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OFFICE OF ORIGIN:

CORE OFFICE

PROJECT:

"Proposed REVISED PLAN SHOWING PROPOSED COMMERCIAL BUILDING ON F.P. NO. 30/1 OF PRELIMINARY T.P.S. NO. 90 (SARKHEJ-OKAF-FATEHWADI-MAKARBA)(R.S. NO. 219/2) MOJE:-MAKARBA,TALUKA Vejalpur Tal. Vejalpur, Dist Ahmedabad"

CLIENT:

AHMEDABAD MUNICIPAL CORPORATION

TITLE:

DESIGN REVIEW REPORT FOR SOLITAIRE ICON

DESIGN CALCULATION NO.: AECA/2023/06/DES/01 DATE: 30-10-2023

PAGES: 1 TO ____

ANNEXURES, if any: _____

Date of Issue	Revision	Revision to incorporate observations of client vide their letter reference/minutes of meeting as the case may be, and as refered below:	Prepared By		Checked By	
			Name	Sign	Name	Sign
30-10-2023	0	ISSUED FOR APPROVAL	ZRK		NDD	

APPROVED BY:

SOLITAIRE ICON

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DESIGN REVIEW REPORT – SOLITAIRE ICON

PROJECT BRIEF

The High Rise (Commercial) building is with 4 Basement Floor + Ground Floor + 22 Upper floors + O.H.W.T. + L.M.R.Total two towers are proposed to be constructed. The project Site is situated at S.G. Highway, Ahmedabad (ZONE-III), Gujarat.

This report discusses the tower for which designs have been submitted by Consultants:

- 4 Basement: Basement is proposed to cater the parking requirements with a floor to floor height of 4.6, 4.6, 5.2, 3.55 m respectively.
- Ground Floor:Ground floors are proposed to cater the shop requirements & entrance of the building, having floor to floor height of 3m.
- Typical Upper Floors:All Typical floors of with floor to floor height 3 m are proposed to cater commercial needs.
- The building is approximately rectangular in configuration with maximum plan dimensions as 27.8X24.7 m and height of 69.92m from ground to terrace floor.
- This report discusses the structure as above for which the designs have been submitted for Review.

PROJECT DATA

The structural information submitted to us in form of preliminary Architectural plan and Structural GA drawings, soil investigation report, structural design basis report, ETABS21 and SAFE model as submitted by the Developer's consultant forms the basis of this preliminary design review report.

ADDITIONAL STUDIES IF REQUIRED

In the present building,WIND TUNNEL studies are not proposed. A detailed soil investigation report has been submitted by undertaking bore holes for suitable depth below the Ground level.Additional bore holes by another independent agency empaneled by AMC were also executed to verify the geotech report. Based on geotechnical investigation report data Raft foundationhave been proposed by the Structural Consultants based on the recommendations by the geotechnical report.

SITE CONSTRAINTS:

The building is approximately rectangular in layout and configured to maximize the utility in an irregular plot shape and the architectural plans are prepared so as to maximize the functionality and FSI potential. The structural configuration though irregular, suitable framing systems and shear walls are proposed to cater to the forces arising from the same.The shape is rectangular with a well distributed lateral load resisting system.

STRUCTURAL DESIGN BASIS REPORT

The structural design basis report as submitted has been reviewed and it is stated that most of the items as listed in the model design basis template have been covered in the same.

The recommendations regarding the Loadings, Nominal cover, Material grades and Fire rating are in order and as per codal standards, further designs are proposed as per new codes of wind (IS-875(iii):2015)& earthquake(IS-1893(i):2016), IS 16700 - 2023.

Analysis and design methodology follows the provisions of relevant IS codes for limit state method of design, andEtabs model have been made considering centreline of beams as per attached drawing. Design of beams,columns and shear wall are proposed to be done in spreadsheets and foundation designs will be in done in SAFE.

The concrete grade of M15, M30, M35, M40 and reinforcement grade is Fe550D. The load combinations considered are as per the IS codes and appropriate for the building under review.

FOUNDATION SYSTEM

The Geotech investigation report recommends spread/raft foundation with four basement supported at a minimum depth of 19 m from existing ground level.The maximum net safe bearing capacity of Raft is recommended as 60 t/m^2, while Settlement shall be less than125 mm for Raft foundation (permissible is 125 mm). The modulus of Sub-grade reaction K is recommended to 4800 kN/m^3, whereas excavation sides are recommended to be supported by shoring or retaining walls. Lateral earth pressure coefficient Ko (coefficient of earth pressure at rest is 0.495)

The raft has been modeled as a mesh of finite elements 3-4 nodded plate with 3 degrees of freedoms at each node. The strip based method of design is used and each strip is designed for bending moment and shear due to the net effect of upward pressures and down ward loads. The sub grade modulus has been modeled with springs of equivalent stiffness and the strip is thus designed as beam on elastic foundation. For analysis and design a commercial finite element software SAFE has been used.

The geotechnical investigation was done by K.C.T Consultancy Services Ltd. as per guidelines of AMC. The field SPT values and the recommended SBC values are closely matching.

SUPERSTRUCTURE STRUCTURAL CONCEPT

The building is provided with a robust gravity load resisting system in combination with a suitable lateral load resisting system. The lateral load resisting system is composed of suitably disposed Ductile Shear Walls as per IS 1893(i):2016& 13920:2016. Floor slabs are cast in situ. A response reduction factor of 5.0 has been adopted.The minimum dimension of the shear wall has been restricted to 200 mm. This is acceptable as per the codal requirements. The gravity load system comprises floor slabs and beams with spans being within normal permissible limits. The beam thickness is kept as a minimum to 200 mm while the minimum thickness for slabs is 150 mm.

The plan geometry is regular and where irregular the structural grid is as far as symmetrical and regular. The maximum plan aspect ratios h/b are well within codal limits of h/b =3.58< 5.

The Ductile detailing as per IS 13920:2016 has been proposed to be followed by the Consultant the structure being in Seismic Zone III.

MATERIALS:

The Grade of concrete in all beams slab is as columns & for columns and shear walls it is M40 (up to7th floor) & M35 (8th to 14th floor) M30 (beyond till terrace floor).

Fe 550Dgrade of reinforcement is proposed to be used for Main/longitudinal bars and transverse reinforcement.

The Exposure condition has been assumed to be SEVERE for substructure elements, MODERATEfor external columns and perimeter beams and MILD for interior structural elements as per IS 456:2000. Further the covers proposed should take in account the FIRE RATING for 2 Hrs as codal norms.

MOVEMENT JOINTS:

Movement joints are not required since plan dimensions of building are less than 40m.

LOADING

GRAVITY LOADING:

The static loading in gravity direction is adopted from IS 875 the Basement roof slabis considered at 5.0 KN/m^2.The SIDL for typical floors passage, office and shops areas has been considered at 4 kN/m^2as per USER requirements. Unit weights of all materials are as per IS 875 part I and it is proposed to use the AAC Block having unit weight of 8 KN/m^3.

The reducible live load provision of the IS 875 part II-1987is adopted.

LATERAL LOADING:

The SEISMIC loading has been evaluated by considering the building to lie in the seismic Zone III and an importance factor of 1.2 which is in conformity with the IS 1893(i): 2016. The ductile detailing has been proposed for both shear walls and frames and the response reduction factor is assumed as 5 on conservative side as per Table 10 of IS1893 (i):2016which is acceptable as per the code.

The WIND loading has been evaluated by considering Gust Factor as per the IS 875 part III with a wind speed of 39.0 m/s and K1=1, Building class – All general buildings &structure – 50 years, Category 3, K3=1, K4=1.

ANALYSIS PARAMETERS& RESULTS:

The structural analysis is carried out using a standard 3D analytical model using an established commercial software ETABS 2021.The structural analytical model prepared by the design consultant in ETABS represents the modelling philosophy and general behaviour of the structure.

The model includes considerations for rigid offsets, diahpragm rigidity, P-δ effects and cracked section properties.

Analysis of the structures for gravity and other loads based on the stiffness matrix approach and Dynamic modal analysis for Earthquake loading is adopted for working out the maximum forces and bending moments in the various elements.

The property modifiers for various elements are considered as below as per codal recommendations for ultimate strength

STRUCTURAL ELEMENT	SERVICE CASE	DESIGN CASE
Shear Wall	0.7 Ig	F11 = F22 = F12 = 0.7 M11 = M22 = M12 = 0.7
SLAB	0.35 Ig	0.25 Ig
BEAM	0.7 Ig	0.35 Ig
WALLS& COLUMNS	0.9 Ig	0.70 Ig

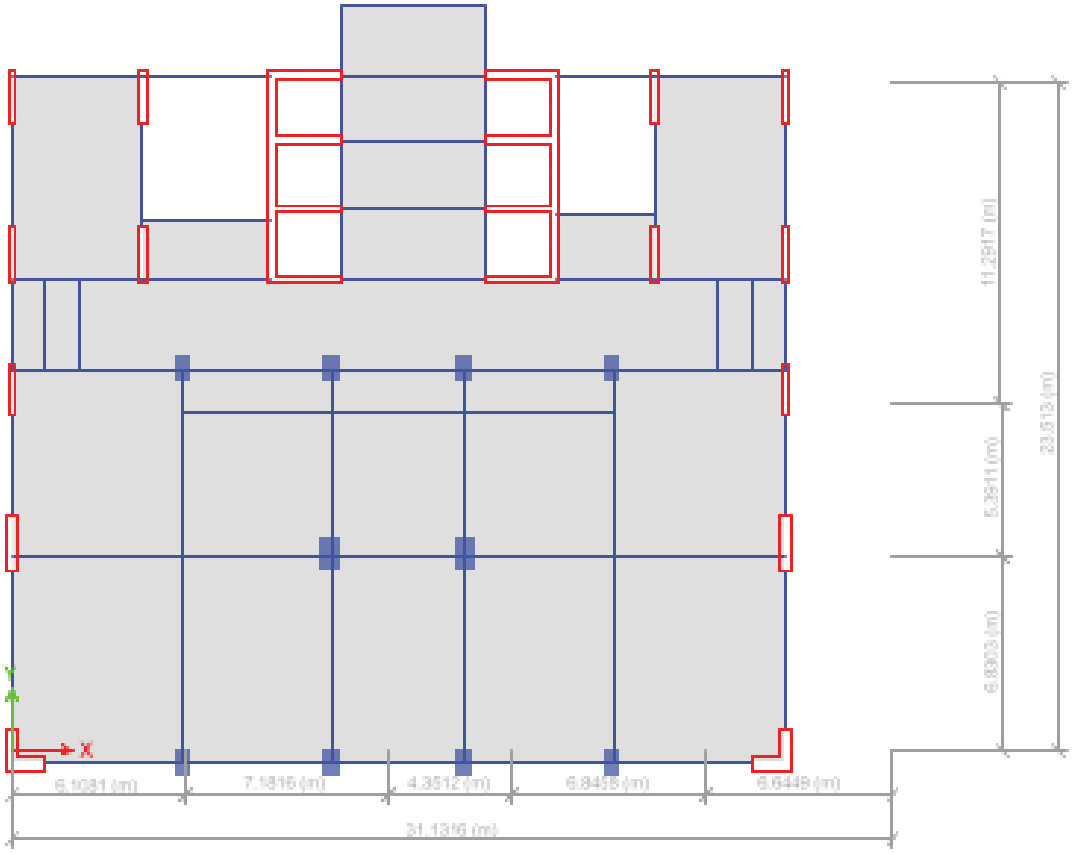
The mass and stiffness properties are adequately modelled and lumped modelling is adopted.

The centers of mass and centers of rigidity are generally within acceptable range except for some floors where it will be possible to control this value during final design stage. In any case torsion developed in the system is being accounted for in design.

On preliminary review it is found that the building satisfies the global stability check requirements for factor of safety against Sliding and Overturning under the effects of the lateral wind and Seismic loads.

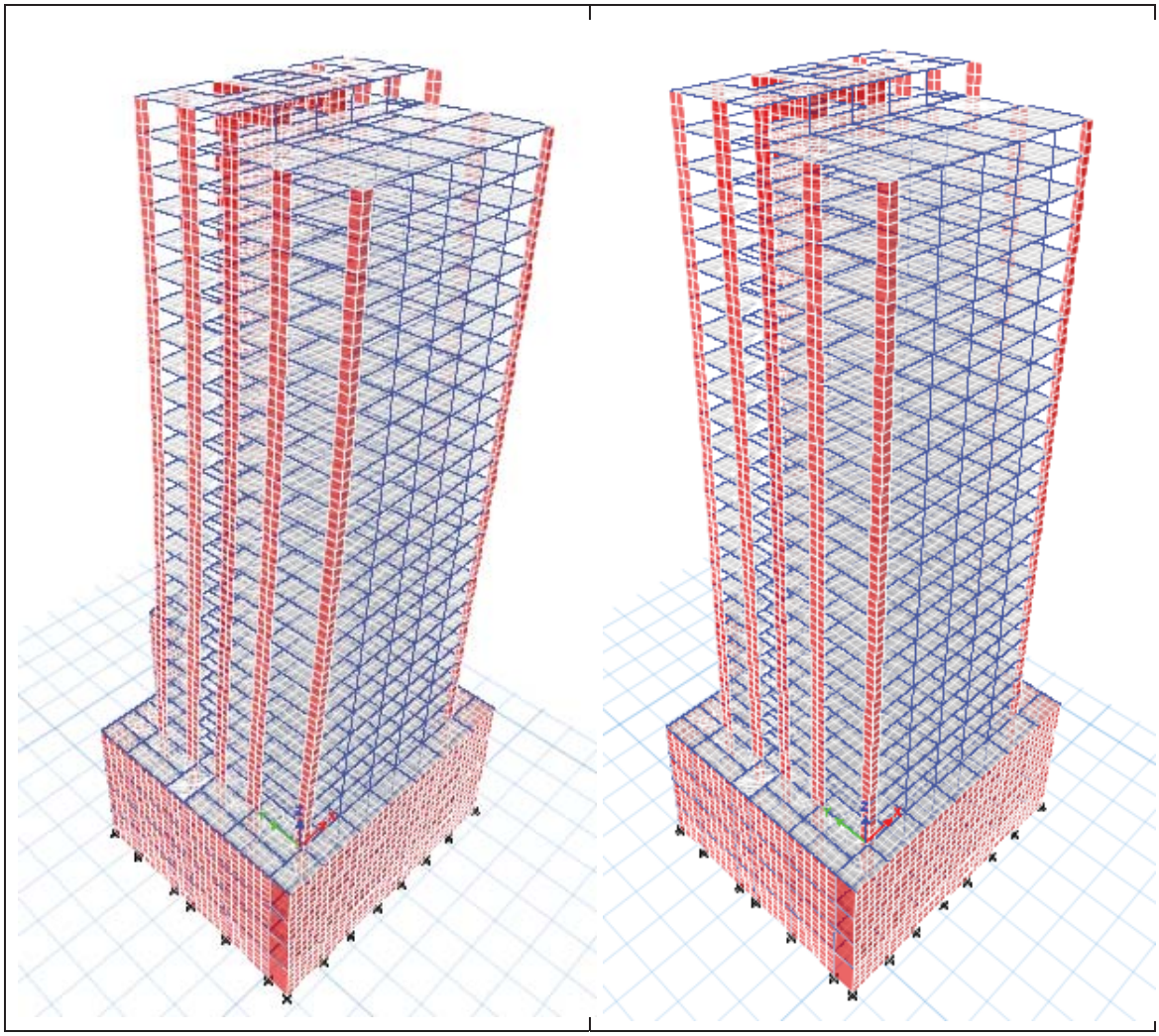
The dynamic seismic forces have been suitably scaled to match with the static basic shear as per the requirements of clause 7.7.3 of IS 1893 2016.

The building is provided with a robust structural configuration a minimum elastic lateral stiffness, a minimum lateral strength and adequate ductility as per the requirements of IS 1893 2016.



TYPICAL FLOOR PLAN

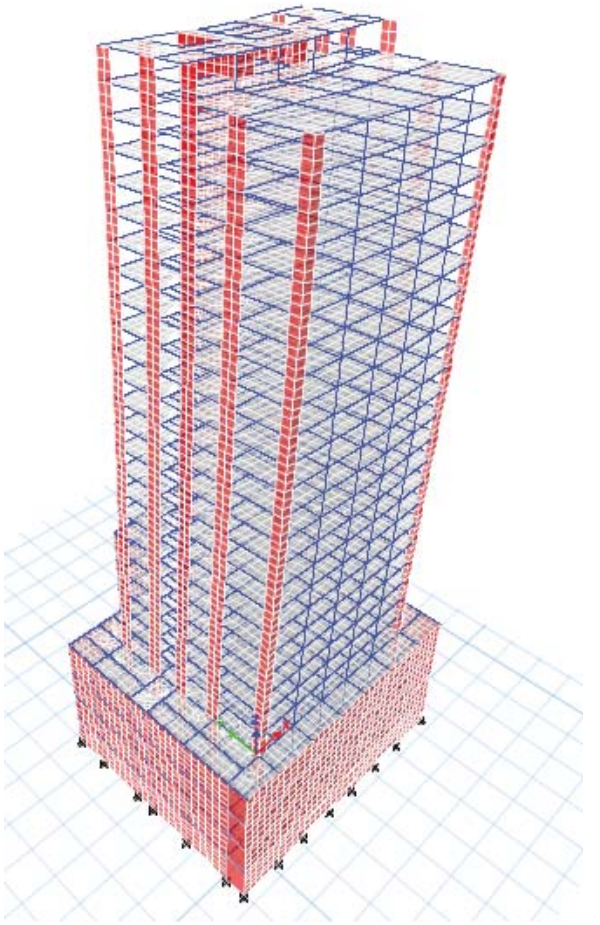
DISPLACEMENT UNDER WIND (GUST) LOAD



WIND X (GUST X) DEFLECTED SHAPE
Max Deflection – 50.99 mm
Limit (H/500) –139.10mm

WIND Y (GUST Y) DEFLECTED SHAPE
Max Deflection – 34.09 mm
Limit (H/500) –139.10mm

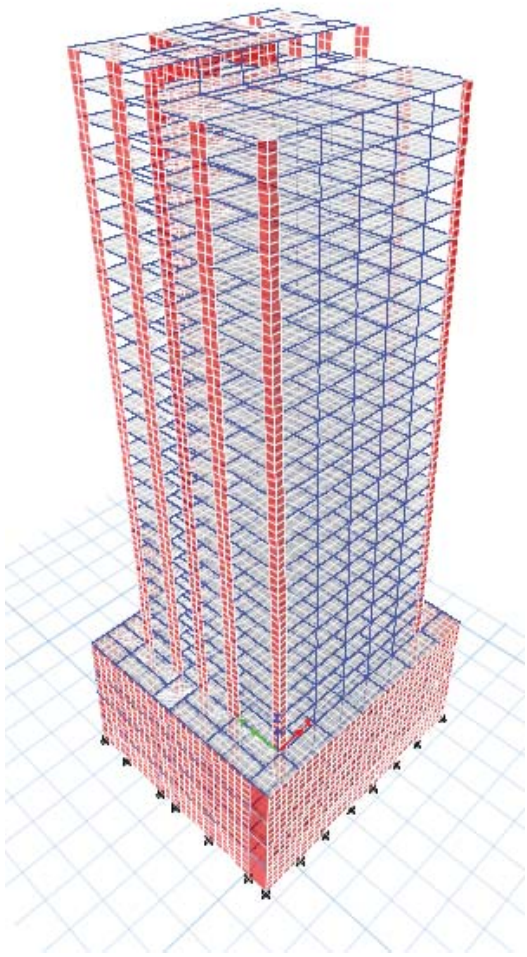
DISPLACEMENT UNDER SEISMIC LOAD



SPEC X (UNSCALED) DEFLECTED SHAPE

Max Deflection – 31.94 mm

Limit (H/250) – 278.20mm



SPEC Y(UNSCALED) DEFLECTED SHAPE

Max Deflection –22.83 mm

Limit (H/250) – 278.20 mm

STRUCTURAL MODEL:

The preliminary structural model have been reviewed and they generally represent the behavior of the structural elements appropriately. The detailed structural drawings which are going to be submitted,should be compatible with the results obtained from the revised ETABS analysis for the various components such as the beams, slabs, columns and shear walls and accordingly detailed RCC drawings to be finalised.

The STRUCTURAL EXPERT REVIEW CHECK LISTis enclosed evaluating the Structural Design safety incorporated in the building.

CONCLUSIONS:

The detailed Schedule/working drawings for substructure and superstructure shall be in conformity with the BIS codes of practice, approved DBR and approved structural analysis model.

The proposed structural system makes efficient use of the primary structural elements, while meeting deflection and vibration criteria set forth in the design basis report. The deflection/drift limits are controlled in the superstructure design stage.

The design work has sufficiently progressed, the comments and observations made on the ETABS, SAFE MODEL, are closed out.

The detailed analysis, designs and drawings for superstructure may be put up for review as per scope of work for Structural Expert Review.

This review report is in conformance to Bureau of Indian Standards Codes of practice and the National Building code. Wherever information is not available in IS codes reference has been made to the ACI, ASCE, EURO codes and the industry standard provisions pertaining to building design and practice.

STRUCTURAL ENGINEER FOR REVIEW

NAME: NEERAJ D DESAI Sign:

STRUCTURAL EXPERT REVIEW CHECKLIST

NAME OF THE PROJECT & SMC FILE NO	DEVELOPER'S STRUCTURAL ENGINEER	DEVELOPER'S ARCHITECT	GEOTECH CONSULTANT
Municipal Reference no:	Developers engineer: KEDAR P. DESAI 001SE05102610168	DIVYESH BALVANTRAI DESAI, 001AR17042710034	KCT Consultancy Services Ltd.

SR. NO.	DESCRIPTION	REMARKS
1	Does the DBR contain all the points mentioned in the STANDARD DBR TEMPLATE	YES
2	Are the loading parameters listed in the DBR as per the relevant IS codes	YES
3	Is the MODEL consistent with the GA & Architectural drawings	YES, some modification are made but acceptable
4	Are there any deviations in the MODEL compared to the GA drawings? If yes, then are they acceptable or would they impact the general behaviour of the MODEL.	NO
5	Is the behaviour of building in dynamic analysis satisfactory	YES
6	Are the time periods of mode and mode shapes acceptable?	YES
7	Are the lateral and vertical deflections within the acceptable limits	YES
8	In your opinion, what is the class of the performance of the Structure – Collapse Prevention / Immediate Occupancy / Operational?	NA At planning stage.
9	Are the accelerations within the acceptable limits	YES
10	Do you think that the accelerations will be comfortable for the occupants	YES
11	Is there a possibility of substantial differential settlement under vertical loads, If yes, what is your suggestion to overcome the problem	NO
12	Is there a Soft storey in the structure? Are the design calculations for such elements consistent with the provision of soft storey?	NO
13	Is Torsional effect checked and applied.	YES
14	Are the stability calculations for uplift and overturning safe?	YES

15	Typical design calculations – Are they as per IS code - For footing - For RCC foundation - For RCC Wall - For Composite Column - For RCC Beam	YES
16	Are there any peculiar structural elements. If such elements are used, have they been analysed and detailed satisfactorily.	NA.
17	Are the ductility details incorporated properly	To be detailed as per approved model and DBR
18	Are any specific precautions required during construction? Have they been documented effectively? Would you like to suggest any special precautions and sequence of construction?	NO.
19	Are the general parameters like grade of concrete, covers, typical detailing as per relevant provisions of code and as per good engineering practice.	YES
20	Are any special provisions suggested for the building (like dampers etc?) Would you like to propose any additional performance improvement and technique?	NA
21	Is there any special structure close to this building separated by expansion joint? If yes is the width of expansion joint suitable and acceptable.	NA
22	Are the non-structural elements like cladding façade etc connected effectively to the structure?	NA
23	In your opinion do the submitted documents and scrutiny of the same indicate a safe and stable structure?	Global stability checks are satisfied.
24	Any additional remarks on important observations in model / analysis / design / construction?	Refer to chapter 3 of Report

The detailed designs and good for construction drawings for sub structure and superstructure shall be as per the approved DBR and 3D computational model in ETABS.

STRUCTURAL ENGINEER FOR EXPERT REVIEW

NAME

NEERAJ D DESAI

STRUCTURAL DESIGN REVIEW

Project name		SOLITAIRE ICON	**Client**		
Project component		Design Basis Reports and Preliminary ETABS model	**Structural Consultant**	CASAD CONSULTANTS PVT. LTD	
Design stage		Preliminary Review	**Reviewed on**	**02-09-2023**	
Design Doc. Received on		**01-10-2023**			
No.	**Doc. Ref.**	**Comments by Prof DD Desais AECA PVT LTD**	**Response by CASAD CONSULTANTS PVT. LTD**		**Remarks**
1	Etabs Model	Apply out-of-plane stiffness modifiers m11, m22, and m12 for shearwall same as that for inplane as per IS 16700-2017 clause 7.2 table 6, since beams are not released on the width of shearwall. Also, consider the deterioration of shear stiffness and apply a modifier in f12 if possible. Justify why no torsional modifier is applied to column since polar moment of inertia is function of I22 and I33.	We are doing it as per our Conservation with the CSI for the same. Find the same in attached Annex 1.In any which case we have also checked with Modifiers as suggested by you find attached model also.		Refer Item 18.
2	Etabs Model	Staircase Slabs are modeled as thin shell elements and assigned with diaphragm action D1. Apply proper one-way distribution by using membrane and remove diaphragm. And since all other slabs contributing as a part of the lateral load-resisting system, how this slab will be designed and detailed?	Instead of adding Slab we have applied Load of the on Line object, Find Updated load in Revised model.		Closed
3	DBR / Etabs Model	Area Averaging Factor (Ka) in wind load calculations in DBR taken as 0.9, justify how tributary area is 25m2.	It shall be 0.8 We have taken it 0.9 to be a conservative, Also we have used Dynamic analysis.		Refer Item 19.
4	Etabs Model	For EQX bottom story range is at SOB1 and for EQY it is at SOG.	Revsied, Find updated Model.		Closed
5	DBR / Etabs Model	Since, the response reduction factor considered is 5 as per IS 1893, table 9, clause 7.2.6, iv) d i.e, building with ductile RC shearwall with RC SMRF, proof that moment resisting frames will resist at least 25% of design base shear separately for both direction as per IS 1893 clause 7.2.7. Dual system. Provide calculation for same in DBR.	We will surely ensure that at a design stage, By taking out the percentage of Lateral Force which Columns are taking & if that is less than the 25% we will redesign columns by revising Importance factor such that it will take 25% of the Original force.		Closed
6	DBR / Etabs Model	Please provide a detailed calculation in DBR for the Time period evaluated as per clause 7.6.2 b) of IS 1893 PI, 2016.	It is already given on Page 9. Also find Revised DBR for Time period calculation as per IS 16700 : 2023.		Closed
7	DBR / Etabs Model	Modal time periods used for evaluating gust forces in X and Y directions in DBR do not match with Etabs model (IS875 part 3 2015 clause 10.2)	We have take the time period from Service model as wind is unfactored load, Find Service model attached.		Closed
8	Etabs Model	As per IS 1893 part 1, 2016, Table 6, clause 7.1, vii) first three modes together should contribute at least 65% mass participation factor in each principal direction for building located in seismic zone 3.	We have tried to keep the first two modes as translation & third as torional mode.Mass participation shall be done with three predominant modes where we are getting 60% of the mass participation with Retaining wall modeled so practically its allowed.		Closed
9	Etabs Model	Grading of Slab and beam in etabs model to be done as mentioned in DBR i.e M35 and M30. Also grade of reinforcement to be as per DBR i.e Fe550D	We would generally keep one grade lower for being conservative side.		Closed
10	DBR / Etabs Model	Design eccentricity for response spectrum case to be used as per Clause 7.8.2 of IS 1893:2016 incorporating dynamic amplification. Apply diaphragm eccentricity in response spectrum case for X and Y directions. Also provide calculation for same in DBR.	Revsied, Find updated Model.Find calculation in Annex 2.		Refer Item 20.
11	DBR	Is RC structural walls density is 2% in each principal directions for seismic zone 3 as per CL 7.10.4 IS 1893(Part 1) : 2016 ? Provide calculation in DBR.	This Clause needed to be checked in case of Soft storey, In this case there is no case of Soft storey as Ground floor is not Hollow Parking, Still as per your comment find Annex 3 where we have calculated Wall density for both the dierection.		Closed
12	Etabs Model	Scaled Response Spectrum Case FX, FY, and FZ are not properly scaled. Also scaled FZ as per IS 1893 part 1, 2016 clause 6.4.6 considering max of either scaled FX or FY.	We have scaled Fx & Fy at Ground floor level (SOG Bottom).& For the Fz we scale it so that we get the Force of Fz as 3.2 % of the Seismic Weight as per Clause 6.4.6 of IS 1893 : 2016, Find revised model for the same.		Closed
13	DBR / Etabs Model	Mention across coefficient for crosswind component in DBR. Is 100% of crosswind is considered? if not, justify. Also, bx for along wind X is 24.7m and by for along wind Y is 27.8m, the a/b ratio seems to be wrongly evaluated.	Find Excel sheet for the calculation.		Refer Item 21
14	DBR / Etabs Model	The building has torsion irregularity in EQX1 Step No. 2, Unscaled SpecX case, and WLX across direction (for eg. 3.76>1.5 OR 1.58>1.2 FOR WLX across) at Terrace floor level. Also, the torsional irregularity check in DBR doesn't match with Etabs, provide an updated check for the same and also include checks for WLX, and WLY cases considering both along and across directions. Use proper modifier for corresponding load case.	Find revised DBR,In case of Torsion Irregularity we will follow the Dynamic Analysis.For the mis matching of the values we will discuss it.		Closed
15	Etabs Model	Proper Floor and Wall auto meshing to be done.	We have provided Auto meshing for both Wall & Slab.		Closed
16	Etabs Model	Provide ETABS strength and service model.	Find the attached Service model, Upon the finalization of the Design model we will generate the final service model.		Closed

STRUCTURAL DESIGN REVIEW

Project name		SOLITAIRE ICON	**Client**		
Project component		Design Basis Reports and Preliminary ETABS model	**Structural Consultant**	CASAD CONSULTANTS PVT. LTD	
Design stage		Preliminary Review	**Reviewed on**	**02-09-2023**	
Design Doc. Received on		**01-10-2023**			
No.	**Doc. Ref.**	**Comments by Prof DD Desais AECA PVT LTD**	**Response by CASAD CONSULTANTS PVT. LTD**		**Remarks**
17	DBR / Etabs Model	P-delta analysis, Gust forces calculations, Load applied in model, General Analysis, Design, etc will be checked after the compliance of all preliminary points stated above in etabs model and DBR.	------		Refer Item 24
18	Etabs Model	Since out of plane stiffness of shearwall is considered (i.e beam are not released on width of shearwall) m11 & m22 modifier should be applied as per CSI website. (which is now applied in revised modifier model, noted) However, correct the torisional modifier to beam as per CSI, i.e. your attached annex to avoid numerical sensitivity issues or atleast 0.1. Service Model provided is not applied with proper service modifier of 0.9 in wall. **(REFER ANNEX 1)**	Find revised model.		Closed
19	DBR / Etabs Model	Ka shall be <1 but >0.9, since tributary area is less than $25m^2$. Correct it for dynamic analysis too. **(REFER ANNEX 2)**	It is 1 only in Calculation of Dynamic wind, Same has been updated in DBR.		Closed
20	Etabs Model	Diaphragm eccentricity not applied in revised modifier model and for sake of simplicity, please keep only two etabs model, 1) strength model with out of plane strength modiifer applied to shearwall and 2) service model also with out of plane service modifier applied to shearwall. **(REFER ANNEX 3)**	Revised modifier model is only for your review that results are not changing with application of those modifiers, anyways as suggested by you keeping two models only.		Closed
21	DBR / Etabs Model / Excel	1) Applied Gust Forces especially cross wind component looks underestimated, Why cross wind coeffcient, is varying along the height of structure? The across wind design peak base bending moment is a single value parameter/quantity and so as the across coefficient, since across coefficient is evaluated from chart against single value of (Vh,d/fc.b). Vh,d is also a single value parameter. 2) Also apply static wind load to compare it with statically applied dynamic gust load. 3) Also why Fig 11 is used for evaluating cross coefficient and not Fig 10, since building is nearly square shaped **(REFER ANNEX 4)**	Building is not excatly square so keeping force as per rectangular only. 2) We have applied static wind to get the idea of force and it is 1900 Kn in X and 2100 Kn in Y direction which is nearer to Dynamic wind force.		Closed
22	Etabs Model	Model provided is showing load transfer/load loss - error/wraning **(REFER ANNEX 5)**	It is due to None beam modled over Wall , Removed check no warnings now.		Closed
23	DBR / Etabs Model	Time period applied in etabs model for EQX and EQY is using formula T= 0.0672 x H^0.75, from new IS 16700: 2023 clause 6.3.4 can be interpreted as upper bound value. As per that clause *"the fundamental period, T (in sec) for a structure shall be determined by accounting for all structural properties and inherent stiffness of the building through rigorously validated structural analysis procedures."* can be interpreted as evaluating the time period of structure using IS 1893 2016 clause 7.6.2 b and c, since this clause takes into account inherent property of structure i.e. plan dimension and shearwall density in each direction, and this time period should not exceed IS 16700: 2023 clause 6.3.4. So time period of 1.471 and 1.267 for X and Y direction as evaluated in DBR should be applied since its not exceeding 1.62 sec. **(REFER ANNEX 6)**	No, code is saying, Try to get the Time period from Modal behaviour and then calculate the same using Giving new formula and the time period shall not be more than the time period getting from Modal results., Still as per your comment we have check with the older time period and there is not much changes happening in over all design.		**Closed**, obviously the modal time period will be more than the time period, Ta calculated by new formula, so by this interpretation modal time period is exceeding time period evaluated by formula given in IS 16700 2023, which the code says it should not exceed.
24	DBR / Etabs Model	P-delta analysis, Gust forces calculations, Load applied in model, General Analysis, Design, etc will be checked after the compliance of all preliminary points stated above in etabs model and DBR. Also please provide ETABS edb and Set file and SAFE fdb, f2k and $sf file	------		Closed

Have the comments made during the previous design stage have been incorporated? Yes No Not applicable

Remarks

	Name	Signature	Date
Review engineer	Neeraj Desai, Ziaur Rehman		
Design engineer			
Client's representative			

Prof. D. D. Desai's Associated Engineering Consultants & Analysts Pvt. Ltd. ★ Mumbai

https://wiki.csiamerica.com/display/etabs/Modeling+concrete+cracked+section+properties+for+building+analysis

Beams.....0.35*Ig	I22 = I33 = 0.35
Columns.....0.70*Ig	I22 = I33 = 0.70
Walls-Uncracked.....0.70*Ig	modeled as shell – f11, f22 = 0.70
Walls-Cracked.....0.35*Ig	similar to Walls-Uncracked (with modifiers of 0.35)

NOTE:

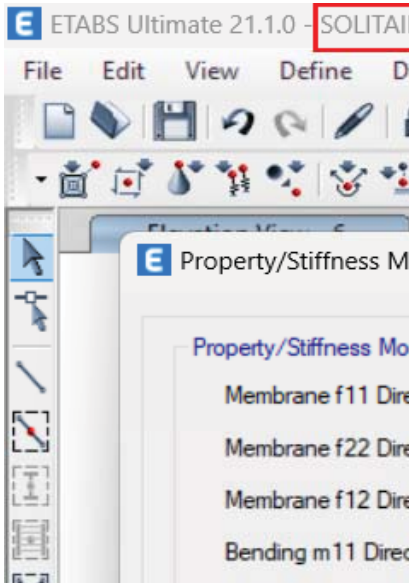
Walls are generally not designed for out-of-plane bending to avoid excessive longitudinal reinforcement. In this case, use a small r
instabilities could be avoided. However, use m11, m22, m12 = 0.70 (or 0.35) when considering the out-of-plane bending in wall.

Flat Plates & Flat Slabs....0.25*Ig modeled as membrane – f11, f22, f12 = 0.25 / modeled as shell – f11, f22, f12, m11
if rigid diaphragm is assigned)

	m12	0.7	1	
BEAM	TORTIONAL CONSTANT	0.0001	1	
	Ixx ABOUT AXIS-2	0.35	1	
	Ixx ABOUT AXIS-3	0.35	0.35	
COLUMN	TORTIONAL CONSTANT	1	1	
	Ixx ABOUT AXIS-2	0.7	0.7	
	Ixx ABOUT AXIS-3	0.7	0.7	

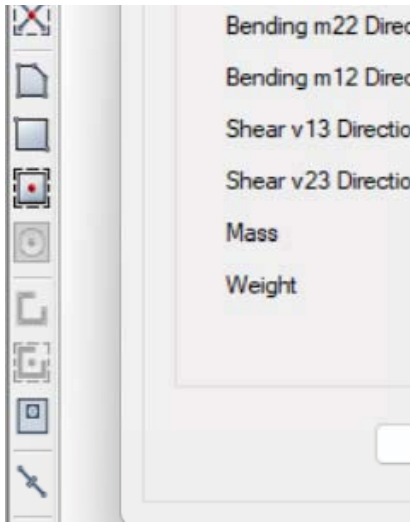
Slabs: F11, F22, F12 modifiers will be unity as slabs do not crack in their own plane for other can be 0.25 as in code

Wall: F11 does not enter into the picture and cracking of walls is primarily at extreme ends. That is taken care of by F22. Shear wall do not in general crack for minor bending as they attract very small moments. If you wish you can apply for F22 and F12 but other are not



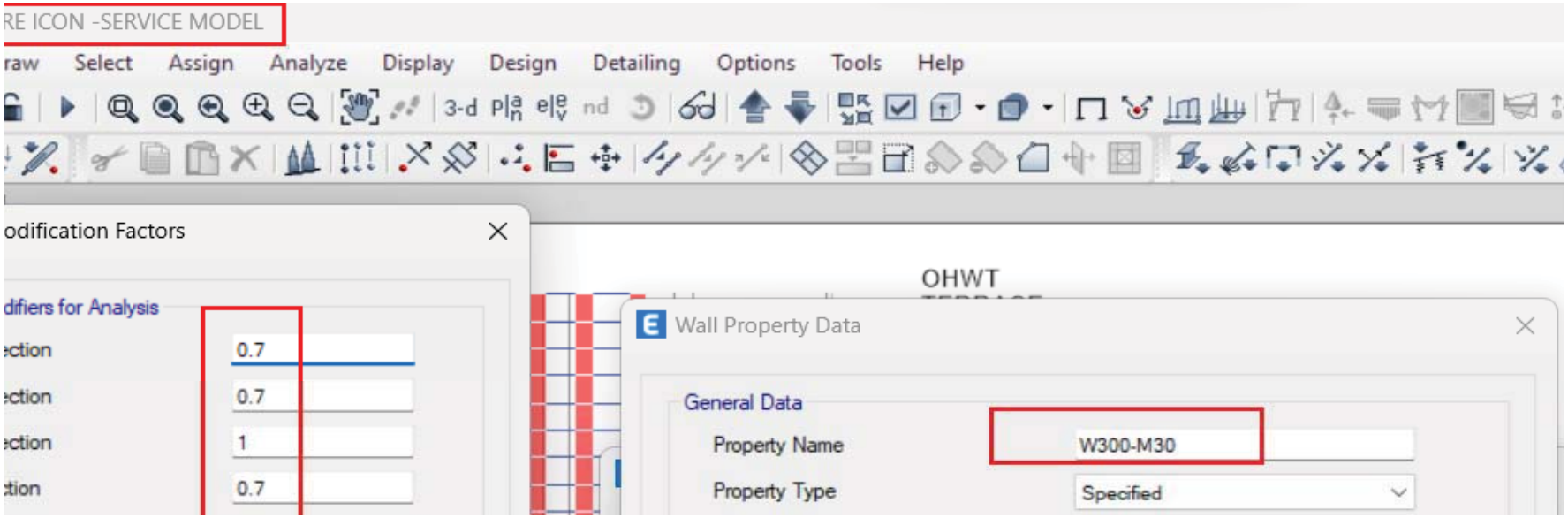
required.

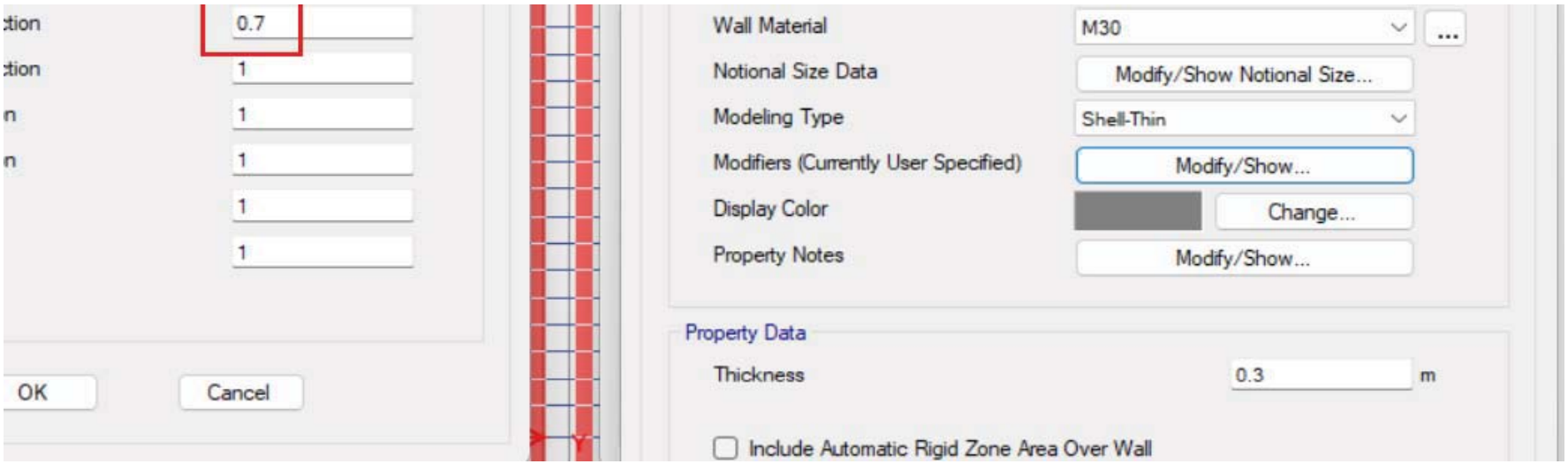
Beams: A very low torsional modifier is questionable. It may give you numerical sensitivity issues. A value of 0.2 or 0.3 is OK. I22 is also not required as horizontal bending is typically not possible due the presence of floor diaphragm.



nodifier say 0.1 for m11, m22 and m12 so numerical

, m22, m12 = 0.25 (for both cases fxx is not important




tion
tion
n
n
0.7
1
1
1
1
1
OK
Cancel
Wall Material
M30
...
Notional Size Data
Modify/Show Notional Size...
Modeling Type
Shell-Thin
Modifiers (Currently User Specified)
Modify/Show...
Display Color
Change...
Property Notes
Modify/Show...
Property Data
Thickness
0.3
m
Include Automatic Rigid Zone Area Over Wall

account as given in Table 4.

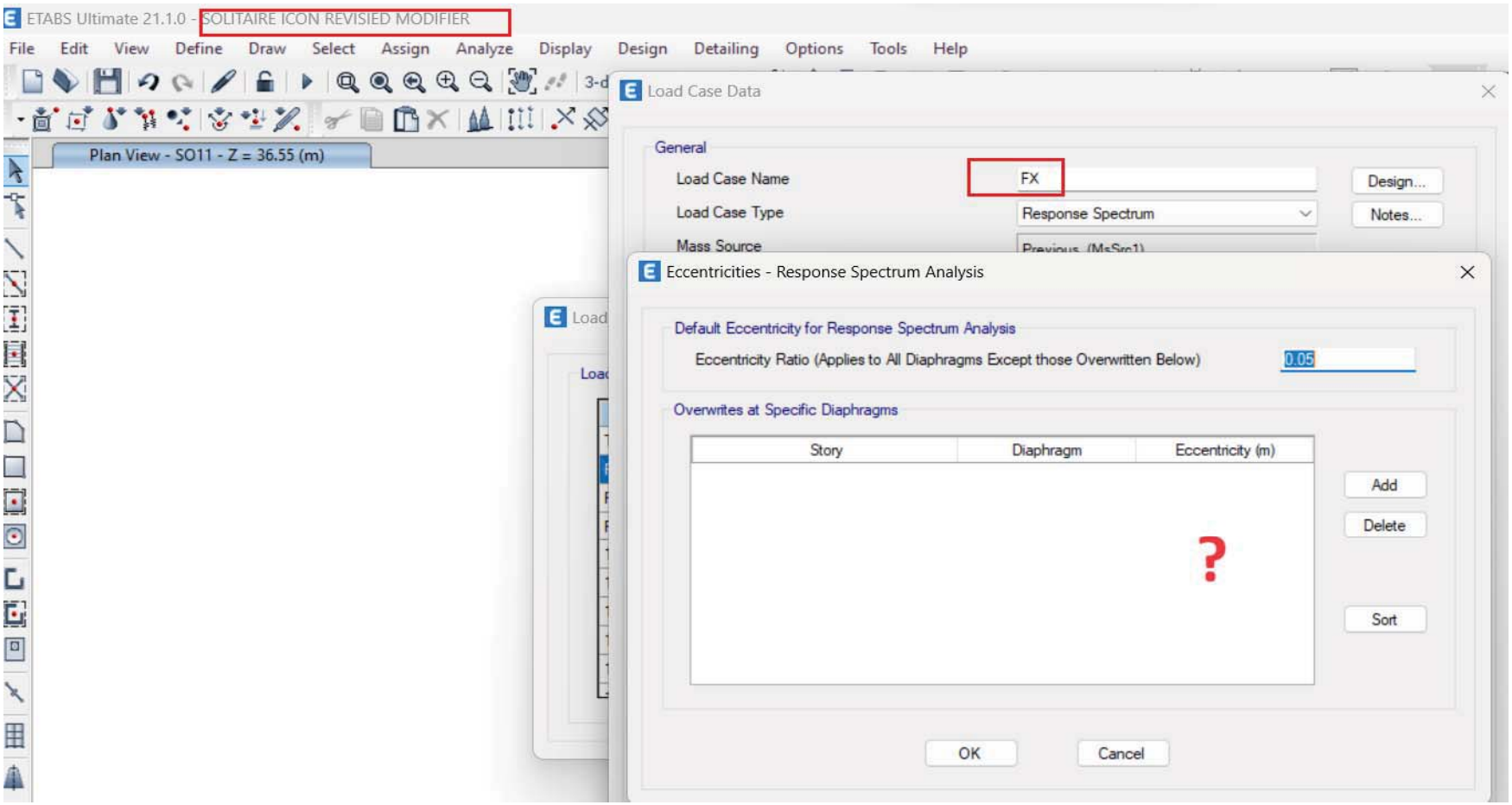
Table 4 Area Averaging Factor (K_a)
(*Clause* 7.2.2)

Sl No.	Tributary Area (A) m^2	Area Averaging Factor (Ka)*
(1)	(2)	(3)
i)	≤10	1.0
ii)	25	0.9
iii)	≥100	0.8

* Linear interpolation for intermediate values of a is permitted.

7.2.2.1 *Tributary area*

a) *Overall structure* — For evaluating loads on frames the tributary area shall be taken as the centre to centre distances between frames multiplied by the individual panel dimension in the other direction together with overall pressure coefficients.


ETABS Ultimate 21.1.0 - SOLITAIRE ICON REVISIED MODIFIER
File Edit View Define Draw Select Assign Analyze Display Design Detailing Options Tools Help
Plan View - SO11 - Z = 36.55 (m)
Load Case Data
General
Load Case Name
FX
Load Case Type
Response Spectrum
Mass Source
Design...
Notes...
Eccentricities - Response Spectrum Analysis
Default Eccentricity for Response Spectrum Analysis
Eccentricity Ratio (Applies to All Diaphragms Except those Overwritten Below)
0.05
Overwrites at Specific Diaphragms
Story
Diaphragm
Eccentricity (m)
?
Add
Delete
Sort
OK
Cancel

The across wind design peak base bending moment M_c for enclosed buildings and towers shall be determined as follows:

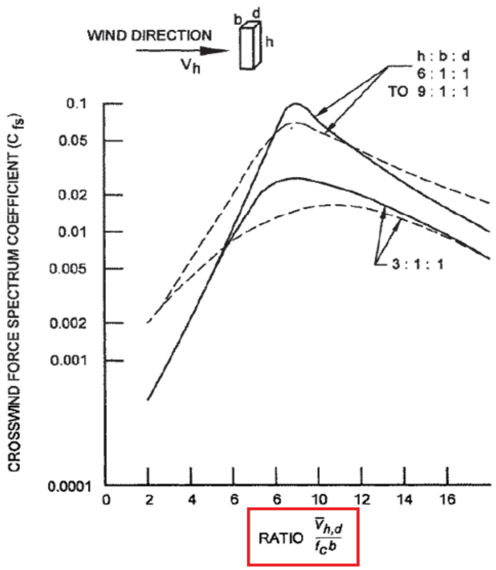
$$M_c = 0.5 g_h \bar{p}_h b h^2 (1.06 - 0.06\,k)\sqrt{\left(\frac{\pi C_{fs}}{\beta}\right)}$$

where

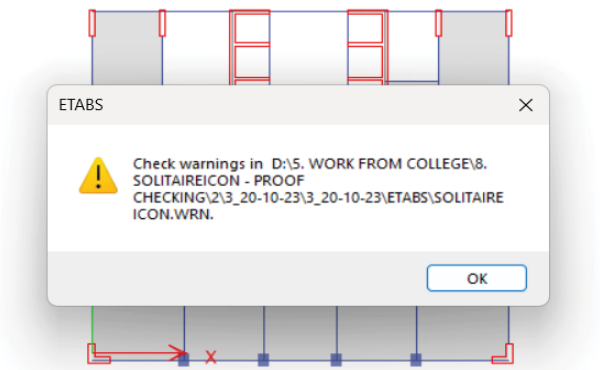
g_h = a peak factor,

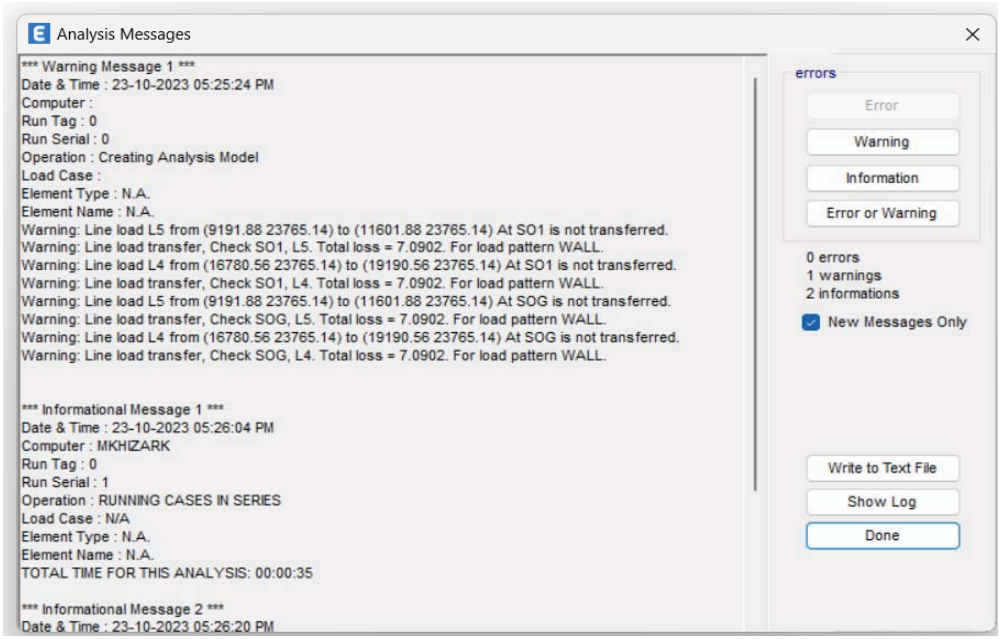
$= \sqrt{\left[2\ln(3600\, f_c)\right]}$ in cross wind direction;

$\bar{p}_h$ = hourly mean wind pressure at height h, in Pa;



ND ...,H	$V_{Z,D}$ (m/s)	P_D/P_h (N/m²)	AVERAGE HEIGHT FOR FRONTAL LOAD (m)	Along X	Along Y	Wind Along X		Wind Along Y		Along X	Along X	Along Y	Along Y	Along X
				GUST FACTOR , G	GUST FACTOR , G	F_X (kN)	F_y (kN)	F_X (kN)	F_y (kN)	$V_{h,d}/f_c b$	C_{fs}	$V_{h,d}/f_c b$	C_{fs}	M_c (kN m)
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.00056	3.88	0.00064	38498.26
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	=E25/(E13*E8)			3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
36	29.01263	505.039745	0	3.095194	3.0348	0	0.00	0	0.00	2.936746	0.0014532	3.876182	0.0013381	62016.69903
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
	29.01	505.04	0	3.10	3.03	0.00	0.00	0.00	0.00	2.94	0.0014532	3.88	0.0013381	62016.70
36	29.01263	505.039745	1.5	3.095194	3.0348	81.481578	75.29	73.82	83.09	2.94	0.0008861	3.88	0.0025952	48426.67
	28.80	497.51	3	3.10	3.04	160.78	148.57	145.80	164.09	2.91	0.0008812	3.85	0.0025590	47573.85
	28.57	489.69	3	3.11	3.05	158.53	146.49	143.87	161.93	2.89	0.0008762	3.82	0.0025210	46691.53
	28.33	481.56	3	3.11	3.06	156.20	144.34	141.87	159.68	2.87	0.0008709	3.78	0.0024812	45777.32
	28.08	473.09	3	3.12	3.07	153.79	142.11	139.78	157.33	2.84	0.0008653	3.75	0.0024395	44828.48
	27.82	464.26	3	3.13	3.08	151.29	139.80	137.60	154.87	2.82	0.0008594	3.72	0.0023955	43841.93
	27.54	455.02	3	3.13	3.09	148.69	137.40	135.32	152.31	2.79	0.0008533	3.68	0.0023490	42814.08
	27.24	445.33	3	3.14	3.10	145.98	134.89	132.93	149.62	2.76	0.0008467	3.64	0.0022998	41740.83
	26.93	435.14	3	3.16	3.11	143.15	132.27	130.42	146.79	2.73	0.0008397	3.60	0.0022474	40617.35
	26.60	424.39	3	3.17	3.13	140.17	129.52	127.77	143.81	2.69	0.0008323	3.55	0.0021915	39438.00
	26.24	413.01	3	3.18	3.14	137.03	126.62	124.97	140.66	2.66	0.0008243	3.51	0.0021316	38196.04
	25.85	400.92	3	3.20	3.16	133.70	123.54	121.99	137.30	2.62	0.0008156	3.45	0.0020670	36883.37
	25.43	388.01	3	3.22	3.18	130.15	120.26	118.81	133.72	2.57	0.0008063	3.40	0.0019969	35490.13
	24.97	374.14	3	3.24	3.20	126.33	116.73	115.37	129.85	2.53	0.0007961	3.34	0.0019203	34004.06


ETABS
Check warnings in D:\5. WORK FROM COLLEGE\8. SOLITAIREICON - PROOF CHECKING\2\3_20-10-23\3_20-10-23\ETABS\SOLITAIRE ICON.WRN.
OK
X


Analysis Messages
*** Warning Message 1 ***
Date & Time : 23-10-2023 05:25:24 PM
Computer :
Run Tag : 0
Run Serial : 0
Operation : Creating Analysis Model
Load Case :
Element Type : N.A.
Element Name : N.A.
Warning: Line load L5 from (9191.88 23765.14) to (11601.88 23765.14) At SO1 is not transferred.
Warning: Line load transfer, Check SO1, L5. Total loss = 7.0902. For load pattern WALL.
Warning: Line load L4 from (16780.56 23765.14) to (19190.56 23765.14) At SO1 is not transferred.
Warning: Line load transfer, Check SO1, L4. Total loss = 7.0902. For load pattern WALL.
Warning: Line load L5 from (9191.88 23765.14) to (11601.88 23765.14) At SOG is not transferred.
Warning: Line load transfer, Check SOG, L5. Total loss = 7.0902. For load pattern WALL.
Warning: Line load L4 from (16780.56 23765.14) to (19190.56 23765.14) At SOG is not transferred.
Warning: Line load transfer, Check SOG, L4. Total loss = 7.0902. For load pattern WALL.
*** Informational Message 1 ***
Date & Time : 23-10-2023 05:26:04 PM
Computer : MKHIZARK
Run Tag : 0
Run Serial : 1
Operation : RUNNING CASES IN SERIES
Load Case : N/A
Element Type : N.A.
Element Name : N.A.
TOTAL TIME FOR THIS ANALYSIS: 00:00:35
*** Informational Message 2 ***
Date & Time : 23-10-2023 05:26:20 PM
errors
Error
Warning
Information
Error or Warning
0 errors
1 warnings
2 informations
New Messages Only
Write to Text File
Show Log
Done

6.3.4 Approximate Fundamental Natural Period

For buildings of height 50 m and more, the fundamental period, T (in sec) for a structure shall be determined by accounting for all structural properties and inherent stiffness of the building through rigorously validated structural analysis procedures. The fundamental period shall however not exceed the value obtained from the approximate fundamental translational natural period T_a (in s) of oscillation, estimated by following expression:

$T_a = 0.0644\ H^{0.9}$ for concrete moment resisting frame systems; and

$T_a = 0.0672\ H^{0.75}$ for all other concrete structural systems

1. SOIL PROFILE & FOUNDATION STRATEGY

SAFE BEARING CAPACITY –600 KN/M^2

SOIL TYPE - TYPE A (TABLE 2 IS 1893-2016)

TYPE OF FOUNDATION - RAFT

ALLOWABLE SETTLEMENT - 125MM

DEPTH OF WATER TABLE –N/A

THE INCREASE IN SOIL PRESSURE DURING LATERAL FORCES IS AS PER TABLE-1 AND TABLE-2 OF IS 1893(PART-I): 2016.

SAFE SOFTWARE IS USED FOR ANALYSIS OF RAFT AND COMBINED FOOTINGS.

SBC OF 60 T/SQMT IS GIVEN AT 19 M DEPTH FOR RAFT FOUNDATION FOR 125 MM DISPLACEMENT.

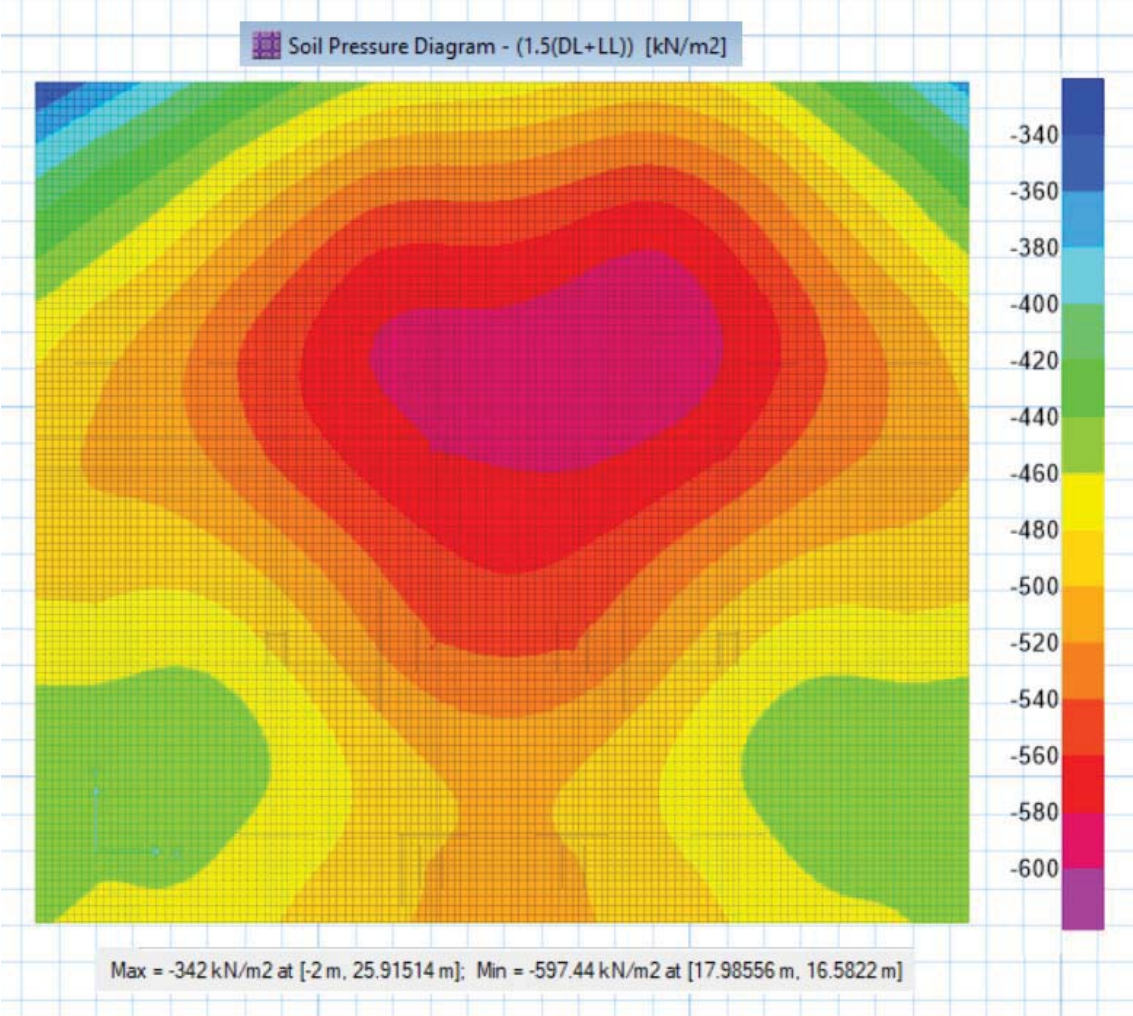
2.DESCRIPTION OF SUBSTRUCTURE

Sr. No	Item	Description
1	No. of basements Height of individual basement floors	4 NOS 5.1, 4.6, 4.6 & 5.2m
2	Minimum clearance between outermost basement retaining wall and compound wall	3.0m
3	Has a Shoring system been installed? Submit sectional detail of the shoring system	No shoring system detail submitted.
4	Give details of methodology used to resist uplift pressure due to ground water for tower portion as well as the portion outside the tower.	Initially at the time of construction, sleeves will be left in the raft to release water pressure. When all the basements will be completed, sufficient dead load will be developed to counteract uplift pressure of water and those sleeves left to release water pressure will be grouted.
5	Bottom Level of Raft w.r.t. ground level in m Total downward load of self weight of raft + Counterweight over raft + Rock Anchors if any (for raft spanning between columns) Whether pressure release pipes have been used? Water level assumed for uplift calculation	19.50 m
6	Description of the foundation for the tower block	Raft footing
7	Nature of Foundation	Raft Footing
8	SBC assumed T/sq.mt.	60 T/sq.mt Same to be verified by geotechnical engineer Incharge.
9	Sub-grade Elastic Modulus	4800 kN/m^3
10	Flooring system of the Basements	NA
11	Retaining wall types & Sequence of backfilling	Propped cantilever.
12	Intended Use of basements	Parking
13	If rock anchors are used, are they grouted after installation and stressing?	No, rock anchors are not used.
14	Is structural steel used in the construction of the sub-structure?	No
15	If yes, what are the measures taken for its fire proofing and corrosion resistance?	N/A
16	Whether Expansion/Separation joints provided? Whether expansion joint/separation joint continues through basement? If yes, detail at Basement level & retaining wall junction	No
17	Is the geotechnical investigation completed as per the requirements of 9.3.1?	Yes
18	Is the minimum depth of foundation provided as per requirements of 9.4?	Yes
19	Are the estimated design settlement values within specified limits?	Yes

3.RELEVANT SAMPLE EXTRACTS FROM SAFE MODEL

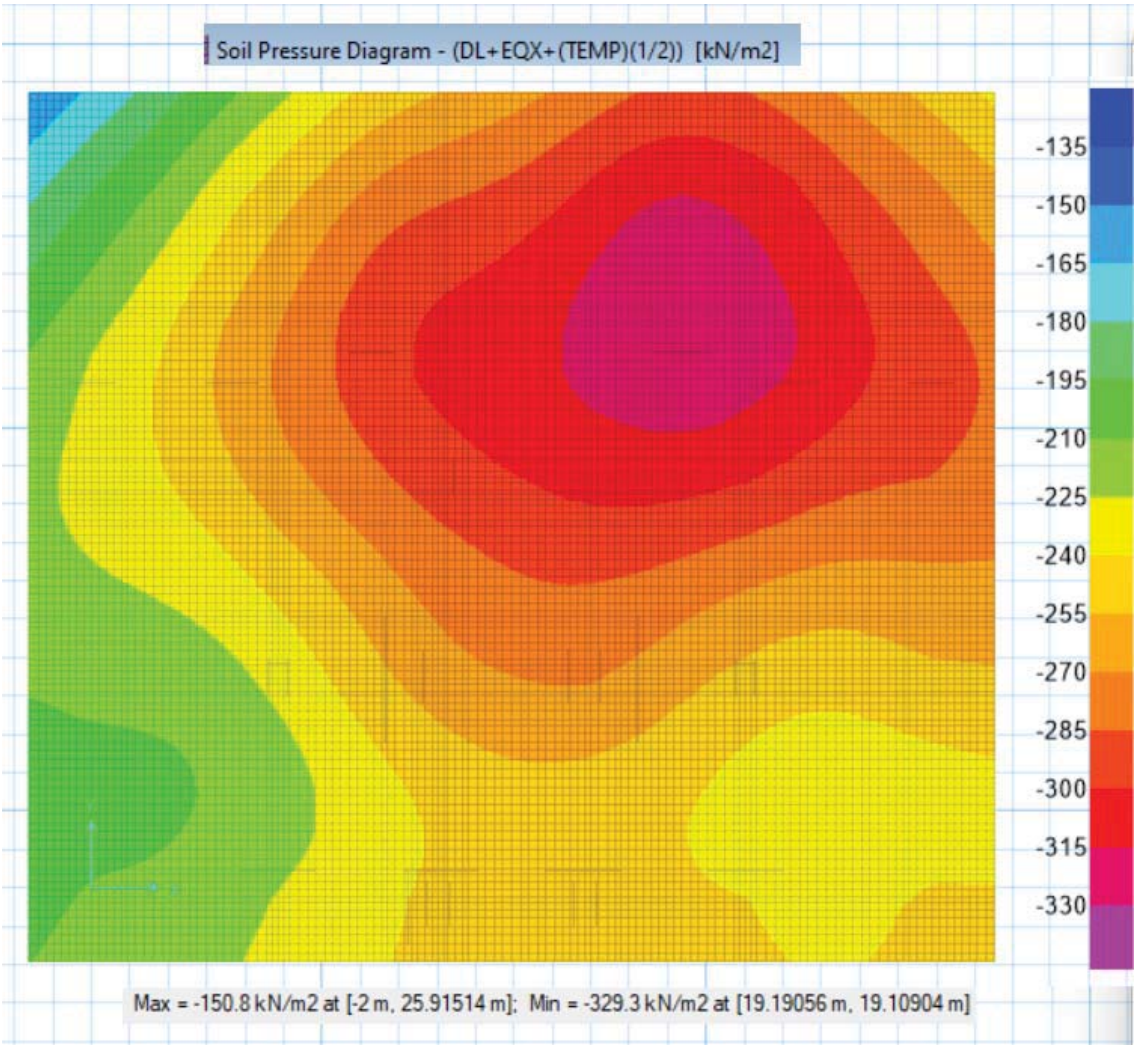
3.1. 1.5DL+1.5LL

MIN SOIL PRESSURE = 597.44 KN/M^2
PERMISSIBLE SBC = 600 X 1.5= 900 KN/M^2



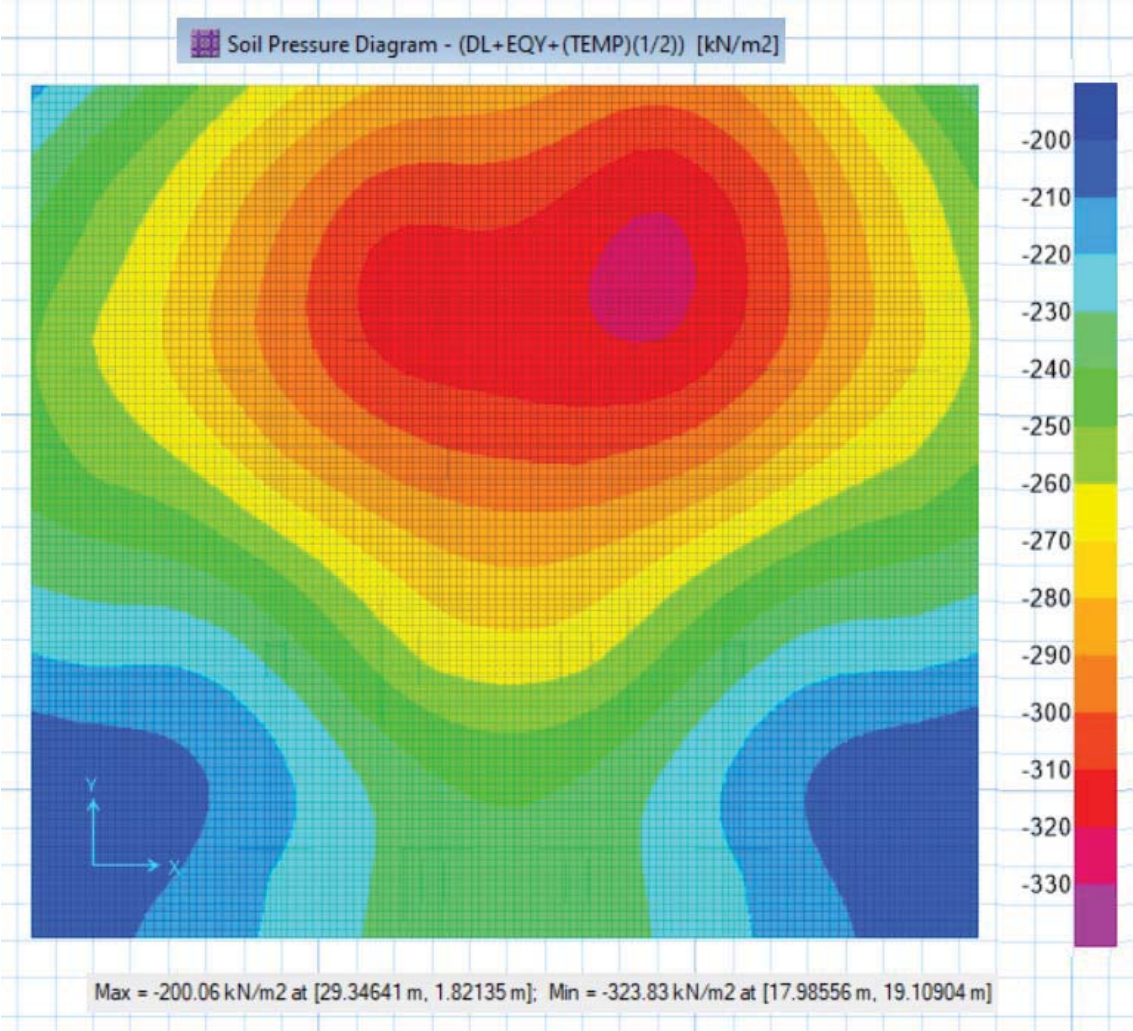
3.2. DL+EQX+TEMP

MIN SOIL PRESSURE = 329.3 KN/M^2
PERMISSIBLE SBC = 600 X 1.5 = 900 KN/M^2



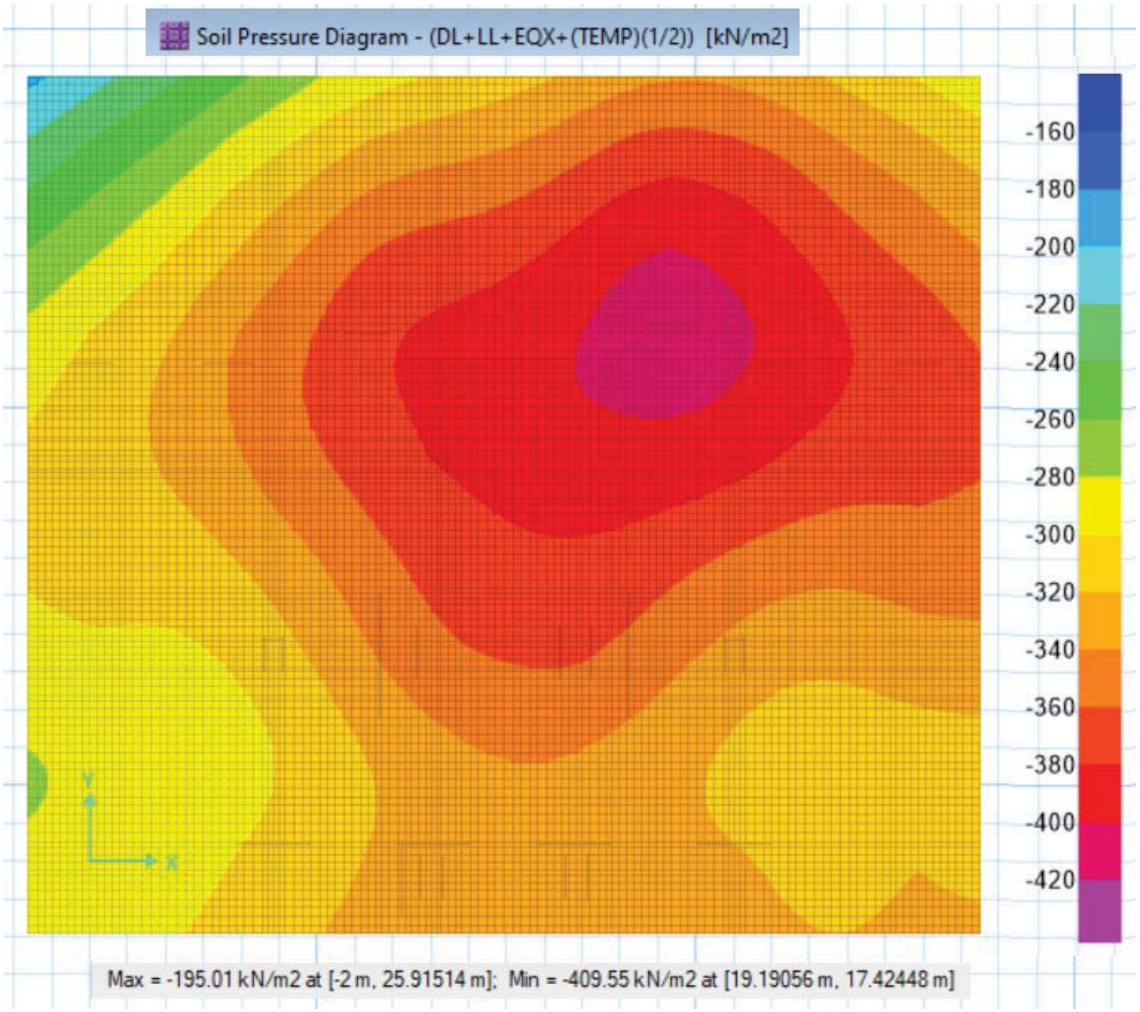
3.3. DL+EQY+TEMP

MIN SOIL PRESSURE = 323.83 KN/M^2
PERMISSIBLE SBC = 600 X 1.5 = 900 KN/M^2



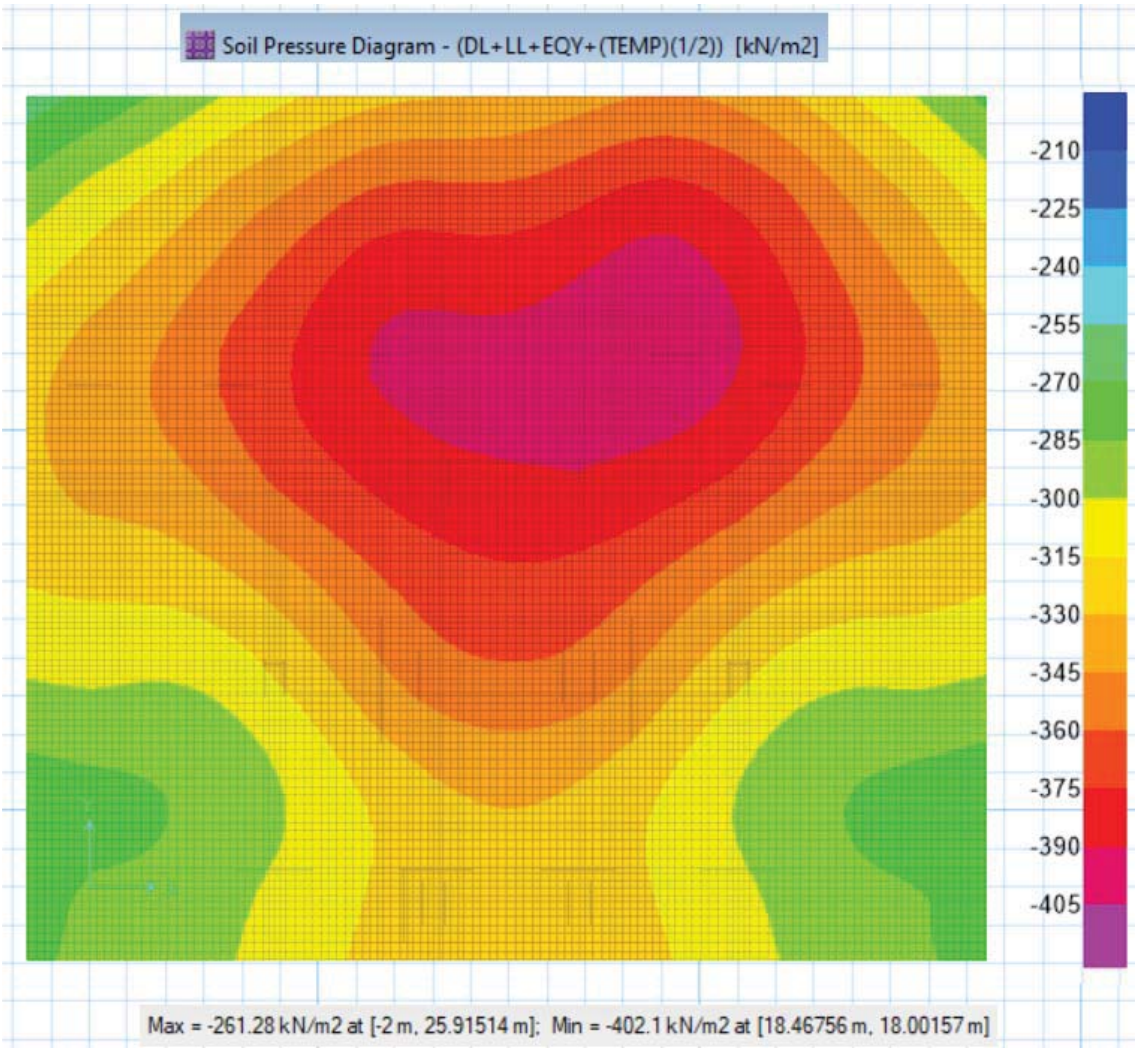
3.4. DL+LL+EQX+TEMP

MIN SOIL PRESSURE = 409.55 KN/M^2
PERMISSIBLE SBC = 600 X 1.5 = 900 KN/M^2



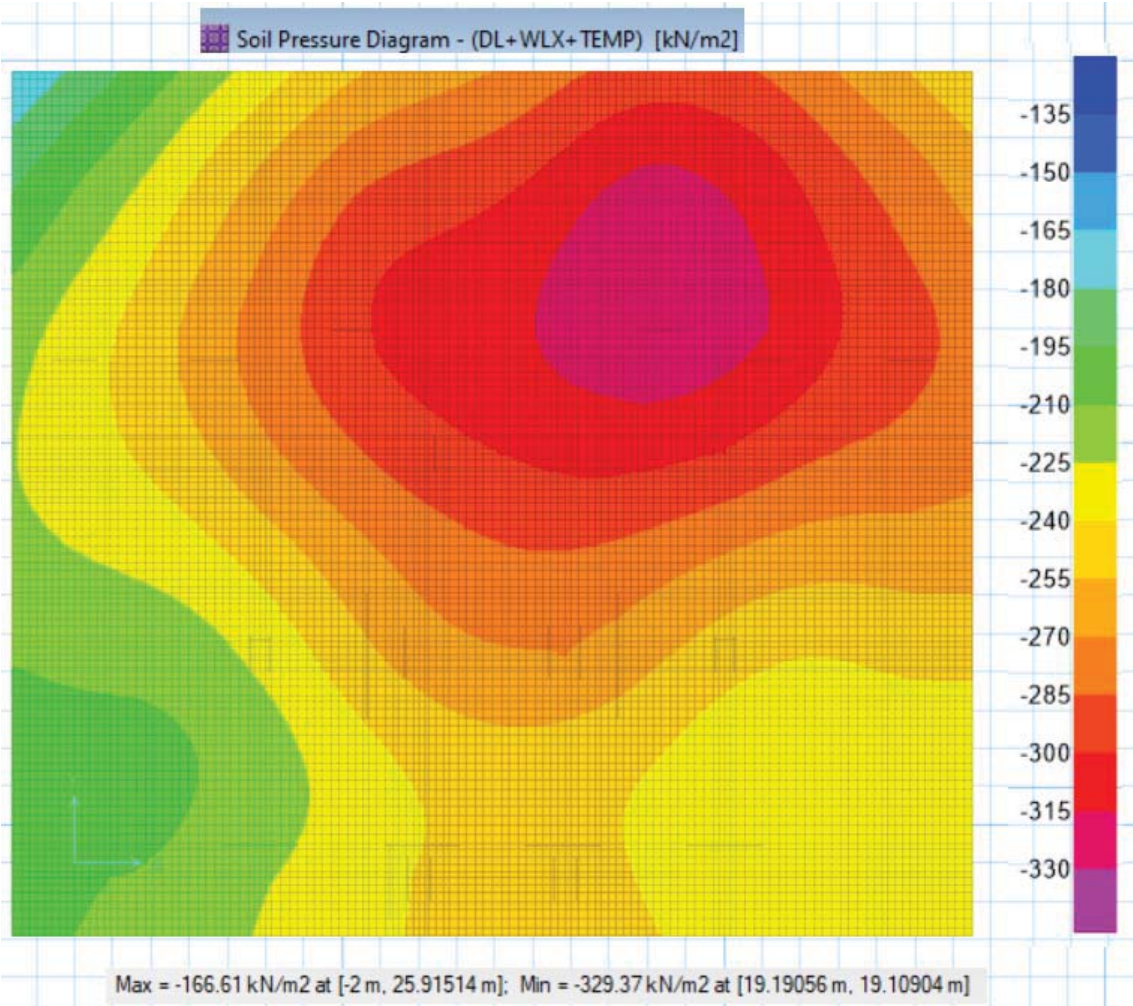
3.5. DL+LL+EQY+TEMP

MIN SOIL PRESSURE = 402.1 KN/M^2
PERMISSIBLE SBC = 600 X 1.5 = 900 KN/M^2



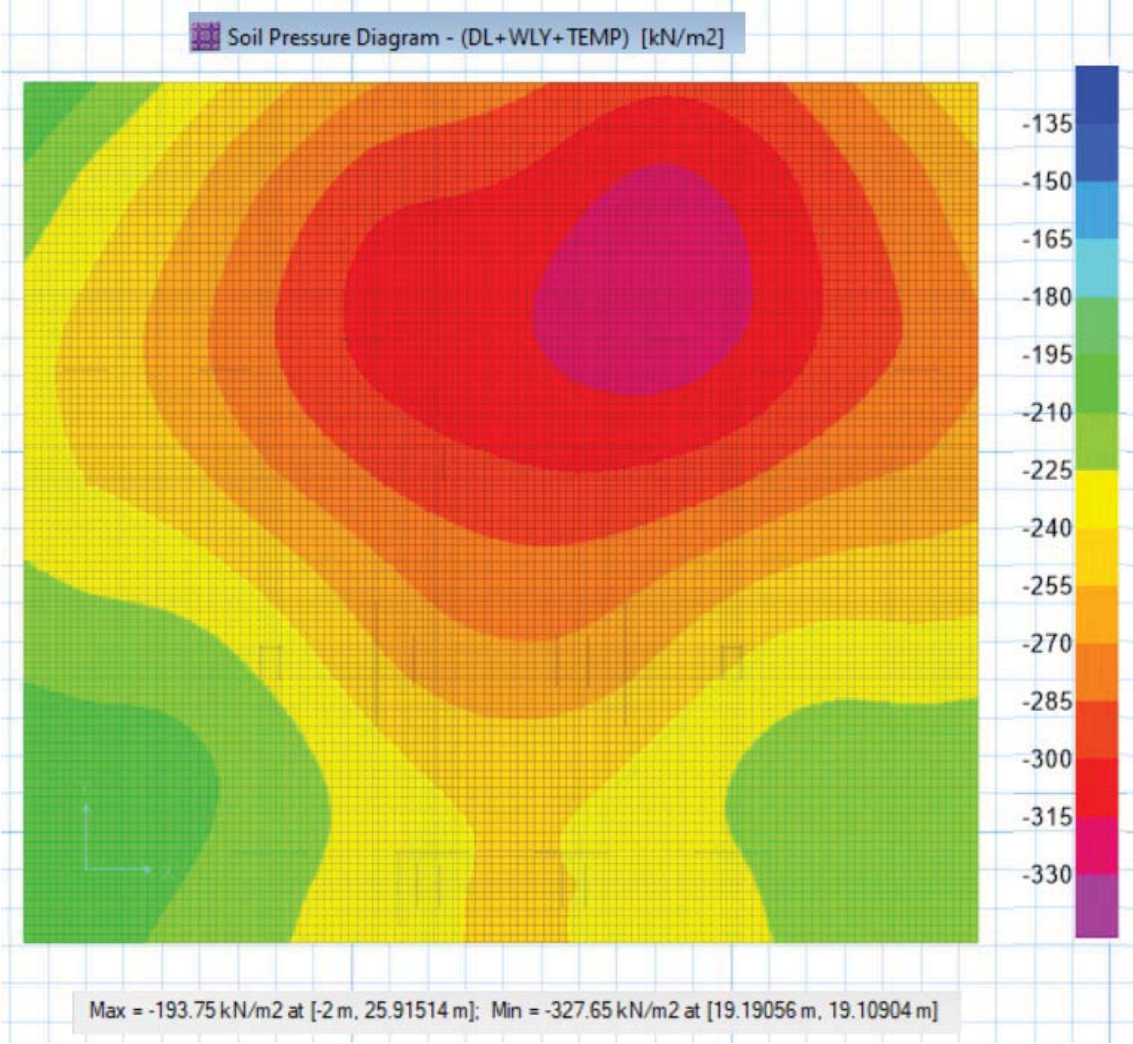
3.6. DL+WLX+TEMP

MIN SOIL PRESSURE = 329.37 KN/M^2
PERMISSIBLE SBC = 600 X 1.25 = 750 KN/M^2



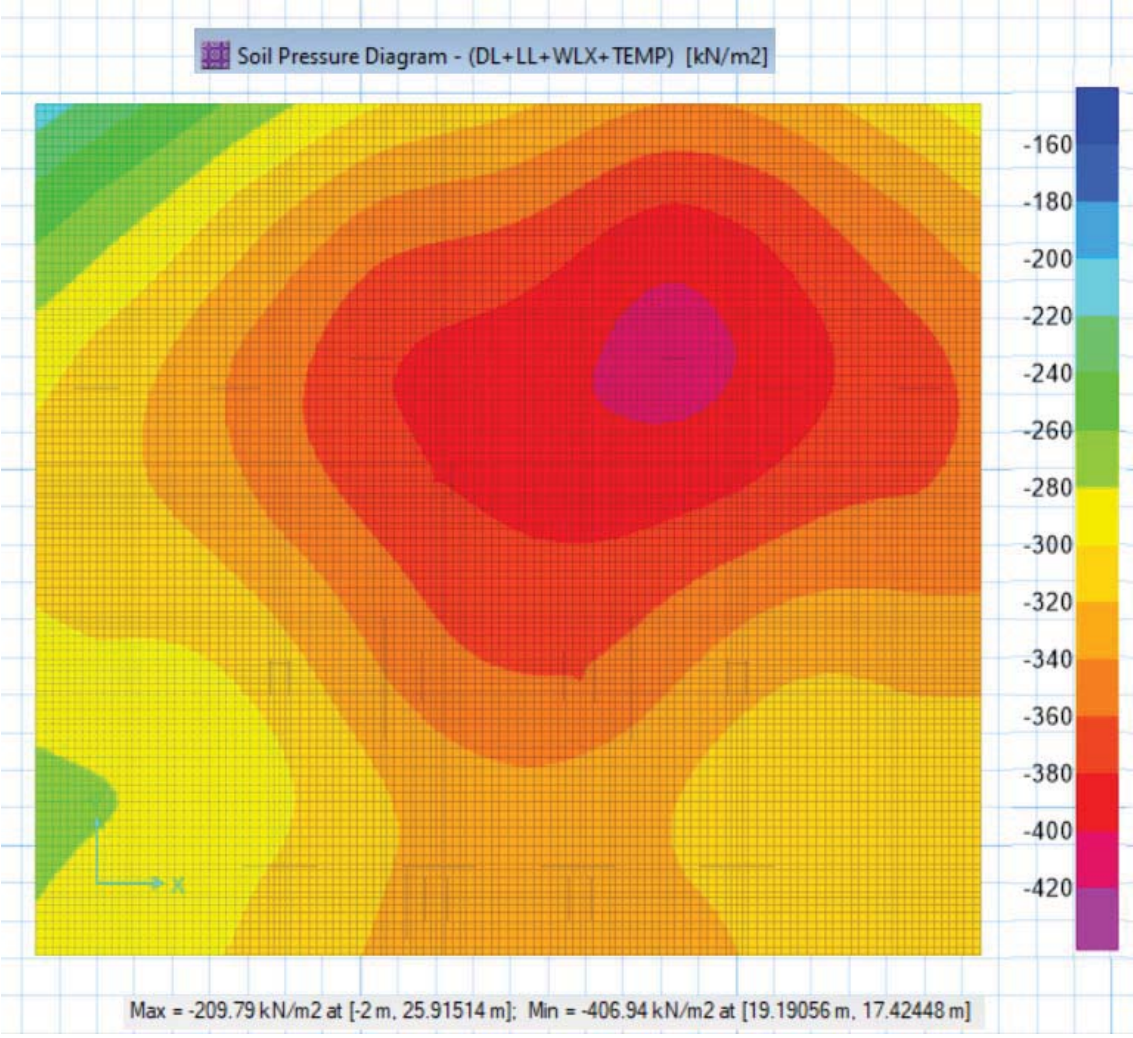
3.7. DL+WLY+TEMP

MIN SOIL PRESSURE = 327.65 KN/M^2
PERMISSIBLE SBC = 600 X 1.25 = 750 KN/M^2



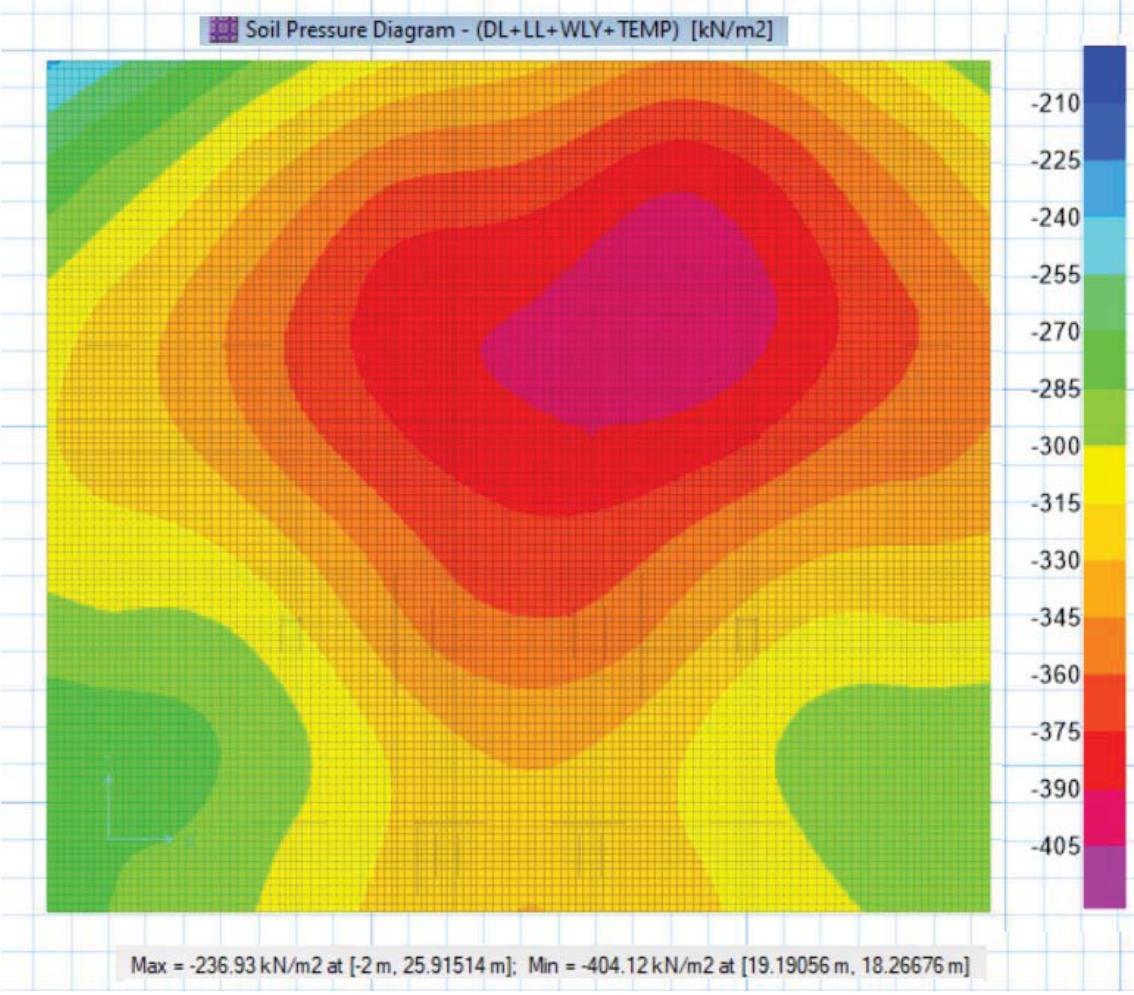
3.8. DL+LL+WLX+TEMP

MIN SOIL PRESSURE = 406.94 KN/M^2
PERMISSIBLE SBC = 600 X 1.25 = 750 KN/M^2



3.9. DL+LL+WLY+TEMP

MIN SOIL PRESSURE = 404.12 KN/M^2
PERMISSIBLE SBC = 600 X 1.25 = 750 KN/M^2



Story Response - Story Shears

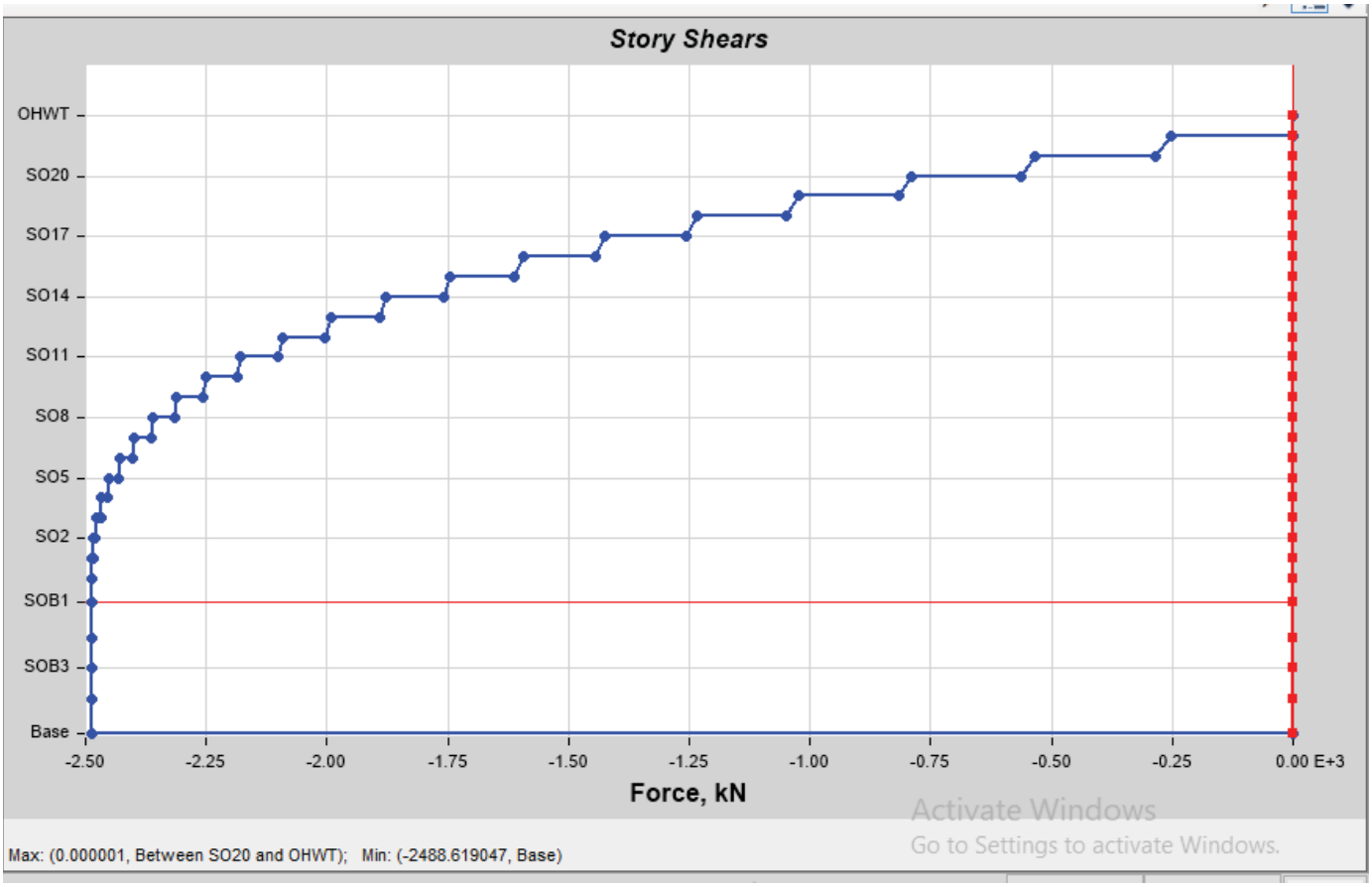
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp1		
Display Type	Story shears	Story Range	All Stories
Load Case	EQX	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



Story Response - Story Shears

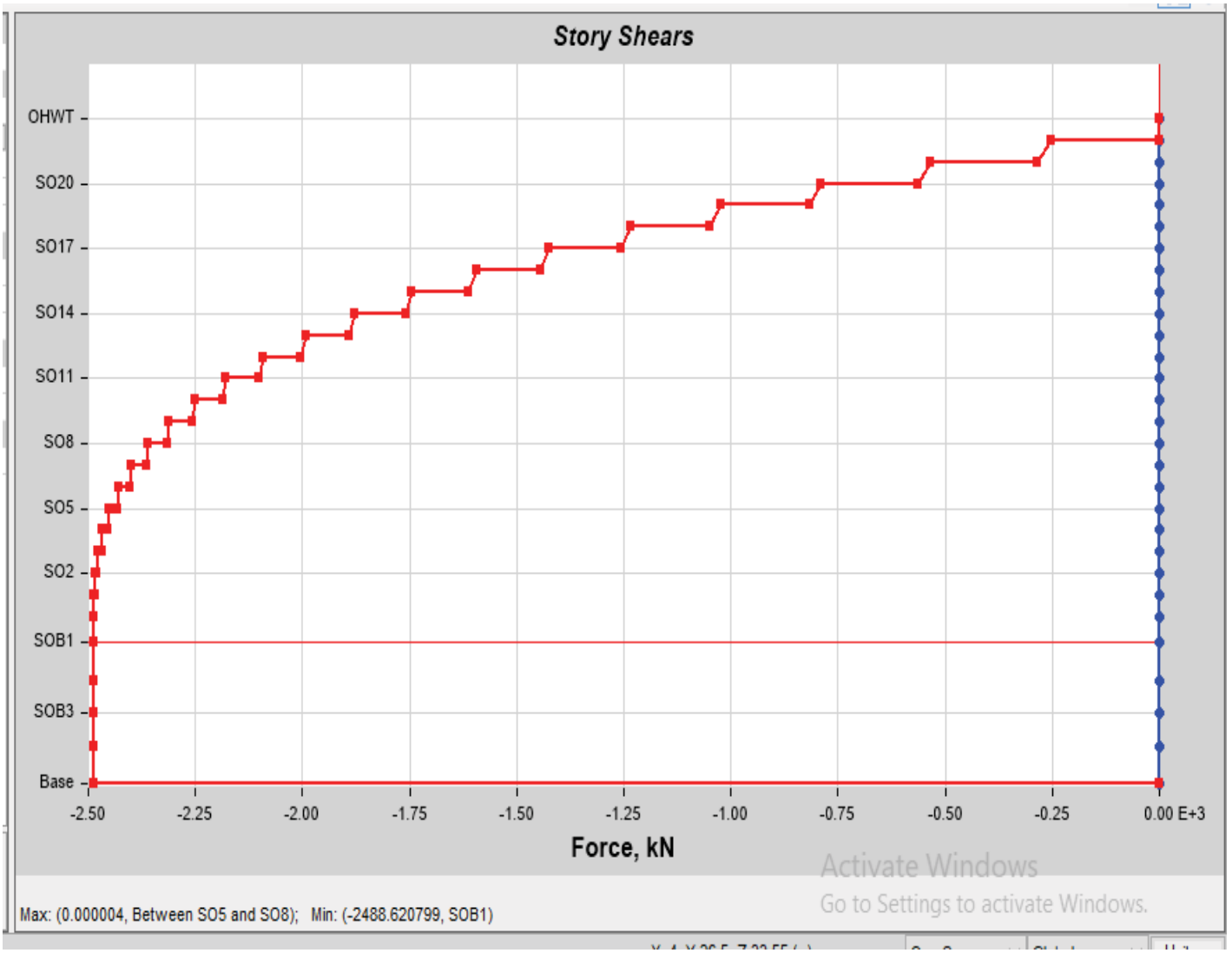
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp2		
Display Type	Story shears	Story Range	All Stories
Load Case	EQY	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



Story Response - Story Shears

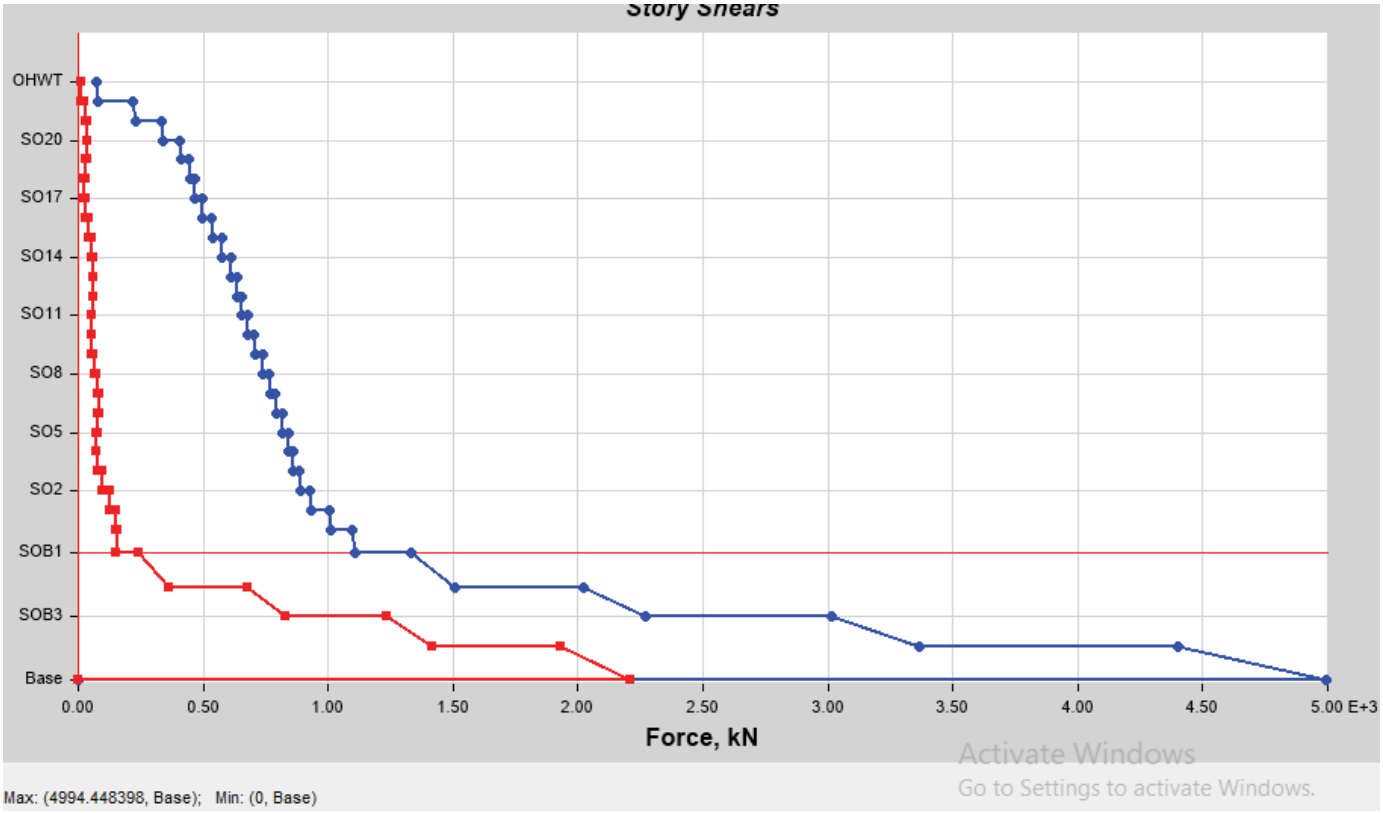
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp1		
Display Type	Story shears	Story Range	All Stories
Load Case	UNSPECX	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



Story Response - Story Shears

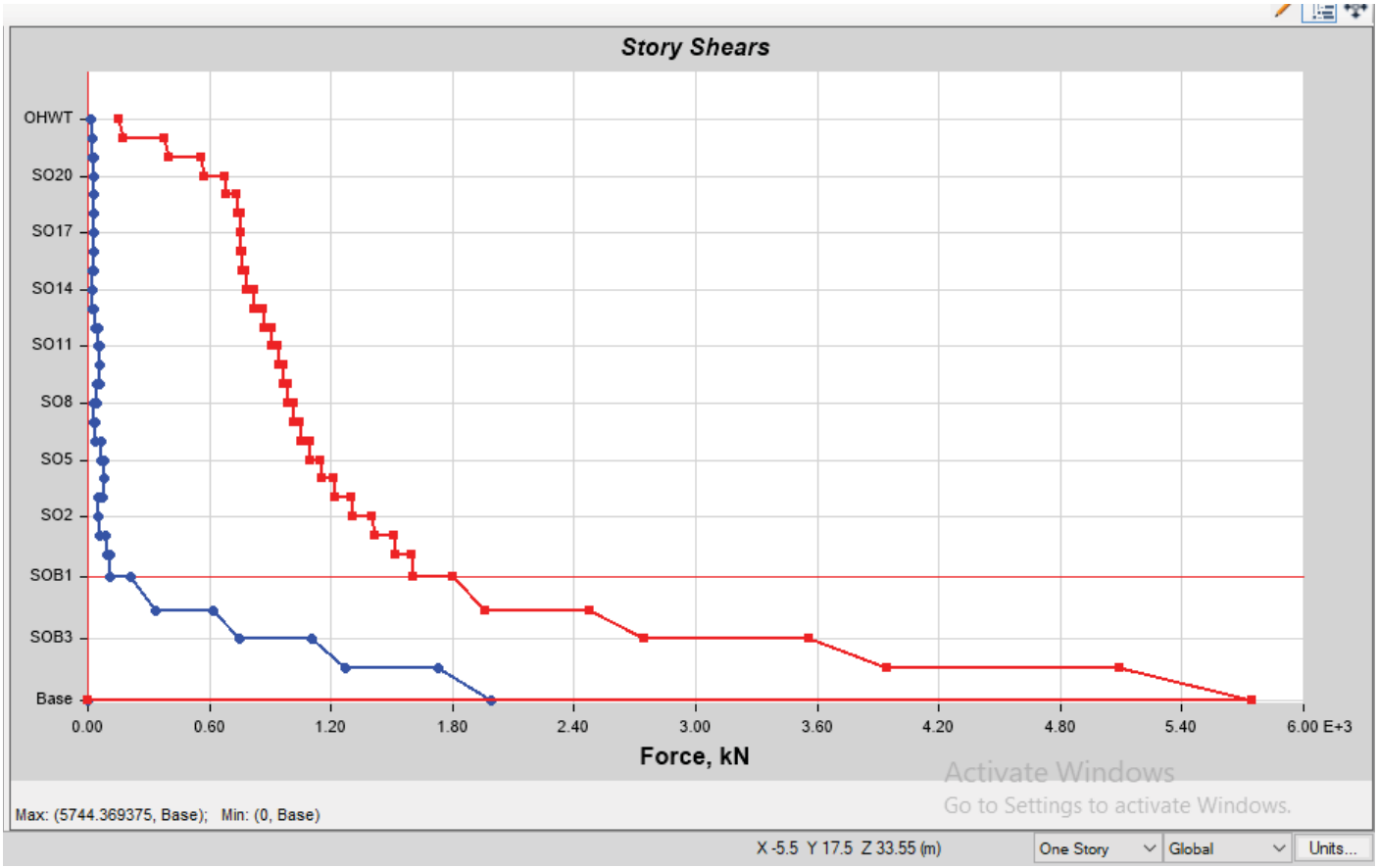
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp1		
Display Type	Story shears	Story Range	All Stories
Load Case	UNSPECY	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



Story Response - Story Shears

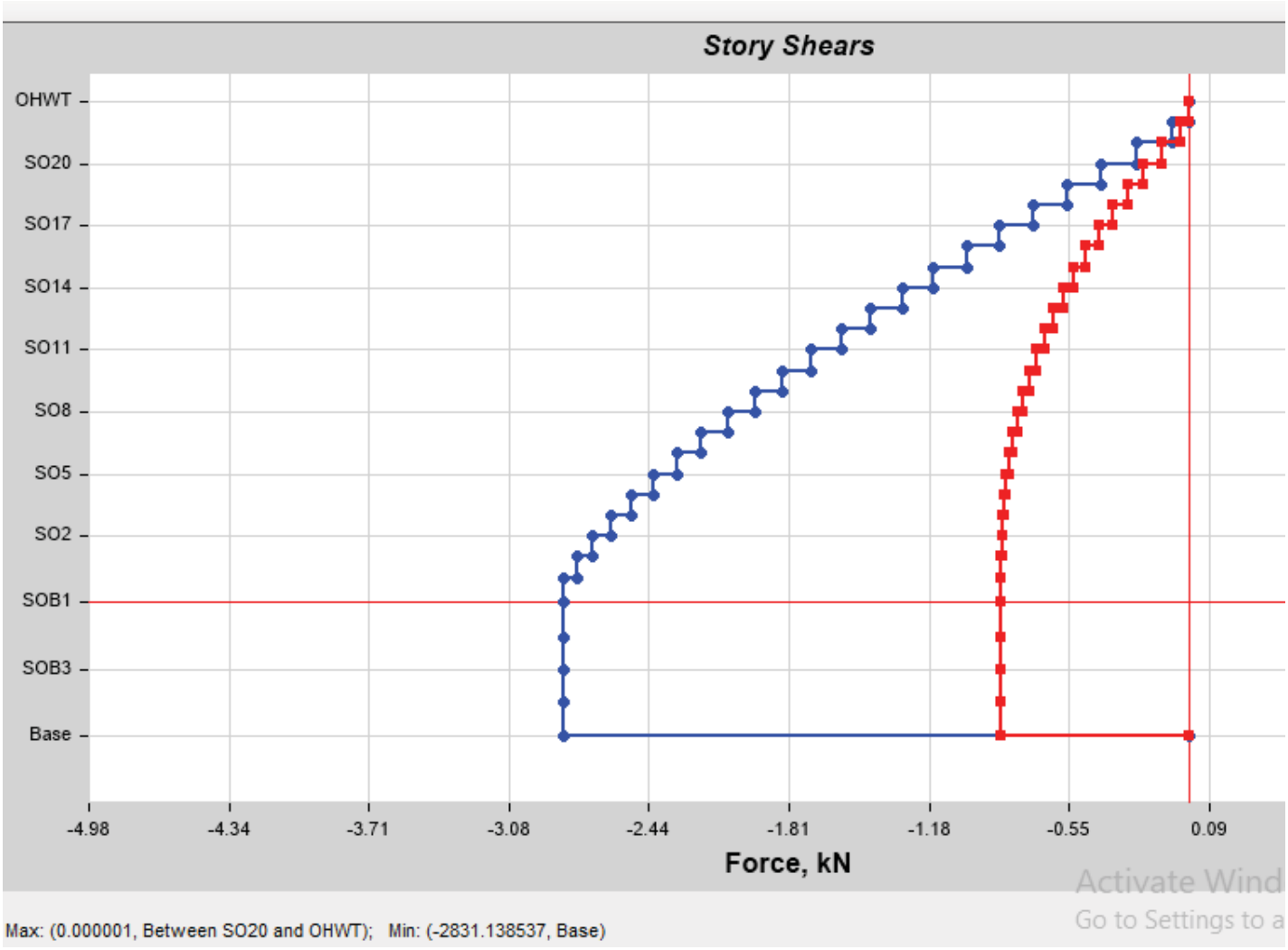
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp3		
Display Type	Story shears	Story Range	All Stories
Load Case	GWX	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



Story Response - Story Shears

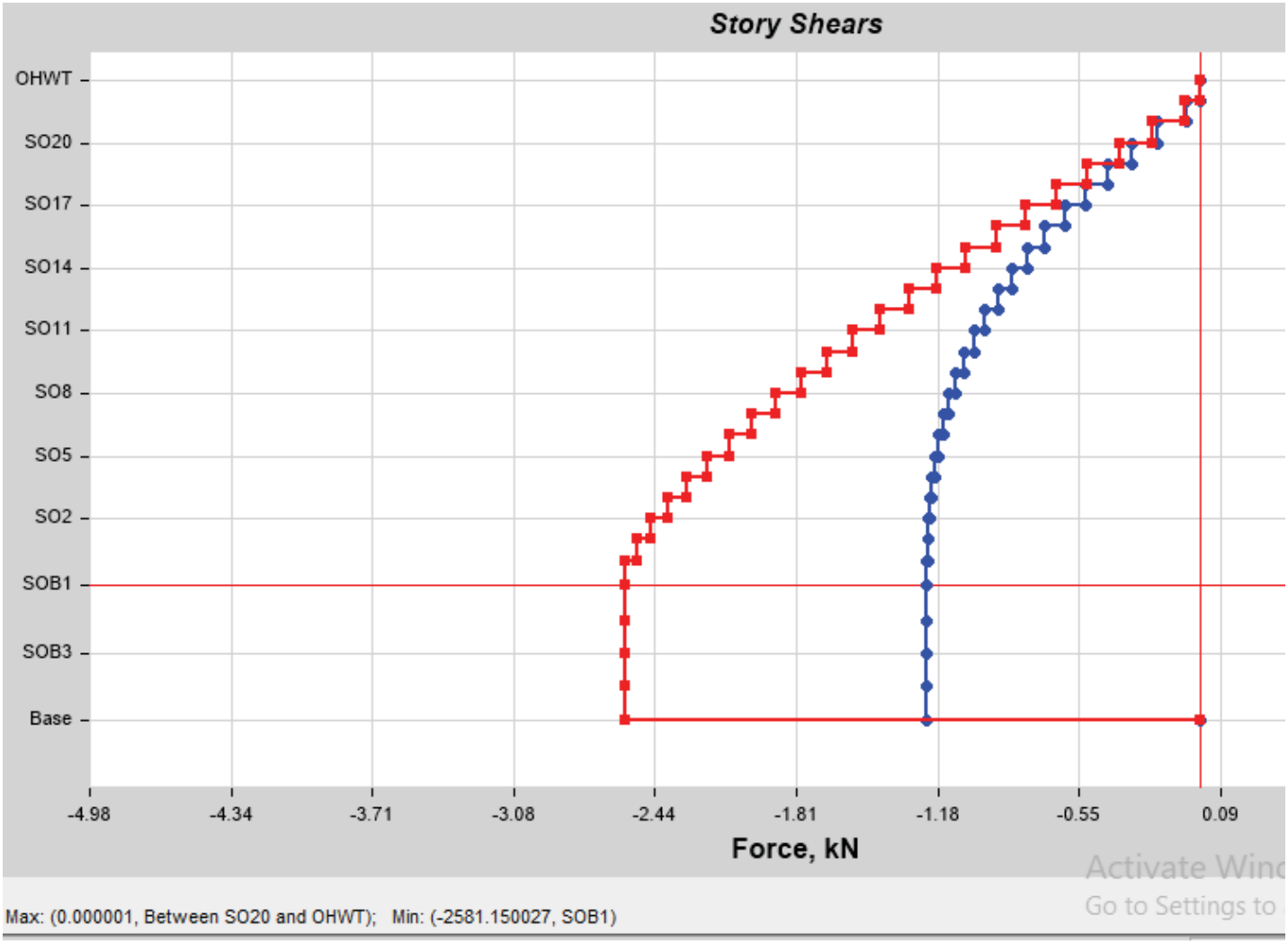
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp3		
Display Type	Story shears	Story Range	All Stories
Load Case	GWY	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



Story Response - Maximum Story Displacement

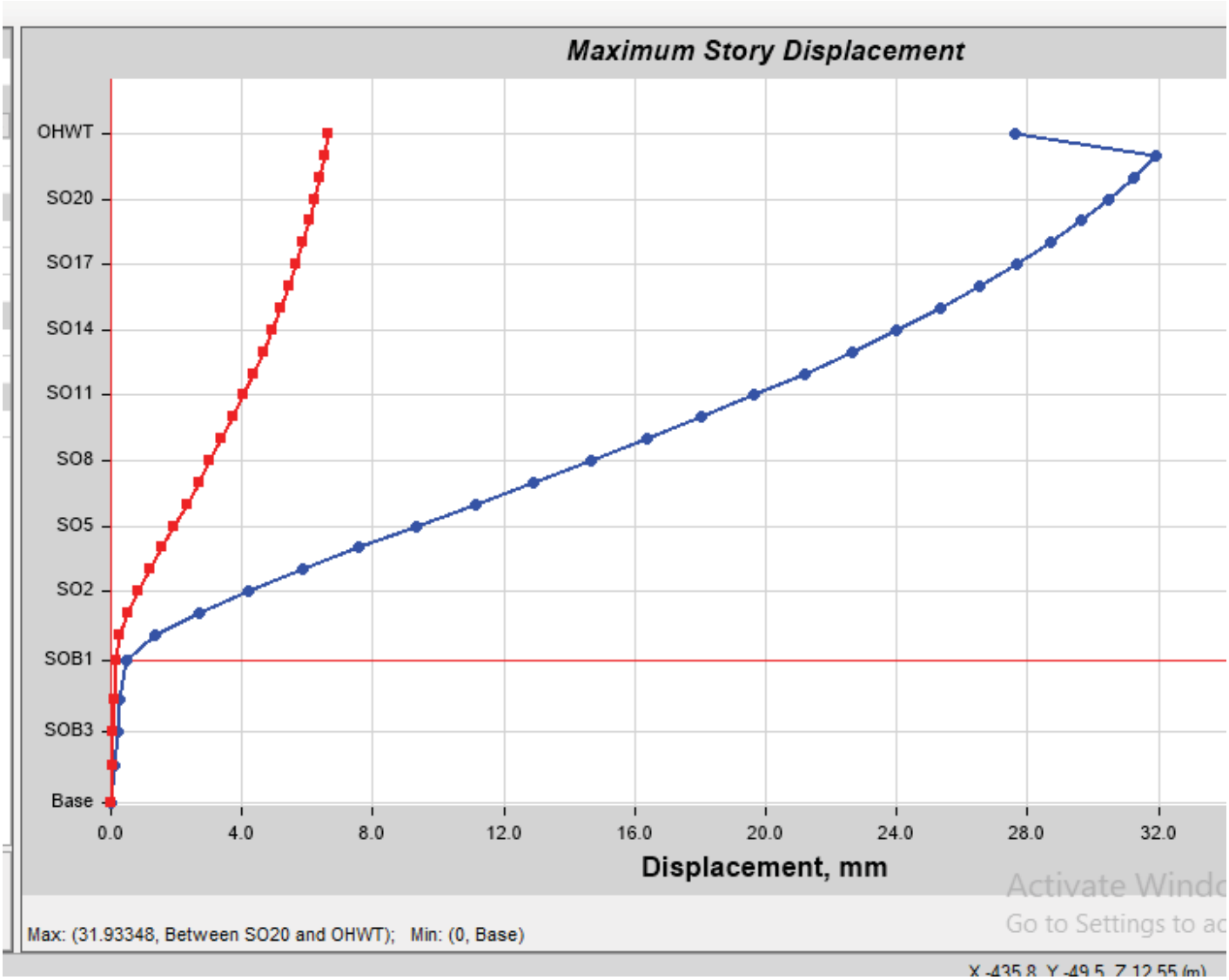
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp4		
Display Type	Max story displ	Story Range	All Stories
Load Case	UNSPECX	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



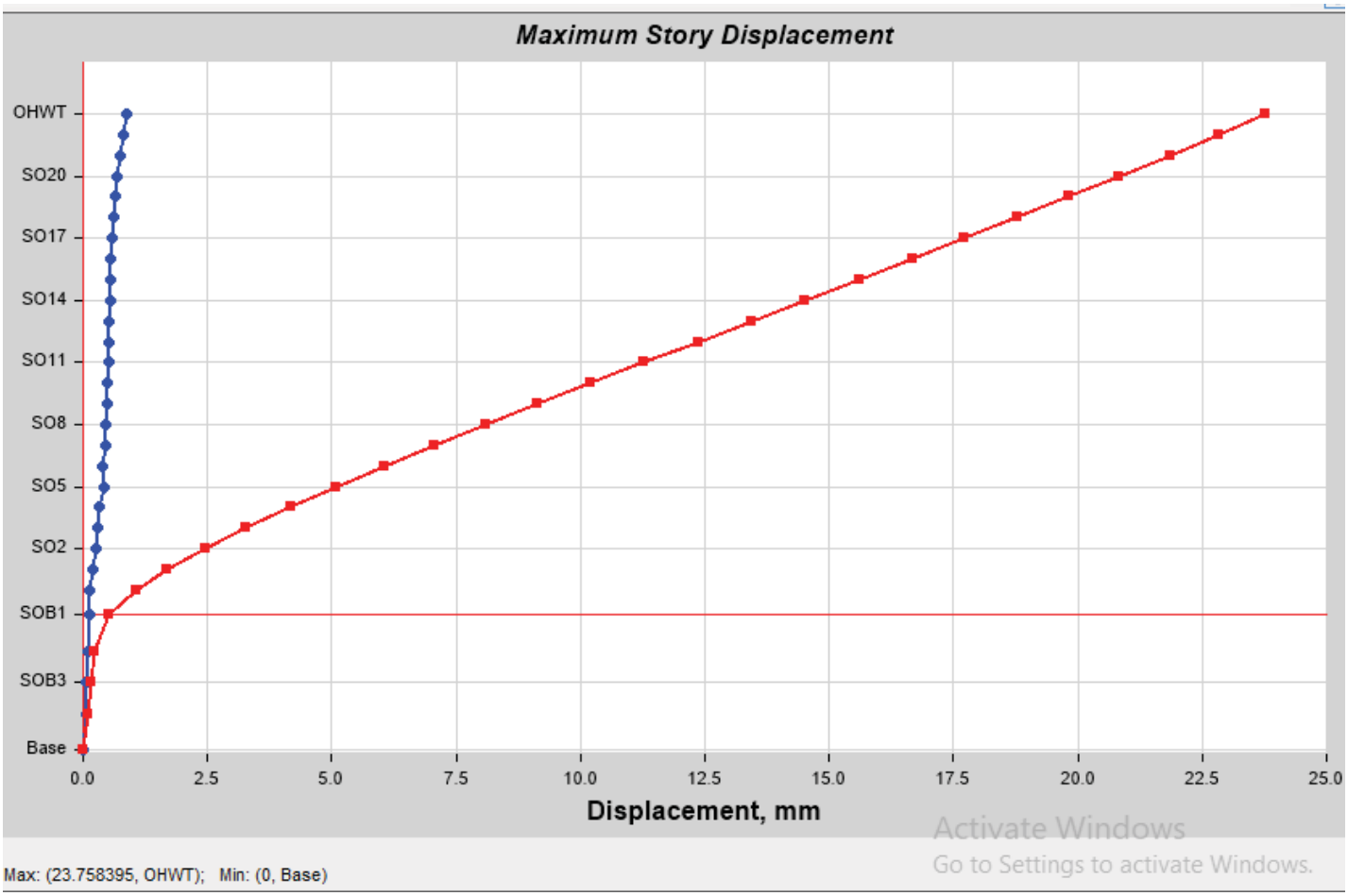
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp4		
Display Type	Max story displ	Story Range	All Stories
Load Case	UNSPECY	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



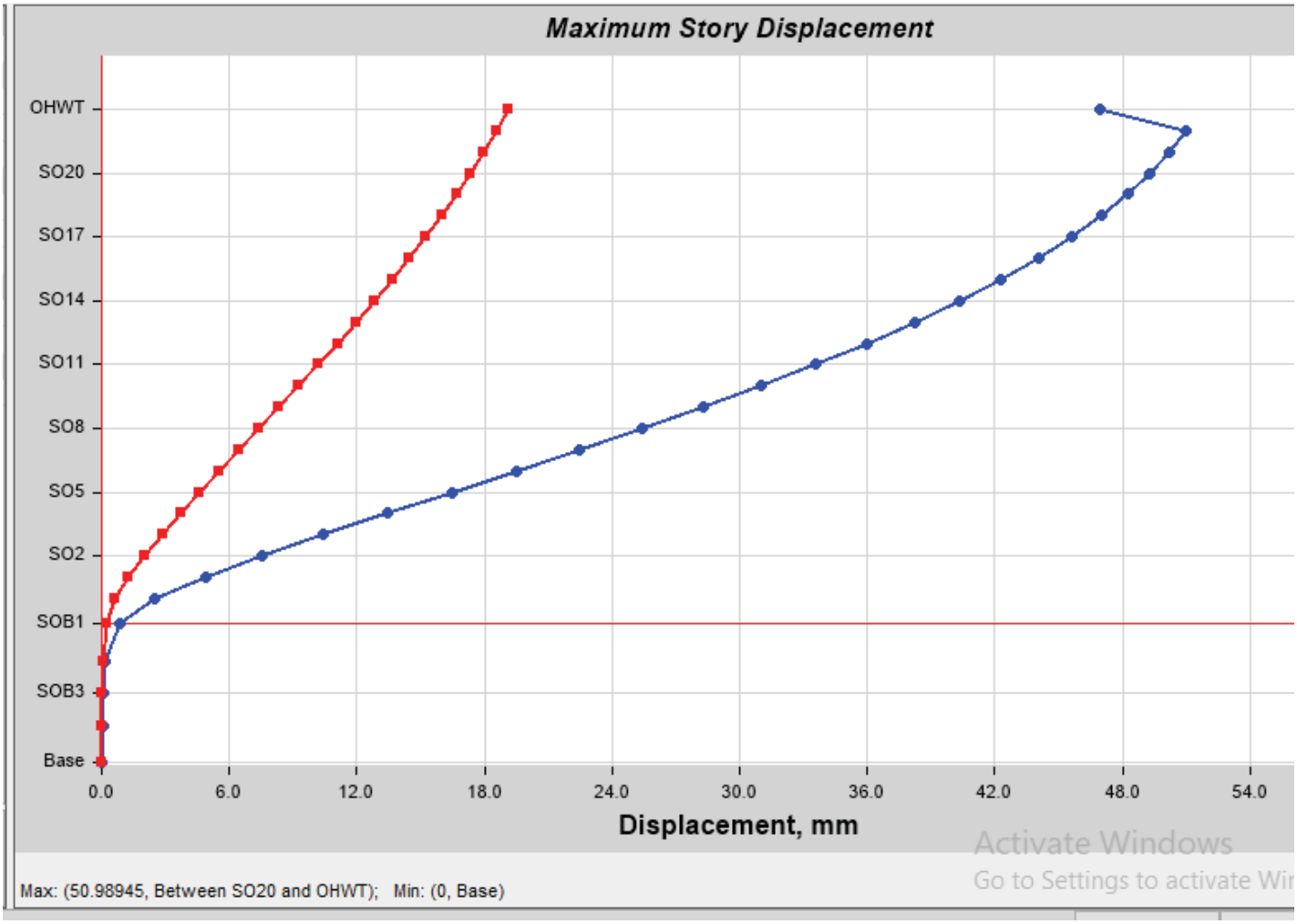
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

Name	StoryResp4		
Display Type	Max story displ	Story Range	All Stories
Load Case	WLX	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



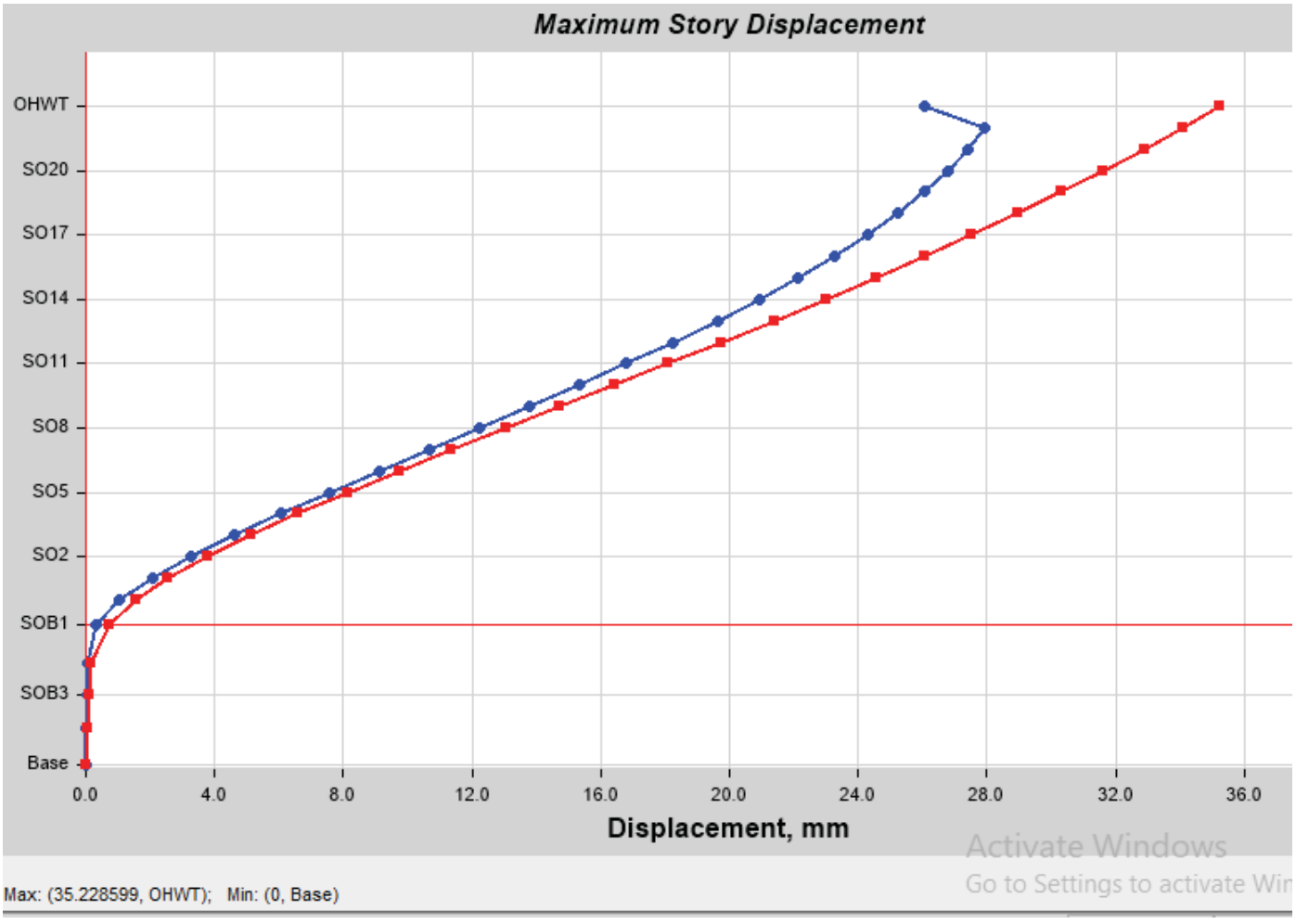
Summary Description

This is story response output for a specified range of stories and a selected load case or load combination.

Input Data

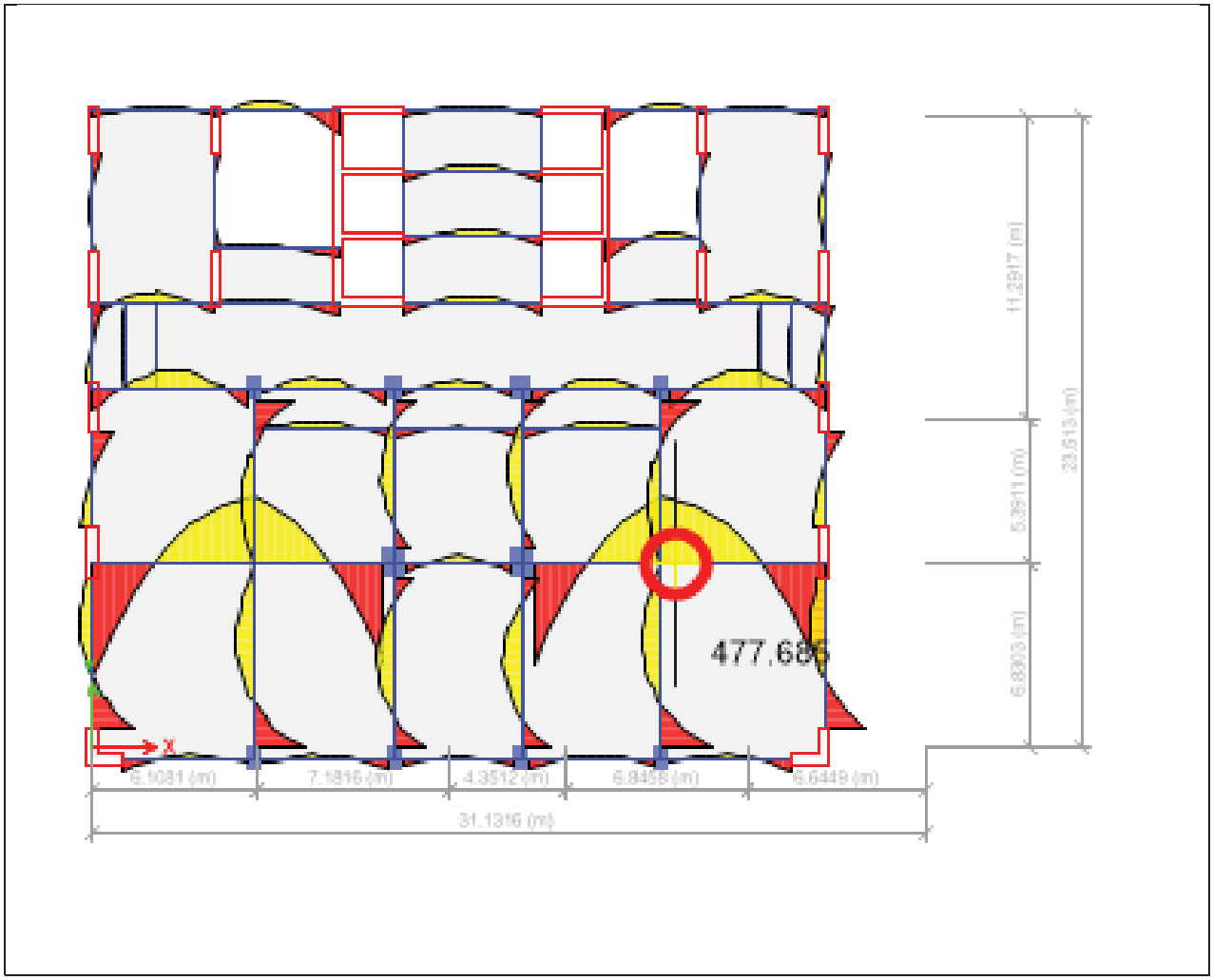
Name	StoryResp4		
Display Type	Max story displ	Story Range	All Stories
Load Case	WLY	Top Story	TERRACE
Output Type	Not Applicable	Bottom Story	BASE

Plot



RELEVANT EXTRACTS FROM RESULTS OF ANALYTICAL MODELS OF ETABS

1. BMD OF TYPICAL FLOOR FOR UDCON2 (GRAVITY + LIVE LOAD)



2. SFD OF TYPICAL FLOOR FOR UDCON2 (GRAVITY + LIVE LOAD)

TABLE: Base Reactions						
Output Case	**FX**	**FY**	**FZ**	**MX**	**MY**	**MZ**
	kN	kN	kN	kN-m	kN-m	kN-m
FX Max	11574.5694	5.12E+03	6863.1222	114448.7159	227760.158	248189.717
FY Max	3107.1511	8.98E+03	1634.6668	145957.1997	44110.9523	120715.4437
FZ Max	1972.2799	7.56E+02	10884.8605	161619.1667	157797.9826	44527.7855
UNSPECX Max	4994.4484	2.21E+03	2961.4501	49379.7763	98170.4201	104241.8443
UNSPECY Max	1987.0684	5744.3694	1045.3932	93338.8911	28149.4513	75487.8862
Dead	0.0001	4.17E-06	275726.2445	3906766.903	-3970148	7.0508
EQx 1	-2488.619	0.00E+00	0	-41.6918	-194139.6241	28873.4856
EQx 2	-2488.619	0.00E+00	7.12E-07	-26.6318	-193789.8569	35913.3277
EQy 1	-2.097E-06	-2488.6208	-2.22E-06	188827	47.1856	-34416.6471
EQy 2	-1.141E-05	-2488.6208	-2.41E-06	188820.7505	-98.5251	-37341.3581
WALL	9.2E-06	0	1.61E+04	166904.7101	-223776.6899	-0.5942
FILL	-1.979E-06	0	4.97E+03	72925.132	-71459.1164	0.0931
EQX1 1	-2488.619	0	0.00E+00	-41.6918	-194139.6241	28873.4856
EQX1 2	-2488.6191	0	0	-46.904	-194261.699	26432.2032
EQY1 1	-2.097E-06	-2.49E+03	-2.22E-06	188827	47.1856	-34416.6471
EQY1 2	6.666E-06	-2488.6208	-2.05E-06	188832.87	184.7104	-31667.8088
TERLIVE	0	0	1.23E+03	16021.2423	-16969.8929	0.0206
WLX	-2831.1385	-853.64	-5.70E-07	61458.5	-181115.3634	21305.1384
WLY	-1226.2392	-2581.15	-1.54E-06	160304.1436	-91777.6712	-21045.7952
FT	-4.17E-06	0	6.97E+03	158709.8113	-102643.2692	0.2139
LIVE<3	0	0	0	0	0	0
LIVE>3	7.625E-06	5.28E-06	80078.5627	1012058.015	-1153898	0.2028
TEMP	0	0	0	0	0	0
DL	0.0001	4.22E-06	296836.7971	4146596.745	-4265384	6.5497
LL	3.812E-06	2.64E-06	40039.2813	506029.0074	-576949.1377	0.1014
DL+LL	0.0001	6.86E-06	336876.0785	4652625.753	-4842333	6.6511

Modes	FREQUENCY	time period in sec	x participitation	y participitation
1	0.241	4.148	0.4922	3.64E-05
2	0.309	3.237	3.27E-05	0.4751
3	0.373	2.679	0.0118	0.0002
4	0.805	1.242	7.79E-02	8.39E-06
5	1.272	0.786	0.0013	0.0166
6	1.309	0.764	0.0003	0.1044
7	1.567	0.638	3.59E-02	1.84E-06
8	2.604	0.384	0.0301	3.34E-05
9	2.976	0.336	0.0001	0.0521
10	3.058	0.327	3.34E-05	0.0034
11	4.184	0.239	0.0281	0.0023
12	4.505	0.222	0.0196	0.0202
13	4.587	0.218	0.0109	0.0154
14	6.667	0.15	0.1997	0.0216
15	8	0.125	2.96E-02	0.2339
16	9.346	0.107	0.0149	0.0014
	SUMMATION		0.9525	0.9467

Project	SOLITAIRE ICON												
Client	-												
Location	Ahmedabad												
Stuctural Engineer	CASAD CONSULTANTS PVT. LTD												
Peer Reviewer	Prof D. D Desai's A.E.C. & A Pvt. Ltd												
Stage													
Building													
Revision	R0												

1) STRUCTURAL DESIGN BASIS REPORT ATTACHED SEPARATELY	Structural DBR submitted
2) Description of Sub-structure and Super-structure as per ANNEXURE-A is enclosed	Kindly refer page 36 from DBR.
3) Description of Structural System -	RC ductile structural Walls and SMRF
4) Brief note on modelling, software used etc.	A comprehensive 3-dimensional analysis of the superstructure will be carried out with the help of ETABS.
Clearly mention whether infill / partition wall is idealized as part of lateral load system?	Infill walls are not part of lateral load resisting system
3 Dimensional grillage model analysed using ETABS software.	Yes. Three dimensional model using ETABS software is analysed
Infills/partition wall is not part of lateral load resisting system.	
refer plan and ETABS model'.	
5) Provide the height of building in mt.	69.55m
5A) Provide plan dimensions of the building (m x m)	27.8m X 24.7m

6) Provide following EQ loading details.						
a) Zone Factor =		Z	0.16			
b) Importance factor =		I	1.2			
c) Response Reduction factor = R			5			
d) Soil Type =	1	S TYP				
e) % LL considered in seismic (<=3, >3)=			25, 50	%		
f) Time Period in the horizontal X-direction (sec) (from formula in code) =				1.62	sec	
g) Time Period in the horizontal Z-direction (sec) (from formula in code) =				1.62	sec	
h) Total Seismic weight (Sw) of building (kN) =				213845.2036	kN	
i) Static Base-shear in X-direction (as % of Sw) =				1.16		
j) Static Base-shear in Z-direction (as % of Sw) =				1.16		
k) Table of distribution for static base shear						

Story	**Load**	**VX**	**Load**	**VY**
		kN		**kN**
OHWT	EQX	8.153E-07	EQY	0
TERRACE	EQX	280.1779	EQY	280.1784
SO21	EQX	559.1641	EQY	559.1649
SO20	EQX	813.5642	EQY	813.5655
SO19	EQX	1044.5124	EQY	1044.5141
SO18	EQX	1253.1425	EQY	1253.1446
SO17	EQX	1440.5883	EQY	1440.5908
SO16	EQX	1607.9837	EQY	1607.9865
SO15	EQX	1756.4625	EQY	1756.4657
SO14	EQX	1887.1589	EQY	1887.1621
SO13	EQX	2001.2064	EQY	2001.2097
SO12	EQX	2099.7389	EQY	2099.7424
SO11	EQX	2183.8909	EQY	2183.8944
SO10	EQX	2254.795	EQY	2254.7986
SO9	EQX	2313.5858	EQY	2313.5895
SO8	EQX	2361.4768	EQY	2361.4806
SO7	EQX	2399.5057	EQY	2399.5095
SO6	EQX	2428.8082	EQY	2428.8121
SO5	EQX	2450.8013	EQY	2450.8054
SO4	EQX	2466.0622	EQY	2466.0663
SO3	EQX	2476.149	EQY	2476.1532
SO2	EQX	2481.9791	EQY	2481.9833
SO1	EQX	2484.6444	EQY	2484.6486
SOG	EQX	2485.4538	EQY	2485.458
SOB1	EQX	2485.4538	EQY	2485.458
l) Max. deflection at roof level. (mm)			106.31	mm	in EQY@Terrace	
m) Max. inter storey drift./ Height			0.001957		in EQY@SO8	

7) Provide following Wind loading details.													
a) Category of building =			3										
b) Class of building =			1										
c) Basic wind speed in m/sec. =			39	m/s									
d) Maximum wind pressure (kN/m2) =			505	N/m2									
e) Force coefficient =			1.25	and	1.3								
f) Wind Base-shear in the horizontal X-direction(kN) =				2831.00									
g) Wind Base-shear in the horizontal Y-direction(kN) =				2581.00									
h) Gust factor calculations (if Gust-wind applied)				**SEE GUST LOAD CALCULATION**									
i) Details of wind-tunnel force data (if applicable				NOT APPLICABLE									
j) Estimated magnitude of wind induced vibrations =				NOT APPLICABLE									
k) Max. deflection at roof level (mm) =			50.99	mm	in WLX (GUSTX)								
8) Provide following data from Dynamic Analysis.													

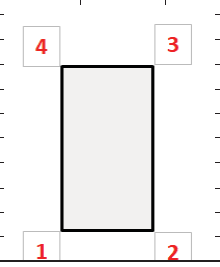
Modes	FREQUENCY HZ	time period in sec	x participitation	y participitation
1	0.241	4.148	0.4922	3.64E-05
2	0.309	3.237	3.27E-05	0.4751
3	0.373	2.679	0.0118	0.0002
4	0.805	1.242	0.0779	8.39E-06
5	1.272	0.786	0.0013	0.0166
6	1.309	0.764	0.0003	0.1044
7	1.567	0.638	3.59E-02	1.84E-06
8	2.604	0.384	0.0301	3.34E-05
9	2.976	0.336	0.0001	0.0521
10	3.058	0.327	3.34E-05	0.0034
11	4.184	0.239	0.0281	0.0023
12	4.505	0.222	0.0196	0.0202
13	4.587	0.218	0.0109	0.0154
14	6.667	0.150	0.1997	0.0216
15	8.000	0.125	2.96E-02	0.2339
16	9.346	0.107	0.0149	0.0014
	SUMMATION		0.9525	0.9467

Note: Fundamental mode should not be a Torsional Mode					OK								
9) Provide Table for lateral deflections (mm) at Terrace Level in the following format.													

Load Case	Dx-max	H/Dx	Drift-x	DY-max	H/Dy	**Drift-y**
DL	4.78	14550.21	8.70E-05	12.67	5489.34	2.63E-04
DL+LL	5.03	13827.04	9.10E-05	19.12	3637.55	3.88E-04
SPECX (unscaled)	31.94	2177.52	0.000313	6.50	10700.00	7.50E-05
SPECY (unscaled)	0.79	88037.97	3.50E-05	22.83	3046.43	0.000363
WINDX (gust x)	50.99	1363.99	0.000263	18.55	3749.33	0.000196
WINDY (gust y)	27.95	2488.37	0.000179	34.09	2040.19	0.000404

10) Provide Corner displacements (mm) for Torsional Irregularity (along X-direction) in the following format.

Load Case	Corner 1	Corner 2	Corner 3	Corner 4	MAX/AVG.	REMARKS	STATUS
EQX (SPECX -unscaled)	31.94	31.94	22.52	22.52	1.173	< 1.4 AVG	OK
WINDX (GUSTX)	50.99	50.99	41.49	41.49	1.103		



11) Provide Corner displacements (mm) for Torsional Irregularity (along Y-direction) in the following format.

Load Case	Corner 1	Corner 2	Corner 3	Corner 4	MAX/AVG.	REMARKS	STATUS
EQY (SPECY- unscaled)	22.83	22.23	22.23	22.83	1.013	< 1.4 AVG	OK
WINDY (GUSTY)	28.83	34.09	34.09	28.83	1.084		

12) Provide acceleration (mg) values in the following format.														
EQX	EQY	WX	WY											
-	-	-	-											
13) Provide following data regarding Vertical Elements.						N/A								
a) Size of Maximum loaded column =						N/A								
b) Gravity load on max. loaded column =						N/A								
c) Axial stress in max. loaded column (Gravity loads) =						N/A								
d) Grade of max. loaded column =						N/A								
e) Axial settlement in max. loaded column =						N/A								
f) Axial settlement in min. loaded column =						N/A								
g) % Base-shear resisted by all columns along X (static) =						N/A								
h) % Base-shear resisted by all columns along Z (static) =						N/A								
14) Provide, if applicable, following data regarding Floating Columns.						N/A								
a) Total gravity load on floating column (provide table if there are multiple floating columns) =						N/A								
b) Size and span of girders supporting floating columns =						N/A								
c) Number of floors supported by floating columns =						N/A								
d) Deflection of girder under column (from model) =						N/A								
e) Deflection of girder under column (from s/s action) =						N/A								
f) Specific details about floating columns on cantilever girders						N/A								
Column	Supporting Girder		Deflection Values											
	Size	Span	Model	S/S Action										
N/A	N/A	N/A	N/A	N/A										
S/S denotes simply supported action					N/A									
15) Provide, if applicable, following data regarding soft story effect.					N/A									
a) Stiffness of lower floor (in deflection/KN) =					N/A									
b) Stiffness of upper floor (in deflection/KN) =					N/A									
c) Relative stiffness ratio (upper/ lower) =					N/A									
d) Level of soft story =					N/A									
e) Number of floors above soft story =					N/A									
16) Provide, if applicable, following data for each cantilever.														
a) Cantilever span =				N/A										
b) Structural system =				N/A										
c) Nature of usage =				N/A										
d) Maximum creep deflection under gravity/live loads =				N/A										
d) Maximum elastic deflection under live loads =				N/A										
e) Precamber provided if any				N/A										
17) Provide stability calculations for uplift and overturning (model extract in case of model)						N/A								
18) Typical design calculations for footings						Details will be shared during dd								
19) Typical design calculations for RCC columns (Or Composite Columns)						N/A								
20) Typical design calculations for RCC walls						Attached								
23) Typical design calculations for Steel Bracings						N/A								
24) Whether it is desirable to conduct Wind tunnel studies for the building.						N/A								
25) Provide a note on special provisions suggested for the building for any special features						No special provisions considered								
such as large canopies, large cantilever beams, cladding, bridging structures any dynamically														
sensitive structures etc.														
26) Soft copy of model including input and output in editable format.						Etabs model is submitted								
27) EMAILED						Emailed								
Note : Provide appropriate unit against each quantity.														

LIST OF DOCUMENTS RECEIVED FROM CASADCONSULTANTS FOR REVIEW

No.	Doc / Drawing No.	Document / Drawing Detail
1	Design Basis report	Latest revised Date:24-10- 2023
2	Soil Investigation Report	Latest revised Date:21 - 09– 2023
3	Architectural Drawings: 1. All Level of plan, elevation & section	Latest revised Date:20 -10 - 2023
4	Structural Drawings: 1. All level Structural layouts.	Latest revised Date:20-10- 2023
5	Structural Design Review	Latest revised Date:
7	ETABS MODEL 1. Solitaire Icon.edb 2. Solitaire Icon with revised Modifiers.edb 3. Solitarire icon with Serveicemodel.edb	Latest revised Date: 24 - 10 - 2023
8	SAFE MODEL Solitaire Icon.FDB	Latest revised Date: 20 - 10 - 2023

PROJECT PERSONNEL ON RECORD AND CONTACT INFORMATION

1.	Project Reference No. (DESIGN REVIEW FOLIO NO.)	SED/ /
2	Municipal Reference No.	(Building Proposal Ref. / File No.)
3	Project Name	SOLITAIRE ICON
4	Project Address	SOLITAIRE CONNECT 2, MOJE MAKARBA, AHMEDABAD
5.	Project Proponent / Developer's Name & Signature Project	ARK INFRA
6.	Proponent / Developer's Address	FP NO 30/2, SUR NO 219/3, 873/2/1, SOLITAIRE CONNECT, B/S. MAYUR PANKHHOTEL, SG HIGHWAY, MAKARBA , AHMEDABAD CITY - 380051
7.	Project Proponent / Developer's Telephone / Mobile / email address	98250 19713, ajaysoni281263@gmail.com
8	Architect's Name, qualifications & License No.,	DIVYESH BALVANTRAI DESAI, 001AR17042710034
9	Architect's Address & Signature	D/813, SHIROMANI COMPLEX, OPP OCEAN PARK, SATELITE ROAD, AHMEDABAD 380015
10	Architect's Telephone / Mobile / email address	98250 15946, divyeshdesaiarch@yahoo,com
11	Structural Engineer's Name, qualifications & License No.	KEDAR P. DESAI 001SE05102610168
12	Structural Engineer's Address & Signature	15th floor , Solitaire Sky Building , B/s Hyatt Regency, Ashram Rd, opp. Gujrat Vidyapith, Ahmedabad, Gujarat 380014
13	Structural Engineer's Telephone / Mobile / Email address	9510415231 kedard@casadconsultants.com
14	Geotechnical Consultant's Name and qualifications.	K.C.T. Consultancy Services, Prof. (Dr.) K.C.Thaker Ph.D. (Geotech) (I.I.T.,Bombay); F.I.E.(India); F.I.G.S.; F.A.C.C.E
15	Geotechnical Consultant's Address & Signature	KCT House, Sayona Silver Estate-Part 2,Behind Silver Oak College of Engineering, Gota, Ahmedabad 382 481
16	Geotechnical Consultant's Telephone / Mobile / Email address	7096034034/ 35035/ 36036,

		kctconser@yahoo.com
17	M.E.P. Consultant's Name, Address, License No & Signature	TRANSENERGY MEP CONSULTANT, 506-508 - INTERSTELLAR,SINDHUBHAVAN - BAGHBAN ROAD, B/H TIMES GRAND,THALTEJ, A'BAD – 380054
18	M.E.P. Consultant's Telephone / Mobile / Email address	+91 79 26752818 , 9974702244, SHASHINSHAH@TRANSENERGY.CO.IN
19	Site Supervisors, Name, Address , License No. & Signature	PIYUSH GOBARBHAI HAPANI 7 CHITRANJAN SOCIETY NR. ST.XAVIERS LOYOLA SCHOOL NARANPURA , AHMEDABAD CITY – 380013, 0 0 1 S R 0 6 0 8 2 5 1 0 1 1 9,

ANNEXURE– A

PLOT & GEOTECHNICAL INFORMATION

Sr. No.	Item		Remarks
1	Area of Plot in sq.mt.	2198.00 sqm	
2	Sanctioned Built Up Area as per SMC	21740.54 sqm	Revised
3	At which depth suitable Founding strata is available in mt.	18.5 m	
4	Nature of foundation recommended for high-rise building	Raft	
5	Ground Water table level with respect to existing ground level	25 m	
6	No of basements proposed	4	
7	Total depth of excavation in mt.	21 m	
8	Arrangement for shoring.	NA	
9	Details of the structures along with height abutting the boundaries of the plot.		
	North	OPEN PLOT	
	East	CONNECT 1 (45 m)	
	West	OPEN PLOT	
	South	ROAD	

ANNEXURE 1 - DESCRIPTION OF SUBSTRUCTURE

Sr. No	Item	Description
1	No. of basements Height of individual basement floors	4 NOS 5.1, 4.6, 4.6 & 5.2m
2	Minimum clearance between outermost basement retaining wall and compound wall	3.0m
3	Has a Shoring system been installed? Submit sectional detail of the shoring system	Retaining wall is proposed
4	Give details of methodology used to resist uplift pressure due to ground water for tower portion as well as the portion outside the tower.	Initially at the time of construction, sleeves will be left in the raft to release water pressure. When all the basements will be completed, sufficient dead load will be developed to counteract uplift pressure of water and those sleeves left to release water pressure will be grouted. Further ground water table encountered is 20.0 m below Gr Lvl hence no uplift pressure is envisaged.
5	Bottom Level of Raft w.r.t. ground level in meters. Total downward load of Selfweight of raft + Counterweight over raft + Rock Anchors if any (for raft spanning between columns) Whether pressure release pipes have been used? Water level assumed for uplift calculation.	Bottom level of raft is 20.0 m below ground level. Rest is not applicable.
6	Description of the foundation strata for the tower block	Very fine grained silty clays with occasional gravels
7	Nature of Foundation (Open/Piled/Raft)	Solid raft foundation
8	SBC assumed T/sq.mt.	600 KN/m^2 To be verified by geotechnical consultant before laying raft foundation
9	Settlement Considered	125 mm
10	Sub-grade Elastic Modulus	4800 KN/m^3
11	Flooring system of the Basements	Trimix flooring
12	Retaining wall types & Sequence of backfilling	Propped cantilever
13	Intended Use of basements	Parking and tanks
14	If rock anchors are used, are they grouted after installation and stressing?	NA
15	Is structural steel used in the construction of the sub-structure?	NA
16	If yes, what are the measures taken for its fire proofing and corrosion resistance?	NA
17	Whether Expansion/Separation joints provided? Whether expansion joint/separation joint continues	NA

	through basement? If yes, detail at Basement level & retaining wall junction	Provided in detailed drawings
18	Is the geotechnical investigation completed as per the requirements of 9.3.1?	Yes
19	Is the minimum depth of foundation provided as per requirements of 9.4?	Yes
20	Are the estimated design settlement values within specified limits?	Yes

ANNEXURE 2 - DESCRIPTION OF SUPERSTRUCTURE

Sr. No	Item	Description
1	No. of Floors & height of building in mt	4 Basement Floor + Ground Floor + 22 Upper floors + O.H.W.T. + L.M.R. Total height of the building considering basement = 88.55 m
2	Shape of Building, Plan, Elevation, Whether Symmetric in Elevation	Symmetrical
3	Maximum plan dimension in either direction in mt.	27.8 m x 24.7 m
4	Ratio of plan dimension	1.125
5	Typical Floor to floor height in mt.	3.0 m
6	Maximum floor to floor height in entire height of building in mt.	5.2 m (Basement)
7	Aspect ratio (Height of Building till Terrace / Minimum Dimension of Building)	88.55/24.7 = 3.585
8	Type of floor slab system Minimum thickness of floor slab in mm.	RCC slab 150 mm
9	Whether column are RCC, Composite or In structural steel	RCC
10	Lateral System Whether the Geometry of Building is Symmetric Whether the lateral load resisting system is symmetrically placed in Geometry	 The geometry of the building is symmetric. The lateral load resisting system is symmetrically placed in geometry
11	Use of floor at different levels (Residential / Commercial / industrial) Whether the occupancy of the building is more than 200 persons?	Commercial Yes, the total occupancy of the building is more than 200 persons
12	Is there any Transfer level? If yes, depth of Transfer Girder	N/A
13	Whether expansion joint is provided? If yes, what is the maximum plan dimension in mt.	NA

14	Whether separation gap at the joint is sufficiently provided?	NA
15	Maximum cantilever projection in mt.	2.2 m