University of Southern Queensland
Faculty of Engineering and Surveying

Elevated Highways – A Solution to Brisbane's Traffic Congestion?

A Dissertation submitted by

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Abstract

The title “**Elevated Highways – A Solution to Brisbane’s Traffic Congestion?”** initially outlines the probable contents of the upcoming dissertation.

Many cities around the world are experiencing worsening traffic chaos especially in peak hour travelling times. The construction of road tunnels, elevated highways, freeways and interchanges, bus ways, transit lanes, tollways and automated traffic systems are some of the methods that planners, engineers and governments have utilized to try to increase the capacity of the road infrastructure network to alleviate the congestion in peak hour traffic.

Thus, the much debated topic of what infrastructure or road systems to construct in order to overcome the dreaded “peak hour rush” for any city reaching the capacity of their current road and transport network, is a never ending question and topic for today’s transport engineers, planners, governments, environmentalists and public to agree upon.

I believe the answer lies within the creativity of the design engineers to conjure up new designs of infrastructure, with new materials, creativity and form that are environmentally acceptable and at a viable cost.

Today’s transport planners and governments need to also implement acceptable systems of control to allow the traffic to flow as well as increase the capacity and use of public transportation systems.

My aim for the upcoming thesis was to highlight another type of road infrastructure solution that is affordable and could be designed to alleviate the traffic congestion that is now evident on our roads in Brisbane, primarily in the peak travel times.

Thus, my infrastructure solution of elevated roadways/highways strategically placed throughout Brisbane within existing railway corridors or over existing freeways/motorways to increase the existing capacity had primarily been my predominant solution for the ease of the traffic congestion in Brisbane.

CONCLUSIONS

Elevated roadways / motorways could be established within existing railway corridors and over existing freeways to minimise the traffic congestion on South East Queensland’s infrastructure as the population grows.

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Certification

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I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Bruce Delahunty

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Signature

25/10/2011

Date

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Glossary of Terms

Arterial road: A road providing connections for the movement of people and goods between motorways, major activity centres and residential areas of a city.

Bio-filtration: is a pollution control technique using sand filter material in trenches or basins to capture and filter out pollutants such as nitrogen and phosphorous.

Bridge Deck: is the roadway or the pedestrian walkway surface of a bridge.

Bypass: A highway that encircles an urban area so that traffic does not have to pass through the centre.

Elevated highway: A public road that is constructed above an existing road usually 6 meters to 8meters high.

Freeway: is a limited access divided highway with grade separated junctions and without traffic lights or stop signs.

Highway: A main route for any form of transport connecting towns and cities.

Infrastructure: The technical structures that support a society such as roads, sewers, telecommunications, etc. by facilitating the production of goods and services as well as basic social services such as schools and hospitals.

Interstate: A junction of highways on different levels that permits traffic to move from one to another without crossing traffic streams.

Level of Service (LOS): A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and passengers.

Light commercial vehicles: Typically vehicles with two axles, single tyres and a load capacity of less than 3.5 tonnes.

Local road: A road providing access to individual properties and carrying low volumes of traffic between arterial roads.

Low water springs datum: The average lowest daily tide level over a lunar month.

Major activity centre: Major activity centres accommodate key district concentrations of employment, services and limited comparison and major convenience retail.

Milton Road corridor: The land set aside for the purpose of Milton Road.

Motorway: A road serving inter and intra-regional connections for high volumes of people and goods, directing long distance traffic away from heavily developed areas.

National Highway: A national network of roads for which the Federal Government is responsible.

Pier: is an upright support for a superstructure such as a bridge.

Pile Cap: is a reinforced concrete slab constructed on top of a group of foundation piles to evenly displace or spread the load they are to carry.

Road tunnels: An underground passageway for vehicular road traffic completely enclosed except for openings commonly at each end.

Suburban Road: A road supplementing arterial roads but also having a distributor function to local roads.

Trans Apex: is a transport plan to connect existing motorways and major arterial roads with new transport links and divert cross-city traffic out of the Brisbane CBD.

Transit lanes: Traffic lanes that have been restricted for use by motorbikes, passenger vehicles with a specified number of occupants or more, taxis, buses and emergency service vehicles.

Water table: The natural level of water below the ground.

Western Corridor: The Greater Ipswich area, extending generally from Wacol through Ipswich City to Amberley and including Ebenezer, Swanbank, Ripley Valley and Springfield.

CHAPTER 1

1.1 Introduction

The title "**Elevated Highways – A Solution to Brisbane's Traffic Congestion?"** initially outlines the probable contents of the upcoming dissertation. However, for the examiner, supervisor and the upcoming readers, I shall expand my thoughts as to how and why I initially conjured up this title and what the reader can expect to get from this thesis.

(www.aldafa.com)

The definition of an elevated highway is that of a public road that is constructed above an existing road and up in the air usually of some 6m-8m high. A highway is a public road that connects between two or more destinations, while a freeway is defined as a limited access divided highway with grade separated junctions and without traffic lights or stop signs.

Access to these roads are usually allowable only for vehicles that can maintain the speed nominated (usually 80km/hr or more), thus pedestrians, cyclists and mopeds are banned at all times.

Many cities around the world are experiencing worsening traffic chaos especially in peak hour travelling times. The construction of road tunnels, elevated highways, freeways and interchanges, bus ways, transit lanes, tollways and automated traffic systems are some of the methods which planners, engineers and governments have utilized to try to increase the capacity of the road infrastructure network to alleviate the congestion in peak hour traffic.

Some cities, like London have introduced congestion charge zones and fees to enter the city. Fees of 10 pound per day apply with over 197 cameras installed around the city to implement the system. Exceptions apply to hybrid cars and other fuel efficient and green energy motorised vehicles.

Thus, the much debated topic of what infrastructure to construct or road systems to install in order to overcome the dreaded "peak hour rush" for any city reaching the capacity of their current road and transport network, is a never ending question and topic for today's transport engineers, planners, governments, environmentalists and public to agree upon.

I believe that part of the answer lies within the creativity of the design engineers to conjure up new designs of infrastructure with new materials, creativity and form that are environmentally acceptable and at a viable cost. Today's transport planners and governments need to also implement acceptable systems of control to allow the traffic to flow as well as increase the capacity and use of public transportation systems.

1.2 Broad Aim

My aim for the upcoming thesis was to highlight another type of road infrastructure that could be designed to alleviate the traffic congestion that is now evident on our roads in Brisbane, primarily in the peak travel times.

A cheaper alternative was also on my mind in comparison to the underperforming tunnels that have been constructed lately such as the Clem 7 tunnel.

Thus, my infrastructure solution of elevated roadways/highways strategically placed throughout Brisbane had primarily been my predominant solution for the ease of the traffic congestion.

The location of these elevated roadways included within existing railway corridors over the top of the existing railways, and on top of existing freeways such as the M3 Freeway, Bruce Highway and the Western Freeway before joining on to the future tunnel Legacy Way planned at the Mount Cootha roundabout.

The cost of the construction of these elevated roadways should be cheaper than tunnels by utilising pre-cast and pre-stressed bridge decks, thus only having to pour the footings i.e., piers and pile caps in in situ.

I would also like to investigate the possibility of using fibre composites to a part of the structure to prolong its intended design lifespan, if time permits.

I am very aware of the poor aesthetics of existing elevated freeways in other countries around the world, particularly in the U.S.A. This is why strategic location is paramount to help camouflage the structure within the neighbourhood area. Some of the more impressive elevated highways are located in Japan specifically in the cities of Tokyo and Osaka.

A surface coat of paint would improve the visual features of the structure while the addition of some bio-filtration and landscaping methods could certainly improve its environmental sustainability.

Thus, a cheaper as well as a more aesthetically and environmentally sustainable structure is foremost on my mind when preparing a design for these types of structures. I believe that these are two of several areas besides the cost that need to be addressed in order to convert public opinion and enable governments to get public acceptance on the use of this type of structure in their neighbourhood or cities.

So the question is, can environmentally and sustainable elevated roadways be designed in strategic locations to ease Brisbane's traffic congestion?

(www.aldafla.com)

- **A more sustainable design**
- **Cheaper alternative**
- **The strategic location**
- **Poor aesthetics - paint**
- **Bio-filtration**
- **Landscaping**
- **Convert public opinion**
- **Thus a cheaper more aesthetically and environmentally sustainable structure**

1.3 Project Background

I have initially chosen a railway line and an existing road that are suitable for the construction of an elevated roadway above the existing infrastructure within the Brisbane council locality.

a) A six-lane elevated motorway over each of the four existing railway lines into Brisbane from the east, west, north and south. However I have modelled my rail solution on the Cleveland Line.
b) A three-lane elevated freeway over the existing Western Freeway from Moggill road to the Toowong roundabout near Frederick Street Toowong.

Figure 1: Existing Western Freeway Elevation, View Looking South
(Google Maps)

This dissertation deals with

- The proposal of using elevated roadways as a solution to increase the traffic capacity of the existing road transport network at a minimal cost to reduce Brisbane's traffic congestion in the future.
- The preliminary feasibility study for a three-lane elevated freeway over the Western Freeway from Moggill road to the Toowong roundabout in more detail.
- A preliminary design of a six-lane elevated motorway over each of the four existing railway lines into Brisbane from the east, west, north and south.

Other roads identified as possible location for elevated freeways within the Brisbane area (but not part of this feasibility study) are as follows:

i) The Gateway Motorway from Northgate near the airport to the intersection of the Bruce Highway and the Gymie Arterial Road near Wyampa Road
ii) The Bruce Highway from Bracken Ridge to Sippy Downs.

1.4 The Project Elevated Road

This report deals with the proposals for the three-lane elevated freeway over the existing Western Freeway from Moggill road to the Toowong roundabout near Frederick Street Toowong.

1.5 Objectives and Scope of Services

The objectives of this preliminary feasibility study are as follows:

- Identify if elevated roadways can help ease the traffic congestion in Brisbane's road transport network
- Provide and identify two differing types of elevated roadways that could be utilised in Brisbane to reduce current traffic congestion
- Provide a preliminary design and feasibility study for one type of elevated roadway and alignment within the Brisbane locality
- Provide some preliminary traffic analysis and forecasts for the proposed alignment.
- Provide a preliminary environmental impact assessment on the chosen alignment
- Establish approximate construction costs of the road project.

The scope of services for this feasibility study includes the following:

1) To carry out a preliminary reconnaissance survey of the project area including activities such as identifying general topography and physical features using BCC Bi-Maps and satellite imageries from Google Earth and Maps.
   a) Preliminary reconnaissance of the area will be conducted and studied near the proposed alignment to examine pre-existing factors such as geometric feasibility; terrain, soil and drainage conditions as well as an environmental assessment study.
   b) Based on available traffic studies and data on past traffic and socio-economic features of the study area/roads, an assessment of forecasted traffic and socio-economic impact will be presented.
   c) Using BCC Bi-Maps and Google Earth, a preliminary survey of the proposed alignment alternatives will be conducted to identify the inventory of structures.
2) To draft and present a proposed design for the elevated freeways including preparation of projected cost estimates with an accuracy of + or – 15%.

3) To collate, prepare and submit all requisite information and documents necessary to obtain environmental clearance for the project from relevant government agencies.
4) To present approximate costs of construction for the estimated value of the project.

A flow chart of the methodology is presented in Figure 2 below

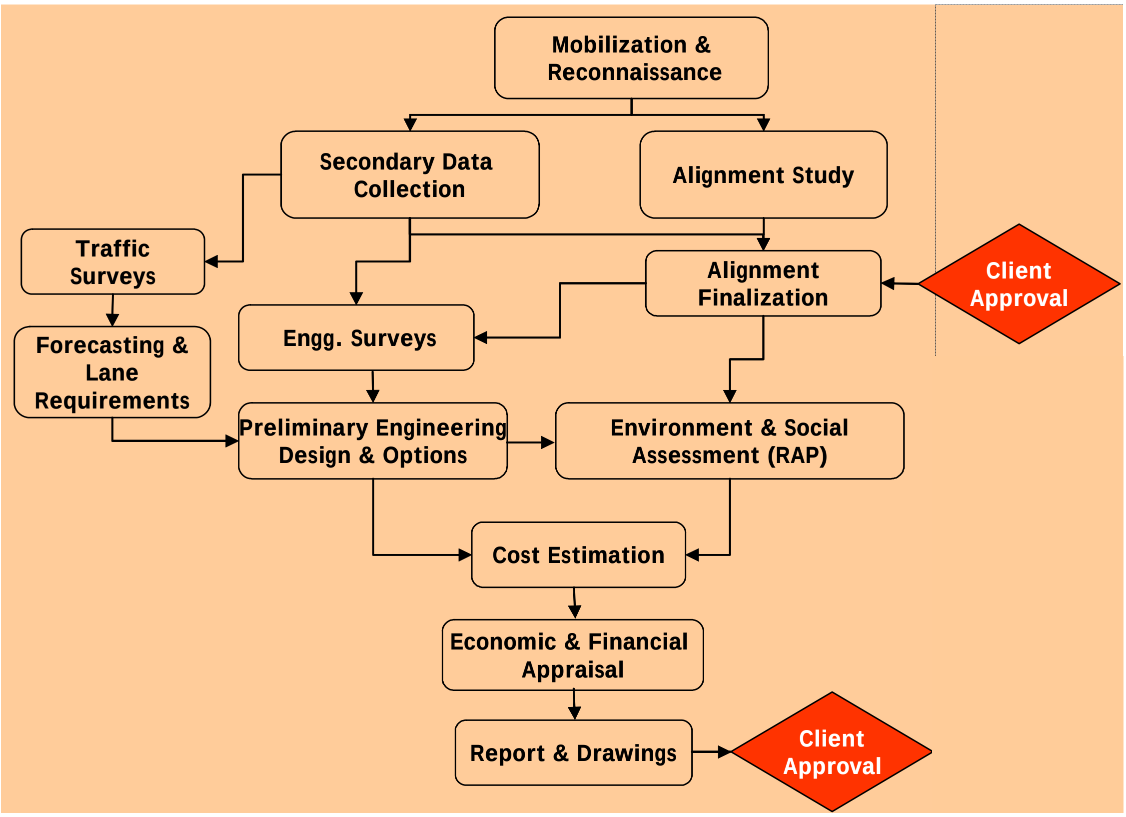

Figure 2: Flow Chart of Study Methodology

1.6 Proposed Options and Configurations of Elevated Structures

The infrastructure solutions discussed in this thesis consist of differing types of elevated concrete structures to increase the capacity of the existing transport network. Positions of the structures relative to other transport infrastructure are as follows:

1) Road over existing motorway or freeway
2) Road over existing rail within existing rail corridor

Option 1 **- The road over existing rail within an existing rail corridor**

This type of configuration allows for increased road capacity whilst reducing costs for resumption of land. It consists of an elevated roadway being constructed over an existing railway. Refer figure 1 below for a typical cross section of this proposed option. Further discussions on this concept will be discussed in chapter 6.

***Option 2* – Road over existing motorway or freeway**

Same as option 1, this type of configuration allows for increased road capacity whilst reducing costs for resumption of land. It consists of an elevated roadway being constructed over an existing motorway/freeway. The supporting piers are designed to be located in the middle of the central grassed median or swale central of the existing freeway. Further discussions on this concept will be discussed in chapter 6.

1.7 Implications

The construction of such a structure anywhere in the world would have major implications in the surrounding locality with respect to the environment as well as the aesthetics of the structure.

The following presents a list of foreseen problems and implications with consequences for this type of project as there would be for any road infrastructure project of this type and scale:

- Environmental Impacts
- Traffic emissions
- Vegetation clearing
- Construction noises
- Planning approval
- Construction costs
- Public consultation
- Geotechnical problems
- Land resumptions
- Aesthetics
- Environmental Sustainability
- Financial viability

Figure 3: Aerial View of the Existing Western Freeway

(Google Maps)

1.8 Thesis Contents

The outline of this thesis is as follows:

Chapter 1 presents the introduction of the thesis and outlines my broad aims, project background, objectives and scope, configuration options and implications.

Chapter 2 presents the relevant literature review and illustrates some existing forms of elevated highways in other countries and describes the present scenario of road infrastructure in Brisbane.

Chapter 3 presents the road alignment project of the elevated Western Freeway

Chapter 4 outlines some existing and forecast traffic survey data for the road project.

Chapter 5 presents some of the material and geotechnical investigations required.

Chapter 6 presents the details of the geometric design for the road project

Chapter 7 presents the preliminary structural design of the road project and the concept of an elevated road over existing rail within an existing railway corridor.

Chapter 8 presents a preliminary environmental impact assessment of the road project

Chapter 9 presents preliminary construction cost estimates of the road project

Chapter 10 presents the conclusions and summaries of the road project and the concept of an elevated road over existing rail.

CHAPTER 2 – LITERATURE REVIEW

2.1 Elevated Highways

Elevated highways have several names (i.e. elevated roadways or freeways) and are located in several countries around the world such as the U.S.A., China, Japan, India, Seoul and Hong Kong (*Wikipedia*). These countries are suitable for these types of highways due to their high population within a smaller landmass and economic suitability.

Obviously, you would not expect to encounter a structure of this type in a third- world country due to the inability of the government to obtain enough capital to construct the required infrastructure.

U.S.A has 100,000km of elevated highways while China has 74,000km, 33,00km of which have been built in the last 6 years. By 2015, China could overtake the U.S.A in terms of freeway developments and rank first in the world (*China Daily*).

The public opinion all over the world varies with respect to the construction of these types of structures in their city. There are also many elevated freeway removals planned especially in the U.S.A for the older- type structures that are considered as obtrusive and aesthetically unpleasing (*Skyscrapercity*).

However, with a more creative form in infrastructure and architectural design nowadays, I believe that these structures can be designed to be pleasing to the eye. The following photographs of several Japanese designs for this type of elevated construction are examples of these.

Figure 4: Overall View, Elevated Highways in Japan
(www.aldafla.com)

Figure 5: Looking to the Top, Elevated Highways in Japan
(www.aldafla.com)

Figure 6: Looking from the Side, Elevated Highways in Bangalore, India
(www.aldafla.com)

<u>Figure 7: Underneath the Highway, Elevated Highways in Japan</u>
(www.aldafla.com)

The following are examples of new design that could have been less intrusive to the eye.

<u>Figure 8: Elevation View, Elevated Highways in Bangalore, India</u>
(www.aldafla.com)

Figure 9: Top View, Elevated Highways in Bangalore, India
(www.xbhp.cpm)

Figure 10: Top View, Elevated Highways in Bangalore, India

Figure 11: Close-Up View, Elevated Highways in Bangalore, India
(www.xbhp.com)

2.2 The Current Scenario

Located in the state of Queensland northeast of Australia with a population of 1.8 million, Metropolitan Brisbane is the third most populous city in Australia. While rapid growth has strengthened and reinforced its economy considerably, the dramatic increase in traffic is also generating increased pressure on Brisbane's transportation networks thereby affecting communities, quality of lifestyle and continued industry development. In this regard, we have to come up with an efficient solution that will overcome the traffic problem for the betterment of Brisbane.

Figure 12: Coronation Drive Peak-Hour Traffic

2.3 A Solution for Brisbane

Aside from the Inner City Bypass, previous new motorway standard road network initiatives in the past 20 years in the City of Brisbane have been limited to the Gateway, Logan and Port of Brisbane motorways.

These main corridors supplement critical network capacity to the east and provide a linkage to the Sunshine Coast on the North Side and Gold Coast to the south side. The Gateway corridor is in a fast mode in terms of reaching the capacity and the State Government has recently bid its mark on the development and upgrade of the said infrastructure.

In a broader sense, major undertakings remain for the middle ring road (Metroad 5), the east-west movements, cross-river capacity, and an inner ring road around the CBD. Closely, all main arterial roads located in the city of Brisbane are presently in its full operation or just a bit higher than its theoretical safe capacity.

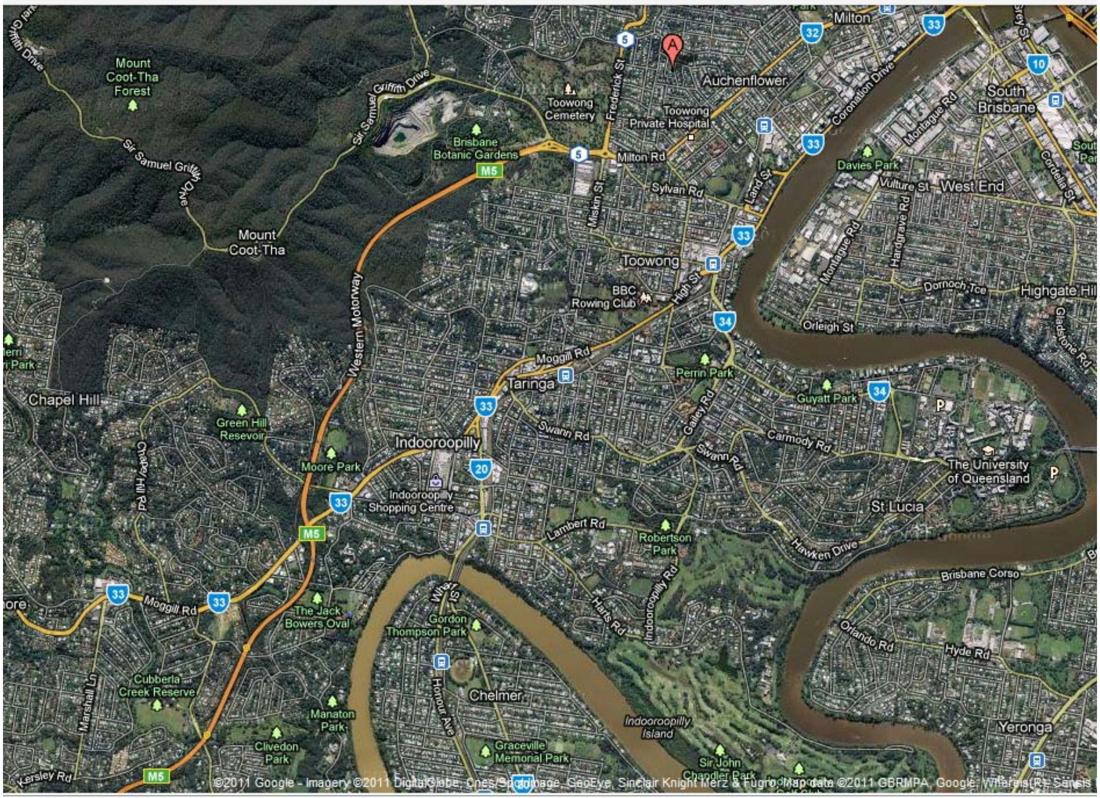

Figure 13: Aerial View of Western Freeway Alignment
(Google Maps)

As travel needs and demands continue to increase, Brisbane's river crossings and rivers continue to be congested as time passes by. Increase in relation to traffic congestion translates lost time for people, increase in terms of the costs for industry, delays to public transport utilizing the road network, worsening of road safety, ecological degradation because of vehicle emissions, and loss of amenity.

The Federal Bureau of Transport Economics roughly estimates the loss due to the congestion of traffic to be within $2.6 billion on a yearly basis through increased operating costs, lost wages and delays to business, accidents and environmental considerations. These costs are being anticipated to balloon to as much as $9.3 billion on a yearly basis in about ten years.

Present traffic researches conducted by the Council and State Government Authorities express that the congestion of traffic specifically in Brisbane's arterial road network is due to cross-city traffic as its main factor. Almost 67% of motorists utilizing the network are practically heading to other destinations but are obliged to head towards CBD in order for them to cross the river. This dramatically targets its attention on Brisbane's lack of facilities to cross the river as well as the inefficiency of "ring road" system.

Through the increased efficiency of Brisbane's motorways road network, a class of road that can be able to handle extreme traffic volumes now manifests. But these are voids that fill the network of motorways in Brisbane which basically oblige motorists to depend mainly on the sub-arterial road class practically in almost all of their travels. The congestion of traffic in the arterial roads specifically during rush hours is specifically manifested in the inner and middle suburbs of the said city. With the inevitable increase of population in the near future, there is a need to act and pay attention to traffic issues in these locations in order to maintain and develop smooth accessibility in and out of Brisbane.

On the other hand, Brisbane is also seeking for solutions that pay attention to a broad array of motorist groups that are asking for developments – from private motorists, emergency facilities, work-related type of traffic, freight and taxis, public transport patrons and the like. The Trans Apex advance study has addressed these considerations relating to these components during the investigations.

2.4 What is Trans Apex?

Trans Apex is an answer to the extreme congestion lever and the continuous demand in terms of mobility. It finds ways to divert traffic to the inner and middle suburbs of Brisbane mainly in the CBD by coming up with a specialized motorway standard road system by means of a series of tunnels and river crossings which are basically "user-pays". This would practically supplement liberty to cross-city traffic; develop access to key locations in Brisbane while lessening its impact in terms of the environmental and social condition.

This type of investment pertaining to Trans Apex targets its solution to the social consideration by putting the circumferential roads underground which is not visible and not recognizable in the ears of people. The motorway standard of Trans Apex would lessen the stop-start feature of a conventional traffic flow, increase the efficiency of travel and simply eradicates emissions in vehicles. This implementation would also supplement river crossings at its finest and conveys links specifically to the main arterial roads in Brisbane.

By taking out the volumes in the surfaces of the present roads, which practically handles main bus routes, substantial enhancements, in relation to public transport are constructed to be able to address the congestion on the main highways. These are expressed in this report. This could possibly develop and enhance the public transport usage level in the middle and inner suburbs of the city of Brisbane by making it dependable and faster. This report also pays attention to the urban renewal and extensive surface opportunities that would practically enhance the liveability and quality of living in most areas in Brisbane thus, increasing the way of living and economy in the city itself.

<u>Figure 14: Trans Apex Links 1 – 5</u>
(Trans Apex)

The Various Links of Trans Apex

The transport infrastructure links considered by this pre-feasibility study are:

1. **The North-South Bypass Tunnel (NSBT)** – This is a cross-river tunnel, presently in the process of procurement which connects the Pacific Motorway (previously known as the South-East Freeway) and Ipswich Road at Woolloongabba and Shafston Avenue at Kangaroo Point located in the south heading towards Lutwyche Road as well as the Inner City Bypass located at Bowen Hills in the north.

2. **The Airport Link** – This is a linkage of the NSBT by tunnel north to Sandgate Road, Gympie Road and the East-West Arterial, connecting to Airport Drive. Another road was considered, particularly the Kingsford Smith Drive and while supplementing efficient local traffic advantages, it does not supplement the overall traffic advantages which the Airport links has to provide.

3. **The Hale Street Link** – This a cross-river link between Hale Street at Milton in the north side and Montague Road, Cordelia Street and Merivale Street located in South Brisbane.

4. **The Legacy Way** – This is a proposed cross-city tunnel which connects the Western Freeway located at Toowong in the west with the Inner City Bypass and Kelvin Grove Road in the north. Our road project will provide a much improved travelling time to access the Legacy Way from the Western Freeway.

5. **The East-West Link** – This is a proposed future cross-river tunnel connecting the Pacific Motorway and O'Keefe Street located at Buranda in the east which heads towards the Western Freeway and Toowong in the west bound.

So the question of whether to implement an elevated highway/freeway depends on many variables not only in terms of cost and financial viability, but aesthetics, estimated revenue stream via tolls, financial ability to repay the debt, public and government opinion, planning laws and regulations and environmental sustainability as well.

Figure 15: Construction of Clem7, Airport Link and Inner City Bypass - Brisbane, Australia (*8.SEQIPP)

Figure 16: Newly-Constructed Go-Between Bridge and Coronation Drive Flyover - Milton, Brisbane QLD

(*7.BCCTP)

CHAPTER 3 – PROJECT ROAD AND RAIL ALIGNMENTS

3.1 Road Alignment – Western Freeway

The Western Freeway is an existing four-lane freeway that traverses from Indooroopilly to Toowong. It caters to most of the western residents travelling into the Brisbane city or to the inner city bypass. The length is approximately 4.2km with central grassed median of varying widths 2-4m wide.

A photo of the existing freeway is shown below in figure 17.

The proposed road is owned by the State Government Land and hence land acquisition is not required and thus savings would be achieved when compared to acquiring private lands.

Since the proposed project road is fully elevated, a better control of the traffic flow can be achieved there by creating a low congestion, high standard, access controlled road facility for western residents to utilise.

Construction of the highway will not greatly affect the traffic flow into the city as we would anticipate construction at night time and the closure of only one lane.

The complete preliminary alignment is shown in figures 23-25 below.

Figure 17: A Portion of the Existing Western Freeway Plan View

(Google Maps)

Figure18: Proposed Elevated Western Freeway Alignment

Figure 19: Proposed Elevated Western Freeway Alignment CH 0-1400

Figure 20: Proposed Elevated Western Freeway Alignment CH 1400-3100

Figure 21: Proposed Elevated Western Freeway Alignment CH 2800-4200

Figure22: Existing Western Freeway Elevation View Looking South

(Google Maps)

Figure23: Existing Western Freeway Elevation View Looking South with 3D Model of roposed Elevated Freeway Superimposed onto the Above Existing Imag

3.2 Alignment Study

The project road alignment is proposed from Moggill Road at Indooroopilly to the Toowong roundabout near Frederick Street Toowong. However the major task is to fit the elevated freeway into an alignment which is:

- Suitable for the design speed.
- Accommodated within the existing grassed central island median along the length of the existing freeway.
- Entry from Moggill road onto the elevated freeway

3.2.1 Fixing of Tentative Alignment from Satellite Imageries

Satellite imageries of the Western Freeway from Moggill road at Indooroopilly to Frederick Street, Toowong were collected, scaled and aligned to a local grid system. Thus, a very comprehensive GPS-ready base map is prepared with all the visible details on both side of the proposed alignment. Based on the envisaged design standards, using 12D Model V8 design software, an alignment was drawn with appropriate curves fitted with transition curves and fully contained within the road reserve boundary.

3.2.2 Drive-Through Survey on Alignment

Further to the identification of the alignment on my desktop via xrefing in satellite imageries into Autocad the Alignment was checked on ground, via a drive-through survey which was carried out and videoed by myself. The process involved diving along the preliminarily designated alignment, making adjustments to the alignments to avoid engineering and other obstacles if necessary and documenting the alignment via a handycam. All obstacles were identified and the alignment adjusted if required.

3.2.3 Alignment Review and Finalisation

Detailed desktop analysis was done based on the satellite images and the salient observations are:

There are several options available at the entry and exits of the proposed alignment for entry and exit points. Due to time restrictions, the detailed design of the entry and exits will not be part of the scope of works.

However, I will discuss the possible options for the entry and exit ramps at the start and end of the proposed alignment. The detailed alignment route is described below.

3.3 PROPOSED ALIGNMENT – Western Freeway

3.3.1 Start of the Proposed Alignment

The proposed alignment starts near the intersection of Moggill road and Burbong Street Indooroopilly with a 1 in 10 taper off Moggill road at CH 0.0 and into a large radii left hand sweeping bend that continues on until it meets the centre of the existing freeway denoted by a large grassed median strip of approximately 4m-5m width. The proposed length of the elevated freeway is approximately 4,246meters which travels through to the western side of the Toowong Roundabout at the intersection of Milton road and Frederick Street Toowong. The elevated highway has been designed to carry a maximum M1600 vehicle load of 44 tonne.

3.3.2 Entry & Exit Ramps for General Traffic

Entry/exits ramps were proposed at the following locations for the usage of general traffic, and vehicles below 44 tonne. The existing Western Freeway on ground level will serve as a heavy vehicle route for vehicles over 44 tonne.

3.3.3 Traffic Travelling East

Entry Ramp from Moggill road: This proposed ramp will serve as the entry of traffic from Chapel Hill and Kenmore in the west. Total length of the ramp is approximately 300 meters.

Exit Ramp to Legacy Way Tunnel: This exit ramp facilitates the exit of traffic from the Western Freeway on the western side to the new Legacy Way tunnel to destinations in North of Brisbane on the ICB near Kelvin Grove. This proposed exit ramp starts on the elevated road at approximately CH 1350 and finishes near the Legacy Way tunnel entrance. The total length of the exit ramp is approximately 520 m.

Exit Ramp to Milton Road: Traffic from the Western Freeway will exit onto either Frederick Street or Milton road Toowong. Total length of the ramp is 447 meters.

3.3.4 Traffic Travelling West

Entry Ramp from Milton Road: Provides entry for the traffic from Milton and Toowong, via Milton Road, to the elevated highway and travels towards Indooroopilly and Chapel Hill. Ramp starts just west of the Toowong roundabout and the total length is approximately 330 m.

Exit Ramp to Moggill Road: Traffic from the Western freeway will exit onto either the Western Freeway or Moggill road at Indooroopilly.

Figure 24: 3D View of Proposed Elevated Freeway Over the Existing Western Freeway

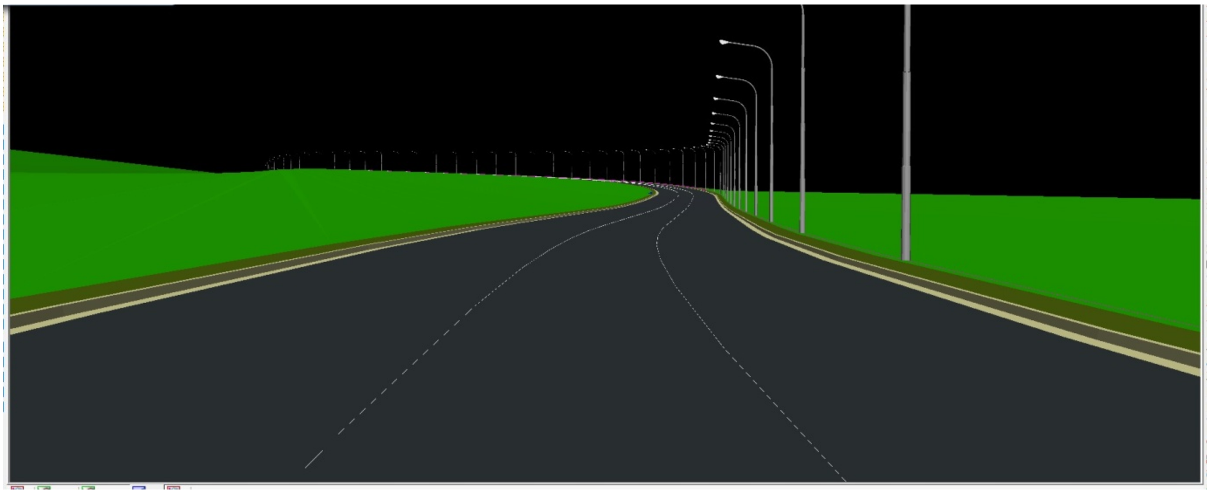

Figure 25: 3D View of Proposed Elevated Freeway Over the Existing Western Freeway

Figure 26: 3D View of Proposed Elevated Freeway Over the Existing Western Freeway

CHAPTER 4 – TRAFFIC SURVEY AND ANALYSIS

4.1 Traffic Survey and Analysis

In 2014, average weekday traffic on the Western Freeway north of Moggill Road is forecast to reach 114,500 vehicles per day with Northern Link. This is similar to the traffic levels carried during 2007 on the four-lane section of the Gateway Motorway north of Kingsford Smith Drive (112,000 AAWT).

By 2026, traffic is forecast to increase by around 30% to 138,000 vehicles per day in 2026 compared to the scenario without the Project. The forecast demands would be within the anticipated traffic lane capacities at that time. SEQIPP provides for upgrading of this route, anticipated as the addition of a transit (T2) lane in each direction by 2016.

Table 1: Legacy Way Traffic Use - Average Weekday Traffic Volumes

	Traffic 2014 (vpd) -opening	Traffic 2014 (vpd)	Traffic 2026 (vpd)	%
Western Freeway	27,500	39,300	54,300	72%

Table 2: Average Weekday Daily Traffic and Average Annual Daily Traffic Volumes

Road	Location	AWDT(1)	AADT(2)	% CV(4)
State Strategic				
Centenary Highway	At Centenary Bridge	86,800(3)	80,600(3)	5.9%
Western Freeway	North of Moggill Rd Interchange, Indooroopilly	76,500	71,200	4.7%
Regional Radial				
Moggill Road	East of Russell Terrace, Indooroopilly	40,700	37,800	6.6%
Moggill Road	East of Brisbane Boys College Entrance	38,500	35,800	6.0%
High Street	West of Benson Street, Toowong	32,400	30,100	1.7%
Milton Road	East of Croydon Street, Toowong	52,900	49,200	5.9%
Coronation Drive	West of Land Street, Auchenflower	62,600	58,200	6.7%
Milton Road	East of Castlemaine Street, Milton	51,500	47,900	8.5%
Coronation Drive	East of Cribb Street, Milton	90,100	83,800	6.7%

(Northern Link traffic model and 2007 traffic counts)

Table Notes:.
1) AWDT - Average of five (5) working days
2) AADT – Average of the full seven (7) day week
3) Modelled volume within 5 to 10% of DMR permanent count.
4) Vehicle type has been based on Austroads (2004) as follows: Cars and light vehicles – Classes 1and 2, Commercial Vehicles – Classes 3 to 12

4.1 Travel Time Benefits

It is anticipated that travel time benefits in excess of 20 minutes would be available after the construction and commissioning of the proposed elevated Western Freeway.

Figure 27: Western Freeway Peak-Hour Traffic

4.2 Local Traffic Effects

The Elevated Western Freeway would need some more adjustments in terms of local traffic management like the modifications and restrictions that would practically be impounded to the entry and exit ramp locations and approaches. Local effects in terms of access can be summarised such as:

Western Connections:

- Western Freeway precinct – Entry to the said location south of Frederic Street such as the Anzac Park, Toowong Cemetery and Botanic Gardens which will take advantage because of the decrease of motorists by diverting them to the Cootha roundabout.

- Toowong – Upper Side of Milton Road and east of Frederic Street – small effects in terms of access in the local traffic in this area.

To help in the maintenance of additional pressure in traffic, it is best advised that a traffic management system in a local area should be implemented in the Toowong North side and

Toowong – down location of Milton Road and east of Miskin Street - restrained effects when project design is implemented.

4.3 Conclusions – Traffic and Transport

- The Elevated Western Freeway would alleviate and ease up traffic congestion on present routes for cars and buses through to Milton Road via the western freeway.

- This proposed elevated three-lane freeway from Moggill Road, Indooroopilly to Frederick Street Toowong offers the increased road network capacity required to compliment the new Legacy Way tunnel from Mount Cootha to the Inner City Bypass at Kelvin Grove.

- The transport and traffic research provides clear support in relation to the projects' objectives specifically in giving improved movement of freight, motorists, and people along the western freeway.

CHAPTER 5 – MATERIAL AND GEOTECHNICAL INVESTIGATIONS

5.1 Introduction

The project road consists of the construction of a three-lane elevated roadway. Except for the approaches to the entry and exit ramps, the project road is a fully elevated concrete structure. Major material requirements for the project will be:

- Cement for concrete.
- Steel for RCC & PSC.
- Bitumen for wearing course.
- CBR 15 for embankment filling and sub-grade of approaches.
- Aggregates for structural concrete and granular and bituminous layers on approaches.

Field surveys will need to carried out to understand the geo-physical and geo-morphological characteristics and material properties of project road area, and to make a general assessment on the quality, quantity and suitability of the available materials based on visual observation followed by appropriate tests to determine its character,

The material and geotechnical investigations for the project road include the following;

Material Investigation of borrow areas and quarries.

Geotechnical Investigation for the elevated structure

5.2 Material Investigations for the Proposed Construction

5.2.1 Objective

The goal of material research is to categorize and classify the origin of effective and reliable natural materials like stone, sand, soil, etc. which has an easy access along the project site that is destined for building of the elevated concrete structure, embankment, and pavement layers.

5.2.2 Methodology for Identification of Borrow Areas and Quarries

Field Investigations of the Mount Cootha Quarry

The samples of such materials are collated from the Mount Cootha Quarry adjacent to the project road coming from the quarries nearby. Several tests will be implemented on the samples in order to determine their characteristics and to have a general overview in relation to their availability and suitability for the construction and reinforcement of the present road pavement, drainage structures and bridges.

For this objective, stone and aggregate samples were gathered from the quarries.

Laboratory Investigations of Soil and Aggregates

The following tests will be carried out on various material samples:

A. Test Pits and Borrow Areas

Gradation test	AS:2720 (Part-4)
Atterberg's limits	ASAS1289 (Part-5)
Modified Density tests	ASAS1289 (Part-8)
Soil classification	IS:AS1289.3.2.1
Soaked CBR tests (4 days soaked) at MDD & OMC	ASAS1289.6.1.1

B. Tests on Aggregates from Quarries

Plasiticity Index	ASAS1289.3.3.1-2009
Moisture Content	AS:AS1289.2.1.4-2005
Particle Density	AAS:AS1289.3.5.1-2006
Particle Size	AS:128.3.6.1-2009

5.2.3 CBR 15 Gravel & Sub grade for entry and exit ramps

CBR15 Gravel for entry and exit ramp fill and sub grade is available in sufficient quantities from the land adjacent to the elevated road and certain prominent extraction areas like the Mount Cootha quarry nearby.

The samples from potential borrow areas will be tested for Atterberg's limits, Modified Density and soaked CBR tests.

Laboratory Test Results required for Borrow Area Soil Samples

* LL = Liquid Limit; PL =Plastic Limit; PI = Plasticity Index

** OMC = Optimum Moisture Content; MDD = Maximum Dry Density (gm/cc)

5.2.4 Stone Quarries for Aggregates

Stone quarries primarily identified for hard stone aggregates for concrete, and road pavement at approaches. The Mount Cootha Quarry nearby can be utilised for sourcing the gravels and aggregates required for this project.

5.2.5 Cement, Bitumen and Steel

Cement, bitumen, and Steel are the manufactured materials. Cement and steel with AS certification are available in abundance from the manufacturers. Bitumen of 80/100, 60/70, penetration grades, Modified Bitumen - 55 grade and Polymer Modified Bitumen SBS 70 grade are available in Brisbane.

5.3 Geotechnical Investigations

A preliminary subsoil investigation will need to be carried out by local geotechnical consultants. Subsoil conditions are to be analysed along with evaluation of field and laboratory data for determination of necessary physical and chemical characteristic of the in-situ soil strata.

5.3.1 Objective

The objective of the investigation for geotechnical purposes is to assess each of the following:

- To determine and specify the subsoil strata
- To have a thorough research on the level of the standing ground water
- To have a thorough research on the engineering and physical behaviour and properties of rock and soil strata (in the event that it manifests)
- To weigh up and assess the safe and permissible load bearing settlement and capacity of rock and soil to come up with a strong foundation and footings
- To come up with an excellent recommendation in relation to the depth and type of foundation
- To come up with an excellent recommendation with regards to the enhancement to the weak soil strata if encountered

5.3.2 Scope and Methodology of the Work

The range and extent of work would approximately encompass forty (40) bore holes at different strategic locations and to perform the following field (in situ) laboratory tests and investigations. The investigations of subsoil conditions would be required with an interval of approximately 200 meters throughout the project.

Investigations on Field (In-situ)

- Making a bore hole with a diameter of 150mm at determined locations
- Gathering undisturbed and disturbed soil samples at a standard interval of depth.
- Performing conventional field testing like the Standard Penetration tests as per AS AS1289.6.3.2 with an interval of 1.5-meter depth or whenever there manifests a change in strata in order to have an idea in relation to the N values together with stiffness and relative density of the soil
- To record and have a thorough study on the Level of the standing Ground Water
- To have an idea on the strata of the sub soil as well as the topography of the location

5.3.3 Laboratory Testing

The scope of Laboratory Testing to be carried out for the proposed elevated freeway should be as per the Australian Standard AS1289;

5.4 Soil Erosion Mitigation Measures

Mitigation measures would be implemented throughout various stages of the project to control and reduce the risk of erosion due to construction and operation activities. These would be developed during the design phase of the project and incorporated into the Environmental Management Plans prepared for the construction and operation of the project. These requirements are outlined in detail in Table 9, of Chapter 8 - Summary of Environmental Impacts and Mitigation Measures.

Specific erosion and sediment control plans would be prepared and adopted for all areas of surface disturbance to ensure that erosion and sediment control measures are implemented and adequate to the nature and scale of disturbance and would include site reinstatement measures once works are complete.

CHAPTER 6 - GEOMETRIC DESIGN

6.1 Western Freeway

My alignment for this proposed elevated freeway is for the centreline of the elevated freeway to be within the middle of the existing grassed median in the centre of the existing road reserve.

The elevated freeway is supported by central round concrete columns of 1,500mm diameter at approximately 30m centres.

Figure 28: 3D View of the Proposed Sub-Structure on the Proposed Elevated Western Freeway

Figure 29: 3D View of the Proposed Sub-Structure on the Proposed Elevated Western Freeway

6.2 Railway Alignments – North, South, East and Western lines

My alignment for this type of proposed elevated freeway within the existing railway corridors is for the centreline of the elevated freeway to be in the centre of the existing 40m wide railway corridor.

I propose to construct a new six-lane elevated freeway over the existing railways within the existing railway corridors.

Initially, I propose to construct these over the southern, northern, eastern and western rail lines which would allow for a marked increase of allowable traffic to flow in and out of the city of Brisbane.

Figure 30: Existing Cleveland Rail Line Elevation Looking West

Figure 31: Existing Cleveland Rail Line Elevation Looking East
(Google Maps)

Figure 32: Existing Cleveland Rail Line Plan view
(Google Maps)

Figure 33: Existing Cleveland Rail Line Plan View (2x)
(Google Maps)

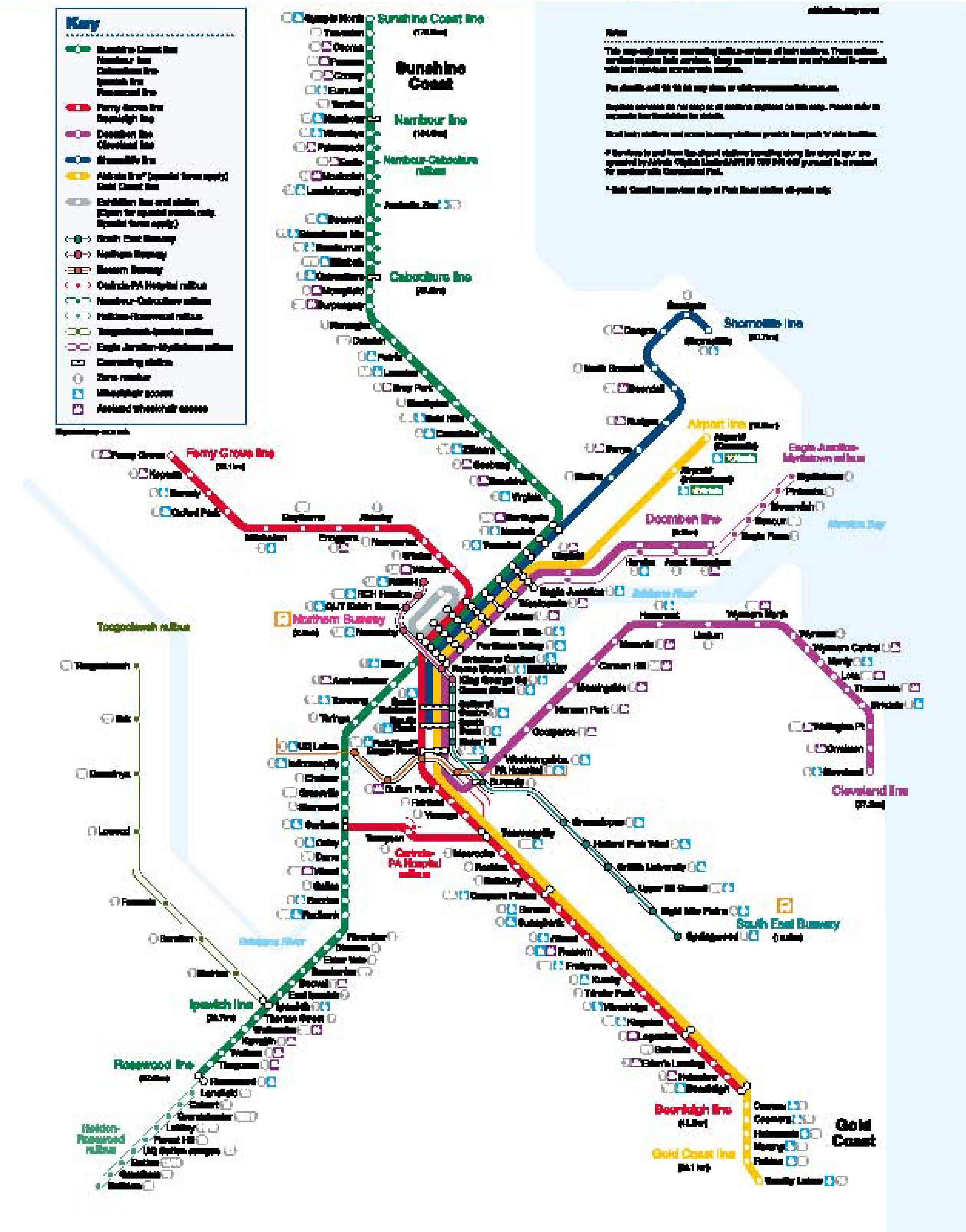

Figure 34: Railways and Busways into Brisbane
(BCC Transport Plan)

6.3 Geometric Design Standards

Geometric design for an elevated highway is dictated by the land availability, requirements of traffic and economic considerations. The geometric design involves design of several elements such as horizontal alignment, vertical profile, sight distance considerations, cross sectional elements, vertical clearances, intersection treatment, control of access, etc. The safety, efficiency, economy, and comfort of vehicle operation are governed by the adequacy of geometric standards used for a specific highway facility.

For the purpose of formulating design standards, I have followed the design standards given in Qld main roads and Australian codes and its special publications. Where the said standards are silent, the following standards are being referred to, the one considered the best, and relevant has been adopted.

The design standards will broadly encompass the following parameters:-

- Design speed
- Minimum radius and transition length of horizontal curves, extra widening, and super elevation.
- Minimum and ruling gradient for longitudinal slope, length of vertical curve and sight distance, maximum grade difference not warranting vertical curves.
- Width of carriageway / shoulder / median / kerb / service road/ footpath etc.
- Cross fall / camber.
- Minimum turning radius, approach sight distance at intersections etc.

Geometric design of the elevated highway was carried out with the aid of advanced CAD techniques, using suitable design software 12D Model V9 and AutoCAD. The topographic survey was digitally inputted from BCC Bimaps and the resulting digital terrain model was the base for this preliminary geometric design.

Preliminary alignment design on satellite imageries revealed that the maximum design speed that is feasible is 100 km/hr, except at some locations, where 60 to 80 km/hr speed will need to be adopted due to entry and exit ramps.

6.4 Proposed Geometry

Having a character of a fully elevated structure, the geometric design of the said road project is safely assisted with structural design considerations. Vertical and Horizontal elements, specifically its length should complement the span arrangements. These factors were seriously taken in the design process:

- Geometrical elements, particularly its length vertically and horizontally were maintained as an array of respective arrangement if it manifests. This will practically lessen the amount of non-uniform spans and will simply result in an easy casting on its place itself.
- Points of contra flexure in terms of horizontal and vertical geometry were maintained with the longer species on the entire alignment. This will give the freedom to come up with an excellent design, and stress-free construction with an excellent stability of the said project.
- Points of contra flexure vertical and horizontal geometry were either kept same or within the longer ones throughout the alignment. This will enable better design, easy construction and better stability of the elevated freeway.

Proposed geometry of the elevated freeway is discussed below.

6.5 Horizontal Geometry

The horizontal geometry for the elevated freeway mostly follows the centre of the existing western freeway alignment denoted with an existing grassed median throughout the proposed alignment. The horizontal geometry complies with the design speed of 100 kph, except at the entry and exit ramps.

Table 3: Summary of Horizontal Geometry

```
Transition : clothoid
Closure    : opened
Chainage   :      0.000
Length     :   4245.799

Horizontal Alignment Report for String <CL1> in Model <CL1 ALIGN>

Horizontal Vertex Data
----------------------

In Seg    Out Seg   Tan    Chainage                               Coordinates
         In Bearing      Out Bearing     In Rad    Out Rad
                                                            X                  Y
Z        Deg Min Sec     Deg Min Sec

          Line                 0.000          225.243              14.565
15.050                   44°15'15.71"
 Line      Arc        Yes     18.498          238.151              27.814
16.062  44°15'15.71"  44°15'15.71"    0.000   -260.000
 Arc       Arc        Yes    220.495          311.924             210.431
27.092  359°44'26.11"  359°44'26.11"  -260.000   600.000
 Arc       Line       Yes    338.457          322.952             327.686
31.699  11°00'18.44"  11°00'18.44"   600.000     0.000
 Line      Arc        Yes    507.589          355.239             493.707
33.915  11°00'18.44"  11°00'18.44"     0.000   600.000
 Arc       Line       Yes    546.924          364.007             532.046
34.296  14°45'40.96"  14°45'40.96"   600.000     0.000
 Line      Arc        Yes    884.897          450.121             858.864
37.573  14°45'40.96"  14°45'40.96"     0.000   600.000
 Arc       Line       Yes   1078.392          528.482            1034.865
39.449  33°14'19.62"  33°14'19.62"   600.000     0.000
 Line      Arc        Yes   1286.388          642.491            1208.832
43.090  33°14'19.62"  33°14'19.62"     0.000  -600.000
 Arc       Line       Yes   1718.987          734.711            1621.953
59.926  351°55'43.23"  351°55'43.23"  -600.000     0.000
 Line      Arc        Yes   1873.246          713.052            1774.684
65.703  351°55'43.23"  351°55'43.23"     0.000   700.000
 Arc       Line       Yes   2728.745         1076.973            2490.757
60.065  61°57'08.02"  61°57'08.02"   700.000     0.000
 Line      Arc        Yes   3547.369         1799.454            2875.681
49.425  61°57'08.02"  61°57'08.02"     0.000  1200.000
 Arc       Line       Yes   3843.187         2074.952            2981.355
39.064  76°04'35.37"  76°04'35.37"  1200.000     0.000
 Line      Arc        Yes   3861.252         2092.486            2985.702
38.431  76°04'35.37"  76°04'35.37"     0.000   500.000
 Arc       Line       Yes   4083.671         2313.029            2990.244
30.641  101°33'49.81"  101°33'49.81"   500.000     0.000
 Line                       4245.799         2471.866            2957.744
        101°33'49.81"
```

6.6 Vertical Geometry

Clear vertical clearance of 5.5m is proposed from the existing ground throughout.

All the gradients along the elevated highway are limited to the ruling gradient of 5%. Vertical curves are designed for a speed of 100 Km/h consistently. Summary of vertical geometry is given in **Table 4** below and an image is pre4sented in figure 32 below..

Table 4: Summary of Vertical Geometry

Vertical Alignment Report for String <CL1> in Model <CL1 ALIGN>

Vertical Vertex Data

In Seg	Out Seg	Tan	Chainage	Level	In Grade %	Out Grade %	In VCL Radius	Out VCL Radius
	Line		-0.922	15.000		5.47		
Line	Parabola	Yes	210.042	26.533	5.47	5.47		4446.99 R
Parabola	Line	Yes	410.042	32.969	0.97	0.97	4446.99 R	
Line	Parabola	Yes	1138.416	40.031	0.97	0.97		6736.73 R
Parabola	Line	Yes	1338.416	44.938	3.94	3.94	6736.73 R	
Line	Parabola	Yes	1824.002	64.062	3.94	3.94		4061.54 R
Parabola	Line	Yes	2024.002	67.014	-0.99	-0.99	4061.54 R	
Line	Parabola	Yes	3345.291	53.986	-0.99	-0.99		7947.94 R
Parabola	Line	Yes	3545.291	49.498	-3.50	-3.50	7947.94 R	
Line			4244.747	25.000	-3.50			

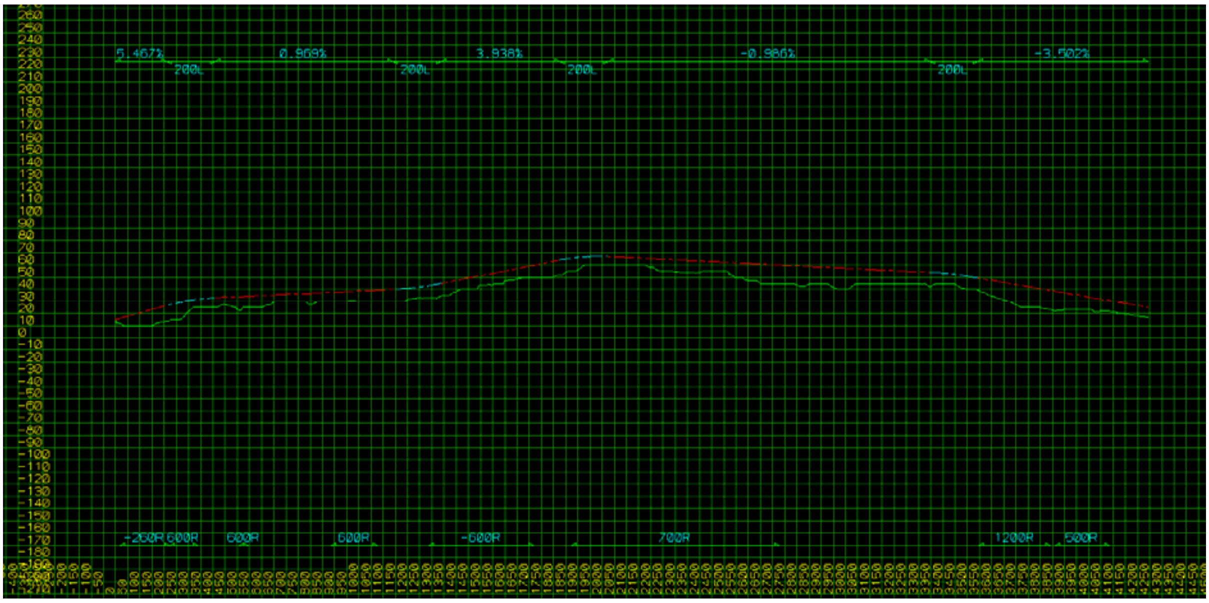

Figure 35: Preliminary Vertical Geometry of the Proposed Elevated Western Freeway

6.7 Typical Cross Sections

The typical cross section proposed for the majority of the project alignment is given below.

It consists of 3m - 3.5m wide carriage way lanes with a 1.2m wide turfed and landscaped verge then a 1.2m high parapet wall and tubular railing.

The landscaping has been added for sustainability and aesthetic reasons.

The piers are to be constructed at 30m centres along the alignment in the middle of the existing grassed median of the existing freeway.

The concrete piers would also be poured with a heritage green oxide paint colour for aesthetic reasons thereby allowing this structure to blend in with the natural surrounding

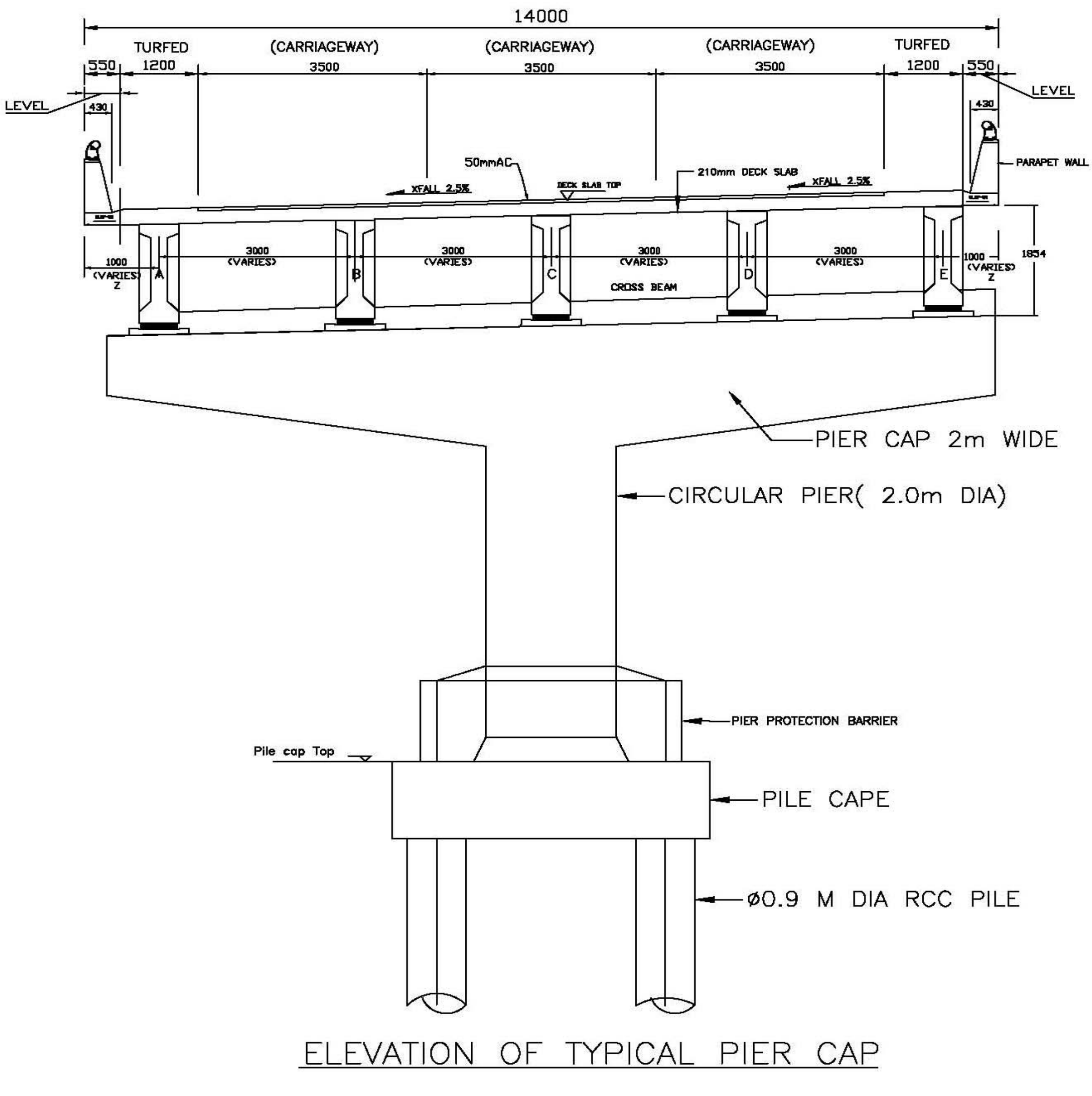

Figure 36 Typical Sectional Elevation of Proposed Elevated Freeway Over the Existing Western Freeway

6.8 Road Furniture

Road Marking and signs as well as traffic lightings are essential features that can be attributed to safety in traffic. These apparatuses supplement crucial information to motorists and provide safety and easy driving. Standard signs and traffic markings provide great information on a particular highway condition, destinations, directions and more importantly, routes. They also provide restrictions, what to do and what-nots, and provide caution and obligations in relation to any hazardous state that are prevalent on the route. MUTCD standards for traffic signs and traffic markings are utilized.

6.9 Road Markings

Retro-reflective beads with a base of thermoplastic paint should be utilized since they possess an appropriate visibility and features a quick-drying rate. In a broader sense, retro-reflective thermoplastic paint is the one that should be utilized in these markings. The standards and specifications for road markings are found in the provisions of

Lane markings are supplemented and reinforced with thermoplastic paint together with retro-reflective beads and are laid down at a width of 3.5meters. The Lane markings are 9.0 meters in length and should be painted continuously with a gap interval of 3.0 meters. When it comes to edge markings, these are laid out at the median edge and pavement edge. There also other traffic markings like chevron markings, warning lines, directional arrows, island markings and a lot more. Specifications and details are as per the MUTCD standards and AS1906.1, AS1906.2, and AS1906.3.

6.10 Traffic Signs

For similar objectives as stated in traffic markings, the best advised material to use for road signage is a retro-reflectorized plastic sheet which possesses a flexible character in nature. The main benefit of this kind of material is the legend and the colour combination makes it more visible especially at night time.

Several traffic signs which are informational, prohibitive, cautionary and regulatory are supplemented in the project at intersections, curves, openings and at crucial locations. The standards and specifications destined for traffic signs are as per the MUTCD and AS1743 and AS1744.

6.11 Highway Lighting

Complete and widespread lightings of the highway are proposed for the project road. Heading the entire elevated highway from start to finish together with the exits and ramps, light poles with a standard height of 10.5 meters with 150-watt luminaire are installed at an interval of 30meters centre-to-centre on the outer crash barriers in each structure of the carriageway.

The following standards should be abided in relation to installations of traffic lighting;
AS/NZ1158 - AS/NZS 1158. - Road Lighting
MUTCD
Austroads – Guide to Traffic engineering Practice, Part 12 – Roadway Lighting
SAA Wiring Rules - AS 3000.
Queensland Transmission and Supply Corporation (QTSC): "QTSC Group - Standard Conditions for the Provision of Public Lighting Services".

6.12 Tolls

One E-tag toll installation should be installed at the entrance to the elevated freeway, which will cover the three lanes. A scheme of "Electronic tolls collection system" in terms of collection would be adopted on the elevated freeway.

CHAPTER 7 - PRELIMNARY STRUCTURES DESIGN

7.1 Western Freeway

This type of construction consists of pier footings up to 15m deep for each of the 2m diameter columns which support a bridging on each of the columns.

This bridging then supports five (5) precast concrete I-girders which then supports concrete slabs over and between the beams. A concrete edge beam is located on each side of the elevated freeway for mounting a guardrail structure.

I have added a road base and asphalt with 2.5% cross-fall over the top of the concrete slabs to allow for drainage and a quieter travel over the elevated freeway.

I have chosen a three- lane configuration for this particular freeway which will consist of a one-way reversible traffic flow to allow the elevated freeway to primarily cater for the extra flow of peak hour traffic in both the mornings and afternoons i.e., in both directions. The actual traffic flow will reverse at 2PM each afternoon. This allows for a solution that caters to traffic in both directions during both peak-hour demands.

7.2 Structural Design – Elevated Western Freeway

The following tables and images are a representation of the loads and forces for a typical 30m span of the proposed Western Elevated Freeway calculated as per AS5100.

TABLE 5: GIRDER FORCES DUE TO SW, DL & SDL and Traffic load ON A TYPICAL SPAN

GIRDER ID	GIRDER SELF WEIGHT, SW		PERMANENT LOAD (DEAD LOAD)		PERMANENT LOAD, SDL (SUPERIMPOSED DEAD LOAD)		M1600 ROAD TRAFFIC, LL (without Dynamic Allowance α)	
	BM (kNM)	End Shear (kN)	BM (kNM)	End Shear (kN)	BM (kNM)	End Shear (kN)	BM (kNM)	End Shear (kN)
G-1	2176	338	2000	230	2680	390	3490	419
G-2	2176	338	2050	236	2620	275	3150	567
G-3	2176	338	2090	242	2550	267	2600	506
G-4	2176	338	2050	236	2620	276	1800	229
G-5	2176	338	2000	230	2680	370	1150	100

Note.

1. Maximum calculated deflection under permanent load is 78 mm - that shall be pre-cambered during construction.
2. Maximum calculated deflection under traffic load is 33 mm which is less than allowable deflection of 50 mm (span/600)

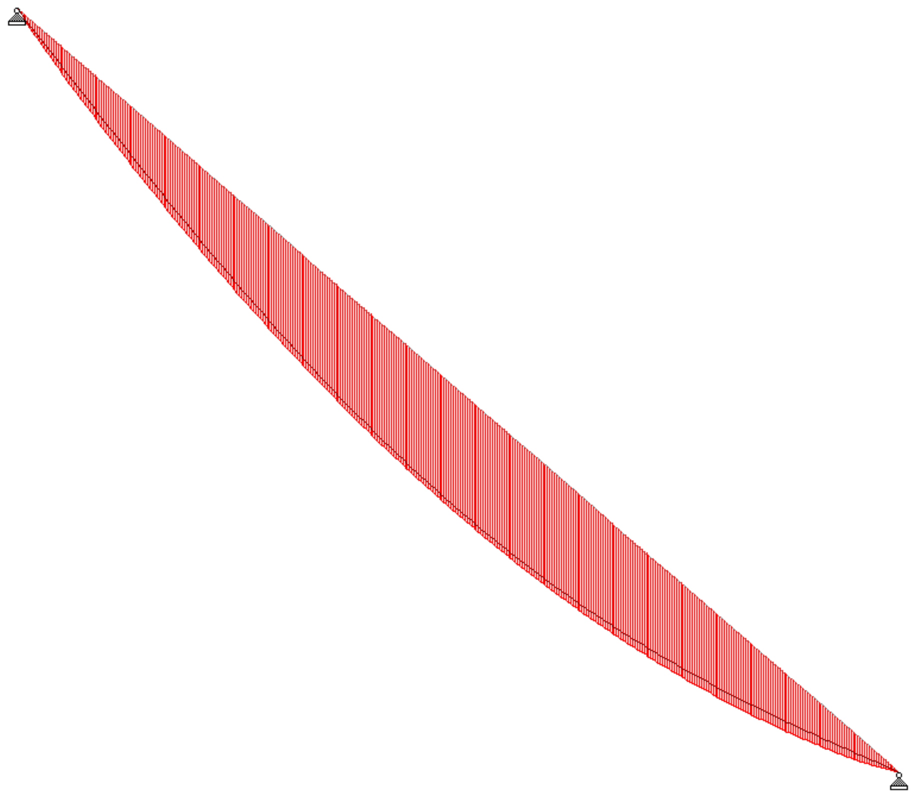

Figure 37 BM-Girder Self Weight (SW) G1-G5

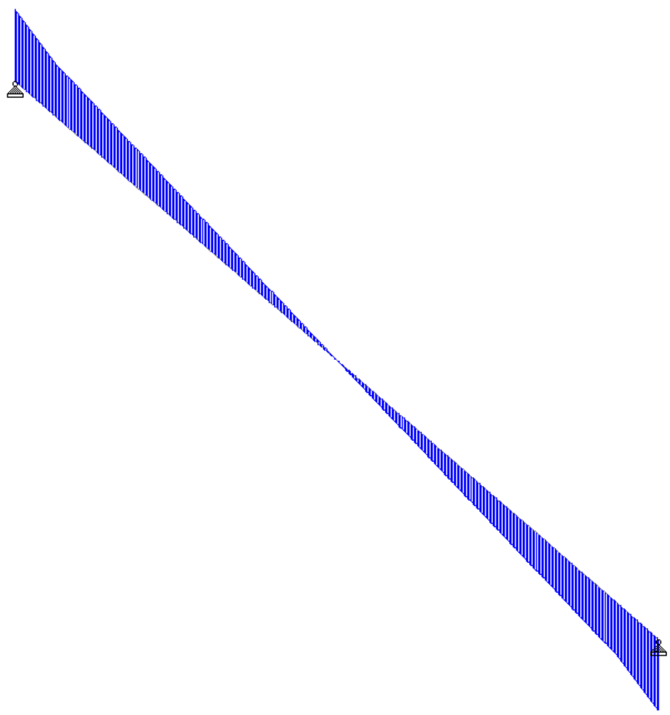

Figure 38 SF-Girder Self Weight (SW) G1-G5

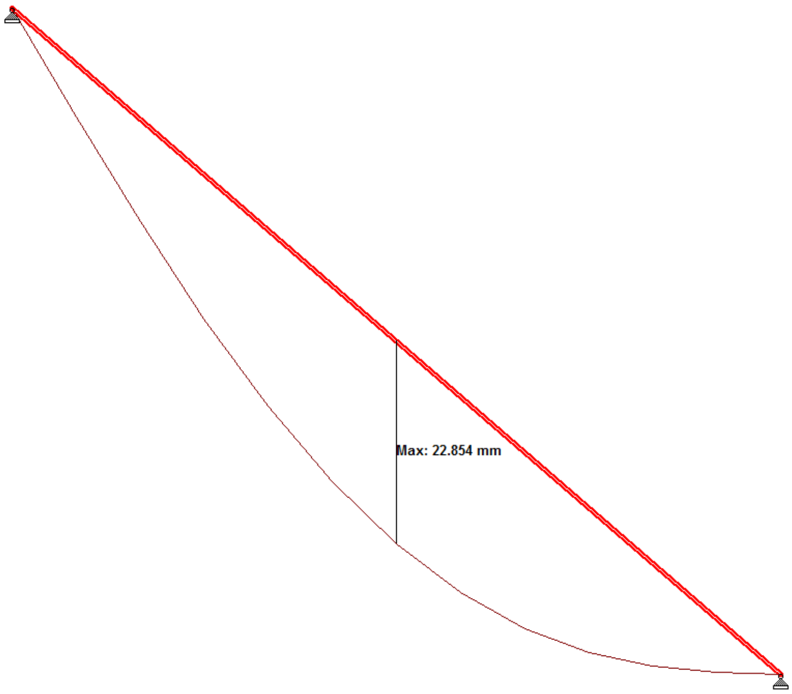

Figure 39 Deflection-Girder Self Weight (SW) G1-G5

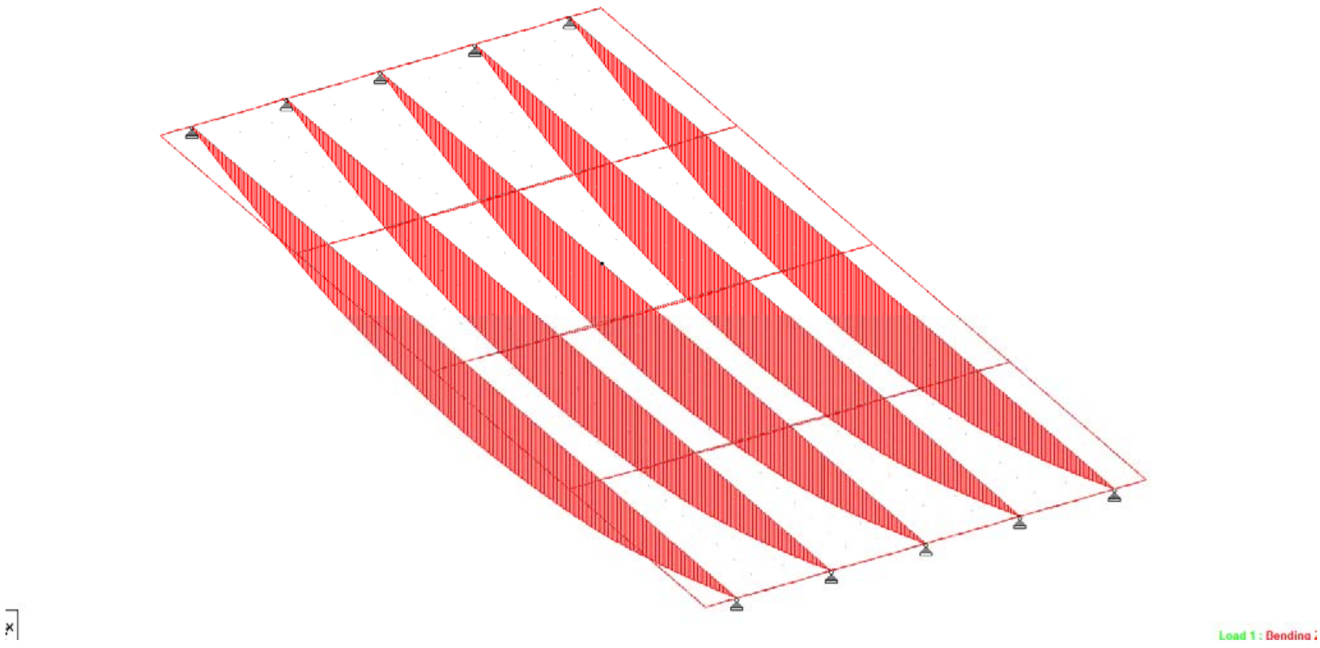

Figure 40 30m Span-BM Dead Load G1-G5

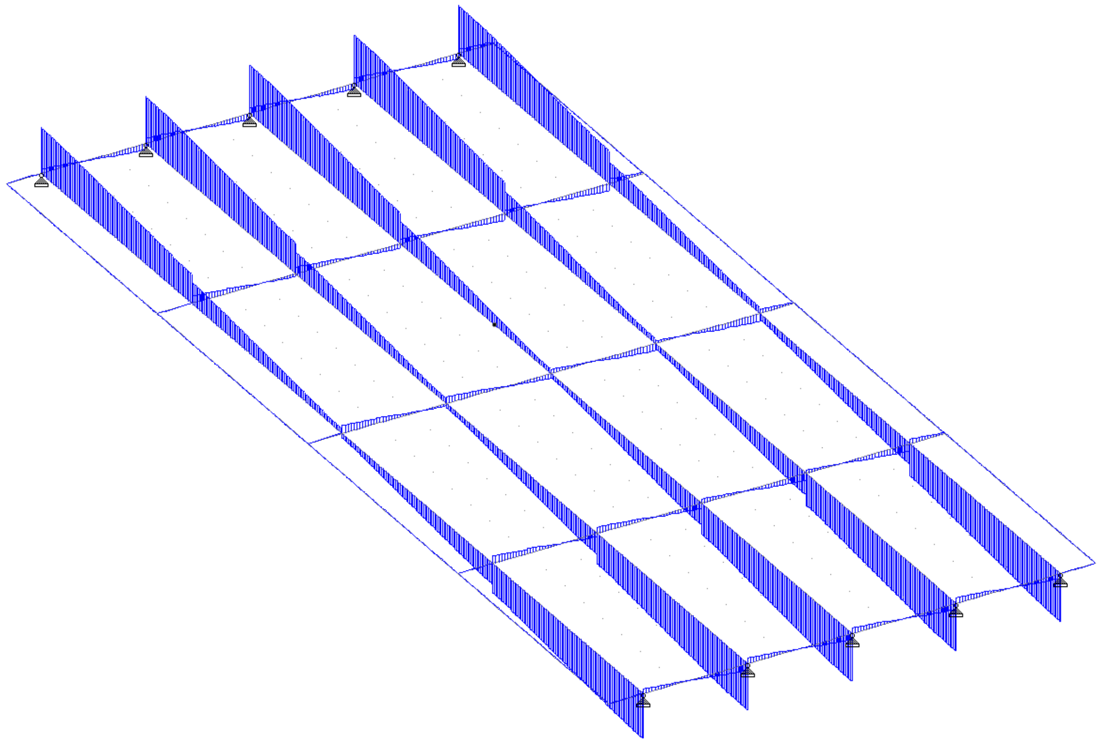

Figure 41 30m Span-SF Dead Load G1-G5

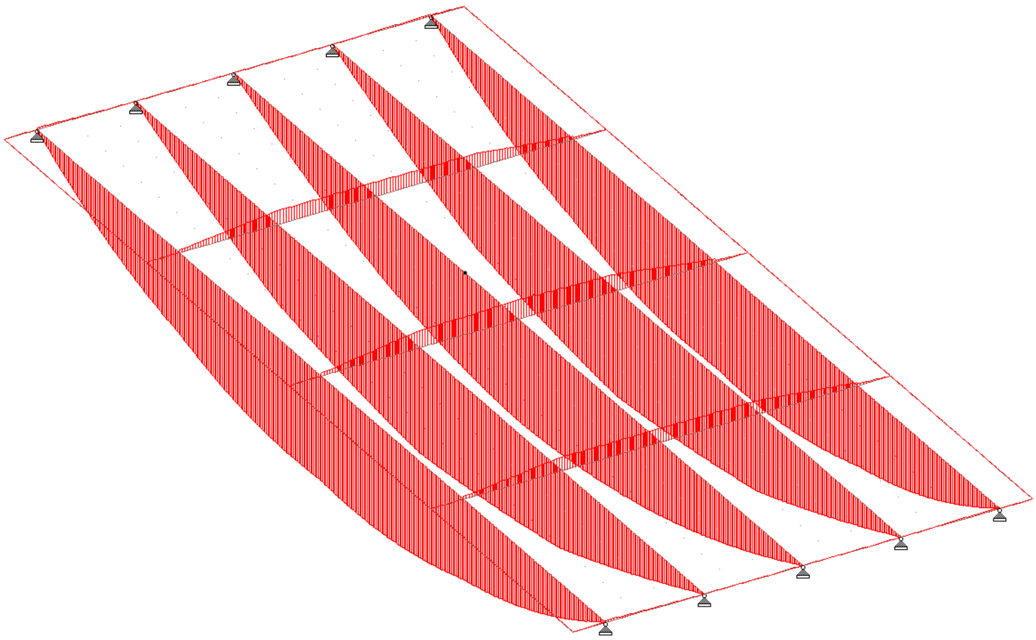

Figure 42 30m Span-BM SDL G1-G5

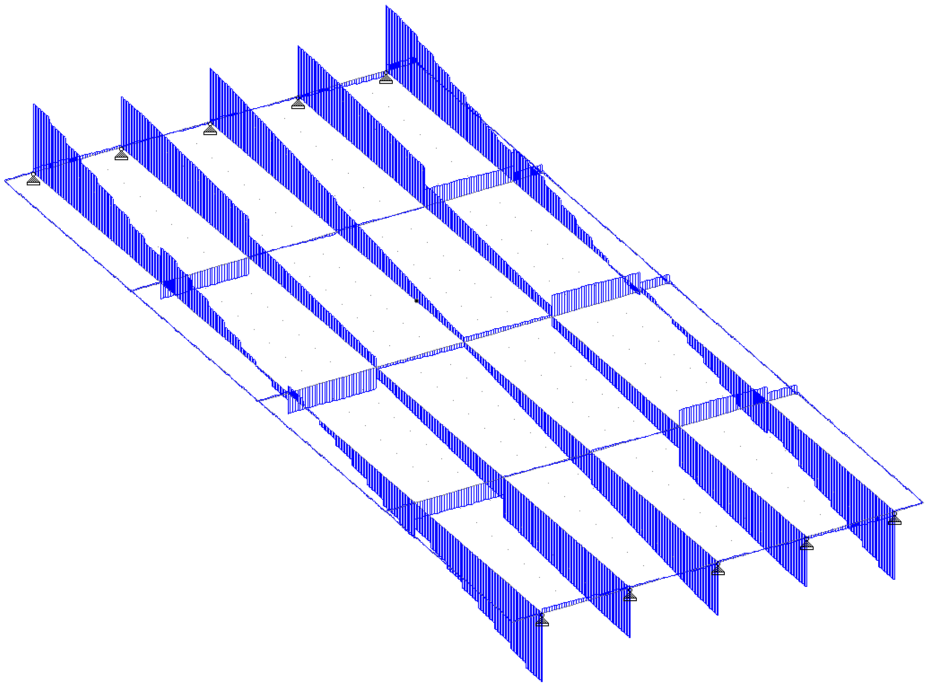

Figure 43 30m Span-SF SDL G1-G5

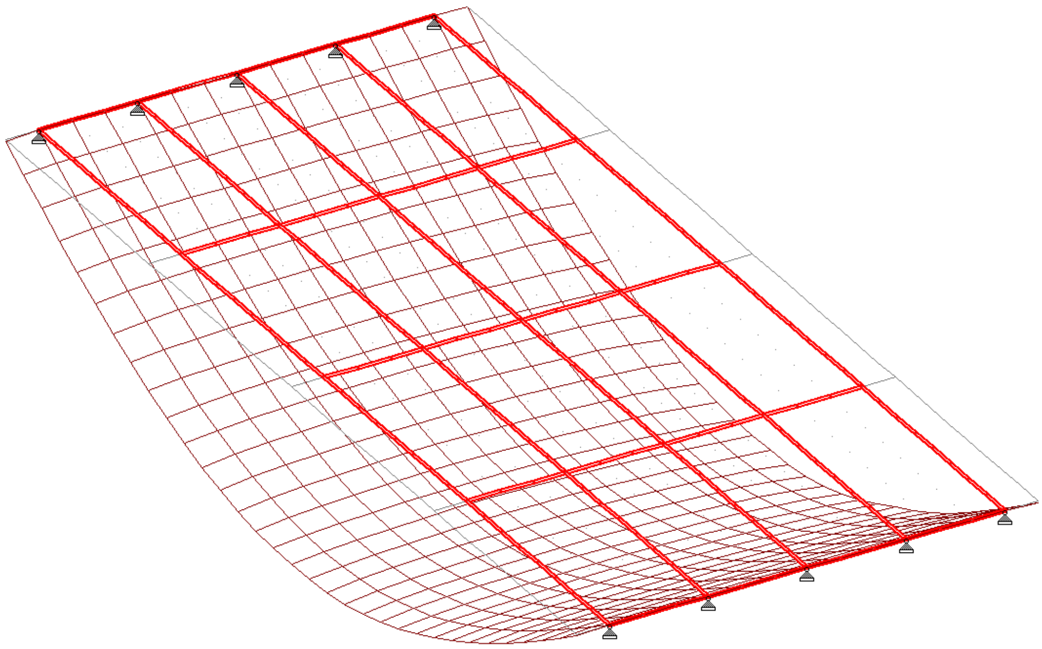

Figure 44 Deflected shape under permanent load (DL+SDL) G1-G5

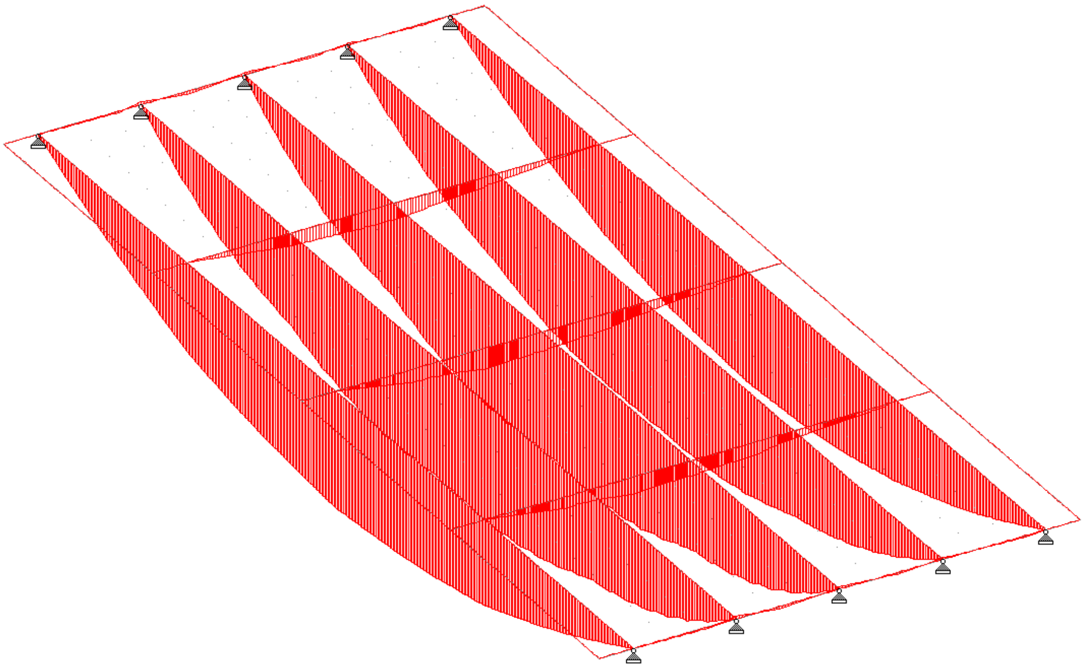

Figure 45 30m Span-BM_M1600 Traffic Load G1-G5

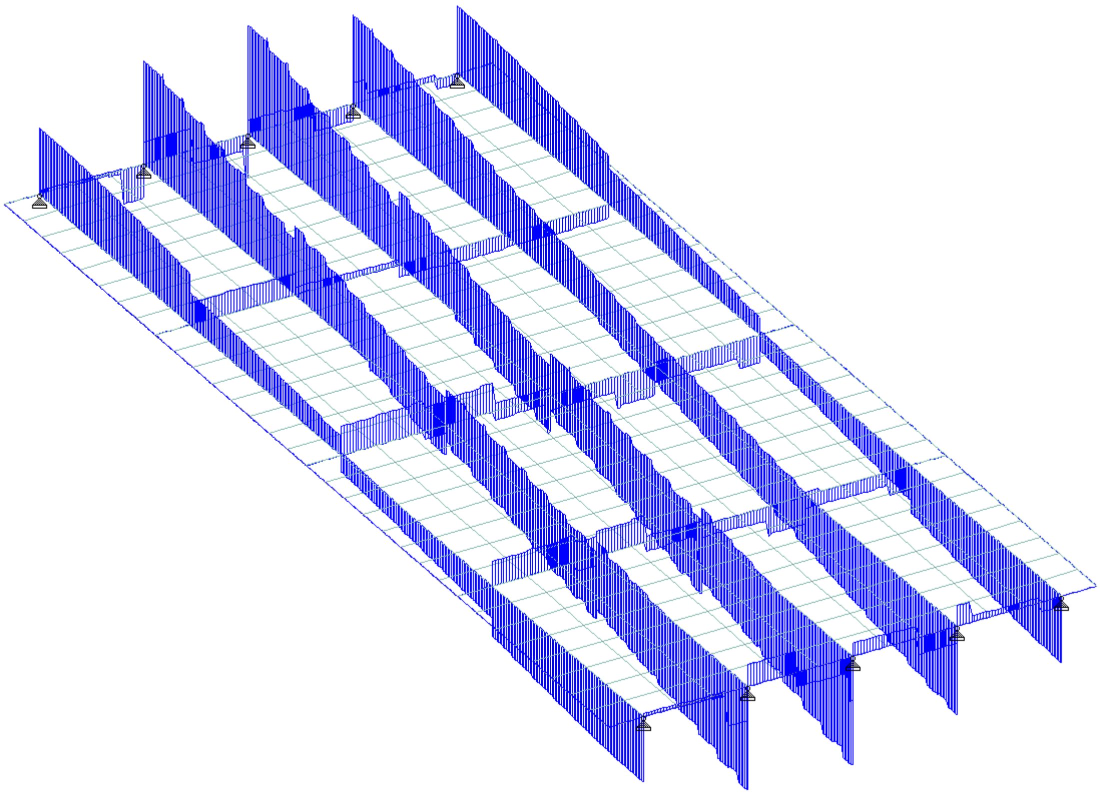

Figure 46 30m Span-SF_M1600 Traffic Load G1-G5

TABLE 6: SUMMARY OF A TYPICAL PIER BASE FORCES

BASE FORCES	PERMANENT LOAD, DL	PERMANENT LOAD, SDL	M1600 ROAD TRAFFIC, LL	WIND ON STRUCTURE FROM TRANSVERSE DIR	EARTHQUAKE FROM TRANSVERSE DIR
AXIAL (P) kN	**8128**	**3194**	**3050**		**0**
SHEAR, kN	**0**	**0**	**956**	**468**	**807**
BENDING (BM), kNM	**0**	**0**	**2390**	**4680**	**7256**

Table 7: Dynamic Load Allowance.

Loading	**Dynamic Load Allowance (α)**
W80 wheel load	0.4
A160 axle load	0.4
M1600 tri-axle group	0.35
M1600 load	0.3
S1600 load	0

Table 8: Accompanying Lane Factors.

Standard Design Lane Number	**Accompanying Lane Factor (ALFi)**
1 lane loaded	1.0
2 lanes loaded	1.0 for first lane; and 0.8 for second lane
3 or more lanes loaded	2.0 for first lane; and 0.8 for second lane 0.4 for third and subdequent lanes

Table 9: Load factors for design road traffic loads

Traffic Load	**Limit State**	
	Ultimate	**Serviceability**
W80 Wheel Load	1.8	1
A160 Axel Load	1.8	1
M1600 Moving Traffic Load	1.8	1
S1600 Stationary Traffic Load	1.8	1

a) Structural Scheme

In developing the structural system composed of the superstructure, the substructure and the foundation, the same must be specifically designed based on its suitability to the following:

- the proposed location,
- the constructability,
- the degree of impact while doing the construction on river banks and its surrounding population residing nearby taking into consideration the salinity of the atmosphere due to the proximity at sea,
- aesthetics,
- Degree of hindrance to the river and the like.

Consequently, various options were offered for superstructure, substructure and foundation based on certain situation at the site.

b) Foundation

The type of foundation to be adopted depends on the subsoil condition at the proposed location. A total of 140 bore holes, one hole every 30m would be required to get a good idea of the composition of the subsoil at the location and to gather information regarding founding strata. Various tests to identify the composition of the soil strata at different levels and to determine various engineering parameters are required to be carried out in the field as well as in the laboratory. These test results could suggest requirement of deep foundations. Pile foundations are proposed at founding levels and may range from 10m to 15m from the ground level.

A pile diameter of 0.9m is proposed depending on the span arrangement and the pile allowable capacity requirements which would be approximately 3000kN per pile for a 30m span..

A typical detail of the pile cap is given in Fig 47 below.

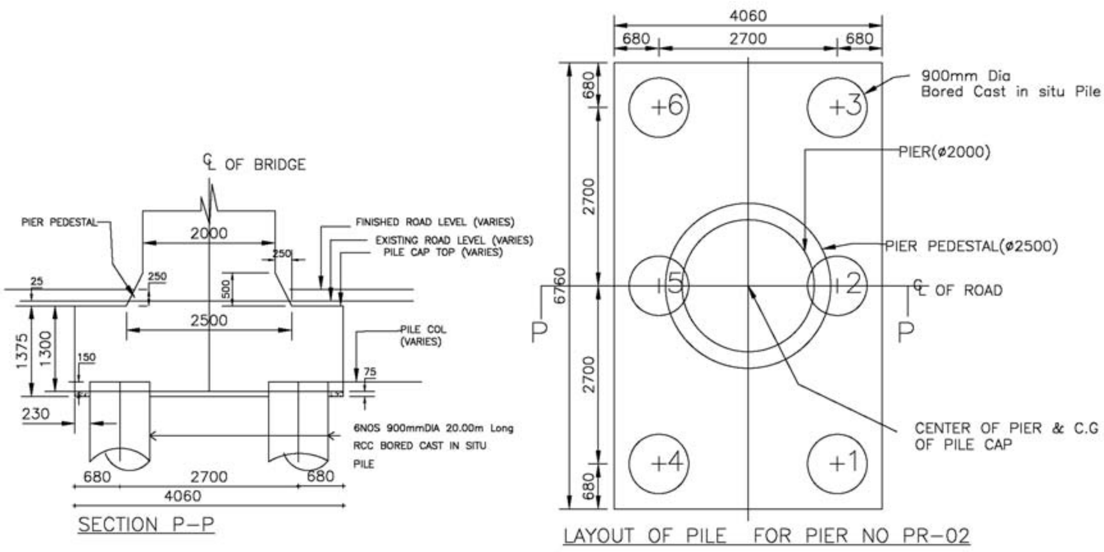

Figure 47: Typical Cross-Sectional Detail of a Pile Cap for Use over the Western Freeway Alignment

c) Substructure

The substructure type has been designed considering the aesthetics, visibility for grade facilities, superstructure type, spacing and other functional requirements etc.

The Substructure types proposed are:

Hammer headed pier with a circular shaft and circular piers with a pile cap.

Hammer headed pier with circular section: The basic type of substructure proposed is hammer headed type with a circular section for the shaft of the substructure. Height of the substructure is fixed based on the clearance requirement of 5.5m. Vertical clearance is ensured wherever vehicular movement is required below the structure.

A typical section of substructure and foundation is given in Fig 48 below.

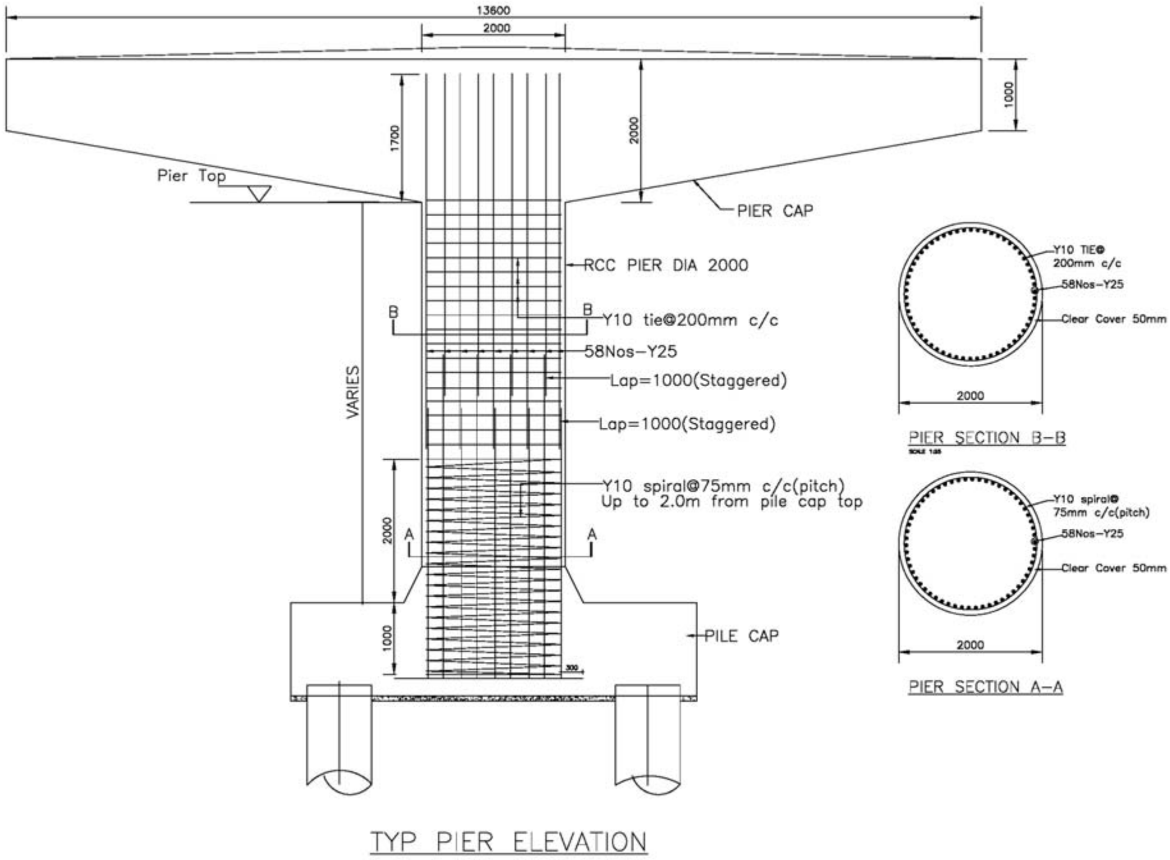

Figure 48: Typical Cross-Section of Proposed Substructure for Use over the Western Freeway Alignment

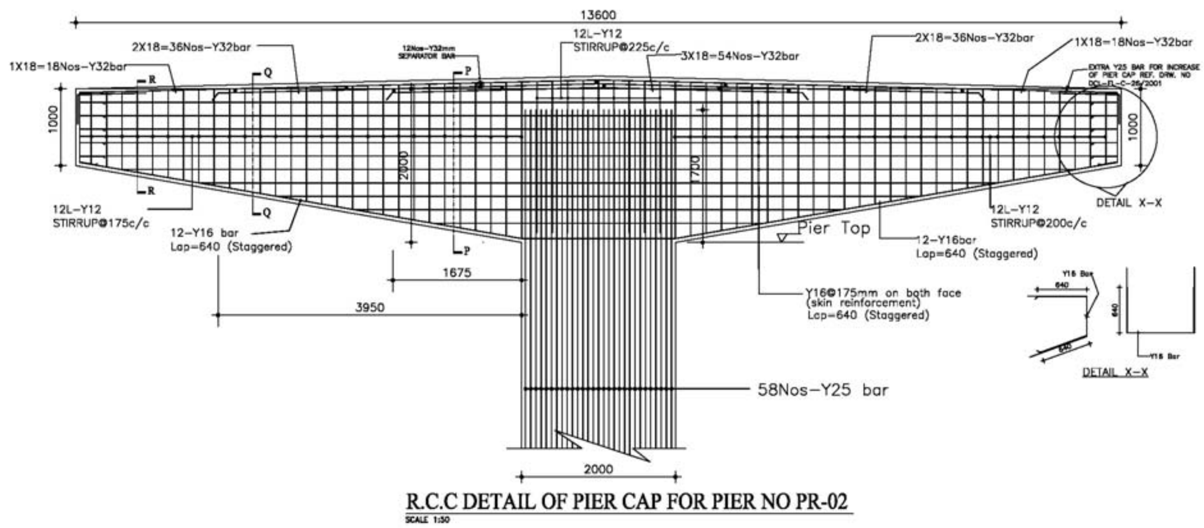

Figure 49: Typical Cross-Sectional Detail of a Pier Cap for Use over the Western Freeway Alignment

7.3 Road over Existing Rail within Existing Rail Corridor

This type of construction consists of pier footings up to 15m deep for each of the 2m diameter columns which the support a bridging on each of the columns.

This bridging then supports 5 precast concrete I-girders which then supports concrete slabs over and between the beams. A concrete edge beam is located on each side of the elevated freeway for mounting a guardrail structure.

I have added a road base and asphalt with 2.5% cross-fall over the top of the concrete slabs to allow for drainage and a quieter travel over the elevated freeway.

I have chosen a six-lane configuration for this particular elevated freeway over existing railway corridor which will consist of two to three-lane traffic flows in each direction. This allows for a solution that caters to traffic in both directions during peak-hour demands.

Typical section of the proposed substructure for the elevated freeway within a rail corridor is given in Figure 50 below.

Figure 50: Proposed 3D View of Elevated Road over Existing Rail Substructure

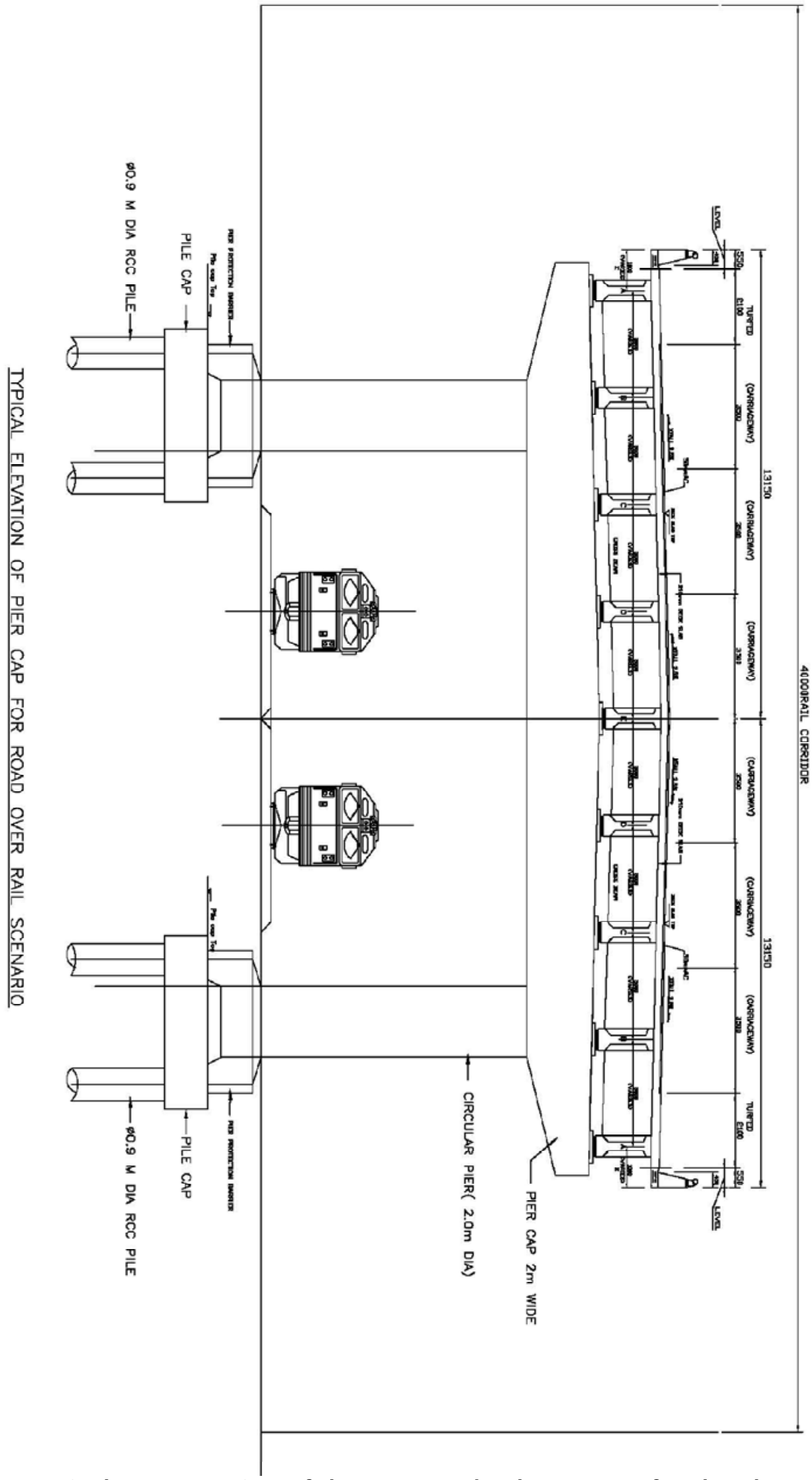

Figure 51: Typical Cross-Section of the Proposed Substructure for the Elevated Freeway Within a Railway Corridor

Based on the previously known structures, my preliminary design has adopted a span length of 30m to be economical. At some places, spans less than 30m are proposed depending on the horizontal and vertical alignment.

Figure 52: 3D Model of Proposed Road over Rail Structure from Road Level

7.4 Structural Design Standards

The basic design standards adopted for the structural designs are as per the requirements laid down in the latest editions of Australian Standards codes of practices & standards specifications, and guidelines of the department of Transport and Main Roads.

Items that are not covered in the specifications above, provisions of following standards are followed in subsequent order of importance:

Provisions of AS codes of Practices:

Relevant Provisions of AS coded of practice

Sound Engineering Practices, technical Literature/ Papers & Provisions of relevant codes of advanced and developing countries.

In the different structural components, grades are adopted according on the rules in AS codes AS3600, AS5100 and AS1170. Rigorous exposure condition is measured to arrive at concrete grades. Grade 500N is used as steel reinforcement for the normal structural members and Grade 1800 is used for post tensioning requirements. The design life span for this structure is 100 years.

<u>Clearances adopted</u>

Vertical clearance - 5.5m up to soffit of deck from the road at grade at locations of crossing.

- 5.5m up to the bottom of the pier cap where vehicles ply under the flyover at locations with restriction of available ROW and road is crossing at skew

- 5.5m at bridge locations.

- 8.0m at Qld rail crossings and ROB location

The vertical clearances for rail crossings and bridge crossings are given in Figure 7.3a below

7.5 Design Methodology

The different geometric constraints, the kind of structure suiting the area and the subsoil characteristics at the location are the basic grounds in finaliSing the span arrangement of the elevated highway. The type of structure must be deliberately considered in order to ensure the good aesthetics of the road. Thus, preparation for the general arrangement on the kind of structure, span arrangements and the like is conducted.

7.6 Geotechnical Design

Subsoil investigations will be done at every 30m intervals along the proposed alignment. Subsoil investigation includes field investigation and laboratory tests. The type and depth of the foundation is finalised based on the results of these investigations. The safe bearing capacity of the foundation is calculated based on various test results. Pile foundations are proposed at all locations, 0.9m diameter piles are proposed. The subsoil investigation is to be carried out prior to final design. The vertical load capacity of the pile is worked out based on the end bearing resistance and frictional resistance.

7.7 Preliminary Structural Design Loadings

1. *Loadings considered*
2. The structural systems are designed for loadings as per AS: 5100. The basic loadings considered are as follows
   a. **Dead load**: This consists of the own weight of the structural members
   b. **Superimposed dead load**: This consists of wearing coat, crash barrier and railing loads
   c. **Live load**: The design is done for two lanes of live loading. Worst case of the following combinations is considered
      i. One lane of M1600 moving traffic load
      ii. Two lanes of M1600 moving traffic load
      iii. Three lanes of M1600 moving traffic load
      iv. One lane of S1600 stationary traffic load
      v. Two lanes of S1600 stationary traffic load
      vi. Three lanes of S1600 stationary traffic load
      vii. W80 wheel load for deck
      viii. A 160 axle load for deck for 1,2 and 3 lanes

   d. **Impact:** Provision for impact or dynamic action due to live load is accounted as per Clause 6.7 of AS5100.

   e. **Braking load**: 20% of the first train load plus 10% of the load of the succeeding trains or part thereof is considered for two lanes of loading in accordance with Cl 6.8.2 of AS5100.

   g. **Seismic Load (Longitudinal and Transverse):** The seismic loads are calculated using Response Spectrum method as per section 14 of AS5100.

   h. **Centrifugal force**: Where the pier is placed on a curve, centrifugal force is taken into account in the design. The effect of centrifugal force is calculated as per clause 6.8.1 of AS5100

   i. **Wind Load**: The wind force is calculated based on wind pressure and height of the structure in accordance with AS1170.2. and as per section 16 of AS5100

The load combinations as per AS5100 are formed from these primary loads. Preliminary design calculations for a typical 30m span section from Staad Pro V8i 3D FEM software are attached in APPENDIX C.

Exposure Condition

Exposure condition B is considered in the design which is representative of South East Queensland.

CHAPTER 8 – ENVIRONMENTAL IMPACT ASSESSMENT

8.1 Environmental Impact Assessment – Western Freeway

This Environmental Impact Assessment Report presents the ecological assessment and suggested mitigation procedures for the Proposed Construction of a Three-Lane, One-Way Elevated Expressway from Moggill Road at Indooroopilly to the Toowong Roundabout near Frederick Street Toowong.

As part of the EIA Study, major tasks conducted are the following:

- Preliminary investigation survey to ascertain baseline conditions as well as ecologically sensitive issues relating to the project;
- Assessment of the possible effects of the project on the baseline conditions;
- Preparation of mitigation procedures to offset the identified negative effects;
- Preparation of Environment Management Plan (EMP) incorporating suitable mitigation as well as Monitoring Plan for monitoring and management procedures (EMP will assess the issues caused by severance and on other features considered "sensitive" along the alignment);
- Evaluation of cost for an EMP and Monitoring Plan.

8.2 Need for the Environmental Impact Assessment (EIA) Study

For all its positive aspects, road construction may also have substantial adverse effects on neighboring communities and the natural environment. Loss of water bodies and green cover; change in land use; accelerated urbanization; etc. are among the anticipated major environmental effects of this project.

Keeping these in mind, environmental evaluation was carried out in order to identify the baseline environmental profile for the area of influence of the proposed three-lane elevated highway. An Environmental Management Plan was also prepared in order to lessen the identified negative effects on the environmental constituents during the design, construction and operation of the road project.

8.3 The Approvals Pathway

The "approvals pathway" for the Project consists of a combination of the SDPWO Act and the *Integrated Planning Act 1997* (IPA). For a major project requiring development approvals under the IPA, the SDPWO Act lays out the procedure to be followed.

Before the start of relevant works, all essential development approvals, environmental certificates and authorizations would be required. In his evaluation of the EIS, the Coordinator- General may state conditions for these licenses and enforce conditions if no previous relevant approvals existed.

8.4 Property Requirements

Since all the land needed for this project is within the state government-controlled road reserve of the Western Freeway, expected property requirements are not required. Thus an enormous savings is achieved due to the nil resumptions of land for either option outlined.

Table 5: Summary of Likely Approvals for the Project

Activity	Relevant Legislation	Determining Authority
Development		
Material change of use for ERA*	Environmental Protection Act Integrated Planning Act	Environmental Protection Agency
Material change of use involving land on EMR or CLR	Environmental Protection Act Integrated Planning Act	Environmental Protection Agency Brisbane City Council
Development on a State heritage place	Queensland Heritage Act Integrated Planning Act	Chief Executive, Environmental Protection Agency
Development on a local heritage place	BCC City Plan 2000 Integrated Planning Act	Brisbane City Council
Operational work (eg: excavation or filling for spoil placement, clearing of native vegetation on freehold land) – if required	Integrated Planning Act	Brisbane City Council
Reconfiguration of a lot	Integrated Planning Act	Brisbane City Council
Building work for demolition of character housing in a demolition control precinct.	BCC City Plan 2000 Integrated Planning Act	Brisbane City Council
Environmental		
Disposal permit for contaminated land	Environmental Protection Act	Environmental Protection Agency
Taking, using, keeping or interfering with a protected animal or plant	Nature Conservation Act	Environmental Protection Agency
Development in Brisbane Forest Park	Brisbane Forest Park Act	Brisbane Forest Park Administration Authority
Potential acid sulphate soils management plan	State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils	Dept Natural Resources and Water Environmental Protection Agency
Disposal permit for contaminated land	Environmental Protection Act	Environmental Protection Agency
Other		
Works on or connecting with a State-controlled road	Transport Infrastructure Act	Dept of Main Roads
Works that interfere with a railway	Transport Infrastructure Act	Queensland Rail
Road closure	Land Act	Dept Natural Resources and Water
Local actions (eg: blasting)	Local laws	Brisbane City Council
Approved CHMP	Aboriginal Cultural Heritage Act	Dept Natural Resources and Water

(Northern Link EIS)

8.5 Baseline Environmental Profile of the Project Area

Field visits will need to be undertaken by environmental consultants in order to study the Environmental Profile of the project influence area and evaluate the effects of the proposed improvements to the road project. This will involve

- field inspections of all the sensitive locations;

- collection of secondary data for all the ecological components;
- conduct field monitoring to establish a standard of value for environmental limitations;
- Consultations with government officials, NGO's and the local public.

The baseline environmental status will be evaluated on the primary data collected from field environmental monitoring and the secondary information collected from consultations with various government agencies and institutions.

8.5.1 Ambient Air

Where there are no set EPA criteria or the NEPM criteria are more stringent than the set EPA criteria, it is proposed to adopt the NEPM air quality standards and goals for the purpose of this EIS.

It is important to mention that the standards determined as part of the NEPM are intended to be measured to provide an "average" representation of general air quality. That is, the NEPM monitoring protocol was not intended to apply to monitoring peak concentrations from major emission sources. The goals for ambient air quality are set out in Table 6 below.

Table 6: Goals for Ambient Air Quality

Pollutant	Goal	Measuring Period
Carbon monoxide (CO)	10 mg/m^3	8 hour maximum
Nitrogen dioxide (NO_2)	246 µg/ m^3	1 hour maximum
	62 µg/ m^3	annual average
Particulate matter < 10µg (PM_{10})	50 µg/ m^3	24 hour maximum
	25 µg/ m^3	annual mean
Particulate matter < 2.5µg ($PM_{2.5}$)	25 µg/ m^3	24 hour maximum
	8 µg/ m^3	annual mean
Total suspended particulate matter	90 µg/ m^3	annual average

Table Note:
The $PM_{2.5}$ goals are referred to as Advisory Reporting Standards and are set for the purpose of gathering data to facilitate a review of these standards as part of the development of the $PM_{2.5}$ NEPM.

(Northern Link EIS)

8.5.2 Water Environment

The leading possible sources of surface water pollution during construction and operation include:

- sediment-laden or contaminated runoff;
- litter and spillage or accidental release of pollutants, including hazardous and toxic chemical substances; and
- Modifications to surface water hydrology.

Management of possible effects to water quality during construction phase would be done through the following measures and controls:

- maximize the retained areas of vegetation and gradually restore cleared sections where appropriate;
- diversion of stormwater from higher ground around affected areas where possible;
- stockpile materials and excavated soil away from natural drainage areas;
- enforce procedures to slow down and/or prevent overland runoff such as the planting of vegetation and/or the putting in place of artificial structures (i.e. geofabric and bunds);
- effective erosion and sediment control measures to be set in place before starting construction works with regular daily monitoring and maintenance to ensure their continued effectiveness throughout the duration of the construction phase;
- make sure that dust-suppression measures are enforced throughout the construction phase;
- chemical storage areas and wash-down facilities having appropriate bunding and waste water collection systems are to be positioned away from existing drainage line;
- chemical and hydrocarbon wastewater must be disposed to a liquid waste disposal facility or company, or with the approval of the responsible authority, be treated to an acceptable level before release; and
- Storage facilities for wastes and spoil placement areas having suitable embankment and drainage systems are to be located away from existing drainage lines.

To ensure compliance with objectives and enable assessment and alleviation of potential effects to water quality, a monitoring program for the construction phase would be established.

A suitable and operational monitoring program is vital to the assessment and management of possible long-term and cumulative effects to surface waters. Runoff from road infrastructure has been identified as a major contributor of heavy metals and other toxic substances to local waterways.

8.5.3 Noise

As revealed from the observation of six sites adjacent to the western connection, existing noise levels in the study corridor indicate an environment typical of inner suburban areas where the dominant noise source is road traffic.

The levels of existing background noise at the monitored sites in the study corridor are presented in Table 7 below.

Table 7: Existing Background Noises – Average L90 Parameter

Site	Monitoring Location	Description	Rating Background Levels, minLA90 (dBA)		
			Day 7am - 6pm	Evening 6 - 10pm	Night 10pm - 7am
1	22 Crag Road, Taringa	Front yard of detached single storey dwelling, facing Western Freeway	48	46	39
2	115 Elizabeth Street, Toowong	High side of front yard of detached highset	46	41	34
3	6 Wool Street, Toowong	Front yard of single-storey detached dwelling	47	41	37
4	128 Sylvan Road, Toowong	Front yard of block of units	49	44	35
5	29 Valentine Street, Toowong	Front yard (facing Milton Road) of detached highset	53	50	43
6	69 Frederick Street, Toowong	Front verandah of highset detached dwelling	61	48	35

(Northern Link EIS)

Where reasonable and feasible, construction activity above ground and outside an acoustically-lined work enclosure should be limited to the hours of 6:30am to 6:30pm from Monday to Saturday with no outside work on Sundays or public holidays in order to achieve the objective of protecting affected communities from noise during construction.

8.5.4 Vibration during Construction

Targets of vibration differ primarily according to whether the sources are continuous or sporadic and whether they occur during the day or night. The effects of vibration in buildings can be classified into three main categories:

- Those in which the residents or users of the building are inconvenienced or possibly disrupted.
- Those in which the structural integrity of the building may be prejudiced.
- Those where the contents of the building may be affected.

Vibration standards which are relevant to the disruption of building contents are more rigorous than the standards relating to cosmetic building damage. However, vibration standards relating to human comfort are the most strictly enforced. This is due to the fact that people are able to "feel" or sense vibration at levels lower than those causing even superficial damage to the most susceptible types of structures.

Australian Standard *AS 2670.2-1990* provides "human comfort" vibration velocity levels based on worldwide experience as shown in Table 8. Below these levels, the probability of reaction (commonly referred to as "adverse comment") is low. A vibration guide level of 0.5mm/s at peak has been estimated as the threshold at which sleep disturbance may occur.

The vibration velocity levels in Table 8 are based on vibration velocity averaged within a defined time. These levels identify that vertical vibration are more readily recognized by humans than horizontal vibration.

Table 8: Recommended Vibration Velocity Levels for Human Comfort

Type of Space Occupancy	Time of Day	Vibration Velocities (mm/s) corresponding to a 'Low Probability of Adverse Comment'			
		Continuous Vibration (16h Day, 8h Night)		Transient Vibration Excitation with several Occurrences per Day	
		Vertical	Horizontal	Vertical	Horizontal
Critical working areas (eg: hospital operating theatres, some precision laboratories, etc)	Day	0.1	0.3	0.1	0.3
	Night	0.1	0.3	0.1	0.3
Residential	Day	0.2 to 0.4	0.6 to 1.1	3 to 9	9 to 26
	Night	0.14	0.40	0.14 to 2.0	0.4 to 6.0
Offices	Day	0.4	1.2	6 to 13	17 to 37
	Night	0.4	1.2	6 to 13	17 to 37
Workshops	Day	1.2	3.2	9 to 13	26 to 37
	Night	1.2	3.2	9 to 13	26 to 37

(Northern Link EIS)

8.5.5 Land

Soil sampling and geotechnical analysis will need to be carried out at several locations along the proposed elevated road in order to assess the soil quality of the study area.

8.6 Environmental Impacts, Mitigation Measures

The proposed project does not intrude into any ecologically sensitive features due to the fact that the project road is being constructed within an existing main roads corridor. The effects on the surrounding environment during construction and operational stages were identified based on the data gathered from the field monitoring surveys and were compared with the permissible limits of the CPCB. Mitigation measures are proposed to remove or abate the negative environmental effects. The EMP also proposes a monitoring plan during the construction and operational stage of the road project. These effects on the surrounding environment along with the various mitigation measures proposed are summarized in Table 9.

Figure 53: A Portion of the Existing Western Freeway Plan View

(Google Maps)

Table 9: Summary of Environmental Impacts and Mitigation Measures

Environmental Component	Environmental Impact	Mitigation Measures
CONSTRUCTION PHASE		
1. Soil		
Loss of topsoil	• Loss of productive soil during leasing of land to contractors for storing, stock yards and workers' camp as well as excavations during project construction.	• The topsoil will be stripped and stored. • The stored topsoil will be spread back to maintain the physicochemical and biological activity of the soil.
Compaction of soil	• The compaction of soil may not be largely affected.	• Construction vehicles, machinery and equipment shall operate and be located in the designated areas. • If operating from a leased land, the topsoil for agriculture should be preserved by ensuring that it will not be destroyed by storage, material-handling or any other construction-related activities. • If required, excavated soil should be dumped in areas selected and approved by the authorized representatives of the project implementing agency.
Contamination of soil from fuel and lubricants	• The impact will be negligible since the chemical nature of the soil will not change much. • Negligible impact on the growth of vegetation	• Vehicles and machines are properly maintained and refilled in such a way that old diesel spillage does not contaminate the soil. • Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies. • All spoils shall be disposed of as preferred and the site shall be fully cleaned before turning it over.
Contamination of soil from	• Negligible effect on the soil quality. • Vegetation growth will be partially	• Construction wastes should be dumped in selected pits which were excavated on infertile land.

Environmental Component	Environmental Impact	Mitigation Measures
construction wastes	disturbed.	• Follow the norms of TNPCB. • Borrow pits to be filled by such wastes.
2. Water		
Water bodies	• Water quality may deteriorate due to surface-runoff from the project site, dumping of construction debris, etc. • Water sources of nearby communities may be affected.	• Planting of vegetation along these water bodies may be undertaken. No labor camps, stone crushers, hot-mix plants and other heavy machinery should be located near water bodies. Dumping of debris to be strictly avoided. • Immediate replacement of any source of water for the community such as ponds, wells, tube-wells etc. inadvertently lost. • All preferred measures will be undertaken to prevent temporary or permanent flooding.
Other water sources	• Dumping of construction wastes into the coastal waters due to its proximity to the coast will have an impact on the near shore environment.	• Sites for the disposal of construction-related wastes should be recognized and approved by the authorized representatives of the project implementing agency prior to the start of construction work.
Drainage and runoff water	• The flow of run-off water will not be affected largely, except at certain stretches where drainage problems already exist.	• At cross-drainage channels, etc., earth, stone or any other construction material should be properly disposed of so as not to obstruct the flow of water.
Contamination of water from fuel and	• Fuel and lubricants may affect water bodies especially the coastal waters due to its proximity to the project site.	• Vehicles and equipment should be properly maintained and repaired to avoid contamination from fuel and lubricants.

Environmental Component	Environmental Impact	Mitigation Measures
lubricants		
Sanitation and waste disposal in construction camps	• Absence of proper sanitation may lead to various human diseases which are mostly water-borne.	• The construction workers' camp shall be located away from habitation and major water bodies. • The sewage system for such camps shall be properly designed and built so that no pollution takes place to any body of water or water course.
Use of water for construction	• The use of water from sources which are already in use by the local community may cause scarcity of water for the locals.	• Preparation for the supply and storage of water will be made by the contractor in such a way that the water availability and supply to neighbouring communities remain unaffected. If a new tube-well is to be bored, proper authorization and approval by Underground Water Department is needed. • Wastage of water during the construction should be reduced.
3. Air		
Emission from construction vehicles and machinery	• Effect on human health • Dust settled on leaves may reduce growth rate of the plants	• All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that pollution emission levels are within the standards of TNPCB. • Monitoring of suspended particulate matter shall be conducted at least once a month at the sites where crushers are used. • Human settlements should be at least 500m away from the windward direction of Hot (asphalt) mix plant.
Dust and its	• The impact of dust at construction sites is rather adverse, but localized in	• All precautionary measures shall be taken in order to lessen the level of dust emissions from hot mix plants.

Environmental Component	Environmental Impact	Mitigation Measures
treatment	nature. • No serious health problem is likely to be caused.	• Hot-mix plants should be located at least 500m away from the nearest habitation and from major water bodies. They should be fitted with dust extraction units. • Regular spraying of water should be done on the earth-mixing and asphalt-mixing sites including service roads. During sub-grade construction, water spraying is necessary to compact the soil properly. After compaction, water should be sprayed regularly to avoid dust. • Vehicles should be properly covered when transporting materials.
4. Noise Levels		
Noise from construction vehicles, asphalt plants and equipment	• The activities using heavy machinery and equipment are localized and intermittent. • No serious impact on human health like loss of hearing ability although some sleep disorders may result.	• Plants and equipment used in construction shall strictly follow the AS noise standards. • Vehicles and equipment used should be fitted with silencers. • Noise standards will be strictly implemented to prevent hearing damage for construction workers. • At project sites within 150m from human settlements, noisy construction work should be discontinued between 10:00pm and 8:00am. • Noise at construction sites to be closely monitored.
5. Safety and Accidental Risk		
Accident risk from construction	• The type of accidental risks may be due to ill-maintained machines and vehicles, poor light conditions at the work place, or carelessness and poor management	• To ensure safety in the temporary accesses during construction, lighting fixtures and safety signal devices shall be installed. Traffic rules and regulations to be strictly followed. • Safety of workers undertaking various operations during

Environmental Component	Environmental Impact	Mitigation Measures
activities	of the work involved	construction should be ensured by providing them with helmets, masks, safety goggles, etc. • Electrical equipment should be checked regularly to avoid hazards to workers. • A readily available first-aid unit including an adequate supply of dressing materials, a mode of transport (ambulance), nursing staff and an attending physician shall be provided at the project site. • Lighting and signal devices to be installed at workplace.
Health issues	• The prevalence of unhygienic conditions at work place of construction workers • The availability of good drinking water	• At every workplace, potable and adequate water supply shall be maintained to avoid waterborne diseases and safeguarding the health of workers. • Suitable drainage, sanitation and waste disposal to be provided at workplaces. • Medical care to be provided to sick workers.
6. Aesthetics & Common Amenities		
Roadside landscape development	• There will be positive impact on bio-aesthetics and beauty.	• Avenue plantation with couch grass and small flowering plants and shrubs shall be undertaken.
OPERATION PHASE		
Contamination from spills due	• The chances of accidents are likely to be reduced with improved width and	• Cleaning of spills at the accident site and the remaining spills may be disposed to a nearby small pit within ROW.

Environmental Component	Environmental Impact	Mitigation Measures
to traffic and accidents	quality of the road. The contamination of soil and water due to spills will be minor.	
Dust generation	• Although dust is a common feature of a tropical climate, the situation can be improved by developing new vegetation.	• Tree plantation at roadside shall be implemented, developed and maintained.
Air pollution	• The degree of air pollution is likely to be on a lower scale with improvement in road surface and with better maintenance.	• $PM_{2.5}$, PM_{10}, CO, SO2, NO_2 to be closely monitored. • Roadside tree plantation to be properly maintained. • Public awareness programs to be launched.
Accidents involving hazardous materials	• The chances of such accidents will be minimal but unavoidable.	• Compliance of rules as defined in Environmental (Protection) Act, 1986 • For delivery of hazardous substances, three certificates are required namely permit license, driving license and guarding license issued by transportation department • Vehicles delivering hazardous substances will be printed with unified signs. • Special route for these vehicles will be designated by the Public Security Transportation and the Fire Fighting Department. • Hazardous substances of the project will be controlled by Highway Management Department Registration System

Environmental Component	Environmental Impact	Mitigation Measures
		• In case of spillage, reporting to pertinent department will be made and instructions followed.
Safety measures	• The chances of accidents would be reduced in view of improved road conditions.	• Traffic management plan to be developed, especially in congested locations • Traffic control measures including speed limits to be strictly enforced • Discourage further advance of encroachment and squatting on ROW • Reduction of accidents through the widening of existing carriageway • Strengthening the pavement • Enhancement of the curves in road geometrics • Proposed service lanes for local approaches • Provision of proper median • Improvement of road crossings • Placement of warning signals and signboards

Figure 54: Existing Elevation View of the Western Freeway

8.7 Block Cost Estimates for Environmental Protection

Stating the various impacts and mitigation measures, a project-specific Environmental Management Plan (EMP) is formulated to avoid/minimize projected ecological effects. The responsibility of executing suggested mitigation measures lies primarily with the Contractor and Project/Design Consultant. A Monitoring Plan is also proposed to assess the efficiency of mitigation measures recommended in the EMP and assist management decisions for the project.

8.8 Conclusions – Environmental Impact Assessment

A framework for sustainable growth management of the Queensland Government is presented in the SEQ Regional Plan and the South East Infrastructure Plan and Program. The ongoing expansion of the road transport system is identified as an important part of the infrastructure group. The foremost deficiencies of the current road system are related to cracks in the planned network largely affecting the efficiency of the east-west transport as well as its safety and reliability. Among these insufficiencies are the following;

- the system performance;
- the capacity to accommodate growth in travel;
- long and unreliable travel times; and
- Absence of choices in route and the flexibility it offers

This proposed piece of road infrastructure seals the network gap between the western approaches from Moggill Road to the Legacy Way

CHAPTER 9 - COST ESTIMATES

9.1 Western Freeway

Approximate costs for this type of construction would

Figure 55: 3D View of Proposed Western Elevated Freeway from underneath

9.2 Road over Rail within Existing Rail Corridor

Figure 56: 3D View of Proposed road over rail Freeway from underneath

CHAPTER 10 - CONCLUSIONS AND SUMMARY

10.1 Western Freeway

This proposed elevated three-lane freeway from Moggill Road, Indooroopilly to Frederick Street Toowong offers the increased road network capacity required to compliment the new Legacy Way tunnel from Mount Cootha to the Inner City Bypass at Kelvin Grove.

Figure 57: 3D View of Proposed Western Elevated Freeway

The following design features improve the economics, aesthetics and sustainability of the project:

- Reversible one way directional flow via electronic signage and boom gates at entry ramps allowing for easy change in directional vehicle flow.
- Aesthetically pleasing with the ability of the concrete piers to be created with a colour oxide or painted a heritage green allowing for a less intrusive impact with respect to the existing bush surroundings.
- Sustainable water quality improvement features of bio-filtration built into the structure that allow for road pollutants to be captured and cleaned within the structure prior to exiting at the pier locations.
- Economical spans with precast girders allowing for quick and efficient construction timelines.
- Asphaltic concrete surface allowing for quieter travel.
- No resumptions of land.
- Current situation = 72000vpd - 24000v/lane/day = LOS = F

- Post elevated construction = 8000v/lane/hr = LOS C
- Expenditure justification is reduced travel time due to free flow conditions, etc.

The new sustainability components offer a more aesthetically pleasing piece of road infrastructure that blends into the natural surrounds whilst the economical precast girders allow for cheaper and quicker construction costs.

Thus, elevated roadways / freeways could be established over existing freeways to minimise the traffic congestion on South East Queensland's infrastructure as the population grows with improved reduction in environmental impacts and economics.

Figure 58: 3D View of Proposed Western Elevated Freeway from underneath

10.2 Road over Rail within Existing Rail Corridor

This proposed elevated six-lane freeway proposal over the top of existing rail lines offers the much increased road network capacity required to reduce traffic congestion within Brisbane.

The following design features improve the economics, aesthetics and sustainability of the project;

- Aesthetically pleasing with the ability of the concrete piers to be created with a colour oxide or painted a heritage green allowing for a less intrusive impact with respect to the existing bush surroundings.
- Sustainable water quality improvement features of bio-filtration built into the structure that allow for road pollutants to be captured and cleaned within the structure prior to exiting at the pier locations.

- Economical spans with precast girders allowing for quick and efficient construction timelines.
- Asphaltic concrete surface allowing for quieter travel.
- No resumptions of land.
- Improved travel time
- Current situation = 72000vpd - 24000v/lane/day = LOS = F
- Post elevated construction = 8000v/lane/hr = LOS C
- Expenditure justification is reduced travel time due to free flow conditions, etc.

The new sustainability components offer a more aesthetically pleasing piece of road infrastructure that blends into the natural surrounds whilst the economical precast girders allow for cheaper and quicker construction costs.

Thus elevated roadways / freeways could be established over existing railways to minimise the traffic congestion on South East Queensland's infrastructure as the population grows with improved reduction in environmental impacts and economics.

Figure 59: 3D Model of Proposed Road over Rail Structure

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Appendix A – Project Specification

***TOPIC*:** **Elevated Highways – A Solution to Brisbane's Traffic Congestion ?**

***SUPERVISOR*:** Trevor Drysdale

***SPONSORSHIP*:** Nil

***PROJECT AIM*:** The project seeks to investigate the feasibility of using elevated highways over the top of existing highways or within railway corridors within Brisbane to reduce the traffic congestion along the selected route and provide preliminary design, documentation and construction costing for at least one route.

***PROGRAMME*:** (Issue E – 5 April 2011)

1. Conduct a literature review and research of elevated highways.
2. Conduct research of elevated highways in other countries and their type of construction.
3. Identify locations of congestion via traffic chopper survey and/or TRM statistics.
4. Identify and select the major site location/s suitable for the proposal.
5. Obtain an existing aerial survey of the selected site from B.C.C or TRM.
6. Obtain GIS Mapping data of existing property boundaries and service locations from B.C.C of the selected site location.
7. Preliminary design of the elevated roadway alignment in 2D Autocad plan format for the selected site.
8. Extract the alignment for proposed elevated roadway at the selected site in 12D model v9.
9. Confirm from the research component, the typical cross section and preliminary structural design of the elevated highway.
10. Preliminary cross section design of the selected alignment in 12D and Autocad formats
11. Preliminary design of the structural components of the elevated highway in Autocad and 3D finite element software Staad Pro v8i.
12. Provide preliminary costing for the construction at the selected site.
13. Present the complete feasibility and preliminary design of the selected location and alignment, plans, cross sections, typical sections, 3d drive views with supporting documentation for location selection and construction costing.
14. Write up the dissertation and provide a hard copy and a pdf copy to USQ.

***As Time Permits*:**

1. Prepare a 3D model using 12D software, google earth and aerial mapping data.
2. Show a 3D model view of the proposed route whilst driving on the roadways in video format
3. Provide supporting structural calculations and a report of the structural

design of a typical elevated road section.

4. Investigate other locations of suitability (max. of 2-4 areas)

***Agreed*: ……………………………………………………………………….(Student)   Date:5/04/2011**

…………………………………………………….(Supervisor)   Date:……………………………….

…………………………………………………….(Examiner/Co-Examiner) Date:.………………….

Appendix B – Staad Pro v8i-Summary Output Calculations for Elevated Western Freeway Sub-structure

Job Information

	Engineer	Checked	Approved
Name:	BRD		
Date:	8/09/2011		

Structure Type	SPACE FRAME

Number of Nodes	495	Highest Node	515
Number of Elements	294	Highest Beam	880
Number of Plates	448	Highest Plate	778

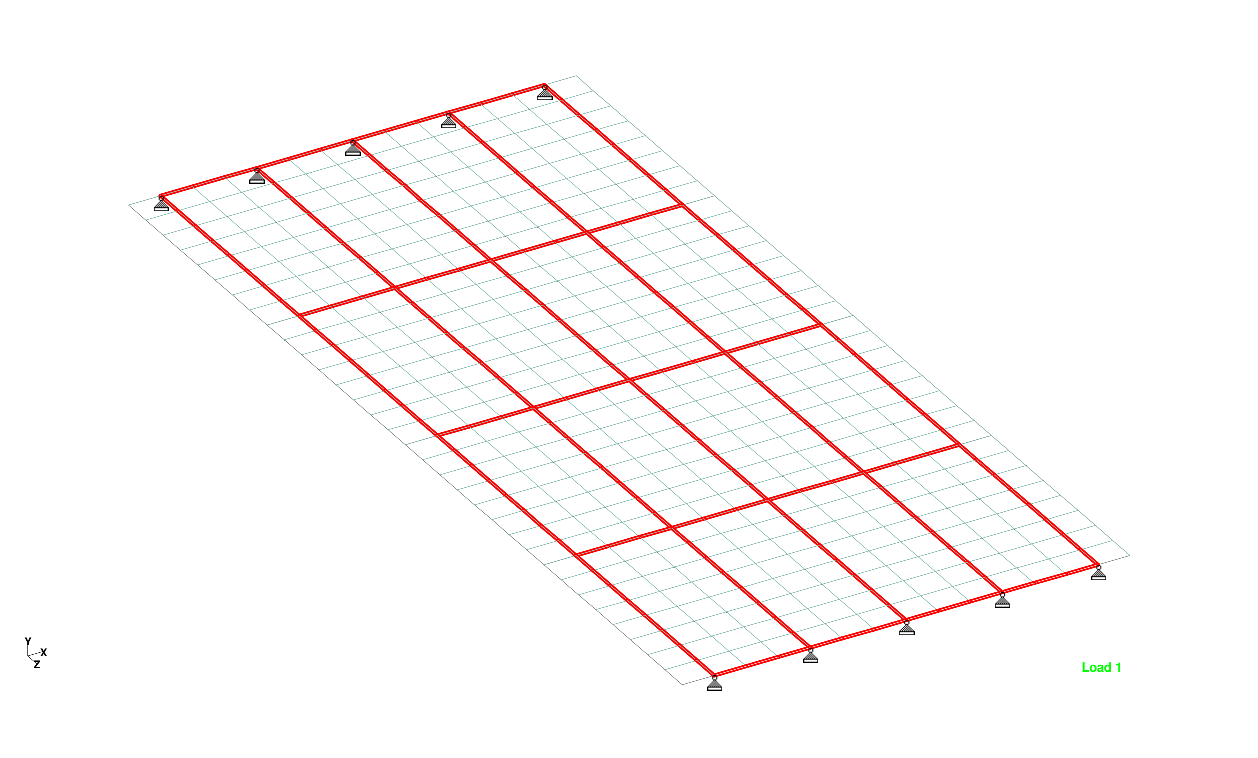
Number of Basic Load Cases	1
Number of Combination Load Cases	0

Included in this printout are data for:

All	The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	UDL
Generation	2	LOAD GENERATION, LOAD #2, (1 of 30)
Generation	3	LOAD GENERATION, LOAD #3, (2 of 30)
Generation	4	LOAD GENERATION, LOAD #4, (3 of 30)
Generation	5	LOAD GENERATION, LOAD #5, (4 of 30)
Generation	6	LOAD GENERATION, LOAD #6, (5 of 30)
Generation	7	LOAD GENERATION, LOAD #7, (6 of 30)
Generation	8	LOAD GENERATION, LOAD #8, (7 of 30)
Generation	9	LOAD GENERATION, LOAD #9, (8 of 30)
Generation	10	LOAD GENERATION, LOAD #10, (9 of 30
Generation	11	LOAD GENERATION, LOAD #11, (10 of 3
Generation	12	LOAD GENERATION, LOAD #12, (11 of 3
Generation	13	LOAD GENERATION, LOAD #13, (12 of 3
Generation	14	LOAD GENERATION, LOAD #14, (13 of 3
Generation	15	LOAD GENERATION, LOAD #15, (14 of 3
Generation	16	LOAD GENERATION, LOAD #16, (15 of 3
Generation	17	LOAD GENERATION, LOAD #17, (16 of 3
Generation	18	LOAD GENERATION, LOAD #18, (17 of 3
Generation	19	LOAD GENERATION, LOAD #19, (18 of 3
Generation	20	LOAD GENERATION, LOAD #20, (19 of 3
Generation	21	LOAD GENERATION, LOAD #21, (20 of 3
Generation	22	LOAD GENERATION, LOAD #22, (21 of 3
Generation	23	LOAD GENERATION, LOAD #23, (22 of 3
Generation	24	LOAD GENERATION, LOAD #24, (23 of 3
Generation	25	LOAD GENERATION, LOAD #25, (24 of 3
Generation	26	LOAD GENERATION, LOAD #26, (25 of 3
Generation	27	LOAD GENERATION, LOAD #27, (26 of 3
Generation	28	LOAD GENERATION, LOAD #28, (27 of 3
Generation	29	LOAD GENERATION, LOAD #29, (28 of 3
Generation	30	LOAD GENERATION, LOAD #30, (29 of 3
Generation	31	LOAD GENERATION, LOAD #31, (30 of 3



Whole Structure

Nodes

Node	X (m)	Y (m)	Z (m)
1	1.000	0.000	0.000
2	4.000	0.000	0.000
3	7.000	0.000	0.000
4	10.000	0.000	0.000
5	13.000	0.000	0.000
26	1.000	0.000	30.000
27	4.000	0.000	30.000
28	7.000	0.000	30.000
29	10.000	0.000	30.000
30	13.000	0.000	30.000
31	13.000	0.000	7.500
32	13.000	0.000	15.000
33	13.000	0.000	22.500
34	1.000	0.000	7.500
35	4.000	0.000	7.500
36	7.000	0.000	7.500
37	10.000	0.000	7.500
38	1.000	0.000	15.000
39	4.000	0.000	15.000
40	7.000	0.000	15.000
41	10.000	0.000	15.000
42	1.000	0.000	22.500
43	4.000	0.000	22.500

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
44	7.000	0.000	22.500
45	10.000	0.000	22.500
46	0.000	0.000	0.000
47	0.000	0.000	30.000
48	0.000	0.000	7.500
49	0.000	0.000	15.000
50	0.000	0.000	22.500
51	14.000	0.000	0.000
52	14.000	0.000	30.000
53	14.000	0.000	7.500
54	14.000	0.000	15.000
55	14.000	0.000	22.500
56	1.000	0.000	0.938
57	2.000	0.000	0.938
58	2.000	0.000	0.000
59	1.000	0.000	1.875
60	2.000	0.000	1.875
61	1.000	0.000	2.813
62	2.000	0.000	2.813
63	1.000	0.000	3.750
64	2.000	0.000	3.750
65	1.000	0.000	4.688
66	2.000	0.000	4.688
67	1.000	0.000	5.625
68	2.000	0.000	5.625
69	1.000	0.000	6.563
70	2.000	0.000	6.563
71	2.000	0.000	7.500
72	3.000	0.000	0.938
73	3.000	0.000	0.000
74	3.000	0.000	1.875
75	3.000	0.000	2.813
76	3.000	0.000	3.750
77	3.000	0.000	4.688
78	3.000	0.000	5.625
79	3.000	0.000	6.563
80	3.000	0.000	7.500
81	4.000	0.000	0.938
82	4.000	0.000	1.875
83	4.000	0.000	2.813
84	4.000	0.000	3.750
85	4.000	0.000	4.688
86	4.000	0.000	5.625
87	4.000	0.000	6.563
88	0.000	0.000	6.563
89	0.000	0.000	5.625
90	0.000	0.000	4.688
91	0.000	0.000	3.750
92	0.000	0.000	2.813

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
93	0.000	0.000	1.875
94	0.000	0.000	0.938
95	14.000	0.000	0.938
96	14.000	0.000	1.875
97	14.000	0.000	2.813
98	14.000	0.000	3.750
99	14.000	0.000	4.688
100	14.000	0.000	5.625
101	14.000	0.000	6.563
102	13.000	0.000	6.563
103	13.000	0.000	5.625
104	13.000	0.000	4.688
105	13.000	0.000	3.750
106	13.000	0.000	2.813
107	13.000	0.000	1.875
108	13.000	0.000	0.938
109	5.000	0.000	0.938
110	5.000	0.000	0.000
111	5.000	0.000	1.875
112	5.000	0.000	2.813
113	5.000	0.000	3.750
114	5.000	0.000	4.688
115	5.000	0.000	5.625
116	5.000	0.000	6.563
117	5.000	0.000	7.500
118	6.000	0.000	0.938
119	6.000	0.000	0.000
120	6.000	0.000	1.875
121	6.000	0.000	2.813
122	6.000	0.000	3.750
123	6.000	0.000	4.688
124	6.000	0.000	5.625
125	6.000	0.000	6.563
126	6.000	0.000	7.500
127	7.000	0.000	0.938
128	7.000	0.000	1.875
129	7.000	0.000	2.813
130	7.000	0.000	3.750
131	7.000	0.000	4.688
132	7.000	0.000	5.625
133	7.000	0.000	6.563
134	8.000	0.000	0.938
135	8.000	0.000	0.000
136	8.000	0.000	1.875
137	8.000	0.000	2.813
138	8.000	0.000	3.750
139	8.000	0.000	4.688
140	8.000	0.000	5.625
141	8.000	0.000	6.563

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
142	8.000	0.000	7.500
143	9.000	0.000	0.938
144	9.000	0.000	0.000
145	9.000	0.000	1.875
146	9.000	0.000	2.813
147	9.000	0.000	3.750
148	9.000	0.000	4.688
149	9.000	0.000	5.625
150	9.000	0.000	6.563
151	9.000	0.000	7.500
152	10.000	0.000	0.938
153	10.000	0.000	1.875
154	10.000	0.000	2.813
155	10.000	0.000	3.750
156	10.000	0.000	4.688
157	10.000	0.000	5.625
158	10.000	0.000	6.563
159	11.000	0.000	0.938
160	11.000	0.000	0.000
161	11.000	0.000	1.875
162	11.000	0.000	2.813
163	11.000	0.000	3.750
164	11.000	0.000	4.688
165	11.000	0.000	5.625
166	11.000	0.000	6.563
167	11.000	0.000	7.500
168	12.000	0.000	0.938
169	12.000	0.000	0.000
170	12.000	0.000	1.875
171	12.000	0.000	2.813
172	12.000	0.000	3.750
173	12.000	0.000	4.688
174	12.000	0.000	5.625
175	12.000	0.000	6.563
176	12.000	0.000	7.500
177	1.000	0.000	8.438
178	2.000	0.000	8.438
179	1.000	0.000	9.375
180	2.000	0.000	9.375
181	1.000	0.000	10.313
182	2.000	0.000	10.313
183	1.000	0.000	11.250
184	2.000	0.000	11.250
185	1.000	0.000	12.188
186	2.000	0.000	12.188
187	1.000	0.000	13.125
188	2.000	0.000	13.125
189	1.000	0.000	14.063
190	2.000	0.000	14.063

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
191	2.000	0.000	15.000
192	3.000	0.000	8.438
193	3.000	0.000	9.375
194	3.000	0.000	10.313
195	3.000	0.000	11.250
196	3.000	0.000	12.188
197	3.000	0.000	13.125
198	3.000	0.000	14.063
199	3.000	0.000	15.000
200	4.000	0.000	8.438
201	4.000	0.000	9.375
202	4.000	0.000	10.313
203	4.000	0.000	11.250
204	4.000	0.000	12.188
205	4.000	0.000	13.125
206	4.000	0.000	14.063
207	0.000	0.000	14.063
208	0.000	0.000	13.125
209	0.000	0.000	12.188
210	0.000	0.000	11.250
211	0.000	0.000	10.313
212	0.000	0.000	9.375
213	0.000	0.000	8.438
214	14.000	0.000	8.438
215	14.000	0.000	9.375
216	14.000	0.000	10.313
217	14.000	0.000	11.250
218	14.000	0.000	12.188
219	14.000	0.000	13.125
220	14.000	0.000	14.063
221	13.000	0.000	14.063
222	13.000	0.000	13.125
223	13.000	0.000	12.188
224	13.000	0.000	11.250
225	13.000	0.000	10.313
226	13.000	0.000	9.375
227	13.000	0.000	8.438
228	5.000	0.000	8.438
229	5.000	0.000	9.375
230	5.000	0.000	10.313
231	5.000	0.000	11.250
232	5.000	0.000	12.188
233	5.000	0.000	13.125
234	5.000	0.000	14.063
235	5.000	0.000	15.000
236	6.000	0.000	8.438
237	6.000	0.000	9.375
238	6.000	0.000	10.313
239	6.000	0.000	11.250

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
240	6.000	0.000	12.188
241	6.000	0.000	13.125
242	6.000	0.000	14.063
243	6.000	0.000	15.000
244	7.000	0.000	8.438
245	7.000	0.000	9.375
246	7.000	0.000	10.313
247	7.000	0.000	11.250
248	7.000	0.000	12.188
249	7.000	0.000	13.125
250	7.000	0.000	14.063
251	8.000	0.000	8.438
252	8.000	0.000	9.375
253	8.000	0.000	10.313
254	8.000	0.000	11.250
255	8.000	0.000	12.188
256	8.000	0.000	13.125
257	8.000	0.000	14.063
258	8.000	0.000	15.000
259	9.000	0.000	8.438
260	9.000	0.000	9.375
261	9.000	0.000	10.313
262	9.000	0.000	11.250
263	9.000	0.000	12.188
264	9.000	0.000	13.125
265	9.000	0.000	14.063
266	9.000	0.000	15.000
267	10.000	0.000	8.438
268	10.000	0.000	9.375
269	10.000	0.000	10.313
270	10.000	0.000	11.250
271	10.000	0.000	12.188
272	10.000	0.000	13.125
273	10.000	0.000	14.063
274	11.000	0.000	8.438
275	11.000	0.000	9.375
276	11.000	0.000	10.313
277	11.000	0.000	11.250
278	11.000	0.000	12.188
279	11.000	0.000	13.125
280	11.000	0.000	14.063
281	11.000	0.000	15.000
282	12.000	0.000	8.438
283	12.000	0.000	9.375
284	12.000	0.000	10.313
285	12.000	0.000	11.250
286	12.000	0.000	12.188
287	12.000	0.000	13.125
288	12.000	0.000	14.063

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
289	12.000	0.000	15.000
290	1.000	0.000	15.938
291	2.000	0.000	15.938
292	1.000	0.000	16.875
293	2.000	0.000	16.875
294	1.000	0.000	17.813
295	2.000	0.000	17.813
296	1.000	0.000	18.750
297	2.000	0.000	18.750
298	1.000	0.000	19.688
299	2.000	0.000	19.688
300	1.000	0.000	20.625
301	2.000	0.000	20.625
302	1.000	0.000	21.563
303	2.000	0.000	21.563
304	2.000	0.000	22.500
305	3.000	0.000	15.938
306	3.000	0.000	16.875
307	3.000	0.000	17.813
308	3.000	0.000	18.750
309	3.000	0.000	19.688
310	3.000	0.000	20.625
311	3.000	0.000	21.563
312	3.000	0.000	22.500
313	4.000	0.000	15.938
314	4.000	0.000	16.875
315	4.000	0.000	17.813
316	4.000	0.000	18.750
317	4.000	0.000	19.688
318	4.000	0.000	20.625
319	4.000	0.000	21.563
320	0.000	0.000	21.563
321	0.000	0.000	20.625
322	0.000	0.000	19.688
323	0.000	0.000	18.750
324	0.000	0.000	17.813
325	0.000	0.000	16.875
326	0.000	0.000	15.938
327	14.000	0.000	15.938
328	14.000	0.000	16.875
329	14.000	0.000	17.813
330	14.000	0.000	18.750
331	14.000	0.000	19.688
332	14.000	0.000	20.625
333	14.000	0.000	21.563
334	13.000	0.000	21.563
335	13.000	0.000	20.625
336	13.000	0.000	19.688
337	13.000	0.000	18.750

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
338	13.000	0.000	17.813
339	13.000	0.000	16.875
340	13.000	0.000	15.938
341	5.000	0.000	15.938
342	5.000	0.000	16.875
343	5.000	0.000	17.813
344	5.000	0.000	18.750
345	5.000	0.000	19.688
346	5.000	0.000	20.625
347	5.000	0.000	21.563
348	5.000	0.000	22.500
349	6.000	0.000	15.938
350	6.000	0.000	16.875
351	6.000	0.000	17.813
352	6.000	0.000	18.750
353	6.000	0.000	19.688
354	6.000	0.000	20.625
355	6.000	0.000	21.563
356	6.000	0.000	22.500
357	7.000	0.000	15.938
358	7.000	0.000	16.875
359	7.000	0.000	17.813
360	7.000	0.000	18.750
361	7.000	0.000	19.688
362	7.000	0.000	20.625
363	7.000	0.000	21.563
364	8.000	0.000	15.938
365	8.000	0.000	16.875
366	8.000	0.000	17.813
367	8.000	0.000	18.750
368	8.000	0.000	19.688
369	8.000	0.000	20.625
370	8.000	0.000	21.563
371	8.000	0.000	22.500
372	9.000	0.000	15.938
373	9.000	0.000	16.875
374	9.000	0.000	17.813
375	9.000	0.000	18.750
376	9.000	0.000	19.688
377	9.000	0.000	20.625
378	9.000	0.000	21.563
379	9.000	0.000	22.500
380	10.000	0.000	15.938
381	10.000	0.000	16.875
382	10.000	0.000	17.813
383	10.000	0.000	18.750
384	10.000	0.000	19.688
385	10.000	0.000	20.625
386	10.000	0.000	21.563

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
387	11.000	0.000	15.938
388	11.000	0.000	16.875
389	11.000	0.000	17.813
390	11.000	0.000	18.750
391	11.000	0.000	19.688
392	11.000	0.000	20.625
393	11.000	0.000	21.563
394	11.000	0.000	22.500
395	12.000	0.000	15.938
396	12.000	0.000	16.875
397	12.000	0.000	17.813
398	12.000	0.000	18.750
399	12.000	0.000	19.688
400	12.000	0.000	20.625
401	12.000	0.000	21.563
402	12.000	0.000	22.500
403	1.000	0.000	23.438
404	2.000	0.000	23.438
405	1.000	0.000	24.375
406	2.000	0.000	24.375
407	1.000	0.000	25.313
408	2.000	0.000	25.313
409	1.000	0.000	26.250
410	2.000	0.000	26.250
411	1.000	0.000	27.188
412	2.000	0.000	27.188
413	1.000	0.000	28.125
414	2.000	0.000	28.125
415	1.000	0.000	29.063
416	2.000	0.000	29.063
417	2.000	0.000	30.000
418	3.000	0.000	23.438
419	3.000	0.000	24.375
420	3.000	0.000	25.313
421	3.000	0.000	26.250
422	3.000	0.000	27.188
423	3.000	0.000	28.125
424	3.000	0.000	29.063
425	3.000	0.000	30.000
426	4.000	0.000	23.438
427	4.000	0.000	24.375
428	4.000	0.000	25.313
429	4.000	0.000	26.250
430	4.000	0.000	27.188
431	4.000	0.000	28.125
432	4.000	0.000	29.063
433	0.000	0.000	29.063
434	0.000	0.000	28.125
435	0.000	0.000	27.188

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
436	0.000	0.000	26.250
437	0.000	0.000	25.313
438	0.000	0.000	24.375
439	0.000	0.000	23.438
440	14.000	0.000	23.438
441	14.000	0.000	24.375
442	14.000	0.000	25.313
443	14.000	0.000	26.250
444	14.000	0.000	27.188
445	14.000	0.000	28.125
446	14.000	0.000	29.063
447	13.000	0.000	29.063
448	13.000	0.000	28.125
449	13.000	0.000	27.188
450	13.000	0.000	26.250
451	13.000	0.000	25.313
452	13.000	0.000	24.375
453	13.000	0.000	23.438
454	5.000	0.000	23.438
455	5.000	0.000	24.375
456	5.000	0.000	25.313
457	5.000	0.000	26.250
458	5.000	0.000	27.188
459	5.000	0.000	28.125
460	5.000	0.000	29.063
461	5.000	0.000	30.000
462	6.000	0.000	23.438
463	6.000	0.000	24.375
464	6.000	0.000	25.313
465	6.000	0.000	26.250
466	6.000	0.000	27.188
467	6.000	0.000	28.125
468	6.000	0.000	29.063
469	6.000	0.000	30.000
470	7.000	0.000	23.438
471	7.000	0.000	24.375
472	7.000	0.000	25.313
473	7.000	0.000	26.250
474	7.000	0.000	27.188
475	7.000	0.000	28.125
476	7.000	0.000	29.063
477	8.000	0.000	23.438
478	8.000	0.000	24.375
479	8.000	0.000	25.313
480	8.000	0.000	26.250
481	8.000	0.000	27.188
482	8.000	0.000	28.125
483	8.000	0.000	29.063
484	8.000	0.000	30.000

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
485	9.000	0.000	23.438
486	9.000	0.000	24.375
487	9.000	0.000	25.313
488	9.000	0.000	26.250
489	9.000	0.000	27.188
490	9.000	0.000	28.125
491	9.000	0.000	29.063
492	9.000	0.000	30.000
493	10.000	0.000	23.438
494	10.000	0.000	24.375
495	10.000	0.000	25.313
496	10.000	0.000	26.250
497	10.000	0.000	27.188
498	10.000	0.000	28.125
499	10.000	0.000	29.063
500	11.000	0.000	23.438
501	11.000	0.000	24.375
502	11.000	0.000	25.313
503	11.000	0.000	26.250
504	11.000	0.000	27.188
505	11.000	0.000	28.125
506	11.000	0.000	29.063
507	11.000	0.000	30.000
508	12.000	0.000	23.438
509	12.000	0.000	24.375
510	12.000	0.000	25.313
511	12.000	0.000	26.250
512	12.000	0.000	27.188
513	12.000	0.000	28.125
514	12.000	0.000	29.063
515	12.000	0.000	30.000

Beams

Beam	Node A	Node B	Length (m)	Property	β (degrees)
1	1	58	1.000	3	0
2	2	110	1.000	3	0
3	3	135	1.000	3	0
4	4	160	1.000	3	0
5	1	56	0.938	2	0
6	2	81	0.938	2	0
7	3	127	0.938	2	0
8	4	152	0.938	2	0
9	5	108	0.938	2	0
46	26	417	1.000	3	0
47	27	461	1.000	3	0
48	28	484	1.000	3	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
49	29	507	1.000	3	0
50	31	227	0.938	2	0
51	32	340	0.938	2	0
52	33	453	0.938	2	0
53	34	177	0.938	2	0
54	35	200	0.938	2	0
55	36	244	0.938	2	0
56	37	267	0.938	2	0
57	34	71	1.000	3	0
58	35	117	1.000	3	0
59	36	142	1.000	3	0
60	37	167	1.000	3	0
61	38	290	0.938	2	0
62	39	313	0.938	2	0
63	40	357	0.938	2	0
64	41	380	0.938	2	0
65	38	191	1.000	3	0
66	39	235	1.000	3	0
67	40	258	1.000	3	0
68	41	281	1.000	3	0
69	42	403	0.938	2	0
70	43	426	0.938	2	0
71	44	470	0.938	2	0
72	45	493	0.938	2	0
73	42	304	1.000	3	0
74	43	348	1.000	3	0
75	44	371	1.000	3	0
76	45	394	1.000	3	0
95	56	59	0.938	2	0
96	58	73	1.000	3	0
98	59	61	0.938	2	0
100	61	63	0.938	2	0
102	63	65	0.938	2	0
104	65	67	0.938	2	0
106	67	69	0.938	2	0
108	69	34	0.938	2	0
110	71	80	1.000	3	0
112	73	2	1.000	3	0
120	80	35	1.000	3	0
122	81	82	0.938	2	0
124	82	83	0.938	2	0
126	83	84	0.938	2	0
128	84	85	0.938	2	0
130	85	86	0.938	2	0
132	86	87	0.938	2	0
134	87	35	0.938	2	0
159	102	31	0.938	2	0
160	103	102	0.938	2	0
161	104	103	0.938	2	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
162	105	104	0.938	2	0
163	106	105	0.938	2	0
164	107	106	0.938	2	0
165	108	107	0.938	2	0
174	110	119	1.000	3	0
175	117	126	1.000	3	0
176	119	3	1.000	3	0
177	126	36	1.000	3	0
178	127	128	0.938	2	0
179	128	129	0.938	2	0
180	129	130	0.938	2	0
181	130	131	0.938	2	0
182	131	132	0.938	2	0
183	132	133	0.938	2	0
184	133	36	0.938	2	0
209	135	144	1.000	3	0
210	142	151	1.000	3	0
211	144	4	1.000	3	0
212	151	37	1.000	3	0
213	152	153	0.938	2	0
214	153	154	0.938	2	0
215	154	155	0.938	2	0
216	155	156	0.938	2	0
217	156	157	0.938	2	0
218	157	158	0.938	2	0
219	158	37	0.938	2	0
244	160	169	1.000	3	0
245	167	176	1.000	3	0
246	169	5	1.000	3	0
247	176	31	1.000	3	0
272	177	179	0.938	2	0
273	179	181	0.937	2	0
274	181	183	0.938	2	0
275	183	185	0.938	2	0
276	185	187	0.938	2	0
277	187	189	0.938	2	0
278	189	38	0.938	2	0
279	191	199	1.000	3	0
280	199	39	1.000	3	0
281	200	201	0.938	2	0
282	201	202	0.937	2	0
283	202	203	0.938	2	0
284	203	204	0.938	2	0
285	204	205	0.938	2	0
286	205	206	0.938	2	0
287	206	39	0.938	2	0
302	221	32	0.938	2	0
303	222	221	0.938	2	0
304	223	222	0.938	2	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
305	224	223	0.938	2	0
306	225	224	0.938	2	0
307	226	225	0.937	2	0
308	227	226	0.938	2	0
309	235	243	1.000	3	0
310	243	40	1.000	3	0
311	244	245	0.938	2	0
312	245	246	0.937	2	0
313	246	247	0.938	2	0
314	247	248	0.938	2	0
315	248	249	0.938	2	0
316	249	250	0.938	2	0
317	250	40	0.938	2	0
318	258	266	1.000	3	0
319	266	41	1.000	3	0
320	267	268	0.938	2	0
321	268	269	0.937	2	0
322	269	270	0.938	2	0
323	270	271	0.938	2	0
324	271	272	0.938	2	0
325	272	273	0.938	2	0
326	273	41	0.938	2	0
327	281	289	1.000	3	0
328	289	32	1.000	3	0
441	290	292	0.938	2	0
442	292	294	0.938	2	0
443	294	296	0.938	2	0
444	296	298	0.938	2	0
445	298	300	0.938	2	0
446	300	302	0.938	2	0
447	302	42	0.938	2	0
448	304	312	1.000	3	0
449	312	43	1.000	3	0
450	313	314	0.938	2	0
451	314	315	0.938	2	0
452	315	316	0.938	2	0
453	316	317	0.938	2	0
454	317	318	0.938	2	0
455	318	319	0.938	2	0
456	319	43	0.938	2	0
471	334	33	0.938	2	0
472	335	334	0.938	2	0
473	336	335	0.938	2	0
474	337	336	0.938	2	0
475	338	337	0.938	2	0
476	339	338	0.938	2	0
477	340	339	0.938	2	0
478	348	356	1.000	3	0
479	356	44	1.000	3	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
480	357	358	0.938	2	0
481	358	359	0.938	2	0
482	359	360	0.938	2	0
483	360	361	0.938	2	0
484	361	362	0.938	2	0
485	362	363	0.938	2	0
486	363	44	0.938	2	0
487	371	379	1.000	3	0
488	379	45	1.000	3	0
489	380	381	0.938	2	0
490	381	382	0.938	2	0
491	382	383	0.938	2	0
492	383	384	0.938	2	0
493	384	385	0.938	2	0
494	385	386	0.938	2	0
495	386	45	0.938	2	0
496	394	402	1.000	3	0
497	402	33	1.000	3	0
610	403	405	0.938	2	0
611	405	407	0.938	2	0
612	407	409	0.938	2	0
613	409	411	0.938	2	0
614	411	413	0.938	2	0
615	413	415	0.938	2	0
616	415	26	0.938	2	0
617	417	425	1.000	3	0
618	425	27	1.000	3	0
619	426	427	0.938	2	0
620	427	428	0.938	2	0
621	428	429	0.938	2	0
622	429	430	0.938	2	0
623	430	431	0.938	2	0
624	431	432	0.938	2	0
625	432	27	0.938	2	0
640	447	30	0.938	2	0
641	448	447	0.938	2	0
642	449	448	0.938	2	0
643	450	449	0.938	2	0
644	451	450	0.938	2	0
645	452	451	0.938	2	0
646	453	452	0.938	2	0
647	461	469	1.000	3	0
648	469	28	1.000	3	0
649	470	471	0.938	2	0
650	471	472	0.938	2	0
651	472	473	0.938	2	0
652	473	474	0.938	2	0
653	474	475	0.938	2	0
654	475	476	0.938	2	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
655	476	28	0.938	2	0
656	484	492	1.000	3	0
657	492	29	1.000	3	0
658	493	494	0.938	2	0
659	494	495	0.938	2	0
660	495	496	0.938	2	0
661	496	497	0.938	2	0
662	497	498	0.938	2	0
663	498	499	0.938	2	0
664	499	29	0.938	2	0
665	507	515	1.000	3	0
666	515	30	1.000	3	0
779	1	46	1.000	1	0
780	26	47	1.000	1	0
781	34	48	1.000	1	0
782	38	49	1.000	1	0
783	42	50	1.000	1	0
812	46	94	0.938	1	0
813	48	213	0.938	1	0
814	49	326	0.938	1	0
815	50	439	0.938	1	0
816	94	93	0.938	1	0
817	93	92	0.938	1	0
818	92	91	0.938	1	0
819	91	90	0.938	1	0
820	90	89	0.938	1	0
821	89	88	0.938	1	0
822	88	48	0.938	1	0
823	213	212	0.938	1	0
824	212	211	0.937	1	0
825	211	210	0.938	1	0
826	210	209	0.938	1	0
827	209	208	0.938	1	0
828	208	207	0.938	1	0
829	207	49	0.938	1	0
830	326	325	0.938	1	0
831	325	324	0.938	1	0
832	324	323	0.938	1	0
833	323	322	0.938	1	0
834	322	321	0.938	1	0
835	321	320	0.938	1	0
836	320	50	0.938	1	0
837	439	438	0.938	1	0
838	438	437	0.938	1	0
839	437	436	0.938	1	0
840	436	435	0.938	1	0
841	435	434	0.938	1	0
842	434	433	0.938	1	0
843	433	47	0.938	1	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
844	51	95	0.938	1	0
845	53	214	0.938	1	0
846	54	327	0.938	1	0
847	55	440	0.938	1	0
848	101	53	0.938	1	0
849	100	101	0.938	1	0
850	99	100	0.938	1	0
851	98	99	0.938	1	0
852	97	98	0.938	1	0
853	96	97	0.938	1	0
854	95	96	0.938	1	0
855	220	54	0.938	1	0
856	219	220	0.938	1	0
857	218	219	0.938	1	0
858	217	218	0.938	1	0
859	216	217	0.938	1	0
860	215	216	0.937	1	0
861	214	215	0.938	1	0
862	333	55	0.938	1	0
863	332	333	0.938	1	0
864	331	332	0.938	1	0
865	330	331	0.938	1	0
866	329	330	0.938	1	0
867	328	329	0.938	1	0
868	327	328	0.938	1	0
869	446	52	0.938	1	0
870	445	446	0.938	1	0
871	444	445	0.938	1	0
872	443	444	0.938	1	0
873	442	443	0.938	1	0
874	441	442	0.938	1	0
875	440	441	0.938	1	0
876	5	51	1.000	1	0
877	31	53	1.000	1	0
878	32	54	1.000	1	0
879	33	55	1.000	1	0
880	30	52	1.000	1	0

Plates

Plate	Node A	Node B	Node C	Node D	Property
97	1	56	57	58	4
99	56	59	60	57	4
101	59	61	62	60	4
103	61	63	64	62	4
105	63	65	66	64	4
107	65	67	68	66	4
109	67	69	70	68	4
111	69	34	71	70	4
113	58	57	72	73	4
114	57	60	74	72	4
115	60	62	75	74	4
116	62	64	76	75	4
117	64	66	77	76	4
118	66	68	78	77	4
119	68	70	79	78	4
121	70	71	80	79	4
123	73	72	81	2	4
125	72	74	82	81	4
127	74	75	83	82	4
129	75	76	84	83	4
131	76	77	85	84	4
133	77	78	86	85	4
135	78	79	87	86	4
136	79	80	35	87	4
138	48	34	69	88	4
140	88	69	67	89	4
142	89	67	65	90	4
144	90	65	63	91	4
146	91	63	61	92	4
148	92	61	59	93	4
150	93	59	56	94	4
151	94	56	1	46	4
166	31	53	101	102	4
167	102	101	100	103	4
168	103	100	99	104	4
169	104	99	98	105	4
170	105	98	97	106	4
171	106	97	96	107	4
172	107	96	95	108	4
173	108	95	51	5	4
185	2	81	109	110	4
186	81	82	111	109	4
187	82	83	112	111	4
188	83	84	113	112	4
189	84	85	114	113	4
190	85	86	115	114	4
191	86	87	116	115	4
192	87	35	117	116	4
193	110	109	118	119	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
194	109	111	120	118	4
195	111	112	121	120	4
196	112	113	122	121	4
197	113	114	123	122	4
198	114	115	124	123	4
199	115	116	125	124	4
200	116	117	126	125	4
201	119	118	127	3	4
202	118	120	128	127	4
203	120	121	129	128	4
204	121	122	130	129	4
205	122	123	131	130	4
206	123	124	132	131	4
207	124	125	133	132	4
208	125	126	36	133	4
220	3	127	134	135	4
221	127	128	136	134	4
222	128	129	137	136	4
223	129	130	138	137	4
224	130	131	139	138	4
225	131	132	140	139	4
226	132	133	141	140	4
227	133	36	142	141	4
228	135	134	143	144	4
229	134	136	145	143	4
230	136	137	146	145	4
231	137	138	147	146	4
232	138	139	148	147	4
233	139	140	149	148	4
234	140	141	150	149	4
235	141	142	151	150	4
236	144	143	152	4	4
237	143	145	153	152	4
238	145	146	154	153	4
239	146	147	155	154	4
240	147	148	156	155	4
241	148	149	157	156	4
242	149	150	158	157	4
243	150	151	37	158	4
248	4	152	159	160	4
249	152	153	161	159	4
250	153	154	162	161	4
251	154	155	163	162	4
252	155	156	164	163	4
253	156	157	165	164	4
254	157	158	166	165	4
255	158	37	167	166	4
256	160	159	168	169	4
257	159	161	170	168	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
258	161	162	171	170	4
259	162	163	172	171	4
260	163	164	173	172	4
261	164	165	174	173	4
262	165	166	175	174	4
263	166	167	176	175	4
264	169	168	108	5	4
265	168	170	107	108	4
266	170	171	106	107	4
267	171	172	105	106	4
268	172	173	104	105	4
269	173	174	103	104	4
270	174	175	102	103	4
271	175	176	31	102	4
329	34	177	178	71	4
330	177	179	180	178	4
331	179	181	182	180	4
332	181	183	184	182	4
333	183	185	186	184	4
334	185	187	188	186	4
335	187	189	190	188	4
336	189	38	191	190	4
337	71	178	192	80	4
338	178	180	193	192	4
339	180	182	194	193	4
340	182	184	195	194	4
341	184	186	196	195	4
342	186	188	197	196	4
343	188	190	198	197	4
344	190	191	199	198	4
345	80	192	200	35	4
346	192	193	201	200	4
347	193	194	202	201	4
348	194	195	203	202	4
349	195	196	204	203	4
350	196	197	205	204	4
351	197	198	206	205	4
352	198	199	39	206	4
353	49	38	189	207	4
354	207	189	187	208	4
355	208	187	185	209	4
356	209	185	183	210	4
357	210	183	181	211	4
358	211	181	179	212	4
359	212	179	177	213	4
360	213	177	34	48	4
361	32	54	220	221	4
362	221	220	219	222	4
363	222	219	218	223	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
364	223	218	217	224	4
365	224	217	216	225	4
366	225	216	215	226	4
367	226	215	214	227	4
368	227	214	53	31	4
369	35	200	228	117	4
370	200	201	229	228	4
371	201	202	230	229	4
372	202	203	231	230	4
373	203	204	232	231	4
374	204	205	233	232	4
375	205	206	234	233	4
376	206	39	235	234	4
377	117	228	236	126	4
378	228	229	237	236	4
379	229	230	238	237	4
380	230	231	239	238	4
381	231	232	240	239	4
382	232	233	241	240	4
383	233	234	242	241	4
384	234	235	243	242	4
385	126	236	244	36	4
386	236	237	245	244	4
387	237	238	246	245	4
388	238	239	247	246	4
389	239	240	248	247	4
390	240	241	249	248	4
391	241	242	250	249	4
392	242	243	40	250	4
393	36	244	251	142	4
394	244	245	252	251	4
395	245	246	253	252	4
396	246	247	254	253	4
397	247	248	255	254	4
398	248	249	256	255	4
399	249	250	257	256	4
400	250	40	258	257	4
401	142	251	259	151	4
402	251	252	260	259	4
403	252	253	261	260	4
404	253	254	262	261	4
405	254	255	263	262	4
406	255	256	264	263	4
407	256	257	265	264	4
408	257	258	266	265	4
409	151	259	267	37	4
410	259	260	268	267	4
411	260	261	269	268	4
412	261	262	270	269	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
413	262	263	271	270	4
414	263	264	272	271	4
415	264	265	273	272	4
416	265	266	41	273	4
417	37	267	274	167	4
418	267	268	275	274	4
419	268	269	276	275	4
420	269	270	277	276	4
421	270	271	278	277	4
422	271	272	279	278	4
423	272	273	280	279	4
424	273	41	281	280	4
425	167	274	282	176	4
426	274	275	283	282	4
427	275	276	284	283	4
428	276	277	285	284	4
429	277	278	286	285	4
430	278	279	287	286	4
431	279	280	288	287	4
432	280	281	289	288	4
433	176	282	227	31	4
434	282	283	226	227	4
435	283	284	225	226	4
436	284	285	224	225	4
437	285	286	223	224	4
438	286	287	222	223	4
439	287	288	221	222	4
440	288	289	32	221	4
498	38	290	291	191	4
499	290	292	293	291	4
500	292	294	295	293	4
501	294	296	297	295	4
502	296	298	299	297	4
503	298	300	301	299	4
504	300	302	303	301	4
505	302	42	304	303	4
506	191	291	305	199	4
507	291	293	306	305	4
508	293	295	307	306	4
509	295	297	308	307	4
510	297	299	309	308	4
511	299	301	310	309	4
512	301	303	311	310	4
513	303	304	312	311	4
514	199	305	313	39	4
515	305	306	314	313	4
516	306	307	315	314	4
517	307	308	316	315	4
518	308	309	317	316	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
519	309	310	318	317	4
520	310	311	319	318	4
521	311	312	43	319	4
522	50	42	302	320	4
523	320	302	300	321	4
524	321	300	298	322	4
525	322	298	296	323	4
526	323	296	294	324	4
527	324	294	292	325	4
528	325	292	290	326	4
529	326	290	38	49	4
530	33	55	333	334	4
531	334	333	332	335	4
532	335	332	331	336	4
533	336	331	330	337	4
534	337	330	329	338	4
535	338	329	328	339	4
536	339	328	327	340	4
537	340	327	54	32	4
538	39	313	341	235	4
539	313	314	342	341	4
540	314	315	343	342	4
541	315	316	344	343	4
542	316	317	345	344	4
543	317	318	346	345	4
544	318	319	347	346	4
545	319	43	348	347	4
546	235	341	349	243	4
547	341	342	350	349	4
548	342	343	351	350	4
549	343	344	352	351	4
550	344	345	353	352	4
551	345	346	354	353	4
552	346	347	355	354	4
553	347	348	356	355	4
554	243	349	357	40	4
555	349	350	358	357	4
556	350	351	359	358	4
557	351	352	360	359	4
558	352	353	361	360	4
559	353	354	362	361	4
560	354	355	363	362	4
561	355	356	44	363	4
562	40	357	364	258	4
563	357	358	365	364	4
564	358	359	366	365	4
565	359	360	367	366	4
566	360	361	368	367	4
567	361	362	369	368	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
568	362	363	370	369	4
569	363	44	371	370	4
570	258	364	372	266	4
571	364	365	373	372	4
572	365	366	374	373	4
573	366	367	375	374	4
574	367	368	376	375	4
575	368	369	377	376	4
576	369	370	378	377	4
577	370	371	379	378	4
578	266	372	380	41	4
579	372	373	381	380	4
580	373	374	382	381	4
581	374	375	383	382	4
582	375	376	384	383	4
583	376	377	385	384	4
584	377	378	386	385	4
585	378	379	45	386	4
586	41	380	387	281	4
587	380	381	388	387	4
588	381	382	389	388	4
589	382	383	390	389	4
590	383	384	391	390	4
591	384	385	392	391	4
592	385	386	393	392	4
593	386	45	394	393	4
594	281	387	395	289	4
595	387	388	396	395	4
596	388	389	397	396	4
597	389	390	398	397	4
598	390	391	399	398	4
599	391	392	400	399	4
600	392	393	401	400	4
601	393	394	402	401	4
602	289	395	340	32	4
603	395	396	339	340	4
604	396	397	338	339	4
605	397	398	337	338	4
606	398	399	336	337	4
607	399	400	335	336	4
608	400	401	334	335	4
609	401	402	33	334	4
667	42	403	404	304	4
668	403	405	406	404	4
669	405	407	408	406	4
670	407	409	410	408	4
671	409	411	412	410	4
672	411	413	414	412	4
673	413	415	416	414	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
674	415	26	417	416	4
675	304	404	418	312	4
676	404	406	419	418	4
677	406	408	420	419	4
678	408	410	421	420	4
679	410	412	422	421	4
680	412	414	423	422	4
681	414	416	424	423	4
682	416	417	425	424	4
683	312	418	426	43	4
684	418	419	427	426	4
685	419	420	428	427	4
686	420	421	429	428	4
687	421	422	430	429	4
688	422	423	431	430	4
689	423	424	432	431	4
690	424	425	27	432	4
691	47	26	415	433	4
692	433	415	413	434	4
693	434	413	411	435	4
694	435	411	409	436	4
695	436	409	407	437	4
696	437	407	405	438	4
697	438	405	403	439	4
698	439	403	42	50	4
699	30	52	446	447	4
700	447	446	445	448	4
701	448	445	444	449	4
702	449	444	443	450	4
703	450	443	442	451	4
704	451	442	441	452	4
705	452	441	440	453	4
706	453	440	55	33	4
707	43	426	454	348	4
708	426	427	455	454	4
709	427	428	456	455	4
710	428	429	457	456	4
711	429	430	458	457	4
712	430	431	459	458	4
713	431	432	460	459	4
714	432	27	461	460	4
715	348	454	462	356	4
716	454	455	463	462	4
717	455	456	464	463	4
718	456	457	465	464	4
719	457	458	466	465	4
720	458	459	467	466	4
721	459	460	468	467	4
722	460	461	469	468	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
723	356	462	470	44	4
724	462	463	471	470	4
725	463	464	472	471	4
726	464	465	473	472	4
727	465	466	474	473	4
728	466	467	475	474	4
729	467	468	476	475	4
730	468	469	28	476	4
731	44	470	477	371	4
732	470	471	478	477	4
733	471	472	479	478	4
734	472	473	480	479	4
735	473	474	481	480	4
736	474	475	482	481	4
737	475	476	483	482	4
738	476	28	484	483	4
739	371	477	485	379	4
740	477	478	486	485	4
741	478	479	487	486	4
742	479	480	488	487	4
743	480	481	489	488	4
744	481	482	490	489	4
745	482	483	491	490	4
746	483	484	492	491	4
747	379	485	493	45	4
748	485	486	494	493	4
749	486	487	495	494	4
750	487	488	496	495	4
751	488	489	497	496	4
752	489	490	498	497	4
753	490	491	499	498	4
754	491	492	29	499	4
755	45	493	500	394	4
756	493	494	501	500	4
757	494	495	502	501	4
758	495	496	503	502	4
759	496	497	504	503	4
760	497	498	505	504	4
761	498	499	506	505	4
762	499	29	507	506	4
763	394	500	508	402	4
764	500	501	509	508	4
765	501	502	510	509	4
766	502	503	511	510	4
767	503	504	512	511	4
768	504	505	513	512	4
769	505	506	514	513	4
770	506	507	515	514	4
771	402	508	453	33	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
772	508	509	452	453	4
773	509	510	451	452	4
774	510	511	450	451	4
775	511	512	449	450	4
776	512	513	448	449	4
777	513	514	447	448	4
778	514	515	30	447	4

Section Properties

Prop	Section	Area (cm^2)	I_{yy} (cm^4)	I_{zz} (cm^4)	J (cm^4)	Material
1	Rect 0.21x0.30	630.000	47.3E+3	23.2E+3	52.6E+3	CONCRETE
2	I-SECTION	8E+3	3.54E+6	41.1E+6	1.37E+6	CONCRETE
3	Rect 1.80x0.30	5.4E+3	405E+3	14.6E+6	1.45E+6	CONCRETE

Plate Thickness

Prop	Node A (cm)	Node B (cm)	Node C (cm)	Node D (cm)	Material
4	21.000	21.000	21.000	21.000	CONCRETE

Materials

Mat	Name	E (kN/mm^2)	ν	Density (kg/m^3)	α (/°C)
1	STEEL	205.000	0.300	7.83E+3	12E -6
2	STAINLESSSTEEL	197.930	0.300	7.83E+3	18E -6
3	ALUMINUM	68.948	0.330	2.71E+3	23E -6
4	MATERIAL1	21.718	0.170	2.4E+3	6.5E -6
5	CONCRETE	21.718	0.170	2.41E+3	5E -6

Supports

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN˙m/deg)	rY (kN˙m/deg)	rZ (kN˙m/deg)
1	Fixed	Fixed	Fixed	-	-	-
2	Fixed	Fixed	Fixed	-	-	-
3	Fixed	Fixed	Fixed	-	-	-
4	Fixed	Fixed	Fixed	-	-	-
5	Fixed	Fixed	Fixed	-	-	-
26	Fixed	Fixed	Fixed	-	-	-
27	Fixed	Fixed	Fixed	-	-	-
28	Fixed	Fixed	Fixed	-	-	-
29	Fixed	Fixed	Fixed	-	-	-
30	Fixed	Fixed	Fixed	-	-	-

Releases

There is no data of this type.

Basic Load Cases

Number	Name
1	UDL

Combination Load Cases

There is no data of this type.

Moving Load Definition : Type 1

Width (m)
2.000

Force (kN)	Distance (m)
180.000	-
180.000	6.250
180.000	8.750
180.000	7.500

Moving Load Definition : Type 2

Width (m)
2.000

Force (kN)	Distance (m)
144.000	-
144.000	6.250
144.000	8.750
144.000	7.500

Moving Load Definition : Type 3

Width (m)
2.000

Force (kN)	Distance (m)
72.000	-
72.000	6.250
72.000	8.750
72.000	7.500

Floor Loads : 1 UDL

Load (N/mm^2)	Min Ht. (m)	Max Ht. (m)	Min X (m)	Max X (m)	Min Y (m)	Max Y (m)
-0.002	0.000	0.000	1.000	13.000	-	-

Moving Loads: Loads 2 to 31

	Initial Position			Increment			
Type	X (m)	Y (m)	Z (m)	X (m)	Y (m)	Z (m)	Range (m)
1	2.350	0.000	0.000	-	-	1.000	-
2	5.850	0.000	0.000	-	-	1.000	-
3	5.850	0.000	0.000	-	-	1.000	-

Statics Check Results

L/C		FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
1:UDL	Loads	0.000	-720.000	0.000	10.8E+3	0.000	-5.04E+3
1:UDL	Reactions	0.000	720.000	0.000	-10.8E+3	0.000	5.04E+3
	Difference	0.000	-0.000	0.000	0.003	0.000	-0.000
2:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	34.7E+3	0.000	-16.7E+3
2:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-34.6E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.011	0.000	-0.001
3:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	37.8E+3	0.000	-16.7E+3
3:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-37.8E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.011	0.000	0.000
4:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	41E+3	0.000	-16.7E+3
4:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-41E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.014	0.000	0.000
5:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	44.2E+3	0.000	-16.7E+3
5:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-44.2E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.014	0.000	0.000
6:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	47.3E+3	0.000	-16.7E+3
6:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-47.3E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.021	0.000	0.000
7:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	50.5E+3	0.000	-16.7E+3
7:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-50.5E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.013	0.000	0.000
8:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	53.7E+3	0.000	-16.7E+3
8:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-53.7E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.012	0.000	0.000
9:LOAD GENER/	Loads	0.000	-3.17E+3	0.000	56.8E+3	0.000	-16.7E+3
9:LOAD GENER/	Reactions	0.000	3.17E+3	0.000	-56.8E+3	0.000	16.7E+3
	Difference	0.000	-0.000	0.000	0.016	0.000	0.000
10:LOAD GENEF	Loads	0.000	-2.38E+3	0.000	35.8E+3	0.000	-12.5E+3
10:LOAD GENEF	Reactions	0.000	2.38E+3	0.000	-35.8E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.011	0.000	0.000
11:LOAD GENER	Loads	0.000	-2.38E+3	0.000	38.2E+3	0.000	-12.5E+3
11:LOAD GENER	Reactions	0.000	2.38E+3	0.000	-38.2E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.012	0.000	0.000

Statics Check Results Cont...

L/C		FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
13:LOAD GENEF	Reactions	0.000	2.38E+3	0.000	-43E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.021	0.000	0.000
14:LOAD GENEF	Loads	0.000	-2.38E+3	0.000	45.3E+3	0.000	-12.5E+3
14:LOAD GENEF	Reactions	0.000	2.38E+3	0.000	-45.3E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.014	0.000	0.000
15:LOAD GENEF	Loads	0.000	-2.38E+3	0.000	47.7E+3	0.000	-12.5E+3
15:LOAD GENEF	Reactions	0.000	2.38E+3	0.000	-47.7E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.007	0.000	0.000
16:LOAD GENEF	Loads	0.000	-2.38E+3	0.000	50.1E+3	0.000	-12.5E+3
16:LOAD GENEF	Reactions	0.000	2.38E+3	0.000	-50.1E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.018	0.000	0.000
17:LOAD GENEF	Loads	0.000	-2.38E+3	0.000	52.5E+3	0.000	-12.5E+3
17:LOAD GENEF	Reactions	0.000	2.38E+3	0.000	-52.5E+3	0.000	12.5E+3
	Difference	0.000	-0.000	0.000	0.010	0.000	-0.001
18:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	30.3E+3	0.000	-8.33E+3
18:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-30.3E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.009	0.000	0.000
19:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	31.9E+3	0.000	-8.33E+3
19:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-31.9E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.011	0.000	0.000
20:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	33.5E+3	0.000	-8.33E+3
20:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-33.5E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.010	0.000	0.000
21:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	35E+3	0.000	-8.33E+3
21:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-35E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.012	0.000	0.000
22:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	36.6E+3	0.000	-8.33E+3
22:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-36.6E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.019	0.000	0.000
23:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	38.2E+3	0.000	-8.33E+3
23:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-38.2E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.013	0.000	0.000
24:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	39.8E+3	0.000	-8.33E+3
24:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-39.8E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.006	0.000	0.000
25:LOAD GENEF	Loads	0.000	-1.58E+3	0.000	41.4E+3	0.000	-8.33E+3
25:LOAD GENEF	Reactions	0.000	1.58E+3	0.000	-41.4E+3	0.000	8.33E+3
	Difference	0.000	-0.000	0.000	0.015	0.000	0.000
26:LOAD GENEF	Loads	0.000	-792.000	0.000	19E+3	0.000	-4.17E+3
26:LOAD GENEF	Reactions	0.000	792.000	0.000	-19E+3	0.000	4.17E+3
	Difference	0.000	-0.000	0.000	0.006	0.000	0.000
27:LOAD GENEF	Loads	0.000	-792.000	0.000	19.8E+3	0.000	-4.17E+3
27:LOAD GENEF	Reactions	0.000	792.000	0.000	-19.8E+3	0.000	4.17E+3
	Difference	0.000	-0.000	0.000	0.006	0.000	0.000
28:LOAD GENEF	Loads	0.000	-792.000	0.000	20.6E+3	0.000	-4.17E+3
28:LOAD GENEF	Reactions	0.000	792.000	0.000	-20.6E+3	0.000	4.17E+3
	Difference	0.000	-0.000	0.000	0.013	0.000	0.000
29:LOAD GENEF	Loads	0.000	-792.000	0.000	21.4E+3	0.000	-4.17E+3

Statics Check Results Cont...

L/C		FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
29:LOAD GENEF	Reactions	0.000	792.000	0.000	-21.4E+3	0.000	4.17E+3
	Difference	0.000	-0.000	0.000	0.007	0.000	0.000
30:LOAD GENEF	Loads	0.000	-792.000	0.000	22.2E+3	0.000	-4.17E+3
30:LOAD GENEF	Reactions	0.000	792.000	0.000	-22.2E+3	0.000	4.17E+3
	Difference	0.000	-0.000	0.000	-0.001	0.000	0.000
31:LOAD GENEF	Loads	0.000	-792.000	0.000	23E+3	0.000	-4.17E+3
31:LOAD GENEF	Reactions	0.000	792.000	0.000	-23E+3	0.000	4.17E+3
	Difference	0.000	-0.000	0.000	0.010	0.000	0.000

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
Max Fx	1	1	1:UDL	**0.000**	1.774	0.000	-1.631	0.000	-0.946
Min Fx	1	1	1:UDL	**0.000**	1.774	0.000	-1.631	0.000	-0.946
Max Fy	122	81	3:LOAD GENE	0.000	**584.336**	0.000	-18.830	0.000	-549.075
Min Fy	625	27	9:LOAD GENE	-0.000	**-567.258**	-0.000	19.693	-0.000	-7.561
Max Fz	1	1	1:UDL	0.000	1.774	**0.000**	-1.631	0.000	-0.946
Min Fz	1	1	1:UDL	0.000	1.774	**0.000**	-1.631	0.000	-0.946
Max Mx	211	144	5:LOAD GENE	0.000	10.663	0.000	**40.981**	0.000	-4.725
Min Mx	657	492	6:LOAD GENE	0.000	10.568	0.000	**-39.778**	0.000	-4.511
Max My	1	1	1:UDL	0.000	1.774	0.000	-1.631	**0.000**	-0.946
Min My	1	1	1:UDL	0.000	1.774	0.000	-1.631	**0.000**	-0.946
Max Mz	3	3	2:LOAD GENE	0.000	188.743	0.000	31.541	0.000	**109.194**
Min Mz	278	38	6:LOAD GENE	-0.000	63.244	-0.000	-6.799	-0.000	**-3.49E+3**

Reaction Summary

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
Max FX	1	1:UDL	**0.000**	63.136	0.000	0.000	0.000	0.000
Min FX	1	1:UDL	**0.000**	63.136	0.000	0.000	0.000	0.000
Max FY	2	2:LOAD GENE	0.000	**677.716**	0.000	0.000	0.000	0.000
Min FY	5	31:LOAD GEN	0.000	**2.515**	0.000	0.000	0.000	0.000
Max FZ	1	1:UDL	0.000	63.136	**0.000**	0.000	0.000	0.000
Min FZ	1	1:UDL	0.000	63.136	**0.000**	0.000	0.000	0.000
Max MX	1	1:UDL	0.000	63.136	0.000	**0.000**	0.000	0.000
Min MX	1	1:UDL	0.000	63.136	0.000	**0.000**	0.000	0.000
Max MY	1	1:UDL	0.000	63.136	0.000	0.000	**0.000**	0.000
Min MY	1	1:UDL	0.000	63.136	0.000	0.000	**0.000**	0.000
Max MZ	1	1:UDL	0.000	63.136	0.000	0.000	0.000	**0.000**
Min MZ	1	1:UDL	0.000	63.136	0.000	0.000	0.000	**0.000**

Job Information

	Engineer	Checked	Approved
Name:	BRD		
Date:	8/09/2011		

Structure Type	FLOOR

Number of Nodes	495	Highest Node	515
Number of Elements	295	Highest Beam	939
Number of Plates	448	Highest Plate	778

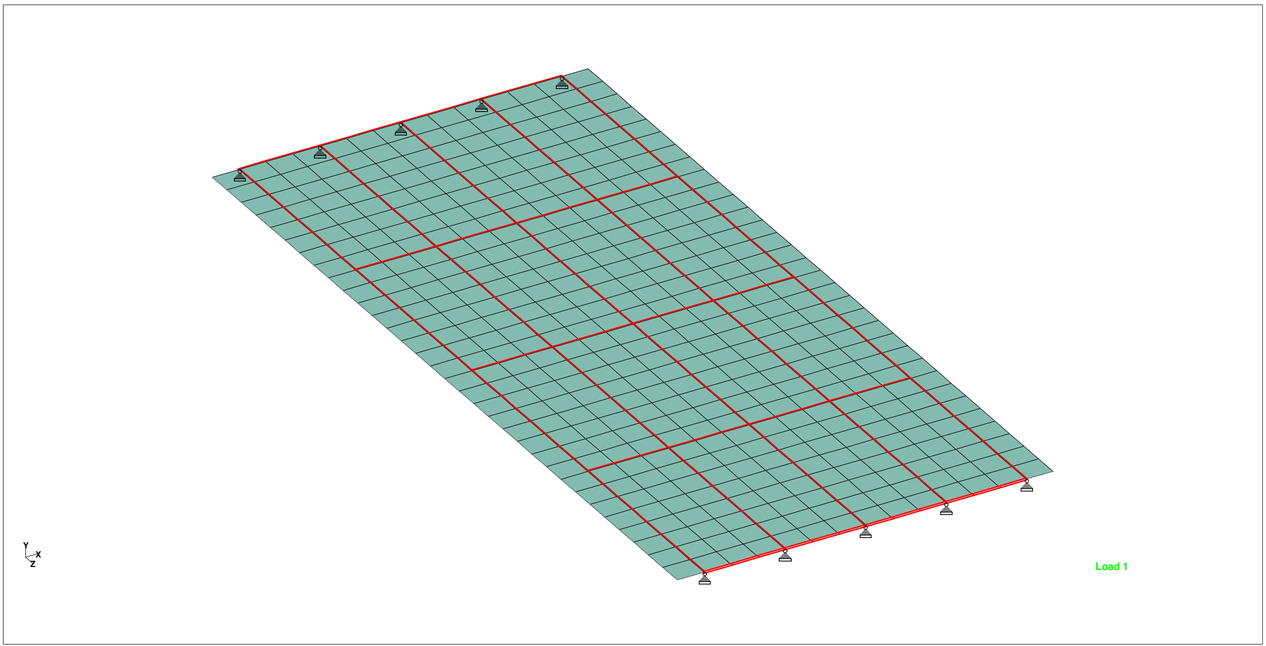
Number of Basic Load Cases	2
Number of Combination Load Cases	1

Included in this printout are data for:

All	The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	DEAD LOAD
Primary	2	SUPERIMPOSED DEAD LOAD (SDL)
Combination	3	COMBINATION LOAD CASE 3



Whole Structure

Nodes

Node	X (m)	Y (m)	Z (m)
1	1.000	0.000	0.000
2	4.000	0.000	0.000
3	7.000	0.000	0.000
4	10.000	0.000	0.000
5	13.000	0.000	0.000
26	1.000	0.000	30.000
27	4.000	0.000	30.000
28	7.000	0.000	30.000
29	10.000	0.000	30.000
30	13.000	0.000	30.000
31	13.000	0.000	7.500
32	13.000	0.000	15.000
33	13.000	0.000	22.500
34	1.000	0.000	7.500
35	4.000	0.000	7.500
36	7.000	0.000	7.500
37	10.000	0.000	7.500
38	1.000	0.000	15.000
39	4.000	0.000	15.000
40	7.000	0.000	15.000
41	10.000	0.000	15.000
42	1.000	0.000	22.500
43	4.000	0.000	22.500
44	7.000	0.000	22.500
45	10.000	0.000	22.500
46	0.000	0.000	0.000
47	0.000	0.000	30.000
48	0.000	0.000	7.500
49	0.000	0.000	15.000
50	0.000	0.000	22.500
51	14.000	0.000	0.000
52	14.000	0.000	30.000
53	14.000	0.000	7.500
54	14.000	0.000	15.000
55	14.000	0.000	22.500
56	1.000	0.000	0.938
57	2.000	0.000	0.938
58	2.000	0.000	0.000
59	1.000	0.000	1.875
60	2.000	0.000	1.875
61	1.000	0.000	2.813
62	2.000	0.000	2.813
63	1.000	0.000	3.750
64	2.000	0.000	3.750
65	1.000	0.000	4.688
66	2.000	0.000	4.688
67	1.000	0.000	5.625
68	2.000	0.000	5.625
69	1.000	0.000	6.563

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
70	2.000	0.000	6.563
71	2.000	0.000	7.500
72	3.000	0.000	0.938
73	3.000	0.000	0.000
74	3.000	0.000	1.875
75	3.000	0.000	2.813
76	3.000	0.000	3.750
77	3.000	0.000	4.688
78	3.000	0.000	5.625
79	3.000	0.000	6.563
80	3.000	0.000	7.500
81	4.000	0.000	0.938
82	4.000	0.000	1.875
83	4.000	0.000	2.813
84	4.000	0.000	3.750
85	4.000	0.000	4.688
86	4.000	0.000	5.625
87	4.000	0.000	6.563
88	0.000	0.000	6.563
89	0.000	0.000	5.625
90	0.000	0.000	4.688
91	0.000	0.000	3.750
92	0.000	0.000	2.813
93	0.000	0.000	1.875
94	0.000	0.000	0.938
95	14.000	0.000	0.938
96	14.000	0.000	1.875
97	14.000	0.000	2.813
98	14.000	0.000	3.750
99	14.000	0.000	4.688
100	14.000	0.000	5.625
101	14.000	0.000	6.563
102	13.000	0.000	6.563
103	13.000	0.000	5.625
104	13.000	0.000	4.688
105	13.000	0.000	3.750
106	13.000	0.000	2.813
107	13.000	0.000	1.875
108	13.000	0.000	0.938
109	5.000	0.000	0.938
110	5.000	0.000	0.000
111	5.000	0.000	1.875
112	5.000	0.000	2.813
113	5.000	0.000	3.750
114	5.000	0.000	4.688
115	5.000	0.000	5.625
116	5.000	0.000	6.563
117	5.000	0.000	7.500
118	6.000	0.000	0.938

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
119	6.000	0.000	0.000
120	6.000	0.000	1.875
121	6.000	0.000	2.813
122	6.000	0.000	3.750
123	6.000	0.000	4.688
124	6.000	0.000	5.625
125	6.000	0.000	6.563
126	6.000	0.000	7.500
127	7.000	0.000	0.938
128	7.000	0.000	1.875
129	7.000	0.000	2.813
130	7.000	0.000	3.750
131	7.000	0.000	4.688
132	7.000	0.000	5.625
133	7.000	0.000	6.563
134	8.000	0.000	0.938
135	8.000	0.000	0.000
136	8.000	0.000	1.875
137	8.000	0.000	2.813
138	8.000	0.000	3.750
139	8.000	0.000	4.688
140	8.000	0.000	5.625
141	8.000	0.000	6.563
142	8.000	0.000	7.500
143	9.000	0.000	0.938
144	9.000	0.000	0.000
145	9.000	0.000	1.875
146	9.000	0.000	2.813
147	9.000	0.000	3.750
148	9.000	0.000	4.688
149	9.000	0.000	5.625
150	9.000	0.000	6.563
151	9.000	0.000	7.500
152	10.000	0.000	0.938
153	10.000	0.000	1.875
154	10.000	0.000	2.813
155	10.000	0.000	3.750
156	10.000	0.000	4.688
157	10.000	0.000	5.625
158	10.000	0.000	6.563
159	11.000	0.000	0.938
160	11.000	0.000	0.000
161	11.000	0.000	1.875
162	11.000	0.000	2.813
163	11.000	0.000	3.750
164	11.000	0.000	4.688
165	11.000	0.000	5.625
166	11.000	0.000	6.563
167	11.000	0.000	7.500

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
168	12.000	0.000	0.938
169	12.000	0.000	0.000
170	12.000	0.000	1.875
171	12.000	0.000	2.813
172	12.000	0.000	3.750
173	12.000	0.000	4.688
174	12.000	0.000	5.625
175	12.000	0.000	6.563
176	12.000	0.000	7.500
177	1.000	0.000	8.438
178	2.000	0.000	8.438
179	1.000	0.000	9.375
180	2.000	0.000	9.375
181	1.000	0.000	10.313
182	2.000	0.000	10.313
183	1.000	0.000	11.250
184	2.000	0.000	11.250
185	1.000	0.000	12.188
186	2.000	0.000	12.188
187	1.000	0.000	13.125
188	2.000	0.000	13.125
189	1.000	0.000	14.063
190	2.000	0.000	14.063
191	2.000	0.000	15.000
192	3.000	0.000	8.438
193	3.000	0.000	9.375
194	3.000	0.000	10.313
195	3.000	0.000	11.250
196	3.000	0.000	12.188
197	3.000	0.000	13.125
198	3.000	0.000	14.063
199	3.000	0.000	15.000
200	4.000	0.000	8.438
201	4.000	0.000	9.375
202	4.000	0.000	10.313
203	4.000	0.000	11.250
204	4.000	0.000	12.188
205	4.000	0.000	13.125
206	4.000	0.000	14.063
207	0.000	0.000	14.063
208	0.000	0.000	13.125
209	0.000	0.000	12.188
210	0.000	0.000	11.250
211	0.000	0.000	10.313
212	0.000	0.000	9.375
213	0.000	0.000	8.438
214	14.000	0.000	8.438
215	14.000	0.000	9.375
216	14.000	0.000	10.313

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
217	14.000	0.000	11.250
218	14.000	0.000	12.188
219	14.000	0.000	13.125
220	14.000	0.000	14.063
221	13.000	0.000	14.063
222	13.000	0.000	13.125
223	13.000	0.000	12.188
224	13.000	0.000	11.250
225	13.000	0.000	10.313
226	13.000	0.000	9.375
227	13.000	0.000	8.438
228	5.000	0.000	8.438
229	5.000	0.000	9.375
230	5.000	0.000	10.313
231	5.000	0.000	11.250
232	5.000	0.000	12.188
233	5.000	0.000	13.125
234	5.000	0.000	14.063
235	5.000	0.000	15.000
236	6.000	0.000	8.438
237	6.000	0.000	9.375
238	6.000	0.000	10.313
239	6.000	0.000	11.250
240	6.000	0.000	12.188
241	6.000	0.000	13.125
242	6.000	0.000	14.063
243	6.000	0.000	15.000
244	7.000	0.000	8.438
245	7.000	0.000	9.375
246	7.000	0.000	10.313
247	7.000	0.000	11.250
248	7.000	0.000	12.188
249	7.000	0.000	13.125
250	7.000	0.000	14.063
251	8.000	0.000	8.438
252	8.000	0.000	9.375
253	8.000	0.000	10.313
254	8.000	0.000	11.250
255	8.000	0.000	12.188
256	8.000	0.000	13.125
257	8.000	0.000	14.063
258	8.000	0.000	15.000
259	9.000	0.000	8.438
260	9.000	0.000	9.375
261	9.000	0.000	10.313
262	9.000	0.000	11.250
263	9.000	0.000	12.188
264	9.000	0.000	13.125
265	9.000	0.000	14.063

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
266	9.000	0.000	15.000
267	10.000	0.000	8.438
268	10.000	0.000	9.375
269	10.000	0.000	10.313
270	10.000	0.000	11.250
271	10.000	0.000	12.188
272	10.000	0.000	13.125
273	10.000	0.000	14.063
274	11.000	0.000	8.438
275	11.000	0.000	9.375
276	11.000	0.000	10.313
277	11.000	0.000	11.250
278	11.000	0.000	12.188
279	11.000	0.000	13.125
280	11.000	0.000	14.063
281	11.000	0.000	15.000
282	12.000	0.000	8.438
283	12.000	0.000	9.375
284	12.000	0.000	10.313
285	12.000	0.000	11.250
286	12.000	0.000	12.188
287	12.000	0.000	13.125
288	12.000	0.000	14.063
289	12.000	0.000	15.000
290	1.000	0.000	15.938
291	2.000	0.000	15.938
292	1.000	0.000	16.875
293	2.000	0.000	16.875
294	1.000	0.000	17.813
295	2.000	0.000	17.813
296	1.000	0.000	18.750
297	2.000	0.000	18.750
298	1.000	0.000	19.688
299	2.000	0.000	19.688
300	1.000	0.000	20.625
301	2.000	0.000	20.625
302	1.000	0.000	21.563
303	2.000	0.000	21.563
304	2.000	0.000	22.500
305	3.000	0.000	15.938
306	3.000	0.000	16.875
307	3.000	0.000	17.813
308	3.000	0.000	18.750
309	3.000	0.000	19.688
310	3.000	0.000	20.625
311	3.000	0.000	21.563
312	3.000	0.000	22.500
313	4.000	0.000	15.938
314	4.000	0.000	16.875

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
315	4.000	0.000	17.813
316	4.000	0.000	18.750
317	4.000	0.000	19.688
318	4.000	0.000	20.625
319	4.000	0.000	21.563
320	0.000	0.000	21.563
321	0.000	0.000	20.625
322	0.000	0.000	19.688
323	0.000	0.000	18.750
324	0.000	0.000	17.813
325	0.000	0.000	16.875
326	0.000	0.000	15.938
327	14.000	0.000	15.938
328	14.000	0.000	16.875
329	14.000	0.000	17.813
330	14.000	0.000	18.750
331	14.000	0.000	19.688
332	14.000	0.000	20.625
333	14.000	0.000	21.563
334	13.000	0.000	21.563
335	13.000	0.000	20.625
336	13.000	0.000	19.688
337	13.000	0.000	18.750
338	13.000	0.000	17.813
339	13.000	0.000	16.875
340	13.000	0.000	15.938
341	5.000	0.000	15.938
342	5.000	0.000	16.875
343	5.000	0.000	17.813
344	5.000	0.000	18.750
345	5.000	0.000	19.688
346	5.000	0.000	20.625
347	5.000	0.000	21.563
348	5.000	0.000	22.500
349	6.000	0.000	15.938
350	6.000	0.000	16.875
351	6.000	0.000	17.813
352	6.000	0.000	18.750
353	6.000	0.000	19.688
354	6.000	0.000	20.625
355	6.000	0.000	21.563
356	6.000	0.000	22.500
357	7.000	0.000	15.938
358	7.000	0.000	16.875
359	7.000	0.000	17.813
360	7.000	0.000	18.750
361	7.000	0.000	19.688
362	7.000	0.000	20.625
363	7.000	0.000	21.563

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
364	8.000	0.000	15.938
365	8.000	0.000	16.875
366	8.000	0.000	17.813
367	8.000	0.000	18.750
368	8.000	0.000	19.688
369	8.000	0.000	20.625
370	8.000	0.000	21.563
371	8.000	0.000	22.500
372	9.000	0.000	15.938
373	9.000	0.000	16.875
374	9.000	0.000	17.813
375	9.000	0.000	18.750
376	9.000	0.000	19.688
377	9.000	0.000	20.625
378	9.000	0.000	21.563
379	9.000	0.000	22.500
380	10.000	0.000	15.938
381	10.000	0.000	16.875
382	10.000	0.000	17.813
383	10.000	0.000	18.750
384	10.000	0.000	19.688
385	10.000	0.000	20.625
386	10.000	0.000	21.563
387	11.000	0.000	15.938
388	11.000	0.000	16.875
389	11.000	0.000	17.813
390	11.000	0.000	18.750
391	11.000	0.000	19.688
392	11.000	0.000	20.625
393	11.000	0.000	21.563
394	11.000	0.000	22.500
395	12.000	0.000	15.938
396	12.000	0.000	16.875
397	12.000	0.000	17.813
398	12.000	0.000	18.750
399	12.000	0.000	19.688
400	12.000	0.000	20.625
401	12.000	0.000	21.563
402	12.000	0.000	22.500
403	1.000	0.000	23.438
404	2.000	0.000	23.438
405	1.000	0.000	24.375
406	2.000	0.000	24.375
407	1.000	0.000	25.313
408	2.000	0.000	25.313
409	1.000	0.000	26.250
410	2.000	0.000	26.250
411	1.000	0.000	27.188
412	2.000	0.000	27.188

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
413	1.000	0.000	28.125
414	2.000	0.000	28.125
415	1.000	0.000	29.063
416	2.000	0.000	29.063
417	2.000	0.000	30.000
418	3.000	0.000	23.438
419	3.000	0.000	24.375
420	3.000	0.000	25.313
421	3.000	0.000	26.250
422	3.000	0.000	27.188
423	3.000	0.000	28.125
424	3.000	0.000	29.063
425	3.000	0.000	30.000
426	4.000	0.000	23.438
427	4.000	0.000	24.375
428	4.000	0.000	25.313
429	4.000	0.000	26.250
430	4.000	0.000	27.188
431	4.000	0.000	28.125
432	4.000	0.000	29.063
433	0.000	0.000	29.063
434	0.000	0.000	28.125
435	0.000	0.000	27.188
436	0.000	0.000	26.250
437	0.000	0.000	25.313
438	0.000	0.000	24.375
439	0.000	0.000	23.438
440	14.000	0.000	23.438
441	14.000	0.000	24.375
442	14.000	0.000	25.313
443	14.000	0.000	26.250
444	14.000	0.000	27.188
445	14.000	0.000	28.125
446	14.000	0.000	29.063
447	13.000	0.000	29.063
448	13.000	0.000	28.125
449	13.000	0.000	27.188
450	13.000	0.000	26.250
451	13.000	0.000	25.313
452	13.000	0.000	24.375
453	13.000	0.000	23.438
454	5.000	0.000	23.438
455	5.000	0.000	24.375
456	5.000	0.000	25.313
457	5.000	0.000	26.250
458	5.000	0.000	27.188
459	5.000	0.000	28.125
460	5.000	0.000	29.063
461	5.000	0.000	30.000

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
462	6.000	0.000	23.438
463	6.000	0.000	24.375
464	6.000	0.000	25.313
465	6.000	0.000	26.250
466	6.000	0.000	27.188
467	6.000	0.000	28.125
468	6.000	0.000	29.063
469	6.000	0.000	30.000
470	7.000	0.000	23.438
471	7.000	0.000	24.375
472	7.000	0.000	25.313
473	7.000	0.000	26.250
474	7.000	0.000	27.188
475	7.000	0.000	28.125
476	7.000	0.000	29.063
477	8.000	0.000	23.438
478	8.000	0.000	24.375
479	8.000	0.000	25.313
480	8.000	0.000	26.250
481	8.000	0.000	27.188
482	8.000	0.000	28.125
483	8.000	0.000	29.063
484	8.000	0.000	30.000
485	9.000	0.000	23.438
486	9.000	0.000	24.375
487	9.000	0.000	25.313
488	9.000	0.000	26.250
489	9.000	0.000	27.188
490	9.000	0.000	28.125
491	9.000	0.000	29.063
492	9.000	0.000	30.000
493	10.000	0.000	23.438
494	10.000	0.000	24.375
495	10.000	0.000	25.313
496	10.000	0.000	26.250
497	10.000	0.000	27.188
498	10.000	0.000	28.125
499	10.000	0.000	29.063
500	11.000	0.000	23.438
501	11.000	0.000	24.375
502	11.000	0.000	25.313
503	11.000	0.000	26.250
504	11.000	0.000	27.188
505	11.000	0.000	28.125
506	11.000	0.000	29.063
507	11.000	0.000	30.000
508	12.000	0.000	23.438
509	12.000	0.000	24.375
510	12.000	0.000	25.313

Nodes Cont...

Node	X (m)	Y (m)	Z (m)
511	12.000	0.000	26.250
512	12.000	0.000	27.188
513	12.000	0.000	28.125
514	12.000	0.000	29.063
515	12.000	0.000	30.000

Beams

Beam	Node A	Node B	Length (m)	Property	β (degrees)
5	1	56	0.938	2	0
6	2	81	0.938	2	0
7	3	127	0.938	2	0
8	4	152	0.938	2	0
9	5	108	0.938	2	0
50	31	227	0.938	2	0
51	32	340	0.938	2	0
52	33	453	0.938	2	0
53	34	177	0.938	2	0
54	35	200	0.938	2	0
55	36	244	0.938	2	0
56	37	267	0.938	2	0
61	38	290	0.938	2	0
62	39	313	0.938	2	0
63	40	357	0.938	2	0
64	41	380	0.938	2	0
69	42	403	0.938	2	0
70	43	426	0.938	2	0
71	44	470	0.938	2	0
72	45	493	0.938	2	0
95	56	59	0.938	2	0
98	59	61	0.938	2	0
100	61	63	0.938	2	0
102	63	65	0.938	2	0
104	65	67	0.938	2	0
106	67	69	0.938	2	0
108	69	34	0.938	2	0
122	81	82	0.938	2	0
124	82	83	0.938	2	0
126	83	84	0.938	2	0
128	84	85	0.938	2	0
130	85	86	0.938	2	0
132	86	87	0.938	2	0
134	87	35	0.938	2	0
159	102	31	0.938	2	0
160	103	102	0.938	2	0
161	104	103	0.938	2	0
162	105	104	0.938	2	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
163	106	105	0.938	2	0
164	107	106	0.938	2	0
165	108	107	0.938	2	0
178	127	128	0.938	2	0
179	128	129	0.938	2	0
180	129	130	0.938	2	0
181	130	131	0.938	2	0
182	131	132	0.938	2	0
183	132	133	0.938	2	0
184	133	36	0.938	2	0
213	152	153	0.938	2	0
214	153	154	0.938	2	0
215	154	155	0.938	2	0
216	155	156	0.938	2	0
217	156	157	0.938	2	0
218	157	158	0.938	2	0
219	158	37	0.938	2	0
272	177	179	0.938	2	0
273	179	181	0.937	2	0
274	181	183	0.938	2	0
275	183	185	0.938	2	0
276	185	187	0.938	2	0
277	187	189	0.938	2	0
278	189	38	0.938	2	0
281	200	201	0.938	2	0
282	201	202	0.937	2	0
283	202	203	0.938	2	0
284	203	204	0.938	2	0
285	204	205	0.938	2	0
286	205	206	0.938	2	0
287	206	39	0.938	2	0
302	221	32	0.938	2	0
303	222	221	0.938	2	0
304	223	222	0.938	2	0
305	224	223	0.938	2	0
306	225	224	0.938	2	0
307	226	225	0.937	2	0
308	227	226	0.938	2	0
311	244	245	0.938	2	0
312	245	246	0.937	2	0
313	246	247	0.938	2	0
314	247	248	0.938	2	0
315	248	249	0.938	2	0
316	249	250	0.938	2	0
317	250	40	0.938	2	0
320	267	268	0.938	2	0
321	268	269	0.937	2	0
322	269	270	0.938	2	0
323	270	271	0.938	2	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
324	271	272	0.938	2	0
325	272	273	0.938	2	0
326	273	41	0.938	2	0
441	290	292	0.938	2	0
442	292	294	0.938	2	0
443	294	296	0.938	2	0
444	296	298	0.938	2	0
445	298	300	0.938	2	0
446	300	302	0.938	2	0
447	302	42	0.938	2	0
450	313	314	0.938	2	0
451	314	315	0.938	2	0
452	315	316	0.938	2	0
453	316	317	0.938	2	0
454	317	318	0.938	2	0
455	318	319	0.938	2	0
456	319	43	0.938	2	0
471	334	33	0.938	2	0
472	335	334	0.938	2	0
473	336	335	0.938	2	0
474	337	336	0.938	2	0
475	338	337	0.938	2	0
476	339	338	0.938	2	0
477	340	339	0.938	2	0
480	357	358	0.938	2	0
481	358	359	0.938	2	0
482	359	360	0.938	2	0
483	360	361	0.938	2	0
484	361	362	0.938	2	0
485	362	363	0.938	2	0
486	363	44	0.938	2	0
489	380	381	0.938	2	0
490	381	382	0.938	2	0
491	382	383	0.938	2	0
492	383	384	0.938	2	0
493	384	385	0.938	2	0
494	385	386	0.938	2	0
495	386	45	0.938	2	0
610	403	405	0.938	2	0
611	405	407	0.938	2	0
612	407	409	0.938	2	0
613	409	411	0.938	2	0
614	411	413	0.938	2	0
615	413	415	0.938	2	0
616	415	26	0.938	2	0
619	426	427	0.938	2	0
620	427	428	0.938	2	0
621	428	429	0.938	2	0
622	429	430	0.938	2	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
623	430	431	0.938	2	0
624	431	432	0.938	2	0
625	432	27	0.938	2	0
640	447	30	0.938	2	0
641	448	447	0.938	2	0
642	449	448	0.938	2	0
643	450	449	0.938	2	0
644	451	450	0.938	2	0
645	452	451	0.938	2	0
646	453	452	0.938	2	0
649	470	471	0.938	2	0
650	471	472	0.938	2	0
651	472	473	0.938	2	0
652	473	474	0.938	2	0
653	474	475	0.938	2	0
654	475	476	0.938	2	0
655	476	28	0.938	2	0
658	493	494	0.938	2	0
659	494	495	0.938	2	0
660	495	496	0.938	2	0
661	496	497	0.938	2	0
662	497	498	0.938	2	0
663	498	499	0.938	2	0
664	499	29	0.938	2	0
665	507	515	1.000	3	0
666	515	30	1.000	3	0
779	1	46	1.000	1	0
780	26	47	1.000	1	0
781	34	48	1.000	1	0
782	38	49	1.000	1	0
783	42	50	1.000	1	0
812	46	94	0.938	1	0
813	48	213	0.938	1	0
814	49	326	0.938	1	0
815	50	439	0.938	1	0
816	94	93	0.938	1	0
817	93	92	0.938	1	0
818	92	91	0.938	1	0
819	91	90	0.938	1	0
820	90	89	0.938	1	0
821	89	88	0.938	1	0
822	88	48	0.938	1	0
823	213	212	0.938	1	0
824	212	211	0.937	1	0
825	211	210	0.938	1	0
826	210	209	0.938	1	0
827	209	208	0.938	1	0
828	208	207	0.938	1	0
829	207	49	0.938	1	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
830	326	325	0.938	1	0
831	325	324	0.938	1	0
832	324	323	0.938	1	0
833	323	322	0.938	1	0
834	322	321	0.938	1	0
835	321	320	0.938	1	0
836	320	50	0.938	1	0
837	439	438	0.938	1	0
838	438	437	0.938	1	0
839	437	436	0.938	1	0
840	436	435	0.938	1	0
841	435	434	0.938	1	0
842	434	433	0.938	1	0
843	433	47	0.938	1	0
844	51	95	0.938	1	0
845	53	214	0.938	1	0
846	54	327	0.938	1	0
847	55	440	0.938	1	0
848	101	53	0.938	1	0
849	100	101	0.938	1	0
850	99	100	0.938	1	0
851	98	99	0.938	1	0
852	97	98	0.938	1	0
853	96	97	0.938	1	0
854	95	96	0.938	1	0
855	220	54	0.938	1	0
856	219	220	0.938	1	0
857	218	219	0.938	1	0
858	217	218	0.938	1	0
859	216	217	0.938	1	0
860	215	216	0.937	1	0
861	214	215	0.938	1	0
862	333	55	0.938	1	0
863	332	333	0.938	1	0
864	331	332	0.938	1	0
865	330	331	0.938	1	0
866	329	330	0.938	1	0
867	328	329	0.938	1	0
868	327	328	0.938	1	0
869	446	52	0.938	1	0
870	445	446	0.938	1	0
871	444	445	0.938	1	0
872	443	444	0.938	1	0
873	442	443	0.938	1	0
874	441	442	0.938	1	0
875	440	441	0.938	1	0
876	5	51	1.000	1	0
877	31	53	1.000	3	0
878	32	54	1.000	3	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
879	33	55	1.000	3	0
880	30	52	1.000	1	0
881	1	58	1.000	3	0
882	58	73	1.000	3	0
883	73	2	1.000	3	0
884	2	110	1.000	3	0
885	110	119	1.000	3	0
886	119	3	1.000	3	0
887	3	135	1.000	3	0
888	135	144	1.000	3	0
889	144	4	1.000	3	0
890	4	160	1.000	3	0
891	160	169	1.000	3	0
892	169	5	1.000	3	0
893	5	51	1.000	3	0
894	34	71	1.000	3	0
895	71	80	1.000	3	0
896	80	35	1.000	3	0
897	35	117	1.000	3	0
898	117	126	1.000	3	0
899	126	36	1.000	3	0
900	36	142	1.000	3	0
901	142	151	1.000	3	0
902	151	37	1.000	3	0
903	37	167	1.000	3	0
904	167	176	1.000	3	0
905	176	31	1.000	3	0
906	38	191	1.000	3	0
907	191	199	1.000	3	0
908	199	39	1.000	3	0
909	39	235	1.000	3	0
910	235	243	1.000	3	0
911	243	40	1.000	3	0
912	40	258	1.000	3	0
913	258	266	1.000	3	0
914	266	41	1.000	3	0
915	41	281	1.000	3	0
916	281	289	1.000	3	0
917	289	32	1.000	3	0
918	42	304	1.000	3	0
919	304	312	1.000	3	0
920	312	43	1.000	3	0
921	43	348	1.000	3	0
922	348	356	1.000	3	0
923	356	44	1.000	3	0
924	44	371	1.000	3	0
925	371	379	1.000	3	0
926	379	45	1.000	3	0
927	45	394	1.000	3	0

Beams Cont...

Beam	Node A	Node B	Length (m)	Property	β (degrees)
928	394	402	1.000	3	0
929	402	33	1.000	3	0
930	26	417	1.000	3	0
931	417	425	1.000	3	0
932	425	27	1.000	3	0
933	27	461	1.000	3	0
934	461	469	1.000	3	0
935	469	28	1.000	3	0
936	28	484	1.000	3	0
937	484	492	1.000	3	0
938	492	29	1.000	3	0
939	29	507	1.000	3	0

Plates

Plate	Node A	Node B	Node C	Node D	Property
97	1	56	57	58	4
99	56	59	60	57	4
101	59	61	62	60	4
103	61	63	64	62	4
105	63	65	66	64	4
107	65	67	68	66	4
109	67	69	70	68	4
111	69	34	71	70	4
113	58	57	72	73	4
114	57	60	74	72	4
115	60	62	75	74	4
116	62	64	76	75	4
117	64	66	77	76	4
118	66	68	78	77	4
119	68	70	79	78	4
121	70	71	80	79	4
123	73	72	81	2	4
125	72	74	82	81	4
127	74	75	83	82	4
129	75	76	84	83	4
131	76	77	85	84	4
133	77	78	86	85	4
135	78	79	87	86	4
136	79	80	35	87	4
138	48	34	69	88	4
140	88	69	67	89	4
142	89	67	65	90	4
144	90	65	63	91	4
146	91	63	61	92	4
148	92	61	59	93	4
150	93	59	56	94	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
151	94	56	1	46	4
166	31	53	101	102	4
167	102	101	100	103	4
168	103	100	99	104	4
169	104	99	98	105	4
170	105	98	97	106	4
171	106	97	96	107	4
172	107	96	95	108	4
173	108	95	51	5	4
185	2	81	109	110	4
186	81	82	111	109	4
187	82	83	112	111	4
188	83	84	113	112	4
189	84	85	114	113	4
190	85	86	115	114	4
191	86	87	116	115	4
192	87	35	117	116	4
193	110	109	118	119	4
194	109	111	120	118	4
195	111	112	121	120	4
196	112	113	122	121	4
197	113	114	123	122	4
198	114	115	124	123	4
199	115	116	125	124	4
200	116	117	126	125	4
201	119	118	127	3	4
202	118	120	128	127	4
203	120	121	129	128	4
204	121	122	130	129	4
205	122	123	131	130	4
206	123	124	132	131	4
207	124	125	133	132	4
208	125	126	36	133	4
220	3	127	134	135	4
221	127	128	136	134	4
222	128	129	137	136	4
223	129	130	138	137	4
224	130	131	139	138	4
225	131	132	140	139	4
226	132	133	141	140	4
227	133	36	142	141	4
228	135	134	143	144	4
229	134	136	145	143	4
230	136	137	146	145	4
231	137	138	147	146	4
232	138	139	148	147	4
233	139	140	149	148	4
234	140	141	150	149	4
235	141	142	151	150	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
236	144	143	152	4	4
237	143	145	153	152	4
238	145	146	154	153	4
239	146	147	155	154	4
240	147	148	156	155	4
241	148	149	157	156	4
242	149	150	158	157	4
243	150	151	37	158	4
248	4	152	159	160	4
249	152	153	161	159	4
250	153	154	162	161	4
251	154	155	163	162	4
252	155	156	164	163	4
253	156	157	165	164	4
254	157	158	166	165	4
255	158	37	167	166	4
256	160	159	168	169	4
257	159	161	170	168	4
258	161	162	171	170	4
259	162	163	172	171	4
260	163	164	173	172	4
261	164	165	174	173	4
262	165	166	175	174	4
263	166	167	176	175	4
264	169	168	108	5	4
265	168	170	107	108	4
266	170	171	106	107	4
267	171	172	105	106	4
268	172	173	104	105	4
269	173	174	103	104	4
270	174	175	102	103	4
271	175	176	31	102	4
329	34	177	178	71	4
330	177	179	180	178	4
331	179	181	182	180	4
332	181	183	184	182	4
333	183	185	186	184	4
334	185	187	188	186	4
335	187	189	190	188	4
336	189	38	191	190	4
337	71	178	192	80	4
338	178	180	193	192	4
339	180	182	194	193	4
340	182	184	195	194	4
341	184	186	196	195	4
342	186	188	197	196	4
343	188	190	198	197	4
344	190	191	199	198	4
345	80	192	200	35	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
346	192	193	201	200	4
347	193	194	202	201	4
348	194	195	203	202	4
349	195	196	204	203	4
350	196	197	205	204	4
351	197	198	206	205	4
352	198	199	39	206	4
353	49	38	189	207	4
354	207	189	187	208	4
355	208	187	185	209	4
356	209	185	183	210	4
357	210	183	181	211	4
358	211	181	179	212	4
359	212	179	177	213	4
360	213	177	34	48	4
361	32	54	220	221	4
362	221	220	219	222	4
363	222	219	218	223	4
364	223	218	217	224	4
365	224	217	216	225	4
366	225	216	215	226	4
367	226	215	214	227	4
368	227	214	53	31	4
369	35	200	228	117	4
370	200	201	229	228	4
371	201	202	230	229	4
372	202	203	231	230	4
373	203	204	232	231	4
374	204	205	233	232	4
375	205	206	234	233	4
376	206	39	235	234	4
377	117	228	236	126	4
378	228	229	237	236	4
379	229	230	238	237	4
380	230	231	239	238	4
381	231	232	240	239	4
382	232	233	241	240	4
383	233	234	242	241	4
384	234	235	243	242	4
385	126	236	244	36	4
386	236	237	245	244	4
387	237	238	246	245	4
388	238	239	247	246	4
389	239	240	248	247	4
390	240	241	249	248	4
391	241	242	250	249	4
392	242	243	40	250	4
393	36	244	251	142	4
394	244	245	252	251	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
395	245	246	253	252	4
396	246	247	254	253	4
397	247	248	255	254	4
398	248	249	256	255	4
399	249	250	257	256	4
400	250	40	258	257	4
401	142	251	259	151	4
402	251	252	260	259	4
403	252	253	261	260	4
404	253	254	262	261	4
405	254	255	263	262	4
406	255	256	264	263	4
407	256	257	265	264	4
408	257	258	266	265	4
409	151	259	267	37	4
410	259	260	268	267	4
411	260	261	269	268	4
412	261	262	270	269	4
413	262	263	271	270	4
414	263	264	272	271	4
415	264	265	273	272	4
416	265	266	41	273	4
417	37	267	274	167	4
418	267	268	275	274	4
419	268	269	276	275	4
420	269	270	277	276	4
421	270	271	278	277	4
422	271	272	279	278	4
423	272	273	280	279	4
424	273	41	281	280	4
425	167	274	282	176	4
426	274	275	283	282	4
427	275	276	284	283	4
428	276	277	285	284	4
429	277	278	286	285	4
430	278	279	287	286	4
431	279	280	288	287	4
432	280	281	289	288	4
433	176	282	227	31	4
434	282	283	226	227	4
435	283	284	225	226	4
436	284	285	224	225	4
437	285	286	223	224	4
438	286	287	222	223	4
439	287	288	221	222	4
440	288	289	32	221	4
498	38	290	291	191	4
499	290	292	293	291	4
500	292	294	295	293	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
501	294	296	297	295	4
502	296	298	299	297	4
503	298	300	301	299	4
504	300	302	303	301	4
505	302	42	304	303	4
506	191	291	305	199	4
507	291	293	306	305	4
508	293	295	307	306	4
509	295	297	308	307	4
510	297	299	309	308	4
511	299	301	310	309	4
512	301	303	311	310	4
513	303	304	312	311	4
514	199	305	313	39	4
515	305	306	314	313	4
516	306	307	315	314	4
517	307	308	316	315	4
518	308	309	317	316	4
519	309	310	318	317	4
520	310	311	319	318	4
521	311	312	43	319	4
522	50	42	302	320	4
523	320	302	300	321	4
524	321	300	298	322	4
525	322	298	296	323	4
526	323	296	294	324	4
527	324	294	292	325	4
528	325	292	290	326	4
529	326	290	38	49	4
530	33	55	333	334	4
531	334	333	332	335	4
532	335	332	331	336	4
533	336	331	330	337	4
534	337	330	329	338	4
535	338	329	328	339	4
536	339	328	327	340	4
537	340	327	54	32	4
538	39	313	341	235	4
539	313	314	342	341	4
540	314	315	343	342	4
541	315	316	344	343	4
542	316	317	345	344	4
543	317	318	346	345	4
544	318	319	347	346	4
545	319	43	348	347	4
546	235	341	349	243	4
547	341	342	350	349	4
548	342	343	351	350	4
549	343	344	352	351	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
550	344	345	353	352	4
551	345	346	354	353	4
552	346	347	355	354	4
553	347	348	356	355	4
554	243	349	357	40	4
555	349	350	358	357	4
556	350	351	359	358	4
557	351	352	360	359	4
558	352	353	361	360	4
559	353	354	362	361	4
560	354	355	363	362	4
561	355	356	44	363	4
562	40	357	364	258	4
563	357	358	365	364	4
564	358	359	366	365	4
565	359	360	367	366	4
566	360	361	368	367	4
567	361	362	369	368	4
568	362	363	370	369	4
569	363	44	371	370	4
570	258	364	372	266	4
571	364	365	373	372	4
572	365	366	374	373	4
573	366	367	375	374	4
574	367	368	376	375	4
575	368	369	377	376	4
576	369	370	378	377	4
577	370	371	379	378	4
578	266	372	380	41	4
579	372	373	381	380	4
580	373	374	382	381	4
581	374	375	383	382	4
582	375	376	384	383	4
583	376	377	385	384	4
584	377	378	386	385	4
585	378	379	45	386	4
586	41	380	387	281	4
587	380	381	388	387	4
588	381	382	389	388	4
589	382	383	390	389	4
590	383	384	391	390	4
591	384	385	392	391	4
592	385	386	393	392	4
593	386	45	394	393	4
594	281	387	395	289	4
595	387	388	396	395	4
596	388	389	397	396	4
597	389	390	398	397	4
598	390	391	399	398	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
599	391	392	400	399	4
600	392	393	401	400	4
601	393	394	402	401	4
602	289	395	340	32	4
603	395	396	339	340	4
604	396	397	338	339	4
605	397	398	337	338	4
606	398	399	336	337	4
607	399	400	335	336	4
608	400	401	334	335	4
609	401	402	33	334	4
667	42	403	404	304	4
668	403	405	406	404	4
669	405	407	408	406	4
670	407	409	410	408	4
671	409	411	412	410	4
672	411	413	414	412	4
673	413	415	416	414	4
674	415	26	417	416	4
675	304	404	418	312	4
676	404	406	419	418	4
677	406	408	420	419	4
678	408	410	421	420	4
679	410	412	422	421	4
680	412	414	423	422	4
681	414	416	424	423	4
682	416	417	425	424	4
683	312	418	426	43	4
684	418	419	427	426	4
685	419	420	428	427	4
686	420	421	429	428	4
687	421	422	430	429	4
688	422	423	431	430	4
689	423	424	432	431	4
690	424	425	27	432	4
691	47	26	415	433	4
692	433	415	413	434	4
693	434	413	411	435	4
694	435	411	409	436	4
695	436	409	407	437	4
696	437	407	405	438	4
697	438	405	403	439	4
698	439	403	42	50	4
699	30	52	446	447	4
700	447	446	445	448	4
701	448	445	444	449	4
702	449	444	443	450	4
703	450	443	442	451	4
704	451	442	441	452	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
705	452	441	440	453	4
706	453	440	55	33	4
707	43	426	454	348	4
708	426	427	455	454	4
709	427	428	456	455	4
710	428	429	457	456	4
711	429	430	458	457	4
712	430	431	459	458	4
713	431	432	460	459	4
714	432	27	461	460	4
715	348	454	462	356	4
716	454	455	463	462	4
717	455	456	464	463	4
718	456	457	465	464	4
719	457	458	466	465	4
720	458	459	467	466	4
721	459	460	468	467	4
722	460	461	469	468	4
723	356	462	470	44	4
724	462	463	471	470	4
725	463	464	472	471	4
726	464	465	473	472	4
727	465	466	474	473	4
728	466	467	475	474	4
729	467	468	476	475	4
730	468	469	28	476	4
731	44	470	477	371	4
732	470	471	478	477	4
733	471	472	479	478	4
734	472	473	480	479	4
735	473	474	481	480	4
736	474	475	482	481	4
737	475	476	483	482	4
738	476	28	484	483	4
739	371	477	485	379	4
740	477	478	486	485	4
741	478	479	487	486	4
742	479	480	488	487	4
743	480	481	489	488	4
744	481	482	490	489	4
745	482	483	491	490	4
746	483	484	492	491	4
747	379	485	493	45	4
748	485	486	494	493	4
749	486	487	495	494	4
750	487	488	496	495	4
751	488	489	497	496	4
752	489	490	498	497	4
753	490	491	499	498	4

Plates Cont...

Plate	Node A	Node B	Node C	Node D	Property
754	491	492	29	499	4
755	45	493	500	394	4
756	493	494	501	500	4
757	494	495	502	501	4
758	495	496	503	502	4
759	496	497	504	503	4
760	497	498	505	504	4
761	498	499	506	505	4
762	499	29	507	506	4
763	394	500	508	402	4
764	500	501	509	508	4
765	501	502	510	509	4
766	502	503	511	510	4
767	503	504	512	511	4
768	504	505	513	512	4
769	505	506	514	513	4
770	506	507	515	514	4
771	402	508	453	33	4
772	508	509	452	453	4
773	509	510	451	452	4
774	510	511	450	451	4
775	511	512	449	450	4
776	512	513	448	449	4
777	513	514	447	448	4
778	514	515	30	447	4

Section Properties

Prop	Section	Area (cm^2)	I_{yy} (cm^4)	I_{zz} (cm^4)	J (cm^4)	Material
1	Rect 0.21x0.30	630.000	47.3E+3	23.2E+3	52.6E+3	CONCRETE
2	I-SECTION	8E+3	3.54E+6	41.1E+6	1.37E+6	CONCRETE
3	Rect 1.80x0.30	5.4E+3	405E+3	14.6E+6	1.45E+6	CONCRETE

Plate Thickness

Prop	Node A (cm)	Node B (cm)	Node C (cm)	Node D (cm)	Material
4	21.000	21.000	21.000	21.000	CONCRETE

Materials

Mat	Name	E (kN/mm^2)	ν	Density (kg/m^3)	α (/°C)
1	STEEL	205.000	0.300	7.83E+3	12E -6
2	STAINLESSSTEEL	197.930	0.300	7.83E+3	18E -6
3	ALUMINUM	68.948	0.330	2.71E+3	23E -6
4	MATERIAL1	21.718	0.170	2.4E+3	6.5E -6
5	CONCRETE	21.718	0.170	2.41E+3	5E -6

Supports

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN˙m/deg)	rY (kN˙m/deg)	rZ (kN˙m/deg)
1	Fixed	Fixed	Fixed	-	-	-
2	Fixed	Fixed	Fixed	-	-	-
3	Fixed	Fixed	Fixed	-	-	-
4	Fixed	Fixed	Fixed	-	-	-
5	Fixed	Fixed	Fixed	-	-	-
26	Fixed	Fixed	Fixed	-	-	-
27	Fixed	Fixed	Fixed	-	-	-
28	Fixed	Fixed	Fixed	-	-	-
29	Fixed	Fixed	Fixed	-	-	-
30	Fixed	Fixed	Fixed	-	-	-

Releases

There is no data of this type.

Basic Load Cases

Number	Name
1	DEAD LOAD
2	SUPERIMPOSED DEAD LOAD (SDL)

Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
3	COMBINATION LOAD CASE 3	1	DEAD LOAD	1.00
		2	SUPERIMPOSED DEAD LOAD (SDL)	1.00

Load Generators

There is no data of this type.

Beam Loads : 1 DEAD LOAD

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
665	UNI	kN/m	GY	-13.000	-	-	-	-
666	UNI	kN/m	GY	-13.000	-	-	-	-
877	UNI	kN/m	GY	-13.000	-	-	-	-
878	UNI	kN/m	GY	-13.000	-	-	-	-
879	UNI	kN/m	GY	-13.000	-	-	-	-
881	UNI	kN/m	GY	-13.000	-	-	-	-
882	UNI	kN/m	GY	-13.000	-	-	-	-
883	UNI	kN/m	GY	-13.000	-	-	-	-
884	UNI	kN/m	GY	-13.000	-	-	-	-
885	UNI	kN/m	GY	-13.000	-	-	-	-
886	UNI	kN/m	GY	-13.000	-	-	-	-
887	UNI	kN/m	GY	-13.000	-	-	-	-
888	UNI	kN/m	GY	-13.000	-	-	-	-
889	UNI	kN/m	GY	-13.000	-	-	-	-
890	UNI	kN/m	GY	-13.000	-	-	-	-
891	UNI	kN/m	GY	-13.000	-	-	-	-
892	UNI	kN/m	GY	-13.000	-	-	-	-
893	UNI	kN/m	GY	-13.000	-	-	-	-
894	UNI	kN/m	GY	-13.000	-	-	-	-
895	UNI	kN/m	GY	-13.000	-	-	-	-
896	UNI	kN/m	GY	-13.000	-	-	-	-
897	UNI	kN/m	GY	-13.000	-	-	-	-
898	UNI	kN/m	GY	-13.000	-	-	-	-
899	UNI	kN/m	GY	-13.000	-	-	-	-
900	UNI	kN/m	GY	-13.000	-	-	-	-
901	UNI	kN/m	GY	-13.000	-	-	-	-
902	UNI	kN/m	GY	-13.000	-	-	-	-
903	UNI	kN/m	GY	-13.000	-	-	-	-
904	UNI	kN/m	GY	-13.000	-	-	-	-
905	UNI	kN/m	GY	-13.000	-	-	-	-
906	UNI	kN/m	GY	-13.000	-	-	-	-
907	UNI	kN/m	GY	-13.000	-	-	-	-
908	UNI	kN/m	GY	-13.000	-	-	-	-
909	UNI	kN/m	GY	-13.000	-	-	-	-
910	UNI	kN/m	GY	-13.000	-	-	-	-
911	UNI	kN/m	GY	-13.000	-	-	-	-
912	UNI	kN/m	GY	-13.000	-	-	-	-
913	UNI	kN/m	GY	-13.000	-	-	-	-
914	UNI	kN/m	GY	-13.000	-	-	-	-
915	UNI	kN/m	GY	-13.000	-	-	-	-
916	UNI	kN/m	GY	-13.000	-	-	-	-
917	UNI	kN/m	GY	-13.000	-	-	-	-
918	UNI	kN/m	GY	-13.000	-	-	-	-
919	UNI	kN/m	GY	-13.000	-	-	-	-
920	UNI	kN/m	GY	-13.000	-	-	-	-
921	UNI	kN/m	GY	-13.000	-	-	-	-
922	UNI	kN/m	GY	-13.000	-	-	-	-
923	UNI	kN/m	GY	-13.000	-	-	-	-
924	UNI	kN/m	GY	-13.000	-	-	-	-

Beam Loads : 1 DEAD LOAD Cont...

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
925	UNI	kN/m	GY	-13.000	-	-	-	-
926	UNI	kN/m	GY	-13.000	-	-	-	-
927	UNI	kN/m	GY	-13.000	-	-	-	-
928	UNI	kN/m	GY	-13.000	-	-	-	-
929	UNI	kN/m	GY	-13.000	-	-	-	-
930	UNI	kN/m	GY	-13.000	-	-	-	-
931	UNI	kN/m	GY	-13.000	-	-	-	-
932	UNI	kN/m	GY	-13.000	-	-	-	-
933	UNI	kN/m	GY	-13.000	-	-	-	-
934	UNI	kN/m	GY	-13.000	-	-	-	-
935	UNI	kN/m	GY	-13.000	-	-	-	-
936	UNI	kN/m	GY	-13.000	-	-	-	-
937	UNI	kN/m	GY	-13.000	-	-	-	-
938	UNI	kN/m	GY	-13.000	-	-	-	-
939	UNI	kN/m	GY	-13.000	-	-	-	-

Floor Loads : 1 DEAD LOAD

Load (N/mm^2)	Min Ht. (m)	Max Ht. (m)	Min X (m)	Max X (m)	Min Y (m)	Max Y (m)
-0.005	0.000	0.000	-	-	-	-

Beam Loads : 2 SUPERIMPOSED DEAD LOAD (SDL)

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
812	UNI	kN/m	GY	-10.000	-	-	-	-
813	UNI	kN/m	GY	-10.000	-	-	-	-
814	UNI	kN/m	GY	-10.000	-	-	-	-
815	UNI	kN/m	GY	-10.000	-	-	-	-
816	UNI	kN/m	GY	-10.000	-	-	-	-
817	UNI	kN/m	GY	-10.000	-	-	-	-
818	UNI	kN/m	GY	-10.000	-	-	-	-
819	UNI	kN/m	GY	-10.000	-	-	-	-
820	UNI	kN/m	GY	-10.000	-	-	-	-
821	UNI	kN/m	GY	-10.000	-	-	-	-
822	UNI	kN/m	GY	-10.000	-	-	-	-
823	UNI	kN/m	GY	-10.000	-	-	-	-
824	UNI	kN/m	GY	-10.000	-	-	-	-
825	UNI	kN/m	GY	-10.000	-	-	-	-
826	UNI	kN/m	GY	-10.000	-	-	-	-
827	UNI	kN/m	GY	-10.000	-	-	-	-
828	UNI	kN/m	GY	-10.000	-	-	-	-
829	UNI	kN/m	GY	-10.000	-	-	-	-
830	UNI	kN/m	GY	-10.000	-	-	-	-
831	UNI	kN/m	GY	-10.000	-	-	-	-
832	UNI	kN/m	GY	-10.000	-	-	-	-
833	UNI	kN/m	GY	-10.000	-	-	-	-

Beam Loads : 2 SUPERIMPOSED DEAD LOAD (SDL) Cont...

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
834	UNI	kN/m	GY	-10.000	-	-	-	-
835	UNI	kN/m	GY	-10.000	-	-	-	-
836	UNI	kN/m	GY	-10.000	-	-	-	-
837	UNI	kN/m	GY	-10.000	-	-	-	-
838	UNI	kN/m	GY	-10.000	-	-	-	-
839	UNI	kN/m	GY	-10.000	-	-	-	-
840	UNI	kN/m	GY	-10.000	-	-	-	-
841	UNI	kN/m	GY	-10.000	-	-	-	-
842	UNI	kN/m	GY	-10.000	-	-	-	-
843	UNI	kN/m	GY	-10.000	-	-	-	-
844	UNI	kN/m	GY	-10.000	-	-	-	-
845	UNI	kN/m	GY	-10.000	-	-	-	-
846	UNI	kN/m	GY	-10.000	-	-	-	-
847	UNI	kN/m	GY	-10.000	-	-	-	-
848	UNI	kN/m	GY	-10.000	-	-	-	-
849	UNI	kN/m	GY	-10.000	-	-	-	-
850	UNI	kN/m	GY	-10.000	-	-	-	-
851	UNI	kN/m	GY	-10.000	-	-	-	-
852	UNI	kN/m	GY	-10.000	-	-	-	-
853	UNI	kN/m	GY	-10.000	-	-	-	-
854	UNI	kN/m	GY	-10.000	-	-	-	-
855	UNI	kN/m	GY	-10.000	-	-	-	-
856	UNI	kN/m	GY	-10.000	-	-	-	-
857	UNI	kN/m	GY	-10.000	-	-	-	-
858	UNI	kN/m	GY	-10.000	-	-	-	-
859	UNI	kN/m	GY	-10.000	-	-	-	-
860	UNI	kN/m	GY	-10.000	-	-	-	-
861	UNI	kN/m	GY	-10.000	-	-	-	-
862	UNI	kN/m	GY	-10.000	-	-	-	-
863	UNI	kN/m	GY	-10.000	-	-	-	-
864	UNI	kN/m	GY	-10.000	-	-	-	-
865	UNI	kN/m	GY	-10.000	-	-	-	-
866	UNI	kN/m	GY	-10.000	-	-	-	-
867	UNI	kN/m	GY	-10.000	-	-	-	-
868	UNI	kN/m	GY	-10.000	-	-	-	-
869	UNI	kN/m	GY	-10.000	-	-	-	-
870	UNI	kN/m	GY	-10.000	-	-	-	-
871	UNI	kN/m	GY	-10.000	-	-	-	-
872	UNI	kN/m	GY	-10.000	-	-	-	-
873	UNI	kN/m	GY	-10.000	-	-	-	-
874	UNI	kN/m	GY	-10.000	-	-	-	-
875	UNI	kN/m	GY	-10.000	-	-	-	-

Plate Loads : 2 SUPERIMPOSED DEAD LOAD (SDL)

Plate	Type		Direction	Fa	Fb	X1 (m)	Y1 (m)	X2 (m)	Y2 (m)
97	PRE	N/mm2	GY	-0.011	-	-	-	-	-
99	PRE	N/mm2	GY	-0.011	-	-	-	-	-
101	PRE	N/mm2	GY	-0.011	-	-	-	-	-
103	PRE	N/mm2	GY	-0.011	-	-	-	-	-
105	PRE	N/mm2	GY	-0.011	-	-	-	-	-
107	PRE	N/mm2	GY	-0.011	-	-	-	-	-
109	PRE	N/mm2	GY	-0.011	-	-	-	-	-
111	PRE	N/mm2	GY	-0.011	-	-	-	-	-
138	PRE	N/mm2	GY	-0.011	-	-	-	-	-
140	PRE	N/mm2	GY	-0.011	-	-	-	-	-
142	PRE	N/mm2	GY	-0.011	-	-	-	-	-
144	PRE	N/mm2	GY	-0.011	-	-	-	-	-
146	PRE	N/mm2	GY	-0.011	-	-	-	-	-
148	PRE	N/mm2	GY	-0.011	-	-	-	-	-
150	PRE	N/mm2	GY	-0.011	-	-	-	-	-
151	PRE	N/mm2	GY	-0.011	-	-	-	-	-
166	PRE	N/mm2	GY	-0.011	-	-	-	-	-
167	PRE	N/mm2	GY	-0.011	-	-	-	-	-
168	PRE	N/mm2	GY	-0.011	-	-	-	-	-
169	PRE	N/mm2	GY	-0.011	-	-	-	-	-
170	PRE	N/mm2	GY	-0.011	-	-	-	-	-
171	PRE	N/mm2	GY	-0.011	-	-	-	-	-
172	PRE	N/mm2	GY	-0.011	-	-	-	-	-
173	PRE	N/mm2	GY	-0.011	-	-	-	-	-
264	PRE	N/mm2	GY	-0.011	-	-	-	-	-
265	PRE	N/mm2	GY	-0.011	-	-	-	-	-
266	PRE	N/mm2	GY	-0.011	-	-	-	-	-
267	PRE	N/mm2	GY	-0.011	-	-	-	-	-
268	PRE	N/mm2	GY	-0.011	-	-	-	-	-
269	PRE	N/mm2	GY	-0.011	-	-	-	-	-
270	PRE	N/mm2	GY	-0.011	-	-	-	-	-
271	PRE	N/mm2	GY	-0.011	-	-	-	-	-
329	PRE	N/mm2	GY	-0.011	-	-	-	-	-
330	PRE	N/mm2	GY	-0.011	-	-	-	-	-
331	PRE	N/mm2	GY	-0.011	-	-	-	-	-
332	PRE	N/mm2	GY	-0.011	-	-	-	-	-
333	PRE	N/mm2	GY	-0.011	-	-	-	-	-
334	PRE	N/mm2	GY	-0.011	-	-	-	-	-
335	PRE	N/mm2	GY	-0.011	-	-	-	-	-
336	PRE	N/mm2	GY	-0.011	-	-	-	-	-
353	PRE	N/mm2	GY	-0.011	-	-	-	-	-
354	PRE	N/mm2	GY	-0.011	-	-	-	-	-
355	PRE	N/mm2	GY	-0.011	-	-	-	-	-
356	PRE	N/mm2	GY	-0.011	-	-	-	-	-
357	PRE	N/mm2	GY	-0.011	-	-	-	-	-
358	PRE	N/mm2	GY	-0.011	-	-	-	-	-
359	PRE	N/mm2	GY	-0.011	-	-	-	-	-
360	PRE	N/mm2	GY	-0.011	-	-	-	-	-
361	PRE	N/mm2	GY	-0.011	-	-	-	-	-

Plate Loads : 2 SUPERIMPOSED DEAD LOAD (SDL) Cont...

Plate	Type		Direction	Fa	Fb	X1 (m)	Y1 (m)	X2 (m)	Y2 (m)
362	PRE	N/mm2	GY	-0.011	-	-	-	-	-
363	PRE	N/mm2	GY	-0.011	-	-	-	-	-
364	PRE	N/mm2	GY	-0.011	-	-	-	-	-
365	PRE	N/mm2	GY	-0.011	-	-	-	-	-
366	PRE	N/mm2	GY	-0.011	-	-	-	-	-
367	PRE	N/mm2	GY	-0.011	-	-	-	-	-
368	PRE	N/mm2	GY	-0.011	-	-	-	-	-
433	PRE	N/mm2	GY	-0.011	-	-	-	-	-
434	PRE	N/mm2	GY	-0.011	-	-	-	-	-
435	PRE	N/mm2	GY	-0.011	-	-	-	-	-
436	PRE	N/mm2	GY	-0.011	-	-	-	-	-
437	PRE	N/mm2	GY	-0.011	-	-	-	-	-
438	PRE	N/mm2	GY	-0.011	-	-	-	-	-
439	PRE	N/mm2	GY	-0.011	-	-	-	-	-
440	PRE	N/mm2	GY	-0.011	-	-	-	-	-
498	PRE	N/mm2	GY	-0.011	-	-	-	-	-
499	PRE	N/mm2	GY	-0.011	-	-	-	-	-
500	PRE	N/mm2	GY	-0.011	-	-	-	-	-
501	PRE	N/mm2	GY	-0.011	-	-	-	-	-
502	PRE	N/mm2	GY	-0.011	-	-	-	-	-
503	PRE	N/mm2	GY	-0.011	-	-	-	-	-
504	PRE	N/mm2	GY	-0.011	-	-	-	-	-
505	PRE	N/mm2	GY	-0.011	-	-	-	-	-
522	PRE	N/mm2	GY	-0.011	-	-	-	-	-
523	PRE	N/mm2	GY	-0.011	-	-	-	-	-
524	PRE	N/mm2	GY	-0.011	-	-	-	-	-
525	PRE	N/mm2	GY	-0.011	-	-	-	-	-
526	PRE	N/mm2	GY	-0.011	-	-	-	-	-
527	PRE	N/mm2	GY	-0.011	-	-	-	-	-
528	PRE	N/mm2	GY	-0.011	-	-	-	-	-
529	PRE	N/mm2	GY	-0.011	-	-	-	-	-
530	PRE	N/mm2	GY	-0.011	-	-	-	-	-
531	PRE	N/mm2	GY	-0.011	-	-	-	-	-
532	PRE	N/mm2	GY	-0.011	-	-	-	-	-
533	PRE	N/mm2	GY	-0.011	-	-	-	-	-
534	PRE	N/mm2	GY	-0.011	-	-	-	-	-
535	PRE	N/mm2	GY	-0.011	-	-	-	-	-
536	PRE	N/mm2	GY	-0.011	-	-	-	-	-
537	PRE	N/mm2	GY	-0.011	-	-	-	-	-
602	PRE	N/mm2	GY	-0.011	-	-	-	-	-
603	PRE	N/mm2	GY	-0.011	-	-	-	-	-
604	PRE	N/mm2	GY	-0.011	-	-	-	-	-
605	PRE	N/mm2	GY	-0.011	-	-	-	-	-
606	PRE	N/mm2	GY	-0.011	-	-	-	-	-
607	PRE	N/mm2	GY	-0.011	-	-	-	-	-
608	PRE	N/mm2	GY	-0.011	-	-	-	-	-
609	PRE	N/mm2	GY	-0.011	-	-	-	-	-
667	PRE	N/mm2	GY	-0.011	-	-	-	-	-
668	PRE	N/mm2	GY	-0.011	-	-	-	-	-

Plate Loads : 2 SUPERIMPOSED DEAD LOAD (SDL) Cont...

Plate	Type		Direction	Fa	Fb	X1 (m)	Y1 (m)	X2 (m)	Y2 (m)
669	PRE	N/mm2	GY	-0.011	-	-	-	-	-
670	PRE	N/mm2	GY	-0.011	-	-	-	-	-
671	PRE	N/mm2	GY	-0.011	-	-	-	-	-
672	PRE	N/mm2	GY	-0.011	-	-	-	-	-
673	PRE	N/mm2	GY	-0.011	-	-	-	-	-
674	PRE	N/mm2	GY	-0.011	-	-	-	-	-
691	PRE	N/mm2	GY	-0.011	-	-	-	-	-
692	PRE	N/mm2	GY	-0.011	-	-	-	-	-
693	PRE	N/mm2	GY	-0.011	-	-	-	-	-
694	PRE	N/mm2	GY	-0.011	-	-	-	-	-
695	PRE	N/mm2	GY	-0.011	-	-	-	-	-
696	PRE	N/mm2	GY	-0.011	-	-	-	-	-
697	PRE	N/mm2	GY	-0.011	-	-	-	-	-
698	PRE	N/mm2	GY	-0.011	-	-	-	-	-
699	PRE	N/mm2	GY	-0.011	-	-	-	-	-
700	PRE	N/mm2	GY	-0.011	-	-	-	-	-
701	PRE	N/mm2	GY	-0.011	-	-	-	-	-
702	PRE	N/mm2	GY	-0.011	-	-	-	-	-
703	PRE	N/mm2	GY	-0.011	-	-	-	-	-
704	PRE	N/mm2	GY	-0.011	-	-	-	-	-
705	PRE	N/mm2	GY	-0.011	-	-	-	-	-
706	PRE	N/mm2	GY	-0.011	-	-	-	-	-
771	PRE	N/mm2	GY	-0.011	-	-	-	-	-
772	PRE	N/mm2	GY	-0.011	-	-	-	-	-
773	PRE	N/mm2	GY	-0.011	-	-	-	-	-
774	PRE	N/mm2	GY	-0.011	-	-	-	-	-
775	PRE	N/mm2	GY	-0.011	-	-	-	-	-
776	PRE	N/mm2	GY	-0.011	-	-	-	-	-
777	PRE	N/mm2	GY	-0.011	-	-	-	-	-
778	PRE	N/mm2	GY	-0.011	-	-	-	-	-

Floor Loads : 2 SUPERIMPOSED DEAD LOAD (SDL)

Load (N/mm^2)	Min Ht. (m)	Max Ht. (m)	Min X (m)	Max X (m)	Min Y (m)	Max Y (m)
-0.004	0.000	0.000	-	-	-	-

Beam Displacement Detail Summary

Displacements shown in italic indicate the presence of an offset

	Beam	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	876	1:DEAD LOAD	0.500	**0.001**	-0.003	0.000	0.003
Min X	876	1:DEAD LOAD	0.400	**-0.000**	-0.002	0.000	0.002
Max Y	891	2:SUPERIMPC	0.800	-0.000	**0.006**	0.000	0.006
Min Y	846	3:COMBINATI(	0.656	0.000	**-53.014**	-0.000	53.014
Max Z	616	1:DEAD LOAD	0.469	0.000	-1.054	**0.002**	1.054
Min Z	616	1:DEAD LOAD	0.563	0.000	-0.843	**-0.001**	0.843
Max Rst	846	3:COMBINATI(	0.656	0.000	-53.014	-0.000	**53.014**

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
Max Fx	5	1	1:DEAD LOAD	**0.000**	230.346	0.000	-1.614	0.000	-8.729
Min Fx	5	1	1:DEAD LOAD	**0.000**	230.346	0.000	-1.614	0.000	-8.729
Max Fy	5	1	3:COMBINATI(	0.000	**620.875**	0.000	-37.898	0.000	-7.391
Min Fy	640	30	3:COMBINATI(	-0.000	**-635.109**	-0.000	-40.559	-0.000	-4.569
Max Fz	5	1	1:DEAD LOAD	0.000	230.346	**0.000**	-1.614	0.000	-8.729
Min Fz	5	1	1:DEAD LOAD	0.000	230.346	**0.000**	-1.614	0.000	-8.729
Max Mx	616	415	3:COMBINATI(	0.000	-613.949	0.000	**37.906**	0.000	-587.132
Min Mx	640	447	3:COMBINATI(	0.000	-628.225	0.000	**-40.559**	0.000	-597.694
Max My	5	1	1:DEAD LOAD	0.000	230.346	0.000	-1.614	**0.000**	-8.729
Min My	5	1	1:DEAD LOAD	0.000	230.346	0.000	-1.614	**0.000**	-8.729
Max Mz	912	40	2:SUPERIMPC	0.000	52.437	0.000	-0.006	0.000	**657.899**
Min Mz	477	340	3:COMBINATI(	0.000	-16.939	0.000	15.975	0.000	**-4.78E+3**

Beam End Forces Envelope

Sign convention is as the action of the joint on the beam.

Beam	Node	Envelope	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)

Results are not available - This Printing is possible only from Post Processing

Reaction Summary

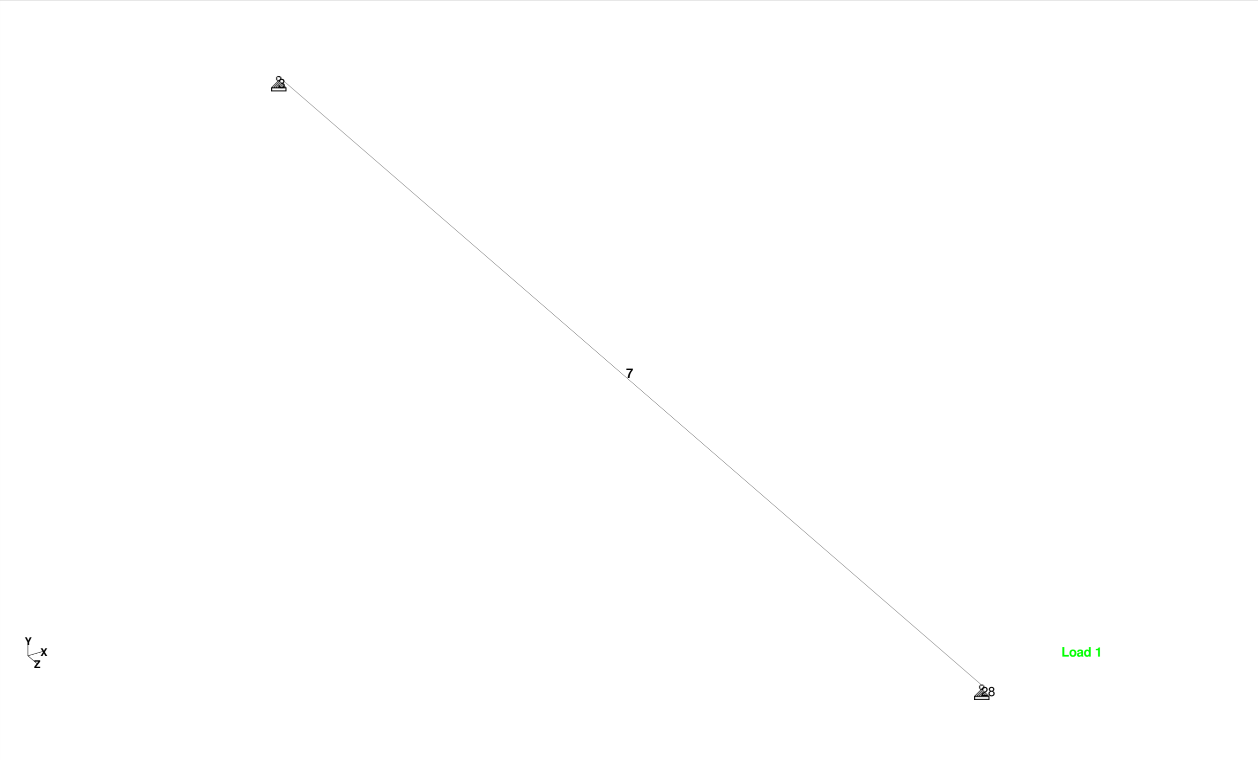
			Horizontal	Vertical	Horizontal	Moment		
	Node	**L/C**	**FX** (kN)	**FY** (kN)	**FZ** (kN)	**MX** (kNm)	**MY** (kNm)	**MZ** (kNm)
Max FX	1	1:DEAD LOAD	**0.000**	263.474	0.000	0.000	0.000	0.000
Min FX	1	1:DEAD LOAD	**0.000**	263.474	0.000	0.000	0.000	0.000
Max FY	5	3:COMBINATI(	0.000	**749.305**	0.000	0.000	0.000	0.000
Min FY	26	1:DEAD LOAD	0.000	**263.469**	0.000	0.000	0.000	0.000
Max FZ	1	1:DEAD LOAD	0.000	263.474	**0.000**	0.000	0.000	0.000
Min FZ	1	1:DEAD LOAD	0.000	263.474	**0.000**	0.000	0.000	0.000
Max MX	1	1:DEAD LOAD	0.000	263.474	0.000	**0.000**	0.000	0.000
Min MX	1	1:DEAD LOAD	0.000	263.474	0.000	**0.000**	0.000	0.000
Max MY	1	1:DEAD LOAD	0.000	263.474	0.000	0.000	**0.000**	0.000
Min MY	1	1:DEAD LOAD	0.000	263.474	0.000	0.000	**0.000**	0.000
Max MZ	1	1:DEAD LOAD	0.000	263.474	0.000	0.000	0.000	**0.000**
Min MZ	1	1:DEAD LOAD	0.000	263.474	0.000	0.000	0.000	**0.000**

Reaction Envelope

Results are not available - This Printing is possible only from Post Processing

Reaction Envelope Cont...

Results are not available - This Printing is possible only from Post Processing



Whole Structure (Input data was modified after picture taken)

Job Information

	Engineer	Checked	Approved
Name:	BRD		
Date:	8/09/2011		

Structure Type	FLOOR

Number of Nodes	2	Highest Node	28
Number of Elements	1	Highest Beam	7

Number of Basic Load Cases	1
Number of Combination Load Cases	0

Included in this printout are data for:

All	The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	SELF WEIGHT

Nodes

Node	X (m)	Y (m)	Z (m)
3	6.000	0.000	0.000
28	6.000	0.000	30.000

Beams

Beam	Node A	Node B	Length (m)	Property	β (degrees)
7	3	28	30.000	1	0

Section Properties

Prop	Section	Area (cm^2)	I_{yy} (cm^4)	I_{zz} (cm^4)	J (cm^4)	Material
1	I-SECTION	8E+3	3.54E+6	41.1E+6	1.37E+6	CONCRETE

Materials

Mat	Name	E (kN/mm^2)	ν	Density (kg/m^3)	α (/°C)
1	STEEL	205.000	0.300	7.83E+3	12E -6
2	STAINLESSSTEEL	197.930	0.300	7.83E+3	18E -6
3	ALUMINUM	68.948	0.330	2.71E+3	23E -6
4	CONCRETE	21.718	0.170	2.41E+3	5E -6

Supports

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN˙m/deg)	rY (kN˙m/deg)	rZ (kN˙m/deg)
3	Fixed	Fixed	Fixed	-	-	-
28	Fixed	Fixed	Fixed	-	-	-

Releases

There is no data of this type.

Basic Load Cases

Number	Name
1	SELF WEIGHT

Combination Load Cases

There is no data of this type.

Load Generators

There is no data of this type.

Beam Loads : 1 SELF WEIGHT

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
7	UNI	kN/m	GY	-29.000	0.000	-	0.938	-
	UNI	kN/m	GY	-29.000	0.938	-	1.875	-
	UNI	kN/m	GY	-29.000	28.125	-	29.063	-
	UNI	kN/m	GY	-29.000	29.063	-	30.000	-

Selfweight : 1 SELF WEIGHT

Direction	Factor
Y	-1.000

Node Displacements

Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
3	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.002	0.000	0.000
28	1:SELF WEIGH	0.000	0.000	0.000	0.000	-0.002	0.000	0.000

Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	3	1:SELF WEIGH	**0.000**	0.000	0.000	0.000	0.002	0.000	0.000
Min X	3	1:SELF WEIGH	**0.000**	0.000	0.000	0.000	0.002	0.000	0.000
Max Y	3	1:SELF WEIGH	0.000	**0.000**	0.000	0.000	0.002	0.000	0.000
Min Y	3	1:SELF WEIGH	0.000	**0.000**	0.000	0.000	0.002	0.000	0.000
Max Z	3	1:SELF WEIGH	0.000	0.000	**0.000**	0.000	0.002	0.000	0.000
Min Z	3	1:SELF WEIGH	0.000	0.000	**0.000**	0.000	0.002	0.000	0.000
Max rX	3	1:SELF WEIGH	0.000	0.000	0.000	0.000	**0.002**	0.000	0.000
Min rX	28	1:SELF WEIGH	0.000	0.000	0.000	0.000	**-0.002**	0.000	0.000
Max rY	3	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.002	**0.000**	0.000
Min rY	3	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.002	**0.000**	0.000
Max rZ	3	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.002	0.000	**0.000**
Min rZ	3	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.002	0.000	**0.000**
Max Rst	3	1:SELF WEIGH	0.000	0.000	0.000	**0.000**	0.002	0.000	0.000

Beam Displacement Detail

Displacements shown in italic indicate the presence of an offset

Beam	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
7	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.000
		3.000	0.000	-7.143	-0.000	7.143
		6.000	0.000	-13.475	-0.000	13.475
		9.000	0.000	-18.444	-0.000	18.444
		12.000	0.000	-21.653	-0.000	21.653
		15.000	0.000	-22.854	-0.000	22.854
		18.000	0.000	-21.653	0.000	21.653
		21.000	0.000	-18.444	-0.000	18.444
		24.000	0.000	-13.475	-0.000	13.475
		27.000	0.000	-7.143	-0.000	7.143
		30.000	0.000	0.000	0.000	0.000

Beam Displacement Detail Summary

Displacements shown in italic indicate the presence of an offset

	Beam	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	7	1:SELF WEIGH	0.000	**0.000**	0.000	0.000	0.000
Min X	7	1:SELF WEIGH	0.000	**0.000**	0.000	0.000	0.000
Max Y	7	1:SELF WEIGH	0.000	0.000	**0.000**	0.000	0.000
Min Y	7	1:SELF WEIGH	15.000	0.000	**-22.854**	-0.000	22.854
Max Z	7	1:SELF WEIGH	18.000	0.000	-21.653	**0.000**	21.653
Min Z	7	1:SELF WEIGH	15.000	0.000	-22.854	**-0.000**	22.854
Max Rst	7	1:SELF WEIGH	15.000	0.000	-22.854	-0.000	**22.854**

Beam Relative Displacement Detail

Beam	L/C	d (m)	Disp. x x (mm)	Disp. y y (mm)	Disp. z z (mm)	Resultant (mm)
7	1:SELF WEIGH	0.000	0.000	0.000	0.000	0.000
		3.000	-0.000	-7.143	0.000	7.143
		6.000	-0.000	-13.475	0.000	13.475
		9.000	-0.000	-18.444	0.000	18.444
		12.000	-0.000	-21.653	0.000	21.653
		15.000	-0.000	-22.854	-0.000	22.854
		18.000	0.000	-21.653	0.000	21.653
		21.000	-0.000	-18.444	0.000	18.444
		24.000	-0.000	-13.475	0.000	13.475
		27.000	-0.000	-7.143	0.000	7.143
		30.000	0.000	0.000	0.000	0.000

Beam Maximum Relative Displacements

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C	y (mm)	d (m)	z (mm)	d (m)	Resultant (mm)	d (m)	Span Max z
7	3	30.000	1:SELF WEIGH	-22.854	15.000	0.000	0.000	22.854	15.000	1313

Beam End Displacements

Displacements shown in italic indicate the presence of an offset

Beam	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
7	3	1:SELF WEIGH	0.000	0.000	0.000	0.000
	28	1:SELF WEIGH	0.000	0.000	0.000	0.000

Beam End Displacement Summary

Displacements shown in italic indicate the presence of an offset

	Beam	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	7	3	1:SELF WEIGH	**0.000**	0.000	0.000	0.000
Min X	7	3	1:SELF WEIGH	**0.000**	0.000	0.000	0.000
Max Y	7	3	1:SELF WEIGH	0.000	**0.000**	0.000	0.000
Min Y	7	3	1:SELF WEIGH	0.000	**0.000**	0.000	0.000
Max Z	7	3	1:SELF WEIGH	0.000	0.000	**0.000**	0.000
Min Z	7	3	1:SELF WEIGH	0.000	0.000	**0.000**	0.000
Max Rst	7	3	1:SELF WEIGH	0.000	0.000	0.000	**0.000**

Beam End Forces

Sign convention is as the action of the joint on the beam.

			Axial	Shear		Torsion	Bending	
Beam	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
7	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	-0.000
	28	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	0.000

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
Max Fx	7	3	1:SELF WEIGH	**0.000**	337.765	0.000	0.000	0.000	-0.000
Min Fx	7	3	1:SELF WEIGH	**0.000**	337.765	0.000	0.000	0.000	-0.000
Max Fy	7	3	1:SELF WEIGH	0.000	**337.765**	0.000	0.000	0.000	-0.000
Min Fy	7	28	1:SELF WEIGH	-0.000	**-337.765**	-0.000	-0.000	-0.000	-0.000
Max Fz	7	3	1:SELF WEIGH	0.000	337.765	**0.000**	0.000	0.000	-0.000
Min Fz	7	3	1:SELF WEIGH	0.000	337.765	**0.000**	0.000	0.000	-0.000
Max Mx	7	3	1:SELF WEIGH	0.000	337.765	0.000	**0.000**	0.000	-0.000
Min Mx	7	3	1:SELF WEIGH	0.000	337.765	0.000	**0.000**	0.000	-0.000
Max My	7	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	**0.000**	-0.000
Min My	7	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	**0.000**	-0.000
Max Mz	7	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	**-0.000**
Min Mz	7	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	**-0.000**

Beam End Forces Envelope

Sign convention is as the action of the joint on the beam.

Beam	Node	Envelope	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)

Results are not available - This Printing is possible only from Post Processing

Beam Force Detail

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

			Axial	Shear		Torsion	Bending	
Beam	**L/C**	**d** (m)	**Fx** (kN)	**Fy** (kN)	**Fz** (kN)	**Mx** (kNm)	**My** (kNm)	**Mz** (kNm)
7	1:SELF WEIGH	0.000	0.000	337.765	0.000	0.000	0.000	-0.000
		3.000	0.000	226.712	0.000	0.000	0.000	-806.682
		6.000	0.000	170.034	0.000	0.000	0.000	-1.4E+3
		9.000	0.000	113.356	0.000	0.000	0.000	-1.82E+3
		12.000	0.000	56.678	0.000	0.000	0.000	-2.08E+3
		15.000	0.000	-0.000	0.000	0.000	0.000	-2.18E+3
		18.000	0.000	-56.678	0.000	0.000	0.000	-2.08E+3
		21.000	0.000	-113.356	0.000	0.000	0.000	-1.82E+3
		24.000	0.000	-170.034	0.000	0.000	0.000	-1.4E+3
		27.000	0.000	-226.712	0.000	0.000	0.000	-806.682
		30.000	-0.000	-337.765	-0.000	-0.000	-0.000	-0.000

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

				Axial	Shear		Torsion	Bending	
	Beam	**L/C**	**d** (m)	**Fx** (kN)	**Fy** (kN)	**Fz** (kN)	**Mx** (kNm)	**My** (kNm)	**Mz** (kNm)
Max Fx	7	1:SELF WEIGH	0.000	**0.000**	337.765	0.000	0.000	0.000	-0.000
Min Fx	7	1:SELF WEIGH	0.000	**0.000**	337.765	0.000	0.000	0.000	-0.000
Max Fy	7	1:SELF WEIGH	0.000	0.000	**337.765**	0.000	0.000	0.000	-0.000
Min Fy	7	1:SELF WEIGH	30.000	-0.000	**-337.765**	-0.000	-0.000	-0.000	-0.000
Max Fz	7	1:SELF WEIGH	0.000	0.000	337.765	**0.000**	0.000	0.000	-0.000
Min Fz	7	1:SELF WEIGH	0.000	0.000	337.765	**0.000**	0.000	0.000	-0.000
Max Mx	7	1:SELF WEIGH	0.000	0.000	337.765	0.000	**0.000**	0.000	-0.000
Min Mx	7	1:SELF WEIGH	0.000	0.000	337.765	0.000	**0.000**	0.000	-0.000
Max My	7	1:SELF WEIGH	0.000	0.000	337.765	0.000	0.000	**0.000**	-0.000
Min My	7	1:SELF WEIGH	0.000	0.000	337.765	0.000	0.000	**0.000**	-0.000
Max Mz	7	1:SELF WEIGH	0.000	0.000	337.765	0.000	0.000	0.000	**-0.000**
Min Mz	7	1:SELF WEIGH	15.000	0.000	-0.000	0.000	0.000	0.000	**-2.18E+3**

Beam Maximum Moments

Distances to maxima are given from beam end A.

Beam	**Node A**	**Length** (m)	**L/C**		**d** (m)	**Max My** (kNm)	**d** (m)	**Max Mz** (kNm)
7	3	30.000	1:SELF WEIGH	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	15.000	-2.18E+3

Beam Maximum Shear Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max Fz (kN)	d (m)	Max Fy (kN)
7	3	30.000	1:SELF WEIGH	Max -ve	0.000	0.000	0.000	337.765
				Max +ve	0.000	0.000	30.000	-337.765

Beam Maximum Axial Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max Fx (kN)
7	3	30.000	1:SELF WEIGH	Max -ve	0.000	0.000
				Max +ve	0.000	0.000

Beam Maximum Forces by Section Property

		Axial	Shear		Torsion	Bending	
Section		Max Fx (kN)	Max Fy (kN)	Max Fz (kN)	Max Mx (kNm)	Max My (kNm)	Max Mz (kNm)
I-SECTION	Max +ve	0.000	337.765	0.000	0.000	0.000	
	Max -ve	0.000	-337.765	0.000	0.000	0.000	-2.18E+3

Beam Combined Axial and Bending Stresses

Beam	L/C	d	Corner 1 (N/mm^2)	Corner 2 (N/mm^2)	Corner 3 (N/mm^2)	Corner 4 (N/mm^2)	Max Tens (N/mm^2)	Max Comp (N/mm^2)
7	1:SELF WEIGH	0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000
		3.000	1.964	1.964	-1.964	-1.964	-1.964	1.964
		6.000	3.402	3.402	-3.402	-3.402	-3.402	3.402
		9.000	4.437	4.437	-4.437	-4.437	-4.437	4.437
		12.000	5.070	5.070	-5.070	-5.070	-5.070	5.070
		15.000	5.300	5.300	-5.300	-5.300	-5.300	5.300
		18.000	5.070	5.070	-5.070	-5.070	-5.070	5.070
		21.000	4.437	4.437	-4.437	-4.437	-4.437	4.437
		24.000	3.402	3.402	-3.402	-3.402	-3.402	3.402
		27.000	1.964	1.964	-1.964	-1.964	-1.964	1.964
		30.000	0.000	0.000	-0.000	-0.000	-0.000	0.000

Beam Combined Axial and Bending Stresses Summary

			Max Comp			Max Tens		
Beam	L/C	Length (m)	Stress (N/mm^2)	d (m)	Corner	Stress (N/mm^2)	d (m)	Corner
7	1:SELF WEIGH	30.000	5.300	15.000	1	-5.300	15.000	3

Beam Profile Stress

There is no data of this type - Analysis results are not available

Reactions

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
3	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	0.000
28	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	0.000

Reaction Summary

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
Max FX	3	1:SELF WEIGH	**0.000**	337.765	0.000	0.000	0.000	0.000
Min FX	3	1:SELF WEIGH	**0.000**	337.765	0.000	0.000	0.000	0.000
Max FY	28	1:SELF WEIGH	0.000	**337.765**	0.000	0.000	0.000	0.000
Min FY	3	1:SELF WEIGH	0.000	**337.765**	0.000	0.000	0.000	0.000
Max FZ	3	1:SELF WEIGH	0.000	337.765	**0.000**	0.000	0.000	0.000
Min FZ	3	1:SELF WEIGH	0.000	337.765	**0.000**	0.000	0.000	0.000
Max MX	3	1:SELF WEIGH	0.000	337.765	0.000	**0.000**	0.000	0.000
Min MX	3	1:SELF WEIGH	0.000	337.765	0.000	**0.000**	0.000	0.000
Max MY	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	**0.000**	0.000
Min MY	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	**0.000**	0.000
Max MZ	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	**0.000**
Min MZ	3	1:SELF WEIGH	0.000	337.765	0.000	0.000	0.000	**0.000**

Reaction Envelope

Results are not available - This Printing is possible only from Post Processing

Utilization Ratio

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (cm^2)	Iz (cm^4)	Iy (cm^4)	Ix (cm^4)
7	I-SECTION	I-SECTION	0.000	1.000	0.000			8E+3	41.1E+6	3.54E+6	1.37E+6

Failed Members

There is no data of this type.

Base Pressure

Node	L/C	FX (N/mm²)	FY (N/mm²)	FZ (N/mm²)
3	1:SELF WEIGH	0.000	0.000	0.000
28	1:SELF WEIGH	0.000	0.000	0.000

Base Pressure Summary

	Node	L/C	FX (N/mm²)	FY (N/mm²)	FZ (N/mm²)
Max FX	3	1:SELF WEIGH	**0.000**	0.000	0.000
Min FX	3	1:SELF WEIGH	**0.000**	0.000	0.000
Max FY	3	1:SELF WEIGH	0.000	**0.000**	0.000
Min FY	3	1:SELF WEIGH	0.000	**0.000**	0.000
Max FZ	3	1:SELF WEIGH	0.000	0.000	**0.000**
Min FZ	3	1:SELF WEIGH	0.000	0.000	**0.000**

Statics Check Results

L/C		FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
1:SELF WEIGHT	Loads	0.000	-675.529	0.000	10.1E+3	0.000	-4.05E+3
1:SELF WEIGHT	Reactions	0.000	675.529	0.000	-10.1E+3	0.000	4.05E+3
	Difference	0.000	0.000	0.000	-0.000	0.000	0.000

Job Information

	Engineer	Checked	Approved
Name:	BRD		
Date:	8/09/2011		

Structure Type	SPACE FRAME

Number of Nodes	4	Highest Node	329
Number of Elements	3	Highest Beam	395

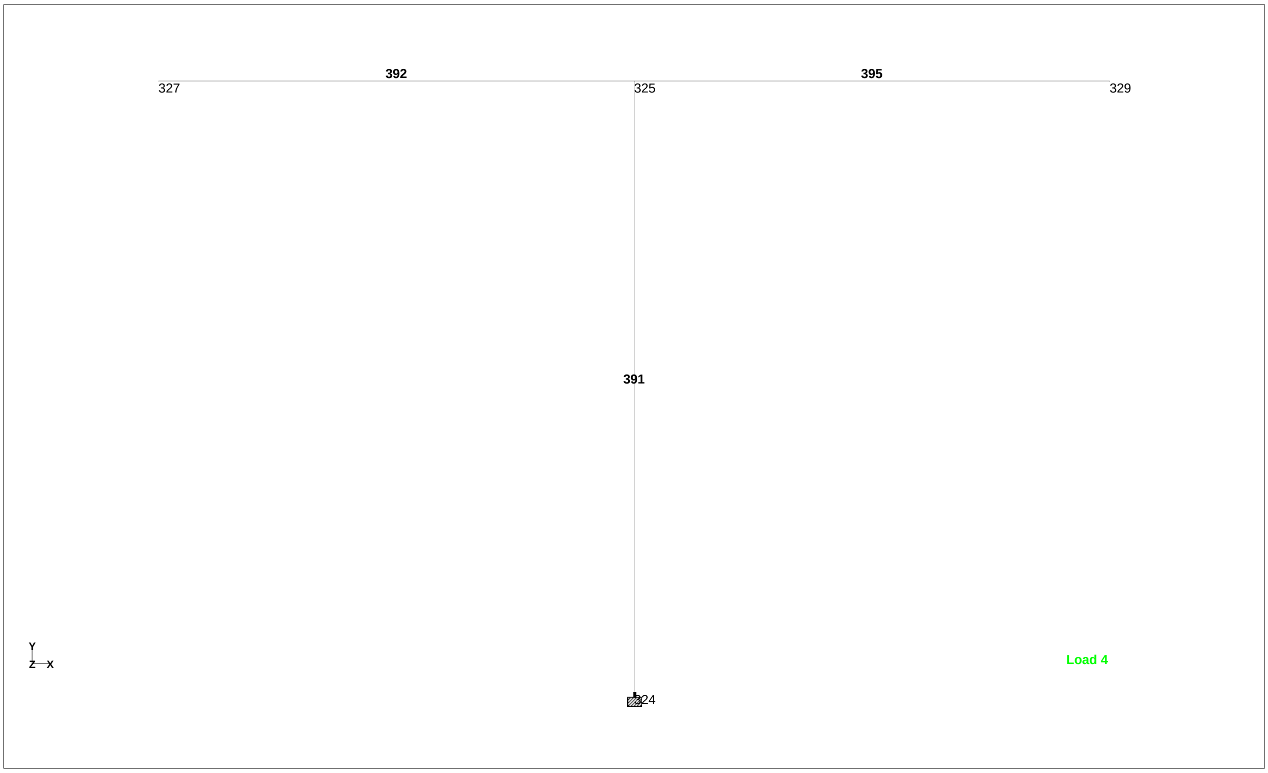
Number of Basic Load Cases	5
Number of Combination Load Cases	6

Included in this printout are data for:

All	The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	DL
Primary	2	SDL
Primary	3	LL
Primary	4	TRANSVERSE WIND
Primary	5	TRANSVERSE EARTHQUAKE LOAD
Combination	101	COMBINATION LOAD CASE 101 (ULTIMA
Combination	102	COMBINATION LOAD CASE 102 (ULTIMA
Combination	103	COMBINATION LOAD CASE 103 (ULTIMA
Combination	104	COMBINATION LOAD CASE 104 (SERVIC
Combination	105	COMBINATION LOAD CASE 105 (SERVIC
Combination	106	COMBINATION LOAD CASE 106 (SERVIC



Whole Structure

Nodes

Node	X (m)	Y (m)	Z (m)
324	0.000	0.000	0.000
325	0.000	9.000	0.000
327	-7.000	9.000	0.000
329	7.000	9.000	0.000

Beams

Beam	Node A	Node B	Length (m)	Property	β (degrees)
391	324	325	9.000	1	0
392	327	325	7.000	2	0
395	325	329	7.000	2	0

Section Properties

Prop	Section	Area (cm^2)	I_{yy} (cm^4)	I_{zz} (cm^4)	J (cm^4)	Material
1	Cir 2.00	31.4E+3	78.5E+6	78.5E+6	157E+6	MATERIAL1
2	Rect 2.00x2.00	40E+3	133E+6	133E+6	225E+6	CONCRETE

Materials

Mat	Name	E (kN/mm^2)	ν	Density (kg/m^3)	α (/°C)
1	STEEL	205.000	0.300	7.83E+3	12E -6
2	STAINLESSSTEEL	197.930	0.300	7.83E+3	18E -6
3	ALUMINUM	68.948	0.330	2.71E+3	23E -6
4	MATERIAL1	25.000	0.170	2.45E+3	11E -6
5	CONCRETE	21.718	0.170	2.4E+3	10E -6

Supports

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN˙m/deg)	rY (kN˙m/deg)	rZ (kN˙m/deg)
324	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

Releases

There is no data of this type.

Basic Load Cases

Number	Name
1	DL
2	SDL
3	LL
4	TRANSVERSE WIND
5	TRANSVERSE EARTHQUAKE LOAD

Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
101	COMBINATION LOAD CASE 101 (ULTIM/	1	DL	1.20
		2	SDL	2.00
		3	LL	2.34
102	COMBINATION LOAD CASE 102 (ULTIM/	1	DL	1.20
		2	SDL	2.00
		4	TRANSVERSE WIND	1.00
103	COMBINATION LOAD CASE 103 (ULTIM/	1	DL	1.20
		2	SDL	2.00
		5	TRANSVERSE EARTHQUAKE LOAD	1.00
104	COMBINATION LOAD CASE 104 (SERVI(	1	DL	1.00
		2	SDL	1.30
		3	LL	1.30
105	COMBINATION LOAD CASE 105 (SERVI(	1	DL	1.00
		2	SDL	1.30
		4	TRANSVERSE WIND	1.00
106	COMBINATION LOAD CASE 106 (SERVI(	1	DL	1.00
		2	SDL	1.30
		5	TRANSVERSE EARTHQUAKE LOAD	1.00

Load Generators

There is no data of this type.

Node Loads : 1 DL

Node	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
325	-	-1.26E+3	-	-	-	-

Beam Loads : 1 DL

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
392	CON	kN	GY	-1.24E+3	1.000	-	-	-
	CON	kN	GY	-1.25E+3	4.000	-	-	-
395	CON	kN	GY	-1.25E+3	3.000	-	-	-
	CON	kN	GY	-1.24E+3	6.000	-	-	-

Selfweight : 1 DL

Direction	Factor
Y	-1.000

Node Loads : 2 SDL

Node	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
325	-	-534.000	-	-	-	-

Beam Loads : 2 SDL

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
392	CON	kN	GY	-780.000	1.000	-	-	-
	CON	kN	GY	-550.000	4.000	-	-	-
395	CON	kN	GY	-550.000	3.000	-	-	-
	CON	kN	GY	-780.000	6.000	-	-	-

Node Loads : 3 LL

Node	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
325	-	-780.000	-	-	-	-

Beam Loads : 3 LL

Beam	Type		Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
392	CON	kN	GY	-770.000	1.000	-	-	-
	CON	kN	GY	-1.03E+3	4.000	-	-	-
395	CON	kN	GY	-344.000	3.000	-	-	-
	CON	kN	GY	-128.000	6.000	-	-	-

Node Loads : 4 TRANSVERSE WIND

Node	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
325	-496.000	-	-	-	-	-

Node Loads : 5 TRANSVERSE EARTHQUAKE LOAD

Node	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
325	-807.000	-	-	-	-	-

Node Displacements

Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
324	1:DL	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2:SDL	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3:LL	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4:TRANSVERS	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5:TRANSVERS	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	101:COMBINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	102:COMBINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	103:COMBINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	104:COMBINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	105:COMBINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	106:COMBINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
325	1:DL	-0.000	-0.904	0.000	0.904	0.000	0.000	0.000
	2:SDL	0.000	-0.366	0.000	0.366	0.000	0.000	-0.000
	3:LL	-12.178	-0.350	0.000	12.183	0.000	0.000	0.003
	4:TRANSVERS	-6.288	-0.000	0.000	6.288	0.000	0.000	0.001
	5:TRANSVERS	-10.230	0.000	0.000	10.230	0.000	0.000	0.002
	101:COMBINA	-28.496	-2.634	0.000	28.618	0.000	0.000	0.006
	102:COMBINA	-6.288	-1.817	0.000	6.545	0.000	0.000	0.001
	103:COMBINA	-10.230	-1.817	0.000	10.390	0.000	0.000	0.002
	104:COMBINA	-15.831	-1.834	0.000	15.937	0.000	0.000	0.004
	105:COMBINA	-6.288	-1.380	0.000	6.437	0.000	0.000	0.001
	106:COMBINA	-10.230	-1.380	0.000	10.323	0.000	0.000	0.002
327	1:DL	-0.000	-7.327	0.000	7.327	0.000	0.000	0.001
	2:SDL	0.000	-3.514	0.000	3.514	0.000	0.000	0.001
	3:LL	-12.178	-22.896	0.000	25.933	0.000	0.000	0.003
	4:TRANSVERS	-6.288	-7.162	0.000	9.530	0.000	0.000	0.001

Node Displacements Cont...

Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
	5:TRANSVERS	-10.230	-11.652	0.000	15.506	0.000	0.000	0.002
	101:COMBINA	-28.496	-69.397	0.000	75.019	0.000	0.000	0.010
	102:COMBINA	-6.288	-22.982	0.000	23.827	0.000	0.000	0.004
	103:COMBINA	-10.230	-27.473	0.000	29.316	0.000	0.000	0.004
	104:COMBINA	-15.831	-41.660	0.000	44.566	0.000	0.000	0.006
	105:COMBINA	-6.288	-19.057	0.000	20.068	0.000	0.000	0.003
	106:COMBINA	-10.230	-23.547	0.000	25.674	0.000	0.000	0.004
329	1:DL	-0.000	-7.327	0.000	7.327	0.000	0.000	-0.001
	2:SDL	0.000	-3.514	0.000	3.514	0.000	0.000	-0.001
	3:LL	-12.178	17.818	0.000	21.582	0.000	0.000	0.003
	4:TRANSVERS	-6.288	7.162	0.000	9.530	0.000	0.000	0.001
	5:TRANSVERS	-10.230	11.652	0.000	15.506	0.000	0.000	0.002
	101:COMBINA	-28.496	25.874	0.000	38.490	0.000	0.000	0.004
	102:COMBINA	-6.288	-8.659	0.000	10.702	0.000	0.000	-0.001
	103:COMBINA	-10.230	-4.169	0.000	11.047	0.000	0.000	-0.001
	104:COMBINA	-15.831	11.268	0.000	19.432	0.000	0.000	0.001
	105:COMBINA	-6.288	-4.734	0.000	7.871	0.000	0.000	-0.001
	106:COMBINA	-10.230	-0.244	0.000	10.233	0.000	0.000	-0.000

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
Max Fx	391	324	101:COMBINA	**23.4E+3**	-0.000	0.000	0.000	0.000	-13.8E+3
Min Fx	395	325	1:DL	**-0.000**	3.14E+3	0.000	0.000	0.000	13.5E+3
Max Fy	395	325	101:COMBINA	-0.000	**7.54E+3**	0.000	0.000	0.000	33E+3
Min Fy	392	325	101:COMBINA	0.000	**-10.6E+3**	0.000	0.000	0.000	46.9E+3
Max Fz	391	324	1:DL	8.23E+3	0.000	**0.000**	0.000	0.000	-0.000
Min Fz	391	324	1:DL	8.23E+3	0.000	**0.000**	0.000	0.000	-0.000
Max Mx	391	324	1:DL	8.23E+3	0.000	0.000	**0.000**	0.000	-0.000
Min Mx	391	324	1:DL	8.23E+3	0.000	0.000	**0.000**	0.000	-0.000
Max My	391	324	1:DL	8.23E+3	0.000	0.000	0.000	**0.000**	-0.000
Min My	391	324	1:DL	8.23E+3	0.000	0.000	0.000	**0.000**	-0.000
Max Mz	392	325	101:COMBINA	0.000	-10.6E+3	0.000	0.000	0.000	**46.9E+3**
Min Mz	391	324	101:COMBINA	23.4E+3	-0.000	0.000	0.000	0.000	**-13.8E+3**

Beam Maximum Moments

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max My (kNm)	d (m)	Max Mz (kNm)
391	324	9.000	1:DL	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-0.000
			2:SDL	Max -ve	0.000	0.000	0.000	0.001
				Max +ve	0.000	0.000		
			3:LL	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-5.9E+3
			4:TRANSVERS	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-4.46E+3
			5:TRANSVERS	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-7.26E+3
			101:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-13.8E+3
			102:COMBINA	Max -ve	0.000	0.000	9.000	0.001
				Max +ve	0.000	0.000	0.000	-4.46E+3
			103:COMBINA	Max -ve	0.000	0.000	9.000	0.001
				Max +ve	0.000	0.000	0.000	-7.26E+3
			104:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-7.68E+3
			105:COMBINA	Max -ve	0.000	0.000	9.000	0.001
				Max +ve	0.000	0.000	0.000	-4.46E+3
			106:COMBINA	Max -ve	0.000	0.000	9.000	0.001
				Max +ve	0.000	0.000	0.000	-7.26E+3
392	327	7.000	1:DL	Max -ve	0.000	0.000	7.000	13.5E+3
				Max +ve	0.000	0.000		
			2:SDL	Max -ve	0.000	0.000	7.000	6.33E+3
				Max +ve	0.000	0.000	0.000	-0.000
			3:LL	Max -ve	0.000	0.000	7.000	7.7E+3
				Max +ve	0.000	0.000		
			4:TRANSVERS	Max -ve	0.000	0.000	6.417	0.000
				Max +ve	0.000	0.000		
			5:TRANSVERS	Max -ve	0.000	0.000	7.000	0.000
				Max +ve	0.000	0.000		
			101:COMBINA	Max -ve	0.000	0.000	7.000	46.9E+3
				Max +ve	0.000	0.000		
			102:COMBINA	Max -ve	0.000	0.000	7.000	28.8E+3
				Max +ve	0.000	0.000	0.000	-0.000
			103:COMBINA	Max -ve	0.000	0.000	7.000	28.8E+3
				Max +ve	0.000	0.000		
			104:COMBINA	Max -ve	0.000	0.000	7.000	31.7E+3
				Max +ve	0.000	0.000		
			105:COMBINA	Max -ve	0.000	0.000	7.000	21.7E+3
				Max +ve	0.000	0.000		
			106:COMBINA	Max -ve	0.000	0.000	7.000	21.7E+3
				Max +ve	0.000	0.000		
395	325	7.000	1:DL	Max -ve	0.000	0.000	0.000	13.5E+3
				Max +ve	0.000	0.000	7.000	-0.000
			2:SDL	Max -ve	0.000	0.000	0.000	6.33E+3
				Max +ve	0.000	0.000	6.417	-0.001

Beam Maximum Moments Cont...

Beam	Node A	Length (m)	L/C		d (m)	Max My (kNm)	d (m)	Max Mz (kNm)
			3:LL	Max -ve	0.000	0.000	0.000	1.8E+3
				Max +ve	0.000	0.000		
			4:TRANSVERS	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000		
			5:TRANSVERS	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000		
			101:COMBINA	Max -ve	0.000	0.000	0.000	33E+3
				Max +ve	0.000	0.000		
			102:COMBINA	Max -ve	0.000	0.000	0.000	28.8E+3
				Max +ve	0.000	0.000	7.000	-0.000
			103:COMBINA	Max -ve	0.000	0.000	0.000	28.8E+3
				Max +ve	0.000	0.000	7.000	-0.000
			104:COMBINA	Max -ve	0.000	0.000	0.000	24E+3
				Max +ve	0.000	0.000		
			105:COMBINA	Max -ve	0.000	0.000	0.000	21.7E+3
				Max +ve	0.000	0.000	7.000	-0.000
			106:COMBINA	Max -ve	0.000	0.000	0.000	21.7E+3
				Max +ve	0.000	0.000	7.000	0.000

Beam Maximum Shear Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max Fz (kN)	d (m)	Max Fy (kN)
391	324	9.000	1:DL	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000		
			2:SDL	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-0.000
			3:LL	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-0.000
			4:TRANSVERS	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-496.000
			5:TRANSVERS	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-807.000
			101:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-0.000
			102:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-496.000
			103:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-807.000
			104:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-0.000
			105:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-496.000
			106:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-807.000
392	327	7.000	1:DL	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	7.000	-3.14E+3
			2:SDL	Max -ve	0.000	0.000	0.000	0.000

Beam Maximum Shear Forces Cont...

Beam	Node A	Length (m)	L/C		d (m)	Max Fz (kN)	d (m)	Max Fy (kN)
				Max +ve	0.000	0.000	4.083	-1.33E+3
			3:LL	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	4.083	-1.8E+3
			4:TRANSVERS	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-0.000
			5:TRANSVERS	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			101:COMBINA	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	7.000	-10.6E+3
			102:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	7.000	-6.43E+3
			103:COMBINA	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	7.000	-6.43E+3
			104:COMBINA	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	7.000	-7.21E+3
			105:COMBINA	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	7.000	-4.87E+3
			106:COMBINA	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	7.000	-4.87E+3
395	325	7.000	1:DL	Max -ve	0.000	0.000	0.000	3.14E+3
				Max +ve	0.000	0.000	7.000	-0.000
			2:SDL	Max -ve	0.000	0.000	0.000	1.33E+3
				Max +ve	0.000	0.000	6.417	0.000
			3:LL	Max -ve	0.000	0.000	0.000	472.000
				Max +ve	0.000	0.000	6.417	0.000
			4:TRANSVERS	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:TRANSVERS	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			101:COMBINA	Max -ve	0.000	0.000	0.000	7.54E+3
				Max +ve	0.000	0.000	7.000	-0.000
			102:COMBINA	Max -ve	0.000	0.000	0.000	6.43E+3
				Max +ve	0.000	0.000	7.000	-0.000
			103:COMBINA	Max -ve	0.000	0.000	0.000	6.43E+3
				Max +ve	0.000	0.000	7.000	-0.000
			104:COMBINA	Max -ve	0.000	0.000	0.000	5.49E+3
				Max +ve	0.000	0.000	7.000	-0.000
			105:COMBINA	Max -ve	0.000	0.000	0.000	4.87E+3
				Max +ve	0.000	0.000	7.000	-0.000
			106:COMBINA	Max -ve	0.000	0.000	0.000	4.87E+3
				Max +ve	0.000	0.000	7.000	-0.000

Beam Maximum Axial Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max Fx (kN)
391	324	9.000	1:DL	Max -ve	0.000	8.23E+3
				Max +ve		
			2:SDL	Max -ve	0.000	3.19E+3
				Max +ve		
			3:LL	Max -ve	0.000	3.05E+3
				Max +ve		
			4:TRANSVERS	Max -ve	0.000	0.000
				Max +ve		
			5:TRANSVERS	Max -ve	0.000	0.000
				Max +ve	0.000	0.000
			101:COMBINA	Max -ve	0.000	23.4E+3
				Max +ve		
			102:COMBINA	Max -ve	0.000	16.3E+3
				Max +ve		
			103:COMBINA	Max -ve	0.000	16.3E+3
				Max +ve		
			104:COMBINA	Max -ve	0.000	16.3E+3
				Max +ve		
			105:COMBINA	Max -ve	0.000	12.4E+3
				Max +ve		
			106:COMBINA	Max -ve	0.000	12.4E+3
				Max +ve		
392	327	7.000	1:DL	Max -ve		
				Max +ve	0.000	-0.000
			2:SDL	Max -ve		
				Max +ve	0.000	-0.000
			3:LL	Max -ve	0.000	0.000
				Max +ve		
			4:TRANSVERS	Max -ve	0.000	0.000
				Max +ve	0.000	0.000
			5:TRANSVERS	Max -ve	0.000	0.000
				Max +ve	0.000	0.000
			101:COMBINA	Max -ve	0.000	0.000
				Max +ve		
			102:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			103:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			104:COMBINA	Max -ve	0.000	0.000
				Max +ve		
			105:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			106:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
395	325	7.000	1:DL	Max -ve		
				Max +ve	0.000	-0.000
			2:SDL	Max -ve	0.000	0.000
				Max +ve		

Beam Maximum Axial Forces Cont...

Beam	Node A	Length (m)	L/C		d (m)	Max Fx (kN)
			3:LL	Max -ve	0.000	0.000
				Max +ve	0.000	0.000
			4:TRANSVERS	Max -ve	0.000	0.000
				Max +ve	0.000	0.000
			5:TRANSVERS	Max -ve	0.000	0.000
				Max +ve		
			101:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			102:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			103:COMBINA	Max -ve	0.000	0.000
				Max +ve		
			104:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			105:COMBINA	Max -ve		
				Max +ve	0.000	-0.000
			106:COMBINA	Max -ve	0.000	0.000
				Max +ve		

Reactions

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
324	1:DL	-0.000	8.23E+3	0.000	0.000	0.000	-0.000
	2:SDL	0.000	3.19E+3	0.000	0.000	0.000	0.001
	3:LL	0.000	3.05E+3	0.000	0.000	0.000	-5.9E+3
	4:TRANSVERS	496.000	0.000	0.000	0.000	0.000	-4.46E+3
	5:TRANSVERS	807.000	0.000	0.000	0.000	0.000	-7.26E+3
	101:COMBINA	0.000	23.4E+3	0.000	0.000	0.000	-13.8E+3
	102:COMBINA	496.000	16.3E+3	0.000	0.000	0.000	-4.46E+3
	103:COMBINA	807.000	16.3E+3	0.000	0.000	0.000	-7.26E+3
	104:COMBINA	0.000	16.3E+3	0.000	0.000	0.000	-7.68E+3
	105:COMBINA	496.000	12.4E+3	0.000	0.000	0.000	-4.46E+3
	106:COMBINA	807.000	12.4E+3	0.000	0.000	0.000	-7.26E+3