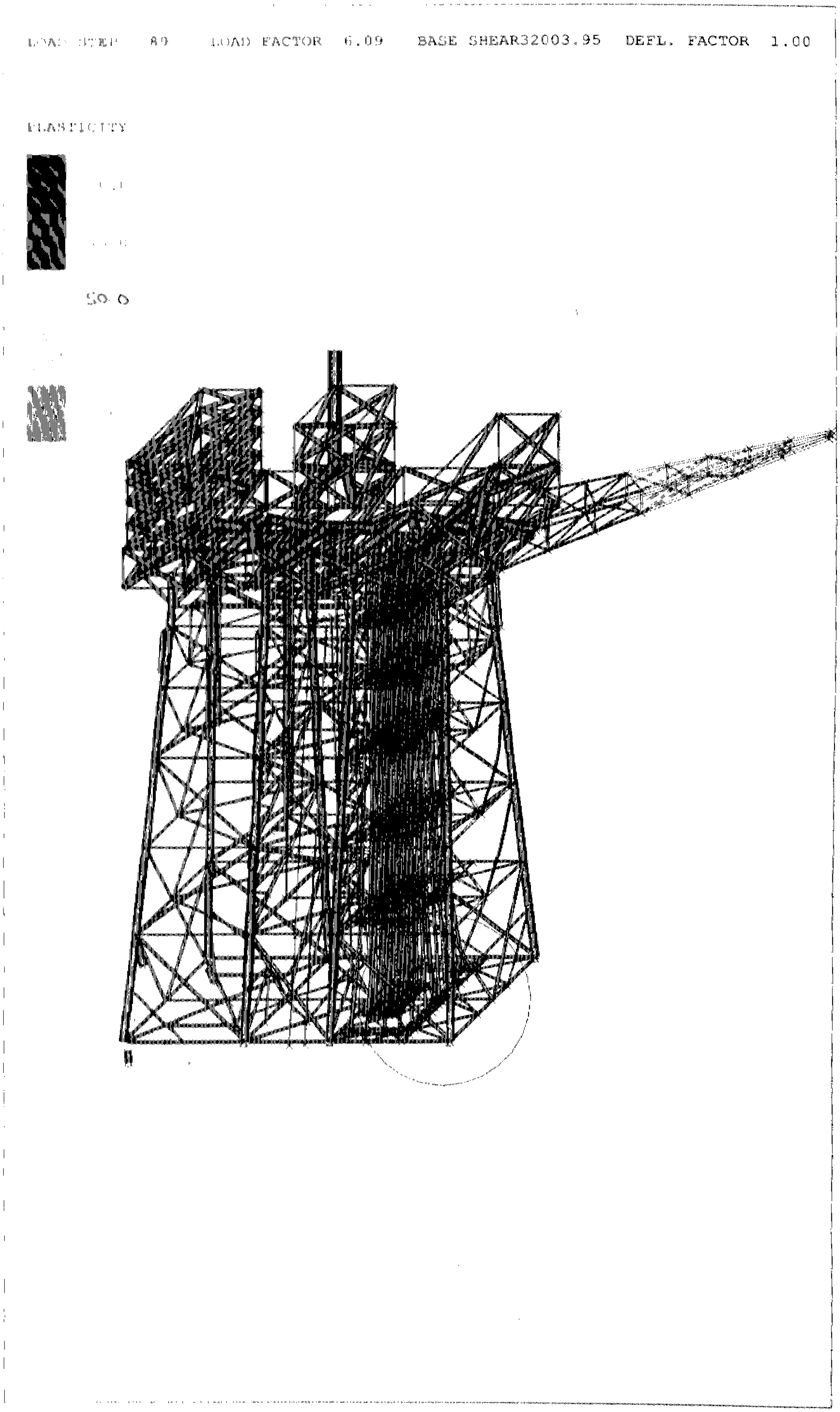
50.0



LOAD STEP 79 LOAD FACTOR 5.39 BASE SHEAR31968.76 DEFL. FACTOR 1.00



275 deg


LOAD STEP 89 LOAD FACTOR 6.09 BASE SHEAR32003.95 DEFL. FACTOR 1.00
50.0

APPENDIX C.5

STATISTICAL RESULTS ANALYSIS OF BOTH DATA

APPENDIX C.5

A) PLATFORM A, B & C COLLAPSE DATA COMPARISON t-Test: Paired Two Sample for Means for Platform B

	Variable 1	Variable 2
Mean	3286.139	4177.111
Variance	209368.6	159270.6
Observations	12	12
Pearson Correlation	0.2387	
Hypothesized Mean Difference	0	
df	11	
t Stat	-5.81762	
P(T<=t) one-tail	5.81E-05	
t Critical one-tail	1.795885	
P(T<=t) two-tail	0.000116	
t Critical two-tail	2.200985	

t-Test: Paired Two Sample for Means for Platform A

	Variable 1	Variable 2
Mean	9388.953	10422.41
Variance	2622163	2085908
Observations	8	8
Pearson Correlation	0.966162	
Hypothesized Mean Difference	0	
df	7	
t Stat	-6.72521	
P(T<=t) one-tail	0.000136	
t Critical one-tail	1.894579	
P(T<=t) two-tail	0.000271	
t Critical two-tail	2.364624	

t-Test: Paired Two Sample for Means for Platform C

	Variable 1	Variable 2
Mean	28556.52	31093.93
Variance	83449873	1.03E+08
Observations	8	8
Pearson Correlation	0.982275	
Hypothesized Mean Difference	0	
df	7	
t Stat	-3.46757	
P(T<=t) one-tail	0.00522	
t Critical one-tail	1.894579	
P(T<=t) two-tail	0.01044	
t Critical two-tail	2.364624	

APPENDIX C.5

B) BRACING CONFIGURATION

t-Test: Paired Two Sample for Means for Design basis and X-bracing in RSR

	Variable 1	*Variable 2*
Mean	1.116387	1.173102
Variance	0.00363	0.015734
Observations	8	8
Pearson Correlation	0.458968	
Hypothesized Mean Difference	0	
df	7	
t Stat	-1.439	
P(T<=t) one-tail	0.096662	
t Critical one-tail	1.894579	
P(T<=t) two-tail	0.193325	
t Critical two-tail	2.364624	

t-Test: Paired Two Sample for Means for Design basis and single diagonal bracing in RSR

	Variable 1	*Variable 2*
Mean	1.116387	1.107139
Variance	0.00363	0.006866
Observations	8	8
Pearson Correlation	0.801158	
Hypothesized Mean Difference	0	
df	7	
t Stat	0.523498	
P(T<=t) one-tail	0.308393	
t Critical one-tail	1.894579	
P(T<=t) two-tail	0.616786	
t Critical two-tail	2.364624	

t-Test: Paired Two Sample for Means for X-bracing and single diagonal bracing in RSR

	Variable 1	*Variable 2*
Mean	1.173102	1.107139
Variance	0.015734	0.006866
Observations	8	8
Pearson Correlation	0.607737	
Hypothesized Mean Difference	0	
df	7	
t Stat	1.868822	
P(T<=t) one-tail	0.051929	
t Critical one-tail	1.894579	
P(T<=t) two-tail	0.103857	
t Critical two-tail	2.364624	