uab GeoFirma

KITOS PASKIRTIES PASTATAS (SIURBLINĖ) GAMYKLOS G. 10, VILNIAUS M.

II GEOTECHNINĖS KATEGORIJOS PROJEKTINIŲ INŽINERINIŲ GEOLOGINIŲ IR GEOTECHNINIŲ TYRIMŲ ATASKAITA

Vilnius, 2024

uab GeoFirma

Leidimas tirti žemės gelmes Nr. 155

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UŽSAKOVAS **AB Vilniaus šilumos tinklai**

VYKDYTOJAS **UAB „GeoFirma“**

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Direktorius

Tyrimų vadovė

2024 m. vasario – kovo mėn.

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AIŠKINAMASIS RAŠTAS

1. Įvadas

UAB „GeoFirma" (leidimas tirti žemės gelmes Nr. 155, 2020-07-01 [7 PRIEDAS]) 2024 m. vasario – kovo mėn. pagal AB Vilniaus šilumos tinklai užsakymą atliko projektinius inžinerinius geologinius ir geotechninius tyrimus projektuojamoms siurblinei ir akumuliacinei talpai Gamyklos g. 10, Vilniaus m. Tirto ploto koordinatės LKS-94 sistemoje pateiktos 1 lentelėje.

Projektuojama siurblinė, kurios orientaciniai gabaritai plane – 15,1 x 13,1 m, aukštis – 8,1 m bei 3000 m^3 akumuliacinė talpa, kurios orientacinis skersmuo – 13,0 m, aukštis – 26,0 m. Statiniai priklauso neypatingųjų statinių kategorijai.

Tyrimų tikslas buvo pateikti informaciją projektuojamų statinių inžinerinių geologinių ir hidrogeologinių sąlygų įvertinimui. Gruntų pavadinimai, simboliai ir aprašymai pateikti pagal Lietuvos Geologijos Tarnybos prie Aplinkos Ministerijos direktoriaus 2019 m. birželio 13 d. įsakymą Nr. 1-175 [7], LST EN ISO 14688-1:2018 ir LST EN ISO 14688-2:2018. Inžineriniai geologiniai tyrimai priskirti antrai geotechninei kategorijai (STR 1.04.02:2011).

Siurblinei išgręžti du gręžiniai iki 15 m gylio (Gr. 1, 2), o akumuliacinei talpai – du iki 30,0 m gylio (Gr. 3, 4). Šalia atlikti statinio zondavimo bandymai (CPT-1...4). Dėl labai stiprių gruntų buvo taikomas intervalinis pragręžimas (CPT-1, 4), dinaminis zondavimas (DPSH-4). Tyrimų vietos, kiekis ir gylis buvo nurodyti projektuotojo.

Duomenys apie tyrimų metodiką pateikti 4 skyriuje. Tyrimų vietas nužymėjo, gręžinius lauke aprašė ir statinio zondavimo bandymus vykdė geologai A. Kulbis ir V. Paulau. Gruntų laboratoriniai tyrimai atlikti UAB „GeoFirma" laboratorijoje. Kameralinimo darbus atliko ir ataskaitą parengė tyrimų vadovė – A. Gelūnaitė.

1 lentelė. Tirto ploto ribų koordinatės (LKS-94)

X	Y
6053169.55	581686.84
6053205.26	581690.62
6053201.52	581728.00
6053164.64	581724.20

Tyrimų metu:

- išskirti pagrindo inžineriniai geologiniai sluoksniai;
- nustatytos išskirtų sluoksnių geotechninės savybės;
- įvertintos hidrogeologinės sąlygos;
- sudaryti pagrindo inžineriniai geologiniai pjūviai.

Ruošiant ataskaitą, panaudota literatūra:

1. Statybos techninis reglamentas STR 1.04.02:2011. "Inžineriniai geologiniai ir geotechniniai tyrimai";
2. Lietuvos standartas LST EN 1997-1. Eurokodas 7. „Geotechninis projektavimas. 1 dalis. Pagrindinės taisyklės" (2006);
3. Lietuvos standartas LST EN 1997-2. Eurokodas 7. „Geotechninis projektavimas. 2 dalis. Pagrindo tyrinėjimai ir bandymai" (2009);
4. Lietuvos standartas LST EN ISO 14688-1. „Geotechniniai tyrinėjimai ir bandymai. Gruntų atpažintis ir klasifikavimas. 1 dalis. Atpažintis ir aprašymas" (2018);
5. Lietuvos standartas LST EN ISO 14688-2. „Geotechniniai tyrinėjimai ir bandymai. Gruntų atpažintis ir klasifikavimas. 2 dalis. Klasifikavimo principai" (2018);
6. Projektinių inžinerinių geologinių ir geotechninių tyrimų rekomendacijos, 2015 m.;
7. Lietuvos Geologijos Tarnybos prie Aplinkos Ministerijos direktoriaus 2019 m. birželio 13 d. įsakymas Nr. 1-175 „Dėl inžinerinių geologinių ir geotechninių tyrimų klasifikacijos". TAR, 2019, Nr. 9653;
8. Automobilių kelių inžinerinių geologinių ir geotechninių bei statinio tyrimų rekomendacijos R IGGT 15. Vilnius, 2015;
9. „Monolitiniai grunte betonuojamieji pamatai", J. Šimkus ir kt. 1985 m., Vilnius;
10. „Prove geotechnice in sito. I Edizione", C. Ferruccio. 1990, Segrate;
11. „Lietuvos TSR gruntų statybinės savybės", J. Šimkus ir kt., 1973 m., Vilnius;
12. www.lgt.lt (http://www.lgt.lt/zemelap/);
13. www.geoportal.lt.



***1 pav**. Inžinerinių geologinių ir geotechninių tyrimų vietos žemėlapis (www.lgt.lt)*

2. Bendrieji statybos sklypo duomenys

Tyrimų plotas yra Vilniaus miesto pietinėje dalyje, Naujininkuose, Gamyklos gatvėje, AB Vilniaus šilumos tinklai teritorijoje. Sklypas aptvertas, jame stovi šilumos tinklams priklausantys statiniai ir įrenginiai. Aplinkui yra pramoniniai pastatai, gyvenamieji namai. Už ~200-300 m vakarų ir pietryčių pusėse telkšo tvenkiniai, kūdros (1 pav.).

Tyrimų aikštelėje žemės paviršius kyla pietų kryptimi nuo 170 m iki 171 absoliutinės altitudės. Jis daugiausia padengtas žaliąja danga.

Projektuojamos siurblinės vietoje (Gr. 1, 2) anksčiau stovėjo pastatas.



***2 pav**. Inžinerinių geologinių ir geotechninių tyrimų vietos (kairėje – Gr. 2; dešinėje – CPT-1)*

3. Inžinerinių geologinių ir geotechninių tyrimų sudėtis

Inžinerinių geologinių ir geotechninių tyrinėjimų metu lauke atlikti šie darbai:

- vizualinis tyrimų vietų apžiūrėjimas ir įvertinimas;
- atlikti 2 statinio zondavimo bandymai (CPT-1,2) iki 11,6...15,0 m gylio ir 2 (CPT-3,4) – iki 14,8...27,9 m gylio ir 1 dinaminio zondavimo bandymas (DPSH-4) nuo 14,8 m iki 23,8 m gylio;
- išgręžti 2 gręžiniai (Gr. 1, 2) iki 15,0 m gylio ir 2 (Gr. 3, 4) iki 30,0 m gylio;
- atliktas tyrimo taškų koordinavimas, niveliacija.

Laboratorijoje nustatyta:

- gruntų granuliometrinė sudėtis (16 ėminių);
- Atterberg`o ribos (14 ėminių);
- gamtinė drėgmė, w (16 ėminių);
- gamtinis tankis, ρ_n (14 ėminių);
- kietų dalelių tankis, ρ_s (16 ėminių);
- grunto tiesioginio kirpimo bandymas (4 bandiniai).

4. Geotechninių tyrimų metodika

Aikštelėje tyrinėjimai buvo atliekami PAGANI firmos (Italija) TG 63/100 ir Massenza MI3 įrangomis, įgalinčiomis atlikti statinio, dinaminio zondavimo bandymus, gręžimą ir gruntų pavyzdžių paėmimą.

4.1 Statinio zondavimo bandymai (CPT)

Statinis zondavimas atliktas elektroniniu zondu Nr. GL 0456 (Lietuva), matuojant kūginį stiprumą q_c ir trinties stiprumą f_s. Zondo rodmenys buvo automatiškai užrašomi personaliniu kompiuteriu kas 1 sekundę. Tai atitinka grunto stiprumo matavimą kas 1,0 cm.

- maksimali spaudimo jėga 100 kN;
- maksimalus kūginis stipris 100 MPa;
- kūginio stiprumo matavimų tikslumas 25 kPa;
- maksimali šoninė trintis 1000 kPa;
- šoninės trinties matavimų tikslumas 5 kPa;
- kūgio skersmuo 35,6 mm;
- kūgio pagrindo plotas 10 cm^2;
- trinties movos ilgis 133 mm;
- trinties movos skersmuo 36 mm;
- trinties movos plotas 150 cm^2.

Statinio zondavimo bandymai atlikti remiantis šiais dokumentais: „Geotechniniai tyrinėjimai ir bandymai. Lauko bandymai. 1 dalis. Įspaudimo bandymas, naudojant elektrinį ir pjezoelektrinį kūgį" (LST EN ISO 22476-1:2023); ISSMFE Reference Test Procedure, 1999 (koreguotas 2001).

Gruntų geotechninės savybės paskaičiuotos pagal statinio zondavimo rezultatus (q_c) [6]:

- *<u>deformacijų modulis (E, MPa)</u>*:
  - piltiniam gruntui ir organiniam gruntui: $E=q_c$ *(kai* $q_c<5$*),* $E=q_c*1,5$ *(kai* $q_c>5$*)*;
  - vidutinio tankumo – labai tankiam rupiam gruntui: $E=7,8*q_c^{0,71}$;
  - nemoreniniam moliui: $E=7,0*q_c$;
  - nemoreniniam dulkiui: $E=5,0*q_c$;
- *<u>vidinės trinties kampas</u>* smėliams pateiktas pagal formulę: $\varphi = 13,5 \lg (q_c) + 23;$
- *<u>kerpamasis stipris nedrenuojant:</u>*
  - smulkiam gruntui (kai $q_c<6,0$ MPa): $c_u = q_c/20;$
  - smulkiam gruntui (kai $q_c>6,0$ MPa): $c_u = q_c/30.$

4.2 Dinaminio zondavimo bandymas (DPSH)

Dinaminis zondavimas atliktas agregatu TG 63/100, supersunkiosios sistemos (DPSH) ISSMFE tipo zondu. Šio zondavimo metu registruojamas smūgių skaičius (N_{20}), reikalingas zondui įgilinti 0,20 m. Pagrindiniai parametrai yra tokie:

- kūgio pagrindo plotas, A 2000 mm^2;
- kūgio pagrindo skersmuo 50,5 mm;
- kūgio kampas 60°;
- plakto masė, M 63,5 kg;
- plakto kritimo aukštis, H 0,75 m;
- smūgių skaičių N_{20} registravimas automatinis;
- tikslumas ±1 smūgis/0,20 m.

Dinaminio zondavimo bandymai dažniausiai naudojami stiprių ir ypatingai stiprių (tankių) gruntų, kuriuose sudėtinga arba negalima atlikti statinį zondavimą, geotechninėms savybėms įvertinti, jų stratigrafinėms riboms pakoreguoti. Pagal formulę $q_d=[M/(M+M')\times(MgH)/Ae]$ paskaičiuotas dinaminis kūginis stipris q_d,

čia: *e* - zondo įsmigis nuo 1 smūgio;

g - laisvo kritimo pagreitis;

M'- priekalo, zondavimo vamzdžių ir antgalio masė.

Dinaminio zondavimo stiprio reikšmės q_d buvo perskaičiuotos į statinio zondavimo grunto stiprio reikšmes q_c*, remiantis koreliacine formule, pateikta 6.7 lentelėje [10] ir statinio zondavimo bandymų rezultatais šiame tyrimų plote.

4.3 Gręžimas

Massenza MI3 agregatu, panaudojus hidraulinę gręžimo galvutę (didžiausias sukimo momentas 420 kgm) sraigtiniu būdu buvo išgręžti 152 mm skersmens gręžiniai. Sraigtai buvo keliami kas 1,5 m, aprašomi sluoksniai ir imami gruntų ėminiai. Nesuardytos sandaros ėminiai (monolitai) smulkiems gruntams paimti specialiu plonasieniu gruntotraukiu PS (ėminio aukštis ~ 600mm, skersmuo ~ 88mm).

Gruntų ėminiai buvo imami vadovaujantis Lietuvos standarto LST EN ISO 22475-1:2021, o požeminio vandens – Lietuvos standarto LST ISO 5667-11:2009 reikalavimais.

5. Inžinerinių geologinių ir geotechninių tyrimų rezultatai

5.1. Geomorfologinė charakteristika. Geomorfologiniu požiūriu tiriamoji vietovė yra Nemėžio moreninės lygumos plynaukštės mikrorajone, Medininkų aukštumos parajoniui, Ašmenos aukštumos rajonui, priešpaskutiniojo apledėjimo aukštumų sričiai [12].

Tyrimų aikštelėje žemės paviršius kyla pietų kryptimi nuo 170 m iki 171 m absoliutinės altitudės.

5.2. Geologinė sandara. Ištirtąjį litologinį – geologinį pjūvį sudaro technogeninis gruntas (t IV), priešpaskutiniojo apledėjimo Medininkų kraštiniai limnoglacialiniai dariniai (lgt II md) ir glacialinės nuogulos (g II md).

5.3. Gruntų sudėtis ir inžineriniai geologiniai sluoksniai. Tyrimų metu išskirta 11 inžinerinių geologinių sluoksnių (IGS) pagal gruntų genezę, sudėtį ir stiprumines savybes. Sluoksniai aprašomi iš viršaus į apačią:

Technogeninis gruntas (t IV)

- ***piltinis gruntas*** *(Mg) (IGS-1):* *dulkingas smėlis*, rudai pilkas, pilkai rudas, šviesiai rudas, smulkus, su žvirgždu, su smėlingo dulkio ir smėlingo molio intarpais, labai purus – purus, drėgnas, gręžinio Gr. 2 aplinkoje nuo 1,9 m gylio tamsiai pilkas, juodas, užterštas naftos produktais, su jų kvapu; *smėlis,* rudas, smulkus, su žvirgždu, su žvyringo smėlio priemaiša, vidutinio tankumo, drėgnas; *smėlingas molis*, rudai pilkas, su žvirgždu ir stipriu naftos produktų kvapu, vidutinio stiprumo; technogeninis gruntas nustatytas iki 1,7...3,8 m gylio.

Medininkų stadijos kraštiniai limnoglacialiniai dariniai (lgt II md)

- ***smėlingas*** *mažo plastiškumo* ***molis*** *(saClL) (IGS-2)* pilkai rudas, rudas, su žvirgždu, su dulkio tarpsluoksniais, vidutinio stiprumo, turi silpną naftos produktų kvapą; slūgso gręžinio Gr. 4 aplinkoje po piltiniu gruntu nuo 2,7 m gylio; sluoksnio storis – 2,8 m;

- *mažai dulkingas – molingas tolygiai išrūšiuotas* ***smėlis*** *(SaFU) (IGS-3)* pilkai rudas, šviesiai rudas, smulkus, su dulkingo smėlio tarpsluoksniais, vidutinio tankumo, drėgnas, prisotintas vandeniu; suklostytas gręžinių Gr. 1, 3 aplinkose nuo 1,7...2,2 m gylio; sluoksnio storis – 2,6...5,2 m;

- ***smėlingas*** *mažo plastiškumo* ***dulkis*** *(saSiL) (IGS-4)* rudai pilkas, pilkai rudas, šviesiai rudas, rudas, su dulkingo smėlio, molio tarpsluoksniais, labai stiprus, prisotintas vandeniu; suklostytas gręžinių Gr. 1, 3, 4 aplinkose nuo 5,5...9,5 m gylio; sluoksnio storis – 1,5...4,1 m;

- ***dulkingas smėlis*** *(siSa) (IGS-5,6)* pilkai rudas, rudas, smulkus, su smėlingo dulkio tarpsluoksniais, tankus (IGS-5), labai tankus (IGS-6), prisotintas vandeniu, slūgso gręžinio Gr. 4 aplinkoje nuo 8,8 m iki 21,0 m gylio; dulkingas smėlis taip pat aptiktas gręžinio Gr. 3 aplinkoje nuo 26,6 m iki 29,0 m gylio; čia jis pilkas, rudai pilkas, smulkus – vidutinio rupumo, labai tankus, prisotintas vandeniu;

- ***smėlingas*** *mažo plastiškumo* ***molis*** *(saClL) (IGS-7)* pilkai rudas, rudai pilkas, šviesiai rudas, su dulkingo smėlio, dulkio, molio tarpsluoksniais, stiprus, prisotintas vandeniu; nustatytas gręžinių Gr. 1, 3 aplinkose nuo 6,5...10,9 m iki 9,5...14,8 m gylio;

- *mažo plastiškumo* ***molis*** *(ClL) (IGS-8)* pilkai rudas, rudai pilkas, su dulkingo smėlio, dulkio, molio sluoksneliais ir tarpsluoksniais, labai stiprus, prisotintas vandeniu; slūgso visame tirtame plote įvairiame gylyje;

- *vidutinio plastiškumo* ***molis*** *(ClM) (IGS-9,10)* rudas, pilkai rudas, su dulkio sluoksneliais, vidutinio stiprumo (IGS-9), stiprus (IGS-10); slūgso nuo 8,1...25,5 m gylio (išskyrus Gr. 1).

Medininkų stadijos glacialinės nuogulos (g II md)

- *moreninis **smėlingas** mažo plastiškumo **molis ir dulkis** (saClL-saSiL) (IGS-11)* pilkai rudas, su žvirgždu, tvirtas; nustatytas gręžinio Gr. 3 aplinkoje nuo 29,0 m gylio; sluoksnio padas gręžiniu iki 30,0 m gylio nepasiektas.

5.4. Hidrogeologinės sąlygos. Tyrimų metu požeminis gruntinis vanduo nusistojo 2,1...2,5 m gylyje (abs. a. 168,85...168,87 m). Jį talpina piltinis rupus gruntas, dulkingas ir mažai dulkingas - molingas smėlis bei smėlingas dulkis, smėlingas molis, molis. Maksimalus tikėtinas vandens lygis gali pakilti apie 1,0 m nuo tyrimų metu fiksuoto lygio.

5.5. Gruntų fizikinės ir mechaninės savybės. Tyrimų metu nustatytų inžinerinių geologinių sluoksnių vidutinės geotechninės savybės yra pateiktos **3 priede**.

5.6. Geologiniai procesai ir reiškiniai. Tirtoje teritorijoje tyrimų metu aktyvių geologinių procesų ir reiškinių nepastebėta.

6. Išvados ir rekomendacijos

1. Inžineriniu geologiniu požiūriu tiriamojo sklypo inžinerinės geologinės sąlygos yra vidutiniškai sudėtingos (kraštiniai dariniai).

1.1 Žemės paviršius tyrimų aikštelėje kyla pietų kryptimi nuo 170 m iki 171 m absoliutinės altitudės.

1.2 Tyrimai atlikti projektuojamoms siurblinei (Gr. 1, 2) bei akumuliacinei talpai (Gr. 3, 4).

1.3 Tirto ploto pagrindo pjūvis kaitus. Vyrauja smulkūs gruntai, pasižymintys įvairiomis stipruminėmis savybėmis (nuo vidutinio stiprumo iki labai stiprių).

Siurblinės pagrindo pjūvį po 0,4 m storio dirvožemiu sudaro (Gr. 1, 2; pjūvis I-I):

- iki 2,2...3,8 m gylio – labai purus – purus piltinis dulkingas smėlis (IGS-1);
- šiaurinėje dalyje (Gr. 2) po piltiniu gruntu iki 8,1 m gylio slūgso labai stiprus mažo plastiškumo molis (IGS-8), o po juo – vidutinio stiprumo vidutinio plastiškumo molis (IGS-9);
- pietinėje dalyje (Gr. 1) iki 4,8 m gylio suklostytas vidutinio tankumo mažai dulkingas – molingas tolygiai išrūšiuotas smėlis (IGS-3), o po juo smulkių gruntų storymė – labai stiprus mažo plastiškumo molis (IGS-8) ir smėlingas mažo plastiškumo dulkis (IGS-4) bei stiprus smėlingas mažo plastiškumo molis (IGS-7);
- požeminis gruntinis vanduo nusistojo 2,1...2,4 m gylyje (abs. a. 168,85...168,87 m).

Akumuliacinės talpos pagrindo pjūvį po 0,2 m storio dirvožemiu sudaro (Gr. 3, 4; pjūvis II-II):

- iki 1,7...2,7 m gylio – piltinis gruntas (labai purus – purus dulkingas smėlis, vidutinio tankumo smėlis, vidutinio stiprumo molis) (IGS-1);
- giliau slūgso kaitūs gruntai: vidutinio tankumo – labai tankus rupus gruntas (IGS-3,5,6), vidutinio stiprumo – labai stiprus smulkus gruntas (IGS-2,4,7,8,9,10,11);
- požeminis gruntinis vanduo nusistojo 2,4...2,5 m gylyje (abs. a. 168,85...168,88 m).

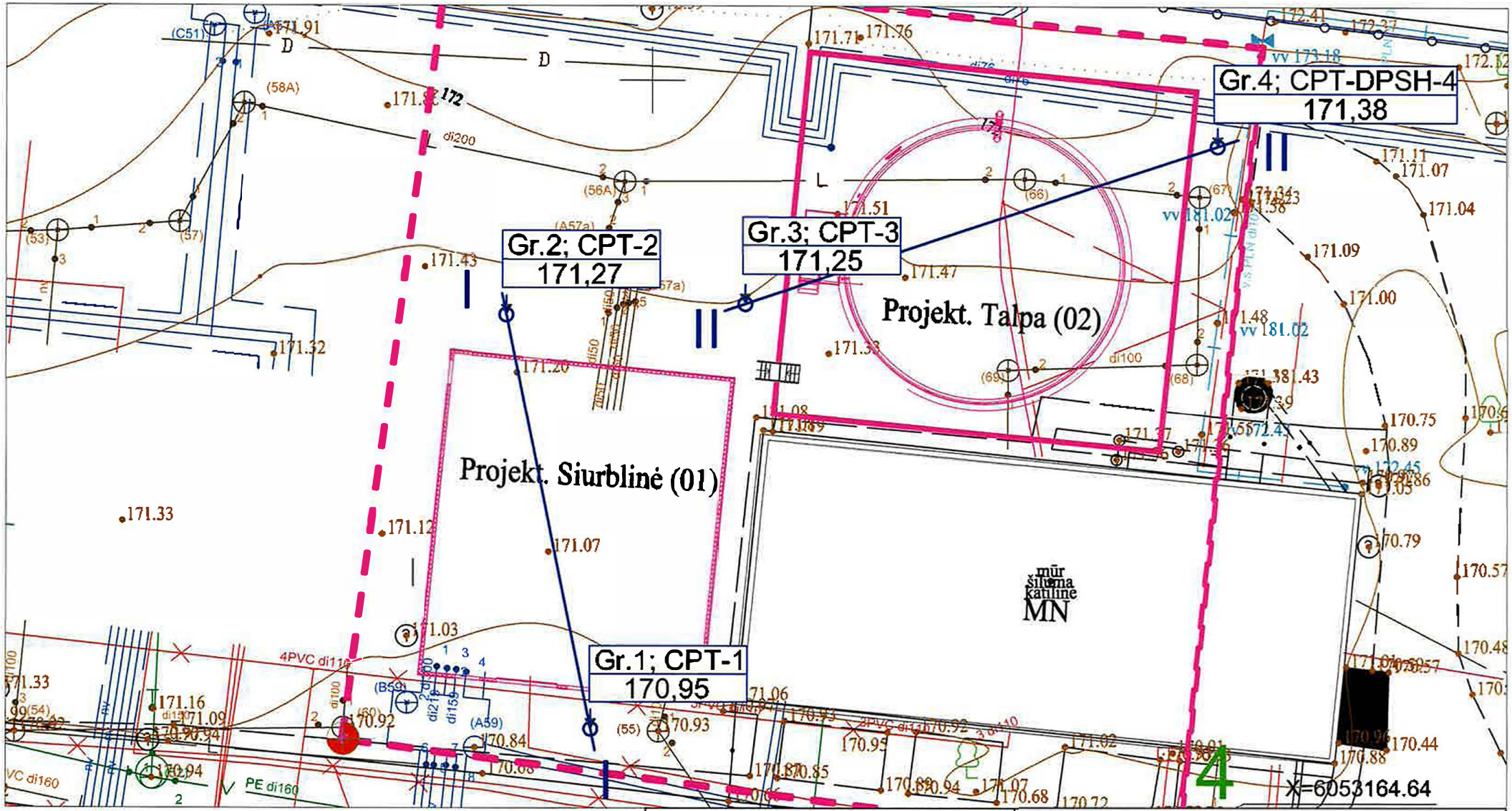
2. Maksimalus tikėtinas vandens lygis gali pakilti apie 1,0 m nuo tyrimų metu fiksuoto lygio.

3. Gruntų geotechninių savybių vidutinės reikšmės pateiktos **3 priede**, o laboratorinių tyrimų suvestinė lentelė – **6.1 priede**.

4. Esant šioms geotechninėms sąlygoms rekomenduojame taikyti atskiruosius (grėžtinius, spraustinius ar pan.) polinius pamatus. Poliai turėtų būti įgilinti į stiprų – labai stiprų smulkų gruntą (dulkį, molį) (IGS-4,7,8,9,10) arba tankų – labai tankų smėlį (IGS-5,6).

Įrengiant pamatus, pagrindą būtina apsaugoti nuo suardymo.

5. Pažymėtina, jog pagrindo pjūvyje sutiktas dulkis (IGS-4), o molyje (IGS-7,8) gausu jo sluoksnelių, tarpsluoksnių. Dulkis pasižymi tiksotropinėmis savybėmis, todėl šie gruntai yra jautrūs dinaminiam poveikiui, vibracijai, mechaniniam suardymui.



uab GeoFirma Leidimo Nr. 155 Tel. 8 612 12228 info@geofirma.lt www.geofirma.lt	**OBJEKTAS:** Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai	**UŽSAKOVAS:** AB Vilniaus šilumos tinklai

Data	**Planas (M 1:250):**	Lapas	Lapų
2024 02	Tyrimo vietos, pjūvio linijos I-I, II-II	1	1
2024 02			

1 PRIEDAS

Gręžinių ir statinio ir dinaminio zondavimo taškų koordinačių ir altitudžių

ŽINIARAŠTIS

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Užsakovas: AB Vilniaus šilumos tinklai

Gręžinius (CPT) nužymėjo

Gręžinius (CPT) pririšo

Koordinačių sistema LKS-94

Aukščių sistema LAS07

Planinio pririšimo būdas GPS prietaisu

Koordinačių nustatymo metodas GPS prietaisu

Altitudžių nustatymo metodas Techninė niveliacija

Data: 2024 m. vasario mėn.

Eil.Nr.	Bandymas	Koordinatės		Altitudė
		x	y	
1.	Gr.1; CPT-1	6053170.0	581697.2	170.95
2.	Gr.2; CPT-2	6053189.2	581693.3	171.27
3.	Gr.3; CPT-3	6053189.7	581704.3	171.25
4.	Gr.4; CPT-4; DPSH-4	6053197.0	581726.0	171.38

Gruntų geotechninių savybių vidutinės reikšmės

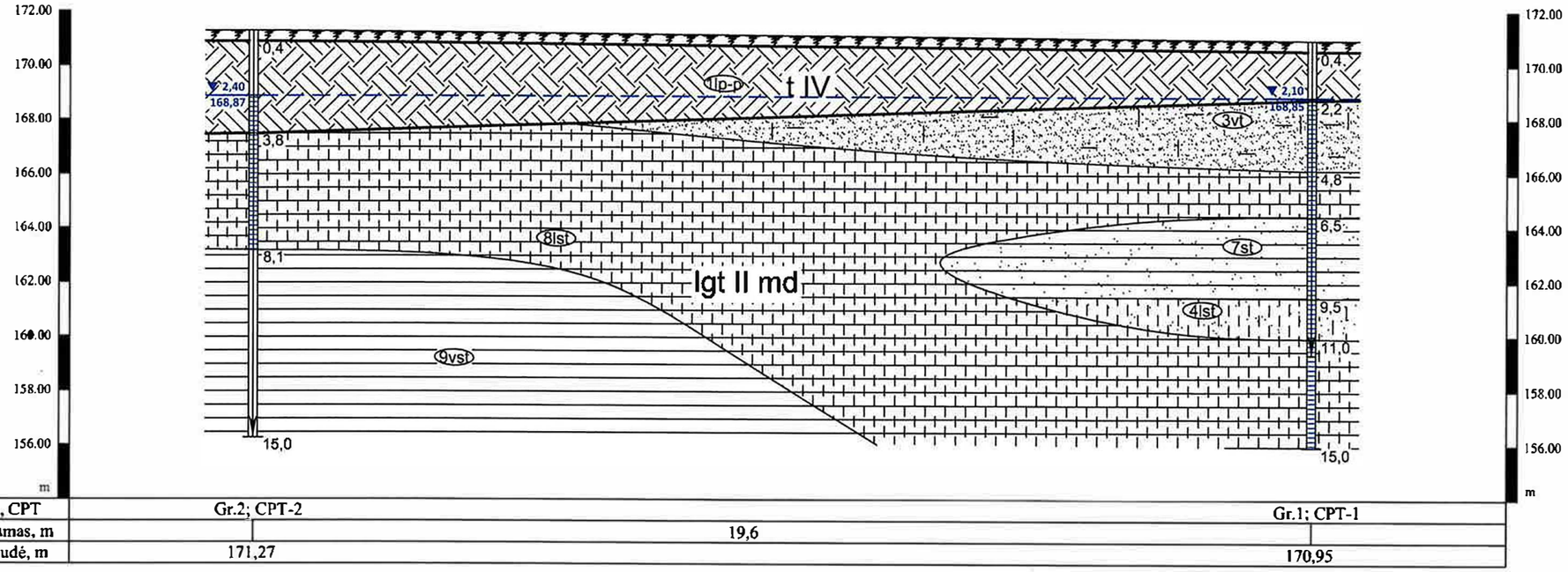
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

IGS Nr.	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Stiprumas ir tankumas	Kūginis stipris q_c (MPa)	Šoninė trintis f_s (kPa)	Deformacijų modulis E (MPa)	Kerpamasis stipris nedrenuojant (φ=0°) c_u (kPa)	Sankiba c´ (kPa)	Vidinės trinties kampas φ´ (laips.)	Grunto tankis ρ (Mg/m³)	Orientacinis pagrindo stiprumas R (kPa)
1lp-p	**Piltinis gruntas** (Mg): dulkingas smėlis	Labai purus	1,5 (4) 0,6 – 2,5	20 (4) 10 – 30	1,5 (4) 0,6 – 2,5	-	0	24,6 (4) 20,0 – 28,4	1,60	-
1vt	**Piltinis gruntas** (Mg): smėlis	Vidutinio tankumo	9,0 (1)	125 (1)	13,5 (1)	-	0	35,9 (1)	1,70	-
1vst	**Piltinis gruntas** (Mg): smėlingas molis	Vidutinio stiprumo	1,1 (1)	25 (1)	1,1 (1)	55,0 (1)	25,3 (1)	17,2 (1)	2,00	-
2vst	**Smėlingas** mažo plastiškumo **molis** (saCIL)	Vidutinio stiprumo	1,5 (2) 1,2 – 1,8	35 (2) 30 – 40	10,5 (2) 8,4 – 12,6	75,0 (2) 60,0 – 90,0	29,9 (2) 26,4 – 33,4	18,1 (2) 17,4 – 18,8	2,17*	360
3vt	Mažai dulkingas – molingas tolygiai išrūšiuotas **smėlis** (SaFU)	Vidutinio tankumo	5,8 (2) 5,0 – 6,5	70 (2) 60 – 80	27,0 (2) 24,5 – 29,5	-	0	33,2 (2) 32,4 – 34,0	1,96**	500
4lst	**Smėlingas** mažo plastiškumo **dulkis** (saSiL)	Labai stiprus	11,7 (5) 9,0 – 15,0	215 (5) 150 – 300	56,9 (5) 45,0 – 75,0	354,2 (5) 300,0 – 400,0	70,3 (6) 11,6* – 82,0	28,3 (6) 28,0 – 29,7*	2,15 (2)* 2,08 – 2,13	2700
5t	**Dulkingas smėlis** (siSa)	Tankus	18,0 (1)	300 (1)	60,7 (1)	-	0	39,9 (1)	2,10**	1800
6lt	**Dulkingas smėlis** (siSa)	Labai tankus	30,7 (3) 28,0 – 32,0	500 (2) 450 – 550	57,2 (2) 83,1 – 91,4	-	0	42,9 (2) 42,5 – 43,3	2,10**	2800
7st	**Smėlingas** mažo plastiškumo **molis** (saCIL)	Stiprus	3,4 (3) 2,6 – 3,8	60 (3) 40 – 80	23,8 (3) 18,2 – 26,6	170,0 (3) 130,0 – 190,0	43,2 (4) 16,8* – 56,6	23,8 (4) 20,7 – 27,9*	2,12 (3)* 2,10 – 2,13	780
8lst	Mažo plastiškumo **molis** (CIL)	Labai stiprus	7,2 (9) 4,2 – 10,0	129 (7) 40 – 200	49,2 (7) 29,4 – 70,0	268,1 (7) 210,0 – 333,3	68,8 (8) 19,4* – 82,1	26,7 (8) 24,2 – 27,9	2,17 (4)* 2,13 – 2,20	1260
9vst	Vidutinio plastiškumo **molis** (CIM)	Vidutinio stiprumo	2,2 (6) 1,8 – 2,5	55 (6) 25 – 75	15,6 (6) 12,6 – 17,5	111,7 (6) 90,0 – 125,0	36,6 (7) 25,8* – 41,5	20,9 (7) 18,8 – 27,5*	2,04*	540
10st	Vidutinio plastiškumo **molis** (CIM)	Stiprus	3,2 (2)	78 (2) 75 – 80	22,4 (2)	160,0 (2)	49,6 (2)	22,0 (2)	2,05 (2)* 2,04 – 2,06	960
11	Moreninis smėlingas mažo plastiškumo **molis ir dulkis** (saCIL-saSiL) *Tvirtas (I_L = 0,42)*								2,28*	

- skaitiklyje – vidutinės reikšmės, skliausteliuose – reikšmių skaičius, vardiklyje – minimalios ir maksimalios reikšmės;
- * nustatyta laboratorijoje;
- ρ pateiktas pagal literatūrinius duomenis [11]; ρ** paskaičiuotas prisotinto grunto tankis (ρ_{sat}) [8]: $\rho_{sat} = (\rho_s*(1+w_{sat}))/(1+w_{sat}*\rho_s)$;
- c´, φ´parametrai moliams, dulkiui (IGS-4,7,8,9) pateikti pagal statinio zondavimo duomenis, kartu su laboratorinių tyrimų rezultatais;
- *R* - orientacinis pagrindo stiprumas paskaičiuotas giliajam atskirajam pamatui-poliui [9].

3 PRIEDAS

INŽINERINIS GEOLOGINIS PJŪVIS I-I
(siurblinė)



Sutartiniai ženklai

- Dirvožemis
- 1 — Piltinis gruntas (Mg)
- 3 — Mažai dulkingas - molingas tolygiai išrūšiuotas smėlis (SaFU)
- 4 — Smėlingas mažo plastiškumo dulkis (saSiL)
- 7 — Smėlingas mažo plastiškumo molis (saClL)
- 8 — Mažo plastiškumo molis (ClL)
- 9 — Vidutinio plastiškumo molis (ClM)

VERTIKALAUS MASTELIO SKALĖ

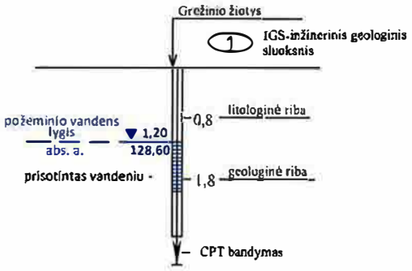
0 2 4 6 8 10 m

HORIZONTALAUS MASTELIO SKALĖ

0 1 2 3 4 5 m

Tankumas ir stiprumas

- lp-p labai purus-purus
- vt vidutinio tankumo
- vst vidutinio stiprumo
- st stiprus
- lst labai stiprus



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OBJEKTAS: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai

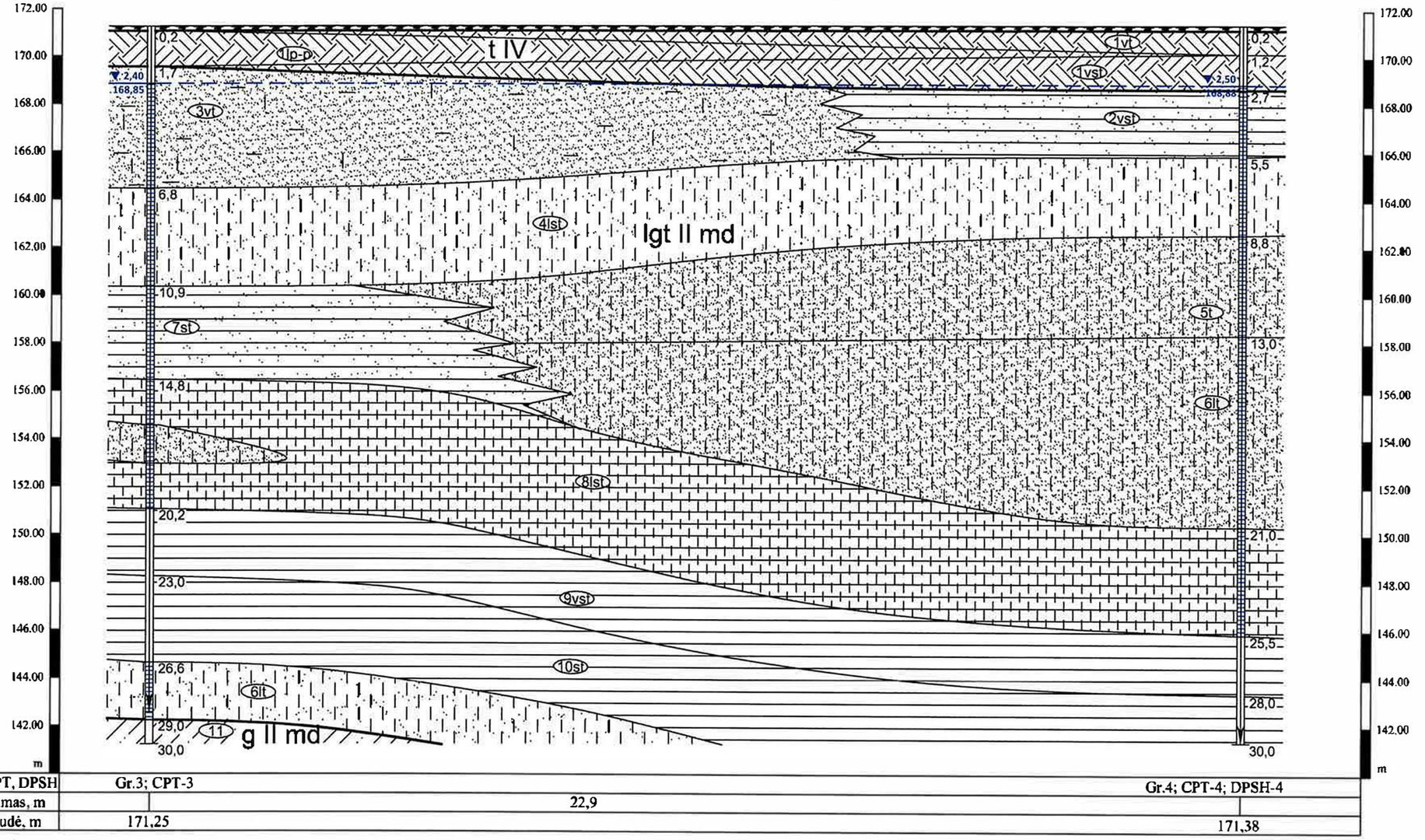
UŽSAKOVAS: AB Vilniaus šilumos tinklai

Data	INŽINERINIS GEOLOGINIS PJŪVIS I-I *(siurblinė)*	Lapas	Lapų
2024 02		1	2
2024 02			

4.1 PRIEDAS

INŽINERINIS GEOLOGINIS PJŪVIS II-II

(akumuliacinė talpa)



Gr., CPT, DPSH	Gr.3; CPT-3		Gr.4; CPT-4; DPSH-4
Atstumas, m		22,9	
Altitudė, m	171,25		171,38

Sutartiniai ženklai

- Dirvožemis
- 1 — Piltinis gruntas (Mg)
- 2,7 — Smėlingas mažo plastiškumo molis (saClL)
- 3 — Mažai dulkingas - molingas tolygiai išrūšiuotas smėlis (SaFU)
- 4 — Smėlingas mažo plastiškumo dulkis (saSiL)
- *smulkus* / *smulkių - vidutinio rupumo* 5,6 — Dulkingas smėlis (siSa)
- 8 — Mažo plastiškumo molis (ClL)
- 9,10 — Vidutinio plastiškumo molis (ClM)
- 11 — Moreninis smėlingas mažo plastiškumo molis ir dulkis (saClL-saSiL)

VERTIKALAUS MASTELIO SKALĖ

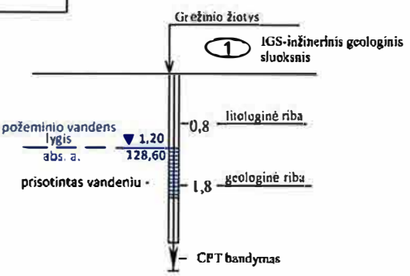
0 2 4 6 8 10 m

HORIZONTALAUS MASTELIO SKALĖ

0 1 2 3 4 5 m

Tankumas ir stiprumas

- lp-p — labai purus-purus
- vt — vidutinio tankumo
- t — tankus
- lt — labai tankus
- vst — vidutinio stiprumo
- st — stiprus
- lst — labai stiprus

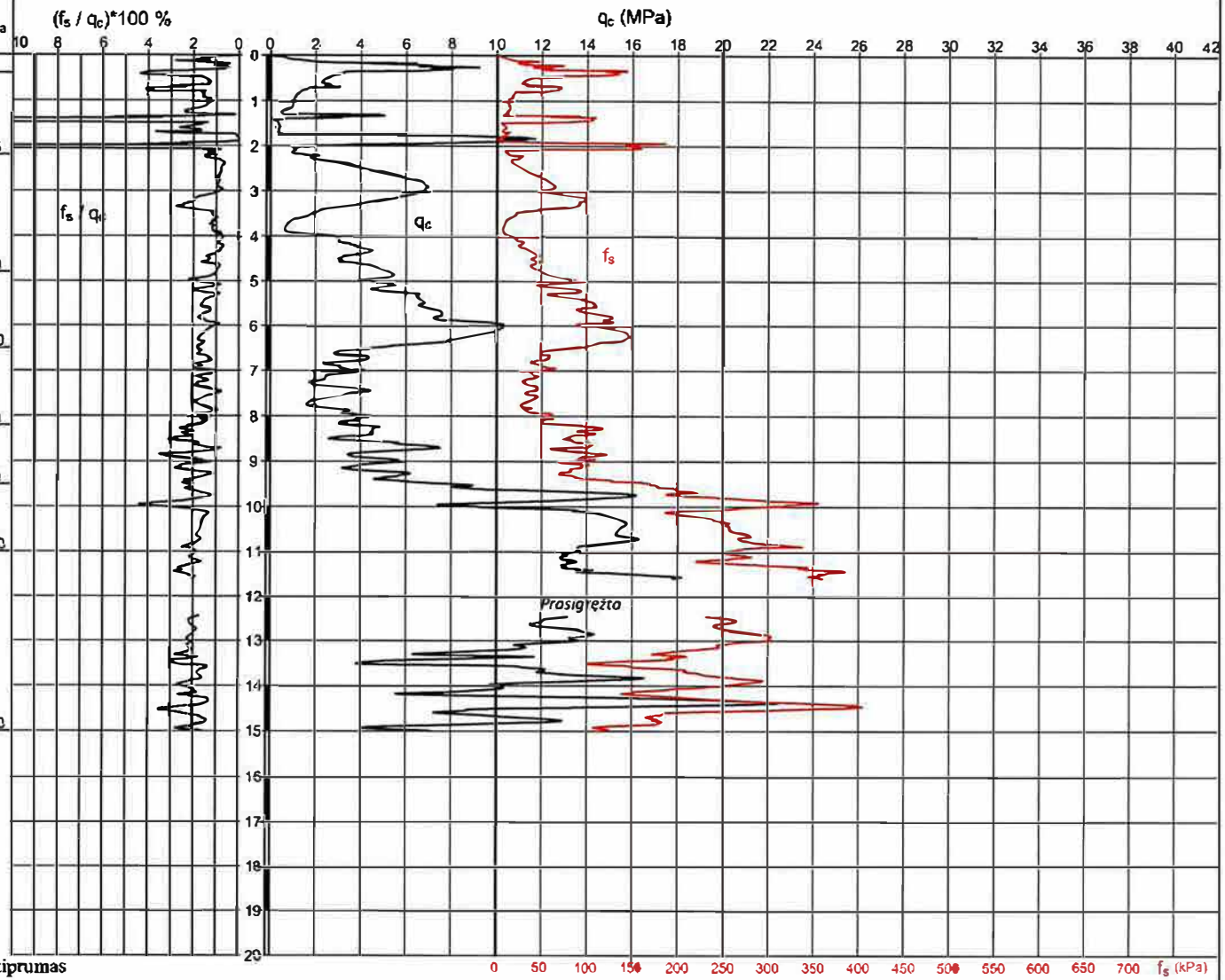


uab GeoFirma Leidimo Nr. 155 Tel. 8 612 12228 info@geofirma.lt www.geofirma.lt	**OBJEKTAS:** Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.	
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai	**UŽSAKOVAS:** AB Vilniaus šilumos tinklai	
Data: 2024 02 / 2024 02	**INŽINERINIS GEOLOGINIS PJŪVIS II-II** *(akumuliacinė talpa)*	Lapas: 2 / Lapų: 2

4.2 PRIEDAS

SRAIGTINIS ⌀ = 152 mm Gr. 1 abs. a. 170,95 m, koordinatės x-6053170,0 m, y-581697,2 m CPT - 1 Data: 2024.02.15

GEOLOGINIS INDEKSAS	GRUNTO APRAŠYMAS	SLUOKSNIO GYLIS, m	SLUOKSNIO STORIS, m	STULPELIS	VANDENS LYGIS PASROŽIS, m	VANDENS LYGIS NUSISTOJO, m	q_c MPa	f_s kPa
	Dirvožemis, rudai pilkas, su betono nuolaužomis	0,4	0,4				-	-
tIV	Pirminis gruntas (Mg): dulkingas smėlis, rudai pilkas, smulkus, su žvirgždu, su smėlingo dulkio intarpais, labai purus - purus, drėgnas	2,2	1,8	lp-p	2,10 168,85	2,10 168,85	1,0	15
lgt II md	Mažai dulkingas - molingas tolygiai grūdėtas smėlis (SaFU) pilkai rudas, smulkus, su dulkingo smėlio tarpsluoksniais, vidutinio tankumo, prisotintas vandeniu	4,8	2,6	vt			5,0	60
	Mažo plastiškumo molis (ClL) pilkai rudas, pereinantis į rudai pilką, su dulkingo smėlio ir gausiais dulkio tarpsluoksniais, sluoksneliais, labai stiprus, prisotintas vandeniu	6,5	1,7	lst			7,0	110
	Smėlingas mažo plastiškumo molis (saClL) pilkai rudas, rudai pilkas, su dulkingo smėlio ir gausiais dulkio ir molio tarpsluoksniais, sluoksneliais, stiprus, prisotintas vandeniu	9,5	3,0	vst			2,6	40
	Smėlingas mažo plastiškumo dulkis (saSiL) rudai pilkas, pilkai rudas, su dulkingo smėlio tarpsluoksniais, labai stiprus, prisotintas vandeniu	11,0	1,5	st			3,8	80
	Mažo plastiškumo molis (ClL) rudai pilkas iki pilko, su dulkio, molio sluoksneliais, tarpsluoksniais, labai stiprus, prisotintas vandeniu	15,0	4,0	lst			13,0	250
							9,0	200



Tankumas ir stiprumas

- lp-p – labai purus-purus
- vt – vidutinio tankumo
- t – tankus
- lt – labai tankus
- vst – vidutinio stiprumo
- st – stiprus
- lst – labai stiprus

- ▯ - grunto ėminys
- ▮ - grunto ėminys, tirtas laboratorijoje
- q_c - kūginis stipris
- f_s - trinties stipris
- f_s / q_c - trinties santykis

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TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai

Pareigos	V. Pavardė	Parašas	Data

OBJEKTAS: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

UŽSAKOVAS: AB Vilniaus šilumos tinklai

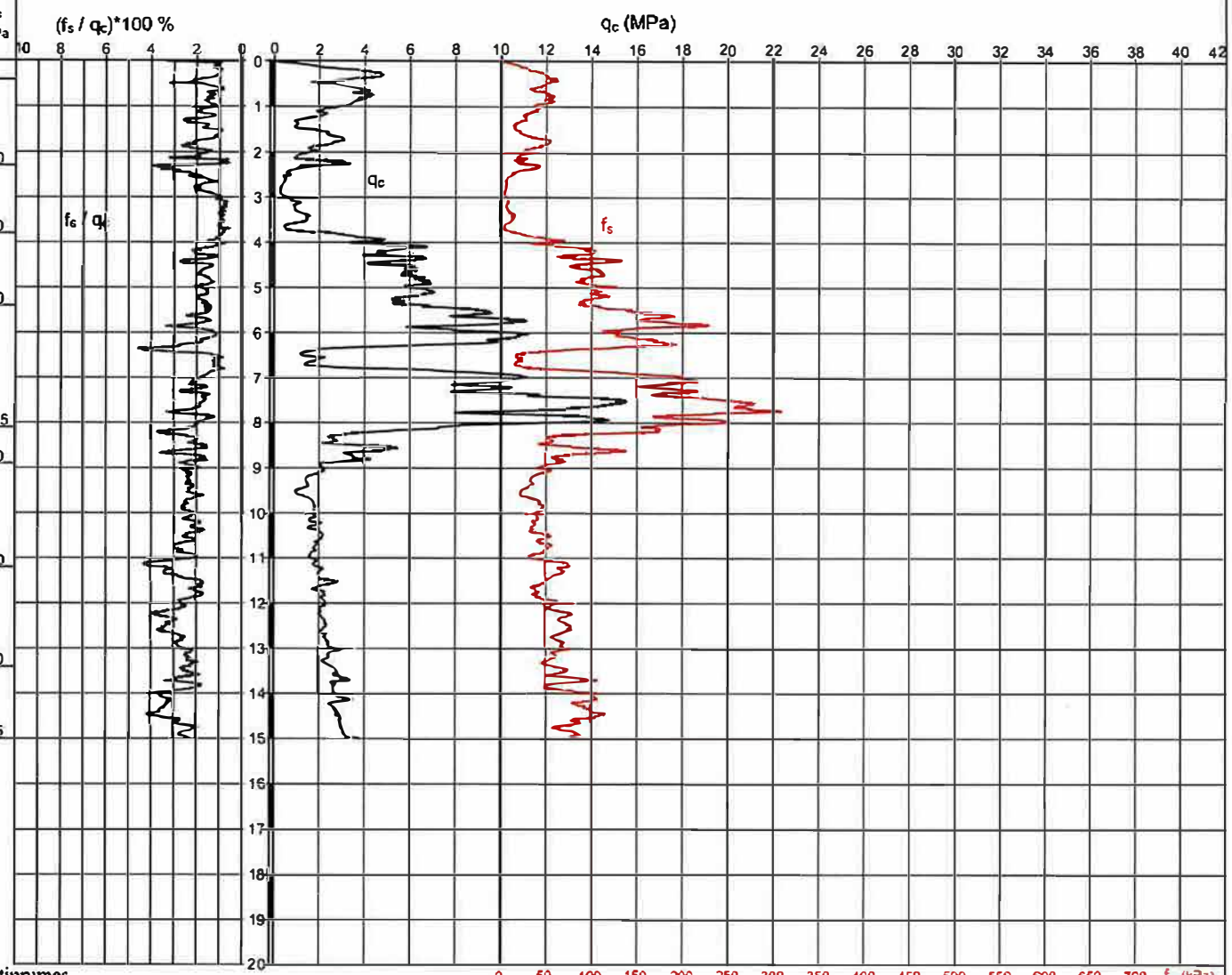
GRĘŽINYS IR ZONDAVIMO BANDYMAS: Gr. 1; CPT -1

Lapas	Lapų
1	6

5.1 PRIEDAS

SRAIGTINIS ⌀ = 152 mm | Gr. 2 | abs. a. 171,27 m, koordinatės x-6053189,2 m, y-581693,3 m | CPT - 2 | Data: 2024.02.15

GEOLOGINIS INDEKSAS	GRUNTO APRAŠYMAS	SLUOKSNIO GYLIS, m	SLUOKSNIO STORIS, m	STULPELIS	VANDENS LYGIS PASIRODĖ, m	VANDENS LYGIS NUSISTOJO, m	q_c MPa	f_s kPa
	Dirvožemis, pilkai rudas, pilkas	0.4	0.4				-	-
t IV	Pilnis grunias (tvg): dulkingas smėlis, rudai pilkas iki pilkai rudo, smulkus, su žvirgždu, su smėlingo dulkio ir smėlingo molio interpais, labai purus - purus, drėgnas; nuo 1.9 m gylio tamsiai pilkas, juodas, su žvirgždu, užterštas naftos produktais	3.8	3.4	lp-p	2.40 168.87	2.40 168.87	2.5	30
							0.6	10
lgt II md	Mažo plastiškumo molis (ClL) rudai pilkas, su molio ir smėlingo dulkio sluoksneliais, labai stiprus, prisotintas vandeniu	8.1	4.3	vst			5.0	90
							9.0	175
	Vidutinio plastiškumo molis (ClM) rudas, pilkai rudas, su dulkio sluoksneliais, vidutinio stiprumo						2.5	60
							1.8	40
							2.2	60
		15.0	16.9				2.5	75



Tankumas ir stiprumas

- lp-p labai purus-purus
- vt vidutinio tankumo
- t tankus
- lt labai tankus
- vst vidutinio stiprumo
- st stiprus
- lst labai stiprus

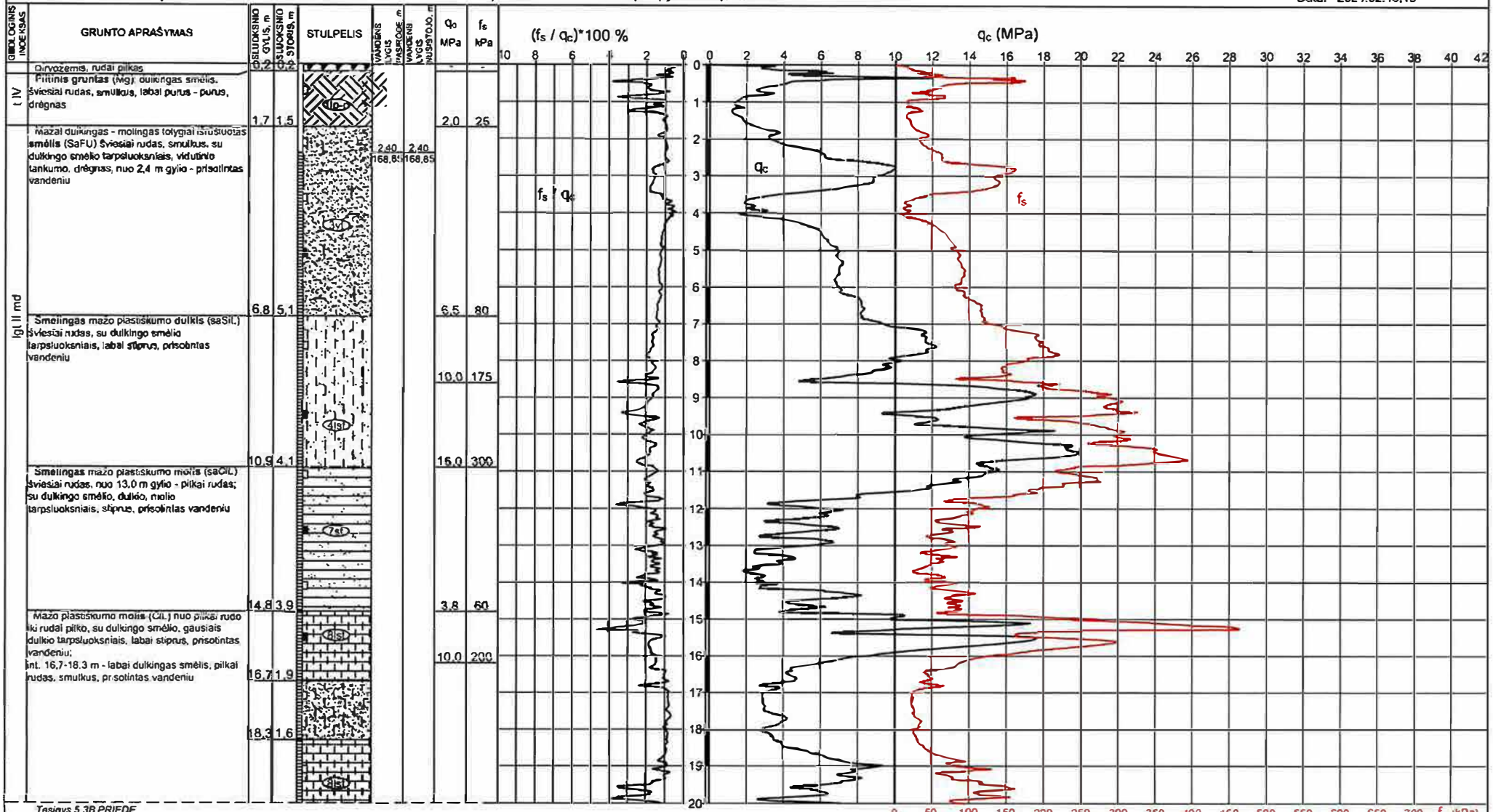
- ▯ - grunto ėminys
- ▮ - grunto ėminys, tirtas laboratorijoje
- q_c - kūginis stipris
- f_s - trinties stipris
- f_s / q_c - trinties santykis

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TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai	**UŽSAKOVAS:** AB Vilniaus šilumos tinklai	
Parengė / Parašas / Data	**GRĖŽINYS IR ZONDAVIMO BANDYMAS:** Gr. 2; CPT -2	Lapas 2 / Lapų 6

5.2 PRIEDAS

SRAIGTINIS ⌀ = 152 mm | Gr. 3 | abs. a. 171,25 m, koordinatės x-6053189,7 m, y-581704,3 m | CPT - 3 | Data: 2024.02.15.19

GEOLOGINIS INDEKSAS	GRUNTO APRAŠYMAS	SLUOKSNIO GYLIS, m	SLUOKSNIO STORIS, m	STULPELIS	VANDENS LYGIS MATUOJANT, m	VANDENS LYGIS NUSISTOJUS, m	q_c MPa	f_s kPa
	Dirvožemis, rudai pilkas	0,2	0,2					
t IV	Pitinis gruntas (Mg): dulkingas smėlis, šviesiai rudas, smulkus, labai purus - purus, drėgnas	1,7	1,5	Mg			2,0	25
lgl II md	Mažai dulkingas - molingas tolygiai nusistovėjęs smėlis (SaFU) šviesiai rudas, smulkus, su dulkingo smėlio tarpsluoksniais, vidutinio tankumo, drėgnas, nuo 2,4 m gylio - prisotintas vandeniu	6,8	5,1	1sv	2,40 168,85	2,40 168,85	6,5	80
	Smėlingas mažo plastiškumo dulkis (saSiL) šviesiai rudas, su dulkingo smėlio tarpsluoksniais, labai stiprus, prisotintas vandeniu	10,9	4,1	4lsl			10,0	175
	Smėlingas mažo plastiškumo molis (saCiL) šviesiai rudas, nuo 13,0 m gylio - pilkai rudas; su dulkingo smėlio, dulkio, molio tarpsluoksniais, stiprus, prisotintas vandeniu	14,8	3,9	7sl			16,0	300
	Mažo plastiškumo molis (CiL) nuo pilkai rudo iki rudai pilko, su dulkingo smėlio, gausiais dulkio tarpsluoksniais, labai stiprus, prisotintas vandeniu; int. 16,7-18,3 m - labai dulkingas smėlis, pilkai rudas, smulkus, prisotintas vandeniu	16,7	1,9	8lsl			3,8	60
		18,3	1,6	9lsl			10,0	200



Tęsinys 5.3B PRIEDE

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OBJEKTAS: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai

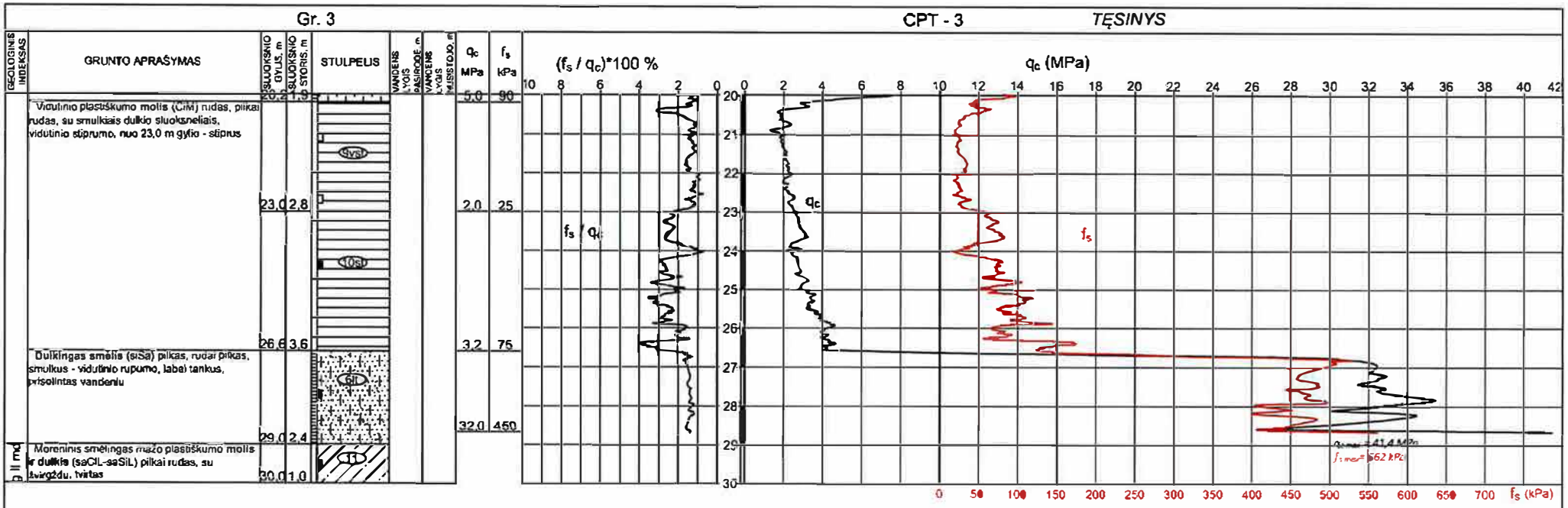
UŽSAKOVAS: AB Vilniaus šilumos tinklai

Pareigos	V. Pavardė	Parašas	Data
			2024 02
			2024 02

GRĖŽINYS IR ZONDAVIMO BANDYMAS: Gr. 3; CPT -3

Lapas	Lapų
3	6

5.3A PRIEDAS



- ▯ - grunto ėminys
- ▮ - grunto ėminys, tirtas laboratorijoje
- q_c - kūginis stipris
- f_s - trinties stipris
- f_s / q_c - trinties santykis

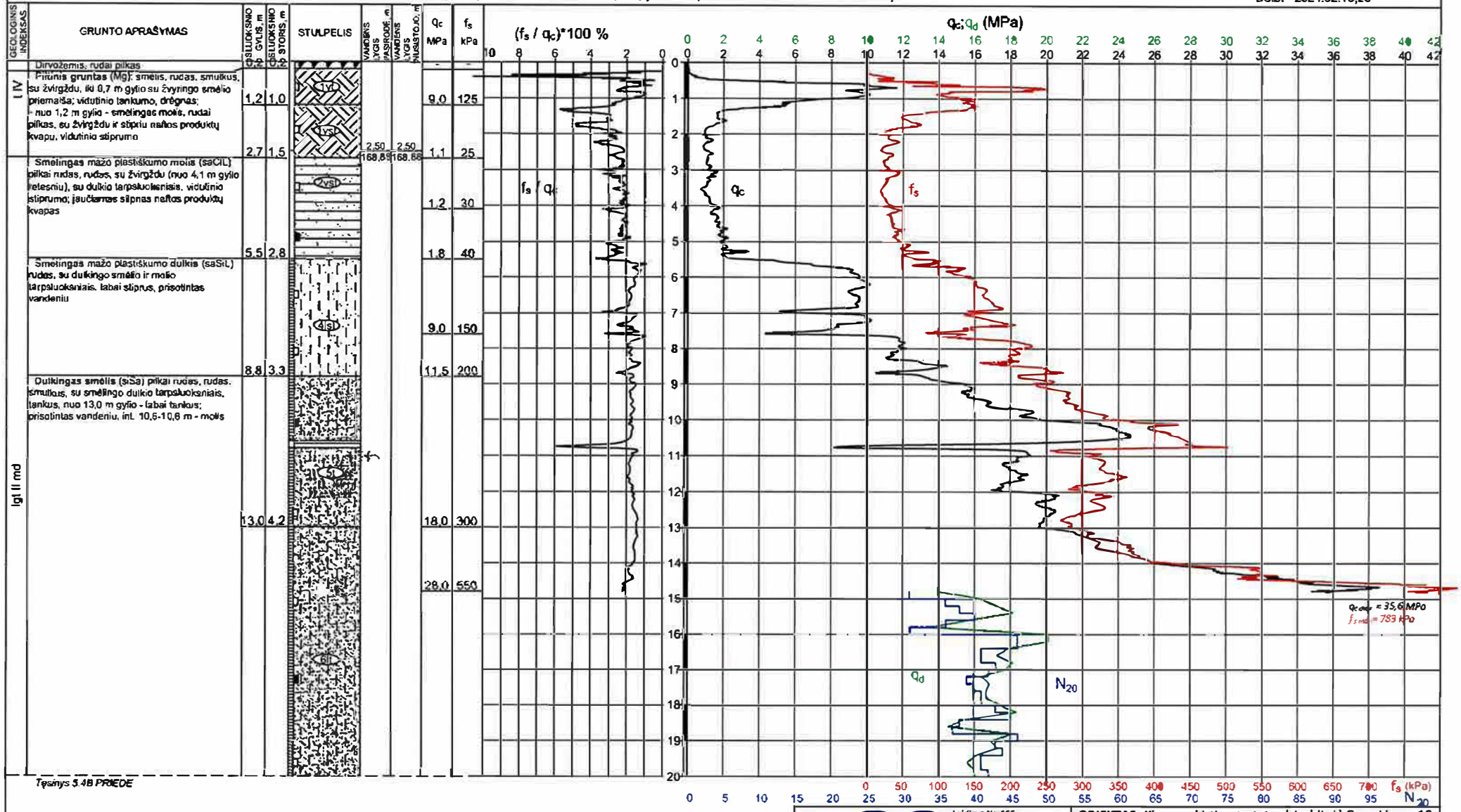
Tankumas ir stiprumas

- lp-p labai purus-purus
- vt vidutinio tankumo
- t tankus
- lt labai tankus
- vst vidutinio stiprumo
- st stiprus
- lst labai stiprus

UAB GeoFirma Leidimo Nr. 155, Tel. 8 612 12228, info@geofirma.lt, www.geofirma.lt	**OBJEKTAS:** Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.	
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai	**UŽSAKOVAS:** AB Vilniaus šilumos tinklai	
Parengė / Paradas / Data	**GRĖŽINYS IR ZONDAVIMO BANDYMAS:** Gr. 3; CPT -3 *TĘSINYS*	Lapas 4 / Lapų 6
Geologas		
Geologė		

5.3B PRIEDAS

SRAIGTINIS ⌀ = 152 mm Gr. 4 abs. a. 171,38 m, koordinatės x-6053197,0 m, y-581726,0 m CPT - 4; DPSH - 4 Data: 2024.02.15,20



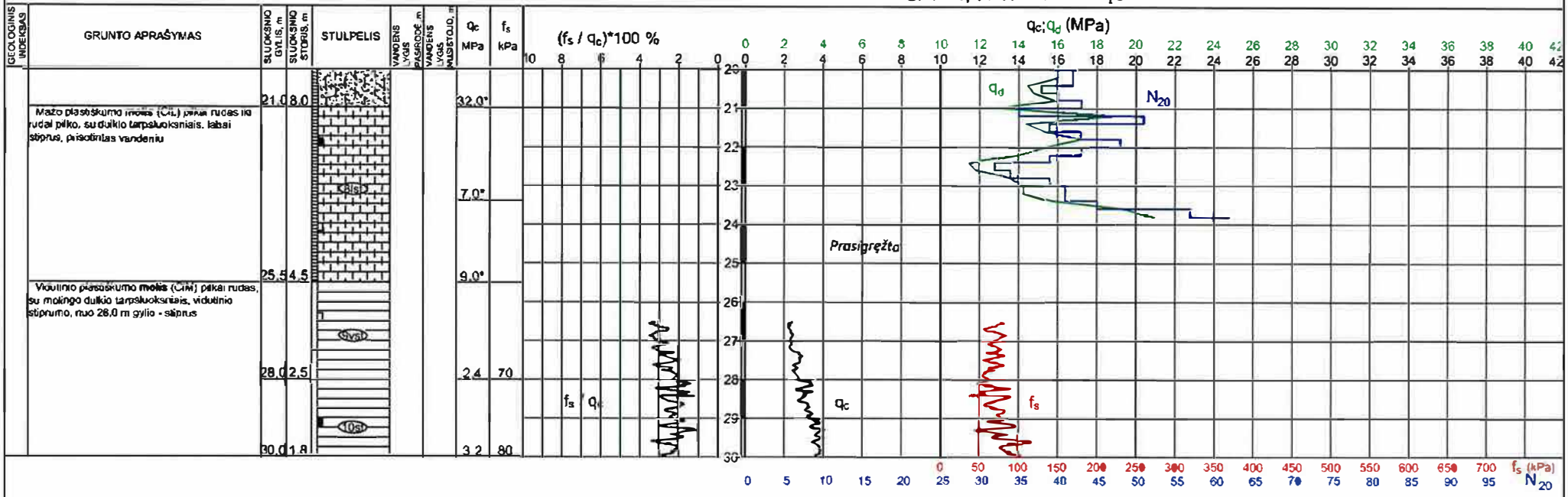
Tęsinys 5.4B PRIEDE

uab GeoFirma Leidimo Nr. 155 Tel. 8 612 12228 info@geofirma.lt www.geofirma.lt			**OBJEKTAS:** Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai			**UŽSAKOVAS:** AB Vilniaus šilumos tinklai
Pareigos	V. Pavardė	Parašas / Data	**GRĖŽINYS IR ZONDAVIMO BANDYMAI:** Gr. 4; CPT -4; DPSH -4
Geologas			Lapas 5 / Lapų 6
Geologė		2024 02	

5.4A PRIEDAS

Gr. 4

CPT - 4; DPSH - 4 *TĘSINYS*



Tankumas ir stiprumas

- (lp-p) labai purus-purus
- (vt) vidutinio tankumo
- (t) tankus
- (lt) labai tankus
- (vst) vidutinio stiprumo
- (st) stiprus
- (lst) labai stiprus

- 0 - grunto ėminys
- 1 - grunto ėminys tirtas laboratorijoje
- q_c - kūginis stipris
- q_c^* - kūginis stipris, paskaičiuotas pagal kūginio ir dinaminio stiprių koreliacinę priklausomybę (Prove geotechnice in sito. I Edizione, C. Ferrucio, 1990), atsižvelgiant į statinio zondavimo bandymų rezultatus (vyrnų plotė: dulkingam smėliui $q_c=2.0*q_d$; mažo plastiškumo moliui $q_c=q_d/2,0$
- q_d - dinaminis stipris
- f_s - trinties stipris
- f_s/q_c - trinties santykis
- N_{20} - smūgių skaičius, reikalingas įgilinti zondą 20 cm

Dinaminio zondo tipas DPSH: supersunkusis

UAB GeoFirma Leidimo Nr. 155, Tel. 8 612 12228, info@geofirma.lt, www.geofirma.lt			**OBJEKTAS:** Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai			**UŽSAKOVAS:** AB Vilniaus šilumos tinklai
Parengė	V. Pavardė	Parašas	Data
Geologas			2024 02
Geologė			~~2024 02~~

GRĘŽINYS IR ZONDAVIMO BANDYMAI: Gr. 4; CPT -4; DPSH -4 *TĘSINYS*

Lapas	Lapų
6	6

5.4B PRIEDAS

uab GeoFirma

Suvestinė laboratorinių tyrimų lentelė

Užsakovas AB Vilniaus šilumos tinklai

Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

2024 m. kovo mėn.

Nr.	Gręžinio numeris	Bandinio numeris	Paėmimo gylis	Dalelių dydis							Tankis			Gamtinis drėgnis, W (%)	Takumo drėgnis, W_L (%)	Plastiškumo drėgnis, W_P (%)	Plastiškumo rodiklis, I_P (%)	Takumo rodiklis I_L, (v. d.)	Konsistencijos rodiklis Ic, (v. d.)	Poringumo koeficientas, e (v. d.)	Grunto soties laipsnis, S_r (v.d.)	Vidinės trinties kampas φ' (°)	Sankiba c´ (kPa)	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")
				Žvyras		Smėlis			Dulkis	Molis														
				>6,3	2,0-6,3	0,63-2,0	0,2-0,63	0,063-0,2	0,002-0,063	<0,002	ρ_s, Mg/m^3	ρ_n, Mg/m^3	ρ_d, Mg/m^3											
1	1	4	4.8-5.0	0.0	0.0	0.2	0.8	6.2	81.7	11.2	2.718	2.15	1.82	17.98	25.5	16.10	9.40	0.20	0.80	0.491	0.99			Mažo plastiškumo molis (ClL)
2	1	8	10.5-10.7	0.0	0.0	0.1	7.7	54.1	33.9	4.1	2.679	2.13	1.80	18.19	23.3	N				0.487	1.00			Smėlingas mažo plastiškumo dulkis (saSiL)
3	2	4	4.8-5.0	0.0	0.0	0.0	0.3	5.1	80.3	14.3	2.728	2.19, 2.20	1.88, 1.89	16.21	20.9	13.72	7.18	0.35	0.65	0.448, 0.441	0.99, 1.00	25.6	19.4	Mažo plastiškumo molis (ClL)
4	2	8	11.0-11.2	0.0	0.0	0.0	0.1	0.8	55.3	43.7	2.771	2.04, 2.08	1.65, 1.68	23.90	35.1	17.07	18.03	0.38	0.62	0.683, 0.651	0.97, 1.02	27.5	25.8	Vidutinio plastiškumo molis (ClM)
5	3	4	5.0-5.2	0.0	0.0	0.0	30.2	61.6	4.6	3.7	2.655			27.52										Mažai dulkingas - molingas tolygiai išrūšiuotas smėlis (SaFU)
6	3	6	9.4-9.6	0.0	0.0	0.2	20.1	43.0	32.3	4.4	2.686	2.08	1.72	20.70	26.2	N				0.559	1.00	29.7	11.6	Smėlingas mažo plastiškumo dulkis (saSiL)
7	3	8	12.5-12.7	0.0	0.0	0.1	2.1	37.7	53.4	6.8	2.697	2.10, 2.13	1.77, 1.80	18.53	23.1	15.1	8.00	0.43	0.57	0.522, 0.501	0.96, 1.00	27.9	16.8	Smėlingas mažo plastiškumo molis (saCIL)
8	3	10	15.4-15.6	0.0	0.3	1.0	2.6	8.1	73.4	14.6	2.722			16.61	22.8	13.19	9.61	0.36	0.64					Mažo plastiškumo molis (ClL)
9	3	15	24.3-24.5	0.0	0.0	0.0	1.5	4.9	36.2	57.4	2.763	2.04	1.63	25.14	39.5	17.36	22.14	0.35	0.65	0.695	1.00			Vidutinio plastiškumo molis (ClM)
10	3	16	27.6-27.8	0.0	0.2	0.8	38.8	38.5	17.3	4.4	2.680			19.46	18.4	N								Dulkingas smėlis (siSa)
11	3	17	29.4-29.6	0.0	5.5	6.1	24.8	28.5	26.3	8.9	2.683	2.28	2.05	11.08	15.0	8.26	6.74	0.42	0.58	0.307	0.97			Smėlingas mažo plastiškumo molis ir dulkis (saCIL - saSiL)
12	4	4	4.8-5.0	0.0	0.6	1.6	10.8	34.5	42.7	9.7	2.695	2.17	1.86	16.61	19.8	11.98	7.82	0.59	0.41	0.448	1.00			Smėlingas mažo plastiškumo molis (saCIL)
13	4	7	10.0-10.2	0.0	0.0	0.1	10.7	69.4	17.5	2.3	2.676			19.57		N								Dulkingas smėlis (siSa)
14	4	10	17.2-17.4	0.0	0.0	0.0	9.0	58.9	29.1	3.0	2.675			23.75	25.6	N								Dulkingas smėlis (siSa)
15	4	12	21.8-22.0	0.0	0.0	0.1	0.5	6.8	80.7	11.8	2.725	2.13	1.80	18.19	25.1	13.31	11.79	0.41	0.59	0.512	0.97			Mažo plastiškumo molis (ClL)
16	4	15	29.0-29.2	0.0	0.0	0.0	0.2	3.3	50.7	45.7	2.753	2.06	1.67	23.58	35.1	17.3	17.80	0.35	0.65	0.652	1.00			Vidutinio plastiškumo molis (ClM)

N-nesikočioja.

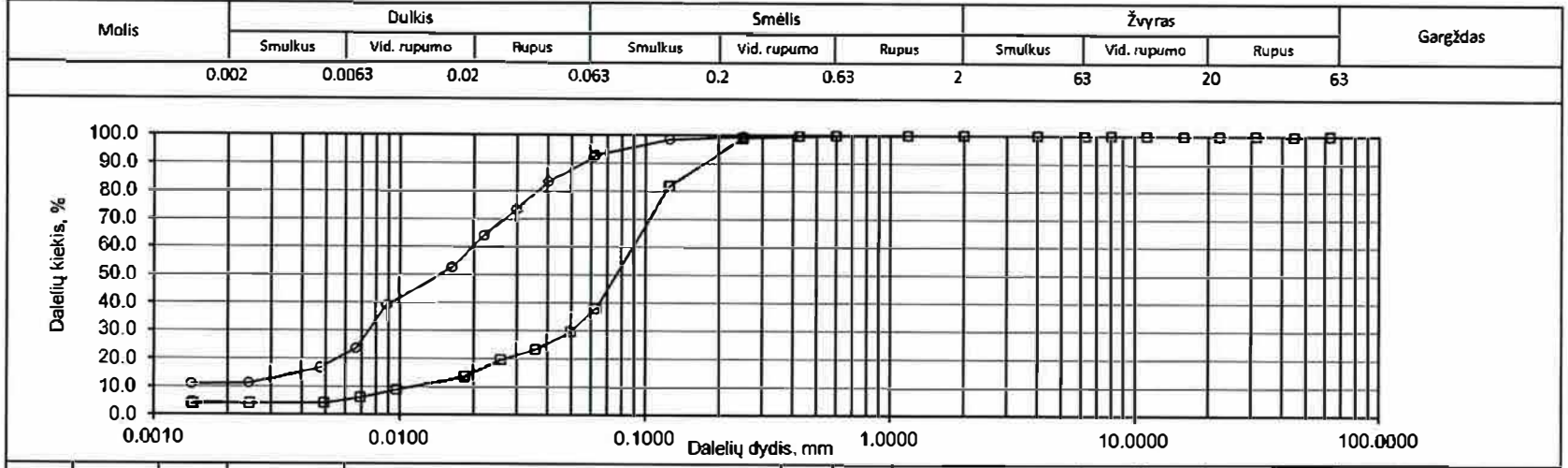
Užsakovas: AB Vilniaus šilumos tinklai

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 01/03/2024

UAB "GeoFirma"
Konstitucijos pr. 8A, Vilnius
info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_U	C_C
							Rupus	Vid. rupumo	Smulkus							
O	1	4	4.8-5.0	**Mažo plastiškumo molis (ClL)**	0.0	0.0	0.2	0.8	6.2	81.7	11.2	0.00	0.01	0.02	-	-
□	1	8	10.5-10.7	**Smėlingas mažo plastiškumo dulkis (saSiL)**	0.0	0.0	0.1	7.7	54.1	33.9	4.1	0.01	0.05	0.09	-	-

Atliko:
Tikrino:

6.2.1 PRIEDAS

Užsakovas: AB Vilniaus šilumos tinklai

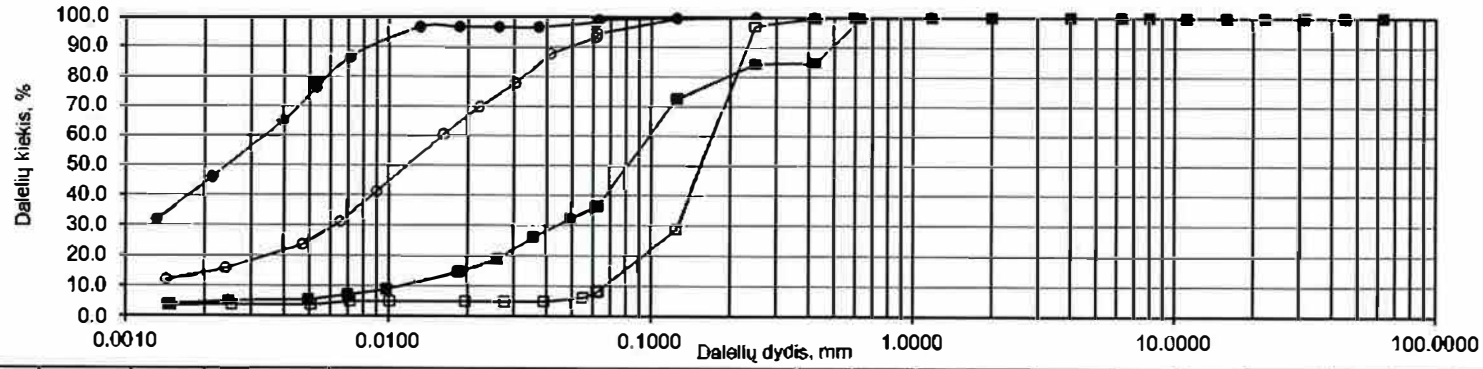
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Garnyklos g. 10, Vilniaus m.

Data: 29/02/2024

UAB "GeoFirma"
Konstitucijos pr. 8A, Vilnius
info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)

Molis	Dulkis			Smėlis			Žvyras			Gargždas
	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	
0.002	0.0063	0.02	0.063	0.2	0.63	2	6.3	20	63	



Simbolis	Grėž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_U	C_C
							Rupus	Vid. rupumo	Smulkus							
O	2	4	4.8-5.0	**Mažo plastiškumo molis (ClL)**	0.0	0.0	0.0	0.3	5.1	80.3	14.3	0.00	0.01	0.02	-	-
●	2	8	11.0-11.2	**Vidutinio plastiškumo molis (ClM)**	0.0	0.0	0.0	0.1	0.8	55.3	43.7	0.00	0.00	0.00	-	-
□	3	4	5.0-5.2	**Mažai dulkingas - molingas tolygiai išrūšiuotas smėlis (SaFU)**	0.0	0.0	0.0	30.2	61.6	4.6	3.7	0.07	0.13	0.18	2.7	1.31
■	3	6	9.4-9.6	**Smėlingas mažo plastiškumo dulkis (saSiL)**	0.0	0.0	0.2	20.1	43.0	32.3	4.4	0.01	0.04	0.10	-	-

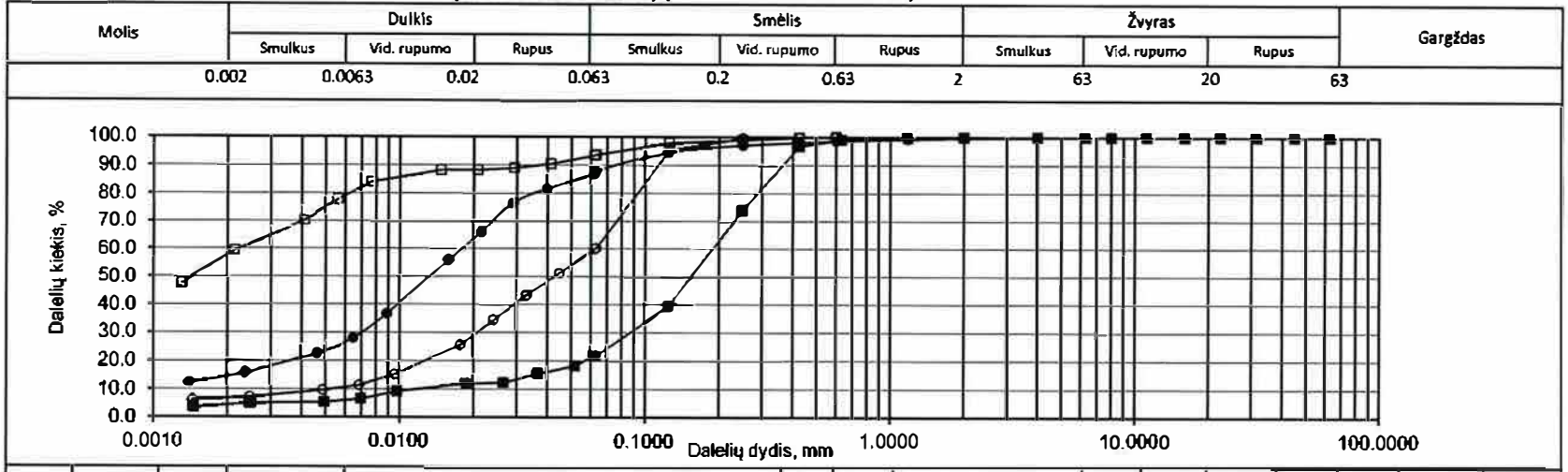
Užsakovas: AB Vilniaus šilumos tinklai

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 29/02/2024

UAB "GeoFirma"
Konstitucijos pr. 8A, Vilnius
info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) **(LST EN ISO 17892-4:2017)**



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_U	C_C
							Rupus	Vid. rupumo	Smulkus							
○	3	8	12.5-12.7	**Smėlingas mažo plastiškumo molis (saCIL)**	0.0	0.0	0.1	2.1	37.7	53.4	6.8	0.01	0.02	0.06	-	-
●	3	10	15.4-15.6	**Mažo plastiškumo molis (CIL)**	0.0	0.3	1.0	2.6	8.1	73.4	14.6	0.00	0.01	0.02	-	-
□	3	15	24.3-24.5	**Vidutinio plastiškumo molis (CIM)**	0.0	0.0	0.0	1.5	4.9	36.2	57.4	0.00	0.00	0.00	-	-
■	3	16	27.6-27.8	**Dulkingas smėlis (siSa)**	0.0	0.2	0.8	38.8	38.5	17.3	4.4	0.01	0.09	0.20	-	-

6.2.3 PRIEDAS

Užsakovas: AB Vilniaus šilumos tinklai

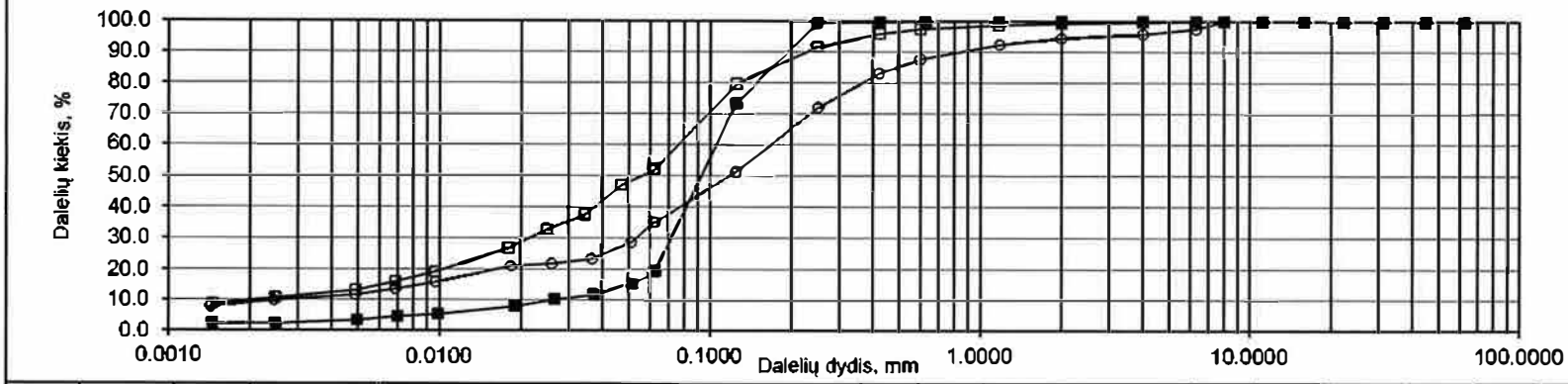
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 29/02/2024

UAB "GeoFirma"
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info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)

Molis	Dulkis			Smėlis			Žvyras			Gargždas
	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	
0.002	0.0063	0.02	0.063	0.2	0.63	2	63	20	63	



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_u	C_c
							Rupus	Vid. rupumo	Smulkus							
O	3	17	29.4-29.6	**Smėlingas mažo plastiškumo molis ir dulkis (saCIL saSILI**	0.0	5.5	6.1	24.8	28.5	26.3	8.9	0.00	0.05	0.18	-	-
□	4	4	4.8-5.0	**Smėlingas mažo plastiškumo molis (saCIL)**	0.0	0.6	1.6	10.8	34.5	42.7	9.7	0.00	0.02	0.08	-	-
■	4	7	10.0-10.2	**Dulkingas smėlis (siSa)**	0.0	0.0	0.1	10.7	69.4	17.5	2.3	0.03	0.07	0.11	-	-

6.2.4 PRIEDAS

Užsakovas: AB Vilniaus šilumos tinklai

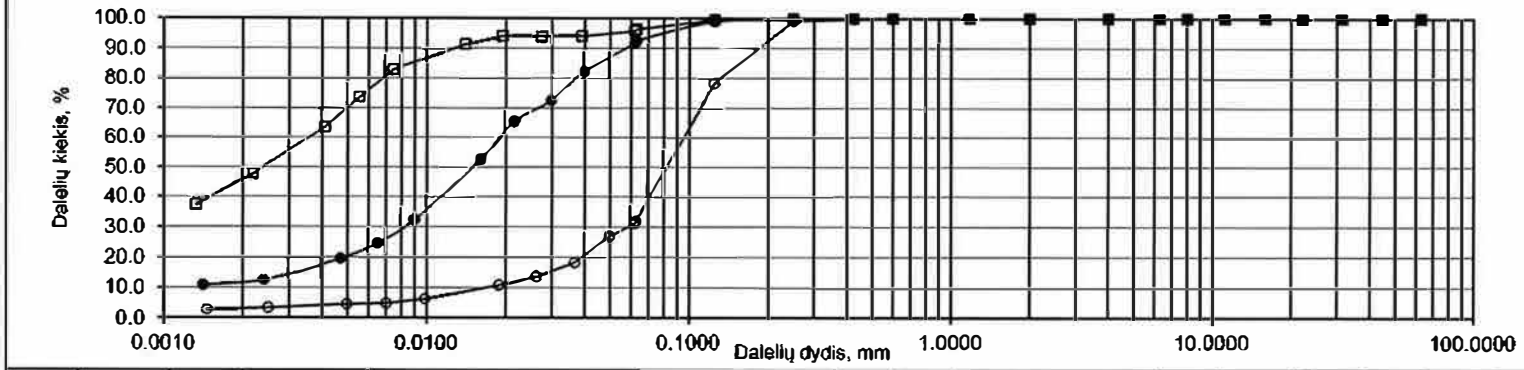
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 29/02/2024

UAB "GeoFirma"
Konstitucijos pr. 8A, Vilnius
info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)

Molis	Dulkis			Smėlis			Žvyras			Gargždas
	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	
0.002	0.0063	0.02	0.063	0.2	0.63	2	6.3	20	63	



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_U	C_C
							Rupus	Vid. rupumo	Smulkus							
○	4	10	17.2-17.4	**Dulkingas smėlis (siSa)**	0.0	0.0	0.0	9.0	58.9	29.1	3.0	0.02	0.06	0.10	-	-
●	4	12	21.2-22.0	**Mažo plastiškumo molis (CIL)**	0.0	0.0	0.1	0.5	6.8	80.7	11.8	0.00	0.01	0.02	-	-
□	4	15	29.0-29.2	**Vidutinio plastiškumo molis (CIM)**	0.0	0.0	0.0	0.2	3.3	50.7	45.7	0.00	0.00	0.00	-	-

6.2.5 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

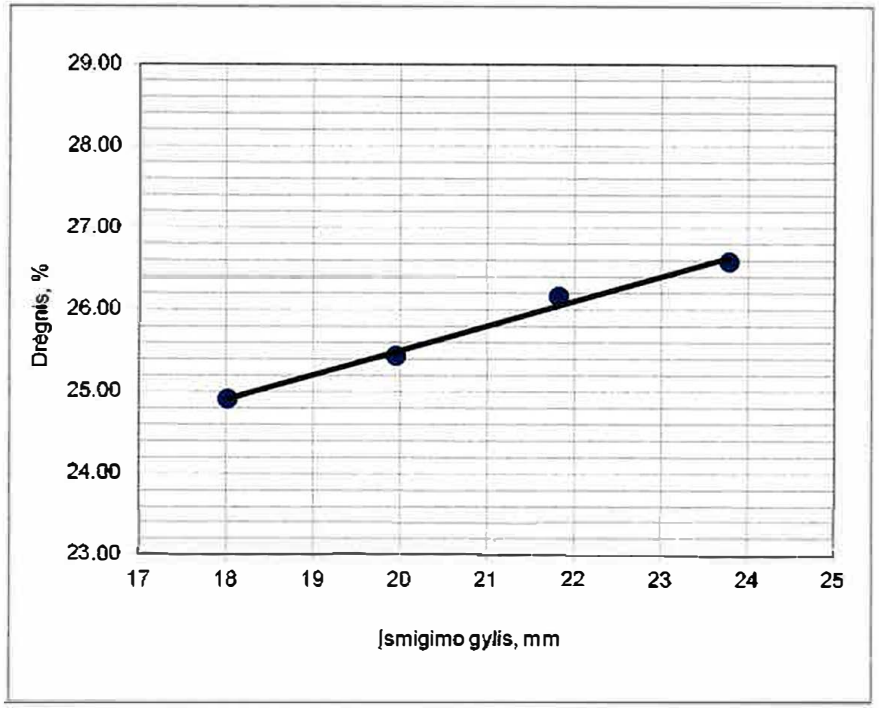
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015,

Gręžinio numeris:	**1**
Bandinio numeris:	**4**
Bandinio paėmimo gylis, m:	**4.8-5.0**
Grunto pavadinimas:	**Mažo plastiškumo molis (CIL)**

Grunto drėgnis:	**w, %**	**17.98**
Takumo drėgnis:	**W_L, %**	**25.5**
Plastingumo drėgnis:	**W_P, %**	**16.10**
Plastingumo rodiklis:	**I_P**	**9.40**
Takumo rodiklis:	**I_L**	**0.20**
Konsistencijos rodiklis:	**I_C**	**0.80**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.15**



Takumo drėgnis W_L, %				**25.50**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	18.02	19.95	21.82	23.78
Biukso svoris, g	14.66	14.56	13.77	13.61
Biuksas+Gw, g	39.38	38.72	35.23	40.94
Biuksas+Gd, g	34.45	33.82	30.78	35.2
Drėgnis w, %	24.91	25.44	26.16	26.59

Plastingumo drėgnis W_P, %	**16.10**
Biukso svoris, g	14.02
Biuksas + Gw, g	34.57
Biuksas + Gd, g	31.72

Grunto drėgnis, w %	**17.98**
Biukso svoris, g	13.88
Biuksas + Gw, g	64.81
Biuksas + Gd, g	57.05

Gamtinis tankis, ρ_n, Mg/m³	**2.15**
Žiedo tūris V, mm^3	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	151.97

6.3.1 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

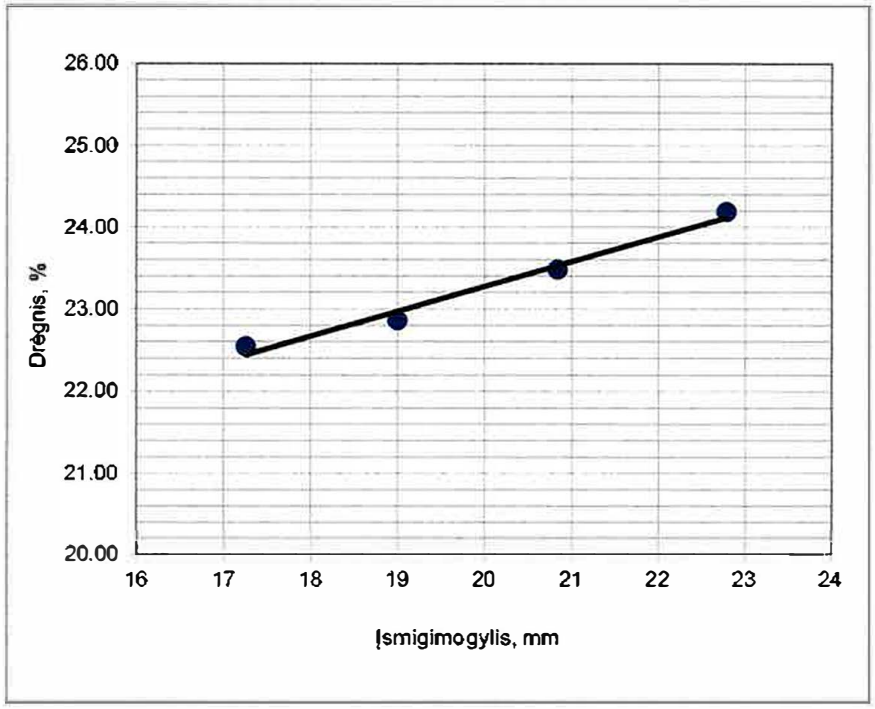
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**1**
Bandinio numeris:	**8**
Bandinio paėmimo gylis, m:	**10.5-10.7**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo dulkis (saSIL)**

Grunto drėgnis:	**w, %**	**18.19**
Takumo drėgnis:	**W_L, %**	**23.3**
Plastingumo drėgnis:	**W_P, %**	**N**
Plastingumo rodiklis:	**I_P**	
Takumo rodiklis:	**I_L**	
Konsistencijos rodiklis:	**I_C**	
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.13**



Takumo drėgnis W_L, %				**23.30**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.26	19	20.84	22.78
Biukso svoris, g	13.86	20.15	14.23	14.58
Biuksas+Gw, g	39.9	45.68	41.84	40.97
Biuksas+Gd, g	35.11	40.93	36.59	35.83
Drėgnis w, %	22.54	22.86	23.48	24.19

Plastingumo drėgnis W_P, %	**N**
Biukso svoris, g	
Biuksas + Gw, g	
Biuksas + Gd, g	

Grunto drėgnis, w %	**18.19**
Biukso svoris, g	20.96
Biuksas + Gw, g	84.57
Biuksas + Gd, g	74.78

Gamtinis tankis, ρ_n, Mg/m³	**2.13**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	150.9

6.3.2 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

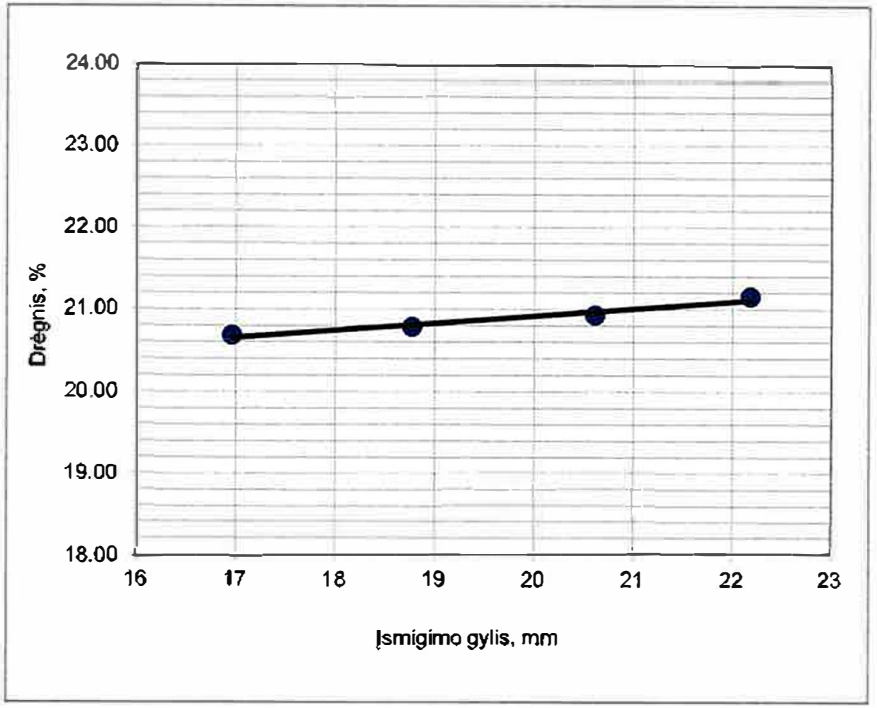
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**2**
Bandinio numeris:	**4**
Bandinio paėmimo gylis, m:	**4.8-5.0**
Grunto pavadinimas:	**Mažo plastiškumo molis (CIL)**

Grunto drėgnis:	**w, %**	**16.21**
Takumo drėgnis:	**W_L, %**	**20.9**
Plastingumo drėgnis:	**W_P, %**	**13.72**
Plastingumo rodiklis:	**I_P**	**7.18**
Takumo rodiklis:	**I_L**	**0.35**
Konsistencijos rodiklis:	**I_C**	**0.65**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.19**



Takumo drėgnis W_L, %				**20.90**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.96	18.77	20.61	22.18
Biukso svoris, g	14.87	14.41	14.63	21.98
Biuksas+Gw, g	41.36	40.91	39.65	47.98
Biuksas+Gd, g	36.82	36.35	35.32	43.44
Drėgnis w, %	20.68	20.78	20.93	21.16

Plastingumo drėgnis W_P, %	**13.72**
Biukso svoris, g	11.15
Biuksas + Gw, g	32.04
Biuksas + Gd, g	29.52

Grunto drėgnis, w %	**16.21**
Biukso svoris, g	13.26
Biuksas + Gw, g	74.26
Biuksas + Gd, g	65.75

Gamtinis tankis, ρ_n, Mg/m³	**2.19**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	154.01

6.3.3 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

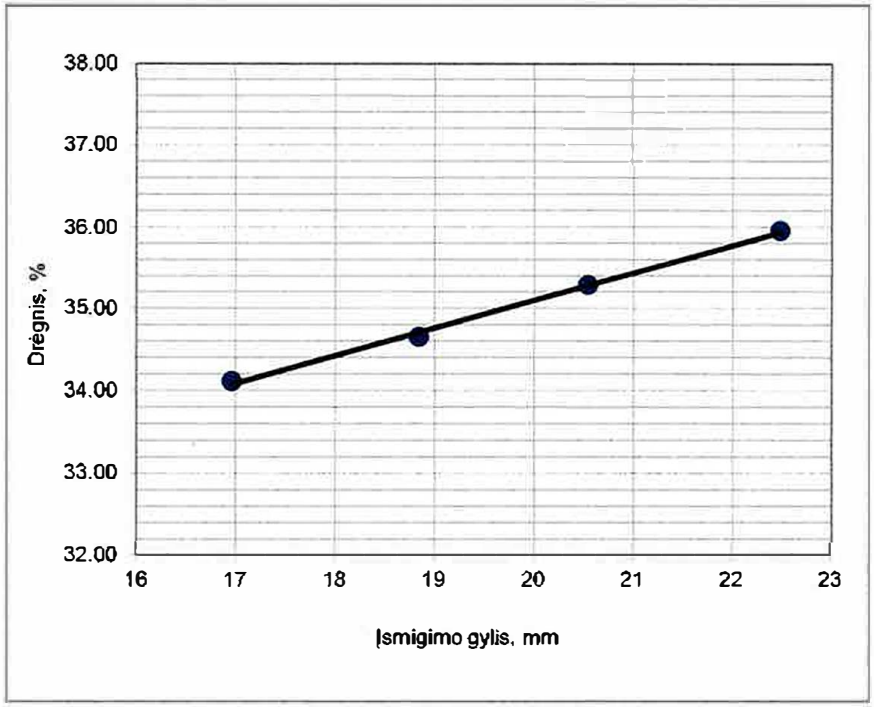
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**2**
Bandinio numeris:	**8**
Bandinio paėmimo gylis, m:	**11.0-11.2**
Grunto pavadinimas:	**Vidutinio plastiškumo molis (ClM)**

Grunto drėgnis:	**w, %**	**23.90**
Takumo drėgnis:	**W_L, %**	**35.1**
Plastingumo drėgnis:	**W_P, %**	**17.07**
Plastingumo rodiklis:	**I_P**	**18.03**
Takumo rodiklis:	**I_L**	**0.38**
Konsistencijos rodiklis:	**I_C**	**0.62**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.04**



Takumo drėgnis W_L, %				**35.10**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.96	18.84	20.54	22.48
Biukso svoris, g	15.51	13.05	14.74	14.76
Biuksas+Gw, g	37.92	40.64	42.19	40.7
Biuksas+Gd, g	32.22	33.54	35.03	33.84
Drėgnis w, %	34.11	34.65	35.29	35.95

Plastingumo drėgnis W_P, %	**17.07**
Biukso svoris, g	15.5
Biuksas + Gw, g	36.55
Biuksas + Gd, g	33.48

Grunto drėgnis, w %	**23.90**
Biukso svoris, g	22.46
Biuksas + Gw, g	84
Biuksas + Gd, g	72.13

Gamtinis tankis, ρ_n, Mg/m³	**2.04**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	146.41

6.3.4 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

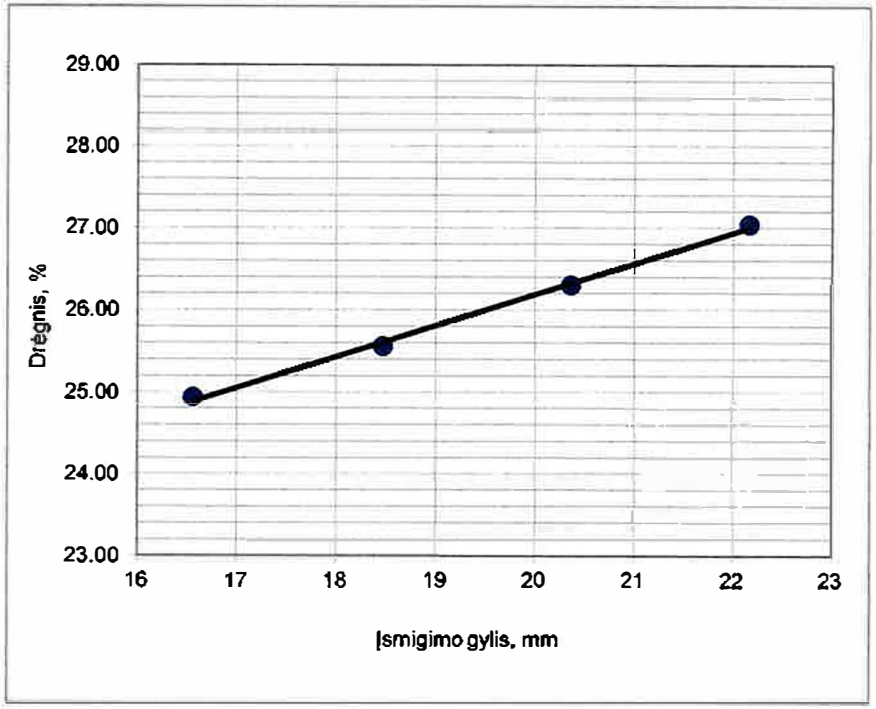
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018

Gręžinio numeris:	**3**
Bandinio numeris:	**6**
Bandinio paėmimo gylis, m:	**9.4-9.6**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo dulkis (saSIL)**

Grunto drėgnis:	**w, %**	**20.70**
Takumo drėgnis:	**W_L, %**	**26.2**
Plastingumo drėgnis:	**W_P, %**	**N**
Plastingumo rodiklis:	**I_P**	
Takumo rodiklis:	**I_L**	
Konsistencijos rodiklis:	**I_C**	



Takumo drėgnis W_L, %				26.20
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.56	18.47	20.36	22.16
Biukso svoris, g	13.42	13.4	13.87	14.23
Biuksas+Gw, g	38.82	40.42	39.66	41.01
Biuksas+Gd, g	33.75	34.92	34.29	35.31
Drėgnis w, %	24.94	25.56	26.30	27.04

Plastingumo drėgnis W_P, %	N
Biukso svoris, g	
Biuksas + Gw, g	
Biuksas + Gd, g	

Grunto drėgnis, w %	20.70
Biukso svoris, g	13.47
Biuksas + Gw, g	74.1
Biuksas + Gd, g	63.70

6.3.5 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.03.06

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

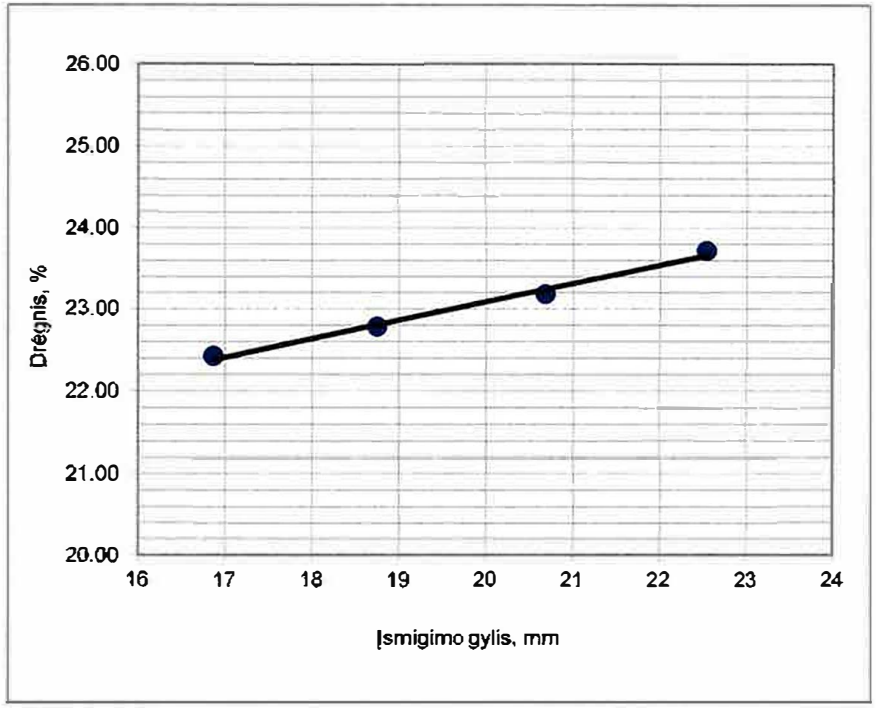
Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**3**
Bandinio numeris:	**8**
Bandinio paėmimo gylis, m:	**12.5-12.7**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo molis (saCIL)**

Grunto drėgnis:	**w, %**	**18.53**
Takumo drėgnis:	**W_L, %**	**23.1**
Plastingumo drėgnis:	**W_P, %**	**15.10**
Plastingumo rodiklis:	**I_P**	**8.00**
Takumo rodiklis:	**I_L**	**0.43**
Konsistencijos rodiklis:	**I_C**	**0.57**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.10**

Takumo drėgnis W_L, %				**23.10**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.87	18.75	20.68	22.54
Biukso svoris, g	14.48	14.25	20.14	13.94
Biuksas+Gw, g	41.12	40.23	46.39	39.34
Biuksas+Gd, g	36.24	35.41	41.45	34.47
Drėgnis w, %	22.43	22.78	23.18	23.72



Plastingumo drėgnis W_P, %	**15.10**
Biukso svoris, g	11.4
Biuksas + Gw, g	33.05
Biuksas + Gd, g	30.21

Grunto drėgnis, w %	**18.53**
Biukso svoris, g	15.05
Biuksas + Gw, g	75.18
Biuksas + Gd, g	65.78

Gamtinis tankis, ρ_n, Mg/m³	**2.10**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	149.22

6.3.6 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.03.06

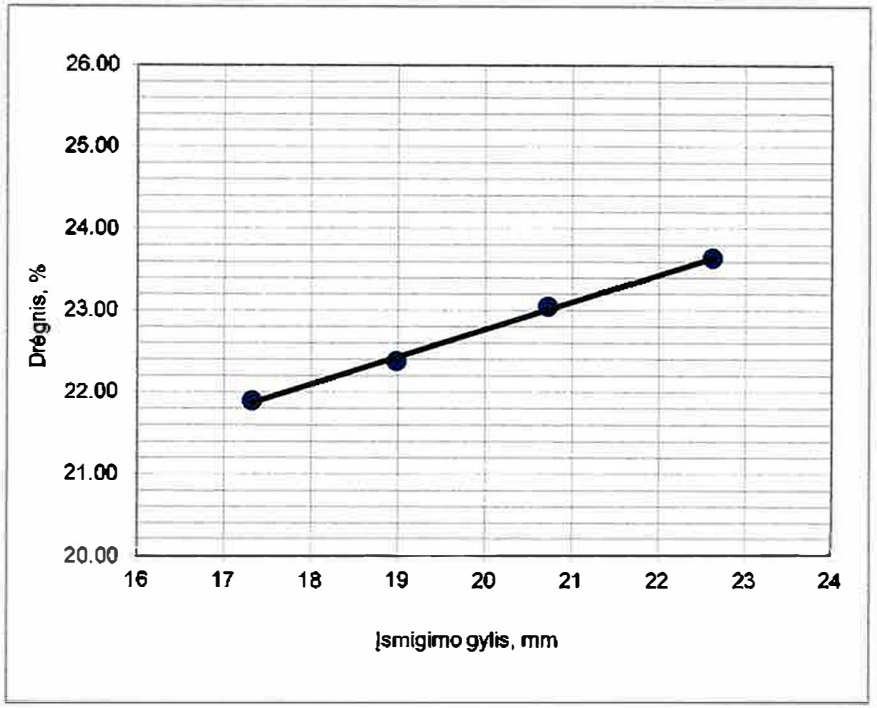
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**3**
Bandinio numeris:	**10**
Bandinio paėmimo gylis, m:	**15.4-15.6**
Grunto pavadinimas:	**Mažo plastiškumo molis (CIL)**

Grunto drėgnis:	**w, %**	**16.61**
Takumo drėgnis:	**W_L, %**	**22.8**
Plastingumo drėgnis:	**W_P, %**	**13.19**
Plastingumo rodiklis:	**I_P**	**9.61**
Takumo rodiklis:	**I_L**	**0.36**
Konsistencijos rodiklis:	**I_C**	**0.64**



Takumo drėgnis W_L, %				22.80
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.32	18.98	20.72	22.62
Biukso svoris, g	14.87	15.27	13.87	14.01
Biuksas+Gw, g	41.26	40.7	40.62	41.99
Biuksas+Gd, g	36.52	36.05	35.61	36.64
Drėgnis w, %	21.89	22.38	23.05	23.64

Plastingumo drėgnis W_P, %	13.19
Biukso svoris, g	9.92
Biuksas + Gw, g	31.55
Biuksas + Gd, g	29.03

Grunto drėgnis, w %	16.61
Biukso svoris, g	14.59
Biuksas + Gw, g	69.91
Biuksas + Gd, g	62.03

6.3.7 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

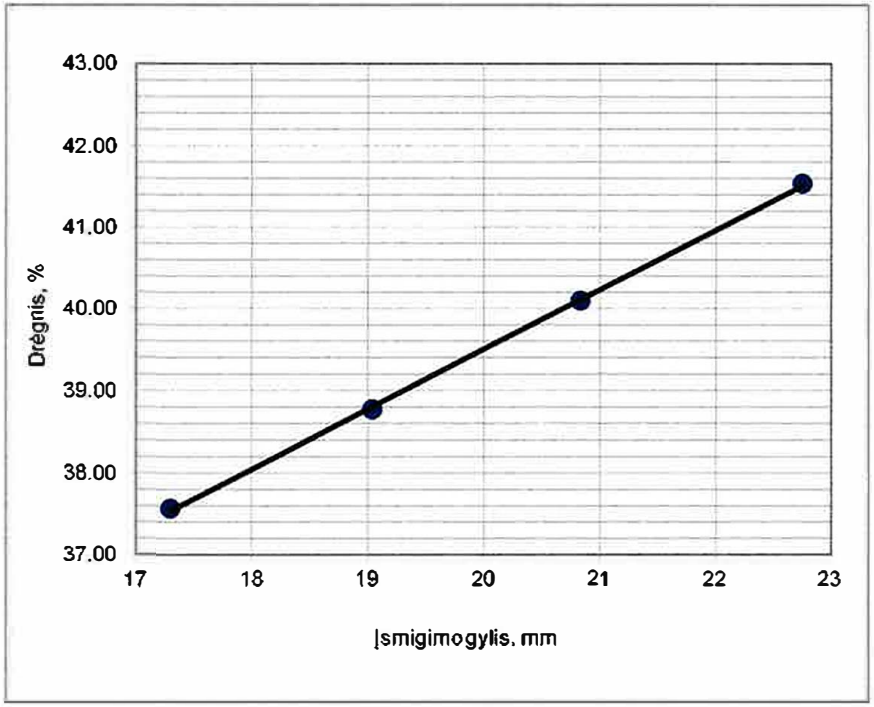
Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**3**
Bandinio numeris:	**15**
Bandinio paėmimo gylis, m:	**24.3-24.5**
Grunto pavadinimas:	**Vidutinio plastiškumo molis (CIM)**

Grunto drėgnis:	**w, %**	**25.14**
Takumo drėgnis:	**W_L, %**	**39.5**
Plastingumo drėgnis:	**W_p, %**	**17.36**
Plastingumo rodiklis:	**I_p**	**22.14**
Takumo rodiklis:	**I_L**	**0.35**
Konsistencijos rodiklis:	**I_C**	**0.65**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.04**

Takumo drėgnis W_L, %				**39.50**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.3	19.04	20.83	22.75
Biukso svoris, g	13.42	22.16	21.11	22.48
Biuksas+Gw, g	39.09	47.5	47.56	48.65
Biuksas+Gd, g	32.08	40.42	39.99	40.97
Drėgnis w, %	37.57	38.77	40.10	41.54



Plastingumo drėgnis W_p, %	**17.36**
Biukso svoris, g	9.1
Biuksas + Gw, g	29.92
Biuksas + Gd, g	26.84

Grunto drėgnis, w %	**25.14**
Biukso svoris, g	13.62
Biuksas + Gw, g	68.77
Biuksas + Gd, g	57.69

Gamtinis tankis, ρ_n, Mg/m³	**2.04**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	146.11

6.3.8 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

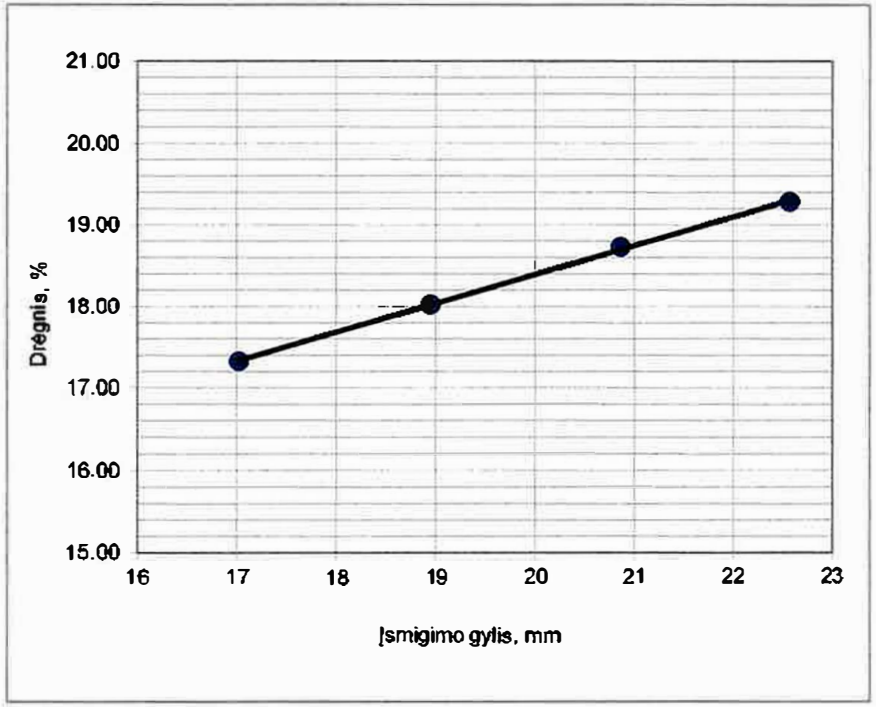
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018

Gręžinio numeris:	**3**
Bandinio numeris:	**16**
Bandinio paėmimo gylis, m:	**27.6-27.8**
Grunto pavadinimas:	**Dulkingas smėlis (slSa)**

Grunto drėgnis:	**w, %**	**19.46**
Takumo drėgnis:	**W_L, %**	**18.4**
Plastingumo drėgnis:	**W_P, %**	**N**
Plastingumo rodiklis:	**I_P**	
Takumo rodiklis:	**I_L**	
Konsistencijos rodiklis:	**I_C**	



Takumo drėgnis W_L, %				18.40
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.02	18.95	20.86	22.57
Biukso svoris, g	14.54	20.15	20.14	14.59
Biuksas+Gw, g	40.54	46.08	45.81	40.32
Biuksas+Gd, g	36.7	42.12	41.76	36.16
Drėgnis w, %	17.33	18.02	18.73	19.29

Plastingumo drėgnis W_P, %	N
Biukso svoris, g	
Biuksas + Gw, g	
Biuksas + Gd, g	

Grunto drėgnis, w %	19.46
Biukso svoris, g	14.76
Biuksas + Gw, g	81.92
Biuksas + Gd, g	70.98

6.3.9 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.03.06

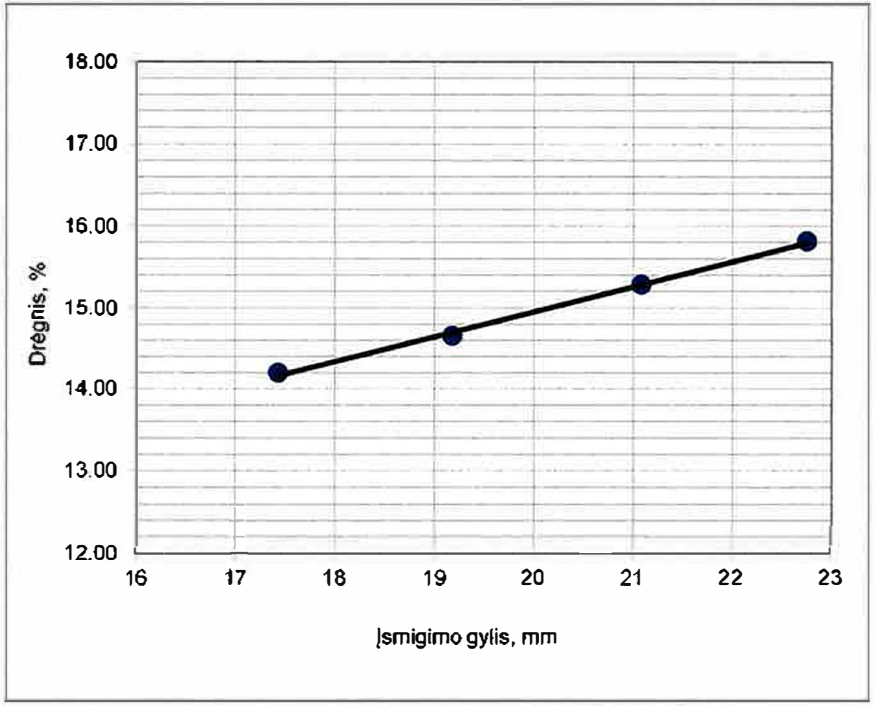
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015,

Gręžinio numeris:	**3**
Bandinio numeris:	**17**
Bandinio paėmimo gylis, m:	**29.4-29.6**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo molis ir dulkis (saCIL-saSIL)**

Grunto drėgnis:	**w, %**	**11.08**
Takumo drėgnis:	**W_L, %**	**15**
Plastingumo drėgnis:	**W_P, %**	**8.26**
Plastingumo rodiklis:	**I_P**	**6.74**
Takumo rodiklis:	**I_L**	**0.42**
Konsistencijos rodiklis:	**I_C**	**0.58**
Gamtinis tankis:	**ρ_w, Mg/m³**	**2.28**



Takumo drėgnis W_L, %				**15.00**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.43	19.18	21.08	22.75
Biukso svoris, g	15.28	13.87	13.95	15.26
Biuksas+Gw, g	41.18	39.22	39.9	42.36
Biuksas+Gd, g	37.96	35.98	36.46	38.66
Drėgnis w, %	14.20	14.65	15.28	15.81

Plastingumo drėgnis W_P, %	**8.26**
Biukso svoris, g	9.91
Biuksas + Gw, g	31.53
Biuksas + Gd, g	29.88

Grunto drėgnis, w %	**11.08**
Biukso svoris, g	15.04
Biuksas + Gw, g	65.35
Biuksas + Gd, g	60.33

Gamtinis tankis, ρ_w, Mg/m³	**2.28**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	158.29

6.3.10 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.03.06

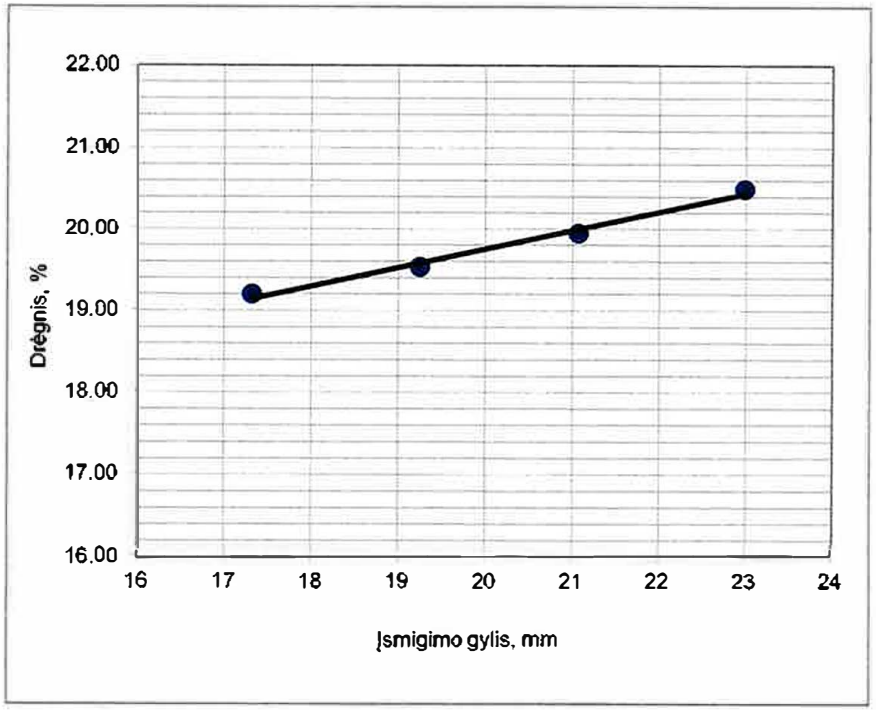
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015,

Gręžinio numeris:	**4**
Bandinio numeris:	**4**
Bandinio paėmimo gylis, m:	**4.8-5.0**
Grunto pavadinimas:	**Smėlingas mažp plastiškumo molis (saCIL)**

Grunto drėgnis:	**w, %**	**16.61**
Takumo drėgnis:	**W_L, %**	**19.8**
Plastingumo drėgnis:	**W_P, %**	**11.98**
Plastingumo rodiklis:	**I_P**	**7.82**
Takumo rodiklis:	**I_L**	**0.59**
Konsistencijos rodiklis:	**I_C**	**0.41**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.17**



Takumo drėgnis W_L, %				**19.80**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.32	19.25	21.07	22.99
Biukso svoris, g	14.66	13.46	14.97	14.76
Biuksas+Gw, g	40.86	41	41.49	41.16
Biuksas+Gd, g	36.64	36.5	37.08	36.67
Drėgnis w, %	19.20	19.53	19.95	20.49

Plastingumo drėgnis W_P, %	**11.98**
Biukso svoris, g	11.15
Biuksas + Gw, g	32.65
Biuksas + Gd, g	30.35

Grunto drėgnis, w %	**16.61**
Biukso svoris, g	13.46
Biuksas + Gw, g	72.01
Biuksas + Gd, g	63.67

Gamtinis tankis, ρ_n, Mg/m³	**2.17**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	152.87

Atliko:

6.3.11 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.03.06

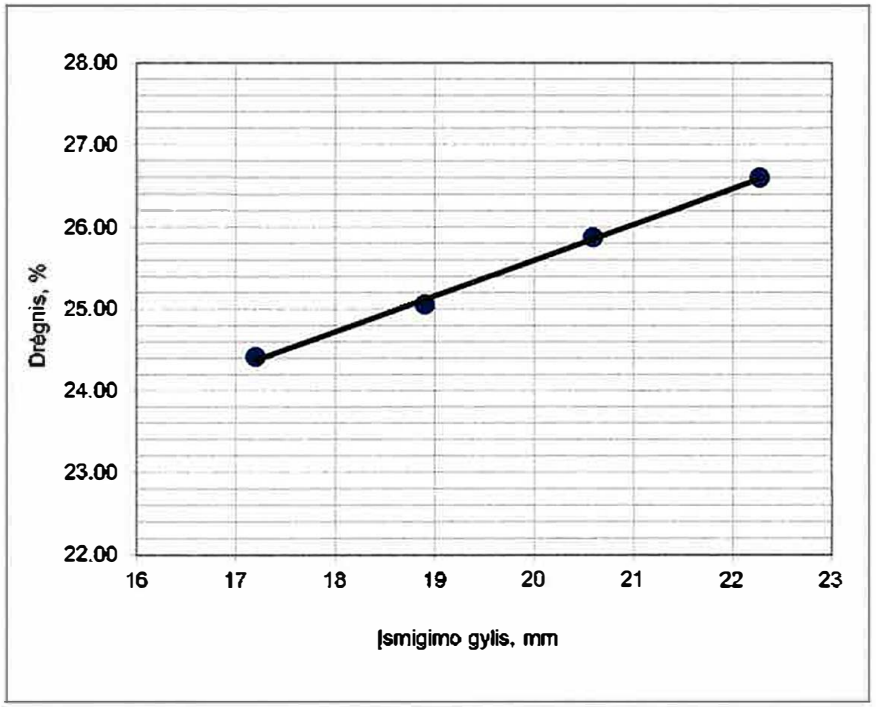
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018

Gręžinio numeris:	**4**
Bandinio numeris:	**10**
Bandinio paėmimo gylis, m:	**17.2-17.4**
Grunto pavadinimas:	**Dulkingas smėlis (siSa)**

Grunto drėgnis:	**w, %**	**24.75**
Takumo drėgnis:	**W_L %**	**25.6**
Plastingumo drėgnis:	**W_P, %**	**N**
Plastingumo rodiklis:	**I_P**	
Takumo rodiklis:	**I_L**	
Konsistencijos rodiklis:	**I_C**	



Takumo drėgnis W_L %				25.60
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.2	18.9	20.59	22.27
Biukso svoris, g	14.17	15.8	13.43	13.6
Biuksas+Gw, g	40.77	42.7	40.38	39.49
Biuksas+Gd, g	35.55	37.31	34.84	34.05
Drėgnis w, %	24.42	25.06	25.88	26.60

Plastingumo drėgnis W_P, %	N
Biukso svoris, g	
Biuksas + Gw, g	
Biuksas + Gd, g	

Grunto drėgnis, w %	24.75
Biukso svoris, g	14.66
Biuksas + Gw, g	70.21
Biuksas + Gd, g	59.19

6.3.12 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

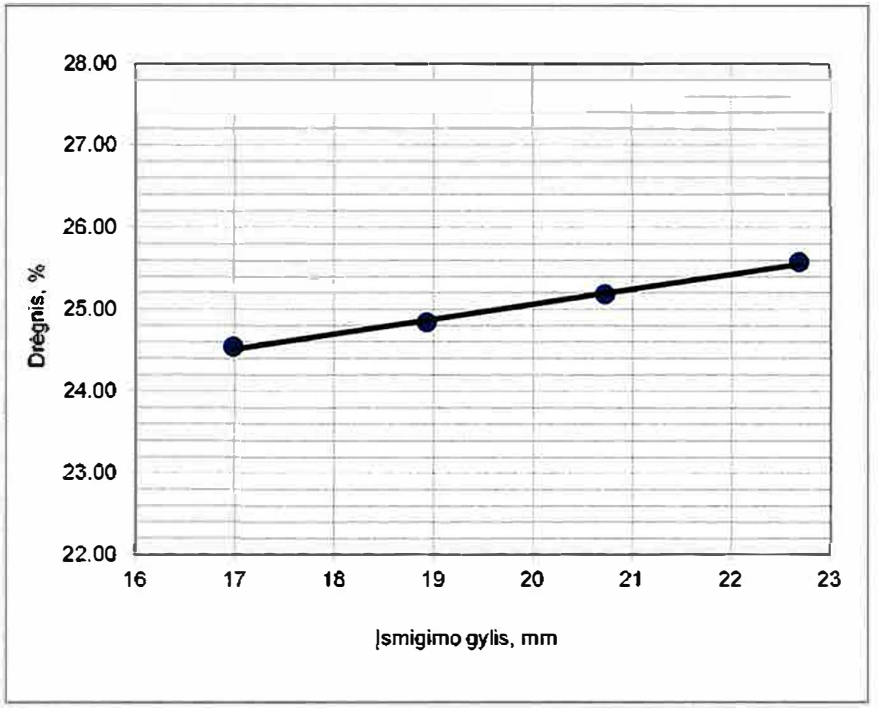
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**4**
Bandinio numeris:	**12**
Bandinio paėmimo gylis, m:	**21.8-22.0**
Grunto pavadinimas:	**Mažo plastiškumo molis (ClL)**

Grunto drėgnis:	**w, %**	**18.19**
Takumo drėgnis:	**W_L, %**	**25.1**
Plastingumo drėgnis:	**W_P, %**	**13.31**
Plastingumo rodiklis:	**I_P**	**11.79**
Takumo rodiklis:	**I_L**	**0.41**
Konsistencijos rodiklis:	**I_C**	**0.59**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.13**



Takumo drėgnis W_L %				**25.10**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.99	18.93	20.72	22.68
Biukso svoris, g	21.97	14.78	15.5	14.56
Biuksas+Gw, g	47.09	41.52	41.4	41.66
Biuksas+Gd, g	42.14	36.2	36.19	36.14
Drėgnis w, %	24.54	24.84	25.18	25.58

Plastingumo drėgnis W_P, %	**13.31**
Biukso svoris, g	11.15
Biuksas + Gw, g	32.69
Biuksas + Gd, g	30.16

Grunto drėgnis, w %	**18.19**
Biukso svoris, g	14.65
Biuksas + Gw, g	78.25
Biuksas + Gd, g	68.46

Gamtinis tankis, ρ_n, Mg/m³	**2.13**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	150.88

6.3.13 PRIEDAS

uab GeoFirma

Užsakovas: AB Vilniaus šilumos tinklai

Data: 2024.02.26

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

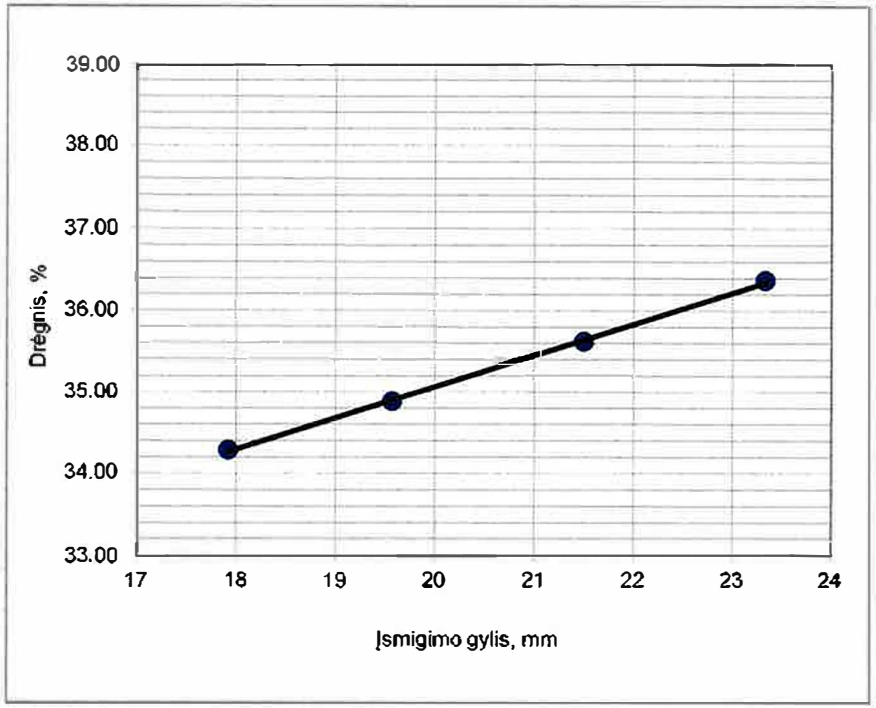
Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**4**
Bandinio numeris:	**15**
Bandinio paėmimo gylis, m:	**29.0-29.2**
Grunto pavadinimas:	**Vidutinio plastiškumo molis (ClM)**

Grunto drėgnis:	**w, %**	**23.58**
Takumo drėgnis:	**W_L %**	**35.1**
Plastingumo drėgnis:	**W_P, %**	**17.30**
Plastingumo rodiklis:	**I_P**	**17.80**
Takumo rodiklis:	**I_L**	**0.35**
Konsistencijos rodiklis:	**I_C**	**0.65**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.06**

Takumo drėgnis W_L %				**35.10**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.92	19.57	21.50	23.33
Biukso svoris, g	13.65	13.25	20.97	13.89
Biuksas+Gw, g	39.89	40.16	46.82	40.21
Biuksas+Gd, g	33.19	33.2	40.03	33.19
Drėgnis w, %	34.29	34.89	35.62	36.37



Plastingumo drėgnis W_P, %	**17.30**
Biukso svoris, g	11.02
Biuksas + Gw, g	33.26
Biuksas + Gd, g	29.98

Grunto drėgnis, w %	**23.58**
Biukso svoris, g	14.02
Biuksas + Gw, g	69.04
Biuksas + Gd, g	58.54

Gamtinis tankis, ρ_n, Mg/m³	**2.06**
Žiedo tūris V, mm³	49.89
Žiedo svoris, g	44.52
Žiedas + Gw, g	147.26

Atliko:

6.3.14 PRIEDAS

uab GeoFirma

Data: 26/02/2024

Grunto drėgnio ir tankio nustatymas
remiantis standartu LST CEN ISO/TS 17892-1 : 2015

Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Grėž.Nr- Bnd.Nr	Gylis, m	Indo svoris, g	Indas su drėgnu gruntu, g	Indas su sausu gruntu, g	Drėgnis, %	Bandinio svoris su žiedu, g	Tankis, Mg/m³	Žiedo V, mm³	Žiedo svoris, g
								49.89	44.52
1-4	4.8-5.0	13.88	64.81	57.05	17.98	151.97	2.15		
1-8	10.5-10.7	20.96	84.57	74.78	18.19	150.9	2.13		
2-4	4.8-5.0	13.26	74.26	65.75	16.21	154.01	2.19		
2-8	11.0-11.2	22.46	84	72.13	23.90	146.41	2.04		
3-4	5.0-5.2	14.25	70.13	58.07	27.52				
3-6	9.4-9.6	13.47	74.1	63.7	20.70				
3-8	12.5-12.7	15.05	75.18	65.78	18.53	149.22	2.10		
3-10	15.4-15.6	14.59	69.91	62.03	16.61				
3-15	24.3-24.5	13.62	68.77	57.69	25.14	146.11	2.04		
3-16	27.6-27.8	14.76	81.92	70.98	19.46				
3-17	29.4-29.6	15.04	65.35	60.33	11.08	158.29	2.28		
4-4	4.8-5.0	13.46	72.01	63.67	16.61	152.87	2.17		
4-7	10.0-10.2	14.27	74.28	64.46	19.57				
4-10	17.2-17.4	14.66	70.21	59.19	24.75				
4-12	21.8-22.0	14.65	78.25	68.46	18.19	150.88	2.13		
4-15	29.0-29.2	14.02	69.04	58.54	23.58	147.26	2.06		

uab GeoFirma

Data: 13/02/2024

Grunto kietųjų dalelių tankio tyrimo rezultatai. Piknometrinis metodas

Vadovaujantis standartu LST CEN ISO/TS 17892-3 : 2015

Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Grežinio, bandinio Nr.	Gylis, m	m_0	m_1	m_2	m_3	m_4	T, °C	ρ_w, Mg/m^3	ρ_s, Mg/m^3
1-4	4.8-5.0	46.09	145.355	62.029	155.44	15.939	20	0.99823	2.718
1-8	10.5-10.7	46.117	146.333	61.776	156.157	15.659	20	0.99823	2.679
2-4	4.8-5.0	44.128	143.289	61.937	154.581	17.809	20	0.99823	2.728
2-8	11.0-11.2	45.499	144.84	61.12	154.834	15.621	20	0.99823	2.771
3-4	5.0-5.2	46.439	145.911	62.907	156.188	16.468	20	0.99823	2.655
3-6	9.4-9.6	44.81	145.593	62.337	156.606	17.527	20	0.99823	2.686
3-8	12.5-12.7	46.193	145.817	61.767	155.627	15.574	20	0.99823	2.697
3-10	15.4-15.6	44.126	143.262	60.288	153.498	16.162	20	0.99823	2.722
3-15	24.3-24.5	46.301	146.625	62.471	156.954	16.17	20	0.99823	2.763
3-16	27.6-27.8	46.071	146.333	62.285	156.508	16.214	20	0.99823	2.680
3-17	29.4-29.6	46.194	145.839	62.819	156.279	16.625	20	0.99823	2.683
4-4	4.8-5.0	46.023	145.268	62.221	155.466	16.198	20	0.99823	2.695
4-7	10.0-10.2	46.068	146.308	61.879	156.221	15.811	20	0.99823	2.676
4-10	17.2-17.4	46.171	145.402	62.691	155.758	16.52	20	0.99823	2.675
4-12	21.8-22	46.116	146.313	61.704	156.19	15.588	20	0.99823	2.725
4-15	29.0-29.2	46.09	145.335	61.358	155.067	15.268	20	0.99823	2.753

Atliko:

Tikrino:

6.5 PRIEDAS

uab GeoFirma	Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.			
	Struktūra: rekonstruota	Gr. 2	Pav. 4	Paėmimo gylis: 4.8 - 5.0 m
	Grunto pavadinimas	***Mažo plastiškumo molis***		***ClL***

TIESIOGINIO KIRPIMO BANDYMAS (CD) (ISO 17892-10:2018)

Prietaisas: UBM-1. Kirpimo aparatas

Grunto fizikiniai rodikliai

Dalelių tankis ρ_s, Mg/m^3	Grunto tankis ρ, Mg/m^3	Sauso grunto tankis ρd, Mg/m^3	Gamtinis drėgnis w, %	Poringumo koeficientas e, v.d.	Sotles laipsnis S_r, v.d.
2.728	2.20	1.89	16.21	0.441	1.00

Žiedo matmenys

H, mm	25
D, mm	71.4
V, mm^3	100098

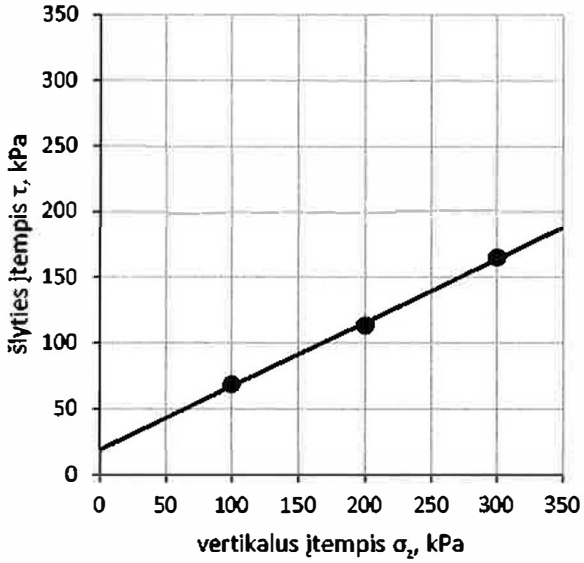
Pradiniai bandinio matmenys

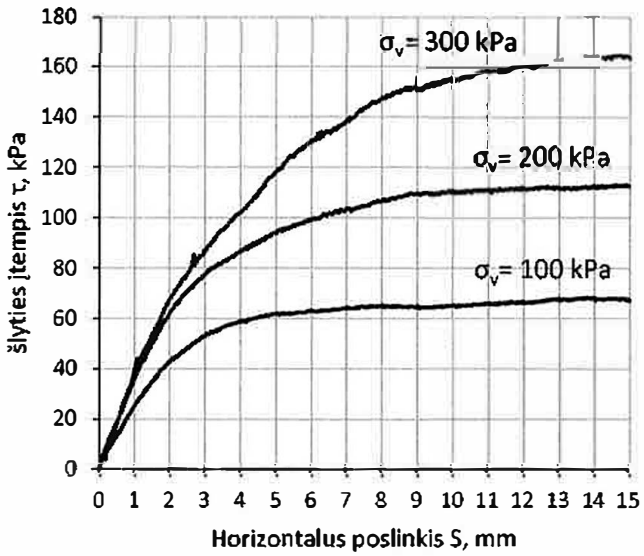
Nr.	H_0, mm	D_0, mm	A_0, mm^2
1.	25	71.4	4000
2.	25	71.4	4000
3.	25	71.4	4000

Bandymo duomenys

σ_z, kPa	τ, kPa	ρ, Mg/m^3	w, %
100	68.47	2.20	16.21
200	113.13	2.19	16.21
300	164.68	2.20	16.21

Kirpimo greitis: 0.05 mm/min





Bandymo rezultatai

tan φ'	**0.5**
φ', °	**25.6**
c', kPa	**19.4**

Atliko:

Tikrino:

Data:

uab GeoFirma	Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.			
	Struktūra: rekonstruota	Gr. 2	Pav. 8	Paėmimo gylis: 11.0 - 11.2 m
	Grunto pavadinimas	***Vidutinio plastiškumo molis***		***CIM***

TIESIOGINIO KIRPIMO BANDYMAS (CD) (ISO 17892-10:2018)

Prietaisas: UBM-1. Kirpimo aparatas

Grunto fizikiniai rodikliai

Dalelių tankis ρ_s, Mg/m^3	Grunto tankis ρ, Mg/m^3	Sauso grunto tankis ρd, Mg/m^3	Gamtinis drėgnis w, %	Poringumo koeficientas e, v.d.	Soties laipsnis S_r, v.d.
2.771	2.08	1.68	23.90	0.651	1.02

Žiedo matmenys

H, mm	25
D, mm	71.4
V, mm^3	100098

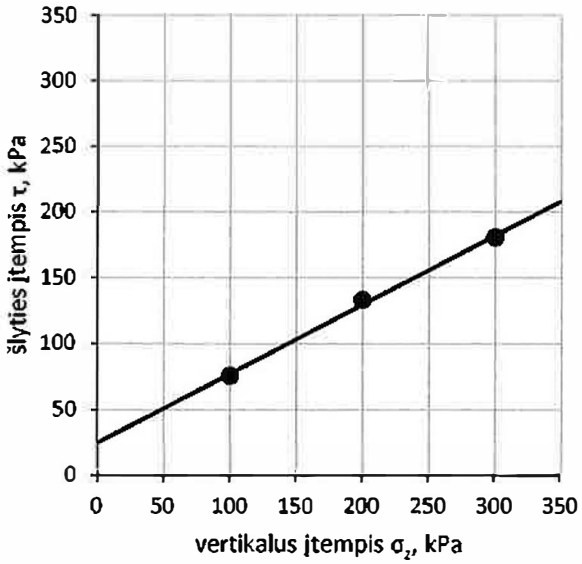
Pradiniai bandinio matmenys

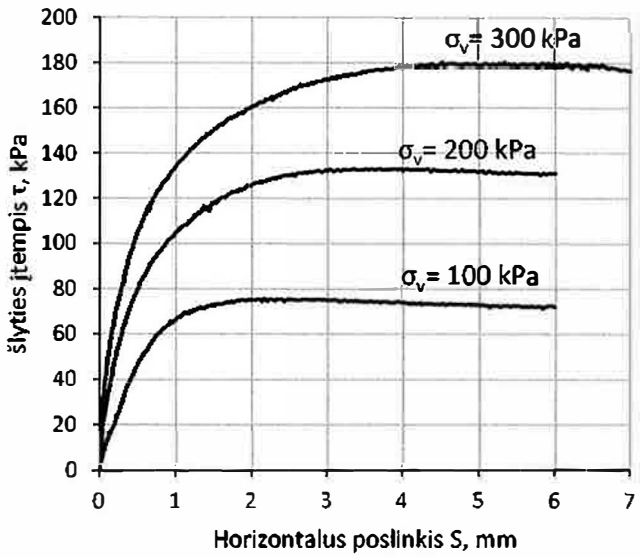
Nr.	H_0, mm	D_0, mm	A_0, mm^2
1.	25	71.4	4000
2.	25	71.4	4000
3.	25	71.4	4000

Bandymo duomenys

σ_z, kPa	τ, kPa	ρ, Mg/m^3	w, %
100	75.76	2.08	23.90
200	133.11	2.08	23.90
300	180.45	2.08	23.90

Kirpimo greitis: 0.05 mm/min





Bandymo rezultatai

tan φ'	**0.5**
φ', °	**27.5**
c', kPa	**25.8**

Atliko:

Tikrino:

Data: 2024-02-25

uab GeoEirma	Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.			
	Struktūra: rekonstruota	Gr. 3	Pav. 6	Paėmimo gylis: 9.4 - 9.6 m
	Grunto pavadinimas	***Smėlingas mažo plastiškumo dulkis***		***saSiL***

TIESIOGINIO KIRPIMO BANDYMAS (CD) (ISO 17892-10:2018)

Prietaisas: UBM-1. Kirpimo aparatas

Grunto fizikiniai rodikliai

Dalelių tankis ρ_s, Mg/m^3	Grunto tankis ρ, Mg/m^3	Sauso grunto tankis ρd, Mg/m^3	Gamtinis drėgnis w, %	Poringumo koeficientas e, v.d.	Soties laipsnis S_r, v.d.
2.686	2.08	1.72	20.70	0.56	1.00

Žiedo matmenys

H, mm	25
D, mm	71.4
V, mm^3	100098

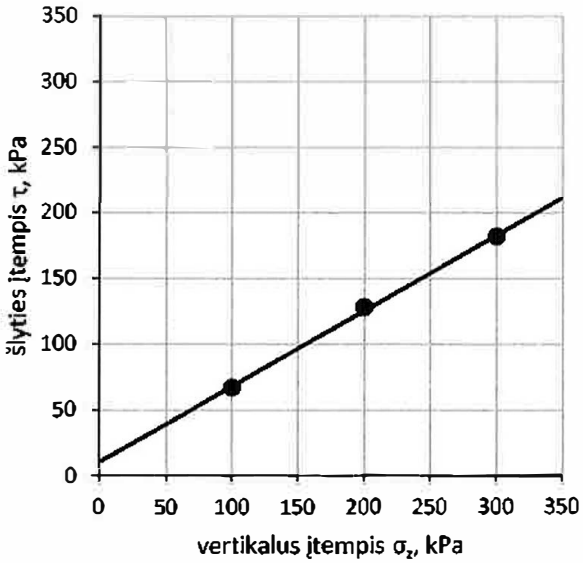
Pradiniai bandinio matmenys

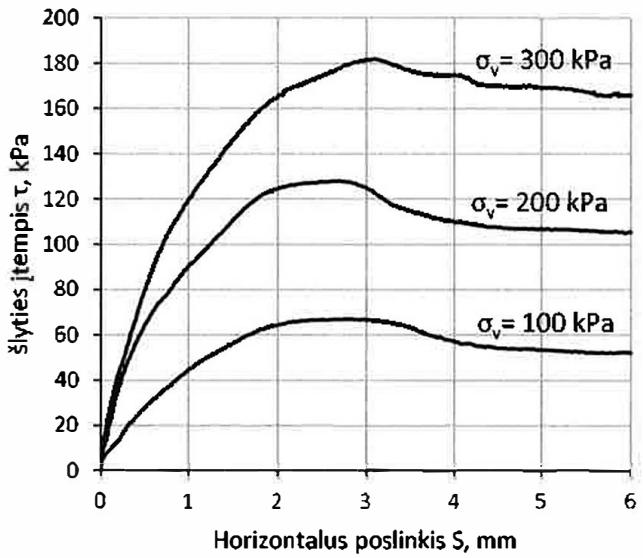
Nr.	H_0, mm	D_0, mm	A_0, mm^2
1.	25	71.4	4000
2.	25	71.4	4000
3.	25	71.4	4000

Bandymo duomenys

σ_z, kPa	τ, kPa	ρ, Mg/m^3	w, %
100	67.04	2.08	20.70
200	128.00	2.08	20.70
300	181.86	2.08	20.70

Kirpimo greitis: 0.05 mm/min





Bandymo rezultatai

tan φ'	**0.6**
φ', °	**29.7**
c', kPa	**11.6**

Atliko:

Tikrino:

Data:

uab GeoFirma	Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.			
	Struktūra: rekonstruota	Gr. 3	Pav. 8	Paėmimo gylis: 12.5 - 12.7 m
	Grunto pavadinimas	***Smėlingas mažo plastiškumo molis***		***saCiL***

TIESIOGINIO KIRPIMO BANDYMAS (CD) (ISO 17892-10:2018)

Prietaisas: UBM-1. Kirpimo aparatas

Grunto fizikiniai rodikliai

Dalelių tankis ρ_s, Mg/m^3	Grunto tankis ρ, Mg/m^3	Sauso grunto tankis pd, Mg/m^3	Gamtinis drėgnis w, %	Poringumo koeficientas e, v.d.	Soties laipsnis S_r, v.d.
2.697	2.13	1.80	18.53	0.501	1.00

Žiedo matmenys

H, mm	25
D, mm	71.4
V, mm^3	100098

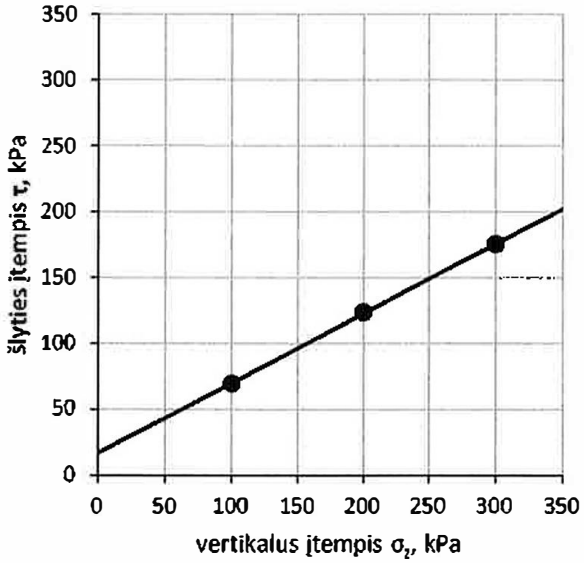
Pradiniai bandinio matmenys

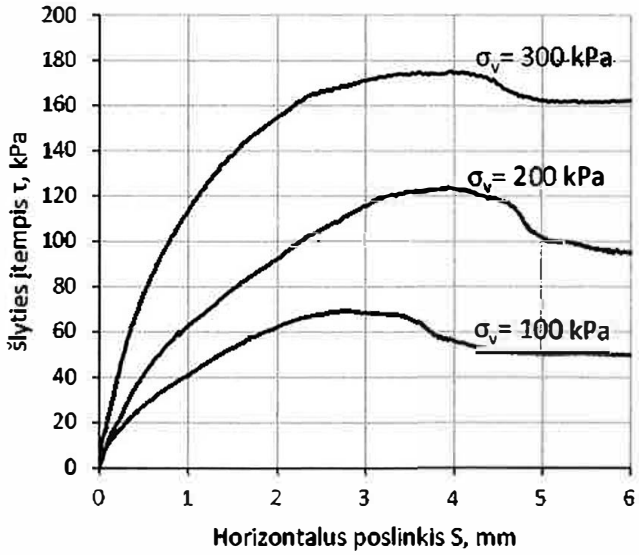
Nr.	H_0, mm	D_0, mm	A_0, mm^2
1.	25	71.4	4000
2.	25	71.4	4000
3.	25	71.4	4000

Bandymo duomenys

σ_z, kPa	τ, kPa	ρ, Mg/m^3	w, %
100	69.55	2.13	18.53
200	123.62	2.12	18.53
300	175.34	2.13	18.53

Kirpimo greitis: 0.05 mm/min





Bandymo rezultatai

tan φ'	**0.5**
φ', °	**27.9**
c', kPa	**16.8**

Atliko:

Tikrino:

Data:

Dokumentą elektroniniu
parašu pasirašė
Data: 2020-07-01 11:34:42

PATVIRTINTA
Lietuvos geologijos tarnybos prie Aplinkos ministerijos
direktoriaus 2020 m. birželio 11 d. įsakymu Nr. 1-207

LIETUVOS GEOLOGIJOS TARNYBA PRIE APLINKOS MINISTERIJOS

LEIDIMAS TIRTI ŽEMĖS GELMES

2020-07-01 Nr. 155
Vilnius

UAB „GeoFirma"
(juridinio asmens duomenys kaupiami ir saugomi Juridinių asmenų registre, kodas 302555562, adresas Vilnius, Konstitucijos pr. 8A)

leidžiama atlikti:

požeminio vandens paiešką ir žvalgybą,

geoterminės energijos paiešką ir žvalgybą,

inžinerinį geologinį (geotechninį) tyrimą,

ekogeologinį tyrimą.

Direktorius (pareigų pavadinimas) A.V. _____ (parašas) (vardas ir pavardė)

KALIBRAVIMO LIUDIJIMAS Nr. K-0000437

Užsakovas	Į.k. 302555562 UAB GEOFIRMA Konstitucijos pr. 8A, LT-09308 Vilnius
Kalibruotas objektas	Tenzozondas CPT Nr. GL 0456 Kūgio spaudimo jėgos matavimo ribos: (0...100) kN (plotas 10 cm²; 100 kN atitinka 100 MPa) Šoninės trinties jėgos matavimo ribos: (0...15) kN (plotas 150 cm²; 15kN atitinka 1 Mpa) Indikatorius GRL 1503
Objekto būklė	MP neturi mechaninių ar kitokių pažeidimų
Kalibravimo metodas	Kalibravimo procedūra J2-02 (2018-12-13), 1 leidimas
Kalibravimą atliko	UAB "Nordic Metrology Science"Jungtinė laboratorija.Vilniaus regiono laboratorija, Dariaus ir Girėno g. 38, LT-02189, Vilnius
Kalibravimo atlikimo vieta	Ganyklų g. 15, Tauragė
Aplinkos sąlygos	Aplinkos temperatūra 21,2 ± 1 °C
Kalibravimo data	2023-08-25
Sietis	Matavimai buvo atlikti su šiais, kalibravimo būdu susietais etalonais: Etaloninis dinamometras susidedantis iš MGS plus, ML38B Nr. 801229358; Z4A/50 kN Nr.184930037; C18/500 kN Nr.002874TY
Kalibravimo liudijimo išdavimo data	2023-08-25
Inžinierius metrologas	

Dokumentą elektroniniu parašu pasirašė 2023-08-28 16:29:14

KALIBRAVIMO LIUDIJIMAS Nr. K-0000437
KALIBRAVIMO REZULTATAI

Tenzozondas CPT Nr. GL 0456

Apkrovos vardinė vertė (P),	Tenzozondo rodmenų vidurkis, (F_R)	Paklaida (ΔF),		Išplėstinė neapibrėžtis, (±U)	
kN	kN	kN	%	kN	%
Šoninė trintis					
0,6	0,590	-0,010	-1,67	± 0,006	± 0,96
1,5	1,480	-0,020	-1,33	± 0,006	± 0,39
3	2,970	-0,030	-1,00	± 0,006	± 0,19
6	5,987	-0,013	-0,22	± 0,029	± 0,49
9	8,967	-0,033	-0,37	± 0,029	± 0,33
15	14,94	-0,06	-0,42	± 0,03	± 0,20
Kūgis					
0,5	0,50	0,00	0,00	± 0,01	± 1,15
5	5,01	0,01	0,27	± 0,03	± 0,59
10	10,04	0,04	0,43	± 0,03	± 0,29
20	20,09	0,09	0,47	± 0,03	± 0,15
30	30,12	0,12	0,41	± 0,03	± 0,10
40	40,15	0,15	0,38	± 0,03	± 0,07
50	50,18	0,18	0,37	± 0,03	± 0,06

Prieš kalibravimą matavimo priemonė buvo apkrauta Max apkrova

Išmatuota jėga (F) lygi rodmens (F_R) ir paklaidos (ΔF) skirtumui su išplėstine neapibrėžtimi (± U)

$$F = (F_R - \Delta F) \pm U$$

Nurodytos vertės taikomos kalibruojamo objekto būklei kalibravimo metu

Išplėstinė neapibrėžtis apskaičiuota sumine standartine neapibrėžtį padauginus iš koeficiento k=2, kuris, esant normaliniam skirstiniui, atitinka 95% pasikliautinumo lygmenį. Standartinė neapibrėžtis paskaičiuota pagal EA-4/02M.

Kalibravimo rezultatai susiję tik su kalibruojamu objektu.

Inžinierius metrologas

Kalibravimo liudijimas gali būti dauginamas tik pilnai. Atskiras kalibravimo liudijimo dalis galima dauginti tik gavus raštišką kalibravimo laboratorijos leidimą.

METROLOGIJOS CENTRAS

LIETUVOS NACIONALINIS AKREDITACIJOS BIURAS

KALIBRAVIMAS
ISO/IEC 17025 Nr. LA. 02.023

METROLOGIJOS CENTRAS
Nr. LA.02.023
KALIBRAVIMO LIUDIJIMO
Data: 2020-03-18
Nr. 071938

KALIBRAVIMO LIUDIJIMAS
Nr. 071938

Puslapių skaičius	2
Puslapis	1
Savininkas	UAB INOVĖ (Taikos pr. 25, Kaunas), įm.k. 303315214, užsakymo Nr. UZ-20662
Kalibruotas objektas	Indikatorius, SHANE tipo, Nr. SH1807A2484, matavimo ribos 25,4 mm, padalos vertė 0,01 mm
Kalibravimo metodas	Kalibravimas atliekamas pagal kalibravimo procedūrą KM G 2001 07 (2012-02-01)
Kalibravimo atlikimo vieta	Kauno regiono laboratorija, E. Ožeškienės g. 25, LT-44254 Kaunas, kaunas@vmc.lt +3705 2333393
Aplinkos sąlygos	Temperatūra: 20,1 °C Santykinė drėgmė: 31 %
Kalibravimo periodas (data)	2020-03-18
Rezultatai	Žiūrėti 2 puslapį, kalibravimo protokolo Nr. 20662-3-1
Sietis	Matavimai buvo atlikti su šiais, kalibravimo būdu, susietais etalonais: galiniai ilgio matai, MKП tipo, (0,5...100) mm, Nr. 734150
Kalibravimo liudijimo išdavimo data	2020-03-18

Vyr. inžinierius metrologas

AB VILNIAUS METROLOGIJOS CENTR

Kalibravimo rezultatai susiję tik su kalibruojamuoju objektu.
Neapibrėžtis. Išplėstinė neapibrėžtis apskaičiuota sumine standartine neapibrėžtį padauginus iš koeficiento k =2, kuris, esant normaliniam skirstiniui, atitinka 95 % pasikliautinumo lygmenį. Standartinė neapibrėžtis apskaičiuota pagal EA-

AB „Vilniaus metrologijos centras"
Dariaus ir Girėno g. 23
LT-02189 Vilnius, LIETUVA
Tel. (8 5) 2333393
El. paštas vmc@vmc.lt
Internetas www.vmc.lt

Nacionalinis akreditacijos biuras yra Europos akreditacijos organizacijos (EA) Daugiašalių pripažinimo susitarimų signataras kalibravimo laboratorijų akreditavimo srityje ir Tarptautinės laboratorijų akreditacijos organizacijos (ILAC) Daugiašalių pripažinimo susitarimų signataras kalibravimo laboratorijų akreditavimo srityje.

Kalibravimo liudijimas gali būti dauginamas tik pilnai. Atskiras kalibravimo liudijimo dalis galima dauginti tik gavus raštišką kalibravimo laboratorijos leidimą.

KALIBRAVIMO LIUDIJIMAS
Nr. 071938

Puslapių skaičius 2
Puslapis 2

KALIBRAVIMO REZULTATAI

Kalibruojamo taško vardinė vertė, mm	Paklaida, mm	Išplėstinė neapibrėžtis, ±mm
1	0,000	0,013
5	0,003	
10	0,010	

Inžinierė metrologė

METROLOGIJOS CENTRAS

ILAC-MRA

LIETUVOS NACIONALINIS AKREDITACIJOS BIURAS

KALIBRAVIMAS
ISO/IEC 17025

Nr. LA. 02.023

KALIBRAVIMO LIUDIJIMAS
Nr. 072514

Puslapių skaičius	2
Puslapis	1
Savininkas	UAB INOVĖ, įm. k. 303315214
Kalibruotas objektas	Universali bandymų mašina UBM-1 jutiklis YGX-D104, numeris 201605485 matavimo ribos iki 5000 N
Kalibravimo metodas	Kalibravimas atliekamas pagal kalibravimo procedūrą KM M 2001 09 (2014-03-17)
Kalibravimo atlikimo vieta	E. Ožeškienės g.25, Kaunas
Aplinkos sąlygos	Temperatūra: 21,4 °C Santykinė drėgmė: 34%
Kalibravimo periodas (data)	2020-03-16
Rezultatai	Žiūrėti 2 puslapį. Kalibravimo protokolo Nr. 20662-1-1
Sietis	Matavimai buvo atlikti su šiais, kalibravimo būdu, susietais etalonais: etaloninis dinamometras Z30A/5 kN , Nr. 182030114 su matavimo stiprintuvu MGCplus Nr. 801229358.
Kalibravimo liudijimo išdavimo data	2020-03-16

AB VILNIAUS ROLOGIJOS CENT

Neapibrėžtis. Išplėstinė neapibrėžtis apskaičiuota sumine standartinę neapibrėžtį padauginus iš koeficiento k=2, kuri, esant normaliajam skirstiniui, atitinka 95% pasikliautinumo lygmenį. Standartinė neapibrėžtis paskaičiuota pagal EA-4/02M.

AB „Vilniaus metrologijos centras"
Dariaus ir Girėno g. 23
LT-02189 Vilnius, LIETUVA
Tel. (8 5) 2333393
El. paštas vmc@vmc.lt
Internetas www.vmc.lt

Nacionalinis akreditacijos biuras yra Europos akreditacijos organizacijos (EA) Daugiašalių pripažinimo susitarimų signalaras kalibravimo laboratorijų akreditavimo srityje ir Tarptautinės laboratorijų akreditacijos organizacijos (ILAC) Daugiašalių pripažinimo susitarimų signalaras kalibravimo laboratorijų akreditavimo srityje.

Kalibravimo liudijimas gali būti dauginamas tik pilnai. Atskiras kalibravimo liudijimo dalis galima dauginti tik gavus raštišką kalibravimo laboratorijos leidimą.

KALIBRAVIMO LIUDIJIMAS
Nr. 072514

KALIBRAVIMO REZULTATAI

Kalibravimo taškas	Bandymų mašinos matavimo paklaida kalibravimo taške, N	Bandymų mašinos matavimo paklaidos išplėstinė neapibrėžtis, %
1000 N	1,5	± 0,307
2500 N	3,1	± 0,146
5000 N	5,7	± 0,096

Nurodytos vertės taikomos bandymų mašinos būklei kalibravimo metu.
Prieš darbų pradžią matavimo priemonė buvo išbandyta Max apkrova.

Vyresnysis inžinierius metrologas

Statybos techninio reglamento
STR 1.04.02:2011
„Inžineriniai geologiniai (geotechniniai)
tyrimai“ 2 priedas

(Techninės užduoties forma)

AB „Vilniaus šilumos tinklai“
Dokumento sudarytojo pavadinimas

TECHNINĖ UŽDUOTIS

2024-01-29 Nr. 23031S1TP-XX-TP-SK_GTU-02

IGG tyrimų stadija (pabraukti): žvalgybiniai, projektiniai, papildomi, kontroliniai.

Tyrimų objekto pavadinimas: Kitos paskirties pastato (siurblinės), Gamyklos g. 10 Vilniaus m., statybos projektas.

Tyrimų objekto adresas (savivaldybė, seniūnija, gyvenvietė, gatvė, statinio numeris): Gamyklos g. 10, Vilniaus m.

Užsakovo duomenys (pavadinimas (v. pavardė), adresas, telefono ryšio Nr., el. pašto adresas): AB „Vilniaus šilumos tinklai“, Elektrinės g. 2, LT-03150 Vilnius, info@chc.lt

Projektuotojo duomenys (pavadinimas (v. pavardė), adresas, telefono ryšio Nr., el. pašto adresas): UAB TEC Industry, Savanorių pr. 109, 4 a., Kaunas, +37061412579, tomas.prusinskas@tec.lt

Statybos rūšis (pabraukti): nauja statyba, rekonstrukcija, kapitalinis remontas, kita

Statinio paskirtis: kitos paskirties pastatas, kitos paskirties inžinerinis statinys

Statinio kategorija (pabraukti): ypatingasis, neypatingasis, nesudėtingasis

Nekilnojamųjų kultūros vertybių registro kodas (jei yra): -

Geotechninė kategorija (projektiniuose tyrimuose) (pabraukti): pirma, antra, trečia.

Duomenys apie statinio parametrus (ilgis, plotis, aukštis, gylis, plotas):
01 – siurblinė (orientaciniai 15,1x13,1m gabaritai plane, aukštis 8,1m);
02 - akumuliacinė talpa (3000 m^3 talpos, orientacinis gabaritas 13 m skersmens, 26 m aukštis).

Perduodamos į pagrindą apkrovos ir jų intensyvumas: nustatoma projektavimo metu.

Tyrimų ploto ribų koordinatės:

Numeris	X	Y
1.	6053169.55	581685.84
2.	6053205.26	581690.62
3.	6053201.52	581728.00
4.	6053164.64	581724.20

Papildomai nustatomi geotechniniai parametrai ir kiti reikalavimai:

1. Išgręžti 4 gręžinius **SZ-1. CPT1; SZ-2. CPT-2; SZ-3. CPT-3; SZ4. CPT4.** Greta gręžinių atlikti statinio zondavimo bandymus.
2. Tyrimo vietos nurodytos topografiniame plane (pridedama **23031S1TP-XX-TP-SK_GTU-01**). Gręžinių gylis ir koordinatės:

Gręžinio numeris	X	Y	Min. gylis nuo žemės paviršiaus, m
SZ-1. CPT-1	6053169.95	581697.21	15
SZ-2. CPT-2	6053189.20	581693.25	15
SZ-3. CPT-3	6053189.68	581704.28	30
SZ-4. CPT-4	6053196.98	581725.98	30

3. Nustatyti gruntinio vandens slūgsojimo gylį.
4. Aptikus smulkiuosius gruntus, pateikti efektyviąją sankibą c'.
5. Gruntų charakteristikas ir rodiklius pateikti, suderinus su laboratorinių tyrimų rezultatais, pagal zondavimo duomenis.
6. Esant sudėtingoms geologinėms sąlygoms spręsti dėl papildomų gręžinių būtinumo, bei gręžinių gylio pakeitimo.
7. Pateikti inžinerinių geologinių tyrinėjimų ataskaitą.
8. Gręžinių vietas galima nežymiai keisti dėl esamų inžinerinių komunikacijų ar kitų kliūčių.

Sąrašas normatyvinių dokumentų, kuriais vadovaujantis atliekami tyrimai:

1. STR 01.04.02:2011 „Inžineriniai geologiniai ir geotechniniai tyrimai"
2. STR 2.05.21:2016. Geotechninis projektavimas. Bendrieji reikalavimai

Anksčiau sklype atlikti geologiniai tyrimai:

1. .....

vardas, pavardė, parašas, data

..... 2024-01-29

vardas,

ŽEMĖS GELMIŲ GEOLOGINIŲ TYRIMŲ REGISTRACIJOS LAPAS

1. Tyrimo užsakovas AB Vilniaus šilumos tinklai, reg.kodas 124135580, Vilniaus apskr., Vilniaus m. sav., Vilniaus m., Elektrinės g. 2

(juridinio asmens pavadinimas, teisinė forma, kodas, buveinės adresas; arba fizinio asmens vardas, pavardė, asmens kodas, gyvenamosios vietos adresas; arba juridinių ir (ar) fizinių asmenų grupės, veikiančios pagal jungtinės veiklos sutartį, šalių vardai, pavardės, pavadinimai, juridinių asmenų teisinės formos, kodai, jungtinės veiklos sutarties sudarymo data ir numeris)

2. Tyrimo vykdytojas UAB "GeoFirma", reg.kodas 302555562, Vilniaus apskr., Vilniaus m. sav., Vilniaus m., Konstitucijos pr. 8A

(juridinio asmens pavadinimas, teisinė forma, kodas, buveinės adresas; arba fizinio asmens vardas, pavardė, asmens kodas, gyvenamosios vietos adresas; arba juridinių ir (ar) fizinių asmenų grupės, veikiančios pagal jungtinės veiklos sutartį, šalių vardai, pavardės, pavadinimai, juridinių asmenų teisinės formos, kodai, jungtinės veiklos sutarties sudarymo data ir numeris)

3. Leidimo tirti žemės gelmes Nr. 155 , išdavimo data 2010-11-16

4. Tyrimo būdas: Tiesioginis

5. Tyrimo rūšis: Inžinerinis geologinis ir geotechninis tyrimas, II-a geotechninė kategorija

6.Tyrimų tikslas ir (ar) etapas II geotechninės kategorijos projektiniai inžineriniai geologiniai ir geotechniniai tyrimai. Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

7. Duomenys apie tyrimo objektą

Tyrimo objekto tipas	objektai: katilinės, elektros ir energetikos obj.
Tyrimo objekto pavadinimas	Siurblinė Gamyklos g. 10, Vilniaus m.
Tyrimo objekto adresas	Vilniaus apskr., Vilniaus m. sav., Vilniaus m., Gamyklos g. 10
Tyrimo ploto ribos arba tyrimų vietos koordinatės (1994 metų Lietuvos koordinačių sistemoje)	Elementas Nr.1: Nr.1 6053170 581686; Nr.2 6053165 581724; Nr.3 6053202 581728; Nr.4 6053205 581691;

8. Tyrimo pradžios data 2024-02-12 , tyrimo pabaigos data 2024-05-13

9. Tyrimo dokumento (-ų) (ataskaitos(-ų)) pavadinimas (-ai)

	Pateikimo data
Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m. II geotechninės kategorijos projektinių inžinerinių geologinių ir geotechninių tyrimų ataskaita	2024-05-13

10. Pridedami dokumentai: Techninė užduotis

(darbų programa, techninė užduotis, projektas)

Užpildė:

Pareigų pavadinimas	Geologė
Vardas, Pavardė	
Data	2024-02-12
Telefono numeris	
El. paštas	info@geofirma.lt

Paraiškos registracijos Nr. ŽGT-2024-600 Paraiškos pateikimo data 2024-02-12

Tyrimo identifikavimo numeris Žemės gelmių registre	47951-2024
Tyrimo įregistravimo Žemės gelmių registre data	2024-03-07

Žemės gelmių registro tvarkytojo pastabos:

uab GeoFirma

KITOS PASKIRTIES PASTATO (SIURBLINĖS) GAMYKLOS G. 10, VILNIAUS M. STATYBOS PROJEKTO II GEOTECHNINĖS KATEGORIJOS PROJEKTINIŲ INŽINERINIŲ GEOLOGINIŲ IR GEOTECHNINIŲ TYRIMŲ ATASKAITA

Vilnius, 2024

uab GeoFirma

Leidimas tirti žemės gelmes Nr. 155

Įmonės kodas 302555562, Saulėtekio al. 15 – 515; LT-10224 Vilnius, mob. tel. 8 612 12228,
el. paštas geofirmalt@gmail.com, info@geofirma.lt

Ataskaitos egz. Nr. 2

TYRIMO ĮREGISTRAVIMO NUMERIS ŽEMĖS GELMIŲ TYRIMŲ REGISTRE: 50583-2024

UŽSAKOVAS **AB „Vilniaus šilumos tinklai“**

VYKDYTOJAS **UAB „GeoFirma“**

KITOS PASKIRTIES PASTATO (SIURBLINĖS) GAMYKLOS G. 10, VILNIAUS M. STATYBOS PROJEKTO II GEOTECHNINĖS KATEGORIJOS PROJEKTINIŲ INŽINERINIŲ GEOLOGINIŲ IR GEOTECHNINIŲ TYRIMŲ ATASKAITA

Direktorius

Tyrimų vadovas

2024 m. rugsėjo mėn.

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7. Leidimas tirti žemės gelmes (kopija) ..... 1 lapas
8. Zondo patikros sertifikatas (kopija) ..... 2 lapai
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10. Žemės gelmių geologinių tyrimų registracijos lapas ..... 2 lapai

AIŠKINAMASIS RAŠTAS

1. Įvadas

UAB „GeoFirma" (leidimas tirti žemės gelmes Nr. 155, 2020-07-01 (6 PRIEDAS)) pagal AB „Vilniaus šilumos tinklai" užsakymą 2024 m rugsėjo mėn. atliko projektinius inžinerinius geologinius ir geotechninius tyrimus projektuojamai akumuliacinei talpai Gamyklos g. 10, Vilniaus m. pagal siurblinės statybos projektą tuo pačiu adresu.

2024 m. vasario – kovo mėn. UAB „GeoFirma" atliko II-os geotechninės kategorijos projektinius inžinerinius geologinius ir geotechninius tyrimus projektuojamai siurblinei ir akumuliacinei talpai Gamyklos g. 10, Vilniaus m. [12]. Pasikeitus statybos projektui, buvo perkelta projektuojamos talpos vieta, kurioje ir yra vykdomi dabartiniai tyrimai. Ankstesnių tyrimų duomenis buvo panaudoti ruošiant šią ataskaitą.

Tirto ploto koordinatės LKS-94 sistemoje pateiktos 1 lentelėje.

Projektuojama 3000 m^3 akumuliacinė talpa, kurios orientacinis skermuo – 13 m, o aukštis – 26 m.

Statinys priklauso ypatingųjų statinių kategorijai. Inžineriniai geologiniai tyrimai priskirti antrai geotechninei kategorijai (STR 1.04.2011;55).

Gruntų pavadinimai ir simboliai pateikti pagal Lietuvos Geologijos Tarnybos prie Aplinkos Ministerijos direktoriaus 2019 m. birželio 13 d. įsakymą Nr. 1-175.

Tyrimų vietos, kiekis ir gylis buvo nurodyti Užsakovo – 2 gręžiniai iki 25,0 m gylio su statinio ir dinaminio zondavimo bandymais.

Tyrimų tikslas buvo pateikti informaciją projektuojamo pastato inžinerinių geologinių ir hidrogeologinių sąlygų įvertinimui.

Tyrimų ploto ribų koordinatės (LKS-94)

Nr.	X	Y
1	6053157	581679
2	6053132	581674
3	6053128	581705
4	6053154	581710

Tyrimų metu:

- išskirti pagrindo inžineriniai geologiniai sluoksniai;
- nustatytos išskirtų sluoksnių geotechninės savybės;
- įvertintos hidrogeologinės sąlygos;
- sudarytas statinio pagrindo inžinerinis geologinis pjūvis.

Ruošiant ataskaitą, panaudota literatūra:

1. Statybos techninis reglamentas STR 1.04.02:2011. "Inžineriniai geologiniai ir geotechniniai tyrimai";
2. Lietuvos standartas LST EN 1997-1. Eurokodas 7. „Geotechninis projektavimas. 1 dalis. Pagrindinės taisyklės" (2006);
3. Lietuvos standartas LST EN 1997-2. Eurokodas 7. „Geotechninis projektavimas. 2 dalis. Pagrindo tyrinėjimai ir bandymai" (2009);

4. Lietuvos standartas LST EN ISO 14688-1. „Geotechniniai tyrinėjimai ir bandymai. Gruntų atpažintis ir klasifikavimas. 1 dalis. Atpažintis ir aprašymas" (2018);
5. Lietuvos standartas LST EN ISO 14688-2. „Geotechniniai tyrinėjimai ir bandymai. Gruntų atpažintis ir klasifikavimas. 2 dalis. Klasifikavimo principai" (2018);
6. Projektinių inžinerinių geologinių ir geotechninių tyrimų rekomendacijos, 2015 m.;
7. Lietuvos Geologijos Tarnybos prie Aplinkos Ministerijos direktoriaus 2019 m. birželio 13 d. įsakymas Nr. 1-175 „Dėl inžinerinių geologinių ir geotechninių tyrimų klasifikacijos". TAR, 2019, Nr. 9653;
8. „Monolitiniai grunte betonuojamieji pamatai", J. Šimkus ir kt. 1985 m., Vilnius;
9. „Lietuvos TSR gruntų statybinės savybės", J. Šimkus ir kt., 1973 m., Vilnius;
10. Vilniaus miesto geologija ir geomorfologija. R. Guobytė. 2014, Vilnius;
11. www.geoportal.lt;
12. „Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.", UAB „GeoFirma", 2024 m., Fondo Nr. 59691

2. Bendrieji statybos sklypo duomenys

Tyrimų plotas yra pietinėje Vilniaus miesto dalyje, Naujininkų seniūnijoje, Gamyklos gatvėje, AB „Vilniaus šilumos tinklai" teritorijoje. Sklypo centre šiaurės-pietų kryptimi eina apleistas asfaltuotas kelias, likusi dalis neužstatyta, apaugusi žole. Šiaurės rytuose, netoli tiriamo ploto stovi šilumos tinklams priklausantys pastatai ir statiniai.



1 pav. Inžinerinių geologinių ir geotechninių tyrimų sklypo žemėlapis [8]



2 pav. Inžinerinių geologinių ir geotechninių tyrimų vieta (CPT-2)

3. Inžinerinių geologinių ir geotechninių tyrimų sudėtis

Inžinerinių geologinių ir geotechninių tyrinėjimų metu lauke atlikti šie darbai:

- vizualinis tyrimų vietų apžiūrėjimas ir įvertinimas;
- atliktas tyrimo taškų koordinavimas;
- atlikti 2 statinio zondavimo bandymai (CPT-1,2) iki 17,2 – 21,3 m gylio;
- atlikti 2 dinaminio zondavimo bandymai (CPT-1) iki 20,0 – 23,0 m gylio;
- išgręžti 2 gręžiniai (Gr. 1,2) iki 25,0 m gylio;

Laboratorijoje atlikta ir nustatyta:

- gruntų granuliometrinė sudėtis (11 ėminių);
- Atterberg`o ribos (7 ėminiai);
- gamtinė drėgmė, w (11 ėminių);
- gamtinis tankis, ρ (7 ėminiai);
- kietųjų dalelių tankis, ρ_s (9 ėminiai);
- efektyvusis grunto vidinės trinties kampas ϕ' ir efektyvioji sankiba c' (1 bandinys).

Tyrimų vietas nužymėjo, gręžinius lauke aprašė ir statinio zondavimo bandymus vykdė geologas V. Paulau, kameralinimo darbus atliko ir ataskaitą parengė geologas K. Gerulaitis, gruntų laboratoriniai tyrimai atlikti UAB „GeoFirma" laboratorijoje.

4. Geotechninių tyrimų metodika

Aikštelėje tyrinėjimai buvo atliekami Massenza MI3 ir PAGANI firmos (Italija) TG 63/100 (2 pav.) įrangomis, įgalinčiomis atlikti statinio zondavimo bandymą, gręžimą ir gruntų pavyzdžių paėmimą.

4.1 Statinio zondavimo bandymai (CPT)

Statinis zondavimas atliktas elektroniniu zondu Nr. 0344 (Lietuva), matuojant kūginį stiprumą q_c ir trinties stiprumą f_s. Zondo rodmenys buvo automatiškai užrašomi personaliniu kompiuteriu kas 1 sekundę. Tai atitinka grunto stiprumo matavimą kas 1,0 cm.

* maksimali spaudimo jėga 100 kN (PAGANI 63/100);
* maksimalus kūginis stipris 100 MPa;
* kūginio stiprumo matavimų tikslumas 250 kPa;
* maksimali šoninė trintis 1000 kPa;
* šoninės trinties matavimų tikslumas 20 kPa;
* kūgio skersmuo 35,6 mm;
* kūgio pagrindo plotas 10 cm^2;
* trinties movos ilgis 133 mm;
* trinties movos skersmuo 36 mm;
* trinties movos plotas 150 cm^2.

Statinio zondavimo bandymai atlikti remiantis šiais dokumentais: Geotechniniai tyrinėjimai ir bandymai. Lauko bandymai. 1 dalis. Įspaudimo bandymas, naudojant elektrinį ir pjezoelektrinį kūgį (LT ESN ISO 22476-1:2012); ISSMFE Reference Test Procedure, 1999 (koreguotas 2001).

Gruntų geotechninės savybės paskaičiuotos pagal statinio zondavimo rezultatus (q_c) [6]:

- *deformacijų modulis (E, MPa):*
  - piltiniam gruntui: $E=1,0*q_c$;
  - puriam rupiam gruntui: $E=3,0*q_c$;
  - vidutinio tankumo – labai tankiam rupiam gruntui: $E=7,8*q_c^{0,71}$;
  - nemoreniniam moliui: $E=7,0*q_c$;
  - nemoreniniam dulkiui: $E=5,0*q_c$;
- *vidinės trinties kampas* smėliams pateiktas pagal formulę: $\varphi = 13,5\ lg\ (q_c)+23$;
- *kerpamasis stipris nedrenuojant:*
  - smulkiam gruntui (kai q_c<6,0 MPa): $c_u = q_c/20$;
  - smulkiam gruntui (kai q_c>6,0 MPa): $c_u = q_c/30$.

4.2 Dinaminio zondavimo bandymas (DPSH)

Dinaminis zondavimas atliktas supersunkiosios sistemos (DPSH) ISSMFE tipo zondu. Šio zondavimo metu registruojamas smūgių skaičius (N_{20}), reikalingas zondui įgilinti 0,20 m. Pagrindiniai parametrai yra tokie:

- kūgio pagrindo plotas, A — 2000 mm^2;
- kūgio pagrindo skersmuo — 50,5 mm;
- kūgio kampas — 60°;
- plakto masė, M — 63,5 kg;
- plakto kritimo aukštis, H — 0,75 m;
- smūgių skaičių N_{20} registravimas — automatinis;
- tikslumas — ±1 smūgis/0,20 m.

Dinaminio zondavimo bandymai dažniausiai naudojami stiprių ir ypatingai stiprių (tankių) gruntų, kuriuose sudėtinga arba negalima atlikti statinį zondavimą, geotechninėms savybėms įvertinti, jų stratigrafinėms riboms pakoreguoti. Pagal formulę $q_d=[M/(M+M')\times(MgH)/Ae]$ paskaičiuotas dinaminis kūginis stipris q_d,

čia: e - zondo įsmigis nuo 1 smūgio;

g - laisvo kritimo pagreitis;

M'- priekalo, zondavimo vamzdžių ir antgalio masė.

Dinaminio zondavimo stiprio reikšmės q_d buvo perskaičiuotos į statinio zondavimo grunto stiprio reikšmes q_c*, remiantis koreliacine formule, pateikta 6.7 lentelėje [13] ir statinio zondavimo bandymų rezultatais šiame tyrimų plote.:

- smėliniams gruntams: $q_c^* = 1{,}0 \cdot q_d$.

4.3 Gręžimas

Massenza MI3 agregatu, panaudojus hidraulinę gręžimo galvutę, didžiausias sukimo momentas 420 kgm sraigtiniu būdu buvo išgręžti 152 mm skersmens gręžiniai. Sraigtai buvo keliami kas 1,5 m aprašomi sluoksniai ir imami gruntų ėminiai. Gruntų mėginiai buvo imami, vadovaujantis Lietuvos standarto LST EN ISO 22475-1 reikalavimais.

5. Inžinerinių geologinių ir geotechninių tyrimų rezultatai

5.1. Geomorfologinė charakteristika. Geomorfologiniu požiūriu tiriamoji vietovė yra Kuprijoniškių mikrorajone, kuris priklauso Medininkų moreninio kalvyno rajonui, Ašmenos (Pietų Nalšios) senųjų moreninių aukštumų sričiai [10]. Sklypo aukštis nežymiai kyla šiaurės kryptimi, aukštis svyruoja tarp 170,00 – 170,50 m abs.a.

5.2. Geologinė sandara. Ištirtąjį litologinį – geologinį pjūvį sudaro technogeninis gruntas (t IV), priešpaskutiniojo apledėjimo Medininkų stadijos kraštiniai limnoglacialiniai dariniai (lgt II md) ir glacialinės nuogulos (g II md).

5.3. Gruntų sudėtis ir inžineriniai geologiniai sluoksniai. Tyrimų metu išskirta 10 inžinerinių geologinių sluoksnių (IGS) pagal gruntų genezę, sudėtį ir stiprumines savybes. Sluoksniai aprašomi iš viršaus į apačią:

Technogeninis gruntas (t IV)

- piltinis gruntas (Mg) (IGS-1) žvyringas dulkingas smėlis pilkai rudas – rudai pilkas, su gargždu; dulkingas smėlis rudai pilkas, labai purus – purus, tankus, su retu žvirgždu, užterštas naftos produktais, vietomis su dirvožemio priemaiša, mažai drėgnas – drėgnas; supiltas visame sklype iki 2,1 – 2,5 m gylio;

Medininkų stadijos kraštiniai limnoglacialiniai dariniai (lgt II md)

- blogai išrūšiuotas mažai dulkingas – molingas smėlis (SaFP) (IGS-2,3) pilkai rudas, purus (IGS-2), vidutinio tankumo (IGS-3), smulkus, su smėlingo dulkio tarpsluoksniais, drėgnas – vandeningas; suklostytas Gr.2 aplinkoje iki 6,6 m gylio;

- smėlingas mažo plastiškumo dulkis (saSiL) (IGS-4) šviesiai rudas, labai stiprus, su dulkingo smėlio tarpsluoksniais, įmirkęs; suklostytas Gr.2 aplinkoje iki 11,8 m gylio;

- smėlingas mažo plastiškumo molis (saClL) (IGS-5) rudas, stiprus, su dulkio tarpsluoksniais; suklostytas Gr.2 aplinkoje iki 13,9 m gylio;

- mažo plastiškumo molis (ClL) (IGS-6) pilkai rudas, su dulkio tarpsluoksniais, labai stiprus; suklostytas Gr.2 aplinkoje iki 18,9 m gylio;

- vidutinio plastiškumo molis (ClM) (IGS-7,8) rudas, su dulkio sluoksneliais, vidutinio stiprumo (IGS-7), stiprus (IGS-8); suklostytas visame sklype iki 16,8 – 20,8 m gylio;

- dulkingas smėlis (siSa) (IGS-9) šviesiai rudas, rudas, smulkus – vidutinio rupumo, vietomis su žvyringo smėlio tarpsluoksniais, labai tankus, mažai drėgnas – vandeningas;

Medininkų stadijos glacialinės nuogulos (g II md)

- moreninis smėlingas mažo plastiškumo molis ir dulkis (saClL-SiL) (IGS-10) rudas – pilkai rudas, tvirtas, su žvirgždu; sluoksnio padas gręžiniais iki 25,0 m gylio nepasiektas.

5.4. Hidrogeologinės sąlygos. Tyrimų metu gruntinis vanduo nustatytas Gr.2 aplinkoje 2,80 m gylyje (abs.a. 167,70 m), jis talpinasi mažai dulkingame – molingame smėlyje (IGS-2,3). Be to, visame sklype fiksuotas nespūdinis tarpsluoksninis vanduo 22,50 m gylyje (abs.a. 147,79 – 148,00 m). Šis slūgso dulkingame smėlyje (IGS-9), tarp sąlyginai nelaidžių molio (IGS-7,8) ir moreninio smėlingo molio ir dulkio (IGS-10) sluoksnių.

5.5. Gruntų mechaninės savybės. Tyrimų metu nustatytų inžinerinių geologinių sluoksnių vidutinės mechaninės savybės yra pateiktos **3 priede**.

5.6. Geologiniai procesai ir reiškiniai. Tirtoje teritorijoje tyrimų metu aktyvių geologinių procesų ir reiškinių nepastebėta.

6. Išvados ir rekomendacijos

1. Inžineriniu geologiniu požiūriu sklypo inžinerinės geologinės sąlygos vidutinės. Projektuojamo pastato vietoje žemės paviršius yra lygus, aukštis yra ~170,50 m abs.a.

2. Pastato pagrindo pjūvis po 2,1 – 2,5 m storio piltinio labai puraus – puraus ir tankaus dulkingo smėlio sluoksniu yra gana kaitus:

   - rytinėje sklypo dalyje (Gr.2) nuo 2,1 iki 6,6 m gylio suklostytas blogai išrūšiuotas mažai dulkingas – molingas smėlis; iki 2,1 m gylio šis yra vidutinio tankumo (IGS-3), o giliau – purus (IGS-2);

   - giliau slūgso labai stiprus smėlingas mažo plastiškumo dulkis (IGS-4), po kuriuo nuo 11,8 m gylio slūgso stiprus smėlingas mažo plastiškumo molis (IGS-5), o nuo 13,9 m gylio – labai stiprus mažo plastiškumo molis (IGS-6);

   - vakarinėje sklypo dalyje (Gr.1) nuo 2,5 iki 13,6 m gylio suklostytas vidutinio stiprumo vidutinio plastiškumo molis (IGS-7);

   - nuo 13,6 – 18,9 m gylio visame sklype slūgso stiprus vidutinio plastiškumo molis (IGS-8);

   - nuo 16,8 – 20,8 m gylio suklostytas labai tankus dulkingas smėlis (IGS-9);

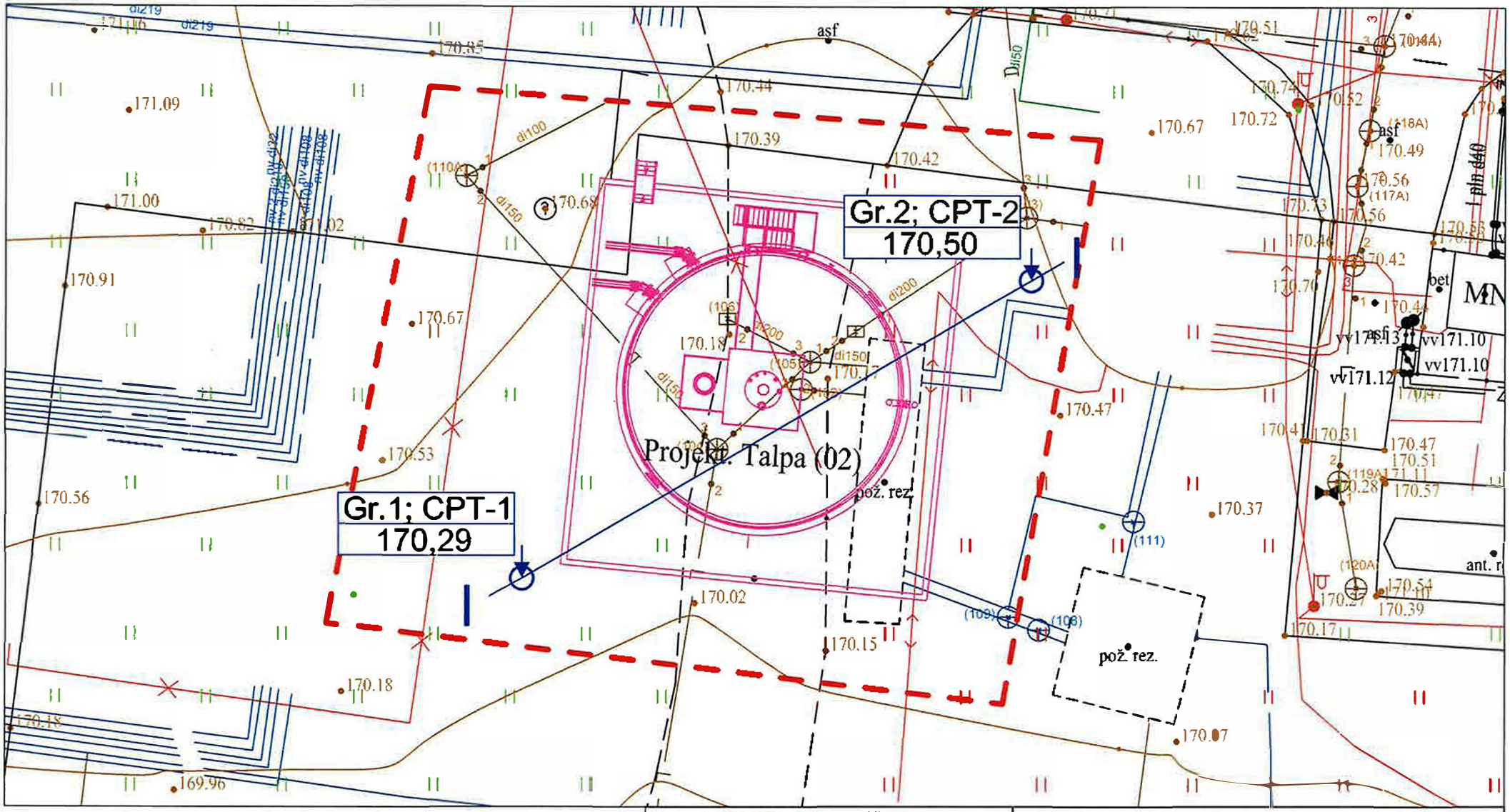
   - nuo 24,1 – 24,4 m gylio slūgso tvirtas moreninis smėlingas mažo plastiškumo molis ir dulkis (IGS-10).

3. Gruntų geotechninių savybių vidutinės reikšmės pateiktos 3 priede.

4. Gruntinis vanduo nustatytas Gr.2 aplinkoje 2,80 m gylyje (abs.a. 167,70 m), jis talpinasi mažai dulkingame – molingame smėlyje (IGS-2,3). Be to, visame sklype fiksuotas nespūdinis tarpsluoksninis vanduo 22,50 m gylyje (abs.a. 147,79 – 148,00 m). Šis slūgso dulkingame smėlyje (IGS-9), tarp sąlyginai nelaidžių molio (IGS-7,8) ir moreninio smėlingo molio ir dulkio (IGS-10) sluoksnių.
   Paviršinio vandens (atmosferinio, sniego, įšalo tirpsmo ir pan.) drenavimosi sąlygos nepalankios.

5. Esant šioms geotechninėms sąlygoms rekomenduojame taikyti atskiruosius (gręžtinius, spraustinius ir kt.) polinius pamatus. Polių įrengimui tinka visi sluoksniai po piltiniu gruntu ir puriuoju smėliu (IGS-2).
   Irengiant pamatus, pagrindą būtina apsaugoti nuo suardymo.

6. Pažymėtina, jo pagrindo pjūvyje sutiktas dulkis (IGS-4), o molio (IGS-5,6,7,8) sluoksniuose gaus jo sluoksnelių, tarpsluoksnių. Dulkis pasižymi tiksotropinėmis savybėmis, todėl šie gruntai yra jautrūs dinaminiam poveikiui, vibracijai, mechaniniam suardymui.



uab GeoFirma Leidimo Nr. 155 Tel. 8 612 12228 info@geofirma.lt www.geofirma.lt	**OBJEKTAS:** Kitos paskirties pastato (siurblinės) Gamyklos g. 10, Vilniaus m. statybos projektas	
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai	**UŽSAKOVAS:** AB "Vilniaus šilumos tinklai"	
Pareigos / Parašas	**Planas (M 1:250):** Tyrimo vietos, pjūvio linija I-I	Lapas 1 / Lapų 1

1 PRIEDAS

Gręžinių ir statinio zondavimo taškų koordinačių ir altitudžių

ŽINIARAŠTIS

Objekto pavadinimas: Kitos paskirties pastato (siurblinės) Gamyklos g. 10, Vilniaus m. statybos projektas

Užsakovas: AB "Vilniaus šilumos tinklai"

Gręžinius (CPT) nužymėjo

Gręžinius (CPT) pririšo

Koordinačių sistema LKS-94

Aukščių sistema LAS07

Planinio pririšimo būdas GPS prietaisu

Koordinačių nustatymo metodas GPS prietaisu

Altitudžių nustatymo metodas Techninė niveliacija

Data: 2024 m. rugsėjo mėn.

Eil.Nr.	Bandymas	Koordinatės		Altitudė
		x	y	
1.	Gr.1; CPT-1	6053147.7	581706.7	170.50
2.	Gr.2; CPT-2	6053133.9	581683.2	170.29

2 PRIEDAS

Gruntų geotechninių savybių suvestinė lentelė

Objekto pavadinimas: Kitos paskirties pastato (siurblinės) Gamyklos g. 10, Vilniaus m. statybos projektas

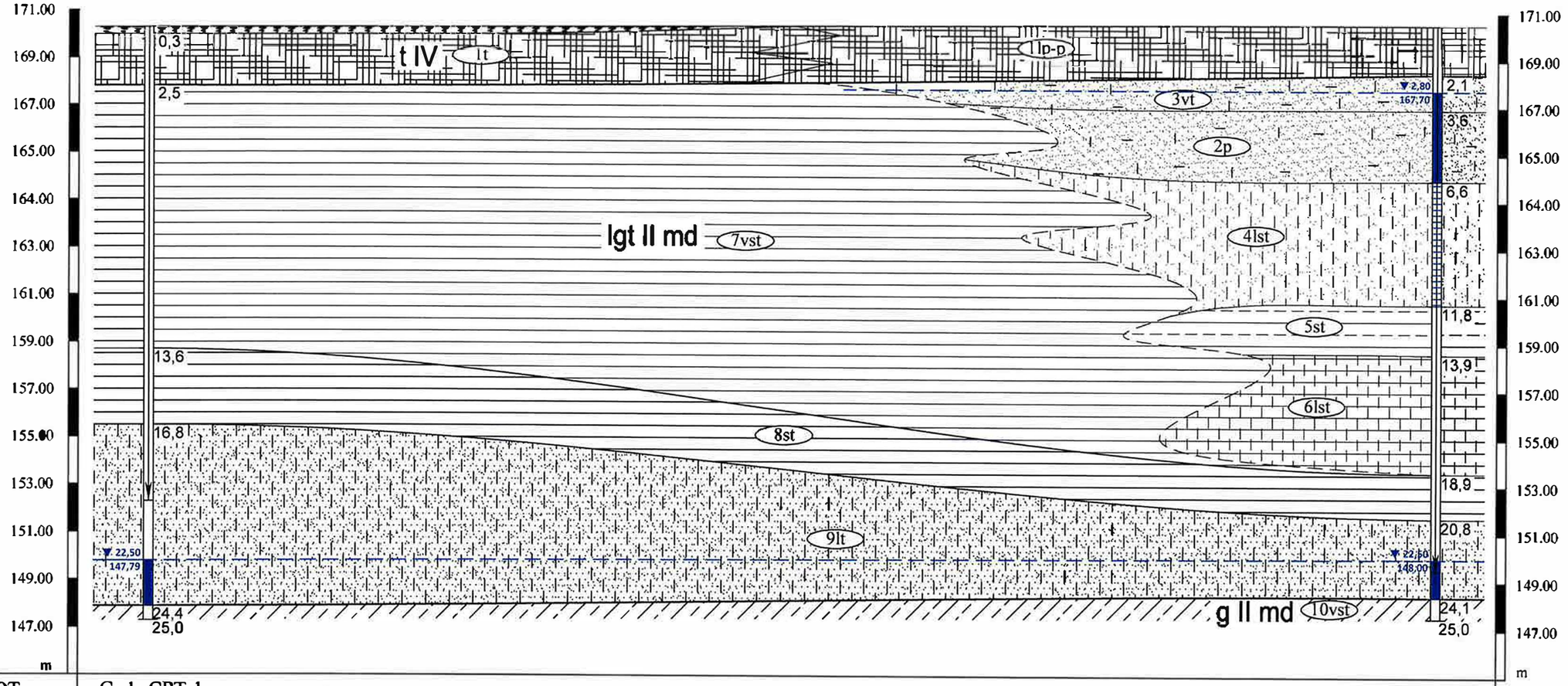
IGS Nr.	Grunto pavadinimas (LGT prie AM direktoriaus 2019 m. birželio 13 d. įsakymas Nr. 1-175 „Dėl inžinerinių geologinių ir geotechninių tyrimų klasifikacijos". TAR, 2019, Nr.9653)	Stiprumas ir tankumas	Kūginis stipris q_c (MPa)	Šoninė trintis f_s (kPa)	Deformacijų modulis E (MPa)	Kerpamasis stipris nedrenuojant (φ=0°) c_u (kPa)	Sankiba c´ (kPa)	Vidinės trinties kampas φ' (laips.)	Grunto tankis ρ (Mg/m³)	Orientacinis pagrindo stiprumas R (kPa)
1lp-p	Piltinis gruntas (Mg): dulkingas smėlis	Labai purus - purus	2,3 (3) 1,0 – 4,0	33 (3) 20 - 50	2,3 (3) 1,0 – 4,0	-	0	27,1 (3) 23,0 – 31,1	1,65	-
1t	Piltinis gruntas (Mg): dulkingas smėlis	Tankus	14,0 (1)	200 (1)	14,0 (1)	-	0	38,5 (1)	1,80	-
2p	Blogai išrūšiuotas mažai dulkingas – molingas smėlis (SaFP)	Purus	4,0 (2) 3,5 – 4,5	40 (2) 30 - 50	12,0 (2) 10,5 – 13,5	-	0	31,1 (2) 30,3 – 31,8	1,93**	-
3vt	Blogai išrūšiuotas mažai dulkingas – molingas smėlis (SaFP)	Vidutinio tankumo	6,0 (1)	50 (1)	27,8 (1)	-	0	33,5 (1)	2,02**	600
4lst	Smėlingas mažo plastiškumo dulkis (saSiL)	Labai stiprus	8,3 (3) 6,5 – 11,0	133 (3) 85 - 200	41,7 (3) 32,5 – 55,0	278 (3) 216 - 366	64,5 (4) 11,6 – 82,1	28,4 (4) 28,0 – 29,7	2,10 (3) 2,08* – 2,10*	1950
5st	Smėlingas mažo plastiškumo molis (saCIL)	Stiprus	3,5 (2) 3,0 – 4,0	53 (2) 50 - 55	24,5 (2) 21,0 – 28,0	175 (2) 150 - 200	41,0 (3) 16,8 – 58,9	24,4 (3) 21,6 – 27,9	2,12 (3) 2,10* – 2,13*	1050
6lst	Mažo plastiškumo molis (ClL)	Labai stiprus	10,0 (3) 6,0 – 14,0	190 (3) 120 - 250	70,0 (3) 42,0 – 98,0	333 (3) 200 - 466	66,4 (4) 19,4 – 82,1	27,3 (4) 25,6 – 27,9	2,17 (5) 2,13* – 2,20*	1800
7vst	Vidutinio plastiškumo molis (ClM)	Vidutinio stiprumo	2,0 (5) 1,0 – 2,5	87 (5) 50 - 175	13,7 (5) 7,0 – 17,5	98 (5) 50 - 125	33,7 (6) 24,1 – 41,5	20,6 (6) 17,0 – 27,5	2,03 (3) 1,98* – 2,08*	300
8st	Vidutinio plastiškumo molis (ClM)	Stiprus	3,4 (4) 2,6 – 4,0	88 (4) 50 - 125	23,6 (4) 21,0 – 28,0	169 (4) 130 - 200	45,6 (5) 21,2 – 58,9	23,0 (5) 20,7 – 25,6	2,08 (4) 2,04* – 2,12*	1020
9lt	Dulkingas smėlis (siSa)	Labai tankus	37,5 (4) 32,0 – 40,0						2,15 (2) 2,10** – 2,19**	3200
10	Moreninis smėlingas mažo plastiškumo molis ir dulkis (saClL-SiL) (I_L = 0,40)	Tvirtas							2,29 (2) 2,28* - 2,30*	

- skaitiklyje – vidutinės reikšmės, skliausteliuose – reikšmių skaičius, vardiklyje – minimalios ir maksimalios reikšmės;
- c' ir ϕ' parametrai moliams ir dulkiui (IGS-4...8) pateikti pagal statinio zondavimo duomenis, kartu su dabartinių laboratorinių tyrimų ir vasario – kovo mėn. ataskaitos laboratorinių tyrimų rezultatais.
- ρ - patelktas pagal literatūrinius duomenis (Šimkus J. ir kt. (1973). Lietuvos TSR gruntų statybinės savybės. Vilnius); ρ* - nustatytas laboratorijoje (dabartinių ir vasario – kovo mėn. tyrimų metu); ρ** - apskaičiuotas vandens prisotinto grunto tankis;
- *R* - orientacinis pagrindo stiprumas paskaičiuotas giliajam atskirajam pamatui-poliui (Šimkus J. ir kt. (1985). Monolitiniai grunte betonuojamieji pamatai. Vilnius);

Sudarė: .....

3 PRIEDAS

INŽINERINIS GEOLOGINIS PJŪVIS I-I



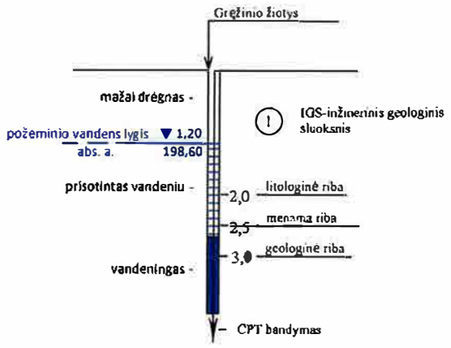
Gr., CPT	Gr.1; CPT-1		Gr.2; CPT-2
Atstumas, m		27,2	
Altitudė, m	170,29		170,50

Sutartiniai ženklai

- Derlingo dirvožemio sluoksnis
- 1 — Piltinis gruntas (Mg)
- 2,3 — Blogai išrūšiuotas mažai dulkingas - molingas smėlis (SaFP)
- 4 — Smėlingas mažo plastiškumo dulkis (saSiL)
- 5 — Smėlingas mažo plastiškumo molis (saCIL)
- 6 — Mažo plastiškumo molis (ClL)
- 7,8 — Mažo/vidutinio plastiškumo molis (ClL/ClM)
- 9 — Dulkingas smėlis (siSa)
- 10 — Moreninis smėlingas mažo plastiškumo molis ir dulkis (saClL-SiL)

Tankumas ir stiprumas

- lp — labai purus
- p — purus
- vt — vidutinio tankumo
- t — tankus
- lt — labai tankus
- vst — vidutiniostiprumo
- st — stiprus
- lst — labai stiprus



VERTIKALAUS MASTELIO SKALĖ

0 2 4 6 8 10 m

HORIZONTALAUS MASTELIO SKALĖ

0 1 2 3 4 5 m

uab GeoFirma
Leidimo Nr. 155
Tel. 8 612 12228
info@geofirma.lt
www.geofirma.lt

OBJEKTAS: Kitos paskirties pastato (siurblinės) Gamyklos g. 10, Vilniaus m. statybos projektas

TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai

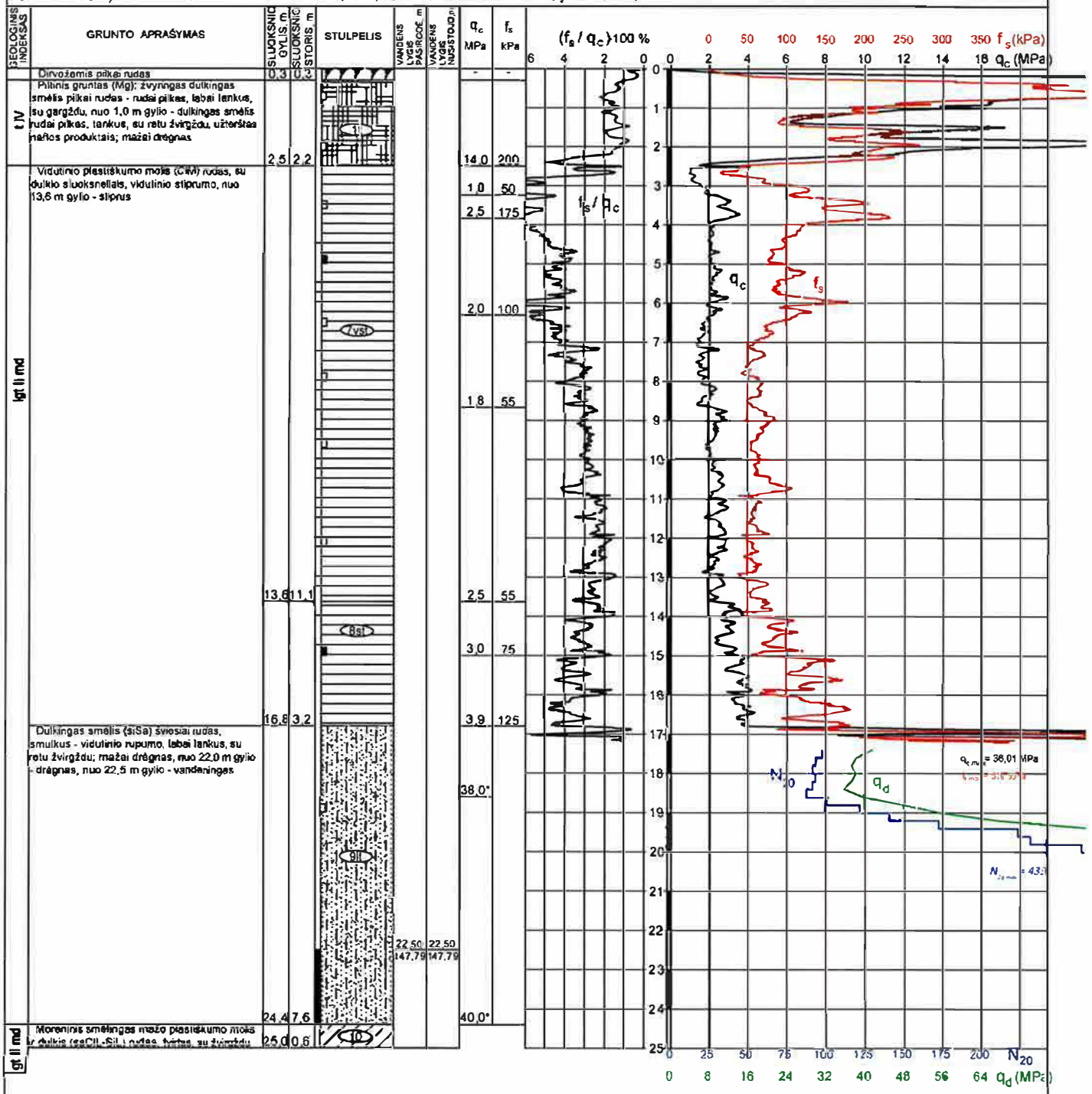
UŽSAKOVAS: AB "Vilniaus šilumos tinklai"

Data	INŽINERINIS GEOLOGINIS PJŪVIS I-I	Lapas	Lapų
2024 09		1	1
2024 09			

4 PRIEDAS

Gr. 1

SRAIGTINIS ⌀ = 100 mm abs. a. 170,29 m, koordinatės x-6053133.9 m, y-581683.2 m CPT - 1; DPSH-1 Data: 2024.09.03



- ▯ - grunto ėminys
- ▮ - grunto ėminys tirtas laboratorijoje
- q_c - kūginis stūris
- q_c^* - kūginis stūris, paskaičiuotas pagal kūginio ir dinaminio stūrių koreliacinę priklausomybę [10], atsižvelgiant į statinio zondavimo bandymų rezultatus tyrimų plote: **smėliui $q_c = q_d$**
- q_d - dinaminis stūris
- f_s - trinties stūris
- f_s / q_c - trinties santykis
- N_{20} - smūgių skaičius, reikalingas įgilinti zondą 20 cm

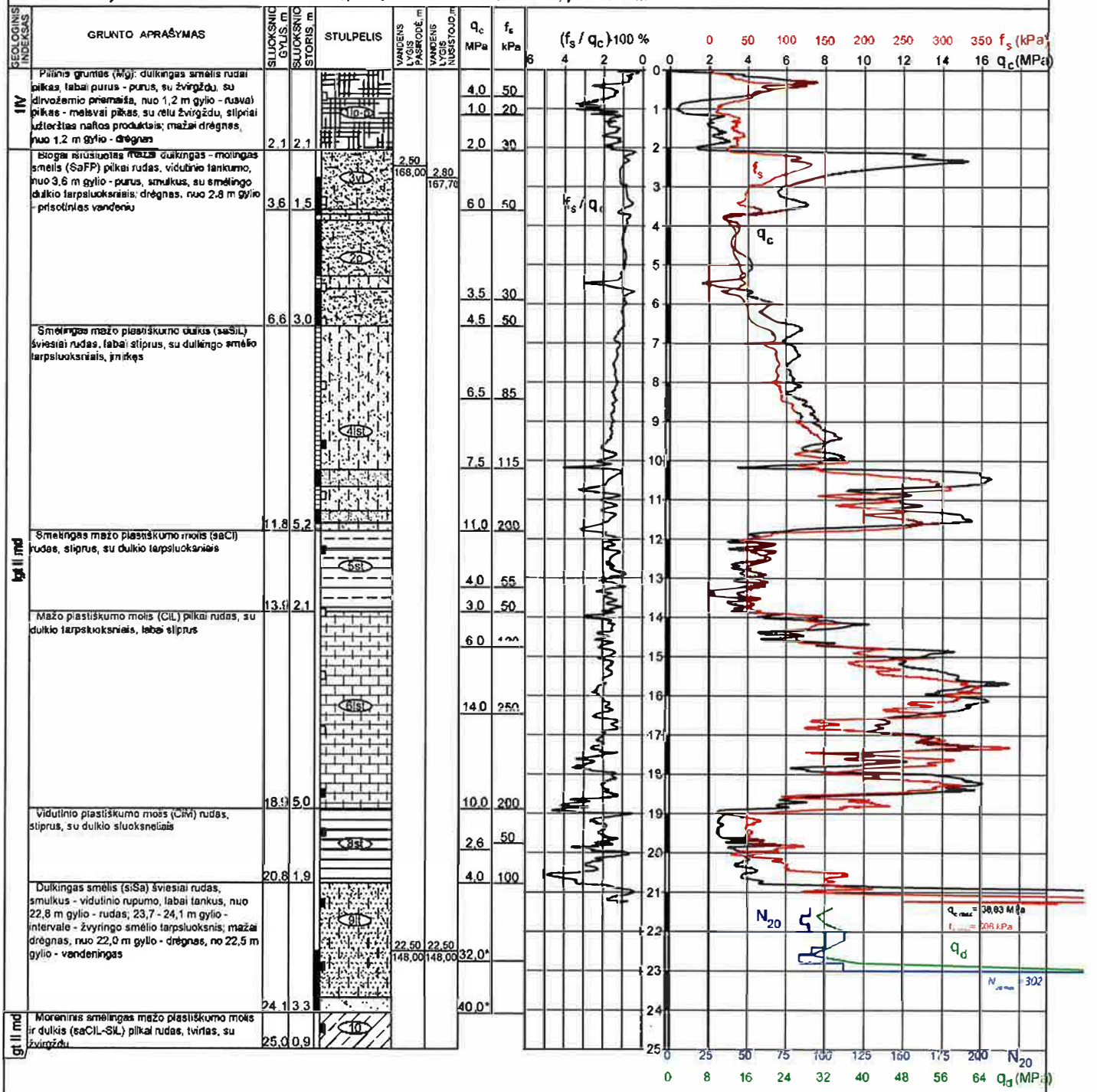
Dinaminio zondo tipas DPSH: supersunkusis

UAB GeoFirma Laidimo Nr. 155 Tel. 8 612 12226 info@geofirma.lt www.geofirma.lt				**OBJEKTAS:** Kitos paskirties pastato (siurblinės) Gamyklos g. 10, Vilniaus m. statybos projektas	
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai				**UŽSAKOVAS:** AB "Vilniaus šilumos tinklai"	
Parengė	V. Pavardė	Parašas	Data	**GRĘŽINIAI IR ZONDAVIMO BANDYMAI:** Gr. 1; CPT - 1; DPSH - 1	Lapas 1 / Lapų 2
Geologas					
Geologas			2024 09		

5.1 PRIEDAS

Gr. 2

SRAIGTINIS ⌀ = 100 mm | abs. a. 170,50 m, koordinatės x-6053147.7 m, y-581706.7 m | CPT - 2; DPSH-2 | Data: 2024.09.03



- ▯ - grunto ėminys
- ■ - grunto ėminys tirtas laboratorijoje
- q_c - kūginis stipris
- q_c^* - kūginis stipris, paskaičiuotas pagal kūginio ir dinaminio stiprių koreliacinę priklausomybę [10], atsižvelgiant į statinio zondavimo bandymų rezultatus tyrimų plote. **smėliui $q_c = q_d$**
- q_d - dinaminis stipris
- f_s - trinties stipris
- f_s / q_c - trinties santykis
- N_{20} - smūgių skaičius, reikalingas įgilinti zondą 20 cm

Dinaminio zondo tipas DPSH: supersunkusis

uab GeoFirma	Leidimo Nr. 155 Tel. 8 612 32228 info@geofirma.lt www.geofirma.lt			**OBJEKTAS:** Kitos paskirties pastato (slurblinės) Gamyklos g. 10, Vilniaus m. statybos projektas
TYRIMŲ RŪŠIS: Projektiniai inžineriniai geologiniai ir geotechniniai tyrimai				**UŽSAKOVAS:** AB "Vilniaus šilumos tinklai"
Pareigos	V. Pavardė	Parašas	Data	**GRĖŽINIAI IR ZONDAVIMO BANDYMAI:** Gr. 2; CPT -2; DPSH - 2
Geologas				Lapas 2 / Lapų 2
Geologas				

5.2 PRIEDAS

uab GeoFirma

Suvestinė laboratorinių tyrimų lentelė

Užsakovas AB "Vilniaus šilumos tinklai"

Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

2024 m.rugsėjo mėn.

Nr.	Grežinio numeris	Bandinio numeris	Paėmimo gylis	Dalelių dydis							Tankis			Gamtinis drėgnis, W (%)	Takumo drėgnis, W_L (%)	Plastiškumo drėgnis, W_P (%)	Plastiškumo rodiklis, I_P (%)	Takumo rodiklis I_L (v. d.)	Konsistencijos rodiklis Ic, (v. d.)	Poringumo koeficientas, e (v. d.)	Grunto soties laipsnis, S_r (v.d.)	Vidinės trinties kampas φ' (°)	Sankiba c' (kPa)	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")
				Žvyras		Smėlis			Dulkis	Molis														
				>6,3	2,0-6,3	0,63-2,0	0,2-0,63	0,063-0,2	0,002-0,063	<0,002	ρ_s, Mg/m^3	ρ_n, Mg/m^3	ρ_d, Mg/m^3											
1	1	4	4.8-5.0	0.0	0.0	0.0	0.4	3.1	41.4	54.2		1.98	1.55	27.41	43	18.92	24.08	0.35	0.65					Vidutinio plastiškumo molis (ClM)
2	1	9	14.8-15.0	0.0	0.2	0.2	1.2	7.9	35.3	55.2	2.746	2.07	1.70	21.73	44	18.13	25.87	0.14	0.86	0.615	0.97	25.6	21.2	Vidutinio plastiškumo molis (ClM)
3	2	3	3.3-3.5	0.0	0.0	0.2	25.4	64.7	9.7		2.654			23.59										Blogai išrūšiuotas mažai dulkingas- molingas smėlis (SaFP)
4	2	5	6.4-6.6	0.0	0.0	0.1	24.1	67.4	8.4		2.654			29.36										Blogai išrūšiuotas mažai dulkingas- molingas smėlis (SaFP)
5	2	7	9.5-9.7	0.0	0.0	1.0	9.2	50.2	35.5	4.0	2.672	2.1	1.77	18.98	25.7	N				0.514	0.99			Smėlingas mažo plastiškumo dulkis (saSiL)
6	2	9	12.2-12.4	0.0	0.0	0.0	4.8	28.5	60.8	5.9	2.696	2.13	1.80	18.24	23.9	16.94	6.96	0.19	0.81	0.497	0.99			Smėlingas mažo plastiškumo molis (saClL)
7	2	13	18.4-18.6	0.0	0.0	0.0	0.7	5.8	83.7	9.8	2.721	2.19	1.89	15.72	23.9	15.21	8.69	0.06	0.94	0.438	0.98			Mažo plastiškumo molis (ClL)
8	2	14	19.4-19.6	0.0	0.7	0.4	1.6	4.8	50.7	41.8		2.12	1.78	18.78	35.2	16.37	18.83	0.13	0.87					Vidutinio plastiškumo molis (ClM)
9	2	15	21.3-21.5	0.0	0.0	0.1	27.3	52.9	14.7	4.9	2.671			15.15		N								Dulkingas smėlis (siSa)
10	2	16	22.8-23.0	0.0	1.4	1.9	53.2	28.5	15.0		2.675			15.78		N								Dulkingas smėlis (siSa)
11	2	17	24.4-24.6	0.0	6.0	6.6	23.3	28.8	25.5	9.7	2.689	2.3	2.06	11.42	14.5	9.3	5.20	0.41	0.59	0.303	1.01			Smėlingas mažo plastiškumo molis ir dulkis (saCIL-SiL)

N - nesikočioja

6.1 PRIEDAS

Užsakovas: AB "Vilniaus šilumos tinklai"

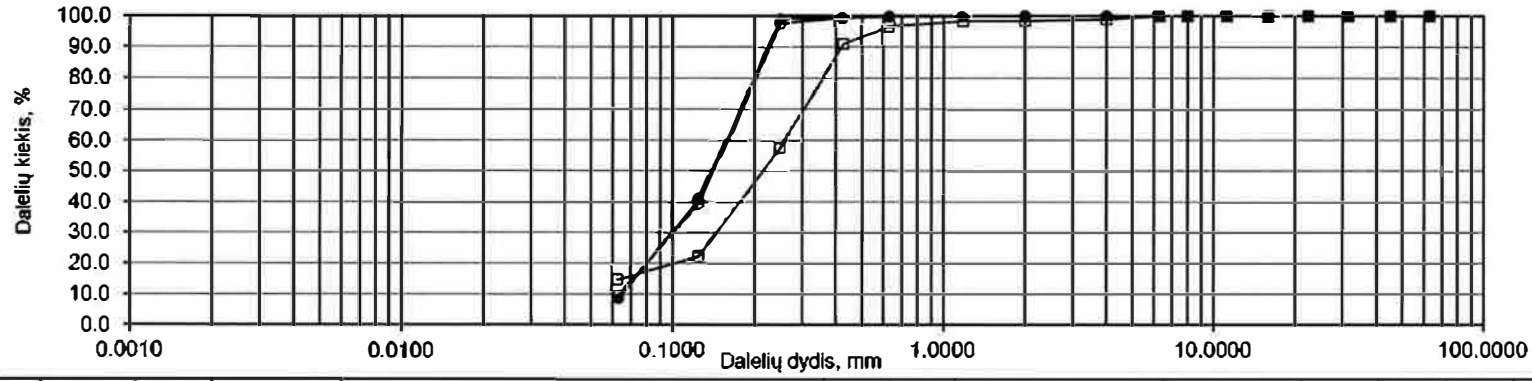
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 2024-09-17

UAB "GeoFirma"
Konstitucijos pr. 8A, Vilnius
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GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)

Molis	Dulkis			Smėlis			Žvyras			Gargždas
	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	
0.002	0.0063	0.02	0.063	0.2	0.63	2	63	20	63	



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis ir molis, %	10%	30%	60%	C_U	C_C
							Rupus	Vid. rupumo	Smulkus						
O	2	3	3.3-3.5	**Blogai išrūšiuotas mažai dulkingas- molingas smėlis (SaFP)**	0.0	0.0	0.2	25.4	64.7	9.7	0.06	0.11	0.17	2.7	1.03
●	2	5	6.4-6.6	**Blogai išrūšiuotas mažai dulkingas- molingas smėlis (SaFP)**	0.0	0.0	0.1	24.1	67.4	8.4	0.07	0.10	0.17	2.5	0.99
□	2	16	22.8-23.0	**Dulkingas smėlis (siSa)**	0.0	1.4	1.9	53.2	28.5	15.0	0.04	0.15	0.26	6.2	2.11

Užsakovas: AB "Vilniaus šilumos tinklai"

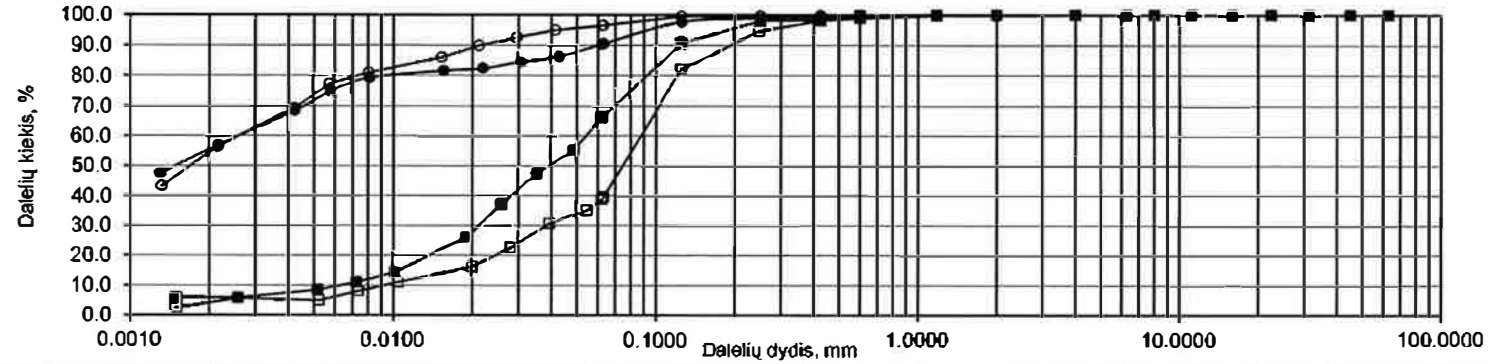
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 2024-09-17

UAB "GeoFirma"
Konstitucijos pr. 8A, Vilnius
info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)

Molis	Dulkis			Smėlis			Žvyras			Gargždas
	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	Smulkus	Vid. rupumo	Rupus	
0.002	0.0063	0.02	0.063	0.2	0.63	2	6.3	20	63	



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_u	C_c
							Rupus	Vid. rupumo	Smulkus							
O	1	4	4.8-5.0	**Vidutinio plastiškumo molis (CIM)**	0.0	0.0	0.0	0.4	3.1	42.4	54.2	0.00	0.00	0.00	-	-
●	1	9	14.8-15.0	**Vidutinio plastiškumo molis (CIM)**	0.0	0.2	0.2	1.2	7.9	35.3	55.2	0.00	0.00	0.00	-	-
□	2	7	9.5-9.7	**Smėlingas mažo plastiškumo dulkis (saSiL)**	0.0	0.0	1.0	9.2	50.2	35.5	4.0	0.01	0.04	0.09	-	-
■	2	9	12.2-12.4	**Smėlingas mažo plastiškumo molis (saCIL)**	0.0	0.0	0.0	4.8	28.5	60.8	5.9	0.01	0.02	0.05	-	-

Atliko:
Tikrino:

6.2.2 PRIEDAS

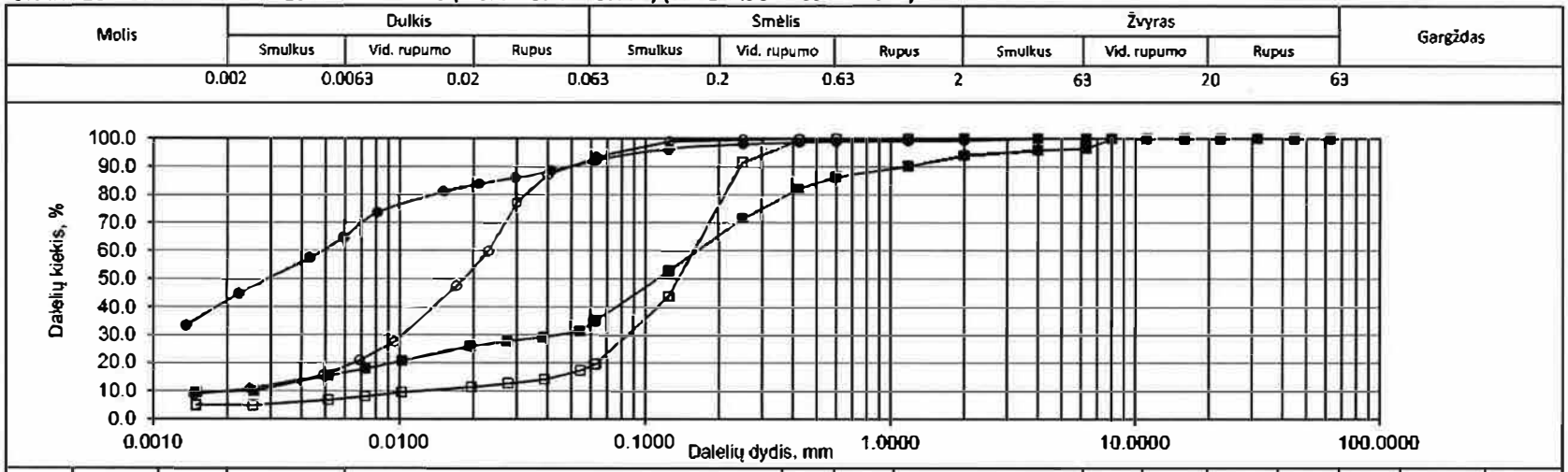
Užsakovas: AB "Vilniaus šilumos tinklai"

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Data: 2024-09-17

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Konstitucijos pr. 8A, Vilnius
info@geofirma.lt, +370 612 12228

GRANULOMETRINĖS SUDĖTIES NUSTATYMAS (hidrometro metodu) (LST EN ISO 17892-4:2017)



Simbolis	Gręž. nr.	Band. nr.	Gylis, m	Grunto pavadinimas (LGT 2019-06-13 įsakymas Nr. 1-175 "IGGT gruntų klasifikacija")	Gargždas, %	Žvyras, %	Smėlis, %			Dulkis, %	Molis, %	10%	30%	60%	C_u	C_c
							Rupus	Vid. rupumo	Smulkus							
O	2	13	18.4-18.6	**Mažo plastiškumo molis (CIL)**	0.0	0.0	0.0	0.7	5.8	83.7	9.8	0.00	0.01	0.02	-	-
●	2	14	19.4-19.6	**Vidutinio plastiškumo molis (CIM)**	0.0	0.7	0.4	1.6	4.8	50.7	41.8	0.00	0.00	0.00	-	-
□	2	15	21.2-21.4	**Dulkingas smėlis (siSa)**	0.0	0.0	0.1	27.3	52.9	14.7	4.9	0.01	0.09	0.17	-	-
■	2	17	24.4-24.6	**Smėlingas mažo plastiškumo molis ir dulkis (saCIL-SiL)**	0.0	6.0	6.6	23.3	28.8	25.5	9.7	0.00	0.04	0.17	-	-

uab GeoFirma

Užsakovas: AB "Vilniaus šilumos tinklai" Data: 2024.09.16

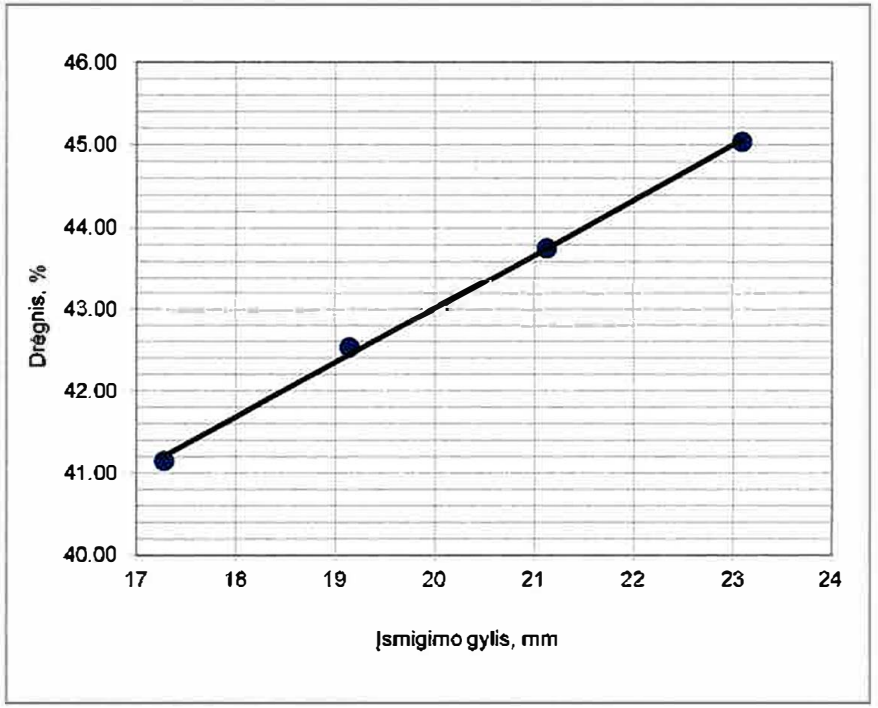
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**1**
Bandinio numeris:	**4**
Bandinio paėmimo gylis, m:	**4.8-5.0**
Grunto pavadinimas:	**Vidutinio plastiškumo molis (ClM)**

Grunto drėgnis:	**w, %**	**27.41**
Takumo drėgnis:	**W_L, %**	**43**
Plastingumo drėgnis:	**W_P, %**	**18.92**
Plastingumo rodiklis:	**I_p**	**24.08**
Takumo rodiklis:	**I_L**	**0.35**
Konsistencijos rodiklis:	**I_C**	**0.65**
Gamtinis tankis:	**ρ_n, Mg/m³**	**1.98**



Takumo drėgnis W_L, %				**43.00**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.28	19.14	21.12	23.09
Biukso svoris, g	13.46	14.33	20.14	13.79
Biuksas+Gw, g	38.74	39.8	47.67	41.39
Biuksas+Gd, g	31.37	32.2	39.29	32.82
Drėgnis w, %	41.15	42.53	43.76	45.03

Plastingumo drėgnis W_P, %	**18.92**
Biukso svoris, g	8.62
Biuksas + Gw, g	30.49
Biuksas + Gd, g	27.01

Grunto drėgnis, w %	**27.41**
Biukso svoris, g	22.33
Biuksas + Gw, g	89.4
Biuksas + Gd, g	74.97

Gamtinis tankis, ρ_n, Mg/m³	**1.98**
Žiedo tūris V, cm³	50.24
Žiedo svoris, g	44.49
Žiedas + Gw, g	144

Atliko: Tikrino:

6.3.1 PRIEDAS

uab GeoFirma

Užsakovas: AB "Vilniaus šilumos tinklai" Data: 2024.09.24

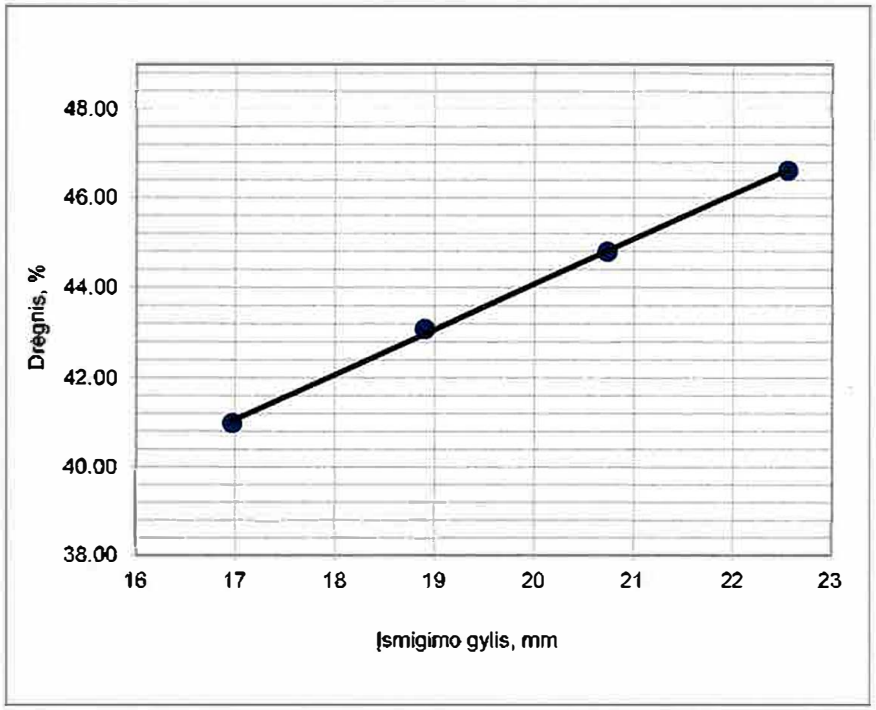
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**1**
Bandinio numeris:	**9**
Bandinio paėmimo gylis, m:	**14.8-15.0**
Grunto pavadinimas:	**Vidutinio plastiškumo molis (ClM)**

Grunto drėgnis:	**w, %**	**21.73**
Takumo drėgnis:	**W_L, %**	**44**
Plastingumo drėgnis:	**W_P, %**	**18.13**
Plastingumo rodiklis:	**I_P**	**25.87**
Takumo rodiklis:	**I_L**	**0.14**
Konsistencijos rodiklis:	**I_C**	**0.86**
Gamtinis tankis:	**ρ_n, Mg/m³**	**1.96**



Takumo drėgnis W_L, %				**44.00**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.97	18.9	20.73	22.55
Biukso svoris, g	14.86	22.43	14.41	14.92
Biuksas+Gw, g	40.35	47.77	40.11	41.12
Biuksas+Gd, g	32.94	40.14	32.16	32.79
Drėgnis w, %	40.98	43.08	44.79	46.61

Plastingumo drėgnis W_P, %	**18.13**
Biukso svoris, g	11
Biuksas + Gw, g	34.33
Biuksas + Gd, g	30.75

Grunto drėgnis, w %	**21.73**
Biukso svoris, g	14.09
Biuksas + Gw, g	69.71
Biuksas + Gd, g	59.78

Tikrino:

6.3.2 PRIEDAS

uab GeoFirma

Užsakovas: AB "Vilniaus šilumo tinklai" Data: 2024.09.16

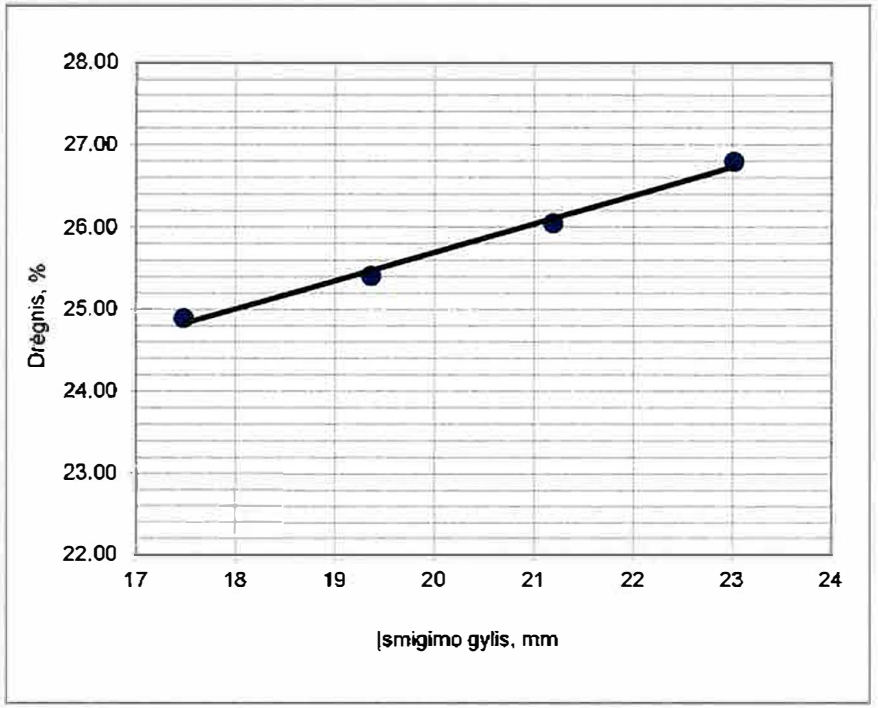
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**2**
Bandinio numeris:	**7**
Bandinio paėmimo gylis, m:	**9.5-9.7**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo dulkis (saSiL)**

Grunto drėgnis:	**w, %**	**18.98**
Takumo drėgnis:	**W_L, %**	**25.7**
Plastingumo drėgnis:	**W_P, %**	**N**
Plastingumo rodiklis:	**I_P**	
Takumo rodiklis:	**I_L**	
Konsistencijos rodiklis:	**I_C**	
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.10**



Takumo drėgnis W_L, %				**25.70**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.48	19.36	21.19	23.01
Biukso svoris, g	14.34	23.67	13.13	15.66
Biuksas+Gw, g	40.28	48.79	39.6	41.31
Biuksas+Gd, g	35.11	43.7	34.13	35.89
Drėgnis w, %	24.89	25.41	26.05	26.79

Plastingumo drėgnis W_P, %	**N**
Biukso svoris, g	
Biuksas + Gw, g	
Biuksas + Gd, g	

Grunto drėgnis, w %	**18.98**
Biukso svoris, g	13.1
Biuksas + Gw, g	72.72
Biuksas + Gd, g	63.21

Gamtinis tankis, ρ_n, Mg/m³	**2.10**
Žiedo tūris V, cm³	50.24
Žiedo svoris, g	44.49
Žiedas + Gw, g	149.81

Atliko: Tikrino:

6.3.3 PRIEDAS

uab GeoFirma

Užsakovas: AB "Vilniaus šilumos tinklai" Data: 2024.09.16

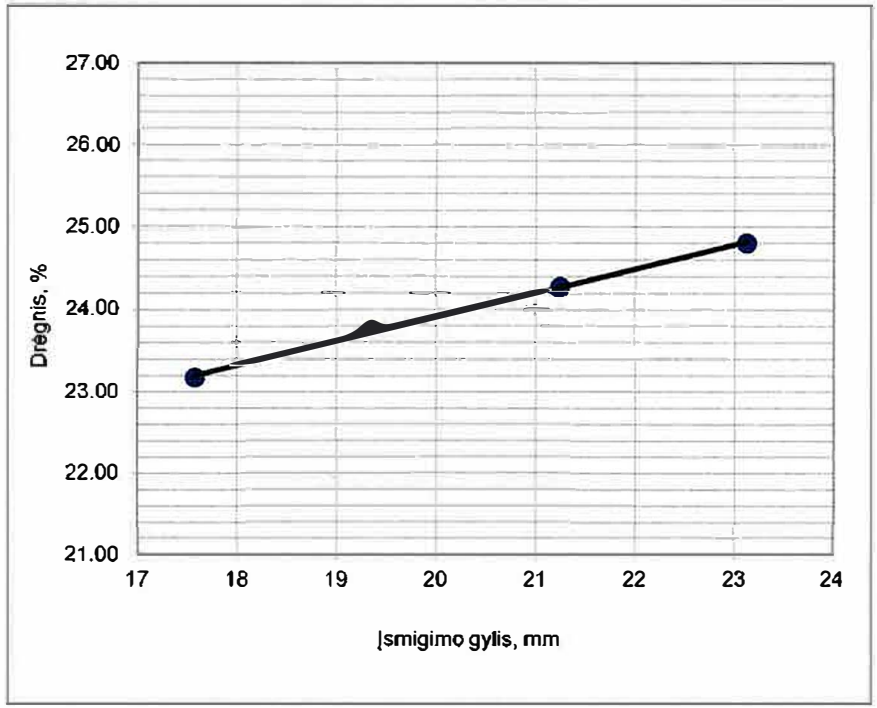
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**2**
Bandinio numeris:	**9**
Bandinio paėmimo gylis, m:	**12.2-12.4**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo molis (saCIL)**

Grunto drėgnis:	**w, %**	**18.24**
Takumo drėgnis:	**W_L, %**	**23.9**
Plastingumo drėgnis:	**W_P, %**	**16.94**
Plastingumo rodiklis:	**I_P**	**6.96**
Takumo rodiklis:	**I_L**	**0.19**
Konsistencijos rodiklis:	**I_C**	**0.81**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.13**



Takumo drėgnis W_L, %				**23.90**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.58	19.37	21.24	23.12
Biukso svoris, g	14.29	14.54	14.76	14.63
Biuksas+Gw, g	40.6	39.85	40	39.94
Biuksas+Gd, g	35.65	34.99	35.07	34.91
Drėgnis w, %	23.17	23.77	24.27	24.80

Plastingumo drėgnis W_P, %	**16.94**
Biukso svoris, g	15
Biuksas + Gw, g	35.23
Biuksas + Gd, g	32.30

Grunto drėgnis, w %	**18.24**
Biukso svoris, g	13.43
Biuksas + Gw, g	75.02
Biuksas + Gd, g	65.52

Gamtinis tankis, ρ_n, Mg/m³	**2.13**
Žiedo tūris V, cm³	50.24
Žiedo svoris, g	44.49
Žiedas + Gw, g	151.3

Tikrino:

6.3.4 PRIEDAS

uab GeoFirma

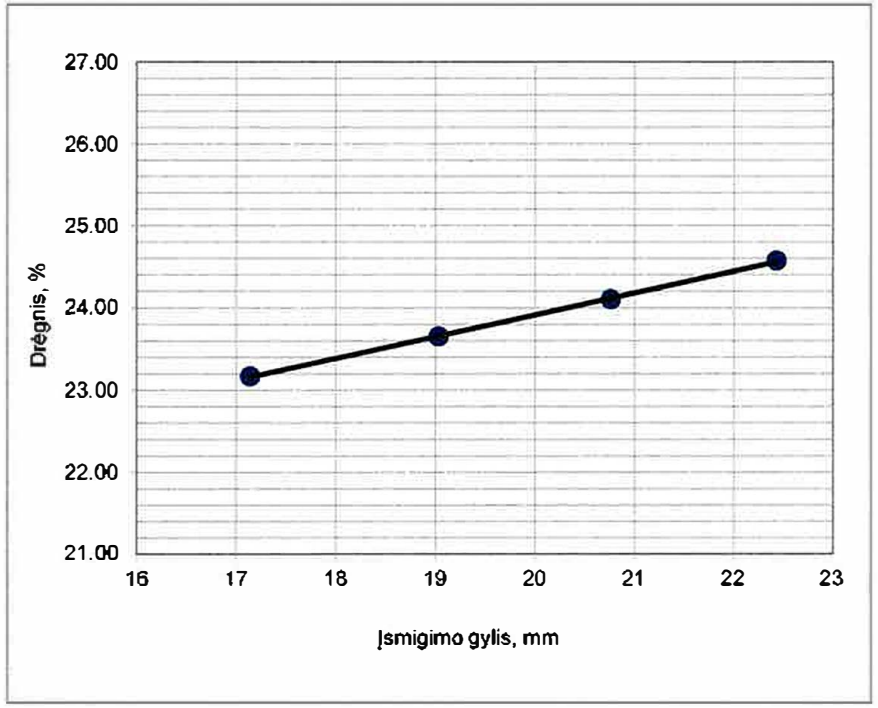
Užsakovas: AB "Vilniaus šilumos tinklai" Data: 2024.09.16

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:		**2**
Bandinio numeris:		**13**
Bandinio paėmimo gylis, m:		**18.4-18.6**
Grunto pavadinimas:		**Mažo plastiškumo molis (CIL)**
Grunto drėgnis:	**w, %**	**15.72**
Takumo drėgnis:	**W_L, %**	**23.9**
Plastingumo drėgnis:	**W_P, %**	**15.21**
Plastingumo rodiklis:	**I_P**	**8.69**
Takumo rodiklis:	**I_L**	**0.06**
Konsistencijos rodiklis:	**I_C**	**0.94**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.19**



Takumo drėgnis W_L, %				**23.90**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.14	19.03	20.76	22.43
Biukso svoris, g	22.34	13.26	20.32	13.4
Biuksas+Gw, g	47.59	38.51	46.63	39.56
Biuksas+Gd, g	42.84	33.68	41.52	34.4
Drėgnis w, %	23.17	23.65	24.10	24.57

Plastingumo drėgnis W_P, %	**15.21**
Biukso svoris, g	11
Biuksas + Gw, g	32.82
Biuksas + Gd, g	29.94

Grunto drėgnis, w %	**15.72**
Biukso svoris, g	14.18
Biuksas + Gw, g	88.1
Biuksas + Gd, g	78.06

Gamtinis tankis, ρ_n, Mg/m³	**2.19**
Žiedo tūris V, cm³	50.24
Žiedo svoris, g	44.49
Žiedas + Gw, g	154.33

Tikrino:

6.3.5 PRIEDAS

uab GeoFirma

Užsakovas: AB "Vilniaus šilumos tinklai" Data: 2024.09.16

Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

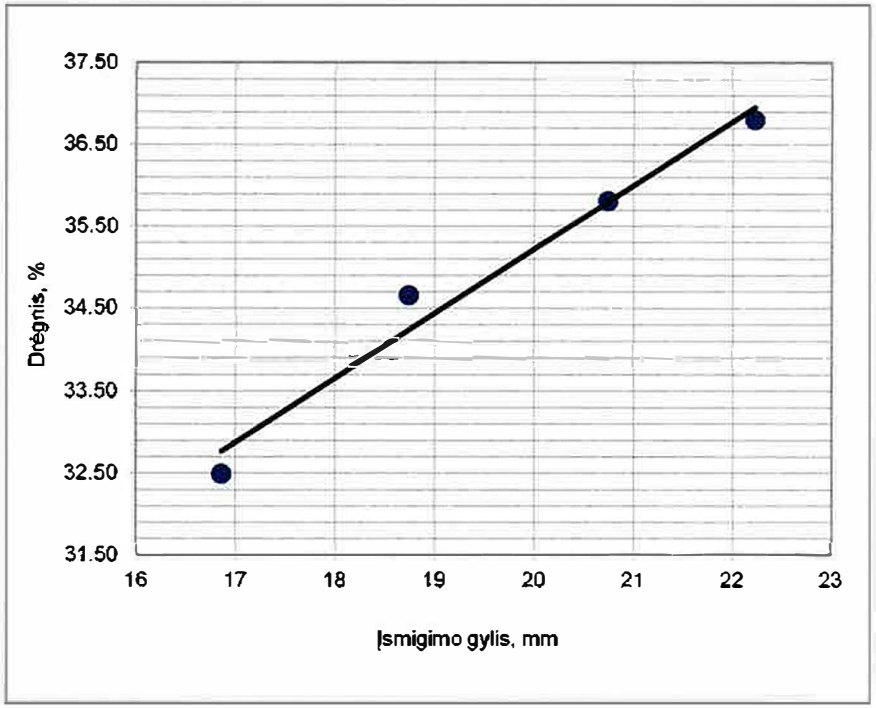
Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**2**
Bandinio numeris:	**14**
Bandinio paėmimo gylis, m:	**19.4-19.6**
Grunto pavadinimas:	**Vidutinio plastiškumo molis (CIM)**

Grunto drėgnis:	**w, %**	**18.78**
Takumo drėgnis:	**W_L, %**	**35.2**
Plastingumo drėgnis:	**W_P, %**	**16.37**
Plastingumo rodiklis:	**I_P**	**18.83**
Takumo rodiklis:	**I_L**	**0.13**
Konsistencijos rodiklis:	**I_C**	**0.87**
Gamtinis tankis:	**ρ_n, Mg/m³**	**2.12**

Takumo drėgnis W_L, %				**35.20**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	16.86	18.74	20.74	22.22
Biukso svoris, g	14.23	14.88	22.17	20.15
Biuksas+Gw, g	39.96	39.94	49.55	48.81
Biuksas+Gd, g	33.65	33.49	42.33	41.1
Drėgnis w, %	32.49	34.66	35.81	36.80



Plastingumo drėgnis W_P, %	**16.37**
Biukso svoris, g	11.76
Biuksas + Gw, g	33.73
Biuksas + Gd, g	30.64

Grunto drėgnis, w %	**18.78**
Biukso svoris, g	14.59
Biuksas + Gw, g	78.22
Biuksas + Gd, g	68.16

Gamtinis tankis, ρ_n, Mg/m³	**2.12**
Žiedo tūris V, cm³	50.24
Žiedo svoris, g	44.49
Žiedas + Gw, g	150.93

Tikrino:

6.3.6 PRIEDAS

uab GeoFirma

Užsakovas: AB "Vilniaus šilumos tinklai" Data: 2024.09.16

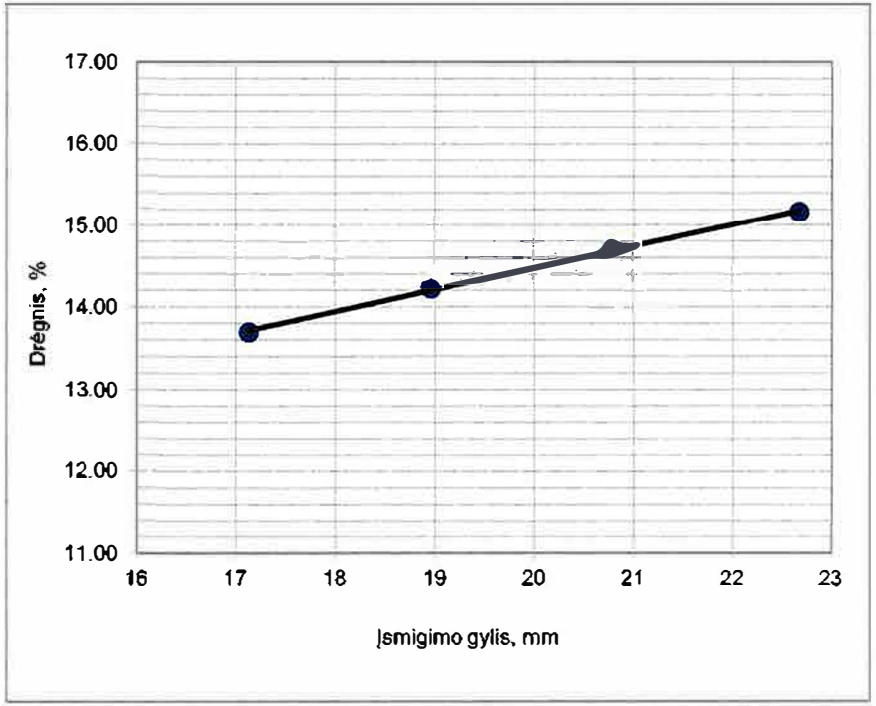
Objekto pavadinimas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Smulkaus grunto gamtinio drėgnio, Atterberg'o ribų ir gamtinio tankio nustatymo rezultatai

LST EN ISO 17892-1:2015, LST EN ISO 17892-12:2018, LST EN ISO 17892-2:2015

Gręžinio numeris:	**2**
Bandinio numeris:	**17**
Bandinio paėmimo gylis, m:	**24.4-24.6**
Grunto pavadinimas:	**Smėlingas mažo plastiškumo molis ir dulkis (saCIL-SiL)**

Grunto drėgnis:	**w, %**	**11.42**
Takumo drėgnis:	**W_L, %**	**14.5**
Plastingumo drėgnis:	**W_P, %**	**9.30**
Plastingumo rodiklis:	**I_P**	**5.20**
Takumo rodiklis:	**I_L**	**0.41**
Konsistencijos rodiklis:	**I_C**	**0.59**
Gamtinis tankis:	**ρ_w, Mg/m³**	**2.30**



Takumo drėgnis W_L, %				**14.50**
Bandymo Nr.	1	2	3	4
Kūgio smigimas, mm	17.13	18.96	20.79	22.67
Biukso svoris, g	14.56	14.25	14.41	13.98
Biuksas+Gw, g	39.89	39.87	40	40.4
Biuksas+Gd, g	36.84	36.68	36.72	36.92
Drėgnis w, %	13.69	14.22	14.70	15.17

Plastingumo drėgnis W_P, %	**9.30**
Biukso svoris, g	9.1
Biuksas + Gw, g	31.44
Biuksas + Gd, g	29.54

Grunto drėgnis, w %	**11.42**
Biukso svoris, g	14.06
Biuksas + Gw, g	81.47
Biuksas + Gd, g	74.56

Gamtinis tankis, ρ_w Mg/m³	**2.30**
Žiedo tūris V, cm³	50.24
Žiedo svoris, g	44.49
Žiedas + Gw, g	159.83

Tikrino:

6.3.7 PRIEDAS

uab GeoFirma

Data: 2024-09-16

Grunto drėgnio ir tankio nustatymas

remiantis standartu LST CEN ISO/TS 17892-1 : 2015

Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Grėž.Nr- Bnd.Nr	Gylis, m	Indo svoris, g	Indas su drėgnu gruntu, g	Indas su sausu gruntu, g	Drėgnis, %	Bandinio svoris su žiedu, g	Tankis Mg/m³	Žiedo V, cm³	Žiedo svoris, g
								50.24	44.49
1-4	4.8-5.0	22.33	89.4	74.97	27.41	144	1.98		
1-9	14.8-15.0	14.09	69.71	59.78	21.73		2.07		
2-3	3.3-3.5	14.83	83.57	70.45	23.59				
2-5	6.4-6.6	14.96	82.86	67.45	29.36				
2-7	9.5-9.7	13.1	72.72	63.21	18.98	149.81	2.10		
2-9	12.2-12.4	13.43	75.02	65.52	18.24	151.3	2.13		
2-13	18.4-18.6	14.18	88.1	78.06	15.72	154.33	2.19		
2-14	19.4-19.6	14.59	78.22	68.16	18.78	150.93	2.12		
2-15	21.2-21.4	22.44	89.18	80.4	15.15				
2-16	22.8-23.0	13.53	77.45	68.74	15.78				
2-17	24.4-24.6	14.06	81.47	74.56	11.42	159.83	2.30		

6.4 PRIEDAS

uab GeoFirma

Data: 2024-09-17

Grunto kietųjų dalelių tankio tyrimo rezultatai. Piknometrinis metodas

Vadovaujantis standartu LST CEN ISO/TS 17892-3 : 2015

Objektas: Kitos paskirties pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.

Grežinio, bandinio Nr.	Gylis, m	m_0	m_1	m_2	m_3	m_4	T, °C	ρ_w, Mg/m³	ρ_s, Mg/m³
1-9	14.8-15.0	46.542	145.474	61.63	155.077	15.088	20	0.99823	2.746
2-5	6.4-6.6	44.805	145.542	61.477	155.944	16.672	20	0.99823	2.654
2-7	9.5-9.7	45.978	144.104	63.026	154.782	17.048	20	0.99823	2.672
2-13	18.4-18.6	46.434	145.853	61.878	155.632	15.444	20	0.99823	2.721
2-15	21.2-21.4	46.067	145.001	62.393	155.225	16.326	20	0.99823	2.671
2-16	22.8-23.0	46.087	145.292	61.865	155.182	15.778	20	0.99823	2.675
2-17	24.4-24.6	46.01	145.981	62.121	156.112	16.111	20	0.99823	2.689

Atliko:

Tikrino:

6.5 PRIEDAS

uab GeoFirma	Objektas: Kitos paskirites pastatas (siurblinė) Gamyklos g. 10, Vilniaus m.			
	Struktūra: rekonstruota	Gr. 1	Pav. 9	Paėmimo gylis: 14.8 - 15.0 m
	Grunto pavadinimas	***Vidutinio plastiškumo molis***		***CIM***

TIESIOGINIO KIRPIMO BANDYMAS (CD) (ISO 17892-10:2018)

Prietaisas: UBM-1. Kirpimo aparatas

Grunto fizikiniai rodikliai

Dalelių tankis ρ_s, Mg/m^3	Grunto tankis ρ, Mg/m^3	Sauso grunto tankis ρd, Mg/m^3	Gamtinis drėgnis w, %	Poringumo koeficientas e, v.d.	Sotles laipsnis S_r, v.d.
2.746	2.07	1.71	20.87	0.60	0.95

Žiedo matmenys

H, mm	25
D, mm	71.4
V, mm^3	100098

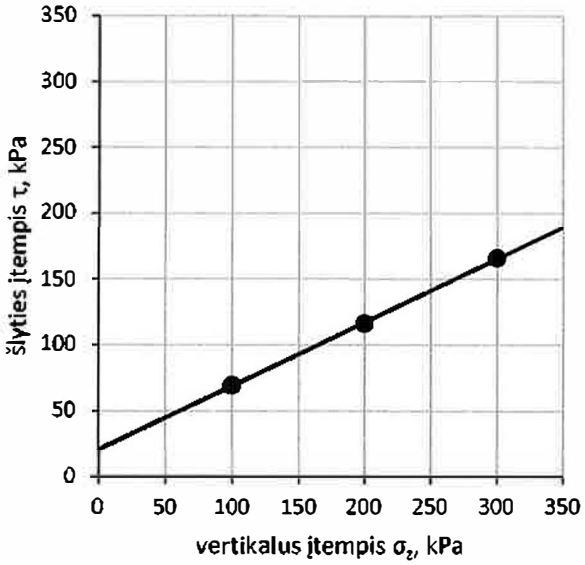
Pradiniai bandinio matmenys

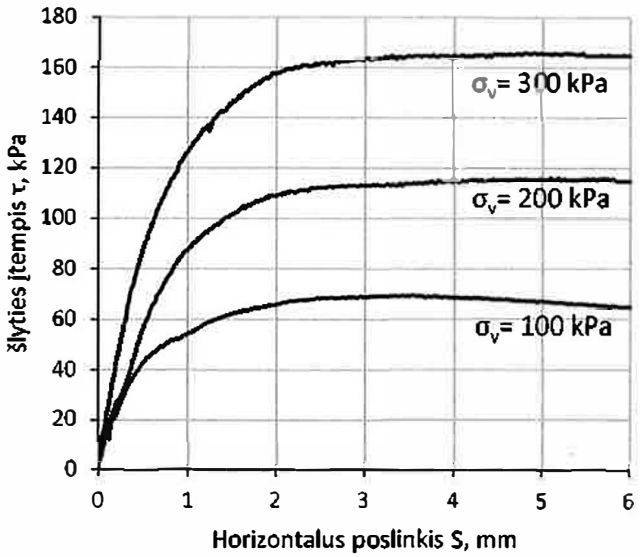
Nr.	H_0, mm	D_0, mm	A_0, mm^2
1.	25	71.4	4000
2.	25	71.4	4000
3.	25	71.4	4000

Bandymo duomenys

σ_z, kPa	τ, kPa	ρ, Mg/m^3	w, %
100	69.49	2.07	22.21
200	116.20	2.07	20.50
300	165.85	2.08	19.90

Kirpimo greitis: 0.05 mm/min





Bandymo rezultatai .

tan φ'	**0.48**
φ', °	**25.6**
c', kPa	**21.2**

Atliko:

Tikrino:

Data:

Dokumentą elektroniniu parašu pasirašė Data: 2020-07-01 11:34:42

PATVIRTINTA
Lietuvos geologijos tarnybos prie Aplinkos ministerijos direktoriaus 2020 m. birželio 11 d. įsakymu Nr. 1-207

LIETUVOS GEOLOGIJOS TARNYBA PRIE APLINKOS MINISTERIJOS

LEIDIMAS TIRTI ŽEMĖS GELMES

2020-07-01 Nr. 155
Vilnius

UAB „GeoFirma"
(juridinio asmens duomenys kaupiami ir saugomi Juridinių asmenų registre, kodas 302555562, adresas Vilnius, Konstitucijos pr. 8A)

leidžiama atlikti:

požeminio vandens paiešką ir žvalgybą,

geoterminės energijos paiešką ir žvalgybą,

inžinerinį geologinį (geotechninį) tyrimą,

ekogeologinį tyrimą.

Direktorius _____ (vardas ir pavardė)
(pareigų pavadinimas) A.V. (parašas)

KALIBRAVIMO LIUDIJIMAS Nr. K-0021498

Užsakovas	Į.k. 302555562 UAB Geofirma Konstitucijos pr. 8A, Vilnius
Kalibruotas objektas	Tenzozondas CPT Nr. GL 0344 Kūgio spaudimo jėgos matavimo ribos: (0...100) kN (plotas 10 cm²; 100 kN atitinka 100 MPa) Šoninės trinties jėgos matavimo ribos: (0...15) kN (plotas 150 cm²; 15kN atitinka 1 Mpa) Indikatorius GRL 1503
Objekto būklė	MP neturi mechaninių ar kitokių pažeidimų
Kalibravimo metodas	Kalibravimo procedūra J2-02 (2018-12-13), 1 leidimas
Kalibravimą atliko	UAB "Nordic Metrology Science"Jungtinė laboratorija.Vilniaus regiono laboratorija, Dariaus ir Girėno g. 38, LT-02189, Vilnius
Kalibravimo atlikimo vieta	Ganyklų g. 15, Tauragė
Aplinkos sąlygos	Aplinkos temperatūra 20,1 ± 1 °C
Kalibravimo data	2024-08-26
Sietis	Matavimai buvo atlikti su šiais, kalibravimo būdu susietais etalonais: Etaloninis dinamometras susidedantis iš MGS plus, ML38B Nr. 801229358; Z4A/50 kN Nr.184930037; C18/500 kN Nr.002874TY
Kalibravimo liudijimo išdavimo data	2024-08-26
Inžinierius metrologas	

Dokumentą elektroniniu parašu pasirašė Data: 2024-08-27 12:29:10

KALIBRAVIMO LIUDIJIMAS Nr. K-0021498
KALIBRAVIMO REZULTATAI

Tenzozondas CPT Nr. GL 0344

Apkrovos vardinė vertė (P),	Tenzozondo rodmenų vidurkis, (F_R)	Paklaida (ΔF),		Išplėstinė neapibrėžtis, (±U)	
kN	kN	kN	%	kN	%
Šoninė trintis					
0,3	0,300	0,000	0,00	± 0,01	± 1,92
1,5	1,500	0,000	0,00	± 0,01	± 0,39
3	3,020	0,020	0,67	± 0,01	± 0,19
6	6,043	0,043	0,72	± 0,03	± 0,49
15	15,093	0,093	0,62	± 0,03	± 0,20
Kūgis					
0,3	0,297	-0,003	-1,11	± 0,03	± 9,75
5	4,983	-0,017	-0,33	± 0,03	± 0,59
10	9,983	-0,017	-0,17	± 0,06	± 0,58
20	19,980	-0,020	-0,10	± 0,01	± 0,03
30	29,977	-0,023	-0,08	± 0,03	± 0,10
40	39,947	-0,053	-0,13	± 0,03	± 0,07
50	49,907	-0,093	-0,19	± 0,03	± 0,06
70	69,890	-0,110	-0,16	± 0,11	± 0,15

Prieš kalibravimą matavimo priemonė buvo apkrauta Max apkrova

Išmatuota jėga (F) lygi rodmens (F_R) ir paklaidos (ΔF) skirtumui su išplėstine neapibrėžtimi (± U)

$$F = (F_R - \Delta F) \pm U$$

Nurodytos vertės taikomos kalibruojamo objekto būklei kalibravimo metu

Išplėstinė neapibrėžtis apskaičiuota sumine standartinę neapibrėžtį padauginus iš koeficiento k=2, kuris, esant normaliniam skirstiniui, atitinka 95% pasikliautinumo lygmenį. Standartinė neapibrėžtis paskaičiuota pagal EA-4/02M.

Kalibravimo rezultatai susiję tik su kalibruojamu objektu.

Inžinierius metrologas

Kalibravimo liudijimas gali būti dauginamas tik pilnai. Atskiras kalibravimo liudijimo dalis galima dauginti tik gavus raštišką kalibravimo laboratorijos leidimą.

Statybos techninio reglamento
STR 1.04.02:2011
„Inžineriniai geologiniai (geotechniniai)
tyrimai“ 2 priedas

(Techninės užduoties forma)

AB „Vilniaus šilumos tinklai“
Dokumento sudarytojo pavadinimas

TECHNINĖ UŽDUOTIS

2024-08-19 Nr. 23031S1TP-XX-TP-SK_GTU-02.1

IGG tyrimų stadija (pabraukti): žvalgybiniai, projektiniai, papildomi, kontroliniai.

Tyrimų objekto pavadinimas: Kitos paskirties pastato (siurblinės), Gamyklos g. 10 Vilniaus m., statybos projektas.

Tyrimų objekto adresas (savivaldybė, seniūnija, gyvenvietė, gatvė, statinio numeris): Gamyklos g. 10, Vilniaus m.

Užsakovo duomenys (pavadinimas (v. pavardė), adresas, telefono ryšio Nr., el. pašto adresas): AB „Vilniaus šilumos tinklai“, Elektrinės g. 2, LT-03150 Vilnius, info@chc.lt

Projektuotojo duomenys (pavadinimas (v. pavardė), adresas, telefono ryšio Nr., el. pašto adresas): UAB TEC Industry, Savanorių pr. 109, 4 a., Kaunas, +37061412579, tomas.prusinskas@tec.lt

Statybos rūšis (pabraukti): nauja statyba, rekonstrukcija, kapitalinis remontas, kita.

Statinio paskirtis: paskirties inžinerinis statinys (akumuliacinė talpa).

Statinio kategorija (pabraukti): ypatingasis, neypatingasis, nesudėtingasis

Nekilnojamųjų kultūros vertybių registro kodas (jei yra): -

Geotechninė kategorija (projektiniuose tyrimuose) (pabraukti): pirma, antra, trečia.

Duomenys apie statinio parametrus (ilgis, plotis, aukštis, gylis, plotas):
02 - akumuliacinė talpa (3000 m^3 talpos, orientacinis gabaritas 13 m skersmens, 26 m aukštis).

Perduodamos į pagrindą apkrovos ir jų intensyvumas: nustatoma projektavimo metu.

Tyrimų ploto ribų koordinatės:

Numeris	X	Y
1.	6053156.61	581678.98
2.	6053131.81	581674.26
3.	6053128.06	581705.41
4.	6053154.20	581709.88

Papildomai nustatomi geotechniniai parametrai ir kiti reikalavimai:

1. Išgręžti 2 gręžinius **SZ-1. CPT1; SZ-2. CPT-2;** Greta gręžinių atlikti statinio zondavimo bandymus.
2. Tyrimo vietos nurodytos topografiniame plane (pridedama **23031S1TP-XX-TP-SK_GTU-02.1**). Gręžinių gylis ir koordinatės:
3.

Gręžinio numeris	**X**	**Y**	**Min. gylis nuo žemės paviršiaus, m**
SZ-1. CPT-1	6053133.86	581683.24	25
SZ-2. CPT-2	6053147.68	581706.70	25

4. Nustatyti gruntinio vandens slūgsojimo gylį.
5. Aptikus smulkiuosius gruntus, pateikti efektyviąją sankibą c'.
6. Gruntų charakteristikas ir rodiklius pateikti, suderinus su laboratorinių tyrimų rezultatais, pagal zondavimo duomenis.
7. Vietose kur statinio zondavimo atlikti nėra galimybių (pvz. kietas gruntas ir pan.) atlikti dinaminį zondavimą. Dinaminio zondavimo reikšmes perskaičiuoti į statinio zondavimo duomenis ir pateikti geologinių tyrinėjimų ataskaitoje;
8. Esant sudėtingoms geologinėms sąlygoms spręsti dėl papildomų gręžinių būtinumo, bei gręžinių gylio pakeitimo.
9. Gręžinių vietas galima nežymiai keisti dėl esamų inžinerinių komunikacijų ar kitų kliūčių.
10. Pateikti inžinerinių geologinių tyrinėjimų ataskaitą.

Sąrašas normatyvinių dokumentų, kuriais vadovaujantis atliekami tyrimai:

1. STR 01.04.02:2011 „Inžineriniai geologiniai ir geotechniniai tyrimai"
2. STR 2.05.21:2016. Geotechninis projektavimas. Bendrieji reikalavimai

Anksčiau sklype atlikti geologiniai tyrimai:

1. UAB "GeoFirma", tyrimo identifikavimo numeris Žemės gelmių registre 47951-2024

Užsakovas AB „Vilniaus šilumos tinklai".....2024-08
vardas, pavardė, parašas, data

Projekto vadovas: 2024-08
vardas, pavardė, parašas, data

Tyrimų vadovas (užduotį gavau)

vardas, pavardė, parašas, data

ŽEMĖS GELMIŲ GEOLOGINIŲ TYRIMŲ REGISTRACIJOS LAPAS

Tyrimo identifikavimo numeris Žemės gelmių registre 50583-2024

1. Tyrimo užsakovas AB Vilniaus šilumos tinklai, reg.kodas 124135580, Vilniaus apskr., Vilniaus m. sav., Vilniaus m., Elektrinės g. 2

(juridinio asmens pavadinimas, teisinė forma, kodas, buveinės adresas; arba fizinio asmens vardas, pavardė, asmens kodas, gyvenamosios vietos adresas; arba juridinių ir (ar) fizinių asmenų grupės, veikiančios pagal jungtinės veiklos sutartį, šalių vardai, pavardės, pavadinimai, juridinių asmenų teisinės formos, kodai, jungtinės veiklos sutarties sudarymo data ir numeris)

2. Tyrimo vykdytojas UAB "GeoFirma", reg.kodas 302555562, Vilniaus apskr., Vilniaus m. sav., Vilniaus m., Konstitucijos pr. 8A

(juridinio asmens pavadinimas, teisinė forma, kodas, buveinės adresas; arba fizinio asmens vardas, pavardė, asmens kodas, gyvenamosios vietos adresas; arba juridinių ir (ar) fizinių asmenų grupės, veikiančios pagal jungtinės veiklos sutartį, šalių vardai, pavardės, pavadinimai, juridinių asmenų teisinės formos, kodai, jungtinės veiklos sutarties sudarymo data ir numeris)

3. Leidimo tirti žemės gelmes Nr. 155 , išdavimo data 2010-11-16

4. Tyrimo būdas: Tiesioginis

5. Tyrimo rūšis: Inžinerinis geologinis ir geotechninis tyrimas, II-a geotechninė kategorija

6.Tyrimų tikslas ir (ar) etapas Kitos paskirties pastato (siurblinės), Gamyklos g. 10, Vilniaus m., statybos projekto II-os geotechninės kategorijos projektiniai inžineriniai geologiniai ir geotechniniai tyrimai.

7. Duomenys apie tyrimo objektą

Tyrimo objekto tipas	objektai, nuotekų valymo įrenginiai
Tyrimo objekto pavadinimas	Siurblinė Gamyklos g. 10, Vilniaus m.
Tyrimo objekto adresas	Vilniaus apskr., Vilniaus m. sav., Vilniaus m., Gamyklos g. 10
Tyrimo ploto ribos arba tyrimų vietos koordinatės (1994 metų Lietuvos koordinačių sistemoje)	Elementas Nr.1: Nr.1 6053157 581679; Nr.2 6053132 581674; Nr.3 6053128 581705; Nr.4 6053154 581710;

8. Tyrimo pradžios data 2024-08-26 , tyrimo pabaigos data 2024-11-26

9. Tyrimo dokumento (-ų) (ataskaitos(-ų)) pavadinimas (-ai) Pateikimo data

Kitos paskirties pastato (siurblinės), Gamyklos g. 10, Vilniaus m., statybos projekto II-os geotechninės kategorijos projektinių inžinerinių geologinių ir geotechninių tyrimų ataskaita	2024-11-26

10. Pridedami dokumentai: TU

(darbų programa, techninė užduotis, projektas)

Tyrimo identifikavimo numeris Žemės gelmių registre | 50583-2024

Užpildė:

Pareigų pavadinimas	Geologas
Vardas, Pavardė	
Data	2024-08-26
Telefono numeris	
El. paštas	info@geofirma.lt

Paraiškos registracijos Nr. | ŽGT-2024-3599 | Paraiškos pateikimo data | 2024-08-26

Tyrimo įregistravimo Žemės gelmių registre data | 2024-09-17

Žemės gelmių registro tvarkytojo pastabos:

Dokumentą atspausdino 2024-09-27, 09:59:23

INŽINERINIŲ SKAIČIAVIMŲ ATASKAITA

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	SPV				
	SPV. ASIST.				
	SPDV			DOKUMENTO PAVADINIMAS INŽINERINIAI SKAIČIAVIMAI	LAIDA D
lt	STATYTOJAS IR (ARBA) UŽSAKOVAS AB VILNIAUS ŠILUMOS TINKLAI			DOKUMENTO ŽYMUO 23031S1TP-XX-TDP-SK_IS-001	LAPAS 1 / LAPŲ 516

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1. PRADINIAI DUOMENYS

Šioje skaičiavimų ataskaitoje yra pateikti pastato konstrukcijų inžineriniai skaičiavimai. Siekiant nustatyti laikančiųjų konstrukcinių elementų įražas bei deformacijas buvo sukurtas erdvinis baigtinių elementų modelis.

Pastato konstrukcinę schemą sudaro vieno tarpsnio 14,4 m skersinis rėmas su standžiai pamatuose įtvirtintomis 6,22 m aukščio kolonomis ir šarnyriškai į kolonas atremtomis sijomis. Pastato kolonos plienines, kolonų žingsnis 6,2 m. Kolonos 400x400mm gelžbetoninės.

Stogo konstrukcija sudaryta iš metalinių sijų HEA ir HEB profilių. Sijos pagamintos iš S355 plieno, prie kolonų tvirtinamos šarnyriškai.

Bendrąjį pastato pastovumą užtikrina ryšių tarp kolonų ir denginio konstrukcijų sistema. Ryšių elementai suprojektuoti iš S355 plieno.

Iš išorės pastatas dengiamas sieniniais daugiasluoksniais paneliais. Stogo danga – akmens vatos ir polistireninio putplasčio apšiltinimas, 2sl. prilydoma bituminė danga. Stogo dangą laikanti konstrukcija suprojektuota iš apkrovas laikančio pakloto lakštų. Suprojektuotas paklotas T153, skardos storis 1,2mm.

Suprojektuoti pastato pamatai – gręžtiniai, CFA tipo. Polių diametras d450mm, ilgis 5 m. Polių betonas C25/30, armatūra B500B. Viršuje poliams apjungti suprojektuotos gb galvenos. Galvenų betonas C25/30, armatūra B500B. Kolonoms tvirtinti galvenose įrengiami inkariniai varžtai.

Langų, stoglangių, deflektorių, durų angų vietose, suprojektuoti angų aprėminimo rėmai iš vamzdinio profilio. Aprėminimai suprojektuoti iš S235 plieno.

Serviso patalpų karkasinės konstrukcijos pastato viduje pagamintos iš S235 plieno markės vamzdinių profilių.

Serviso platformos ir įrangos atramos projektuojamos iš I-, U-tipo ir vamzdinių profilių, plieno S235.

Sienų panelių horizontaliam tvirtinimui, pastato perimetru, tarp kolonų, suprojektuoti vamzdinio profilio elementai iš S235, S355 plieno.

2. NORMATYVINIŲ DOKUMENTŲ SĄRAŠAS

LST EN 1990:2004	Eurokodas. Konstrukcijų projektavimo pagrindai
LST EN 1991-1-1:2004	Eurokodas 1. Poveikiai konstrukcijoms. 1-1 dalis. Bendrieji poveikiai. Tankiai, savasis svoris, pastatų naudojimo apkrovos
LST EN 1991-1-3:2004	Eurokodas 1. Poveikiai konstrukcijoms. 1-3 dalis. Bendrieji poveikiai. Sniego apkrovos
LST EN 1991-1-4:2005	Eurokodas 1. Poveikiai konstrukcijoms. 1-4 dalis. Bendrieji poveikiai. Vėjo poveikiai

LST EN 1991-1-5:2004	Eurokodas 1. Poveikiai konstrukcijoms. 1-5 dalis. Bendrieji poveikiai. Temperatūriniai poveikiai
LST EN 1991-1-6:2005	Eurokodas 1. Poveikiai konstrukcijoms. 1-6 dalis. Bendrieji poveikiai. Poveikiai vykdymo metu
LST EN 1991-3:2006	Eurokodas 1. Poveikiai konstrukcijoms. 3 dalis. Kranų ir mašinų sukelti poveikiai
LST EN 1992-1-1:2005	Eurokodas 2: Gelžbetoninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės
LST EN 1993-1-1:2005	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės
LST EN 1993-1-8:2005	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-8 dalis. Mazgų projektavimas
LST EN 1993-1-10:2005	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-10 dalis. Medžiagų tąsumas ir jų savybės išilgai storio
LST EN 1993-6:2007	Eurokodas 3. Plieninių konstrukcijų projektavimas. 6 dalis. Kranus laikančios konstrukcijos
LST EN 1090-2:2018	Darbų, susijusių su plieninėmis ir aliumininėmis konstrukcijomis, atlikimas. 2 dalis. Techniniai reikalavimai, keliami plieninėms konstrukcijoms
LST EN 1992-1-1:2005	Eurokodas 2. Gelžbetoninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės
STR 1.04.04:2017	Statinio projektavimas, projekto ekspertizė
STR 2.01.01(1):2005	Esminis statinio reikalavimas. Mechaninis atsparumas ir pastovumas

3. KOMPIUTERITNĖS PROGRAMOS

Skaičiavimams panaudota programos:

- Dlubal RFEM;
- GEO5;
- Peikko Designer.

4. APKROVOS

4.1. NUOLATINĖS APKROVOS

Konstrukcijų nuosavas svoris yra automatiškai įvertinamas programoje.

1 lentelė. Priimtos nuolatinės apkrovos į sandėlio denginio konstrukcijas (g_k, kN/m^2):

Apkrova	Norminė apkrova kN/m²	Daliniai koef.	Skaičiuotinė apkrova kN/m²
Du sluoksniai prilydomosios bituminės stogo dangos	0,019	1,35	0,026
Mineralinės vatos izoliacija, 30 mm	0,011	1,35	0,014
Polistireninis putplastis, 100 mm	0,035	1,35	0,047
Mineralinės vatos izoliacija, 20 mm	0,007	1,35	0,009
Pakolotas RUUKKI T153-40L-840 1,2 mm	0,170	1,35	0,230
Inžinerinė įranga	0,500	1,35	0,675
	0,742		1,001

2 lentelė. Priimtos nuolatinės apkrovos į sandėlio sienas (g_k, kN/m²):

Apkrovos pavadinimas	Charakteristinė apkrova kN/m²	Daliniai koef.	Skaičiuotinė apkrova kN/m²
Daugiasluoksnė plokštė SPA F RUUKKI, t = 150 mm	0,280	1,35	0,378

Vamzdynų ir technologinės apkrovos – pagal pateiktas užduotis.

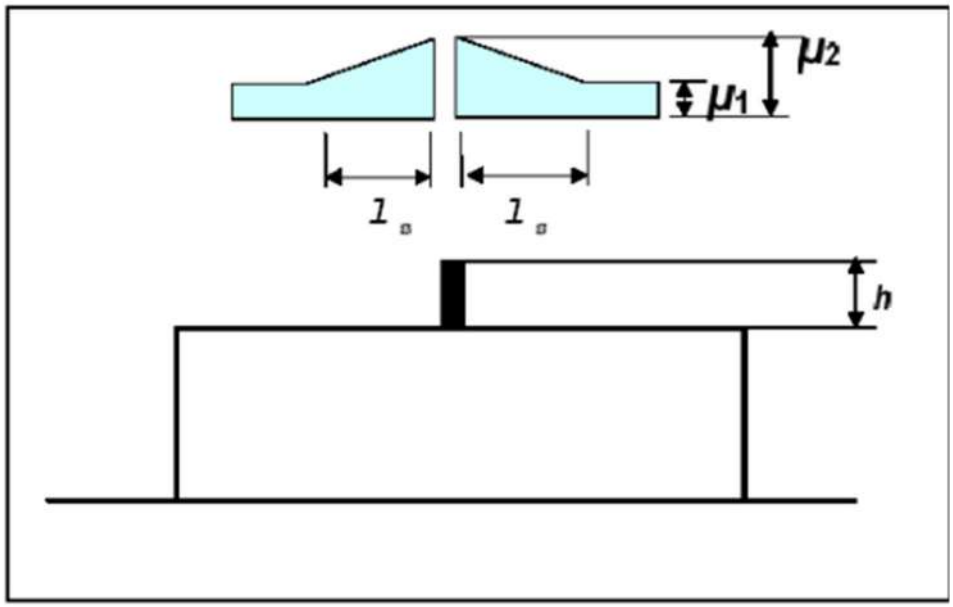
4.2. SNIEGO APKROVA

Sniego apkrovos automatiškai generuojamos kompiuterinės programos Dlubal RFEM pagalba pagal LST EN 1991-1-3/NA, naudojant šiuos parametrus:.

Sniego apkrovos rajonas:	II rajonas
Charakteristinė sniego apkrova ant žemės:	s_k = 1,6 kN/m²
Topografinė charakteristika:	Ce = 1,0
Šilumos koef.:	Ct = 1,0
Sniego formos koeficientas:	μ_1= 0,8 (LST EN1991-1-3-:2004 (NA:2012) 5.3.3)

Sniego sąnašos skaičiavimas:

Sniego sąnašos skaičiavimas LST-EN 1991-1-3:2003 6.2 skyrių



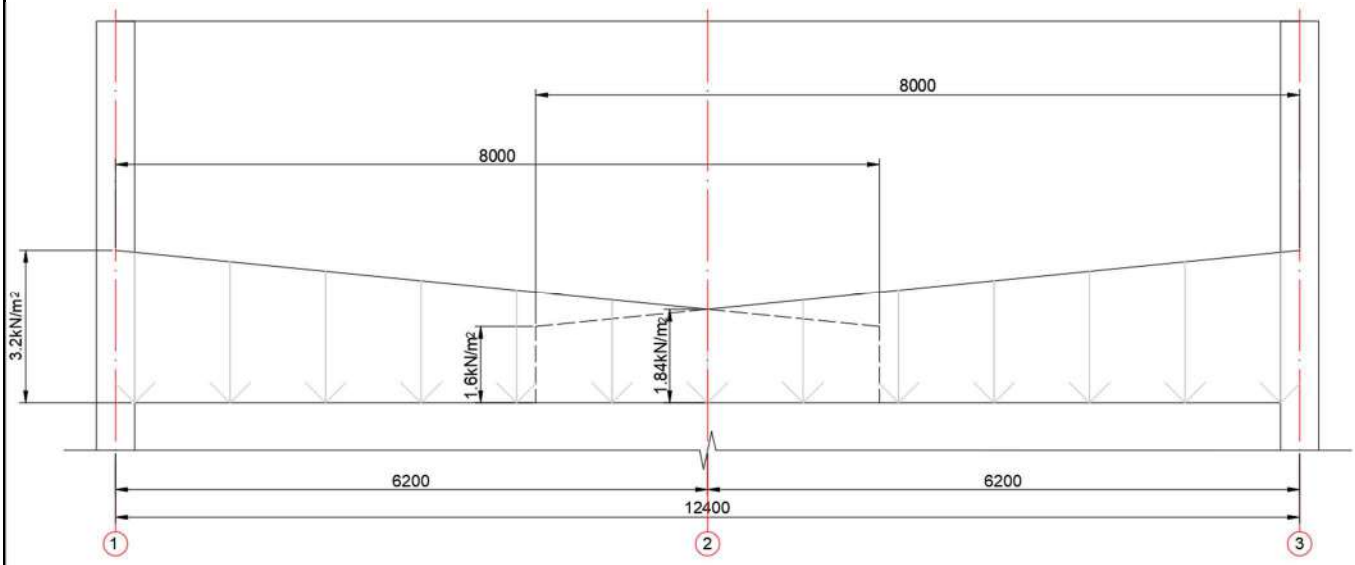
h	4	m
sk	1,6	kN/m2
gamma	2	kN/m3

$\mu_2 = \gamma h / s_k$ = 5 , bet ne daugiau nei 2 (6.1, 6.2)

μ_2 = 2

Sniego apkrova 3,2 kN/m2

ls = 2*h = 8 m



4.3. VĖJO APKROVA

Vėjo apkrovos automatiškai generuojamos kompiuterinės programos Dlubal RFEM pagalba pagal LST EN 1991-1-4/NA, naudojant šiuos parametrus:

Vėjo apkrovos rajonas:	I rajonas
Svarbiausioji pagrindinio vėjo greičio reikšmė:	$v_{b,0}$ = 24,0 m/s
Vėjo krypties koef.:	c_{dir} = 1,0
Metų laiko koef.:	c_{season} = 1,0
Vietovės kategorija:	II
Konstrukcinis koef.:	$c_s c_d$ = 1,0

4.4. NAUDOJIMO APKROVA

Stogas priskiriamas H kategorijai, naudojimo apkrovos reikšmė q_k=0.4 kN/m², Q_k=1.1 kN. Apkrova ant aptarnavimo aikštelių – 2,0 kN/m²,

5. BEM SKAIČIAIMAI

Žemiau pateikiami pastato karkaso skaičiavimų, programa Dlubal RFEM, įvesties duomenys ir rezultatai (anglų k.).

5.1. PASTATO KARKASO SKAIČIAVIMAS

Model - General Data

General	Model name	:	Salininku - FRAME_V19	
	Type of model	:	3D	
	Positive direction of global axis Z	:	Upward	
	Classification of load cases and combinations	:	According to Standard: EN 1990 National Annex: LST - Lithuania	
	x Automatically create combinations	:	x Result Combinations	
Options	- RF-FORM-FINDING - Find initial equilibrium shapes of membrane and cable structures			
	- RF-CUTTING-PATTERN			
	- Piping analysis			
	- Use CQC Rule			
	- Enable CAD/BIM model			
	Standard Gravity g	: :	 10.00 m/s²	

FE Mesh Settings

General	Target length of finite elements		l_{FE}	:	0.500 m
	Maximum distance between a node and a line to integrate it into the line		ε	:	0.001 m
	Maximum number of mesh nodes (in thousands)			:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic			:	10
	x Activate member divisions for large deformation or post-critical analysis				
	x Use division also for straight members, which are not integrated in surfaces, with			:	Target length LFE of finite elements
	Minimum number of member divisions			:	2
	x Use division for members with node lying on them				

FE Mesh Settings

	Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
		Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
		Shape direction of finite elements		:	Triangles and quadrangles
					x Same squares where possible

1.3 Materials

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/°C]	Partial Factor γ_M [-]	Material Model
1	Concrete C30/37 | DIN 1045-1:2008-08						
	2830.00	1179.17	0.200	25.00	1.00E-05	1.00	Isotropic Linear Elastic
2	Steel S 355 JR | EN 10025-2:2004-11						
	21000.00	8076.92	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic
3	a						
	1.00000E+13	5.00006E+15	-0.999	0.00E+00	0.00E+00	1.00	Isotropic Linear Elastic
4	Steel S 355 JR | EN 10025-2:2004-11						
	21000.00	8076.92	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic
5	Steel S 235 | EN 10025-2:2004-11						
	21000.00	8076.92	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic
6	Steel S 355 JR | EN 10025-2:2004-11						
	21000.00	8076.92	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic

1.7 Nodal Supports

Support No.	Nodes No.	Axis System	Column in Z	Support Conditions u_X	u_Y	u_Z	φ_X	φ_Y	φ_Z
1	151,391,392,435,436,588,590,595,617,619,657	Global X,Y,Z	-	x	x	x	-	-	x
3	1,3,5,8,17,22,23,33,35,37,40	Global X,Y,Z	-	x	x	x	x	x	x

1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] / A [cm²]	I_y [cm⁴] / A_y [cm²]	I_z [cm⁴] / A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	HE B 300 | Euronorm 53-62							
	2	186.00	25170.00	8560.00	0.00	0.00	300.0	300.0
		149.00	94.97	28.65				
2	HE B 200 | Euronorm 53-62							
	2	59.50	5700.00	2000.00	0.00	0.00	200.0	200.0
		78.10	50.04	15.35				
3	HE B 200 | Euronorm 53-62							
	2	59.50	5700.00	2000.00	0.00	0.00	200.0	200.0
		78.10	50.04	15.35				
4	HE A 400 | Euronorm 53-62							
	2	190.00	45070.00	8560.00	0.00	0.00	300.0	390.0
		159.00	94.99	38.67				
5	QRO 120x5 | EN 10219-2:2006							
	2	778.00	485.00	485.00	0.00	0.00	120.0	120.0
		22.40	9.69	9.69				
6	QRO 120x5 | EN 10219-2:2006							
	2	778.00	485.00	485.00	0.00	0.00	120.0	120.0
		22.40	9.69	9.69				
7	HE B 300 | Euronorm 53-62							
	2	186.00	25170.00	8560.00	0.00	0.00	300.0	300.0
		149.00	94.97	28.65				
8	HE B 180 | Euronorm 53-62							
	2	42.30	3830.00	1360.00	0.00	0.00	180.0	180.0
		65.30	42.05	12.98				
9	IPE 120 | SZS							
	2	1.74	317.80	22.67	0.00	0.00	64.0	120.0
		13.21	6.77	4.79				

1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] / A [cm²]	I_y [cm⁴] / A_y [cm²]	I_z [cm⁴] / A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
10	HE A 180 | Euronorm 53-62							
	2	14.90	2510.00	925.00	0.00	0.00	180.0	171.0
		45.30	28.48	8.89				
11	HE B 300 | Euronorm 53-62							
	2	186.00	25170.00	8560.00	0.00	0.00	300.0	300.0
		149.00	94.97	28.65				
12	QRO 140x6 | EN 10219-2:2006							
	2	1479.00	920.00	920.00	0.00	0.00	140.0	140.0
		31.20	13.55	13.55				
13	HE B 200 | Euronorm 53-62							
	2	59.50	5700.00	2000.00	0.00	0.00	200.0	200.0
		78.10	50.04	15.35				
14	QRO 140x6 | EN 10219-2:2006							
	2	1479.00	920.00	920.00	0.00	0.00	140.0	140.0
		31.20	13.55	13.55				
15	HE A 180 | Euronorm 53-62							
	2	14.90	2510.00	925.00	0.00	0.00	180.0	171.0
		45.30	28.48	8.89				
16	QRO 120x5 | EN 10219-2:2006							
	2	778.00	485.00	485.00	0.00	0.00	120.0	120.0
		22.40	9.69	9.69				
17	QRO 100x5 | EN 10210-2:2006							
	2	439.00	279.00	279.00	0.00	0.00	100.0	100.0
		18.70	8.01	8.01				
18	UPN 160 | ArcelorMittal (EN 10365:2017)							
	2	7.39	925.00	85.30	0.00	0.00	65.0	160.0
		24.00	6.49	10.22				
19	IPE 160 | Euronorm 19-57							
	2	3.62	869.00	68.30	0.00	0.00	82.0	160.0
		20.10	10.17	7.33				
20	IPE 240 | Euronorm 19-57							
	2	12.90	3890.00	284.00	0.00	0.00	120.0	240.0
		39.10	19.65	13.82				
21	UPN 120 | ArcelorMittal (EN 10365:2017)							
	2	4.15	364.00	43.20	0.00	0.00	55.0	120.0
		17.00	5.12	6.95				
22	IPE 200 | Euronorm 19-57							
	2	7.02	1940.00	142.00	0.00	0.00	100.0	200.0
		28.50	14.23	10.35				
23	QRO 120x5 | EN 10219-2:2006							
	4	778.00	485.00	485.00	0.00	0.00	120.0	120.0
		22.40	9.69	9.69				
24	UPE 140 | EN 10279							
	4	4.05	599.50	78.70	0.00	0.00	65.0	140.0
		18.40	6.25	5.87				
25	UPE 160 | EN 10279							
	5	5.20	911.10	106.80	0.00	0.00	70.0	160.0
		21.70	6.86	7.45				
26	IPE 300 | Euronorm 19-57							
	4	20.20	8360.00	604.00	0.00	0.00	150.0	300.0
		53.80	26.81	19.82				
27	IPE 140 | Euronorm 19-57							
	4	2.45	541.00	44.90	0.00	0.00	73.0	140.0
		16.40	8.45	5.99				
28	Rectangle 400/400							
	1	360106.66	213333.34	213333.34	0.00	0.00	400.0	400.0
		1600.00	1333.33	1333.33				
29	HE A 300 | Euronorm 53-62							
	2	85.60	18260.00	6310.00	0.00	0.00	300.0	290.0
		113.00	69.89	21.83				
30	QRO 80x80x4 | ALUKÖNIGSTAHL - EN 10210							
	2	180.00	114.00	114.00	0.00	0.00	80.0	80.0

1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
		12.00	5.12	5.12				
31	HE A 140 | Euronorm 53-62							
	2	8.16	1030.00	389.00	0.00	0.00	140.0	133.0
		31.40	19.83	6.25				
32	UPN 180 | ArcelorMittal (EN 10365:2017)							
	2	9.55	1350.00	114.00	0.00	0.00	70.0	180.0
		28.00	7.14	12.38				
33	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210							
	2	777.00	498.00	498.00	0.00	0.00	120.0	120.0
		22.70	9.68	9.68				
34	HE A 240 | Euronorm 53-62							
	2	41.70	7760.00	2770.00	0.00	0.00	240.0	230.0
		76.80	47.96	15.10				
35	HE A 260 | Euronorm 53-62							
	2	52.60	10450.00	3670.00	0.00	0.00	260.0	250.0
		86.80	54.08	16.58				
36	HE A 280 | Euronorm 53-62							
	2	62.40	13670.00	4760.00	0.00	0.00	280.0	270.0
		97.30	60.60	19.05				
37	HE B 220 | Euronorm 53-62							
	2	76.80	8090.00	2840.00	0.00	0.00	220.0	220.0
		91.00	58.71	17.87				
38	HE B 240 | Euronorm 53-62							
	2	103.00	11260.00	3920.00	0.00	0.00	240.0	240.0
		106.00	68.04	20.61				
39	IPE 240 | Euronorm 19-57							
	2	12.90	3890.00	284.00	0.00	0.00	120.0	240.0
		39.10	19.65	13.82				
40	IPE 200 | Euronorm 19-57							
	2	7.02	1940.00	142.00	0.00	0.00	100.0	200.0
		28.50	14.23	10.35				
41	QRO 180x180x8 | ALUKÖNIGSTAHL - EN 10210							
	2	4160.00	2660.00	2660.00	0.00	0.00	180.0	180.0
		54.40	23.17	23.17				
42	QRO 150x150x5 | ALUKÖNIGSTAHL - EN 10210							
	2	1550.00	1002.00	1002.00	0.00	0.00	150.0	150.0
		28.70	12.18	12.18				
43	HE B 200 | Euronorm 53-62							
	2	59.50	5700.00	2000.00	0.00	0.00	200.0	200.0
		78.10	50.04	15.35				
44	HE A 300 | Euronorm 53-62							
	2	85.60	18260.00	6310.00	0.00	0.00	300.0	290.0
		113.00	69.89	21.83				
45	HE A 200 | Euronorm 53-62							
	2	21.10	3690.00	1340.00	0.00	0.00	200.0	190.0
		53.80	33.30	10.77				
46	IPE 180 | Euronorm 19-57							
	2	4.80	1320.00	101.00	0.00	0.00	91.0	180.0
		23.90	12.19	8.76				
47	QRO 160x160x8 | ALUKÖNIGSTAHL - EN 10210							
	2	2880.00	1830.00	1830.00	0.00	0.00	160.0	160.0
		48.00	20.50	20.50				
48	HE A 160 | Euronorm 53-62							
	2	12.30	1670.00	616.00	0.00	0.00	160.0	152.0
		38.80	23.99	7.85				
49	UPN 200 | ArcelorMittal (EN 10365:2017)							
	2	11.90	1910.00	148.00	0.00	0.00	75.0	200.0
		32.20	7.83	14.71				
50	HE A 100 | Euronorm 53-62							
	2	5.26	349.00	134.00	0.00	0.00	100.0	96.0
		21.20	13.34	4.03				
51	IPE 240 | Euronorm 19-57							

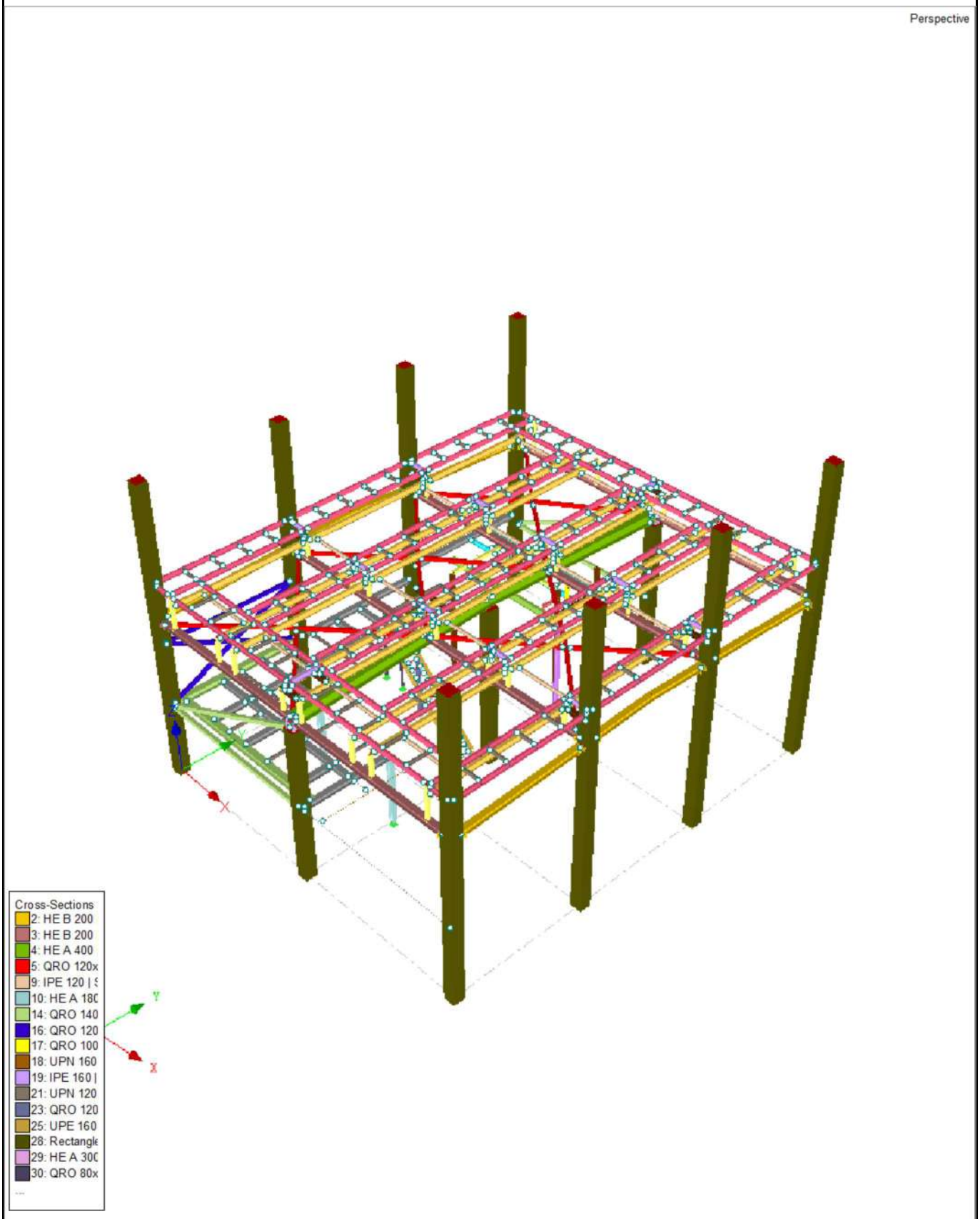
1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] / A [cm²]	I_y [cm⁴] / A_y [cm²]	I_z [cm⁴] / A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
	6	12.90 39.10	3890.00 19.65	284.00 13.82	0.00	0.00	120.0	240.0
52	HE A 140 | Euronorm 53-62							
	6	8.16 31.40	1030.00 19.83	389.00 6.25	0.00	0.00	140.0	133.0

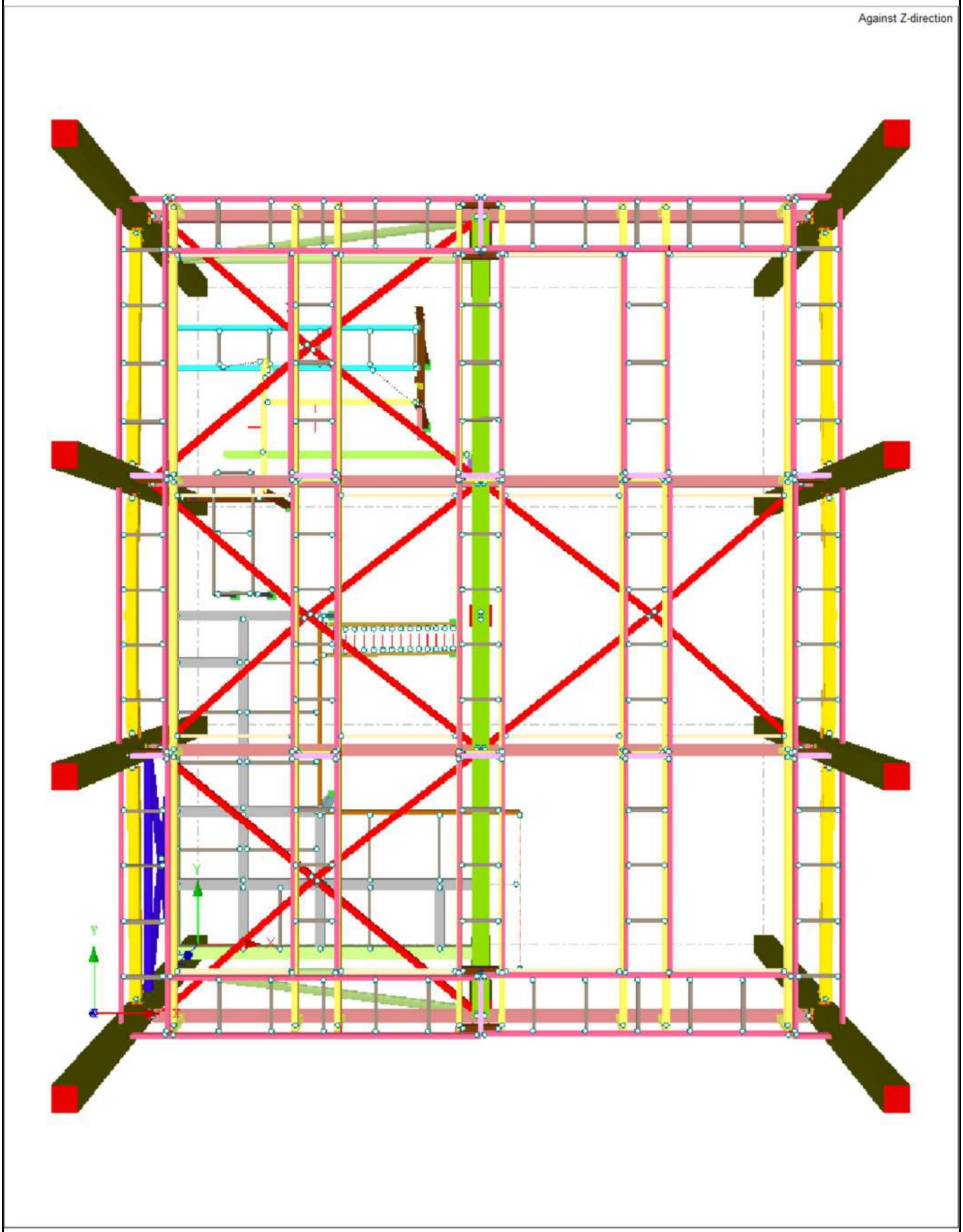
1.14 Member Hinges

Release No.	Reference System	Axial/Shear Release or Spring[kN/m] u_x	u_y	u_z	Moment Release or Spring[kNm/rad] φ_x	φ_y	φ_z	Comment
1	Local x,y,z	-	-	-	-	x	x	
2	Local x,y,z	x	-	-	-	x	x	
3	Local x,y,z	-	-	-	-	x	x	
4	Local x,y,z	-	-	-	-	x	-	
5	Local x,y,z	-	-	-	-	x	-	
6	Local x,y,z	-	-	-	-	x	x	

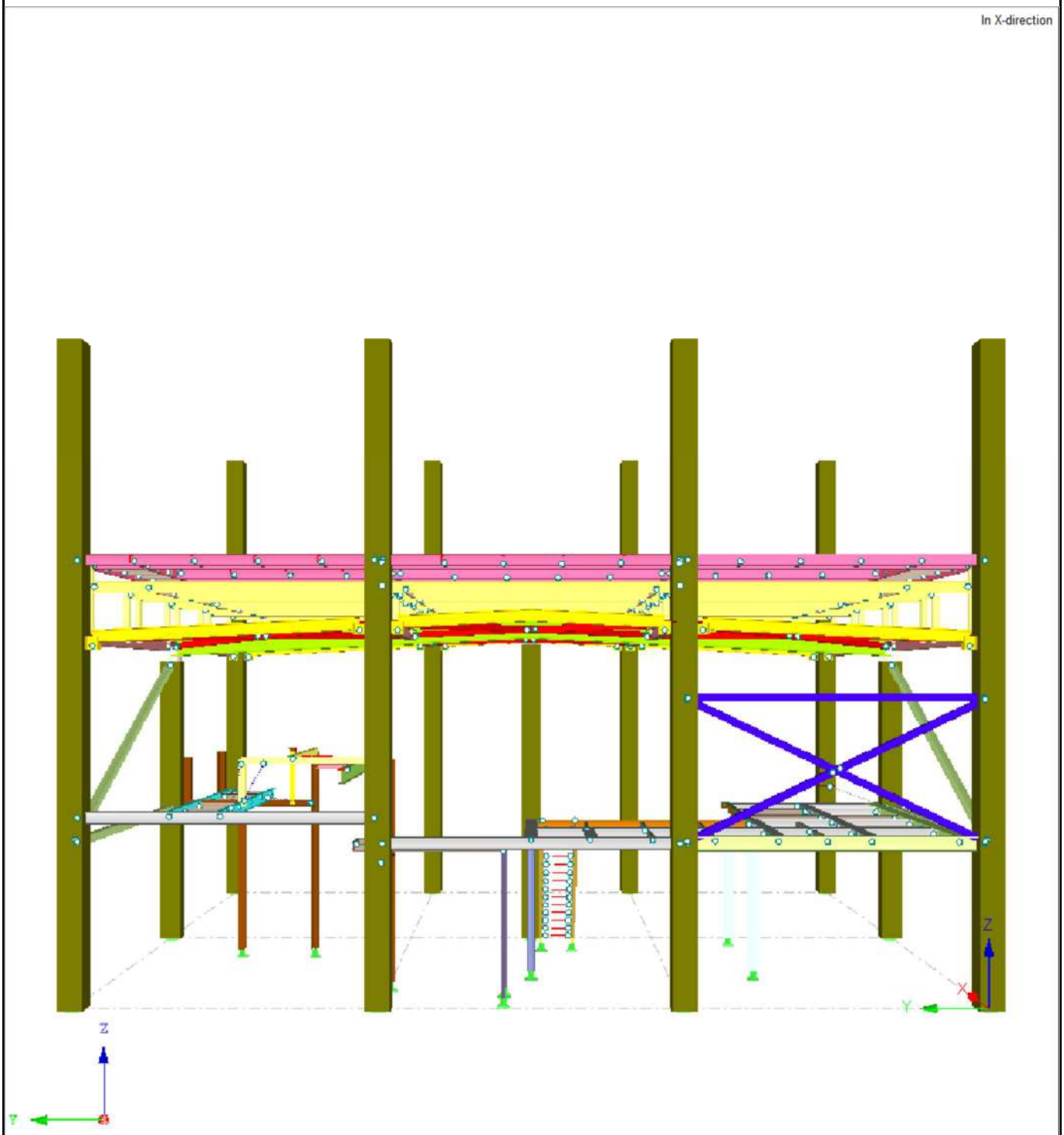
PASTATO SKAICIUOJAMOJI SCHEMA 3D



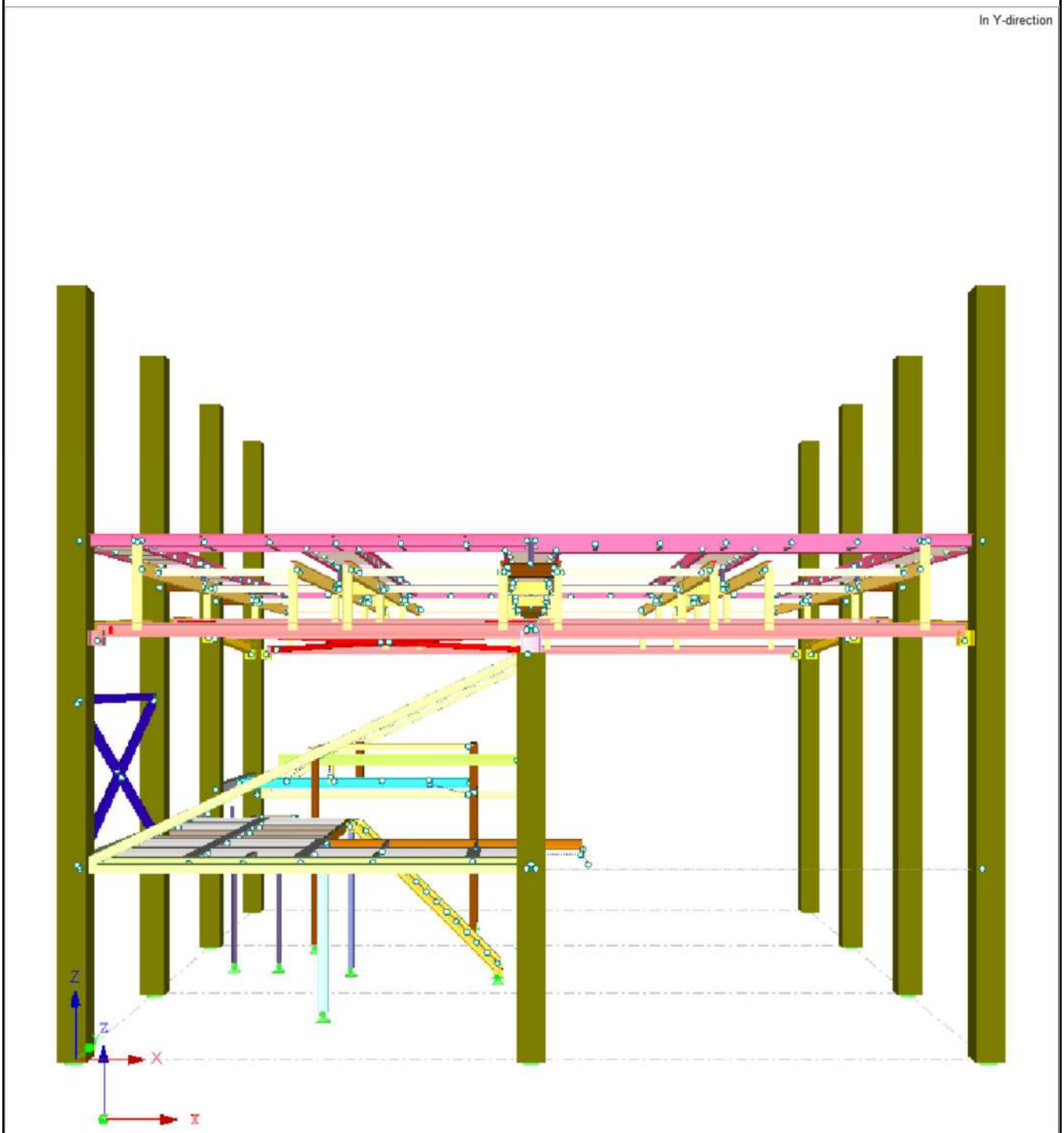
PASTATO SKAICIUOJAMOJI SCHEMA IS VIRSAUS



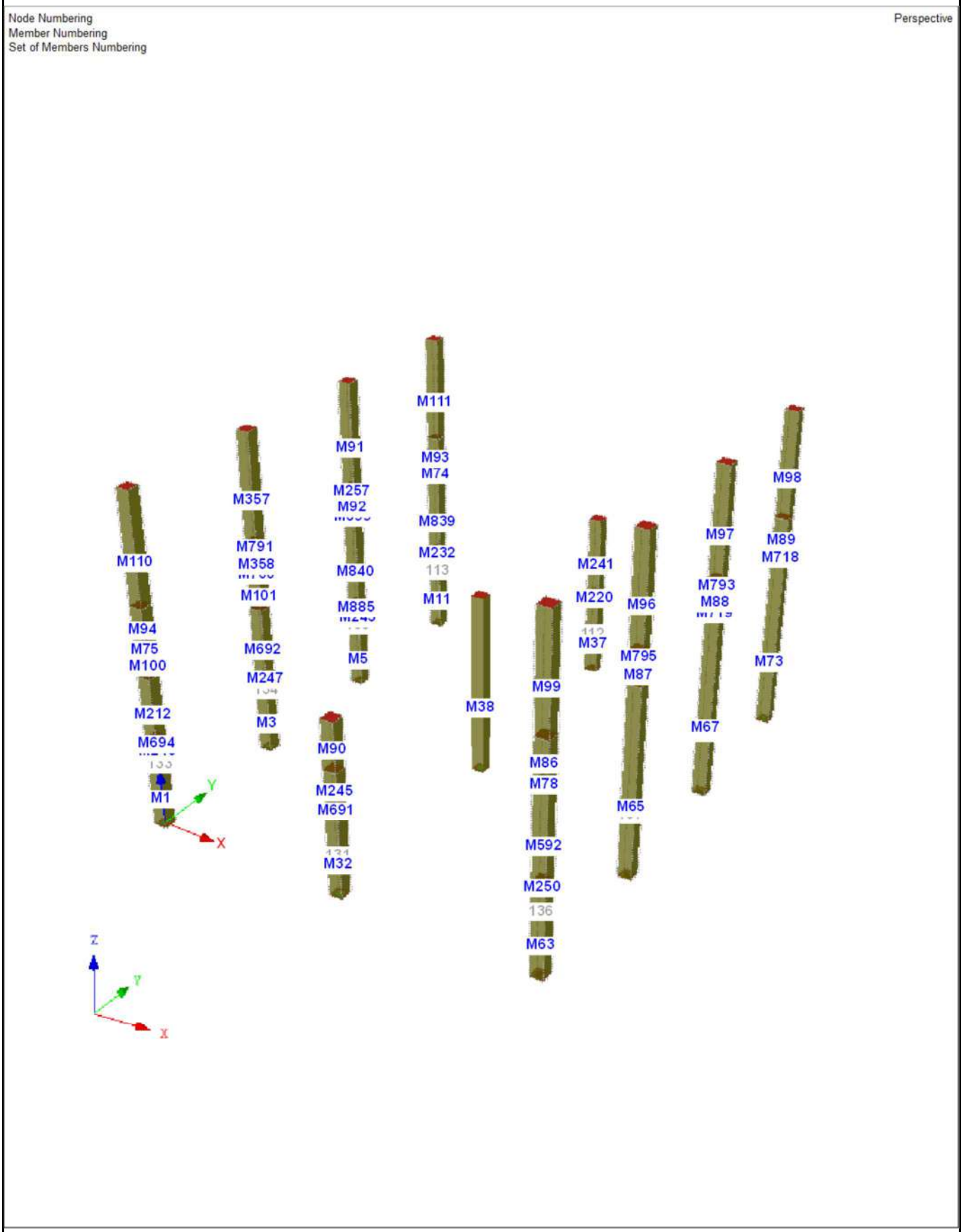
PASTATO SKAICIUOJAMOJI SCHEMA IS PRIEKIO



PASTATO SKAICIUOJAMOJI SCHEMA IS SONO



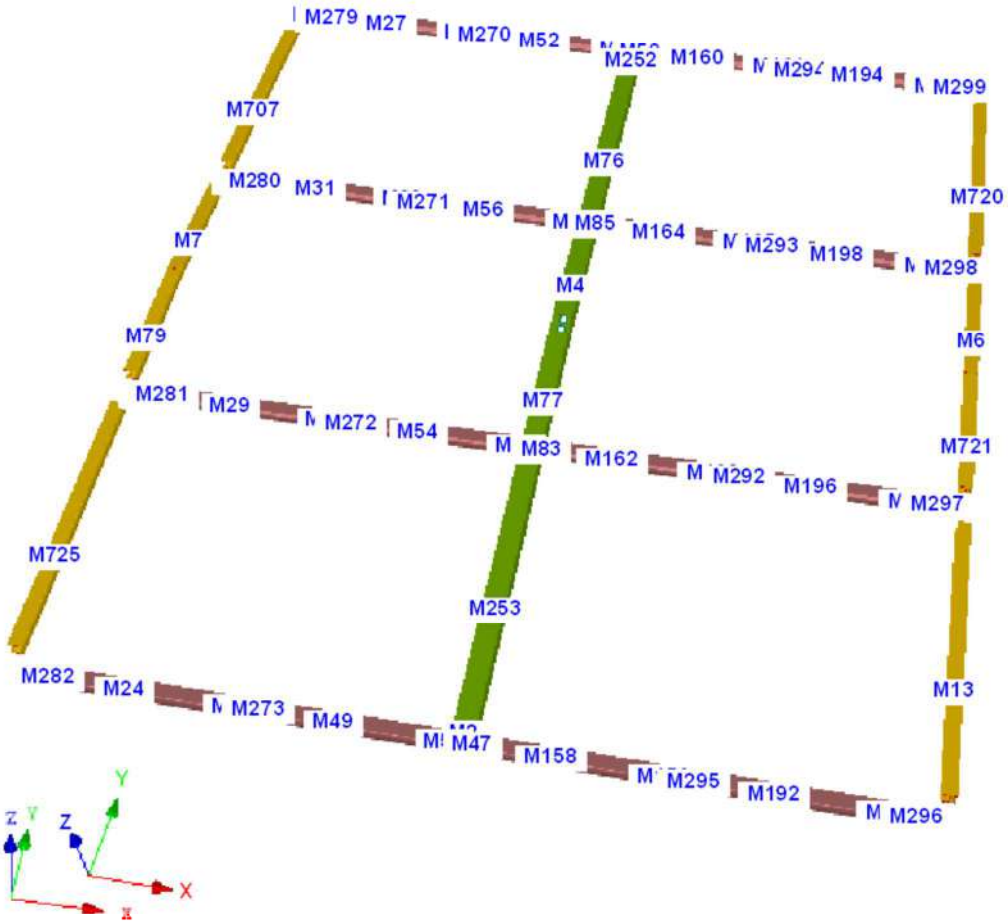
GB. KOLONOS


Node Numbering
Member Numbering
Set of Members Numbering
Perspective
M110
M94
M75
M100
M212
M694
M1
M357
M791
M358
M101
M692
M247
M3
M91
M257
M92
M840
M885
M5
M90
M245
M691
M32
M111
M93
M74
M839
M232
113
M11
M38
M99
M86
M78
M592
M250
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M37
M96
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M67
M98
M89
M718
M73
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X
Z
Y
X

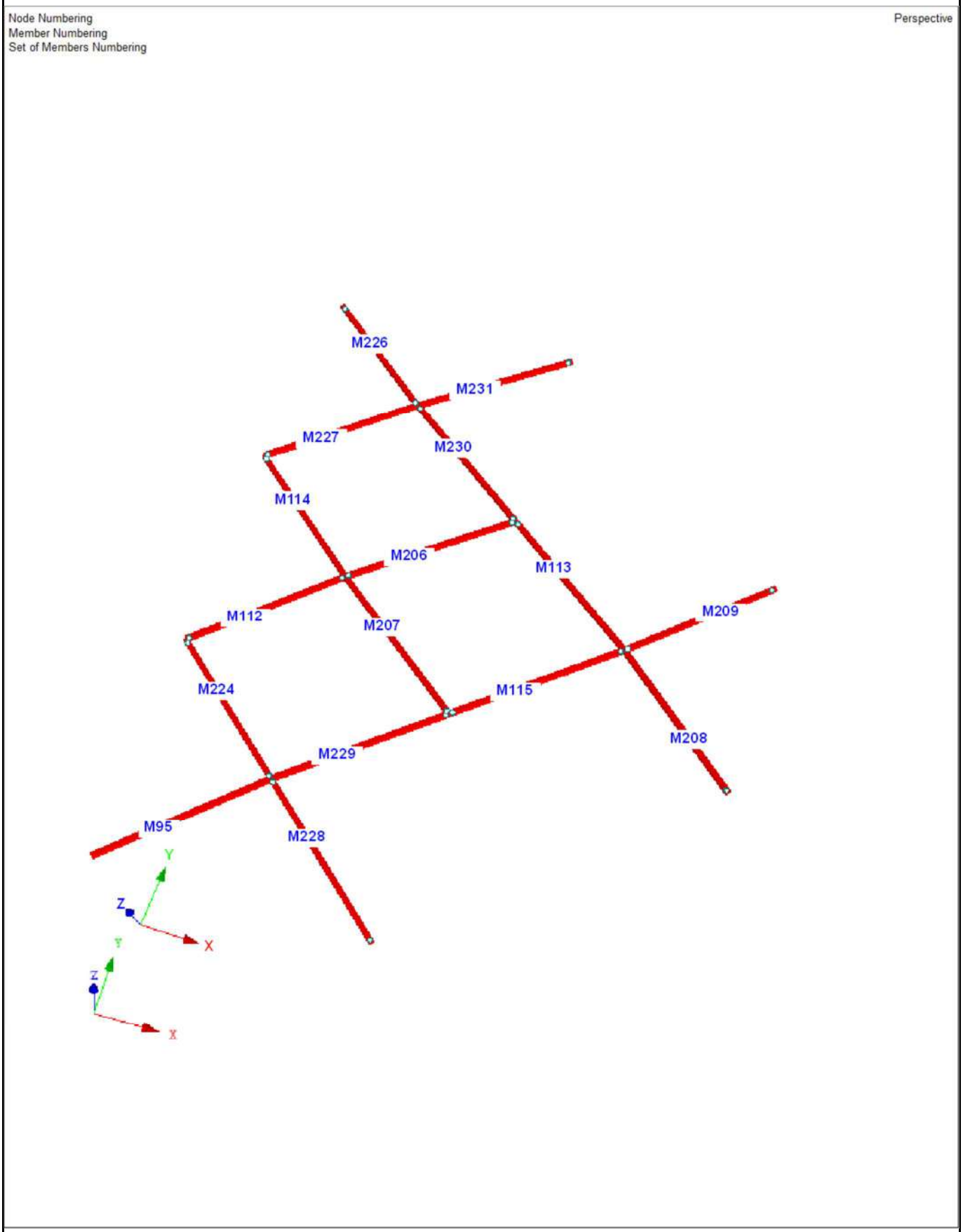
STOGO SIJOS

Node Numbering
Member Numbering
Set of Members Numbering

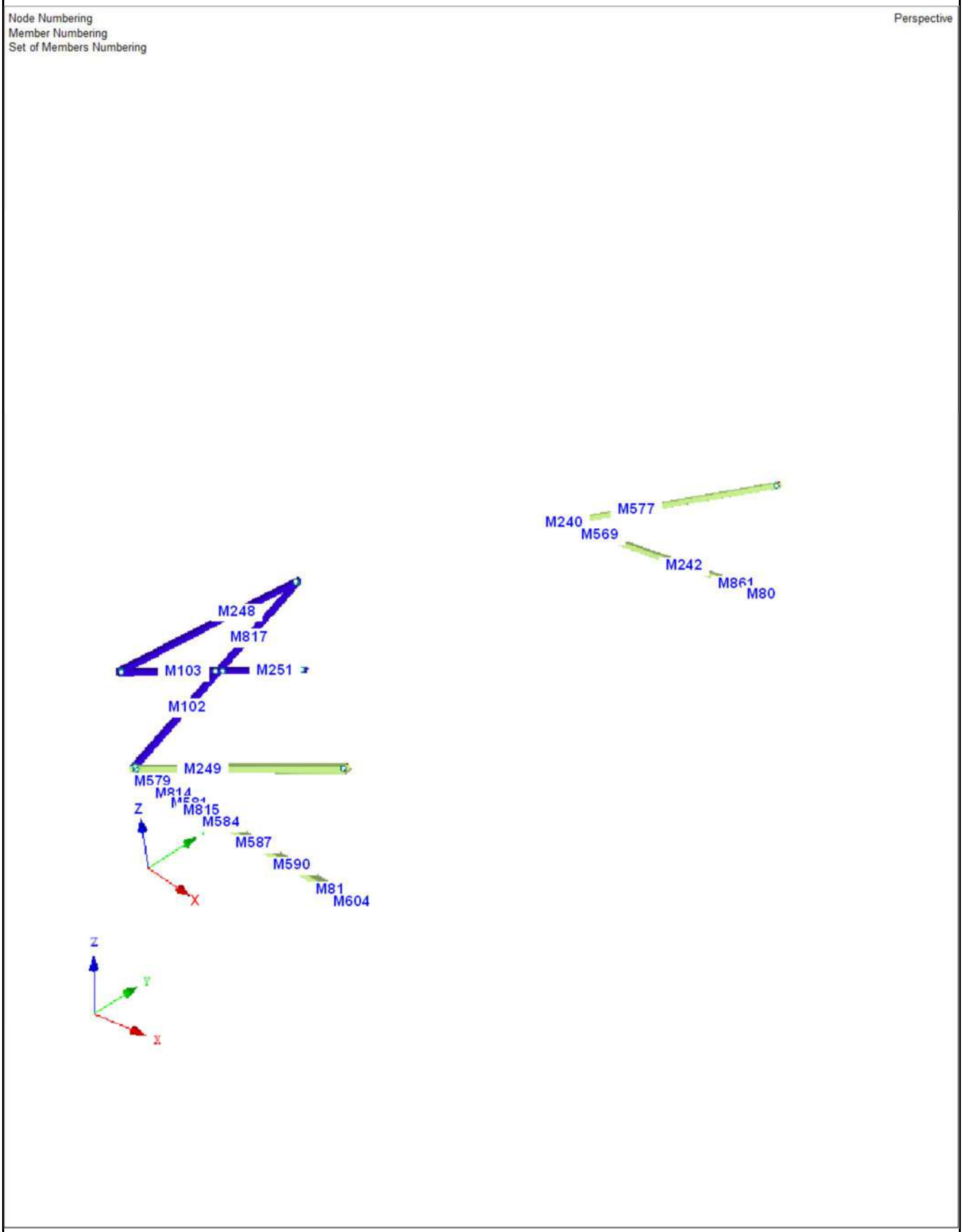
Perspective



STOGO RYSIAI



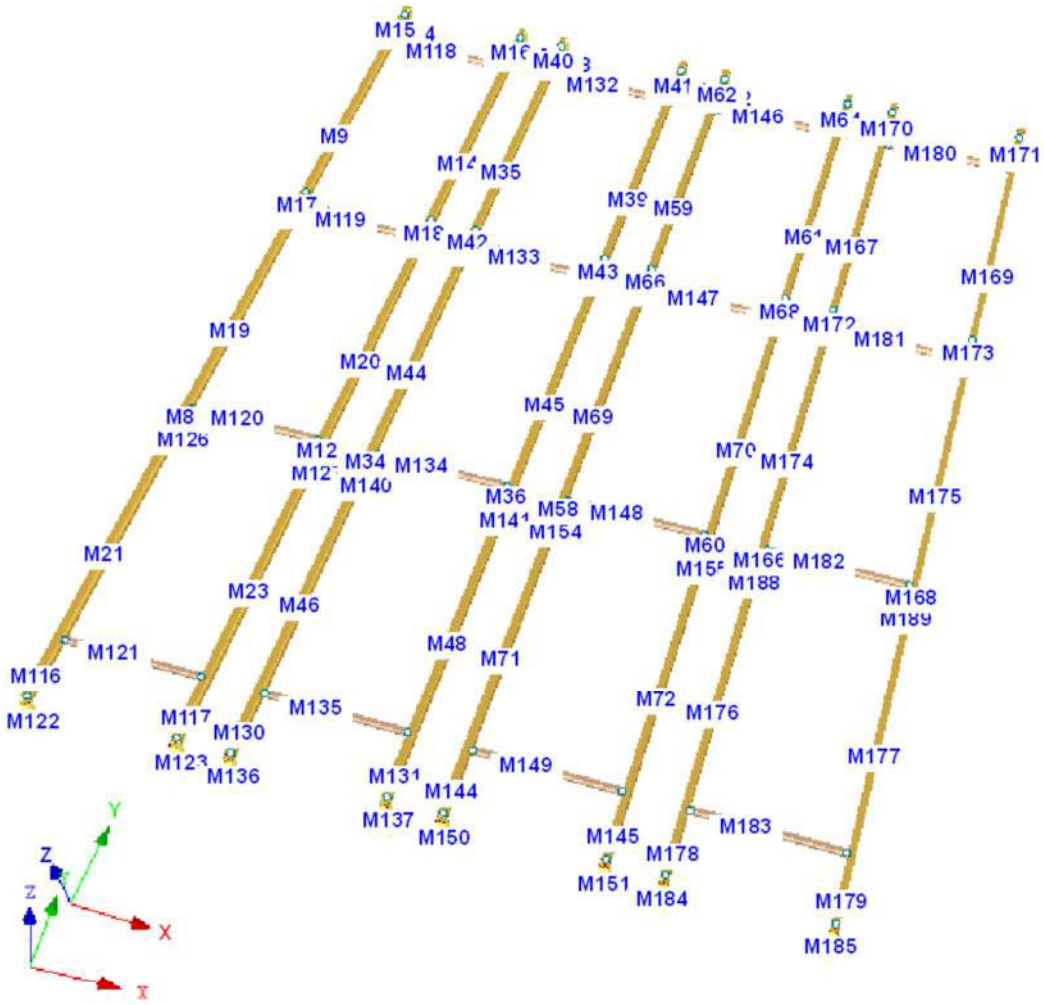
KOLONU RYSIAI



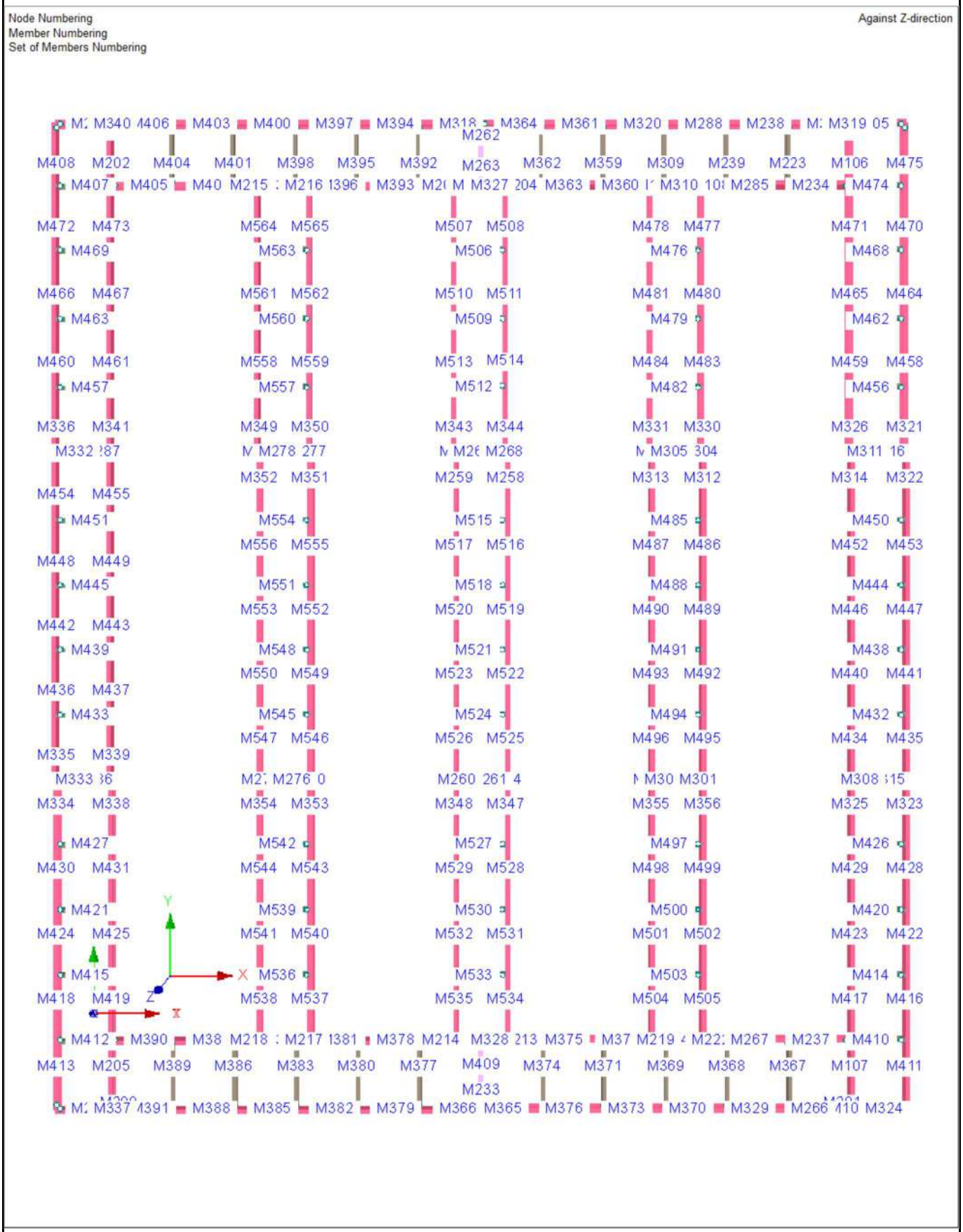
IRANGOS REMAS ANT STOGO

Node Numbering
Member Numbering
Set of Members Numbering

Perspective



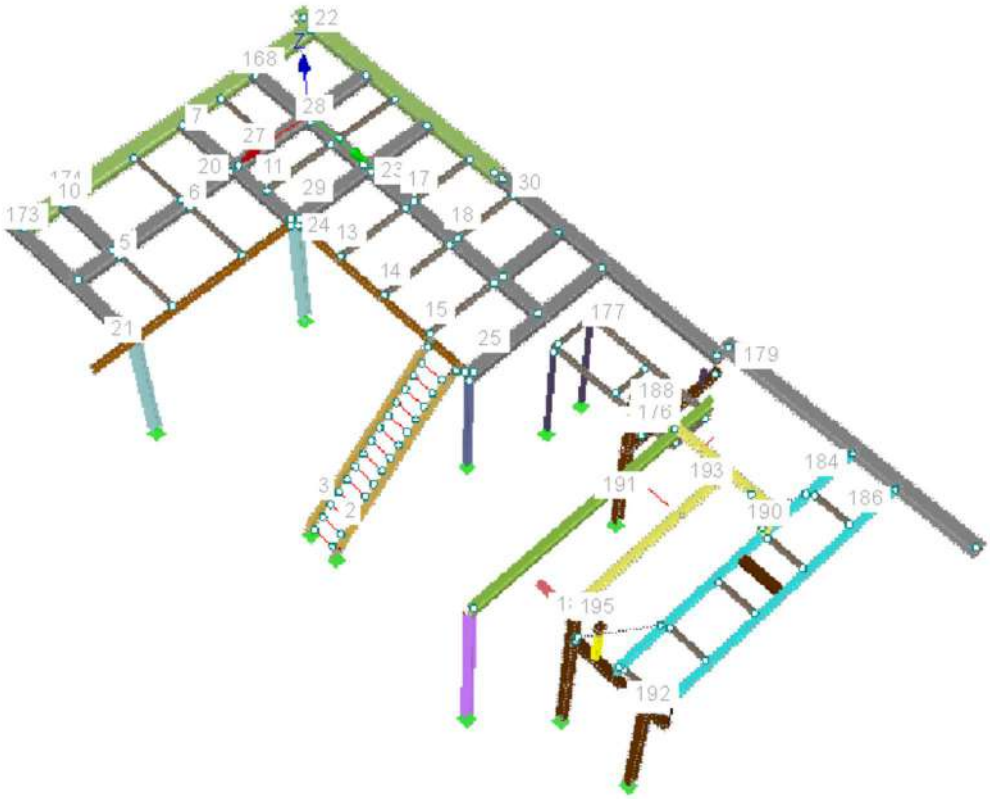
AIKSTELE ANT STOGO

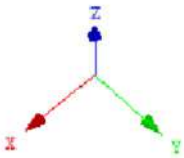


VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS- Copy

Node Numbering
Set of Members Numbering

Perspective





VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS- Copy- Copy

Node Numbering
Set of Members Numbering

Against Z-direction



2.1 Load Cases

Load Case	Load Case Description	EN 1990 | LST Action Category	Self-Weight - Factor in Direction			
			Active	X	Y	Z
LC1	Self-weight	Permanent	x	0.000	0.000	-1.000
LC2	Wind in +X	Wind	-			
LC3	Wind in -X	Wind	-			
LC4	Wind in +Y	Wind	-			
LC5	Wind in -Y	Wind	-			
LC9	Imposed load	Imposed - Category H: roofs	-			
LC10	Equipment	Permanent/Imposed	-			
LC13	LL	Imposed - Category A: domestic, residential areas	-			
LC14	SNOW	Snow / ice	-			
LC15	LL2	Imposed - Category A: domestic, residential areas	-			
LC16	SNOW2	Snow / ice	-			
LC17	Talė 1 var.	Permanent/Imposed	-			
LC18	Talė 2 var.	Permanent/Imposed	-			

2.1.1 Load Cases - Calculation Parameters

Load Case	Load Case Description	Calculation Parameters		
LC1	Self-weight	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC2	Wind in +X	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC3	Wind in -X	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC4	Wind in +Y	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC5	Wind in -Y	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC9	Imposed load	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC10	Equipment	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC13	LL	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC14	SNOW	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)

2.1.1 Load Cases - Calculation Parameters

Load Case	Load Case Description	Calculation Parameters		
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC15	LL2	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC16	SNOW2	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC17	Talė 1 var.	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC18	Talė 2 var.	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)

2.7 Result Combinations

Result Combin	Description	Loading
RC1	1.00*LC1/p	LC1/p
RC2	1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	LC2 or to LC5
RC3	1.00*LC14 or 1.00*LC16	LC14 or LC16
RC4	1.00*LC9	LC9
RC5	1.00*LC10	LC10
RC6	1.00*LC13 + 1.00*LC15	LC13 + LC15
RC7	1.00*LC17 + 1.00*LC18	LC17 + LC18
RC8		1.35*RC1/p + 1.3*RC2/p + 0.91*RC3 + 0*RC4 + 1.35*RC5 + 0.91*RC6 + 1.35*RC7
RC9		1.35*RC1/p + 0.78*RC2 + 1.3*RC3/p + 0*RC4 + 1.35*RC5 + 0.91*RC6 + 1.35*RC7
RC10		1.35*RC1/p + 0.78*RC2 + 0.91*RC3 + 1.3*RC4/p + 1.35*RC5 + 0.91*RC6 + 1.35*RC7
RC11		1.35*RC1/p + 0.78*RC2 + 0.91*RC3 + 0*RC4 + 1.35*RC5 + 1.3*RC6/p + 1.35*RC7
RC12	1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	LC2 or to LC5
RC13		RC1/p + RC12/p + 0.7*RC3 + 0*RC4 + RC5 + 0.7*RC6 + RC7
RC14		RC1/p + 0.6*RC12 + RC3/p + 0*RC4 + RC5 + 0.7*RC6 + RC7
RC15		RC1/p + 0.6*RC12 + 0.7*RC3 + RC4/p + RC5 + 0.7*RC6 + RC7
RC16		RC1/p + 0.6*RC12 + 0.7*RC3 + 0*RC4 + RC5 + RC6/p + RC7
RC17	1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	LC2 or to LC5
RC18		RC1/p + 0.2*RC17/p + 0.2*RC3 + 0*RC4 + RC5 + 0.3*RC6 + RC7
RC19		RC1/p + 0*RC17 + 0.5*RC3/p + 0*RC4 + RC5 + 0.3*RC6 + RC7
RC20		RC1/p + 0*RC17 + 0.2*RC3 + 0*RC4/p + RC5 + 0.3*RC6 + RC7
RC21		RC1/p + 0*RC17 + 0.2*RC3 + 0*RC4 + RC5 + 0.5*RC6/p + RC7
RC22	1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	LC2 or to LC5
RC23		RC1/p + 0*RC22 + 0.2*RC3 + 0*RC4 + RC5 + 0.3*RC6 + RC7
RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	RC8/p or to RC11
RC25	SLS - Characteristic	RC13/p or to RC16
RC26	SLS - Frequent	RC18/p or to RC21
RC27	SLS - Quasi-permanent	RC23/p

LC1
Self-weight

3.15 Generated Loads

LC1: Self-weight

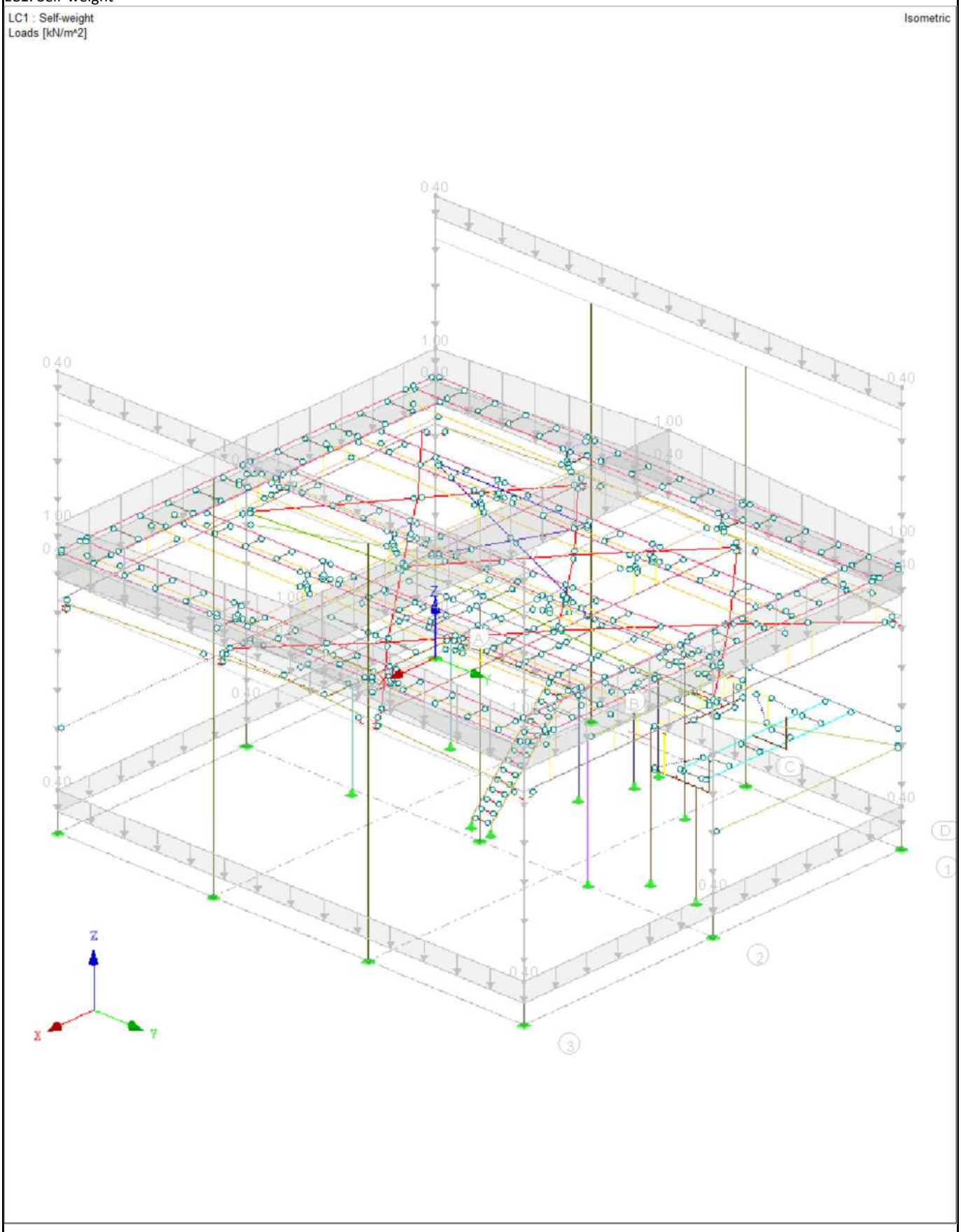
No.	Load Description			
1	From Area Loads via Plane			
	Area load direction	Global relative to the true area:	:	x ZL
	Area of load application	x Fully closed plane		
	Load distribution type:	x Combined		
	Area load magnitude	x Constant	:	-0.40 kN/m²
	Boundary of the area load plane	Corner nodes	:	8,9,2,1; 1,2,45,17; 17,45,34,33; 33,34,41,40; 40,41,46,22; 22,46,9,8
		Note	:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members	:	10,24,26,27,28,47,49,50,51,52, 53,80,81,102,103,158,159,160, 161,192,193,194,195,211,240, 861,242,248,249,251,270,273, 279,282,294,295,296,299,566, 567,569,573,577,579,581,584, 587,590,593,596,598,604,614, 616,618,621,893,624,722,726, 727,729,731,732,733,735,739, 745,747,810,811,812,813,814, 815,817,841,847,850
	Generating total loads in direction	ΣP_{Areas}	X :	0.000 kN
			Y :	0.000 kN
			Z :	-125.807 kN
		$\Sigma P_{Members}$	X :	0.000 kN
			Y :	0.000 kN
			Z :	-125.807 kN
	Total moment to the origin	ΣM_{Areas}	X :	-905.809 kNm
			Y :	780.002 kNm
			Z :	0.000 kNm
		$\Sigma M_{Members}$	X :	-905.810 kNm
			Y :	780.001 kNm
			Z :	0.000 kNm
	Cells selected for generating	Σ number of cells	:	10
		Σ cell area	:	314.517 m²
	Convert loads to members No.		:	1,3,5,11,32,37,63,65,67,73-75,78,90,100,101,212,220,232, 241,243,245-247,250,592,691,692,694,696, 698,701,702,705,706,708,714, 718,723,728,734,736-738,744,746,839,840,885
2	From Area Loads via Plane			
	Area load direction	Global relative to the true area:	:	x ZL
	Area of load application	x Fully closed plane		
	Load distribution type:	x Combined		
	Area load magnitude	x Constant	:	-1.00 kN/m²
	Boundary of the area load plane	Corner nodes	:	34,2,44,43; 43,44,9,41
		Note	:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members	:	112,113,114,115,206,207,208, 209,224,95,226,227,228,229,2

3.15 Generated Loads

LC1: Self-weight

No.	Load Description				
					30,231
		Members parallel to member		:	83,162,292,163,196,297,197
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-178.771 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-178.771 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-1287.150 kNm
			Y	:	1108.380 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-1287.150 kNm
			Y	:	1108.380 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	4
		Σ cell area		:	178.771 m^2
	Convert loads to members No.			:	2,4,6,7,13,76,77,79,252,253,707,720,721,725
3	From Area Loads via Plane				
	Area load direction	Global relative to the true area:		:	x ZL
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-0.40 kN/m^2
	Boundary of the area load plane	Corner nodes		:	34,36,49,41,43; 2,4,10,9,44
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	321,322,323,334,335,336,408,411,413,416,418,422,424,428,430,435,436,441,442,447,448,453,454,458,460,464,466,470,472,475
		Members parallel to member		:	6,721
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-51.552 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-51.552 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-371.174 kNm
			Y	:	319.622 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-371.174 kNm
			Y	:	319.622 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	6
		Σ cell area		:	128.880 m^2
	Convert loads to members No.			:	86-89,91-94,96-99,110,111,257,357,358,791,793,795

LC1: Self-weight



LC2

Wind in +X

3.15 Generated Loads

LC2: Wind in +X

No.	Load Description				
1	From Wind Loads (Vertical Walls)				
	Velocity pressure	According to Standard		:	EN 1991-1-4
		National Annex		:	Lithuania
		Wind zone		:	24
		Terrain category		:	Category II
		Structure height	h	:	5.500 m
		Fundamental wind velocity	$v_{b,0}$	:	24.0 m/s
		Lack of correlation acc. to 7.2.2(3)		:	x
	Base geometry	Node	I	:	1
			J	:	8
			K	:	40
			L	:	33
	Roof type and geometry	Type		:	x Flat/monopitch roof
		Node	A	:	2
			B	:	9
			C	:	41
			D	:	34
	Generate LC	x LC w		:	LC2
	Set wind on side	x A - B			
	Create load type	x Member loads			
	Load distribution type	x Combined			
	Remove influence from	Single members		:	80,81,102,240,861,242,249,569,577,579,581,584,587,590,593,598,604,814,815,817
		Members parallel to member		:	103,248
	Generate wind loads on members No.			:	1,3,5,10,11,24,26-28,32,37,47,49-53,63,65,67,73-75,78,90,100,101,158-161,192-195,212,220,232,241,243,245-247,250,270,273,279,282,294-296,299,592,691,692,694,696,698,718,726,727,729,731-733,735,738,739,744-747,839,840,885
	Walls dimensions	h		:	5.500 m
		b		:	14.400 m
		d		:	12.400 m
		e		:	11.000 m
		A		:	313.560 m^2
		d_A		:	2.200 m
		d_B		:	8.800 m
		d_C		:	1.400 m

Zone	External pressure coefficient $c_{pe,10}$	External pressure w_e [kN/m^2]
A	-1.200	-0.86
B	-0.800	-0.57
C	-0.500	-0.36
D	0.726	0.44
E	-0.352	-0.21

3.15 Generated Loads

LC2: Wind in +X

No.	Load Description				
	Generated total loads	ΣP_{Areas}	:	55.455	kN
		ΣP	:	55.455	kN
	Total moment to the origin	ΣM_{Areas}	:	431.244	kNm
		ΣM	:	431.245	kNm
	Cells selected for generating	Σ number of cells	:	24	
		Σ cell area	:	468.840	m^2
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:	:	x XP	
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant	:	1.44	kN/m^2
	Boundary of the area load plane	Corner nodes	:	9,10,4,2,44	
		Note	:	Each row in the drop down list box denotes one plane	
	Remove influence from	Members parallel to member	:	79,430,707	
	Generating total loads in direction	ΣP_{Areas} X	:	92.794	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
		$\Sigma P_{Members}$ X	:	92.794	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
	Total moment to the origin	ΣM_{Areas} X	:	0.000	kNm
		Y	:	766.601	kNm
		Z	:	-668.114	kNm
		$\Sigma M_{Members}$ X	:	0.000	kNm
		Y	:	766.601	kNm
		Z	:	-668.114	kNm
	Cells selected for generating	Σ number of cells	:	3	
		Σ cell area	:	64.440	m^2
	Convert loads to members No.		:	91-94,110,111,257,357,358,791	
3	From Wind Loads (Duopitch/Troughed Roof)				
	Velocity pressure	According to Standard	:	EN 1991-1-4	
		National Annex	:	Lithuania	
		Wind zone	:	24	
		Terrain category	:	Category II	
		Structure height h	:	7.400	m
		Fundamental wind velocity $v_{b,0}$	:	24.0	m/s
	Roof geometry	Node A	:	2	
		B	:	44	
		C	:	9	
		D	:	41	
		E	:	43	
		F	:	34	
	Generate LC	x LC w+	:	LC2	
	Set wind on side	x A - B - C			

3.15 Generated Loads

LC2: Wind in +X

No.	Load Description				
	Create load type	x Member loads			
	Load distribution type	x Combined			
	Remove influence from	Single members	:	95,224,226,227,228	
		Members parallel to member	:	26,229,230,231,273	
	Generate wind loads on members No.		:	2,4,6,7,13,76,77,79,252,253,707,720,721,725	
	Duopitch roof dimensions	h	:	7.400	m
		b	:	14.400	m
		d	:	12.400	m
		e	:	14.400	m
		A	:	178.771	m^2
		α_1	:	2.8	°
		α_2	:	2.8	°
		b_F	:	3.600	m
		d_F	:	1.440	m
		d_H	:	5.760	m
		d_I	:	5.200	m
		Θ	:	90.0	°

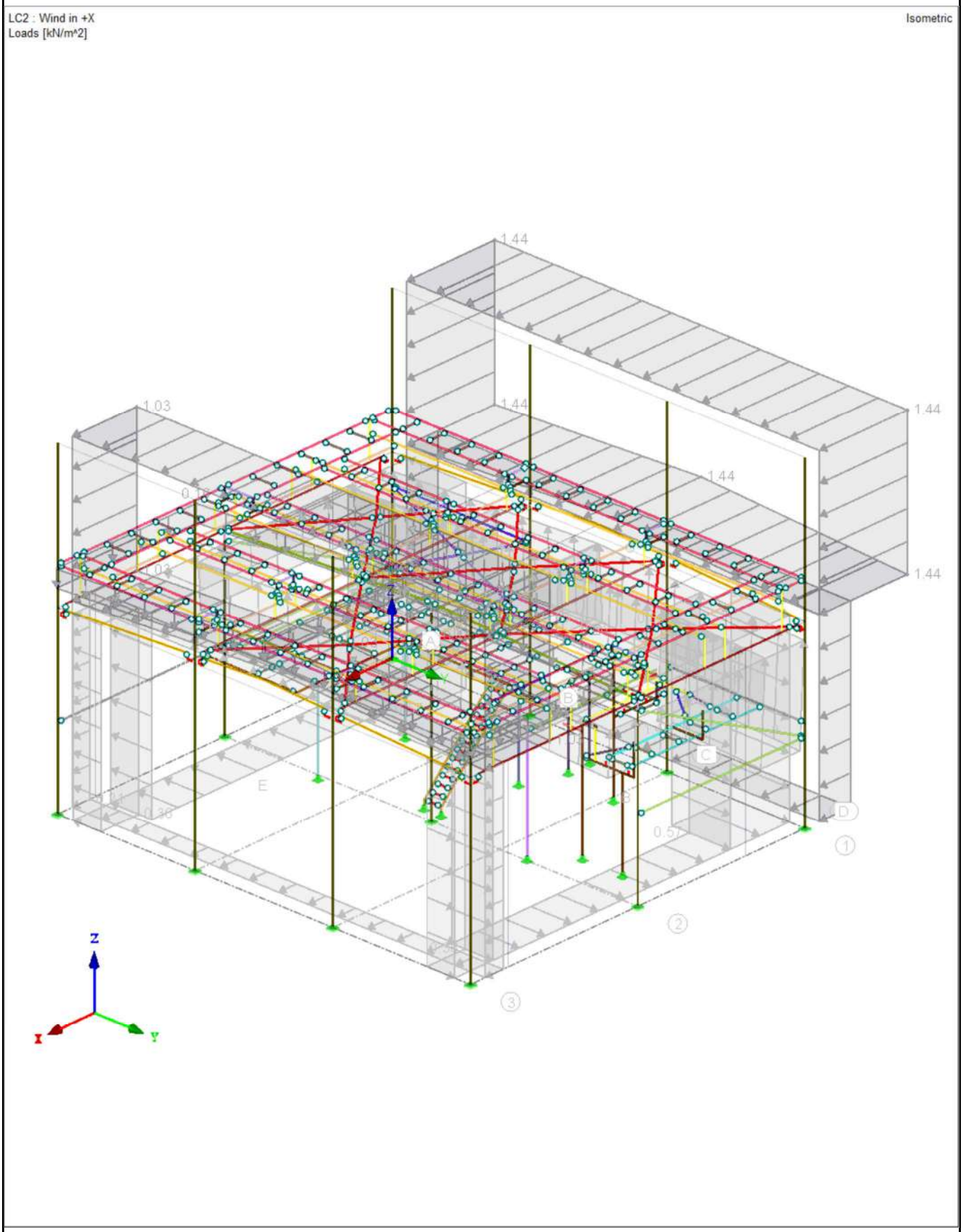
Zone	External pressure coefficient $c_{pe,10}$	External pressure w_e [kN/m²]
F	-1.800	-1.40
G	-1.200	-0.93
H	-0.700	-0.55
I	0.200	0.16

	Generated total loads	ΣP_{Areas}	:	57.804	kN
		ΣP	:	57.804	kN
	Total moment to the origin	ΣM_{Areas}	:	427.690	kNm
		ΣM	:	427.690	kNm
	Cells selected for generating	Σ number of cells	:	20	
		Σ cell area	:	715.083	m^2
4	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:	:	x XP	
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant	:	1.03	kN/m^2
	Boundary of the area load plane	Corner nodes	:	41,43,34,36,49	
		Note	:	Each row in the drop down list box denotes one plane	
	Remove influence from	Members parallel to member	:	6,721,453	
	Generating total loads in direction	ΣP_{Areas}	X	:	66.373 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
		$\Sigma P_{Members}$	X	:	66.373 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
	Total moment to the origin	ΣM_{Areas}	X	:	0.000 kNm
			Y	:	548.333 kNm
			Z	:	-477.887 kNm
		$\Sigma M_{Members}$	X	:	0.000 kNm
			Y	:	548.333 kNm

3.15 Generated Loads

No.	Load Description				
			Z	: -477.887	kNm
	Cells selected for generating	Σ number of cells		: 3	
		Σ cell area		: 64.440	m^2
	Convert loads to members No.			: 86-89,96-99,793,795	

LC2: Wind in +X



LC3
Wind in -X

3.15 Generated Loads

LC3: Wind in -X

No.	Load Description				
1	From Wind Loads (Vertical Walls)				
	Velocity pressure	According to Standard		:	EN 1991-1-4
		National Annex		:	Lithuania
		Wind zone		:	24
		Terrain category		:	Category IV
		Structure height	h	:	5.500 m
		Fundamental wind velocity	$v_{b,0}$	:	24.0 m/s
		Lack of correlation acc. to 7.2.2(3)		:	x
	Base geometry	Node	I	:	1
			J	:	8
			K	:	40
			L	:	33
	Roof type and geometry	Type		:	x Flat/monopitch roof
		Node	A	:	2
			B	:	9
			C	:	41
			D	:	34
	Generate LC	x LC w		:	LC3
	Set wind on side	x C - D			
	Create load type	x Member loads			
	Load distribution type	x Combined			
	Remove influence from	Single members		:	80,81,102,240,861,242,249,569,577,579,581,584,587,590,593,598,604,814,815,817
		Members parallel to member		:	103,248
	Generate wind loads on members No.			:	1,3,5,10,11,24,26-28,32,37,47,49-53,63,65,67,73-75,78,90,100,101,158-161,192-195,212,220,232,241,243,245-247,250,270,273,279,282,294-296,299,592,691,692,694,696,698,718,726,727,729,731-733,735,738,739,744-747,839,840,885
	Walls dimensions	h		:	5.500 m
		b		:	14.400 m
		d		:	12.400 m
		e		:	11.000 m
		A		:	313.560 m^2
		d_A		:	2.200 m
		d_B		:	8.800 m
		d_C		:	1.400 m

Zone	External pressure coefficient $c_{pe,10}$	External pressure w_e [kN/m^2]
A	-1.200	-0.51
B	-0.800	-0.34
C	-0.500	-0.21
D	0.726	0.26
E	-0.352	-0.13

3.15 Generated Loads

LC3: Wind in -X

No.	Load Description				
	Generated total loads	ΣP_{Areas}	:	32.852	kN
		ΣP	:	32.852	kN
	Total moment to the origin	ΣM_{Areas}	:	255.515	kNm
		ΣM	:	255.512	kNm
	Cells selected for generating	Σ number of cells	:	24	
		Σ cell area	:	468.957	m^2
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:	:	x XP	
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant	:	-1.03	kN/m^2
	Boundary of the area load plane	Corner nodes	:	9,10,4,2,44	
		Note	:	Each row in the drop down list box denotes one plane	
	Remove influence from	Members parallel to member	:	79,418,707	
	Generating total loads in direction	ΣP_{Areas} X	:	-66.373	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
		$\Sigma P_{Members}$ X	:	-66.373	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
	Total moment to the origin	ΣM_{Areas} X	:	0.000	kNm
		Y	:	-548.333	kNm
		Z	:	477.887	kNm
		$\Sigma M_{Members}$ X	:	0.000	kNm
		Y	:	-548.333	kNm
		Z	:	477.887	kNm
	Cells selected for generating	Σ number of cells	:	3	
		Σ cell area	:	64.440	m^2
	Convert loads to members No.		:	91-94,110,111,257,357,358,791	
3	From Wind Loads (Duopitch/Troughed Roof)				
	Velocity pressure	According to Standard	:	EN 1991-1-4	
		National Annex	:	Lithuania	
		Wind zone	:	24	
		Terrain category	:	Category IV	
		Structure height h	:	7.400	m
		Fundamental wind velocity $v_{b,0}$	:	24.0	m/s
	Roof geometry	Node A	:	2	
		B	:	44	
		C	:	9	
		D	:	41	
		E	:	43	
		F	:	34	
	Generate LC	x LC w+	:	LC3	
	Set wind on side	x D - E - F			
	Create load type	x Member loads			

3.15 Generated Loads

LC3: Wind in -X

No.	Load Description				
	Load distribution type	x Combined			
	Remove influence from	Single members	:	224,226,227,228	
		Members parallel to member	:	26,229,230,231,273	
	Generate wind loads on members No.		:	2,4,6,7,13,76,77,79,95,252,253,707,720,721,725	
	Duopitch roof dimensions	h	:	7.400	m
		b	:	14.400	m
		d	:	12.400	m
		e	:	14.400	m
		A	:	178.771	m^2
		α_1	:	2.8	°
		α_2	:	2.8	°
		b_F	:	3.600	m
		d_F	:	1.440	m
		d_H	:	5.760	m
		d_I	:	5.200	m
		Θ	:	90.0	°

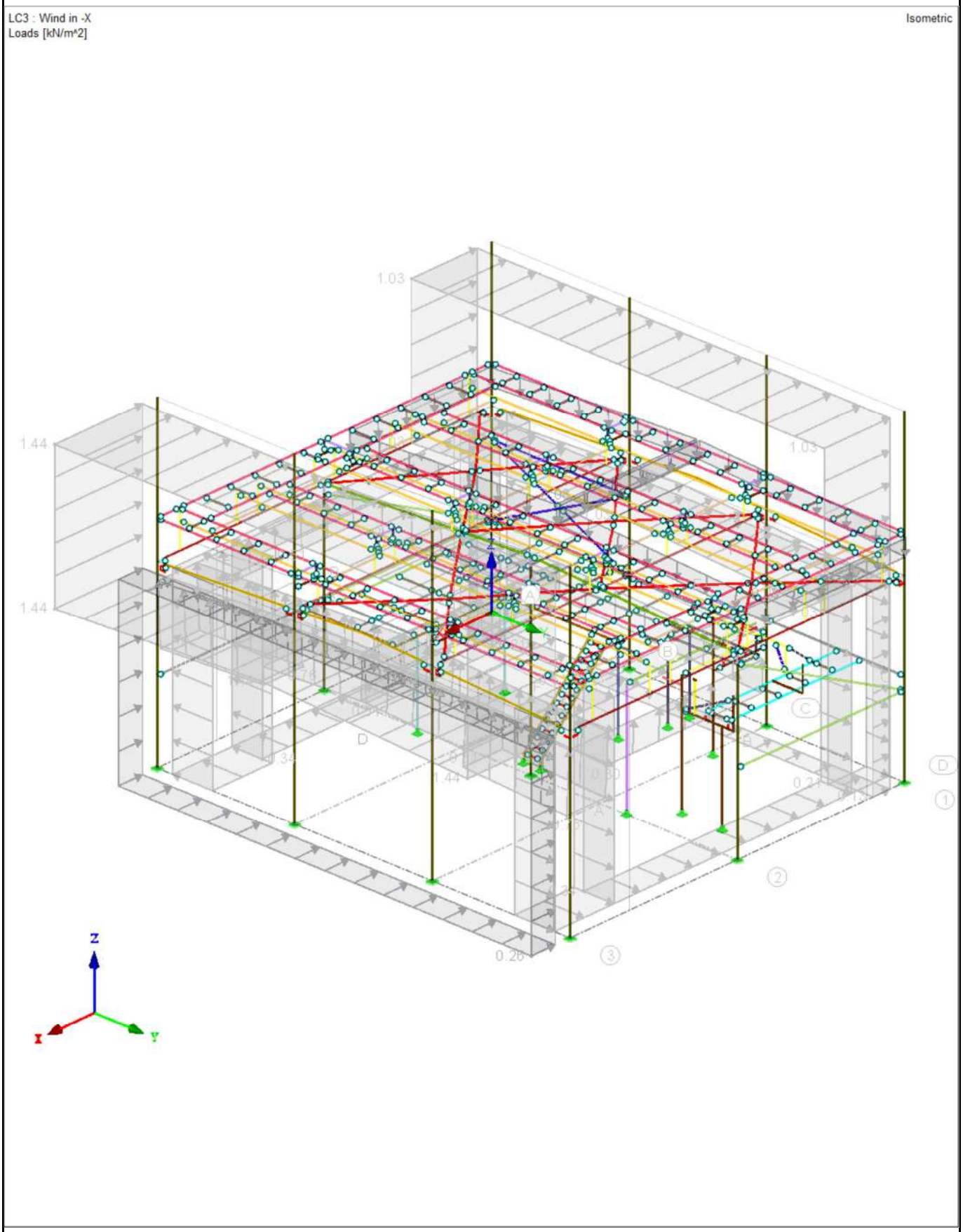
Zone	External pressure coefficient $c_{pe, 10}$	External pressure w_e [kN/m²]
F	-1.800	-0.76
G	-1.200	-0.51
H	-0.700	-0.30
I	0.200	0.08

	Generated total loads	ΣP_{Areas}	:	31.413	kN
		ΣP	:	31.413	kN
	Total moment to the origin	ΣM_{Areas}	:	405.016	kNm
		ΣM	:	405.016	kNm
	Cells selected for generating	Σ number of cells	:	20	
		Σ cell area	:	715.083	m^2
4	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:	:	x XP	
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant	:	-1.44	kN/m^2
	Boundary of the area load plane	Corner nodes	:	34,43,41,49,36	
		Note	:	Each row in the drop down list box denotes one plane	
	Remove influence from	Members parallel to member	:	13,475,720	
	Generating total loads in direction	ΣP_{Areas} X	:	-92.794	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
		$\Sigma P_{Members}$ X	:	-92.794	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
	Total moment to the origin	ΣM_{Areas} X	:	0.000	kNm
		Y	:	-766.601	kNm
		Z	:	668.114	kNm
		$\Sigma M_{Members}$ X	:	0.000	kNm
		Y	:	-766.601	kNm
		Z	:	668.114	kNm

3.15 Generated Loads

No.	Load Description				
	Cells selected for generating	Σ number of cells	:	3	
		Σ cell area	:	64.440	m^2
	Convert loads to members No.		:	86-89,96-99,793,795	

LC3: Wind in -X



LC4
Wind in +Y

3.15 Generated Loads

LC4: Wind in +Y

No.	Load Description				
1	From Wind Loads (Vertical Walls)				
	Velocity pressure	According to Standard		:	EN 1991-1-4
		National Annex		:	Lithuania
		Wind zone		:	24
		Terrain category		:	Category II
		Structure height	h	:	5.500 m
		Fundamental wind velocity	$v_{b,0}$	:	24.0 m/s
		Lack of correlation acc. to 7.2.2(3)		:	x
	Base geometry	Node	I	:	1
			J	:	8
			K	:	40
			L	:	33
	Roof type and geometry	Type		:	x Flat/monopitch roof
		Node	A	:	2
			B	:	9
			C	:	41
			D	:	34
	Generate LC	x LC w		:	LC4
	Set wind on side	x D - A			
	Create load type	x Member loads			
	Load distribution type	x Combined			
	Remove influence from	Single members		:	80,81,102,240,861,242,249,569,577,579,581,584,587,590,593,598,604,694,814,815,817
		Members parallel to member		:	103,248
	Generate wind loads on members No.			:	1,3,5,10,11,24,26-28,32,37,47,49-53,63,65,67,73-75,78,90,100,101,158-161,192-195,212,220,232,241,243,245-247,250,270,273,279,282,294-296,299,592,691,692,696,698,718,726,727,729,731-733,735,738,739,744-747,839,840,885
	Walls dimensions	h		:	5.500 m
		b		:	12.400 m
		d		:	14.400 m
		e		:	11.000 m
		A		:	313.560 m^2
		d_A		:	2.200 m
		d_B		:	8.800 m
		d_C		:	3.400 m

Zone	External pressure coefficient $c_{pe,10}$	External pressure w_e [kN/m^2]
A	-1.200	-0.86
B	-0.800	-0.57
C	-0.500	-0.36
D	0.718	0.44
E	-0.335	-0.20

3.15 Generated Loads

LC4: Wind in +Y

No.	Load Description				
	Generated total loads	ΣP_{Areas}	:	46.397	kN
		ΣP	:	46.397	kN
	Total moment to the origin	ΣM_{Areas}	:	318.066	kNm
		ΣM	:	318.064	kNm
	Cells selected for generating	Σ number of cells	:	26	
		Σ cell area	:	653.072	m^2
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:	:	x XP	
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Varying in	Y1	: 0.00	m
			p1	: 2203.00	N/m^2
			Y2	: 1.30	m
			p2	: 2203.00	N/m^2
			Y3	: 1.30	m
			p3	: 1341.00	N/m^2
			Y4	: 8.70	m
			p4	: 1341.00	N/m^2
	Boundary of the area load plane	Corner nodes	:	34,36,49,41,43	
		Note	:	Each row in the drop down list box denotes one plane	
	Remove influence from	Members parallel to member	:	720,721,435	
	Generating total loads in direction	ΣP_{Areas}	X	: 91.609	kN
			Y	: 0.000	kN
			Z	: 0.000	kN
		$\Sigma P_{Members}$	X	: 91.609	kN
			Y	: 0.000	kN
			Z	: 0.000	kN
	Total moment to the origin	ΣM_{Areas}	X	: 0.000	kNm
			Y	: 756.450	kNm
			Z	: -625.563	kNm
		$\Sigma M_{Members}$	X	: 0.000	kNm
			Y	: 756.450	kNm
			Z	: -625.563	kNm
	Cells selected for generating	Σ number of cells	:	3	
		Σ cell area	:	64.440	m^2
	Convert loads to members No.		:	86-89,96-99,793,795	
3	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:	:	x XP	
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Varying in	Y1	: 0.00	m
			p1	: -2200.00	N/m^2
			Y2	: 1.30	m
			p2	: -2200.00	N/m^2
			Y3	: 1.30	m
			p3	: -1340.00	N/m^2
			Y4	: 8.70	m
			p4	: -1340.00	N/m^2

3.15 Generated Loads

LC4: Wind in +Y

No.	Load Description				
	Boundary of the area load plane	Corner nodes		:	4,10,9,44,2
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Members parallel to member		:	707,79,408
	Generating total loads in direction	ΣP_{Areas}	X	:	-91.533 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
		$\Sigma P_{Members}$	X	:	-91.533 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
	Total moment to the origin	ΣM_{Areas}	X	:	0.000 kNm
			Y	:	-755.819 kNm
			Z	:	625.091 kNm
		$\Sigma M_{Members}$	X	:	0.000 kNm
			Y	:	-755.819 kNm
			Z	:	625.091 kNm
	Cells selected for generating	Σ number of cells		:	3
		Σ cell area		:	64.440 m^2
	Convert loads to members No.			:	91-94,110,111,257,357,358,791
5	From Wind Loads (Duopitch/Troughed Roof)				
	Velocity pressure	According to Standard		:	EN 1991-1-4
		National Annex		:	Lithuania
		Wind zone		:	24
		Terrain category		:	Category II
		Structure height	h	:	7.400 m
		Fundamental wind velocity	$v_{b,0}$	:	24.0 m/s
	Roof geometry	Node	A	:	2
			B	:	44
			C	:	9
			D	:	41
			E	:	43
			F	:	34
	Generate LC	x LC w+		:	LC4
	Set wind on side	x F - A			
	Create load type	x Member loads			
	Load distribution type	x Combined			
	Remove influence from	Single members		:	95,224,226,227,228
		Members parallel to member		:	26,229,230,231,273
	Generate wind loads on members No.			:	2,4,6,7,13,76,77,79,252,253,707,720,721,725
	Duopitch roof dimensions	h		:	7.400 m
		b		:	12.400 m
		d		:	14.400 m
		e		:	12.400 m
		A		:	178.771 m^2
		α_1		:	2.8 °

3.15 Generated Loads

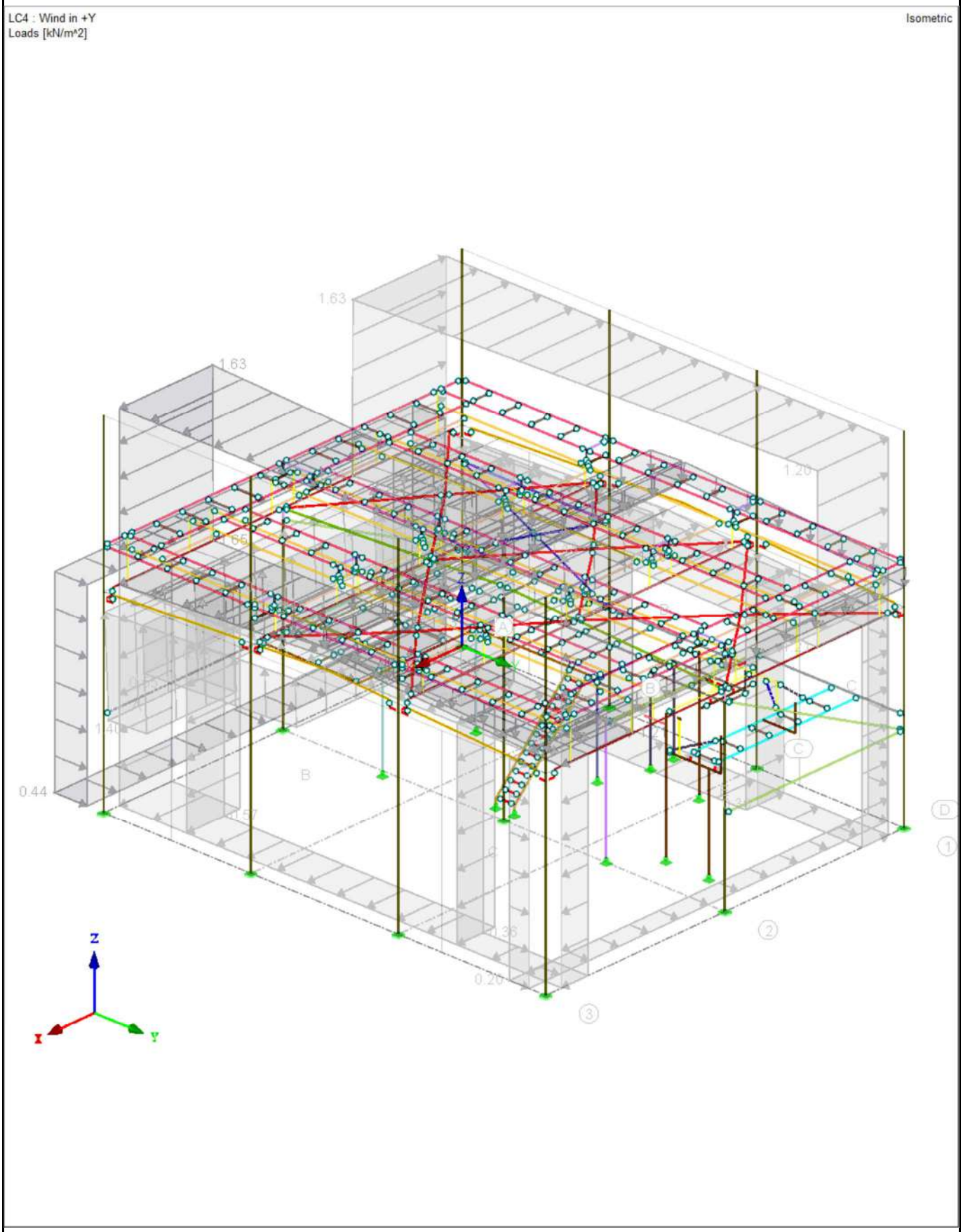
LC4: Wind in +Y

No.	Load Description				
		α_2	:	2.8	°
		b_F	:	3.100	m
		d_F	:	1.240	m
		d_H	:	4.960	m
		d_I	:	8.200	m
		Θ	:	0.0	°

Zone	External pressure coefficient $c_{pe,10}$	External pressure w_e [kN/m²]
F	-1.800	-1.40
G	-1.200	-0.93
H	-0.700	-0.55
I	0.200	0.16
J	0.000	0.00

Generated total loads	ΣP_{Areas}	:	35.803	kN
	ΣP	:	35.803	kN
Total moment to the origin	ΣM_{Areas}	:	222.154	kNm
	ΣM	:	222.154	kNm
Cells selected for generating	Σ number of cells	:	14	
	Σ cell area	:	346.617	m²

LC4: Wind in +Y



LC5
Wind in -Y

3.15 Generated Loads

LC5: Wind in -Y

No.	Load Description				
1	From Wind Loads (Duopitch/Troughed Roof)				
	Velocity pressure	According to Standard		: EN 1991-1-4	
		National Annex		: Lithuania	
		Wind zone		: 24	
		Terrain category		: Category II	
		Structure height	h	: 7.400	m
		Fundamental wind velocity	$v_{b,0}$	: 24.0	m/s
	Roof geometry	Node	A	: 2	
			B	: 44	
			C	: 9	
			D	: 41	
			E	: 43	
			F	: 34	
	Generate LC	x LC w+		: LC5	
	Set wind on side	x C - D			
	Create load type	x Member loads			
	Load distribution type	x Combined			
	Remove influence from	Single members		: 95,224,226,227,228	
		Members parallel to member		: 26,229,230,231,273	
	Generate wind loads on members No.			: 2,4,6,7,13,76,77,79,252,253,707,720,721,725	
	Duopitch roof dimensions	h		: 7.400	m
		b		: 12.400	m
		d		: 14.400	m
		e		: 12.400	m
		A		: 178.771	m^2
		α_1		: 2.8	°
		α_2		: 2.8	°
		b_F		: 3.100	m
		d_F		: 1.240	m
		d_H		: 4.960	m
		d_I		: 8.200	m
		Θ		: 0.0	°

Zone	External pressure coefficient $c_{pe,10}$	External pressure w_e [kN/m²]
F	-1.800	-1.40
G	-1.200	-0.93
H	-0.700	-0.55
I	0.200	0.16
J	0.000	0.00

Generated total loads	ΣP_{Areas}	:	35.803	kN
	ΣP	:	35.803	kN
Total moment to the origin	ΣM_{Areas}	:	567.656	kNm
	ΣM	:	567.656	kNm
Cells selected for generating	Σ number of cells	:	14	
	Σ cell area	:	346.617	m^2
2	From Area Loads via Plane			

3.15 Generated Loads

LC5: Wind in -Y

No.	Load Description				
	Area load direction	Global relative to the projected area:		:	x XP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Varying in	Y1	:	0.00 m
			p1	:	0.00 N/m²
			Y2	:	5.70 m
			p2	:	0.00 N/m²
			Y3	:	5.70 m
			p3	:	-1340.00 N/m²
			Y4	:	13.10 m
			p4	:	-1340.00 N/m²
			Y5	:	13.10 m
			p5	:	-2200.00 N/m²
			Y6	:	14.40 m
			p6	:	-2200.00 N/m²
	Boundary of the area load plane	Corner nodes		:	9,10,4,2,44
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Members parallel to member		:	725,707,472
	Generating total loads in direction	ΣP_{Areas}	X	:	-57.074 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
		$\Sigma P_{Members}$	X	:	-57.074 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
	Total moment to the origin	ΣM_{Areas}	X	:	0.000 kNm
			Y	:	-471.758 kNm
			Z	:	595.778 kNm
		$\Sigma M_{Members}$	X	:	0.000 kNm
			Y	:	-471.758 kNm
			Z	:	595.778 kNm
	Cells selected for generating	Σ number of cells		:	3
		Σ cell area		:	64.440 m²
	Convert loads to members No.			:	91-94,110,111,257,357,358,791
3	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x XP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Varying in	Y1	:	0.00 m
			p1	:	0.00 N/m²
			Y2	:	5.70 m
			p2	:	0.00 N/m²
			Y3	:	5.70 m
			p3	:	1340.00 N/m²
			Y4	:	13.10 m
			p4	:	1340.00 N/m²
			Y5	:	13.10 m
			p5	:	2200.00 N/m²
			Y6	:	14.40 m
			p6	:	2200.00 N/m²
	Boundary of the area load plane	Corner nodes		:	34,36,49,41,43

3.15 Generated Loads

LC5: Wind in -Y

No.	Load Description				
	Note		:	Each row in the drop down list box denotes one plane	
Remove influence from	Single members		:	321,322,323,411,416,422,428,435,441,447,453,458,464,470,475	
	Members parallel to member		:	720,721	
Generating total loads in direction	ΣP_{Areas}	X	:	57.074	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
	$\Sigma P_{Members}$	X	:	57.074	kN
		Y	:	0.000	kN
		Z	:	0.000	kN
Total moment to the origin	ΣM_{Areas}	X	:	0.000	kNm
		Y	:	471.758	kNm
		Z	:	-595.778	kNm
	$\Sigma M_{Members}$	X	:	0.000	kNm
		Y	:	471.758	kNm
		Z	:	-595.778	kNm
Cells selected for generating	Σ number of cells		:	3	
	Σ cell area		:	64.440	m^2
Convert loads to members No.			:	86-89,96-99,793,795	
4 From Wind Loads (Vertical Walls)					
Velocity pressure	According to Standard		:	EN 1991-1-4	
	National Annex		:	Lithuania	
	Wind zone		:	24	
	Terrain category		:	Category II	
	Structure height	h	:	5.500	m
	Fundamental wind velocity	$v_{b,0}$	:	24.0	m/s
	Lack of correlation acc. to 7.2.2(3)		:	x	
Base geometry	Node	I	:	1	
		J	:	8	
		K	:	40	
		L	:	33	
Roof type and geometry	Type		:	x Flat/monopitch roof	
	Node	A	:	2	
		B	:	9	
		C	:	41	
		D	:	34	
Generate LC	x LC w		:	LC5	
Set wind on side	x B - C				
Create load type	x Member loads				
Load distribution type	x Combined				
Remove influence from	Single members		:	80,81,102,240,861,242,249,569,577,579,581,584,587,590,593,598,604,814,815,817	
	Members parallel to member		:	103,248	
Generate wind loads on members No.			:	1,3,5,10,11,24,26-28,32,37,47,49-	

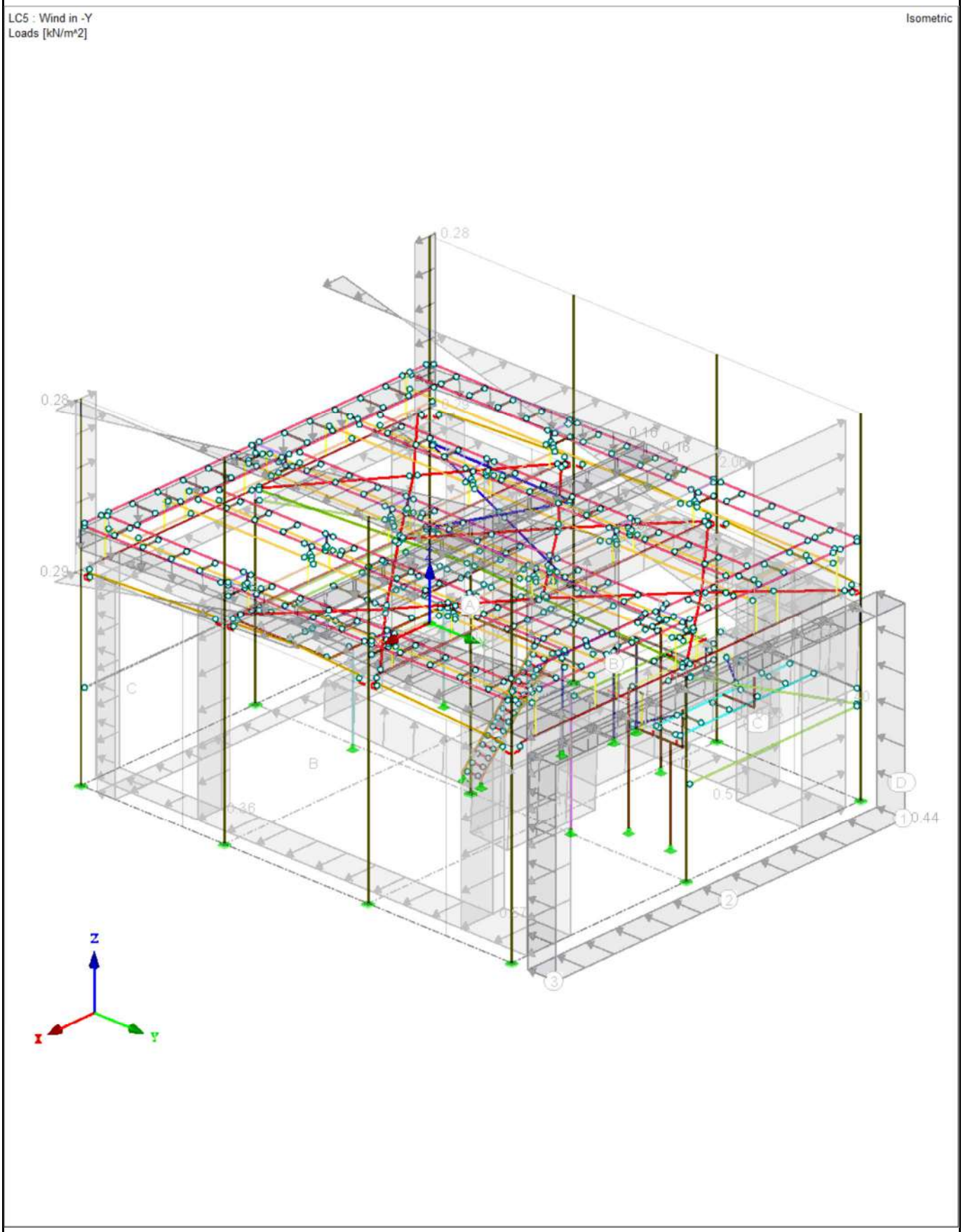
3.15 Generated Loads

No.	Load Description			
				53,63,65,67,73-75,78,90,100,101,158-161,192-195,212,220,232,241,243,245-247,250,270,273,279,282,294-296,299,592,691,692,694,696,698,718,726,727,729,731-733,735,738,739,744-747,839,840,885
	Walls dimensions	h	: 5.500	m
		b	: 12.400	m
		d	: 14.400	m
		e	: 11.000	m
		A	: 313.560	m^2
		d_A	: 2.200	m
		d_B	: 8.800	m
		d_C	: 3.400	m

Zone	External pressure coefficient $c_{pe, 10}$	External pressure w_e [kN/m^2]
A	-1.200	-0.86
B	-0.800	-0.57
C	-0.500	-0.36
D	0.718	0.44
E	-0.335	-0.20

Generated total loads	ΣP_{Areas}	:	46.397	kN
	ΣP	:	46.397	kN
Total moment to the origin	ΣM_{Areas}	:	318.066	kNm
	ΣM	:	318.066	kNm
Cells selected for generating	Σ number of cells	:	26	
	Σ cell area	:	653.072	m^2

LC5: Wind in -Y



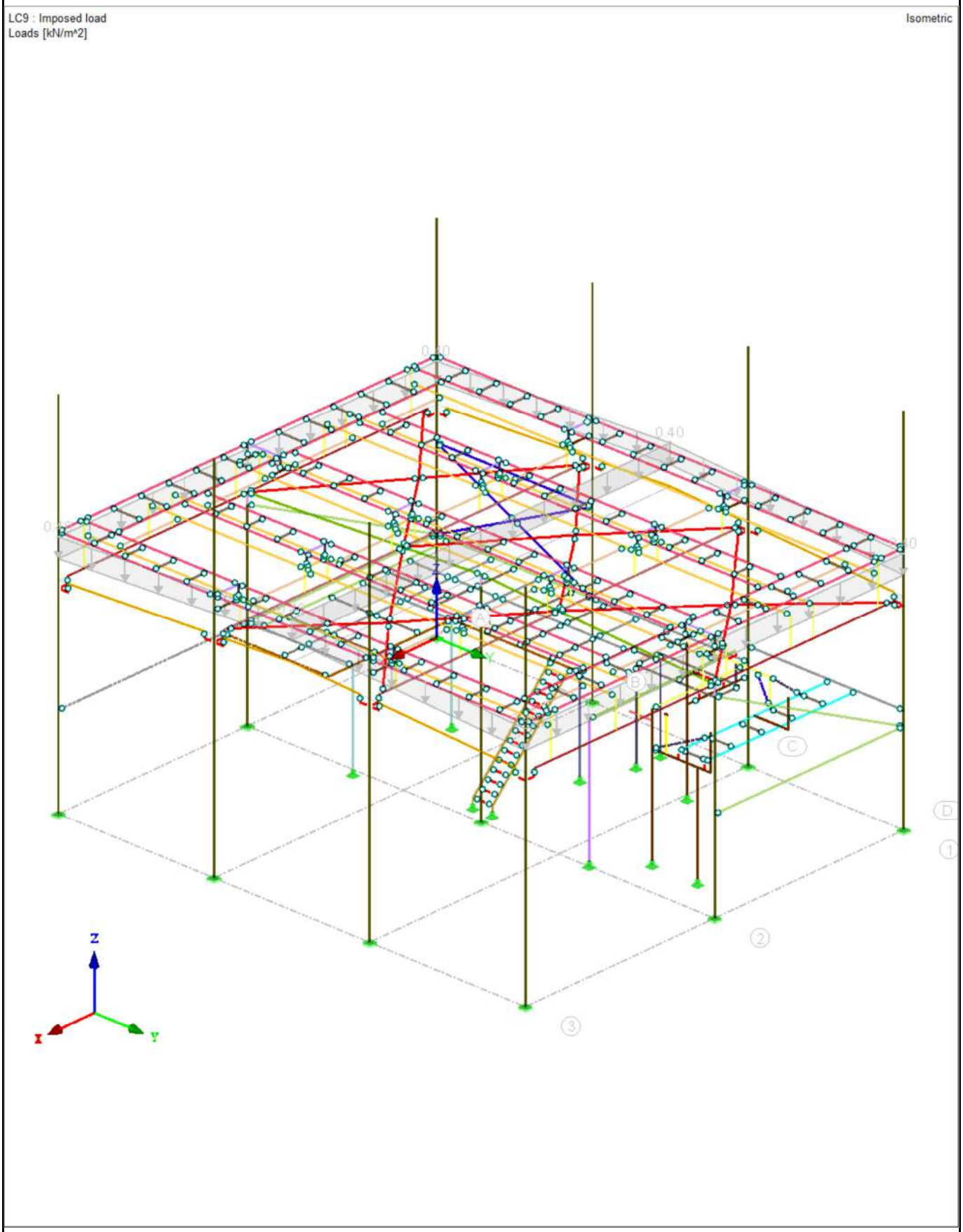
LC9
Imposed load

3.15 Generated Loads

LC9: Imposed load

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Global relative to the true area:		:	x ZL
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-0.40 kN/m²
	Boundary of the area load plane	Corner nodes		:	2,44,43,34; 44,9,41,43
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	95,224,226,227,228,229,230,231
		Members parallel to member		:	22,29,30,54,55,272,281
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-71.508 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-71.508 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-514.860 kNm
			Y	:	443.352 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-514.860 kNm
			Y	:	443.352 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	4
		Σ cell area		:	178.771 m²
	Convert loads to members No.			:	2,4,6,7,13,76,77,79,252,253,707,720,721,725

LC9: Imposed load



LC10
Equipment

3.1 Nodal Loads - By Components - Coordinate System

LC10: Equipment

No.	On Nodes No.	Coordinate System	Force [kN] P_X / P_U	P_Y / P_V	P_Z / P_W	Moment [kNm] M_X / M_U	M_Y / M_V	M_Z / M_W
1	67,68,73,74,78,82,89,90,99,100,105,106,115,116,121,122	0 | Global XYZ	0.000	0.000	-2.780	0.000	0.000	0.000
2	69-72,85-88,101-104,117-120	0 | Global XYZ	0.000	0.000	-5.550	0.000	0.000	0.000
3	600	0 | Global XYZ	0.000	1.750	-5.000	0.000	0.000	0.000
4	605,608,609	0 | Global XYZ	2.800	0.000	-8.000	0.000	0.000	0.000
5	623,624,643,654	0 | Global XYZ	0.000	0.000	-6.000	0.000	0.000	0.000
6	616,622,626	0 | Global XYZ	2.450	0.000	-7.000	0.000	0.000	0.000
7	645	0 | Global XYZ	2.800	0.000	-8.000	0.000	0.000	0.000

LC10
Equipment

3.15 Generated Loads

LC10: Equipment

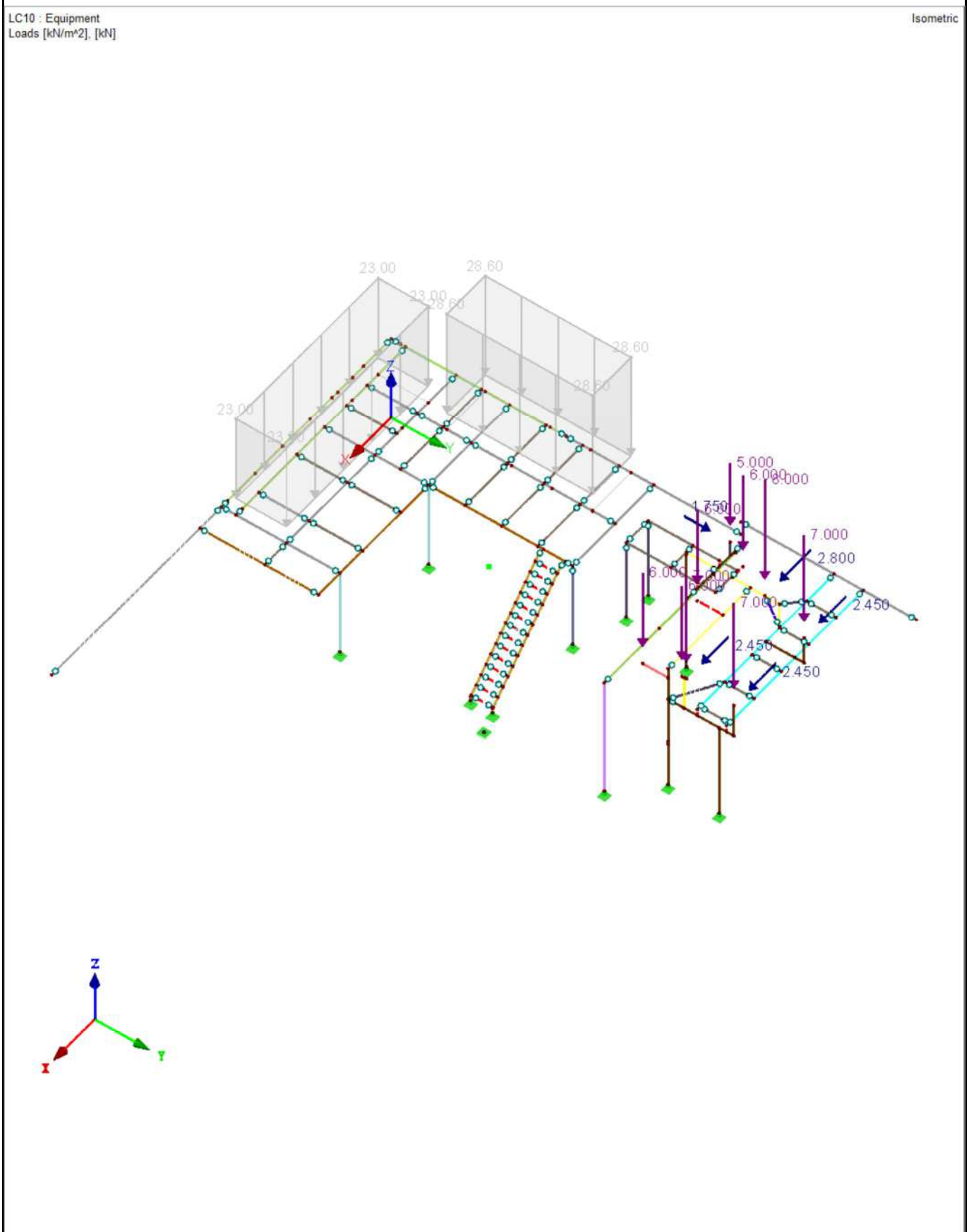
No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-23.00 kN/m²
	Boundary of the area load plane	Corner nodes		:	577,398,408,576
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	210,225,235,244,576,582,585,588,591,605,693,816,821,822,823,824,825,826,828
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-164.731 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-164.731 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-179.556 kNm
			Y	:	593.854 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-179.556 kNm
			Y	:	585.591 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	3
		Σ cell area		:	7.162 m²
	Convert loads to members No.			:	221,827
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-28.60 kN/m²
	Boundary of the area load plane	Corner nodes		:	413,410,418,419
		Note		:	Each row in the drop down list box denotes one plane

3.15 Generated Loads

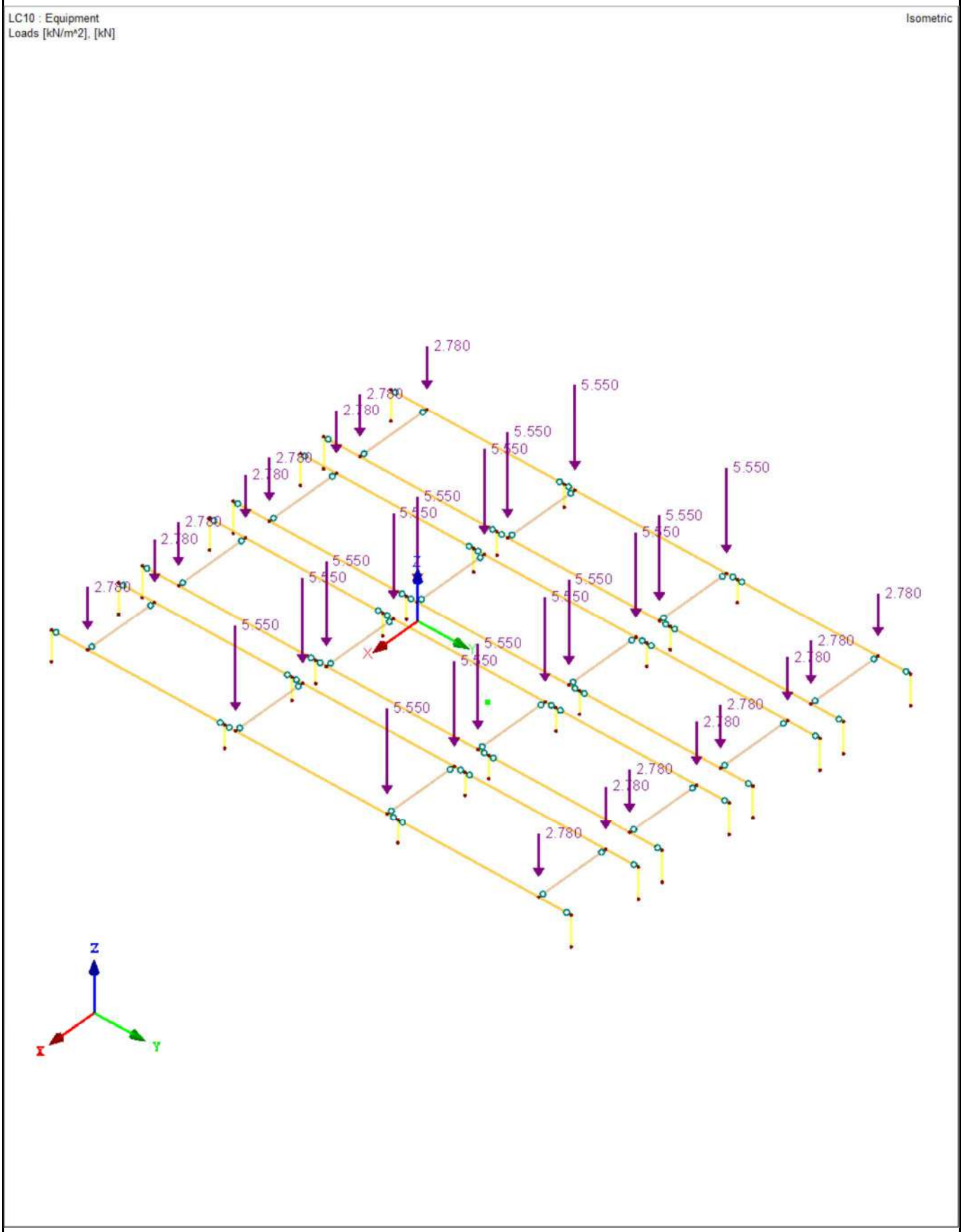
LC10: Equipment

No.	Load Description				
	Remove influence from	Single members	:	566,614,615,616,617,618,619, 620,621,622,630,632,634,636, 810,811,812	
	Generating total loads in direction	ΣP_{Areas} X	:	0.000	kN
		Y	:	0.000	kN
		Z	:	-161.304	kN
		$\Sigma P_{Members}$ X	:	0.000	kN
		Y	:	0.000	kN
		Z	:	-161.304	kN
	Total moment to the origin	ΣM_{Areas} X	:	-738.772	kNm
		Y	:	113.719	kNm
		Z	:	0.000	kNm
		$\Sigma M_{Members}$ X	:	-745.628	kNm
		Y	:	113.719	kNm
		Z	:	0.000	kNm
	Cells selected for generating	Σ number of cells	:	3	
		Σ cell area	:	5.640	m^2
	Convert loads to members No.		:	623,690	

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LC13
LL

3.15 Generated Loads

LC13: LL

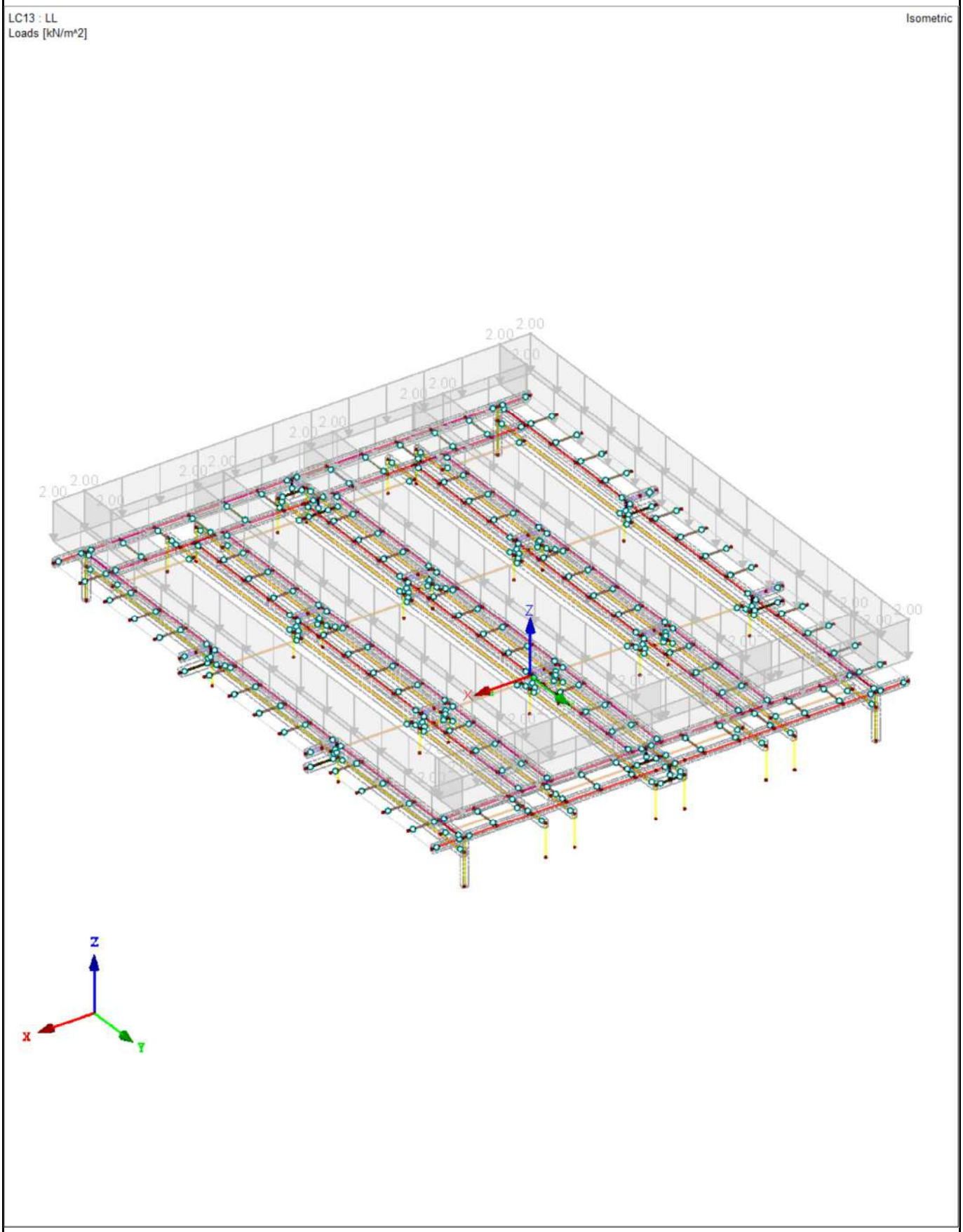
No.	Load Description				
7	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-2.00 kN/m²
	Boundary of the area load plane	Corner nodes		:	225,227,228,226; 231,232,233,234; 141,142,170,169; 224,223,236,235; 222,172,218,219; 213,219,227,230; 228,229,206,222
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	223,233,239,260,261,262,263, 265,268,269,274,275,276,277, 278,286,287,300,301,302,303, 304,305,308,309,311,315,316, 332,333,359,362,367,368,369, 371,374,377,380,383,386,389, 392,395,398,401,404,407,409, 410,412,414,415,420,421,426, 427,432,433,438,439,444,445, 450,451,456,457,462,463,468, 469,474,476,479,482,485,488, 491,494,497,500,503,506,509, 512,515,518,521,524,527,530, 533,536,539,542,545,548,551, 554,557,560,563,715,730,778, 779,780,781,782,783
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-143.370 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-143.370 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-1021.580 kNm
			Y	:	889.869 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-1021.580 kNm
			Y	:	889.868 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	7
		Σ cell area		:	71.685 m²
	Convert loads to members No.			:	104-109,200-205,213-219,222,234,237,238,258,259, 266,267,285,288,310,312-314,317-331,334-356,360,361,363-366,370,372,373,375,376,378, 379,381,382,384,385,387,388, 390,391,393,394,396,397,399, 400,402,403,405,406,408,411, 413,416-419,422-425,428-431,434-437,440-443,446-449,452-455,458-461,464-467,470-473,475,477,478,480,481,483, 484,486,487,489,490,492,493,

3.15 Generated Loads

LC13: LL

No.	Load Description
	495,496,498,499,501,502,504, 505,507,508,510,511,513,514, 516,517,519,520,522,523,525, 526,528,529,531,532,534,535, 537,538,540,541,543,544,546, 547,549,550,552,553,555,556, 558,559,561,562,564,565

LC13



LC14
SNOW

3.15 Generated Loads

LC14: SNOW

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Linear - Nodes No.	34	:	-3.20 kN/m²
			43	:	-3.20 kN/m²
			42	:	-1.84 kN/m²
	Boundary of the area load plane	Corner nodes		:	34,43,42,45
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	47,83,115,158,159,162,163,192,193,196,197,208,292,295,296,297
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-112.493 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-112.493 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-404.974 kNm
			Y	:	1077.550 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-404.974 kNm
			Y	:	1077.550 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	1
		Σ cell area		:	44.640 m²
	Convert loads to members No.			:	2,13,77,253,721
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Linear - Nodes No.	2	:	-3.20 kN/m²
			44	:	-3.20 kN/m²
			42	:	-1.84 kN/m²
	Boundary of the area load plane	Corner nodes		:	2,44,42,45
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	10,22,24,26,29,30,49,51,54,55,112,207,224,95,228,229,272,273,281,282
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-112.493 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-112.493 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-404.974 kNm

3.15 Generated Loads

LC14: SNOW

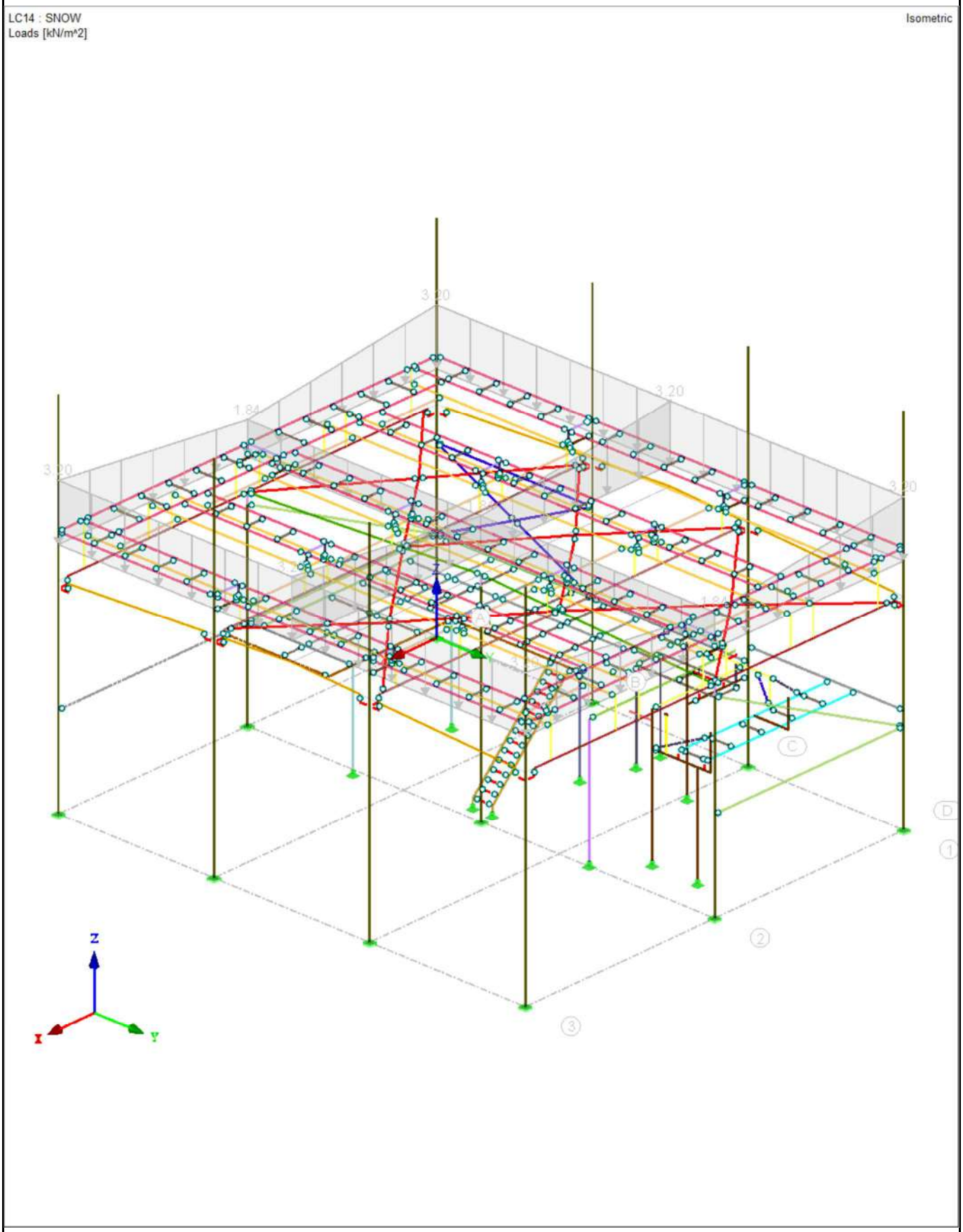
No.	Load Description				
			Y	:	317.361 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-404.974 kNm
			Y	:	317.361 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	1
		Σ cell area		:	44.640 m^2
	Convert loads to members No.			:	2,77,79,253,725
3	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Linear - Nodes No.	44	:	-3.20 kN/m^2
			9	:	-3.20 kN/m^2
			46	:	-1.84 kN/m^2
	Boundary of the area load plane	Corner nodes		:	44,9,46,42
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	25,27,28,31,33,52,53,56,57,114,206,226,227,230,231,270,271,279,280,732
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-112.493 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-112.493 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-1214.920 kNm
			Y	:	317.361 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-1214.920 kNm
			Y	:	317.361 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	1
		Σ cell area		:	44.640 m^2
	Convert loads to members No.			:	4,7,76,252,707
4	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Linear - Nodes No.	41	:	-3.20 kN/m^2
			43	:	-3.20 kN/m^2
			42	:	-1.84 kN/m^2
	Boundary of the area load plane	Corner nodes		:	43,42,46,41
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	50,85,113,160,161,164,165,194,195,198,199,209,293,294,298,299

3.15 Generated Loads

LC14: SNOW

No.	Load Description					
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000	kN
			Y	:	0.000	kN
			Z	:	-112.493	kN
		$\Sigma P_{Members}$	X	:	0.000	kN
			Y	:	0.000	kN
			Z	:	-112.493	kN
	Total moment to the origin	ΣM_{Areas}	X	:	-1214.920	kNm
			Y	:	1077.550	kNm
			Z	:	0.000	kNm
		$\Sigma M_{Members}$	X	:	-1214.920	kNm
			Y	:	1077.550	kNm
			Z	:	0.000	kNm
	Cells selected for generating	Σ number of cells		:	1	
		Σ cell area		:	44.640	m^2
	Convert loads to members No.			:	4,6,76,252,720	

LC14: SNOW


LC14 : SNOW
Loads [kN/m^2]
Isometric
3.20
1.84
3.20
3.20
Z
Y
Z
X
Y
A
B
C
D
1
2
3

LC15
LL2

3.15 Generated Loads

LC15: LL2

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-2.00 kN/m²
	Boundary of the area load plane	Corner nodes		:	433,431,432,434
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	650,651,654,657,660,663,666, 669,672,675,678,681,684,687
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-2.976 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-2.976 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-19.939 kNm
			Y	:	13.035 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-19.939 kNm
			Y	:	13.035 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	1
		Σ cell area		:	1.488 m²
	Convert loads to members No.			:	641,645,648,649,652,653,655, 656,658,659,661,662,664,665, 667,668,670,671,673,674,676, 677,679,680,682,683,685,686, 688,689
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-2.00 kN/m²
	Boundary of the area load plane	Corner nodes		:	388,381,161,408,398,393,571, 410,413,419,418,382,386,389
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	578,579,582,816,585,595,593, 598,606,608,610,613,893,624, 625,626,629,631,633,635
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-38.711 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-38.711 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-127.192 kNm
			Y	:	118.754 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-127.192 kNm

3.15 Generated Loads

LC15: LL2

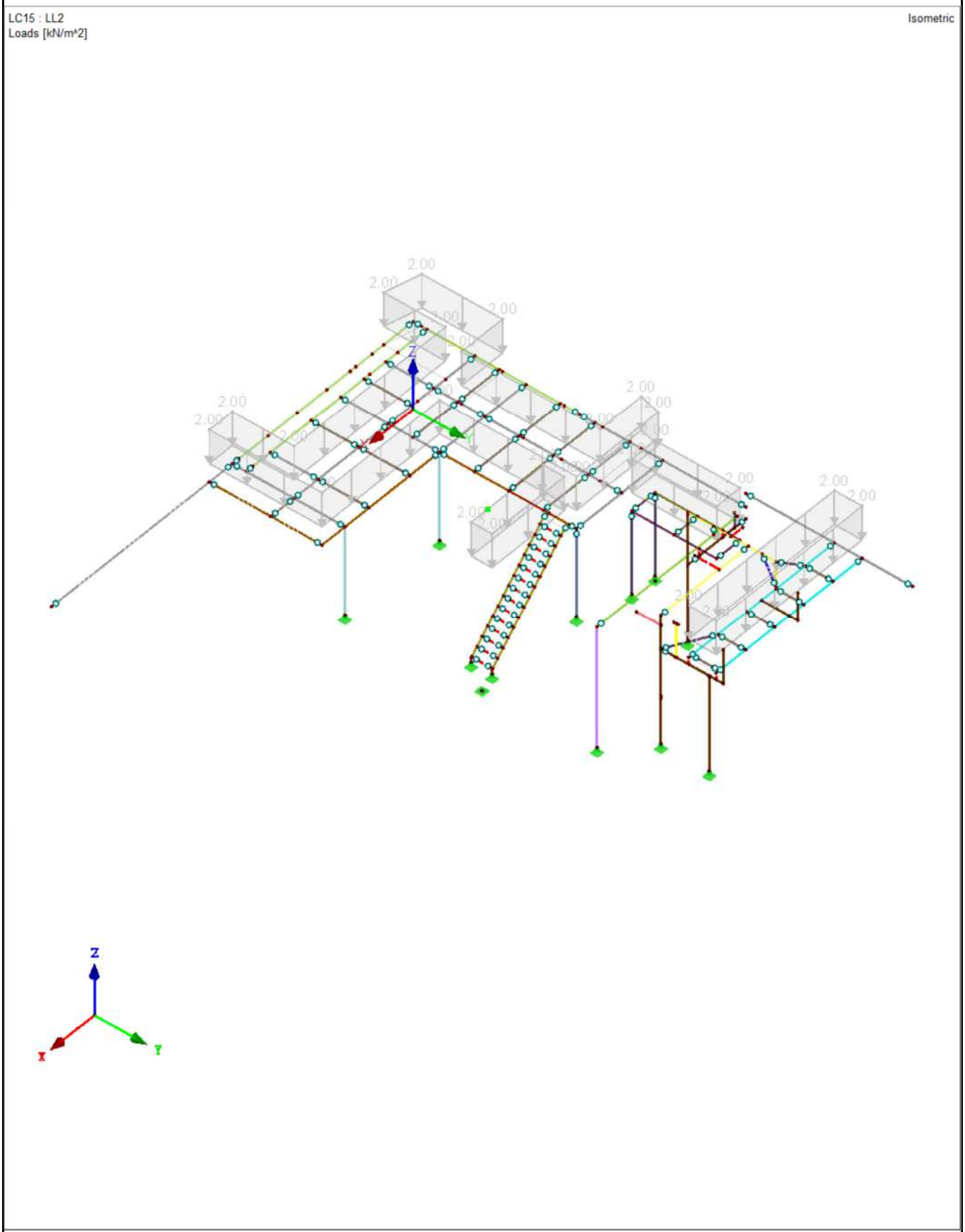
No.	Load Description				
			Y	:	118.754 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	4
		Σ cell area		:	19.355 m^2
	Convert loads to members No.			:	211,567,572,573,575,576,588, 591,597,600,601,603,605,607, 609,611,612,615,619,622,627, 628,630,632,634,636-639,643,647,813,828
3	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-2.00 kN/m^2
	Boundary of the area load plane	Corner nodes		:	597,592,589,594
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	842,844,845
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-3.920 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-3.920 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-34.790 kNm
			Y	:	4.704 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-34.790 kNm
			Y	:	4.704 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	1
		Σ cell area		:	1.960 m^2
	Convert loads to members No.			:	586,833,835,836,838,843
4	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-2.00 kN/m^2
	Boundary of the area load plane	Corner nodes		:	610,612,607,606
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	841,851,852,869,872,875,878
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-8.000 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-8.000 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-100.400 kNm

3.15 Generated Loads

LC15: LL2

No.	Load Description					
		$\Sigma M_{Members}$	Y	:	20.000	kNm
			Z	:	0.000	kNm
			X	:	-100.400	kNm
			Y	:	20.000	kNm
			Z	:	0.000	kNm
	Cells selected for generating	Σ number of cells		:	1	
		Σ cell area		:	4.000	m^2
	Convert loads to members No.			:	848,849,853,854,870,871,873, 874,876,877,879-882	

LC15



LC16
SNOW2

3.15 Generated Loads

LC16: SNOW2

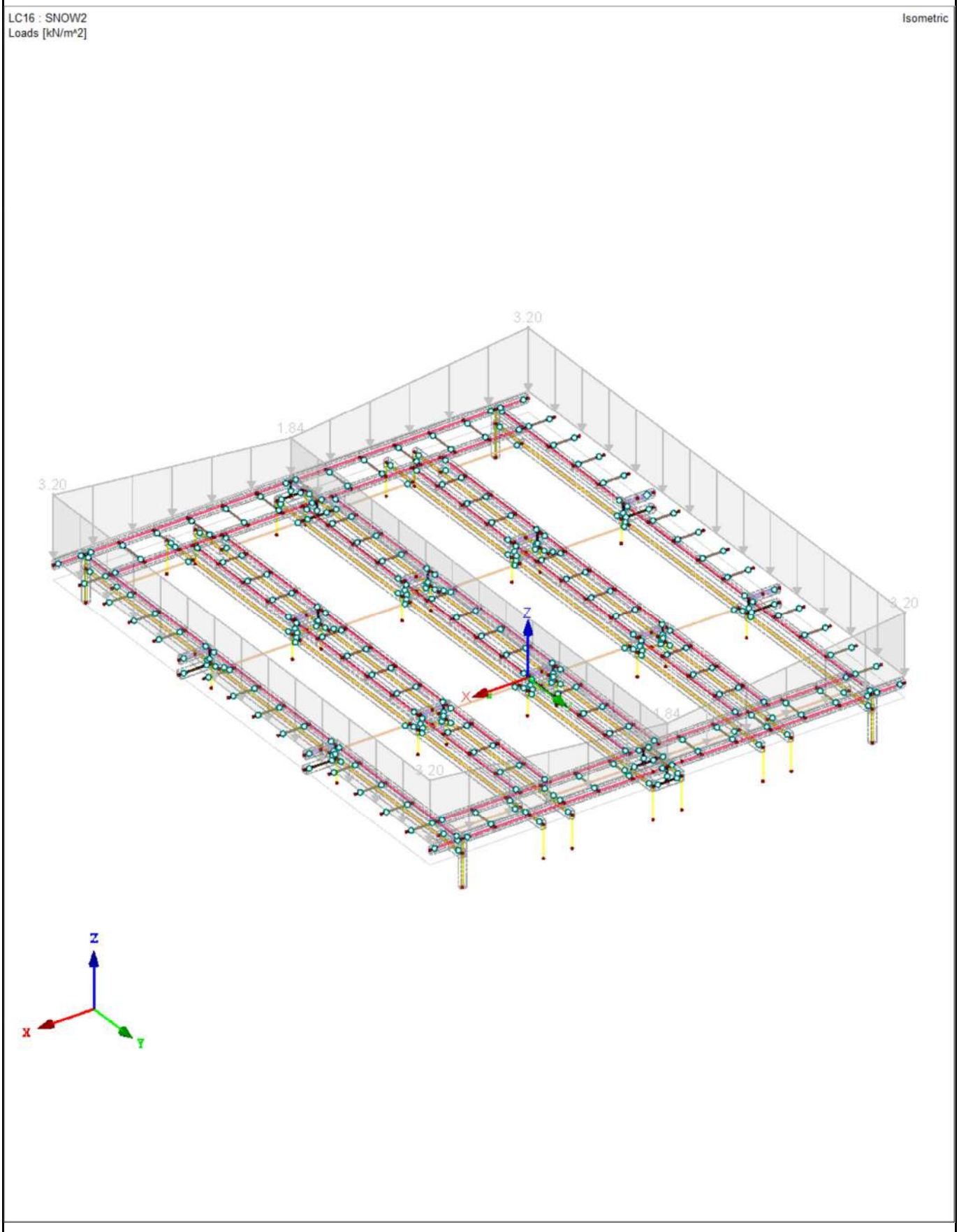
No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Linear - Nodes No.	218	:	-3.20 kN/m²
			172	:	-3.20 kN/m²
			42	:	-1.84 kN/m²
	Boundary of the area load plane	Corner nodes		:	134,560,526,132
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	146,147,148,149,180,181,182,183,283,284,756,757,760,761,764,765,772,773,776,777,784,785,792,794,797,799,807,809
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-225.012 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-225.052 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-1619.940 kNm
			Y	:	2155.270 kNm
			Z	:	0.000 kNm
		$\Sigma M_{Members}$	X	:	-1620.210 kNm
			Y	:	2141.050 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	5
		Σ cell area		:	89.316 m²
	Convert loads to members No.			:	58-62,64,66,68-72,144,145,166-179
2	From Area Loads via Plane				
	Area load direction	Global relative to the projected area:		:	x ZP
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Linear - Nodes No.	144	:	-3.20 kN/m²
			138	:	-3.20 kN/m²
			526	:	-1.84 kN/m²
	Boundary of the area load plane	Corner nodes		:	526,560,144,138
		Note		:	Each row in the drop down list box denotes one plane
	Remove influence from	Single members		:	82,84,118,119,120,121,132,133,134,135,254,255,256,306,307,752,753,762,763,768,769,788,789,790,801,803,804,805
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-224.910 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-224.870 kN

3.15 Generated Loads

LC16: SNOW2

No.	Load Description					
	Total moment to the origin	ΣM_{Areas}	X	:	-1619.500	kNm
			Y	:	634.353	kNm
			Z	:	0.000	kNm
		$\Sigma M_{Members}$	X	:	-1619.230	kNm
			Y	:	648.516	kNm
			Z	:	0.000	kNm
	Cells selected for generating	Σ number of cells		:	5	
		Σ cell area		:	89.244	m^2
	Convert loads to members No.			:	8,9,12,14-21,23,34-36,39-46,48,116,117,130,131	

LC16



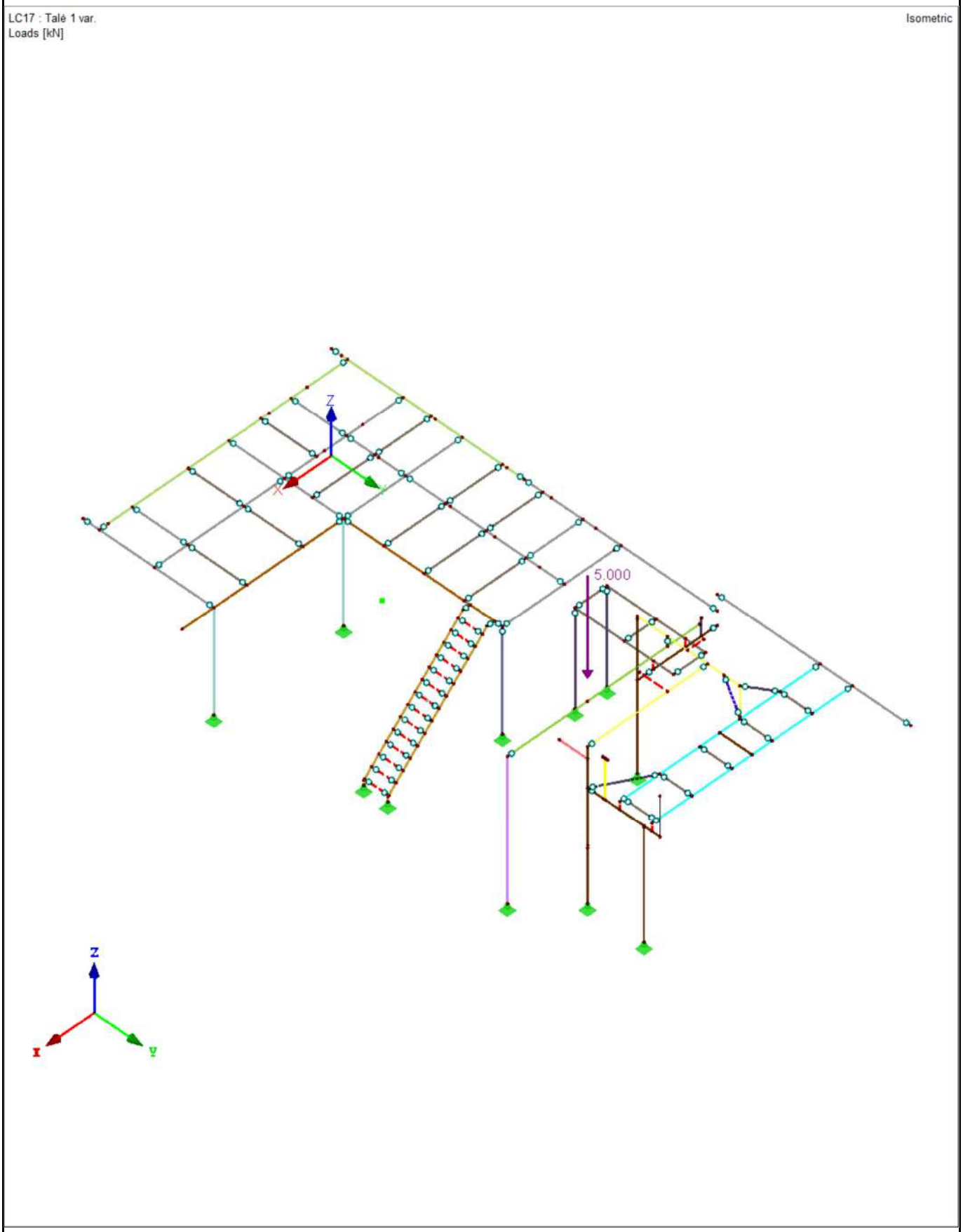
LC17
Talė 1 var.

3.1 Nodal Loads - By Components - Coordinate System

LC17: Talė 1 var.

No.	On Nodes No.	Coordinate System	Force [kN] P_X / P_U	P_Y / P_V	P_Z / P_W	Moment [kNm] M_X / M_U	M_Y / M_V	M_Z / M_W
1	662	0 | Global XYZ	0.000	0.000	-5.000	0.000	0.000	0.000

LC17



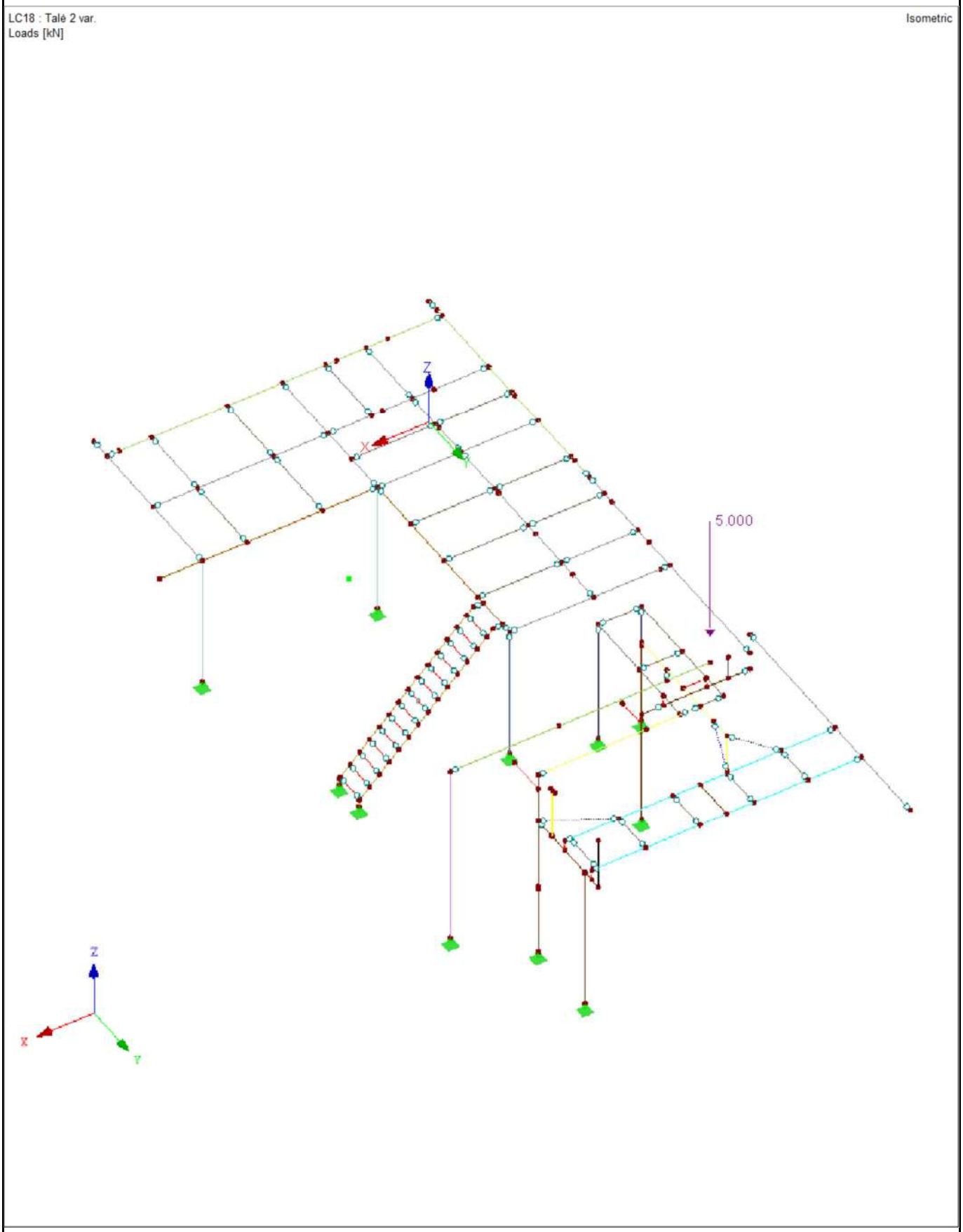
LC18
Talė 2 var.

3.1 Nodal Loads - By Components - Coordinate System

LC18: Talė 2 var.

No.	On Nodes No.	Coordinate System	Force [kN] P_X / P_U	P_Y / P_V	P_Z / P_W	Moment [kNm] M_X / M_U	M_Y / M_V	M_Z / M_W
1	659	0 | Global XYZ	0.000	0.000	-5.000	0.000	0.000	0.000

LC18


LC18 : Talė 2 var.
Loads [kN]
Isometric
Z
X
Y
5.000
Z
X
Y

4.1 Nodes - Support Forces

Node No.	LC/CO	Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
1	LC1	0.00	1.15	-85.17	-1.26	-1.20	0.22	Self-weight
	LC2	54.16	-7.30	78.84	5.41	99.94	5.52	Wind in +X
	LC3	-50.61	0.36	-68.87	-1.11	-94.87	-6.25	Wind in -X
	LC4	-2.86	6.53	14.80	-8.42	-0.33	1.10	Wind in +Y
	LC5	-3.36	-5.38	-9.32	7.82	-4.60	-0.21	Wind in -Y
	LC9	0.00	0.39	-3.45	-0.43	0.04	0.11	Imposed load
	LC10	0.25	0.79	-77.47	-1.38	-0.44	0.01	Equipment
	LC13	-0.09	0.00	-9.59	0.01	-1.03	-0.05	LL
	LC14	0.02	2.63	-23.71	-2.90	0.22	0.78	SNOW
	LC15	-0.19	0.02	-5.67	-0.02	-0.36	-0.02	LL2
	LC16	-0.45	-0.06	-20.63	0.07	-4.95	-0.25	SNOW2
	LC17	0.00	0.02	0.02	-0.04	0.00	0.00	Talė 1 var.
	LC18	0.00	0.05	0.04	-0.09	-0.01	0.00	Talė 2 var.
3	LC1	-2.44	1.28	-95.98	-1.56	-6.07	-0.59	Self-weight
	LC2	1.49	-2.64	14.10	3.26	20.49	5.23	Wind in +X
	LC3	0.88	1.84	-4.58	-2.07	-19.62	-5.43	Wind in -X
	LC4	1.69	4.35	-1.88	-7.43	12.45	1.39	Wind in +Y
	LC5	-4.77	-4.45	4.46	7.45	-2.42	-0.30	Wind in -Y
	LC9	-0.16	0.40	-5.87	-0.48	-0.48	-0.13	Imposed load
	LC10	-2.49	0.86	-105.99	-1.48	-5.61	-0.21	Equipment
	LC13	-1.51	0.02	-12.02	-0.03	-3.80	-0.18	LL
	LC14	-0.96	2.68	-39.95	-3.21	-2.93	-0.75	SNOW
	LC15	-1.18	0.02	-4.58	-0.03	-1.86	-0.03	LL2
	LC16	-7.95	0.05	-44.49	-0.10	-19.95	-0.75	SNOW2
	LC17	0.00	0.02	-0.02	-0.04	0.00	0.00	Talė 1 var.
	LC18	0.00	0.06	-0.04	-0.10	0.00	0.00	Talė 2 var.
5	LC1	-2.95	-1.08	-94.20	-0.27	-6.88	0.69	Self-weight
	LC2	-0.15	1.80	13.61	0.29	17.89	-6.27	Wind in +X
	LC3	1.99	-2.05	-3.48	0.35	-17.86	6.69	Wind in -X
	LC4	3.98	3.04	-3.14	-6.01	14.66	-0.48	Wind in +Y
	LC5	2.97	-2.81	5.14	6.11	14.29	-1.83	Wind in -Y
	LC9	-0.22	-0.34	-5.76	-0.08	-0.58	0.15	Imposed load
	LC10	2.38	0.62	-49.65	-1.37	2.61	0.01	Equipment
	LC13	-1.93	-0.05	-11.92	0.01	-4.46	0.34	LL
	LC14	-1.29	-2.33	-39.27	-0.54	-3.44	0.85	SNOW
	LC15	-0.56	0.01	-3.49	-0.04	-0.89	-0.49	LL2
	LC16	-10.20	-0.22	-44.64	0.03	-23.53	1.62	SNOW2
	LC17	0.02	0.02	-0.16	-0.04	0.03	0.00	Talė 1 var.
	LC18	0.05	0.04	-0.39	-0.09	0.07	0.00	Talė 2 var.
8	LC1	-0.02	-1.77	-79.43	-0.06	-1.01	-0.42	Self-weight
	LC2	55.51	8.32	74.94	-3.23	101.86	-4.53	Wind in +X
	LC3	-51.90	-0.30	-66.03	-1.25	-96.73	5.38	Wind in -X
	LC4	-3.40	3.11	-3.31	-5.52	-3.62	-0.23	Wind in +Y
	LC5	-3.24	-3.63	7.63	6.02	-1.17	-0.75	Wind in -Y
	LC9	0.03	-0.59	-3.21	0.01	0.09	-0.17	Imposed load
	LC10	5.52	0.45	-20.31	-1.20	9.64	0.12	Equipment
	LC13	-0.14	-0.03	-9.36	-0.02	-1.10	0.06	LL
	LC14	0.25	-4.03	-21.96	0.08	0.70	-1.19	SNOW
	LC15	-0.12	0.02	-2.54	-0.05	-0.23	0.00	LL2
	LC16	-0.51	-0.14	-21.05	-0.09	-5.20	0.34	SNOW2
	LC17	0.00	0.02	-0.18	-0.04	0.00	0.00	Talė 1 var.
	LC18	0.00	0.06	-0.44	-0.11	0.00	0.00	Talė 2 var.
17	LC1	-1.35	0.33	-88.56	-1.51	-2.18	0.21	Self-weight
	LC2	45.10	-12.31	-60.75	12.91	83.89	-3.11	Wind in +X
	LC3	-43.08	-9.18	69.47	8.11	-80.17	2.86	Wind in -X
	LC4	1.12	9.68	14.99	-12.43	1.92	-0.27	Wind in +Y
	LC5	-1.97	-5.22	-2.09	8.38	-3.53	0.05	Wind in -Y
	LC9	0.00	0.08	-9.51	-0.44	0.03	0.02	Imposed load
	LC10	-0.79	0.11	-80.41	0.02	-1.26	0.11	Equipment
	LC13	-1.02	0.08	-19.52	-0.16	-1.69	0.12	LL
	LC14	0.01	0.54	-54.91	-2.95	0.17	0.13	SNOW
	LC15	-0.19	0.04	-4.66	-0.05	-0.34	0.05	LL2

4.1 Nodes - Support Forces

Node No.	LC/CO	Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	LC16	-4.79	0.44	-53.82	-0.83	-8.01	0.60	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.01	-0.02	-0.01	0.00	Talė 2 var.
22	LC1	-1.00	0.24	-83.17	-1.40	-1.62	0.00	Self-weight
	LC2	43.00	13.51	-58.44	-11.99	80.86	-0.01	Wind in +X
	LC3	-40.96	8.32	67.37	-8.93	-77.14	0.00	Wind in -X
	LC4	-0.92	5.03	-0.33	-7.76	-1.78	0.00	Wind in +Y
	LC5	0.44	-10.25	15.29	13.60	0.80	0.01	Wind in -Y
	LC9	0.04	0.07	-8.87	-0.43	0.09	0.00	Imposed load
	LC10	4.26	-0.03	-18.73	0.19	7.61	0.00	Equipment
	LC13	-0.92	0.02	-18.54	-0.08	-1.56	0.00	LL
	LC14	0.30	0.49	-51.00	-2.89	0.67	-0.01	SNOW
	LC15	-0.10	0.00	0.12	0.01	-0.19	0.00	LL2
	LC16	-4.42	0.09	-52.75	-0.38	-7.54	0.00	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	-0.01	-0.02	-0.01	0.00	Talė 2 var.
23	LC1	-0.11	0.20	-94.78	-1.25	-0.74	0.00	Self-weight
	LC2	4.60	-0.26	7.69	1.63	28.40	0.00	Wind in +X
	LC3	-4.52	0.20	10.68	-1.26	-27.94	0.00	Wind in -X
	LC4	0.06	0.45	7.69	-2.79	0.38	0.00	Wind in +Y
	LC5	0.07	-0.51	6.64	3.17	0.42	0.00	Wind in -Y
	LC9	-0.03	0.06	-16.48	-0.38	-0.16	0.00	Imposed load
	LC10	0.10	-0.03	-30.81	0.21	0.60	0.00	Equipment
	LC13	-0.03	0.01	-18.96	-0.05	-0.20	0.00	LL
	LC14	-0.17	0.41	-93.84	-2.57	-1.10	0.00	SNOW
	LC15	-0.01	0.00	-0.01	0.01	-0.08	0.00	LL2
	LC16	-0.17	0.04	-79.53	-0.24	-1.02	0.00	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	-0.02	0.00	0.00	Talė 2 var.
33	LC1	1.19	-2.61	-73.91	5.17	2.53	-0.15	Self-weight
	LC2	2.63	-4.50	-1.79	6.11	24.72	0.78	Wind in +X
	LC3	-2.20	-3.68	4.76	1.44	-22.71	0.69	Wind in -X
	LC4	4.23	6.81	6.53	-12.25	3.19	-0.66	Wind in +Y
	LC5	2.73	-3.23	-1.04	7.07	2.19	0.24	Wind in -Y
	LC9	0.01	-0.87	-2.59	1.70	0.05	-0.05	Imposed load
	LC10	1.10	-0.23	-4.30	1.09	2.45	-0.02	Equipment
	LC13	0.98	-0.02	-9.73	0.07	2.06	-0.01	LL
	LC14	0.05	-5.96	-18.10	11.72	0.25	-0.32	SNOW
	LC15	-0.03	0.00	0.00	0.01	-0.11	0.00	LL2
	LC16	4.50	-0.09	-21.15	0.29	9.46	-0.03	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 2 var.
35	LC1	2.59	-1.46	-91.37	2.45	5.22	0.15	Self-weight
	LC2	0.80	-0.41	-4.19	1.47	22.82	-0.22	Wind in +X
	LC3	2.49	0.12	8.32	-0.71	-15.39	0.28	Wind in -X
	LC4	-3.52	0.19	5.75	-2.88	-14.38	-0.48	Wind in +Y
	LC5	4.69	-0.38	-2.66	3.20	2.26	-0.20	Wind in -Y
	LC9	0.17	-0.51	-6.50	0.86	0.30	0.02	Imposed load
	LC10	3.53	-0.20	-12.83	1.02	8.05	0.35	Equipment
	LC13	1.95	-0.03	-12.07	0.09	4.11	0.11	LL
	LC14	0.95	-3.38	-44.17	5.60	1.55	0.04	SNOW
	LC15	-0.02	0.00	0.01	0.01	-0.11	0.00	LL2
	LC16	10.31	-0.14	-44.58	0.38	21.67	0.52	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 2 var.
37	LC1	3.06	0.69	-89.74	-2.52	5.70	-0.04	Self-weight
	LC2	1.69	-0.11	-4.42	0.78	23.74	0.50	Wind in +X
	LC3	1.33	0.24	8.99	-0.98	-16.68	-0.49	Wind in -X
	LC4	-3.68	0.63	-4.06	-3.94	-14.36	0.41	Wind in +Y
	LC5	-2.45	-0.48	5.02	3.55	-12.89	0.22	Wind in -Y
	LC9	0.22	0.24	-6.08	-0.88	0.35	0.01	Imposed load
	LC10	4.29	-0.18	-13.11	0.98	9.41	-0.12	Equipment

4.1 Nodes - Support Forces

Node No.	LC/CO	Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	LC13	2.32	0.01	-12.28	0.01	4.53	-0.08	LL
	LC14	1.20	1.61	-41.25	-5.96	1.81	0.08	SNOW
	LC15	-0.02	0.00	0.01	0.01	-0.10	0.00	LL2
	LC16	12.25	0.03	-46.17	0.00	23.92	-0.37	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 2 var.
40	LC1	1.17	3.14	-75.42	-8.14	2.52	0.13	Self-weight
	LC2	2.73	4.01	-1.76	-3.92	24.86	-0.76	Wind in +X
	LC3	-2.31	4.06	4.77	-3.21	-22.92	-0.70	Wind in -X
	LC4	1.18	3.46	-1.36	-7.72	-0.84	-0.20	Wind in +Y
	LC5	4.20	-6.99	6.61	12.64	3.05	0.67	Wind in -Y
	LC9	0.01	1.07	-3.18	-2.79	0.05	0.05	Imposed load
	LC10	1.84	-0.22	-4.44	1.08	5.14	-0.02	Equipment
	LC13	0.96	0.00	-9.39	0.02	1.98	-0.01	LL
	LC14	0.06	7.33	-21.81	-19.07	0.35	0.33	SNOW
	LC15	-0.02	0.00	0.00	0.01	-0.08	0.00	LL2
	LC16	4.47	0.01	-21.12	0.04	9.29	-0.03	SNOW2
	LC17	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	-0.01	0.00	0.00	Talė 2 var.
151	LC1	0.05	0.00	-3.17	0.00	0.00	0.00	Self-weight
	LC2	0.41	0.00	-0.33	0.00	0.00	0.00	Wind in +X
	LC3	-0.38	0.00	0.31	0.00	0.00	0.00	Wind in -X
	LC4	0.05	0.00	-0.04	0.00	0.00	0.00	Wind in +Y
	LC5	-0.01	0.00	0.01	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	-0.01	0.00	-24.86	0.00	0.00	0.00	Equipment
	LC13	-0.02	0.00	0.01	0.00	0.00	0.00	LL
	LC14	-0.01	0.00	0.01	0.00	0.00	0.00	SNOW
	LC15	0.31	0.00	-7.19	0.00	0.00	0.00	LL2
	LC16	-0.09	0.00	0.08	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	0.00	0.00	0.00	Talė 2 var.
391	LC1	0.00	0.00	-4.67	0.00	0.00	0.00	Self-weight
	LC2	0.00	0.00	0.48	0.00	0.00	0.00	Wind in +X
	LC3	0.00	0.00	-0.47	0.00	0.00	0.00	Wind in -X
	LC4	0.00	0.00	0.13	0.00	0.00	0.00	Wind in +Y
	LC5	0.00	0.00	0.01	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	0.00	0.01	-39.36	0.00	0.00	0.00	Equipment
	LC13	0.00	0.00	-0.04	0.00	0.00	0.00	LL
	LC14	0.00	0.00	-0.03	0.00	0.00	0.00	SNOW
	LC15	0.00	0.00	-9.53	0.00	0.00	0.00	LL2
	LC16	0.00	0.00	-0.19	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	0.00	0.00	0.00	Talė 2 var.
392	LC1	0.00	0.00	-3.24	0.00	0.00	0.01	Self-weight
	LC2	0.00	0.00	2.42	0.00	0.00	0.02	Wind in +X
	LC3	0.00	0.00	-2.49	0.00	0.00	-0.03	Wind in -X
	LC4	0.00	0.00	1.99	0.00	0.00	-0.01	Wind in +Y
	LC5	0.00	0.00	0.66	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	-0.06	0.00	0.00	0.00	Imposed load
	LC10	0.00	0.00	-13.55	0.00	0.00	0.00	Equipment
	LC13	0.00	0.00	-0.51	0.00	0.00	0.00	LL
	LC14	0.00	0.00	-0.37	0.00	0.00	0.01	SNOW
	LC15	0.00	0.00	-5.27	0.00	0.00	0.00	LL2
	LC16	0.00	0.00	-2.73	0.00	0.00	0.01	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talė 1 var.
	LC18	0.00	0.00	0.00	0.00	0.00	0.00	Talė 2 var.
435	LC1	-0.86	0.00	1.30	0.00	0.00	0.00	Self-weight
	LC2	0.51	0.00	-2.42	0.00	0.00	0.00	Wind in +X
	LC3	-0.50	0.00	2.49	0.00	0.00	0.00	Wind in -X
	LC4	1.42	0.00	-2.20	0.00	0.00	0.00	Wind in +Y

4.1 Nodes - Support Forces

Node No.	LC/CO	Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	LC5	0.79	0.00	-0.79	0.00	0.00	0.00	Wind in -Y
	LC9	-0.03	0.00	0.07	0.00	0.00	0.00	Imposed load
	LC10	-0.01	0.00	0.20	0.00	0.00	0.00	Equipment
	LC13	-0.36	0.00	0.57	0.00	0.00	0.00	LL
	LC14	-0.21	0.00	0.40	0.00	0.00	0.00	SNOW
	LC15	-2.02	0.00	3.53	0.00	0.00	0.00	LL2
	LC16	-1.94	0.00	3.02	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.00	0.00	0.00	0.00	0.00	Talë 2 var.
436	LC1	0.57	0.00	-1.69	0.00	0.00	0.00	Self-weight
	LC2	2.13	0.00	-0.16	0.00	0.00	0.00	Wind in +X
	LC3	-2.21	0.00	0.16	0.00	0.00	0.00	Wind in -X
	LC4	0.71	0.00	0.13	0.00	0.00	0.00	Wind in +Y
	LC5	-0.10	0.00	0.12	0.00	0.00	0.00	Wind in -Y
	LC9	-0.03	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	-0.19	0.00	-0.01	0.00	0.00	0.00	Equipment
	LC13	-0.19	0.00	-0.03	0.00	0.00	0.00	LL
	LC14	-0.19	0.00	-0.01	0.00	0.00	0.00	SNOW
	LC15	3.88	0.00	-6.94	0.00	0.00	0.00	LL2
	LC16	-0.98	0.00	-0.17	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.00	0.00	0.00	0.00	0.00	Talë 2 var.
588	LC1	0.10	-0.14	-2.84	0.00	0.00	0.00	Self-weight
	LC2	0.00	-0.01	-0.03	0.00	0.00	0.00	Wind in +X
	LC3	0.00	0.01	0.02	0.00	0.00	0.00	Wind in -X
	LC4	0.02	0.01	0.01	0.00	0.00	0.00	Wind in +Y
	LC5	0.01	0.00	0.00	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	-0.09	-1.28	-10.23	0.00	0.00	0.00	Equipment
	LC13	0.00	0.00	0.00	0.00	0.00	0.00	LL
	LC14	0.00	0.00	0.00	0.00	0.00	0.00	SNOW
	LC15	0.28	-0.10	-2.05	0.00	0.00	0.00	LL2
	LC16	-0.02	0.00	-0.01	0.00	0.00	0.00	SNOW2
	LC17	-0.01	-0.14	-1.93	0.00	0.00	0.00	Talë 1 var.
	LC18	-0.03	-0.34	-4.62	0.00	0.00	0.00	Talë 2 var.
590	LC1	0.00	0.00	-0.41	0.00	0.00	0.00	Self-weight
	LC2	0.00	0.00	0.00	0.00	0.00	0.00	Wind in +X
	LC3	0.00	0.00	0.00	0.00	0.00	0.00	Wind in -X
	LC4	0.00	0.00	0.00	0.00	0.00	0.00	Wind in +Y
	LC5	0.00	0.00	0.00	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	0.00	0.00	0.02	0.00	0.00	-0.01	Equipment
	LC13	0.00	0.00	0.00	0.00	0.00	0.00	LL
	LC14	0.00	0.00	0.00	0.00	0.00	0.00	SNOW
	LC15	0.00	0.00	-0.72	0.00	0.00	0.01	LL2
	LC16	0.00	0.00	0.00	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.00	0.01	0.00	0.00	0.00	Talë 2 var.
595	LC1	0.00	0.00	-0.41	0.00	0.00	0.01	Self-weight
	LC2	0.00	0.00	0.00	0.00	0.00	0.00	Wind in +X
	LC3	0.00	0.00	0.00	0.00	0.00	0.00	Wind in -X
	LC4	0.00	0.00	0.00	0.00	0.00	0.00	Wind in +Y
	LC5	0.00	0.00	0.00	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	0.00	0.00	0.20	0.00	0.00	0.00	Equipment
	LC13	0.00	0.00	0.00	0.00	0.00	0.00	LL
	LC14	0.00	0.00	0.00	0.00	0.00	0.00	SNOW
	LC15	0.00	0.00	-0.73	0.00	0.00	0.01	LL2
	LC16	0.00	0.00	0.00	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	0.00	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.00	0.00	0.00	0.00	0.00	Talë 2 var.
617	LC1	0.00	0.04	-2.91	0.00	0.00	0.00	Self-weight

4.1 Nodes - Support Forces

Node No.	LC/CO	Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	LC2	0.00	-0.06	0.12	0.00	0.00	0.00	Wind in +X
	LC3	0.00	0.05	-0.11	0.00	0.00	0.00	Wind in -X
	LC4	0.00	0.02	-0.05	0.00	0.00	0.00	Wind in +Y
	LC5	0.00	0.01	-0.03	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	-0.84	-0.41	-19.68	0.00	0.00	0.01	Equipment
	LC13	0.00	0.00	0.01	0.00	0.00	0.00	LL
	LC14	0.00	0.00	0.00	0.00	0.00	0.00	SNOW
	LC15	0.00	0.07	-3.51	0.00	0.00	0.00	LL2
	LC16	0.00	-0.02	0.04	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.03	-0.21	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.08	-0.49	0.00	0.00	0.00	Talë 2 var.
619	LC1	0.00	-0.01	-1.69	0.00	0.00	0.00	Self-weight
	LC2	0.01	-0.01	-0.12	0.00	0.00	0.00	Wind in +X
	LC3	-0.01	0.01	0.11	0.00	0.00	0.00	Wind in -X
	LC4	0.00	0.00	0.04	0.00	0.00	0.00	Wind in +Y
	LC5	0.00	0.00	0.02	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	-0.31	1.48	-16.00	0.00	0.00	0.01	Equipment
	LC13	0.00	0.00	0.00	0.00	0.00	0.00	LL
	LC14	0.00	0.00	0.00	0.00	0.00	0.00	SNOW
	LC15	0.00	-0.06	-0.40	0.00	0.00	0.00	LL2
	LC16	0.00	0.00	-0.03	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.01	-0.02	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.03	-0.05	0.00	0.00	0.00	Talë 2 var.
657	LC1	0.00	0.00	-1.47	0.00	0.00	0.00	Self-weight
	LC2	0.00	0.00	0.00	0.00	0.00	0.00	Wind in +X
	LC3	0.00	0.00	0.00	0.00	0.00	0.00	Wind in -X
	LC4	0.00	0.00	0.00	0.00	0.00	0.00	Wind in +Y
	LC5	0.00	0.00	0.00	0.00	0.00	0.00	Wind in -Y
	LC9	0.00	0.00	0.00	0.00	0.00	0.00	Imposed load
	LC10	0.00	0.00	0.00	0.00	0.00	0.00	Equipment
	LC13	0.00	0.00	0.00	0.00	0.00	0.00	LL
	LC14	0.00	0.00	0.00	0.00	0.00	0.00	SNOW
	LC15	0.00	0.00	0.00	0.00	0.00	0.00	LL2
	LC16	0.00	0.00	0.00	0.00	0.00	0.00	SNOW2
	LC17	0.00	0.00	-2.50	0.00	0.00	0.00	Talë 1 var.
	LC18	0.00	0.00	1.00	0.00	0.00	0.00	Talë 2 var.
Σ Supp.	LC1	0.00	0.00	-972.96				
Σ Loads	LC1	0.00	0.00	-972.96				
Σ Supp.	LC2	214.62	0.03	57.80				
Σ Loads	LC2	214.62	0.03	57.80				
Σ Supp.	LC3	-192.02	0.00	31.41				
Σ Loads	LC3	-192.02	0.00	31.41				
Σ Supp.	LC4	0.08	43.31	35.67				
Σ Loads	LC4	0.08	43.31	35.67				
Σ Supp.	LC5	0.00	-43.31	35.67				
Σ Loads	LC5	0.00	-43.31	35.67				
Σ Supp.	LC9	0.00	0.00	-71.51				
Σ Loads	LC9	0.00	0.00	-71.51				
Σ Supp.	LC10	18.55	1.75	-541.31				
Σ Loads	LC10	18.55	1.75	-541.31				
Σ Supp.	LC13	0.00	0.00	-143.37				
Σ Loads	LC13	0.00	0.00	-143.37				
Σ Supp.	LC14	0.00	0.00	-449.97				
Σ Loads	LC14	0.00	0.00	-449.97				
Σ Supp.	LC15	0.00	0.00	-53.61				
Σ Loads	LC15	0.00	0.00	-53.61				
Σ Supp.	LC16	0.00	0.00	-449.92				
Σ Loads	LC16	0.00	0.00	-449.92				
Σ Supp.	LC17	0.00	0.00	-5.00				

4.1 Nodes - Support Forces

Node No.	LC/CO	Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
Σ Loads	LC17	0.00	0.00	-5.00				
Σ Supp.	LC18	0.00	0.00	-5.00				
Σ Loads	LC18	0.00	0.00	-5.00				

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
1	RC1	Max	0.00	1.15	-85.17	-1.26	-1.20	0.22	1.00*LC1/p
		Min	0.00	1.15	-85.17	-1.26	-1.20	0.22	1.00*LC1/p
	RC2	Max	54.16	6.53	78.84	7.82	99.94	5.52	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-50.61	-7.30	-68.87	-8.42	-94.87	-6.25	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.02	2.63	0.00	0.07	0.22	0.78	1.00*LC14 or 1.00*LC16
		Min	-0.45	-0.06	-23.71	-2.90	-4.95	-0.25	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.39	0.00	0.00	0.04	0.11	1.00*LC9
		Min	0.00	0.00	-3.45	-0.43	0.00	0.00	1.00*LC9
	RC5	Max	0.25	0.79	0.00	0.00	0.00	0.01	1.00*LC10
		Min	0.00	0.00	-77.47	-1.38	-0.44	0.00	1.00*LC10
	RC6	Max	0.00	0.02	0.00	0.01	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.28	0.00	-15.26	-0.02	-1.39	-0.07	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.08	0.05	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	-0.01	0.00	0.00	-0.13	-0.01	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	70.77	13.61	-12.42	8.53	128.50	8.20	
		Min	-66.47	-8.00	-344.56	-17.34	-131.33	-8.13	
	RC9	Max	42.62	11.24	-53.42	4.49	76.62	5.64	
		Min	-40.33	-4.22	-317.99	-14.10	-83.93	-4.98	
	RC10	Max	42.62	10.72	-53.42	4.46	76.58	5.48	
		Min	-40.15	-4.20	-313.23	-13.52	-82.00	-4.88	
	RC11	Max	42.61	10.22	-53.42	4.47	76.54	5.33	
		Min	-40.26	-4.20	-314.70	-12.97	-82.54	-4.91	
	RC12	Max	54.16	6.53	78.84	7.82	99.94	5.52	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-50.61	-7.30	-68.87	-8.42	-94.87	-6.25	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	54.43	10.40	-6.28	6.61	98.89	6.30	
		Min	-51.13	-6.20	-258.79	-13.23	-100.96	-6.26	
	RC14	Max	32.77	8.57	-37.82	3.50	58.99	4.33	
		Min	-31.02	-3.29	-238.36	-10.74	-64.50	-3.84	
	RC15	Max	32.77	8.17	-37.82	3.48	58.96	4.20	
		Min	-30.89	-3.28	-234.69	-10.30	-63.01	-3.76	
	RC16	Max	32.77	7.79	-37.82	3.48	58.92	4.09	
		Min	-30.97	-3.28	-235.82	-9.87	-63.43	-3.78	
	RC17	Max	54.16	6.53	78.84	7.82	99.94	5.52	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-50.61	-7.30	-68.87	-8.42	-94.87	-6.25	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	11.09	3.85	-69.35	0.32	18.83	1.49	
		Min	-10.30	-0.33	-185.74	-5.04	-22.03	-1.10	
	RC19	Max	0.27	3.33	-85.12	-1.22	-1.09	0.63	
		Min	-0.32	1.12	-179.07	-4.22	-4.54	0.07	
	RC20	Max	0.26	2.54	-85.12	-1.24	-1.15	0.39	
		Min	-0.18	1.13	-171.96	-3.35	-3.06	0.15	
	RC21	Max	0.26	2.55	-85.12	-1.24	-1.15	0.39	
		Min	-0.24	1.13	-175.01	-3.36	-3.34	0.13	
	RC22	Max	54.16	6.53	78.84	7.82	99.94	5.52	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-50.61	-7.30	-68.87	-8.42	-94.87	-6.25	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.26	2.54	-85.12	-1.24	-1.15	0.39	
		Min	-0.18	1.13	-171.96	-3.35	-3.06	0.15	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC24	Max	70.77	13.61	-12.42	8.53	128.50	8.20	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-66.47	-8.00	-344.56	-17.34	-131.33	-8.13	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	54.43	10.40	-6.28	6.61	98.89	6.30	SLS - Characteristic
		Min	-51.13	-6.20	-258.79	-13.23	-100.96	-6.26	SLS - Characteristic
	RC26	Max	11.09	3.85	-69.35	0.32	18.83	1.49	SLS - Frequent
		Min	-10.30	-0.33	-185.74	-5.04	-22.03	-1.10	SLS - Frequent
	RC27	Max	0.26	2.54	-85.12	-1.24	-1.15	0.39	SLS - Quasi-permanent
		Min	-0.18	1.13	-171.96	-3.35	-3.06	0.15	SLS - Quasi-permanent
3	RC1	Max	-2.44	1.28	-95.98	-1.56	-6.07	-0.59	1.00*LC1/p
		Min	-2.44	1.28	-95.98	-1.56	-6.07	-0.59	1.00*LC1/p
	RC2	Max	1.69	4.35	14.10	7.45	20.49	5.23	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.77	-4.45	-4.58	-7.43	-19.62	-5.43	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	2.68	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	-7.95	0.00	-44.49	-3.21	-19.95	-0.75	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.40	0.00	0.00	0.00	0.00	1.00*LC9
		Min	-0.16	0.00	-5.87	-0.48	-0.48	-0.13	1.00*LC9
	RC5	Max	0.00	0.86	0.00	0.00	0.00	0.00	1.00*LC10
		Min	-2.49	0.00	-105.99	-1.48	-5.61	-0.21	1.00*LC10
	RC6	Max	0.00	0.04	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-2.70	0.00	-16.59	-0.06	-5.67	-0.21	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.08	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-0.06	-0.14	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	-1.09	11.15	-111.24	7.58	18.44	6.01	
		Min	-22.55	-4.06	-334.29	-16.93	-64.59	-9.01	
	RC9	Max	-1.97	9.93	-118.57	3.70	7.79	3.29	
		Min	-23.17	-1.74	-349.26	-14.32	-62.17	-6.48	
	RC10	Max	-1.97	9.40	-118.57	3.70	7.79	3.29	
		Min	-20.28	-1.74	-339.54	-13.68	-55.01	-6.36	
	RC11	Max	-1.97	8.90	-118.57	3.70	7.79	3.29	
		Min	-21.12	-1.74	-338.38	-13.09	-56.59	-6.27	
	RC12	Max	1.69	4.35	14.10	7.45	20.49	5.23	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.77	-4.45	-4.58	-7.43	-19.62	-5.43	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	-0.75	8.49	-81.88	5.89	14.42	4.65	
		Min	-17.15	-3.17	-249.37	-12.90	-49.23	-6.90	
	RC14	Max	-1.42	7.55	-87.52	2.91	6.22	2.55	
		Min	-17.63	-1.39	-260.89	-10.89	-47.37	-4.95	
	RC15	Max	-1.42	7.15	-87.52	2.91	6.22	2.55	
		Min	-15.41	-1.39	-253.41	-10.40	-41.87	-4.86	
	RC16	Max	-1.42	6.76	-87.52	2.91	6.22	2.55	
		Min	-16.05	-1.39	-252.52	-9.94	-43.08	-4.79	
	RC17	Max	1.69	4.35	14.10	7.45	20.49	5.23	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.77	-4.45	-4.58	-7.43	-19.62	-5.43	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	-2.10	3.65	-93.16	-0.07	-1.97	0.46	
		Min	-8.28	0.39	-216.83	-5.32	-21.29	-2.10	
	RC19	Max	-2.44	3.58	-95.98	-1.56	-6.07	-0.59	
		Min	-9.71	1.28	-229.26	-4.80	-23.36	-1.24	
	RC20	Max	-2.44	2.78	-95.98	-1.56	-6.07	-0.59	
		Min	-7.33	1.28	-215.91	-3.84	-17.37	-1.01	
	RC21	Max	-2.44	2.79	-95.98	-1.56	-6.07	-0.59	
		Min	-7.87	1.28	-219.23	-3.85	-18.50	-1.05	
	RC22	Max	1.69	4.35	14.10	7.45	20.49	5.23	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.77	-4.45	-4.58	-7.43	-19.62	-5.43	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC23	Max	-2.44	2.78	-95.98	-1.56	-6.07	-0.59	
		Min	-7.33	1.28	-215.91	-3.84	-17.37	-1.01	
	RC24	Max	-1.09	11.15	-111.24	7.58	18.44	6.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-23.17	-4.06	-349.26	-16.93	-64.59	-9.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	-0.75	8.49	-81.88	5.89	14.42	4.65	SLS - Characteristic
		Min	-17.63	-3.17	-260.89	-12.90	-49.23	-6.90	SLS - Characteristic
	RC26	Max	-2.10	3.65	-93.16	-0.07	-1.97	0.46	SLS - Frequent
		Min	-9.71	0.39	-229.26	-5.32	-23.36	-2.10	SLS - Frequent
	RC27	Max	-2.44	2.78	-95.98	-1.56	-6.07	-0.59	SLS - Quasi-permanent
		Min	-7.33	1.28	-215.91	-3.84	-17.37	-1.01	SLS - Quasi-permanent
5	RC1	Max	-2.95	-1.08	-94.20	-0.27	-6.88	0.69	1.00*LC1/p
		Min	-2.95	-1.08	-94.20	-0.27	-6.88	0.69	1.00*LC1/p
	RC2	Max	3.98	3.04	13.61	6.11	17.89	6.69	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.15	-2.81	-3.48	-6.01	-17.86	-6.27	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.03	0.00	1.62	1.00*LC14 or 1.00*LC16
		Min	-10.20	-2.33	-44.64	-0.54	-23.53	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.15	1.00*LC9
		Min	-0.22	-0.34	-5.76	-0.08	-0.58	0.00	1.00*LC9
	RC5	Max	2.38	0.62	0.00	0.00	2.61	0.01	1.00*LC10
		Min	0.00	0.00	-49.65	-1.37	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.01	0.00	0.01	0.00	0.34	1.00*LC13 + 1.00*LC15
		Min	-2.49	-0.05	-15.41	-0.04	-5.35	-0.49	1.00*LC13 + 1.00*LC15
	RC7	Max	0.07	0.06	0.00	0.00	0.10	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-0.56	-0.12	0.00	-0.01	1.00*LC17 + 1.00*LC18
	RC8	Max	4.51	3.40	-109.47	7.60	17.62	11.41	
		Min	-15.71	-7.27	-254.12	-10.72	-58.78	-7.68	
	RC9	Max	2.44	1.82	-116.55	4.44	8.32	8.57	
		Min	-19.62	-6.72	-269.72	-7.81	-58.67	-4.42	
	RC10	Max	2.44	1.82	-116.55	4.43	8.32	8.13	
		Min	-15.93	-6.26	-259.80	-7.71	-50.24	-4.42	
	RC11	Max	2.44	1.82	-116.55	4.43	8.32	8.07	
		Min	-16.61	-5.83	-258.32	-7.61	-51.58	-4.61	
	RC12	Max	3.98	3.04	13.61	6.11	17.89	6.69	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.15	-2.81	-3.48	-6.01	-17.86	-6.27	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	3.49	2.63	-80.59	5.86	13.72	8.75	
		Min	-11.97	-5.55	-189.92	-8.18	-44.95	-5.93	
	RC14	Max	1.90	1.42	-86.03	3.42	6.56	6.56	
		Min	-14.98	-5.13	-201.92	-5.94	-44.86	-3.42	
	RC15	Max	1.90	1.42	-86.03	3.42	6.56	6.22	
		Min	-12.14	-4.77	-194.29	-5.86	-38.38	-3.42	
	RC16	Max	1.90	1.42	-86.03	3.42	6.56	6.18	
		Min	-12.66	-4.44	-193.15	-5.79	-39.41	-3.57	
	RC17	Max	3.98	3.04	13.61	6.11	17.89	6.69	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.15	-2.81	-3.48	-6.01	-17.86	-6.27	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.31	0.20	-91.47	0.96	-0.59	2.46	
		Min	-5.76	-2.12	-158.65	-3.09	-16.76	-0.72	
	RC19	Max	-0.49	-0.41	-94.20	-0.26	-4.17	1.61	
		Min	-8.79	-2.26	-171.35	-2.05	-20.24	0.54	
	RC20	Max	-0.49	-0.41	-94.20	-0.27	-4.17	1.12	
		Min	-5.73	-1.56	-157.96	-1.89	-13.19	0.54	
	RC21	Max	-0.49	-0.41	-94.20	-0.26	-4.17	1.19	
		Min	-6.23	-1.57	-161.04	-1.90	-14.26	0.44	
	RC22	Max	3.98	3.04	13.61	6.11	17.89	6.69	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
		Min	-0.15	-2.81	-3.48	-6.01	-17.86	-6.27	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	-0.49	-0.41	-94.20	-0.27	-4.17	1.12	
		Min	-5.73	-1.56	-157.96	-1.89	-13.19	0.54	
	RC24	Max	4.51	3.40	-109.47	7.60	17.62	11.41	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-19.62	-7.27	-269.72	-10.72	-58.78	-7.68	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	3.49	2.63	-80.59	5.86	13.72	8.75	SLS - Characteristic
		Min	-14.98	-5.55	-201.92	-8.18	-44.95	-5.93	SLS - Characteristic
	RC26	Max	0.31	0.20	-91.47	0.96	-0.59	2.46	SLS - Frequent
		Min	-8.79	-2.26	-171.35	-3.09	-20.24	-0.72	SLS - Frequent
	RC27	Max	-0.49	-0.41	-94.20	-0.27	-4.17	1.12	SLS - Quasi-permanent
		Min	-5.73	-1.56	-157.96	-1.89	-13.19	0.54	SLS - Quasi-permanent
8	RC1	Max	-0.02	-1.77	-79.43	-0.06	-1.01	-0.42	1.00*LC1/p
		Min	-0.02	-1.77	-79.43	-0.06	-1.01	-0.42	1.00*LC1/p
	RC2	Max	55.51	8.32	74.94	6.02	101.86	5.38	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-51.90	-3.63	-66.03	-5.52	-96.73	-4.53	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.25	0.00	0.00	0.08	0.70	0.34	1.00*LC14 or 1.00*LC16
		Min	-0.51	-4.03	-21.96	-0.09	-5.20	-1.19	1.00*LC14 or 1.00*LC16
	RC4	Max	0.03	0.00	0.00	0.01	0.09	0.00	1.00*LC9
		Min	0.00	-0.59	-3.21	0.00	0.00	-0.17	1.00*LC9
	RC5	Max	5.52	0.45	0.00	0.00	9.64	0.12	1.00*LC10
		Min	0.00	0.00	-20.31	-1.20	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.02	0.00	0.00	0.00	0.06	1.00*LC13 + 1.00*LC15
		Min	-0.26	-0.03	-11.90	-0.07	-1.33	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.08	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-0.62	-0.15	-0.01	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	79.82	9.17	-9.81	7.82	144.71	6.96	
		Min	-68.20	-10.79	-252.14	-9.22	-133.07	-7.53	
	RC9	Max	51.06	4.84	-48.78	4.72	92.01	4.29	
		Min	-41.41	-10.48	-226.37	-6.39	-84.80	-5.64	
	RC10	Max	51.00	4.84	-48.78	4.70	91.86	4.16	
		Min	-41.21	-9.67	-221.98	-6.35	-82.77	-5.40	
	RC11	Max	50.96	4.85	-48.78	4.69	91.74	4.19	
		Min	-41.31	-8.92	-222.45	-6.38	-83.29	-5.18	
	RC12	Max	55.51	8.32	74.94	6.02	101.86	5.38	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-51.90	-3.63	-66.03	-5.52	-96.73	-4.53	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	61.19	7.10	-4.49	6.01	110.98	5.37	
		Min	-52.46	-8.23	-190.09	-7.04	-102.32	-5.77	
	RC14	Max	39.06	3.77	-34.47	3.63	70.45	3.31	
		Min	-31.85	-7.99	-170.27	-4.86	-65.19	-4.32	
	RC15	Max	39.02	3.77	-34.47	3.61	70.33	3.21	
		Min	-31.70	-7.37	-166.90	-4.83	-63.63	-4.13	
	RC16	Max	38.99	3.78	-34.47	3.61	70.24	3.23	
		Min	-31.78	-6.79	-167.25	-4.85	-64.03	-3.96	
	RC17	Max	55.51	8.32	74.94	6.02	101.86	5.38	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-51.90	-3.63	-66.03	-5.52	-96.73	-4.53	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	16.65	0.43	-64.45	1.16	29.14	0.87	
		Min	-10.58	-3.31	-121.53	-2.56	-21.80	-1.56	
	RC19	Max	5.63	-1.23	-79.43	-0.02	8.98	-0.11	
		Min	-0.35	-3.79	-114.91	-1.48	-4.02	-1.01	
	RC20	Max	5.55	-1.23	-79.43	-0.05	8.77	-0.21	
		Min	-0.20	-2.58	-108.32	-1.45	-2.46	-0.66	
	RC21	Max	5.55	-1.23	-79.43	-0.05	8.77	-0.20	
		Min	-0.25	-2.59	-110.71	-1.47	-2.72	-0.66	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC22	Max	55.51	8.32	74.94	6.02	101.86	5.38	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-51.90	-3.63	-66.03	-5.52	-96.73	-4.53	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	5.55	-1.23	-79.43	-0.05	8.77	-0.21	
		Min	-0.20	-2.58	-108.32	-1.45	-2.46	-0.66	
	RC24	Max	79.82	9.17	-9.81	7.82	144.71	6.96	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-68.20	-10.79	-252.14	-9.22	-133.07	-7.53	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	61.19	7.10	-4.49	6.01	110.98	5.37	SLS - Characteristic
		Min	-52.46	-8.23	-190.09	-7.04	-102.32	-5.77	SLS - Characteristic
	RC26	Max	16.65	0.43	-64.45	1.16	29.14	0.87	SLS - Frequent
		Min	-10.58	-3.79	-121.53	-2.56	-21.80	-1.56	SLS - Frequent
	RC27	Max	5.55	-1.23	-79.43	-0.05	8.77	-0.21	SLS - Quasi-permanent
		Min	-0.20	-2.58	-108.32	-1.45	-2.46	-0.66	SLS - Quasi-permanent
17	RC1	Max	-1.35	0.33	-88.56	-1.51	-2.18	0.21	1.00*LC1/p
		Min	-1.35	0.33	-88.56	-1.51	-2.18	0.21	1.00*LC1/p
	RC2	Max	45.10	9.68	69.47	12.91	83.89	2.86	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-43.08	-12.31	-60.75	-12.43	-80.17	-3.11	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.01	0.54	0.00	0.00	0.17	0.60	1.00*LC14 or 1.00*LC16
		Min	-4.79	0.00	-54.91	-2.95	-8.01	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.08	0.00	0.00	0.03	0.02	1.00*LC9
		Min	0.00	0.00	-9.51	-0.44	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.11	0.00	0.02	0.00	0.11	1.00*LC10
		Min	-0.79	0.00	-80.41	0.00	-1.26	0.00	1.00*LC10
	RC6	Max	0.00	0.12	0.00	0.00	0.00	0.17	1.00*LC13 + 1.00*LC15
		Min	-1.22	0.00	-24.18	-0.21	-2.03	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.01	0.01	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	-0.01	0.00	0.00	-0.03	-0.01	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	56.82	13.78	-29.24	14.76	106.27	4.84	
		Min	-64.37	-15.56	-379.06	-21.11	-118.01	-3.76	
	RC9	Max	33.37	8.96	-65.36	8.05	62.72	3.58	
		Min	-43.84	-9.16	-368.89	-15.79	-79.44	-2.14	
	RC10	Max	33.37	8.86	-65.36	8.05	62.69	3.38	
		Min	-41.97	-9.16	-359.84	-15.22	-76.32	-2.14	
	RC11	Max	33.37	8.80	-65.36	8.05	62.65	3.42	
		Min	-42.44	-9.16	-356.90	-14.73	-77.11	-2.14	
	RC12	Max	45.10	9.68	69.47	12.91	83.89	2.86	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-43.08	-12.31	-60.75	-12.43	-80.17	-3.11	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	43.76	10.59	-19.09	11.41	81.83	3.71	
		Min	-49.43	-11.98	-285.09	-16.18	-90.64	-2.90	
	RC14	Max	25.72	6.88	-46.87	6.25	48.33	2.74	
		Min	-33.64	-7.06	-277.26	-12.09	-60.98	-1.65	
	RC15	Max	25.72	6.80	-46.87	6.25	48.30	2.59	
		Min	-32.20	-7.06	-270.30	-11.65	-58.57	-1.65	
	RC16	Max	25.72	6.75	-46.87	6.25	48.28	2.62	
		Min	-32.57	-7.06	-268.04	-11.27	-59.18	-1.65	
	RC17	Max	45.10	9.68	69.47	12.91	83.89	2.86	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-43.08	-12.31	-60.75	-12.43	-80.17	-3.11	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	7.67	2.52	-74.66	1.09	14.64	1.06	
		Min	-12.09	-2.14	-199.36	-4.68	-21.69	-0.41	
	RC19	Max	-1.34	0.75	-88.56	-1.49	-2.09	0.66	
		Min	-4.91	0.33	-203.69	-3.07	-8.06	0.21	
	RC20	Max	-1.35	0.59	-88.56	-1.49	-2.14	0.49	
		Min	-3.47	0.33	-187.21	-2.19	-5.65	0.21	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC21	Max	-1.35	0.61	-88.56	-1.49	-2.14	0.52	
		Min	-3.71	0.33	-192.05	-2.23	-6.06	0.21	
	RC22	Max	45.10	9.68	69.47	12.91	83.89	2.86	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-43.08	-12.31	-60.75	-12.43	-80.17	-3.11	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	-1.35	0.59	-88.56	-1.49	-2.14	0.49	
		Min	-3.47	0.33	-187.21	-2.19	-5.65	0.21	
	RC24	Max	56.82	13.78	-29.24	14.76	106.27	4.84	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-64.37	-15.56	-379.06	-21.11	-118.01	-3.76	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	43.76	10.59	-19.09	11.41	81.83	3.71	SLS - Characteristic
		Min	-49.43	-11.98	-285.09	-16.18	-90.64	-2.90	SLS - Characteristic
	RC26	Max	7.67	2.52	-74.66	1.09	14.64	1.06	SLS - Frequent
		Min	-12.09	-2.14	-203.69	-4.68	-21.69	-0.41	SLS - Frequent
	RC27	Max	-1.35	0.59	-88.56	-1.49	-2.14	0.49	SLS - Quasi-permanent
		Min	-3.47	0.33	-187.21	-2.19	-5.65	0.21	SLS - Quasi-permanent
22	RC1	Max	-1.00	0.24	-83.17	-1.40	-1.62	0.00	1.00*LC1/p
		Min	-1.00	0.24	-83.17	-1.40	-1.62	0.00	1.00*LC1/p
	RC2	Max	43.00	13.51	67.37	13.60	80.86	0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-40.96	-10.25	-58.44	-11.99	-77.14	-0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.30	0.49	0.00	0.00	0.67	0.00	1.00*LC14 or 1.00*LC16
		Min	-4.42	0.00	-52.75	-2.89	-7.54	-0.01	1.00*LC14 or 1.00*LC16
	RC4	Max	0.04	0.07	0.00	0.00	0.09	0.00	1.00*LC9
		Min	0.00	0.00	-8.87	-0.43	0.00	0.00	1.00*LC9
	RC5	Max	4.26	0.00	0.00	0.19	7.61	0.00	1.00*LC10
		Min	0.00	-0.03	-18.73	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.02	0.12	0.01	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-1.02	0.00	-18.54	-0.08	-1.75	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-0.01	-0.03	-0.01	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	60.57	18.35	-24.59	16.06	113.83	0.00	
		Min	-59.56	-13.04	-278.43	-20.21	-110.93	-0.03	
	RC9	Max	38.33	11.52	-59.62	8.99	72.04	0.00	
		Min	-39.99	-7.71	-268.62	-15.10	-73.76	-0.03	
	RC10	Max	38.26	11.42	-59.62	8.99	71.90	0.00	
		Min	-38.26	-7.71	-259.58	-14.53	-70.82	-0.03	
	RC11	Max	38.22	11.33	-59.58	8.99	71.78	0.00	
		Min	-38.66	-7.71	-255.28	-14.00	-71.50	-0.03	
	RC12	Max	43.00	13.51	67.37	13.60	80.86	0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-40.96	-10.25	-58.44	-11.99	-77.14	-0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	46.47	14.11	-15.72	12.40	87.33	0.00	
		Min	-45.78	-10.04	-210.26	-15.49	-85.27	-0.02	
	RC14	Max	29.36	8.85	-42.67	6.96	55.18	0.00	
		Min	-30.72	-5.94	-202.71	-11.56	-56.67	-0.02	
	RC15	Max	29.31	8.78	-42.67	6.96	55.07	0.00	
		Min	-29.39	-5.94	-195.76	-11.12	-54.41	-0.02	
	RC16	Max	29.27	8.71	-42.63	6.96	54.98	0.00	
		Min	-29.70	-5.94	-192.45	-10.72	-54.94	-0.02	
	RC17	Max	43.00	13.51	67.37	13.60	80.86	0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-40.96	-10.25	-58.44	-11.99	-77.14	-0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	11.92	3.05	-69.66	1.52	22.30	0.00	
		Min	-10.39	-1.84	-129.72	-4.43	-19.08	-0.01	
	RC19	Max	3.41	0.49	-83.14	-1.21	6.33	0.00	
		Min	-3.52	0.21	-133.85	-2.89	-5.92	-0.01	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC20	Max	3.32	0.34	-83.14	-1.21	6.13	0.00	
		Min	-2.19	0.21	-118.03	-2.03	-3.66	-0.01	
	RC21	Max	3.32	0.35	-83.11	-1.20	6.13	0.00	
		Min	-2.40	0.21	-121.74	-2.04	-4.01	-0.01	
	RC22	Max	43.00	13.51	67.37	13.60	80.86	0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-40.96	-10.25	-58.44	-11.99	-77.14	-0.01	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	3.32	0.34	-83.14	-1.21	6.13	0.00	
		Min	-2.19	0.21	-118.03	-2.03	-3.66	-0.01	
	RC24	Max	60.57	18.35	-24.59	16.06	113.83	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-59.56	-13.04	-278.43	-20.21	-110.93	-0.03	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	46.47	14.11	-15.72	12.40	87.33	0.00	SLS - Characteristic
		Min	-45.78	-10.04	-210.26	-15.49	-85.27	-0.02	SLS - Characteristic
	RC26	Max	11.92	3.05	-69.66	1.52	22.30	0.00	SLS - Frequent
		Min	-10.39	-1.84	-133.85	-4.43	-19.08	-0.01	SLS - Frequent
	RC27	Max	3.32	0.34	-83.14	-1.21	6.13	0.00	SLS - Quasi-permanent
		Min	-2.19	0.21	-118.03	-2.03	-3.66	-0.01	SLS - Quasi-permanent
23	RC1	Max	-0.11	0.20	-94.78	-1.25	-0.74	0.00	1.00*LC1/p
		Min	-0.11	0.20	-94.78	-1.25	-0.74	0.00	1.00*LC1/p
	RC2	Max	4.60	0.45	10.68	3.17	28.40	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.52	-0.51	0.00	-2.79	-27.94	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.41	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	-0.17	0.00	-93.84	-2.57	-1.10	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.06	0.00	0.00	0.00	0.00	1.00*LC9
		Min	-0.03	0.00	-16.48	-0.38	-0.16	0.00	1.00*LC9
	RC5	Max	0.10	0.00	0.00	0.21	0.60	0.00	1.00*LC10
		Min	0.00	-0.03	-30.81	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.01	0.00	0.01	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.04	0.00	-18.97	-0.05	-0.28	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	-0.02	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	5.96	1.25	-114.08	2.72	36.73	0.00	
		Min	-6.23	-0.44	-272.21	-7.73	-38.57	-0.01	
	RC9	Max	3.57	1.17	-119.63	1.07	21.96	0.00	
		Min	-3.95	-0.17	-308.81	-7.28	-24.47	-0.01	
	RC10	Max	3.57	1.09	-119.63	1.07	21.96	0.00	
		Min	-3.91	-0.17	-293.63	-6.78	-24.25	-0.01	
	RC11	Max	3.57	1.02	-119.63	1.07	21.96	0.00	
		Min	-3.90	-0.17	-279.61	-6.30	-24.15	-0.01	
	RC12	Max	4.60	0.45	10.68	3.17	28.40	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.52	-0.51	0.00	-2.79	-27.94	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	4.58	0.95	-84.11	2.13	28.26	0.00	
		Min	-4.79	-0.34	-204.56	-5.90	-29.64	-0.01	
	RC14	Max	2.74	0.90	-88.38	0.86	16.90	0.00	
		Min	-3.03	-0.14	-232.71	-5.55	-18.80	-0.01	
	RC15	Max	2.74	0.83	-88.38	0.86	16.90	0.00	
		Min	-3.01	-0.14	-221.04	-5.16	-18.63	-0.01	
	RC16	Max	2.74	0.77	-88.38	0.87	16.90	0.00	
		Min	-2.99	-0.14	-210.25	-4.80	-18.55	-0.01	
	RC17	Max	4.60	0.45	10.68	3.17	28.40	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.52	-0.51	0.00	-2.79	-27.94	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.90	0.38	-92.65	-0.41	5.54	0.00	
		Min	-1.07	0.07	-150.06	-2.36	-6.63	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC19	Max	-0.02	0.41	-94.78	-1.04	-0.14	0.00	
		Min	-0.21	0.17	-178.21	-2.57	-1.37	0.00	
	RC20	Max	-0.02	0.29	-94.78	-1.04	-0.14	0.00	
		Min	-0.16	0.17	-150.06	-1.80	-1.04	0.00	
	RC21	Max	-0.02	0.29	-94.78	-1.04	-0.14	0.00	
		Min	-0.17	0.17	-153.85	-1.81	-1.10	0.00	
	RC22	Max	4.60	0.45	10.68	3.17	28.40	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-4.52	-0.51	0.00	-2.79	-27.94	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	-0.02	0.29	-94.78	-1.04	-0.14	0.00	
		Min	-0.16	0.17	-150.06	-1.80	-1.04	0.00	
	RC24	Max	5.96	1.25	-114.08	2.72	36.73	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-6.23	-0.44	-308.81	-7.73	-38.57	-0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	4.58	0.95	-84.11	2.13	28.26	0.00	SLS - Characteristic
		Min	-4.79	-0.34	-232.71	-5.90	-29.64	-0.01	SLS - Characteristic
	RC26	Max	0.90	0.41	-92.65	-0.41	5.54	0.00	SLS - Frequent
		Min	-1.07	0.07	-178.21	-2.57	-6.63	0.00	SLS - Frequent
	RC27	Max	-0.02	0.29	-94.78	-1.04	-0.14	0.00	SLS - Quasi-permanent
		Min	-0.16	0.17	-150.06	-1.80	-1.04	0.00	SLS - Quasi-permanent
33	RC1	Max	1.19	-2.61	-73.91	5.17	2.53	-0.15	1.00*LC1/p
		Min	1.19	-2.61	-73.91	5.17	2.53	-0.15	1.00*LC1/p
	RC2	Max	4.23	6.81	6.53	7.07	24.72	0.78	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.20	-4.50	-1.79	-12.25	-22.71	-0.66	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	4.50	0.00	0.00	11.72	9.46	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	-5.96	-21.15	0.00	0.00	-0.32	1.00*LC14 or 1.00*LC16
	RC4	Max	0.01	0.00	0.00	1.70	0.05	0.00	1.00*LC9
		Min	0.00	-0.87	-2.59	0.00	0.00	-0.05	1.00*LC9
	RC5	Max	1.10	0.00	0.00	1.09	2.45	0.00	1.00*LC10
		Min	0.00	-0.23	-4.30	0.00	0.00	-0.02	1.00*LC10
	RC6	Max	0.98	0.00	0.00	0.08	2.06	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.03	-0.02	-9.73	0.00	-0.11	-0.01	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	-0.02	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	13.57	5.33	-91.29	28.40	49.35	0.81	
		Min	-1.29	-15.12	-136.01	-8.97	-26.20	-1.39	
	RC9	Max	13.12	1.79	-94.69	29.29	40.19	0.41	
		Min	-0.14	-15.10	-143.33	-2.60	-14.40	-1.17	
	RC10	Max	11.38	1.79	-94.69	26.93	36.56	0.41	
		Min	-0.14	-13.90	-138.45	-2.60	-14.40	-1.11	
	RC11	Max	11.75	1.79	-94.69	24.75	37.30	0.41	
		Min	-0.15	-12.79	-138.87	-2.60	-14.44	-1.05	
	RC12	Max	4.23	6.81	6.53	7.07	24.72	0.78	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.20	-4.50	-1.79	-12.25	-22.71	-0.66	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	10.35	4.20	-67.38	21.60	37.77	0.63	
		Min	-1.04	-11.52	-101.62	-7.10	-20.25	-1.06	
	RC14	Max	10.01	1.48	-69.99	22.29	30.72	0.32	
		Min	-0.15	-11.51	-107.24	-2.20	-11.17	-0.89	
	RC15	Max	8.67	1.48	-69.99	20.47	27.93	0.32	
		Min	-0.15	-10.59	-103.49	-2.20	-11.17	-0.84	
	RC16	Max	8.95	1.48	-69.99	18.80	28.50	0.32	
		Min	-0.16	-9.73	-103.82	-2.20	-11.20	-0.80	
	RC17	Max	4.23	6.81	6.53	7.07	24.72	0.78	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.20	-4.50	-1.79	-12.25	-22.71	-0.66	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC18	Max	4.32	-1.24	-72.61	10.05	12.44	0.01	
		Min	0.74	-4.93	-85.72	2.70	-2.04	-0.37	
	RC19	Max	4.83	-2.60	-73.91	12.15	10.34	-0.15	
		Min	1.18	-5.82	-91.70	5.15	2.50	-0.33	
	RC20	Max	3.48	-2.60	-73.91	8.63	7.50	-0.15	
		Min	1.18	-4.03	-85.36	5.15	2.50	-0.24	
	RC21	Max	3.67	-2.60	-73.91	8.65	7.91	-0.15	
		Min	1.17	-4.04	-87.30	5.15	2.47	-0.24	
	RC22	Max	4.23	6.81	6.53	7.07	24.72	0.78	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.20	-4.50	-1.79	-12.25	-22.71	-0.66	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	3.48	-2.60	-73.91	8.63	7.50	-0.15	
		Min	1.18	-4.03	-85.36	5.15	2.50	-0.24	
	RC24	Max	13.57	5.33	-91.29	29.29	49.35	0.81	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-1.29	-15.12	-143.33	-8.97	-26.20	-1.39	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	10.35	4.20	-67.38	22.29	37.77	0.63	SLS - Characteristic
		Min	-1.04	-11.52	-107.24	-7.10	-20.25	-1.06	SLS - Characteristic
	RC26	Max	4.83	-1.24	-72.61	12.15	12.44	0.01	SLS - Frequent
		Min	0.74	-5.82	-91.70	2.70	-2.04	-0.37	SLS - Frequent
	RC27	Max	3.48	-2.60	-73.91	8.63	7.50	-0.15	SLS - Quasi-permanent
		Min	1.18	-4.03	-85.36	5.15	2.50	-0.24	SLS - Quasi-permanent
35	RC1	Max	2.59	-1.46	-91.37	2.45	5.22	0.15	1.00*LC1/p
		Min	2.59	-1.46	-91.37	2.45	5.22	0.15	1.00*LC1/p
	RC2	Max	4.69	0.19	8.32	3.20	22.82	0.28	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.52	-0.41	-4.19	-2.88	-15.39	-0.48	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	10.31	0.00	0.00	5.60	21.67	0.52	1.00*LC14 or 1.00*LC16
		Min	0.00	-3.38	-44.58	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.17	0.00	0.00	0.86	0.30	0.02	1.00*LC9
		Min	0.00	-0.51	-6.50	0.00	0.00	0.00	1.00*LC9
	RC5	Max	3.53	0.00	0.00	1.02	8.05	0.35	1.00*LC10
		Min	0.00	-0.20	-12.83	0.00	0.00	0.00	1.00*LC10
	RC6	Max	1.95	0.00	0.01	0.10	4.11	0.12	1.00*LC13 + 1.00*LC15
		Min	-0.02	-0.03	-12.07	0.00	-0.11	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	-0.02	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	25.52	-1.72	-112.53	14.03	71.03	1.60	
		Min	-1.09	-5.88	-197.67	-0.47	-13.07	-0.44	
	RC9	Max	27.10	-1.82	-116.85	14.55	67.62	1.66	
		Min	0.74	-6.99	-212.88	1.03	-5.07	-0.19	
	RC10	Max	23.31	-1.82	-116.85	13.49	59.56	1.47	
		Min	0.74	-6.34	-203.95	1.03	-5.07	-0.19	
	RC11	Max	23.84	-1.82	-116.85	12.41	60.77	1.50	
		Min	0.73	-5.68	-200.20	1.03	-5.11	-0.19	
	RC12	Max	4.69	0.19	8.32	3.20	22.82	0.28	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.52	-0.41	-4.19	-2.88	-15.39	-0.48	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	19.40	-1.27	-83.05	10.66	54.13	1.21	
		Min	-0.94	-4.46	-148.05	-0.45	-10.25	-0.34	
	RC14	Max	20.61	-1.34	-86.37	11.06	51.50	1.25	
		Min	0.47	-5.31	-159.75	0.70	-4.10	-0.15	
	RC15	Max	17.69	-1.34	-86.37	10.25	45.31	1.12	
		Min	0.47	-4.81	-152.88	0.70	-4.10	-0.15	
	RC16	Max	18.11	-1.34	-86.37	9.41	46.24	1.13	
		Min	0.46	-4.31	-149.99	0.70	-4.13	-0.15	
	RC17	Max	4.69	0.19	8.32	3.20	22.82	0.28	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
		Min	-3.52	-0.41	-4.19	-2.88	-15.39	-0.48	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	9.71	-1.42	-89.70	5.26	23.40	0.68	
		Min	1.88	-2.43	-117.58	1.85	2.10	0.04	
	RC19	Max	11.86	-1.46	-91.37	6.30	25.33	0.78	
		Min	2.59	-3.36	-130.11	2.43	5.18	0.14	
	RC20	Max	8.77	-1.46	-91.37	4.62	18.83	0.63	
		Min	2.59	-2.34	-116.74	2.43	5.18	0.14	
	RC21	Max	9.16	-1.46	-91.37	4.64	19.66	0.65	
		Min	2.58	-2.35	-119.15	2.43	5.16	0.14	
	RC22	Max	4.69	0.19	8.32	3.20	22.82	0.28	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.52	-0.41	-4.19	-2.88	-15.39	-0.48	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	8.77	-1.46	-91.37	4.62	18.83	0.63	
		Min	2.59	-2.34	-116.74	2.43	5.18	0.14	
	RC24	Max	27.10	-1.72	-112.53	14.55	71.03	1.66	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-1.09	-6.99	-212.88	-0.47	-13.07	-0.44	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	20.61	-1.27	-83.05	11.06	54.13	1.25	SLS - Characteristic
		Min	-0.94	-5.31	-159.75	-0.45	-10.25	-0.34	SLS - Characteristic
	RC26	Max	11.86	-1.42	-89.70	6.30	25.33	0.78	SLS - Frequent
		Min	1.88	-3.36	-130.11	1.85	2.10	0.04	SLS - Frequent
	RC27	Max	8.77	-1.46	-91.37	4.62	18.83	0.63	SLS - Quasi-permanent
		Min	2.59	-2.34	-116.74	2.43	5.18	0.14	SLS - Quasi-permanent
37	RC1	Max	3.06	0.69	-89.74	-2.52	5.70	-0.04	1.00*LC1/p
		Min	3.06	0.69	-89.74	-2.52	5.70	-0.04	1.00*LC1/p
	RC2	Max	1.69	0.63	8.99	3.55	23.74	0.50	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.68	-0.48	-4.42	-3.94	-16.68	-0.49	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	12.25	1.61	0.00	0.00	23.92	0.08	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	-46.17	-5.96	0.00	-0.37	1.00*LC14 or 1.00*LC16
	RC4	Max	0.22	0.24	0.00	0.00	0.35	0.01	1.00*LC9
		Min	0.00	0.00	-6.08	-0.88	0.00	0.00	1.00*LC9
	RC5	Max	4.29	0.00	0.00	0.98	9.41	0.00	1.00*LC10
		Min	0.00	-0.18	-13.11	0.00	0.00	-0.12	1.00*LC10
	RC6	Max	2.32	0.01	0.01	0.02	4.53	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.02	0.00	-12.28	0.00	-0.10	-0.08	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	-0.02	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	25.37	3.22	-109.46	2.55	77.16	0.66	
		Min	-0.67	0.06	-197.79	-13.97	-14.09	-1.25	
	RC9	Max	29.28	3.52	-114.13	0.70	74.14	0.43	
		Min	1.24	0.31	-213.50	-14.25	-5.41	-1.14	
	RC10	Max	24.78	3.20	-114.13	0.70	65.26	0.41	
		Min	1.24	0.31	-203.39	-13.06	-5.41	-1.00	
	RC11	Max	25.40	2.89	-114.13	0.71	66.58	0.40	
		Min	1.23	0.31	-200.28	-11.92	-5.45	-1.03	
	RC12	Max	1.69	0.63	8.99	3.55	23.74	0.50	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.68	-0.48	-4.42	-3.94	-16.68	-0.49	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	19.24	2.45	-80.75	2.02	58.77	0.51	
		Min	-0.63	0.03	-148.19	-10.65	-11.05	-0.96	
	RC14	Max	22.24	2.68	-84.34	0.60	56.45	0.33	
		Min	0.84	0.22	-160.27	-10.86	-4.38	-0.87	
	RC15	Max	18.78	2.44	-84.34	0.60	49.62	0.31	
		Min	0.84	0.22	-152.50	-9.95	-4.38	-0.76	
	RC16	Max	19.26	2.20	-84.34	0.61	50.63	0.31	
		Min	0.83	0.22	-150.11	-9.08	-4.41	-0.79	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC17	Max	1.69	0.63	8.99	3.55	23.74	0.50	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.68	-0.48	-4.42	-3.94	-16.68	-0.49	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	10.83	1.14	-87.94	-0.83	26.01	0.07	
		Min	2.32	0.41	-116.65	-4.52	2.33	-0.35	
	RC19	Max	14.17	1.50	-89.74	-1.54	28.43	-0.01	
		Min	3.05	0.51	-129.62	-5.52	5.67	-0.37	
	RC20	Max	10.50	1.01	-89.74	-1.54	21.26	-0.03	
		Min	3.05	0.51	-115.77	-3.73	5.67	-0.26	
	RC21	Max	10.96	1.01	-89.74	-1.53	22.16	-0.03	
		Min	3.05	0.51	-118.23	-3.73	5.65	-0.27	
	RC22	Max	1.69	0.63	8.99	3.55	23.74	0.50	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-3.68	-0.48	-4.42	-3.94	-16.68	-0.49	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	10.50	1.01	-89.74	-1.54	21.26	-0.03	
		Min	3.05	0.51	-115.77	-3.73	5.67	-0.26	
	RC24	Max	29.28	3.52	-109.46	2.55	77.16	0.66	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.67	0.06	-213.50	-14.25	-14.09	-1.25	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	22.24	2.68	-80.75	2.02	58.77	0.51	SLS - Characteristic
		Min	-0.63	0.03	-160.27	-10.86	-11.05	-0.96	SLS - Characteristic
	RC26	Max	14.17	1.50	-87.94	-0.83	28.43	0.07	SLS - Frequent
		Min	2.32	0.41	-129.62	-5.52	2.33	-0.37	SLS - Frequent
	RC27	Max	10.50	1.01	-89.74	-1.54	21.26	-0.03	SLS - Quasi-permanent
		Min	3.05	0.51	-115.77	-3.73	5.67	-0.26	SLS - Quasi-permanent
40	RC1	Max	1.17	3.14	-75.42	-8.14	2.52	0.13	1.00*LC1/p
		Min	1.17	3.14	-75.42	-8.14	2.52	0.13	1.00*LC1/p
	RC2	Max	4.20	4.06	6.61	12.64	24.86	0.67	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.31	-6.99	-1.76	-7.72	-22.92	-0.76	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	4.47	7.33	0.00	0.04	9.29	0.33	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	-21.81	-19.07	0.00	-0.03	1.00*LC14 or 1.00*LC16
	RC4	Max	0.01	1.07	0.00	0.00	0.05	0.05	1.00*LC9
		Min	0.00	0.00	-3.18	-2.79	0.00	0.00	1.00*LC9
	RC5	Max	1.84	0.00	0.00	1.08	5.14	0.00	1.00*LC10
		Min	0.00	-0.22	-4.44	0.00	0.00	-0.02	1.00*LC10
	RC6	Max	0.96	0.00	0.00	0.04	1.98	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.02	0.00	-9.39	0.00	-0.08	-0.01	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	-0.02	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	14.46	16.20	-93.23	6.96	52.91	1.34	
		Min	-1.45	-5.15	-138.49	-38.41	-26.47	-0.88	
	RC9	Max	14.02	16.95	-96.66	0.41	43.60	1.12	
		Min	-0.25	-1.51	-146.08	-41.83	-14.55	-0.49	
	RC10	Max	12.29	15.48	-96.66	0.39	40.05	1.05	
		Min	-0.25	-1.51	-141.71	-38.02	-14.55	-0.48	
	RC11	Max	12.65	14.09	-96.66	0.41	40.75	0.99	
		Min	-0.25	-1.51	-141.24	-34.40	-14.58	-0.49	
	RC12	Max	4.20	4.06	6.61	12.64	24.86	0.67	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.31	-6.99	-1.76	-7.72	-22.92	-0.76	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	11.01	12.34	-68.81	5.63	40.40	1.02	
		Min	-1.16	-4.07	-103.46	-29.23	-20.46	-0.68	
	RC14	Max	10.67	12.91	-71.46	0.58	33.25	0.85	
		Min	-0.23	-1.28	-109.30	-31.87	-11.29	-0.38	
	RC15	Max	9.34	11.79	-71.46	0.57	30.51	0.80	
		Min	-0.23	-1.28	-105.94	-28.93	-11.29	-0.38	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC16	Max	9.62	10.72	-71.45	0.58	31.05	0.76	
		Min	-0.24	-1.28	-105.57	-26.14	-11.32	-0.38	
	RC17	Max	4.20	4.06	6.61	12.64	24.86	0.67	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.31	-6.99	-1.76	-7.72	-22.92	-0.76	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	5.03	5.43	-74.10	-4.52	15.08	0.33	
		Min	0.70	1.52	-87.39	-13.52	-2.09	-0.05	
	RC19	Max	5.53	6.81	-75.42	-7.03	12.90	0.29	
		Min	1.16	2.92	-93.59	-17.70	2.50	0.09	
	RC20	Max	4.19	4.61	-75.42	-7.04	10.11	0.19	
		Min	1.16	2.92	-87.04	-11.98	2.50	0.10	
	RC21	Max	4.38	4.61	-75.42	-7.04	10.51	0.19	
		Min	1.16	2.92	-88.92	-11.98	2.48	0.10	
	RC22	Max	4.20	4.06	6.61	12.64	24.86	0.67	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.31	-6.99	-1.76	-7.72	-22.92	-0.76	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	4.19	4.61	-75.42	-7.04	10.11	0.19	
		Min	1.16	2.92	-87.04	-11.98	2.50	0.10	
	RC24	Max	14.46	16.95	-93.23	6.96	52.91	1.34	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-1.45	-5.15	-146.08	-41.83	-26.47	-0.88	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	11.01	12.91	-68.81	5.63	40.40	1.02	SLS - Characteristic
		Min	-1.16	-4.07	-109.30	-31.87	-20.46	-0.68	SLS - Characteristic
	RC26	Max	5.53	6.81	-74.10	-4.52	15.08	0.33	SLS - Frequent
		Min	0.70	1.52	-93.59	-17.70	-2.09	-0.05	SLS - Frequent
	RC27	Max	4.19	4.61	-75.42	-7.04	10.11	0.19	SLS - Quasi-permanent
		Min	1.16	2.92	-87.04	-11.98	2.50	0.10	SLS - Quasi-permanent
151	RC1	Max	0.05	0.00	-3.17	0.00	0.00	0.00	1.00*LC1/p
		Min	0.05	0.00	-3.17	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.41	0.00	0.31	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.38	0.00	-0.33	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.08	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	-0.09	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10
		Min	-0.01	0.00	-24.86	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.31	0.00	0.01	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.02	0.00	-7.19	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.88	0.00	-3.80	0.00	0.00	0.00	
		Min	-0.54	0.00	-44.81	0.00	0.00	0.00	
	RC9	Max	0.67	0.00	-3.93	0.00	0.00	0.00	
		Min	-0.38	0.00	-44.64	0.00	0.00	0.00	
	RC10	Max	0.67	0.00	-3.96	0.00	0.00	0.00	
		Min	-0.35	0.00	-44.64	0.00	0.00	0.00	
	RC11	Max	0.79	0.00	-3.95	0.00	0.00	0.00	
		Min	-0.35	0.00	-47.44	0.00	0.00	0.00	
	RC12	Max	0.41	0.00	0.31	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.38	0.00	-0.33	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.68	0.00	-2.80	0.00	0.00	0.00	
		Min	-0.42	0.00	-33.39	0.00	0.00	0.00	
	RC14	Max	0.51	0.00	-2.90	0.00	0.00	0.00	
		Min	-0.29	0.00	-33.26	0.00	0.00	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC15	Max	0.51	0.00	-2.92	0.00	0.00	0.00	
		Min	-0.27	0.00	-33.26	0.00	0.00	0.00	
	RC16	Max	0.61	0.00	-2.92	0.00	0.00	0.00	
		Min	-0.27	0.00	-35.42	0.00	0.00	0.00	
	RC17	Max	0.41	0.00	0.31	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.38	0.00	-0.33	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.23	0.00	-3.09	0.00	0.00	0.00	
		Min	-0.06	0.00	-30.26	0.00	0.00	0.00	
	RC19	Max	0.15	0.00	-3.13	0.00	0.00	0.00	
		Min	-0.01	0.00	-30.19	0.00	0.00	0.00	
	RC20	Max	0.15	0.00	-3.15	0.00	0.00	0.00	
		Min	0.02	0.00	-30.19	0.00	0.00	0.00	
	RC21	Max	0.21	0.00	-3.15	0.00	0.00	0.00	
		Min	0.01	0.00	-31.63	0.00	0.00	0.00	
	RC22	Max	0.41	0.00	0.31	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.38	0.00	-0.33	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.15	0.00	-3.15	0.00	0.00	0.00	
		Min	0.02	0.00	-30.19	0.00	0.00	0.00	
	RC24	Max	0.88	0.00	-3.80	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.54	0.00	-47.44	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.68	0.00	-2.80	0.00	0.00	0.00	SLS - Characteristic
		Min	-0.42	0.00	-35.42	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.23	0.00	-3.09	0.00	0.00	0.00	SLS - Frequent
		Min	-0.06	0.00	-31.63	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.15	0.00	-3.15	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.02	0.00	-30.19	0.00	0.00	0.00	SLS - Quasi-permanent
391	RC1	Max	0.00	0.00	-4.67	0.00	0.00	0.00	1.00*LC1/p
		Min	0.00	0.00	-4.67	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.00	0.00	0.48	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	-0.47	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	-0.19	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.01	0.00	0.00	0.00	0.00	1.00*LC10
		Min	0.00	0.00	-39.36	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	0.00	0.00	-9.56	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.00	0.01	-5.68	0.00	0.00	0.00	
		Min	0.00	0.00	-68.93	0.00	0.00	0.00	
	RC9	Max	0.00	0.01	-5.93	0.00	0.00	0.00	
		Min	0.00	0.00	-68.76	0.00	0.00	0.00	
	RC10	Max	0.00	0.01	-5.93	0.00	0.00	0.00	
		Min	0.00	0.00	-68.69	0.00	0.00	0.00	
	RC11	Max	0.00	0.01	-5.93	0.00	0.00	0.00	
		Min	0.00	0.00	-72.42	0.00	0.00	0.00	
	RC12	Max	0.00	0.00	0.48	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	-0.47	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.00	0.01	-4.19	0.00	0.00	0.00	
		Min	0.00	0.00	-51.33	0.00	0.00	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC14	Max	0.00	0.01	-4.38	0.00	0.00	0.00	
		Min	0.00	0.00	-51.20	0.00	0.00	0.00	
	RC15	Max	0.00	0.01	-4.38	0.00	0.00	0.00	
		Min	0.00	0.00	-51.15	0.00	0.00	0.00	
	RC16	Max	0.00	0.01	-4.38	0.00	0.00	0.00	
		Min	0.00	0.00	-54.01	0.00	0.00	0.00	
	RC17	Max	0.00	0.00	0.48	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	-0.47	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.00	0.01	-4.57	0.00	0.00	0.00	
		Min	0.00	0.00	-47.03	0.00	0.00	0.00	
	RC19	Max	0.00	0.01	-4.67	0.00	0.00	0.00	
		Min	0.00	0.00	-47.00	0.00	0.00	0.00	
	RC20	Max	0.00	0.01	-4.67	0.00	0.00	0.00	
		Min	0.00	0.00	-46.94	0.00	0.00	0.00	
	RC21	Max	0.00	0.01	-4.67	0.00	0.00	0.00	
		Min	0.00	0.00	-48.85	0.00	0.00	0.00	
	RC22	Max	0.00	0.00	0.48	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	-0.47	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.00	0.01	-4.67	0.00	0.00	0.00	
		Min	0.00	0.00	-46.94	0.00	0.00	0.00	
	RC24	Max	0.00	0.01	-5.68	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	0.00	0.00	-72.42	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.00	0.01	-4.19	0.00	0.00	0.00	SLS - Characteristic
		Min	0.00	0.00	-54.01	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.00	0.01	-4.57	0.00	0.00	0.00	SLS - Frequent
		Min	0.00	0.00	-48.85	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	0.01	-4.67	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.00	0.00	-46.94	0.00	0.00	0.00	SLS - Quasi-permanent
392	RC1	Max	0.00	0.00	-3.24	0.00	0.00	0.01	1.00*LC1/p
		Min	0.00	0.00	-3.24	0.00	0.00	0.01	1.00*LC1/p
	RC2	Max	0.00	0.00	2.42	0.00	0.00	0.02	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	-2.49	0.00	0.00	-0.03	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.01	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	-2.73	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	-0.06	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10
		Min	0.00	0.00	-13.55	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	0.00	0.00	-5.79	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.00	0.00	-1.23	0.00	0.00	0.05	
		Min	0.00	0.00	-33.65	0.00	0.00	-0.03	
	RC9	Max	0.00	0.00	-2.49	0.00	0.00	0.05	
		Min	0.00	0.00	-33.42	0.00	0.00	-0.01	
	RC10	Max	0.00	0.00	-2.49	0.00	0.00	0.04	
		Min	0.00	0.00	-32.44	0.00	0.00	-0.01	
	RC11	Max	0.00	0.00	-2.49	0.00	0.00	0.04	
		Min	0.00	0.00	-34.61	0.00	0.00	-0.01	
	RC12	Max	0.00	0.00	2.42	0.00	0.00	0.02	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	-2.49	0.00	0.00	-0.03	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC13	Max	0.00	0.00	-0.82	0.00	0.00	0.04	
		Min	0.00	0.00	-25.24	0.00	0.00	-0.02	
	RC14	Max	0.00	0.00	-1.79	0.00	0.00	0.03	
		Min	0.00	0.00	-25.06	0.00	0.00	-0.01	
	RC15	Max	0.00	0.00	-1.79	0.00	0.00	0.03	
		Min	0.00	0.00	-24.31	0.00	0.00	-0.01	
	RC16	Max	0.00	0.00	-1.79	0.00	0.00	0.03	
		Min	0.00	0.00	-25.98	0.00	0.00	-0.01	
	RC17	Max	0.00	0.00	2.42	0.00	0.00	0.02	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	0.00	0.00	-2.49	0.00	0.00	-0.03	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC18	Max	0.00	0.00	-2.76	0.00	0.00	0.02	
		Min	0.00	0.00	-19.57	0.00	0.00	0.00	
	RC19	Max	0.00	0.00	-3.24	0.00	0.00	0.01	
		Min	0.00	0.00	-19.89	0.00	0.00	0.01	
	RC20	Max	0.00	0.00	-3.24	0.00	0.00	0.01	
		Min	0.00	0.00	-19.07	0.00	0.00	0.01	
	RC21	Max	0.00	0.00	-3.24	0.00	0.00	0.01	
		Min	0.00	0.00	-20.23	0.00	0.00	0.01	
	RC22	Max	0.00	0.00	2.42	0.00	0.00	0.02	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	0.00	0.00	-2.49	0.00	0.00	-0.03	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC23	Max	0.00	0.00	-3.24	0.00	0.00	0.01	
		Min	0.00	0.00	-19.07	0.00	0.00	0.01	
	RC24	Max	0.00	0.00	-1.23	0.00	0.00	0.05	
								ULS (STR/GEO) - Permanent / transient - Eq. 6.10	
		Min	0.00	0.00	-34.61	0.00	0.00	-0.03	
								ULS (STR/GEO) - Permanent / transient - Eq. 6.10	
	RC25	Max	0.00	0.00	-0.82	0.00	0.00	0.04	SLS - Characteristic
		Min	0.00	0.00	-25.98	0.00	0.00	-0.02	SLS - Characteristic
	RC26	Max	0.00	0.00	-2.76	0.00	0.00	0.02	SLS - Frequent
		Min	0.00	0.00	-20.23	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	0.00	-3.24	0.00	0.00	0.01	SLS - Quasi-permanent
		Min	0.00	0.00	-19.07	0.00	0.00	0.01	SLS - Quasi-permanent
435	RC1	Max	-0.86	0.00	1.30	0.00	0.00	0.00	1.00*LC1/p
		Min	-0.86	0.00	1.30	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	1.42	0.00	2.49	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	-0.50	0.00	-2.42	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC3	Max	0.00	0.00	3.02	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	-1.94	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.07	0.00	0.00	0.00	1.00*LC9
		Min	-0.03	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.20	0.00	0.00	0.00	1.00*LC10
		Min	-0.01	0.00	0.00	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.00	4.09	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-2.38	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.68	0.01	11.73	0.00	0.00	0.00	
		Min	-5.77	0.00	-1.40	0.00	0.00	0.00	
	RC9	Max	-0.05	0.00	11.61	0.00	0.00	0.00	
		Min	-6.26	0.00	-0.14	0.00	0.00	0.00	
	RC10	Max	-0.05	0.00	10.52	0.00	0.00	0.00	
		Min	-5.55	0.00	-0.14	0.00	0.00	0.00	
	RC11	Max	-0.05	0.01	12.03	0.00	0.00	0.00	
		Min	-6.43	0.00	-0.14	0.00	0.00	0.00	
	RC12	Max	1.42	0.00	2.49	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
		Min	-0.50	0.00	-2.42	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.56	0.00	8.96	0.00	0.00	0.00	
		Min	-4.40	0.00	-1.13	0.00	0.00	0.00	
	RC14	Max	-0.01	0.00	8.87	0.00	0.00	0.00	
		Min	-4.78	0.00	-0.16	0.00	0.00	0.00	
	RC15	Max	-0.01	0.00	8.03	0.00	0.00	0.00	
		Min	-4.24	0.00	-0.16	0.00	0.00	0.00	
	RC16	Max	-0.01	0.00	9.20	0.00	0.00	0.00	
		Min	-4.91	0.00	-0.16	0.00	0.00	0.00	
	RC17	Max	1.42	0.00	2.49	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.50	0.00	-2.42	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	-0.58	0.00	3.83	0.00	0.00	0.00	
		Min	-2.08	0.00	0.81	0.00	0.00	0.00	
	RC19	Max	-0.86	0.00	4.24	0.00	0.00	0.00	
		Min	-2.56	0.00	1.30	0.00	0.00	0.00	
	RC20	Max	-0.86	0.00	3.33	0.00	0.00	0.00	
		Min	-1.98	0.00	1.30	0.00	0.00	0.00	
	RC21	Max	-0.86	0.00	4.15	0.00	0.00	0.00	
		Min	-2.45	0.00	1.30	0.00	0.00	0.00	
	RC22	Max	1.42	0.00	2.49	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.50	0.00	-2.42	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	-0.86	0.00	3.33	0.00	0.00	0.00	
		Min	-1.98	0.00	1.30	0.00	0.00	0.00	
	RC24	Max	0.68	0.01	12.03	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-6.43	0.00	-1.40	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.56	0.00	9.20	0.00	0.00	0.00	SLS - Characteristic
		Min	-4.91	0.00	-1.13	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	-0.58	0.00	4.24	0.00	0.00	0.00	SLS - Frequent
		Min	-2.56	0.00	0.81	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	-0.86	0.00	3.33	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	-1.98	0.00	1.30	0.00	0.00	0.00	SLS - Quasi-permanent
436	RC1	Max	0.57	0.00	-1.69	0.00	0.00	0.00	1.00*LC1/p
		Min	0.57	0.00	-1.69	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	2.13	0.00	0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.21	0.00	-0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	-0.98	0.00	-0.17	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	-0.03	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10
		Min	-0.19	0.00	-0.01	0.00	0.00	0.00	1.00*LC10
	RC6	Max	3.88	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	-0.19	0.00	-6.97	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	7.07	0.01	-2.07	0.00	0.00	0.00	
		Min	-3.41	0.00	-8.99	0.00	0.00	0.00	
	RC9	Max	5.97	0.00	-2.15	0.00	0.00	0.00	
		Min	-2.65	0.00	-8.98	0.00	0.00	0.00	
	RC10	Max	5.97	0.00	-2.15	0.00	0.00	0.00	
		Min	-2.31	0.00	-8.91	0.00	0.00	0.00	
	RC11	Max	7.48	0.01	-2.15	0.00	0.00	0.00	
		Min	-2.34	0.00	-11.63	0.00	0.00	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC12	Max	2.13	0.00	0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.21	0.00	-0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	5.42	0.00	-1.53	0.00	0.00	0.00	
		Min	-2.64	0.00	-6.85	0.00	0.00	0.00	
	RC14	Max	4.57	0.00	-1.59	0.00	0.00	0.00	
		Min	-2.05	0.00	-6.84	0.00	0.00	0.00	
	RC15	Max	4.57	0.00	-1.59	0.00	0.00	0.00	
		Min	-1.79	0.00	-6.79	0.00	0.00	0.00	
	RC16	Max	5.73	0.00	-1.59	0.00	0.00	0.00	
		Min	-1.81	0.00	-8.88	0.00	0.00	0.00	
	RC17	Max	2.13	0.00	0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.21	0.00	-0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	2.16	0.00	-1.66	0.00	0.00	0.00	
		Min	-0.31	0.00	-3.86	0.00	0.00	0.00	
	RC19	Max	1.74	0.00	-1.69	0.00	0.00	0.00	
		Min	-0.16	0.00	-3.88	0.00	0.00	0.00	
	RC20	Max	1.74	0.00	-1.69	0.00	0.00	0.00	
		Min	0.13	0.00	-3.82	0.00	0.00	0.00	
	RC21	Max	2.51	0.00	-1.69	0.00	0.00	0.00	
		Min	0.09	0.00	-5.22	0.00	0.00	0.00	
	RC22	Max	2.13	0.00	0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-2.21	0.00	-0.16	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	1.74	0.00	-1.69	0.00	0.00	0.00	
		Min	0.13	0.00	-3.82	0.00	0.00	0.00	
	RC24	Max	7.48	0.01	-2.07	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-3.41	0.00	-11.63	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	5.73	0.00	-1.53	0.00	0.00	0.00	SLS - Characteristic
		Min	-2.64	0.00	-8.88	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	2.51	0.00	-1.66	0.00	0.00	0.00	SLS - Frequent
		Min	-0.31	0.00	-5.22	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	1.74	0.00	-1.69	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.13	0.00	-3.82	0.00	0.00	0.00	SLS - Quasi-permanent
588	RC1	Max	0.10	-0.14	-2.84	0.00	0.00	0.00	1.00*LC1/p
		Min	0.10	-0.14	-2.84	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.02	0.01	0.02	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	-0.01	-0.03	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	-0.02	0.00	-0.01	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10
		Min	-0.09	-1.28	-10.23	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.28	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	0.00	-0.11	-2.05	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	-0.05	-0.49	-6.55	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.41	-0.17	-3.80	0.00	0.00	0.00	
		Min	-0.08	-2.67	-28.38	0.00	0.00	0.00	
	RC9	Max	0.40	-0.17	-3.81	0.00	0.00	0.00	
		Min	-0.09	-2.67	-28.37	0.00	0.00	0.00	
	RC10	Max	0.40	-0.17	-3.81	0.00	0.00	0.00	
		Min	-0.08	-2.67	-28.36	0.00	0.00	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC11	Max	0.51	-0.18	-3.81	0.00	0.00	0.00	
		Min	-0.08	-2.71	-29.16	0.00	0.00	0.00	
	RC12	Max	0.02	0.01	0.02	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	-0.01	-0.03	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.31	-0.13	-2.81	0.00	0.00	0.00	
		Min	-0.06	-1.98	-21.08	0.00	0.00	0.00	
	RC14	Max	0.31	-0.13	-2.82	0.00	0.00	0.00	
		Min	-0.07	-1.98	-21.07	0.00	0.00	0.00	
	RC15	Max	0.31	-0.13	-2.82	0.00	0.00	0.00	
		Min	-0.06	-1.98	-21.06	0.00	0.00	0.00	
	RC16	Max	0.39	-0.13	-2.82	0.00	0.00	0.00	
		Min	-0.06	-2.01	-21.68	0.00	0.00	0.00	
	RC17	Max	0.02	0.01	0.02	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	-0.01	-0.03	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.19	-0.14	-2.83	0.00	0.00	0.00	
		Min	-0.05	-1.93	-20.23	0.00	0.00	0.00	
	RC19	Max	0.18	-0.14	-2.84	0.00	0.00	0.00	
		Min	-0.05	-1.93	-20.23	0.00	0.00	0.00	
	RC20	Max	0.18	-0.14	-2.84	0.00	0.00	0.00	
		Min	-0.04	-1.93	-20.23	0.00	0.00	0.00	
	RC21	Max	0.24	-0.14	-2.84	0.00	0.00	0.00	
		Min	-0.05	-1.95	-20.64	0.00	0.00	0.00	
	RC22	Max	0.02	0.01	0.02	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	-0.01	-0.03	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.18	-0.14	-2.84	0.00	0.00	0.00	
		Min	-0.04	-1.93	-20.23	0.00	0.00	0.00	
	RC24	Max	0.51	-0.17	-3.80	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.09	-2.71	-29.16	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.39	-0.13	-2.81	0.00	0.00	0.00	SLS - Characteristic
		Min	-0.07	-2.01	-21.68	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.24	-0.14	-2.83	0.00	0.00	0.00	SLS - Frequent
		Min	-0.05	-1.95	-20.64	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.18	-0.14	-2.84	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	-0.04	-1.93	-20.23	0.00	0.00	0.00	SLS - Quasi-permanent
590	RC1	Max	0.00	0.00	-0.41	0.00	0.00	0.00	1.00*LC1/p
		Min	0.00	0.00	-0.41	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.02	0.00	0.00	0.00	1.00*LC10
		Min	0.00	0.00	0.00	0.00	0.00	-0.01	1.00*LC10
	RC6	Max	0.00	0.00	0.00	0.00	0.00	0.01	1.00*LC13 + 1.00*LC15
		Min	0.00	0.00	-0.72	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.01	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.00	0.00	-0.51	0.00	0.00	0.02	
		Min	0.00	0.00	-1.21	0.00	0.00	-0.01	
	RC9	Max	0.00	0.00	-0.51	0.00	0.00	0.02	
		Min	0.00	0.00	-1.21	0.00	0.00	-0.01	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC10	Max	0.00	0.00	-0.51	0.00	0.00	0.02	
		Min	0.00	0.00	-1.21	0.00	0.00	0.00	
	RC11	Max	0.00	0.00	-0.51	0.00	0.00	0.02	
		Min	0.00	0.00	-1.49	0.00	0.00	0.00	
	RC12	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.00	0.00	-0.37	0.00	0.00	0.02	
		Min	0.00	0.00	-0.92	0.00	0.00	0.00	
	RC14	Max	0.00	0.00	-0.37	0.00	0.00	0.01	
		Min	0.00	0.00	-0.92	0.00	0.00	0.00	
	RC15	Max	0.00	0.00	-0.37	0.00	0.00	0.01	
		Min	0.00	0.00	-0.91	0.00	0.00	0.00	
	RC16	Max	0.00	0.00	-0.37	0.00	0.00	0.02	
		Min	0.00	0.00	-1.13	0.00	0.00	0.00	
	RC17	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.00	0.00	-0.38	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC19	Max	0.00	0.00	-0.38	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC20	Max	0.00	0.00	-0.38	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC21	Max	0.00	0.00	-0.38	0.00	0.00	0.01	
		Min	0.00	0.00	-0.77	0.00	0.00	0.00	
	RC22	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.00	0.00	-0.38	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC24	Max	0.00	0.00	-0.51	0.00	0.00	0.02	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	0.00	0.00	-1.49	0.00	0.00	-0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.00	0.00	-0.37	0.00	0.00	0.02	SLS - Characteristic
		Min	0.00	0.00	-1.13	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.00	0.00	-0.38	0.00	0.00	0.01	SLS - Frequent
		Min	0.00	0.00	-0.77	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	0.00	-0.38	0.00	0.00	0.01	SLS - Quasi-permanent
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	SLS - Quasi-permanent
595	RC1	Max	0.00	0.00	-0.41	0.00	0.00	0.01	1.00*LC1/p
		Min	0.00	0.00	-0.41	0.00	0.00	0.01	1.00*LC1/p
	RC2	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.20	0.00	0.00	0.00	1.00*LC10
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.00	0.00	0.00	0.00	0.01	1.00*LC13 + 1.00*LC15
		Min	0.00	0.00	-0.73	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.00	0.00	-0.29	0.00	0.00	0.02	
		Min	0.00	0.00	-1.22	0.00	0.00	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC9	Max	0.00	0.00	-0.29	0.00	0.00	0.02	
		Min	0.00	0.00	-1.22	0.00	0.00	0.00	
	RC10	Max	0.00	0.00	-0.29	0.00	0.00	0.02	
		Min	0.00	0.00	-1.22	0.00	0.00	0.00	
	RC11	Max	0.00	0.00	-0.29	0.00	0.00	0.02	
		Min	0.00	0.00	-1.50	0.00	0.00	0.00	
	RC12	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.00	0.00	-0.21	0.00	0.00	0.02	
		Min	0.00	0.00	-0.92	0.00	0.00	0.00	
	RC14	Max	0.00	0.00	-0.21	0.00	0.00	0.02	
		Min	0.00	0.00	-0.92	0.00	0.00	0.00	
	RC15	Max	0.00	0.00	-0.21	0.00	0.00	0.02	
		Min	0.00	0.00	-0.92	0.00	0.00	0.00	
	RC16	Max	0.00	0.00	-0.21	0.00	0.00	0.02	
		Min	0.00	0.00	-1.14	0.00	0.00	0.00	
	RC17	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.00	0.00	-0.21	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC19	Max	0.00	0.00	-0.21	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC20	Max	0.00	0.00	-0.21	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC21	Max	0.00	0.00	-0.21	0.00	0.00	0.01	
		Min	0.00	0.00	-0.78	0.00	0.00	0.00	
	RC22	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.00	0.00	-0.21	0.00	0.00	0.01	
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	
	RC24	Max	0.00	0.00	-0.29	0.00	0.00	0.02	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	0.00	0.00	-1.50	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.00	0.00	-0.21	0.00	0.00	0.02	SLS - Characteristic
		Min	0.00	0.00	-1.14	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.00	0.00	-0.21	0.00	0.00	0.01	SLS - Frequent
		Min	0.00	0.00	-0.78	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	0.00	-0.21	0.00	0.00	0.01	SLS - Quasi-permanent
		Min	0.00	0.00	-0.63	0.00	0.00	0.00	SLS - Quasi-permanent
617	RC1	Max	0.00	0.04	-2.91	0.00	0.00	0.00	1.00*LC1/p
		Min	0.00	0.04	-2.91	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.00	0.05	0.12	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	-0.06	-0.11	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.04	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	-0.02	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.00	0.00	0.00	0.01	1.00*LC10
		Min	-0.84	-0.41	-19.68	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.07	0.01	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	0.00	0.00	-3.51	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.12	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-0.70	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC8	Max	0.00	0.34	-3.73	0.00	0.00	0.02	
		Min	-1.13	-0.58	-34.78	0.00	0.00	0.00	
	RC9	Max	0.00	0.32	-3.78	0.00	0.00	0.01	
		Min	-1.13	-0.56	-34.72	0.00	0.00	0.00	
	RC10	Max	0.00	0.32	-3.79	0.00	0.00	0.01	
		Min	-1.13	-0.55	-34.72	0.00	0.00	0.00	
	RC11	Max	0.00	0.34	-3.79	0.00	0.00	0.01	
		Min	-1.13	-0.55	-36.09	0.00	0.00	0.00	
	RC12	Max	0.00	0.05	0.12	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	0.00	-0.06	-0.11	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC13	Max	0.00	0.26	-2.76	0.00	0.00	0.01	
		Min	-0.84	-0.43	-25.86	0.00	0.00	0.00	
	RC14	Max	0.00	0.24	-2.79	0.00	0.00	0.01	
		Min	-0.84	-0.42	-25.81	0.00	0.00	0.00	
	RC15	Max	0.00	0.24	-2.80	0.00	0.00	0.01	
		Min	-0.84	-0.41	-25.81	0.00	0.00	0.00	
	RC16	Max	0.00	0.26	-2.80	0.00	0.00	0.01	
		Min	-0.84	-0.41	-26.87	0.00	0.00	0.00	
	RC17	Max	0.00	0.05	0.12	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	0.00	-0.06	-0.11	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC18	Max	0.00	0.19	-2.88	0.00	0.00	0.01	
		Min	-0.84	-0.38	-24.37	0.00	0.00	0.00	
	RC19	Max	0.00	0.18	-2.89	0.00	0.00	0.01	
		Min	-0.84	-0.37	-24.34	0.00	0.00	0.00	
	RC20	Max	0.00	0.18	-2.90	0.00	0.00	0.01	
		Min	-0.84	-0.37	-24.34	0.00	0.00	0.00	
	RC21	Max	0.00	0.19	-2.90	0.00	0.00	0.01	
		Min	-0.84	-0.37	-25.05	0.00	0.00	0.00	
	RC22	Max	0.00	0.05	0.12	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	0.00	-0.06	-0.11	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC23	Max	0.00	0.18	-2.90	0.00	0.00	0.01	
		Min	-0.84	-0.37	-24.34	0.00	0.00	0.00	
	RC24	Max	0.00	0.34	-3.73	0.00	0.00	0.02	
								ULS (STR/GEO) - Permanent / transient - Eq. 6.10	
		Min	-1.13	-0.58	-36.09	0.00	0.00	0.00	
								ULS (STR/GEO) - Permanent / transient - Eq. 6.10	
	RC25	Max	0.00	0.26	-2.76	0.00	0.00	0.01	SLS - Characteristic
		Min	-0.84	-0.43	-26.87	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.00	0.19	-2.88	0.00	0.00	0.01	SLS - Frequent
		Min	-0.84	-0.38	-25.05	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	0.18	-2.90	0.00	0.00	0.01	SLS - Quasi-permanent
		Min	-0.84	-0.37	-24.34	0.00	0.00	0.00	SLS - Quasi-permanent
619	RC1	Max	0.00	-0.01	-1.69	0.00	0.00	0.00	1.00*LC1/p
		Min	0.00	-0.01	-1.69	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.01	0.01	0.11	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
		Min	-0.01	-0.01	-0.12	0.00	0.00	0.00	
								1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5	
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	-0.03	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	1.48	0.00	0.00	0.00	0.01	1.00*LC10
		Min	-0.31	0.00	-16.00	0.00	0.00	0.00	1.00*LC10
	RC6	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	0.00	-0.06	-0.40	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15

4.1 Nodes - Support Forces

Result Combinations

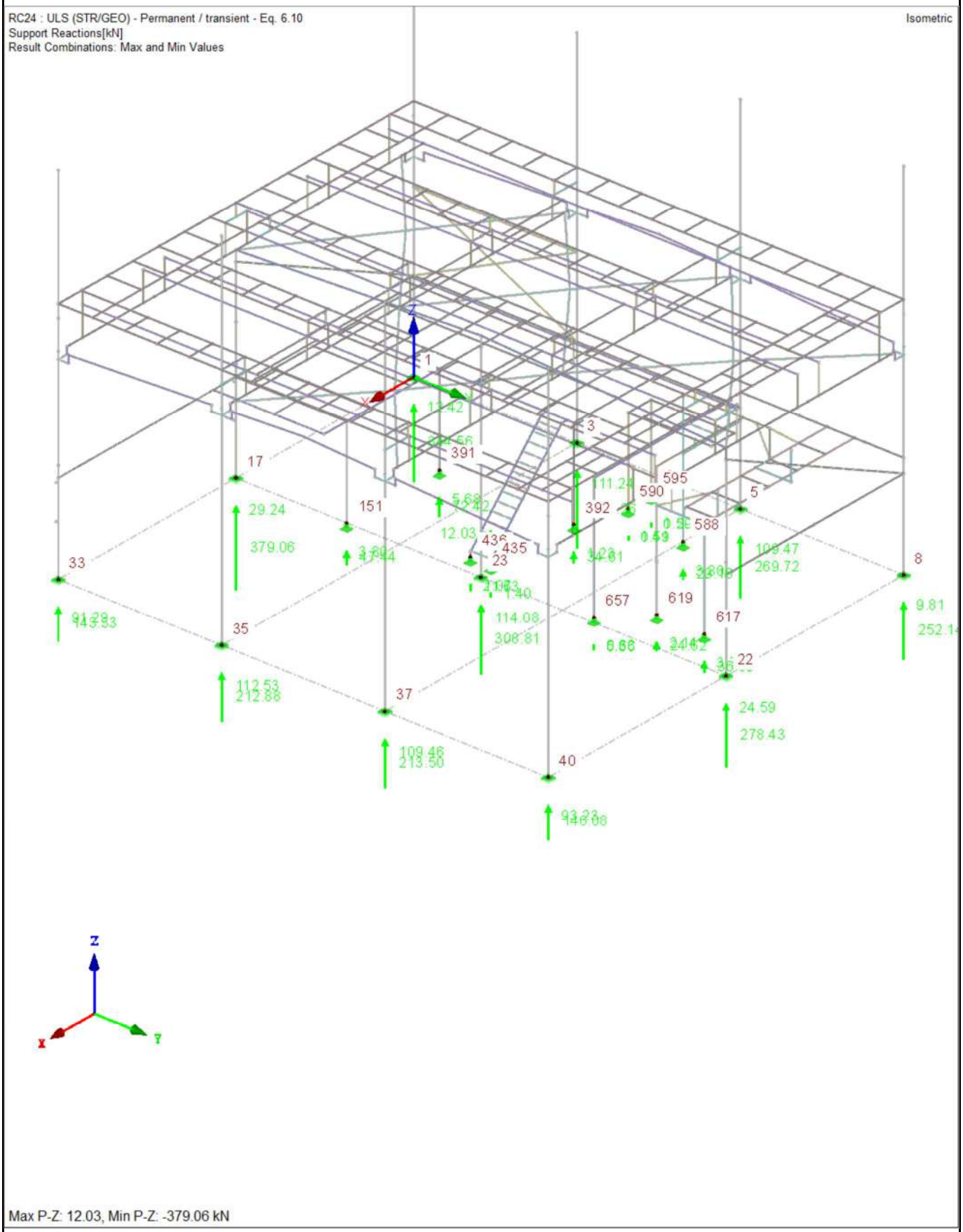
Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC7	Max	0.00	0.04	0.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-0.07	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.01	2.05	-2.14	0.00	0.00	0.02	
		Min	-0.44	-0.09	-24.52	0.00	0.00	0.00	
	RC9	Max	0.01	2.04	-2.20	0.00	0.00	0.02	
		Min	-0.43	-0.09	-24.47	0.00	0.00	0.00	
	RC10	Max	0.01	2.04	-2.20	0.00	0.00	0.02	
		Min	-0.43	-0.08	-24.46	0.00	0.00	0.00	
	RC11	Max	0.01	2.04	-2.20	0.00	0.00	0.02	
		Min	-0.43	-0.11	-24.62	0.00	0.00	0.00	
	RC12	Max	0.01	0.01	0.11	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.01	-0.01	-0.12	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.01	1.52	-1.58	0.00	0.00	0.01	
		Min	-0.32	-0.07	-18.18	0.00	0.00	0.00	
	RC14	Max	0.00	1.51	-1.62	0.00	0.00	0.01	
		Min	-0.32	-0.07	-18.14	0.00	0.00	0.00	
	RC15	Max	0.00	1.51	-1.62	0.00	0.00	0.01	
		Min	-0.32	-0.06	-18.13	0.00	0.00	0.00	
	RC16	Max	0.00	1.51	-1.62	0.00	0.00	0.01	
		Min	-0.32	-0.08	-18.25	0.00	0.00	0.00	
	RC17	Max	0.01	0.01	0.11	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.01	-0.01	-0.12	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.00	1.51	-1.67	0.00	0.00	0.01	
		Min	-0.31	-0.03	-17.91	0.00	0.00	0.00	
	RC19	Max	0.00	1.51	-1.69	0.00	0.00	0.01	
		Min	-0.31	-0.03	-17.89	0.00	0.00	0.00	
	RC20	Max	0.00	1.51	-1.69	0.00	0.00	0.01	
		Min	-0.31	-0.03	-17.89	0.00	0.00	0.00	
	RC21	Max	0.00	1.51	-1.69	0.00	0.00	0.01	
		Min	-0.31	-0.04	-17.97	0.00	0.00	0.00	
	RC22	Max	0.01	0.01	0.11	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	-0.01	-0.01	-0.12	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.00	1.51	-1.69	0.00	0.00	0.01	
		Min	-0.31	-0.03	-17.89	0.00	0.00	0.00	
	RC24	Max	0.01	2.05	-2.14	0.00	0.00	0.02	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.44	-0.11	-24.62	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.01	1.52	-1.58	0.00	0.00	0.01	SLS - Characteristic
		Min	-0.32	-0.08	-18.25	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.00	1.51	-1.67	0.00	0.00	0.01	SLS - Frequent
		Min	-0.31	-0.04	-17.97	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	1.51	-1.69	0.00	0.00	0.01	SLS - Quasi-permanent
		Min	-0.31	-0.03	-17.89	0.00	0.00	0.00	SLS - Quasi-permanent
657	RC1	Max	0.00	0.00	-1.47	0.00	0.00	0.00	1.00*LC1/p
		Min	0.00	0.00	-1.47	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC14 or 1.00*LC16
	RC4	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC9
	RC5	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC10

4.1 Nodes - Support Forces

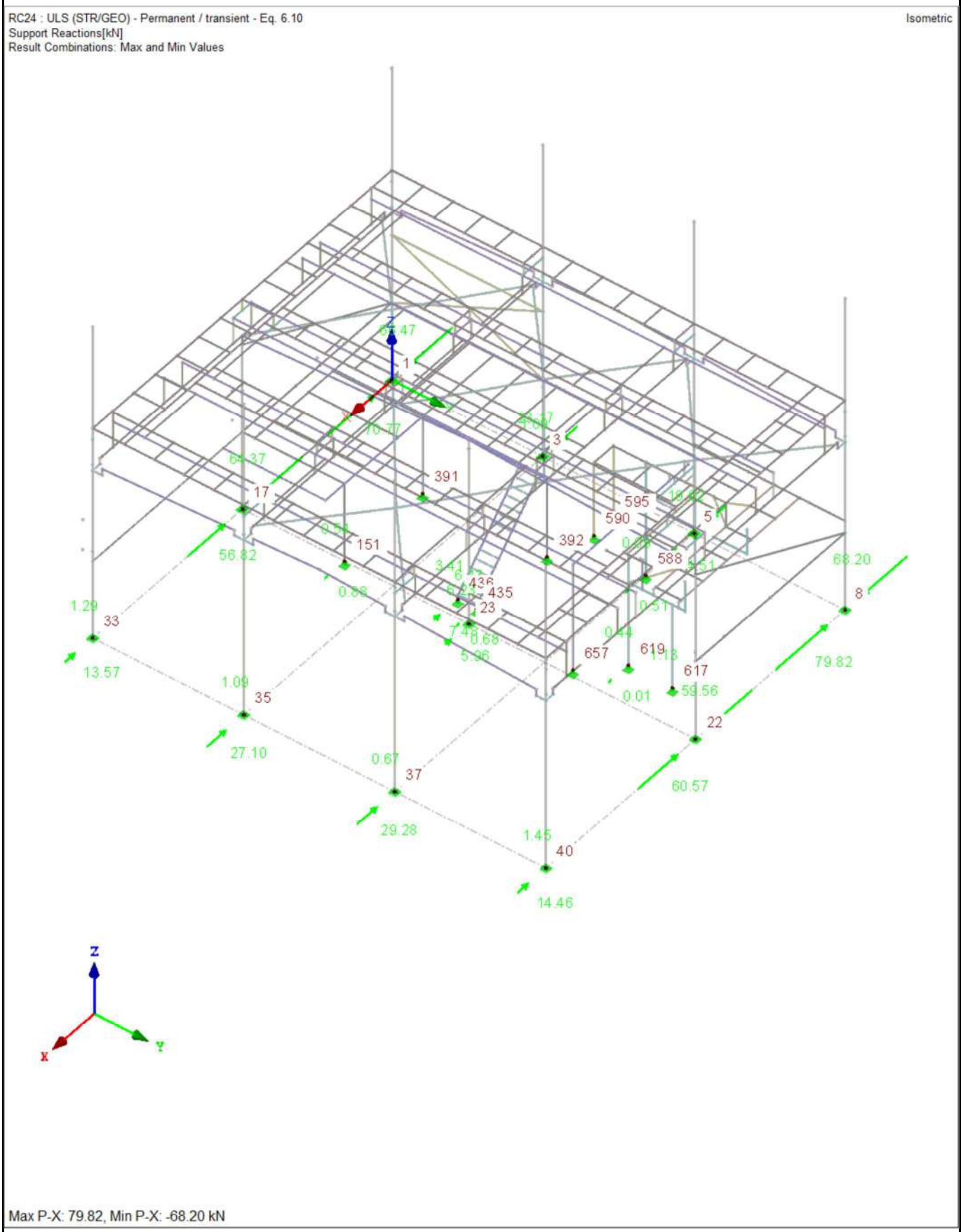
Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
	RC6	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC13 + 1.00*LC15
	RC7	Max	0.00	0.00	1.00	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
		Min	0.00	0.00	-2.50	0.00	0.00	0.00	1.00*LC17 + 1.00*LC18
	RC8	Max	0.00	0.00	-0.63	0.00	0.00	0.00	
		Min	0.00	0.00	-5.36	0.00	0.00	0.00	
	RC9	Max	0.00	0.00	-0.63	0.00	0.00	0.00	
		Min	0.00	0.00	-5.36	0.00	0.00	0.00	
	RC10	Max	0.00	0.00	-0.63	0.00	0.00	0.00	
		Min	0.00	0.00	-5.36	0.00	0.00	0.00	
	RC11	Max	0.00	0.00	-0.63	0.00	0.00	0.00	
		Min	0.00	0.00	-5.36	0.00	0.00	0.00	
	RC12	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC13	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC14	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC15	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC16	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC17	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC18	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC19	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC20	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC21	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC22	Max	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
		Min	0.00	0.00	0.00	0.00	0.00	0.00	
									1.00*LC2 or 1.00*LC3 or 1.00*LC4 or 1.00*LC5
	RC23	Max	0.00	0.00	-0.47	0.00	0.00	0.00	
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	
	RC24	Max	0.00	0.00	-0.63	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	0.00	0.00	-5.36	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	Max	0.00	0.00	-0.47	0.00	0.00	0.00	SLS - Characteristic
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	SLS - Characteristic
	RC26	Max	0.00	0.00	-0.47	0.00	0.00	0.00	SLS - Frequent
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	SLS - Frequent
	RC27	Max	0.00	0.00	-0.47	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.00	0.00	-3.97	0.00	0.00	0.00	SLS - Quasi-permanent

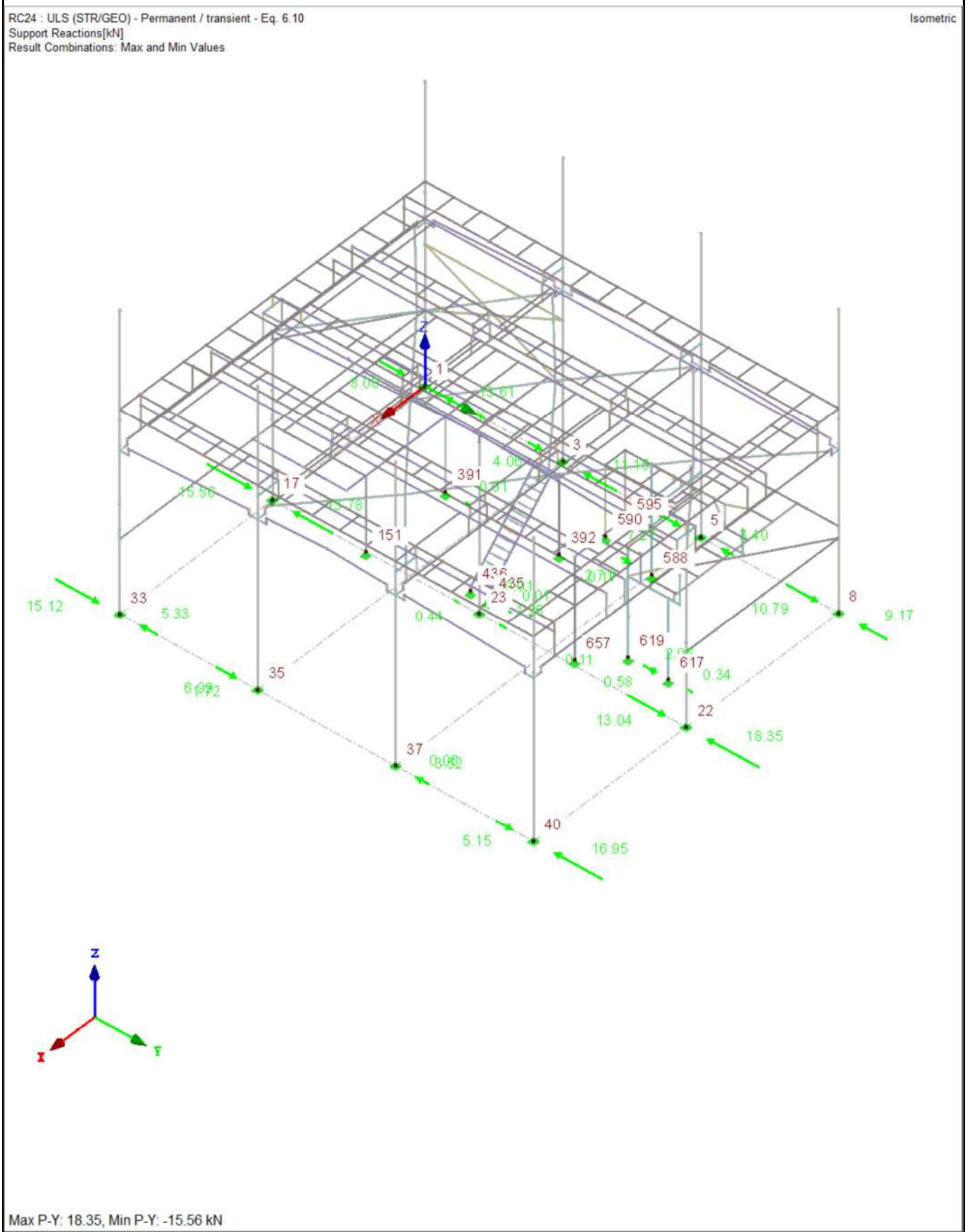
Support Reactions



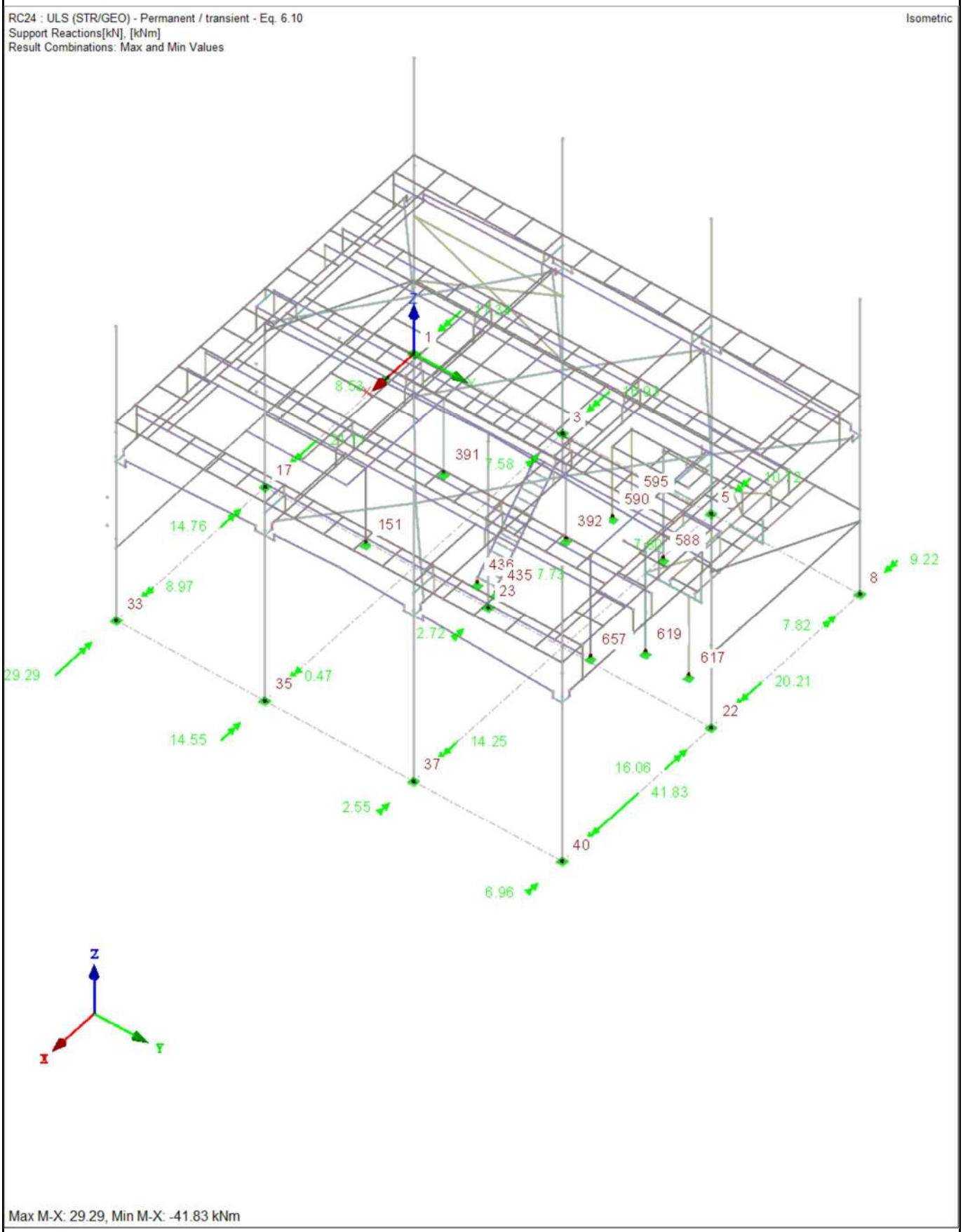
Support Reactions



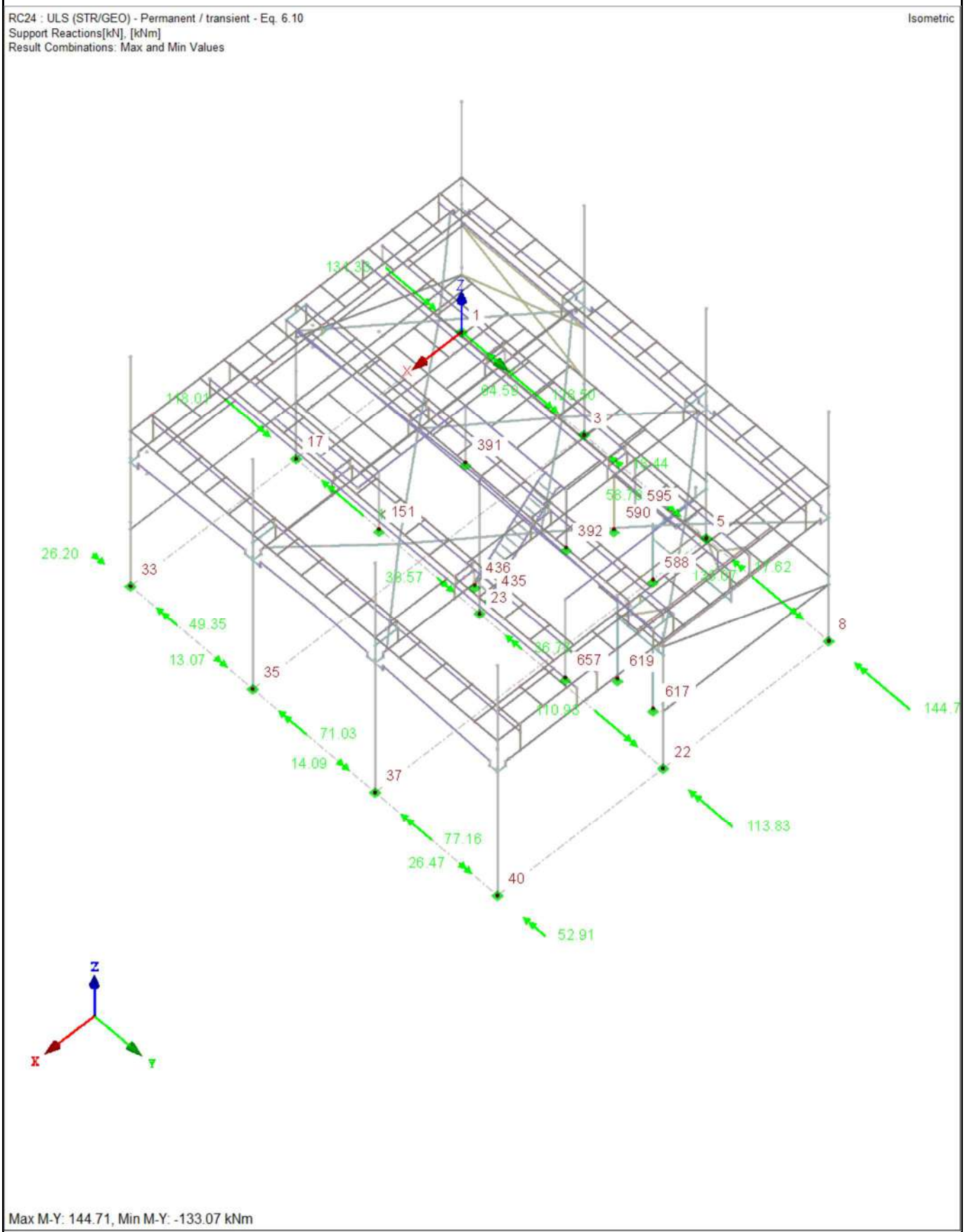
Support Reactions



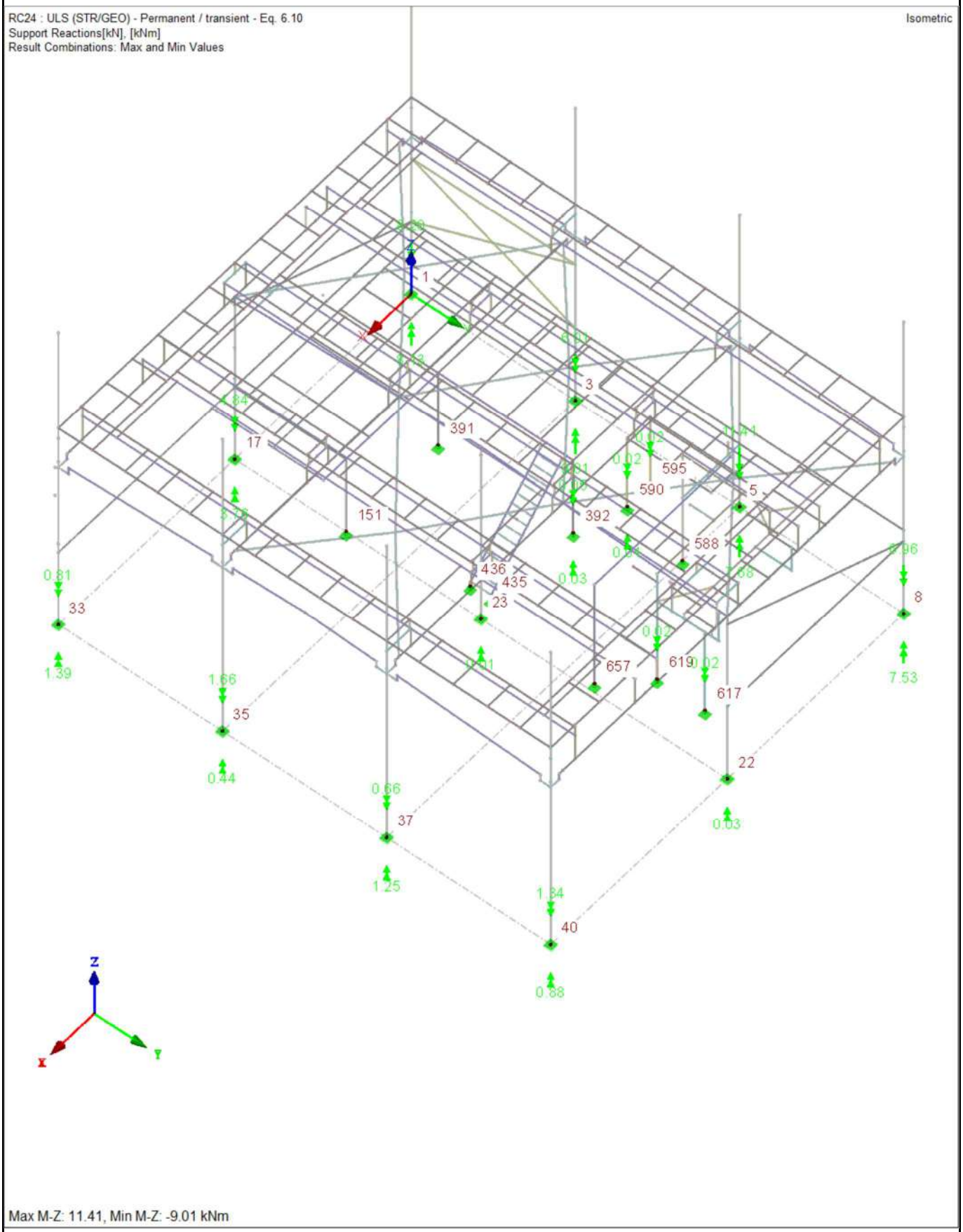
Support Reactions



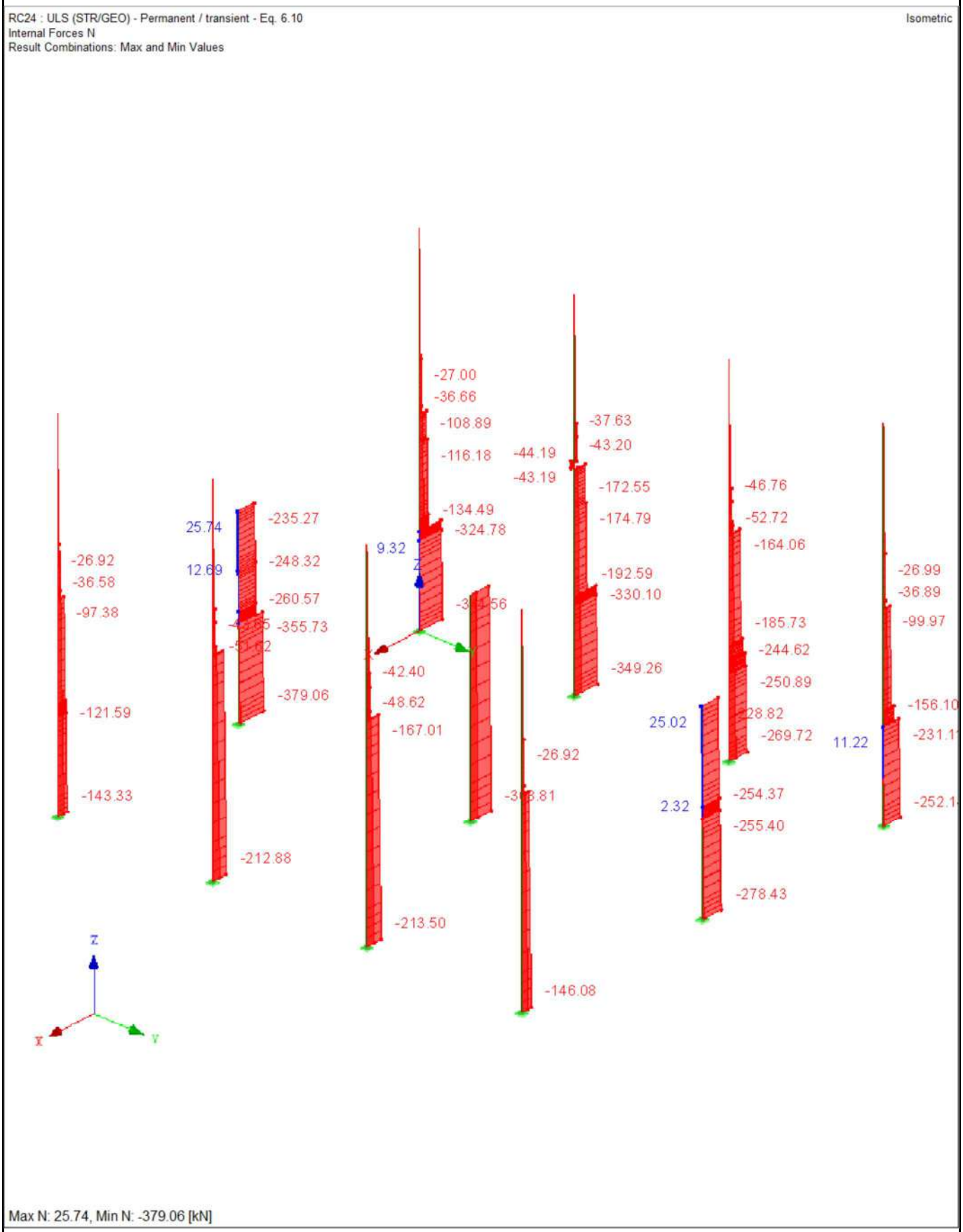
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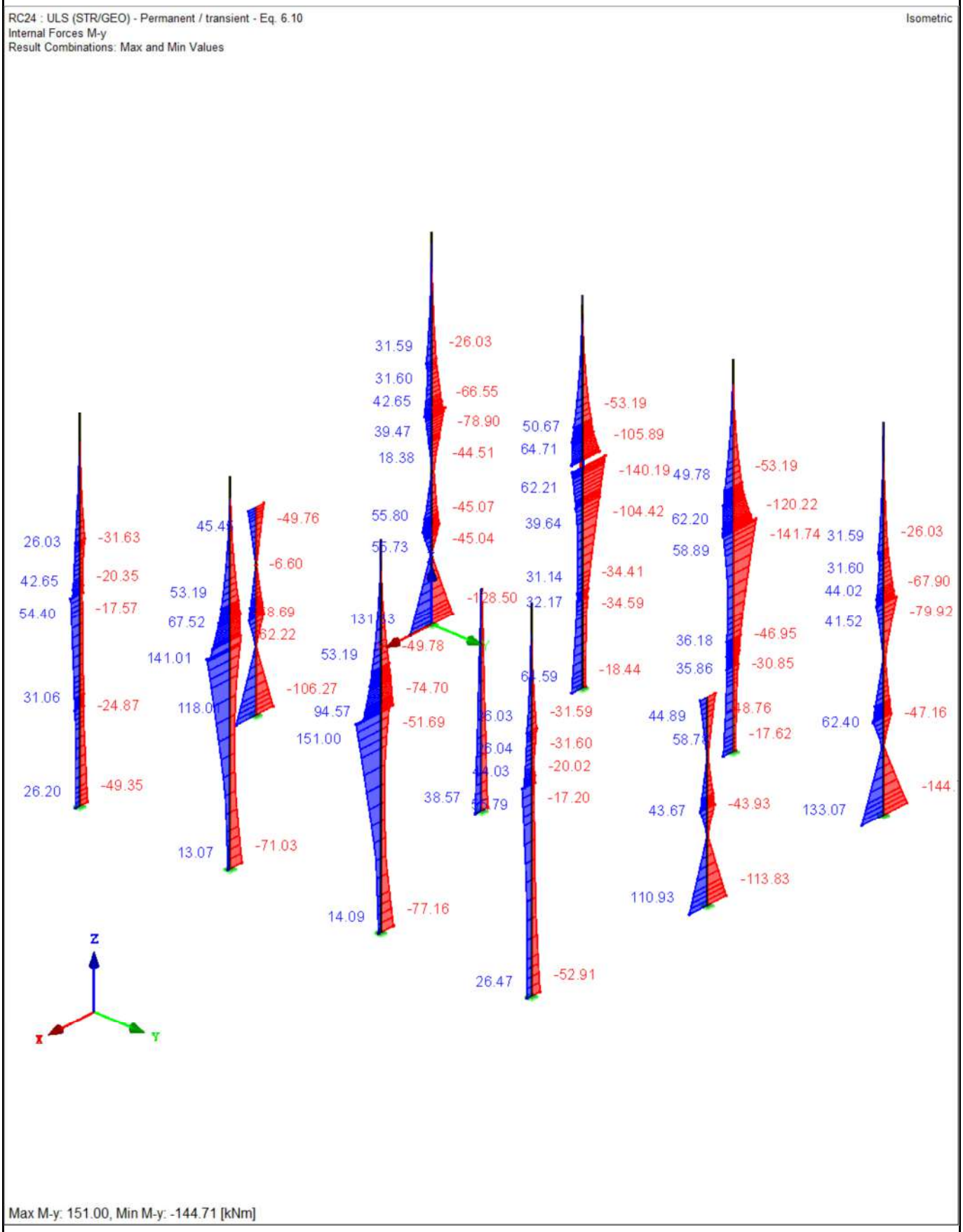
Support Reactions



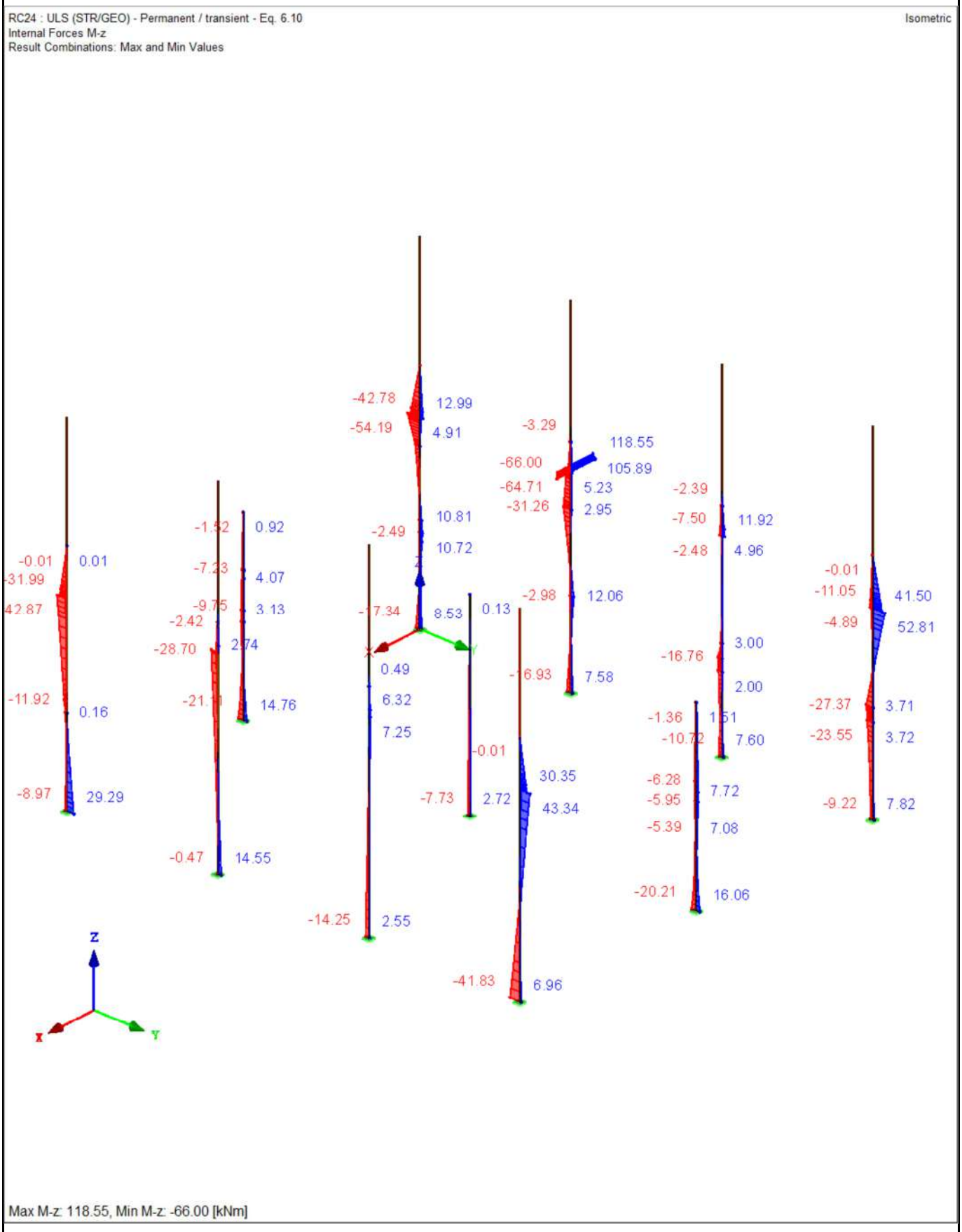
GB. KOLONOS Internal forces N



GB. KOLONOS Internal forces M_y



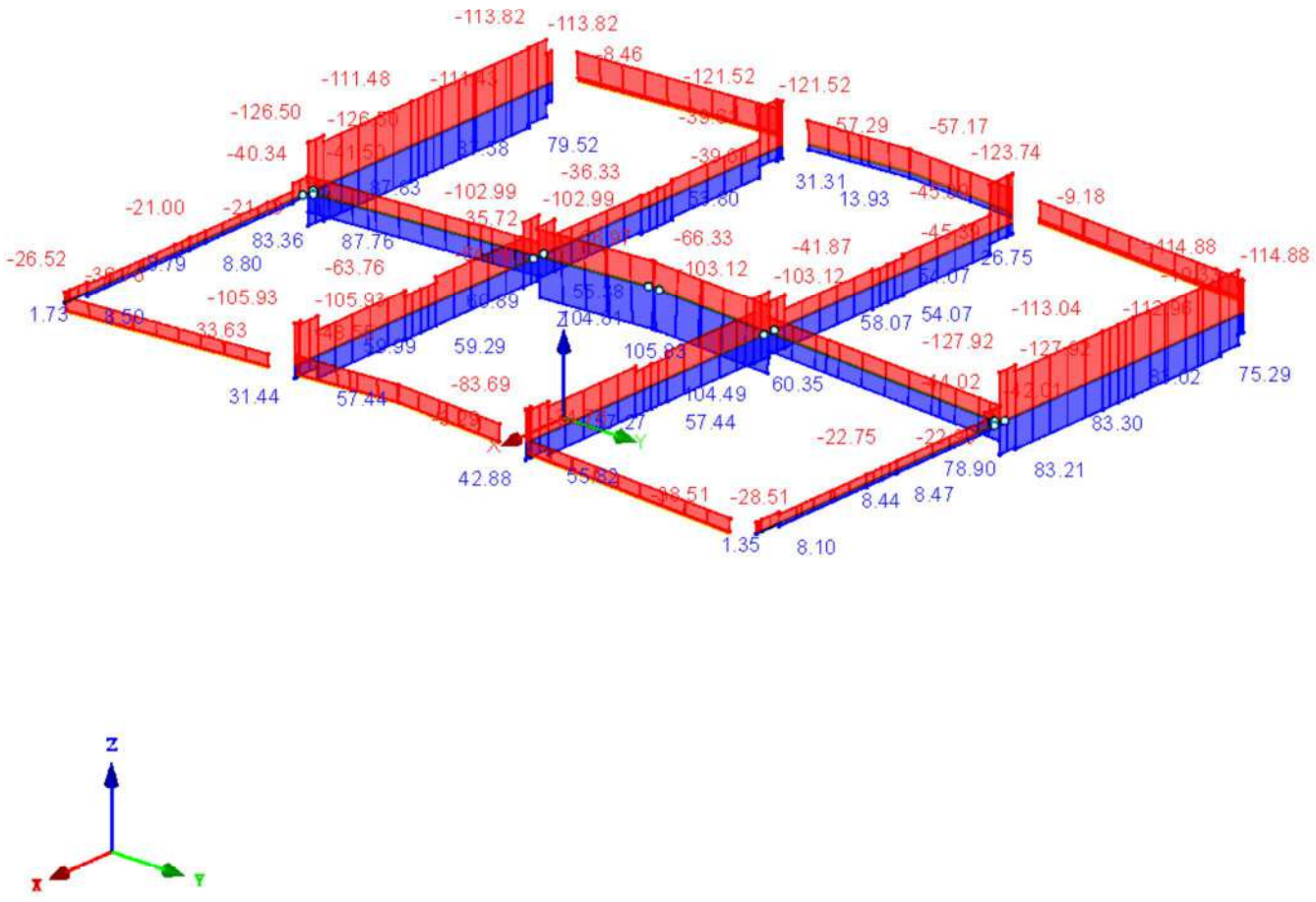
GB. KOLONOS Internal forces M_z



SIJOS Internal forces N

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

Isometric

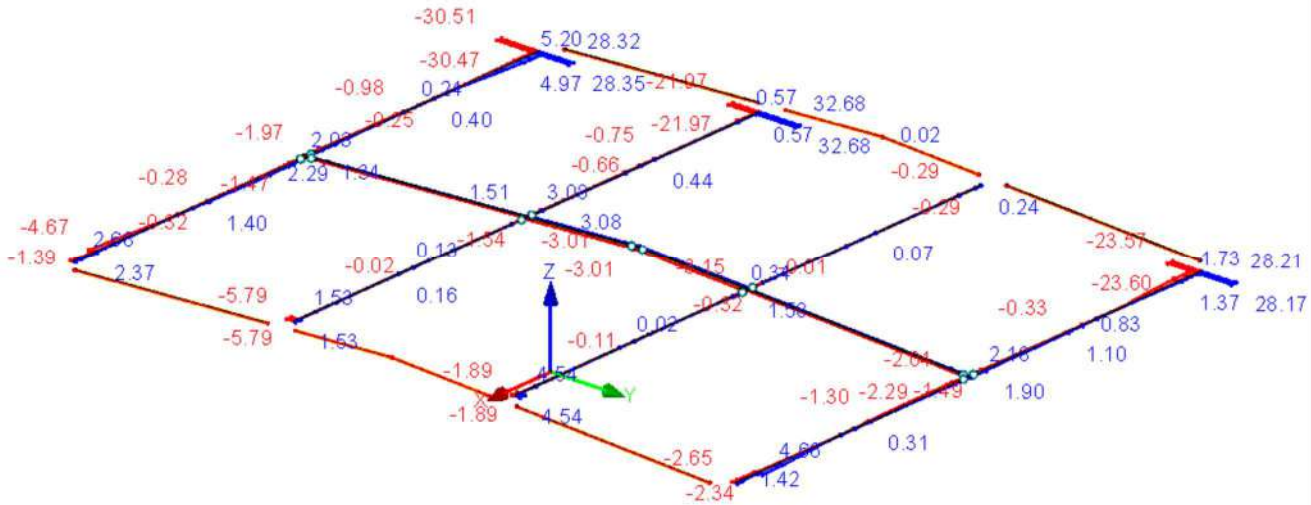


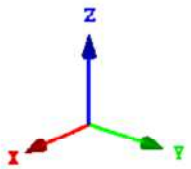
Max N: 105.83, Min N: -127.92 [kN]

SIJOS Internal forces V_y

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-y
Result Combinations: Max and Min Values

Isometric



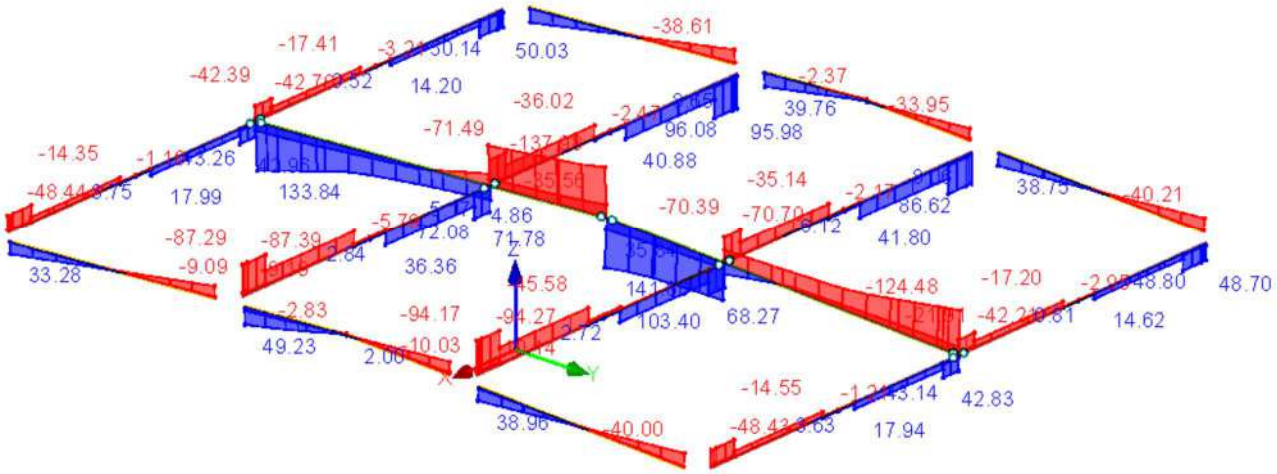


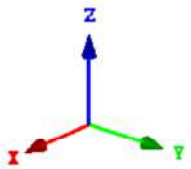
Max V-y: 32.68, Min V-y: -30.51 [kN]

SIJOS Internal forces V_z

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Result Combinations: Max and Min Values

Isometric



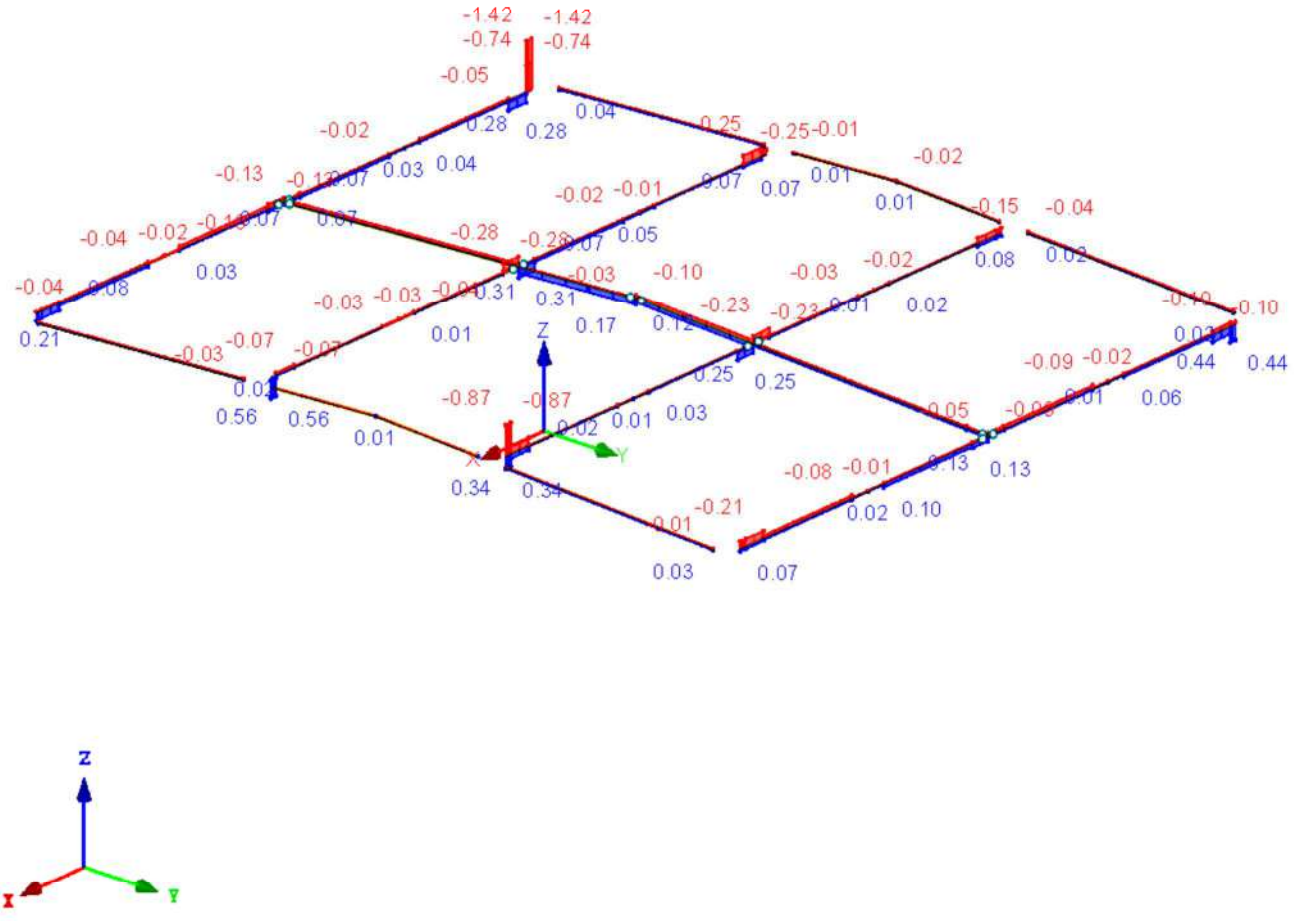


Max V-z: 141.66, Min V-z: -137.98 [kN]

SIJOS Internal forces M_T

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-T
Result Combinations: Max and Min Values

Isometric

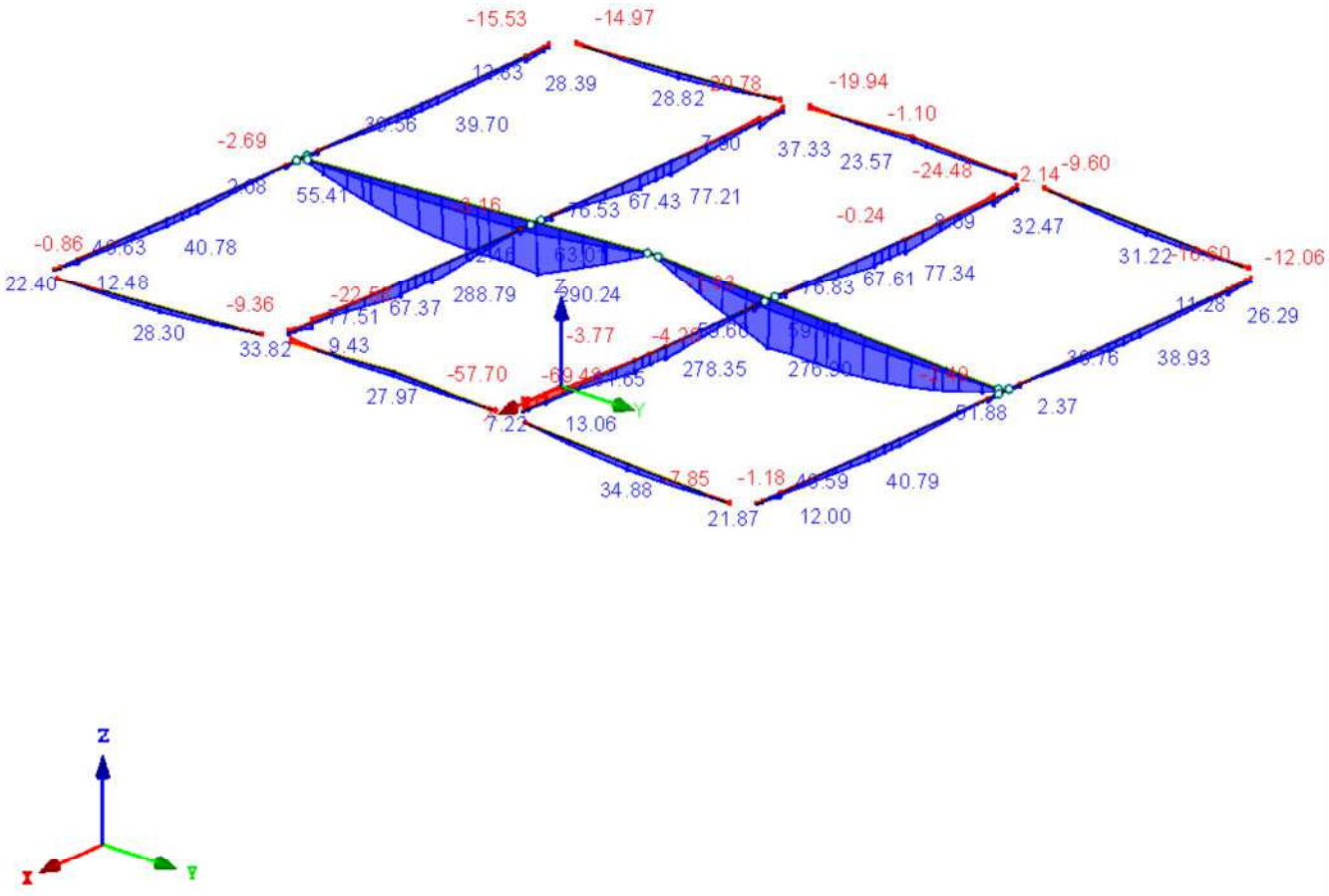


Max M-T: 0.56, Min M-T: -1.42 [kNm]

SIJOS Internal forces M_y

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Max and Min Values

Isometric

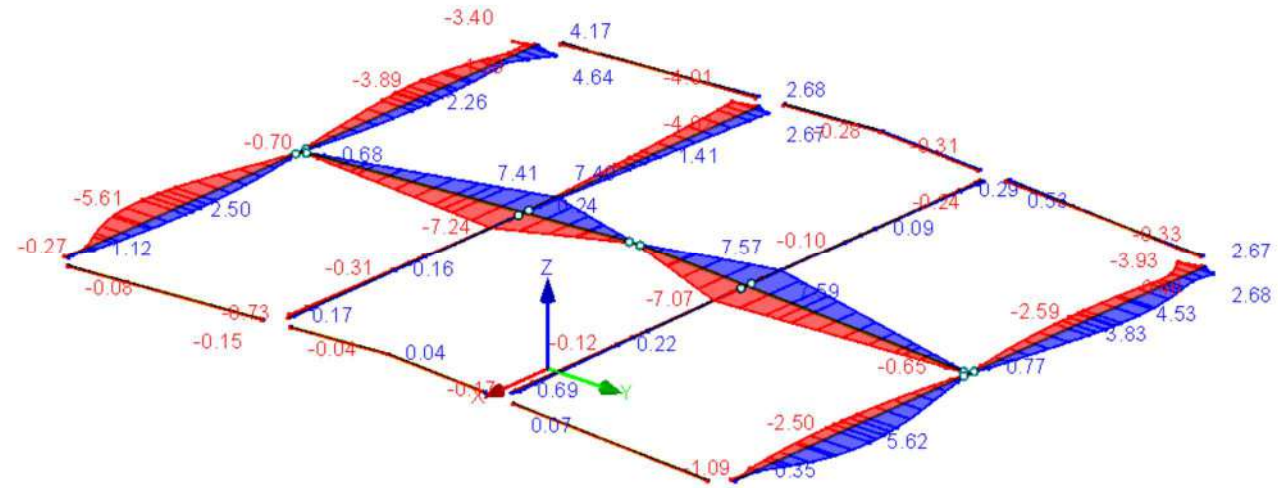


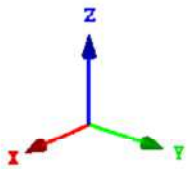
Max M-y: 290.24, Min M-y: -69.48 [kNm]

SIJOS Internal forces M_z

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-z
Result Combinations: Max and Min Values

Isometric



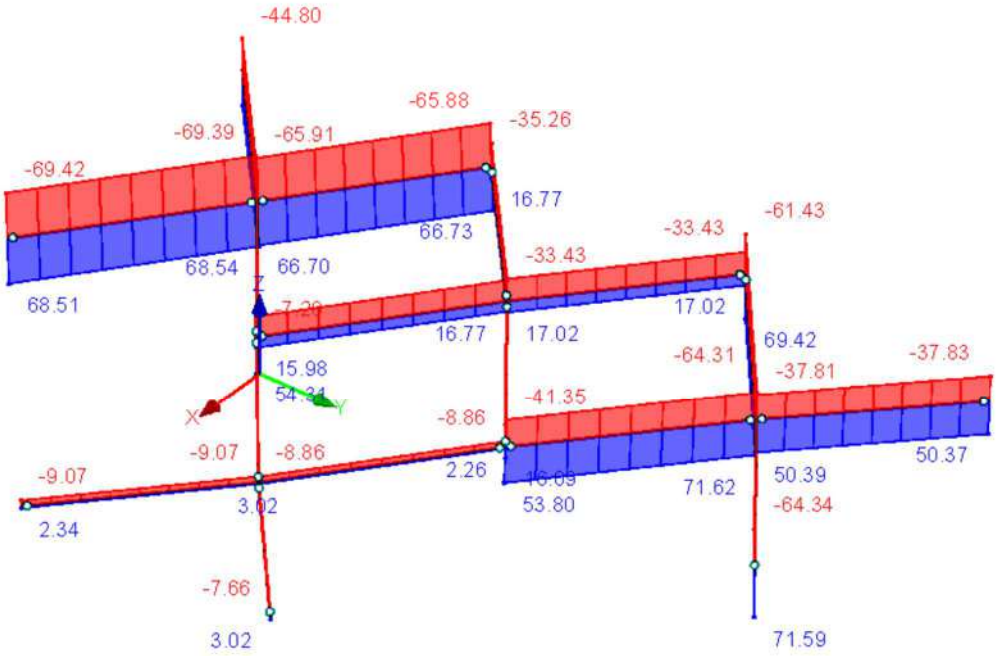


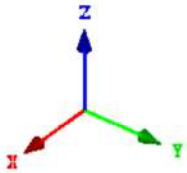
Max M-z: 7.59, Min M-z: -7.24 [kNm]

STOGO RYSIAI Internal forces N

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

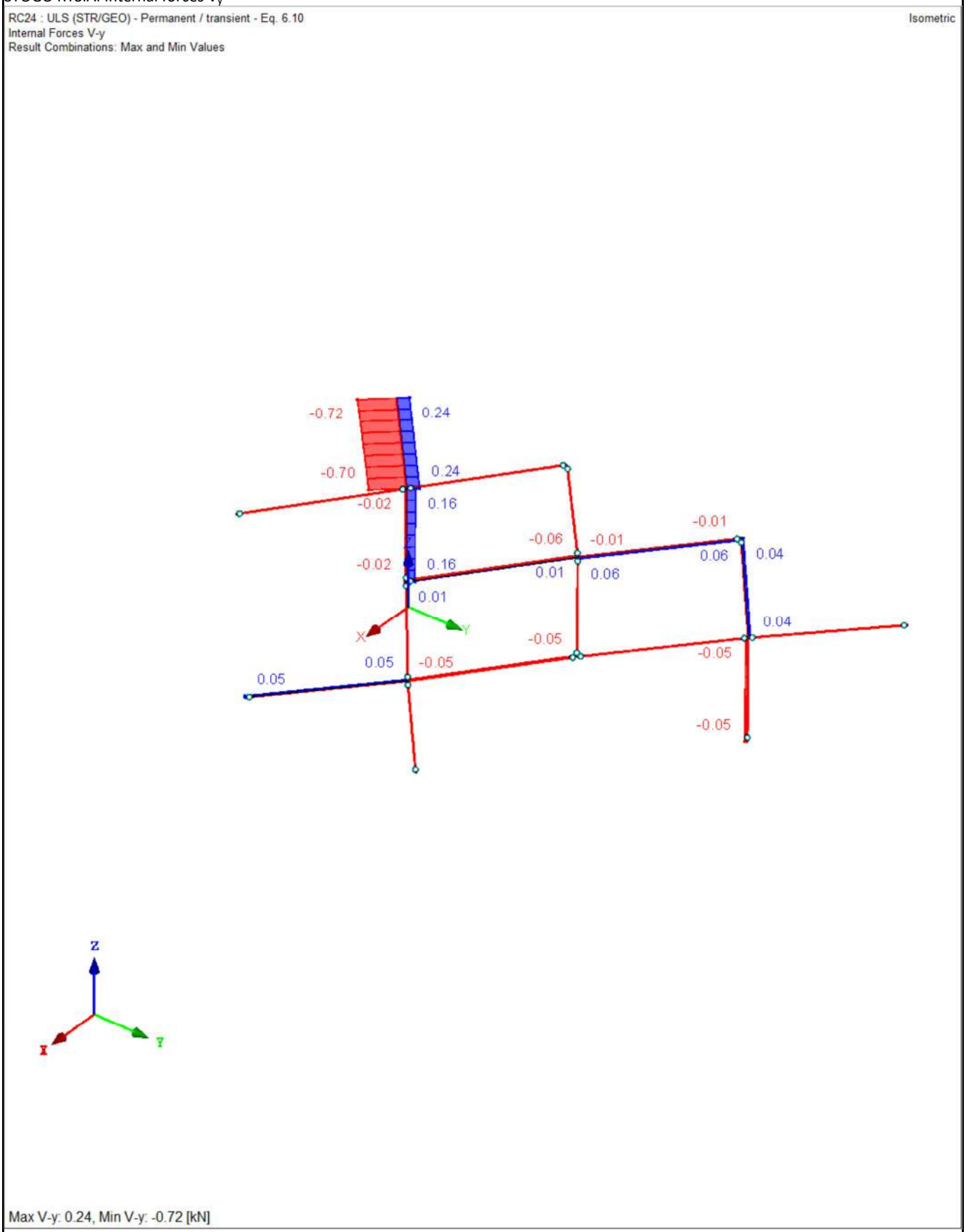
Isometric





Max N: 71.62, Min N: -69.42 [kN]

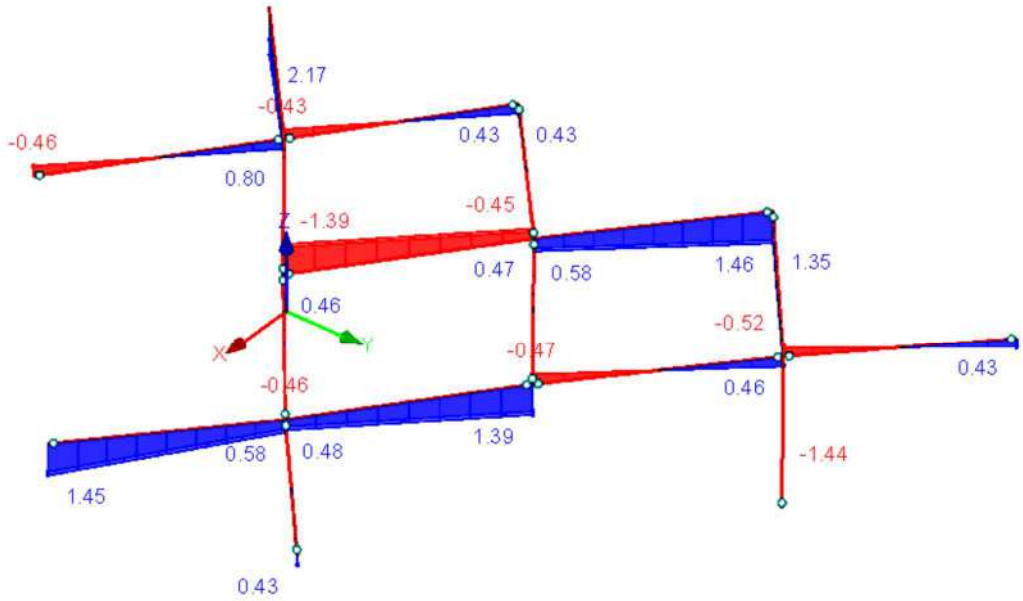
STOGO RYSIAI Internal forces V_y

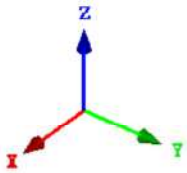


STOGO RYSIAI Internal forces V_z

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Result Combinations: Max and Min Values

Isometric



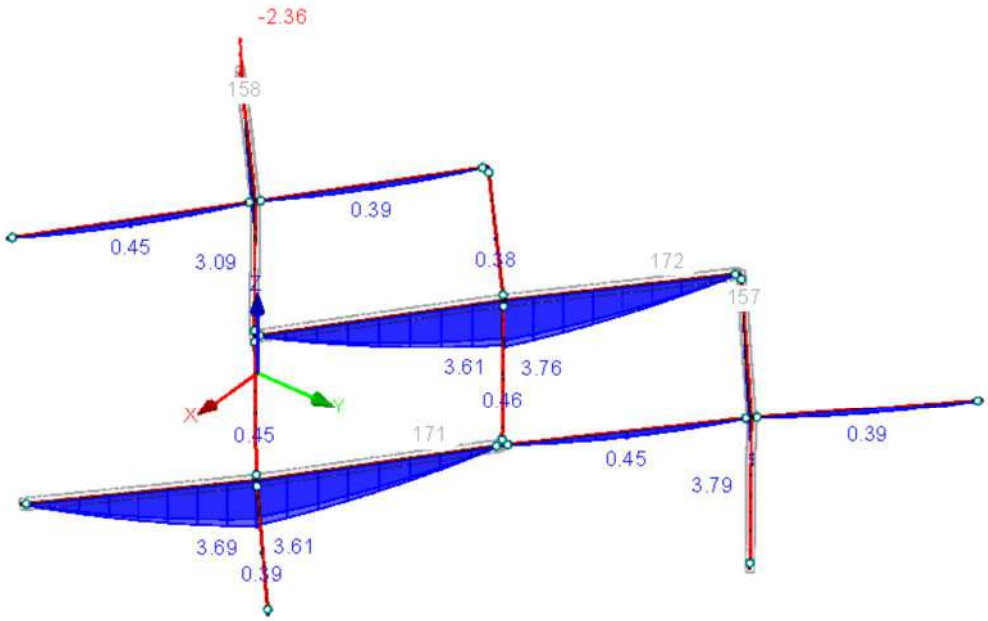


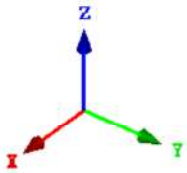
Max V-z: 2.17, Min V-z: -1.44 [kN]

STOGO RYSIAI Internal forces M_y

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Max and Min Values

Isometric



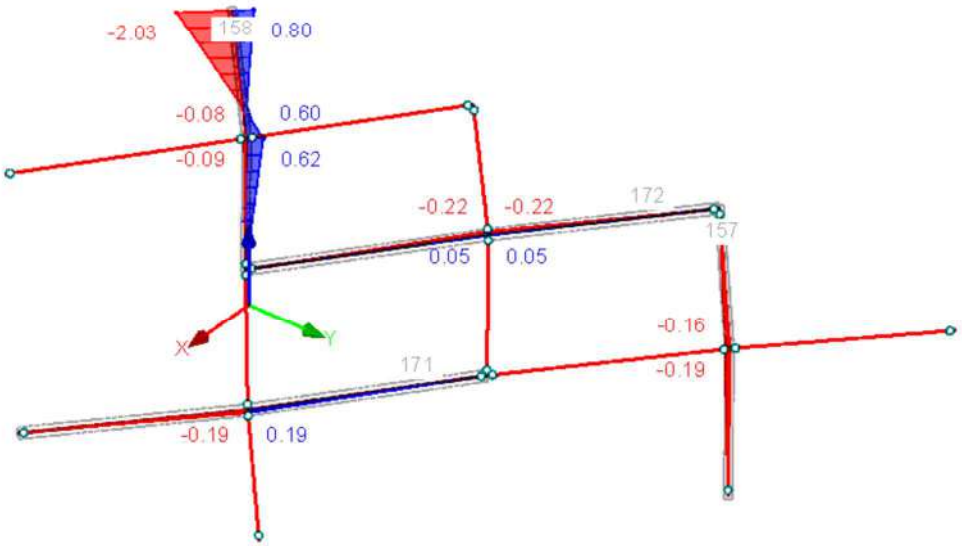


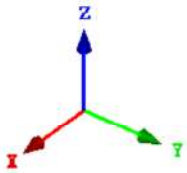
Max M-y: 3.79, Min M-y: -2.36 [kNm]

STOGO RYSIAI Internal forces M_z

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-z
Result Combinations: Max and Min Values

Isometric



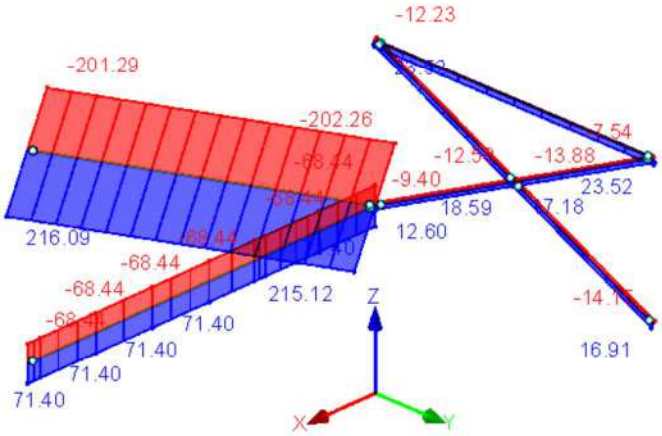


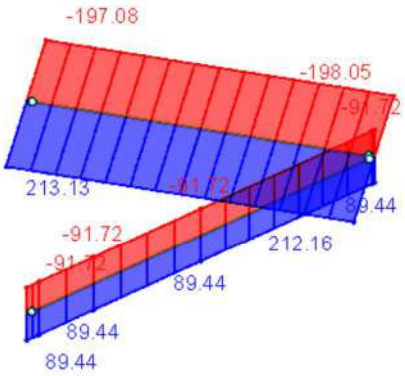
Max M-z: 0.80, Min M-z: -2.03 [kNm]

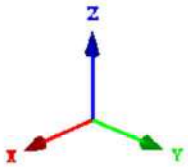
KOLONU RYSIAI Internal forces N, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

Isometric





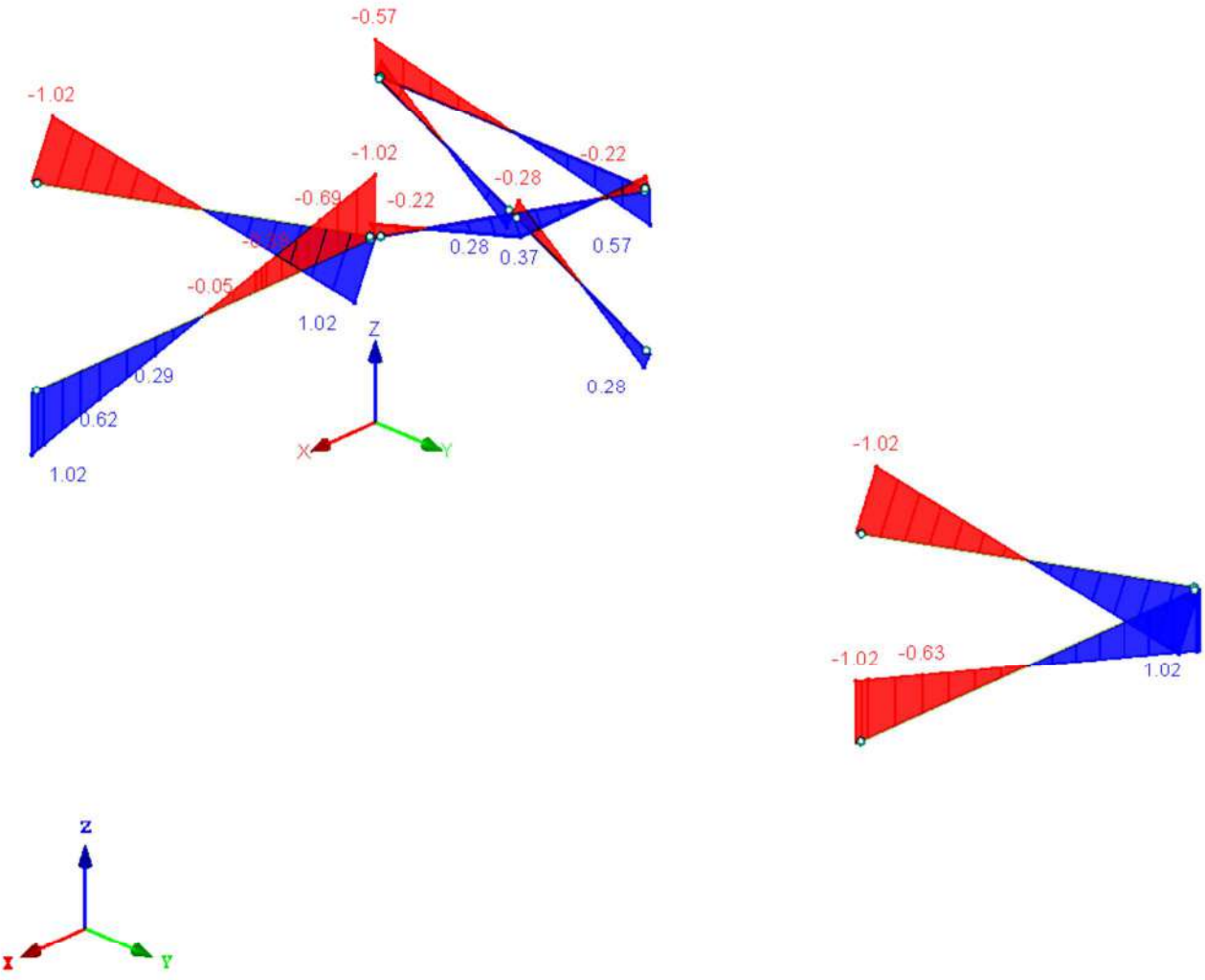


Max N: 216.09, Min N: -202.26 [kN]

KOLONU RYSIAI Internal forces V_z, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Result Combinations: Max and Min Values

Isometric

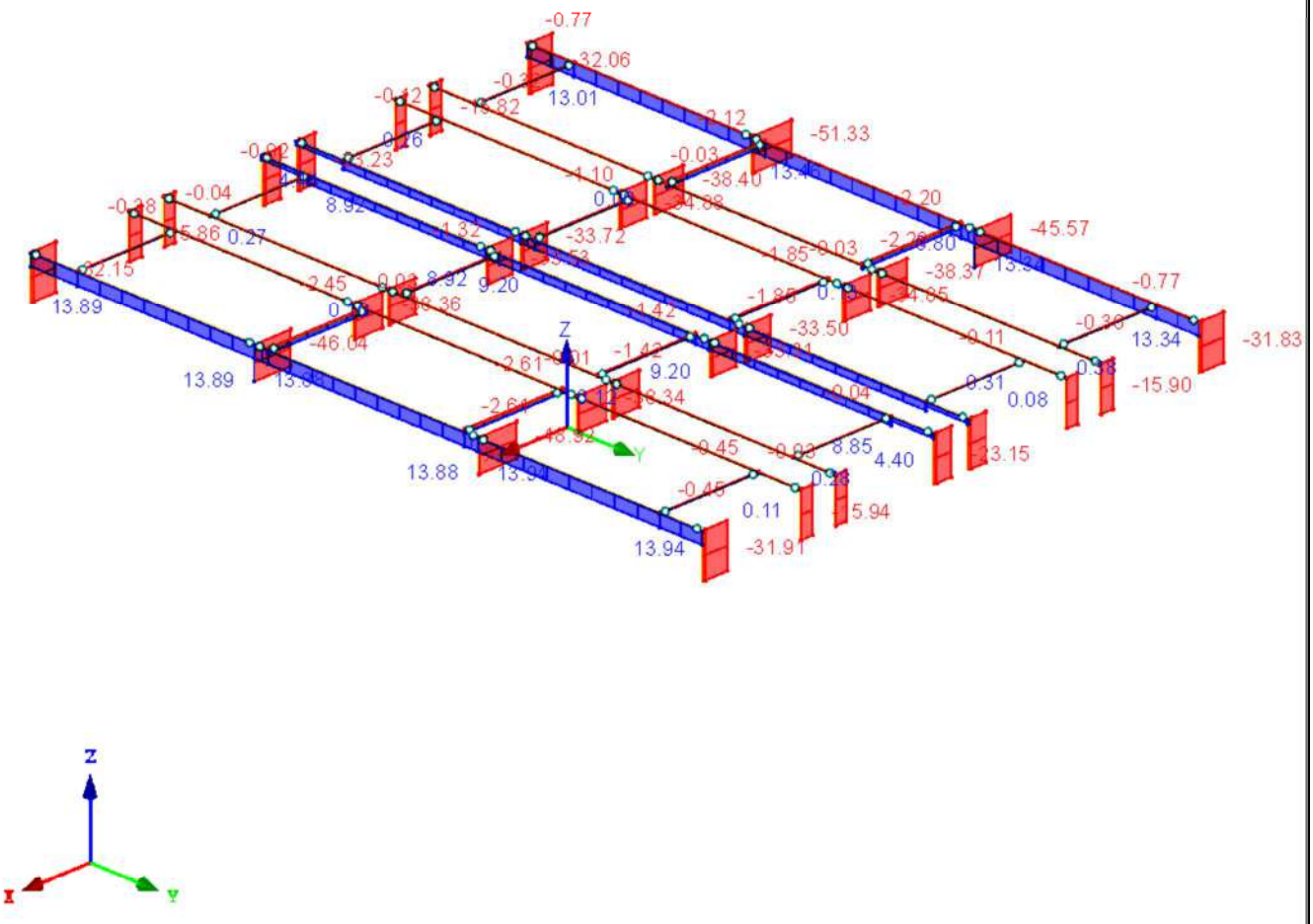


Max V-z: 1.02, Min V-z: -1.02 [kN]

IRANGOS REMAS ANT STOGO Internal forces N, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

Isometric

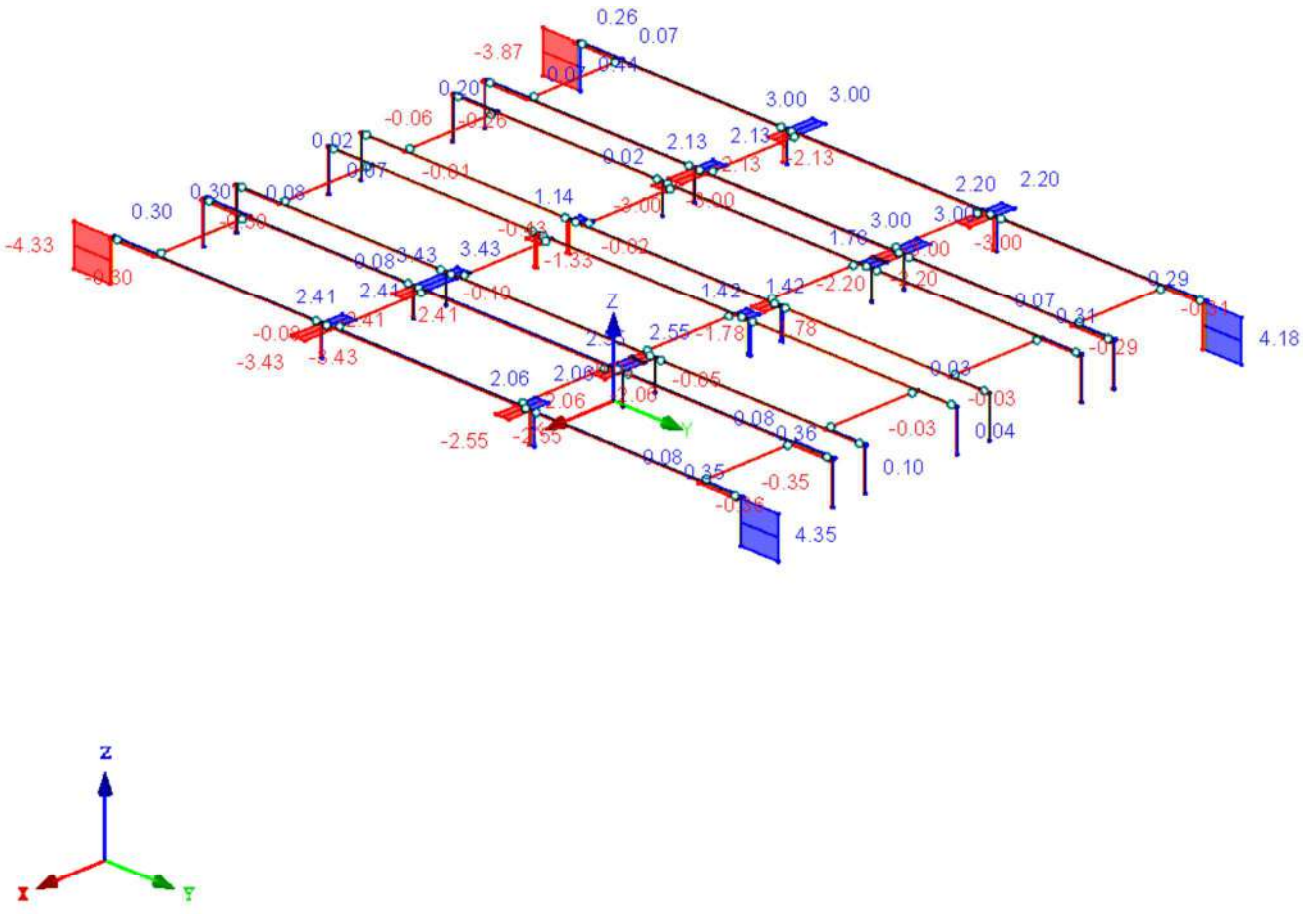


Max N: 13.94, Min N: -51.33 [kN]

IRANGOS REMAS ANT STOGO Internal forces V_y, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-y
Result Combinations: Max and Min Values

Isometric

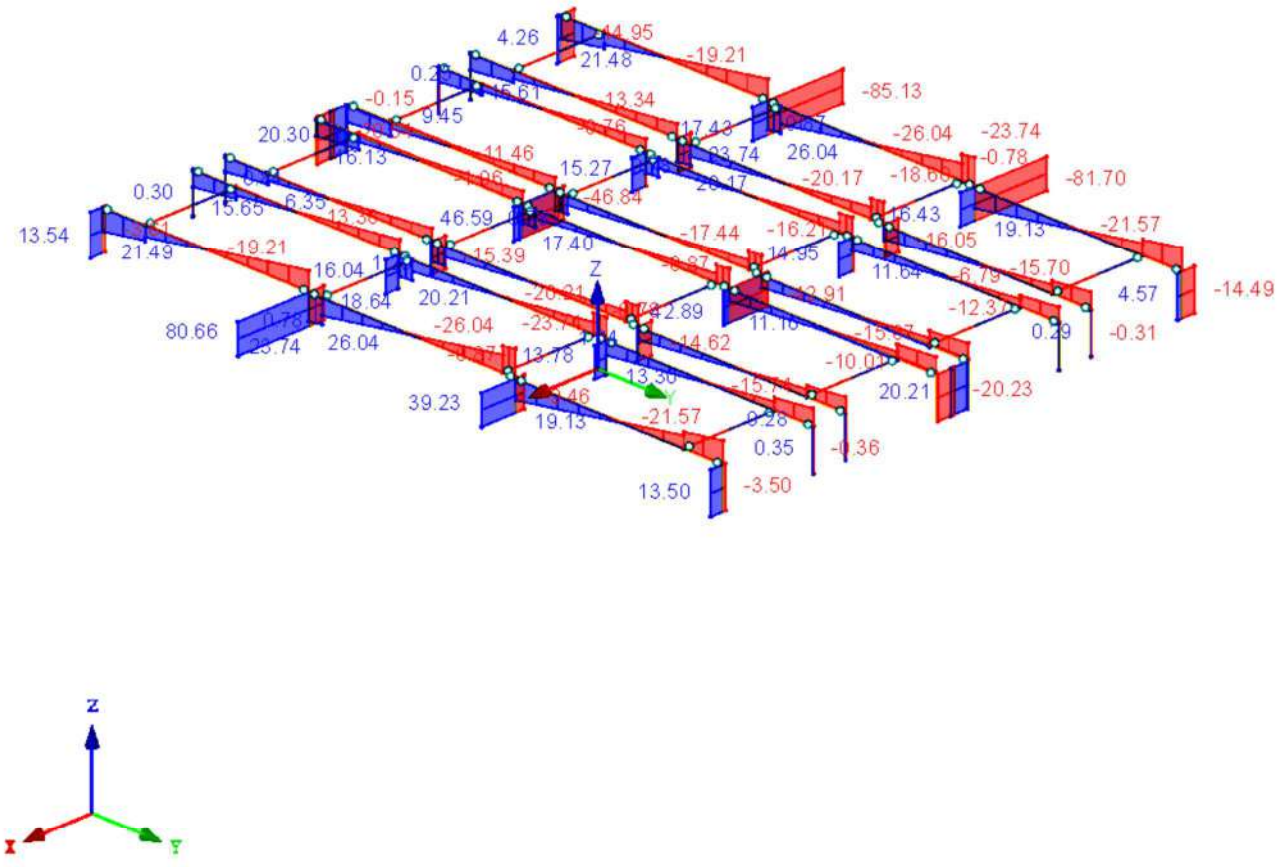


Max V-y: 4.35, Min V-y: -4.33 [kN]

IRANGOS REMAS ANT STOGO Internal forces V_z, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Result Combinations: Max and Min Values

Isometric

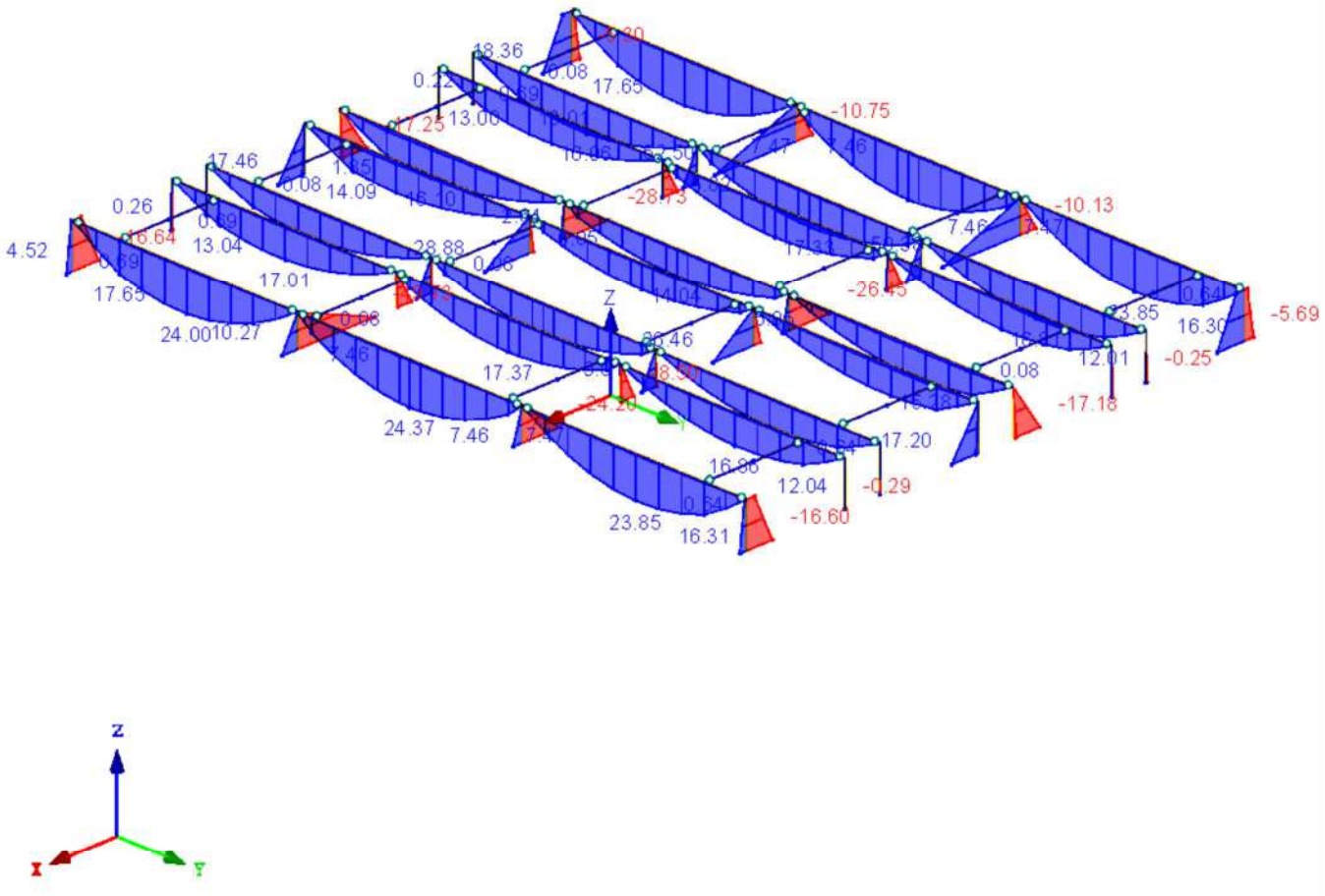


Max V-z: 80.66, Min V-z: -85.13 [kN]

IRANGOS REMAS ANT STOGO Internal forces M_y, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Max and Min Values

Isometric

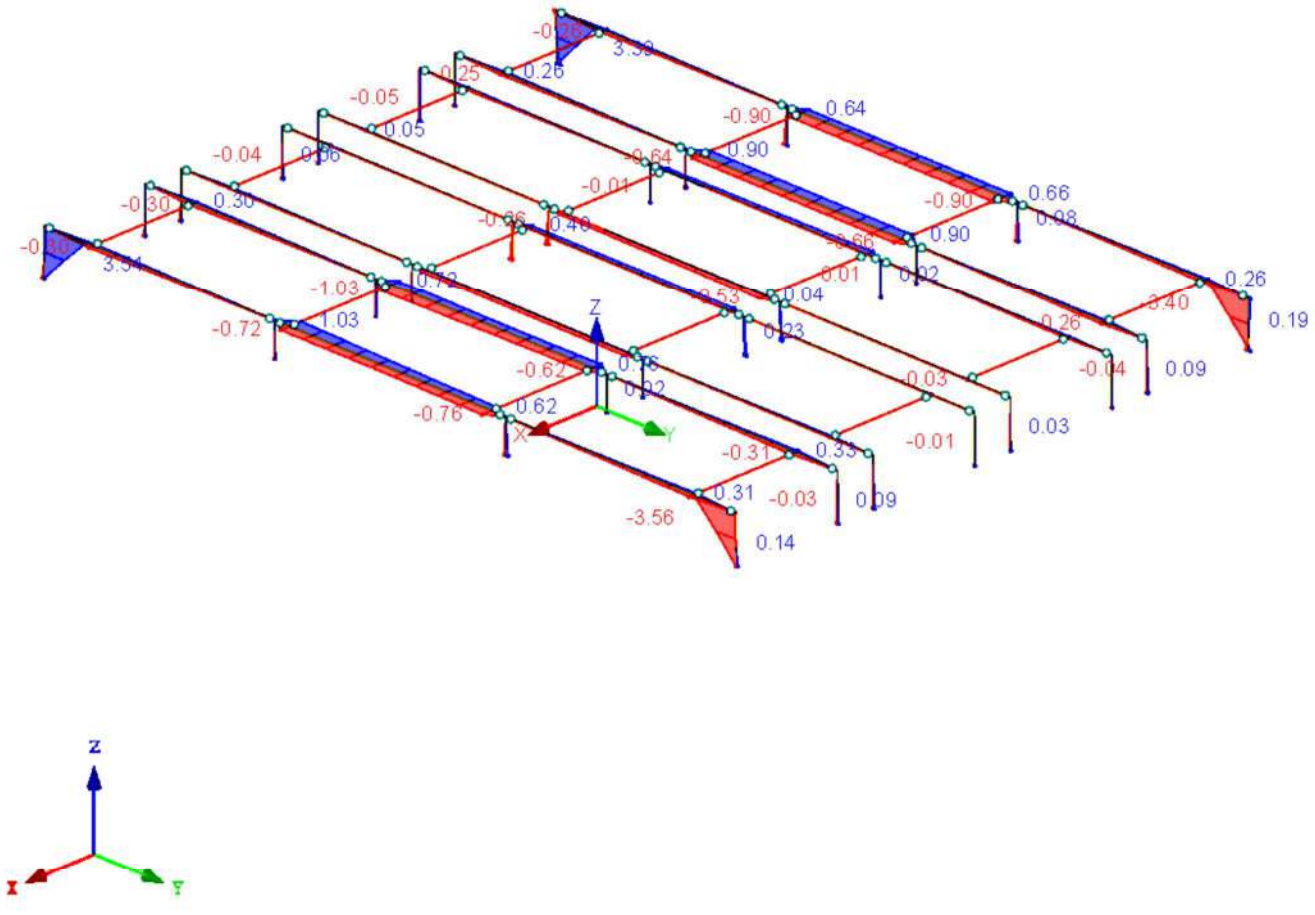


Max M-y: 52.50, Min M-y: -49.73 [kNm]

IRANGOS REMAS ANT STOGO Internal forces M_z, Support Reactions

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-z
Result Combinations: Max and Min Values

Isometric

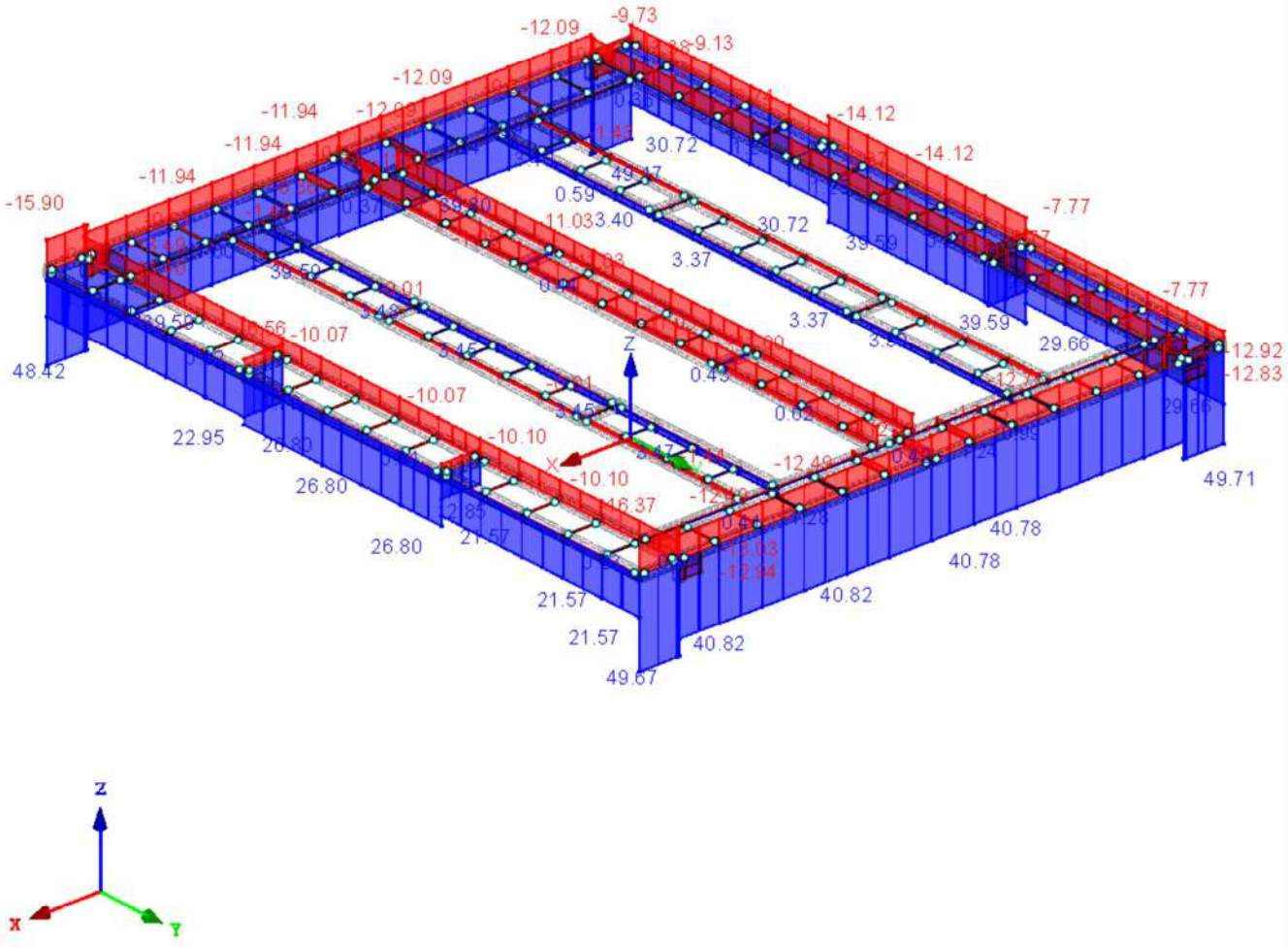


Max M-z: 3.54, Min M-z: -3.56 [kNm]

AIKSTELE ANT STOGO Internal forces N

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

Isometric

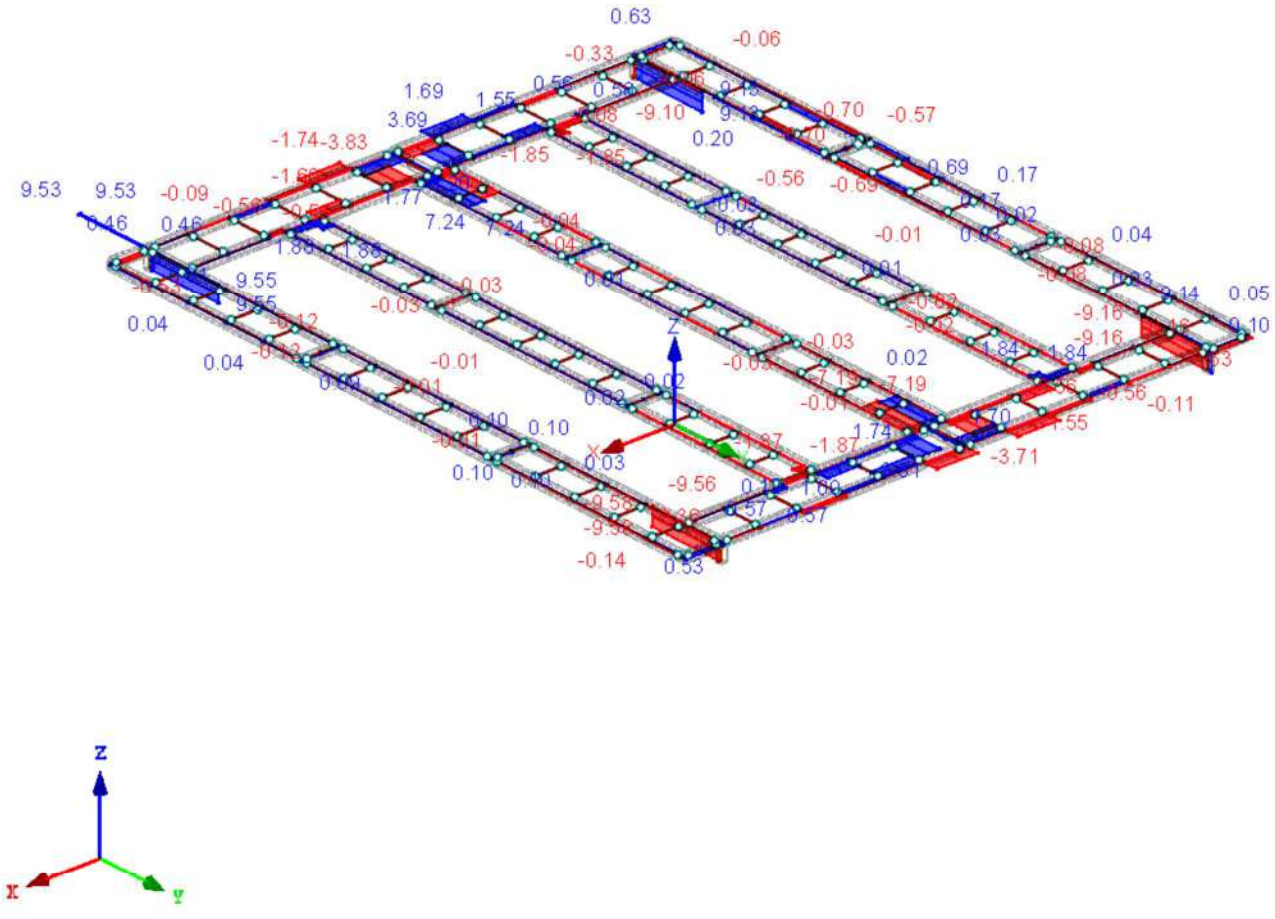


Max N: 49.71, Min N: -16.37 [kN]

AIKSTELE ANT STOGO Internal forces V_y

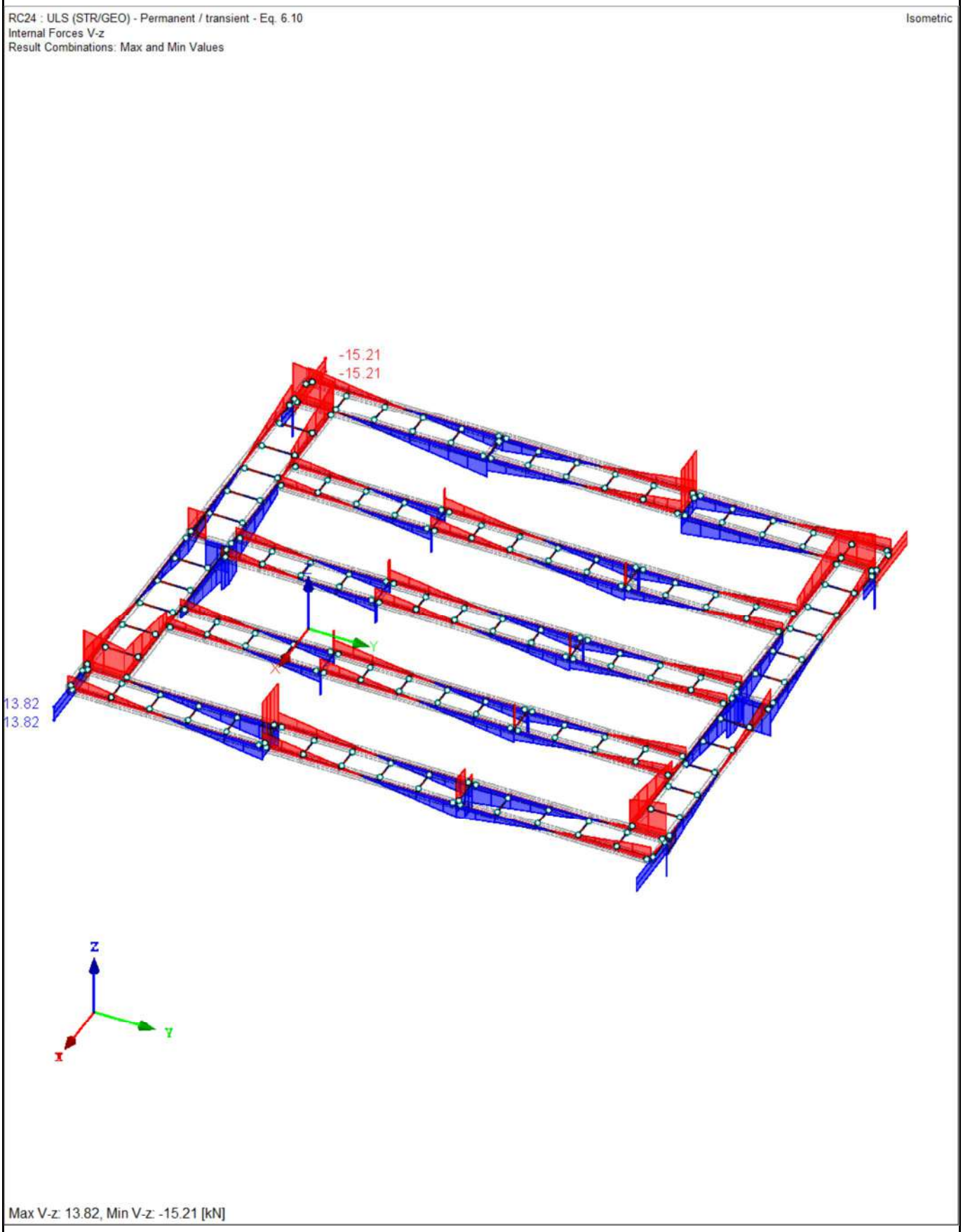
RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-y
Result Combinations: Max and Min Values

Isometric



Max V-y: 9.55, Min V-y: -9.58 [kN]

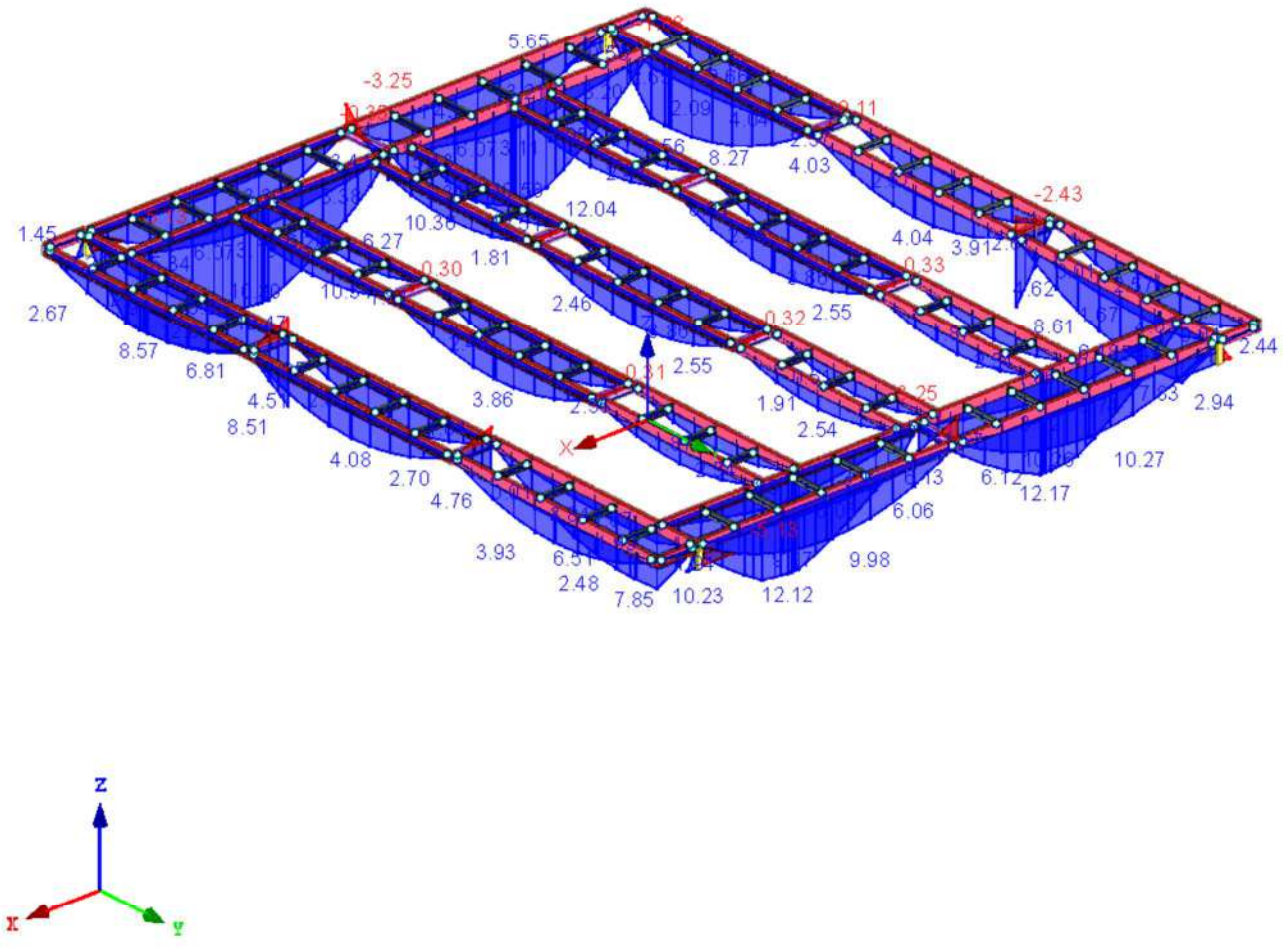
AIKSTELE ANT STOGO Internal forces V_z



AIKSTELE ANT STOGO Internal forces M_y

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Max and Min Values

Isometric

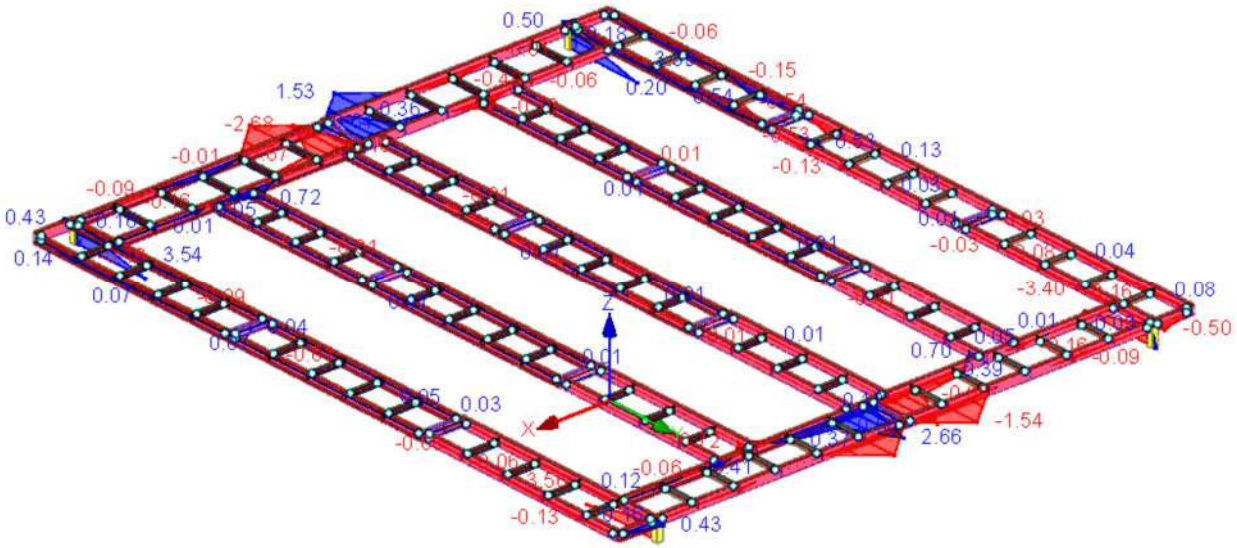


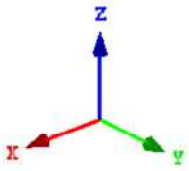
Max M-y: 12.51, Min M-y: -5.13 [kNm]

AIKSTELE ANT STOGO Internal forces M_z

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-z
Result Combinations: Max and Min Values

Isometric



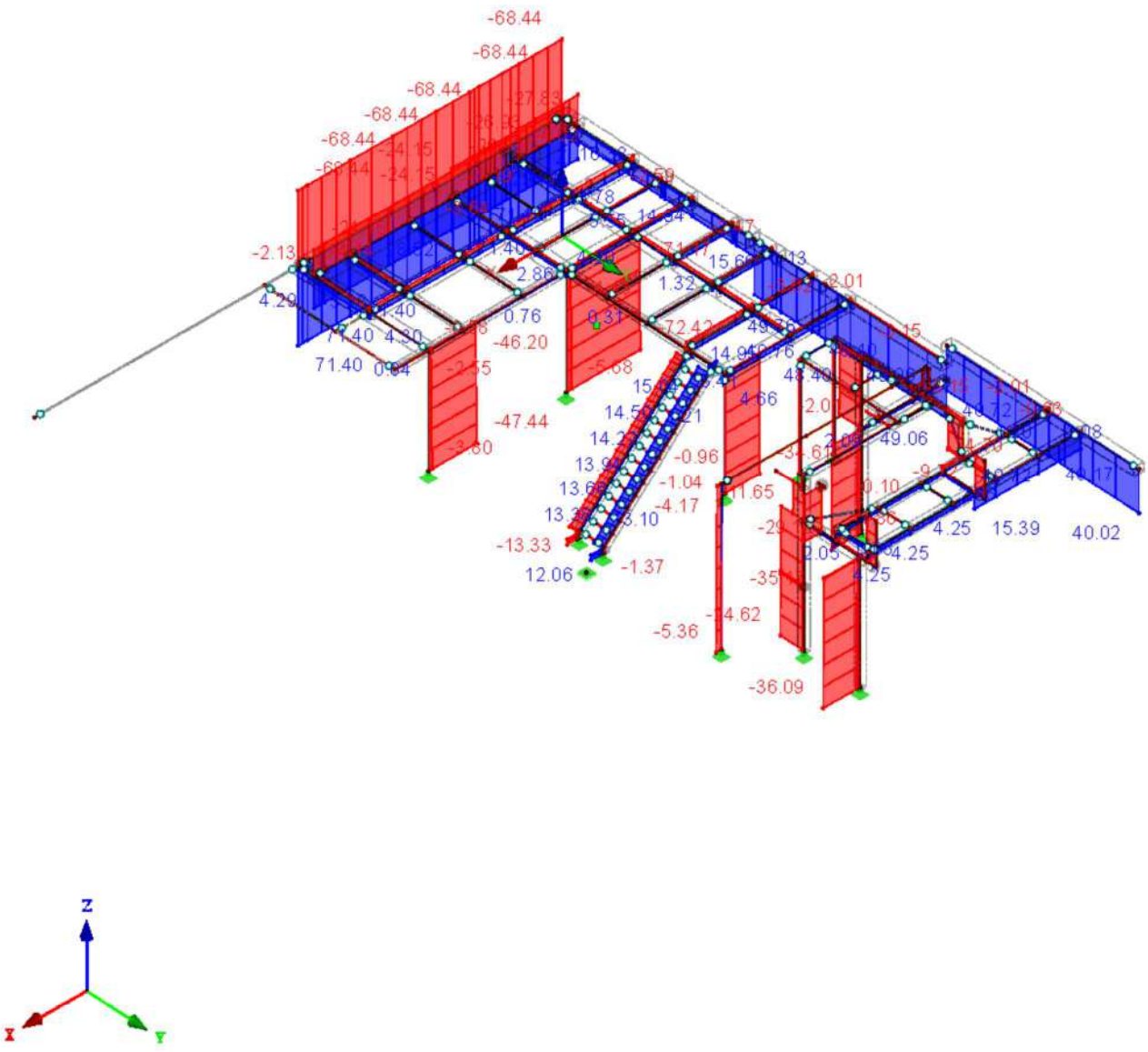


Max M-z: 3.54, Min M-z: -3.56 [kNm]

VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS Internal forces N

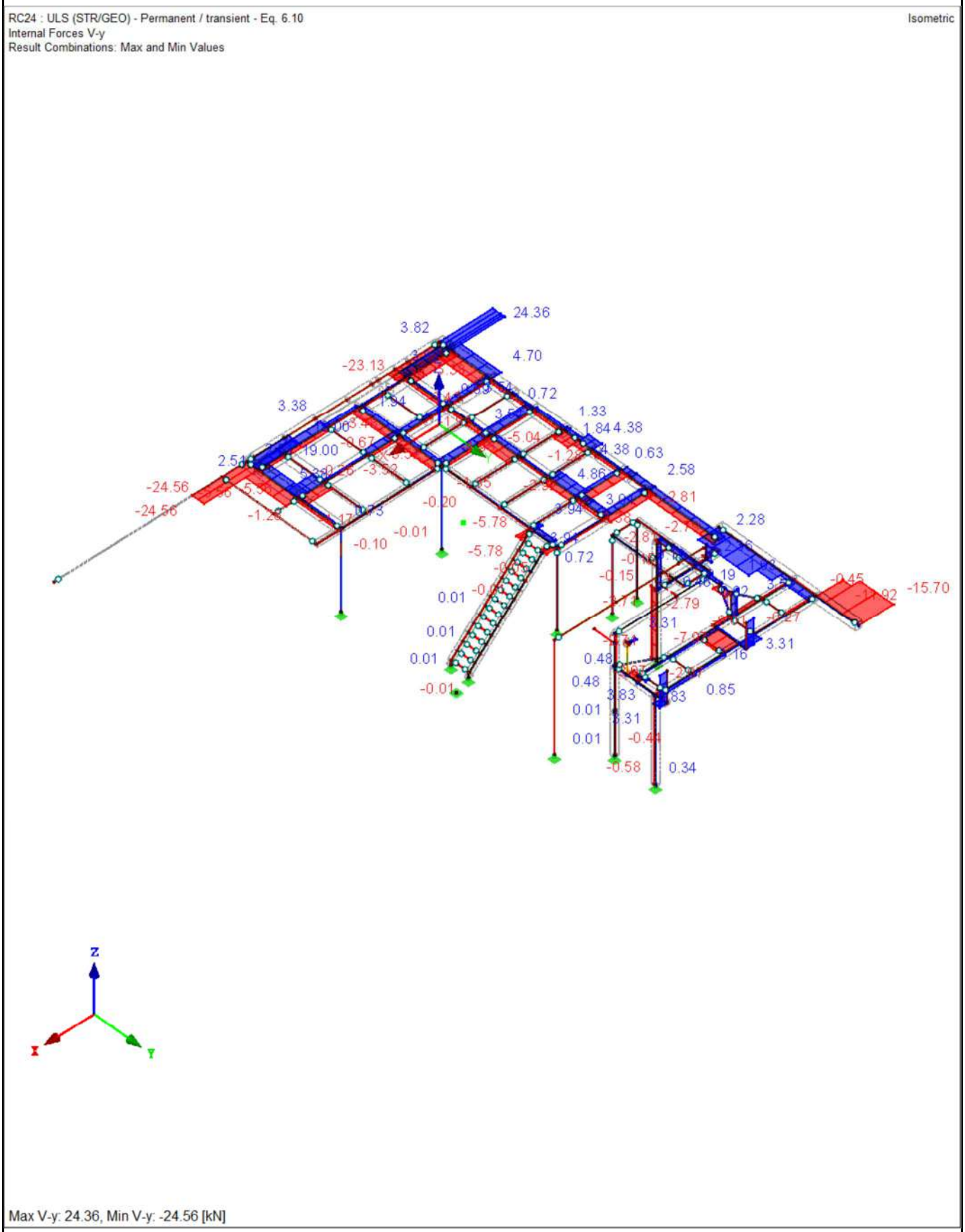
RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

Isometric

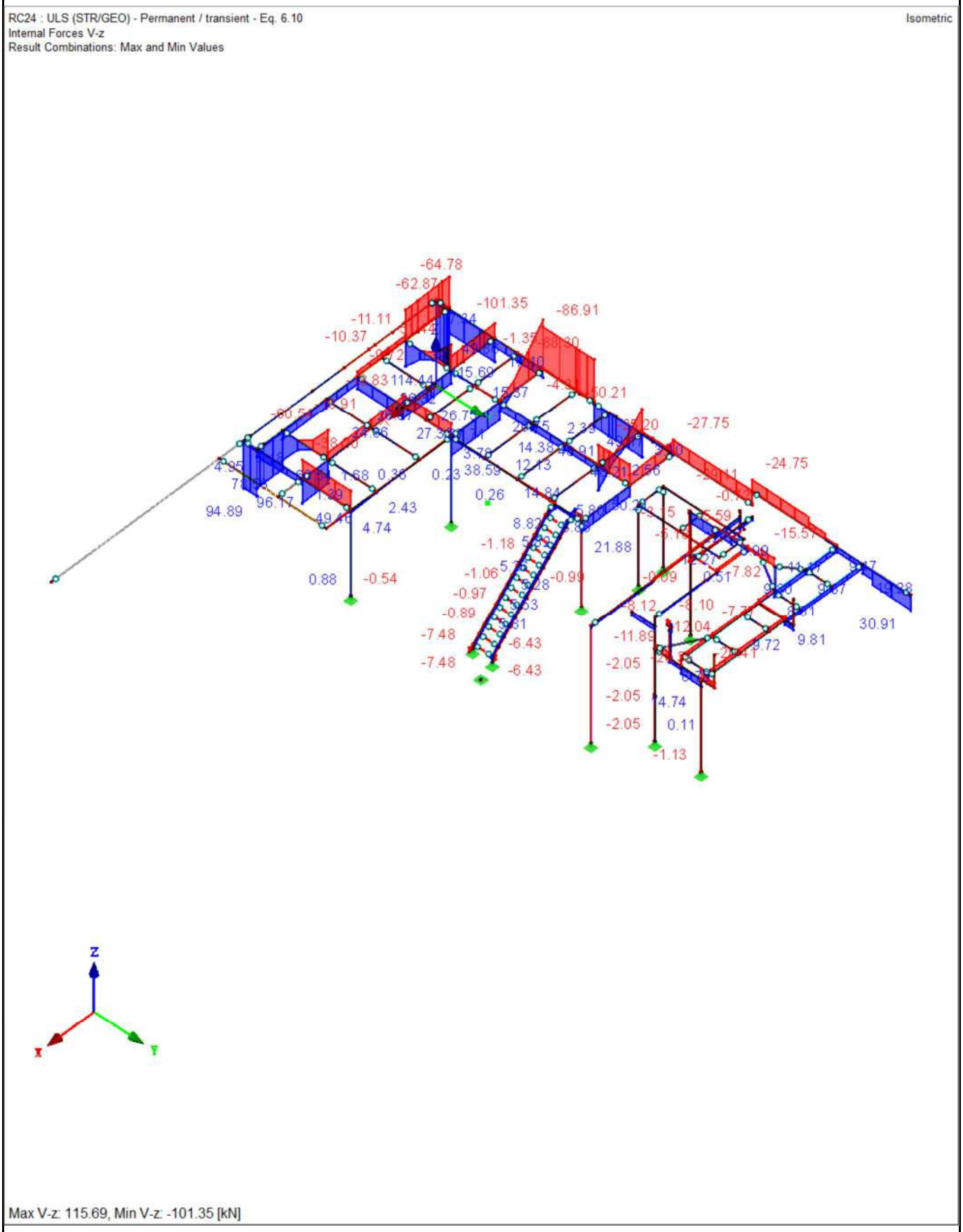


Max N: 71.40, Min N: -72.42 [kN]

VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS Internal forces V_y



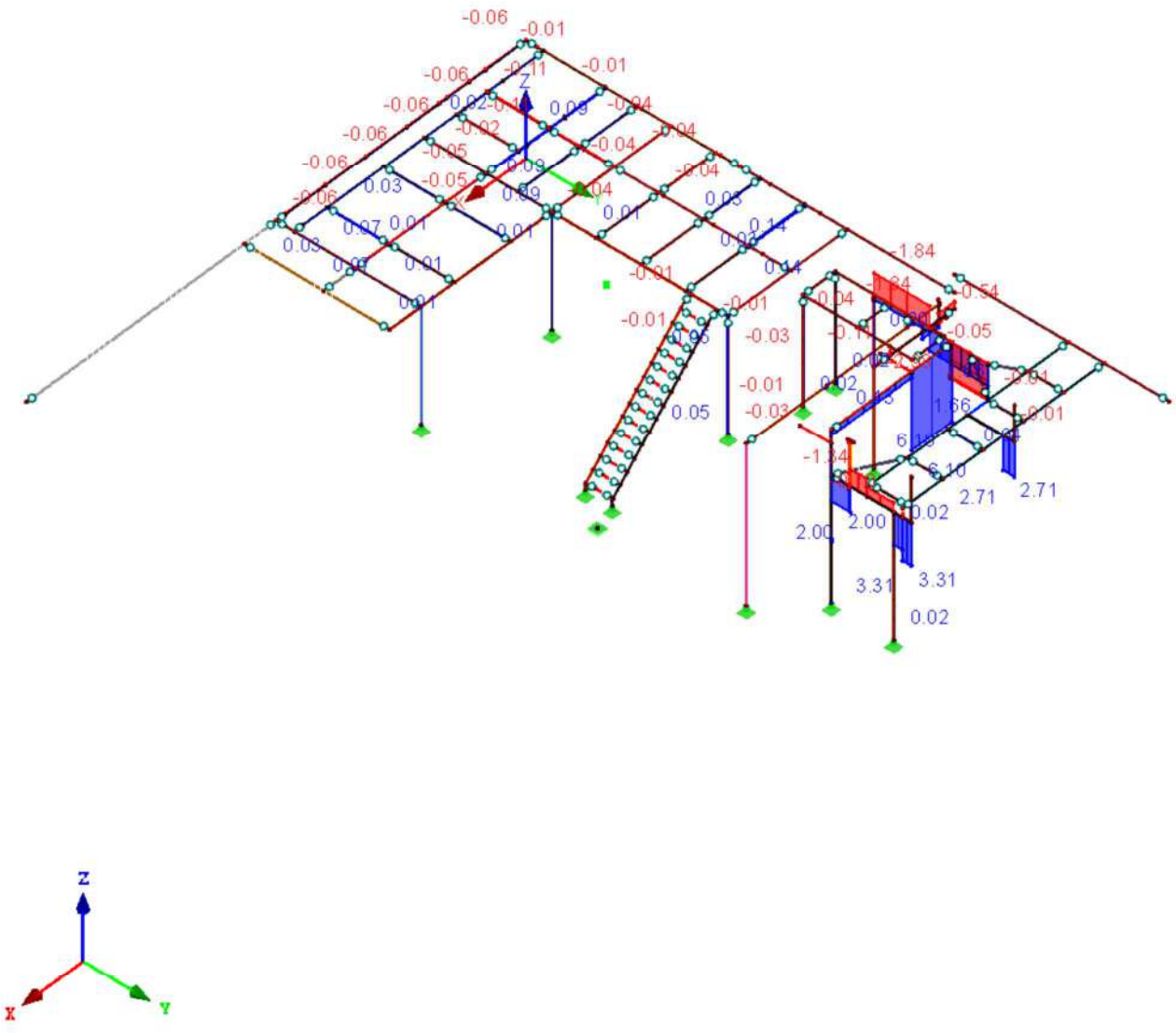
VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS Internal forces V_z



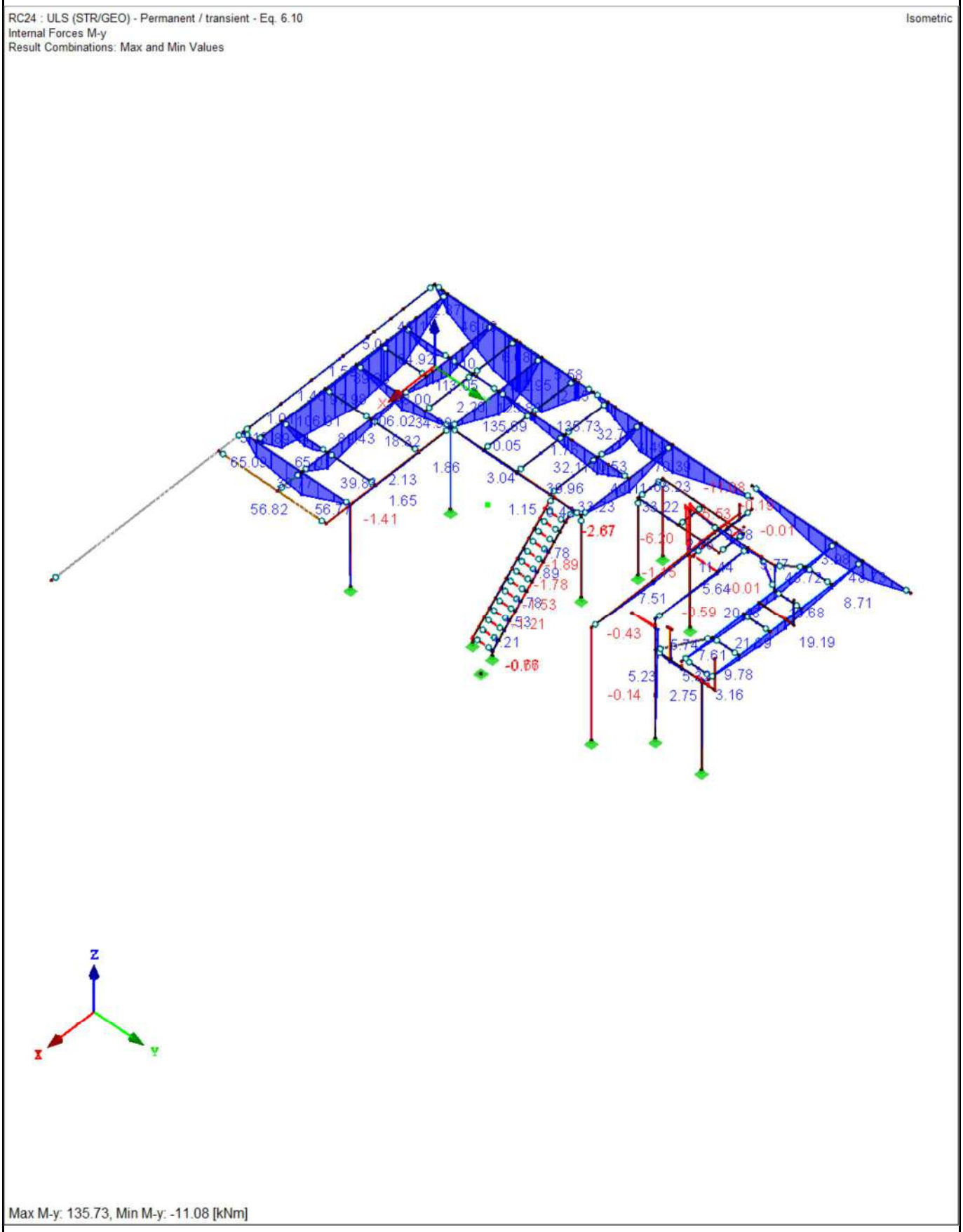
VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS Internal forces M_T

RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-T
Result Combinations: Max and Min Values

Isometric



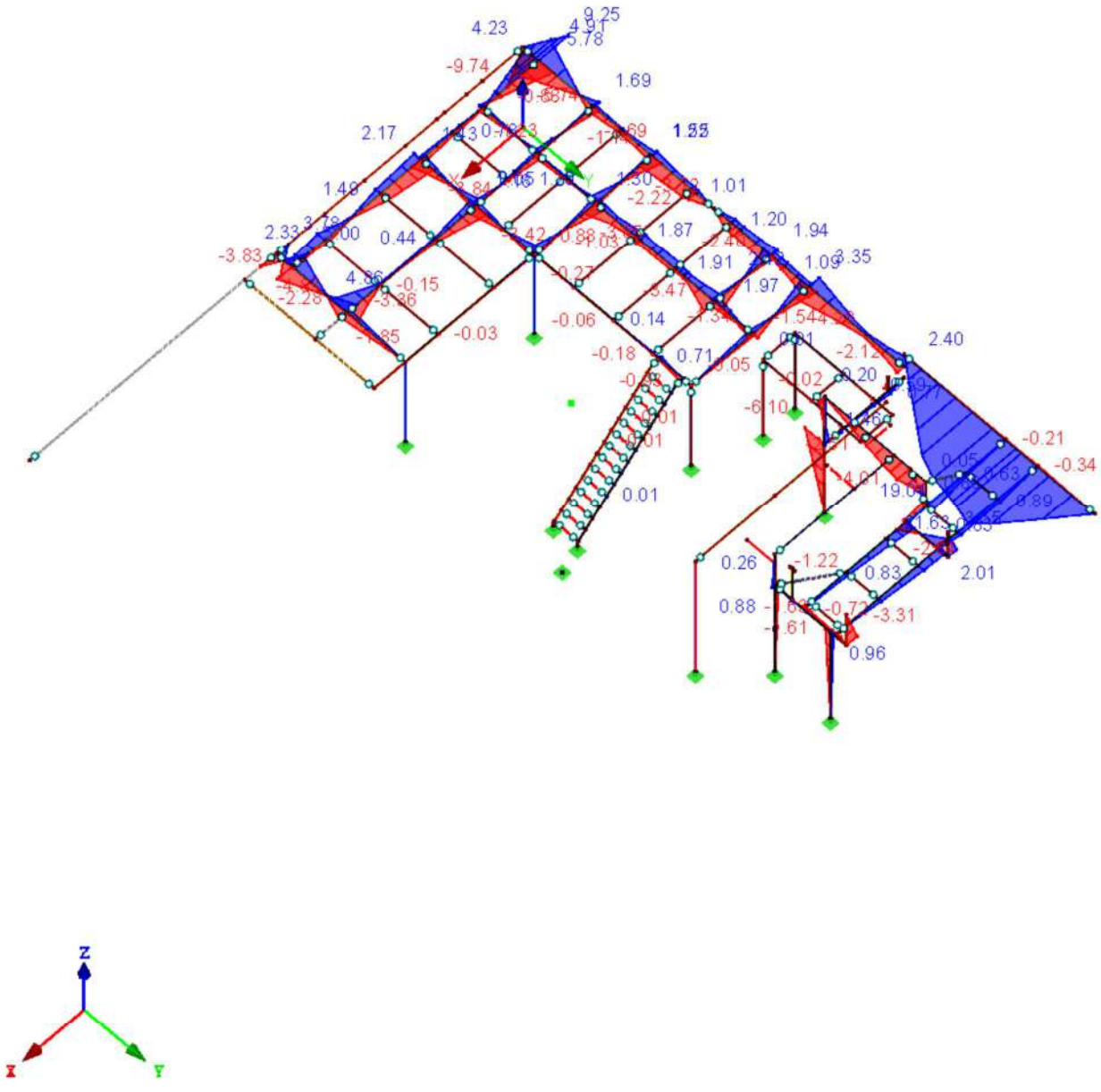
VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS Internal forces M_y



VIDAUS AIKSTELES IR VAMZDYNO ATRAMOS Internal forces M_z

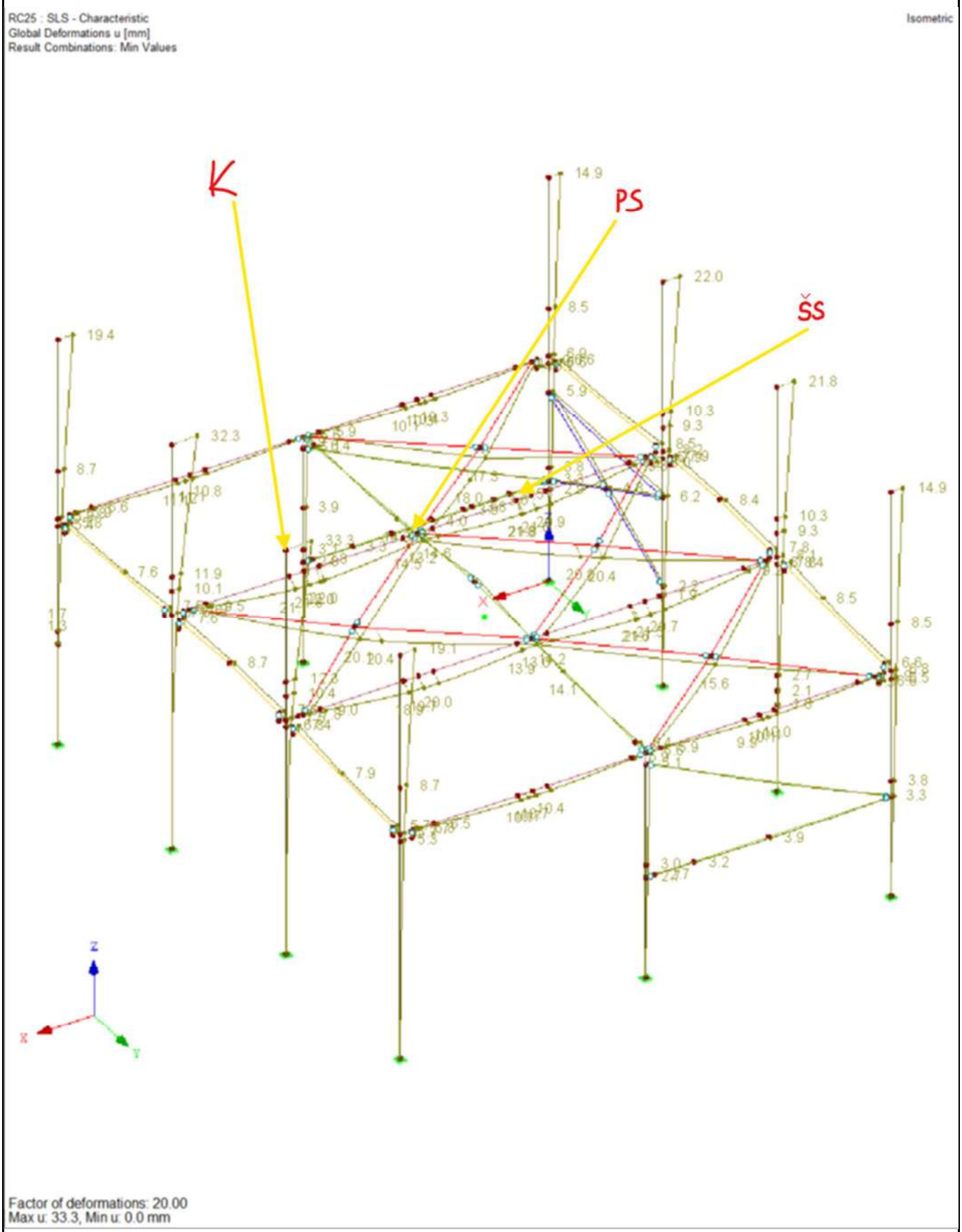
RC24 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-z
Result Combinations: Max and Min Values

Isometric



Max M-z: 21.63, Min M-z: -9.74 [kNm]

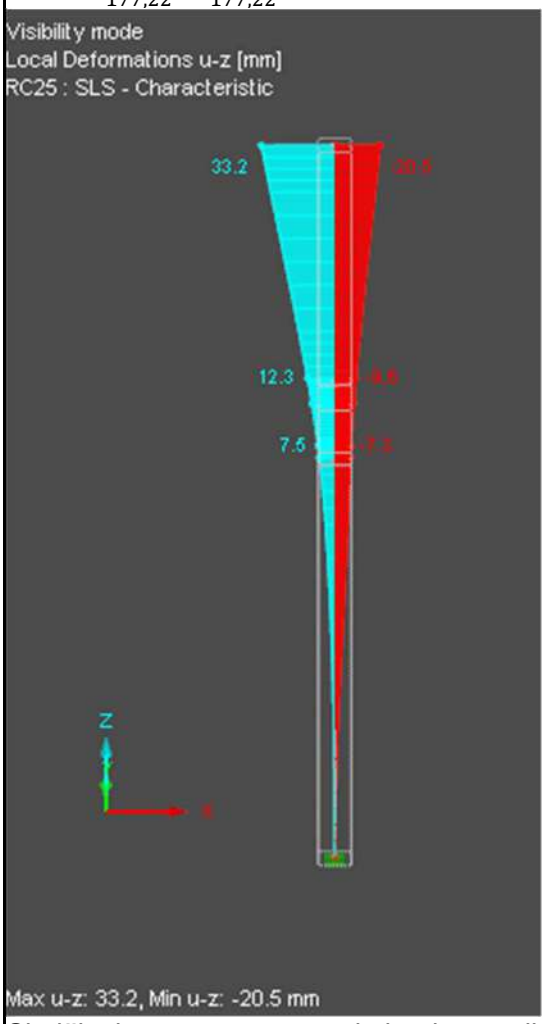
PASTATO KARKASO Global Deformations u


RC25 : SLS - Characteristic
Global Deformations u [mm]
Result Combinations: Min Values
Isometric
K
PS
ŠS
Factor of deformations: 20.00
Max u: 33.3, Min u: 0.0 mm

TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
VISI Šių ir kitų konstrukcijų (estakada ir lauko aikštelė) deformacijos ir poslinkiai skaičiuojami pagal lokaliąsias element deformacijas.
KOLONOS (K): ribinis kolonos poslinkis pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.4 lentelę, kai kolonos aukštis 10,9m gaunamas interpoliuojant ir yra:

x	y
150	6
177.2222222222	10.9
200	15

$$D_{\lim} = \frac{h_s}{177{,}22} = \frac{10900}{177{,}22} = 61{,}6\ mm.$$

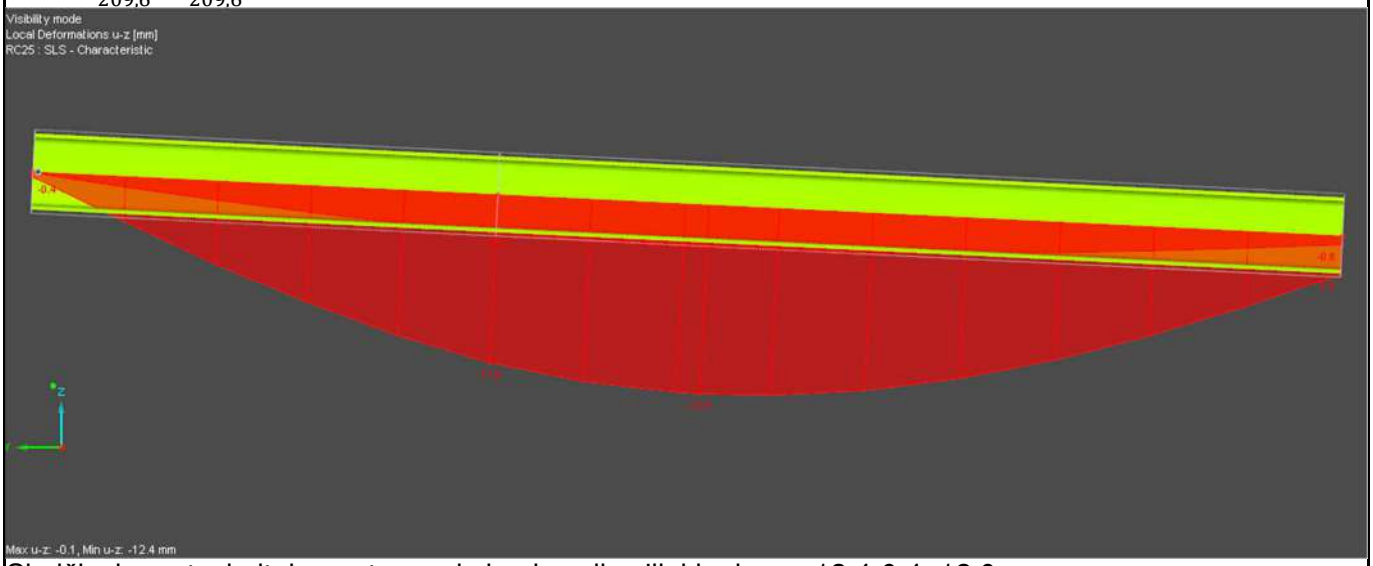


Skaičiavimuose gautas maksimalus poslinkis lygus 33,2mm.
d_{lim}=61,6mm>d_{max}=33,2mm.

SIJOS:
Pagrindinė sija (PS):
Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 2 skyrių.
Ribinis įlinkis, kai sijos ilgis 7,15 m gaunamas interpoliuojant ir yra:

x	y
200	6
209.5833333333	7.15
250	12

$$D_{\lim} = \frac{l}{209{,}6} = \frac{7150}{209{,}6} = 34{,}1\ mm.$$



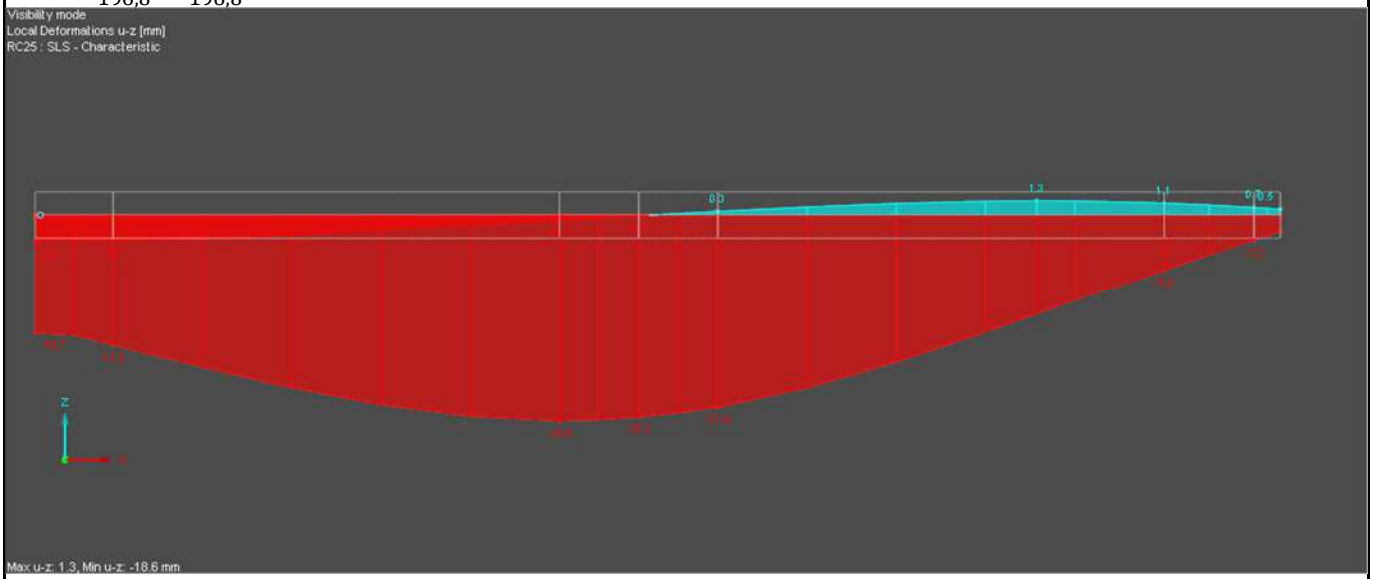
Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=12,4-0,4=12,0mm.
d_{lim}=34,1mm>d_{max}=12,0mm.

Šalutinė sija (ŠS):

Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 2 skyrių.
Ribinis įlinkis, kai sijos ilgis 5,81 m gaunamas interpoliuojant ir yra:

x	y
150	3
196.8333333333	5.81
200	6

$$D_{\lim} = \frac{l}{196{,}8} = \frac{5810}{196{,}8} = 29{,}52\ mm.$$



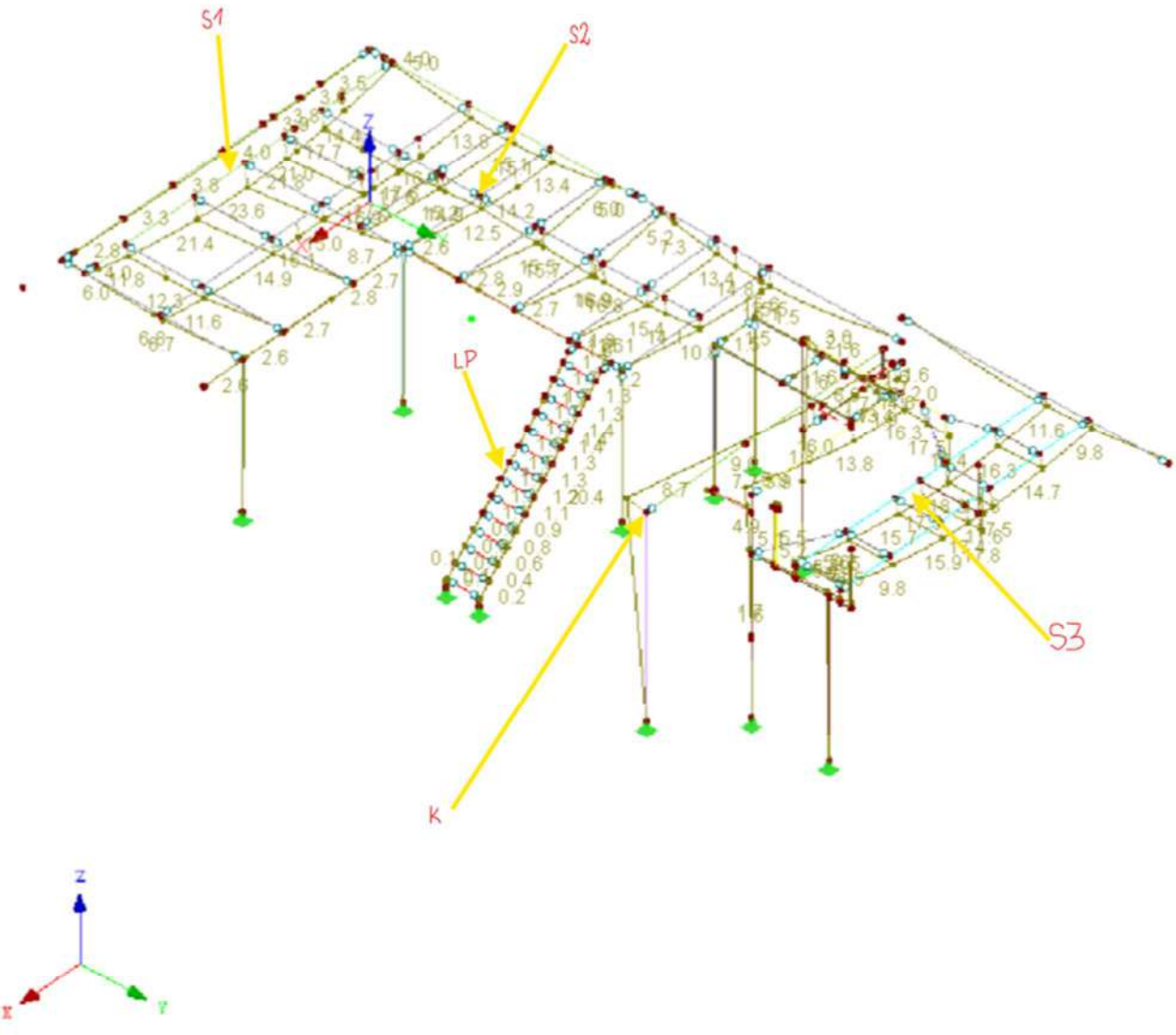
Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis d_{max}=18,6-2,2=16,4mm.
d_{lim}=29,52mm>d_{max}=16,4mm.

Išvada: tinkamumo ribiniai būviai tenkinami.

VIDAUS AIKSTELIU IR VAMZDYNO ATRAMU Global Deformations u

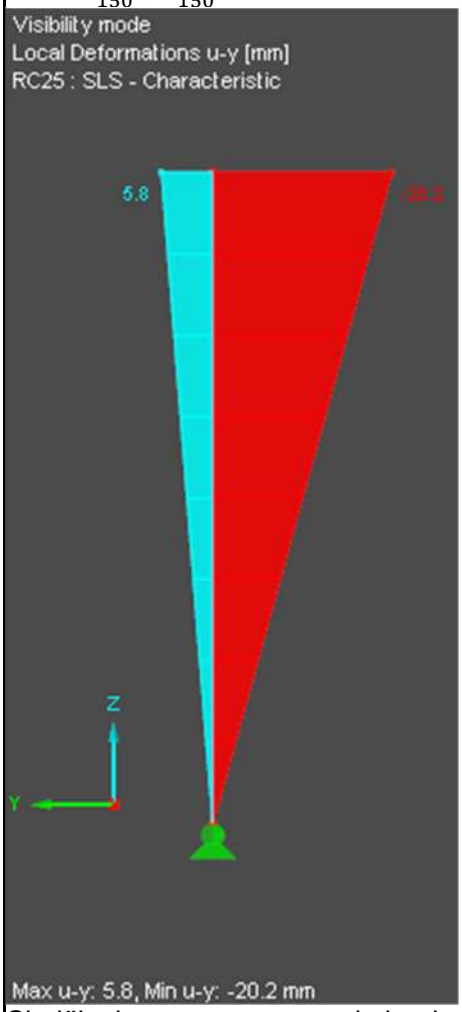
RC25 : SLS - Characteristic
Global Deformations u [mm]
Result Combinations: Min Values

Isometric

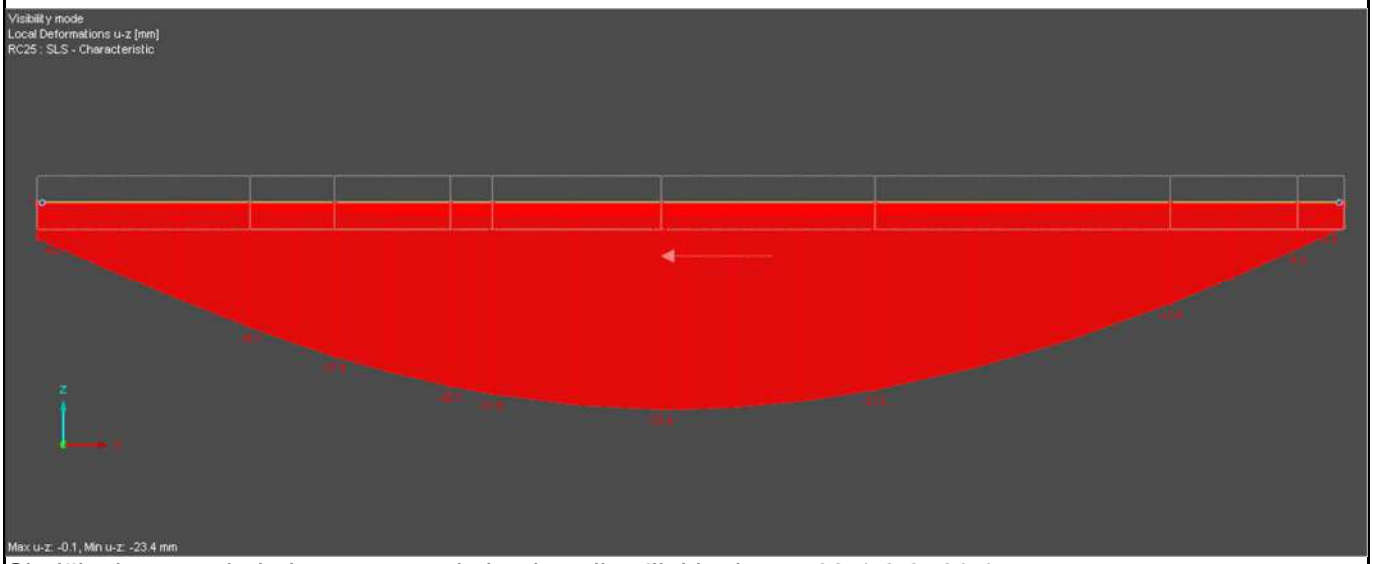


Factor of deformations: 20.00
Max u: 23.6, Min u: 0.0 mm

TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
KOLONOS: ribinis kolonos poslinkis pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra :
$d_{\lim} = \frac{h_s}{150} = \frac{3266}{150} = 21{,}77\ mm.$



Skaičiavimuose gautas maksimalus poslinkis lygus 20,2mm.
d_{lim}=21,77mm>d_{max}=20,2mm.
SIJOS:
S1:
Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra:
$d_{\lim} = \frac{l}{150} = \frac{5900}{150} = 39{,}3\ mm.$

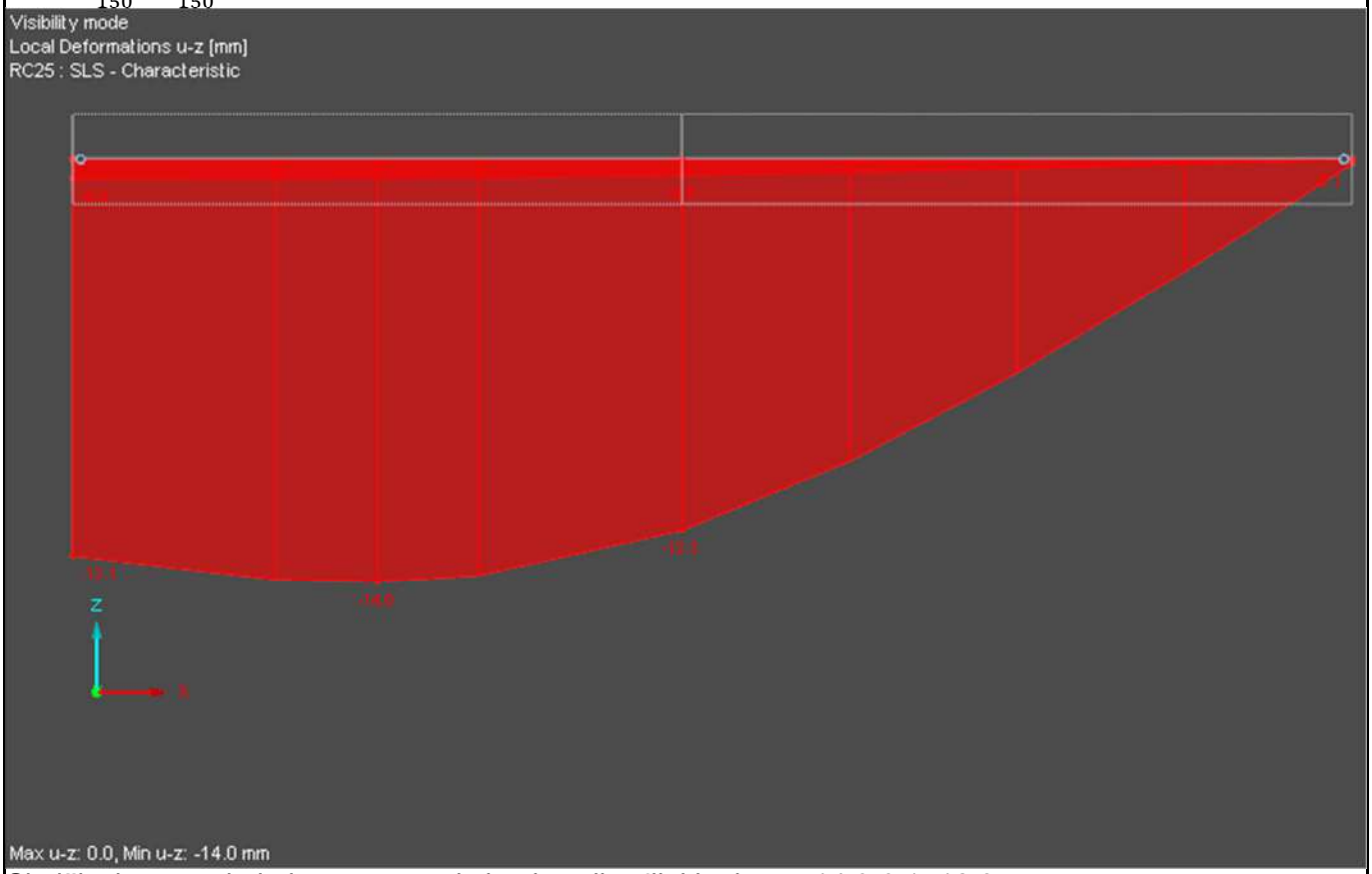


Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=23,4-2,8=20,6mm.
d_{lim}=39,3mm>d_{max}=20,6mm.

S2:

Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra:

$$d_{\lim} = \frac{l}{150} = \frac{2710}{150} = 18{,}1\ mm.$$

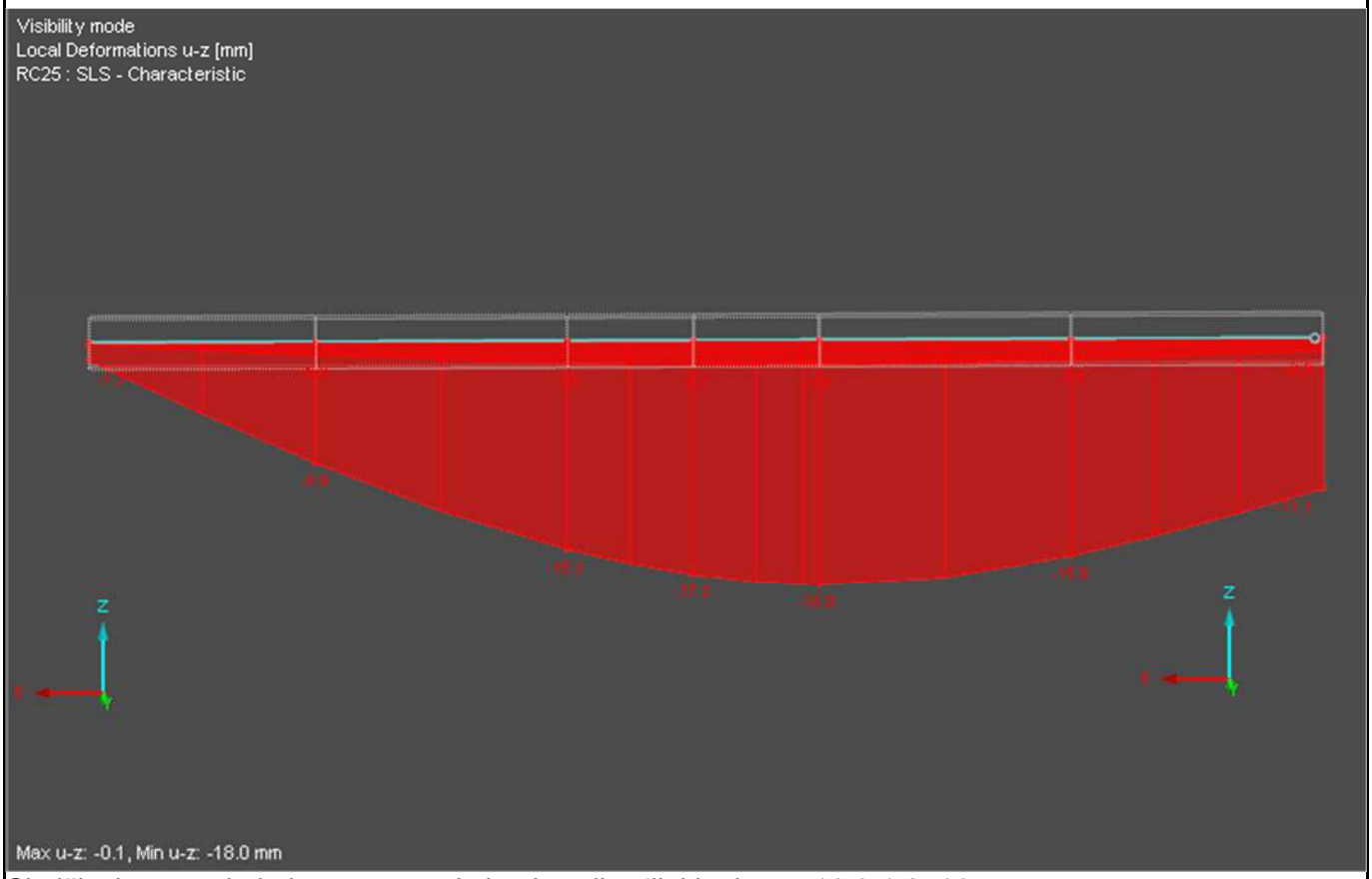


Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=14,0-0,1=13,9mm.
d_{lim}=18,1mm>d_{max}=13,9mm.

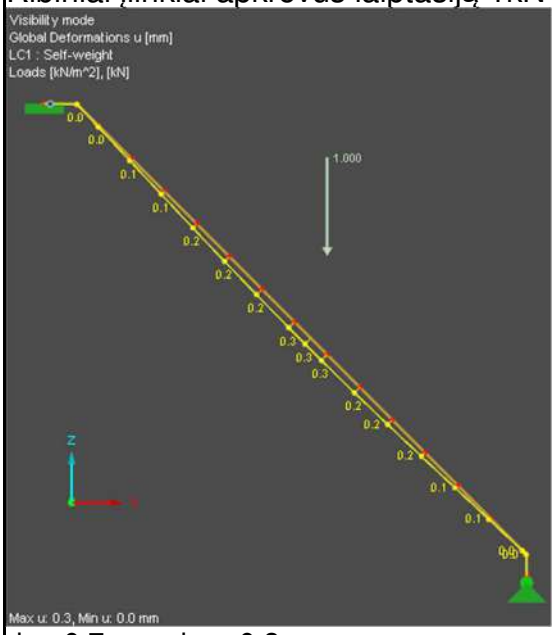
S3:

Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra:

$$d_{\lim} = \frac{l}{150} = \frac{5070}{150} = 33{,}8\ mm.$$



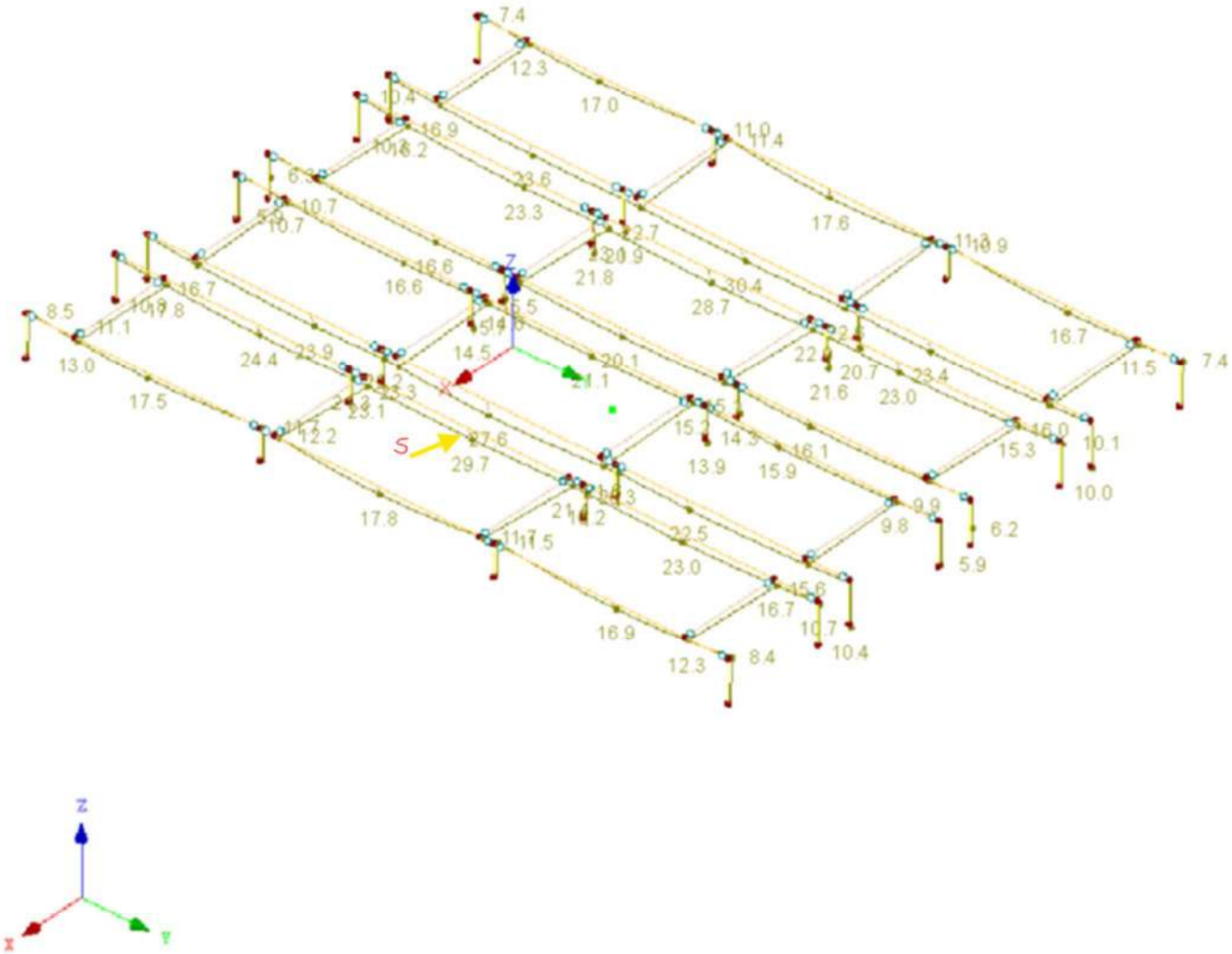
Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=18,0-1,3=16,7mm.
d_{lim}=33,8mm>d_{max}=16,7mm.
LP:
Laiptasija tikrinama pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 4 skyrių.
Ribiniai įlinkiai apkrovus laiptasiją 1kN apkrova – 0,7mm.



d_{lim}=0,7mm>d_{max}=0,3mm.
Išvada: tinkamumo ribiniai būviai tenkinami.

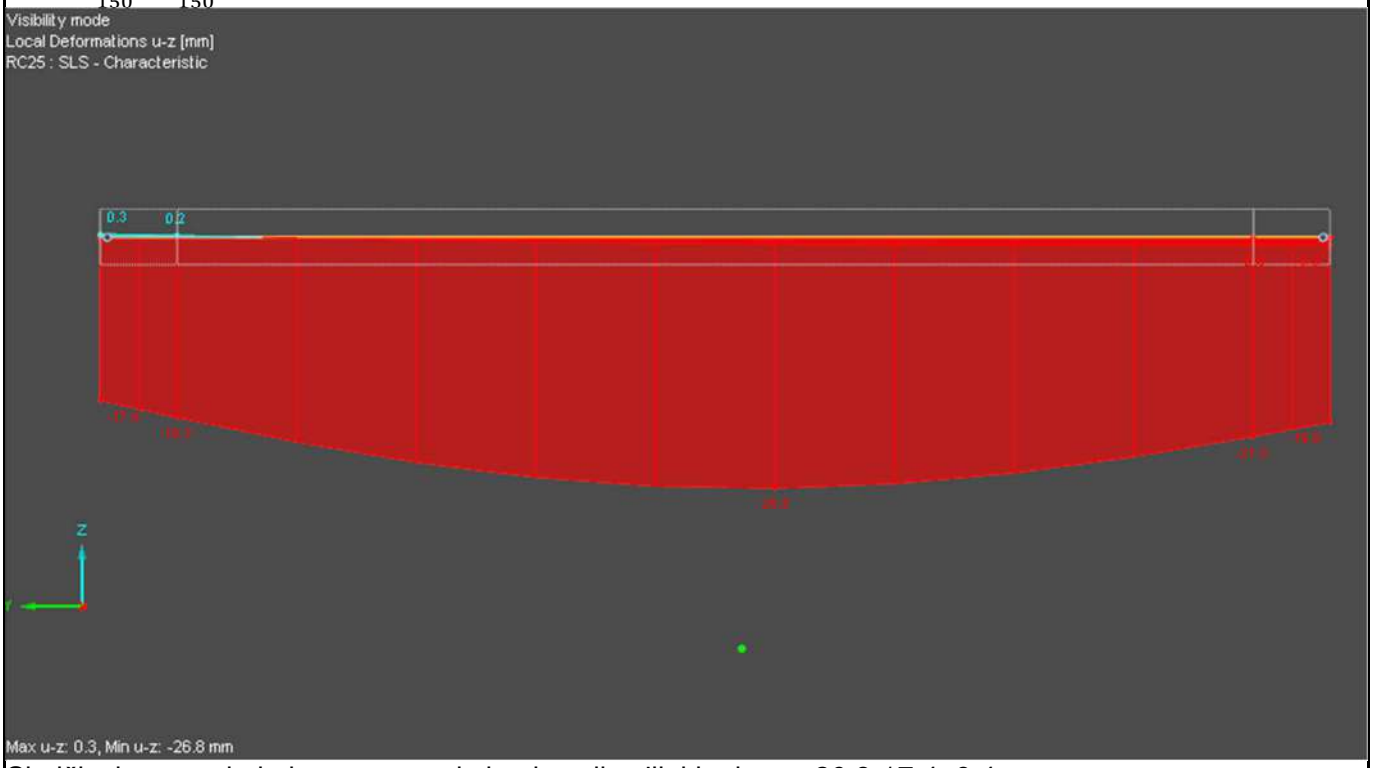
IRANGOS REMU ANT STOGO Global Deformations u
RC25 : SLS - Characteristic
Global Deformations u [mm]
Result Combinations: Min Values

Isometric



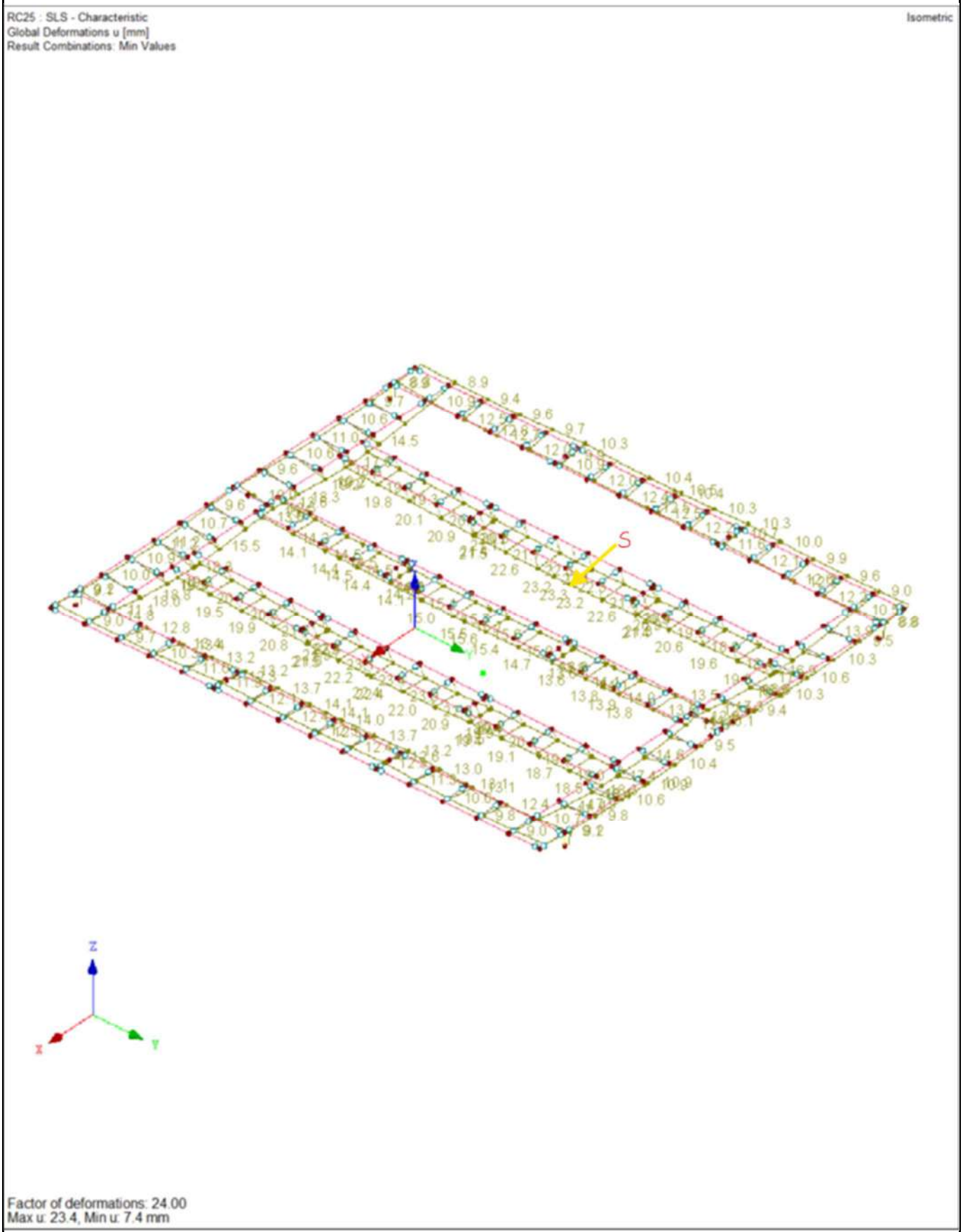
Factor of deformations: 12.00
Max u: 30.4, Min u: 5.6 mm

TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
SIJA S:
Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra:
$d_{\lim} = \frac{l}{150} = \frac{4660}{150} = 31{,}1\ mm.$

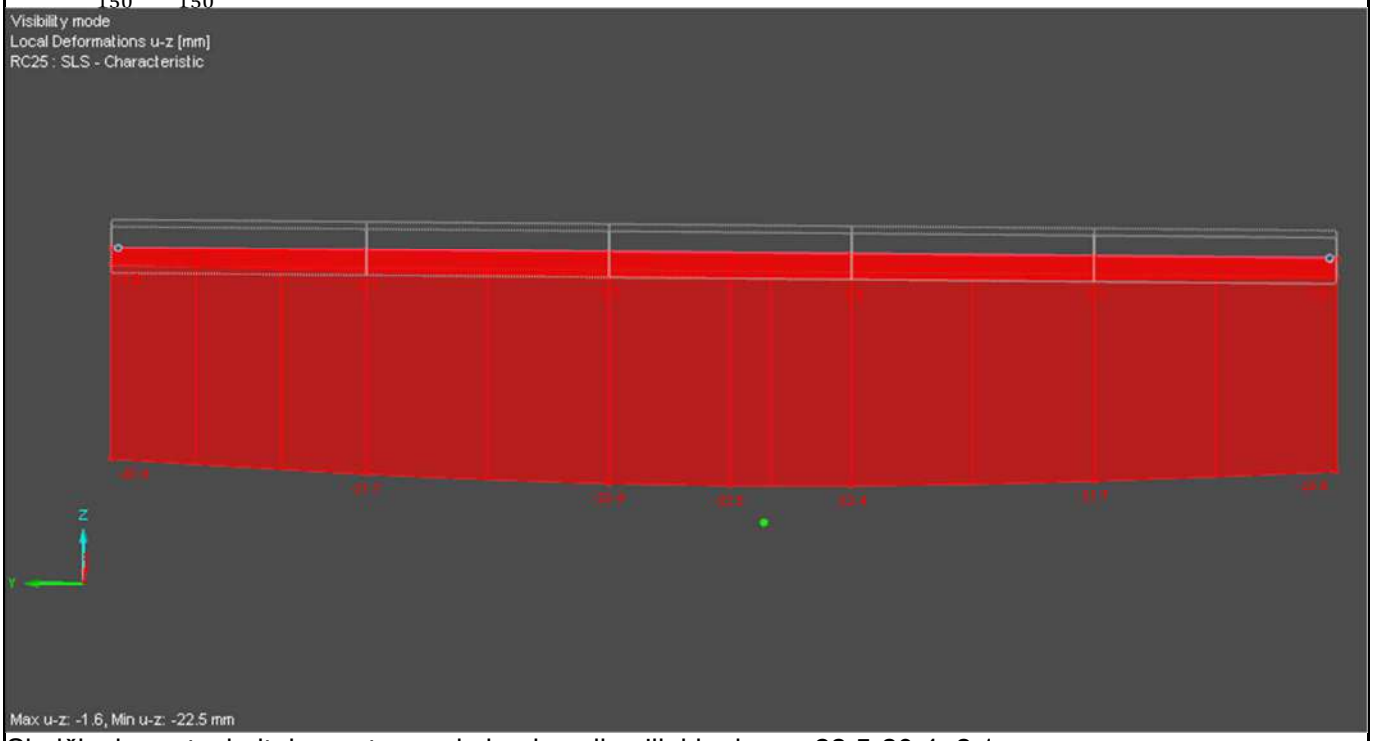


Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=26,8-17,4=9,4mm.
d_{lim}=31,1mm>d_{max}=9,4mm.
Išvada: tinkamumo ribiniai būviai tenkinami.

AIKSTELES ANT STOGO Global Deformations u



TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
SIJA S:
Ribinis sijos įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra:
$d_{\lim} = \frac{l}{150} = \frac{4700}{150} = 31{,}3\ mm.$



Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=22,5-20,4=2,1mm.
d_{lim}=31,3mm>d_{max}=2,1mm.
Išvada: tinkamumo ribiniai būviai tenkinami.

RF-STEEL EC3
CA1
DENGINIO SIJOS

1.1 General Data

Members to design:		
Sets of members to design:	1,110,114,115,119-122,127,128,140,141,161-164	
National Annex:	CEN	
Ultimate Limit State Design		
Result combinations to design:	RC23	RC1/p + 0RC22 + 0.2RC3 + 0RC4 + RC5 + 0.3RC6 + RC7
Serviceability Limit State Design		
Result combinations to design:	RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	SLS - Characteristic
	RC26	SLS - Frequent

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
2	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
					28.50	200.0

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
2	2	HE B 200 | Euronorm 53-62	I-section rolled	0.21	
3	2	HE B 200 | Euronorm 53-62	I-section rolled	0.95	
4	2	HE A 400 | Euronorm 53-62	I-section rolled	0.21	

1.6 Effective Lengths - Sets of Members

Set No.	Buckling Possible	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
		Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
1	x	x	1.00	6.085	x	1.00	6.085	x	1.0	1.0	6.085	6.085
110	x	x	1.00	6.085	x	1.00	6.085	x	1.0	1.0	6.085	6.085
114	x	x	1.00	6.100	x	1.00	6.100	x	1.0	1.0	6.100	6.100
115	x	x	1.00	6.100	x	1.00	6.100	x	1.0	1.0	6.100	6.100
119	x	x	1.00	5.900	x	1.00	5.900	x	1.0	1.0	5.900	5.900
120	x	x	1.00	5.900	x	1.00	5.900	x	1.0	1.0	5.900	5.900
121	x	x	1.00	7.209	x	1.00	7.209	x	1.0	1.0	7.209	7.209
122	x	x	1.00	7.209	x	1.00	7.209	x	1.0	1.0	7.209	7.209
127	x	x	1.00	6.100	x	1.00	6.100	x	1.0	1.0	6.100	6.100
128	x	x	1.00	6.100	x	1.00	6.100	x	1.0	1.0	6.100	6.100
140	x	x	1.00	4.605	x	1.00	4.605	x	1.0	1.0	4.605	4.605
141	x	x	1.00	4.605	x	1.00	4.605	x	1.0	1.0	4.605	4.605
161	x	x	1.00	4.591	x	1.00	4.591	x	1.0	1.0	4.591	4.591
162	x	x	1.00	4.591	x	1.00	4.591	x	1.0	1.0	4.591	4.591
163	x	x	1.00	4.591	x	1.00	4.591	x	1.0	1.0	4.591	4.591
164	x	x	1.00	4.591	x	1.00	4.591	x	1.0	1.0	4.591	4.591

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
1	List of Members	1	-	6.085	y, z	0.0	Beam
2	List of Members	110	-	6.085	y, z	0.0	Beam
3	List of Members	114	-	6.100	y, z	0.0	Beam
4	List of Members	115	-	6.100	y, z	0.0	Beam
5	List of Members	119	-	5.900	y, z	0.0	Beam
6	List of Members	120	-	5.900	y, z	0.0	Beam
7	List of Members	123	-	7.209	y, z	0.0	Beam
8	List of Members	124	-	7.209	y, z	0.0	Beam
9	List of Members	125	-	7.209	y, z	0.0	Beam
10	List of Members	126	-	7.209	y, z	0.0	Beam
11	List of Members	127	-	6.100	y, z	0.0	Beam
12	List of Members	128	-	6.100	y, z	0.0	Beam

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
2	HE B 200 | Euronorm 53-62						
	749	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	749	0.000	RC23	0.07	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	703	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	6	0.421	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	720	1.869	RC23	0.05	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	712	0.200	RC23	0.08	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	741	0.185	RC23	0.00	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9

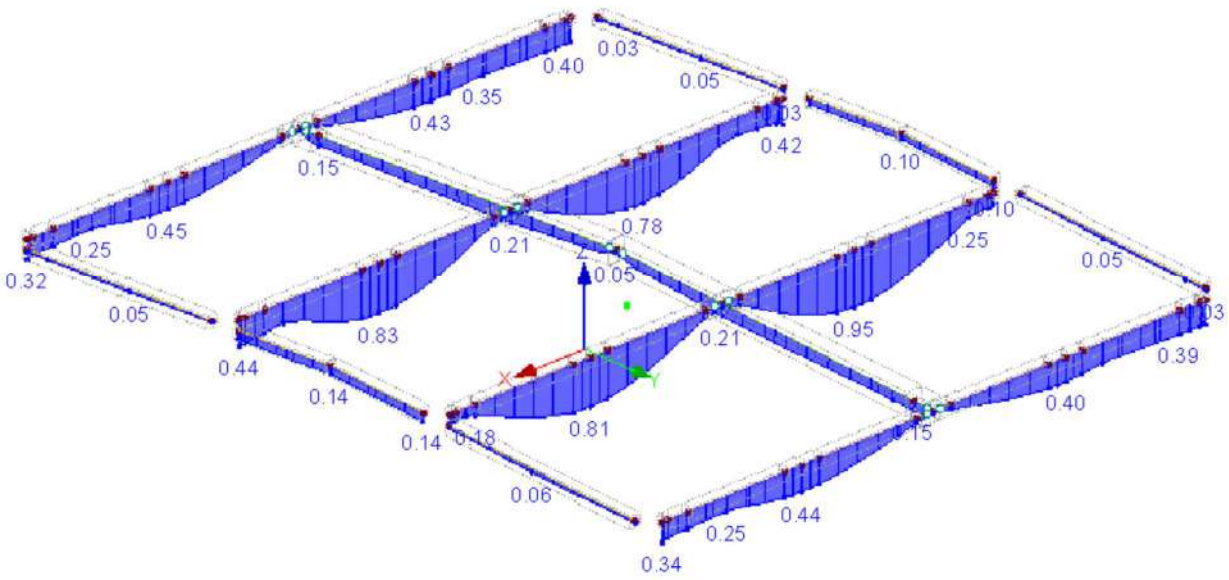
2.2 Design by Cross-Section

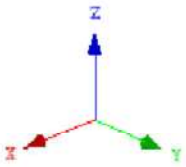
Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
	749	0.093	RC23	0.12	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	712	0.000	RC23	0.14	≤ 1	ST363)	Stability analysis - Biaxial bending acc. to 6.3.3, Method 2
	749	0.000	RC23	0.21	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	733	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	749	0.185	RC24	0.08	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	749	0.185	RC25	0.04	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	749	0.185	RC26	0.03	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	741	0.185	RC24	0.01	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	741	0.185	RC25	0.01	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	741	0.185	RC26	0.00	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
3	HE B 200 | Euronorm 53-62						
	22	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	54	0.000	RC23	0.12	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	29	0.423	RC23	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	22	0.000	RC23	0.06	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	22	0.000	RC23	0.00	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	10	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	54	0.000	RC23	0.12	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	29	0.423	RC23	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	29	1.692	RC23	0.01	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	56	0.000	RC23	0.12	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	747	0.000	RC23	0.01	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	747	0.100	RC23	0.01	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	56	0.000	RC23	0.17	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	22	0.000	RC23	0.22	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	25	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	33	0.370	RC24	0.95	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	33	0.370	RC25	0.48	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	33	0.370	RC26	0.30	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	295	0.188	RC24	0.19	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	295	0.188	RC25	0.10	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	22	0.000	RC26	0.02	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
4	HE A 400 | Euronorm 53-62						
	77	0.000	RC23	0.15	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	4	0.000	RC23	0.05	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	2	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	77	0.000	RC23	0.15	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	77	0.000	RC23	0.21	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section

Design Ratio

RF-STEEL EC3 CA1
Ultimate Limit State: Cross-Section Design, Stability Design
Serviceability Limit State: Deformations

Isometric





Max Design Ratio: 0.95

RF-STEEL EC3
CA2
STOGO RYĐIAI

1.1 General Data

Members to design:	95,112-115,206-209,224,226-231	
Sets of members to design:	157,158,171,172	
National Annex:	CEN	
Ultimate Limit State Design		
Result combinations to design:	RC23	RC1/p + 0RC22 + 0.2RC3 + 0RC4 + RC5 + 0.3RC6 + RC7
Serviceability Limit State Design		
Result combinations to design:	RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
2	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
5	2	QRO 120x5 | EN 10219-2:2006	Box rolled	0.31	

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
95	x	x	1.00	3.736	x	1.00	3.736	-	1.0	1.0	3.736	3.736
112	x	x	1.00	3.594	x	1.00	3.594	-	1.0	1.0	3.594	3.594
113	x	x	1.00	3.863	x	1.00	3.863	-	1.0	1.0	3.863	3.863
114	x	x	1.00	3.688	x	1.00	3.688	-	1.0	1.0	3.688	3.688
115	x	x	1.00	3.906	x	1.00	3.906	-	1.0	1.0	3.906	3.906
206	x	x	1.00	3.920	x	1.00	3.920	-	1.0	1.0	3.920	3.920
207	x	x	1.00	3.920	x	1.00	3.920	-	1.0	1.0	3.920	3.920
208	x	x	1.00	3.651	x	1.00	3.651	-	1.0	1.0	3.651	3.651
209	x	x	1.00	3.605	x	1.00	3.605	-	1.0	1.0	3.605	3.605
224	x	x	2.00	7.269	x	1.00	3.635	-	1.0	1.0	3.635	3.635
226	x	x	2.00	7.208	x	1.00	3.604	-	1.0	1.0	3.604	3.604
227	x	x	2.00	7.470	x	1.00	3.735	-	1.0	1.0	3.735	3.735
228	x	x	2.00	7.757	x	1.00	3.878	-	1.0	1.0	3.878	3.878
229	x	x	2.00	7.562	x	1.00	3.781	-	1.0	1.0	3.781	3.781
230	x	x	2.00	7.822	x	1.00	3.911	-	1.0	1.0	3.911	3.911
231	x	x	2.00	7.754	x	1.00	3.877	-	1.0	1.0	3.877	3.877

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
157	x	x	1.00	7.612	x	1.00	7.612	-	1.0	1.0	7.612	7.612
158	x	x	1.00	7.517	x	1.00	7.517	-	1.0	1.0	7.517	7.517
171	x	x	1.00	7.514	x	1.00	7.514	-	1.0	1.0	7.514	7.514
172	x	x	1.00	7.608	x	1.00	7.608	-	1.0	1.0	7.608	7.608

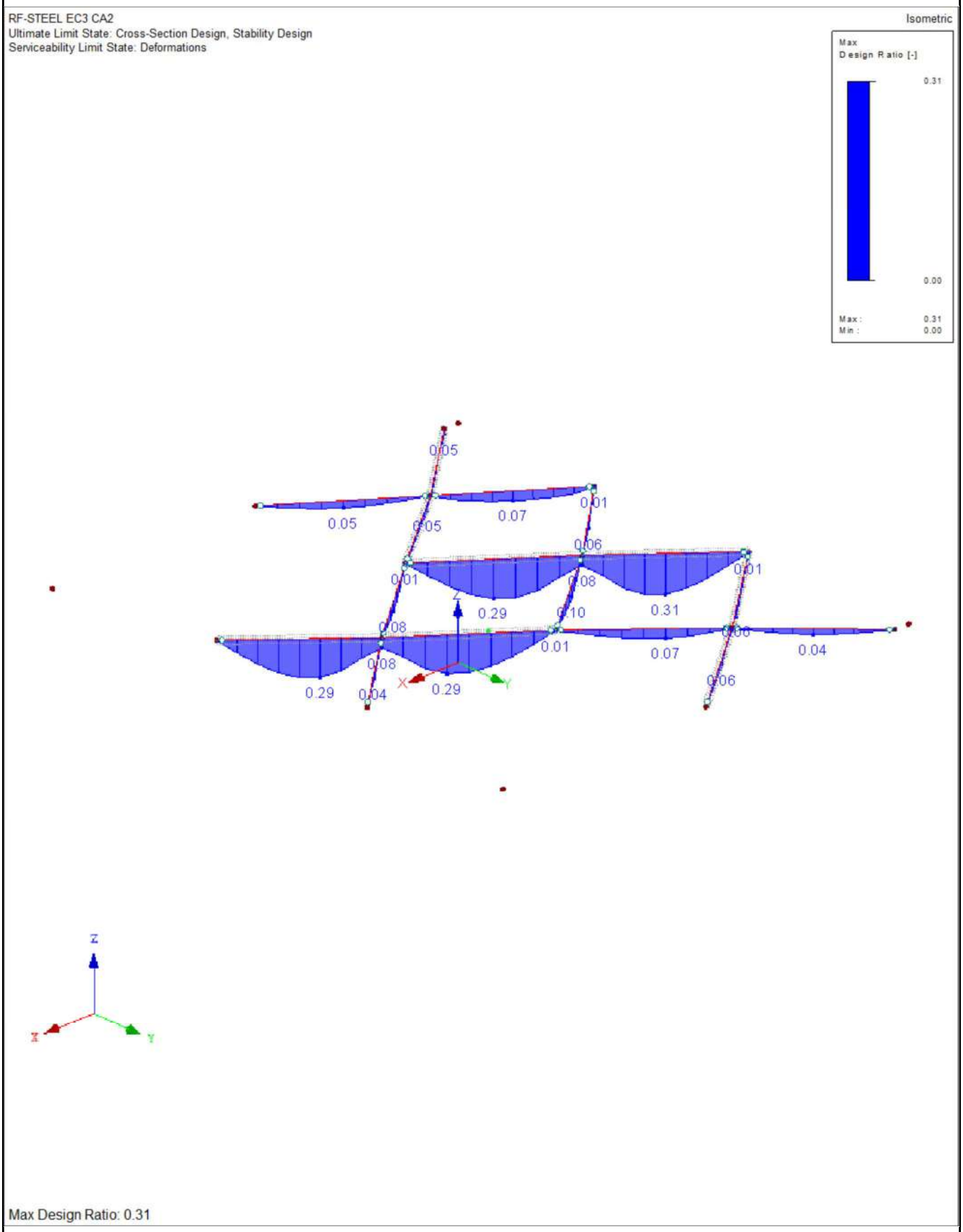
1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
1	List of Members	116	-	7.844	y, z	0.0	Beam
2	List of Members	117	-	6.200	y, z	0.0	Beam
3	List of Members	118	-	6.200	y, z	0.0	Beam
4	List of Members	129	-	7.844	y, z	0.0	Beam
5	Member	112	-	3.594	y, z	0.0	Beam
6	Member	113	-	3.863	y, z	0.0	Beam
7	Member	114	-	3.688	y, z	0.0	Beam
8	Member	115	-	3.906	y, z	0.0	Beam
9	Member	206	-	3.920	y, z	0.0	Beam
10	Member	207	-	3.920	y, z	0.0	Beam
11	Member	208	-	3.651	y, z	0.0	Beam
12	Member	209	-	3.605	y, z	0.0	Beam
13	Member	224	-	3.635	y, z	0.0	Beam
14	Member	226	-	3.604	y, z	0.0	Beam
15	Member	228	-	3.878	y, z	0.0	Beam
16	Member	230	-	3.911	y, z	0.0	Beam

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
5	QRO 120x5 | EN 10219-2:2006						
	224	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	226	3.604	RC23	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	112	0.898	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	208	3.651	RC23	0.08	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	95	0.000	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	95	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	208	3.651	RC23	0.08	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	231	0.000	RC23	0.01	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	114	3.688	RC23	0.08	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	231	0.000	RC23	0.01	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	112	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	114	1.844	RC24	0.31	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	208	1.826	RC24	0.02	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction

Design Ratio



RF-STEEL EC3
CA3
KOLONŘ RYĐIAI

1.1 General Data

Members to design:	103,248,249,251,577	
Sets of members to design:	19,111,154	
National Annex:	CEN	
Ultimate Limit State Design		
Result combinations to design:	RC23	RC1/p + 0RC22 + 0.2RC3 + 0RC4 + RC5 + 0.3RC6 + RC7
Serviceability Limit State Design		
Result combinations to design:	RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
2	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
14	2	QRO 140x6 | EN 10219-2:2006	Box rolled	0.20	
16	2	QRO 120x5 | EN 10219-2:2006	Box rolled	0.10	

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
103	x	x	1.00	2.659	x	1.00	2.659	-	1.0	1.0	2.659	2.659
248	x	x	1.00	4.800	x	1.00	4.800	-	1.0	1.0	4.800	4.800
249	x	x	1.00	6.866	x	1.00	6.866	-	1.0	1.0	6.866	6.866
251	x	x	1.00	2.659	x	1.00	2.659	-	1.0	1.0	2.659	2.659
577	x	x	1.00	6.866	x	1.00	6.866	-	1.0	1.0	6.866	6.866

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
19	x	x	1.00	6.200	x	1.00	6.200	-	1.0	1.0	6.200	6.200
111	x	x	1.00	6.200	x	1.00	6.200	-	1.0	1.0	6.200	6.200
154	x	x	1.00	5.318	x	1.00	5.318	-	1.0	1.0	5.318	5.318

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
1	List of Members	111	-	6.200	y, z	0.0	Beam
2	List of Members	130	-	6.200	y, z	0.0	Beam
3	List of Members	132	-	5.426	y, z	0.0	Beam
4	Member	220	-	0.325	y, z	0.0	Beam
5	Member	221	-	4.262	y, z	0.0	Beam
6	Member	235	-	6.627	y, z	0.0	Beam
7	Member	236	-	4.262	y, z	0.0	Beam
8	Member	248	-	4.800	y, z	0.0	Beam
9	Member	249	-	6.866	y, z	0.0	Beam
10	Member	103	-	2.659	y, z	0.0	Beam

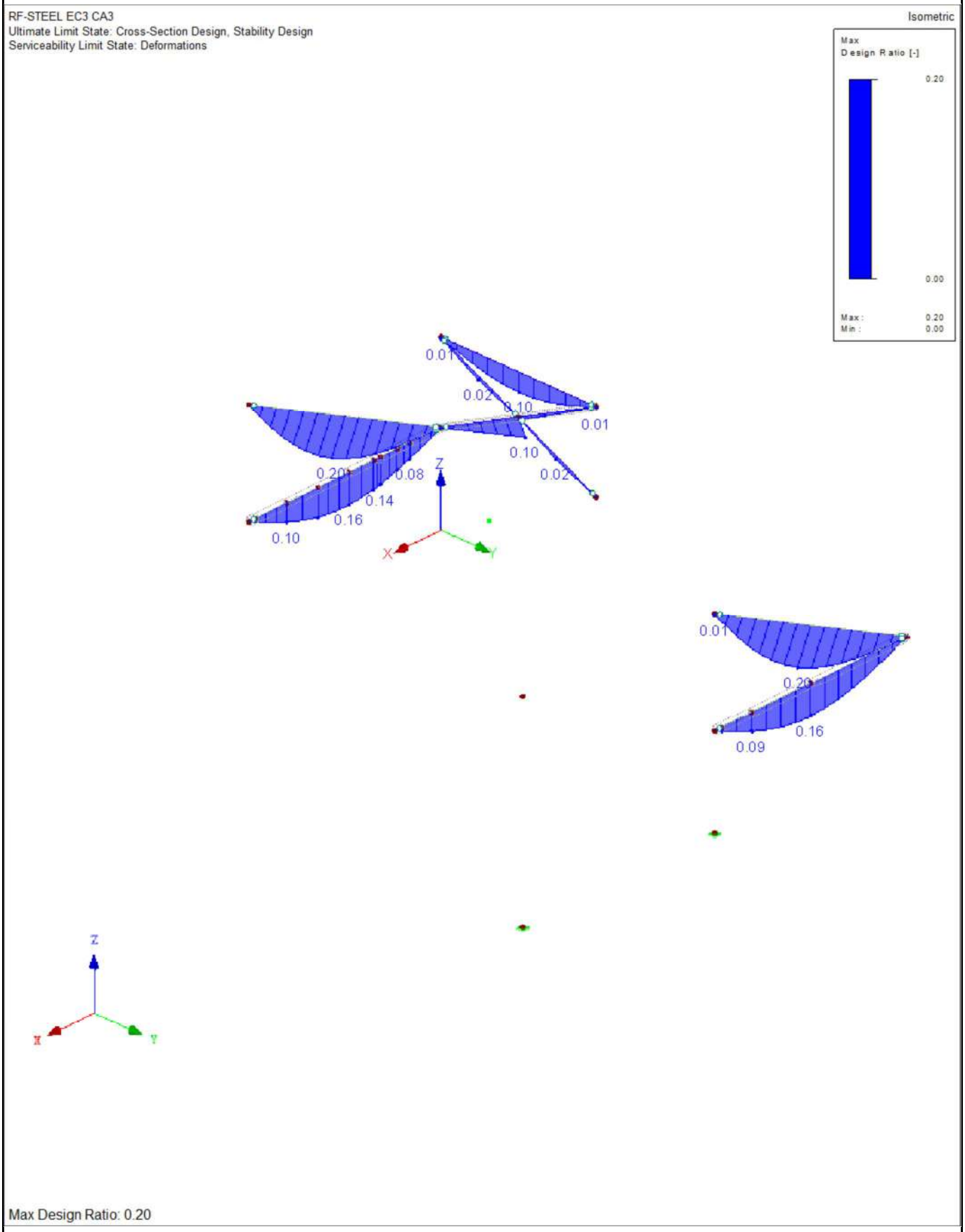
1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
11	Member	243	-	6.435	y, z	0.0	Beam
12	Member	251	-	2.659	y, z	0.0	Beam
13	List of Members	19	-	6.200	y, z	0.0	Beam
14	List of Members	154	-	5.318	y, z	0.0	Beam
15	Member	577	-	6.866	y, z	0.0	Beam

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
14	QRO 140x6 | EN 10219-2:2006						
	577	6.866	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	80	0.000	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	249	3.433	RC23	0.02	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	80	0.221	RC23	0.00	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	80	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	249	3.433	RC23	0.02	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	249	3.433	RC23	0.02	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	80	0.221	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	249	3.433	RC24	0.20	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	81	1.004	RC24	0.00	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
16	QRO 120x5 | EN 10219-2:2006						
	817	0.886	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	248	0.000	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	102	0.000	RC23	0.00	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	102	0.000	RC23	0.00	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	248	2.400	RC23	0.01	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	102	2.659	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	248	2.400	RC24	0.10	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	102	0.000	RC24	0.10	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction

Design Ratio



RF-STEEL EC3
CA4
ÁRANGOS RĖMAI ANT STOGO

1.1 General Data

Members to design:	118-125,127,129,132-143,146-157,180-188,190,191	
Sets of members to design:	82-105	
National Annex:	CEN	
Ultimate Limit State Design		
Result combinations to design:	RC23	RC1/p + 0RC22 + 0.2RC3 + 0RC4 + RC5 + 0.3RC6 + RC7
Serviceability Limit State Design		
Result combinations to design:	RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	SLS - Characteristic
	RC26	SLS - Frequent

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
2	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
9	2	IPE 120 | SZS	I-section rolled	0.07	
33	2	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210	Box rolled	0.34	
40	2	IPE 200 | Euronorm 19-57	I-section rolled	0.92	

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
118	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
119	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
120	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
121	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
122	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
123	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
124	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
125	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
127	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
129	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
132	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
133	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
134	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
135	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
136	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
137	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
138	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
139	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
140	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
141	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
142	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
143	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
146	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
147	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
148	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
149	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
150	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
151	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
152	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
153	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
154	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
155	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
156	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
157	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
180	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
181	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
182	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
183	x	x	1.00	2.115	x	1.00	2.115	x	1.0	1.0	2.115	2.115
184	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
185	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
186	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
187	x	x	1.00	0.850	x	1.00	0.850	-	1.0	1.0	0.850	0.850
188	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
190	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617
191	x	x	1.00	0.617	x	1.00	0.617	-	1.0	1.0	0.617	0.617

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
82	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
83	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
84	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
85	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
86	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
87	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
88	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
89	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
90	x	x	1.00	4.500	x	1.00	4.500	x	1.0	1.0	4.500	4.500
91	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
92	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
93	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
94	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
95	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
96	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
97	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
98	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
99	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
100	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
101	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
102	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
103	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
104	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
105	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length		Direct.	Precamber	Beam Type
			Manually	l [m]		e_0 [mm]	
1	List of Members		-	0.000	y, z	0.0	Beam
2	List of Members	82	-	4.800	y, z	0.0	Beam
3	List of Members	83	-	4.800	y, z	0.0	Beam
4	List of Members	84	-	4.800	y, z	0.0	Beam
5	List of Members	85	-	4.800	y, z	0.0	Beam
6	List of Members	86	-	4.800	y, z	0.0	Beam
7	List of Members	87	-	4.800	y, z	0.0	Beam

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
8	List of Members	88	-	4.800	y, z	0.0	Beam
9	List of Members	89	-	4.800	y, z	0.0	Beam
10	List of Members	90	-	4.500	y, z	0.0	Beam
11	List of Members	91	-	4.800	y, z	0.0	Beam
12	List of Members	92	-	4.800	y, z	0.0	Beam
13	List of Members	93	-	4.800	y, z	0.0	Beam
14	List of Members	94	-	4.800	y, z	0.0	Beam
15	List of Members	95	-	4.800	y, z	0.0	Beam
16	List of Members	96	-	4.800	y, z	0.0	Beam
17	List of Members	97	-	4.800	y, z	0.0	Beam
18	List of Members	98	-	4.800	y, z	0.0	Beam
19	List of Members	99	-	4.800	y, z	0.0	Beam
20	List of Members	100	-	4.800	y, z	0.0	Beam
21	List of Members	101	-	4.800	y, z	0.0	Beam
22	List of Members	102	-	4.800	y, z	0.0	Beam
23	List of Members	103	-	4.800	y, z	0.0	Beam
24	List of Members	104	-	4.800	y, z	0.0	Beam
25	List of Members	105	-	4.800	y, z	0.0	Beam
26	Member	118	-	2.115	y, z	0.0	Beam
27	Member	119	-	2.115	y, z	0.0	Beam
28	Member	120	-	2.115	y, z	0.0	Beam
29	Member	121	-	2.115	y, z	0.0	Beam
30	Member	122	-	0.850	y, z	0.0	Beam
31	Member	123	-	0.850	y, z	0.0	Beam
32	Member	124	-	0.850	y, z	0.0	Beam
33	Member	125	-	0.850	y, z	0.0	Beam
34	Member	126	-	0.617	y, z	0.0	Beam
35	Member	127	-	0.617	y, z	0.0	Beam
36	Member	128	-	0.617	y, z	0.0	Beam
37	Member	129	-	0.617	y, z	0.0	Beam
38	Member	132	-	2.115	y, z	0.0	Beam
39	Member	133	-	2.115	y, z	0.0	Beam
40	Member	134	-	2.115	y, z	0.0	Beam
41	Member	135	-	2.115	y, z	0.0	Beam
42	Member	136	-	0.850	y, z	0.0	Beam
43	Member	137	-	0.850	y, z	0.0	Beam
44	Member	138	-	0.850	y, z	0.0	Beam
45	Member	139	-	0.850	y, z	0.0	Beam
46	Member	140	-	0.617	y, z	0.0	Beam
47	Member	141	-	0.617	y, z	0.0	Beam
48	Member	142	-	0.617	y, z	0.0	Beam
49	Member	143	-	0.617	y, z	0.0	Beam
50	Member	146	-	2.115	y, z	0.0	Beam
51	Member	147	-	2.115	y, z	0.0	Beam
52	Member	148	-	2.115	y, z	0.0	Beam
53	Member	149	-	2.115	y, z	0.0	Beam
54	Member	150	-	0.850	y, z	0.0	Beam
55	Member	151	-	0.850	y, z	0.0	Beam
56	Member	152	-	0.850	y, z	0.0	Beam
57	Member	153	-	0.850	y, z	0.0	Beam
58	Member	154	-	0.617	y, z	0.0	Beam
59	Member	155	-	0.617	y, z	0.0	Beam
60	Member	156	-	0.617	y, z	0.0	Beam
61	Member	157	-	0.617	y, z	0.0	Beam
62	Member	180	-	2.115	y, z	0.0	Beam
63	Member	181	-	2.115	y, z	0.0	Beam
64	Member	182	-	2.115	y, z	0.0	Beam
65	Member	183	-	2.115	y, z	0.0	Beam
66	Member	184	-	0.850	y, z	0.0	Beam
67	Member	185	-	0.850	y, z	0.0	Beam
68	Member	186	-	0.850	y, z	0.0	Beam
69	Member	188	-	0.617	y, z	0.0	Beam

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
70	Member	189	-	0.617	y, z	0.0	Beam
71	Member	190	-	0.617	y, z	0.0	Beam
72	Member	191	-	0.617	y, z	0.0	Beam

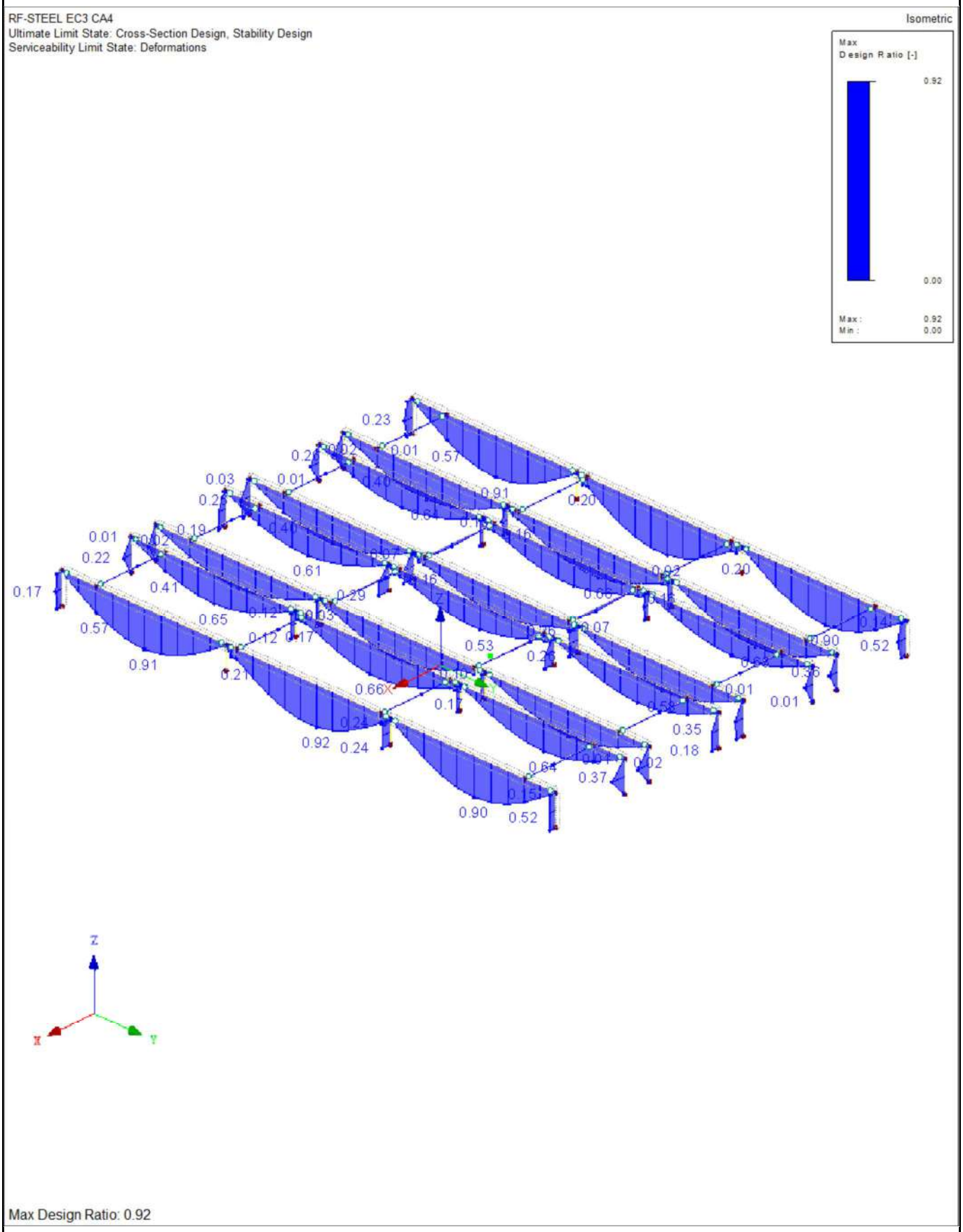
2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
9	IPE 120 | SZS						
	118	0.423	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	118	0.846	RC23	0.00	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	118	0.846	RC23	0.00	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	118	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	133	1.269	RC24	0.07	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	133	1.269	RC25	0.03	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	133	1.269	RC26	0.01	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	132	0.423	RC24	0.00	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	132	0.423	RC25	0.00	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	132	0.423	RC26	0.00	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
33	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210						
	125	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	191	0.000	RC23	0.02	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	154	0.000	RC23	0.07	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	185	0.000	RC23	0.00	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	122	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	150	0.000	RC23	0.17	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	154	0.000	RC23	0.12	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	129	0.617	RC23	0.02	≤ 1	ST301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	129	0.617	RC23	0.02	≤ 1	ST311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	154	0.000	RC23	0.29	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	122	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	137	0.425	RC24	0.26	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	137	0.425	RC25	0.13	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	137	0.425	RC26	0.08	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	186	0.425	RC24	0.34	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	186	0.425	RC25	0.18	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	186	0.425	RC26	0.04	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
40	IPE 200 | Euronorm 19-57						
	177	3.800	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	58	0.000	RC23	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	131	1.000	RC23	0.07	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	42	0.150	RC23	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	168	0.000	RC23	0.03	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	8	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	131	1.000	RC23	0.07	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	42	0.150	RC23	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	19	1.867	RC23	0.01	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	48	0.000	RC23	0.07	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	168	0.150	RC23	0.00	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	45	4.200	RC23	0.01	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	17	0.150	RC23	0.20	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	168	0.150	RC23	0.21	≤ 1	ST363)	Stability analysis - Biaxial bending acc. to 6.3.3, Method 2

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
	8	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	175	2.333	RC24	0.92	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	175	2.333	RC25	0.47	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	175	2.333	RC26	0.27	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	20	1.867	RC24	0.49	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	20	1.867	RC25	0.25	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	20	1.867	RC26	0.08	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction

Design Ratio



RF-STEEL EC3
CA5
AIKĐTELË ANT STOGO

1.1 General Data

Members to design:	223,239,264,289-291,309,359,362,367-369,371,374,377,380,383,386,389,392,395,398,401,404,407,410,412,414,415,420,421,426,427,432,433,438,439,444,445,450,451,456,457,462,463,468,469,474,476,479,482,485,488,491,494,497,500,503,506,509,512,515,518,521,524,527,530,533,536,539,542,545,548,551,554,557,560,563,711,724,733,754,755,758,759,766,767,770,771,774,775,786,787,796,798,800,802,806,808	
Sets of members to design:	31-81,106-109,142-152,159,160	
National Annex:	CEN	
Ultimate Limit State Design		
Result combinations to design:	RC23	RC1/p + 0RC22 + 0.2RC3 + 0RC4 + RC5 + 0.3RC6 + RC7
Serviceability Limit State Design		
Result combinations to design:	RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	SLS - Characteristic
	RC26	SLS - Frequent

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
2	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
2	2	HE B 200 | Euronorm 53-62	I-section rolled	0.03	
19	2	IPE 160 | Euronorm 19-57	I-section rolled	0.57	
21	2	UPN 120 | ArcelorMittal (EN 10365:2017)	Channel rolled	0.09	
30	2	QRO 80x80x4 | ALUKÖNIGSTAHL - EN 10210	Box rolled	0.22	
31	2	HE A 140 | Euronorm 53-62	I-section rolled	0.02	
32	2	UPN 180 | ArcelorMittal (EN 10365:2017)	Channel rolled	0.72	
33	2	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210	Box rolled	0.23	
40	2	IPE 200 | Euronorm 19-57	I-section rolled	0.01	

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
223	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
239	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
264	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
289	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
290	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
291	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
309	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
359	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
362	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
367	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
368	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
369	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
371	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
374	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
377	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
380	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
383	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
386	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
389	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
392	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
395	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
398	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
401	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
404	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
407	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
410	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
412	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
414	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
415	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
420	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
421	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
426	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
427	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
432	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
433	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
438	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
439	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
444	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
445	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
450	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
451	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
456	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
457	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
462	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
463	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
468	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
469	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
474	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
476	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
479	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
482	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
485	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
488	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
491	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
494	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
497	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
500	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
503	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
506	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
509	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
512	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
515	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
518	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
521	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
524	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
527	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
530	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
533	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
536	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
539	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
542	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
545	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
548	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
551	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
554	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
557	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
560	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
563	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
711	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
724	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
733	x	x	1.00	0.200	x	1.00	0.200	x	1.0	1.0	0.200	0.200
754	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
755	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
758	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
759	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
766	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
767	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
770	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
771	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
774	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
775	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
786	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
787	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
796	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
798	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
800	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
802	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
806	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371
808	x	x	1.00	0.371	x	1.00	0.371	-	1.0	1.0	0.371	0.371

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
31	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
32	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
33	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
34	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
35	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
36	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
37	x	x	1.00	5.350	x	1.00	5.350	x	1.0	1.0	5.350	5.350
38	x	x	1.00	5.405	x	1.00	5.405	x	1.0	1.0	5.405	5.405
39	x	x	1.00	3.900	x	1.00	3.900	x	1.0	1.0	3.900	3.900
40	x	x	1.00	3.900	x	1.00	3.900	x	1.0	1.0	3.900	3.900
41	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
42	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
43	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
44	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
45	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
46	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850
47	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850
48	x	x	1.00	5.350	x	1.00	5.350	x	1.0	1.0	5.350	5.350
49	x	x	1.00	5.405	x	1.00	5.405	x	1.0	1.0	5.405	5.405
50	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
51	x	x	1.00	5.350	x	1.00	5.350	x	1.0	1.0	5.350	5.350
52	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850
53	x	x	1.00	5.395	x	1.00	5.395	x	1.0	1.0	5.395	5.395
54	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
55	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
56	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
57	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
58	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
59	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
60	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
61	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
62	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
63	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
64	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
65	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
66	x	x	1.00	3.900	x	1.00	3.900	x	1.0	1.0	3.900	3.900
67	x	x	1.00	3.900	x	1.00	3.900	x	1.0	1.0	3.900	3.900
68	x	x	1.00	5.395	x	1.00	5.395	x	1.0	1.0	5.395	5.395
69	x	x	1.00	5.350	x	1.00	5.350	x	1.0	1.0	5.350	5.350
70	x	x	1.00	0.900	x	1.00	0.900	x	1.0	1.0	0.900	0.900
71	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
72	x	x	1.00	0.805	x	1.00	0.805	x	1.0	1.0	0.805	0.805
73	x	x	1.00	1.000	x	1.00	1.000	x	1.0	1.0	1.000	1.000
74	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
75	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
76	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
77	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
78	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
79	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
80	x	x	1.00	0.795	x	1.00	0.795	x	1.0	1.0	0.795	0.795
81	x	x	1.00	1.221	x	1.00	1.221	-	1.0	1.0	1.221	1.221
106	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
107	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
108	x	x	1.00	3.900	x	1.00	3.900	x	1.0	1.0	3.900	3.900
109	x	x	1.00	3.900	x	1.00	3.900	x	1.0	1.0	3.900	3.900
142	x	x	1.00	0.740	x	1.00	0.740	x	1.0	1.0	0.740	0.740
143	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850
144	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850
145	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
146	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
147	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
148	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
149	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
150	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
151	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
152	x	x	1.00	0.750	x	1.00	0.750	x	1.0	1.0	0.750	0.750
159	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850
160	x	x	1.00	0.850	x	1.00	0.850	x	1.0	1.0	0.850	0.850

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length		Direct.	Precamber	Beam Type
			Manually	l [m]		e_0 [mm]	
1	List of Members	31	-	4.800	y, z	0.0	Beam
2	List of Members	32	-	4.800	y, z	0.0	Beam
3	List of Members	33	-	4.800	y, z	0.0	Beam
4	List of Members	34	-	4.800	y, z	0.0	Beam
5	List of Members	35	-	4.800	y, z	0.0	Beam
6	List of Members	36	-	4.800	y, z	0.0	Beam
7	List of Members	37	-	5.350	y, z	0.0	Beam
8	List of Members	38	-	5.405	y, z	0.0	Beam
9	List of Members	39	-	3.900	y, z	0.0	Beam
10	List of Members	40	-	3.900	y, z	0.0	Beam
11	List of Members	41	-	4.800	y, z	0.0	Beam
12	List of Members	42	-	4.800	y, z	0.0	Beam
13	List of Members	43	-	0.750	y, z	0.0	Beam
14	List of Members	44	-	3.800	y, z	0.0	Beam
15	List of Members	45	-	3.800	y, z	0.0	Beam
16	List of Members	46	-	0.850	y, z	0.0	Beam
17	List of Members	47	-	0.850	y, z	0.0	Beam
18	List of Members	48	-	5.350	y, z	0.0	Beam
19	List of Members	49	-	5.405	y, z	0.0	Beam
20	List of Members	50	-	3.800	y, z	0.0	Beam
21	List of Members	51	-	5.350	y, z	0.0	Beam
22	List of Members	52	-	0.850	y, z	0.0	Beam

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
23	List of Members	53	-	5.395	y, z	0.0	Beam
24	List of Members	54	-	4.800	y, z	0.0	Beam
25	List of Members	55	-	4.800	y, z	0.0	Beam
26	List of Members	56	-	3.800	y, z	0.0	Beam
27	List of Members	57	-	3.800	y, z	0.0	Beam
28	List of Members	58	-	3.800	y, z	0.0	Beam
29	List of Members	59	-	4.800	y, z	0.0	Beam
30	List of Members	60	-	4.800	y, z	0.0	Beam
31	List of Members	61	-	4.800	y, z	0.0	Beam
32	List of Members	62	-	4.800	y, z	0.0	Beam
33	List of Members	63	-	0.850	y, z	0.0	Beam
34	List of Members	64	-	4.800	y, z	0.0	Beam
35	List of Members	65	-	4.800	y, z	0.0	Beam
36	List of Members	66	-	3.900	y, z	0.0	Beam
37	List of Members	67	-	3.900	y, z	0.0	Beam
38	List of Members	68	-	5.395	y, z	0.0	Beam
39	List of Members	69	-	5.350	y, z	0.0	Beam
40	List of Members	70	-	0.900	y, z	0.0	Beam
41	List of Members	71	-	0.805	y, z	0.0	Beam
42	List of Members	72	-	0.805	y, z	0.0	Beam
43	List of Members	73	-	1.000	y, z	0.0	Beam
44	List of Members	74	-	0.750	y, z	0.0	Beam
45	List of Members	75	-	0.750	y, z	0.0	Beam
46	List of Members	76	-	0.750	y, z	0.0	Beam
47	List of Members	77	-	0.750	y, z	0.0	Beam
48	List of Members	78	-	0.750	y, z	0.0	Beam
49	List of Members	79	-	0.795	y, z	0.0	Beam
50	List of Members	80	-	0.795	y, z	0.0	Beam
51	List of Members	81	-	1.221	y, z	0.0	Beam
52	List of Members	106	-	4.800	y, z	0.0	Beam
53	List of Members	107	-	4.800	y, z	0.0	Beam
54	List of Members	108	-	3.900	y, z	0.0	Beam
55	List of Members	109	-	3.900	y, z	0.0	Beam
56	Member	223	-	0.900	y, z	0.0	Beam
57	Member	239	-	0.900	y, z	0.0	Beam
58	Member	254	-	0.375	y, z	0.0	Beam
59	Member	255	-	0.300	y, z	0.0	Beam
60	Member	256	-	0.080	y, z	0.0	Beam
61	Member	257	-	0.371	y, z	0.0	Beam
62	Member	264	-	0.371	y, z	0.0	Beam
63	Member	265	-	0.300	y, z	0.0	Beam
64	Member	274	-	0.070	y, z	0.0	Beam
65	Member	283	-	0.300	y, z	0.0	Beam
66	Member	284	-	0.080	y, z	0.0	Beam
67	Member	289	-	0.371	y, z	0.0	Beam
68	Member	290	-	0.371	y, z	0.0	Beam
69	Member	291	-	0.371	y, z	0.0	Beam
70	Member	300	-	0.295	y, z	0.0	Beam
71	Member	301	-	0.065	y, z	0.0	Beam
72	Member	306	-	0.300	y, z	0.0	Beam
73	Member	307	-	0.070	y, z	0.0	Beam
74	Member	309	-	0.900	y, z	0.0	Beam
75	Member	359	-	0.900	y, z	0.0	Beam
76	Member	362	-	0.900	y, z	0.0	Beam
77	Member	367	-	1.000	y, z	0.0	Beam
78	Member	368	-	1.000	y, z	0.0	Beam
79	Member	369	-	1.000	y, z	0.0	Beam
80	Member	371	-	1.000	y, z	0.0	Beam
81	Member	374	-	1.000	y, z	0.0	Beam
82	Member	377	-	1.000	y, z	0.0	Beam
83	Member	380	-	1.000	y, z	0.0	Beam
84	Member	383	-	1.000	y, z	0.0	Beam

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
85	Member	386	-	1.000	y, z	0.0	Beam
86	Member	389	-	1.000	y, z	0.0	Beam
87	Member	392	-	0.900	y, z	0.0	Beam
88	Member	395	-	0.900	y, z	0.0	Beam
89	Member	398	-	0.900	y, z	0.0	Beam
90	Member	401	-	0.900	y, z	0.0	Beam
91	Member	404	-	0.900	y, z	0.0	Beam
92	Member	407	-	0.795	y, z	0.0	Beam
93	Member	410	-	0.805	y, z	0.0	Beam
94	Member	412	-	0.795	y, z	0.0	Beam
95	Member	414	-	0.805	y, z	0.0	Beam
96	Member	415	-	0.795	y, z	0.0	Beam
97	Member	420	-	0.805	y, z	0.0	Beam
98	Member	421	-	0.795	y, z	0.0	Beam
99	Member	426	-	0.805	y, z	0.0	Beam
100	Member	427	-	0.795	y, z	0.0	Beam
101	Member	432	-	0.805	y, z	0.0	Beam
102	Member	433	-	0.795	y, z	0.0	Beam
103	Member	438	-	0.805	y, z	0.0	Beam
104	Member	439	-	0.795	y, z	0.0	Beam
105	Member	444	-	0.805	y, z	0.0	Beam
106	Member	445	-	0.795	y, z	0.0	Beam
107	Member	450	-	0.805	y, z	0.0	Beam
108	Member	451	-	0.795	y, z	0.0	Beam
109	Member	456	-	0.805	y, z	0.0	Beam
110	Member	457	-	0.795	y, z	0.0	Beam
111	Member	462	-	0.805	y, z	0.0	Beam
112	Member	463	-	0.795	y, z	0.0	Beam
113	Member	468	-	0.805	y, z	0.0	Beam
114	Member	469	-	0.795	y, z	0.0	Beam
115	Member	474	-	0.805	y, z	0.0	Beam
116	Member	476	-	0.750	y, z	0.0	Beam
117	Member	479	-	0.750	y, z	0.0	Beam
118	Member	482	-	0.750	y, z	0.0	Beam
119	Member	485	-	0.750	y, z	0.0	Beam
120	Member	488	-	0.750	y, z	0.0	Beam
121	Member	491	-	0.750	y, z	0.0	Beam
122	Member	494	-	0.750	y, z	0.0	Beam
123	Member	497	-	0.750	y, z	0.0	Beam
124	Member	500	-	0.750	y, z	0.0	Beam
125	Member	503	-	0.750	y, z	0.0	Beam
126	Member	506	-	0.750	y, z	0.0	Beam
127	Member	509	-	0.750	y, z	0.0	Beam
128	Member	512	-	0.750	y, z	0.0	Beam
129	Member	515	-	0.750	y, z	0.0	Beam
130	Member	518	-	0.750	y, z	0.0	Beam
131	Member	521	-	0.750	y, z	0.0	Beam
132	Member	524	-	0.750	y, z	0.0	Beam
133	Member	527	-	0.750	y, z	0.0	Beam
134	Member	530	-	0.750	y, z	0.0	Beam
135	Member	533	-	0.750	y, z	0.0	Beam
136	Member	536	-	0.750	y, z	0.0	Beam
137	Member	539	-	0.750	y, z	0.0	Beam
138	Member	542	-	0.750	y, z	0.0	Beam
139	Member	545	-	0.750	y, z	0.0	Beam
140	Member	548	-	0.750	y, z	0.0	Beam
141	Member	551	-	0.750	y, z	0.0	Beam
142	Member	554	-	0.750	y, z	0.0	Beam
143	Member	557	-	0.750	y, z	0.0	Beam
144	Member	560	-	0.750	y, z	0.0	Beam
145	Member	563	-	0.750	y, z	0.0	Beam

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
2	HE B 200 | Euronorm 53-62						
	733	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	733	0.000	RC23	0.03	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	733	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	733	0.200	RC23	0.01	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	733	0.000	RC23	0.00	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
19	IPE 160 | Euronorm 19-57						
	286	0.185	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	287	0.000	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	409	0.000	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	409	0.561	RC23	0.02	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	286	0.370	RC23	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	332	0.425	RC23	0.02	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	233	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	409	0.561	RC23	0.02	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	286	0.370	RC23	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	287	0.185	RC23	0.05	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	287	0.000	RC23	0.01	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	287	0.000	RC23	0.06	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	233	0.439	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	778	0.150	RC24	0.11	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	778	0.150	RC25	0.06	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	332	0.000	RC26	0.02	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	333	0.000	RC24	0.57	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	333	0.000	RC25	0.29	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	333	0.000	RC26	0.25	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
21	UPN 120 | ArcelorMittal (EN 10365:2017)						
	377	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	374	0.000	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	223	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	518	0.375	RC24	0.09	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	518	0.375	RC25	0.05	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	518	0.375	RC26	0.01	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	407	0.397	RC24	0.05	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	407	0.397	RC25	0.02	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	407	0.397	RC26	0.01	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
30	QRO 80x80x4 | ALUKÖNIGSTAHL - EN 10210						
	800	0.000	RC23	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	806	0.371	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	800	0.000	RC23	0.22	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	800	0.000	RC23	0.06	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	808	0.000	RC23	0.03	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	796	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	800	0.000	RC23	0.22	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	800	0.000	RC23	0.20	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	808	0.000	RC23	0.10	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
31	HE A 140 | Euronorm 53-62						
	790	0.000	RC23	0.02	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	804	0.190	RC23	0.01	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	807	0.370	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	785	0.000	RC23	0.00	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	254	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)

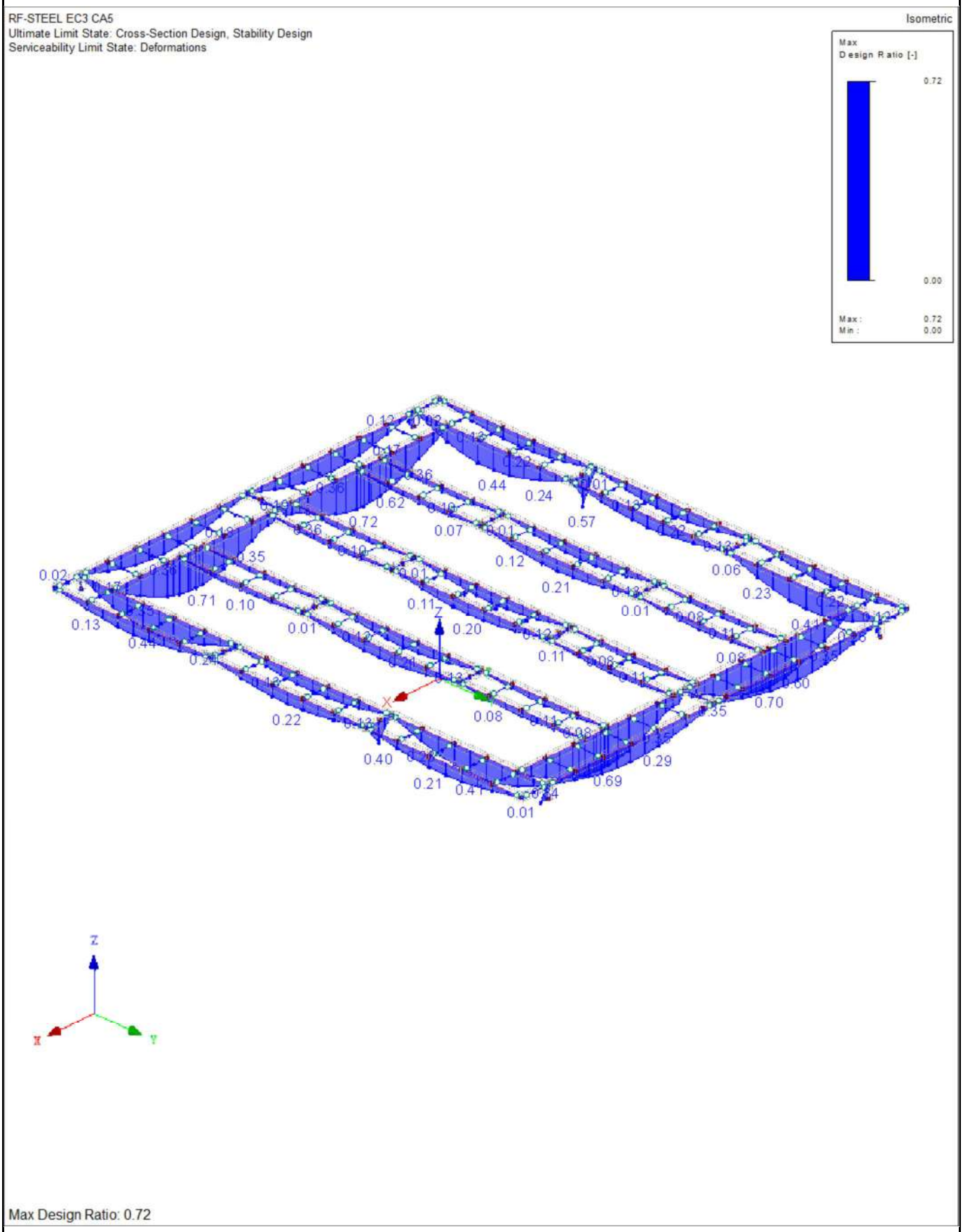
2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
	804	0.190	RC23	0.01	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	785	0.375	RC23	0.02	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	790	0.055	RC23	0.00	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	784	0.375	RC23	0.02	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
32	UPN 180 | ArcelorMittal (EN 10365:2017)						
	200	0.397	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	335	0.000	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	347	0.000	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	384	0.270	RC23	0.08	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	104	0.000	RC23	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	107	1.000	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	328	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	104	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	384	0.270	RC23	0.08	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	104	0.000	RC23	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	372	0.685	RC23	0.10	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	442	0.475	RC23	0.03	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	319	0.045	RC23	0.01	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	361	0.900	RC23	0.06	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	417	0.475	RC23	0.05	≤ 1	ST332)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.2(4) - General Section
	217	0.105	RC23	0.28	≤ 1	ST333)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.2 - General Section
	104	0.023	RC25	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	217	0.210	RC24	0.72	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	217	0.210	RC25	0.36	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	217	0.210	RC26	0.23	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	204	0.262	RC24	0.12	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	204	0.262	RC25	0.06	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	361	0.900	RC26	0.04	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
33	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210						
	187	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	290	0.000	RC23	0.02	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	291	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	187	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	187	0.000	RC23	0.13	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	187	0.425	RC23	0.02	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	187	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	187	0.425	RC24	0.23	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	187	0.425	RC25	0.12	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	187	0.425	RC26	0.07	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	187	0.850	RC24	0.04	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	187	0.850	RC25	0.02	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	187	0.850	RC26	0.01	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
40	IPE 200 | Euronorm 19-57						
	753	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	256	0.000	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	82	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	764	0.150	RC23	0.00	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	765	0.000	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	84	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
	764	0.150	RC23	0.00	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	764	0.150	RC23	0.00	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1

Design Ratio



RF-STEEL EC3
CA6
AIKĐTELËS VIDUJE

1.1 General Data

Members to design:	244,568,570,571,613,623,830-832,842,844,845,851,852,865,869,872,875,878,912-914	
Sets of members to design:	2,3,5-7,10,11,13-15,17,18,20-25,27-30,168,173,174,176,177,179,180,184,188,190,191,193-195	
National Annex:	CEN	
Ultimate Limit State Design		
Result combinations to design:	RC23	RC1/p + 0RC22 + 0.2RC3 + 0RC4 + RC5 + 0.3RC6 + RC7
Serviceability Limit State Design		
Result combinations to design:	RC24	ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC25	SLS - Characteristic
	RC26	SLS - Frequent

1.2 Materials

Matl. No.	Material Description	E- Modulus E [kN/cm²]	Shear Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Yield Stress f_{yk} [kN/cm²]	Max. Thickness t [mm]
2	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0
4	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0
5	Steel S 235 | EN 10025-2:2004-11	21000.00	8076.92	0.300	23.50	16.0
					22.50	40.0
					21.50	100.0
					19.50	150.0
					18.50	200.0
					17.50	250.0
					16.50	400.0
6	Steel S 355 JR | EN 10025-2:2004-11	21000.00	8076.92	0.300	35.50	3.0
					35.50	16.0
					34.50	40.0
					33.50	63.0
					32.50	80.0
					31.50	100.0
					29.50	150.0
					28.50	200.0

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
10	2	HE A 180 | Euronorm 53-62	I-section rolled	0.04	
17	2	QRO 100x5 | EN 10210-2:2006	Box rolled	0.12	
18	2	UPN 160 | ArcelorMittal (EN 10365:2017)	Channel rolled	0.12	
21	2	UPN 120 | ArcelorMittal (EN 10365:2017)	Channel rolled	0.03	
23	4	QRO 120x5 | EN 10219-2:2006	Box rolled	0.03	
25	5	UPE 160 | EN 10279	Channel rolled	0.07	
30	2	QRO 80x80x4 | ALUKÖNIGSTAHL - EN 10210	Box rolled	0.00	

1.3 Cross-Sections

Sect. No.	Matl. No.	Cross-Section Description	Cross-Section Type	Max Design Ratio	Comment
31	2	HE A 140 | Euronorm 53-62	I-section rolled	0.40	
33	2	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210	Box rolled	0.44	
34	2	HE A 240 | Euronorm 53-62	I-section rolled	0.87	
45	2	HE A 200 | Euronorm 53-62	I-section rolled	0.86	
46	2	IPE 180 | Euronorm 19-57	I-section rolled	0.66	
50	2	HE A 100 | Euronorm 53-62	I-section rolled	0.14	
51	6	IPE 240 | Euronorm 19-57	I-section rolled	0.10	
52	6	HE A 140 | Euronorm 53-62	I-section rolled	0.00	

1.5 Effective Lengths - Members

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
244	x	x	1.00	1.380	x	1.00	1.380	x	1.0	1.0	1.380	1.380
568	x	x	1.00	2.600	x	1.00	2.600	-	1.0	1.0	2.600	2.600
570	x	x	1.00	2.600	x	1.00	2.600	-	1.0	1.0	2.600	2.600
571	x	x	1.00	2.600	x	1.00	2.600	-	1.0	1.0	2.600	2.600
613	x	x	1.00	1.410	x	1.00	1.410	x	1.0	1.0	1.410	1.410
623	x	x	1.00	1.410	x	1.00	1.410	x	1.0	1.0	1.410	1.410
830	x	x	1.00	2.250	x	1.00	2.250	-	1.0	1.0	2.250	2.250
831	x	x	1.00	2.450	x	1.00	2.450	-	1.0	1.0	2.450	2.450
832	x	x	1.00	2.450	x	1.00	2.450	-	1.0	1.0	2.450	2.450
842	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
844	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
845	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
851	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
852	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
865	x	x	1.00	0.700	x	1.00	0.700	x	1.0	1.0	0.700	0.700
869	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
872	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
875	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
878	x	x	1.00	0.800	x	1.00	0.800	x	1.0	1.0	0.800	0.800
912	x	x	1.00	1.000	x	1.00	1.000	-	1.0	1.0	1.000	1.000
913	x	x	1.00	4.800	x	1.00	4.800	x	1.0	1.0	4.800	4.800
914	x	x	1.00	3.566	x	1.00	3.566	x	1.0	1.0	3.566	3.566

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
2	x	x	1.00	3.807	x	0.07	0.255	x	1.0	1.0	3.807	3.807
3	x	x	1.00	3.807	x	0.07	0.255	x	1.0	1.0	3.807	3.807
5	x	x	1.00	1.470	x	1.00	1.470	x	1.0	1.0	1.470	1.470
6	x	x	1.00	1.470	x	1.00	1.470	x	1.0	1.0	1.470	1.470
7	x	x	1.00	2.850	x	0.59	1.671	x	1.0	1.0	2.850	2.850
10	x	x	1.00	1.380	x	1.00	1.380	x	1.0	1.0	1.380	1.380
11	x	x	1.00	1.550	x	1.00	1.550	x	1.0	1.0	1.550	1.550
13	x	x	1.00	1.550	x	1.00	1.550	x	1.0	1.0	1.550	1.550
14	x	x	1.00	1.550	x	1.00	1.550	x	1.0	1.0	1.550	1.550
15	x	x	1.00	1.550	x	1.00	1.550	x	1.0	1.0	1.550	1.550
17	x	x	1.00	1.410	x	1.00	1.410	x	1.0	1.0	1.410	1.410
18	x	x	1.00	1.410	x	1.00	1.410	x	1.0	1.0	1.410	1.410
20	x	x	1.00	3.240	x	0.38	1.225	x	1.0	1.0	3.240	3.240
21	x	x	1.00	4.030	x	0.30	1.225	x	1.0	1.0	4.030	4.030
22	x	x	1.00	4.800	x	0.33	1.580	x	1.0	1.0	4.800	4.800
23	x	x	1.00	3.950	x	0.25	1.000	x	1.0	1.0	3.950	3.950
24	x	x	1.00	3.950	x	0.25	1.000	x	1.0	1.0	3.950	3.950
25	x	x	1.00	2.960	x	0.52	1.550	x	1.0	1.0	2.960	2.960
27	x	x	1.00	2.960	x	0.48	1.410	x	1.0	1.0	2.960	2.960
28	x	x	1.00	1.470	x	0.54	0.792	x	1.0	1.0	1.470	1.470
29	x	x	1.00	2.960	x	0.58	1.706	x	1.0	1.0	2.960	2.960

1.6 Effective Lengths - Sets of Members

Set	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling				
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	k_z	k_w	L_w [m]	L_T [m]
30	x	x	1.00	4.800	x	0.40	1.900	x	1.0	1.0	4.800	4.800
168	x	x	1.00	1.380	x	1.00	1.380	x	1.0	1.0	1.380	1.380
173	x	x	1.00	3.250	x	0.45	1.470	x	1.0	1.0	3.250	3.250
174	x	x	1.00	6.200	x	0.20	1.225	x	1.0	1.0	6.200	6.200
176	x	x	1.00	2.450	x	0.50	1.225	x	1.0	1.0	2.450	2.450
177	x	x	1.00	2.450	x	0.50	1.225	x	1.0	1.0	2.450	2.450
179	x	x	1.00	4.800	x	0.53	2.550	x	1.0	1.0	4.800	4.800
180	x	x	1.00	3.800	x	1.00	3.800	-	1.0	1.0	3.800	3.800
184	x	x	0.95	4.750	x	0.40	2.000	x	1.0	1.0	5.000	5.000
188	x	x	1.00	2.550	x	1.00	2.550	-	1.0	1.0	2.550	2.550
190	x	x	1.00	0.800	x	1.00	0.800	-	1.0	1.0	0.800	0.800
191	x	x	1.00	3.800	x	1.00	3.800	x	1.0	1.0	3.800	3.800
193	x	x	1.00	3.000	x	1.00	3.000	-	1.0	1.0	3.000	3.000
194	x	x	1.00	2.800	x	1.00	2.800	x	1.0	1.0	2.800	2.800
195	x	x	1.00	0.125	x	1.00	0.125	x	1.0	1.0	0.125	0.125

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length		Direct.	Precamber	Beam Type
			Manually	l [m]		e_0 [mm]	
1	List of Members	2	-	3.807	y, z	0.0	Beam
2	List of Members	3	-	3.807	y, z	0.0	Beam
3	List of Members	4	-	1.670	y, z	0.0	Beam
4	List of Members	5	-	1.470	y, z	0.0	Beam
5	List of Members	6	-	1.470	y, z	0.0	Beam
6	List of Members	7	-	2.850	y, z	0.0	Beam
7	List of Members	8	-	1.580	y, z	0.0	Beam
8	List of Members	9	-	1.580	y, z	0.0	Beam
9	List of Members	10	-	1.380	y, z	0.0	Beam
10	List of Members	11	-	1.550	y, z	0.0	Beam
11	List of Members	13	-	1.550	y, z	0.0	Beam
12	List of Members	14	-	1.550	y, z	0.0	Beam
13	List of Members	15	-	1.550	y, z	0.0	Beam
14	List of Members	17	-	1.410	y, z	0.0	Beam
15	List of Members	18	-	1.410	y, z	0.0	Beam
16	List of Members	19	-	6.200	y, z	0.0	Beam
17	List of Members	20	-	3.240	y, z	0.0	Beam
18	List of Members	21	-	4.030	y, z	0.0	Beam
19	List of Members	22	-	4.800	y, z	0.0	Beam
20	List of Members	23	-	3.950	y, z	0.0	Beam
21	List of Members	24	-	3.950	y, z	0.0	Beam
22	List of Members	25	-	2.960	y, z	0.0	Beam
23	List of Members	26	-	3.250	y, z	0.0	Beam
24	List of Members	27	-	2.960	y, z	0.0	Beam
25	List of Members	28	-	1.470	y, z	0.0	Beam
26	List of Members	29	-	2.960	y, z	0.0	Beam
27	List of Members	30	-	4.800	y, z	0.0	Beam
28	Member	568	-	2.600	y, z	0.0	Beam
29	Member	570	-	2.600	y, z	0.0	Beam
30	Member	571	-	2.600	y, z	0.0	Beam
31	Member	695	-	2.600	y, z	0.0	Beam
32	List of Members	173	-	3.250	y, z	0.0	Beam
33	List of Members	174	-	6.200	y, z	0.0	Beam
34	Member	830	-	2.250	y, z	0.0	Beam
35	Member	831	-	2.450	y, z	0.0	Beam
36	Member	832	-	2.450	y, z	0.0	Beam
37	Member	842	-	0.800	y, z	0.0	Beam
38	Member	844	-	0.800	y, z	0.0	Beam
39	Member	845	-	0.800	y, z	0.0	Beam
40	Member	851	-	0.800	y, z	0.0	Beam
41	Member	869	-	0.800	y, z	0.0	Beam
42	Member	872	-	0.800	y, z	0.0	Beam

1.9 Serviceability Data

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length l [m]	Direct.	Precamber e_0 [mm]	Beam Type
43	Member	875	-	0.800	y, z	0.0	Beam
44	Member	878	-	0.800	y, z	0.0	Beam
45	List of Members	175	-	2.000	y, z	0.0	Beam
46	List of Members	176	-	2.450	y, z	0.0	Beam
47	List of Members	177	-	2.450	y, z	0.0	Beam
48	List of Members	178	-	1.050	y, z	0.0	Beam
49	List of Members	179	-	4.800	y, z	0.0	Beam
50	List of Members	180	-	3.800	y, z	0.0	Beam
52	List of Members	182	-	1.800	y, z	0.0	Beam
53	List of Members	183	-	3.800	y, z	0.0	Beam
54	List of Members	184	-	5.000	y, z	0.0	Beam
55	List of Members	185	-	2.500	y, z	0.0	Beam
56	List of Members	186	-	5.000	y, z	0.0	Beam
57	List of Members	187	-	2.500	y, z	0.0	Beam
59	List of Members	188	-	2.550	y, z	0.0	Beam
60	List of Members	190	-	0.800	y, z	0.0	Beam
61	List of Members	191	-	3.800	y, z	0.0	Beam
62	List of Members	193	-	3.000	y, z	0.0	Beam
63	List of Members	194	-	2.800	y, z	0.0	Beam

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
10	HE A 180 | Euronorm 53-62						
	568	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	570	0.000	RC23	0.03	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	568	2.600	RC23	0.00	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	570	0.000	RC23	0.03	≤ 1	ST301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	570	0.000	RC23	0.04	≤ 1	ST311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	568	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	568	1.300	RC24	0.01	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	568	1.300	RC25	0.01	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	568	1.300	RC26	0.00	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	570	1.300	RC24	0.00	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	570	1.300	RC25	0.00	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	570	1.300	RC26	0.00	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
17	QRO 100x5 | EN 10210-2:2006						
	912	1.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	912	1.000	RC23	0.02	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	912	0.000	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	912	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	912	0.000	RC23	0.00	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	912	1.000	RC23	0.02	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	912	1.000	RC23	0.12	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
18	UPN 160 | ArcelorMittal (EN 10365:2017)						
	639	0.150	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	637	0.500	RC23	0.02	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	643	0.000	RC23	0.01	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	647	0.200	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	647	0.000	RC23	0.00	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	600	0.790	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	637	0.500	RC23	0.02	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	643	0.000	RC23	0.01	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	647	0.000	RC23	0.04	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6,

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
							6.2.7 and 6.2.9
	637	0.500	RC23	0.02	≤ 1	ST332)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.2(4) - General Section
	600	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	637	1.000	RC24	0.12	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	637	1.000	RC25	0.09	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	637	1.000	RC26	0.04	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	643	0.000	RC24	0.02	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	643	0.000	RC25	0.01	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	637	0.500	RC26	0.01	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
21	UPN 120 | ArcelorMittal (EN 10365:2017)						
	635	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	851	0.000	RC23	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	875	0.000	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	586	0.000	RC23	0.01	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	835	0.000	RC23	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	586	0.725	RC23	0.00	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	586	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	586	0.000	RC23	0.01	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	835	0.000	RC23	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	586	0.725	RC23	0.03	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	586	0.725	RC23	0.02	≤ 1	ST332)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.2(4) - General Section
	608	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	833	0.817	RC24	0.02	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	833	0.817	RC25	0.02	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	586	0.363	RC26	0.01	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	586	0.725	RC24	0.03	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	586	0.725	RC25	0.02	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	586	0.725	RC26	0.02	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
23	QRO 120x5 | EN 10219-2:2006						
	571	0.000	RC23	0.02	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	571	0.000	RC23	0.03	≤ 1	ST301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	571	0.000	RC23	0.03	≤ 1	ST311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	571	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
25	UPE 160 | EN 10279						
	649	0.170	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	641	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	661	0.255	RC23	0.01	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	646	0.180	RC23	0.03	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	640	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	661	0.255	RC23	0.01	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	649	0.000	RC23	0.05	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	649	0.000	RC23	0.04	≤ 1	ST332)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.2(4) - General Section
	640	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	665	0.000	RC24	0.07	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	665	0.000	RC25	0.05	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	665	0.000	RC26	0.03	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	646	0.000	RC24	0.01	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	646	0.000	RC25	0.01	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	646	0.000	RC26	0.00	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
30	QRO 80x80x4 | ALUKÖNIGSTAHL - EN 10210						
	832	2.450	RC23	0.00	≤ 1	CS100)	Negligible internal forces

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
	831	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
31	HE A 140 | Euronorm 53-62						
	887	1.343	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	856	2.771	RC23	0.02	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	894	0.075	RC23	0.01	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	852	0.000	RC23	0.07	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	901	0.000	RC23	0.03	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	852	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	852	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	894	0.075	RC23	0.01	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	852	0.000	RC23	0.07	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	852	0.800	RC23	0.08	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	894	0.075	RC23	0.04	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	830	0.000	RC23	0.14	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	894	0.075	RC23	0.06	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	856	2.771	RC23	0.03	≤ 1	ST301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	830	2.250	RC23	0.05	≤ 1	ST311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	856	2.771	RC23	0.03	≤ 1	ST321)	Stability analysis - Torsional buckling acc. to 6.3.1.4 and 6.3.1.2(4)
	894	0.075	RC23	0.11	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	830	1.800	RC23	0.19	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	830	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	830	0.000	RC24	0.40	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	830	0.000	RC25	0.30	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	830	0.000	RC26	0.31	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	830	0.900	RC24	0.19	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	830	0.900	RC25	0.14	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	830	0.900	RC26	0.14	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
33	QRO 120x120x5 | ALUKÖNIGSTAHL - EN 10210						
	897	0.200	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	886	0.000	RC23	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	863	0.000	RC23	0.12	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	897	0.200	RC23	0.01	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	890	0.000	RC23	0.07	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	886	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	858	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	863	0.000	RC23	0.12	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	897	0.200	RC23	0.01	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	890	0.750	RC23	0.02	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	890	0.000	RC23	0.23	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	886	0.000	RC23	0.02	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	892	0.500	RC23	0.11	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	886	0.000	RC23	0.07	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	863	1.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	892	0.000	RC24	0.44	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	892	0.000	RC25	0.33	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	892	0.000	RC26	0.33	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	910	1.600	RC24	0.28	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	910	1.600	RC25	0.20	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	910	1.600	RC26	0.20	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction

2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
34	HE A 240 | Euronorm 53-62						
	616	0.000	RC23	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	614	0.670	RC23	0.37	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	824	0.000	RC23	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	596	0.000	RC23	0.16	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	210	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	614	0.670	RC23	0.37	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	824	0.000	RC23	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	616	0.000	RC23	0.14	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	618	0.220	RC23	0.05	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	616	0.000	RC23	0.14	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	616	0.000	RC23	0.48	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	596	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	821	0.000	RC24	0.87	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	821	0.000	RC25	0.64	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	821	0.000	RC26	0.63	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	614	0.670	RC24	0.01	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	614	0.670	RC25	0.01	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	614	0.670	RC26	0.01	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
45	HE A 200 | Euronorm 53-62						
	575	0.350	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	566	0.000	RC23	0.01	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	690	0.470	RC23	0.27	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	630	0.000	RC23	0.01	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	690	1.410	RC23	0.20	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	847	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	221	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	690	0.470	RC23	0.27	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	630	0.000	RC23	0.01	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	690	0.000	RC23	0.08	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9
	621	0.780	RC23	0.33	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	893	2.400	RC23	0.01	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	847	1.450	RC23	0.25	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	621	0.780	RC23	0.47	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	235	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	624	0.620	RC24	0.86	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	624	0.620	RC25	0.64	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	624	0.620	RC26	0.62	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	841	0.800	RC24	0.69	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	841	0.800	RC25	0.51	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	841	0.800	RC26	0.51	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
46	IPE 180 | Euronorm 19-57						
	854	0.000	RC23	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	877	0.000	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	871	0.000	RC23	0.02	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	849	0.000	RC23	0.03	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	882	0.000	RC23	0.01	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	849	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	871	0.000	RC23	0.02	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	880	1.000	RC23	0.16	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9

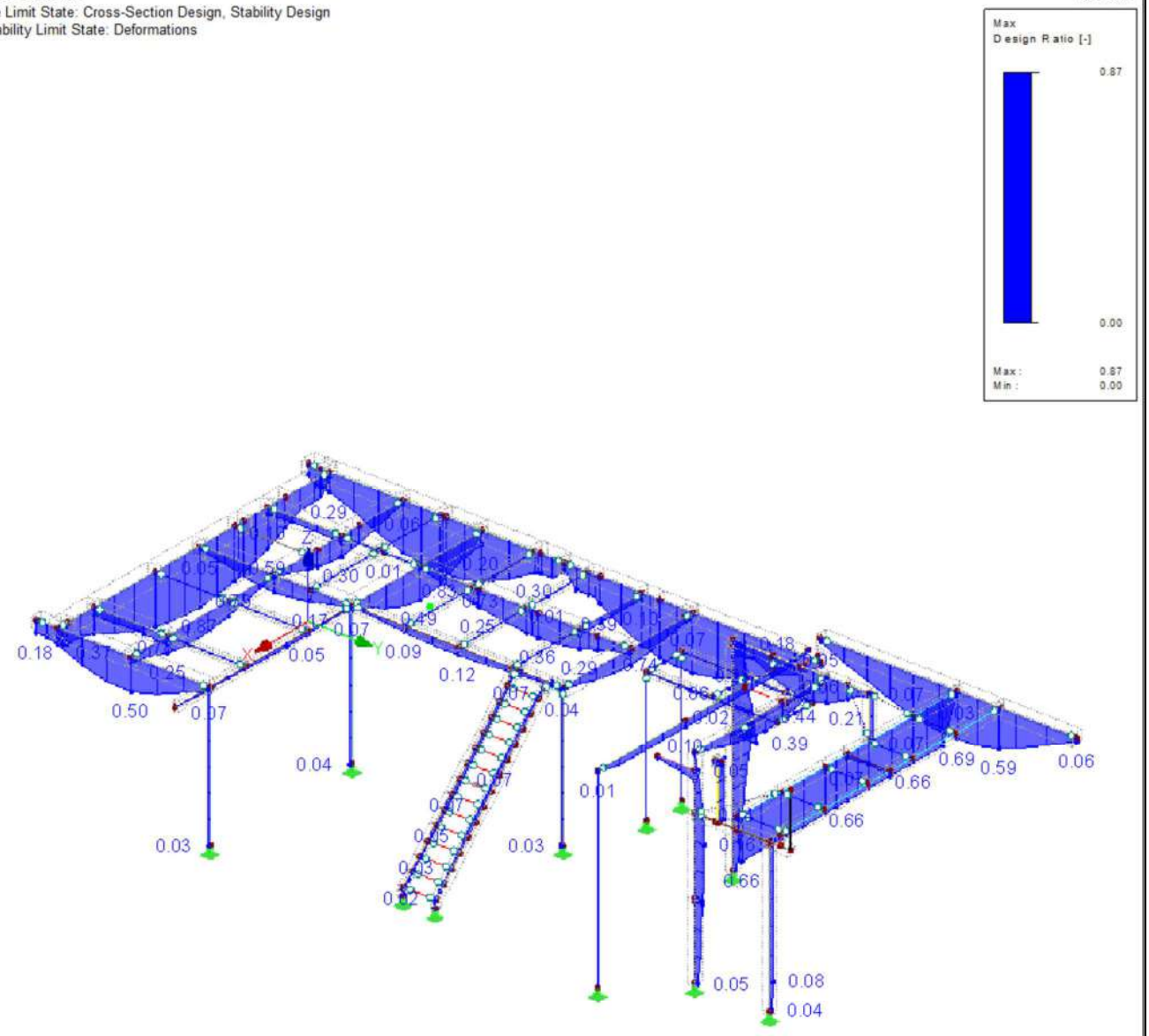
2.2 Design by Cross-Section

Sect. No.	Member No.	Location x [m]	LC/CO/ RC	Design		Equation No.	Description
	854	0.000	RC23	0.17	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	877	0.500	RC23	0.66	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
	849	0.000	RC24	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	877	0.250	RC24	0.62	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	877	0.250	RC25	0.46	≤ 1	SE402)	Serviceability - Combination of actions 'Frequent' - z-direction
	877	0.250	RC26	0.42	≤ 1	SE403)	Serviceability - Combination of actions 'Quasi-permanent' - z-direction
	854	0.250	RC24	0.47	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
	854	0.250	RC25	0.35	≤ 1	SE407)	Serviceability - Combination of actions 'Frequent' - y-direction
	854	0.250	RC26	0.34	≤ 1	SE408)	Serviceability - Combination of actions 'Quasi-permanent' - y-direction
50	HE A 100 | Euronorm 53-62						
	865	0.000	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	865	0.000	RC23	0.14	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	865	0.000	RC23	0.04	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	865	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	865	0.000	RC23	0.14	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	865	0.000	RC23	0.14	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
51	IPE 240 | Euronorm 19-57						
	913	0.500	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	913	2.000	RC23	0.04	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	913	4.000	RC23	0.01	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	913	0.000	RC23	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	913	2.000	RC23	0.04	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	913	2.000	RC23	0.10	≤ 1	ST331)	Stability analysis - Lateral torsional buckling acc. to 6.3.2.1 and 6.3.2.3 - I-Section
52	HE A 140 | Euronorm 53-62						
	914	3.566	RC23	0.00	≤ 1	CS100)	Negligible internal forces
	914	3.566	RC23	0.00	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4

Design Ratio

RF-STEEL EC3 CA6
Ultimate Limit State: Cross-Section Design, Stability Design
Serviceability Limit State: Deformations

Isometric



Max Design Ratio: 0.87

6. PAGRINDINIO PASTATO PAMATŲ POLIO LAIKOMOSIOS GALIOS SKAIČIAVIMAS

6.1. D450 STATYBINIŲ KARKASINIŲ KOLONŲ POLIŲ SKAIČIAVIMAS

Perskaičiuota maksimali gniuždymo apkrova nuo skaičiuotinių apkrovų derinių į polių – 354kN (žiūr. 4 lentelę).

4 lentelė. Maksimalios apkrovų reikšmės į polius.

Pradiniai duomenys								
Polių skaičius		Atsumas tarp polių, m		Polio Ø, m	Polio ilgis, m	Galvenos aukštis, m	Polio svoris, kN	Galvenos svoris, kN
X kryptimi	Y kryptimi	X kryptimi	Y kryptimi					
2,00	1,00	1,35	1,00	0,45	5,00	0,70	19,88	25,11

Atraminės reakcijos							Polių įrąžos			
							MAX		MIN	
Atrama/ Derinio	FX, kN	FY, kN	FZ, kN	MX, kNm	MY, kNm	MZ, kNm	X kryptis	Y kryptis	X kryptis	Y kryptis
1	56,82	13,77	29,25	14,80	106,28	4,84	166,60	58,41	-64,37	43,82
2	-64,37	-15,56	379,06	-21,07	-118,00	-3,76	354,10	233,32	97,94	218,72
3	**56,82**	-15,07	248,50	12,06	106,28	-3,64	276,23	168,04	45,25	153,44
4	**-64,37**	-10,84	208,78	7,63	-118,00	4,84	268,96	148,18	12,80	133,58
5	-2,53	**13,77**	280,60	-21,01	-3,84	0,35	188,25	184,09	165,34	169,49
6	56,82	**-15,56**	198,53	14,74	106,12	-3,76	251,12	143,05	20,39	128,46
7	-57,82	-11,50	**29,25**	8,51	-107,16	4,00	167,77	58,41	-65,54	43,82
8	54,64	-14,82	**379,06**	11,93	102,72	-3,35	337,74	233,32	114,30	218,72
9	55,74	-15,42	307,08	**14,80**	104,42	-3,61	303,58	197,33	76,48	182,73
10	-1,46	13,62	172,05	**-21,07**	-2,13	0,20	132,15	129,81	112,88	115,22
11	56,82	-15,07	248,50	12,06	**106,28**	-3,64	276,23	168,04	45,25	153,44
12	-64,37	-10,84	208,78	7,63	**-118,00**	4,84	268,96	148,18	12,80	133,58

REZULTATAI						
Maksimali ašinė jėga,kN	354,10	kN	Minimali ašinė jėga, kN	-65,54	kN	Maksimali skersinė jėga, kN	32,19	kN
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Polio laikomosios galios skaičiavimai atlikti programa „GEO5 Pile CPT“.

Analysis of CPT pile

Input data

Date : 2025-05-04

Settings

Standard - EN 1997 - DA1_A1+M1+R1

Pile CPT

Verification methodology : EN 1997-2
Analysis type : EN 1997-2

Partial factors for resistances (R)			
Partial factor on base resistance :	γ_b =	1,10	[–]
Partial factor on shaft resistance :	γ_s =	1,00	[–]

Reduction coefficients			
Reduction coeff. of load settlement curve :	k =	1,00	[–]

Tests

No.	Test name	Offset of the origin d_h [m]	Overall depth d_{tot} [m]
1	cpt-1_v2	0,45	15,00
2	cpt-2_v2	0,13	15,00

Test : cpt-1_v2

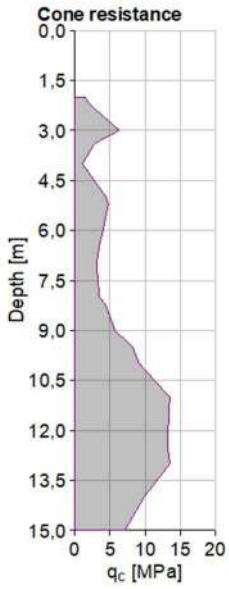


Table (CPT)

No.	Depth d [m]	Cone resistance q_c [MPa]
1	2,00	1,39
2	2,20	2,00
3	3,00	6,33
4	3,40	2,74
5	4,00	1,05
6	5,00	4,45
7	5,20	4,74
8	6,00	4,00
9	6,50	3,43
10	7,00	3,08
11	8,00	3,45
12	8,20	4,32
13	9,00	5,69
14	9,50	8,18
15	10,00	9,17
16	11,00	13,52
17	12,44	13,17
18	13,00	13,57
19	14,00	9,86
20	15,00	7,09

Test : cpt-2_v2

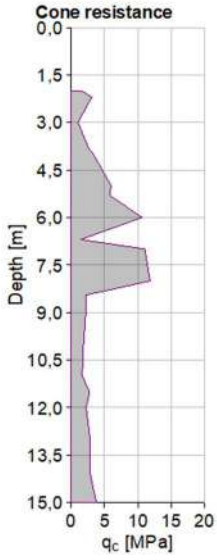


Table (CPT)

No.	Depth d [m]	Cone resistance q_c [MPa]
1	2,00	1,55
2	2,20	3,08
3	3,00	1,00
4	3,80	2,57
5	4,00	3,33
6	5,00	5,98
7	5,30	5,77
8	6,00	10,65
9	6,70	1,39
10	7,00	11,06
11	8,00	11,86
12	8,45	2,13
13	9,00	2,17
14	10,00	1,85
15	11,00	1,62
16	11,50	2,76
17	12,00	2,25
18	13,00	2,82
19	14,00	2,76
20	15,00	3,76

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	γ [kN/m³]	γ_{su} [kN/m³]
1	1lp-p (Mg)		24,60	16,00	6,00
2	8lst (CIL)		32,80	16,50	6,50
3	9vst (CIM)		21,00	20,00	10,00

Soil parameters

1lp-p (Mg)

Unit weight : γ = 16,00 kN/m³
Angle of internal friction : φ_{ef} = 24,60 °
Saturated unit weight : γ_{sat} = 16,00 kN/m³
Type of soil : sand, gravel
Magnitude OCR : OCR ≤ 2
Type of grains : sand finer than 600 nm

8lst (CIL)

Unit weight : γ = 16,50 kN/m³
Angle of internal friction : φ_{ef} = 32,80 °
Saturated unit weight : γ_{sat} = 16,50 kN/m³
Type of soil : silt

9vst (CIM)

Unit weight : γ = 20,00 kN/m³
Angle of internal friction : φ_{ef} = 21,00 °
Saturated unit weight : γ_{sat} = 20,00 kN/m³
Type of soil : silt

Construction

Type of construction : single pile
Design load Fs_d = 355,00 kN
Service load Fs = 250,00 kN

Geometry

Type of pile : continuous flight auger pile
Pile material : concrete
Reduce q_c III to 2 MPa : Yes
Elevation from the original ground = -0,53 m
Elevation from the finished grade = -1,78 m
Pile length in soil = 8,50 m
Pile head offset above terrain = 0,00 m
Depth of finished grade = 1,25 m

Pile cross-section - circular
Pile diameter d = 0,60 m

GWT

Ground water table GWT = 1,30 m

Geometry

Type of pile : continuous flight auger pile
Pile material : concrete
Reduce q_c III to 2 MPa : Yes
Elevation from the original ground = -0,53 m
Elevation from the finished grade = -1,78 m
Pile length in soil = 5,00 m
Pile head offset above terrain = 0,00 m
Depth of finished grade = 1,25 m

Pile cross-section - circular
Pile diameter d = 0,45 m

GWT

Ground water table GWT = 1,15 m

Global settings

Analysis based on tests : CPT
The analysis does not consider the influence of negative skin friction.
Partial factor on model uncertainty γ_{cal} = 1,00

Geological profile and assigned soils

Position information
Terrain elevation = -0,53 m

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Elevation [m]	Assigned soil	Pattern
1	3,80	0,00 .. 3,80	-0,53 .. -4,33	1lp-p (Mg)	
2	4,30	3,80 .. 8,10	-4,33 .. -8,63	8lst (CIL)	
3	6,90	8,10 .. 15,00	-8,63 .. -15,53	9vst (CIM)	
4	-	15,00 .. ∞	-15,53 .. -	9vst (CIM)	

Bearing capacity calculation - EN 1997-2

Calculation of vertical bearing capacity - intermediate results of tests

Intermediate results CPT - cpt-1_v2

Total resistance	$R_{c,i}$	=	571,90 kN
Skin bearing capacity	$R_{s,i}$	=	327,90 kN
Base bearing capacity	$R_{b,i}$	=	244,00 kN
Medium magnitude of penetration resistance	$q_{cI,mean}$	=	2,73 MPa
Medium magnitude of penetration resistance	$q_{cII,mean}$	=	2,47 MPa
Medium magnitude of penetration resistance	$q_{cIII,mean}$	=	1,23 MPa
Maximum stress at pile base	$p_{max,base}$	=	1534,15 kPa
Reduced stress at pile base	$p_{max,base,red}$	=	1534,15 kPa

No.	Depth [m]	q_{cz} [MPa]	Coeff. [–]	Skin frict. [kPa]
4	3,45	6,33	0,0060	37,98
5	3,50	5,88	0,0060	35,29
6	3,80	3,19	0,0250	79,72
7	3,85	2,74	0,0250	68,50
8	4,11	2,00	0,0250	50,00
9	4,73	2,00	0,0250	50,00
10	5,45	4,45	0,0250	111,25
11	5,58	4,63	0,0250	115,78
12	5,65	4,74	0,0250	118,50
13	6,25	4,19	0,0250	104,63

Calculation of vertical pile bearing capacity - intermediate results

Pile diameter	d_{eq}	=	0,45 m
Pile diameter at base	$d_{s,eq}$	=	0,45 m
Pile area at base	A_b	=	0,16 m^2
Coeff. of reduc. of pile base bear. capacity	α_p	=	0,80
Coeff. of influence of pile shape	s	=	1,00
Coeff. of influence of pile widened base	β	=	1,00

Calculation of vertical bearing capacity - results

Analysis carried out for test: cpt-1_v2

Minimum resistance of pile in compression	$R_{c,min}$	=	571,90 kN
Coefficient	ξ_4	=	1,40
Mean resistance of pile in compression	$R_{c,mean}$	=	571,90 kN
Coefficient	ξ_3	=	1,40
Characteristic pile bearing capacity	R_c	=	408,50 kN
Design pile bearing capacity	R_{cd}	=	392,65 kN
Design load	$F_{s,d}$	=	355,00 kN

R_{cd} = 392,65 kN > $F_{s,d}$ = 355,00 kN

Settlement calculation - EN 1997-2

Settlement calculation:

Service load	F_s	=	250,00 kN
Skin bearing capacity	R_s	=	180,77 kN
Bearing capacity at base	R_b	=	69,23 kN
Pile base settlement	w_{base}	=	9,6 mm
Elastic deformation of pile	$w_{el,d}$	=	0,3 mm
Overall settlement	$w_{1,d}$	=	9,9 mm

Pile settlement calculation - results

For loading Fs = 250,00 kN the pile settlement is = 9,9 mm

Verification of pile for bearing capacity is SATISFACTORY /
Polio laikomosios galios patikrinimas yra TINKAMAS

Settings

Standard - EN 1997 - DA1

Materials and standards

Concrete structures :	EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 :	standard
Circle pile shear :	simplified method
Steel structures :	EN 1993-1-1 (EC3)
Partial factor on bearing capacity of steel cross section :	γ_{M0} = 1,00
Timber structures :	EN 1995-1-1 (EC5)
Partial factor for timber property :	γ_M = 1,30
Modif. factor of load duration and moisture content :	k_{mod} = 0,50
Coeff. of effective width for shear stress :	k_{cr} = 0,67

Pile

Verification methodology :	according to EN 1997
Analysis for drained conditions :	NAVFAC DM 7.2
Load settlement curve :	linear (Poulos)
Horizontal bearing capacity :	Elastic subsoil (p-y method)
Design approach :	1 - reduction of actions and soil parameters

Partial factors on actions (A)
Permanent design situation

		Combination 1		Combination 2	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	γ_G =	1,35 [–]	1,00 [–]	1,00 [–]	1,00 [–]

Partial factors for soil parameters (M)
Permanent design situation

		Combination 1	Combination 2
Partial factor on internal friction :	γ_ϕ =	1,00 [–]	1,25 [–]
Partial factor on effective cohesion :	γ_c =	1,00 [–]	1,25 [–]
Partial factor on undrained shear strength :	γ_{cu} =	1,00 [–]	1,40 [–]

Partial factors for resistances (R)
Permanent design situation

		Combination 1	Combination 2
Partial factor on shaft resistance :	γ_s =	1,00 [–]	1,30 [–]
Partial factor on base resistance :	γ_b =	1,00 [–]	1,45 [–]
Partial factor on resistance in tension :	γ_{st} =	1,25 [–]	1,60 [–]

Basic soil parameters

No.	Name	Pattern	γ [kN/m³]	ν [–]
1	1lp-p (Mg)		16,00	0,30
2	8lst (CIL)		21,70	0,30
3	9vst (CIM)		20,40	0,30

No.	Name	Pattern	E_{oed} [MPa]	E_{def} [MPa]	γ_{sat} [kN/m³]	γ_s [kN/m³]	n [–]
1	1lp-p (Mg)		-	1,50	16,00	-	-
2	8lst (CIL)		-	49,20	21,70	-	-
3	9vst (CIM)		-	15,60	20,40	-	-

No.	Name	Pattern	φ_{ef} [°]	δ [°]	K [–]	c_u [kPa]	α [–]
1	1lp-p (Mg)		24,60	-	-	-	-
2	8lst (CIL)		-	-	-	268,10	0,30
3	9vst (CIM)		-	-	-	112,00	0,40

Parameters of soils to compute modulus of subsoil reaction

No.	Name	Pattern	Type of soil	n_h [MN/m³]
1	1lp-p (Mg)		cohesionless	0,75
2	8lst (CIL)		cohesive	-
3	9vst (CIM)		cohesive	-

Soil parameters

1lp-p (Mg)

Unit weight : γ = 16,00 kN/m³
Poisson's ratio : ν = 0,30
Deformation modulus : E_{def} = 1,50 MPa
Saturated unit weight : γ_{sat} = 16,00 kN/m³
Type of soil : cohesionless
Modulus of horiz.compressibility : n_h = 0,75 MN/m³
Angle of internal friction : φ_{ef} = 24,60 °

8lst (CIL)

Unit weight : γ = 21,70 kN/m³

Poisson's ratio : ν = 0,30
Deformation modulus : E_{def} = 49,20 MPa
Saturated unit weight : γ_{sat} = 21,70 kN/m³
Type of soil : cohesive
Cohesion of soil : c_u = 268,10 kPa
Adhesion factor : α = 0,30

9vst (CIM)

Unit weight : γ = 20,40 kN/m³
Poisson's ratio : ν = 0,30
Deformation modulus : E_{def} = 15,60 MPa
Saturated unit weight : γ_{sat} = 20,40 kN/m³
Type of soil : cohesive
Cohesion of soil : c_u = 112,00 kPa
Adhesion factor : α = 0,40

Geometry

Pile profile: circular

Dimensions

Diameter d = 0,45 m
Length l = 5,00 m

Calculated cross-sectional characteristics

Area A = 1,59E-01 m^2
Moment of inertia I = 2,01E-03 m^4

Location

Off ground height h = 0,00 m
Depth of finished grade h_z = 1,25 m

Technology: CFA piles
Modulus of subsoil reaction considered according to CSN 731004.

Material of structure

Unit weight γ = 23,00 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 25/30

Cylinder compressive strength f_{ck} = 25,00 MPa
Tensile strength f_{ctm} = 2,60 MPa
Elasticity modulus E_{cm} = 31000,00 MPa
Shear modulus G = 12917,00 MPa

Longitudinal reinforcement: B500B

Yield strength f_{yk} = 500,00 MPa

Transverse reinforcement: B500B

Yield strength f_{yk} = 500,00 MPa

Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Load No. 1	Design	354,00	11,93	106,00	56,82	15,07
2	Yes		Load No. 1 - service	Service	252,86	8,52	75,71	40,59	10,76

Ground water table

The ground water table is at a depth of 2,40 m from the original terrain.

Global settings

Analysis of vertical bearing capacity : analytical solution
Analysis type : analysis for drained conditions

Settings of the stage of construction

Design situation : permanent
Verification methodology : without reduction of soil parameters

Verification No. 1

Verification of pile bearing capacity according to NAVFAC DM 7.2 - partial results

Pile base bearing capacity:
The soil under the base is cohesive
Design undrained shear strength c_u = 268,10 kPa
Area of pile transverse cross-section A_p = 1,59E-01 m^2

Pile shaft resistance:

Depth [m]	Thickness [m]	c_{ud} [kPa]	α [–]	K [–]	δ [°]	σ_{or} [kPa]	R_{si} [kN]
0,00	-	-	-	-	-	-	-
0,45	0,45	-	-	1,14	18,45	3,60	0,87
0,45	-	-	-	-	-	-	-
1,15	0,70	-	-	1,14	18,45	7,20	2,71
1,15	-	-	-	-	-	-	-
2,55	1,40	-	-	1,14	18,45	7,20	5,42
2,55	-	-	-	-	-	-	-
5,00	2,45	268,10	0,30	-	-	7,20	278,58

Verification of bearing capacity : NAVFAC DM 7.2

Analysis carried out with automatic selection of the most unfavourable load cases.
Factor determining critical depth k_{dc} = 1,00
Bearing capacity coefficient N_q was calculated.
Bearing capacity coefficient N_c was calculated.

Verification of compressive pile:
Most unfavorable load case No. 2 (Load No. 1 - service)
Pile skin bearing capacity R_s = 158,29 kN
Pile base bearing capacity R_b = 189,04 kN

Pile bearing capacity R_c = 347,33 kN
Ultimate vertical force V_d = 265,02 kN

R_c = 347,33 kN > 265,02 kN = V_d

Pile bearing capacity is SATISFACTORY

Verification No. 1

Analysis of load settlement curve - input data

Layer No.	Origin [m]	End [m]	E_s [MPa]
1	0,00	2,55	15,00
2	2,55	5,00	15,00

Maximum pile settlement s_{lim} = 25,0 mm

Analysis of load settlement curve - partial results

Correction factor for pile compressibility C_k = 0,96
Correction factor for Poisson's ratio of soil C_v = 0,80
Correction factor for stiffness of bearing stratum C_b = 2,62
Base-load proportion for incompressible pile β_0 = 0,10
Proportion of applied load transferred to pile base β = 0,19

Influence coefficients of settlement :
Basic - dependent on ratio l/d I_0 = 0,14
Correction factor for pile compressibility R_k = 1,01
Correction factor for finite depth of layer on a rigid base R_h = 1,00
Correction factor for Poisson's ratio of soil R_v = 0,91

Analysis of load settlement curve - results

Load at the onset of mobilization of skin friction R_{yu} = 357,24 kN
The settlement for the force R_{yu} s_y = 6,7 mm
Total resistance R_c = 510,64 kN

Maximum settlement s_{lim} = 25,0 mm

The settlement for maximum service load V = 252,86kN is 4,8mm.

Maximum internal force and deformation :

Max. pile displacement = 5,7 mm
Max. shear force = 58,78 kN
Maximum moment = 106,67 kNm

Verification of cross section in bending and compression:

Cross-section: circular, d = 0,45 m
Reinforcement - 8 pc bars 20,0 mm; cover 75,0 mm
Type of structure (reinforcement ratio) : pile
Reinforcement ratio ρ = 1,580 % > 0,500 % = ρ_{min}
Load : N_{Ed} = 354,00 kN (compression) ; M_{Ed} = 106,67 kNm
Bearing capacity : N_{Rd} = 595,52 kN; M_{Rd} = 179,44 kNm

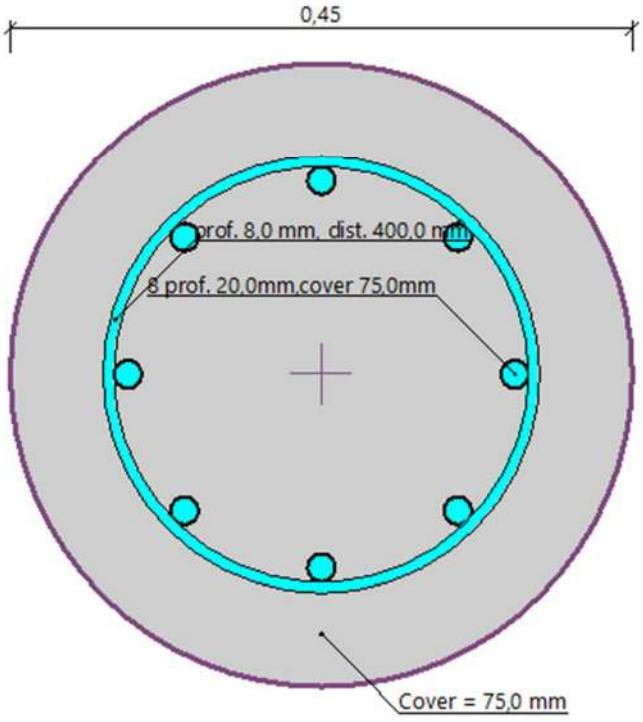
Designed pile reinforcement is SATISFACTORY

Verification of cross section in shear:

Shear reinf. - profile 8,0 mm; spacing 400,0 mm
A_{sw} = 2 x 125,7 = 251,3 mm^2
b_w = 0,40 m; d = 0,36 m
Ultimate shear force: V_{Rd} = 123,37 kN > 58,78 kN = V_{Ed}

Cross-section is SATISFACTORY.
only minimal shear reinforcement

Reinforcement drawing



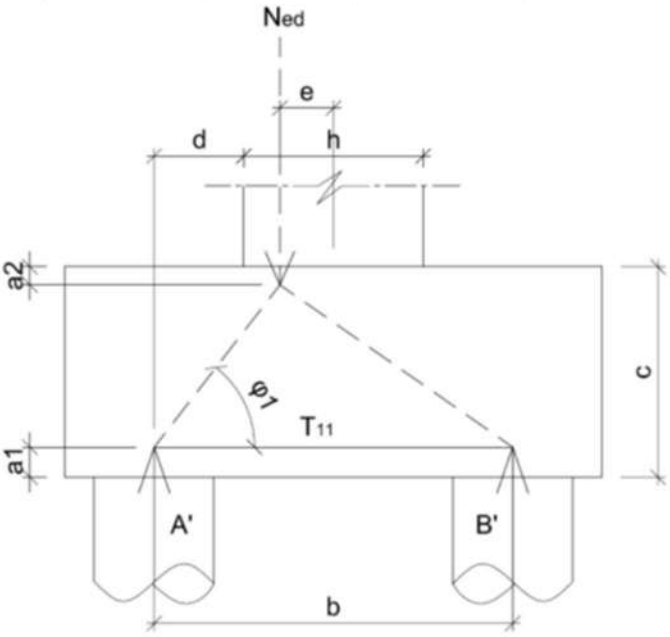
7. GALVENŲ ARMAVIMO SKAIČIAIVIMAS

Galvenų ant dviejų polių skaičiavimas atliekamas nuo dviejų derinių Nmax ir Mmax, pagal Strut and tie metodą

Strypai išdėstomi dvejais variantais:

1. Atraminė reakcija centre:

Galvenos ant dviejų polių skaičiavimas spyrių-stygų metodu

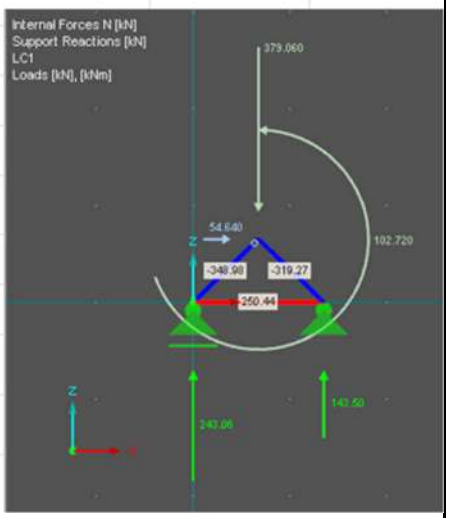


Pradiniai duomenys

f_{cd}=	18	MPa
f_{yd}=	435	MPa
a_1=	75	mm
a_2=	50	mm
b=	1350	mm
c=	700	mm
d=	400	mm
h=	400	mm
t=	400	mm

Poveikiai derinys Nmax

M=	102,72	kN
H=	54,64	kN
N_{ed}=	379,06	kN
A'=	243,06	kN
B'=	143,5	kN
$T_{11}=A' \cot\phi_1$=	250,44	kN

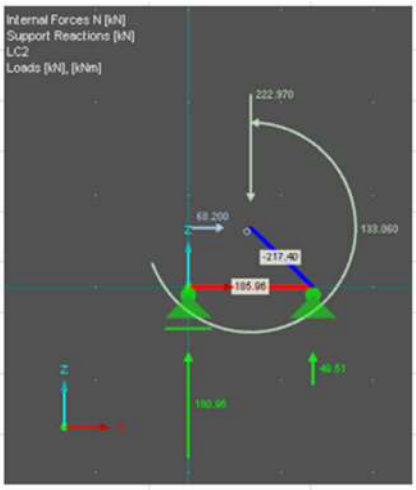


Stygos nr.	Jėga, kN	$A_{s,reik}$, mm²	Parinkta
11	250,44	575,72	4ø16, A_s=804mm²

Poveikiai derinys Mmax

M=	133,06	kN
H=	68,2	kN
N_{ed}=	222,97	kN
A'=	180,95	kN
B'=	49,51	kN
$T_{11}=A' \cot\phi_1$=	185,96	kN

Stygos nr.	Jėga, kN	$A_{s,reik}$, mm²	Parinkta
11	185,96	427,49	4ø16, A_s=804mm²



2. Atraminė reakcija perduodama per inkarinius varžtus, išskirstant gniuždomų inkarinių strypų poveikių sumą ir tempiamų inkarinių strypų poveikių sumą:

Load Case #1: (Nd=-379,1, Mxd=11,9, Myd=102,7, Vxd=54,6, Vyd=-14,8)

Determination of shear load

Design value of normal compressive force in the column	$N_{c,Ed}$	-379,1	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	75,82	kN
Resultant shear force	V_{sd}	56,61	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	0	kN

Steel Failure of bolt in joint calculation

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	90,7	202,0	44,9	0,0	71,6	0,0	n/r
2	-44,5	202,0	22,0	0,0	71,6	0,0	n/r
3	-59,4	202,0	29,4	0,0	71,6	0,0	n/r
4	75,8	202,0	37,5	0,0	71,6	0,0	n/r

Load Case #2: (Nd=-223,0, Mxd=-1,8, Myd=-133,1, Vxd=-68,2, Vyd=-2,9)

Determination of shear load

Design value of normal compressive force in the column	$N_{c,Ed}$	-223	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	44,6	kN
Resultant shear force	V_{sd}	68,26	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	23,66	kN

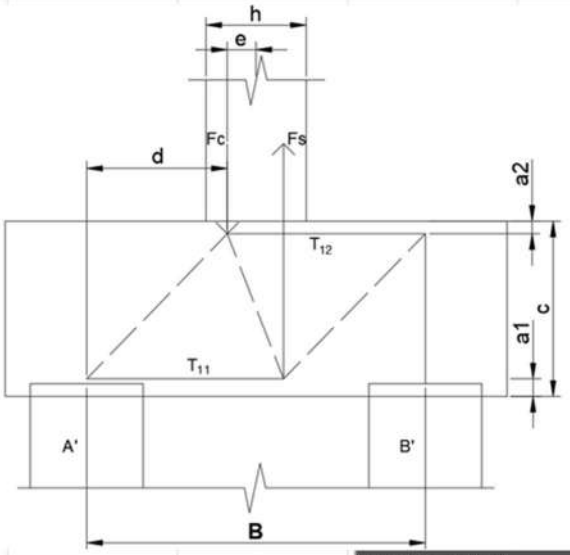
Steel Failure of bolt in joint calculation

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	-60,7	202,0	30,1	7,89	71,6	11,0	n/r
2	162,8	202,0	80,6	0,0	71,6	0,0	n/r
3	165,5	202,0	82,0	7,89	71,6	11,0	69,6
4	-58,0	202,0	28,7	7,89	71,6	11,0	n/r

Galvenos ant dviejų polių skaičiavimas spyrių-stygų metodu

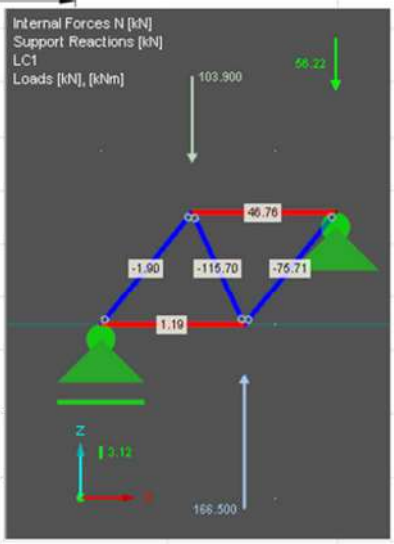
Pradiniai duomenys

f_{cd}=	18	MPa
f_{yd}=	435	MPa
a_1=	75	mm
a_2=	50	mm
b=	1350	mm
c=	700	mm
d=	400	mm
h=	400	mm
t=	400	mm



Poveikiai derinys Nmax

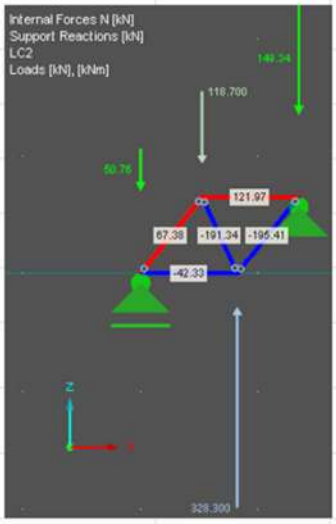
Fs	166,5	
Fc	103,9	
A'=	3,12	kN
B'=	56,22	kN
T_{11}=A' cotϕ_1=	-1,19	kN



Stygos nr.	Jėga, kN	$A_{s,reik}$, mm²	Parinkta
12	46,76	107,49	4ø12, A_s=452mm²

Poveikiai derinys Mmax

Fs	328,3	
Fc	118,7	
A'=	50,76	kN
B'=	149,34	kN
T_{11}=A' cotϕ_1=	121,97	kN



Stygos nr.	Jėga, kN	$A_{s,reik}$, mm²	Parinkta
12	121,97	280,39	4ø12, A_s=452mm²

8. KOLONOS PAGRINDO INKARŲ SKAIČIAVIMAS

8.1. PASTATO KOLONŲ JUNGIMO MAZGO SKAIČIAVIMAS

Inkariniai varžtais skaičiuojami nuo šių derinių Nmax, Mmax.

Didžiausia ašinė jėga yra kolonoje ašyse 2/D, atitinkamas mazgas skaičiavimų ataskaitoje – mazgas nr. 8, didžiausias momentas – 3/A ašyje esančioje kolonoje, atitinkamas mazgas nr. 17. Atraminės reakcijos RFEM skaičiavimų programoje:

Node	Support Forces [kN]			Support Moments [kNm]				
No.	**Column1**	**$P_{X'}$**	**$P_{Y'}$**	**$P_{Z'}$**	**$M_{X'}$**	**$M_{Y'}$**	**$M_{Z'}$**	**Derinys**
8	Min P_Z	54,64	-14,82	**-379,06**	11,93	102,72	-3,35	LC 1,2,10,13-15
17	Min M_Y	-68,20	-2,92	-222,97	-1,83	**-133,06**	6,80	LC 1,3,13,15,16

This design applies exclusively to proprietary PEIKKO products and can't be used to validate properties of third party products, might they appear to be identical.

Summary

Name	Stage	#	Load Case	Page No.	Max Utilization	Status
Column 1	Final	1	Nd=-379,1, Mxd=11,9, Myd=102,7, Vxd=54,6, Vyd=-14,8	5	45%	OK
	Final	2	Nd=-223,0, Mxd=-1,8, Myd=-133,1, Vxd=-68,2, Vyd=-2,9	5	82%	OK
	Erection	3	wind 'y' + self w.	7	39%	OK
	Erection	4	wind 'y' + self w.	7	39%	OK
	Erection	5	wind 'x' + self w.	8	39%	OK
	Erection	6	wind 'x' + self w.	9	39%	OK
	Erection	7	Nd=-17,0, Mxd=13,0, Myd=-10,0, Vxd=4,0, Vyd=-10,0	10	39%	OK

Column 1

Note:

Number of Columns: 1

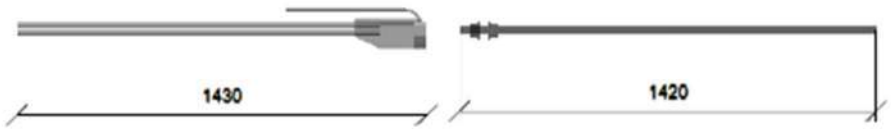
Peikko Products

Column Shoes: 4 x HPKM30

Bolts: 4 x HPM30P

Totals

Product	Amount
HPKM30	4
HPM30P	4



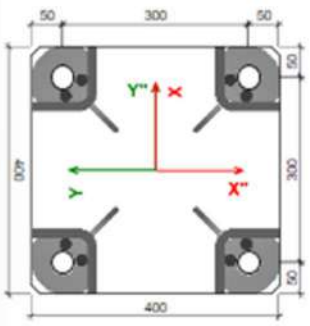
Minimum required torque value of nuts : T_{min} = 250 Nm
Maximum allowed torque value of nuts : T_{max} = 450 Nm
Bolt installation template: PPL30-4 300x300

Materials and Geometry

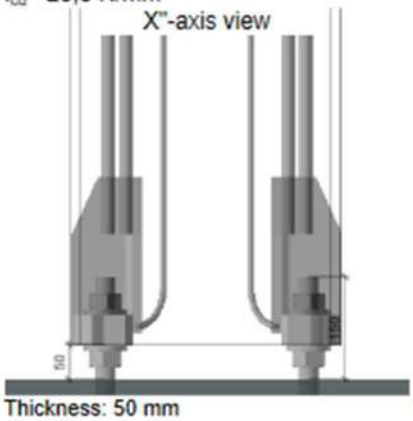
Column: 400x400

Concrete: C35/45
f_{cd}= 23,3 N/mm²

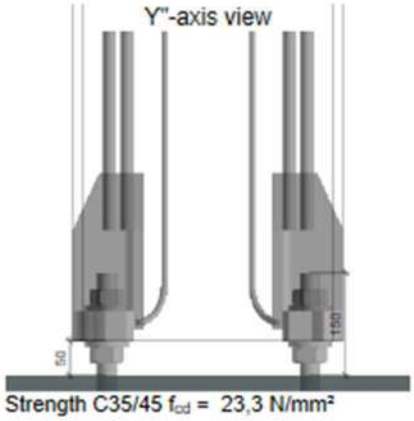
Plane View



X"-axis view



Y"-axis view



Grouting:

Thickness: 50 mm

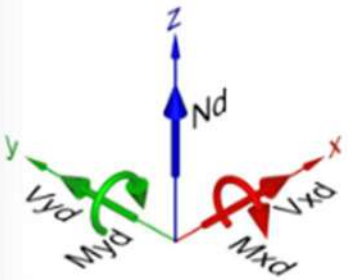
Strength C35/45 f_{cd} = 23,3 N/mm²

X; Y = local coordinate system of profile
X"; Y" = local coordinate system of anchors

ad Cases

NOTE: Loads are defined in the local coordinate system of the profile.

(Design loads)



Final Stage

#	Name	N_d [kN]	M_{xd} [kNm]	M_{yd} [kNm]	V_{xd} [kN]	V_{yd} [kN]
1		-379,1	11,9	102,7	54,6	-14,8
2		-223,0	-1,8	-133,1	-68,2	-2,9

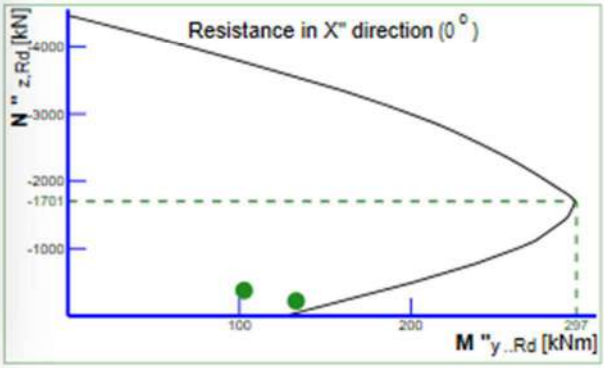
Erection stage

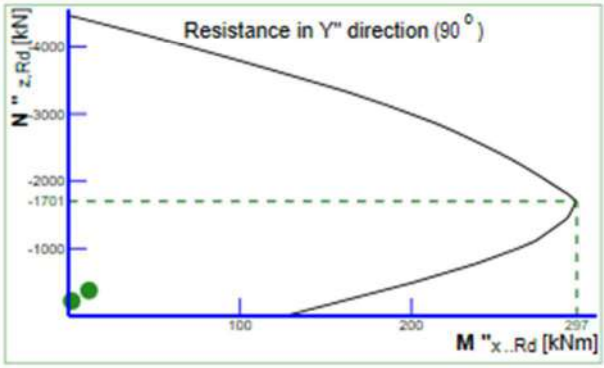
#	Name	N_d [kN]	M_{xd} [kNm]	M_{yd} [kNm]	V_{xd} [kN]	V_{yd} [kN]
3	wind 'y' + self w.	-58,9	23,7	0,0	0,0	-4,2
4	wind 'y' + self w.	-58,9	-23,7	0,0	0,0	4,2
5	wind 'x' + self w.	-58,9	0,0	23,7	4,2	0,0
6	wind 'x' + self w.	-58,9	0,0	-23,7	-4,2	0,0
7		-17,0	13,0	-10,0	4,0	-10,0

Fire Situation Loads

No load case for this stage defined

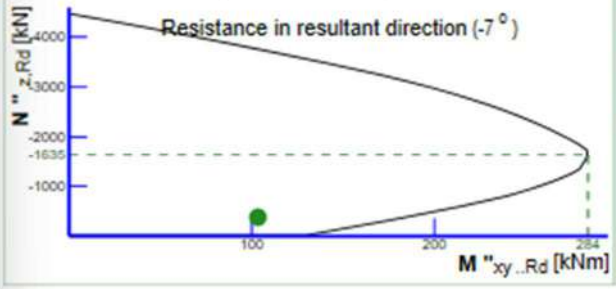
sistance Diagrams



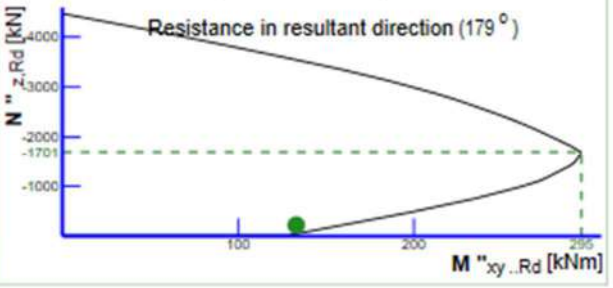


Resultant Diagrams per Load

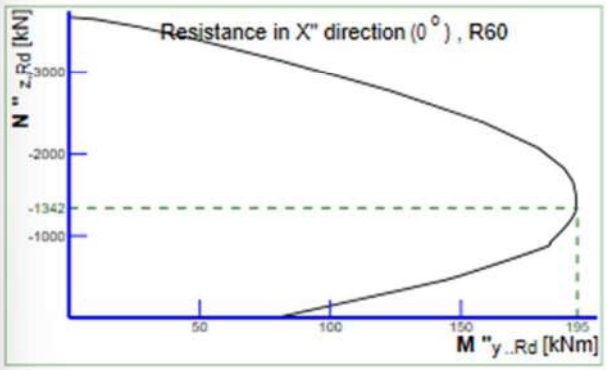
Nd=-379,1, Mxd=11,9, Myd=102,7, Vxd=54,6, Vyd=-14,8
(loads in coordinate system of profile)
N"d=-379,1, M"xd=11,9, M"yd=102,7, V"xd=54,6, V"yd=-14,8
(loads in coordinate system of anchors)

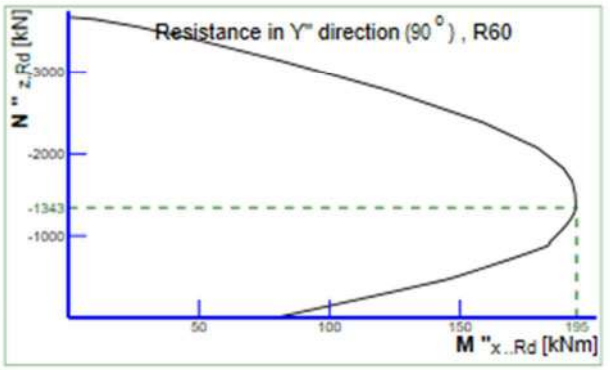


Nd=-223,0, Mxd=-1,8, Myd=-133,1, Vxd=-68,2, Vyd=-2,9
(loads in coordinate system of profile)
N"d=-223,0, M"xd=-1,8, M"yd=-133,1, V"xd=-68,2, V"yd=-2,9
(loads in coordinate system of anchors)



re Situation Resistances Diagrams





Base Structure

Concrete	C30/37
Uncracked	Yes
Aggregate size	32 mm
Base column dimension X-axis direction (b)	760 mm
Base column dimension Y-axis direction (h)	700 mm
Height of Base column	0 mm
Eccentricity of bolted column (e_x)	0 mm
Eccentricity of bolted column (e_y)	0 mm

Anchor Bolts Failure Verifications

Final Stage Bolts

Load Case #1 : Nd=-379,1, Mxd=11,9, Myd=102,7, Vxd=54,6, Vyd=-14,8

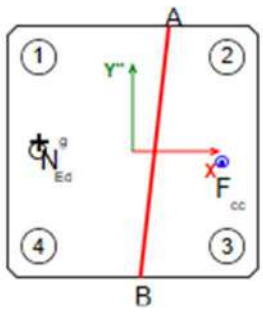
Steel Failure: Sufficient capacity

Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	-379,1	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	75,82	kN
Resultant shear force	V_{sd}	56,61	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	0	kN



Neutral axis in (X"/Y") = A(56,7 / 200,0); B(12,7 / -200,0)
Resultant tension force in (X"/Y") = N_{Ed}(-150,0/13,4)
Resultant compression force (concrete) in (X"/Y") = F_{cc}(141,3/-17,0)

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	90,7	202,0	44,9	0,0	71,6	0,0	n/r
2	-44,5	202,0	22,0	0,0	71,6	0,0	n/r
3	-59,4	202,0	29,4	0,0	71,6	0,0	n/r
4	75,8	202,0	37,5	0,0	71,6	0,0	n/r

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	90,7	209	628,0	0,95	1,5	480	1230	39,0 %
2	-44,5	102	628,0	1,00	1,5	480	1230	39,0 %
3	-59,4	137	628,0	1,00	1,5	480	1230	39,0 %
4	75,8	174	628,0	0,94	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

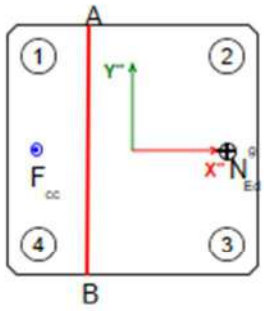
Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	-223	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	44,6	kN
Resultant shear force	V_{sd}	68,26	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	23,66	kN



Neutral axis in (X''/Y'') = A(-67,9 / 200,0); B(-72,8 / -200,0)
Resultant tension force in (X''/Y'') = N_{Ed}(150,0/-1,3)
Resultant compression force (concrete) in (X''/Y'') = F_{cc}(-152,5/2,4)

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	-60,7	202,0	30,1	7,89	71,6	11,0	n/r
2	162,8	202,0	80,6	0,0	71,6	0,0	n/r
3	165,5	202,0	82,0	7,89	71,6	11,0	69,6
4	-58,0	202,0	28,7	7,89	71,6	11,0	n/r

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	-60,7	140	628,0	1,00	1,5	480	1230	39,0 %
2	162,8	374	628,0	0,97	1,5	774	1230	62,9 %
3	165,5	381	628,0	0,97	1,5	787	1230	64,0 %
4	-58,0	133	628,0	1,00	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Erection Stage Bolts

Load Case #1 : wind 'y' + self w. : Nd=-58,9, Mxd=23,7, Myd=0,0, Vxd=0,0, Vyd=-4,2

Steel Failure: Sufficient capacity

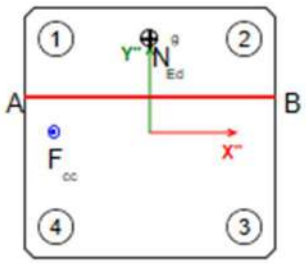
Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	4,24	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	4,24	kN

Neutral axis in (X"/Y") = A(-200,0 / 55,9); B(200,0 / 55,9)
Resultant tension force in (X"/Y") = N^{g}_{Ed}(0,0/150,0)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	24,8	202,0	12,3	0,0	35,7	0,0	12,3
2	24,8	202,0	12,3	0,0	35,7	0,0	12,3
3	-54,2	202,0	26,9	2,12	35,7	5,9	32,8
4	-54,2	202,0	26,9	2,12	35,7	5,9	32,8

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	24,8	57	628,0	0,93	1,5	480	1230	39,0 %
2	24,8	57	628,0	0,93	1,5	480	1230	39,0 %
3	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %
4	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Load Case #2 : wind 'y' + self w. : Nd=-58,9, Mxd=-23,7, Myd=0,0, Vxd=0,0, Vyd=4,2

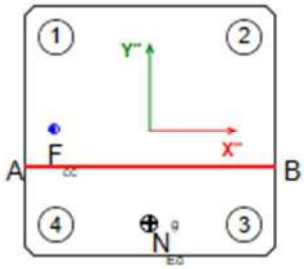
Steel Failure: Sufficient capacity

Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	4,24	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	4,24	kN



Neutral axis in (X''/Y'') = A(-200,0 / -55,9); B(200,0 / -55,9)
Resultant tension force in (X''/Y'') = N_{Ed}^{g}(0,0/-150,0)

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	-54,2	202,0	26,9	2,12	35,7	5,9	32,8
2	-54,2	202,0	26,9	2,12	35,7	5,9	32,8
3	24,8	202,0	12,3	0,0	35,7	0,0	12,3
4	24,8	202,0	12,3	0,0	35,7	0,0	12,3

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %
2	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %
3	24,8	57	628,0	0,93	1,5	480	1230	39,0 %
4	24,8	57	628,0	0,93	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Load Case #3 : wind 'x' + self w. : Nd=-58,9, Mxd=0,0, Myd=23,7, Vxd=4,2, Vyd=0,0

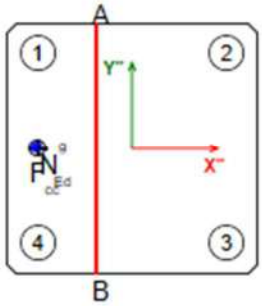
Steel Failure: Sufficient capacity

Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	4,24	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	4,24	kN



Neutral axis in (X"/Y") = A(-55,9 / 200,0); B(-55,9 / -200,0)
Resultant tension force in (X"/Y") = N^{g}_{Ed}(-150,0/0,0)

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	24,8	202,0	12,3	0,0	35,7	0,0	12,3
2	-54,2	202,0	26,9	2,12	35,7	5,9	32,8
3	-54,2	202,0	26,9	2,12	35,7	5,9	32,8
4	24,8	202,0	12,3	0,0	35,7	0,0	12,3

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	24,8	57	628,0	0,93	1,5	480	1230	39,0 %
2	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %
3	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %
4	24,8	57	628,0	0,93	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Load Case #4 : wind 'x' + self w. : Nd=-58,9, Mxd=0,0, Myd=-23,7, Vxd=-4,2, Vyd=0,0

Steel Failure: Sufficient capacity

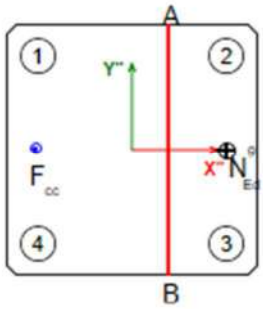
Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	4,24	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	4,24	kN

Neutral axis in (X"/Y") = A(55,9 / 200,0); B(55,9 / -200,0)
Resultant tension force in (X"/Y") = N_{Ed}(150,0/0,0)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	-54,2	202,0	26,9	2,12	35,7	5,9	32,8
2	24,8	202,0	12,3	0,0	35,7	0,0	12,3
3	24,8	202,0	12,3	0,0	35,7	0,0	12,3
4	-54,2	202,0	26,9	2,12	35,7	5,9	32,8

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %
2	24,8	57	628,0	0,93	1,5	480	1230	39,0 %
3	24,8	57	628,0	0,93	1,5	480	1230	39,0 %
4	-54,2	125	628,0	1,00	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Load Case #5 : Nd=-17,0, Mxd=13,0, Myd=-10,0, Vxd=4,0, Vyd=-10,0

Steel Failure: Sufficient capacity

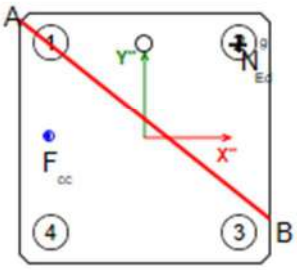
Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	10,77	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	10,77	kN

Neutral axis in (X"/Y") = A(-200,0 / 189,0); B(200,0 / -129,4)
Resultant tension force in (X"/Y") = N_{Ed}(149,0/150,0)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	0,114	202,0	0,1	0,0	35,7	0,0	0,1
2	34,2	202,0	16,9	3,59	35,7	10,0	26,9
3	-8,61	202,0	4,3	3,59	35,7	10,0	14,3
4	-42,7	202,0	21,1	3,59	35,7	10,0	31,1

Anchorage By Splicing Adequate splice length.

Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	0,114	0	628,0	0,92	1,5	480	1230	39,0 %
2	34,2	79	628,0	0,93	1,5	480	1230	39,0 %
3	-8,61	20	628,0	1,00	1,5	480	1230	39,0 %
4	-42,7	98	628,0	1,00	1,5	480	1230	39,0 %

Note 1: The reinforcement of base structure should correspond to the bolts' bonding strength.

Note 2: Where factor [α3 < 1], the actual area of selected transverse reinforcement directly affects required lap length of anchor bolt.

Note 3: The final arrangement of designed transverse reinforcement should be checked with respect to constrictive provisions of paragraph 8.7.4 of EN 1992-1-1.

Note 4: Shear Load: Concrete edge failure in case of straight anchor bolts (type P) should be checked and estimated manually !

Transverse reinforcement in the lap zone

Reinforcement	B500B
Transverse reinforcement along lapped splices (A_{st})	628 mm^2

Detailing of required reinforcement must be executed according to product technical manual.
See also EN 1992-1-1. Figure 8.9

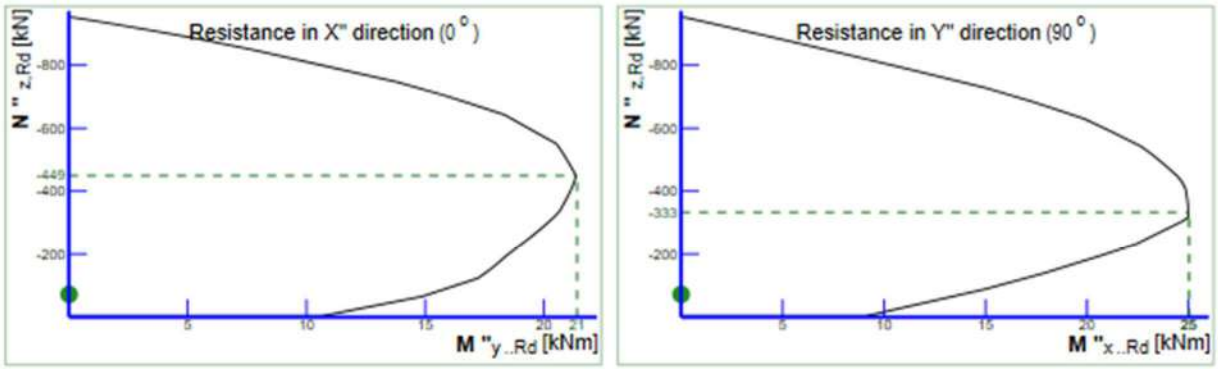
IŠVADA:
Peikko inkarų laikomoji geba pakankama.

8.2. APTARNAVIMO AIKŠTELIŲ JUNGIMO MAZGO SKAIČIAVIMAS

Skaičiuojamas labiausiai apkrautos aptarnavimo aikštelės jungimo mazgas ašyse 2->3/C->D

Node	Support Forces [kN]			Support Moments [kNm]				
No.	**Column1**	**$P_{X'}$**	**$P_{Y'}$**	**$P_{Z'}$**	**$M_{X'}$**	**$M_{Y'}$**	**$M_{Z'}$**	**Derinys**
391	Min P_Z	0,00	0,01	**-72,36**	0,00	0,00	0,00	LC 1,3,10,13,15,16

Resistance Diagrams



Base Structure

Concrete	C30/37
Uncracked	Yes
Aggregate size	32 mm
Base column dimension X-axis direction (b)	550 mm
Base column dimension Y-axis direction (h)	490 mm
Height of Base column	0 mm
Eccentricity of bolted column (e_x)	0 mm
Eccentricity of bolted column (e_y)	0 mm

Anchor Bolts Failure Verifications

Final Stage Bolts

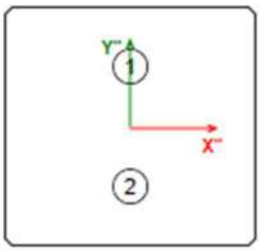
Load Case #1 : Nd=-72,0, Mxd=0,0, Myd=0,0, Vxd=1,0, Vyd=1,0

Steel Failure: Sufficient capacity **Concrete failure: Sufficient capacity**

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	-72	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	14,4	kN
Resultant shear force	V_{sd}	1,41	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	0	kN

Resultant compression force (concrete) in (X"/Y") = F_{cc}(0,0/0,0)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	-2,58	56,5	4,6	0,0	20,0	0,0	n/r
2	-2,57	56,5	4,6	0,0	20,0	0,0	n/r

IŠVADA:
Peikko inkarų laikomoji geba pakankama.

8.3. ANTKOLONIŲ INKARINIŲ VARŽTŲ SKAIČIAVIMAS

This design applies exclusively to proprietary PEIKKO products and can't be used to validate properties of third party products, might they appear to be identical.

Summary

Name	Stage	#	Load Case	Page No.	Max Utilization	Status
Column 2	Final	1	Nd=-275,0, Mxd=50,0, Myd=0,0, Vxd=0,0, Vyd=50,0	4	59%	OK

Column 2

Note:

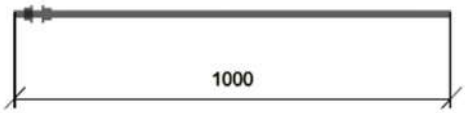
Number of Columns: 1

Peikko Products

Bolts: 4 x HPM20P

Totals

Product	Amount
HPM20P	4



Minimum required torque value of nuts : T_{min} = 150 Nm
Maximum allowed torque value of nuts : T_{max} = 250 Nm

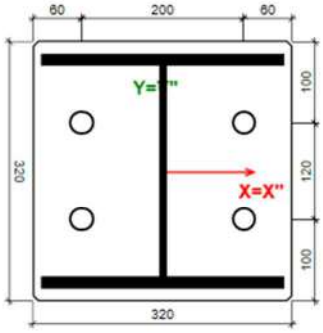
Bolt installation template: PPL20-4 200x120

Materials and Geometry

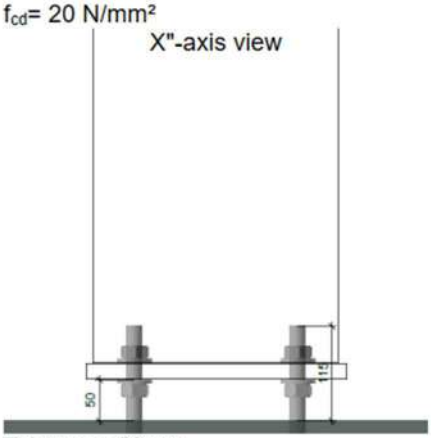
Column: 300x290

f_{cd}= 20 N/mm²

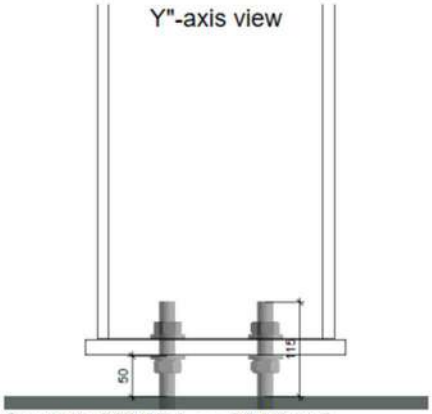
Plane View



X"-axis view



Y"-axis view



Grouting:

Thickness: 50 mm

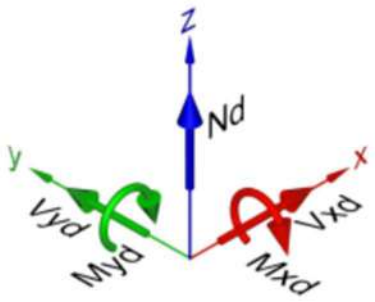
Strength C30/37 f_{cd} = 20 N/mm²

X; Y = local coordinate system of profile
X"; Y" = local coordinate system of anchors

Load Cases

NOTE: Loads are defined in the local coordinate system of the profile.

(Design loads)



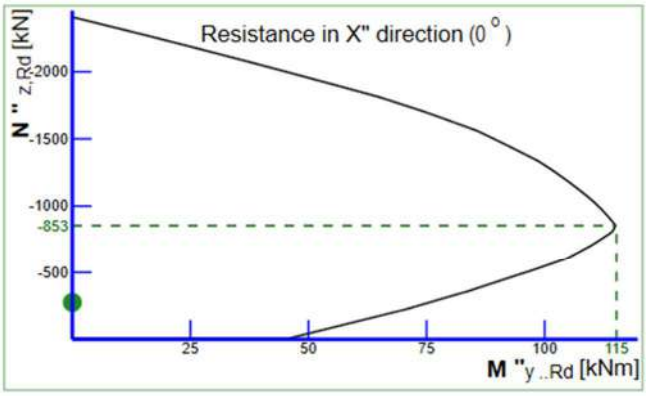
Final Stage

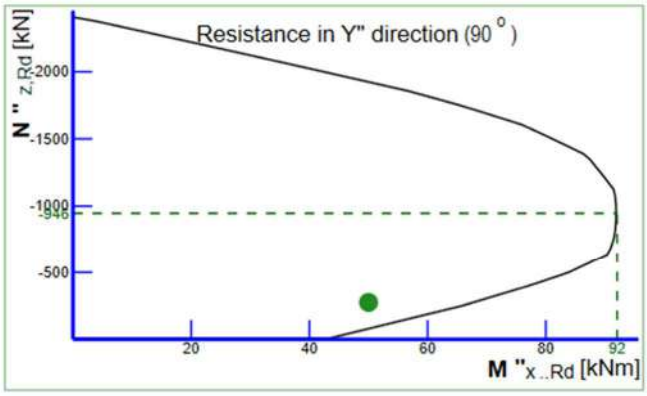
#	Name	N_d [kN]	M_{xd} [kNm]	M_{yd} [kNm]	V_{xd} [kN]	V_{yd} [kN]
1		-275,0	50,0	0,0	0,0	50,0

Erection stage

No load case for this stage defined

Resistance Diagrams





Base Structure

Concrete	C30/37
Uncracked	No
Aggregate size	16 mm
Footing dimension X-axis direction (b)	500 mm
Footing dimension Y-axis direction (h)	500 mm
Height of Footing	5000 mm
Eccentricity of bolted column (e_x)	0 mm
Eccentricity of bolted column (e_y)	0 mm

Base Structure

Concrete	C30/37
Uncracked	No
Aggregate size	16 mm
Footing dimension X-axis direction (b)	500 mm
Footing dimension Y-axis direction (h)	500 mm
Height of Footing	5000 mm
Eccentricity of bolted column (e_x)	0 mm
Eccentricity of bolted column (e_y)	0 mm

Anchor Bolts Failure Verifications

Final Stage Bolts

Load Case #1 : Nd=-275,0, Mxd=50,0, Myd=0,0, Vxd=0,0, Vyd=50,0

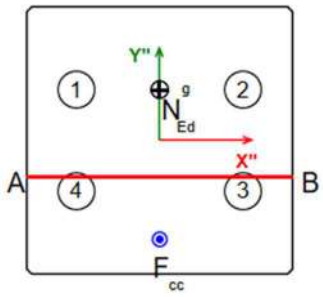
Steel Failure: Sufficient capacity

Concrete failure: Adequate splice length.

Concrete edge failure: Not calculated

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	-275	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	55	kN
Resultant shear force	V_{sd}	50	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	0	kN



Neutral axis in (X"/Y") = A(-160,0 / -42,5); B(160,0 / -42,5)
Resultant tension force in (X"/Y") = N^{g}_{Ed}(0,0/60,0)
Resultant compression force (concrete) in (X"/Y") = F_{cc}(0,0/-117,6)

Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	52,3	88,2	59,3	0,0	31,3	0,0	n/r
2	52,3	88,2	59,3	0,0	31,3	0,0	n/r
3	-8,91	88,2	10,1	0,0	31,3	0,0	n/r
4	-8,91	88,2	10,1	0,0	31,3	0,0	n/r

Anchorage By Splicing Adequate splice length.

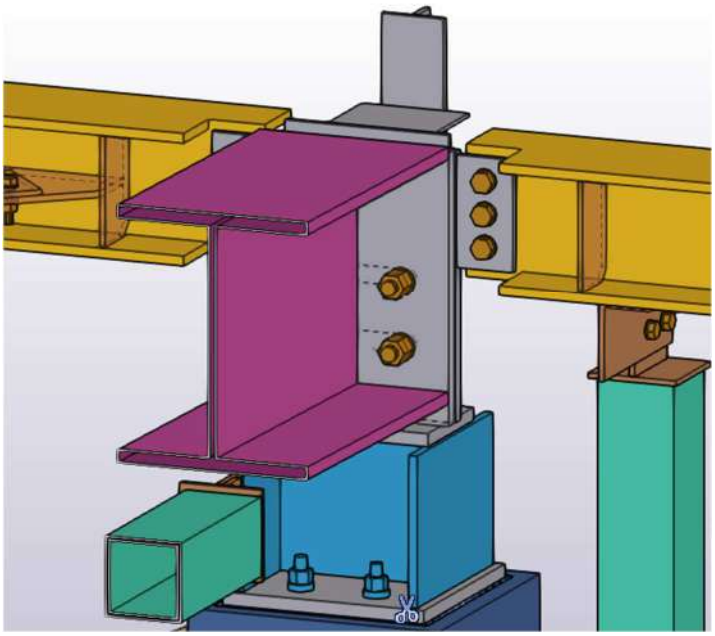
Bolt Pos.	Acting axial force [kN]	Required minimum area of stirrups [mm^2]	Actual area of stirrups [mm^2]	The stirrup confinement effectiveness factor α_3 [-]	Splice factor α_6 [-]	Required lap length [mm]	Current lap length [mm]	Usage of lap length [%]
1	52,3	120	302,0	0,94	1,5	386	860	44,9 %
2	52,3	120	302,0	0,94	1,5	387	860	44,9 %
3	-8,91	20	302,0	1,00	1,5	300	860	34,9 %
4	-8,91	20	302,0	1,00	1,5	300	860	34,9 %

IŠVADA:
Peikko inkarų laikomoji geba pakankama.

9. JUNGČIŲ SKAIČIAVIMAS

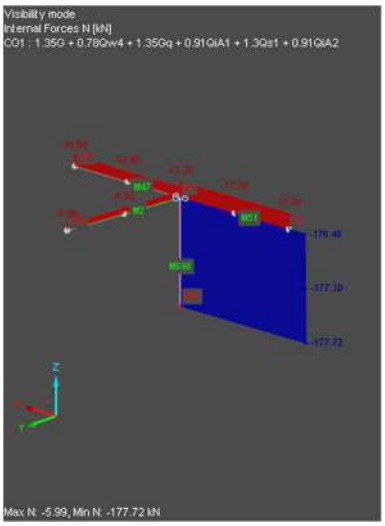
9.1. ANTKOLONIO – SIJOS KRAŠTINIS MAZGAS (MAZGAS J SK_B-011)

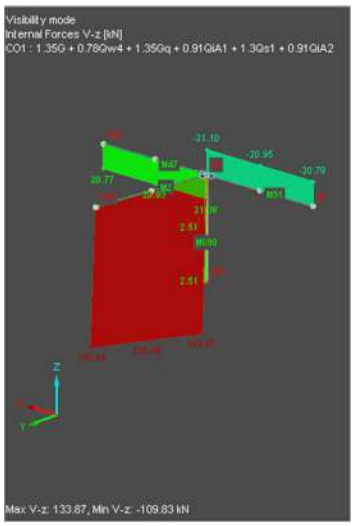
Projektuojamame pastate yra du identiški mazgai ašyse 1/B ir 3/B. Mazgas modelyje:

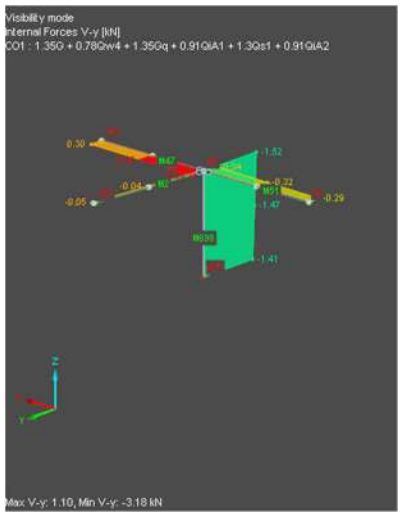


Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

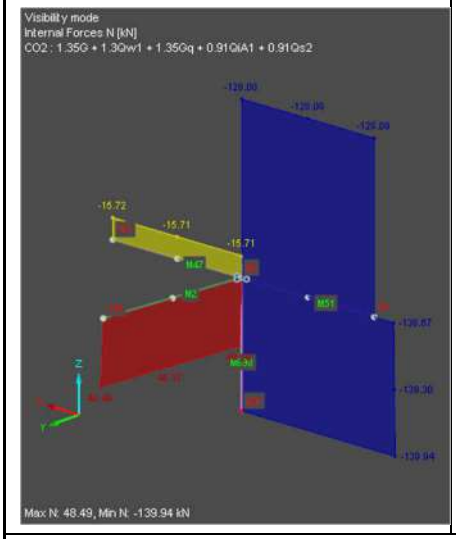
Sąlyga	Derinys
Didžiausia ašinė jėga antkolonyje, Didžiausia skersinė jėga pagrindinėje sijoje	LC1*1,35+LC10*1,35+LC14*1,3+LC5*0,78+LC13*0,91+LC15*0,91

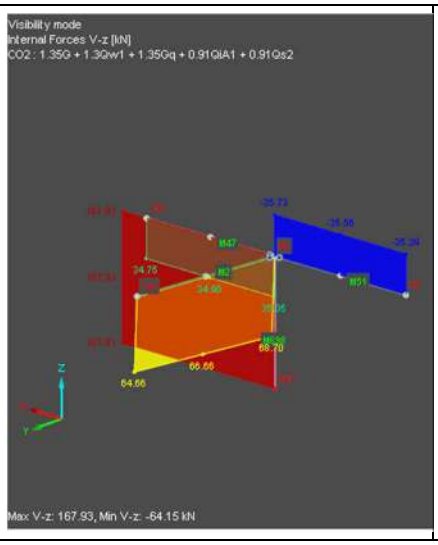


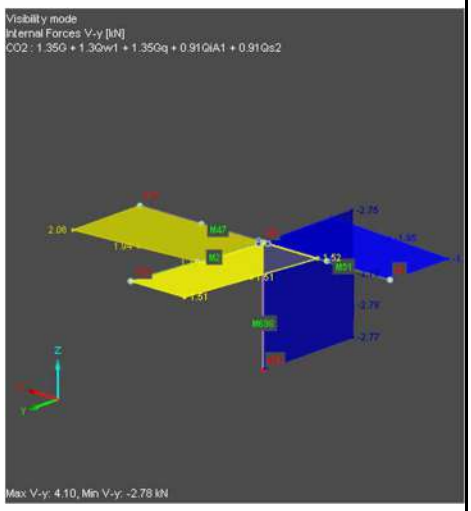




Didžiausia skersinė jėga šalutinėje sijoje	LC1*1,35+LC10*1,35+LC2*1,3+LC13*0,91+LC16*0,91







Pastaba: Šalutinių sijoms pridėtas papildomas lenkimo momentas lenkimo momento įtakai varžtams nuimti (mazgas šarnyrinis)

Material

Steel	S 355
Concrete	C25/30

Project item CON1

Design

Name	CON1
Description	
Analysis	Stress, strain/ loads in equilibrium

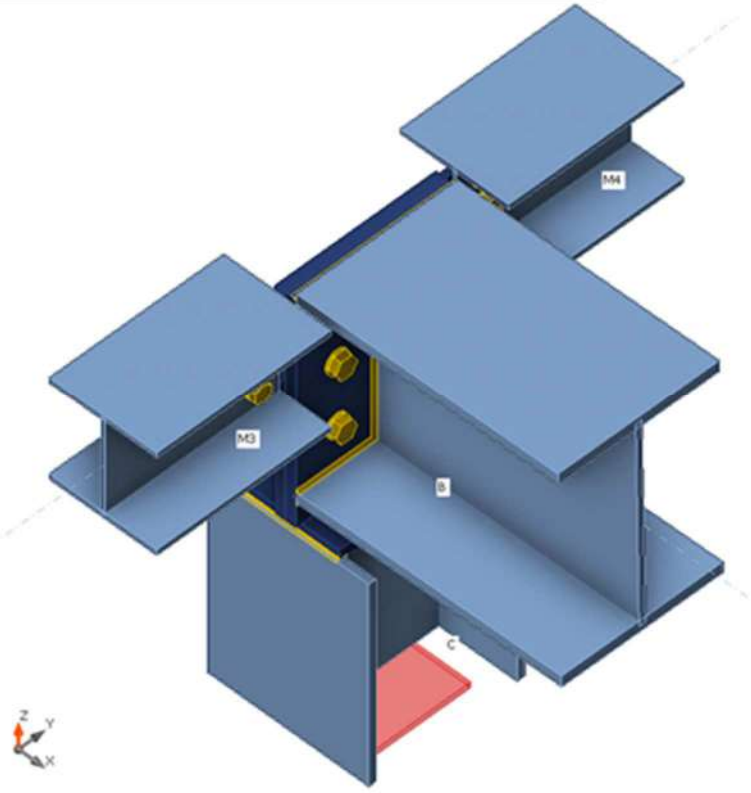
Members

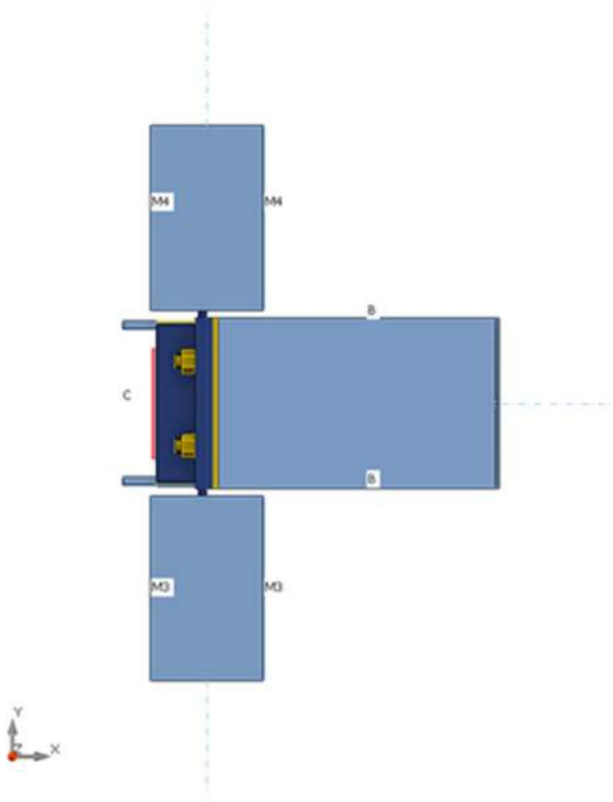
Geometry

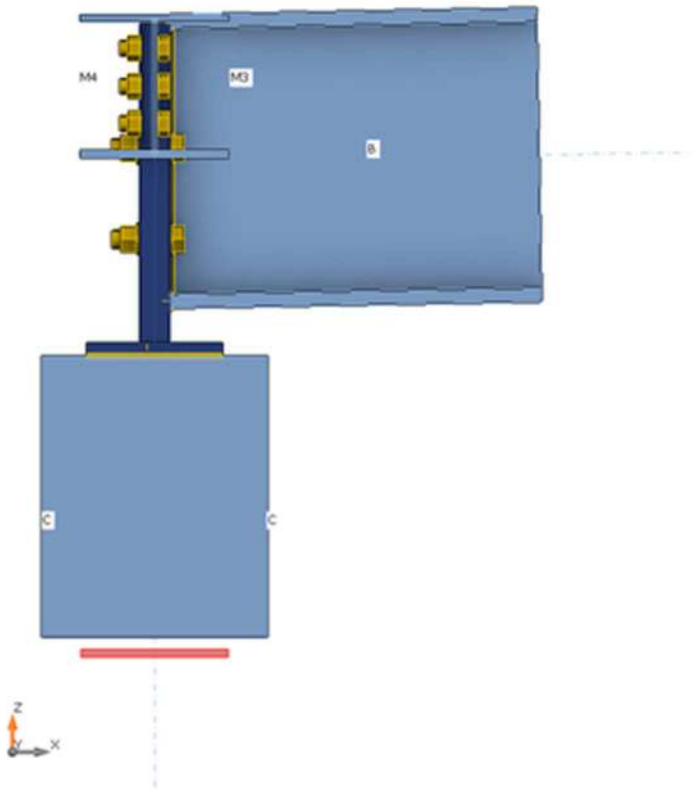
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	3 - HEA300	0,0	-90,0	-90,0	108	0	0
B	4 - HEA400	0,0	1,0	0,0	0	0	150
M3	5 - HEA200	-90,0	0,0	0,0	108	0	250
M4	5 - HEA200	90,0	0,0	0,0	108	0	250

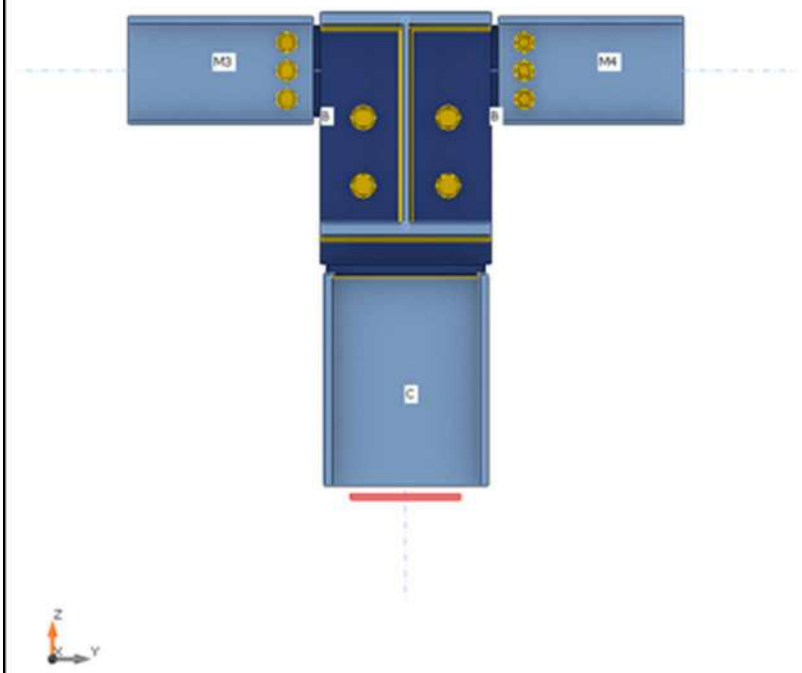
Supports and forces

Name	Support	Forces in	X [mm]
C / end	N-Vy-Vz-Mx-My-Mz	Node	0
B / end		Bolts	0
M3 / end		Node	0
M4 / end		Node	0




M4
M4
B
C
B
M3
M3
Y
Z
X


M4
M3
B
C
C
Z
Y
X



Cross-sections

Name	Material
3 - HEA300	S 355
4 - HEA400	S 355
5 - HEA200	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M24 8.8	M24 8.8	24	800,0	452
M20 8.8	M20 8.8	20	800,0	314

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	C / End	-176,5	-5,2	1,5	0,0	0,0	0,0
	B / End	-6,6	0,0	-133,9	0,0	0,0	0,0
	M3 / End	-10,9	0,0	-21,8	0,0	2,2	0,0
	M4 / End	-17,3	0,0	-21,1	0,0	2,2	0,0
LE2	C / End	-138,7	-5,2	-167,9	0,0	0,0	0,0
	B / End	48,3	1,5	-68,7	0,0	0,0	0,0
	M3 / End	15,7	1,8	-35,7	0,0	-0,3	0,0
	M4 / End	128,1	-2,1	-35,5	0,0	3,5	0,0

Unbalanced forces

Name	X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	0,9	-4,8	-0,4	1,8	-1,6	0,0
LE2	58,6	-54,0	-0,4	-50,2	7,7	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	2,1 < 5,0%	OK
Bolts	90,4 < 100%	OK
Welds	98,6 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C-bfl 1	14,0	LE2	286,7	0,0	0,0	OK
C-tfl 1	14,0	LE2	265,3	0,0	0,0	OK
C-w 1	8,5	LE2	355,1	0,0	0,0	OK
B-bfl 1	19,0	LE2	78,6	0,0	0,0	OK
B-tfl 1	19,0	LE1	32,8	0,0	0,0	OK
B-w 1	11,0	LE2	71,5	0,0	0,0	OK
M3-bfl 1	10,0	LE2	43,4	0,0	0,0	OK
M3-tfl 1	10,0	LE2	52,7	0,0	0,0	OK
M3-w 1	6,5	LE2	321,2	0,0	30,5	OK
M4-bfl 1	10,0	LE2	61,3	0,0	0,0	OK
M4-tfl 1	10,0	LE2	40,3	0,0	0,0	OK
M4-w 1	6,5	LE2	355,1	0,1	43,0	OK
SP1	20,0	LE2	355,2	0,1	0,0	OK
SP2	20,0	LE2	222,1	0,0	22,6	OK
SP3	20,0	LE2	359,4	2,1	76,8	OK
SP4	12,0	LE2	219,4	0,0	30,5	OK
SP5	12,0	LE2	316,4	0,0	74,1	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p Plate thickness
σ_{Ed} Equivalent stress
ε_{Pl} Plastic strain
$\sigma_{c,Ed}$ Contact stress

f_y Yield strength
ε_{lim} Limit of plastic strain

Detailed result for SP3

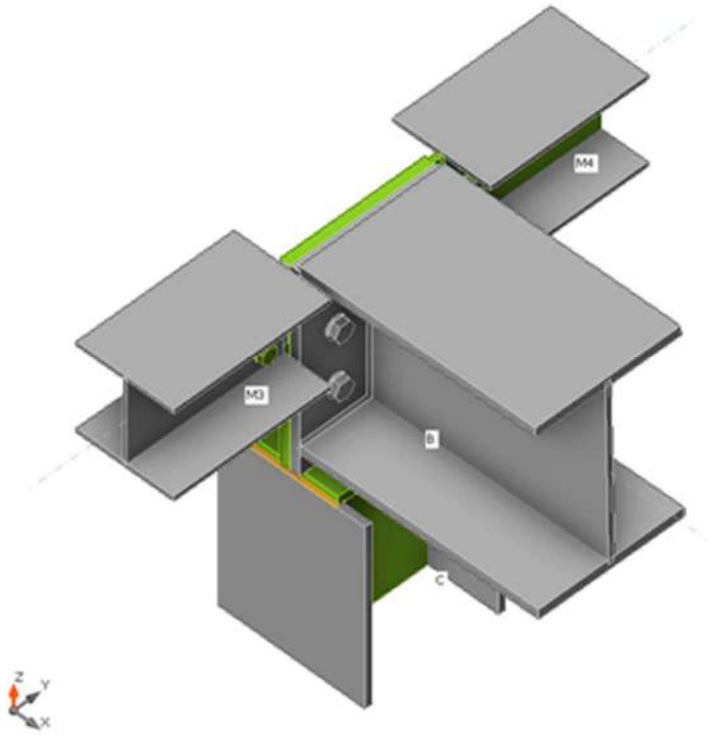
Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

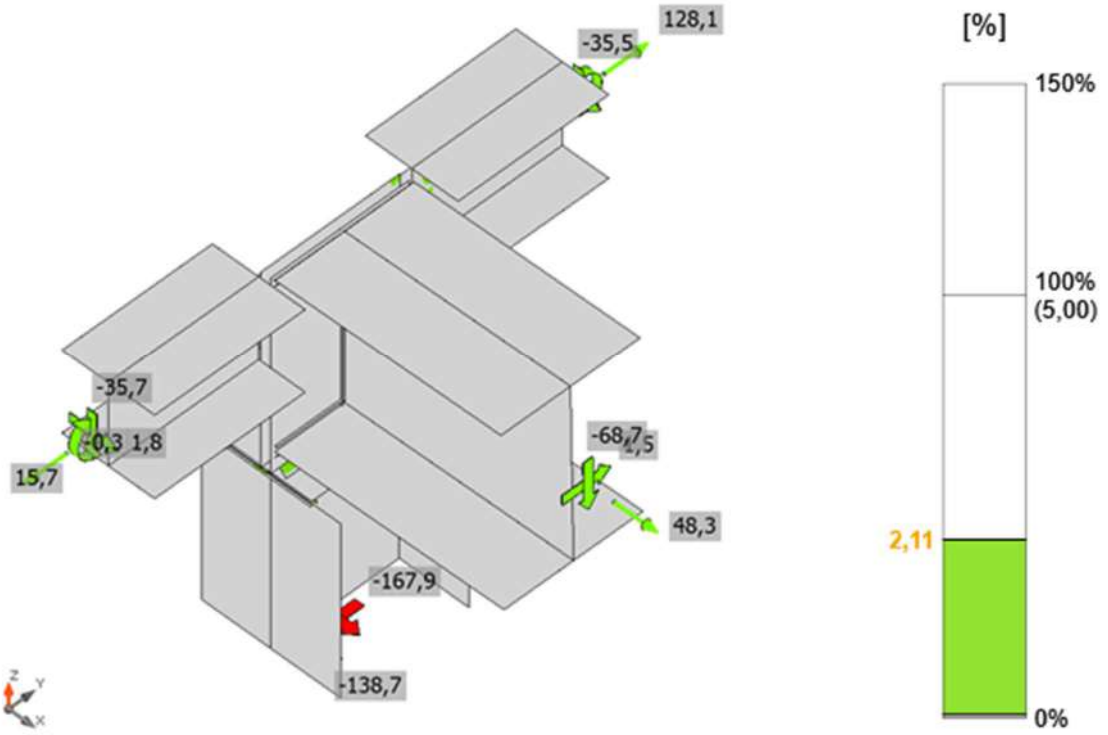
Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

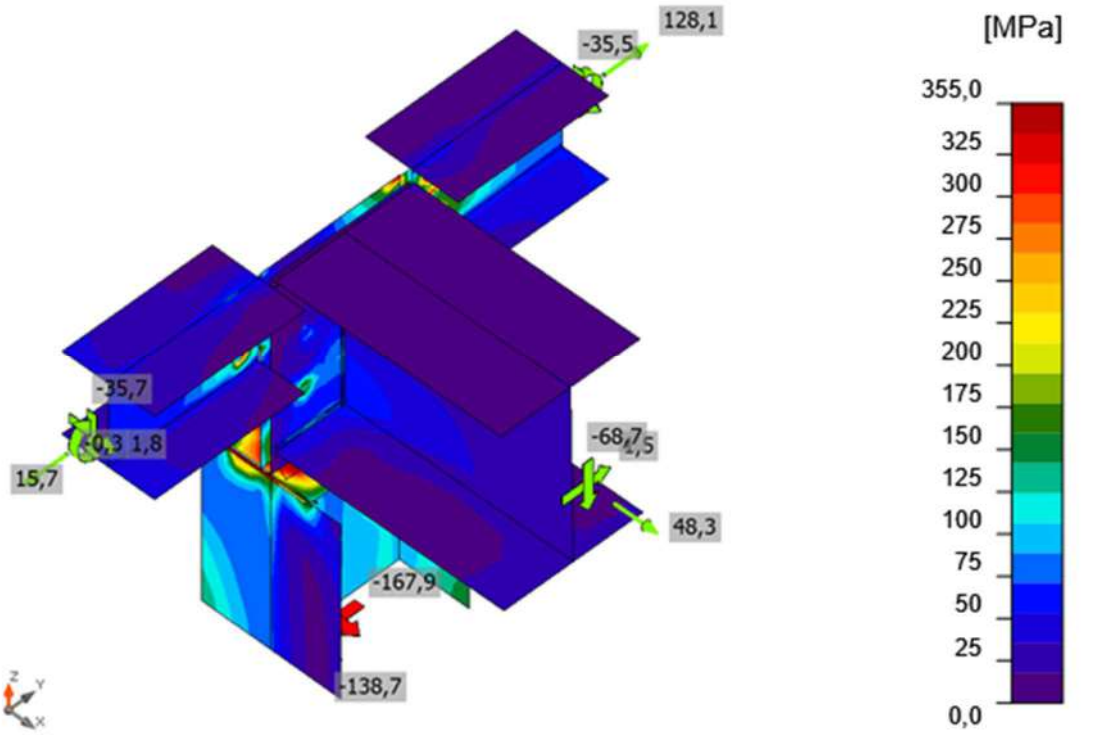
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE2

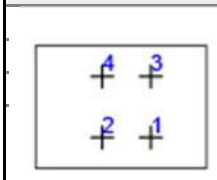
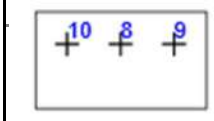


Strain check, LE2



Equivalent stress, LE2

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M24 8.8 - 1	LE2	47,0	45,7	470,4	23,1	33,7	50,2	OK	OK
	B2	M24 8.8 - 1	LE2	1,7	39,0	470,4	0,8	28,8	29,4	OK	OK
	B3	M24 8.8 - 1	LE2	41,6	88,3	470,4	20,5	65,1	79,7	OK	OK
	B4	M24 8.8 - 1	LE2	8,0	86,9	470,4	4,0	64,1	66,9	OK	OK
	B5	M20 8.8 - 2	LE2	2,0	12,8	64,7	1,4	19,8	14,7	OK	OK
	B6	M20 8.8 - 2	LE2	10,0	46,5	51,5	7,1	90,4	54,5	OK	OK
	B7	M20 8.8 - 2	LE2	13,4	36,3	60,7	9,5	59,8	45,4	OK	OK
	B8	M20 8.8 - 2	LE2	12,4	42,8	51,5	8,8	83,2	51,8	OK	OK
	B9	M20 8.8 - 2	LE2	22,0	46,4	51,5	15,6	90,1	60,5	OK	OK
	B10	M20 8.8 - 2	LE2	25,2	43,7	51,5	17,9	84,9	59,2	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M24 8.8 - 1	203,3	561,4	135,6
M20 8.8 - 2	141,1	152,6	94,1

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B6

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 141,1 kN ≥ $F_{t,Ed} =$ 10,0 kN

Where:

$k_2 =$ 0,90 – Factor

$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt

$A_s =$ 245 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6\,\pi\,d_m\,t_p\,f_u}{\gamma_{M2}}$ = 152,6 kN ≥ $F_{t,Ed}$ = 10,0 kN

Where:

d_m = 32 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

t_p = 7 mm – Plate thickness

f_u = 490,0 MPa – Ultimate strength

γ_{M2} = 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p\,\alpha_v\,f_{ub}\,A}{\gamma_{M2}}$ = 94,1 kN ≥ $F_{v,Ed}$ = 46,5 kN

Where:

β_p = 1,00 – Reduction factor for packing

α_v = 0,60 – Reduction factor for shear stress

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

A = 245 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1\,\alpha_b\,f_u\,dt}{\gamma_{M2}}$ = 51,5 kN ≥ $F_{b,Ed}$ = 46,5 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5)$ = 1,48 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 0,68 – Factor for end distance and bolt spacing in direction of load transfer

e_2 = 41 mm – Distance to the plate edge perpendicular to the shear force

p_2 = 50 mm – Distance between bolts perpendicular to the shear force

d_0 = 22 mm – Bolt hole diameter

e_1 = 45 mm – Distance to the plate edge in the direction of the shear force

p_1 = ∞ mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 20 mm – Nominal diameter of the fastener

t = 7 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd};\,B_{p,Rd})} =$ 0,07 ≤ 1,0

Where:

$F_{t,Ed}$ = 10,0 kN – Tensile force

$F_{t,Rd}$ = 141,1 kN – Tension resistance

$B_{p,Rd}$ = 152,6 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}};\,\frac{F_{b,Ed}}{F_{b,Rd}}) =$ 0,90 ≤ 1,0

Where:

$F_{v,Ed}$ = 46,5 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 94,1 kN – Shear resistance

$F_{b,Ed}$ = 46,5 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 51,5 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}} =$ 0,55 ≤ 1,0

Where:

$F_{v,Ed}$ = 46,5 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 94,1 kN – Shear resistance

$F_{t,Ed}$ = 10,0 kN – Tensile force

$F_{t,Rd}$ = 141,1 kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
SP2	B-bfl 1	◢ 4,0 ◣	299	LE2	177,5	0,0	63,9	49,0	82,1	40,8	31,0	OK	OK
		◢ 4,0 ◣	299	LE2	217,7	0,0	-112,2	84,5	66,7	50,0	22,4	OK	OK
SP2	B-tfl 1	◢ 4,0 ◣	299	LE2	41,4	0,0	-25,2	18,2	5,5	9,5	8,8	OK	OK
		◢ 4,0 ◣	299	LE2	42,3	0,0	25,9	-19,0	-3,7	9,7	9,2	OK	OK
SP2	B-w 1	◢ 4,0 ◣	366	LE2	106,4	0,0	44,7	-45,1	32,8	24,4	16,1	OK	OK
		◢ 4,0 ◣	366	LE2	84,9	0,0	41,9	41,6	-9,1	19,5	13,6	OK	OK
SP1	SP3	-	280	-	-	-	-	-	-	-	-	OK	OK
SP1	C-bfl 1	◢ 4,0 ◣	179	LE2	429,3	1,4	211,7	-210,0	-49,1	98,6	97,2	OK	OK

		◢ 4,0 ◣	179	LE2	426,9	0,0	-24,5	53,2	-240,2	98,0	65,5	OK	OK
SP1	C-tfl 1	◢ 4,0 ◣	179	LE2	427,1	0,1	-179,9	-145,4	169,9	98,1	48,2	OK	OK
		◢ 4,0 ◣	179	LE2	427,4	0,3	-208,3	-209,5	50,2	98,1	88,1	OK	OK
SP1	C-w 1	◢ 4,0 ◣	274	LE2	427,7	0,5	169,6	159,3	-161,3	98,2	82,4	OK	OK
		◢ 4,0 ◣	274	LE2	427,4	0,3	-194,3	187,2	115,3	98,1	74,5	OK	OK
SP3	SP4	-	160	-	-	-	-	-	-	-	-	OK	OK
SP3	SP5	-	160	-	-	-	-	-	-	-	-	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_\perp$	Perpendicular stress
$\tau_\perp$	Shear stress perpendicular to weld axis
$\tau_\parallel$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for SP1 / C-bfl 1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 429,3 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 248,0 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,99 ≤ 1,0

Where:

$\sigma_{w,Ed}$ = 429,3 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd}$ = 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp}$ = 248,0 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd}$ = 352,8 MPa – Perpendicular stress resistance

Buckling

Buckling analysis was not calculated.

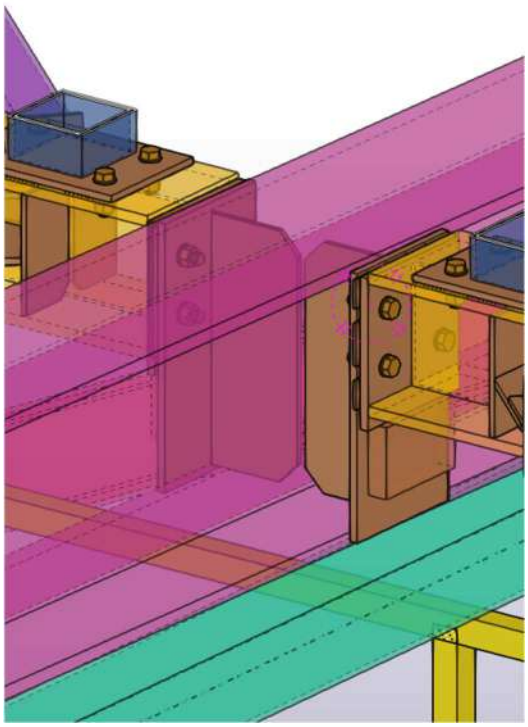
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_{C}	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

IŠVADA: Laikomoji galia pakankama.

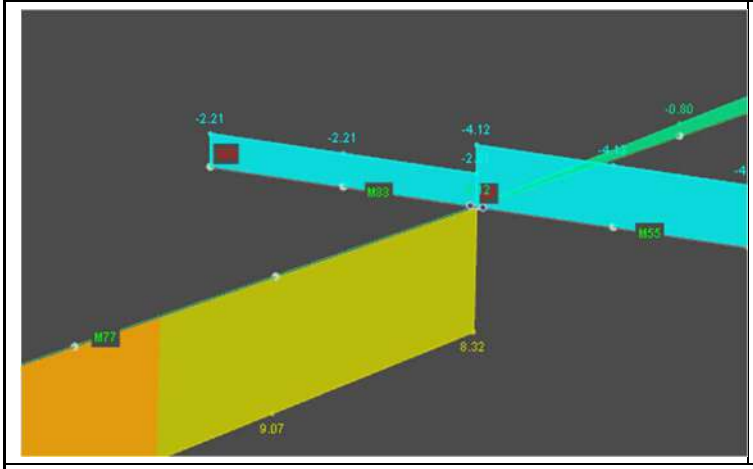
9.2. PAGRINDINĖS – ŠALUTINIŲ SIJŲ MAZGAS (MAZGAS L SK_B-011)

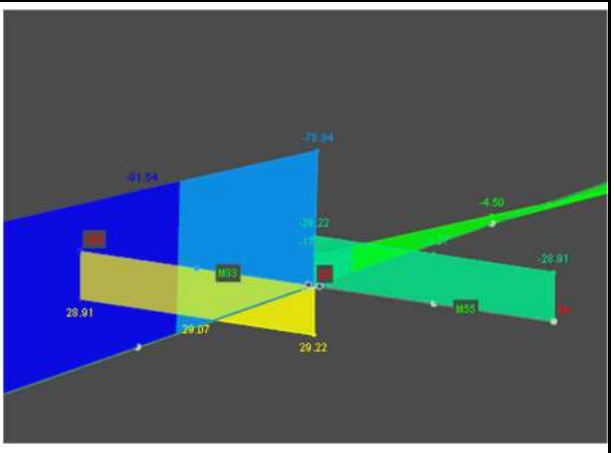
Projektuojamame pastate yra du identiški mazgai ašyse 2/B ir 2/C. Mazgas modelyje:

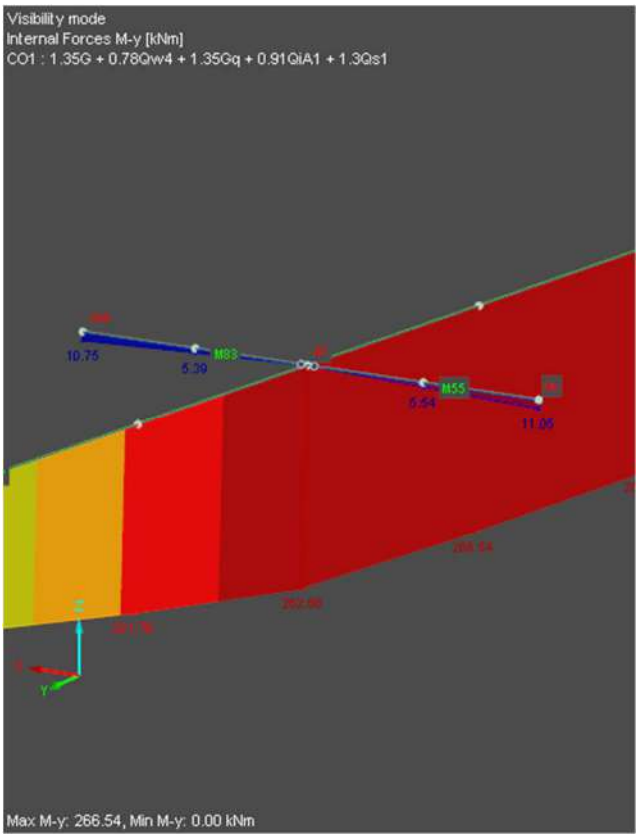


Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausias momentas pagrindinėje sijoje	LC1*1,35+LC10*1,35+LC14*1,3+LC5*0,78+LC13*0,91+LC15*0,91

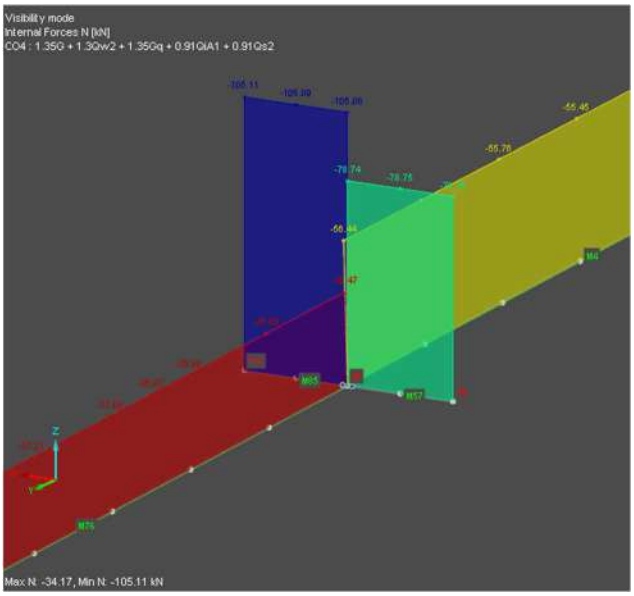


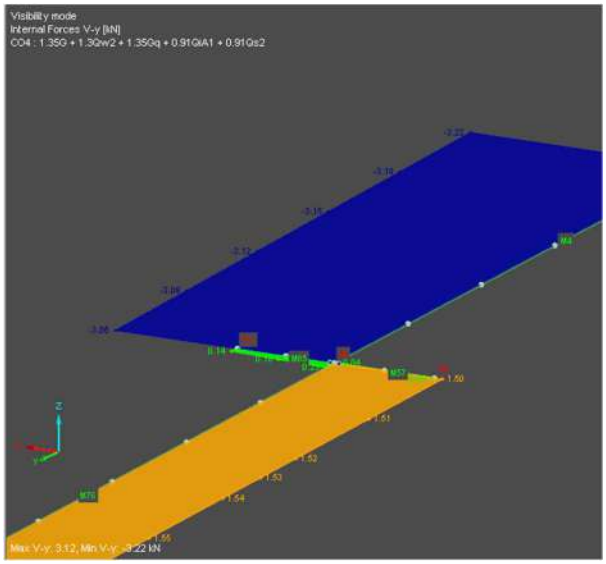


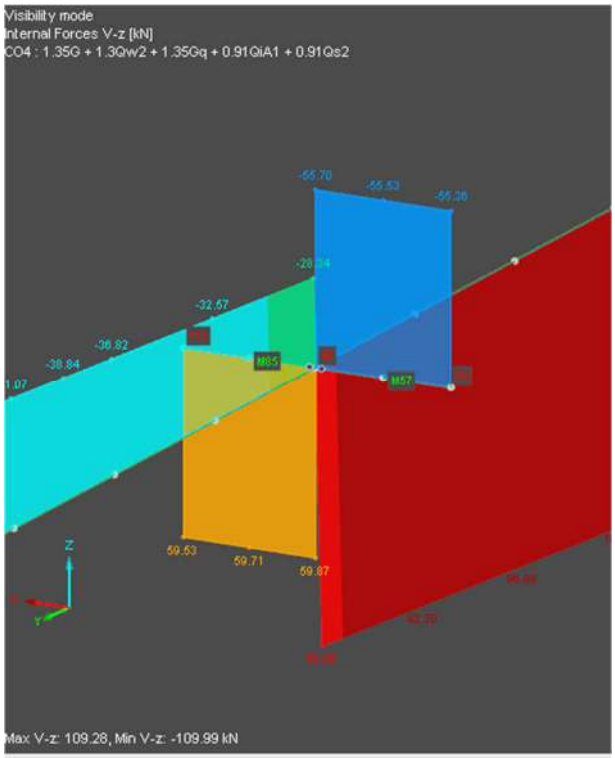


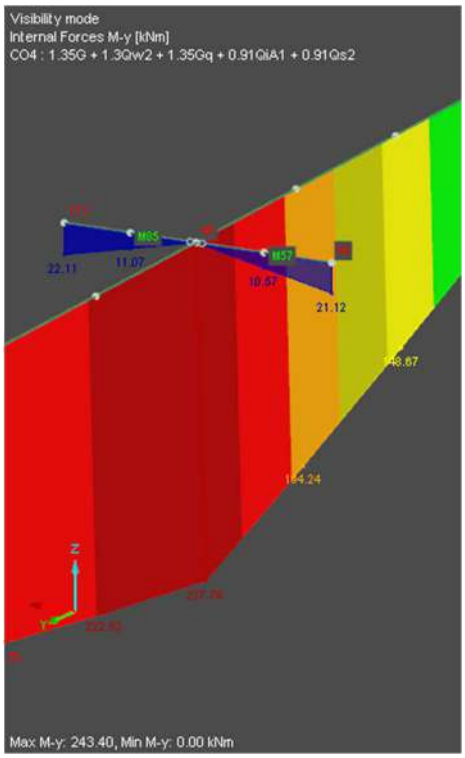
Didžiausia ašinė jėga šalutinėje sijoje

LC1*1,35+LC10*1,35+LC3*1,3+LC13*0,91+LC14*0,91









Pastaba: Šalutinių sijoms pridėtas papildomas lenkimo momentas lenkimo momento įtakai varžtams nuimti (mazgas šarnyrinis)

Project item CON2

Design

Name	CON2
Description	
Analysis	Stress, strain/ loads in equilibrium

Members

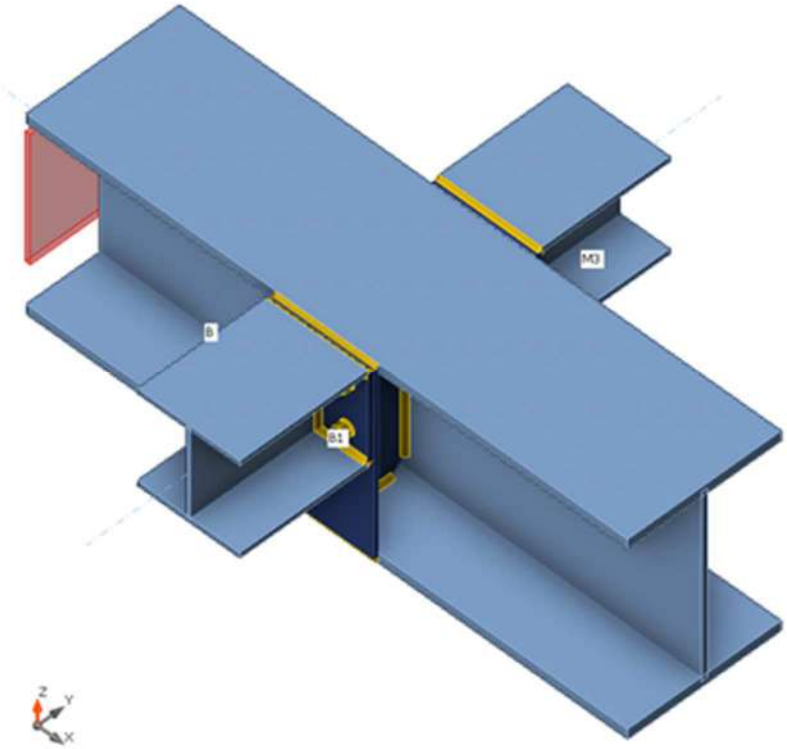
Geometry

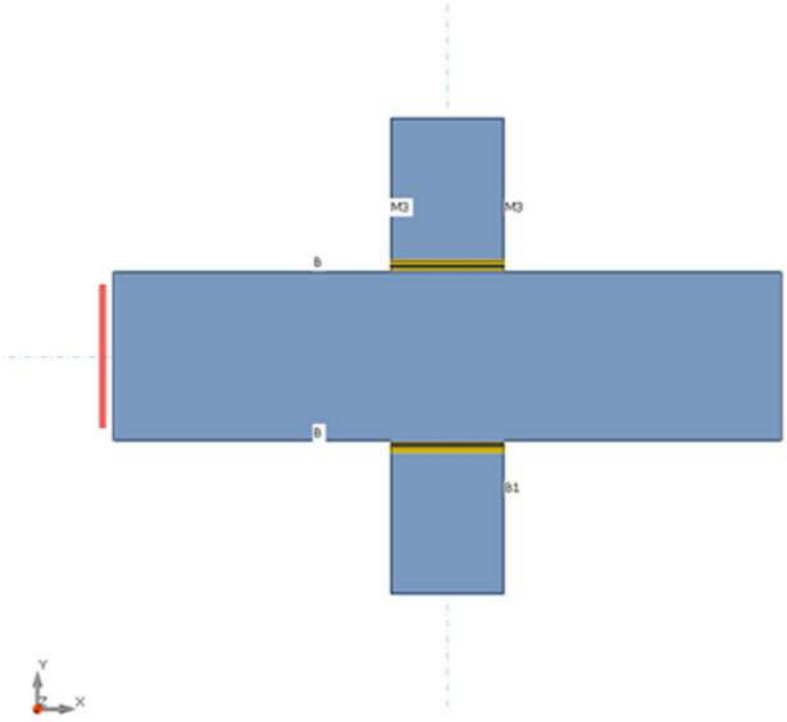
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
B	4 - HEA400	0,0	0,0	0,0	0	0	0
B1	5 - HEA200	-90,0	0,0	0,0	0	0	100
M3	5 - HEA200	90,0	0,0	0,0	0	0	100

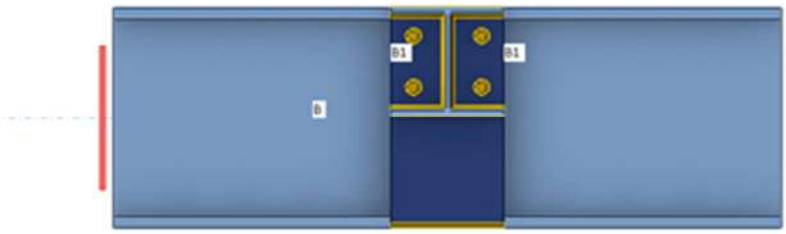
Supports and forces

Name	Support	Forces in	X [mm]
B / begin	N-Vy-Vz-Mx-My-Mz	Node	0
B / end		Node	0

B1 / end		Node	0
M3 / end		Node	0













Cross-sections

Name	Material

4 - HEA400	S 355
5 - HEA200	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm²]
M16 8.8	M16 8.8	16	800,0	201

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	B / Begin	8,3	0,0	-78,8	-7,0	-262,7	0,0
	B / End	0,7	0,0	17,8	7,0	262,7	0,0
	B1 / End	-2,2	0,0	29,2	0,0	-4,5	0,0
	M3 / End	-4,1	0,0	28,9	0,0	-4,6	0,0
LE2	B / Begin	56,4	3,1	-88,5	-7,0	-237,8	0,0
	B / End	-36,5	-1,5	-28,3	7,0	237,8	0,0
	B1 / End	-105,1	0,1	59,9	0,0	0,0	0,0
	M3 / End	-78,7	0,1	55,7	0,0	0,0	0,0

Unbalanced forces

Name	X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	9,0	-1,9	-2,9	0,3	0,0	0,0
LE2	20,0	27,9	-1,3	-2,6	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	39,2 < 100%	OK
Welds	93,0 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
B-bfl 1	19,0	LE1	201,8	0,0	0,0	OK
B-tfl 1	19,0	LE1	205,2	0,0	0,0	OK
B-w 1	11,0	LE1	125,5	0,0	0,0	OK
B1-bfl 1	10,0	LE2	157,2	0,0	0,0	OK
B1-tfl 1	10,0	LE2	53,1	0,0	0,0	OK
B1-w 1	6,5	LE2	189,2	0,0	0,0	OK
M3-bfl 1	10,0	LE2	142,1	0,0	0,0	OK

M3-tfl 1	10,0	LE2	67,3	0,0	0,0	OK
M3-w 1	6,5	LE2	159,7	0,0	0,0	OK
SEP1a	8,0	LE2	258,1	0,0	73,6	OK
SEP1b	12,0	LE2	123,2	0,0	138,1	OK
STIFF	16,0	LE2	108,5	0,0	0,0	OK
SEP2a	8,0	LE2	308,2	0,0	66,1	OK
SEP2b	12,0	LE2	130,5	0,0	136,3	OK
STIFF	16,0	LE2	99,4	0,0	0,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for SEP2a

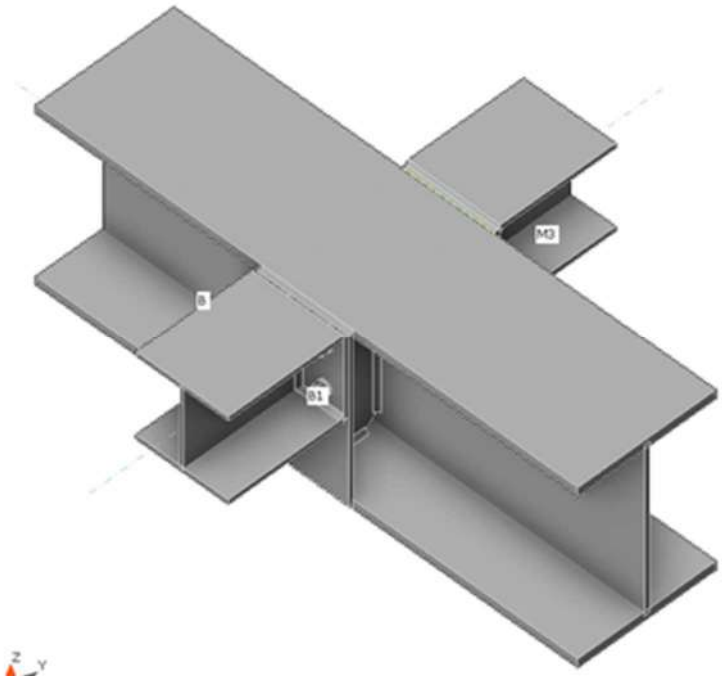
Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

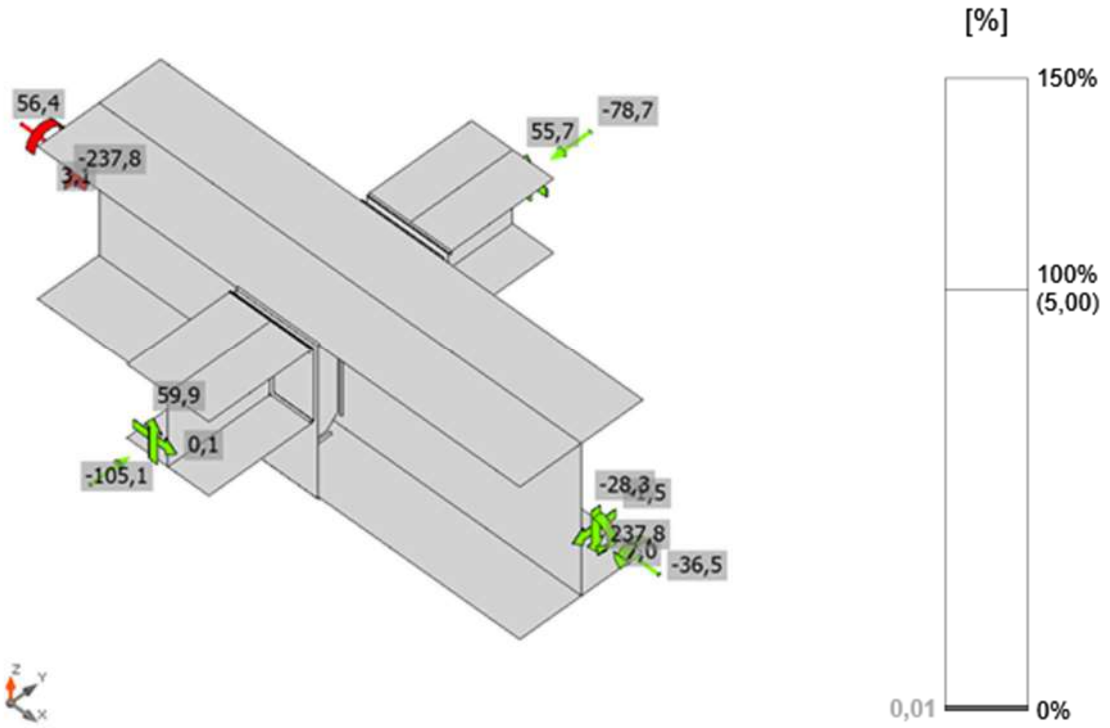
Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

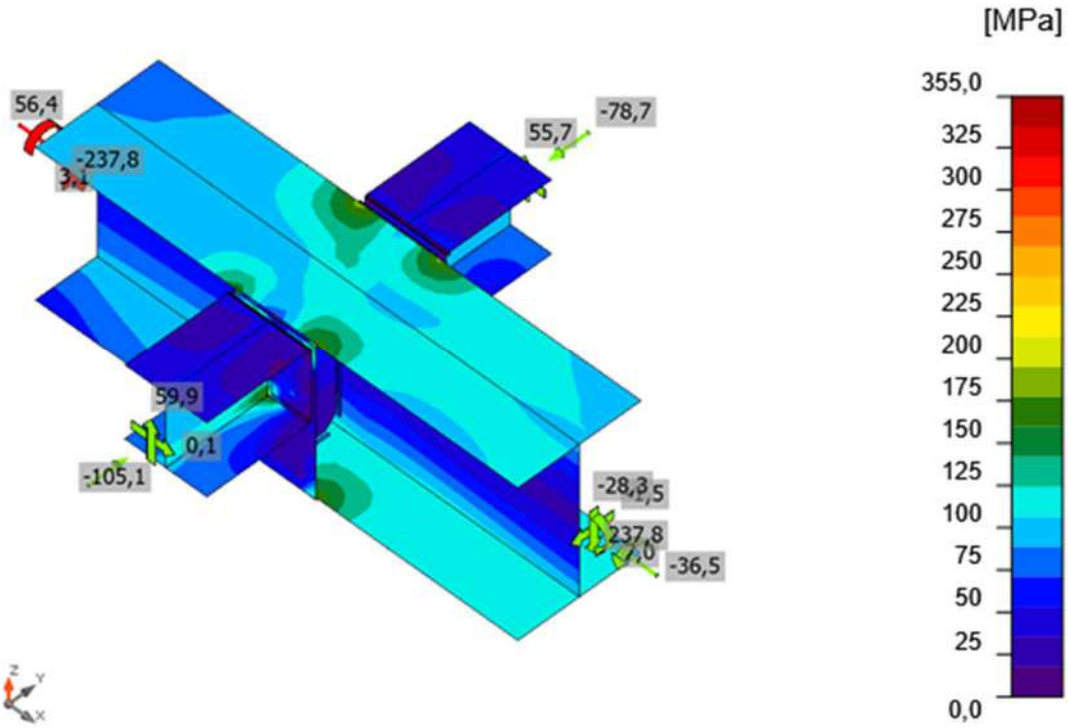
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE2

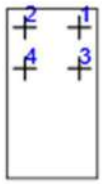
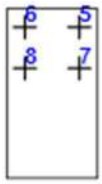


Strain check, LE2



Equivalent stress, LE2

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE2	8,9	15,0	94,1	9,9	24,9	31,9	OK	OK
	B2	M16 8.8 - 1	LE2	14,7	14,5	94,1	16,2	24,0	35,6	OK	OK
	B3	M16 8.8 - 1	LE2	1,9	15,2	125,4	2,0	25,3	26,7	OK	OK
	B4	M16 8.8 - 1	LE2	2,2	15,1	125,4	2,5	25,1	26,9	OK	OK
	B5	M16 8.8 - 1	LE2	21,5	13,4	94,1	23,7	22,2	39,2	OK	OK
	B6	M16 8.8 - 1	LE2	15,9	13,9	94,1	17,6	23,1	35,7	OK	OK
	B7	M16 8.8 - 1	LE2	2,5	14,1	125,4	2,8	23,4	25,4	OK	OK
	B8	M16 8.8 - 1	LE2	2,4	14,2	125,4	2,7	23,6	25,6	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	150,0	60,3

Symbol explanation

$F_{t,Ed}$ Tension force

$F_{v,Ed}$ Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$ Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t Utilization in tension
Ut_s Utilization in shear
Ut_{ts} Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$ Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$ Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$ Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B5

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 21,5 kN

Where:

$k_2 =$ 0,90 – Factor
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A_s =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 150,0 kN ≥ $F_{t,Ed} =$ 21,5 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
$t_p =$ 8 mm – Plate thickness
$f_u =$ 490,0 MPa – Ultimate strength
$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 60,3 kN ≥ $F_{v,Ed} =$ 13,4 kN

Where:

$\beta_p =$ 1,00 – Reduction factor for packing
$\alpha_v =$ 0,60 – Reduction factor for shear stress
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}} =$ 94,1 kN ≥ $F_{b,Ed} =$ 13,4 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5) = 2{,}50$ – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1) = 0{,}75$ – Factor for end distance and bolt spacing in direction of load transfer

$e_2 = 40$ mm – Distance to the plate edge perpendicular to the shear force

$p_2 = 120$ mm – Distance between bolts perpendicular to the shear force

$d_0 = 18$ mm – Bolt hole diameter

$e_1 = 41$ mm – Distance to the plate edge in the direction of the shear force

$p_1 = \infty$ mm – Distance between bolts in the direction of the shear force

$f_{ub} = 800{,}0$ MPa – Ultimate tensile strength of the bolt

$f_u = 490{,}0$ MPa – Ultimate strength of the plate

$d = 16$ mm – Nominal diameter of the fastener

$t = 8$ mm – Thickness of the plate

$\gamma_{M2} = 1{,}25$ – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})} = 0{,}24 \leq 1{,}0$

Where:

$F_{t,Ed} = 21{,}5$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

$B_{p,Rd} = 150{,}0$ kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}; \frac{F_{b,Ed}}{F_{b,Rd}}) = 0{,}22 \leq 1{,}0$

Where:

$F_{v,Ed} = 13{,}4$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{b,Ed} = 13{,}4$ kN – Bearing force (for decisive plate)

$F_{b,Rd} = 94{,}1$ kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}} = 0{,}39 \leq 1{,}0$

Where:

$F_{v,Ed} = 13{,}4$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{t,Ed} = 21{,}5$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
SEP1a	B-tfl 1	◢ 6,0	199	LE1	234,2	0,0	89,6	66,7	-105,6	53,8	42,8	OK	OK
SEP1a	B-bfl 1	◢ 6,0	199	LE1	243,6	0,0	-92,5	69,0	-110,3	55,9	44,6	OK	OK
SEP1b	B1-bfl 1	◢ 6,0 ◣	198	LE2	130,1	0,0	-59,7	-66,6	-4,6	29,9	13,8	OK	OK
		◢ 6,0 ◣	198	LE2	150,7	0,0	-80,8	-72,1	13,8	34,6	15,2	OK	OK
SEP1b	B1-tfl 1	◢ 6,0 ◣	199	LE1	20,2	0,0	-16,0	6,9	-2,0	4,6	4,6	OK	OK
		◢ 6,0 ◣	198	LE2	29,5	0,0	21,4	-6,4	9,8	6,8	6,7	OK	OK
SEP1b	B1-w 1	◢ 6,0 ◣	175	LE2	201,0	0,0	-44,0	-44,7	104,1	46,2	33,5	OK	OK
		◢ 6,0 ◣	175	LE2	199,7	0,0	-45,7	45,0	-102,8	45,9	33,4	OK	OK
B-bfl 1	STIFF	◢ 6,0 ◣	117	LE1	81,3	0,0	8,2	-6,0	-46,3	18,7	16,4	OK	OK
		◢ 6,0 ◣	117	LE1	92,8	0,0	20,6	-1,2	-52,2	21,3	16,8	OK	OK
B-w 1	STIFF	◢ 6,0 ◣	298	LE2	78,1	0,0	-24,0	-36,3	-22,8	17,9	14,9	OK	OK
		◢ 6,0 ◣	298	LE2	111,7	0,0	-44,7	32,4	49,4	25,6	20,1	OK	OK
B-tfl 1	STIFF	◢ 6,0 ◣	117	LE1	73,0	0,0	-5,5	8,5	-41,2	16,8	15,0	OK	OK
		◢ 6,0 ◣	117	LE2	126,7	0,0	-26,1	9,2	-71,0	29,1	20,7	OK	OK
SEP1a	STIFF	◢ 6,0 ◣	350	LE2	354,2	0,0	-175,4	-169,4	53,7	81,3	37,3	OK	OK
		◢ 6,0 ◣	350	LE2	309,6	0,0	-147,2	153,4	-34,6	71,1	35,8	OK	OK
SEP2a	B-tfl 1	◢ 5,0	199	LE1	288,1	0,0	115,3	84,8	-126,7	66,2	52,3	OK	OK
SEP2a	B-bfl 1	◢ 5,0	199	LE1	302,7	0,0	-121,3	88,3	-133,5	69,5	54,7	OK	OK

SEP2 b	M3-bfl 1	◢ 5,0 ◣	198	LE2	141,8	0,0	-63,2	-73,2	-3,0	32,5	15,0	OK	OK
		◢ 5,0 ◣	198	LE2	174,9	0,0	-96,5	-83,1	13,7	40,2	17,2	OK	OK
SEP2 b	M3-tfl 1	◢ 5,0 ◣	199	LE1	24,2	0,0	-18,5	8,7	-2,5	5,6	5,6	OK	OK
		◢ 5,0 ◣	198	LE2	46,3	0,0	33,8	-10,9	14,6	10,6	8,4	OK	OK
SEP2 b	M3-w 1	◢ 5,0 ◣	175	LE2	216,0	0,0	-52,9	-54,1	108,2	49,6	37,0	OK	OK
		◢ 5,0 ◣	175	LE2	215,0	0,0	-57,4	56,3	-105,5	49,4	36,6	OK	OK
B-bfl 1	STIFF	◢ 5,0 ◣	117	LE1	101,4	0,0	10,2	-8,3	-57,6	23,3	19,4	OK	OK
		◢ 5,0 ◣	117	LE2	122,7	0,0	32,0	-8,9	-67,8	28,2	20,8	OK	OK
B-w 1	STIFF	◢ 5,0 ◣	298	LE2	87,1	0,0	-33,1	-45,1	-11,4	20,0	16,8	OK	OK
		◢ 5,0 ◣	298	LE2	114,2	0,0	-51,0	39,1	44,2	26,2	21,5	OK	OK
B-tfl 1	STIFF	◢ 5,0 ◣	117	LE2	88,6	0,0	-8,5	9,2	-50,1	20,3	17,7	OK	OK
		◢ 5,0 ◣	117	LE2	126,9	0,0	-39,5	15,2	-67,9	29,1	20,6	OK	OK
SEP2 a	STIFF	◢ 5,0 ◣	350	LE2	405,0	0,0	-203,0	-194,1	57,1	93,0	47,2	OK	OK
		◢ 5,0 ◣	350	LE2	348,3	0,0	-165,3	174,4	-30,5	80,0	44,1	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress

$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for SEP2a / STIFF

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0.5} =$ 405,0 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 203,0 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_{\perp}|}{\sigma_{\perp,Rd}}) =$ 0,93 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 405,0 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp} =$ -203,0 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Detailing check

- Weld is too small. Throat thickness should be greater or equal to 7,3 mm where rupture of the weld is to be avoided for ductility purposes. (FprEN 1993-1-8:2023 – 6.9(4))

Buckling

Buckling analysis was not calculated.

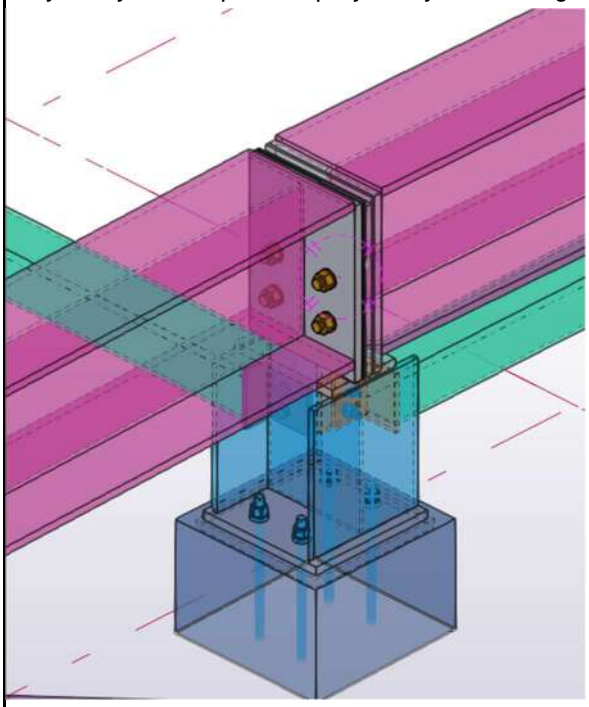
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1

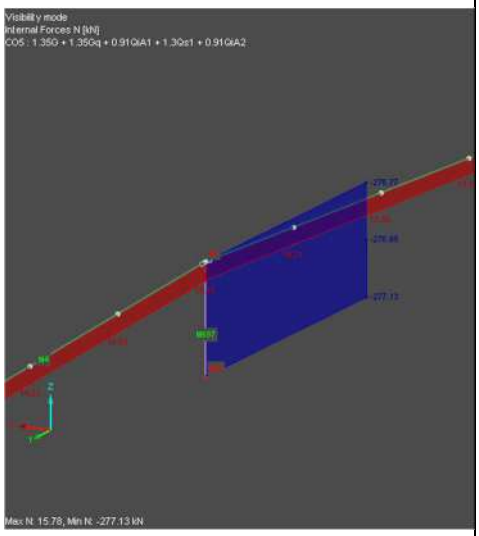
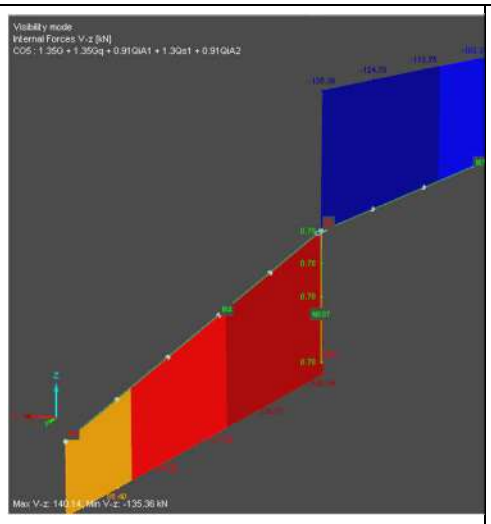
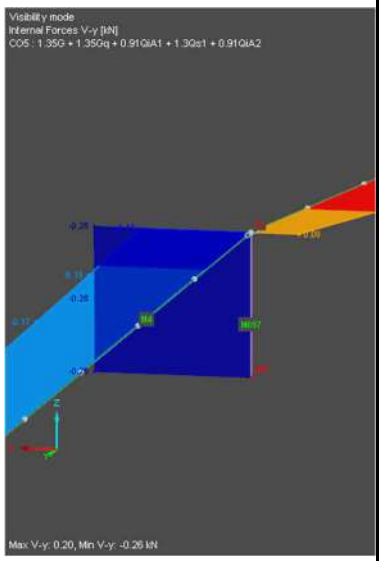
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_{C}	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

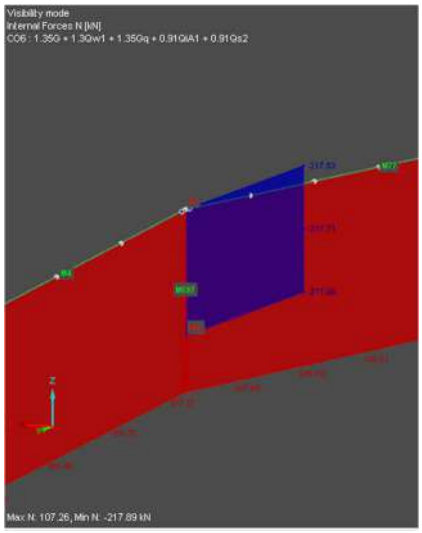
9.3. ANTKOLONIO – SIJOS VIDINIS MAZGAS (MAZGAS K SK_B-011)

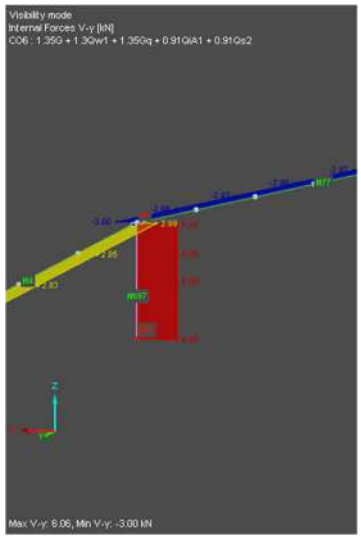
Projektuojamame pastate projektuojamas mazgas yra ašyse 2/B->C. Mazgas modelyje:

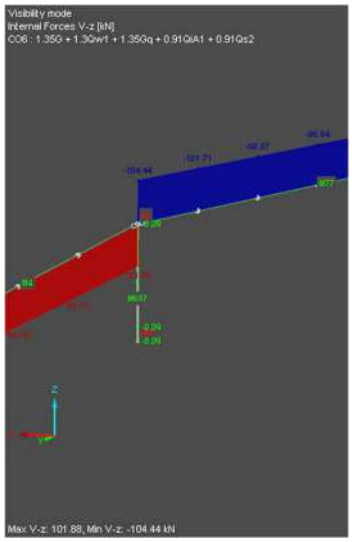


Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia ašinė jėga antkolonyje, Didžiausia skersinė jėga sijose	LC1*1,35+LC10*1,35+LC14*1,3+LC5*0,78+LC13*0,91+LC15*0,91
	 
Didžiausia ašinė jėga sijose	LC1*1,35+LC10*1,35+LC2*1,3+LC13*0,91+LC16*0,91







Pastaba: Šalutinių sijoms pridėtas papildomas lenkimo momentas lenkimo momento įtakai varžtams nuimti (mazgas šarnyrinis)

Project item CON3

Design

Name	CON3
Description	
Analysis	Stress, strain/ loads in equilibrium

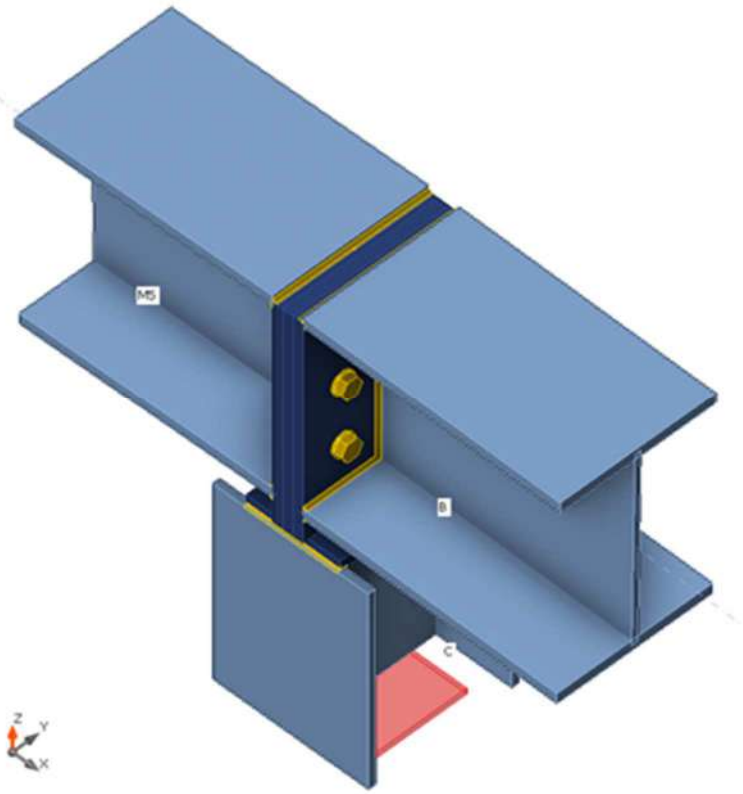
Members

Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	3 - HEA300	0,0	-90,0	-90,0	108	0	0
B	4 - HEA400	0,0	-1,0	0,0	0	0	150
M5	4 - HEA400	180,0	-1,0	0,0	0	0	150

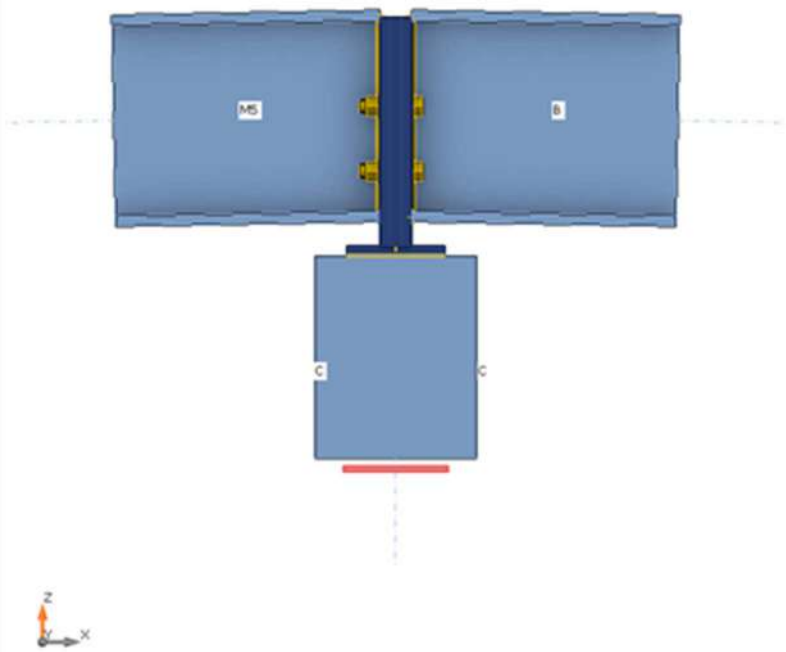
Supports and forces

Name	Support	Forces in	X [mm]
C / end	N-Vy-Vz-Mx-My-Mz	Node	0
B / end		Bolts	0
M5 / end		Bolts	0


M5
B
C
Z
Y
X


M5
B
M5
B


Y
Z
X







Cross-sections

Name	Material

3 - HEA300	S 355
4 - HEA400	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M24 8.8	M24 8.8	24	800,0	452

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	C / End	-276,8	-0,3	0,8	0,0	0,0	0,0
	B / End	-15,8	0,2	-135,4	0,0	0,0	0,0
	M5 / End	-15,8	0,1	-140,1	0,0	0,0	0,0
LE2	C / End	-203,3	-6,0	0,0	0,0	0,0	0,0
	B / End	-106,0	0,0	-105,0	0,0	0,0	0,0
	M5 / End	-106,0	0,0	-102,0	0,0	0,0	0,0

Unbalanced forces

Name	X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	0,3	0,9	1,9	0,1	0,0	0,0
LE2	5,9	0,0	0,0	0,0	-0,6	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	3,5 < 100%	OK
Welds	47,7 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C-bfl 1	14,0	LE1	59,6	0,0	0,0	OK
C-tfl 1	14,0	LE1	59,8	0,0	0,0	OK
C-w 1	8,5	LE1	77,5	0,0	0,0	OK
B-bfl 1	19,0	LE1	32,1	0,0	0,0	OK
B-tfl 1	19,0	LE1	33,9	0,0	0,0	OK
B-w 1	11,0	LE1	61,2	0,0	0,0	OK
M5-bfl 1	19,0	LE1	33,2	0,0	0,0	OK
M5-tfl 1	19,0	LE1	35,1	0,0	0,0	OK
M5-w 1	11,0	LE1	64,3	0,0	0,0	OK

SP1	20,0	LE1	62,1	0,0	0,0	OK
SP2	20,0	LE1	36,0	0,0	6,8	OK
SP3	20,0	LE1	79,6	0,0	6,8	OK
SP4	20,0	LE1	42,7	0,0	6,8	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for C-bfl 1

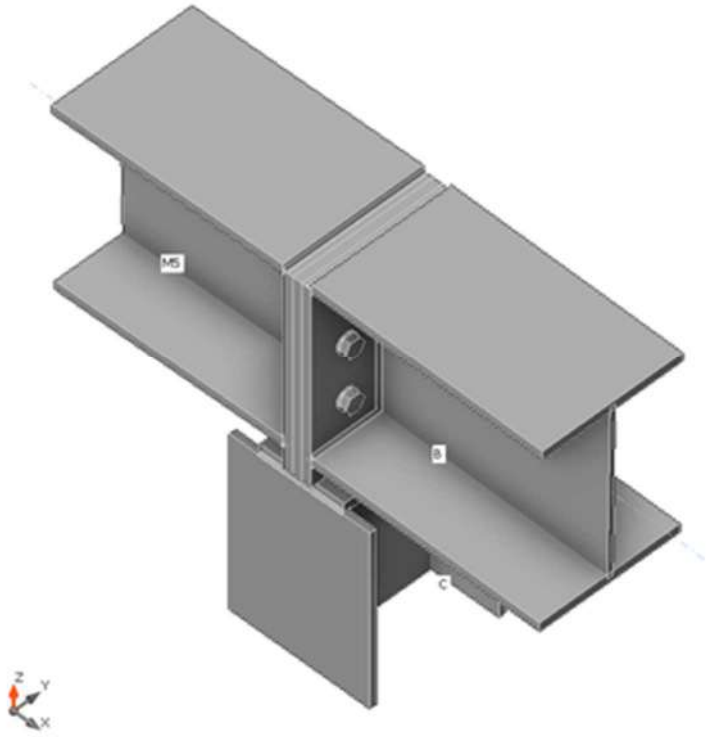
Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

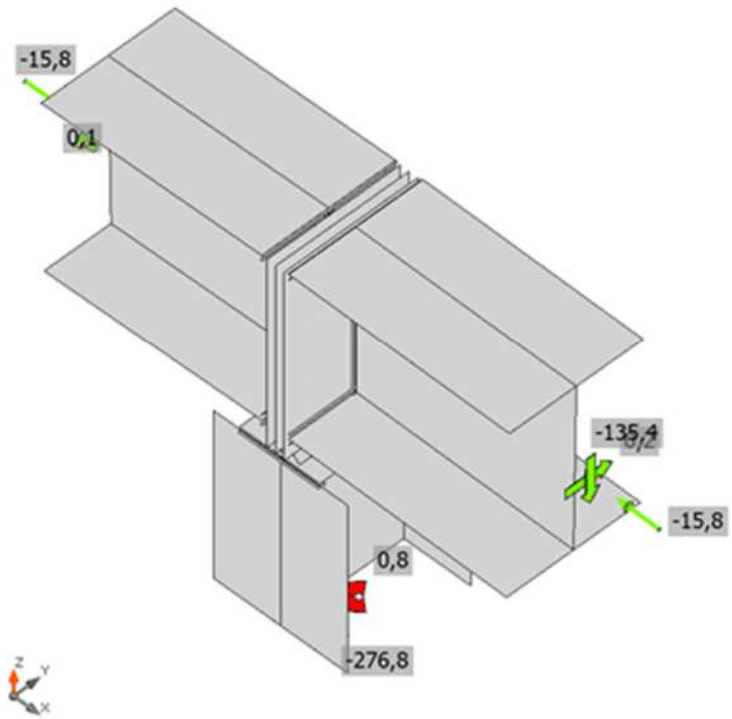
Where:

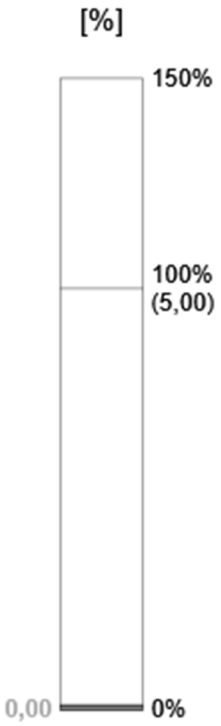
$f_{yk} =$ 355,0 MPa – characteristic yield strength

$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1

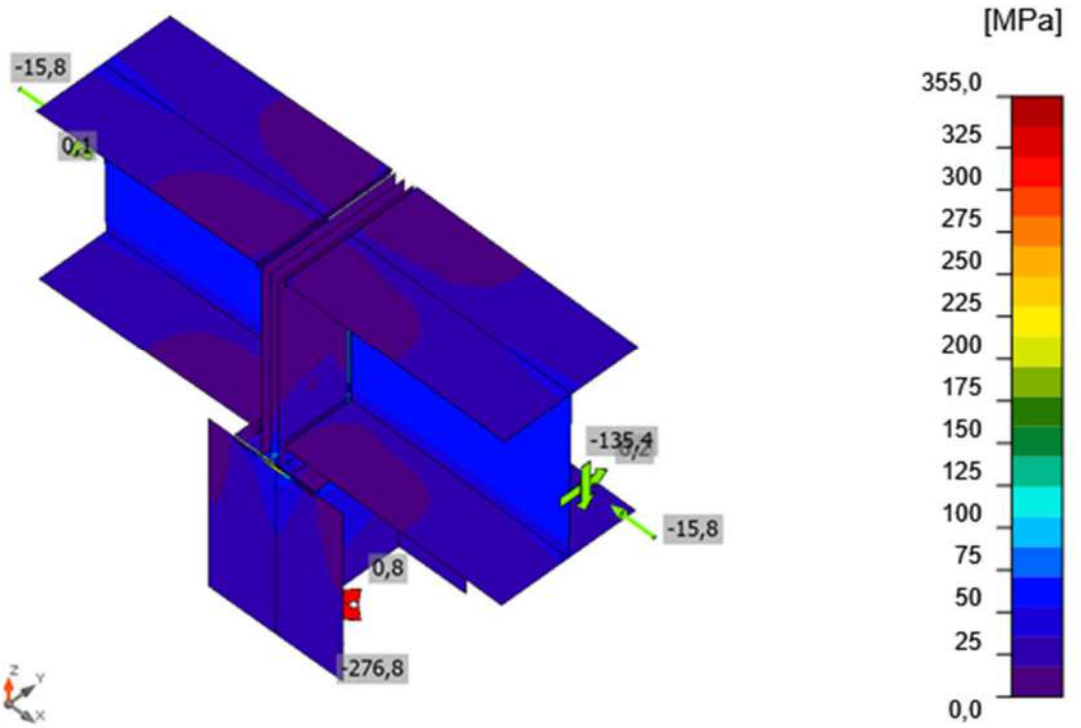


Overall check, LE1



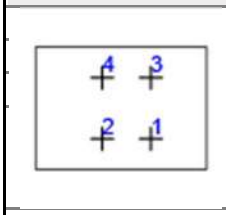


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M24 8.8 - 1	LE1	2,6	3,5	470,4	1,3	2,6	3,5	OK	OK
	B2	M24 8.8 - 1	LE1	0,5	4,0	470,4	0,3	3,0	3,2	OK	OK
	B3	M24 8.8 - 1	LE1	2,6	3,5	470,4	1,3	2,6	3,5	OK	OK
	B4	M24 8.8 - 1	LE1	0,5	4,0	470,4	0,3	3,0	3,2	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M24 8.8 - 1	203,3	561,4	135,6

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4

$B_{p,Rd}$ Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$ Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B3

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 203,3 kN ≥ $F_{t,Ed} =$ 2,6 kN

Where:

$k_2 =$ 0,90 – Factor
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A_s =$ 353 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 561,4 kN ≥ $F_{t,Ed} =$ 2,6 kN

Where:

$d_m =$ 38 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
$t_p =$ 20 mm – Plate thickness
$f_u =$ 490,0 MPa – Ultimate strength
$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 135,6 kN ≥ $F_{v,Ed} =$ 3,5 kN

Where:

$\beta_p =$ 1,00 – Reduction factor for packing
$\alpha_v =$ 0,60 – Reduction factor for shear stress
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A =$ 353 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u d t}{\gamma_{M2}} =$ 470,4 kN ≥ $F_{b,Ed} =$ 5,6 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5) =$ 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1) =$ 1,00 – Factor for end distance and bolt spacing in direction of load transfer

$e_2 =$ 75 mm – Distance to the plate edge perpendicular to the shear force

$p_2 = 150$ mm – Distance between bolts perpendicular to the shear force

$d_0 = 26$ mm – Bolt hole diameter

$e_1 = 119$ mm – Distance to the plate edge in the direction of the shear force

$p_1 = \infty$ mm – Distance between bolts in the direction of the shear force

$f_{ub} = 800{,}0$ MPa – Ultimate tensile strength of the bolt

$f_u = 490{,}0$ MPa – Ultimate strength of the plate

$d = 24$ mm – Nominal diameter of the fastener

$t = 20$ mm – Thickness of the plate

$\gamma_{M2} = 1{,}25$ – Safety factor

Utilization in tension

$$\frac{F_{t,Ed}}{\min(F_{t,Rd}\,;\,B_{p,Rd})} = 0{,}01 \leq 1{,}0$$

Where:

$F_{t,Ed} = 2{,}6$ kN – Tensile force

$F_{t,Rd} = 203{,}3$ kN – Tension resistance

$B_{p,Rd} = 561{,}4$ kN – Punching resistance

Utilization in shear

$$\max\left(\frac{F_{v,Ed}}{F_{v,Rd}}\,;\,\frac{F_{b,Ed}}{F_{b,Rd}}\right) = 0{,}03 \leq 1{,}0$$

Where:

$F_{v,Ed} = 3{,}5$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 135{,}6$ kN – Shear resistance

$F_{b,Ed} = 5{,}6$ kN – Bearing force (for decisive plate)

$F_{b,Rd} = 470{,}4$ kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}} = 0{,}04 \leq 1{,}0$$

Where:

$F_{v,Ed} = 3{,}5$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 135{,}6$ kN – Shear resistance

$F_{t,Ed} = 2{,}6$ kN – Tensile force

$F_{t,Rd} = 203{,}3$ kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status

SP2	B-bfl 1	◢ 4,0 ◣	299	LE1	39,8	0,0	33,0	12,7	1,5	9,4	7,7	OK	OK
		◢ 4,0 ◣	299	LE2	58,6	0,0	-40,7	20,7	-12,7	13,5	8,8	OK	OK
SP2	B-tfl 1	◢ 4,0 ◣	299	LE2	37,3	0,0	-15,2	17,4	9,1	8,6	8,6	OK	OK
		◢ 4,0 ◣	299	LE2	35,4	0,0	-14,9	17,6	5,8	8,1	8,1	OK	OK
SP2	B-w 1	◢ 4,0 ◣	368	LE1	80,5	0,0	-14,9	15,1	43,1	18,5	17,5	OK	OK
		◢ 4,0 ◣	368	LE1	80,8	0,0	-2,8	-3,1	-46,5	18,5	17,5	OK	OK
SP1	SP3	-	280	-	-	-	-	-	-	-	-	OK	OK
SP1	C-bfl 1	◢ 4,0 ◣	179	LE1	153,8	0,0	-68,3	78,5	13,1	35,3	20,6	OK	OK
		◢ 4,0 ◣	179	LE1	207,3	0,0	-93,4	102,2	-31,3	47,6	24,2	OK	OK
SP1	C-tfl 1	◢ 4,0 ◣	179	LE1	207,9	0,0	-93,7	-102,5	31,4	47,7	24,3	OK	OK
		◢ 4,0 ◣	179	LE1	154,3	0,0	-68,6	-78,7	-13,1	35,4	20,7	OK	OK
SP1	C-w 1	◢ 4,0 ◣	274	LE1	124,2	0,0	-66,2	-59,8	10,0	28,5	26,9	OK	OK
		◢ 4,0 ◣	274	LE1	116,0	0,0	-53,1	59,4	-3,7	26,6	25,0	OK	OK
SP4	M5-bfl 1	◢ 4,0 ◣	299	LE1	41,7	0,0	27,5	12,5	-13,1	10,3	6,7	OK	OK
		◢ 4,0 ◣	299	LE2	72,1	0,0	-50,4	26,3	14,1	16,6	9,4	OK	OK
SP4	M5-tfl 1	◢ 4,0 ◣	299	LE2	37,7	0,0	-15,6	17,6	-9,1	8,7	8,7	OK	OK
		◢ 4,0 ◣	299	LE2	35,0	0,0	-14,6	17,4	-5,8	8,0	8,0	OK	OK
SP4	M5-w 1	◢ 4,0 ◣	368	LE1	91,6	0,0	-16,7	16,5	49,3	21,0	18,6	OK	OK
		◢ 4,0 ◣	368	LE1	92,2	0,0	-16,6	-16,7	-49,6	21,2	18,6	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_\perp$	Perpendicular stress
$\tau_\perp$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation

◢ Fillet weld
f_u Ultimate strength of weld
β_w Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$ Equivalent stress resistance
0.9 σ Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for SP1 / C-tfl 1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 207,9 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 93,7 MPa

where:

f_u = 490,0 MPa – Ultimate strength

β_w = 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

γ_{M2} = 1,25 – Safety factor

Stress utilization

$U_t = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,48 ≤ 1,0

Where:

$\sigma_{w,Ed}$ = 207,9 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd}$ = 435,6 MPa – Equivalent stress resistance

$\sigma_\perp$ = -93,7 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd}$ = 352,8 MPa – Perpendicular stress resistance

Detailing check

- Weld is too small. Throat thickness should be greater or equal to 6,4 mm where rupture of the weld is to be avoided for ductility purposes. (FprEN 1993-1-8:2023 – 6.9(4))

Buckling

Buckling analysis was not calculated.

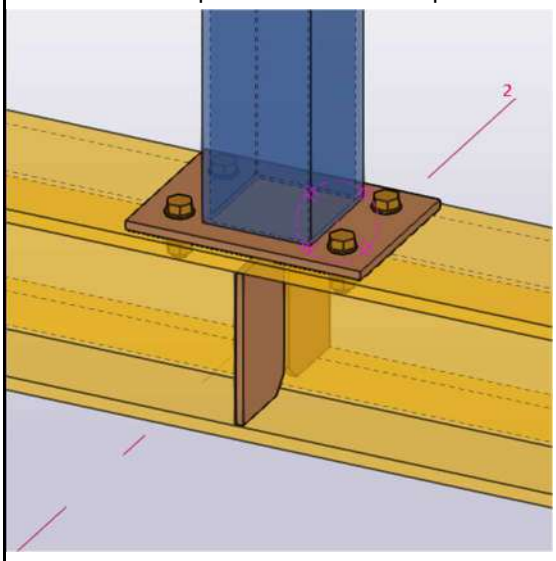
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1

Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

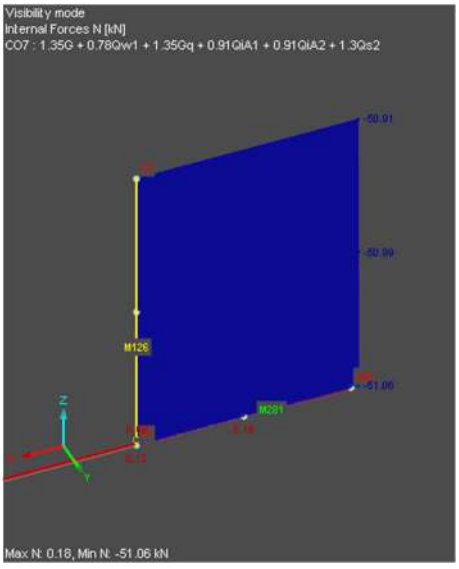
9.4. ŠALUTINĖS SIJOS – ĮRANGOS RĖMO MAZGAS (MAZGAS B-B SK_B-016)

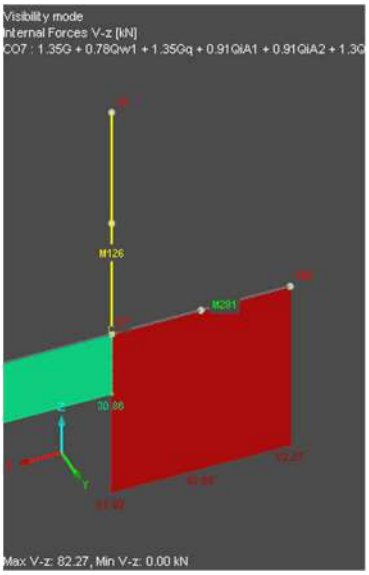
Projektuojamame pastate projektuojamas mazgas naudojamas visuose įrangos rėmų ant stogo mazguose. Skaičiavimuose priimtas labiausiai apkrautas mazgas ašyse 1->2-C. Mazgas modelyje:

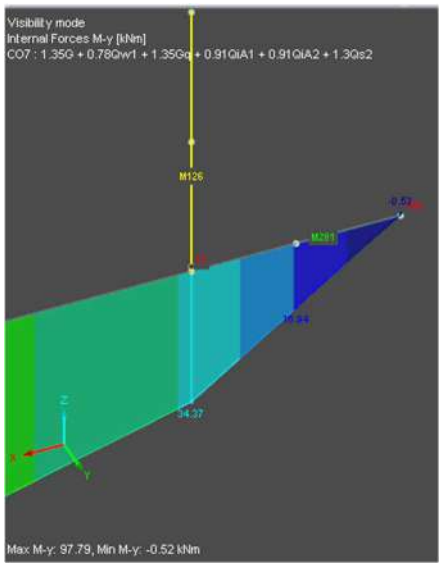


Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia ašinė jėga kolonoje	LC1*1,35+LC10*1,35+LC16*1,3+LC2*0,78+LC13*0,91+LC15*0,91







Project item CON4

Design

Name	CON4
Description	
Analysis	Stress, strain/ loads in equilibrium

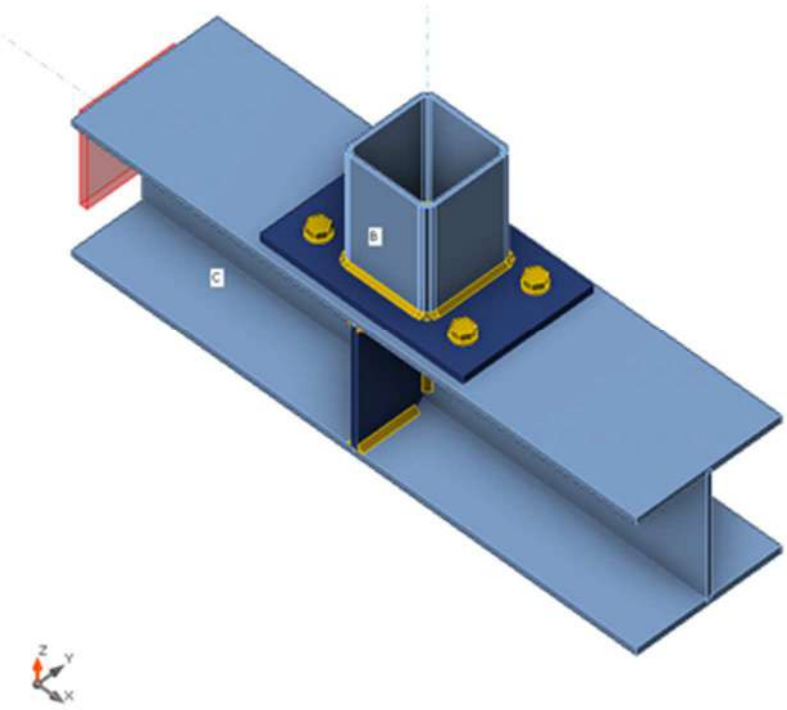
Members

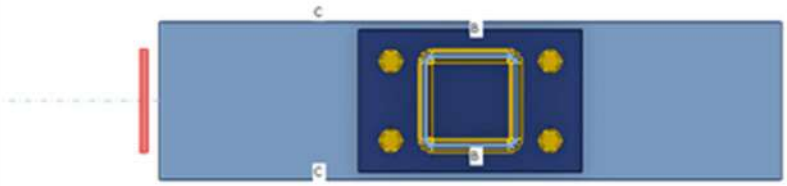
Geometry

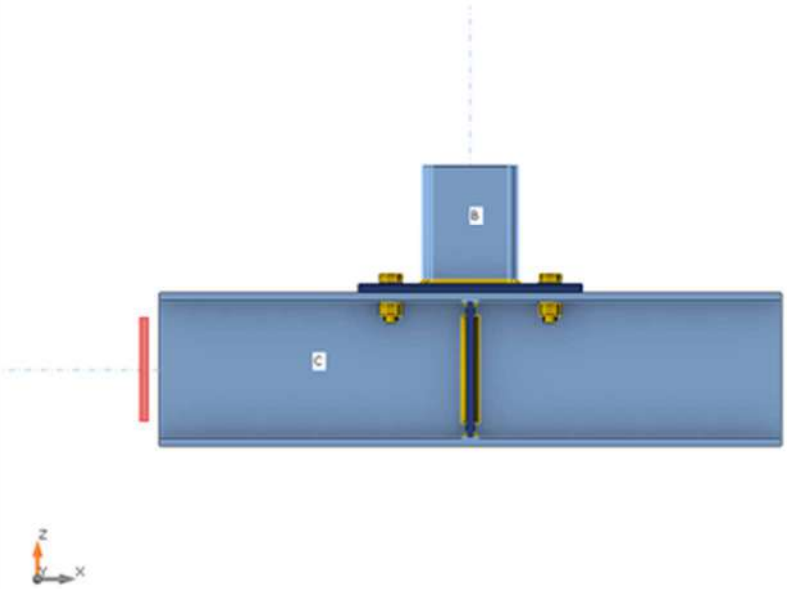
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	5 - HEA200	0,0	0,0	0,0	0	0	0
B	2 - SHS CF 120x120x6	0,0	90,0	0,0	0	0	0

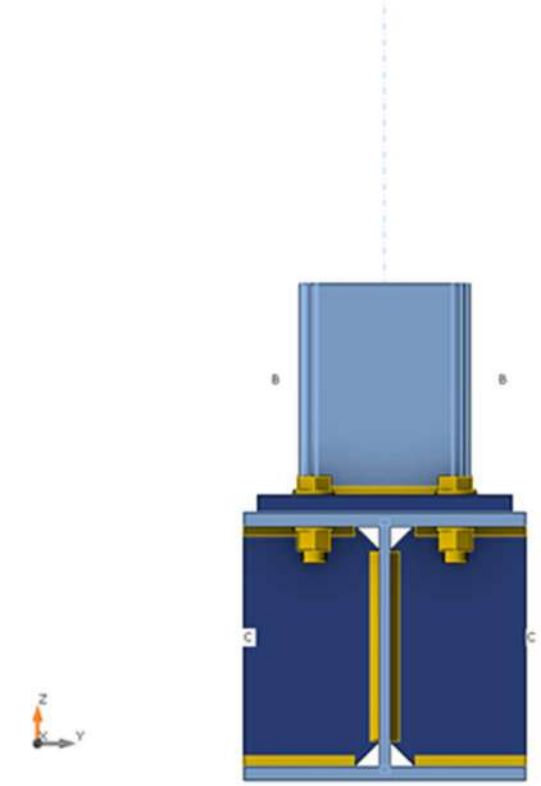
Supports and forces

Name	Support	Forces in	X [mm]
C / begin	N-Vy-Vz-Mx-My-Mz	Node	0
C / end		Node	0
B / end		Node	0


B
C


C
B
B
C





Cross-sections

Name	Material

5 - HEA200	S 355
2 - SHS CF 120x120x6	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M16 8.8	M16 8.8	16	800,0	201

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	C / Begin	0,6	0,0	81,9	0,0	34,4	0,0
	C / End	-0,1	0,0	-30,9	0,0	-34,4	0,0
	B / End	-51,1	0,0	0,0	0,0	0,0	0,0
LE2	C / Begin	0,6	0,0	81,9	0,0	34,4	0,0
	C / End	-0,1	0,0	-30,9	0,0	-34,4	0,0
	B / End	-51,1	0,0	0,0	0,0	0,0	0,0

Unbalanced forces

Name	X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	0,5	0,0	0,0	0,0	0,0	0,0
LE2	0,5	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Loc. deformation	0,0 < 3%	OK
Bolts	4,2 < 100%	OK
Welds	15,1 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C-bfl 1	10,0	LE2	123,7	0,0	0,0	OK
C-tfl 1	10,0	LE2	123,9	0,0	12,7	OK
C-w 1	6,5	LE2	128,8	0,0	0,0	OK
B	6,0	LE2	61,9	0,0	0,0	OK
EP1	12,0	LE2	33,9	0,0	13,0	OK
STIFF1a	8,0	LE2	34,7	0,0	0,0	OK
STIFF1b	8,0	LE2	34,7	0,0	0,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for C-bfl 1

Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

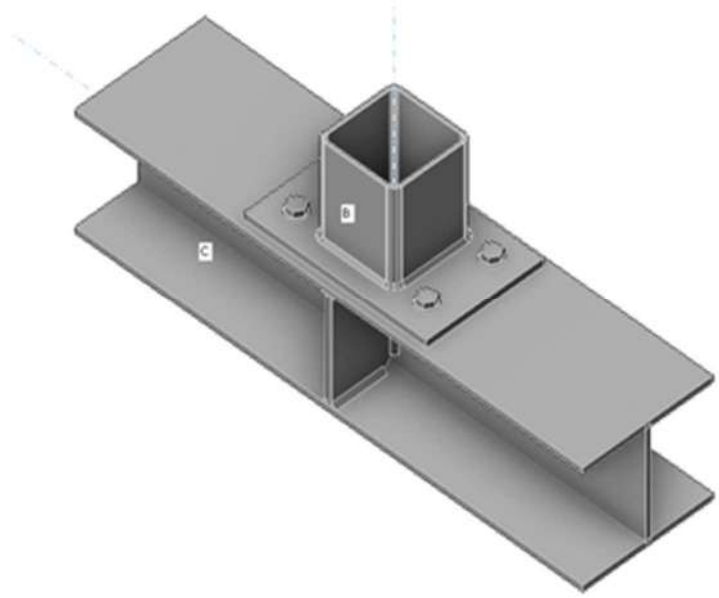
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1

Loc. deformation

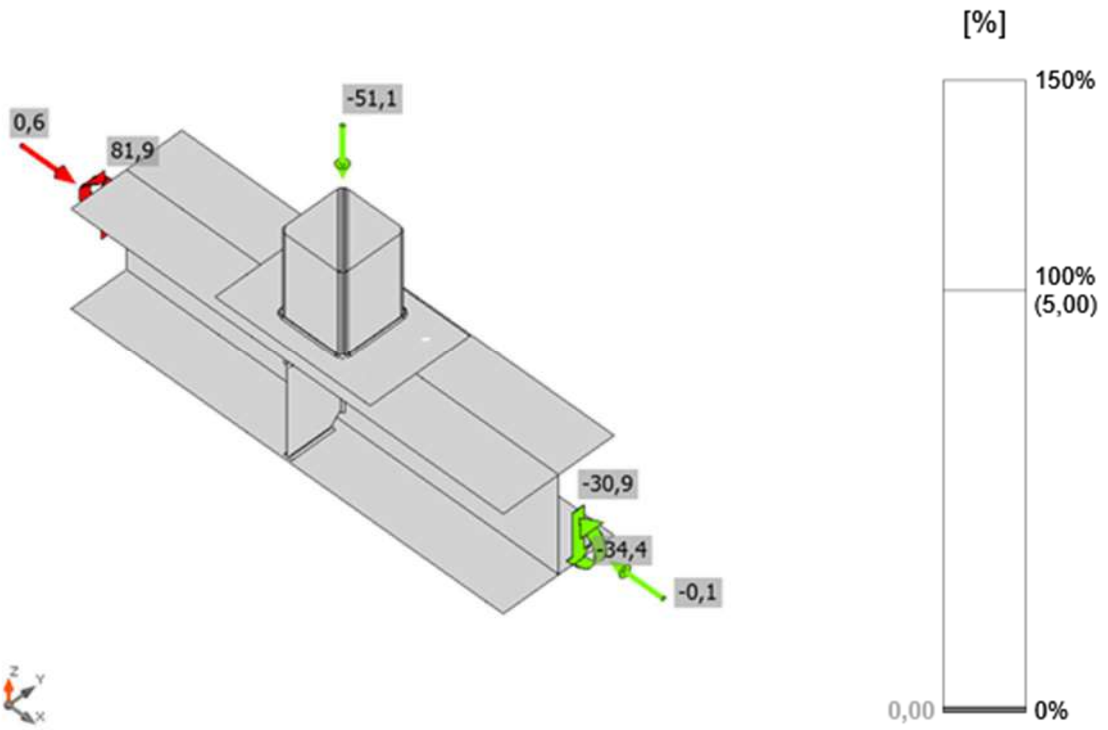
Name	d_0 [mm]	Loads	δ [mm]	δ_{lim} [mm]	δ/d_0 [%]	Check status
B	120	LE2	0	4	0,0	OK

Symbol explanation

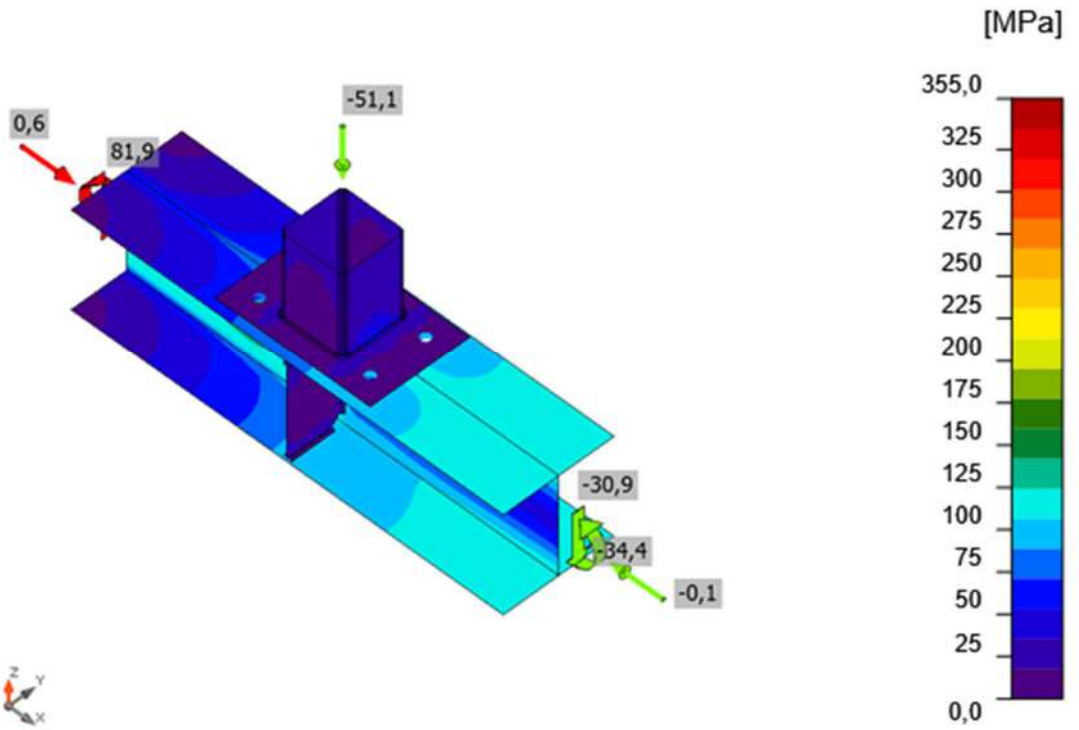
d_0	Cross-section size
δ	Local cross-section deformation
δ_{lim}	Allowed deformation



Overall check, LE2

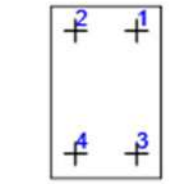


Strain check, LE2



Equivalent stress, LE2

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE2	0,2	2,4	156,8	0,3	3,9	4,1	OK	OK
	B2	M16 8.8 - 1	LE2	0,2	2,4	156,8	0,2	3,9	4,1	OK	OK
	B3	M16 8.8 - 1	LE2	0,3	2,4	156,8	0,3	4,0	4,2	OK	OK
	B4	M16 8.8 - 1	LE2	0,3	2,4	156,8	0,3	4,0	4,2	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	187,5	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4

$B_{p,Rd}$ Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$ Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B4

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 0,3 kN

Where:

$k_2 =$ 0,90 – Factor
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A_s =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 187,5 kN ≥ $F_{t,Ed} =$ 0,3 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
$t_p =$ 10 mm – Plate thickness
$f_u =$ 490,0 MPa – Ultimate strength
$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 60,3 kN ≥ $F_{v,Ed} =$ 2,4 kN

Where:

$\beta_p =$ 1,00 – Reduction factor for packing
$\alpha_v =$ 0,60 – Reduction factor for shear stress
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}} =$ 156,8 kN ≥ $F_{b,Ed} =$ 2,4 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5) =$ 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1) =$ 1,00 – Factor for end distance and bolt spacing in direction of load transfer

$e_2 =$ 50 mm – Distance to the plate edge perpendicular to the shear force

$p_2 = \infty$ mm – Distance between bolts perpendicular to the shear force

$d_0 = 18$ mm – Bolt hole diameter

$e_1 = 290$ mm – Distance to the plate edge in the direction of the shear force

$p_1 = \infty$ mm – Distance between bolts in the direction of the shear force

$f_{ub} = 800{,}0$ MPa – Ultimate tensile strength of the bolt

$f_u = 490{,}0$ MPa – Ultimate strength of the plate

$d = 16$ mm – Nominal diameter of the fastener

$t = 10$ mm – Thickness of the plate

$\gamma_{M2} = 1{,}25$ – Safety factor

Utilization in tension

$$\frac{F_{t,Ed}}{\min(F_{t,Rd}\,;\,B_{p,Rd})} = 0{,}00 \leq 1{,}0$$

Where:

$F_{t,Ed} = 0{,}3$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

$B_{p,Rd} = 187{,}5$ kN – Punching resistance

Utilization in shear

$$\max\left(\frac{F_{v,Ed}}{F_{v,Rd}}\,;\,\frac{F_{b,Ed}}{F_{b,Rd}}\right) = 0{,}04 \leq 1{,}0$$

Where:

$F_{v,Ed} = 2{,}4$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{b,Ed} = 2{,}4$ kN – Bearing force (for decisive plate)

$F_{b,Rd} = 156{,}8$ kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}} = 0{,}04 \leq 1{,}0$$

Where:

$F_{v,Ed} = 2{,}4$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{t,Ed} = 0{,}3$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

Welds

Item	Edge	T_w	L	Loads	$\sigma_{w,Ed}$	ε_{Pl}	$\sigma_{\perp}$	$\tau_{\perp}$	$\tau_{\parallel}$	Ut [%]	Ut_c	Detailing	Status

		[mm]	[mm]		[MPa]	[%]	[MPa]	[MPa]	[MPa]		[%]		
C-bfl 1	STIFF1 a	◢ 5,0 ◣	79	LE2	24,2	0,0	1,2	-4,0	-13,4	5,6	5,6	OK	OK
		◢ 5,0 ◣	79	LE2	35,3	0,0	-16,8	11,6	13,7	8,1	8,1	OK	OK
C-w 1	STIFF1 a	◢ 5,0 ◣	134	LE2	31,2	0,0	-16,3	-13,0	8,2	7,2	7,2	OK	OK
		◢ 5,0 ◣	134	LE2	23,3	0,0	-4,5	7,8	-10,6	5,3	5,3	OK	OK
C-tfl 1	STIFF1 a	◢ 5,0 ◣	79	LE2	25,0	0,0	-7,4	-2,8	-13,5	5,7	5,7	OK	OK
		◢ 5,0 ◣	79	LE2	26,5	0,0	10,8	-6,2	12,5	6,1	6,1	OK	OK
C-bfl 1	STIFF1 b	◢ 5,0 ◣	78	LE2	35,3	0,0	-16,8	-11,6	-13,7	8,1	8,1	OK	OK
		◢ 5,0 ◣	78	LE2	24,2	0,0	1,2	4,0	13,4	5,6	5,6	OK	OK
C-w 1	STIFF1 b	◢ 5,0 ◣	134	LE2	23,3	0,0	-4,5	-7,8	10,6	5,3	5,3	OK	OK
		◢ 5,0 ◣	134	LE2	31,2	0,0	-16,3	13,0	-8,2	7,2	7,2	OK	OK
C-tfl 1	STIFF1 b	◢ 5,0 ◣	78	LE2	26,5	0,0	10,8	6,3	-12,5	6,1	6,1	OK	OK
		◢ 5,0 ◣	78	LE2	25,1	0,0	-7,3	2,8	13,6	5,8	5,8	OK	OK
EP1	B	◢ 4,0 ◣	436	LE2	61,1	0,0	-29,3	-30,5	-5,0	14,0	8,4	OK	OK
		◢ 4,0 ◣	435	LE2	65,9	0,0	-33,5	32,4	5,3	15,1	9,5	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w Throat thickness a
L Length
$\sigma_{w,Ed}$ Equivalent stress

ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for EP1 / B

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0.5} =$ 65,9 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 33,5 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$U_t = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_{\perp}|}{\sigma_{\perp,Rd}}) =$ 0,15 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 65,9 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp} =$ -33,5 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Buckling

Buckling analysis was not calculated.

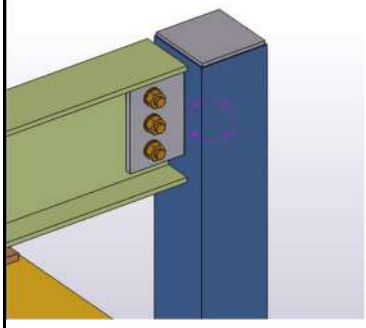
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4

Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

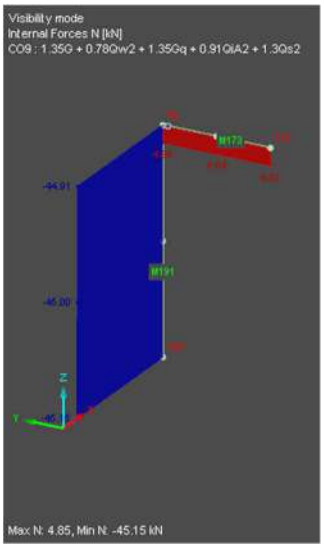
9.5. ĮRANGOS RĖMO KOLONOS – SIJOS MAZGAS (B1-B1 SK_B-016)

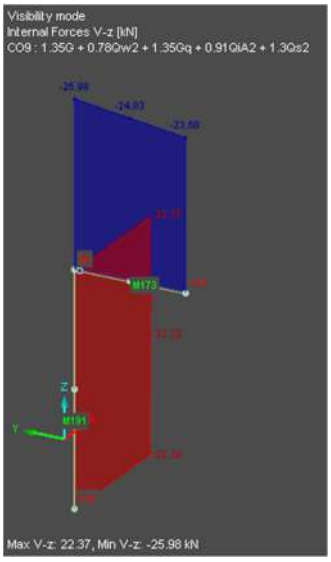
Projektuojamame pastate projektuojamas mazgas naudojamas visuose įrangos rėmų ant stogo mazguose. Skaičiavimuose priimtas labiausiai apkrautas mazgas ašyse 2->3-C. Mazgas modelyje:



Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35+LC16*1,3+LC3*0,78+LC15*0,91





Project item CON6

Design

Name	CON6
Description	
Analysis	Stress, strain/ simplified loading

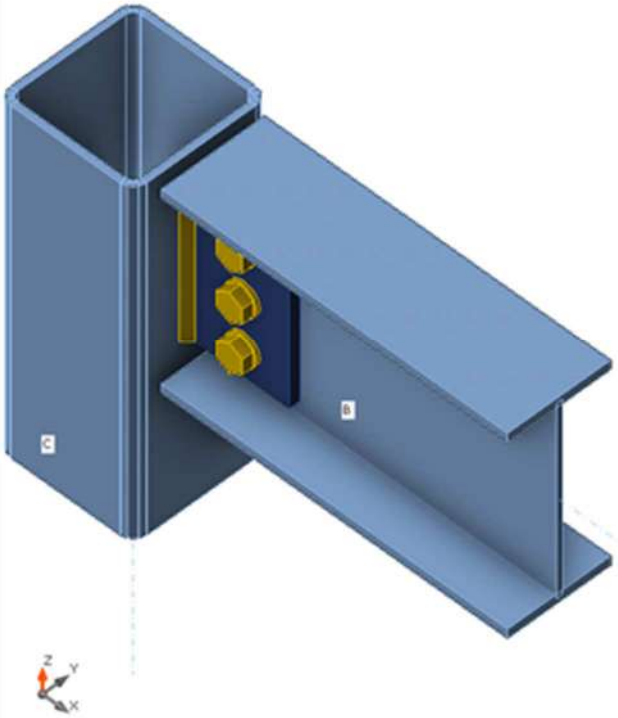
Members

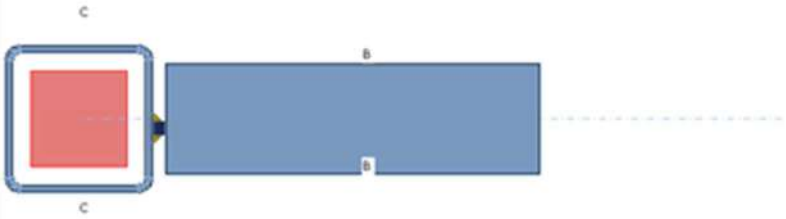
Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	2 - SHS CF 120x120x6	0,0	-90,0	0,0	0	0	0
B	11 - IPE180	0,0	0,0	0,0	0	0	0

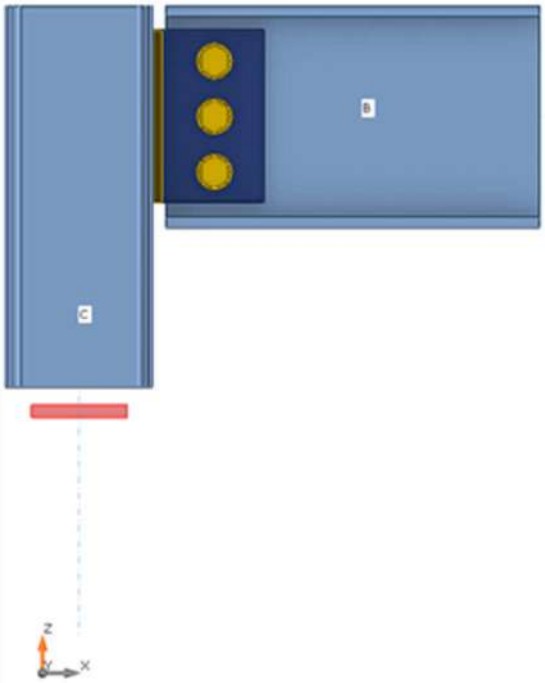
Supports and forces

Name	Support	Forces in	X [mm]
C / end	N-Vy-Vz-Mx-My-Mz	Node	0
B / end		Bolts	110


C
B
Z
Y
X


C
B
B
C


Y
X





Cross-sections

Name	Material

2 - SHS CF 120x120x6	S 355
11 - IPE180	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm²]
M16 8.8	M16 8.8	16	800,0	201

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	B / End	4,9	0,0	26,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,1 < 5,0%	OK
Loc. deformation	0,3 < 3%	OK
Bolts	18,2 < 100%	OK
Welds	76,4 < 100%	OK
Buckling	Not calculated	
GMNA	Calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C	6,0	LE1	355,2	0,1	0,0	OK
B-bfl 1	8,0	LE1	47,0	0,0	0,0	OK
B-tfl 1	8,0	LE1	48,5	0,0	0,0	OK
B-w 1	5,3	LE1	121,1	0,0	9,0	OK
FP2	10,0	LE1	156,9	0,0	9,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p Plate thickness
σ_{Ed} Equivalent stress
ε_{Pl} Plastic strain
$\sigma_{c,Ed}$ Contact stress
f_y Yield strength

ε_{lim} Limit of plastic strain

Detailed result for C

Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

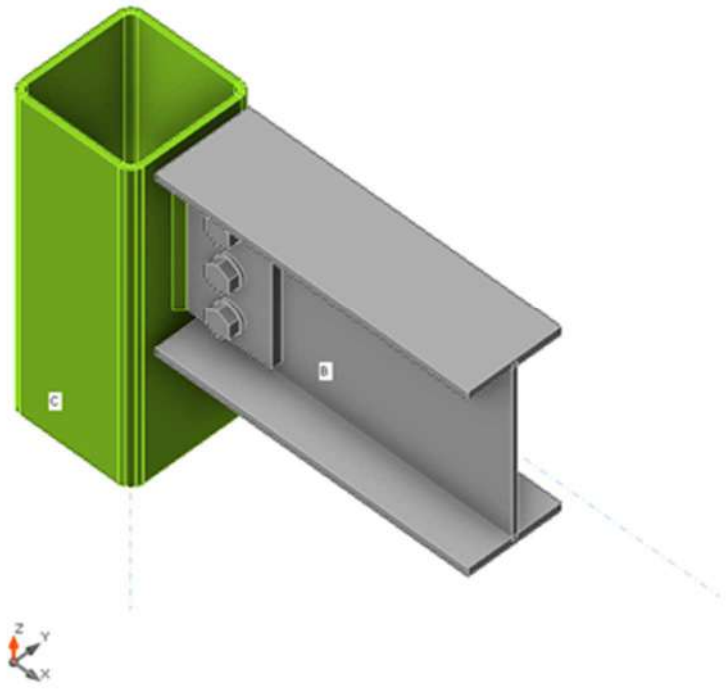
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1

Loc. deformation

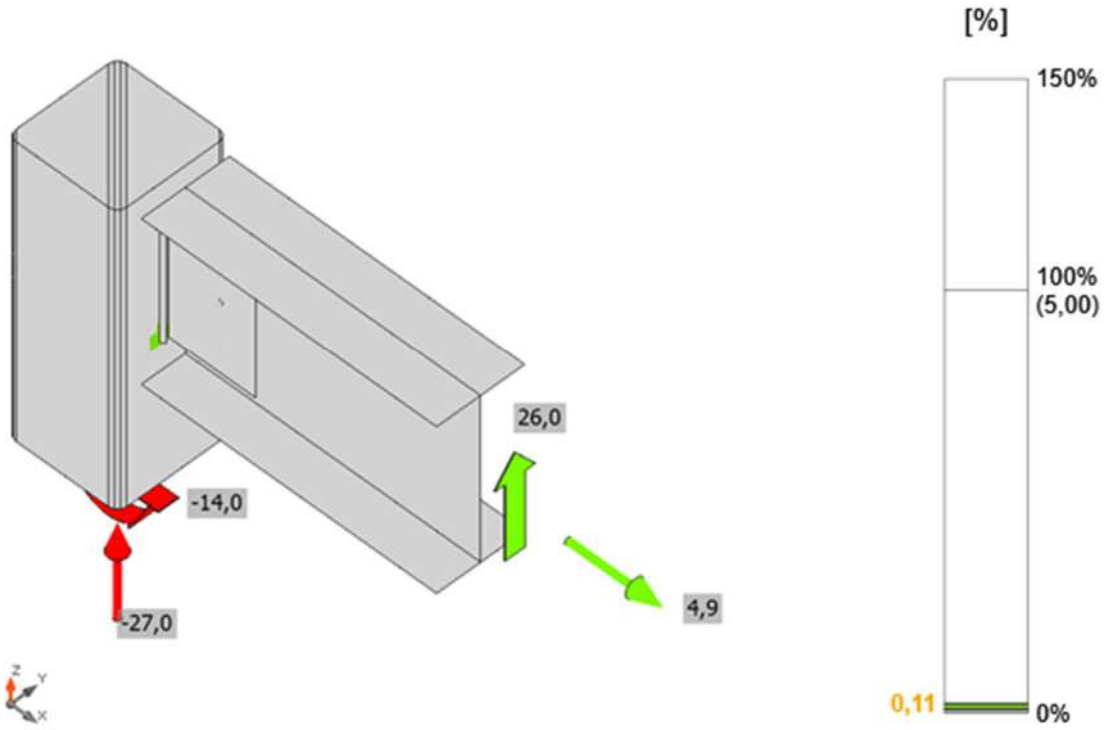
Name	d_0 [mm]	Loads	δ [mm]	δ_{lim} [mm]	δ/d_0 [%]	Check status
C	120	LE1	0	4	0,3	OK

Symbol explanation

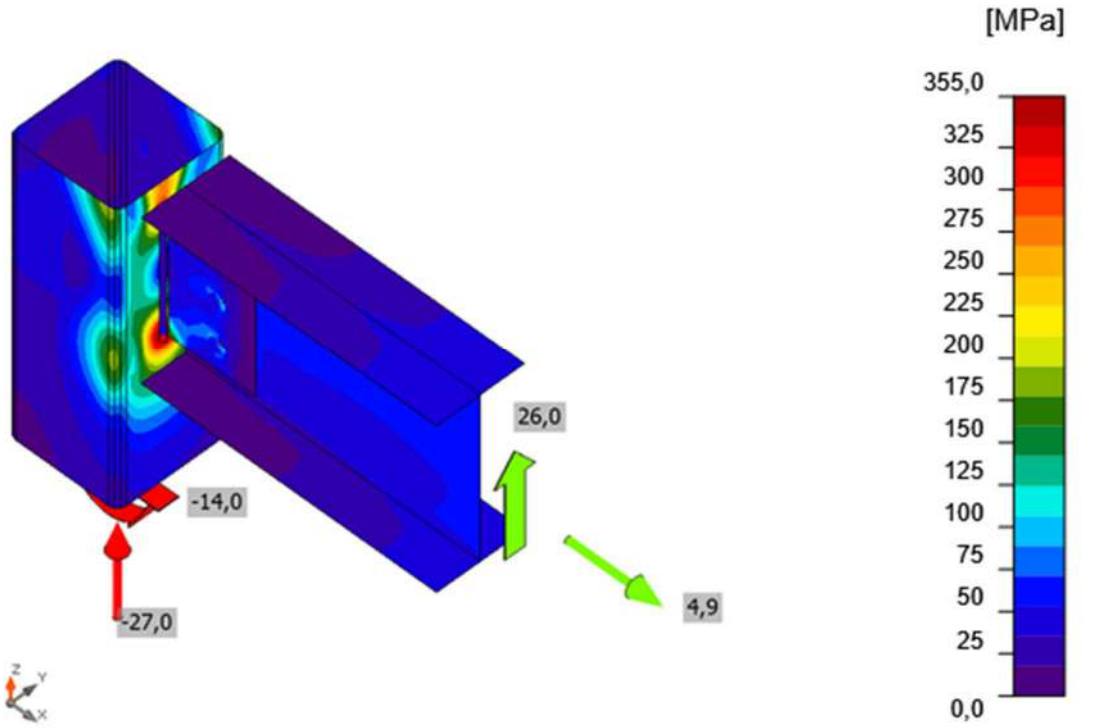
d_0 Cross-section size
δ Local cross-section deformation
δ_{lim} Allowed deformation



Overall check, LE1

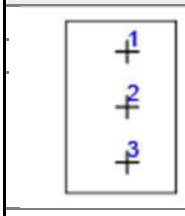


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE1	0,8	8,8	48,5	0,9	18,2	15,3	OK	OK
	B2	M16 8.8 - 1	LE1	0,9	8,8	48,5	1,0	18,2	15,4	OK	OK
	B3	M16 8.8 - 1	LE1	2,9	8,8	63,1	3,2	14,5	16,8	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	99,4	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B2

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 0,9 kN

Where:

$k_2 =$ 0,90 – Factor

$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt

$A_s =$ 157 mm^2 – Tensile stress area of the bolt

$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 99,4 kN ≥ $F_{t,Ed} =$ 0,9 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p =$ 5 mm – Plate thickness

$f_u =$ 490,0 MPa – Ultimate strength

γ_{M2} = 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}}$ = 60,3 kN ≥ $F_{v,Ed}$ = 8,8 kN

Where:

β_p = 1,00 – Reduction factor for packing

α_v = 0,60 – Reduction factor for shear stress

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

A = 157 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}}$ = 48,5 kN ≥ $F_{b,Ed}$ = 8,8 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5)$ = 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 0,58 – Factor for end distance and bolt spacing in direction of load transfer

e_2 = 40 mm – Distance to the plate edge perpendicular to the shear force

p_2 = ∞ mm – Distance between bolts perpendicular to the shear force

d_0 = 18 mm – Bolt hole diameter

e_1 = 62 mm – Distance to the plate edge in the direction of the shear force

p_1 = 45 mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 16 mm – Nominal diameter of the fastener

t = 5 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})}$ = 0,01 ≤ 1,0

Where:

$F_{t,Ed}$ = 0,9 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

$B_{p,Rd}$ = 99,4 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}; \frac{F_{b,Ed}}{F_{b,Rd}}) =$ 0,18 ≤ 1,0

Where:

$F_{v,Ed}$ = 8,8 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{b,Ed}$ = 8,8 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 48,5 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1,4\,F_{t,Rd}} =$ 0,15 ≤ 1,0

Where:

$F_{v,Ed}$ = 8,8 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{t,Ed}$ = 0,9 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
C-w 3	FP2	◢ 5,0 ◣	139	LE1	332,8	0,0	138,6	124,3	-122,7	76,4	40,7	OK	OK
		◢ 5,0 ◣	139	LE1	295,5	0,0	96,2	-110,4	117,6	67,8	36,6	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance

0.9 σ Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for C-w 3 / FP2

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 332,8 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 138,6 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$U_t = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,76 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 332,8 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_\perp =$ 138,6 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Buckling

Buckling analysis was not calculated.

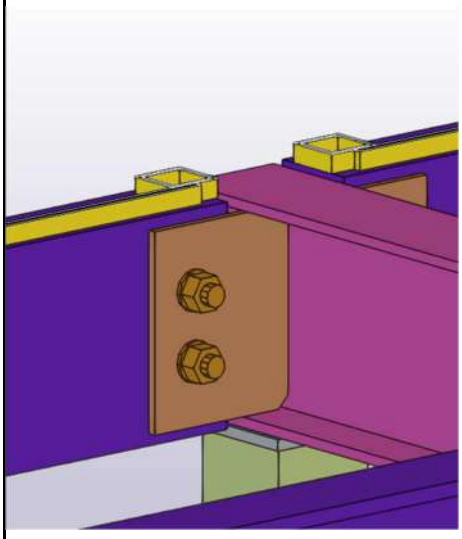
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5

Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

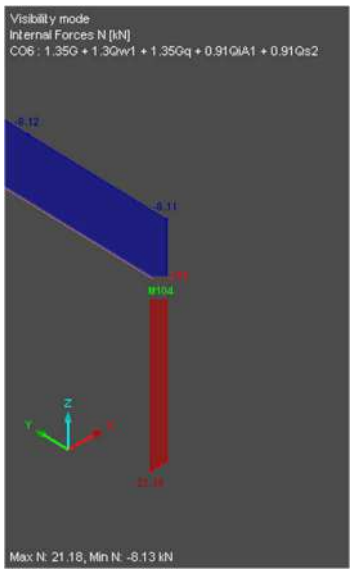
9.6. APTARNAVIMO AIKŠTELĖS SIJŲ MAZGAS (B-B SK_B-017)

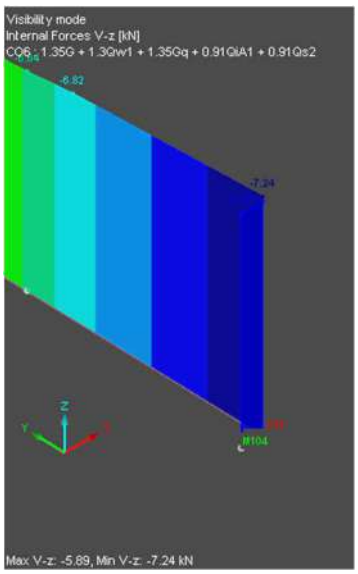
Projektuojamame pastate projektuojamas mazgas naudojamas visuose įrangos rėmų ant stogo mazguose. Skaičiavimuose priimtas labiausiai apkrautas mazgas ašyse 2->3-C. Mazgas modelyje:



Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35+LC2*1,3+LC13*0,91+LC16*0,91





Project item CON7

Design

Name	CON7
Description	
Analysis	Stress, strain/ simplified loading

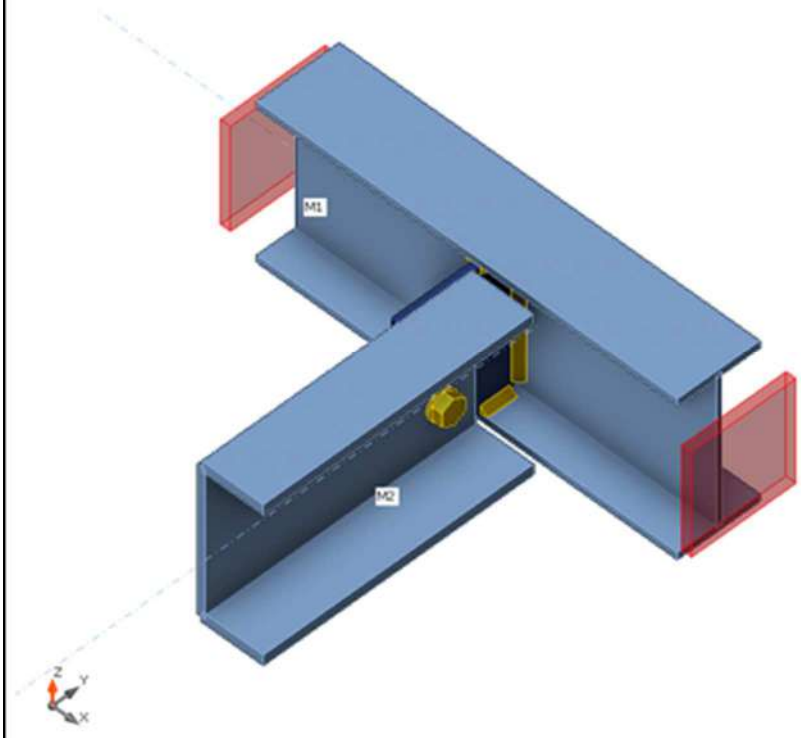
Members

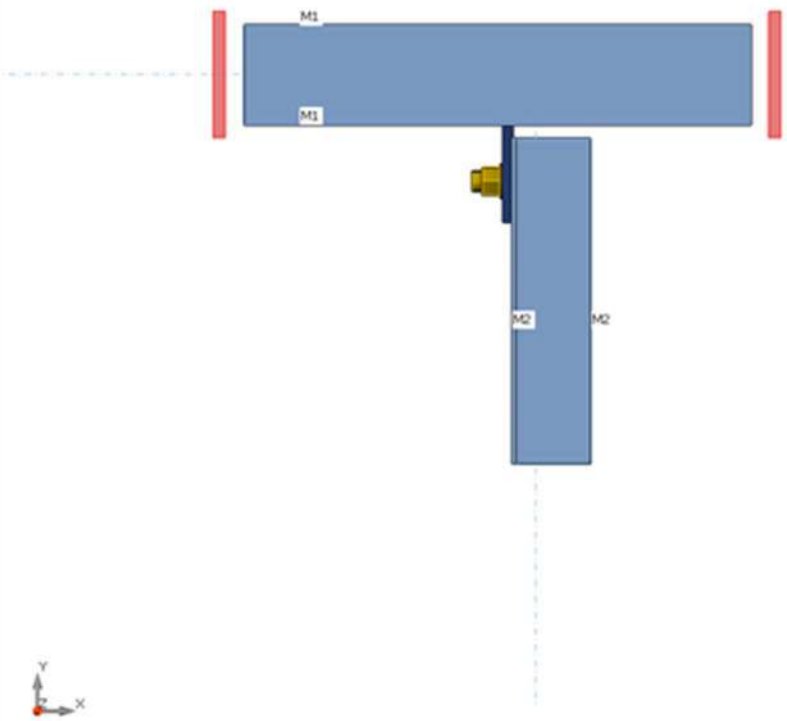
Geometry

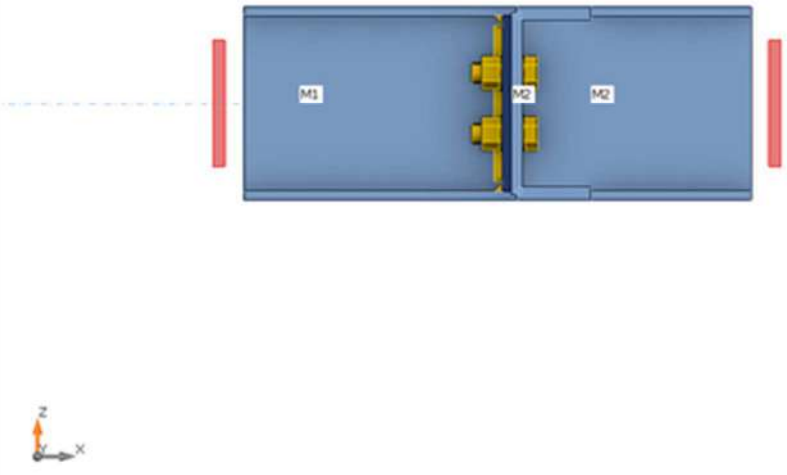
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
M1	15 - CON1(IPE160)	0,0	0,0	0,0	0	0	0
M2	17 - UNP160	-90,0	0,0	0,0	0	31	0

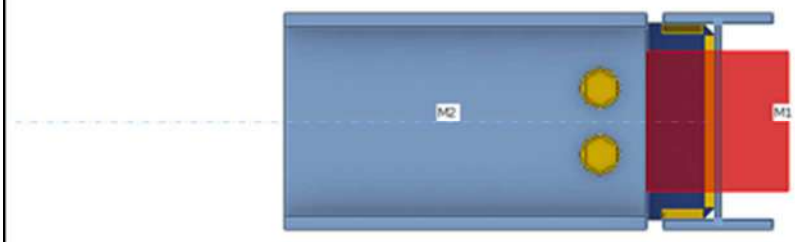
Supports and forces

Name	Support	Forces in	X [mm]
M1 / begin	N-Vy-Vz-Mx-My-Mz	Node	0
M1 / end	N-Vy-Vz-Mx-My-Mz	Node	0
M2 / end		Bolts	88




M1
M1
M2
M2
Y
Z
X


M1
M2
M2
Z
Y
X





Cross-sections

Name	Material
15 - CON1(IPE160)	S 355
17 - UNP160	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M16 8.8	M16 8.8	16	800,0	201

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	M2 / End	8,1	0,0	-7,2	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	13,7 < 100%	OK

Welds	20,9 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
M1-bfl 1	7,4	LE1	78,4	0,0	0,0	OK
M1-tfl 1	7,4	LE1	177,0	0,0	0,0	OK
M1-w 1	5,0	LE1	31,1	0,0	0,0	OK
M2-bfl 1	10,5	LE1	72,6	0,0	0,0	OK
M2-tfl 1	10,5	LE1	59,4	0,0	0,0	OK
M2-w 1	7,5	LE1	119,2	0,0	15,9	OK
STIFF1	8,0	LE1	259,1	0,0	15,9	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p Plate thickness
σ_{Ed} Equivalent stress
ε_{Pl} Plastic strain
$\sigma_{c,Ed}$ Contact stress
f_y Yield strength
ε_{lim} Limit of plastic strain

Detailed result for M1-bfl 1

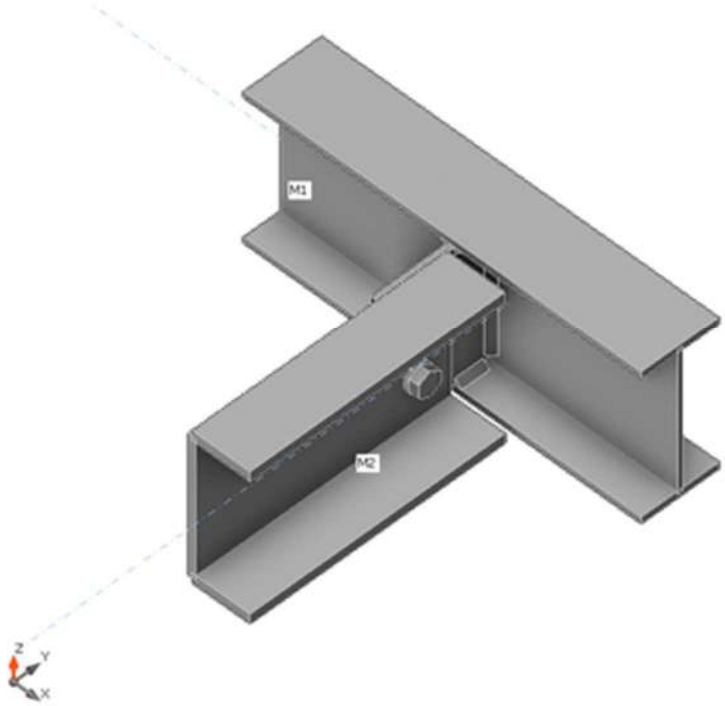
Design values used in the analysis

$$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} = 355,0 \text{ MPa}$$

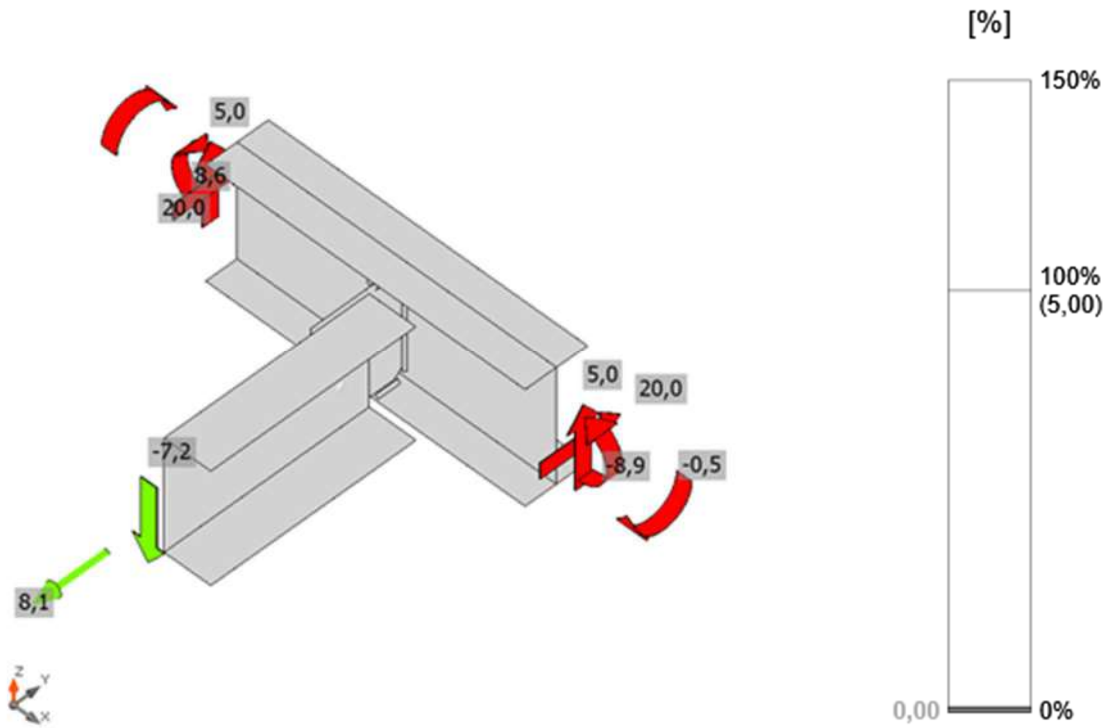
Where:

$f_{yk} = 355,0$ MPa – characteristic yield strength

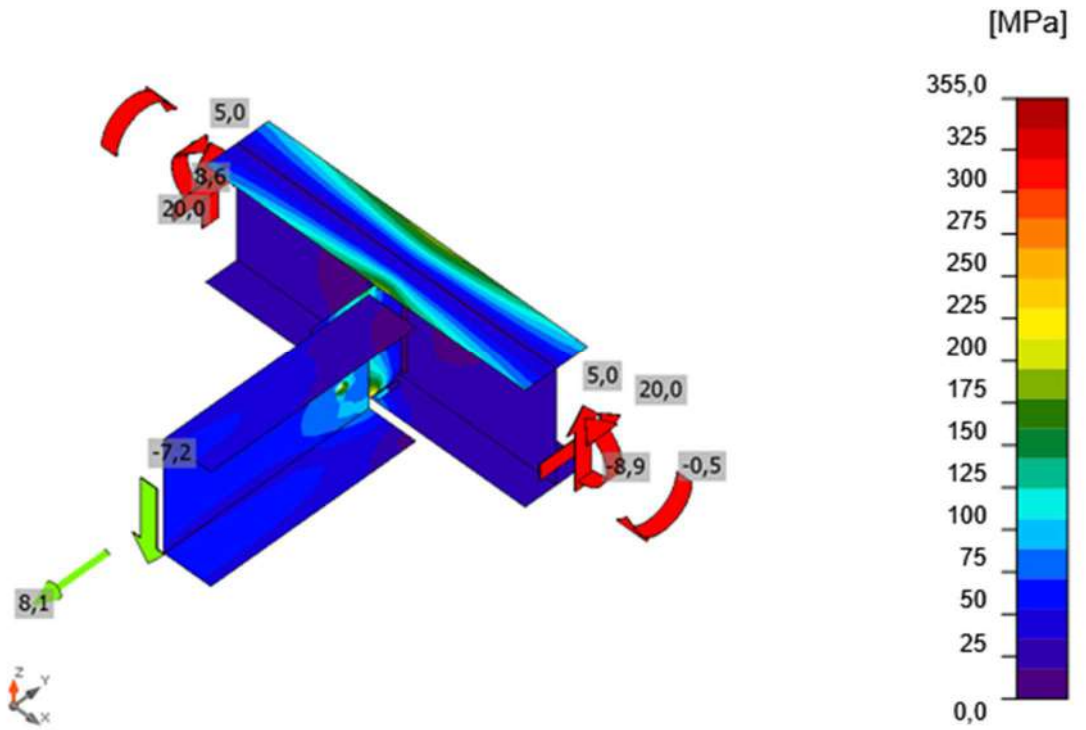
$\gamma_{M0} = 1,00$ – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE1



Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE1	6,2	5,3	77,5	6,8	8,8	13,7	OK	OK
	B2	M16 8.8 - 1	LE1	5,7	5,6	78,3	6,3	9,2	13,7	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	140,6	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4

$B_{p,Rd}$ Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$ Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B1

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 6,2 kN

Where:

$k_2 =$ 0,90 – Factor
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A_s =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 140,6 kN ≥ $F_{t,Ed} =$ 6,2 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
$t_p =$ 8 mm – Plate thickness
$f_u =$ 490,0 MPa – Ultimate strength
$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 60,3 kN ≥ $F_{v,Ed} =$ 5,3 kN

Where:

$\beta_p =$ 1,00 – Reduction factor for packing
$\alpha_v =$ 0,60 – Reduction factor for shear stress
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}} =$ 77,5 kN ≥ $F_{b,Ed} =$ 5,3 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5) =$ 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1) =$ 0,66 – Factor for end distance and bolt spacing in direction of load transfer

$e_2 =$ 35 mm – Distance to the plate edge perpendicular to the shear force

$p_2 = \infty$ mm – Distance between bolts perpendicular to the shear force

$d_0 = 18$ mm – Bolt hole diameter

$e_1 = 36$ mm – Distance to the plate edge in the direction of the shear force

$p_1 = \infty$ mm – Distance between bolts in the direction of the shear force

$f_{ub} = 800{,}0$ MPa – Ultimate tensile strength of the bolt

$f_u = 490{,}0$ MPa – Ultimate strength of the plate

$d = 16$ mm – Nominal diameter of the fastener

$t = 8$ mm – Thickness of the plate

$\gamma_{M2} = 1{,}25$ – Safety factor

Utilization in tension

$$\frac{F_{t,Ed}}{\min(F_{t,Rd}\,;\,B_{p,Rd})} = 0{,}07 \leq 1{,}0$$

Where:

$F_{t,Ed} = 6{,}2$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

$B_{p,Rd} = 140{,}6$ kN – Punching resistance

Utilization in shear

$$\max\left(\frac{F_{v,Ed}}{F_{v,Rd}}\,;\,\frac{F_{b,Ed}}{F_{b,Rd}}\right) = 0{,}09 \leq 1{,}0$$

Where:

$F_{v,Ed} = 5{,}3$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{b,Ed} = 5{,}3$ kN – Bearing force (for decisive plate)

$F_{b,Rd} = 77{,}5$ kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}} = 0{,}14 \leq 1{,}0$$

Where:

$F_{v,Ed} = 5{,}3$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{t,Ed} = 6{,}2$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status

M1-bfl 1	STIFF1	◢ 5,0 ◣	29	LE1	86,8	0,0	-29,2	-13,1	-45,4	19,9	15,3	OK	OK
		◢ 5,0 ◣	29	LE1	90,1	0,0	25,8	-9,7	-48,9	20,7	15,8	OK	OK
M1-w 1	STIFF1	◢ 5,0 ◣	127	LE1	17,3	0,0	-1,0	-1,0	9,9	4,0	4,0	OK	OK
		◢ 5,0 ◣	127	LE1	30,2	0,0	2,0	-2,1	-17,3	6,9	6,9	OK	OK
M1-tfl 1	STIFF1	◢ 5,0 ◣	29	LE1	41,2	0,0	-0,7	-3,7	-23,5	9,5	9,5	OK	OK
		◢ 5,0 ◣	29	LE1	91,0	0,0	21,4	-24,5	44,8	20,9	18,1	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_\perp$	Perpendicular stress
$\tau_\perp$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for M1-tfl 1 / STIFF1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 91,0 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 21,4 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

γ_{M2} = 1,25 – Safety factor

Stress utilization

$U_t = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,21 ≤ 1,0

Where:

$\sigma_{w,Ed}$ = 91,0 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd}$ = 435,6 MPa – Equivalent stress resistance

$\sigma_\perp$ = 21,4 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd}$ = 352,8 MPa – Perpendicular stress resistance

Buckling

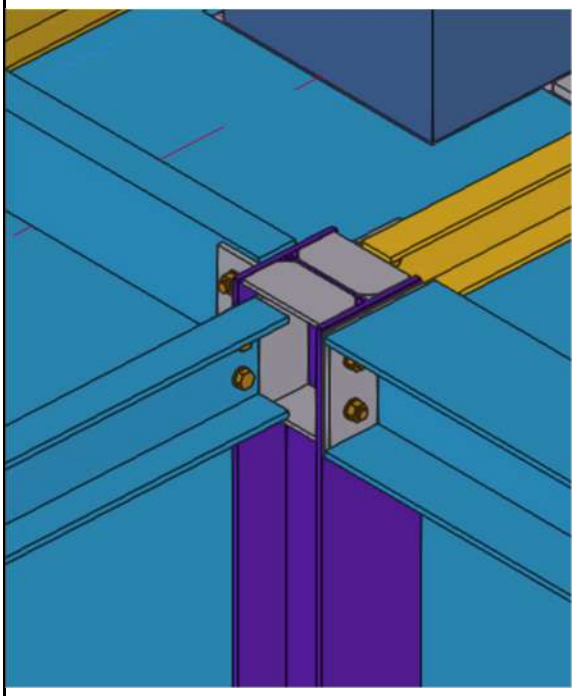
Buckling analysis was not calculated.

Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

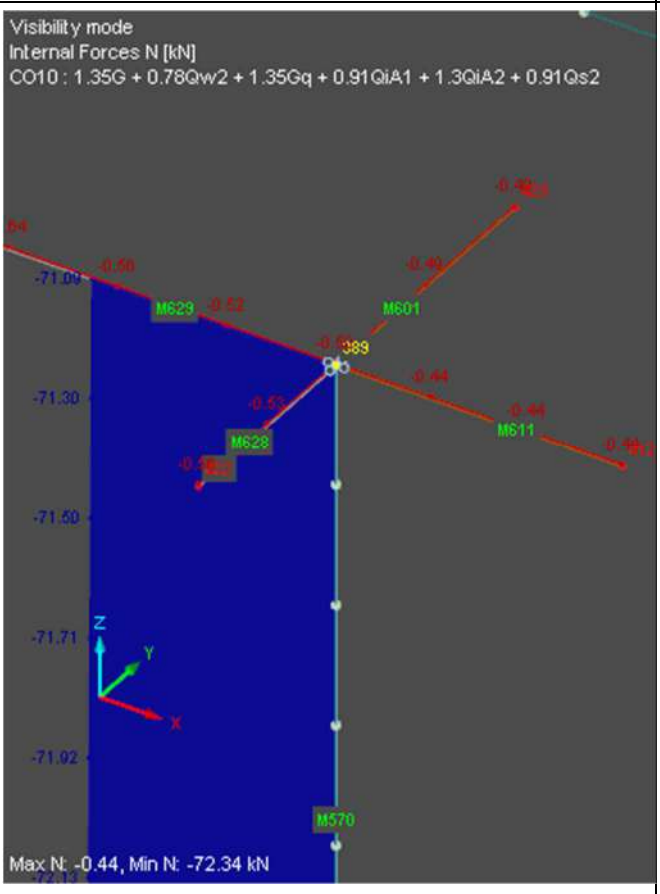
9.7. APTARNAVIMO AIKŠTELĖS KOLONOS – SIJŲ MAZGAS (MAZGAS B SK_B-014)

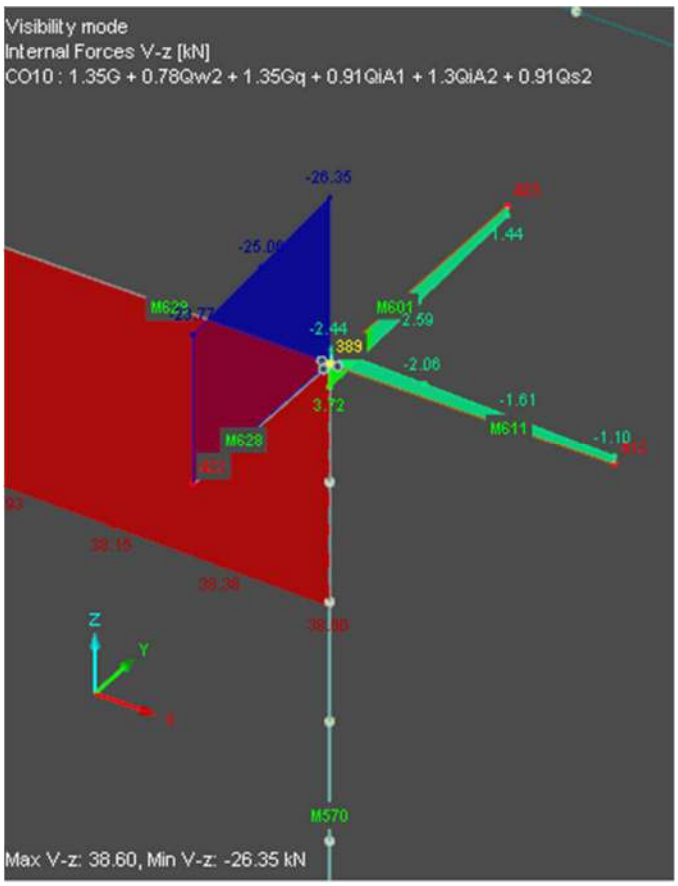
Projektuojamame pastate projektuojamas mazgas yra ašyse 2->3/C->D. Mazgas modelyje:



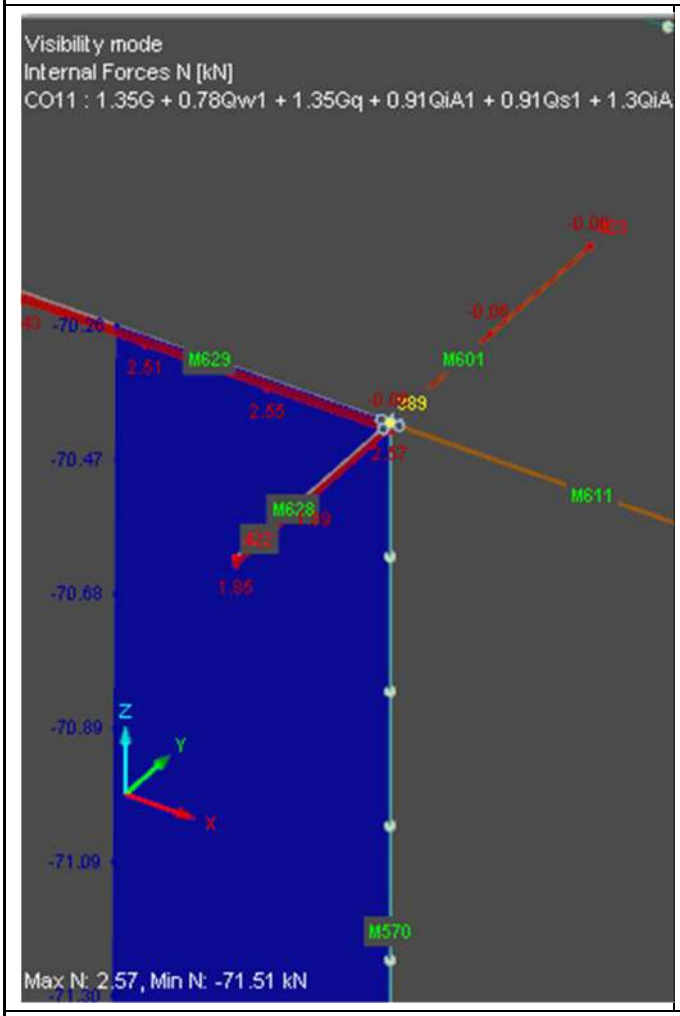
Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

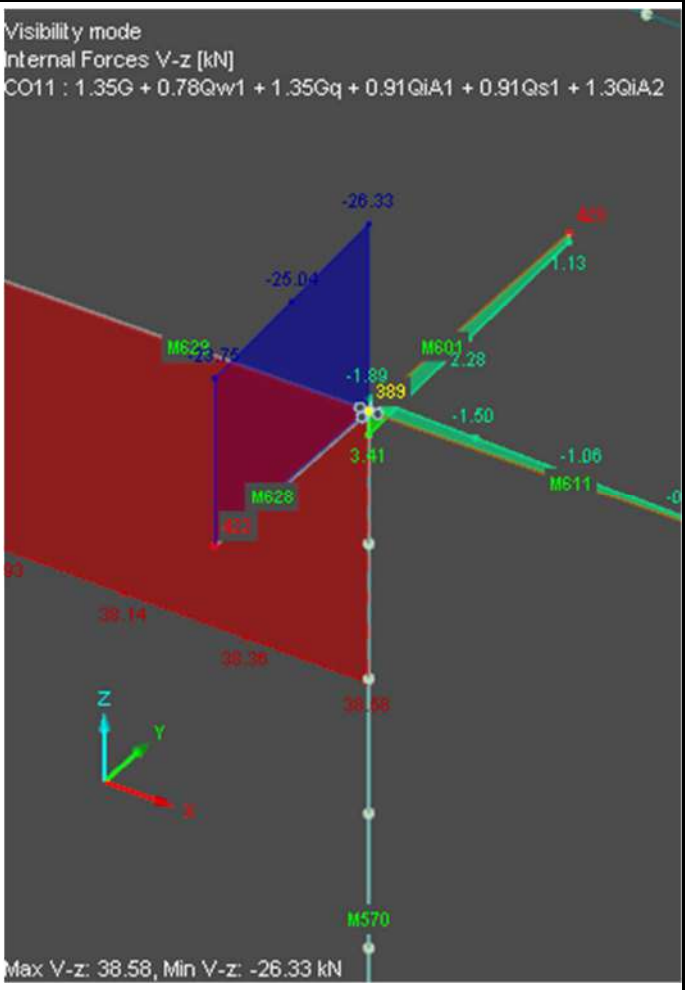
Sąlyga	Derinys
Didžiausia ašinė jėga kolonoje, Didžiausios skersinė jėga sijose	LC1*1,35+LC10*1,35+LC13*1,3+LC3*0,78+LC15*0,91+LC16*0,91





Didžiausia ašinė jėga sijose	LC1*1,35+LC10*1,35+LC13*1,3+LC2*0,78+LC14*0,91+LC15*0,91





Pastaba: Šalutinių sijoms pridėtas papildomas lenkimo momentas lenkimo momento įtakai varžtams nuimti (mazgas šarnyrinis)

Project item CON8

Design

Name	CON8
Description	
Analysis	Stress, strain/ loads in equilibrium

Members

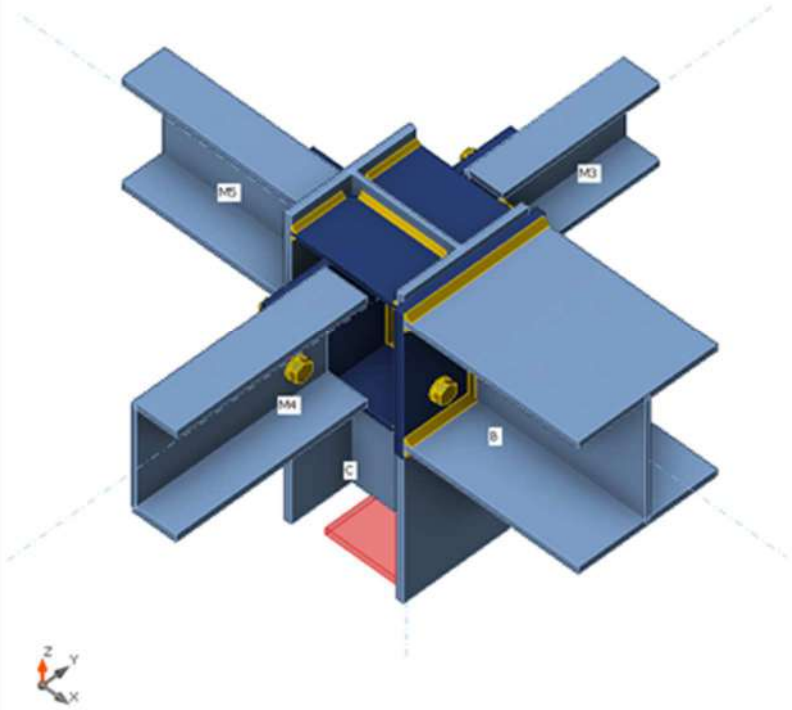
Geometry

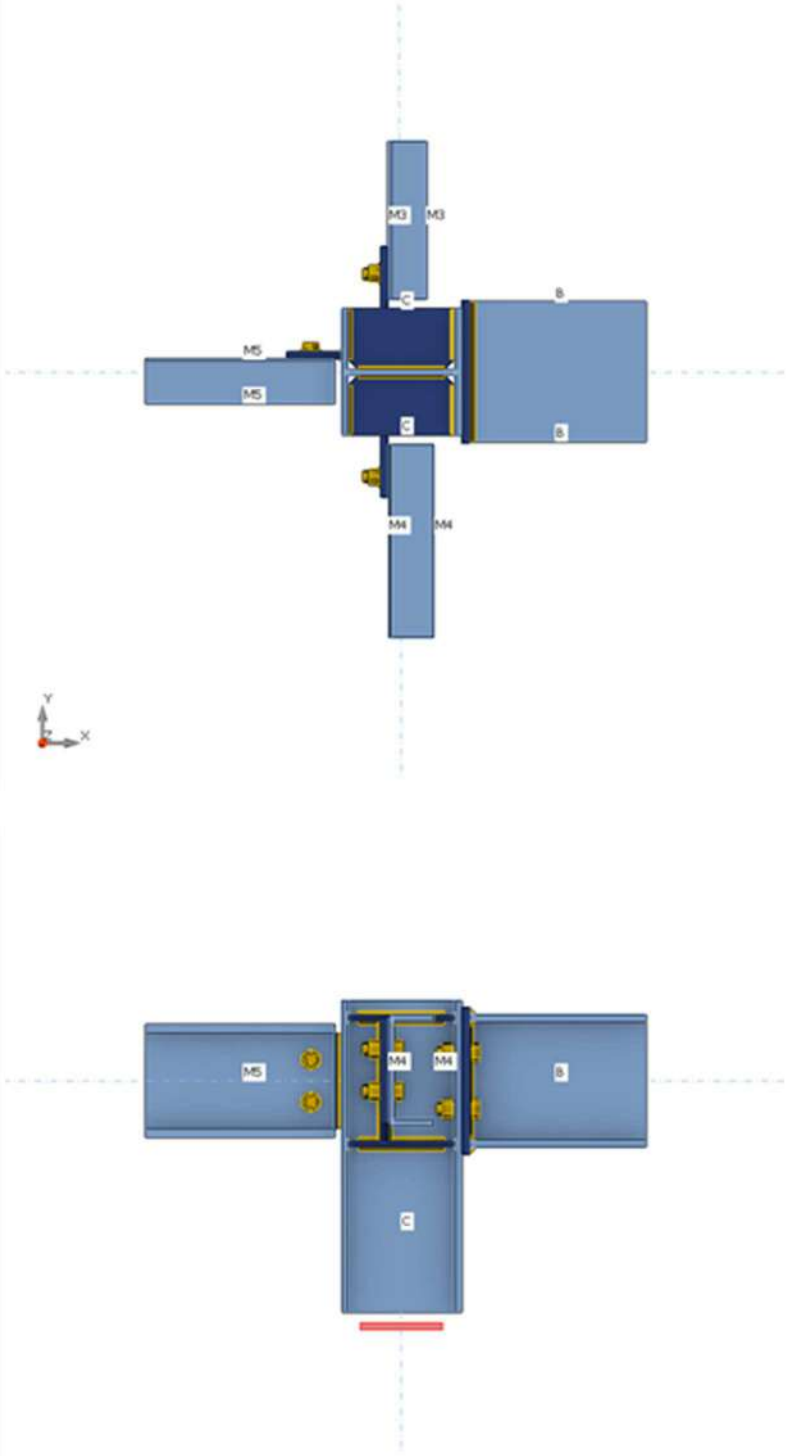
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	20 - HEA180	0,0	-90,0	0,0	0	0	0
B	5 - HEA200	0,0	0,0	0,0	0	0	0
M3	21 - UNP120	90,0	0,0	180,0	0	-3	-30
M4	17 - UNP160	-90,0	0,0	0,0	0	0	15

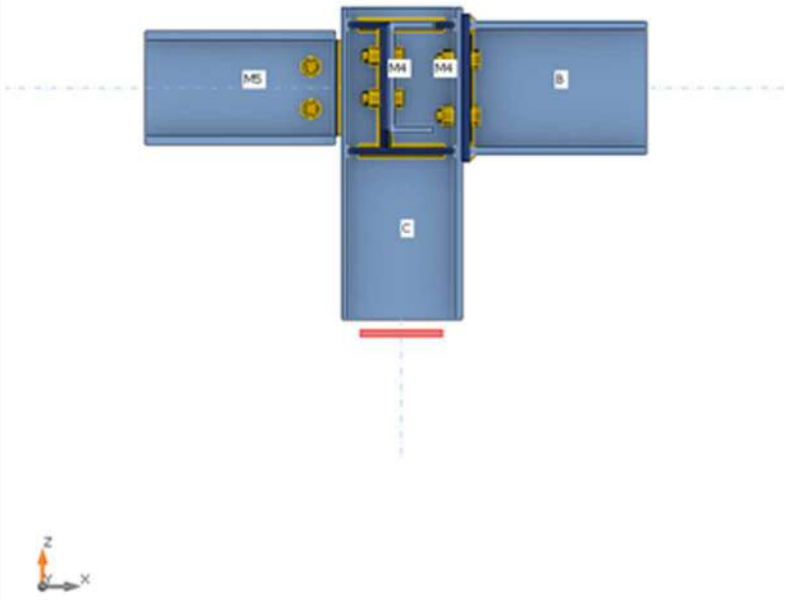
M5	17 - UNP160	180,0	0,0	0,0	0	0	0

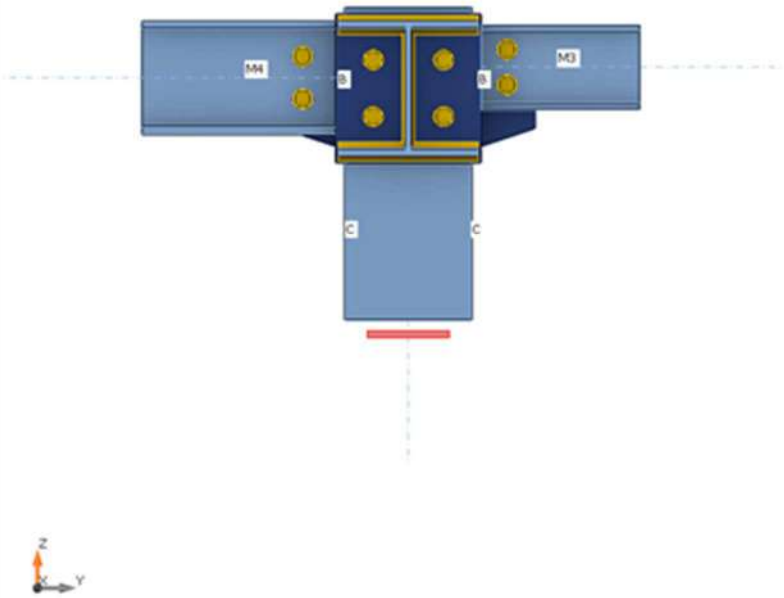
Supports and forces

Name	Support	Forces in	X [mm]
C / end	N-Vy-Vz-Mx-My-Mz	Node	0
B / end		Node	0
M3 / end		Node	0
M4 / end		Node	0
M5 / end		Node	0




M3
M3
C
B
M5
M5
C
B
M4
M4
Y
Z
X


M5
M4
M4
B
C
Z
Y
X



Cross-sections

Name	Material
20 - HEA180	S 355
5 - HEA200	S 355
21 - UNP120	S 355
17 - UNP160	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M16 8.8	M16 8.8	16	800,0	201

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	C / End	-71,1	0,0	0,0	0,0	0,0	3,3
	B / End	0,5	0,0	-38,6	0,0	3,3	0,0
	M3 / End	0,5	0,0	26,4	0,0	-3,7	0,0
	M4 / End	0,5	0,0	-3,7	0,0	0,6	0,0
	M5 / End	0,5	0,0	-2,4	0,0	0,3	0,0
LE2	C / End	-70,3	0,0	0,0	0,0	0,0	3,3
	B / End	2,6	0,0	-38,6	0,0	3,3	0,0
	M3 / End	1,9	0,0	26,3	0,0	-3,7	0,0

	M4 / End	0,3	0,0	-3,4	0,0	0,5	0,0
	M5 / End	0,3	0,0	-1,8	0,0	0,2	0,0

Unbalanced forces

Name	X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	0,0	0,0	0,0	0,2	2,9	0,0
LE2	2,3	1,6	0,1	0,0	3,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,1 < 5,0%	OK
Bolts	37,6 < 100%	OK
Welds	83,8 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C-bfl 1	9,5	LE2	54,4	0,0	0,0	OK
C-tfl 1	9,5	LE2	71,7	0,0	6,3	OK
C-w 1	6,0	LE2	82,7	0,0	0,0	OK
B-bfl 1	10,0	LE2	31,5	0,0	0,0	OK
B-tfl 1	10,0	LE1	31,0	0,0	0,0	OK
B-w 1	6,5	LE2	61,0	0,0	0,0	OK
M3-bfl 1	9,0	LE1	342,0	0,0	0,0	OK
M3-tfl 1	9,0	LE1	315,4	0,0	0,0	OK
M3-w 1	7,0	LE1	355,2	0,1	62,8	OK
M4-bfl 1	10,5	LE1	32,8	0,0	0,0	OK
M4-tfl 1	10,5	LE1	30,3	0,0	0,0	OK
M4-w 1	7,5	LE1	46,9	0,0	5,2	OK
M5-bfl 1	10,5	LE1	21,6	0,0	0,0	OK
M5-tfl 1	10,5	LE1	20,4	0,0	0,0	OK
M5-w 1	7,5	LE1	33,9	0,0	3,5	OK
EP2	12,0	LE1	51,8	0,0	5,5	OK
STIFF2a	8,0	LE1	73,8	0,0	0,0	OK
STIFF2b	8,0	LE1	42,8	0,0	0,0	OK
STIFF2c	8,0	LE2	57,2	0,0	0,0	OK
STIFF2d	8,0	LE2	80,6	0,0	0,0	OK
SP1	10,0	LE2	87,5	0,0	8,4	OK
SP2	10,0	LE2	317,2	0,0	49,2	OK
SP3	10,0	LE1	40,4	0,0	6,4	OK

Design data

Material	f_y	ε_{lim}

	[MPa]	[%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for M3-w 1

Design values used in the analysis

$$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} = 355,0 \text{ MPa}$$

Where:

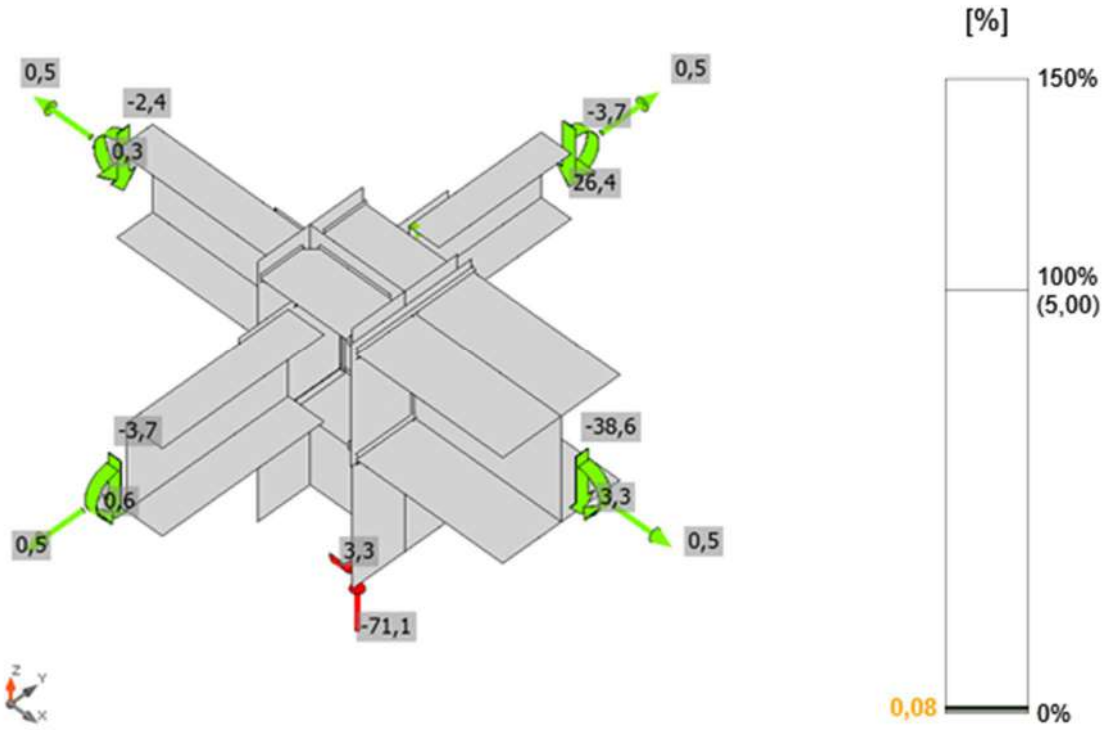
$f_{yk} = 355,0$ MPa – characteristic yield strength

$\gamma_{M0} = 1,00$ – partial safety factor for steel material EN 1993-1-1 – 6.1

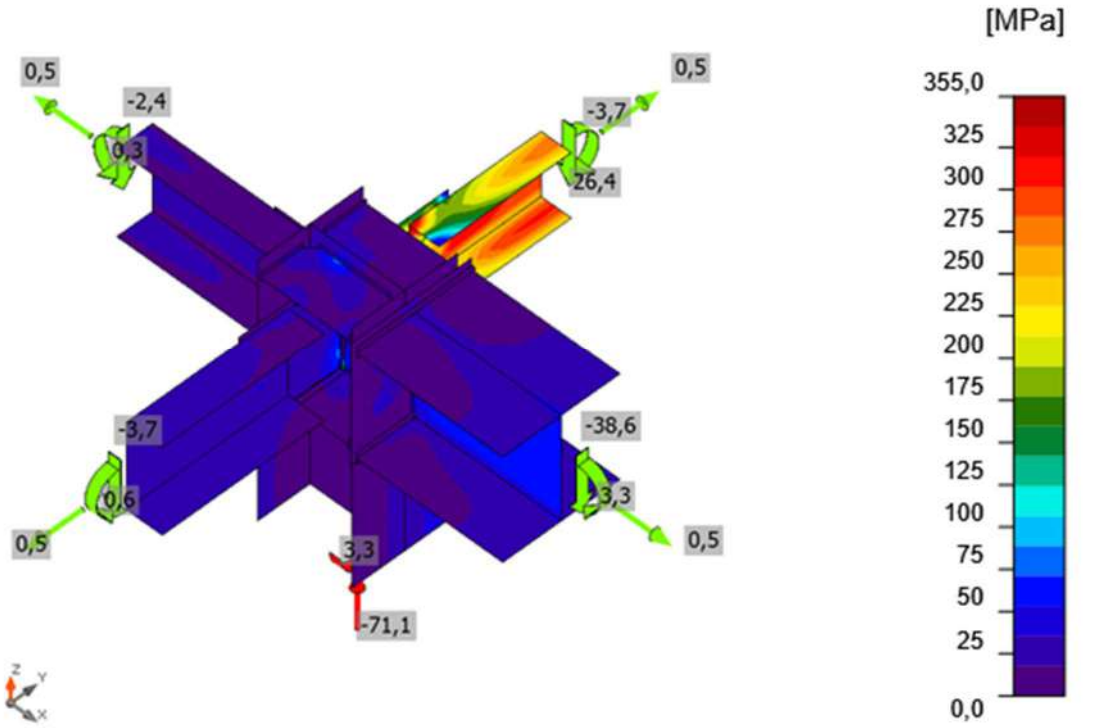




Overall check, LE1

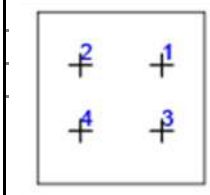
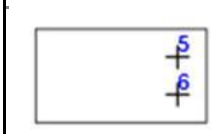
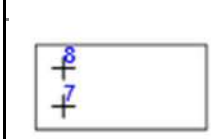
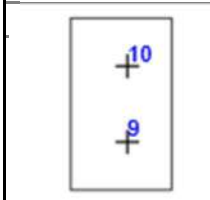


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE2	1,3	9,5	149,0	1,4	15,7	16,7	OK	OK
	B2	M16 8.8 - 1	LE2	1,9	9,6	149,0	2,1	15,9	17,3	OK	OK
	B3	M16 8.8 - 1	LE2	3,4	9,9	149,0	3,7	16,4	19,1	OK	OK
	B4	M16 8.8 - 1	LE2	1,4	9,7	149,0	1,6	16,0	17,1	OK	OK
	B5	M16 8.8 - 2	LE1	1,9	1,9	97,5	2,1	3,1	4,6	OK	OK
	B6	M16 8.8 - 2	LE1	0,9	1,9	101,3	1,0	3,2	3,9	OK	OK
	B7	M16 8.8 - 3	LE2	9,7	13,7	74,2	10,8	22,7	30,3	OK	OK
	B8	M16 8.8 - 3	LE1	20,9	12,7	62,0	23,1	21,1	37,6	OK	OK
	B9	M16 8.8 - 2	LE1	0,7	1,3	101,3	0,7	2,1	2,6	OK	OK
	B10	M16 8.8 - 2	LE1	1,5	1,2	97,5	1,6	2,0	3,2	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	178,1	60,3
M16 8.8 - 2	90,4	140,6	60,3
M16 8.8 - 3	90,4	131,2	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B8

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 20,9 kN

Where:

$k_2 =$ 0,90 – Factor

$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt

$A_s =$ 157 mm^2 – Tensile stress area of the bolt

$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 131,2 kN ≥ $F_{t,Ed} =$ 20,9 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p =$ 7 mm – Plate thickness

$f_u =$ 490,0 MPa – Ultimate strength

$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 60,3 kN ≥ $F_{v,Ed} =$ 12,7 kN

Where:

$\beta_p =$ 1,00 – Reduction factor for packing

$\alpha_v =$ 0,60 – Reduction factor for shear stress

$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt

$A =$ 157 mm^2 – Tensile stress area of the bolt

$\gamma_{M2} =$ 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}} =$ 62,0 kN ≥ $F_{b,Ed} =$ 12,7 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5) =$ 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1) =$ 0,56 – Factor for end distance and bolt spacing in direction of load transfer

$e_2 =$ 37 mm – Distance to the plate edge perpendicular to the shear force

$p_2 =$ ∞ mm – Distance between bolts perpendicular to the shear force

$d_0 =$ 18 mm – Bolt hole diameter

$e_1 =$ 31 mm – Distance to the plate edge in the direction of the shear force

$p_1 =$ ∞ mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 16 mm – Nominal diameter of the fastener

t = 7 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}\,;\,B_{p,Rd})}$ = 0,23 ≤ 1,0

Where:

$F_{t,Ed}$ = 20,9 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

$B_{p,Rd}$ = 131,2 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}\,;\,\frac{F_{b,Ed}}{F_{b,Rd}})$ = 0,21 ≤ 1,0

Where:

$F_{v,Ed}$ = 12,7 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{b,Ed}$ = 12,7 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 62,0 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}}$ = 0,38 ≤ 1,0

Where:

$F_{v,Ed}$ = 12,7 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{t,Ed}$ = 20,9 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
EP2	B-bfl 1	◢ 6,0 ◣	198	LE1	13,4	0,0	7,0	6,0	2,7	3,1	0,0	OK	OK
		◢ 6,0 ◣	198	LE2	14,7	0,0	-2,3	0,2	8,4	3,4	3,4	OK	OK

EP2	B-tfl 1	◢ 6,0 ◣	198	LE1	10,1	0,0	1,5	-0,5	5,7	2,3	0,0	OK	OK
		◢ 6,0 ◣	198	LE2	14,5	0,0	-7,6	5,7	4,3	3,3	0,0	OK	OK
EP2	B-w 1	◢ 4,0 ◣	178	LE2	44,2	0,0	3,1	2,7	-25,3	10,1	10,1	OK	OK
		◢ 4,0 ◣	178	LE2	52,7	0,0	1,8	-1,9	30,4	12,1	11,1	OK	OK
C-bfl 1	STIFF2a	◢ 4,0 ◣	72	LE1	33,0	0,0	-9,1	-6,0	-17,3	7,6	7,6	OK	OK
		◢ 4,0 ◣	72	LE1	16,4	0,0	9,1	-7,0	3,6	3,8	3,8	OK	OK
C-w 1	STIFF2a	◢ 4,0 ◣	121	LE1	34,5	0,0	-4,0	19,8	-1,1	7,9	7,5	OK	OK
		◢ 4,0 ◣	121	LE1	86,0	0,0	59,3	-35,7	4,6	19,8	12,2	OK	OK
C-tfl 1	STIFF2a	◢ 4,0 ◣	72	LE2	24,5	0,0	-14,4	-10,2	5,2	5,6	5,6	OK	OK
		◢ 4,0 ◣	72	LE2	25,3	0,0	13,5	-9,4	-8,1	5,8	5,8	OK	OK
C-bfl 1	STIFF2b	◢ 4,0 ◣	72	LE1	23,2	0,0	6,8	5,3	11,6	5,3	5,3	OK	OK
		◢ 4,0 ◣	72	LE1	24,3	0,0	-3,4	1,9	-13,8	5,6	5,6	OK	OK
C-w 1	STIFF2b	◢ 4,0 ◣	121	LE1	68,7	0,0	-33,1	-34,4	5,3	15,8	11,1	OK	OK
		◢ 4,0 ◣	121	LE1	50,1	0,0	-25,5	24,3	5,7	11,5	8,2	OK	OK
C-tfl 1	STIFF2b	◢ 4,0 ◣	72	LE1	21,1	0,0	0,5	0,7	-12,1	4,8	4,8	OK	OK
		◢ 4,0 ◣	72	LE1	21,7	0,0	3,9	-3,7	11,7	5,0	5,0	OK	OK
C-bfl 1	STIFF2c	◢ 4,0 ◣	72	LE2	24,8	0,0	6,9	4,0	13,2	5,7	5,7	OK	OK
		◢ 4,0 ◣	72	LE2	23,2	0,0	-5,6	2,7	-12,7	5,3	5,3	OK	OK
C-w 1	STIFF2c	◢ 4,0 ◣	121	LE2	75,4	0,0	-45,8	-34,4	3,4	17,3	11,7	OK	OK

		◢ 4,0 ◣	121	LE2	54,5	0,0	-18,2	29,6	-2,0	12,5	8,3	OK	OK
C-tfl 1	STIFF2c	◢ 4,0 ◣	72	LE1	24,6	0,0	-11,4	-8,6	-9,2	5,6	5,6	OK	OK
		◢ 4,0 ◣	72	LE1	16,6	0,0	-4,6	7,4	5,5	3,8	3,8	OK	OK
C-bfl 1	STIFF2d	◢ 4,0 ◣	72	LE2	33,1	0,0	4,5	1,8	-18,9	7,6	7,6	OK	OK
		◢ 4,0 ◣	72	LE2	25,0	0,0	-7,0	4,3	13,2	5,7	5,7	OK	OK
C-w 1	STIFF2d	◢ 4,0 ◣	121	LE2	50,7	0,0	-2,8	29,0	3,5	11,6	9,1	OK	OK
		◢ 4,0 ◣	121	LE2	93,4	0,0	68,4	-36,7	1,0	21,4	13,6	OK	OK
C-tfl 1	STIFF2d	◢ 4,0 ◣	72	LE2	17,9	0,0	-1,1	-4,5	9,3	4,1	4,1	OK	OK
		◢ 4,0 ◣	72	LE2	25,9	0,0	1,1	-4,5	-14,2	5,9	5,9	OK	OK
C-w 1	SP1	◢ 4,0 ◣	173	LE1	154,7	0,0	21,9	44,8	76,2	35,5	27,8	OK	OK
		◢ 4,0 ◣	173	LE2	155,5	0,0	36,6	-9,3	-86,7	35,7	26,1	OK	OK
C-w 1	SP2	◢ 4,0 ◣	173	LE1	165,5	0,0	-20,0	-65,2	68,9	38,0	25,5	OK	OK
		◢ 4,0 ◣	173	LE2	364,8	0,0	-195,5	147,5	-99,4	83,8	67,2	OK	OK
C-bfl 1	SP3	◢ 4,0 ◣	135	LE1	45,2	0,0	-22,5	-14,2	17,6	10,4	8,8	OK	OK
		◢ 4,0 ◣	135	LE1	22,4	0,0	6,8	1,4	-12,2	5,1	5,1	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w Throat thickness a
L Length

$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for C-w 1 / SP2

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0.5} =$ 364,8 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 195,5 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_{\perp}|}{\sigma_{\perp,Rd}}) =$ 0,84 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 364,8 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp} =$ -195,5 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Detailing check

- Weld is too small. Throat thickness should be greater or equal to 4,6 mm where rupture of the weld is to be avoided for ductility purposes. (FprEN 1993-1-8:2023 – 6.9(4))

Buckling

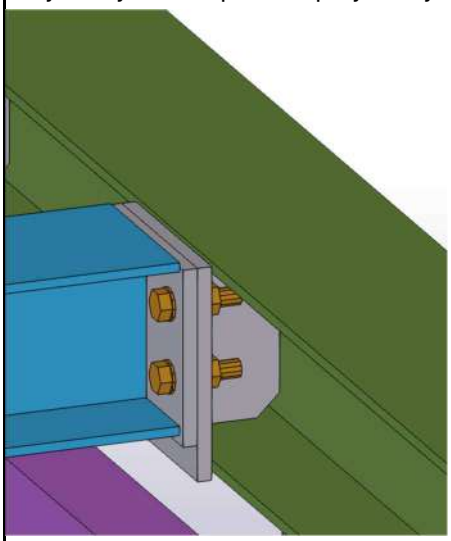
Buckling analysis was not calculated.

Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_{C}	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

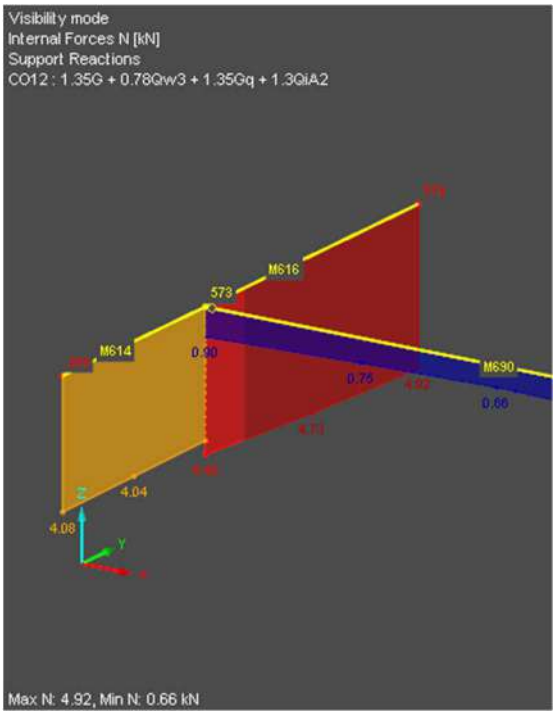
9.8. RĖMO SIJŲ JUNGIMO MAZGAS (1) (N-N SK_B-0.14)

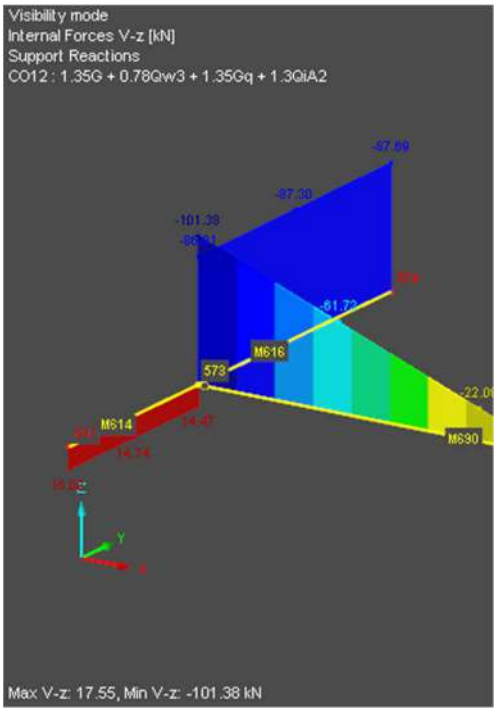
Projektuojamame pastate projektuojamas mazgas yra ašyse 3/C->D. Mazgas modelyje:



Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35+LC15*1,3+LC3*0,78





Design

Name	CON5
Description	
Analysis	Stress, strain/ simplified loading

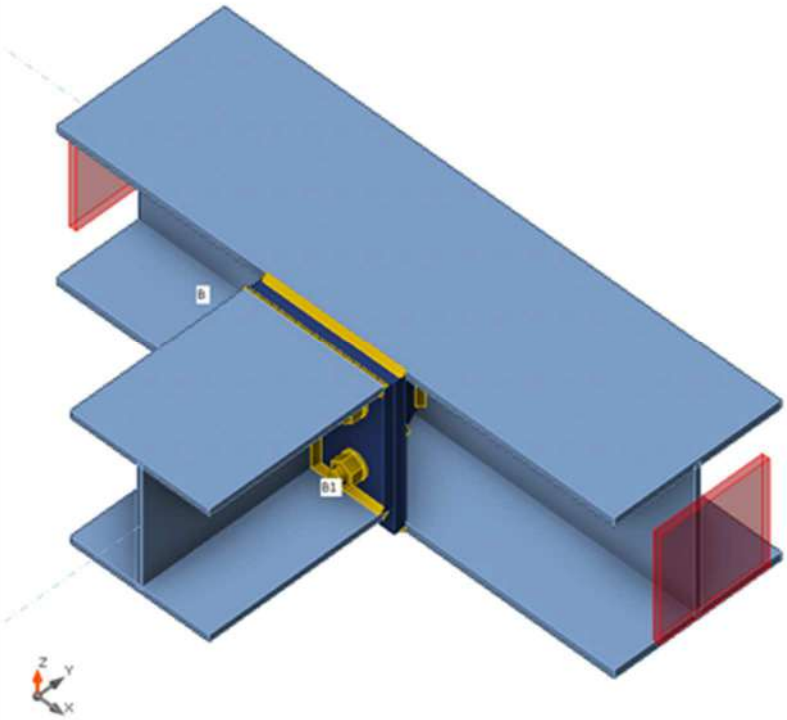
Members

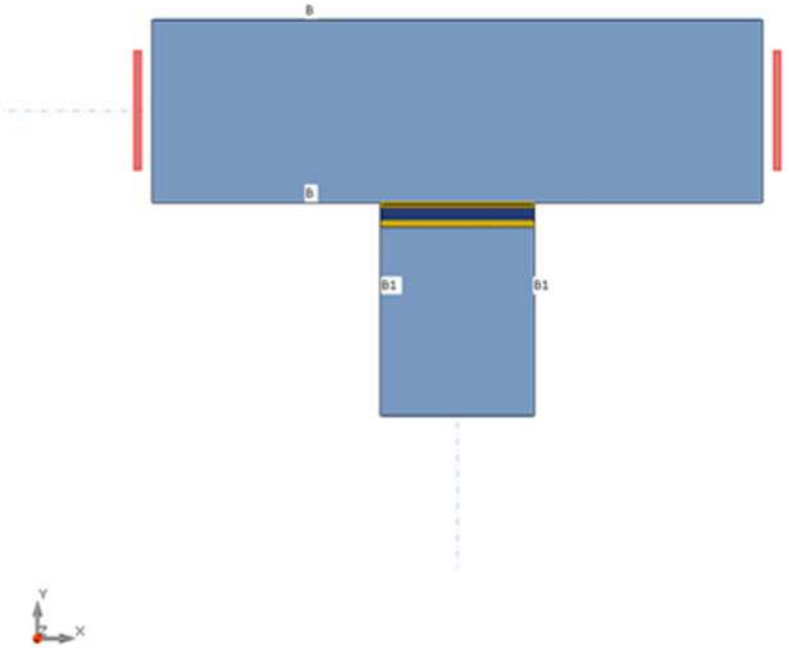
Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
B	7 - CON1(HEA240)	0,0	0,0	0,0	0	0	0
B1	5 - HEA200	-90,0	0,0	0,0	0	0	20

Supports and forces

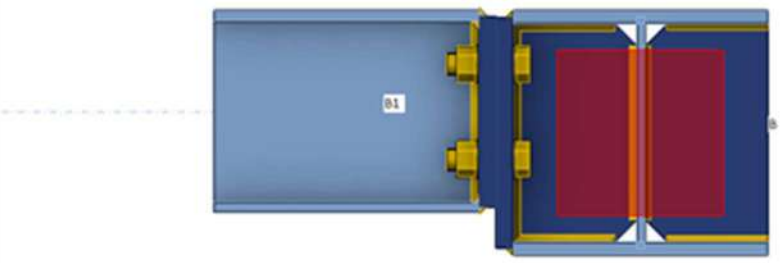
Name	Support	Forces in	X [mm]
B / begin	N-Vy-Vz-Mx-My-Mz	Node	0
B / end	N-Vy-Vz-Mx-My-Mz	Node	0
B1 / end		Node	0


B
B1
Z
Y
X


B
B
B1
B1
Y
X









Cross-sections

Name	Material

7 - CON1(HEA240)	S 355
5 - HEA200	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M20 8.8	M20 8.8	20	800,0	314

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	B1 / End	0,9	0,0	-101,4	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	61,3 < 100%	OK
Welds	46,5 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
B-bfl 1	12,0	LE1	90,6	0,0	0,0	OK
B-tfl 1	12,0	LE1	98,4	0,0	0,0	OK
B-w 1	7,5	LE1	81,0	0,0	0,0	OK
B1-bfl 1	10,0	LE1	170,2	0,0	0,0	OK
B1-tfl 1	10,0	LE1	112,6	0,0	0,0	OK
B1-w 1	6,5	LE1	207,6	0,0	0,0	OK
SEP1a	16,0	LE1	307,5	0,0	54,6	OK
SEP1b	16,0	LE1	295,1	0,0	47,5	OK
STIFF	10,0	LE1	137,1	0,0	0,0	OK
STIFF1	10,0	LE1	42,1	0,0	0,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p Plate thickness
σ_{Ed} Equivalent stress

ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for SEP1a

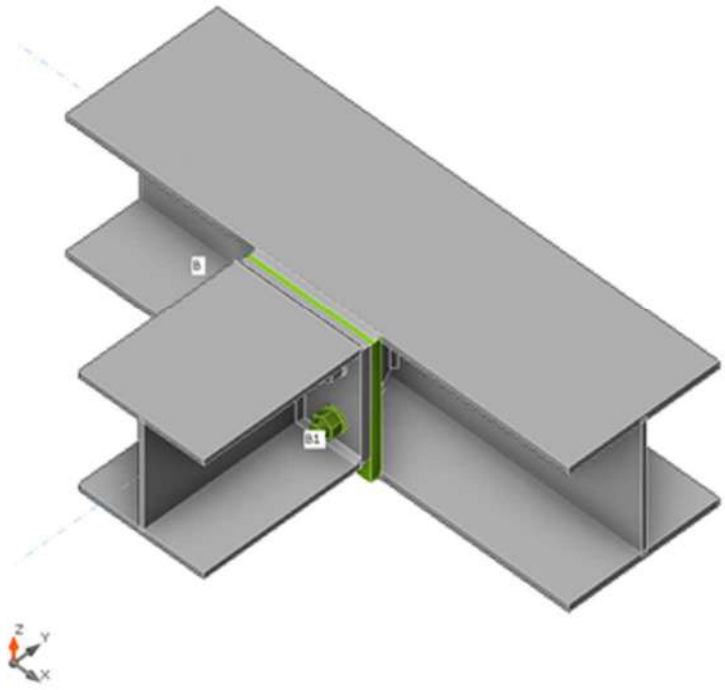
Design values used in the analysis

$$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} = 355,0 \text{ MPa}$$

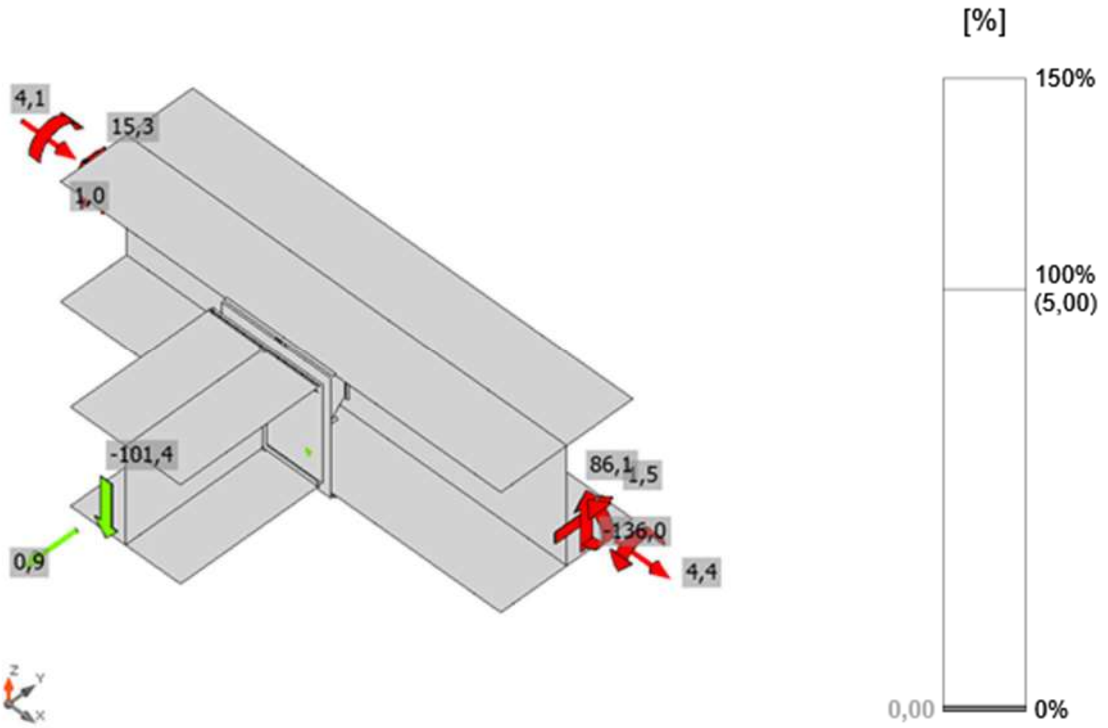
Where:

f_{yk} = 355,0 MPa – characteristic yield strength

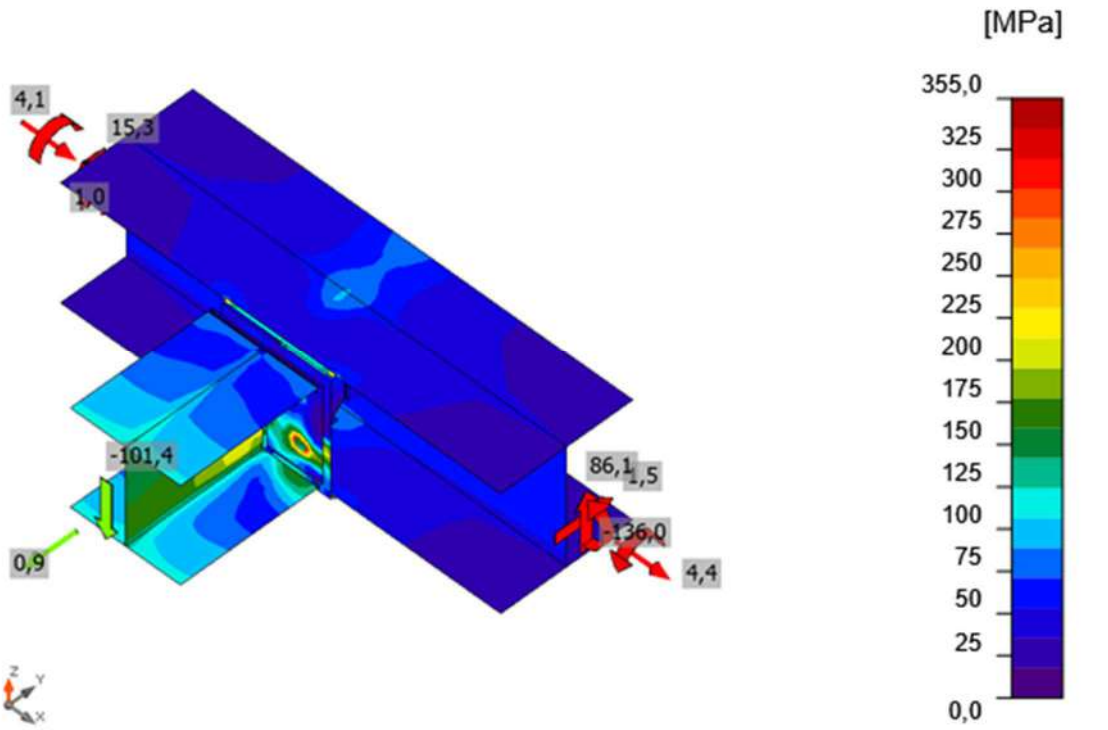
γ_{M0} = 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE1

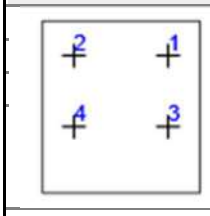


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M20 8.8 - 1	LE1	11,6	25,1	213,8	8,2	26,7	32,6	OK	OK
	B2	M20 8.8 - 1	LE1	11,6	25,1	213,8	8,2	26,7	32,5	OK	OK
	B3	M20 8.8 - 1	LE1	67,3	25,6	313,6	47,7	27,2	61,3	OK	OK
	B4	M20 8.8 - 1	LE1	67,3	25,6	313,6	47,7	27,2	61,3	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M20 8.8 - 1	141,1	375,5	94,1

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B4

Tension resistance check (EN 1993-1-8 – Table 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 141,1 \text{ kN} \geq F_{t,Ed} = 67,3 \text{ kN}$$

Where:

$k_2 = 0,90$ – Factor

$f_{ub} = 800,0$ MPa – Ultimate tensile strength of the bolt

$A_s = 245$ mm^2 – Tensile stress area of the bolt

$\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 375,5 \text{ kN} \geq F_{t,Ed} = 67,3 \text{ kN}$$

Where:

$d_m = 32$ mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p = 16$ mm – Plate thickness

$f_u = 490,0$ MPa – Ultimate strength

γ_{M2} = 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}}$ = 94,1 kN ≥ $F_{v,Ed}$ = 25,6 kN

Where:

β_p = 1,00 – Reduction factor for packing

α_v = 0,60 – Reduction factor for shear stress

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

A = 245 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}}$ = 313,6 kN ≥ $F_{b,Ed}$ = 25,6 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5)$ = 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 1,00 – Factor for end distance and bolt spacing in direction of load transfer

e_2 = 40 mm – Distance to the plate edge perpendicular to the shear force

p_2 = 120 mm – Distance between bolts perpendicular to the shear force

d_0 = 22 mm – Bolt hole diameter

e_1 = 84 mm – Distance to the plate edge in the direction of the shear force

p_1 = ∞ mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 20 mm – Nominal diameter of the fastener

t = 16 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})}$ = 0,48 ≤ 1,0

Where:

$F_{t,Ed}$ = 67,3 kN – Tensile force

$F_{t,Rd}$ = 141,1 kN – Tension resistance

$B_{p,Rd}$ = 375,5 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}; \frac{F_{b,Ed}}{F_{b,Rd}}) =$ 0,27 ≤ 1,0

Where:

$F_{v,Ed}$ = 25,6 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 94,1 kN – Shear resistance

$F_{b,Ed}$ = 25,6 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 313,6 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1,4\,F_{t,Rd}} =$ 0,61 ≤ 1,0

Where:

$F_{v,Ed}$ = 25,6 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 94,1 kN – Shear resistance

$F_{t,Ed}$ = 67,3 kN – Tensile force

$F_{t,Rd}$ = 141,1 kN – Tension resistance

Detailing check

- Ductility, rotation capacity: Plate SEP1a is too thick. Thickness should be lesser or equal to 10,8 mm. (EN 1993-1-8 – Equation 6.32)

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
SEP1a	B-tfl 1	◢ 5,0	199	LE1	202,4	0,0	-70,8	101,8	-40,3	46,5	42,6	OK	OK
SEP1a	B-bfl 1	◢ 5,0	199	LE1	160,5	0,0	62,5	79,4	31,3	36,8	33,2	OK	OK
SEP1b	B1-bfl 1	◢ 5,0 ◣	198	LE1	122,3	0,0	77,1	33,6	-43,3	28,1	17,0	OK	OK
		◢ 5,0 ◣	198	LE1	81,2	0,0	-17,4	-2,5	45,7	18,6	10,5	OK	OK
SEP1b	B1-tfl 1	◢ 5,0 ◣	198	LE1	104,2	0,0	-60,0	48,2	9,6	23,9	23,9	OK	OK
		◢ 5,0 ◣	198	LE1	71,1	0,0	-32,4	36,5	-1,4	16,3	15,4	OK	OK
SEP1b	B1-w 1	◢ 5,0 ◣	178	LE1	144,7	0,0	43,0	43,3	-67,0	33,2	25,0	OK	OK
		◢ 5,0 ◣	178	LE1	144,5	0,0	43,2	-42,8	67,1	33,2	25,1	OK	OK

B-bfl 1	STIFF	◢ 5,0 ◣	95	LE1	58,5	0,0	-14,7	-14,7	-29,2	13,4	12,7	OK	OK
		◢ 5,0 ◣	95	LE1	58,5	0,0	-14,7	14,6	29,2	13,4	12,7	OK	OK
B-w 1	STIFF	◢ 5,0 ◣	164	LE1	175,0	0,0	22,7	22,8	97,6	40,2	30,8	OK	OK
		◢ 5,0 ◣	164	LE1	175,1	0,0	22,8	-22,8	-97,6	40,2	30,8	OK	OK
B-tfl 1	STIFF	◢ 5,0 ◣	95	LE1	187,5	0,0	21,2	21,2	-105,5	43,1	29,3	OK	OK
		◢ 5,0 ◣	95	LE1	187,5	0,0	21,2	-21,2	105,5	43,1	29,3	OK	OK
SEP1 a	STIFF	◢ 5,0 ◣	204	LE1	176,7	0,0	70,7	69,0	63,0	40,6	21,7	OK	OK
		◢ 5,0 ◣	204	LE1	175,2	0,0	67,8	-69,4	-62,3	40,2	21,6	OK	OK
B-bfl 1	STIFF 1	◢ 4,0 ◣	95	LE1	62,0	0,0	-17,7	-17,7	-29,4	14,2	13,5	OK	OK
		◢ 4,0 ◣	95	LE1	62,0	0,0	-17,7	17,7	29,4	14,2	13,5	OK	OK
B-w 1	STIFF 1	◢ 4,0 ◣	164	LE1	75,2	0,0	29,2	29,2	-27,4	17,3	15,0	OK	OK
		◢ 4,0 ◣	164	LE1	75,2	0,0	29,2	-29,2	27,4	17,3	15,0	OK	OK
B-tfl 1	STIFF 1	◢ 4,0 ◣	95	LE1	49,2	0,0	17,1	17,1	20,4	11,3	11,2	OK	OK
		◢ 4,0 ◣	95	LE1	49,2	0,0	17,1	-17,1	-20,4	11,3	11,2	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress

$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for SEP1a / B-tfl 1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0.5} =$ 202,4 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 70,8 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_{\perp}|}{\sigma_{\perp,Rd}}) =$ 0,46 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 202,4 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp} =$ -70,8 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Detailing check

- Weld is too small. Throat thickness should be greater or equal to 5,5 mm where rupture of the weld is to be avoided for ductility purposes. (FprEN 1993-1-8:2023 – 6.9(4))

Buckling

Buckling analysis was not calculated.

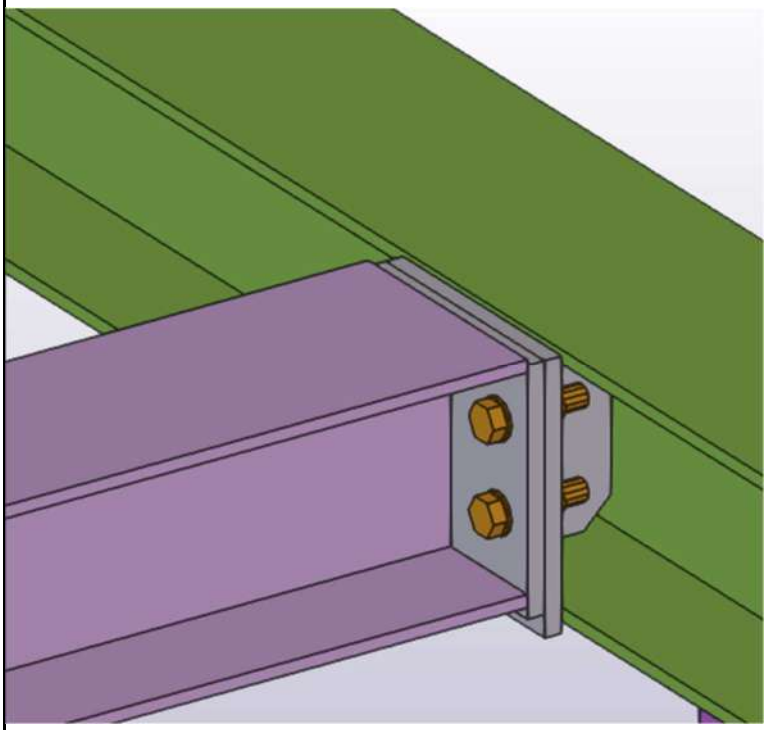
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1

Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_{C}	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

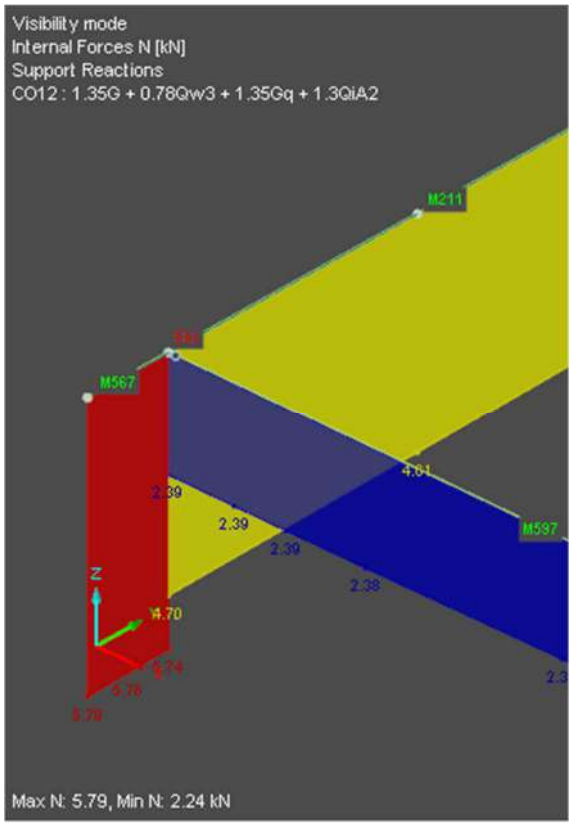
9.9. RĖMO SIJŲ JUNGIMO MAZGAS (2) (H-H SK_B-0.14)

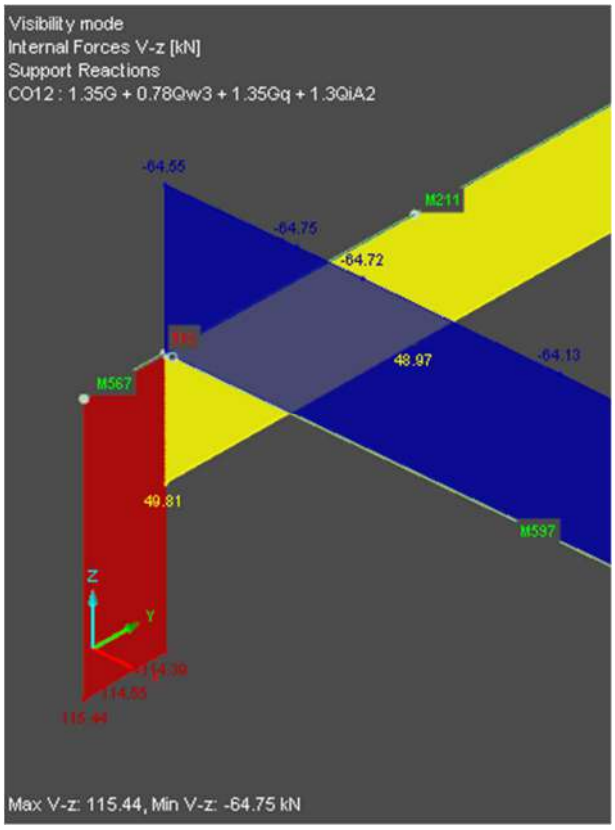
Projektuojamame pastate projektuojamas mazgas yra ašyse 3/C->D. Mazgas modelyje:



Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35+LC15*1,3+LC3*0,78





Design

Name	CON9
Description	
Analysis	Stress, strain/ simplified loading

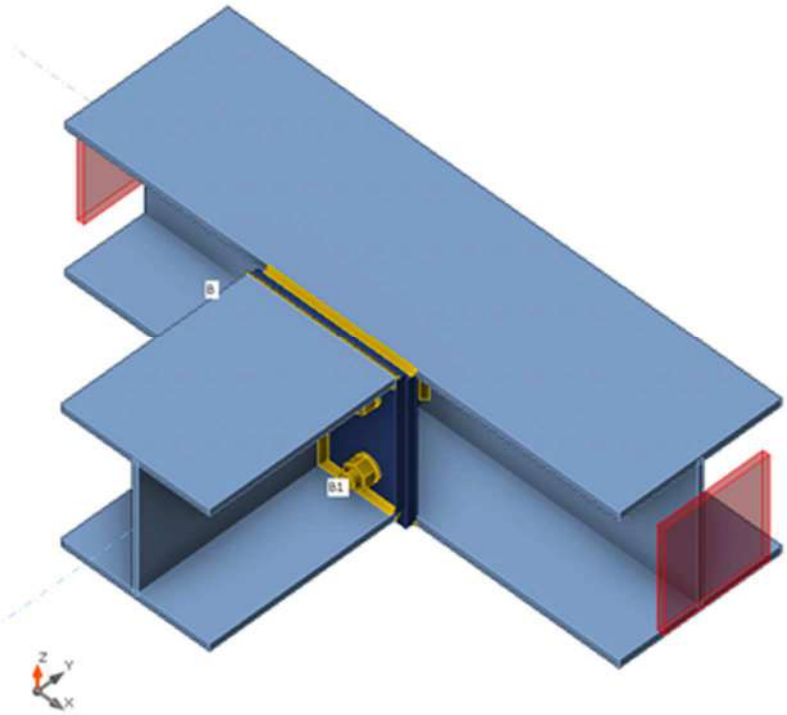
Members

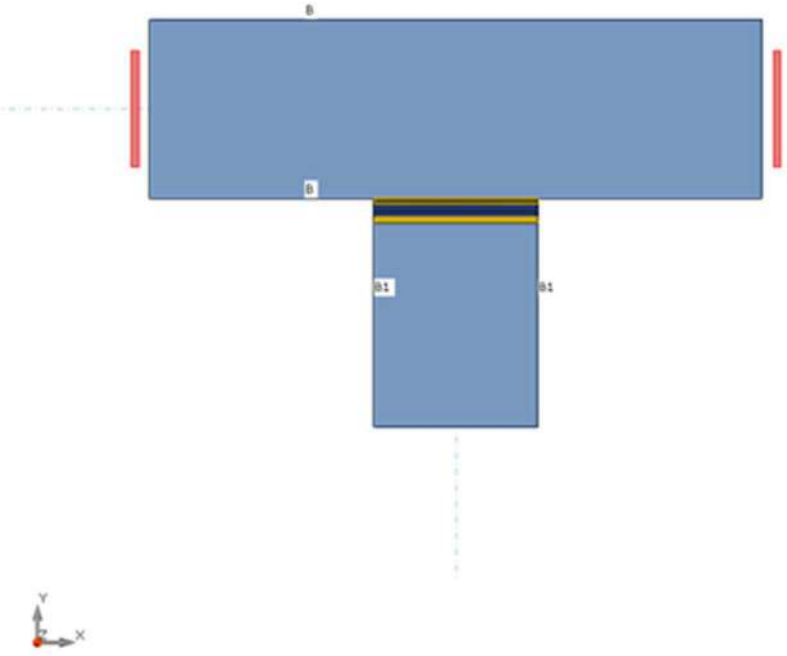
Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
B	7 - CON1(HEA240)	0,0	0,0	0,0	0	0	0
B1	22 - HEA220	-90,0	0,0	0,0	0	0	20

Supports and forces

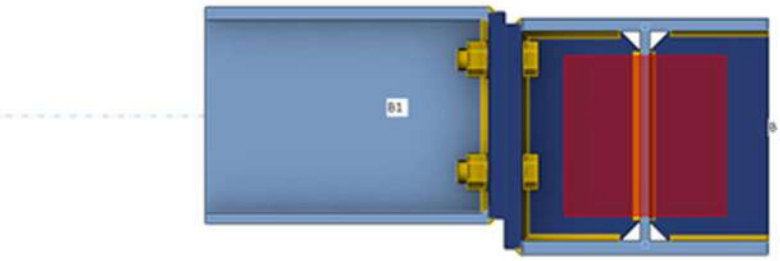
Name	Support	Forces in	X [mm]
B / begin	N-Vy-Vz-Mx-My-Mz	Node	0
B / end	N-Vy-Vz-Mx-My-Mz	Node	0
B1 / end		Node	0


B
B1
Z
Y
X


B
B
B1
B1
Y
X









Cross-sections

Name	Material

7 - CON1(HEA240)	S 355
22 - HEA220	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm²]
M20 8.8	M20 8.8	20	800,0	314

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	B1 / End	2,4	0,0	-65,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	38,3 < 100%	OK
Welds	26,9 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
B-bfl 1	12,0	LE1	61,0	0,0	0,0	OK
B-tfl 1	12,0	LE1	65,5	0,0	0,0	OK
B-w 1	7,5	LE1	50,8	0,0	0,0	OK
B1-bfl 1	11,0	LE1	97,5	0,0	0,0	OK
B1-tfl 1	11,0	LE1	57,5	0,0	0,0	OK
B1-w 1	7,0	LE1	101,7	0,0	0,0	OK
SEP1a	16,0	LE1	208,9	0,0	65,2	OK
SEP1b	16,0	LE1	183,5	0,0	29,0	OK
STIFF	10,0	LE1	78,5	0,0	0,0	OK
STIFF1	10,0	LE1	24,7	0,0	0,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p Plate thickness
σ_{Ed} Equivalent stress

ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for B-bfl 1

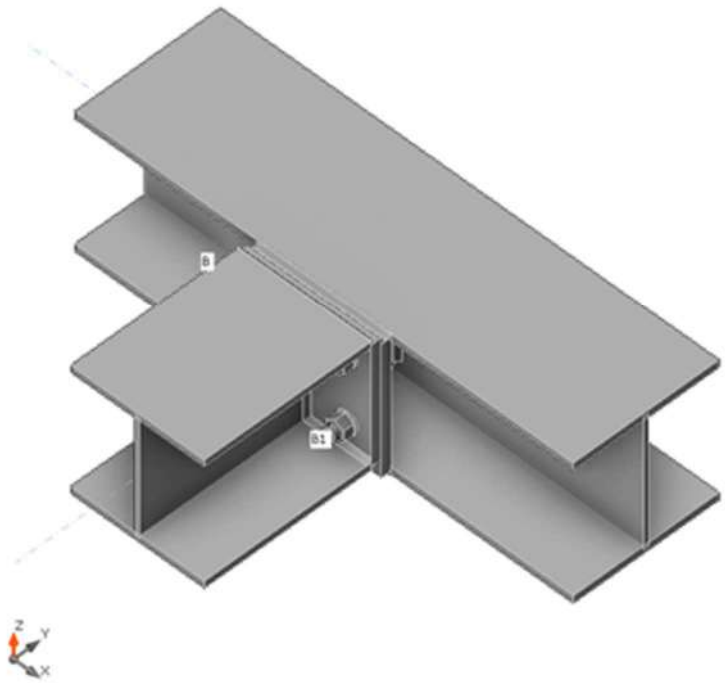
Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

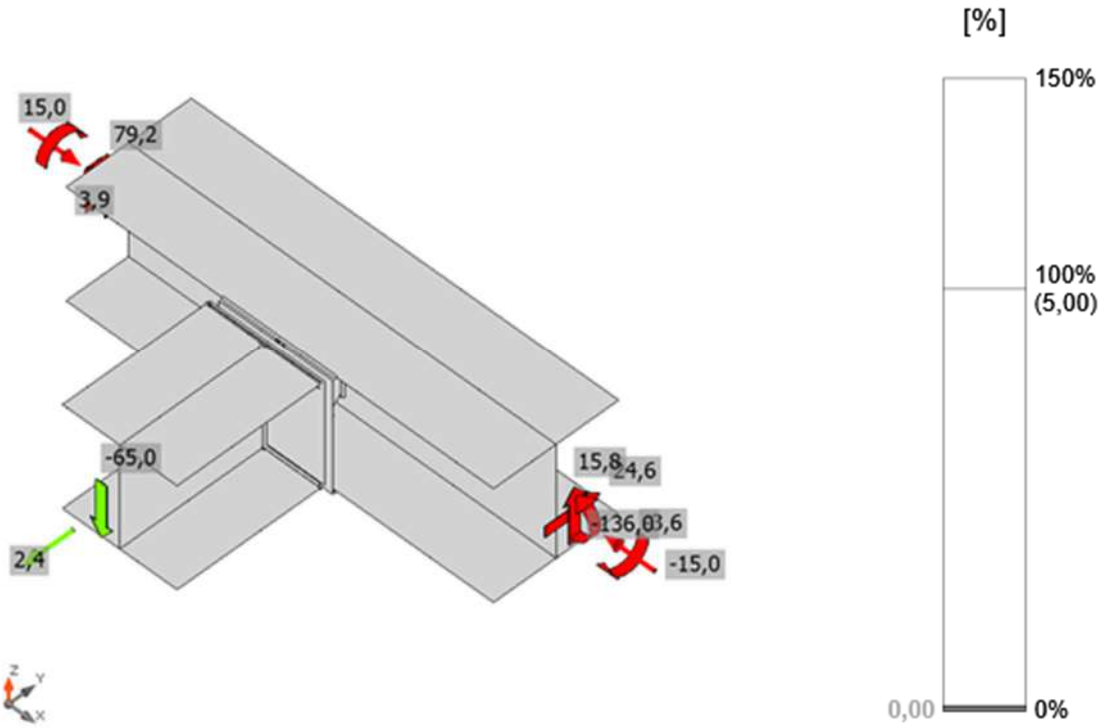
Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

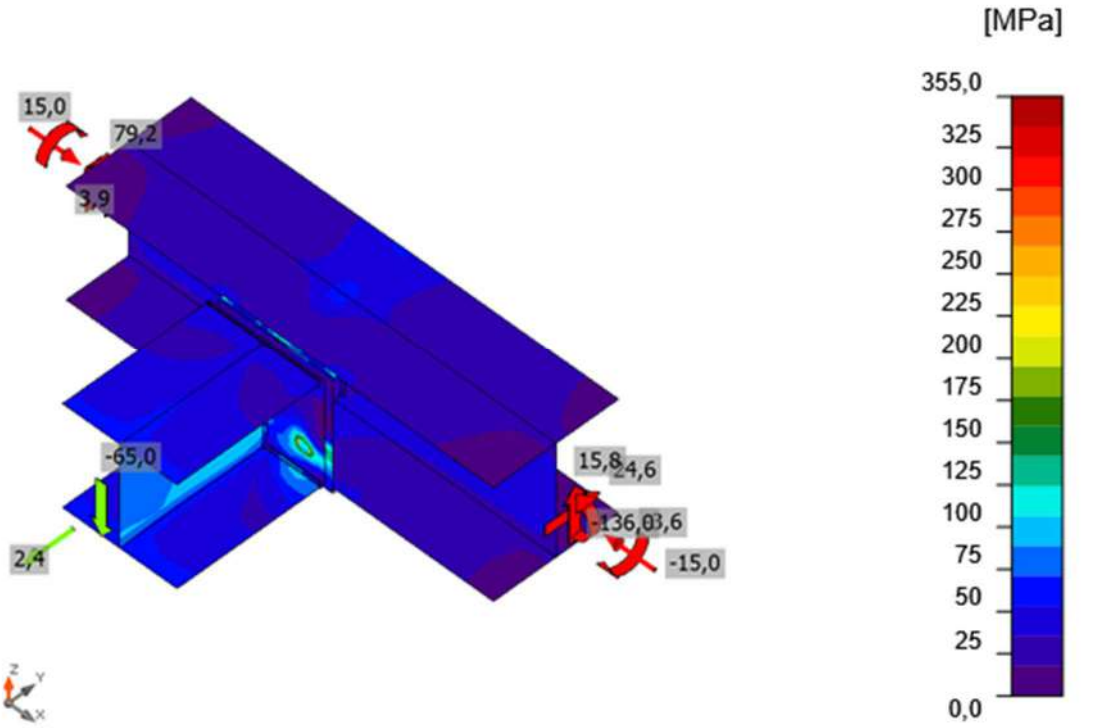
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE1

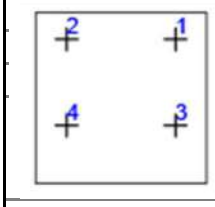


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M20 8.8 - 1	LE1	6,2	16,3	213,8	4,4	17,3	20,4	OK	OK
	B2	M20 8.8 - 1	LE1	6,1	16,3	213,8	4,3	17,3	20,4	OK	OK
	B3	M20 8.8 - 1	LE1	41,5	16,3	313,6	29,4	17,3	38,3	OK	OK
	B4	M20 8.8 - 1	LE1	41,5	16,3	313,6	29,4	17,3	38,3	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M20 8.8 - 1	141,1	375,5	94,1

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B3

Tension resistance check (EN 1993-1-8 – Table 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 141,1 \text{ kN} \geq F_{t,Ed} = 41,5 \text{ kN}$$

Where:

$k_2 = 0,90$ – Factor

$f_{ub} = 800,0$ MPa – Ultimate tensile strength of the bolt

$A_s = 245$ mm^2 – Tensile stress area of the bolt

$\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 375,5 \text{ kN} \geq F_{t,Ed} = 41,5 \text{ kN}$$

Where:

$d_m = 32$ mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p = 16$ mm – Plate thickness

$f_u = 490,0$ MPa – Ultimate strength

γ_{M2} = 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}}$ = 94,1 kN ≥ $F_{v,Ed}$ = 16,3 kN

Where:

β_p = 1,00 – Reduction factor for packing

α_v = 0,60 – Reduction factor for shear stress

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

A = 245 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}}$ = 313,6 kN ≥ $F_{b,Ed}$ = 16,3 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5)$ = 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 1,00 – Factor for end distance and bolt spacing in direction of load transfer

e_2 = 40 mm – Distance to the plate edge perpendicular to the shear force

p_2 = 140 mm – Distance between bolts perpendicular to the shear force

d_0 = 22 mm – Bolt hole diameter

e_1 = 74 mm – Distance to the plate edge in the direction of the shear force

p_1 = ∞ mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 20 mm – Nominal diameter of the fastener

t = 16 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})}$ = 0,29 ≤ 1,0

Where:

$F_{t,Ed}$ = 41,5 kN – Tensile force

$F_{t,Rd}$ = 141,1 kN – Tension resistance

$B_{p,Rd}$ = 375,5 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}; \frac{F_{b,Ed}}{F_{b,Rd}}) =$ 0,17 ≤ 1,0

Where:

$F_{v,Ed}$ = 16,3 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 94,1 kN – Shear resistance

$F_{b,Ed}$ = 16,3 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 313,6 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1,4\,F_{t,Rd}} =$ 0,38 ≤ 1,0

Where:

$F_{v,Ed}$ = 16,3 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 94,1 kN – Shear resistance

$F_{t,Ed}$ = 41,5 kN – Tensile force

$F_{t,Rd}$ = 141,1 kN – Tension resistance

Detailing check

- Ductility, rotation capacity: Plate SEP1a is too thick. Thickness should be lesser or equal to 10,8 mm. (EN 1993-1-8 – Equation 6.32)

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
SEP1a	B-tfl 1	◢ 5,0	219	LE1	99,6	0,0	-28,1	49,1	25,1	22,9	22,7	OK	OK
SEP1a	B-bfl 1	◢ 5,0	219	LE1	117,2	0,0	45,8	57,4	-24,1	26,9	24,2	OK	OK
SEP1b	B1-bfl 1	◢ 5,0 ◣	218	LE1	80,8	0,0	47,9	21,4	-30,9	18,6	12,0	OK	OK
		◢ 5,0 ◣	218	LE1	45,2	0,0	-11,7	-2,1	25,1	10,4	7,4	OK	OK
SEP1b	B1-tfl 1	◢ 5,0 ◣	218	LE1	43,4	0,0	-22,0	19,9	-8,4	10,0	10,0	OK	OK
		◢ 5,0 ◣	218	LE1	47,0	0,0	-22,9	23,6	1,6	10,8	10,7	OK	OK
SEP1b	B1-w 1	◢ 5,0 ◣	198	LE1	89,1	0,0	-9,5	-9,0	-50,4	20,5	16,8	OK	OK
		◢ 5,0 ◣	198	LE1	89,0	0,0	-7,9	8,4	50,5	20,4	16,7	OK	OK

B-bfl 1	STIFF	◢ 5,0 ◣	95	LE1	44,2	0,0	-9,7	-9,7	-22,9	10,1	10,0	OK	OK
		◢ 5,0 ◣	95	LE1	44,2	0,0	-9,7	9,7	22,9	10,1	10,0	OK	OK
B-w 1	STIFF	◢ 5,0 ◣	164	LE1	107,3	0,0	14,2	14,2	59,8	24,6	19,4	OK	OK
		◢ 5,0 ◣	164	LE1	107,4	0,0	14,2	-14,2	-59,8	24,6	19,4	OK	OK
B-tfl 1	STIFF	◢ 5,0 ◣	95	LE1	114,8	0,0	13,2	13,2	-64,5	26,4	20,6	OK	OK
		◢ 5,0 ◣	95	LE1	114,9	0,0	13,2	-13,2	64,5	26,4	20,5	OK	OK
SEP1 a	STIFF	◢ 5,0 ◣	204	LE1	100,1	0,0	37,4	37,4	38,4	23,0	14,9	OK	OK
		◢ 5,0 ◣	204	LE1	100,2	0,0	37,5	-37,4	-38,5	23,0	15,1	OK	OK
B-bfl 1	STIFF 1	◢ 4,0 ◣	95	LE1	35,7	0,0	-11,1	-11,1	-16,1	8,2	8,2	OK	OK
		◢ 4,0 ◣	95	LE1	35,7	0,0	-11,1	11,1	16,1	8,2	8,2	OK	OK
B-w 1	STIFF 1	◢ 4,0 ◣	164	LE1	45,0	0,0	18,2	18,2	-15,3	10,3	10,1	OK	OK
		◢ 4,0 ◣	164	LE1	45,0	0,0	18,2	-18,2	15,3	10,3	10,1	OK	OK
B-tfl 1	STIFF 1	◢ 4,0 ◣	95	LE1	28,2	0,0	10,9	10,9	10,3	6,5	6,5	OK	OK
		◢ 4,0 ◣	95	LE1	28,2	0,0	10,9	-10,9	-10,3	6,5	6,5	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress

$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for SEP1a / B-bfl 1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0.5} =$ 117,2 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 45,8 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_{\perp}|}{\sigma_{\perp,Rd}}) =$ 0,27 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 117,2 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp} =$ 45,8 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Detailing check

- Weld is too small. Throat thickness should be greater or equal to 5,5 mm where rupture of the weld is to be avoided for ductility purposes. (FprEN 1993-1-8:2023 – 6.9(4))

Buckling

Buckling analysis was not calculated.

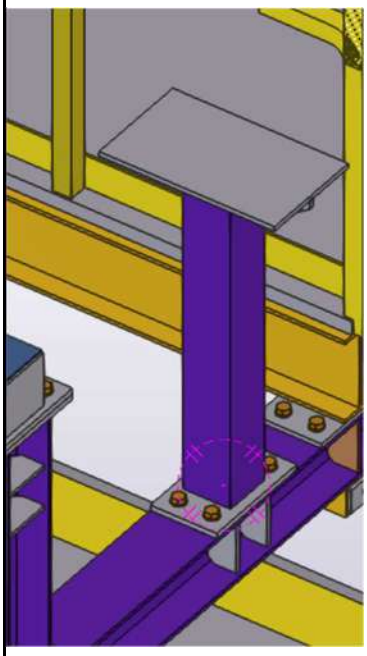
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1

Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_{C}	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

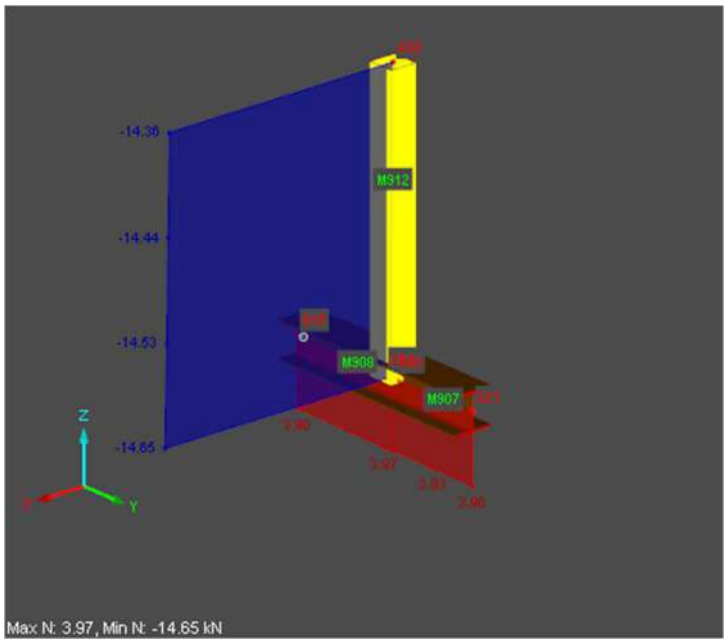
9.10. VAMZDYNŲ ATRAMOS JUNGIMO MAZGAS (PJŪVIS O-O SK_B-0.14)

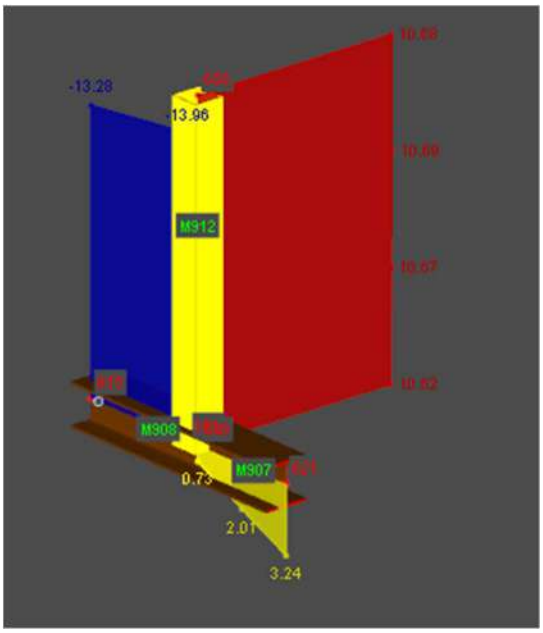
Projektuojamamas labiausiai apkrautos vamzdyno atramos mazgas pastate yra ašyse 3/C->D. Mazgas modelyje:

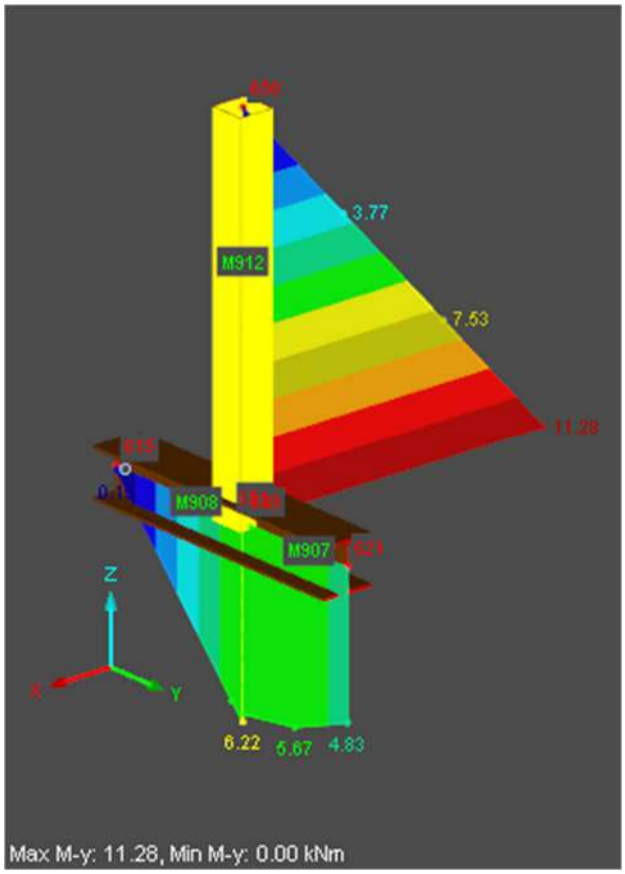


Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35


-14.36
-14.44
-14.53
-14.65
M912
M908
M907
Z
Y
Max N: 3.97, Min N: -14.65 kN


-13.28
13.96
M912
M908
M907
0.73
2.01
3.24


3.77
7.53
11.28
M912
M908
M907
Z
Y
6.22
5.67
4.83
Max M-y: 11.28, Min M-y: 0.00 kNm

Project item CON10

Design

Name	CON10
Description	
Analysis	Stress, strain/ loads in equilibrium

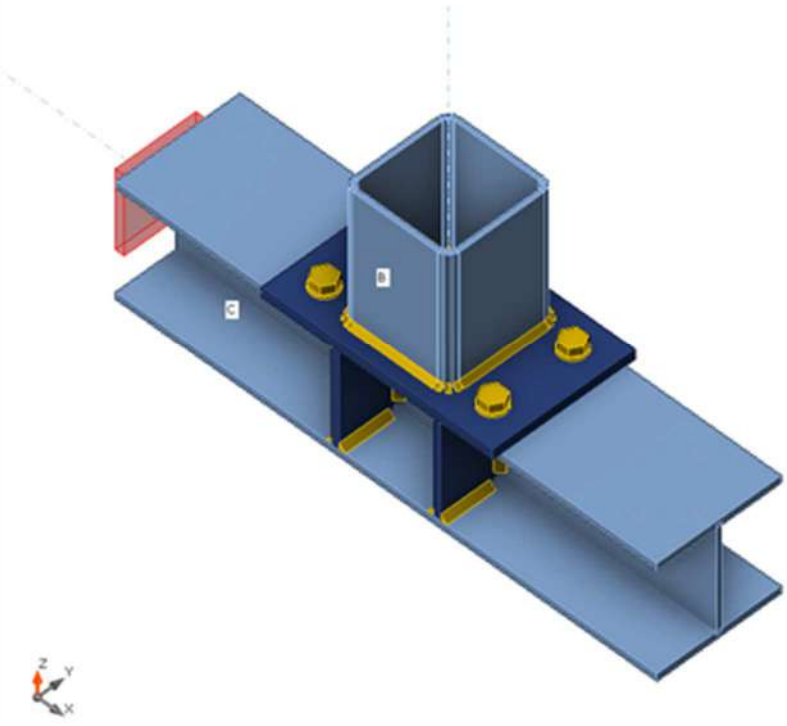
Members

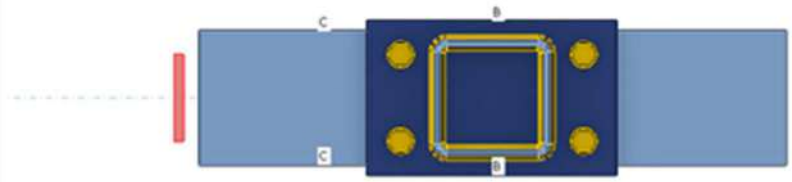
Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	26 - HEA140	0,0	0,0	0,0	0	0	0
B	2 - SHS CF 120x120x6	0,0	90,0	0,0	0	0	0

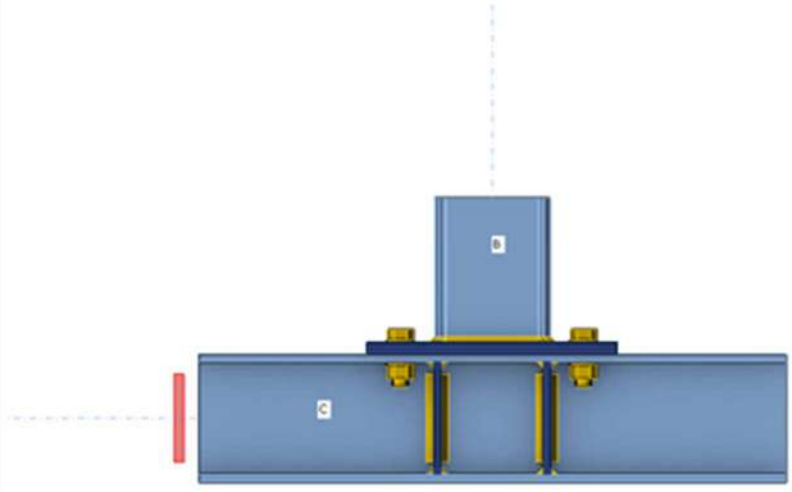
Supports and forces

Name	Support	Forces in	X [mm]
C / begin	N-Vy-Vz-Mx-My-Mz	Node	0
C / end		Node	0
B / end		Node	0

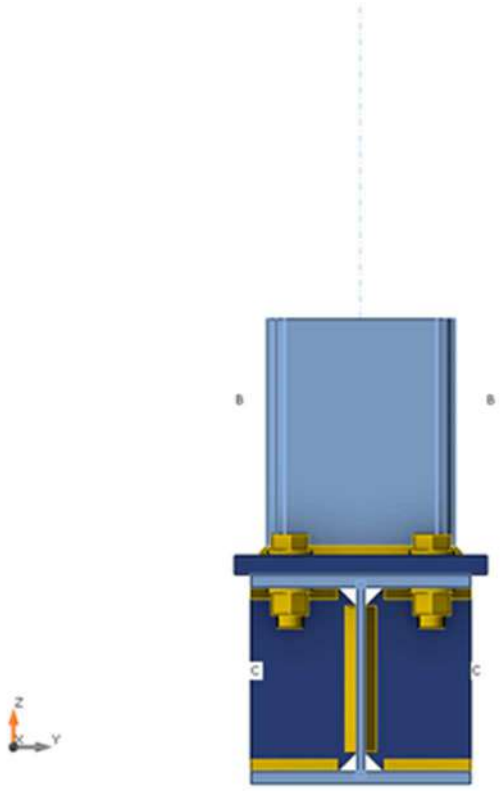



C
B
C
B


Y
Z
X


B
C


Z
Y
X



Cross-sections

Name	Material
26 - HEA140	S 355
2 - SHS CF 120x120x6	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M16 8.8	M16 8.8	16	800,0	201

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	C / Begin	4,0	0,0	13,3	0,0	-6,2	0,0
	C / End	-4,0	0,0	0,7	0,0	-6,2	0,0
	B / End	-14,7	0,0	10,6	0,0	11,3	0,0

Unbalanced forces

Name	X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	-10,6	0,0	-0,6	0,0	-1,2	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,2 < 5,0%	OK
Loc. deformation	0,1 < 3%	OK
Bolts	59,6 < 100%	OK
Welds	98,0 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C-bfl 1	8,5	LE1	103,2	0,0	0,0	OK
C-tfl 1	8,5	LE1	355,4	0,2	84,5	OK
C-w 1	5,5	LE1	239,3	0,0	0,0	OK
B	6,0	LE1	355,5	0,2	0,0	OK
EP1	12,0	LE1	355,1	0,0	84,5	OK
STIFF1a	8,0	LE1	148,2	0,0	0,0	OK
STIFF1b	8,0	LE1	148,4	0,0	0,0	OK
STIFF1c	8,0	LE1	314,2	0,0	0,0	OK
STIFF1d	8,0	LE1	313,8	0,0	0,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for B

Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

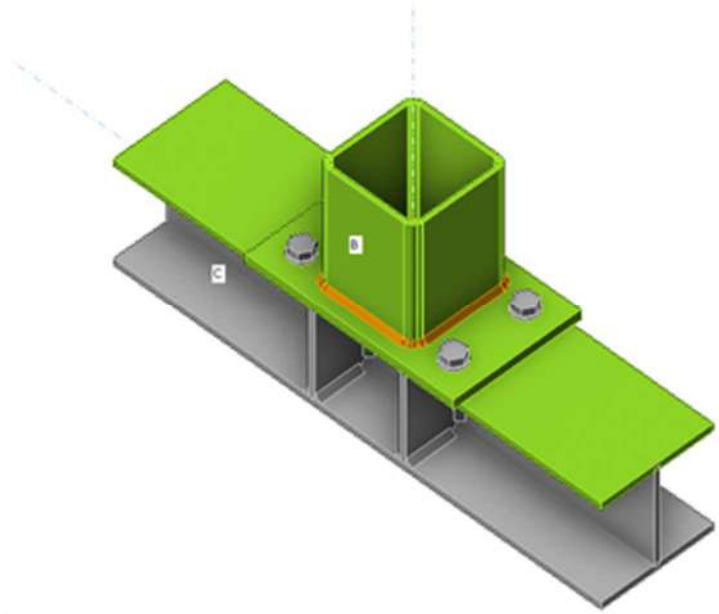
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1

Loc. deformation

Name	d_0 [mm]	Loads	δ [mm]	δ_{lim} [mm]	δ/d_0 [%]	Check status
B	120	LE1	0	4	0,1	OK

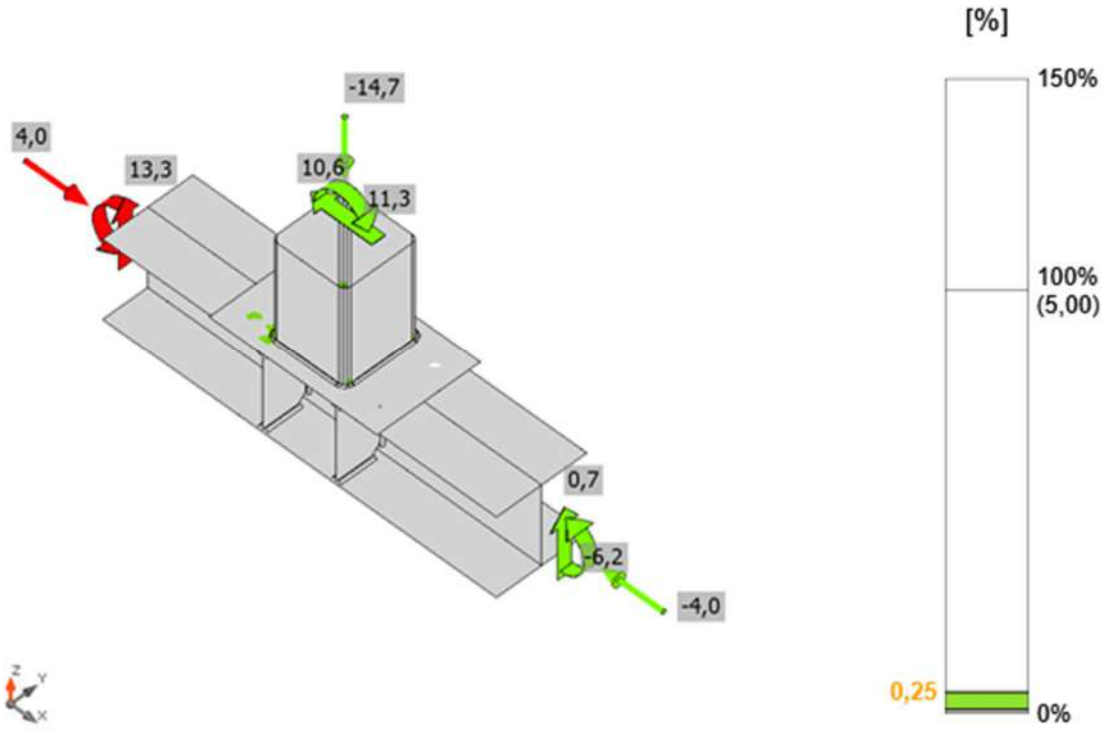
Symbol explanation

d_0 Cross-section size
δ Local cross-section deformation
δ_{lim} Allowed deformation

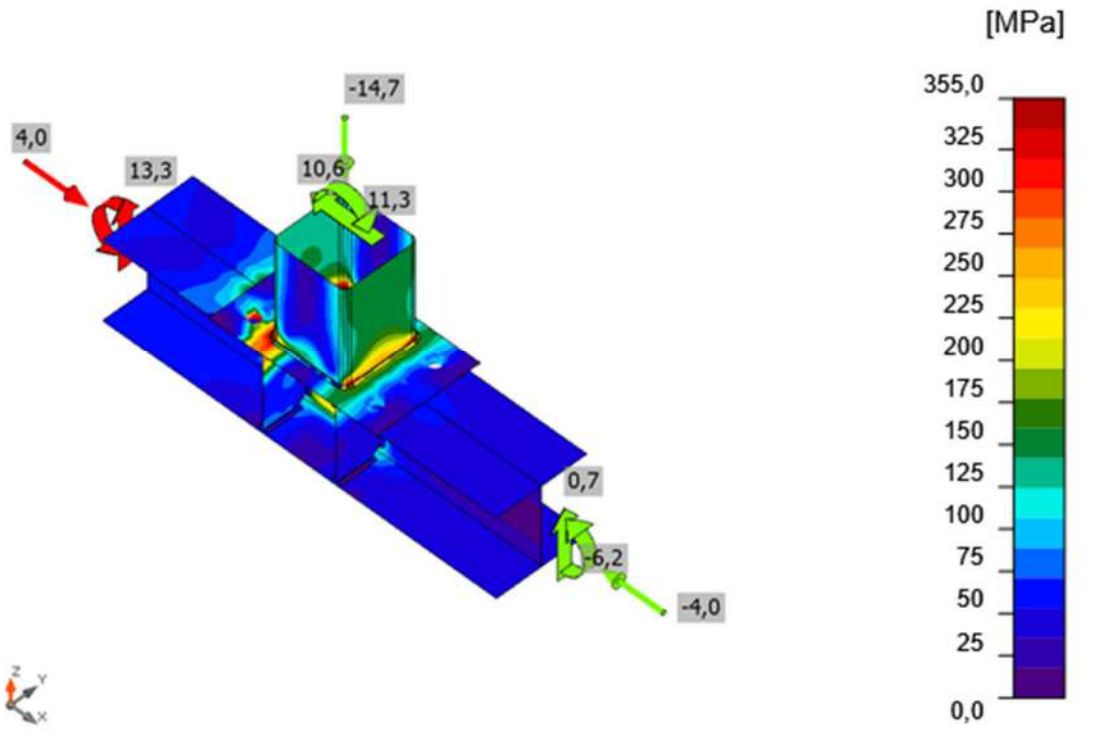




Overall check, LE1

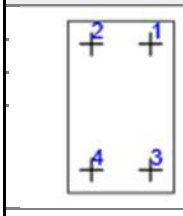


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE1	53,9	2,5	66,2	59,6	4,1	46,7	OK	OK
	B2	M16 8.8 - 1	LE1	53,9	2,5	66,2	59,6	4,2	46,7	OK	OK
	B3	M16 8.8 - 1	LE1	0,4	3,1	118,3	0,5	5,1	5,5	OK	OK
	B4	M16 8.8 - 1	LE1	0,4	3,1	118,4	0,5	5,2	5,5	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	159,4	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B1

Tension resistance check (EN 1993-1-8 – Table 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 90,4 \text{ kN} \geq F_{t,Ed} = 53,9 \text{ kN}$$

Where:

$k_2 = 0,90$ – Factor

$f_{ub} = 800,0$ MPa – Ultimate tensile strength of the bolt

$A_s = 157$ mm^2 – Tensile stress area of the bolt

$\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 159,4 \text{ kN} \geq F_{t,Ed} = 53,9 \text{ kN}$$

Where:

$d_m = 25$ mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p = 9$ mm – Plate thickness

$f_u = 490,0$ MPa – Ultimate strength

γ_{M2} = 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}}$ = 60,3 kN ≥ $F_{v,Ed}$ = 2,5 kN

Where:

β_p = 1,00 – Reduction factor for packing

α_v = 0,60 – Reduction factor for shear stress

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

A = 157 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}}$ = 66,2 kN ≥ $F_{b,Ed}$ = 2,5 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5)$ = 2,19 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 0,57 – Factor for end distance and bolt spacing in direction of load transfer

e_2 = 25 mm – Distance to the plate edge perpendicular to the shear force

p_2 = ∞ mm – Distance between bolts perpendicular to the shear force

d_0 = 18 mm – Bolt hole diameter

e_1 = 31 mm – Distance to the plate edge in the direction of the shear force

p_1 = ∞ mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 16 mm – Nominal diameter of the fastener

t = 9 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})}$ = 0,60 ≤ 1,0

Where:

$F_{t,Ed}$ = 53,9 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

$B_{p,Rd}$ = 159,4 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}; \frac{F_{b,Ed}}{F_{b,Rd}}) =$ 0,04 ≤ 1,0

Where:

$F_{v,Ed}$ = 2,5 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{b,Ed}$ = 2,5 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 66,2 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1,4\,F_{t,Rd}} =$ 0,47 ≤ 1,0

Where:

$F_{v,Ed}$ = 2,5 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{t,Ed}$ = 53,9 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
C-bfl 1	STIFF1 a	◢ 5,0 ◣	55	LE1	47,6	0,0	3,7	-6,6	-26,6	10,9	10,9	OK	OK
		◢ 5,0 ◣	55	LE1	67,7	0,0	-33,0	22,7	25,6	15,6	13,5	OK	OK
C-w 1	STIFF1 a	◢ 5,0 ◣	92	LE1	57,9	0,0	-22,9	-14,4	27,1	13,3	11,6	OK	OK
		◢ 5,0 ◣	92	LE1	59,4	0,0	-0,7	9,1	-33,1	13,6	11,8	OK	OK
C-tfl 1	STIFF1 a	◢ 5,0 ◣	55	LE1	135,8	0,0	-68,0	-56,9	-37,0	31,2	23,5	OK	OK
		◢ 5,0 ◣	55	LE1	45,9	0,0	-4,0	15,1	21,7	10,5	10,5	OK	OK
C-bfl 1	STIFF1 b	◢ 5,0 ◣	55	LE1	67,8	0,0	-33,0	-22,7	-25,6	15,6	13,5	OK	OK
		◢ 5,0 ◣	55	LE1	47,7	0,0	3,7	6,6	26,7	11,0	10,9	OK	OK
C-w 1	STIFF1 b	◢ 5,0 ◣	92	LE1	59,4	0,0	-0,7	-9,1	33,0	13,6	11,7	OK	OK

		◢ 5,0 ◣	92	LE1	57,9	0,0	-22,9	14,4	-27,1	13,3	11,6	OK	OK
C-tfl 1	STIFF1b	◢ 5,0 ◣	55	LE1	45,6	0,0	-4,2	-15,1	-21,4	10,5	10,5	OK	OK
		◢ 5,0 ◣	55	LE1	136,0	0,0	-68,0	57,1	36,9	31,2	23,6	OK	OK
C-bfl 1	STIFF1c	◢ 5,0 ◣	55	LE1	65,7	0,0	35,0	21,3	24,0	15,1	12,9	OK	OK
		◢ 5,0 ◣	55	LE1	37,8	0,0	-12,2	-1,4	-20,6	8,7	8,7	OK	OK
C-w 1	STIFF1c	◢ 5,0 ◣	92	LE1	71,9	0,0	39,2	11,6	-32,9	16,5	15,2	OK	OK
		◢ 5,0 ◣	92	LE1	72,2	0,0	-48,8	21,2	22,2	16,6	15,1	OK	OK
C-tfl 1	STIFF1c	◢ 5,0 ◣	55	LE1	98,3	0,0	-26,1	-54,6	-3,3	22,6	20,2	OK	OK
		◢ 5,0 ◣	55	LE1	188,9	0,0	92,6	-61,6	-72,4	43,4	35,0	OK	OK
C-bfl 1	STIFF1d	◢ 5,0 ◣	55	LE1	37,7	0,0	-12,1	1,5	20,6	8,7	8,7	OK	OK
		◢ 5,0 ◣	55	LE1	65,7	0,0	34,9	-21,3	-24,0	15,1	12,9	OK	OK
C-w 1	STIFF1d	◢ 5,0 ◣	92	LE1	72,2	0,0	-48,8	-21,2	-22,2	16,6	15,1	OK	OK
		◢ 5,0 ◣	92	LE1	72,0	0,0	39,1	-11,5	32,9	16,5	15,2	OK	OK
C-tfl 1	STIFF1d	◢ 5,0 ◣	55	LE1	193,3	0,0	95,2	63,1	73,9	44,4	35,2	OK	OK
		◢ 5,0 ◣	55	LE1	97,7	0,0	-26,1	54,3	3,0	22,4	20,0	OK	OK
EP1	B	◢ 4,0 ◣	436	LE1	426,8	0,0	72,8	240,0	37,1	98,0	55,9	OK	OK
		◢ 4,0 ◣	436	LE1	426,9	0,1	261,1	-116,3	156,5	98,0	63,7	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_\perp$	Perpendicular stress
$\tau_\perp$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for EP1 / B

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 426,9 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 261,1 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,98 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 426,9 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_\perp =$ 261,1 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Buckling

Buckling analysis was not calculated.

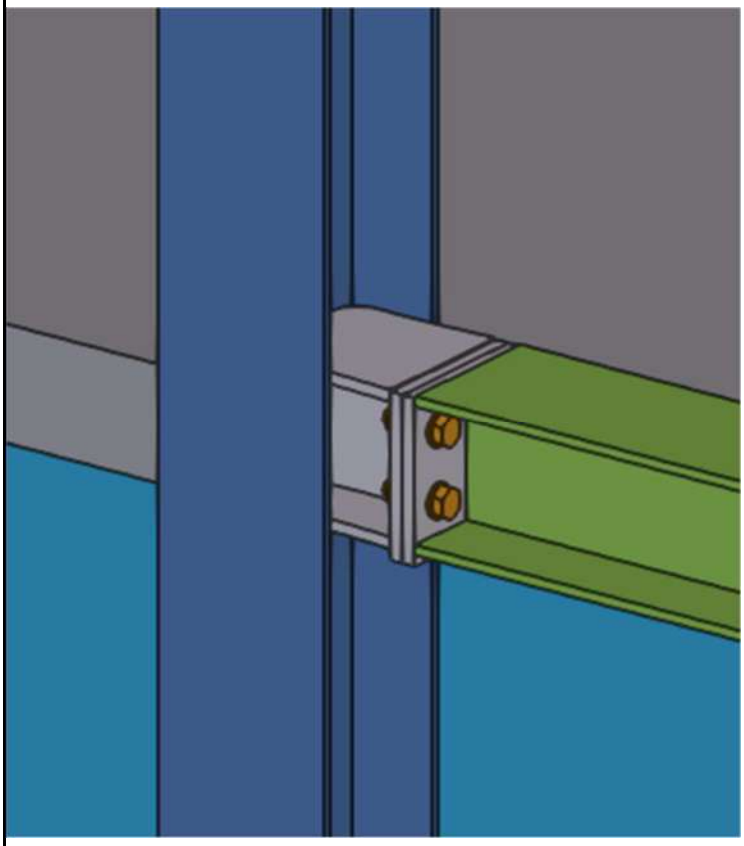
Code settings

Item	Value	Unit	Reference

Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_{C}	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

9.11. APTARNAVIMO AIKŠTELĖS JUNGIMO MAZGAS (PJŪVIS C-C SK_B-0.14)

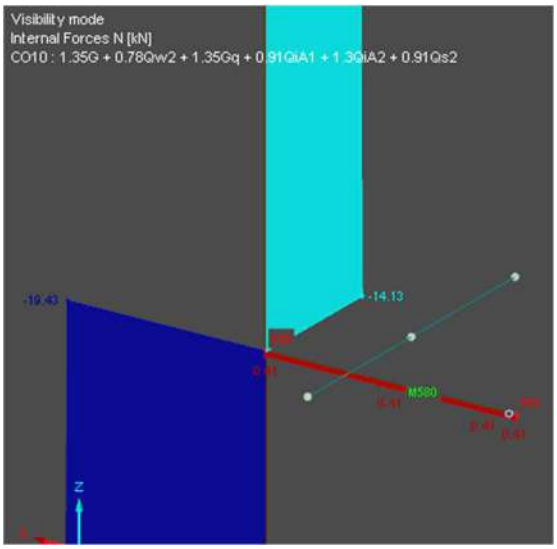
Projektuojamamas aptarnavimo aikštelės mazgas pastate yra ašyse 2->3/B. Mazgas modelyje:

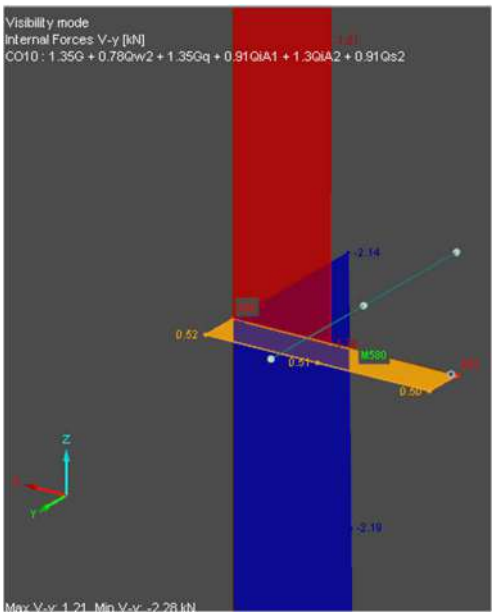


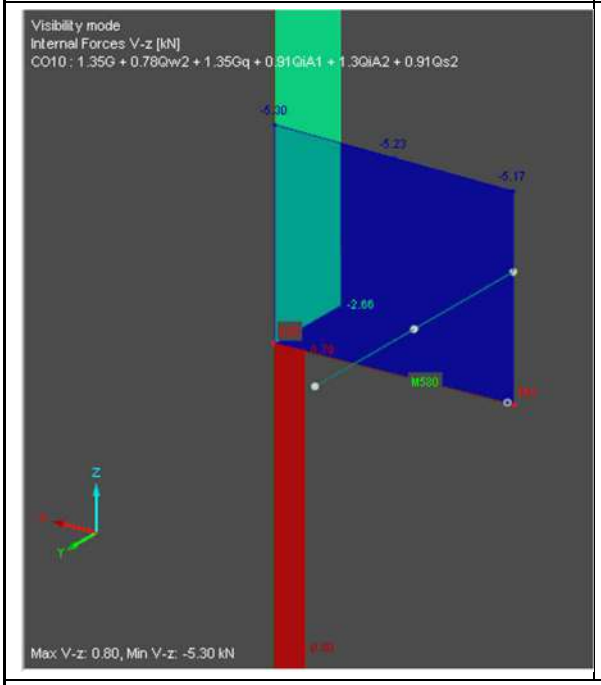
Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

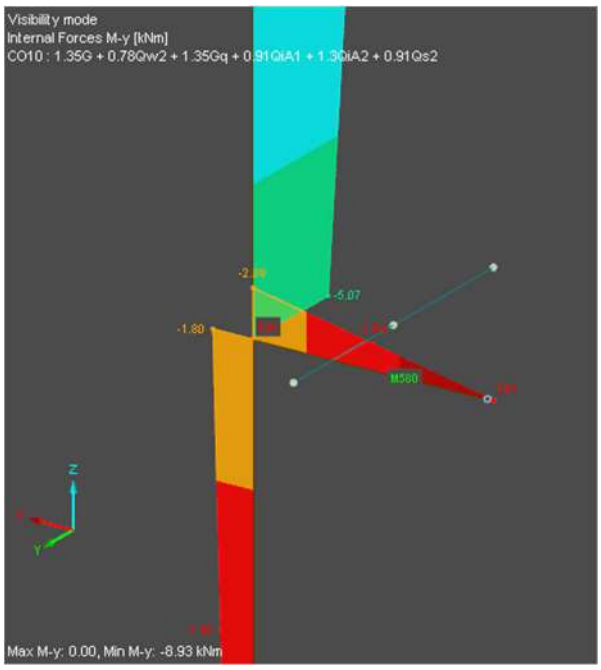
Sąlyga	Derinys

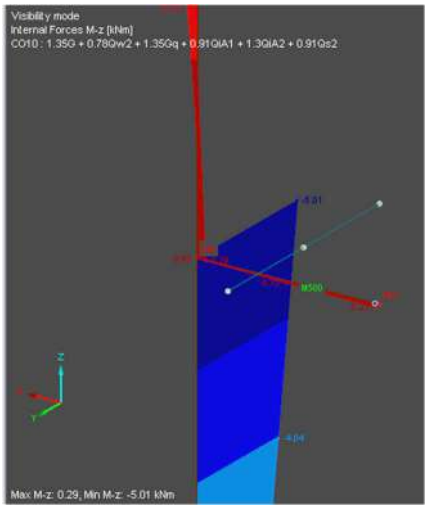
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35+LC15*1,3+LC3*0,78+LC13*0,91+LC16*0,91











Design

Name	CON11
Description	
Analysis	Stress, strain/ simplified loading

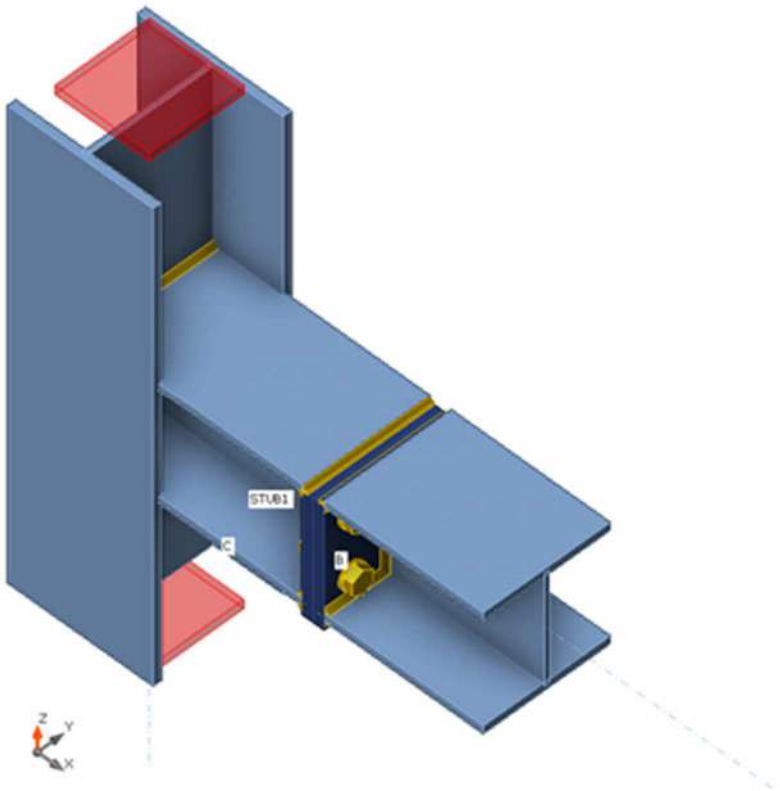
Members

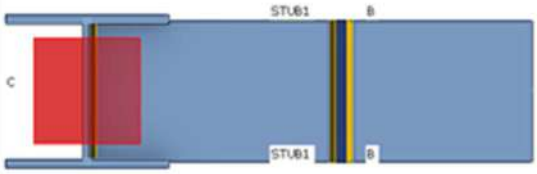
Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
C	25 - HEA160	0,0	90,0	-90,0	0	0	0
B	26 - HEA140	0,0	0,0	0,0	0	0	0

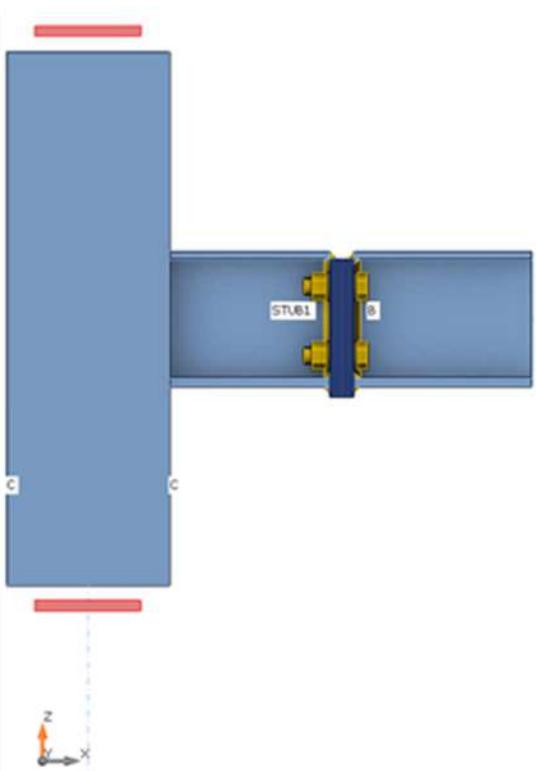
Supports and forces

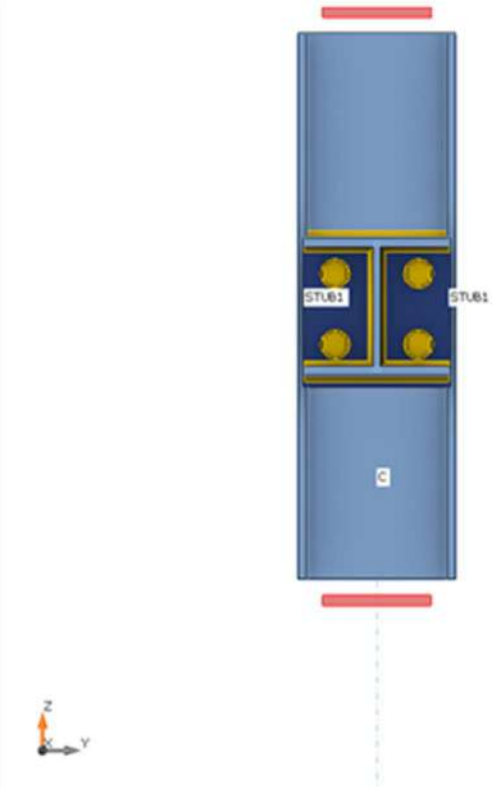
Name	Support	Forces in	X [mm]
C / begin	N-Vy-Vz-Mx-My-Mz	Node	0
C / end	N-Vy-Vz-Mx-My-Mz	Node	0
B / end		Node	0


STUB1
C
B
Z
Y
X


STUB1
B
C
STUB1
B


Y
Z
X





Cross-sections

Name	Material

25 - HEA160	S 355
26 - HEA140	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm²]
M16 8.8	M16 8.8	16	800,0	201

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	B / End	0,4	0,5	-5,3	0,0	2,1	0,1

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	6,4 < 100%	OK
Welds	38,8 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
C-bfl 1	9,0	LE1	33,5	0,0	0,0	OK
C-tfl 1	9,0	LE1	33,0	0,0	0,0	OK
C-w 1	6,0	LE1	56,8	0,0	0,0	OK
B-bfl 1	8,5	LE1	17,8	0,0	0,0	OK
B-tfl 1	8,5	LE1	16,3	0,0	0,0	OK
B-w 1	5,5	LE1	20,9	0,0	0,0	OK
STUB1-bfl 1	8,5	LE1	91,4	0,0	0,0	OK
STUB1-tfl 1	8,5	LE1	94,0	0,0	0,0	OK
STUB1-w 1	5,5	LE1	23,0	0,0	0,0	OK
STUB1-EPa	12,0	LE1	36,3	0,0	4,0	OK
STUB1-EPb	12,0	LE1	34,1	0,0	4,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p Plate thickness

σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for C-bfl 1

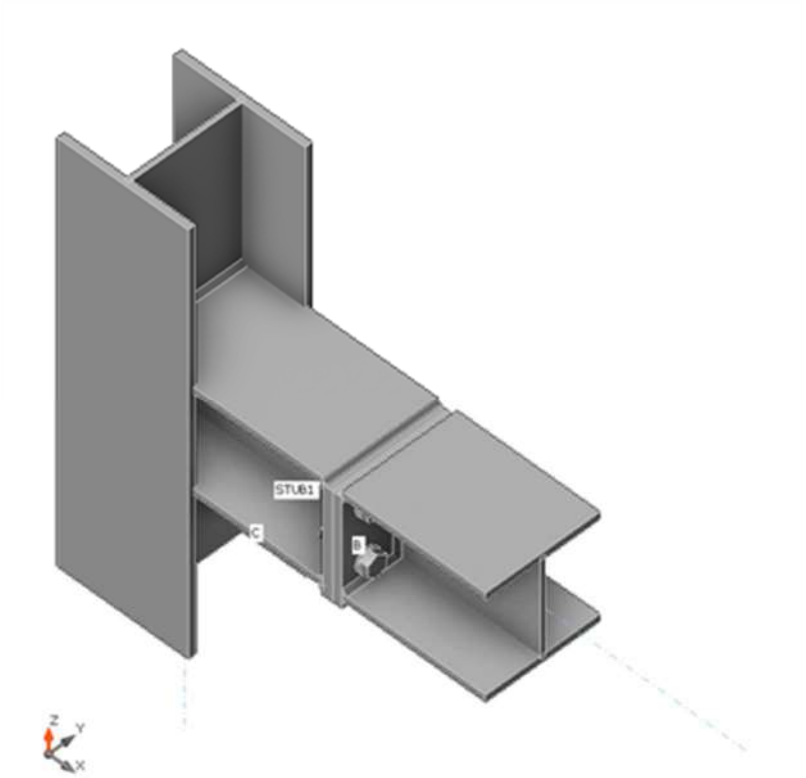
Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

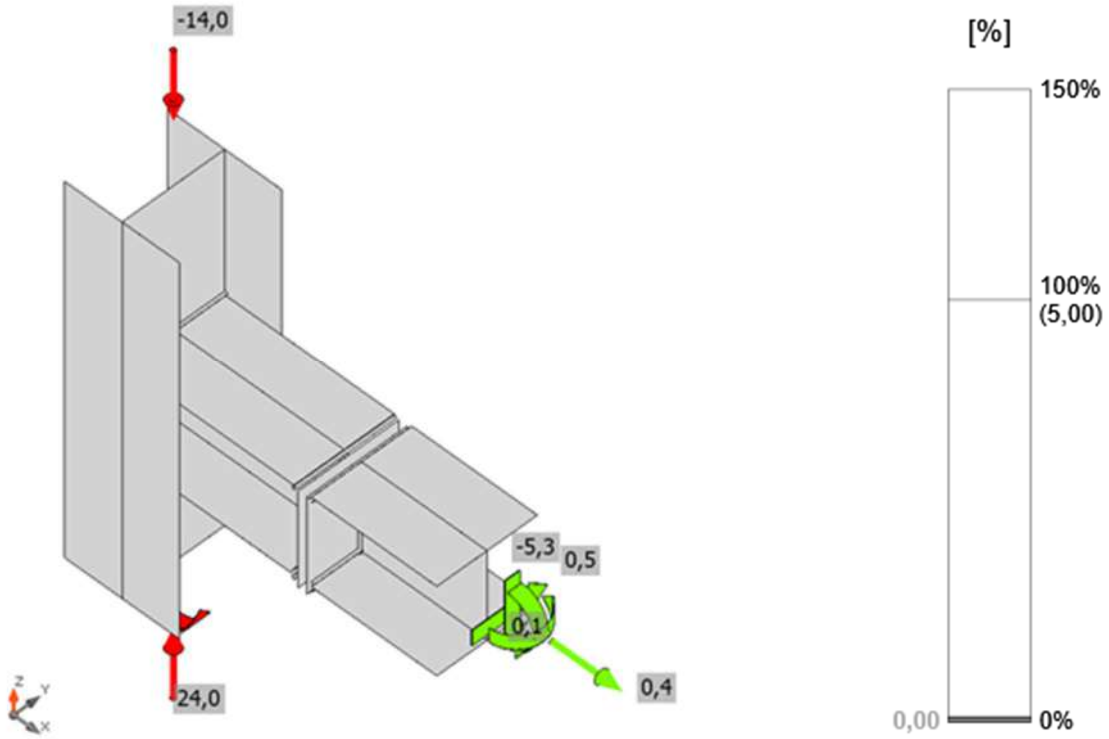
Where:

f_{yk} = 355,0 MPa – characteristic yield strength

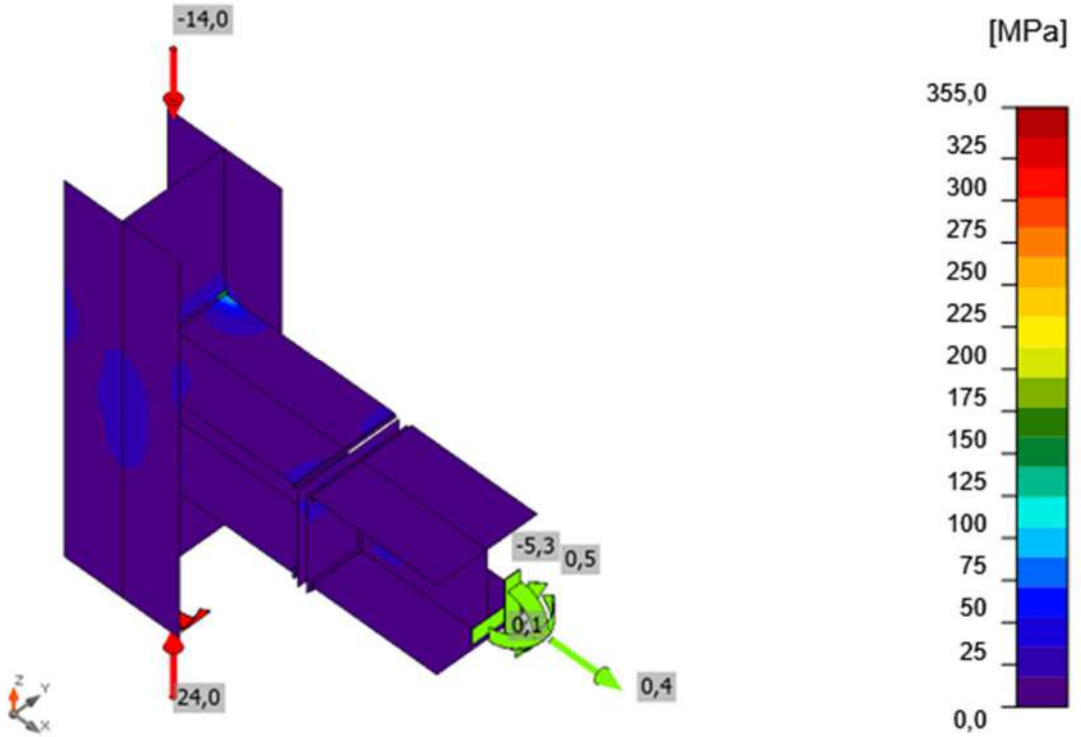
γ_{M0} = 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE1

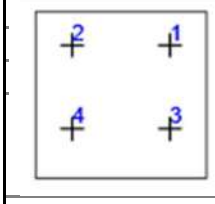


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE1	5,2	1,3	94,1	5,8	2,2	6,4	OK	OK
	B2	M16 8.8 - 1	LE1	5,1	1,3	94,1	5,7	2,2	6,3	OK	OK
	B3	M16 8.8 - 1	LE1	0,3	1,3	139,4	0,4	2,2	2,5	OK	OK
	B4	M16 8.8 - 1	LE1	0,3	1,3	139,4	0,4	2,2	2,5	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	225,0	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$	Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B1

Tension resistance check (EN 1993-1-8 – Table 3.4)

$$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 90,4 \text{ kN} \geq F_{t,Ed} = 5,2 \text{ kN}$$

Where:

$k_2 = 0,90$ – Factor

$f_{ub} = 800,0$ MPa – Ultimate tensile strength of the bolt

$A_s = 157$ mm^2 – Tensile stress area of the bolt

$\gamma_{M2} = 1,25$ – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} = 225,0 \text{ kN} \geq F_{t,Ed} = 5,2 \text{ kN}$$

Where:

$d_m = 25$ mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p = 12$ mm – Plate thickness

$f_u = 490,0$ MPa – Ultimate strength

γ_{M2} = 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}}$ = 60,3 kN ≥ $F_{v,Ed}$ = 1,3 kN

Where:

β_p = 1,00 – Reduction factor for packing

α_v = 0,60 – Reduction factor for shear stress

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

A = 157 mm^2 – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}}$ = 94,1 kN ≥ $F_{b,Ed}$ = 1,3 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5)$ = 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 0,50 – Factor for end distance and bolt spacing in direction of load transfer

e_2 = 30 mm – Distance to the plate edge perpendicular to the shear force

p_2 = 80 mm – Distance between bolts perpendicular to the shear force

d_0 = 18 mm – Bolt hole diameter

e_1 = 27 mm – Distance to the plate edge in the direction of the shear force

p_1 = ∞ mm – Distance between bolts in the direction of the shear force

f_{ub} = 800,0 MPa – Ultimate tensile strength of the bolt

f_u = 490,0 MPa – Ultimate strength of the plate

d = 16 mm – Nominal diameter of the fastener

t = 12 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}; B_{p,Rd})}$ = 0,06 ≤ 1,0

Where:

$F_{t,Ed}$ = 5,2 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

$B_{p,Rd}$ = 225,0 kN – Punching resistance

Utilization in shear

$\max(\frac{F_{v,Ed}}{F_{v,Rd}}; \frac{F_{b,Ed}}{F_{b,Rd}}) =$ 0,02 ≤ 1,0

Where:

$F_{v,Ed}$ = 1,3 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{b,Ed}$ = 1,3 kN – Bearing force (for decisive plate)

$F_{b,Rd}$ = 94,1 kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1,4\,F_{t,Rd}} =$ 0,06 ≤ 1,0

Where:

$F_{v,Ed}$ = 1,3 kN – Shear force (in decisive shear plane)

$F_{v,Rd}$ = 60,3 kN – Shear resistance

$F_{t,Ed}$ = 5,2 kN – Tensile force

$F_{t,Rd}$ = 90,4 kN – Tension resistance

Detailing check

- Ductility, rotation capacity: Plate STUB1-EPa is too thick. Thickness should be lesser or equal to 8,6 mm. (EN 1993-1-8 – Equation 6.32)

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
STUB1-EPa	B-bfl 1	◢ 4,0 ◣	138	LE1	7,5	0,0	-1,3	-4,1	-1,4	1,7	0,0	OK	OK
		◢ 4,0 ◣	138	LE1	16,4	0,0	-9,9	7,1	2,5	3,8	3,8	OK	OK
STUB1-EPa	B-tfl 1	◢ 4,0 ◣	138	LE1	6,2	0,0	1,4	-1,3	-3,2	1,4	0,0	OK	OK
		◢ 4,0 ◣	138	LE1	8,9	0,0	6,0	-3,5	-1,5	2,0	0,0	OK	OK
STUB1-EPa	B-w 1	◢ 4,0 ◣	119	LE1	18,9	0,0	9,0	8,1	-5,2	4,3	4,3	OK	OK
		◢ 4,0 ◣	119	LE1	18,9	0,0	7,7	-8,6	5,1	4,3	4,3	OK	OK
STUB1-EPb	STUB1-bfl 1	◢ 4,0 ◣	138	LE1	12,2	0,0	-5,8	-6,2	0,1	2,8	0,0	OK	OK

		◢ 4,0 ◣	138	LE1	13,9	0,0	-7,3	6,9	0,5	3,2	3,2	OK	OK
STUB1 -EPb	STUB1 -tfl 1	◢ 4,0 ◣	139	LE1	7,0	0,0	-2,7	-3,5	1,4	1,6	0,0	OK	OK
		◢ 4,0 ◣	138	LE1	14,4	0,0	12,3	-3,2	2,9	3,5	3,5	OK	OK
STUB1 -EPb	STUB1 -w 1	◢ 4,0 ◣	120	LE1	22,2	0,0	0,6	-4,1	-12,2	5,1	5,1	OK	OK
		◢ 4,0 ◣	119	LE1	18,9	0,0	5,3	-5,8	8,8	4,3	4,3	OK	OK
C-w 1	STUB1 -bfl 1	◢ 4,0 ◣	139	LE1	146,6	0,0	-54,7	-59,2	-51,6	33, 7	27, 0	OK	OK
		◢ 4,0 ◣	139	LE1	164,1	0,0	-67,5	63,0	59,1	37, 7	28, 8	OK	OK
C-w 1	STUB1 -tfl 1	◢ 4,0 ◣	139	LE1	168,9	0,0	69,4	64,8	-60,9	38, 8	26, 4	OK	OK
		◢ 4,0 ◣	139	LE1	150,9	0,0	56,3	-60,8	53,3	34, 7	24, 9	OK	OK
C-w 1	STUB1 -w 1	◢ 3,0 ◣	123	LE1	7,6	0,0	0,6	0,4	-4,3	1,7	0,0	OK	OK
		◢ 3,0 ◣	123	LE1	7,9	0,0	0,1	-0,2	4,6	1,8	0,0	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_\perp$	Perpendicular stress
$\tau_\perp$	Shear stress perpendicular to weld axis
$\tau_\parallel$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance

0.9 σ Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for C-w 1 / STUB1-tfl 1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 168,9 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 69,4 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$U_t = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,39 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 168,9 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_\perp =$ 69,4 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Buckling

Buckling analysis was not calculated.

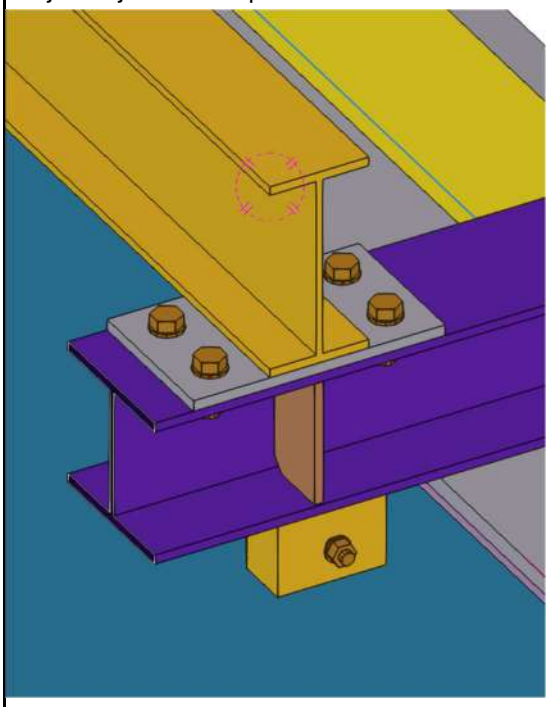
Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5

Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4
Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

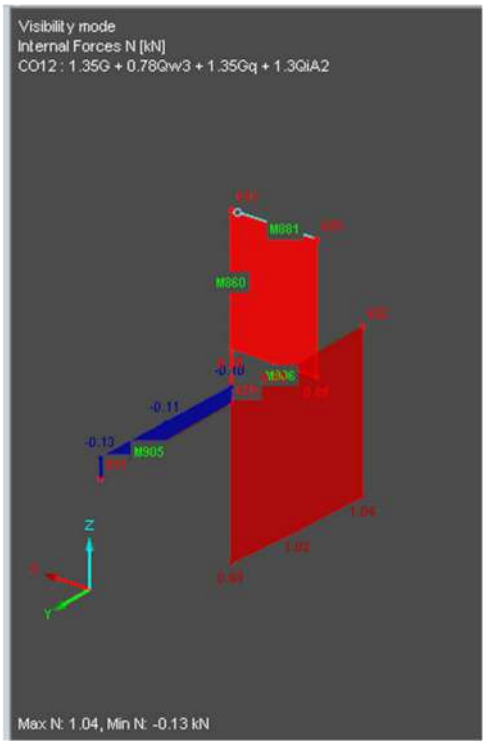
9.12. APTARNAVIMO AIKŠTELĖS JUNGIMO MAZGAS (PJŪVIS O-O SK_B-0.14)

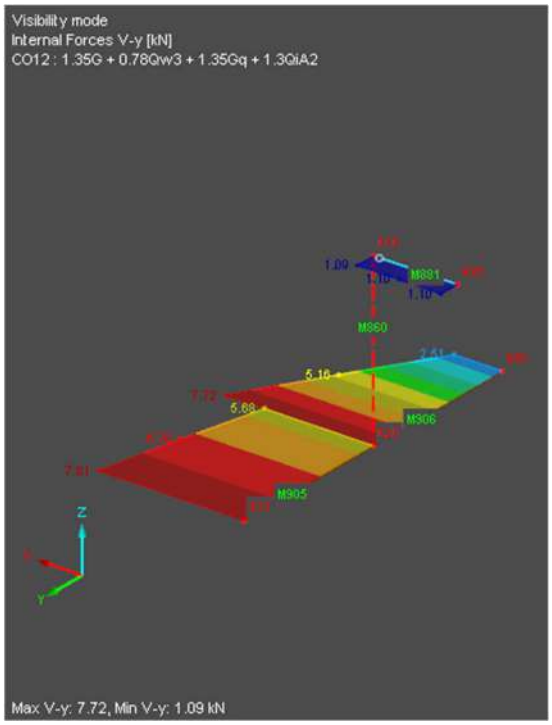
Projektuojamamas aptarnavimo aikštelės mazgas yra ašyse 2->3/A->B. Mazgas modelyje:

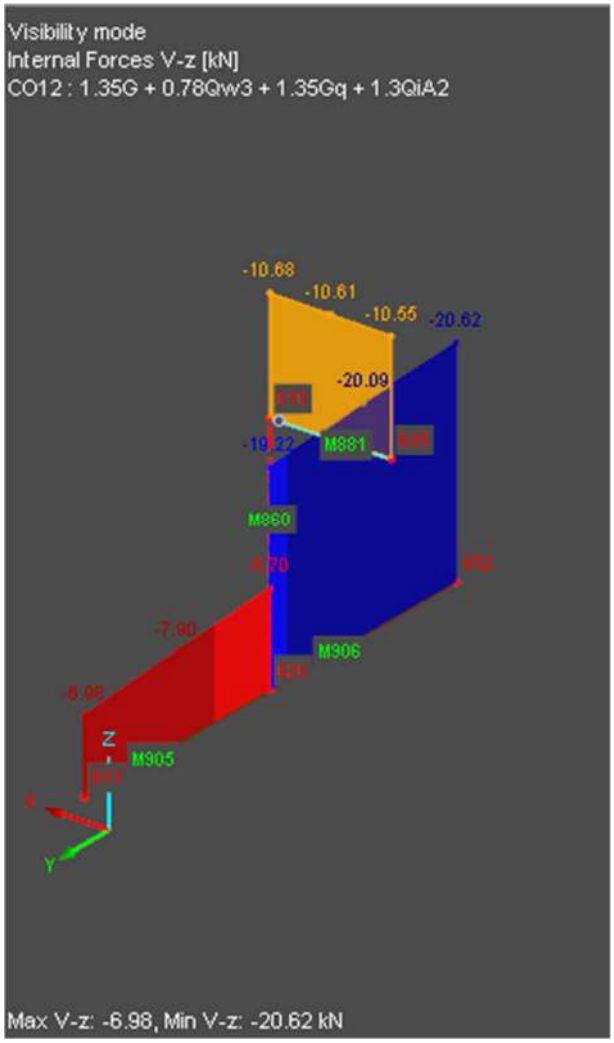


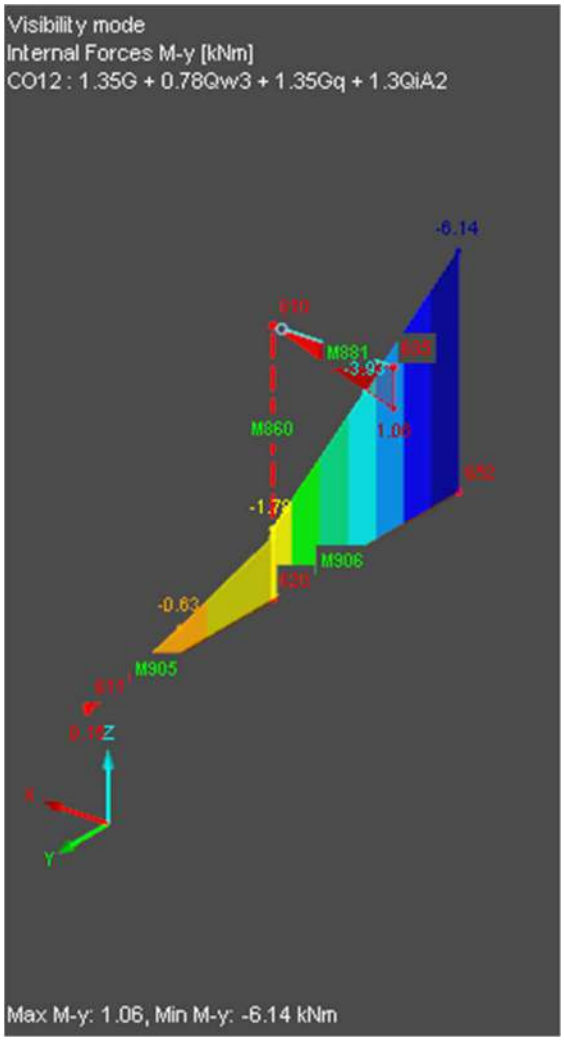
Mazgas skaičiuojamas pagal šiuos maksimalius apkrovų derinius:

Sąlyga	Derinys
Didžiausia skersinė jėga sijoje	LC1*1,35+LC10*1,35+LC15*1,3+LC3*0,78


Visibility mode
Internal Forces N [kN]
CO12 : 1.35G + 0.78Qw3 + 1.35Gq + 1.3QiA2
M881
M860
M905
Max N: 1.04, Min N: -0.13 kN


Visibility mode
Internal Forces V-y [kN]
CO12 : 1.35G + 0.78Qw3 + 1.35Gq + 1.3QiA2
M881
M860
M306
M905
Max V-y: 7.72, Min V-y: 1.09 kN


Visibility mode
Internal Forces V-z [kN]
CO12 : 1.35G + 0.78Qw3 + 1.35Gq + 1.3QiA2
-10.68
-10.61
-10.55
-20.62
-20.09
M881
M860
M906
M905
Max V-z: -6.98, Min V-z: -20.62 kN


Visibility mode
Internal Forces M-y [kNm]
CO12 : 1.35G + 0.78Qw3 + 1.35Gq + 1.3QiA2
-6.14
M881
M860
M906
M905
Max M-y: 1.06, Min M-y: -6.14 kNm

Project item CON12

Design

Name	CON12
Description	
Analysis	Stress, strain/ simplified loading

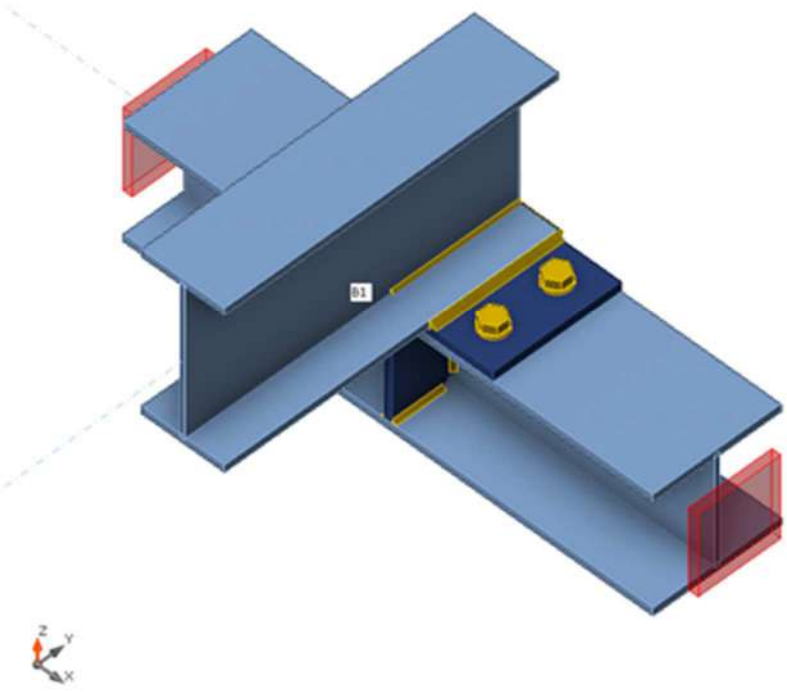
Members

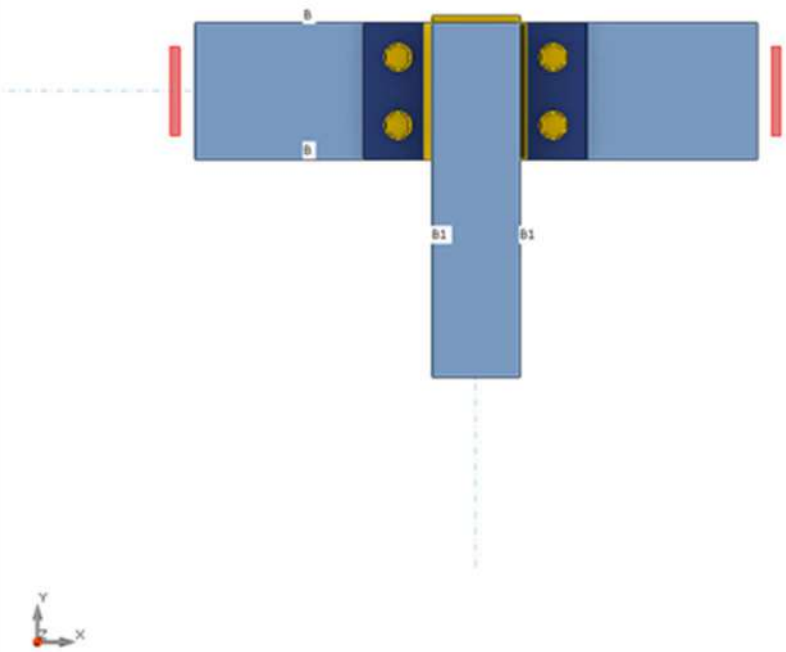
Geometry

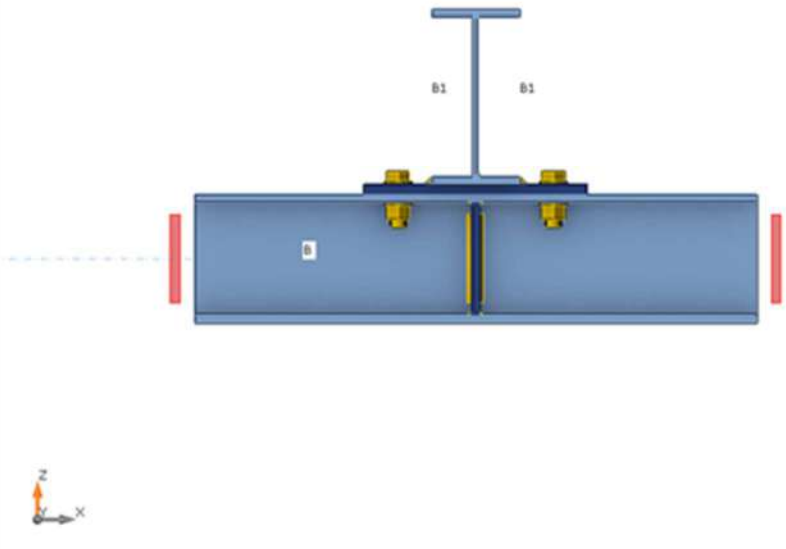
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
B	26 - HEA140	0,0	0,0	0,0	0	0	0
B1	11 - IPE180	-90,0	0,0	0,0	-70	0	167

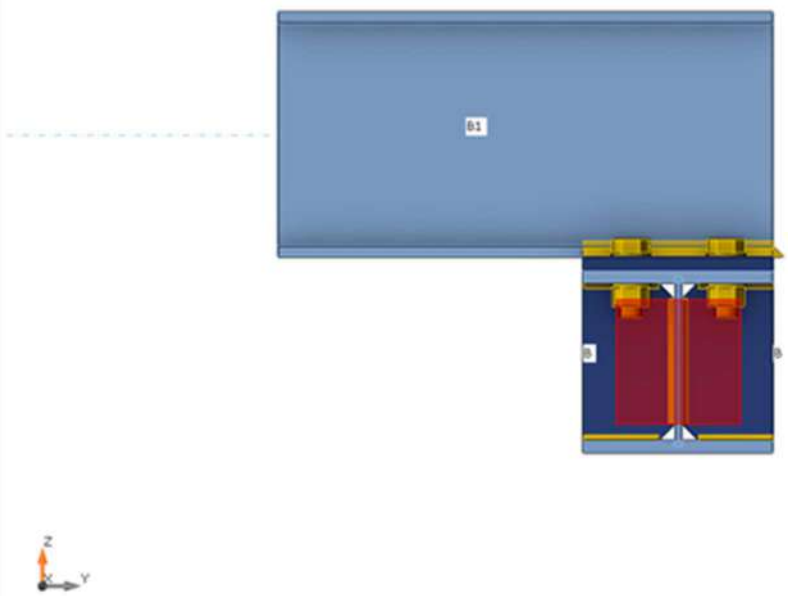
Supports and forces

Name	Support	Forces in	X [mm]
B / begin	N-Vy-Vz-Mx-My-Mz	Node	0
B / end	N-Vy-Vz-Mx-My-Mz	Node	0
B1 / end		Bolts	0




B
B
B1
B1


B1
B1
B



Cross-sections

Name	Material
26 - HEA140	S 355
11 - IPE180	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M16 8.8	M16 8.8	16	800,0	201

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	B1 / End	0,9	1,1	-10,7	0,0	0,7	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	1,5 < 100%	OK

Welds	7,0 < 100%	OK
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
B-bfl 1	8,5	LE1	21,7	0,0	0,0	OK
B-tfl 1	8,5	LE1	24,1	0,0	4,2	OK
B-w 1	5,5	LE1	17,3	0,0	0,0	OK
B1-bfl 1	8,0	LE1	45,3	0,0	0,0	OK
B1-tfl 1	8,0	LE1	32,8	0,0	0,0	OK
B1-w 1	5,3	LE1	83,0	0,0	0,0	OK
SP1	10,0	LE1	13,7	0,0	4,1	OK
STIFF1a	8,0	LE1	8,7	0,0	0,0	OK
STIFF1b	8,0	LE1	18,1	0,0	0,0	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for B-bfl 1

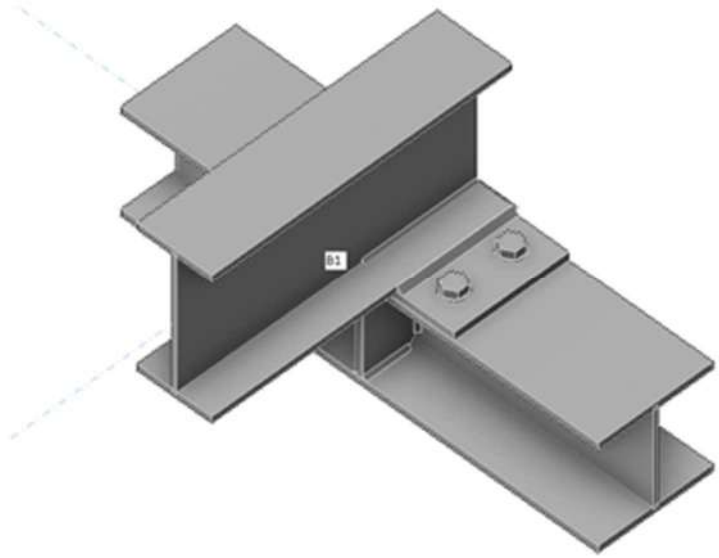
Design values used in the analysis

$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} =$ 355,0 MPa

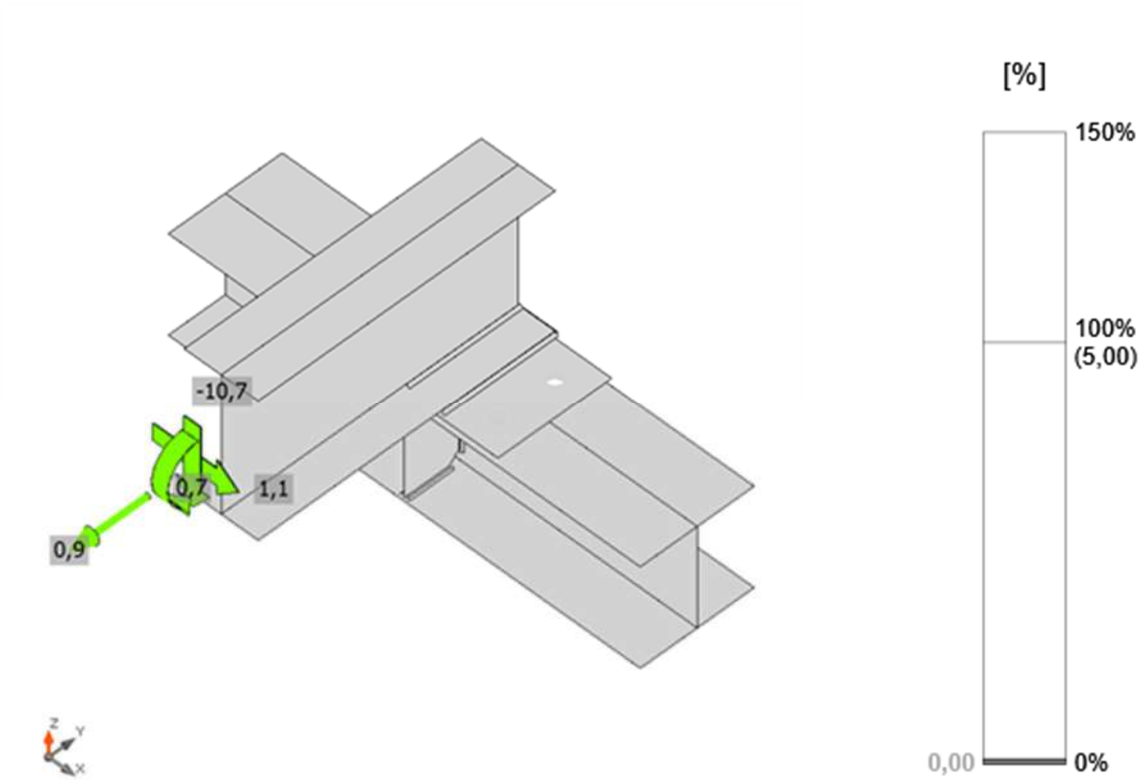
Where:

$f_{yk} =$ 355,0 MPa – characteristic yield strength

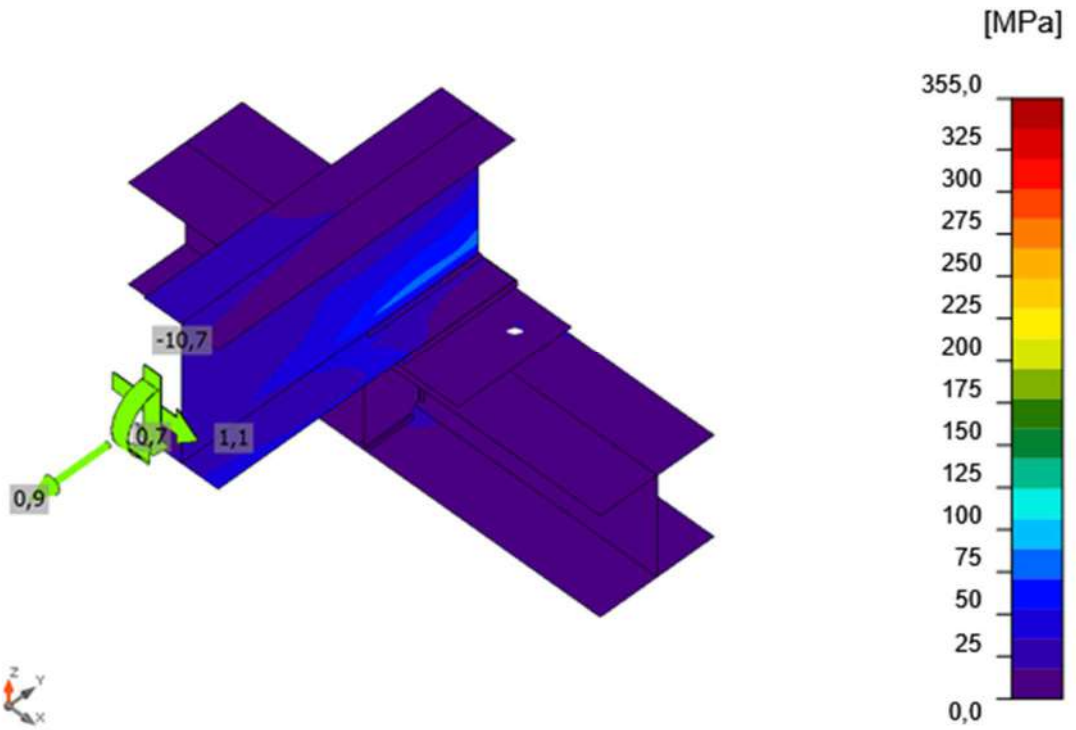
$\gamma_{M0} =$ 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1



Overall check, LE1

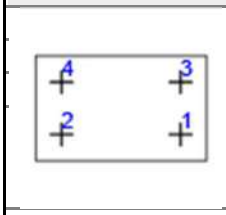


Strain check, LE1



Equivalent stress, LE1

Bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{b,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Detailing	Status
	B1	M16 8.8 - 1	LE1	0,0	0,5	94,4	0,0	0,8	0,9	OK	OK
	B2	M16 8.8 - 1	LE1	0,1	0,1	133,3	0,2	0,2	0,3	OK	OK
	B3	M16 8.8 - 1	LE1	0,0	0,9	114,2	0,0	1,5	1,5	OK	OK
	B4	M16 8.8 - 1	LE1	0,0	0,1	101,6	0,0	0,1	0,1	OK	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90,4	159,4	60,3

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{b,Rd}$	Plate bearing resistance EN 1993-1-8 – Tab. 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear EN 1993-1-8 – Tab. 3.4
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4

$B_{p,Rd}$ Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{v,Rd}$ Bolt shear resistance EN 1993-1-8 – Tab. 3.4

Detailed result for B3

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 0,0 kN

Where:

$k_2 =$ 0,90 – Factor
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A_s =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 159,4 kN ≥ $F_{t,Ed} =$ 0,0 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller
$t_p =$ 9 mm – Plate thickness
$f_u =$ 490,0 MPa – Ultimate strength
$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 – Table 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 60,3 kN ≥ $F_{v,Ed} =$ 0,9 kN

Where:

$\beta_p =$ 1,00 – Reduction factor for packing
$\alpha_v =$ 0,60 – Reduction factor for shear stress
$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt
$A =$ 157 mm^2 – Tensile stress area of the bolt
$\gamma_{M2} =$ 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 – Table 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u dt}{\gamma_{M2}} =$ 114,2 kN ≥ $F_{b,Ed} =$ 0,9 kN

Where:

$k_1 = \min(2.8\frac{e_2}{d_0} - 1.7, 1.4\frac{p_2}{d_0} - 1.7, 2.5) =$ 2,50 – Factor for edge distance and bolt spacing perpendicular to the direction of load transfer

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1) =$ 0,73 – Factor for end distance and bolt spacing in direction of load transfer

$e_2 =$ 35 mm – Distance to the plate edge perpendicular to the shear force

$p_2 = \infty$ mm – Distance between bolts perpendicular to the shear force

$d_0 = 18$ mm – Bolt hole diameter

$e_1 = 39$ mm – Distance to the plate edge in the direction of the shear force

$p_1 = \infty$ mm – Distance between bolts in the direction of the shear force

$f_{ub} = 800{,}0$ MPa – Ultimate tensile strength of the bolt

$f_u = 490{,}0$ MPa – Ultimate strength of the plate

$d = 16$ mm – Nominal diameter of the fastener

$t = 10$ mm – Thickness of the plate

$\gamma_{M2} = 1{,}25$ – Safety factor

Utilization in tension

$$\frac{F_{t,Ed}}{\min(F_{t,Rd}\,;\,B_{p,Rd})} = 0{,}00 \leq 1{,}0$$

Where:

$F_{t,Ed} = 0{,}0$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

$B_{p,Rd} = 159{,}4$ kN – Punching resistance

Utilization in shear

$$\max\left(\frac{F_{v,Ed}}{F_{v,Rd}}\,;\,\frac{F_{b,Ed}}{F_{b,Rd}}\right) = 0{,}02 \leq 1{,}0$$

Where:

$F_{v,Ed} = 0{,}9$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{b,Ed} = 0{,}9$ kN – Bearing force (for decisive plate)

$F_{b,Rd} = 114{,}2$ kN – Bearing resistance

Interaction of tension and shear (EN 1993-1-8 – Table 3.4)

$$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1{,}4\,F_{t,Rd}} = 0{,}02 \leq 1{,}0$$

Where:

$F_{v,Ed} = 0{,}9$ kN – Shear force (in decisive shear plane)

$F_{v,Rd} = 60{,}3$ kN – Shear resistance

$F_{t,Ed} = 0{,}0$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_\perp$ [MPa]	$\tau_\perp$ [MPa]	$\tau_\parallel$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status

SP1	B1-bfl 1	◢ 5,0	139	LE1	18,9	0,0	-6,9	-10,0	1,9	4,3	4,3	OK	OK
SP1	B1-bfl 1	◢ 5,0	90	LE1	7,0	0,0	-0,6	0,7	-4,0	1,6	0,0	OK	OK
SP1	B1-bfl 1	◢ 5,0	139	LE1	21,8	0,0	0,4	12,1	-3,7	5,0	5,0	OK	OK
SP1	B1-w 1	◢ 5,0	139	LE1	30,6	0,0	-5,3	-17,3	-1,5	7,0	7,0	OK	OK
B-bfl 1	STIFF1a	◢ 3,0 ◣	55	LE1	13,5	0,0	-3,7	-3,9	-6,4	3,1	3,1	OK	OK
		◢ 3,0 ◣	55	LE1	13,7	0,0	-4,4	4,2	6,2	3,2	3,2	OK	OK
B-w 1	STIFF1a	◢ 3,0 ◣	92	LE1	14,0	0,0	-4,9	-4,7	6,0	3,2	3,2	OK	OK
		◢ 3,0 ◣	92	LE1	13,5	0,0	-4,4	4,6	-5,8	3,1	3,1	OK	OK
B-tfl 1	STIFF1a	◢ 3,0 ◣	55	LE1	14,5	0,0	-7,1	-7,2	-0,8	3,3	3,3	OK	OK
		◢ 3,0 ◣	55	LE1	14,5	0,0	-7,3	7,2	0,8	3,3	3,3	OK	OK
B-bfl 1	STIFF1b	◢ 3,0 ◣	55	LE1	15,8	0,0	-4,6	-4,3	-7,6	3,6	3,6	OK	OK
		◢ 3,0 ◣	55	LE1	14,4	0,0	-3,5	3,8	7,1	3,3	3,3	OK	OK
B-w 1	STIFF1b	◢ 3,0 ◣	92	LE1	16,2	0,0	-4,5	-4,6	7,7	3,7	3,7	OK	OK
		◢ 3,0 ◣	92	LE1	15,5	0,0	-4,7	4,6	-7,2	3,6	3,6	OK	OK
B-tfl 1	STIFF1b	◢ 3,0 ◣	55	LE1	18,8	0,0	-7,1	-9,7	-2,4	4,3	4,3	OK	OK
		◢ 3,0 ◣	55	LE1	27,7	0,0	-14,4	11,8	6,9	6,4	6,4	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_\perp$	Perpendicular stress
$\tau_\perp$	Shear stress perpendicular to weld axis
$\tau_\parallel$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for SP1 / B1-w 1

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_\perp^2 + 3(\tau_\perp^2 + \tau_\parallel^2)]^{0.5} =$ 30,6 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_\perp| =$ 14,2 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$U_t = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_\perp|}{\sigma_{\perp,Rd}}) =$ 0,07 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 30,6 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_\perp =$ -14,2 MPa – Normal stress perpendicular to the throat

$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

Buckling

Buckling analysis was not calculated.

Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M1}	1,00	-	EN 1993-1-1: 6.1
Safety factor γ_{M2}	1,25	-	EN 1993-1-1: 6.1
Safety factor γ_{M3}	1,25	-	EN 1993-1-8: 2.2
Safety factor γ_C	1,50	-	EN 1992-1-1: 2.4.2.4
Safety factor γ_{Inst}	1,20	-	EN 1992-4: Table 4.1
Joint coefficient βj	0,67	-	EN 1993-1-8: 6.2.5
Effective area - influence of mesh size	0,10	-	
Friction coefficient - concrete	0,25	-	EN 1993-1-8
Friction coefficient in slip-resistance	0,30	-	EN 1993-1-8 tab 3.7
Limit plastic strain	0,05	-	EN 1993-1-5
Detailing	Yes		
Distance between bolts [d]	2,20	-	EN 1993-1-8: tab 3.3
Distance between bolts and edge [d]	1,20	-	EN 1993-1-8: tab 3.3
Concrete breakout resistance check	Both		EN 1992-4: 7.2.1.4 and 7.2.2.5
Use calculated αb in bearing check.	Yes		EN 1993-1-8: tab 3.4
Cracked concrete	Yes		EN 1992-4

Local deformation check	Yes		CIDECT DG 1, 3 - 1.1
Local deformation limit	0,03	-	CIDECT DG 1, 3 - 1.1
Geometrical nonlinearity (GMNA)	Yes		Analysis with large deformations for hollow section joints
Braced system	No		EN 1993-1-8: 5.2.2.5

10. PROFPAKLTOTO SKAIČIAVIMAS (IŠILGAI PASTATO)

Structural part: Part

Updated: 2025-09-11 13:15 (GMT) **Version:** 1.1.126-5-g777a540 (2025-08-27)

Created: 2025-09-11 12:22 (GMT)

Reliability class: RC2

Structure type: Load bearing roof deck

Profile: Ruukki T153-40L-840

Design situation: Normal

Deflection limit: L/150 (custom)

SLS combination: Frequent

Roof slope: 1 °

Usage as lateral bracing for rafters: No

Usage of stressed skin effect: No

Supporting framework: Sheet on main supports

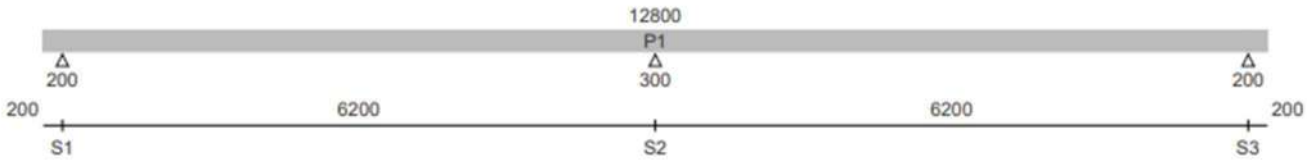
Chosen sheets fulfill design criteria. Maximum utilization rate: 85.1 %

Chosen fasteners fulfill design criteria. Maximum utilization rate: 27.5 %

Structural model

Left end: Length of cantilever: 200 mm

Right end: Length of cantilever: 200 mm



Selected profile: Ruukki T153-40L-840

Total weight of the sheeting: 16.8 kg/m^2

Global warming potential, GWP (A1...A3): 43.7 kg CO_2 eq. / m^2 Zinc-coated

Global warming potential, GWP (A1...A3): 46.1 kg CO_2 eq. / m^2 Colour-coated

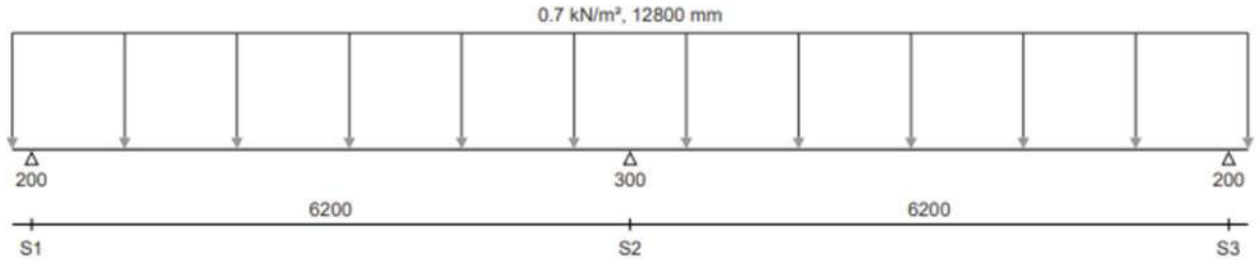
Sheet	Thickness / strength	Side overlap	Length
	[mm] / [MPa]		[mm]
P1	1.2 / 350	0	12800

Supports and joints

Support	Support width	Joint type
	[mm]	
S1	200	End support (vertical)
S2	300	Continuous
S3	200	End support (vertical)

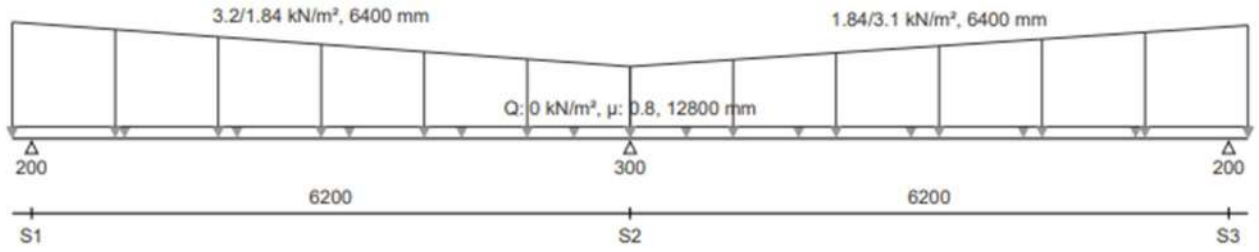
Dead load

Structure weight without sheet: 0 kN/m^2



Snow load

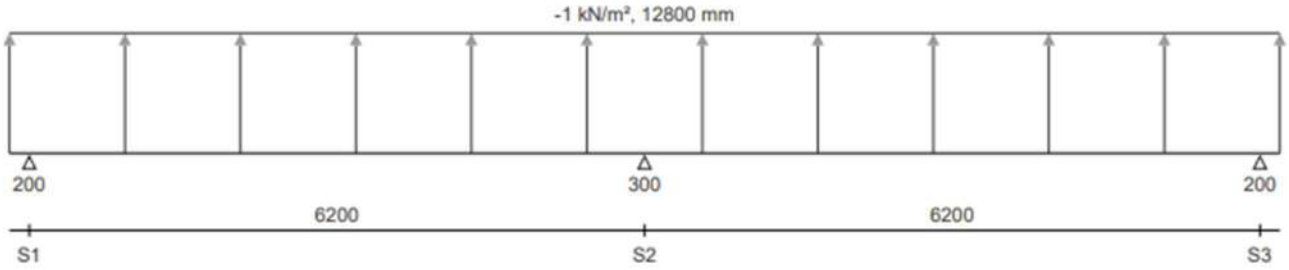
Basic snow load: 0 kN/m^2



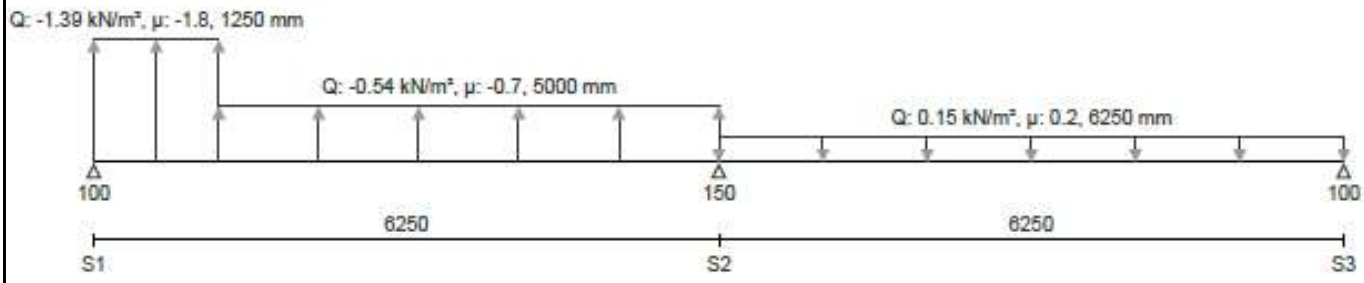
Wind load

Basic wind load: 0 kN/m^2

Case 1

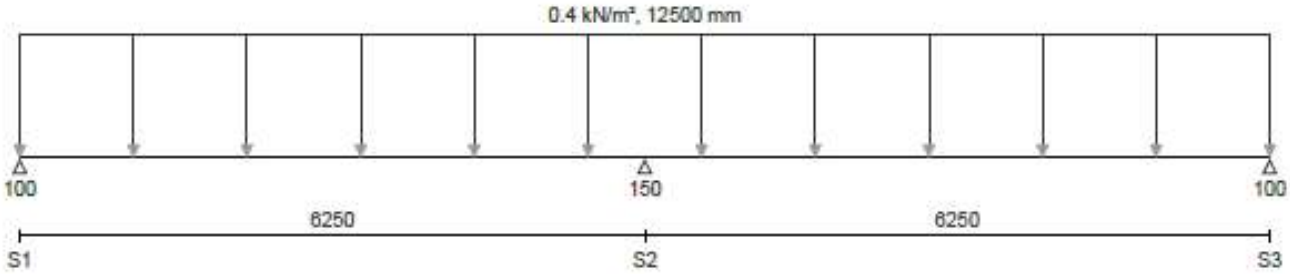


Case 2



Live load

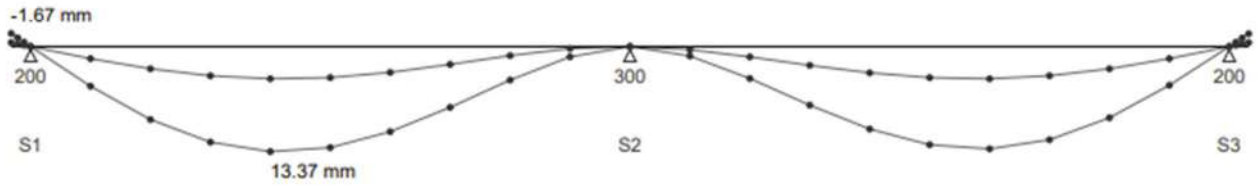
Load category: H: roofs



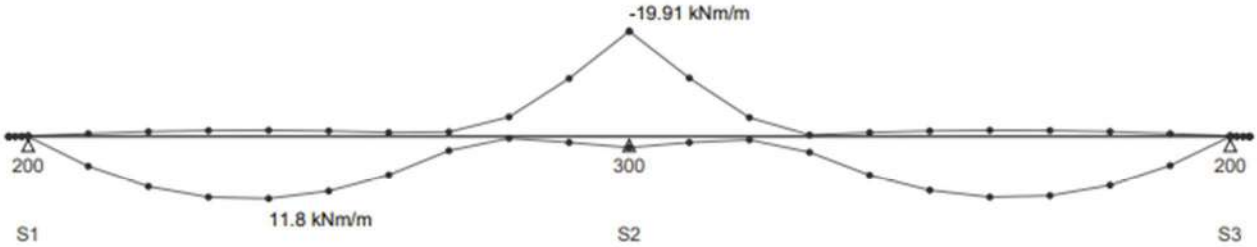
Utilization rates

Sheet	Weight	M	R	M/R	V	N/V/M	D
	[kg/m^2]	[kNm/m]	[kN/m]		[kN/m]		[mm]
P1	16.8	19.9 / 25.3 78.7 %	30.8 / 94.6 32.5 %	85.1 %	15.5 / 117.0 13.2 %	78.7 %	-1.7 / 2.7 62.6 %

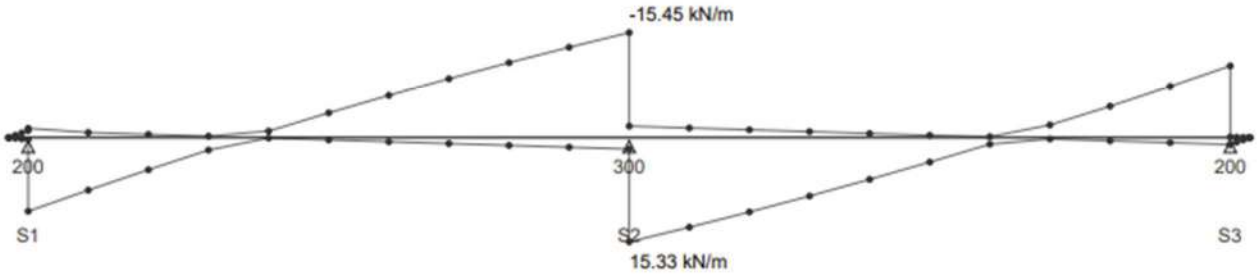
Deflection



Bending moment



Shear force



Support reactions

ULS

Support	Min	Max
	[kN/m]	[kN/m]
S1	-1.66	11.86
S2	-3.37	30.78
S3	-1.1	11.57

Fasteners

Support wall thickness: 10 mm

Support fastener type: SD14-T16-5.5x34

Support fastener length: 34.0 mm

Sidelap fastener type: SL2-T-A14-4.8x20

Sidelap fastener length: 20.0 mm

	Support fasteners		
Support	**Pcs / trough**	**UT** [%]	**Design criterion**
S1	1	13.8	Combined pull-out, pull-through and bearing
S2	1	27.5	Combined pull-out, pull-through and bearing
S3	1	9.7	Combined pull-out, pull-through and bearing

UT Utilization rate

Total amounts

Support fasteners: 156 pcs (11 pcs / m)

Sidelap fasteners (c/c: 500 mm): 445 pcs (30 pcs / m)

IŠVADA: Laikomoji galia pakankama

11. SURENKAMOS TRISLUOKSNĖS SIJOS SKAIČIAVIMAI

Projektuojama surenkama trisluosnė pamatinė sija. Ilgiausios sijos ilgis – 6,2 m. Betonas C30/37. Sijos skrespjūvis – 200x600 (h). Pamatinė sija veikiama savojo svorio, pagrindinio betoninio elemento svoris programoje uždedamas automatiškai. Šiltinimo ir apdailinio sluoksnio storis:

Apkrova	Norminė apkrova kN/m²	Daliniai koef.	Skaičiuotinė apkrova kN/m²
XPS300 t=200mm	0,050	1,35	0,068
Betonas C30/37 t=50mm	1,150	1,35	1,553
	1,200		1,620

Priimama, kad apkrova perduodama kas 200mm. Programoje jėga uždėta su momentu ekscentricitetui įvertinti ir lygu:

F=1,2kN/m*0,2m=0,24kN,

M=F*d=0,24kN*0,29m=0,07kNm

d-jėgos petis, lygus atstumui nuo sienutės centro iki apdailinio betono centro.

Grunto ir naudojimo apkrovos poveikis į sienutę:

SIENUTĖS APKROVOS

ĮVESTIES DUOMENYS: SIENUTĖS SCHEMA									REZULTATAI SIENUTĖS APKROVOS			
			Naudojimo apkrova						Nuolatinės, charakteristinė [kN/m^2]		Kintama, charakteristinė [kN/m^2]	Suminė, skaičiuotinė [kN/m^2]
						Autokeltuvo apkrova			$P_{grindys}$	+ $P_{gruntas}$ +	P_q	= $P_a * 1,35 + P_q * 1,30$
						b' [m]	a' [m]	Apkrova nuo autokrautuvo				
						0	0					
± 0,000	Sienutės aukštis [m]	0,1	5	kN/m2	Išskirstyta apkrova	0	kN	Apkrova į ašį				
			0,15	m	Grindys							
			0,1	m	Apšiltinimas							
		0,5	0,25	m	Gruntas				1,56	+	2,08	= 4,8
-0,500										1,875		7,3

Aktyvūs slėgiai:

1) **Aktyvaus slėgio grunte Rakninė koeficientas:**

$$K_a = tan^2\left(45 - \frac{\varphi}{2}\right) * 1,25 = \quad 0,417$$

2) **Aktyvus slėgis nuo grunto:**

$P_{gruntas} = K_a * h * \gamma =$ **1,875** kN/m2

pgruntas*(2/3)h **0,625** kN/m

3) **Aktyvus slėgis nuo grindų:**

$P_{grindys} = K_a * h * \gamma =$ **1,56** kN/m2

pgrindys*h **0,78** kN/m

4) **Aktyvaus slėgio suma:**

$P_a = P_{gruntas} + P_{grindys} =$ **3,438** kN/m2

5) **Slėgis nuo apkrovos:**

$P_q = K_a * q =$ **2,08** kN/m2

Pq*h= **1,04** kN/m

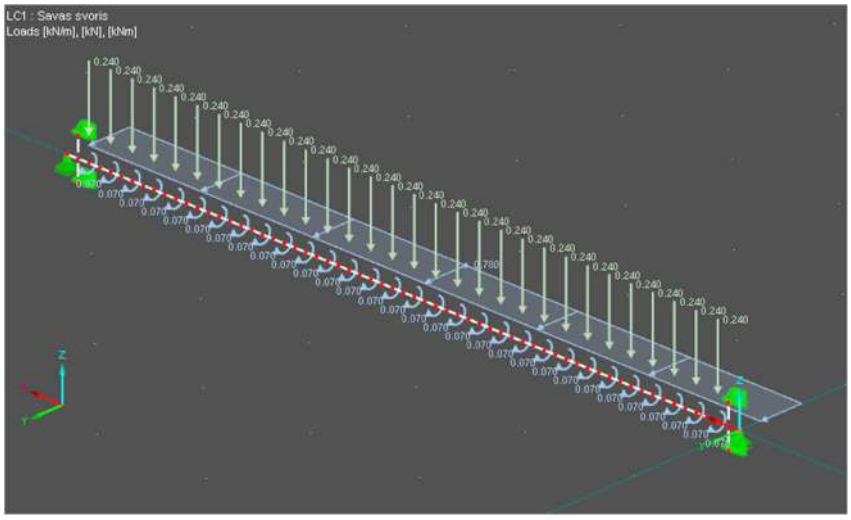
Grunto apkrova turi būti pridedama 2/3 aukščio, kuris lygus 0,333m. Apkrova uždedama su momentu ekscentricitetui įvertinti,. Momentas lygus

M= F*d=0,625*0,083=0,05kNm;

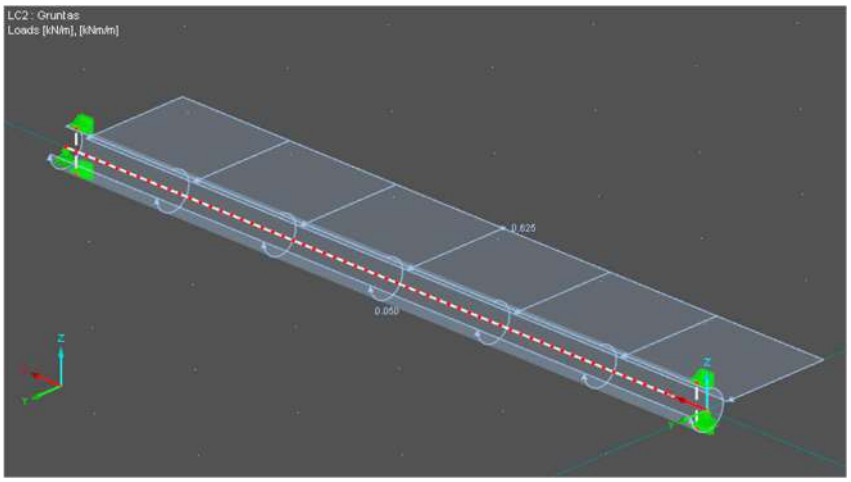
d-jėgos petis, lygus atstumui nuo sienutės centro iki 2/3 skerspjūvio aukščio grunte.

Sijos apkrovimas programoje:

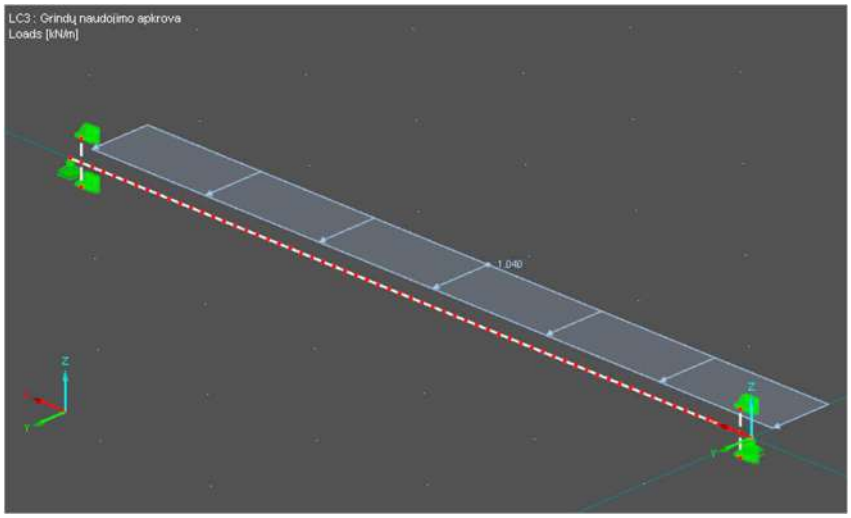
Savasis svoris:



Gruntas:

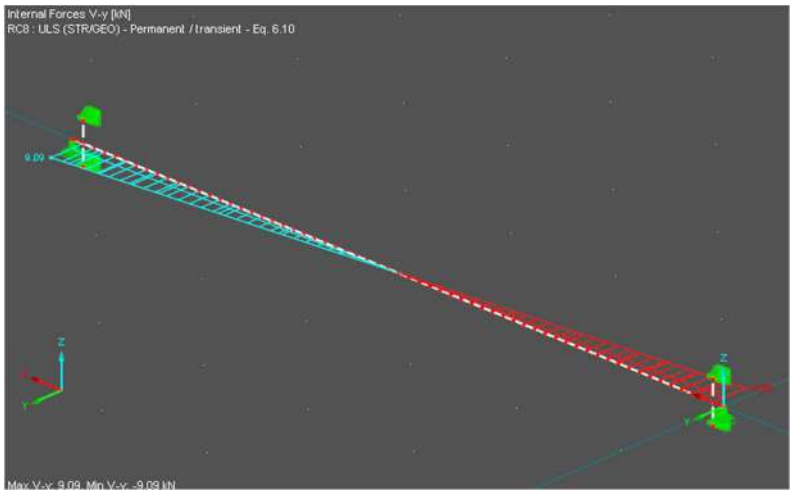


Grindų naudojimo apkrova:

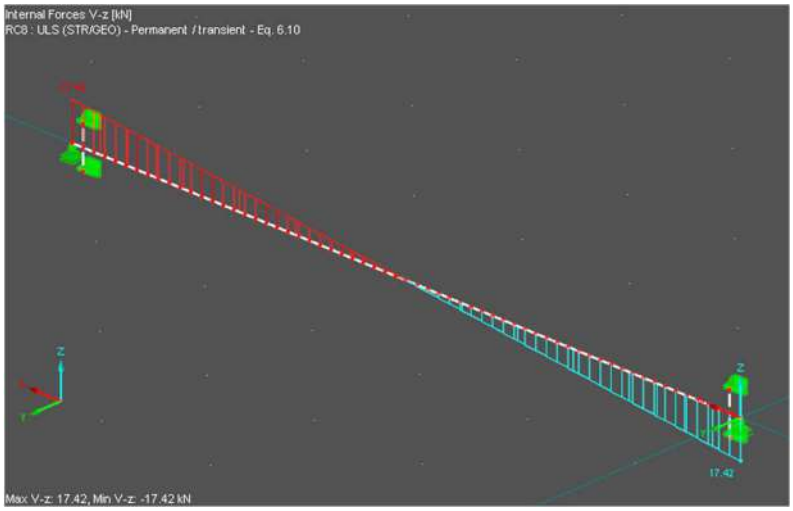


Sijos įražos ir momentai:

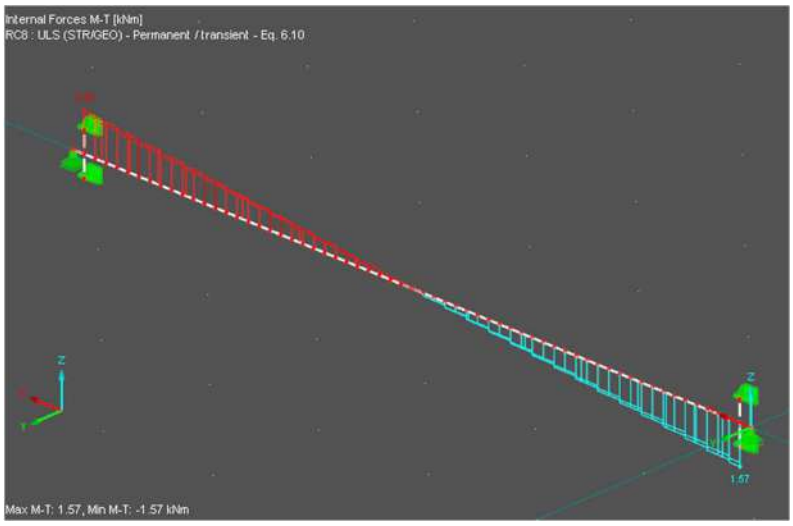
Fy:

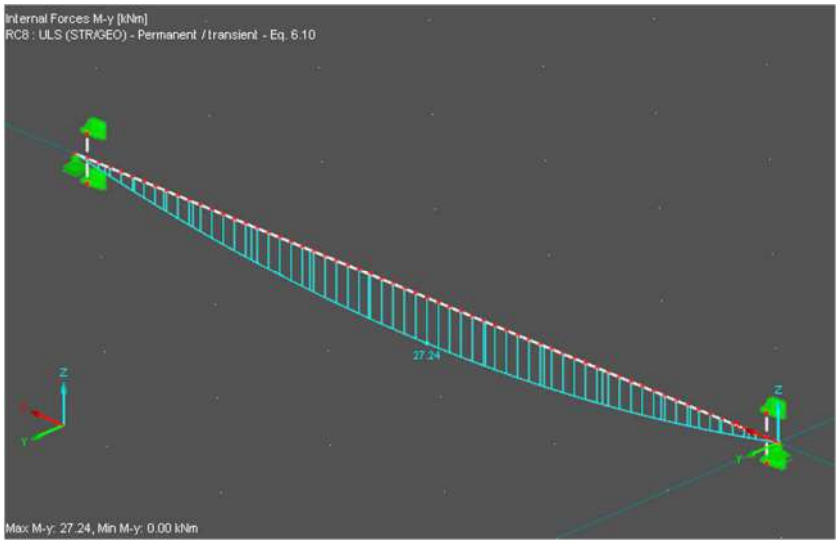


Fz

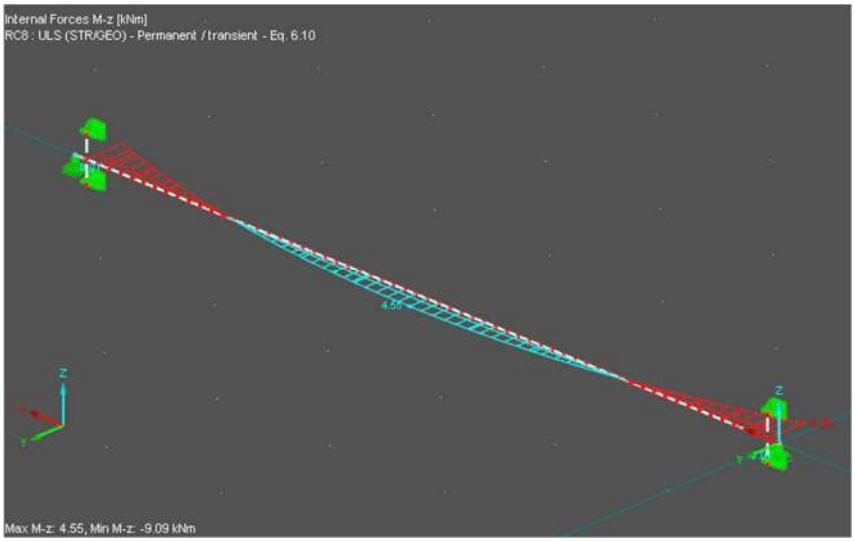


Mt:



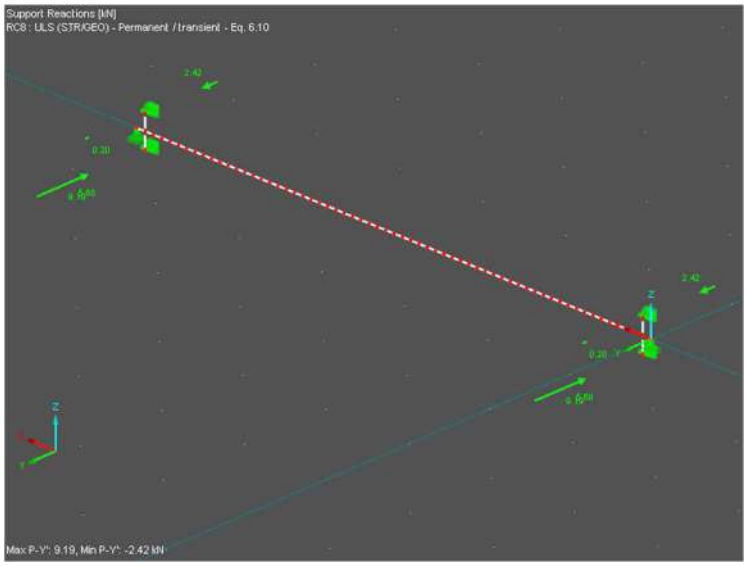


Mz:

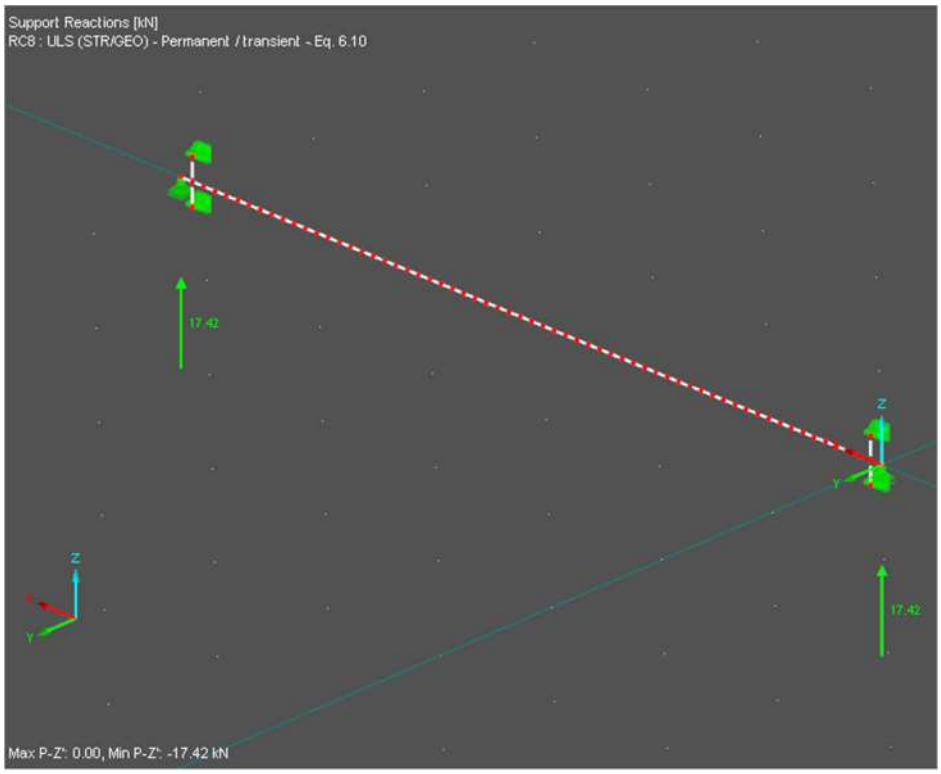


Atraminės reakcijos

Py:



Pz



Sijos armavimo poreikis:

RF-CONCRETE Members
CA1
Design of concrete members

1.1 General Data

Design according to Standard:	EN 1992-1-1:2004/A1:2014	
ULTIMATE LIMIT STATES		
Result combinations to design:	RC8	ULS (STR/GEO) - Permanent / transient - Eq. 6.10 Persistent and Transient
SERVICEABILITY LIMIT STATES		
Result combinations to design:	RC9	SLS - Characteristic Quasi-permanent, k-t: 0.600
	RC10	SLS - Frequent Frequent, k-t: 0.520
	RC11	SLS - Quasi-permanent Quasi-permanent, k-t: 0.513
Design Situation Settings for Serviceability Limit State Checks		
Load combination:		
Characteristic with direct load	Checks: k_1*f_{ck}, k_3*f_{yk}	
Characteristic with imposed deformation	Checks: k_1*f_{ck}, k_4*f_{yk}	
Frequent	Checks: w_k	
Quasi-permanent	Checks: k_2*f_{ck}, w_k, u_l	
Deformation Relative to:	Undeformed system	

RF-CONCRETE Members
CA1
Design of concrete members

1.1 Settings - Nonlinear Calculation (State II)

Activate nonlinear calculation for ULTIMATE LIMIT state:	-
Activate nonlinear calculation for SERVICEABILITY LIMIT state:	-
Activate nonlinear calculation for fire resistance	-

RF-CONCRETE Members
CA1
Design of concrete members

1.1.1 Parameters of National Annex

2. Basis of design			
2.4.2.4 Partial Factors for Materials			
Partial factor of concrete at the ultimate limit state (persistent, transient)	γ_c	1.500	
Partial factor of steel at the ultimate limit state (persistent, transient)	γ_s	1.150	
Partial factor of concrete at the ultimate limit state (accidental)	γ_c	1.200	
Partial factor of steel at the ultimate limit state (accidental)	γ_s	1.000	
Partial factor of concrete at the serviceability limit state	γ_c	1.000	
Partial factor of steel at the serviceability limit state	γ_s	1.000	
3. Materials			
3.1 Concrete			
Maximum value of strength class of concrete	C_{max}	C90/105	
Factor considering long term actions on compressive strength	α_{cc}	1.000	
Factor considering long term actions on tensile strength	α_{ct}	1.000	
3.2 Reinforcing Steel			
Maximum Value of Yield Strength	f_{yk}	600.000	N/mm^2
Factor for calculation of the design value for limit elongation of steel	k_{ud1}	0.900	
4. Durability and Concrete Cover			
4.4.1 Minimum Concrete Cover			
Structural Class	S.C.	S4	
Modification of Structural Class			
Minimum Concrete Cover			
Additive safety element for increase of minimum concrete cover	$\Delta c_{dur,\gamma}$	0.0	mm
Reduction Factor Under Use of Stainless Steel	$\Delta c_{dur,st}$	0.0	mm
Reduction Factor for Concrete with Additional Protection	$\Delta c_{dur,add}$	0.0	mm
Increase of the cover layer under abrasion loading			
Value of increase for abrasion Class XM1	k_1	5.0	mm
Value of increase for abrasion Class XM2	k_2	10.0	mm
Value of increase for abrasion Class XM3	k_3	15.0	mm
Allowance in Design for Deviation	Δc_{dev}	10.0	mm
Value of increase for concreting of uneven surfaces			
Value of increase for prepared ground	k_1	40.0	mm
Value of increase for concrete directly against soil	k_2	75.0	mm
5. Structural Analysis			
5.5 Linear Analysis with Limited Redistribution			
Factor k_1 for calculation of redistribution ratio δ	k_1	0.440	
Factor k_2 for calculation of redistribution ratio δ	k_2	1.250	
Factor k_3 for calculation of redistribution ratio δ	k_3	0.540	
Factor k_4 for calculation of redistribution ratio δ	k_4	1.250	
Factor k_5 for calculation of redistribution ratio δ	k_5	0.700	
Factor k_6 for calculation of redistribution ratio δ	k_6	0.800	
5.8.6 General Method			
Partial safety factor of design value of modulus of elasticity for concrete	γ_{cE}	1.200	
6. Ultimate Limit States (ULS)			
6.2.2 Members Not Requiring Design Shear Reinforcement			
Factor k_0 for calculation of the design value for shear resistance	k_0	0.180	
Factor k_1 for calculation of the design value for shear resistance	k_1	0.150	
Factor k_2 for calculation of the design value for shear resistance	k_2	0.035	
Reduction Factor for Concrete Cracked in Shear			
Reduction Factor k_1 for Concrete Cracked in Shear	k_1	0.600	
Reduction Factor k_2 for Concrete Cracked in Shear	k_2	250.000	
6.2.3 Members Requiring Design Shear Reinforcement			

1.1.1 Parameters of National Annex

Min Angle of Compression Strut	Θ_{min}	21.80	°
Max Angle of Compression Strut	Θ_{max}	45.00	°
Reduction Factor for Concrete Cracked in Shear			
Reduction Factor k_1 for Concrete Cracked in Shear	k_1	0.600	
Reduction Factor k_2 for Concrete Cracked in Shear	k_2	250.000	
Factor for considering stress condition in compression chord	α_{cw}	1.000	
6.2.4 Shear Between Web and Flanges of T-Sections			
Min. Cotangents of Compression Strut Angle in Compression Flange	$\cot\Theta_{f,min}$	1.000	
Max. Cotangents of Compression Strut Angle in Compression Flange	$\cot\Theta_{f,max}$	2.000	
Min. Cotangents of Compression Strut Angle in Tension Flange	$\cot\Theta_{f,min}$	1.000	
Max. Cotangents of Compression Strut Angle in Tension Flange	$\cot\Theta_{f,max}$	1.250	
Factor for Shear Strength	k	0.400	
6.2.5 Shear at the interface between concrete cast at different times			
Factor c for very smooth surfaces	$c_{v.smooth}$	0.025	
Factor μ for very smooth surfaces	$\mu_{v.smooth}$	0.500	
Factor c for smooth surfaces	c_{smooth}	0.200	
Factor μ for smooth surfaces	μ_{smooth}	0.600	
Factor c for rough surfaces	c_{rough}	0.400	
Factor μ for rough surfaces	μ_{rough}	0.700	
Factor c for indented surfaces	$c_{indented}$	0.500	
Factor μ for indented surfaces	$\mu_{indented}$	0.900	
7. Serviceability Limit State (SLS)			
7.2 Stress Limitation			
Factor k_1 for limitation of compressive stress in concrete	k_1	0.600	
Factor k_2 for limitation of compressive stress in concrete	k_2	0.450	
Factor k_3 for stress limitation in steel	k_3	0.800	
Factor k_4 for stress limitation in steel	k_4	1.000	
7.3 Crack Control			
Limiting calculated crack width of reinforced concrete and concrete prestressed with unbonded tendons			
Maximum size of crack width for exposure classes X0, XC1	w_{max}	0.4	mm
Maximum size of crack width for exposure classes XC2-4, XD1-3, XS1-3	w_{max}	0.3	mm
Factor k_3 for calculation of maximum crack spacing	k_3	3.400	
Factor k_4 for calculation of maximum crack spacing	k_4	0.425	
8. Detailing of Reinforcement and Prestressing Tendons - General			
8.2 Spacing of Bars			
Factor for calculation of the minimum clear distance of bars	k_1	1.000	
Second value of minimum clear distance of bars	a_{min}	20.0	mm
8.3 Permissible Mandrel Diameters for Bent Bars			
Minimum inside diameter of bar and wire curvature			
Factor for minimum inside diameter of bar and wire curvature for $\varnothing \leq 16$ mm	k	4.000	
Factor for minimum inside diameter of bar and wire curvature for $\supseteq$ 16 mm	k	7.000	
Minimum inside diameter of curvature for bent welded reinforcement and mesh fabrics bent after welding			
Factor for minimum inside diameter of bar curvature with bar welded to the inside of the bend	k	5.000	
8.8 Additional Rules for Large Diameter Bars			
Bar diameter	$\varnothing_{large}$	32.0	mm
9. Detailing of Members and Particular Rules			
9.2 Beams			
Minimum area of longitudinal tension reinforcement			
Factor k_1 for calculation of the minimum area of longitudinal tension reinforcement	k_1	0.260	
Factor k_2 for calculation of the minimum area of longitudinal tension reinforcement	k_2	0.001	
Maximum reinforcement area			
Factor for calculation of maximum reinforcement area	k	0.040	
Factor for considering partial fixity	β_1	0.150	
Multiple of reinforcement area	β_2	0.250	
Minimum ratio of shear reinforcement			
Factor for minimum ratio of shear reinforcement	k	0.080	
Maximum longitudinal spacing between link shear assemblies			
Factor for calculation of the maximum longitudinal spacing between shear assemblies	k	0.750	
Maximum transverse spacing of legs in a series of shear links			
Factor k_1 for calculation of the maximum transverse spacing of legs in a series of shear links	k_1	0.750	
Factor k_2 for calculation of the maximum transverse spacing of legs in a series of shear links	k_2	600.0	mm
9.5 Columns			
Minimum diameter of longitudinal reinforcement	$\varnothing_{min}$	8.0	mm
Minimum Reinforcement Area			

1.1.1 Parameters of National Annex

Factor k_1 for calculation of the minimum total area of longitudinal reinforcement	k_1	0.100	
Factor k_2 for calculation of the minimum total area of longitudinal reinforcement	k_2	0.002	
Maximum reinforcement area			
Factor outside lap locations	k	0.040	
Maximum spacing of transverse reinforcement			
Factor k_1 for calculation of the maximum spacing of transverse reinforcement along column	k_1	20.000	
Factor k_2 for calculation of the maximum spacing of transverse reinforcement along column	k_2	400.0	mm
11. Lightweight Aggregate Concrete Structures			
11.3 Materials			
Factor considering long term actions on compressive strength	α_{lcc}	0.850	
Factor considering long term actions on tensile strength	α_{lct}	0.850	
11.6 Ultimate Limit State Analysis (ULS)			
11.6.1 Members Not Requiring Design Shear Reinforcement			
Factor k_0 for calculation of the design value for shear resistance	k_0	0.150	
Factor k_1 for calculation of the design value for shear resistance	k_1	0.150	
Factor k_2 for calculation of the design value for shear resistance	k_2	0.028	
11.6.2 Structural Element Requiring Design Shear Reinforcement			
Reduction Factor k_1 for Concrete Cracked in Shear	k_1	0.500	
Reduction Factor k_2 for Concrete Cracked in Shear	k_2	250.000	

RF-CONCRETE Members
CA1
Design of concrete members

1.2 Materials

Matl. No.	Material Description: Concrete Strength Class	Material Description: Reinforcing Steel	Comment
2	Concrete C30/37	B 500 S (B)	

RF-CONCRETE Members
CA1
Design of concrete members

1.2.1 Material Parameters

Matl. No.	Description	Name	Size	Unit
2	Concrete Strength Class: Concrete C30/37			
	Characteristic Cylinder Compressive Strength	f_{ck}	30.000	N/mm^2
	Mean Cylinder Compressive Strength	f_{cm}	38.000	N/mm^2
	Mean Axial Tensile Strength	f_{ctm}	2.900	N/mm^2
	5 % Fractile of Axial Tensile Strength	$f_{ctk,0.05}$	2.000	N/mm^2
	95 % Fractile of Axial Tensile Strength	$f_{ctk,0.95}$	3.800	N/mm^2
	Mean Secant Modulus of Elasticity	E_{cm}	33000.000	N/mm^2
	Characteristic Strains for Nonlinear Calculations			
	Ultimate Strain for Pure Compression	ε_{c1}	-2.200	‰
	Ultimate Strain at Failure	ε_{cu1}	-3.500	‰
	Characteristic Strains for Parabolic-Rectangular Diagram			
	Ultimate Strain for Pure Compression	ε_{c2}	-2.000	‰
	Ultimate Strain at Failure	ε_{cu2}	-3.500	‰
	Parabola Exponent	n	2	
	Specific Weight	γ	25.00	kN/m^3
	Reinforcing Steel: B 500 S (B)			
	Modulus of Elasticity	E_s	200000	N/mm^2
	Characteristic Yield Stress	f_{yk}	500	N/mm^2
	Characteristic Tensile Strength	f_{tk}	540	N/mm^2
	Limiting Strain	ε_{uk}	50.000	‰

1.3 Cross-Sections

Section No.	Matl. No.	Cross-Section Description	Notes	Comment
1	2	Rectangle 200/600		

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1.5 Supports

Support No.	Node No.	Support Width b [mm]	Direct Support	Monolithic Connection	End Support	Comment
1	1	0.0	x	-	x	
2	2	0.0	x	-	x	

SETTINGS

- Consideration of limited moment redistribution of the supporting moments
- Reduction of the moments or dimensioning for the moments at the face of a monolithic support
x Reduction of the shear forces in the support area according to 6.2.2
x Reduction of the shear forces with concentrated load acc. to 6.2.2(6) and 6.2.3(8)

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1.6 Reinforcement Group No. 1

Applied to members:	All (67)
LONGITUDINAL REINFORCEMENT	
Possible diameters:	12.0, 14.0, 16.0, 20.0 mm
Max. number of layers:	1
Min. spacing for first layer:	20.0 mm
Type of anchorage:	Straight with two transverse bars
Steel surface:	Ribbed
Reduction of reinforcement:	None
SHEAR REINFORCEMENT	
Possible diameters:	10.0 mm
No. of stirrup legs:	2
Inclination:	90°
Type of anchorage:	Hook
Stirrup layout:	Uniform spacing throughout
REINFORCEMENT LAYOUT	
Concrete cover acc. to Standard	-
Concrete cover c-top:	38.1 mm
Concrete cover c-bottom:	38.1 mm
Concrete cover c-side:	38.1 mm
Reinforcement layout:	-z (top) - +z (bottom) (optimized distribution)
Torsional reinforcement distributed circumferentially:	x
Relevant internal forces:	N, V-y, V-z, M-T, M-y, M-z
MINIMUM REINFORCEMENT	
Min. reinforcement area (min. A-s,top):	0.00 cm^2
Min. reinforcement area (min. A-s,bottom):	0.00 cm^2
Min. longitudinal reinforcement acc. to Standard:	x
Min. shear reinforcement acc. to Standard:	x
Longitudinal reinforcement for shear force design:	Use required longitudinal reinforcement
SHEAR JOINT	
Shear joint available:	-
Design of flange connections on segmented cross-sections	-
OPTIONS FOR EN 1992-1-1:2004/A1:2014	
Max. percentage of reinforcement:	8.00 %
Neutral axis depth limitation	x
Partial safety factor Gamma-c	PT 1.50, AC 1.20, SLS 1.00
Partial safety factor Gamma-s	PT 1.15, AC 1.00, SLS 1.00

1.6 Reinforcement Group No. 1

Reduction factor Alpha-cc	PT 1.00, AC 1.00, SLS 1.00
Reduction factor Alpha-ct	PT 1.00, AC 1.00, SLS 1.00
Min. inclination of concrete strut	21.80 °
Max. inclination of concrete strut	45.00 °
SERVICEABILITY	
Crack Analysis	
Limit values of allowable crack width $w_{k,max,-z\ (top)}$:	0.3 mm
Limit values of allowable crack width $w_{k,max,+z\ (bottom)}$:	0.3 mm
Design without direct crack width calculation:	x
Calculation of limit diameter lim d_s:	x
Calculation of maximum rebar spacing lim s_l:	x
Design with direct crack width calculation:	x
Use Eq. (7.14) for $s_{r,\ max}$:	-
Effective concrete tensile strength at time of cracking:	1.000 * f_{ctm}
$A_{s,min}$ for effects due to restraint:	x
Stress Distribution Within the Section Prior to Cracking:	Depending on the defined load (k_c = 0.0 ... 1.0)
$A_{s,min}$ Layout:	-z (top) / +z (bottom)
Crack formation within the first 28 days:	-
Stress Analysis	
Limitation of concrete Compressive stress σ_c:	-
Limitation of steel stress σ_s:	x
According to the design situation with k_3*f_{yk} and k_4*f_{yk} acc. to EN 1992-1-1, NDP(7.2)	
Factor k_3 for stress limitation in steel k_3:	0.800
Factor k_4 for stress limitation in steel k_4:	1.000
Deflection Analysis	
Deflection $u_{l,z}$:	-
Determination of Longitudinal Reinforcement	
Increase the required longitudinal reinforcement automatically for serviceability limit state design:	x
Find the most economical reinforcement for crack width design:	x
Consider A_s,min acc. to 7.3.2 also for the direct calculation of crack width acc. To 7.3.4:	x

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2.1 Required Reinforcement by Cross-Section

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
Cross-Section No.1 - Rectangle 200/600						
$A_{s,-z\ (top)}$	67	3.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.007	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.100	RC8	0.93	cm²	
$a_{sw,V,stirrup}$	67	0.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.100	RC8	0.12	cm²/m	

RF-CONCRETE Members
CA1
Design of concrete members

2.3 Required Reinforcement by Member

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
Member No. 67 - Rectangle 200/600						
$A_{s,-z\ (top)}$	67	3.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.007	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.100	RC8	0.93	cm²	
$a_{sw,V,stirrup}$	67	0.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.100	RC8	0.12	cm²/m	

RF-CONCRETE Members

CA1
Design of concrete members

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
Member No. 67 - Rectangle 200/600 - x: 0.000 m						
$A_{s,-z\ (top)}$	67	0.000	RC8	0.00	cm²	
$A_{s,+z\ (bottom)}$	67	0.000	RC8	0.00	cm²	
$A_{s,T}$	67	0.000	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	0.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.000	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.007 m						
$A_{s,-z\ (top)}$	67	0.007	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.007	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.007	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	0.007	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.007	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.100 m, left						
$A_{s,-z\ (top)}$	67	0.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.100	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	0.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.100	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.100 m, right						
$A_{s,-z\ (top)}$	67	0.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.100	RC8	0.93	cm²	
$a_{sw,V,stirrup}$	67	0.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.100	RC8	0.12	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.200 m, left						
$A_{s,-z\ (top)}$	67	0.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.200	RC8	0.92	cm²	
$a_{sw,V,stirrup}$	67	0.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.200	RC8	0.12	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.200 m, right						
$A_{s,-z\ (top)}$	67	0.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.200	RC8	0.87	cm²	
$a_{sw,V,stirrup}$	67	0.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.200	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.258 m						
$A_{s,-z\ (top)}$	67	0.258	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.258	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.258	RC8	0.87	cm²	
$a_{sw,V,stirrup}$	67	0.258	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.258	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.300 m						
$A_{s,-z\ (top)}$	67	0.300	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.300	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.300	RC8	0.86	cm²	
$a_{sw,V,stirrup}$	67	0.300	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.300	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.400 m, left						
$A_{s,-z\ (top)}$	67	0.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.400	RC8	0.86	cm²	
$a_{sw,V,stirrup}$	67	0.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.400	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.400 m, right						
$A_{s,-z\ (top)}$	67	0.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.400	RC8	0.81	cm²	
$a_{sw,V,stirrup}$	67	0.400	RC8	1.75	cm²/m	58) 69)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$a_{sw,T,stirrup}$	67	0.400	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.500 m						
$A_{s,-z\ (top)}$	67	0.500	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.500	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.500	RC8	0.80	cm²	
$a_{sw,V,stirrup}$	67	0.500	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.500	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.517 m						
$A_{s,-z\ (top)}$	67	0.517	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.517	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.517	RC8	0.80	cm²	
$a_{sw,V,stirrup}$	67	0.517	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.517	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.600 m, left						
$A_{s,-z\ (top)}$	67	0.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.600	RC8	0.80	cm²	
$a_{sw,V,stirrup}$	67	0.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.600	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.600 m, right						
$A_{s,-z\ (top)}$	67	0.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.600	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	0.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.600	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.700 m						
$A_{s,-z\ (top)}$	67	0.700	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.700	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.700	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	0.700	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.700	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.775 m						
$A_{s,-z\ (top)}$	67	0.775	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.775	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.775	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	0.775	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.775	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.800 m, left						
$A_{s,-z\ (top)}$	67	0.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.800	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	0.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.800	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.800 m, right						
$A_{s,-z\ (top)}$	67	0.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.800	RC8	0.68	cm²	
$a_{sw,V,stirrup}$	67	0.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.800	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 0.900 m						
$A_{s,-z\ (top)}$	67	0.900	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	0.900	RC8	1.60	cm²	29)
$A_{s,T}$	67	0.900	RC8	0.68	cm²	
$a_{sw,V,stirrup}$	67	0.900	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	0.900	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.000 m, left						
$A_{s,-z\ (top)}$	67	1.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.000	RC8	0.68	cm²	
$a_{sw,V,stirrup}$	67	1.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.000	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.000 m, right						

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,-z\ (top)}$	67	1.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.000	RC8	0.62	cm²	
$a_{sw,V,stirrup}$	67	1.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.000	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.033 m						
$A_{s,-z\ (top)}$	67	1.033	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.033	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.033	RC8	0.62	cm²	
$a_{sw,V,stirrup}$	67	1.033	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.033	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.100 m						
$A_{s,-z\ (top)}$	67	1.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.100	RC8	0.62	cm²	
$a_{sw,V,stirrup}$	67	1.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.100	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.200 m, left						
$A_{s,-z\ (top)}$	67	1.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.200	RC8	0.61	cm²	
$a_{sw,V,stirrup}$	67	1.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.200	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.200 m, right						
$A_{s,-z\ (top)}$	67	1.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.200	RC8	0.56	cm²	
$a_{sw,V,stirrup}$	67	1.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.200	RC8	0.07	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.300 m						
$A_{s,-z\ (top)}$	67	1.300	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.300	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.300	RC8	0.56	cm²	
$a_{sw,V,stirrup}$	67	1.300	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.300	RC8	0.07	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.400 m, left						
$A_{s,-z\ (top)}$	67	1.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.400	RC8	0.55	cm²	
$a_{sw,V,stirrup}$	67	1.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.400	RC8	0.07	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.400 m, right						
$A_{s,-z\ (top)}$	67	1.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.400	RC8	0.50	cm²	
$a_{sw,V,stirrup}$	67	1.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.400	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.500 m						
$A_{s,-z\ (top)}$	67	1.500	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.500	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.500	RC8	0.49	cm²	
$a_{sw,V,stirrup}$	67	1.500	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.500	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.550 m						
$A_{s,-z\ (top)}$	67	1.550	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.550	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.550	RC8	0.49	cm²	
$a_{sw,V,stirrup}$	67	1.550	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.550	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.600 m, left						
$A_{s,-z\ (top)}$	67	1.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.600	RC8	1.60	cm²	29)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,T}$	67	1.600	RC8	0.49	cm²	
$a_{sw,V,stirrup}$	67	1.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.600	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.600 m, right						
$A_{s,-z\ (top)}$	67	1.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.600	RC8	0.43	cm²	
$a_{sw,V,stirrup}$	67	1.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.600	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.700 m						
$A_{s,-z\ (top)}$	67	1.700	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.700	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.700	RC8	0.43	cm²	
$a_{sw,V,stirrup}$	67	1.700	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.700	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.800 m, left						
$A_{s,-z\ (top)}$	67	1.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.800	RC8	0.43	cm²	
$a_{sw,V,stirrup}$	67	1.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.800	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.800 m, right						
$A_{s,-z\ (top)}$	67	1.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.800	RC8	0.37	cm²	
$a_{sw,V,stirrup}$	67	1.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.800	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 1.900 m						
$A_{s,-z\ (top)}$	67	1.900	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	1.900	RC8	1.60	cm²	29)
$A_{s,T}$	67	1.900	RC8	0.37	cm²	
$a_{sw,V,stirrup}$	67	1.900	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	1.900	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.000 m, left						
$A_{s,-z\ (top)}$	67	2.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.000	RC8	0.37	cm²	
$a_{sw,V,stirrup}$	67	2.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.000	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.000 m, right						
$A_{s,-z\ (top)}$	67	2.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.000	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	2.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.000	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.067 m						
$A_{s,-z\ (top)}$	67	2.067	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.067	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.067	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	2.067	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.067	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.100 m						
$A_{s,-z\ (top)}$	67	2.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.100	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	2.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.100	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.200 m, left						
$A_{s,-z\ (top)}$	67	2.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.200	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	2.200	RC8	1.75	cm²/m	58) 69)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$a_{sw,T,stirrup}$	67	2.200	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.200 m, right						
$A_{s,-z\ (top)}$	67	2.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.200	RC8	0.25	cm²	
$a_{sw,V,stirrup}$	67	2.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.200	RC8	0.03	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.300 m						
$A_{s,-z\ (top)}$	67	2.300	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.300	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.300	RC8	0.25	cm²	
$a_{sw,V,stirrup}$	67	2.300	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.300	RC8	0.03	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.400 m, left						
$A_{s,-z\ (top)}$	67	2.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.400	RC8	0.24	cm²	
$a_{sw,V,stirrup}$	67	2.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.400	RC8	0.03	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.400 m, right						
$A_{s,-z\ (top)}$	67	2.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.400	RC8	0.19	cm²	
$a_{sw,V,stirrup}$	67	2.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.400	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.500 m						
$A_{s,-z\ (top)}$	67	2.500	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.500	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.500	RC8	0.19	cm²	
$a_{sw,V,stirrup}$	67	2.500	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.500	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.583 m						
$A_{s,-z\ (top)}$	67	2.583	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.583	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.583	RC8	0.18	cm²	
$a_{sw,V,stirrup}$	67	2.583	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.583	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.600 m, left						
$A_{s,-z\ (top)}$	67	2.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.600	RC8	0.18	cm²	
$a_{sw,V,stirrup}$	67	2.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.600	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.600 m, right						
$A_{s,-z\ (top)}$	67	2.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.600	RC8	0.13	cm²	
$a_{sw,V,stirrup}$	67	2.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.600	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.700 m						
$A_{s,-z\ (top)}$	67	2.700	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.700	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.700	RC8	0.12	cm²	
$a_{sw,V,stirrup}$	67	2.700	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.700	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.800 m, left						
$A_{s,-z\ (top)}$	67	2.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.800	RC8	0.12	cm²	
$a_{sw,V,stirrup}$	67	2.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.800	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.800 m, right						

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,-z\ (top)}$	67	2.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.800	RC8	0.06	cm²	
$a_{sw,V,stirrup}$	67	2.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.800	RC8	0.01	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 2.900 m						
$A_{s,-z\ (top)}$	67	2.900	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	2.900	RC8	1.60	cm²	29)
$A_{s,T}$	67	2.900	RC8	0.06	cm²	
$a_{sw,V,stirrup}$	67	2.900	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	2.900	RC8	0.01	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.000 m, left						
$A_{s,-z\ (top)}$	67	3.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.000	RC8	0.06	cm²	
$a_{sw,V,stirrup}$	67	3.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.000	RC8	0.01	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.000 m, right						
$A_{s,-z\ (top)}$	67	3.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.000	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	3.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.000	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.100 m						
$A_{s,-z\ (top)}$	67	3.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.100	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	3.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.100	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.200 m, left						
$A_{s,-z\ (top)}$	67	3.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.200	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	3.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.200	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.200 m, right						
$A_{s,-z\ (top)}$	67	3.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.200	RC8	0.06	cm²	
$a_{sw,V,stirrup}$	67	3.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.200	RC8	0.01	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.300 m						
$A_{s,-z\ (top)}$	67	3.300	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.300	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.300	RC8	0.06	cm²	
$a_{sw,V,stirrup}$	67	3.300	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.300	RC8	0.01	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.400 m, left						
$A_{s,-z\ (top)}$	67	3.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.400	RC8	0.06	cm²	
$a_{sw,V,stirrup}$	67	3.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.400	RC8	0.01	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.400 m, right						
$A_{s,-z\ (top)}$	67	3.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.400	RC8	0.12	cm²	
$a_{sw,V,stirrup}$	67	3.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.400	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.500 m						
$A_{s,-z\ (top)}$	67	3.500	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.500	RC8	1.60	cm²	29)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,T}$	67	3.500	RC8	0.12	cm²	
$a_{sw,V,stirrup}$	67	3.500	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.500	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.600 m, left						
$A_{s,-z\ (top)}$	67	3.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.600	RC8	0.13	cm²	
$a_{sw,V,stirrup}$	67	3.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.600	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.600 m, right						
$A_{s,-z\ (top)}$	67	3.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.600	RC8	0.18	cm²	
$a_{sw,V,stirrup}$	67	3.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.600	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.617 m						
$A_{s,-z\ (top)}$	67	3.617	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.617	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.617	RC8	0.18	cm²	
$a_{sw,V,stirrup}$	67	3.617	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.617	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.700 m						
$A_{s,-z\ (top)}$	67	3.700	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.700	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.700	RC8	0.19	cm²	
$a_{sw,V,stirrup}$	67	3.700	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.700	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.800 m, left						
$A_{s,-z\ (top)}$	67	3.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.800	RC8	0.19	cm²	
$a_{sw,V,stirrup}$	67	3.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.800	RC8	0.02	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.800 m, right						
$A_{s,-z\ (top)}$	67	3.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.800	RC8	0.24	cm²	
$a_{sw,V,stirrup}$	67	3.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.800	RC8	0.03	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 3.900 m						
$A_{s,-z\ (top)}$	67	3.900	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	3.900	RC8	1.60	cm²	29)
$A_{s,T}$	67	3.900	RC8	0.25	cm²	
$a_{sw,V,stirrup}$	67	3.900	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	3.900	RC8	0.03	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.000 m, left						
$A_{s,-z\ (top)}$	67	4.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.000	RC8	0.25	cm²	
$a_{sw,V,stirrup}$	67	4.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.000	RC8	0.03	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.000 m, right						
$A_{s,-z\ (top)}$	67	4.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.000	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	4.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.000	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.100 m						
$A_{s,-z\ (top)}$	67	4.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.100	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	4.100	RC8	1.75	cm²/m	58) 69)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$a_{sw,T,stirrup}$	67	4.100	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.133 m						
$A_{s,-z\ (top)}$	67	4.133	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.133	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.133	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	4.133	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.133	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.200 m, left						
$A_{s,-z\ (top)}$	67	4.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.200	RC8	0.31	cm²	
$a_{sw,V,stirrup}$	67	4.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.200	RC8	0.04	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.200 m, right						
$A_{s,-z\ (top)}$	67	4.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.200	RC8	0.37	cm²	
$a_{sw,V,stirrup}$	67	4.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.200	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.300 m						
$A_{s,-z\ (top)}$	67	4.300	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.300	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.300	RC8	0.37	cm²	
$a_{sw,V,stirrup}$	67	4.300	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.300	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.400 m, left						
$A_{s,-z\ (top)}$	67	4.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.400	RC8	0.37	cm²	
$a_{sw,V,stirrup}$	67	4.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.400	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.400 m, right						
$A_{s,-z\ (top)}$	67	4.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.400	RC8	0.43	cm²	
$a_{sw,V,stirrup}$	67	4.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.400	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.500 m						
$A_{s,-z\ (top)}$	67	4.500	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.500	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.500	RC8	0.43	cm²	
$a_{sw,V,stirrup}$	67	4.500	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.500	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.600 m, left						
$A_{s,-z\ (top)}$	67	4.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.600	RC8	0.43	cm²	
$a_{sw,V,stirrup}$	67	4.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.600	RC8	0.05	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.600 m, right						
$A_{s,-z\ (top)}$	67	4.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.600	RC8	0.49	cm²	
$a_{sw,V,stirrup}$	67	4.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.600	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.650 m						
$A_{s,-z\ (top)}$	67	4.650	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.650	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.650	RC8	0.49	cm²	
$a_{sw,V,stirrup}$	67	4.650	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.650	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.700 m						

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,-z\ (top)}$	67	4.700	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.700	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.700	RC8	0.49	cm²	
$a_{sw,V,stirrup}$	67	4.700	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.700	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.800 m, left						
$A_{s,-z\ (top)}$	67	4.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.800	RC8	0.50	cm²	
$a_{sw,V,stirrup}$	67	4.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.800	RC8	0.06	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.800 m, right						
$A_{s,-z\ (top)}$	67	4.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.800	RC8	0.55	cm²	
$a_{sw,V,stirrup}$	67	4.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.800	RC8	0.07	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 4.900 m						
$A_{s,-z\ (top)}$	67	4.900	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	4.900	RC8	1.60	cm²	29)
$A_{s,T}$	67	4.900	RC8	0.56	cm²	
$a_{sw,V,stirrup}$	67	4.900	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	4.900	RC8	0.07	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.000 m, left						
$A_{s,-z\ (top)}$	67	5.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.000	RC8	0.56	cm²	
$a_{sw,V,stirrup}$	67	5.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.000	RC8	0.07	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.000 m, right						
$A_{s,-z\ (top)}$	67	5.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.000	RC8	0.61	cm²	
$a_{sw,V,stirrup}$	67	5.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.000	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.100 m						
$A_{s,-z\ (top)}$	67	5.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.100	RC8	0.62	cm²	
$a_{sw,V,stirrup}$	67	5.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.100	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.167 m						
$A_{s,-z\ (top)}$	67	5.167	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.167	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.167	RC8	0.62	cm²	
$a_{sw,V,stirrup}$	67	5.167	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.167	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.200 m, left						
$A_{s,-z\ (top)}$	67	5.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.200	RC8	0.62	cm²	
$a_{sw,V,stirrup}$	67	5.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.200	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.200 m, right						
$A_{s,-z\ (top)}$	67	5.200	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.200	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.200	RC8	0.68	cm²	
$a_{sw,V,stirrup}$	67	5.200	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.200	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.300 m						
$A_{s,-z\ (top)}$	67	5.300	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.300	RC8	1.60	cm²	29)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,T}$	67	5.300	RC8	0.68	cm²	
$a_{sw,V,stirrup}$	67	5.300	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.300	RC8	0.08	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.400 m, left						
$A_{s,-z\ (top)}$	67	5.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.400	RC8	0.68	cm²	
$a_{sw,V,stirrup}$	67	5.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.400	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.400 m, right						
$A_{s,-z\ (top)}$	67	5.400	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.400	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.400	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	5.400	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.400	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.425 m						
$A_{s,-z\ (top)}$	67	5.425	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.425	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.425	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	5.425	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.425	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.500 m						
$A_{s,-z\ (top)}$	67	5.500	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.500	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.500	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	5.500	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.500	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.600 m, left						
$A_{s,-z\ (top)}$	67	5.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.600	RC8	0.74	cm²	
$a_{sw,V,stirrup}$	67	5.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.600	RC8	0.09	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.600 m, right						
$A_{s,-z\ (top)}$	67	5.600	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.600	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.600	RC8	0.80	cm²	
$a_{sw,V,stirrup}$	67	5.600	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.600	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.683 m						
$A_{s,-z\ (top)}$	67	5.683	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.683	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.683	RC8	0.80	cm²	
$a_{sw,V,stirrup}$	67	5.683	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.683	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.700 m						
$A_{s,-z\ (top)}$	67	5.700	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.700	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.700	RC8	0.80	cm²	
$a_{sw,V,stirrup}$	67	5.700	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.700	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.800 m, left						
$A_{s,-z\ (top)}$	67	5.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.800	RC8	0.81	cm²	
$a_{sw,V,stirrup}$	67	5.800	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.800	RC8	0.10	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.800 m, right						
$A_{s,-z\ (top)}$	67	5.800	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.800	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.800	RC8	0.86	cm²	
$a_{sw,V,stirrup}$	67	5.800	RC8	1.75	cm²/m	58) 69)

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$a_{sw,T,stirrup}$	67	5.800	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.900 m						
$A_{s,-z\ (top)}$	67	5.900	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.900	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.900	RC8	0.86	cm²	
$a_{sw,V,stirrup}$	67	5.900	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.900	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.942 m						
$A_{s,-z\ (top)}$	67	5.942	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.942	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.942	RC8	0.87	cm²	
$a_{sw,V,stirrup}$	67	5.942	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.942	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.992 m, left						
$A_{s,-z\ (top)}$	67	5.992	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.992	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.992	RC8	0.87	cm²	
$a_{sw,V,stirrup}$	67	5.992	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.992	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 5.992 m, right						
$A_{s,-z\ (top)}$	67	5.992	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	5.992	RC8	1.60	cm²	29)
$A_{s,T}$	67	5.992	RC8	0.87	cm²	
$a_{sw,V,stirrup}$	67	5.992	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	5.992	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.000 m, left						
$A_{s,-z\ (top)}$	67	6.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	6.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	6.000	RC8	0.87	cm²	
$a_{sw,V,stirrup}$	67	6.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	6.000	RC8	0.11	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.000 m, right						
$A_{s,-z\ (top)}$	67	6.000	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	6.000	RC8	1.60	cm²	29)
$A_{s,T}$	67	6.000	RC8	0.92	cm²	
$a_{sw,V,stirrup}$	67	6.000	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	6.000	RC8	0.12	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.100 m, left						
$A_{s,-z\ (top)}$	67	6.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	6.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	6.100	RC8	0.93	cm²	
$a_{sw,V,stirrup}$	67	6.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	6.100	RC8	0.12	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.100 m, right						
$A_{s,-z\ (top)}$	67	6.100	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	6.100	RC8	1.60	cm²	29)
$A_{s,T}$	67	6.100	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	6.100	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	6.100	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.193 m, left						
$A_{s,-z\ (top)}$	67	6.193	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	6.193	RC8	1.60	cm²	29)
$A_{s,T}$	67	6.193	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	6.193	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	6.193	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.193 m, right						
$A_{s,-z\ (top)}$	67	6.193	RC8	1.68	cm²	26)
$A_{s,+z\ (bottom)}$	67	6.193	RC8	1.60	cm²	29)
$A_{s,T}$	67	6.193	RC8	0.00	cm²	
$a_{sw,V,stirrup}$	67	6.193	RC8	1.75	cm²/m	58) 69)
$a_{sw,T,stirrup}$	67	6.193	RC8	0.00	cm²/m	
Member No. 67 - Rectangle 200/600 - x: 6.200 m						

2.4 Required Reinforcement by x-Location

Reinforcement	Member No.	Location x [m]	Loading	Reinforcement Area	Unit	Error Message or Note
$A_{s,-z\ (top)}$	67	6.200	RC8	0.00	cm^2	
$A_{s,+z\ (bottom)}$	67	6.200	RC8	0.00	cm^2	
$A_{s,T}$	67	6.200	RC8	0.00	cm^2	
$a_{sw,V,stirrup}$	67	6.200	RC8	1.75	cm^2/m	58) 69)
$a_{sw,T,stirrup}$	67	6.200	RC8	0.00	cm^2/m	

RF-CONCRETE Members
CA1
Design of concrete members

3.1 Provided Longitudinal Reinforcement

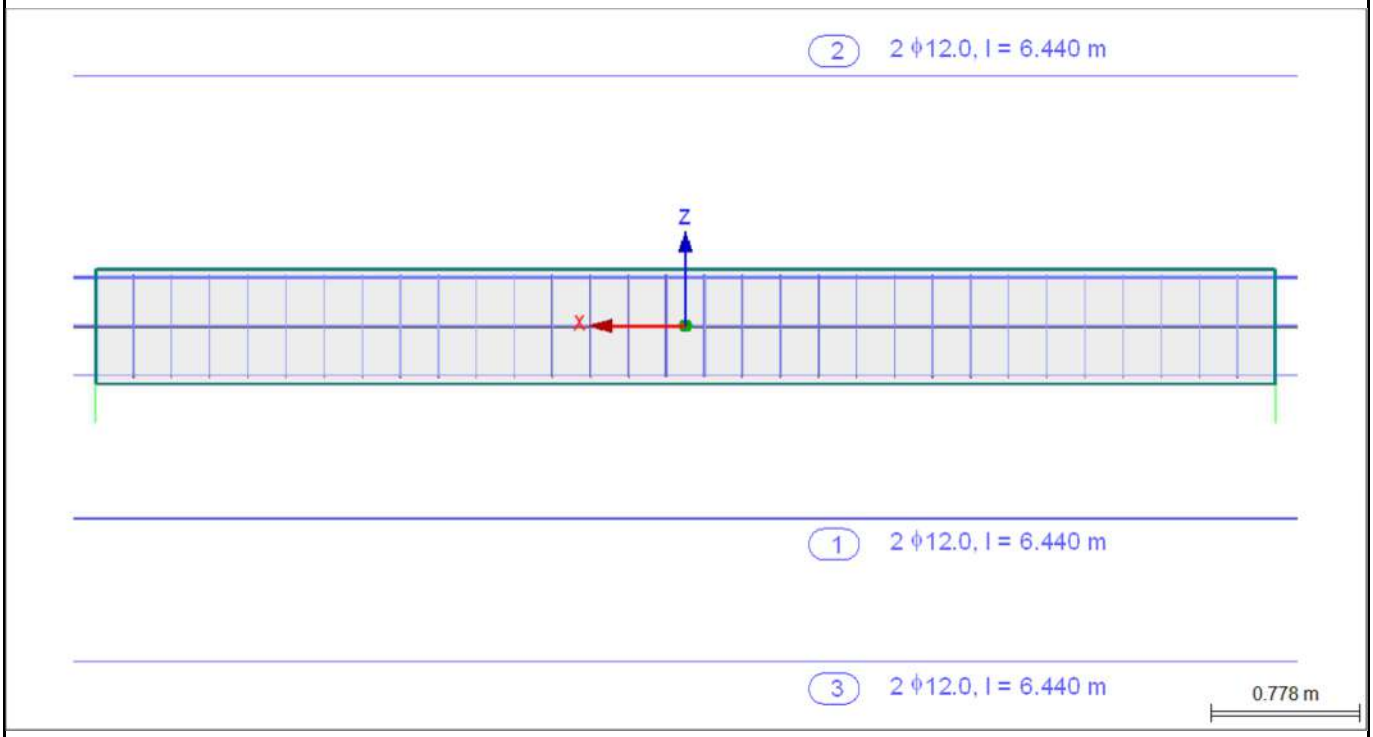
Item No.	Reinforcement Position	No. of Bars	d_s [mm]	A_s [cm^2]	Length [m]	x-Location [m] from	x-Location [m] to	Weight [kg]	Notes
Member No.67 - Rectangle 200/600									
1	-z (top)	2	12.0	2.26	6.440	-0.120	6.320	11.44	
2	+z (bottom)	2	12.0	2.26	6.440	-0.120	6.320	11.44	
3	+-y (side)	2	12.0	2.26	6.440	-0.120	6.320	11.44	158)

RF-CONCRETE Members
CA1
Design of concrete members

3.1.1 Provided Longitudinal Reinforcement - Anchorage

Item No.	Anchorage Type	Bond	l_{bd} [m]	l_1 [m]	l_2 [m]	Total [m]	d_{br} [m]
Member No.67 - Rectangle 200/600							
1 Start	Straight with two transverse bars	poor	0.120	0.120	-	0.120	-
1 End	Straight with two transverse bars	poor	0.120	0.120	-	0.120	-
2 Start	Straight with two transverse bars	good	0.120	0.120	-	0.120	-
2 End	Straight with two transverse bars	good	0.120	0.120	-	0.120	-
3 Start	Straight with two transverse bars	poor	0.120	0.120	-	0.120	-
3 End	Straight with two transverse bars	poor	0.120	0.120	-	0.120	-

RF-CONCRETE Members - Member No. 67 - Rectangle 200/600

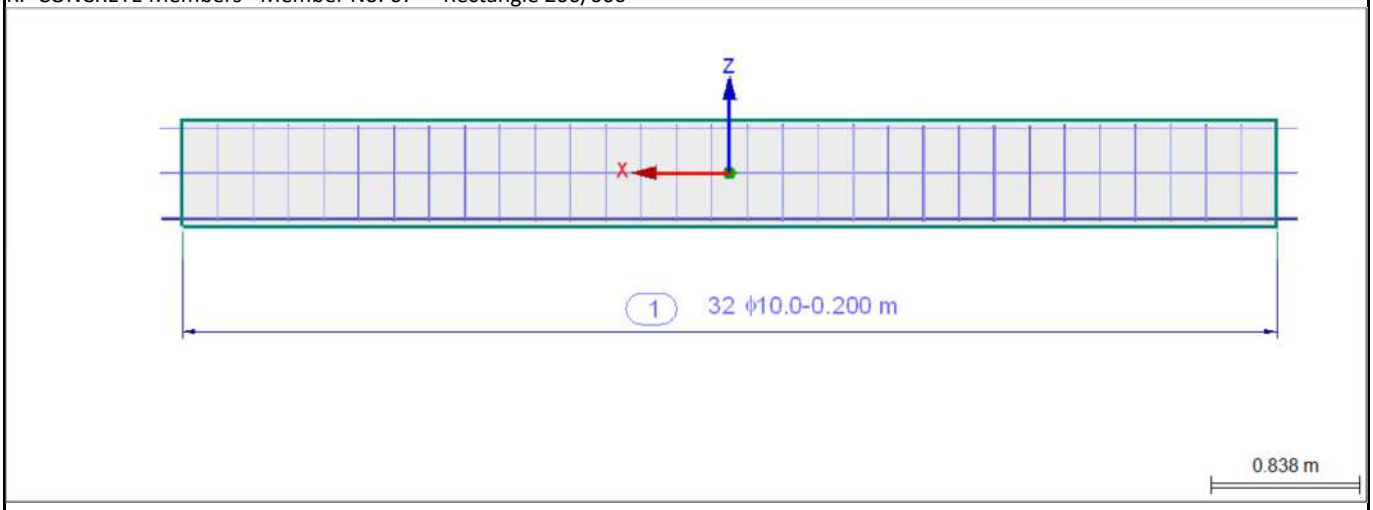


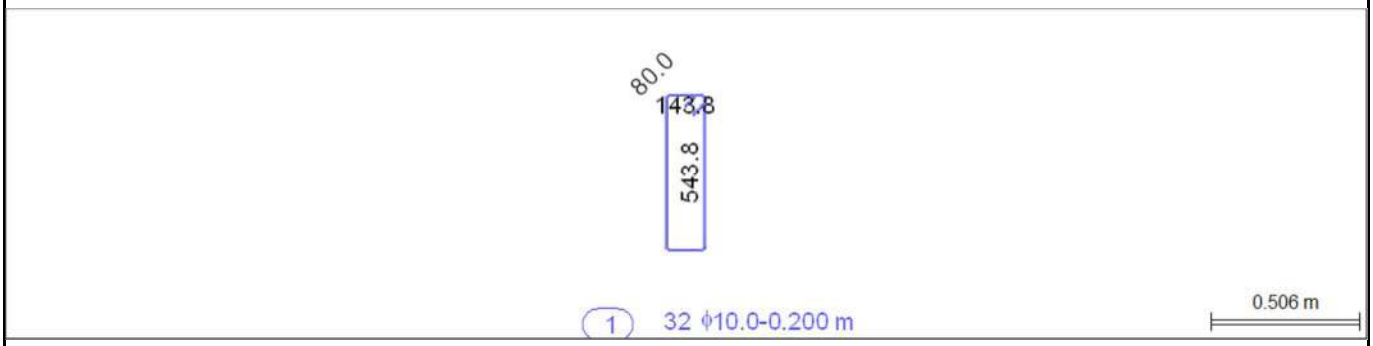
RF-CONCRETE Members
CA1
Design of concrete members

3.2 Provided Shear Reinforcement

Item No.	No. of stirrups	d_s [mm]	Length [m]	x-Location [m] from	x-Location [m] to	Spacing s_{li} [m]	Stirrup Dimensions [mm]	No. of Legs	Weight [kg]	Notes
Member No. 67 - Rectangle 200/600										
1	32	10.0	6.200	0.000	6.200	0.200	543.8/143.8/108.9	2	31.43	115)

RF-CONCRETE Members - Member No. 67 - Rectangle 200/600





RF-CONCRETE Members
CA1
Design of concrete members

3.3 Provided Reinforcement by x-Location

Location x [m]	$A_{s,-z\ (top)}$ [cm²]	$A_{s,+z\ (bottom)}$ [cm²]	$A_{s,total}$ [cm²]	$A_{s,stirrup}$ [cm²/m]	Notes
Member No. 67 - Rectangle 200/600					
0.000	2.26	4.52	6.79	7.85	158)
0.007	2.26	4.52	6.79	7.85	158)
0.100	2.26	4.52	6.79	7.85	158)
0.100	2.26	4.52	6.79	7.85	158)
0.200	2.26	4.52	6.79	7.85	158)
0.200	2.26	4.52	6.79	7.85	158)
0.258	2.26	4.52	6.79	7.85	158)
0.300	2.26	4.52	6.79	7.85	158)
0.400	2.26	4.52	6.79	7.85	158)
0.400	2.26	4.52	6.79	7.85	158)
0.500	2.26	4.52	6.79	7.85	158)
0.517	2.26	4.52	6.79	7.85	158)
0.600	2.26	4.52	6.79	7.85	158)
0.600	2.26	4.52	6.79	7.85	158)
0.700	2.26	4.52	6.79	7.85	158)
0.775	2.26	4.52	6.79	7.85	158)
0.800	2.26	4.52	6.79	7.85	158)
0.800	2.26	4.52	6.79	7.85	158)
0.900	2.26	4.52	6.79	7.85	158)
1.000	2.26	4.52	6.79	7.85	158)
1.000	2.26	4.52	6.79	7.85	158)
1.033	2.26	4.52	6.79	7.85	158)
1.100	2.26	4.52	6.79	7.85	158)
1.200	2.26	4.52	6.79	7.85	158)
1.200	2.26	4.52	6.79	7.85	158)
1.300	2.26	4.52	6.79	7.85	158)
1.400	2.26	4.52	6.79	7.85	158)
1.400	2.26	4.52	6.79	7.85	158)
1.500	2.26	4.52	6.79	7.85	158)
1.550	2.26	4.52	6.79	7.85	158)
1.600	2.26	4.52	6.79	7.85	158)
1.600	2.26	4.52	6.79	7.85	158)
1.700	2.26	4.52	6.79	7.85	158)
1.800	2.26	4.52	6.79	7.85	158)
1.800	2.26	4.52	6.79	7.85	158)
1.900	2.26	4.52	6.79	7.85	158)
2.000	2.26	4.52	6.79	7.85	158)
2.000	2.26	4.52	6.79	7.85	158)
2.067	2.26	4.52	6.79	7.85	158)
2.100	2.26	4.52	6.79	7.85	158)
2.200	2.26	4.52	6.79	7.85	158)
2.200	2.26	4.52	6.79	7.85	158)
2.300	2.26	4.52	6.79	7.85	158)
2.400	2.26	4.52	6.79	7.85	158)

3.3 Provided Reinforcement by x-Location

Location x [m]	$A_{s,-z\ (top)}$ [cm²]	$A_{s,+z\ (bottom)}$ [cm²]	$A_{s,total}$ [cm²]	$A_{s,stirrup}$ [cm²/m]	Notes
2.400	2.26	4.52	6.79	7.85	158)
2.500	2.26	4.52	6.79	7.85	158)
2.583	2.26	4.52	6.79	7.85	158)
2.600	2.26	4.52	6.79	7.85	158)
2.600	2.26	4.52	6.79	7.85	158)
2.700	2.26	4.52	6.79	7.85	158)
2.800	2.26	4.52	6.79	7.85	158)
2.800	2.26	4.52	6.79	7.85	158)
2.900	2.26	4.52	6.79	7.85	158)
3.000	2.26	4.52	6.79	7.85	158)
3.000	2.26	4.52	6.79	7.85	158)
3.100	2.26	4.52	6.79	7.85	158)
3.200	2.26	4.52	6.79	7.85	158)
3.200	2.26	4.52	6.79	7.85	158)
3.300	2.26	4.52	6.79	7.85	158)
3.400	2.26	4.52	6.79	7.85	158)
3.400	2.26	4.52	6.79	7.85	158)
3.500	2.26	4.52	6.79	7.85	158)
3.600	2.26	4.52	6.79	7.85	158)
3.600	2.26	4.52	6.79	7.85	158)
3.617	2.26	4.52	6.79	7.85	158)
3.700	2.26	4.52	6.79	7.85	158)
3.800	2.26	4.52	6.79	7.85	158)
3.800	2.26	4.52	6.79	7.85	158)
3.900	2.26	4.52	6.79	7.85	158)
4.000	2.26	4.52	6.79	7.85	158)
4.000	2.26	4.52	6.79	7.85	158)
4.100	2.26	4.52	6.79	7.85	158)
4.133	2.26	4.52	6.79	7.85	158)
4.200	2.26	4.52	6.79	7.85	158)
4.200	2.26	4.52	6.79	7.85	158)
4.300	2.26	4.52	6.79	7.85	158)
4.400	2.26	4.52	6.79	7.85	158)
4.400	2.26	4.52	6.79	7.85	158)
4.500	2.26	4.52	6.79	7.85	158)
4.600	2.26	4.52	6.79	7.85	158)
4.600	2.26	4.52	6.79	7.85	158)
4.650	2.26	4.52	6.79	7.85	158)
4.700	2.26	4.52	6.79	7.85	158)
4.800	2.26	4.52	6.79	7.85	158)
4.800	2.26	4.52	6.79	7.85	158)
4.900	2.26	4.52	6.79	7.85	158)
5.000	2.26	4.52	6.79	7.85	158)
5.000	2.26	4.52	6.79	7.85	158)
5.100	2.26	4.52	6.79	7.85	158)
5.167	2.26	4.52	6.79	7.85	158)
5.200	2.26	4.52	6.79	7.85	158)
5.200	2.26	4.52	6.79	7.85	158)
5.300	2.26	4.52	6.79	7.85	158)
5.400	2.26	4.52	6.79	7.85	158)
5.400	2.26	4.52	6.79	7.85	158)
5.425	2.26	4.52	6.79	7.85	158)
5.500	2.26	4.52	6.79	7.85	158)
5.600	2.26	4.52	6.79	7.85	158)
5.600	2.26	4.52	6.79	7.85	158)
5.683	2.26	4.52	6.79	7.85	158)
5.700	2.26	4.52	6.79	7.85	158)
5.800	2.26	4.52	6.79	7.85	158)
5.800	2.26	4.52	6.79	7.85	158)
5.900	2.26	4.52	6.79	7.85	158)
5.942	2.26	4.52	6.79	7.85	158)
5.992	2.26	4.52	6.79	7.85	158)

3.3 Provided Reinforcement by x-Location

Location x [m]	$A_{s,-z\ (top)}$ [cm²]	$A_{s,+z\ (bottom)}$ [cm²]	$A_{s,total}$ [cm²]	$A_{s,stirrup}$ [cm²/m]	Notes
5.992	2.26	4.52	6.79	7.85	158)
6.000	2.26	4.52	6.79	7.85	158)
6.000	2.26	4.52	6.79	7.85	158)
6.100	2.26	4.52	6.79	7.85	158)
6.100	2.26	4.52	6.79	7.85	158)
6.193	2.26	4.52	6.79	7.85	158)
6.193	2.26	4.52	6.79	7.85	158)
6.200	2.26	4.52	6.79	7.85	158)

RF-CONCRETE Members
CA1
Design of concrete members

3.4 Steel Schedule

Item No.	Reinforcement Type	d_s [mm]	Surface	No. of Bars	Length [m]	Anchorage Type Start	Anchorage Type End	Bending Diameter [m]	Weight [kg]
Material No. 2 - Reinforcing Steel B 500 S (B)									
1	Length	12.0	Ribbed	6	6.440	Straight with two transverse bars	Straight with two transverse bars		34.31
2	Stirrup	10.0	Ribbed	32	1.593	Hook	Hook	0.040	31.43
Total				38					65.73

RF-CONCRETE Members
CA1
Design of concrete members

4.1 Serviceability Check by Cross-Section

Sect. No.	Location x [m]	Loading	Design Type	Existing Value	Limit Value	Unit	Capacity	Note
Cross-Section No.1 - Rectangle 200/600								
67	0.000		σ_s	Undefined	-	N/mm²	0.00	
67	0.100	RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
67	0.000	RC9	lim d_s	12.0	-	mm	0.00	215)
67	0.000	RC9	lim s_l	0.000	-	m	0.01	
67	0.000	RC9	w_k	0.000	0.305	mm	0.00	207) 215)

4.3 Serviceability Check by Member

Member No.	Location x [m]	Loading	Design Type	Existing Value	Limit Value	Unit	Capacity	Note
Member No. 67 - Rectangle 200/600								
67	0.000		σ_s	Undefined	-	N/mm²	0.00	
67	0.100	RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
67	0.000	RC9	lim d_s	12.0	-	mm	0.00	215)
67	0.000	RC9	lim s_l	0.000	-	m	0.01	
67	0.000	RC9	w_k	0.000	0.305	mm	0.00	207) 215)

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Design Type	Existing Value	Limit Value	Unit	Capacity	Note
Member No. 67 - Rectangle 200/600								
67	0.000		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	0.00	0.00	cm²	0.00	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.000	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.007		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	0.00	0.00	cm²	0.00	
		RC9	lim d_s	12.0	-	mm	0.00	215)

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Type	Design Existing Value	Design Limit Value	Unit	Capacity	Note
		RC9	lim s_l	0.000	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.258		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.300		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.400		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.500		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.517		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.600		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.700		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.775		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.800		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	0.900		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Type	Design Existing Value	Design Limit Value	Unit	Capacity	Note
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.000		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.033		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.300		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.400		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.500		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.550		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.600		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.700		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.800		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	1.900		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Design Type	Existing Value	Limit Value	Unit	Capacity	Note
67	2.000		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.067		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.300		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.400		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.500		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.583		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.600		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.700		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.800		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	2.900		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.000		σ_s	Undefined	-	N/mm²	0.00	

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Design Type	Existing Value	Limit Value	Unit	Capacity	Note
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.300		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.400		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.500		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.600		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.617		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.700		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.800		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	3.900		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.000		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Type	Design Existing Value	Design Limit Value	Unit	Capacity	Note
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.133		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.300		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.400		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.500		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.600		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.650		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.700		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.800		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	4.900		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.000		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Type	Design Existing Value	Design Limit Value	Unit	Capacity	Note
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.167		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.300		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.400		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.425		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.500		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.600		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.683		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.700		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.800		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.900		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.942		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	

4.4 Serviceability Check by x-Location

Member No.	Location x [m]	Loading	Design Type	Existing Value	Limit Value	Unit	Capacity	Note
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	5.992		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	6.000		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	6.100		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	2.26	1.60	cm²	0.71	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.112	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	6.193		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	0.00	0.00	cm²	0.00	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.000	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)
67	6.200		σ_s	Undefined	-	N/mm²	0.00	
		RC9	$A_{s,min}$	0.00	0.00	cm²	0.00	
		RC9	lim d_s	12.0	-	mm	0.00	215)
		RC9	lim s_l	0.000	-	m	0.01	
		RC9	w_k	0.000	0.305	mm	0.00	207) 215)

Notes

No.	Description
26)	Minimum reinforcement for beams - Top acc. to 9.2.1.1 (1)
29)	Bottom longitudinal reinforcement was increased for SLS
58)	Using the approximate value of lever z
69)	Min. shear reinforcement acc. to 9.2.2 (5)
115)	Min. shear reinforcement for beam acc. to 9.2.2
158)	Torsional reinforcement with circumferential distribution
207)	Crack width directly restricted (complied)
215)	Concrete does not crack

Sijos armavimą parenka gamykla gamintoja.

12. KITŲ KONSTRUKCIJŲ BEM SKAIČIAIMAI

Žemiau pateikiami, vamzdynų estakados ir atramos, taip pat išorinės laiptinės konstrukcijų skaičiavimai. Skaičiavimai atlikti programa Dlubal RFEM, įvesties duomenys ir rezultatai (anglų k.).

12.1. VAMZDYNŲ ESTAKADOS, ATRAMOS KONSTRUKCIJŲ SKAIČIAVIMAI

Model - General Data

General	Model name	:	Salininku - Estacada - V3
	Type of model	:	3D
	Positive direction of global axis Z	:	Upward
	Classification of load cases and	:	According to Standard: EN 1990

Model - General Data

		combinations		National Annex: LST - Lithuania
		x Automatically create combinations	:	x Result Combinations
	Options	- RF-FORM-FINDING - Find initial equilibrium shapes of membrane and cable structures		
		- RF-CUTTING-PATTERN		
		- Piping analysis		
		- Use CQC Rule		
		- Enable CAD/BIM model		
		Standard Gravity		
		g	:	10.00 m/s²

FE Mesh Settings

	General	Target length of finite elements	l_{FE}	:	0.500 m
		Maximum distance between a node and a line to integrate it into the line	ε	:	0.001 m
		Maximum number of mesh nodes (in thousands)		:	500
	Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic		:	10
		x Activate member divisions for large deformation or post-critical analysis			
		x Use division for members with node lying on them			
	Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
		Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
		Shape direction of finite elements		:	Triangles and quadrangles
					x Same squares where possible

1.3 Materials

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/°C]	Partial Factor γ_M [-]	Material Model
1	Steel S 355 JR | EN 10025-2:2004-11						
	21000.00	8076.92	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic

1.7 Nodal Supports

Support No.	Nodes No.	Axis System	Column in Z	Support Conditions $u_X/u_{X'}$	$u_Y/u_{Y'}$	$u_Z/u_{Z'}$	$\varphi_X/\varphi_{X'}$	$\varphi_Y/\varphi_{Y'}$	$\varphi_Z/\varphi_{Z'}$
1	1,2,5,6,9	Global X,Y,Z	-	x	x	x	x	x	x
3	45	User Defined X',Y',Z'	-	x	x	x	-	-	x
4	44	User Defined X',Y',Z'	-	x	x	x	x	x	x

1.7.10 Nodal Supports - User-Defined Axis System

Support No.	Direction Type	Sequence	Rotation [°] about X	about Y	about Z	Coordinate System	1st axis	Node 1 No.	Node 2 No.	2nd axis	Reference Node	Member/Line No.
3	Rotated	ZYX	0.00	90.00	0.00							
4	Rotated	ZYX	0.00	90.00	0.00							

1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	QRO 120x5 | EN 10219-2:2006							
	1	778.00	485.00	485.00	0.00	0.00	120.0	120.0
		22.40	9.69	9.69				
2	QRO 120x5 | EN 10219-2:2006							
	1	778.00	485.00	485.00	0.00	0.00	120.0	120.0
		22.40	9.69	9.69				
3	QRO 160x6 | EN 10219-2:2006							
	1	2239.00	1405.00	1405.00	0.00	0.00	160.0	160.0
		36.00	15.55	15.55				
4	UPE 240 | EN 10279							
	1	15.14	3599.00	310.90	0.00	0.00	90.0	240.0
		38.50	10.31	14.65				
5	IPE 200 | Euronorm 19-57							
	1	7.02	1940.00	142.00	0.00	0.00	100.0	200.0
		28.50	14.23	10.35				
6	QRO 50x4 | EN 10219-2:2006							
	1	40.40	23.70	23.70	0.00	0.00	50.0	50.0
		6.95	3.13	3.13				
7	QRO 40x4 | EN 10219-2:2006							
	1	19.40	11.10	11.10	0.00	0.00	40.0	40.0
		5.35	2.46	2.46				
8	QRO 50x4 | EN 10219-2:2006							
	1	40.40	23.70	23.70	0.00	0.00	50.0	50.0
		6.95	3.13	3.13				
9	HE A 140 | Euronorm 53-62							
	1	8.16	1030.00	389.00	0.00	0.00	140.0	133.0
		31.40	19.83	6.25				
10	QRO 80x4 | EN 10219-2:2006							
	1	180.00	111.00	111.00	0.00	0.00	80.0	80.0
		11.70	5.13	5.13				
11	UPE 200 | EN 10279							
	1	8.89	1909.00	187.30	0.00	0.00	80.0	200.0
		29.00	8.43	10.37				
12	QRO 100x4 | EN 10219-2:2006							
	1	362.00	226.00	226.00	0.00	0.00	100.0	100.0
		14.90	6.47	6.47				
13	IPE 200 | Euronorm 19-57							
	1	7.02	1940.00	142.00	0.00	0.00	100.0	200.0
		28.50	14.23	10.35				
14	QRO 70x70x5 | ALUKÖNIGSTAHL - EN 10210							
	1	142.00	88.50	88.50	0.00	0.00	70.0	70.0
		12.70	5.50	5.50				
15	QRO 60x60x4 | ALUKÖNIGSTAHL - EN 10210							
	1	72.50	45.40	45.40	0.00	0.00	60.0	60.0
		8.79	3.79	3.79				
16	HE A 200 | Euronorm 53-62							
	1	21.10	3690.00	1340.00	0.00	0.00	200.0	190.0
		53.80	33.30	10.77				
17	HE A 160 | Euronorm 53-62							
	1	12.30	1670.00	616.00	0.00	0.00	160.0	152.0
		38.80	23.99	7.85				
18	QRO 70x70x5 | ALUKÖNIGSTAHL - EN 10210							
	1	142.00	88.50	88.50	0.00	0.00	70.0	70.0
		12.70	5.50	5.50				
19	QRO 140x140x5 | ALUKÖNIGSTAHL - EN 10210							
	1	1250.00	807.00	807.00	0.00	0.00	140.0	140.0
		26.70	11.34	11.34				
20	RRO 160x120x5 | ALUKÖNIGSTAHL - EN 10219							
	1	1201.00	962.00	618.00	0.00	0.00	120.0	160.0
		26.40	8.97	13.73				
21	UPN 220 | ArcelorMittal (EN 10365:2017)							
	1	16.00	2690.00	197.00	0.00	0.00	80.0	220.0

1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
		37.40	8.84	17.22				

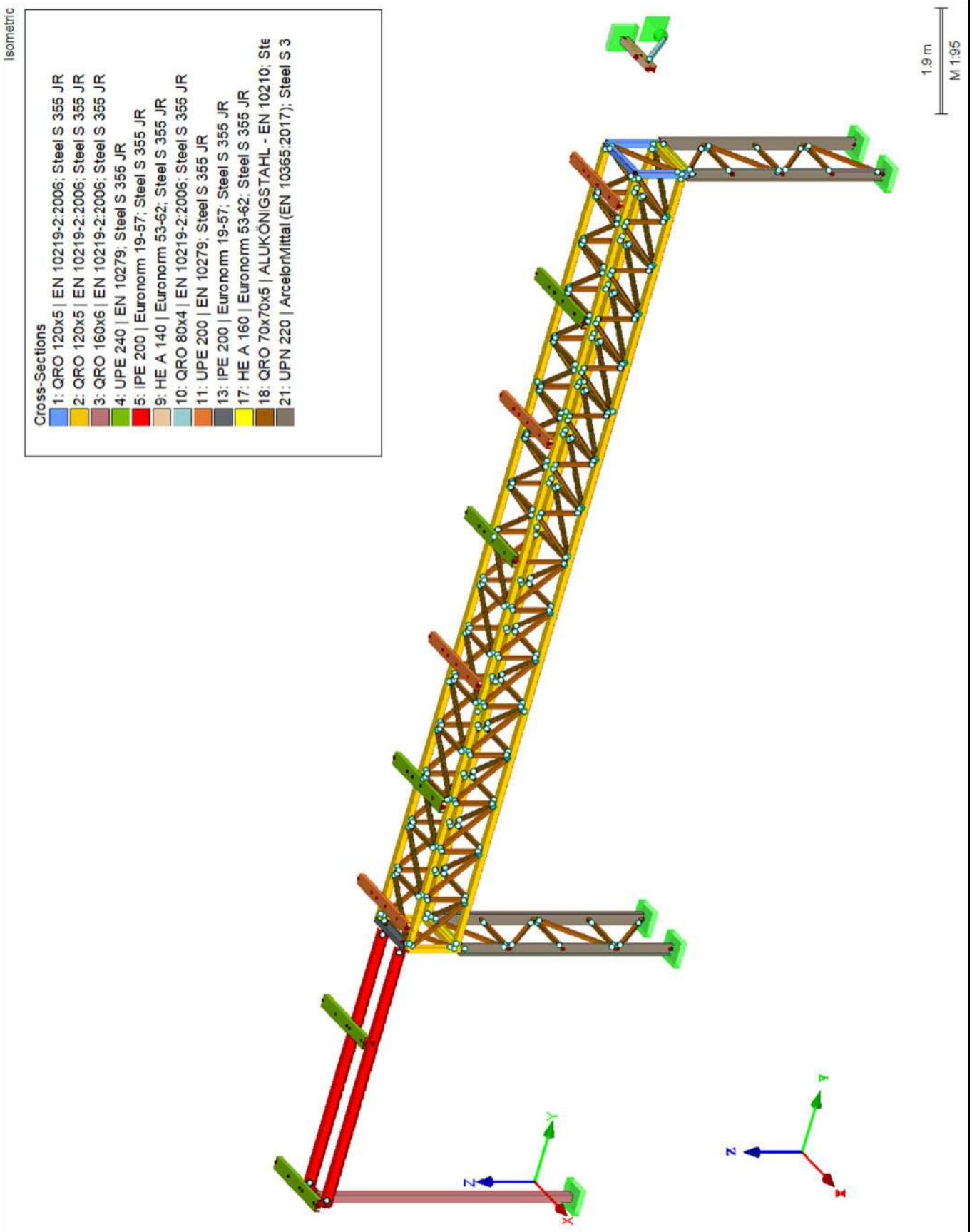
1.14 Member Hinges

Release No.	Reference System	Axial/Shear Release or Spring[kN/m] u_x	u_y	u_z	Moment Release or Spring[kNm/rad] φ_x	φ_y	φ_z	Comment
1	Local x,y,z	-	-	-	-	x	x	
2	Local x,y,z	-	-	-	-	x	-	

1.21 Sets of Members

Set No.	Set of Members Description	Type	Member No.	Length [m]	Comment
1	Continuous Members 1	Contin. member	280,281,319,18,321	1.575	
2	Continuous Members 2	Contin. member	25,22,24,278,251	1.800	
3	Continuous Members 3	Contin. member	33,30,32,277,250	1.800	
4	Continuous Members 4	Contin. member	41,38,40,276,246	1.800	
5	Continuous Members 5	Contin. member	48,46,47	1.090	
6	Continuous Members 6	Contin. member	1,324,243,244	4.520	
7	Continuous Members 7	Contin. member	2,325,247,248	4.520	
8	Continuous Members 8	Contin. member	3,260-262	4.180	
9	Continuous Members 9	Contin. member	4,263-265	4.180	
14	Continuous Members 14	Contin. member	54,31	5.300	
15	Continuous Members 15	Contin. member	55,39	5.300	
16	Continuous Members 16	Contin. member	14,21,23	1.100	
17	Continuous Members 17	Contin. member	259,279,318,20,320	1.575	
18	Continuous Members 18	Contin. member	284,282,283,288,287	1.800	
19	Continuous Members 19	Contin. member	293,291,292,297,296	1.800	
20	Continuous Members 20	Contin. member	302,300,301,306,305	1.800	
21	Continuous Members 21	Contin. member	311,309,310,315,314	1.800	
26	Continuous Members 26	Contin. member	19,326	0.650	
27	Continuous Members 27	Contin. member	142,150,44,158,166,174,316	5.000	
28	Continuous Members 28	Contin. member	143,151,45,159,167,175,317	5.000	
29	Continuous Members 29	Contin. member	145,153,161,169,177	5.000	
30	Continuous Members 30	Contin. member	144,152,160,168,176	5.000	
31	Continuous Members 31	Contin. member	96,104,112,120,128,136	6.000	
32	Continuous Members 32	Contin. member	97,105,113,121,129,137	6.000	
33	Continuous Members 33	Contin. member	307,134,126,118,110,102,298,94	6.000	
34	Continuous Members 34	Contin. member	308,135,127,119,111,103,299,95	6.000	
35	Continuous Members 35	Contin. member	86,78,27,71,63,290,6	5.000	
36	Continuous Members 36	Contin. member	9,65,73,81,89	5.000	
37	Continuous Members 37	Contin. member	87,79,29,70,62,289,5	5.000	
38	Continuous Members 38	Contin. member	8,64,72,80,88	5.000	
39	Continuous Members 39	Contin. member	12,17	1.100	
40	Continuous Members 40	Contin. member	13,15	1.100	
41	Continuous Members 41	Contin. member	11,37	1.100	
42	Continuous Members 42	Contin. member	10,36	1.100	

CROSS-SECTIONS



2.1 Load Cases

Load Case	Load Case Description	EN 1990 | LST Action Category	Self-Weight - Factor in Direction			
			Active	X	Y	Z
LC1	Self-weight	Permanent	x	0.000	0.000	-1.000
LC2	P1	Permanent/Imposed	-			
LC3	P2	Permanent/Imposed	-			
LC4	Wind in +X	Wind	-			
LC5	Wind in -X	Wind	-			
LC6	Wind in +Y	Wind	-			
LC7	Ice	Snow / ice	-			
LC8	Snow	Snow / ice	-			

2.1.1 Load Cases - Calculation Parameters

Load Case	Load Case Description	Calculation Parameters		
LC1	Self-weight	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC2	P1	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC3	P2	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC4	Wind in +X	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC5	Wind in -X	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC6	Wind in +Y	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC7	Ice	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC8	Snow	Method of analysis	: x	Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: x	Newton-Raphson
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)

2.7 Result Combinations

Result Combin	Description	Loading
RC1	1.00*LC1/p	LC1/p
RC2	1.00*LC2 + 1.00*LC3	LC2 + LC3
RC3	1.00*LC4 or 1.00*LC5 or 1.00*LC6	LC4 or to LC6
RC4	1.00*LC7 or 1.00*LC8	LC7 or LC8
RC5		1.35*RC1/p + 1.35*RC2 + 1.3*RC3/p + 0.91*RC4

2.7 Result Combinations

Result Combin	Description	Loading
RC6		1.35*RC1/p + 1.35*RC2 + 0.78*RC3 + 1.3*RC4/p
RC7	1.00*LC4 or 1.00*LC5 or 1.00*LC6	LC4 or to LC6
RC8		RC1/p + RC2 + RC7/p + 0.7*RC4
RC9		RC1/p + RC2 + 0.6*RC7 + RC4/p
RC10	1.00*LC4 or 1.00*LC5 or 1.00*LC6	LC4 or to LC6
RC11		RC1/p + RC2 + 0.2*RC10/p + 0.2*RC4
RC12		RC1/p + RC2 + 0*RC10 + 0.5*RC4/p
RC13	1.00*LC4 or 1.00*LC5 or 1.00*LC6	LC4 or to LC6
RC14		RC1/p + RC2 + 0*RC13 + 0.2*RC4
RC15	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	RC5/p or RC6/p
RC16	SLS - Characteristic	RC8/p or RC9/p
RC17	SLS - Frequent	RC11/p or RC12/p
RC18	SLS - Quasi-permanent	RC14/p

LC1

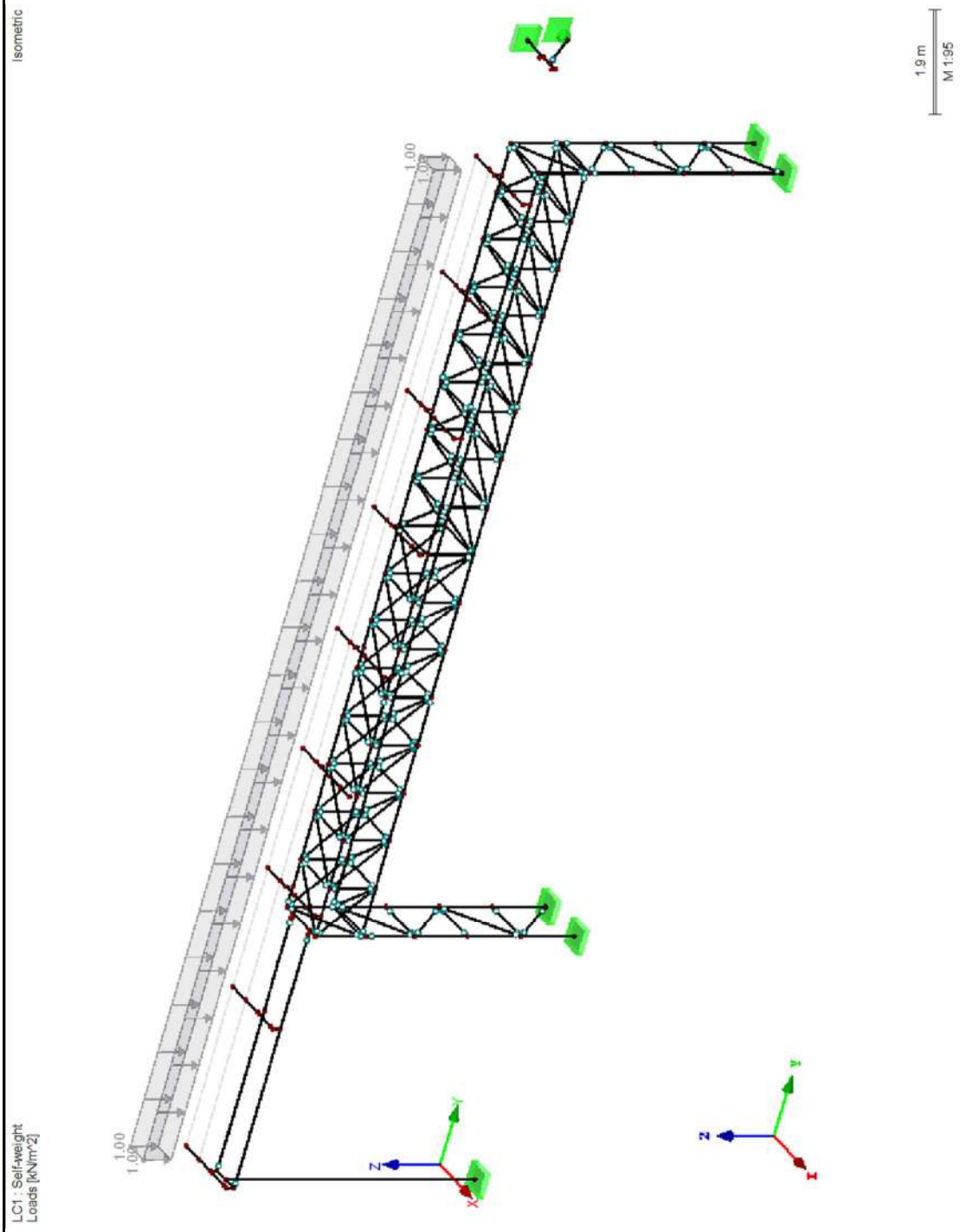
Self-weight

3.15 Generated Loads

LC1: Self-weight

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Perpendicular to the plane		:	x z
	Member load direction	Direction of generated member loads:		:	x Local in x, y, z
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	1.00 kN/m²
	Boundary of the area load plane	Corner nodes		:	133,164,165,134
		Note		:	Each row in the drop down list box denotes one plane
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.104 kN
			Z	:	-10.370 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-11.805 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-108.079 kNm
			Y	:	-4.666 kNm
			Z	:	-0.047 kNm
		$\Sigma M_{Members}$	X	:	-120.033 kNm
			Y	:	-5.312 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	8
		Σ cell area		:	10.371 m²
	Convert loads to members No.			:	246,250,251,259,280,287,296, 305,314
	Correction factors for loaded members	Members	280,314	:	2

LC1: Self-weight



LC2

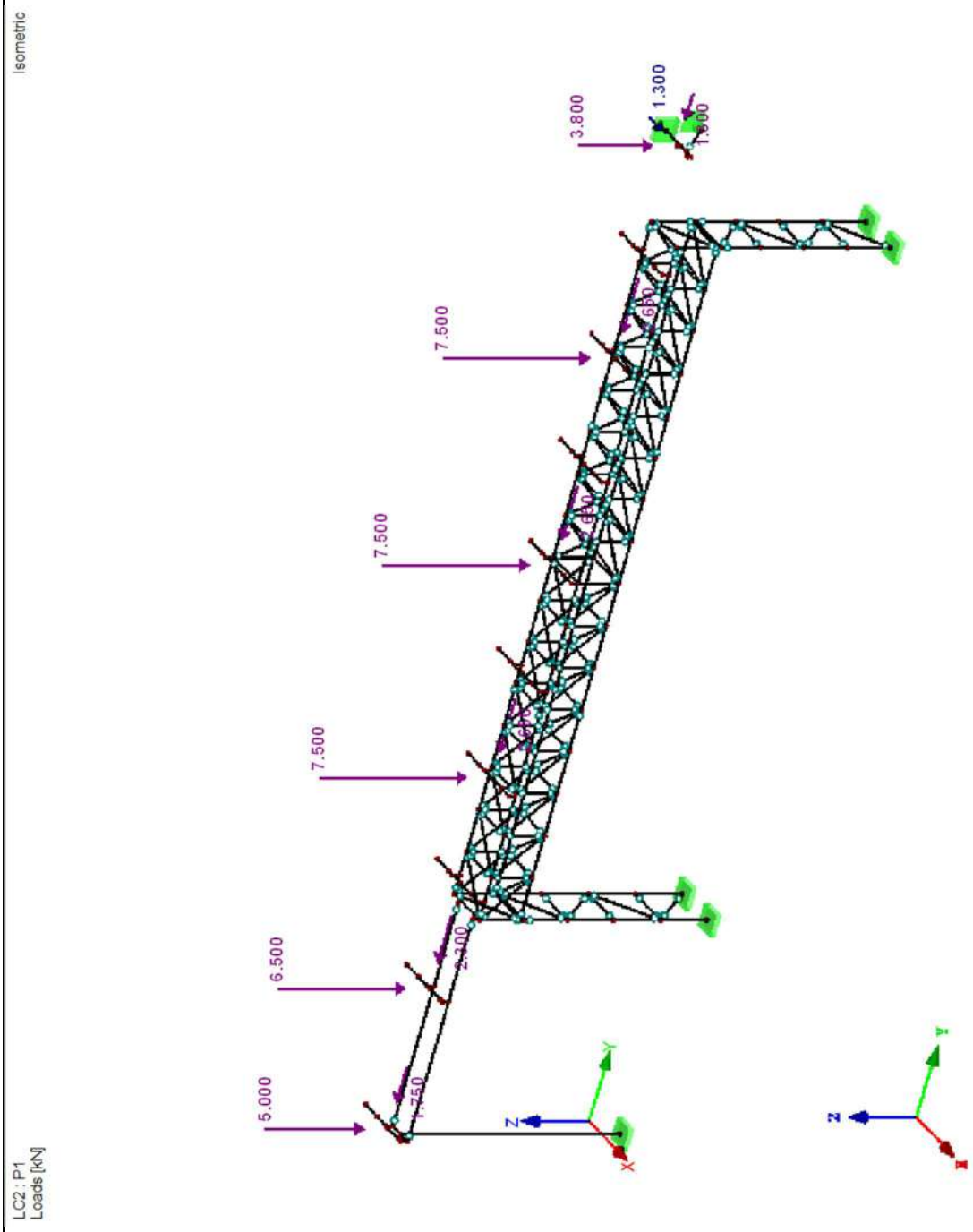
P1

3.1 Nodal Loads - By Components - Coordinate System

LC2: P1

No.	On Nodes No.	Coordinate System	Force [kN] P_X / P_U	P_Y / P_V	P_Z / P_W	Moment [kNm] M_X / M_U	M_Y / M_V	M_Z / M_W
1	16	0 | Global XYZ	0.000	-1.750	-5.000	0.000	0.000	0.000
2	19	0 | Global XYZ	0.000	-2.300	-6.500	0.000	0.000	0.000
3	22,29	0 | Global XYZ	0.000	-2.650	-7.500	0.000	0.000	0.000
5	36	0 | Global XYZ	0.000	-2.650	-7.500	0.000	0.000	0.000
6	49	0 | Global XYZ	1.300	-1.300	-3.800	0.000	0.000	0.000

LC2: P1



LC3

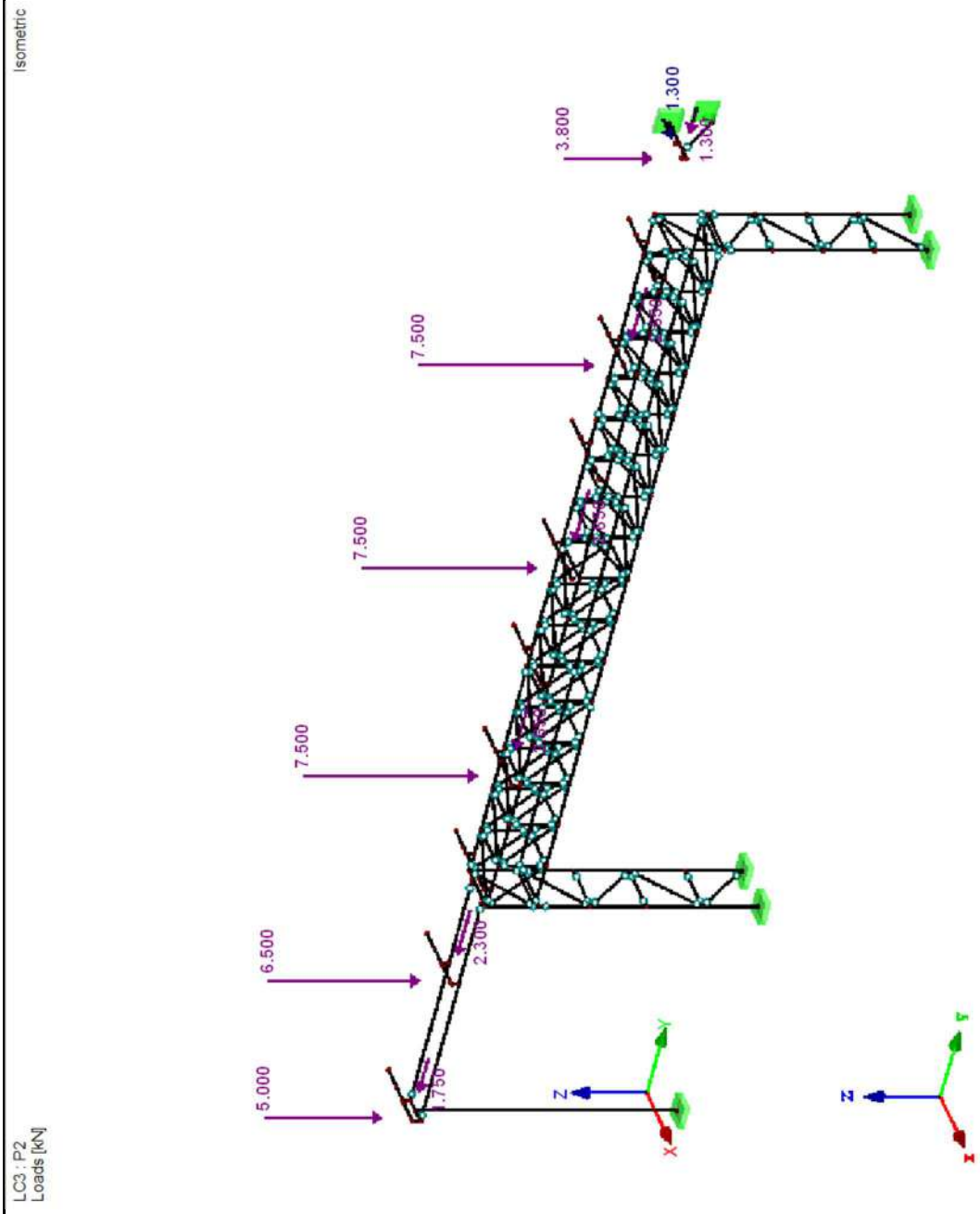
P2

3.1 Nodal Loads - By Components - Coordinate System

LC3: P2

No.	On Nodes No.	Coordinate System	Force [kN] P_X / P_U	P_Y / P_V	P_Z / P_W	Moment [kNm] M_X / M_U	M_Y / M_V	M_Z / M_W
1	15	0 | Global XYZ	0.000	-1.750	-5.000	0.000	0.000	0.000
2	18	0 | Global XYZ	0.000	-2.300	-6.500	0.000	0.000	0.000
3	21,28	0 | Global XYZ	0.000	-2.650	-7.500	0.000	0.000	0.000
5	35	0 | Global XYZ	0.000	-2.650	-7.500	0.000	0.000	0.000
6	47	0 | Global XYZ	1.300	-1.300	-3.800	0.000	0.000	0.000

LC3: P2



LC4

Wind in +X

3.2 Member Loads

LC4: Wind in +X

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters		
							Symbol	Value	Unit
1	Members	7	Force	Uniform	XL	True Length	p	0.190	kN/m
2	Members		Force	Uniform	XL	True Length	p	0.150	kN/m
	1-4,11,13,15,17,31,36,37,39,54,55,243,244,247,248,260-265,324,325								

LC4

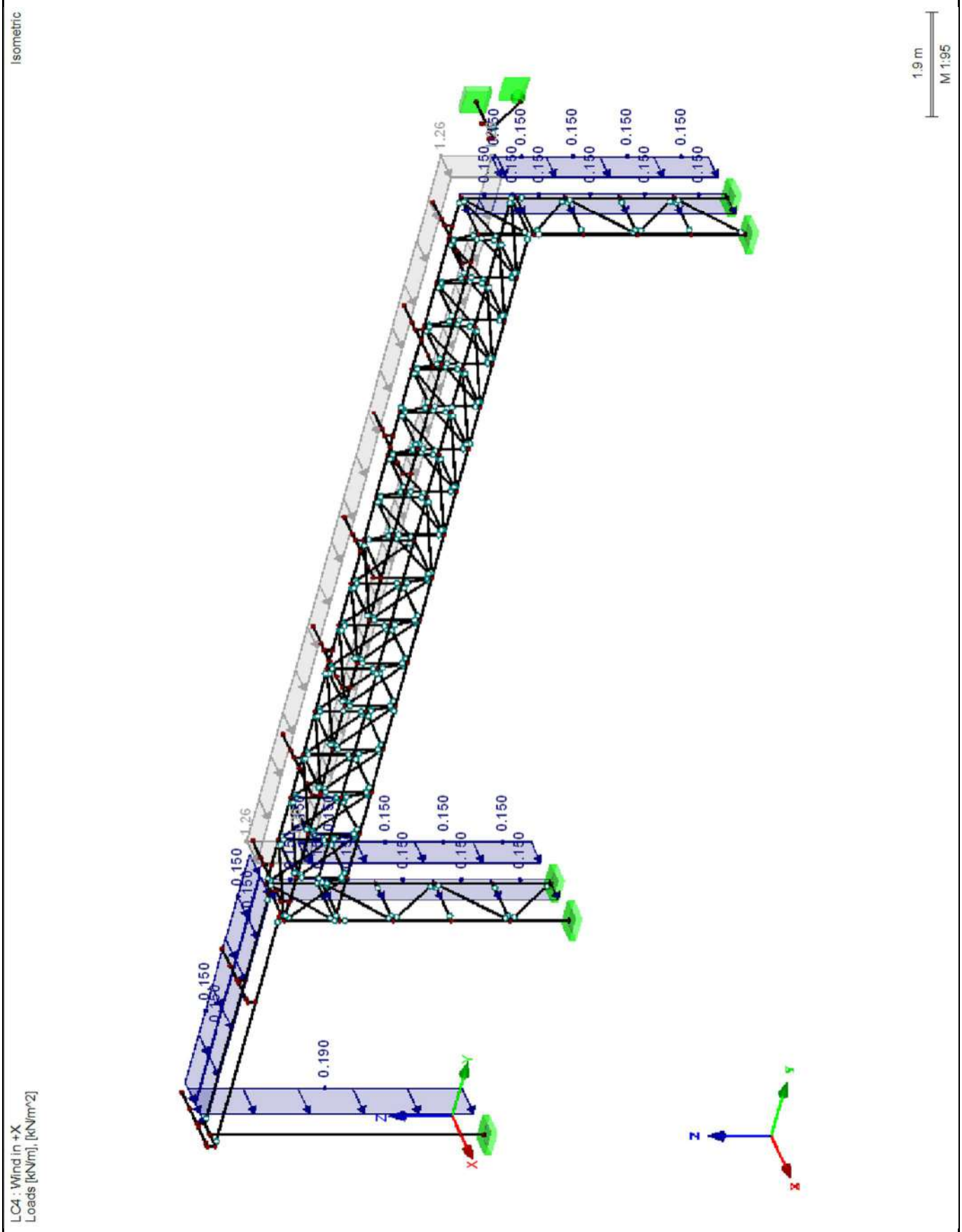
Wind in +X

3.15 Generated Loads

LC4: Wind in +X

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Perpendicular to the plane		:	x z
	Member load direction	Direction of generated member loads:		:	x Local in x, y, z
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	1.26 kN/m²
	Boundary of the area load plane	Corner nodes		:	13,7,3,11
		Note		:	Each row in the drop down list box denotes one plane
	Generating total loads in direction	ΣP_{Areas}	X	:	20.160 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
		$\Sigma P_{Members}$	X	:	20.159 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
	Total moment to the origin	ΣM_{Areas}	X	:	0.000 kNm
			Y	:	92.736 kNm
			Z	:	-270.144 kNm
		$\Sigma M_{Members}$	X	:	0.000 kNm
			Y	:	92.733 kNm
			Z	:	-270.136 kNm
	Cells selected for generating	Σ number of cells		:	32
		Σ cell area		:	16.000 m²
	Convert loads to members No.			:	5,8,10,12,29,45,58,62,64,66,70,72,74,79,80,82,87,88,90,95,96,98,103,104,106,111,112,114,119,120,122,127,128,130,135,136,138,143,144,146,151,152,154,159,160,162,167,168,170,175,176,180,184,188,192,196,200,204,208,210,214,218,222,226,230,234,238,289,299,308,317

LC4: Wind in +X


Isometric
1.9 m
M 1:95
1.26
0.150
0.190
LC4 : Wind in +X
Loads [kN/m], [kN/m^2]

LC5

Wind in -X

3.2 Member Loads

LC5: Wind in -X

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
1	Members	7	Force	Uniform	XL	True Length	p	-0.190	kN/m
2	Members	1-4,10,12,15,17,31,36,37,39,55,243,244,247,248,260-265,324,325	Force	Uniform	XL	True Length	p	-0.150	kN/m
4	Members	54	Force	Uniform	XL	True Length	p	-0.150	kN/m

LC5

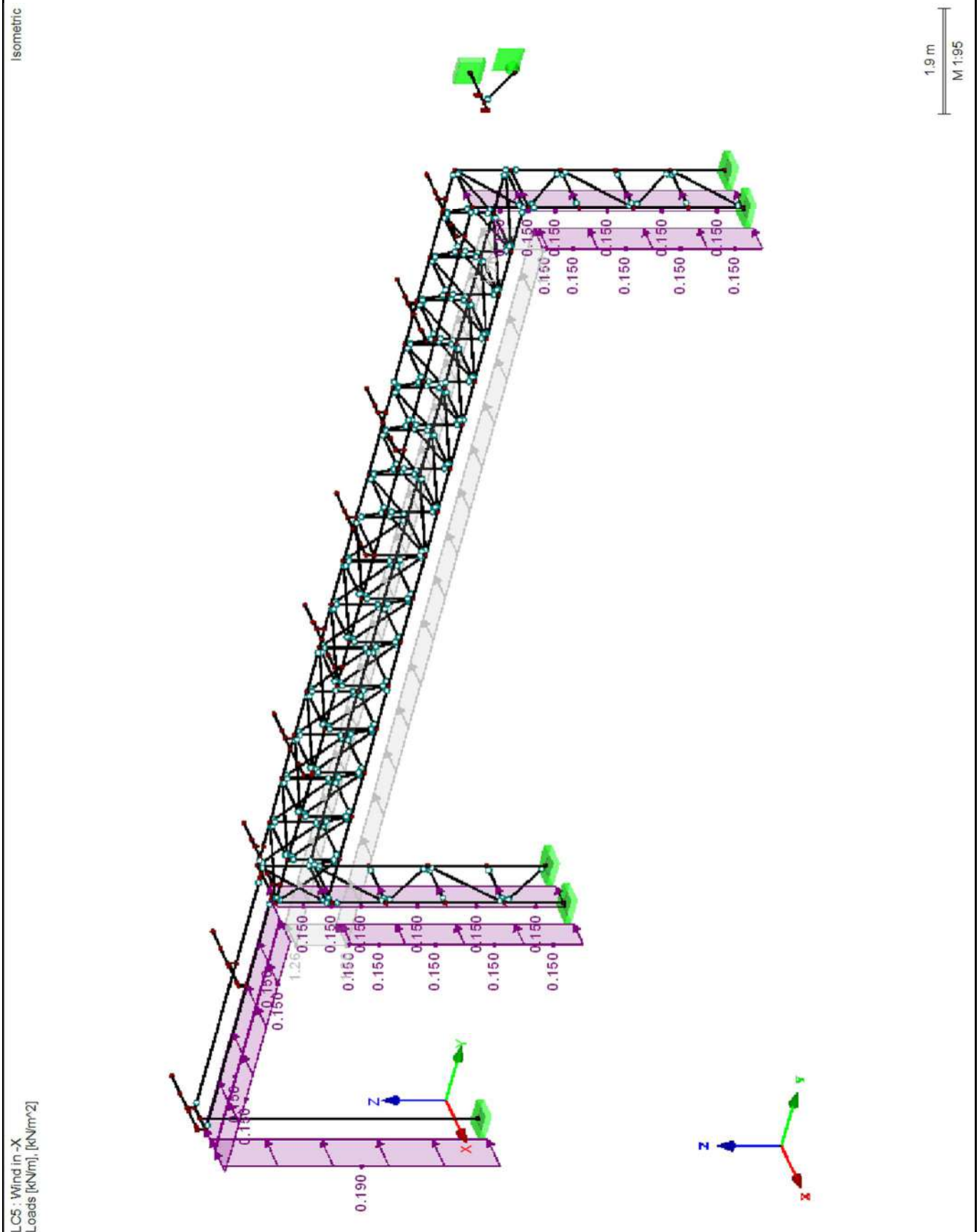
Wind in -X

3.15 Generated Loads

LC5: Wind in -X

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Perpendicular to the plane		:	x z
	Member load direction	Direction of generated member loads:		:	x Local in x, y, z
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	-1.26 kN/m²
	Boundary of the area load plane	Corner nodes		:	12,4,8,14
		Note		:	Each row in the drop down list box denotes one plane
	Generating total loads in direction	ΣP_{Areas}	X	:	-20.160 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
		$\Sigma P_{Members}$	X	:	-20.159 kN
			Y	:	0.000 kN
			Z	:	0.000 kN
	Total moment to the origin	ΣM_{Areas}	X	:	0.000 kNm
			Y	:	-92.736 kNm
			Z	:	270.144 kNm
		$\Sigma M_{Members}$	X	:	0.000 kNm
			Y	:	-92.733 kNm
			Z	:	270.136 kNm
	Cells selected for generating	Σ number of cells		:	32
		Σ cell area		:	16.000 m²
	Convert loads to members No.			:	6,9,11,13,27,44,59,63,65,67,71,73,75,78,81,83,86,89,91,94,97,99,102,105,107,110,113,115,118,121,123,126,129,131,134,137,139,142,145,147,150,153,155,158,161,163,166,169,171,174,177,179,183,187,191,195,199,203,207,211,215,219,223,227,231,235,239,290,298,307,316

LC5: Wind in -X



LC6

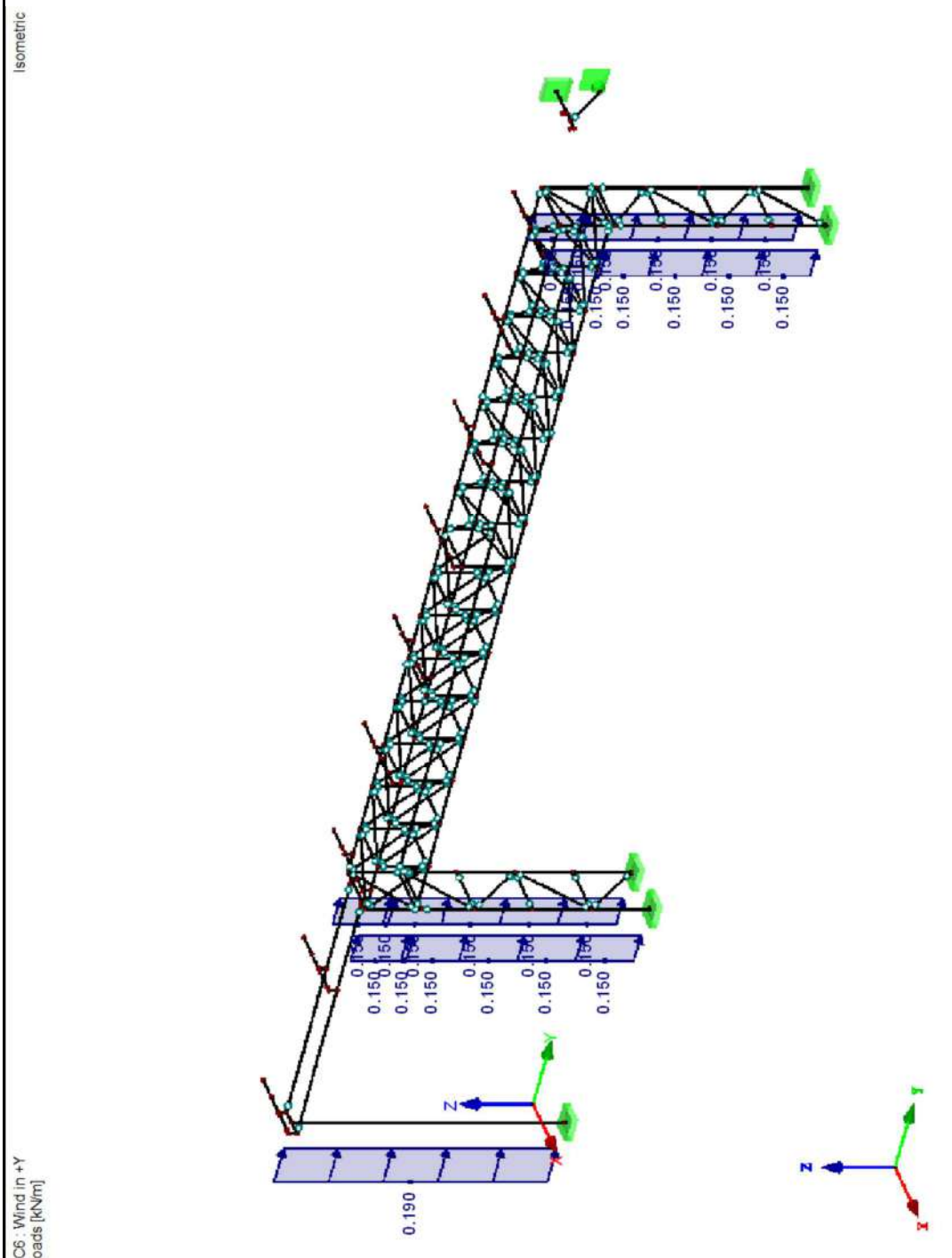
Wind in +Y

3.2 Member Loads

LC6: Wind in +Y

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
1	Members	7	Force	Uniform	YL	True Length	p	0.190	kN/m
2	Members	1-4,10-13,15,17,36,37,243,244,247,248,260-265,324,325	Force	Uniform	YL	True Length	p	0.150	kN/m

LC6: Wind in +Y



LC7

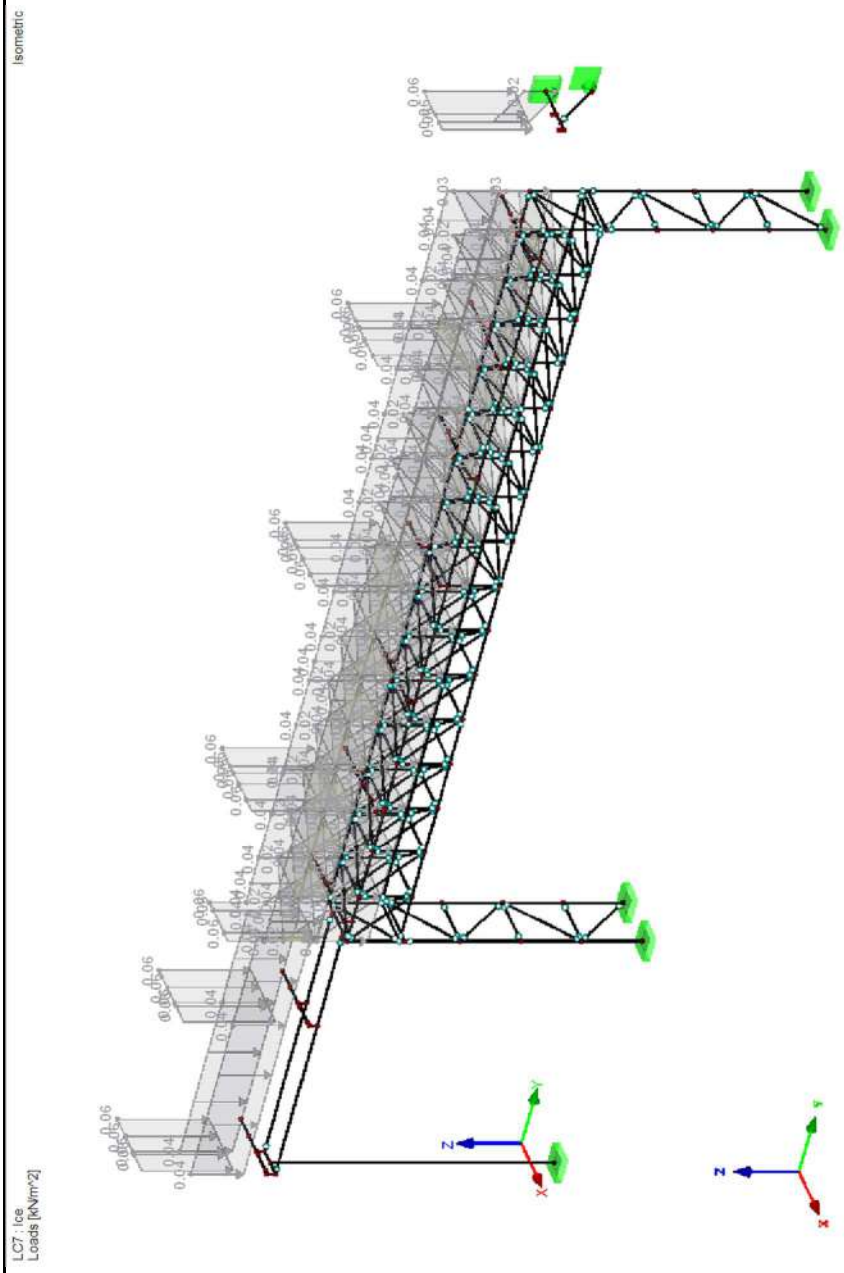
Ice

3.15 Generated Loads

LC7: Ice

No.	Load Description					
1	From Coating					
	Members with coating load	Members No.		:	289,5,290,6,8-14,16,18,20-25,27,29-33,38-41,44-49,54,55,58-93,298,94,299,95-133,307,134,308,135-173,316,174,317,175-241,246,250,251,259,274-278,318,279,280,319,281	
	Coating	Thickness	t	:	8.5	mm
		Specific weight of coating	γ_S	:	8.82	kN/m^3

LC7: Ice



LC8

Snow

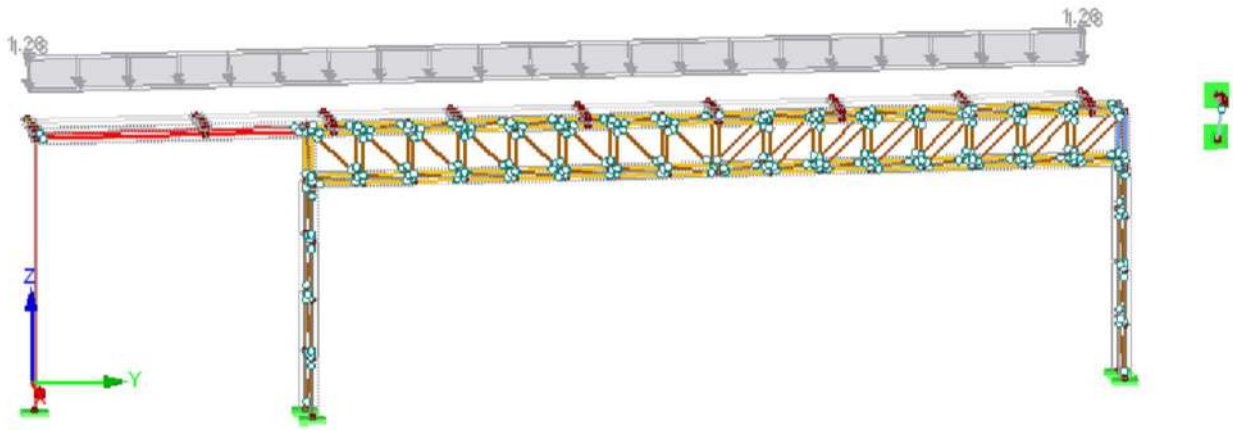
3.15 Generated Loads

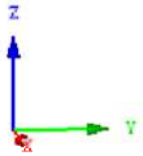
LC8: Snow

No.	Load Description				
1	From Area Loads via Plane				
	Area load direction	Perpendicular to the plane		:	x z
	Member load direction	Direction of generated member loads:		:	x Local in x, y, z
	Area of load application	x Fully closed plane			
	Load distribution type:	x Combined			
	Area load magnitude	x Constant		:	1.28 kN/m^2
	Boundary of the area load plane	Corner nodes		:	133,164,165,134
		Note		:	Each row in the drop down list box denotes one plane
	Generating total loads in direction	ΣP_{Areas}	X	:	0.000 kN
			Y	:	0.133 kN
			Z	:	-13.274 kN
		$\Sigma P_{Members}$	X	:	0.000 kN
			Y	:	0.000 kN
			Z	:	-14.045 kN
	Total moment to the origin	ΣM_{Areas}	X	:	-138.341 kNm
			Y	:	-5.973 kNm
			Z	:	-0.060 kNm
		$\Sigma M_{Members}$	X	:	-153.642 kNm
			Y	:	-6.320 kNm
			Z	:	0.000 kNm
	Cells selected for generating	Σ number of cells		:	8
		Σ cell area		:	10.371 m^2
	Convert loads to members No.			:	246,250,251,259,280,287,296, 305,314
	Correction factors for loaded members	Members	314	:	2

LC8 : Snow
Loads [kN/m^2]

Isometric





4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] $P_{X'}$	$P_{Y'}$	$P_{Z'}$	Support Moments [kNm] $M_{X'}$	$M_{Y'}$	$M_{Z'}$	
1	RC1	Max	-0.65	-0.10	-21.76	0.46	0.02	0.00	1.00*LC1/p
		Min	-0.65	-0.10	-21.76	0.46	0.02	0.00	1.00*LC1/p
	RC2	Max	0.22	0.00	0.00	23.22	0.04	0.05	1.00*LC2 + 1.00*LC3
		Min	-0.29	-5.13	-16.08	0.00	0.00	0.00	1.00*LC2 + 1.00*LC3
	RC3	Max	13.23	0.84	59.21	0.18	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-13.23	-0.05	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC4	Max	0.00	0.00	0.00	0.13	0.00	0.00	1.00*LC7 or 1.00*LC8
		Min	-0.42	-0.03	-11.54	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
	RC5	Max	16.63	0.96	47.61	32.33	0.40	0.07	
		Min	-18.85	-7.14	-138.56	-2.34	-0.31	0.00	
	RC6	Max	9.75	0.52	16.81	32.29	0.28	0.06	
		Min	-12.14	-7.13	-112.28	-1.15	-0.18	0.00	
	RC7	Max	13.23	0.84	59.21	0.18	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-13.23	-0.05	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC8	Max	12.81	0.74	37.46	23.96	0.31	0.05	
		Min	-14.47	-5.29	-105.13	-1.82	-0.24	0.00	
	RC9	Max	7.52	0.40	13.77	23.93	0.21	0.05	
		Min	-9.30	-5.29	-84.91	-0.90	-0.14	0.00	
	RC10	Max	13.23	0.84	59.21	0.18	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-13.23	-0.05	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC11	Max	2.22	0.07	-9.91	23.75	0.11	0.05	
		Min	-3.67	-5.24	-51.99	0.01	-0.03	0.00	
	RC12	Max	-0.42	-0.10	-21.76	23.75	0.06	0.05	
		Min	-1.15	-5.24	-43.61	0.46	0.01	0.00	
	RC13	Max	13.23	0.84	59.21	0.18	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-13.23	-0.05	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	-0.42	-0.10	-21.76	23.71	0.06	0.05	
		Min	-1.02	-5.23	-40.15	0.46	0.02	0.00	
	RC15	Max	16.63	0.96	47.61	32.33	0.40	0.07	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-18.85	-7.14	-138.56	-2.34	-0.31	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	12.81	0.74	37.46	23.96	0.31	0.05	SLS - Characteristic
		Min	-14.47	-5.29	-105.13	-1.82	-0.24	0.00	SLS - Characteristic
	RC17	Max	2.22	0.07	-9.91	23.75	0.11	0.05	SLS - Frequent
		Min	-3.67	-5.24	-51.99	0.01	-0.03	0.00	SLS - Frequent
	RC18	Max	-0.42	-0.10	-21.76	23.71	0.06	0.05	SLS - Quasi-permanent
		Min	-1.02	-5.23	-40.15	0.46	0.02	0.00	SLS - Quasi-permanent
2	RC1	Max	0.05	-0.10	-5.04	0.43	0.02	0.00	1.00*LC1/p
		Min	0.05	-0.10	-5.04	0.43	0.02	0.00	1.00*LC1/p
	RC2	Max	0.07	0.00	0.00	23.16	0.04	0.00	1.00*LC2 + 1.00*LC3
		Min	0.00	-5.14	-16.34	0.00	0.00	-0.03	1.00*LC2 + 1.00*LC3
	RC3	Max	0.29	0.84	59.21	0.13	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.29	-0.04	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC4	Max	0.01	0.00	4.71	0.09	0.00	0.00	1.00*LC7 or 1.00*LC8
		Min	0.00	-0.02	-1.54	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
	RC5	Max	0.54	0.97	74.46	32.11	0.41	0.00	
		Min	-0.31	-7.13	-107.24	-2.37	-0.31	-0.04	
	RC6	Max	0.39	0.53	45.51	32.08	0.28	0.00	
		Min	-0.16	-7.12	-77.05	-1.19	-0.18	-0.04	
	RC7	Max	0.29	0.84	59.21	0.13	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.29	-0.04	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] $P_{X'}$	$P_{Y'}$	$P_{Z'}$	Support Moments [kNm] $M_{X'}$	$M_{Y'}$	$M_{Z'}$	
	RC8	Max	0.41	0.75	57.47	23.79	0.31	0.00	
		Min	-0.24	-5.28	-81.67	-1.84	-0.24	-0.03	
	RC9	Max	0.30	0.41	35.20	23.77	0.21	0.00	
		Min	-0.13	-5.27	-58.44	-0.93	-0.14	-0.03	
	RC10	Max	0.29	0.84	59.21	0.13	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.29	-0.04	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC11	Max	0.18	0.07	7.75	23.64	0.11	0.00	
		Min	-0.01	-5.24	-33.52	-0.02	-0.03	-0.03	
	RC12	Max	0.12	-0.10	-2.68	23.64	0.06	0.00	
		Min	0.05	-5.24	-22.14	0.43	0.01	-0.03	
	RC13	Max	0.29	0.84	59.21	0.13	0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.29	-0.04	-59.21	-2.28	-0.25	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	0.12	-0.10	-4.09	23.61	0.06	0.00	
		Min	0.05	-5.24	-21.68	0.43	0.02	-0.03	
	RC15	Max	0.54	0.97	74.46	32.11	0.41	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.31	-7.13	-107.24	-2.37	-0.31	-0.04	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	0.41	0.75	57.47	23.79	0.31	0.00	SLS - Characteristic
		Min	-0.24	-5.28	-81.67	-1.84	-0.24	-0.03	SLS - Characteristic
	RC17	Max	0.18	0.07	7.75	23.64	0.11	0.00	SLS - Frequent
		Min	-0.01	-5.24	-33.52	-0.02	-0.03	-0.03	SLS - Frequent
	RC18	Max	0.12	-0.10	-4.09	23.61	0.06	0.00	SLS - Quasi-permanent
		Min	0.05	-5.24	-21.68	0.43	0.02	-0.03	SLS - Quasi-permanent
5	RC1	Max	-0.05	0.10	-15.86	-0.40	-0.03	0.00	1.00*LC1/p
		Min	-0.05	0.10	-15.86	-0.40	-0.03	0.00	1.00*LC1/p
	RC2	Max	0.00	0.00	0.00	25.86	0.00	0.04	1.00*LC2 + 1.00*LC3
		Min	-0.05	-6.20	-10.48	0.00	-0.03	0.00	1.00*LC2 + 1.00*LC3
	RC3	Max	0.26	0.92	45.87	0.24	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.26	-0.07	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC4	Max	0.00	0.03	0.00	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
		Min	-0.01	0.00	-7.40	-0.12	-0.01	0.00	1.00*LC7 or 1.00*LC8
	RC5	Max	0.27	1.36	38.22	34.69	0.23	0.05	
		Min	-0.48	-8.33	-101.91	-3.94	-0.36	-0.01	
	RC6	Max	0.14	0.89	14.37	34.56	0.12	0.05	
		Min	-0.35	-8.29	-80.95	-2.67	-0.25	0.00	
	RC7	Max	0.26	0.92	45.87	0.24	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.26	-0.07	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC8	Max	0.21	1.04	30.01	25.70	0.18	0.04	
		Min	-0.37	-6.17	-77.38	-3.02	-0.27	0.00	
	RC9	Max	0.11	0.68	11.66	25.61	0.09	0.04	
		Min	-0.27	-6.15	-61.25	-2.04	-0.19	0.00	
	RC10	Max	0.26	0.92	45.87	0.24	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.26	-0.07	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC11	Max	0.00	0.29	-6.68	25.51	0.01	0.04	
		Min	-0.15	-6.12	-36.99	-0.93	-0.10	0.00	
	RC12	Max	-0.05	0.11	-15.86	25.46	-0.03	0.04	
		Min	-0.10	-6.11	-30.03	-0.46	-0.06	0.00	
	RC13	Max	0.26	0.92	45.87	0.24	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-0.26	-0.07	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	-0.05	0.10	-15.86	25.46	-0.03	0.04	
		Min	-0.10	-6.11	-27.81	-0.42	-0.06	0.00	

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] $P_{X'}$	$P_{Y'}$	$P_{Z'}$	Support Moments [kNm] $M_{X'}$	$M_{Y'}$	$M_{Z'}$	
	RC15	Max	0.27	1.36	38.22	34.69	0.23	0.05	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.48	-8.33	-101.91	-3.94	-0.36	-0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	0.21	1.04	30.01	25.70	0.18	0.04	SLS - Characteristic
		Min	-0.37	-6.17	-77.38	-3.02	-0.27	0.00	SLS - Characteristic
	RC17	Max	0.00	0.29	-6.68	25.51	0.01	0.04	SLS - Frequent
		Min	-0.15	-6.12	-36.99	-0.93	-0.10	0.00	SLS - Frequent
	RC18	Max	-0.05	0.10	-15.86	25.46	-0.03	0.04	SLS - Quasi-permanent
		Min	-0.10	-6.11	-27.81	-0.42	-0.06	0.00	SLS - Quasi-permanent
6	RC1	Max	0.20	0.08	-8.06	-0.34	-0.03	0.00	1.00*LC1/p
		Min	0.20	0.08	-8.06	-0.34	-0.03	0.00	1.00*LC1/p
	RC2	Max	0.08	0.00	0.00	25.92	0.00	0.00	1.00*LC2 + 1.00*LC3
		Min	-0.04	-6.18	-10.17	0.00	-0.02	-0.05	1.00*LC2 + 1.00*LC3
	RC3	Max	10.97	0.92	45.87	0.20	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-10.97	-0.06	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC4	Max	0.11	0.01	1.94	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
		Min	0.00	0.00	-1.52	-0.06	-0.01	0.00	1.00*LC7 or 1.00*LC8
	RC5	Max	14.74	1.32	50.52	34.79	0.23	0.01	
		Min	-14.04	-8.31	-85.62	-3.82	-0.35	-0.07	
	RC6	Max	9.08	0.85	27.42	34.68	0.12	0.00	
		Min	-8.34	-8.28	-62.37	-2.52	-0.25	-0.07	
	RC7	Max	10.97	0.92	45.87	0.20	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-10.97	-0.06	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC8	Max	11.33	1.01	39.17	25.78	0.18	0.01	
		Min	-10.81	-6.16	-65.16	-2.93	-0.27	-0.05	
	RC9	Max	6.97	0.65	21.40	25.70	0.10	0.00	
		Min	-6.42	-6.14	-47.27	-1.93	-0.19	-0.05	
	RC10	Max	10.97	0.92	45.87	0.20	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-10.97	-0.06	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC11	Max	2.50	0.27	1.50	25.62	0.01	0.00	
		Min	-2.03	-6.12	-27.71	-0.86	-0.10	-0.05	
	RC12	Max	0.34	0.09	-7.09	25.57	-0.03	0.00	
		Min	0.16	-6.10	-18.99	-0.37	-0.06	-0.05	
	RC13	Max	10.97	0.92	45.87	0.20	0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-10.97	-0.06	-45.87	-2.54	-0.21	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	0.30	0.08	-7.67	25.57	-0.03	0.00	
		Min	0.16	-6.10	-18.53	-0.35	-0.06	-0.05	
	RC15	Max	14.74	1.32	50.52	34.79	0.23	0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-14.04	-8.31	-85.62	-3.82	-0.35	-0.07	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	11.33	1.01	39.17	25.78	0.18	0.01	SLS - Characteristic
		Min	-10.81	-6.16	-65.16	-2.93	-0.27	-0.05	SLS - Characteristic
	RC17	Max	2.50	0.27	1.50	25.62	0.01	0.00	SLS - Frequent
		Min	-2.03	-6.12	-27.71	-0.86	-0.10	-0.05	SLS - Frequent
	RC18	Max	0.30	0.08	-7.67	25.57	-0.03	0.00	SLS - Quasi-permanent
		Min	0.16	-6.10	-18.53	-0.35	-0.06	-0.05	SLS - Quasi-permanent
9	RC1	Max	0.45	0.02	-5.72	-0.12	-0.02	-0.07	1.00*LC1/p
		Min	0.45	0.02	-5.72	-0.12	-0.02	-0.07	1.00*LC1/p
	RC2	Max	0.32	0.00	0.00	7.88	0.10	0.03	1.00*LC2 + 1.00*LC3
		Min	-0.32	-1.35	-14.93	0.00	-0.10	-0.03	1.00*LC2 + 1.00*LC3
	RC3	Max	1.00	0.77	0.00	0.00	2.54	0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-1.00	0.00	0.00	-1.39	-2.55	-0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6

4.1 Nodes - Support Forces

Result Combinations

Node No.	RC		Support Forces [kN] $P_{X'}$	$P_{Y'}$	$P_{Z'}$	Support Moments [kNm] $M_{X'}$	$M_{Y'}$	$M_{Z'}$	
	RC4	Max	0.31	0.01	0.00	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
		Min	0.00	0.00	-1.76	-0.03	-0.04	-0.06	1.00*LC7 or 1.00*LC8
	RC5	Max	2.63	1.04	-7.72	10.49	3.42	-0.01	
		Min	-1.12	-1.80	-29.49	-2.00	-3.51	-0.24	
	RC6	Max	2.23	0.64	-7.72	10.48	2.10	-0.03	
		Min	-0.61	-1.80	-30.17	-1.29	-2.20	-0.24	
	RC7	Max	1.00	0.77	0.00	0.00	2.54	0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-1.00	0.00	0.00	-1.39	-2.55	-0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC8	Max	1.99	0.80	-5.72	7.77	2.63	0.00	
		Min	-0.87	-1.33	-21.89	-1.53	-2.69	-0.18	
	RC9	Max	1.68	0.49	-5.72	7.77	1.61	-0.02	
		Min	-0.47	-1.33	-22.41	-0.99	-1.69	-0.18	
	RC10	Max	1.00	0.77	0.00	0.00	2.54	0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-1.00	0.00	0.00	-1.39	-2.55	-0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC11	Max	1.04	0.18	-5.72	7.76	0.59	-0.03	
		Min	-0.07	-1.33	-21.01	-0.40	-0.64	-0.12	
	RC12	Max	0.93	0.03	-5.72	7.76	0.08	-0.04	
		Min	0.13	-1.33	-21.53	-0.14	-0.14	-0.13	
	RC13	Max	1.00	0.77	0.00	0.00	2.54	0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	-1.00	0.00	0.00	-1.39	-2.55	-0.03	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	0.84	0.02	-5.72	7.76	0.08	-0.04	
		Min	0.13	-1.33	-21.01	-0.13	-0.13	-0.11	
	RC15	Max	2.63	1.04	-7.72	10.49	3.42	-0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-1.12	-1.80	-30.17	-2.00	-3.51	-0.24	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	1.99	0.80	-5.72	7.77	2.63	0.00	SLS - Characteristic
		Min	-0.87	-1.33	-22.41	-1.53	-2.69	-0.18	SLS - Characteristic
	RC17	Max	1.04	0.18	-5.72	7.76	0.59	-0.03	SLS - Frequent
		Min	-0.07	-1.33	-21.53	-0.40	-0.64	-0.13	SLS - Frequent
	RC18	Max	0.84	0.02	-5.72	7.76	0.08	-0.04	SLS - Quasi-permanent
		Min	0.13	-1.33	-21.01	-0.13	-0.13	-0.11	SLS - Quasi-permanent
44*	RC1	Max	0.14	0.00	0.19	0.00	0.03	0.00	1.00*LC1/p
		Min	0.14	0.00	0.19	0.00	0.03	0.00	1.00*LC1/p
	RC2	Max	1.46	0.00	9.71	2.25	0.66	0.06	1.00*LC2 + 1.00*LC3
		Min	-0.96	-2.40	0.00	0.00	0.00	0.00	1.00*LC2 + 1.00*LC3
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC4	Max	0.04	0.00	0.05	0.00	0.01	0.00	1.00*LC7 or 1.00*LC8
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
	RC5	Max	2.19	0.00	13.40	3.04	0.94	0.08	
		Min	-1.12	-3.24	0.25	0.00	0.05	0.00	
	RC6	Max	2.20	0.00	13.42	3.04	0.95	0.08	
		Min	-1.12	-3.24	0.25	0.00	0.05	0.00	
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC8	Max	1.62	0.00	9.93	2.25	0.70	0.06	
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	
	RC9	Max	1.63	0.00	9.94	2.25	0.70	0.06	
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	
	RC10	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6

4.1 Nodes - Support Forces

Result Combinations

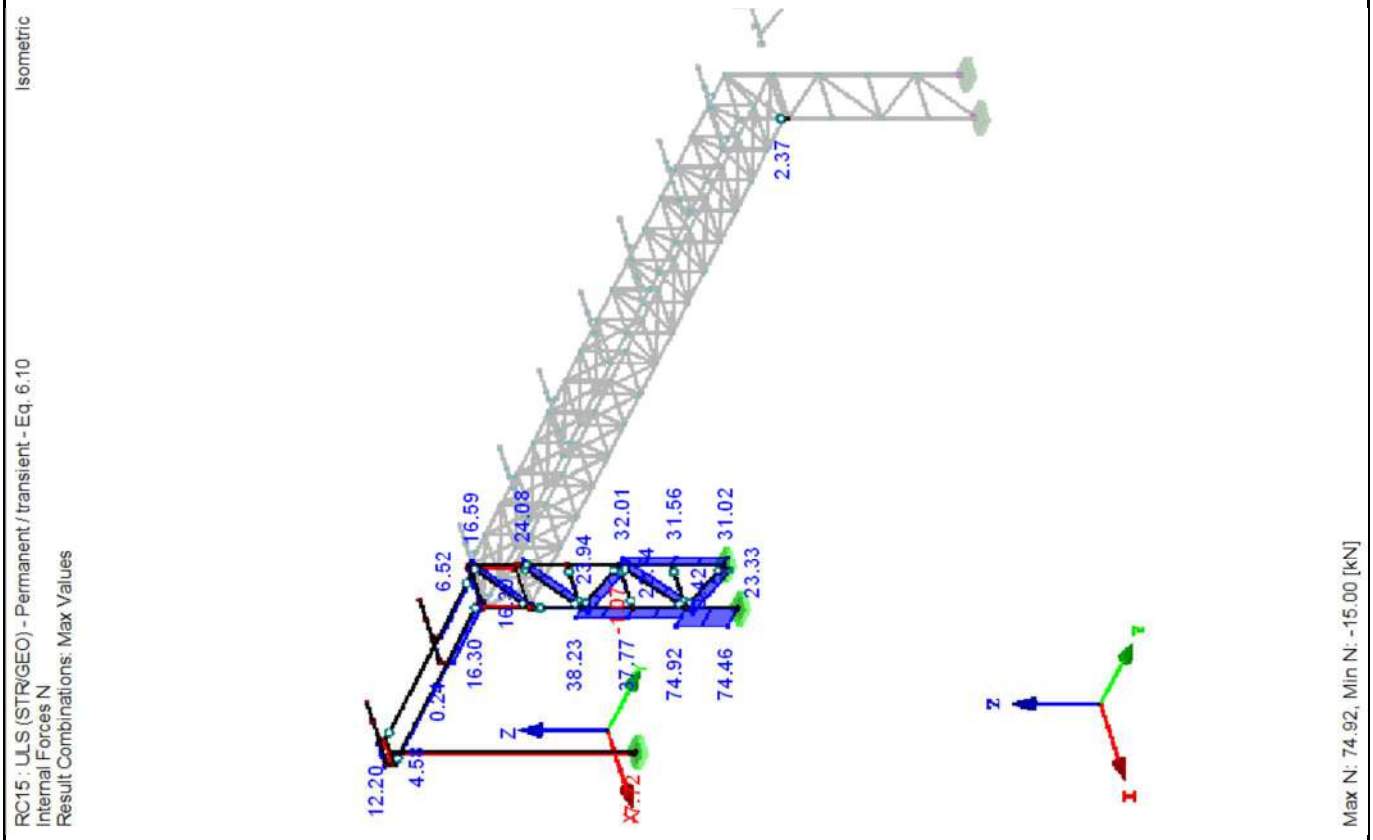
Node No.	RC		Support Forces [kN] $P_{X'}$	$P_{Y'}$	$P_{Z'}$	Support Moments [kNm] $M_{X'}$	$M_{Y'}$	$M_{Z'}$	
	RC11	Max	1.60	0.00	9.90	2.25	0.70	0.06	
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	
	RC12	Max	1.61	0.00	9.92	2.25	0.70	0.06	
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	
	RC13	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	1.60	0.00	9.90	2.25	0.70	0.06	
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	
	RC15	Max	2.20	0.00	13.42	3.04	0.95	0.08	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-1.12	-3.24	0.25	0.00	0.05	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	1.63	0.00	9.94	2.25	0.70	0.06	SLS - Characteristic
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	SLS - Characteristic
	RC17	Max	1.61	0.00	9.92	2.25	0.70	0.06	SLS - Frequent
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	SLS - Frequent
	RC18	Max	1.60	0.00	9.90	2.25	0.70	0.06	SLS - Quasi-permanent
		Min	-0.83	-2.40	0.19	0.00	0.03	0.00	SLS - Quasi-permanent
45*	RC1	Max	0.24	0.00	-0.19	0.00	0.00	0.00	1.00*LC1/p
		Min	0.24	0.00	-0.19	0.00	0.00	0.00	1.00*LC1/p
	RC2	Max	7.11	0.00	0.00	0.00	0.00	0.35	1.00*LC2 + 1.00*LC3
		Min	0.00	-0.20	-7.11	0.00	0.00	0.00	1.00*LC2 + 1.00*LC3
	RC3	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC4	Max	0.06	0.00	0.00	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
		Min	0.00	0.00	-0.05	0.00	0.00	0.00	1.00*LC7 or 1.00*LC8
	RC5	Max	9.98	0.00	-0.25	0.00	0.00	0.47	
		Min	0.33	-0.27	-9.89	0.00	0.00	0.00	
	RC6	Max	10.01	0.00	-0.25	0.00	0.00	0.47	
		Min	0.33	-0.27	-9.91	0.00	0.00	0.00	
	RC7	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC8	Max	7.39	0.00	-0.19	0.00	0.00	0.35	
		Min	0.24	-0.20	-7.33	0.00	0.00	0.00	
	RC9	Max	7.41	0.00	-0.19	0.00	0.00	0.35	
		Min	0.24	-0.20	-7.34	0.00	0.00	0.00	
	RC10	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC11	Max	7.36	0.00	-0.19	0.00	0.00	0.35	
		Min	0.24	-0.20	-7.30	0.00	0.00	0.00	
	RC12	Max	7.38	0.00	-0.19	0.00	0.00	0.35	
		Min	0.24	-0.20	-7.32	0.00	0.00	0.00	
	RC13	Max	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
		Min	0.00	0.00	0.00	0.00	0.00	0.00	1.00*LC4 or 1.00*LC5 or 1.00*LC6
	RC14	Max	7.36	0.00	-0.19	0.00	0.00	0.35	
		Min	0.24	-0.20	-7.30	0.00	0.00	0.00	
	RC15	Max	10.01	0.00	-0.25	0.00	0.00	0.47	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	0.33	-0.27	-9.91	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC16	Max	7.41	0.00	-0.19	0.00	0.00	0.35	SLS - Characteristic
		Min	0.24	-0.20	-7.34	0.00	0.00	0.00	SLS - Characteristic
	RC17	Max	7.38	0.00	-0.19	0.00	0.00	0.35	SLS - Frequent
		Min	0.24	-0.20	-7.32	0.00	0.00	0.00	SLS - Frequent

4.1 Nodes - Support Forces

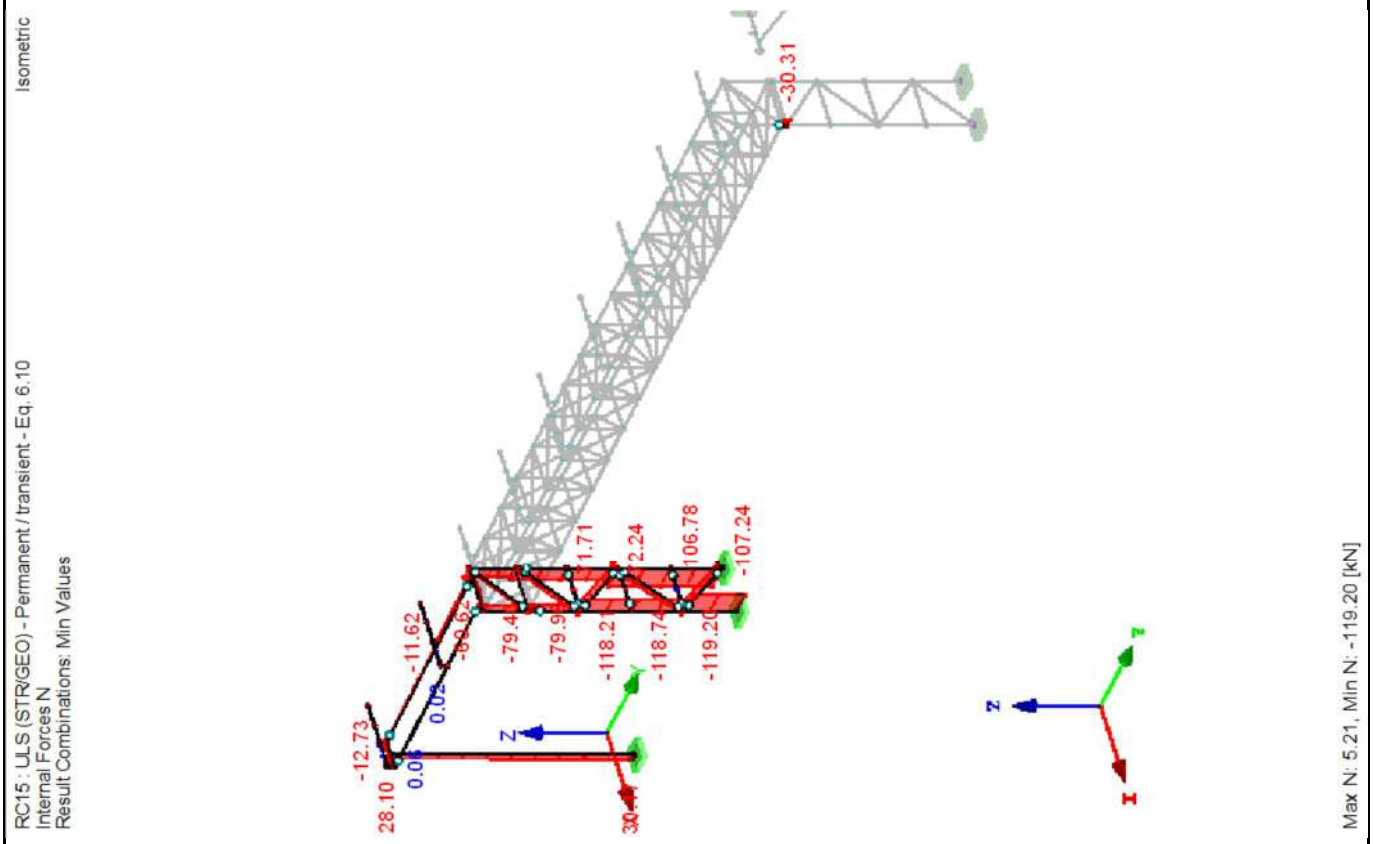
Result Combinations

Node No.	RC		Support Forces [kN]			Support Moments [kNm]			
			$P_{X'}$	$P_{Y'}$	$P_{Z'}$	$M_{X'}$	$M_{Y'}$	$M_{Z'}$	
	RC18	Max	7.36	0.00	-0.19	0.00	0.00	0.35	SLS - Quasi-permanent
		Min	0.24	-0.20	-7.30	0.00	0.00	0.00	SLS - Quasi-permanent

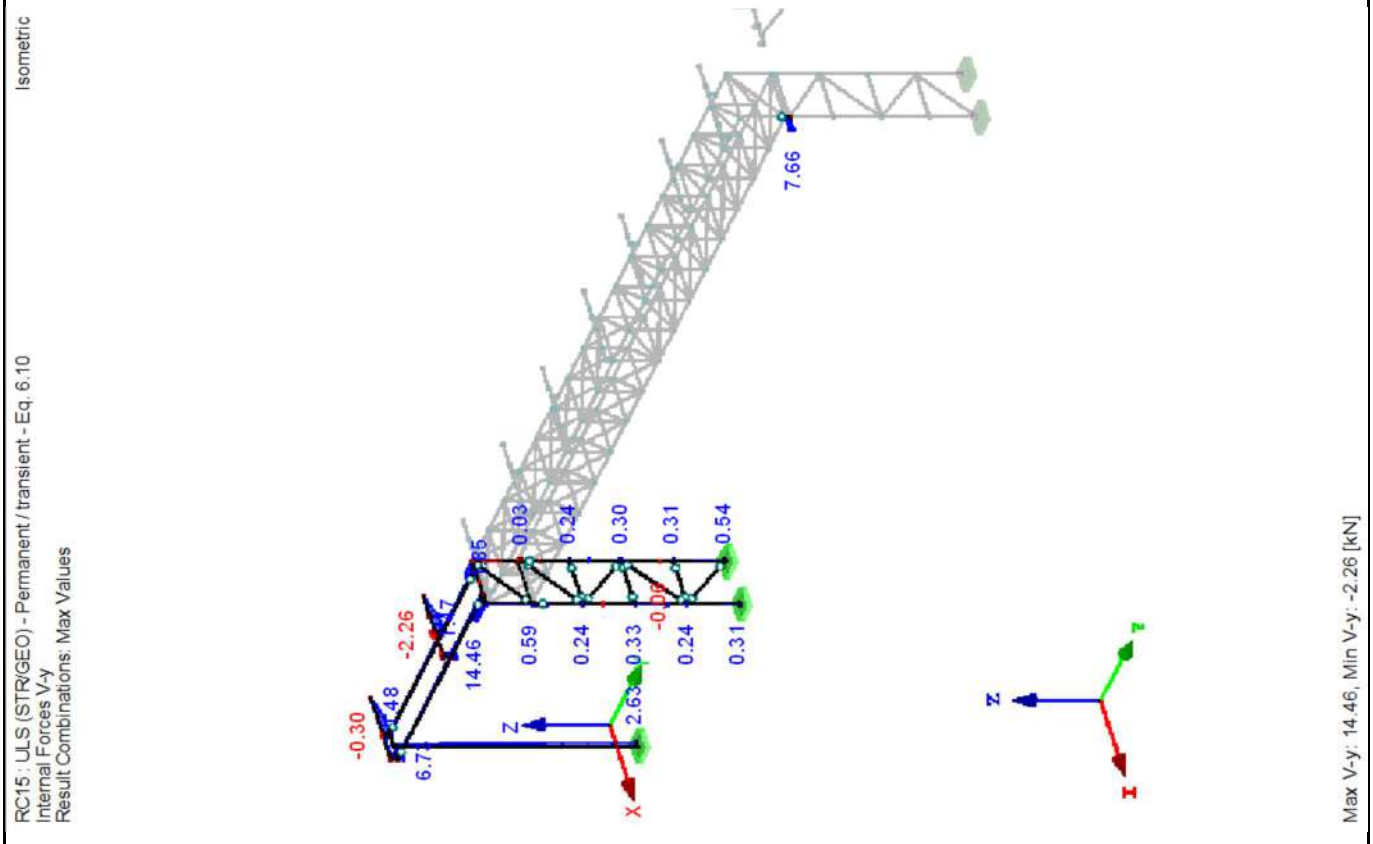
Internal forces N max



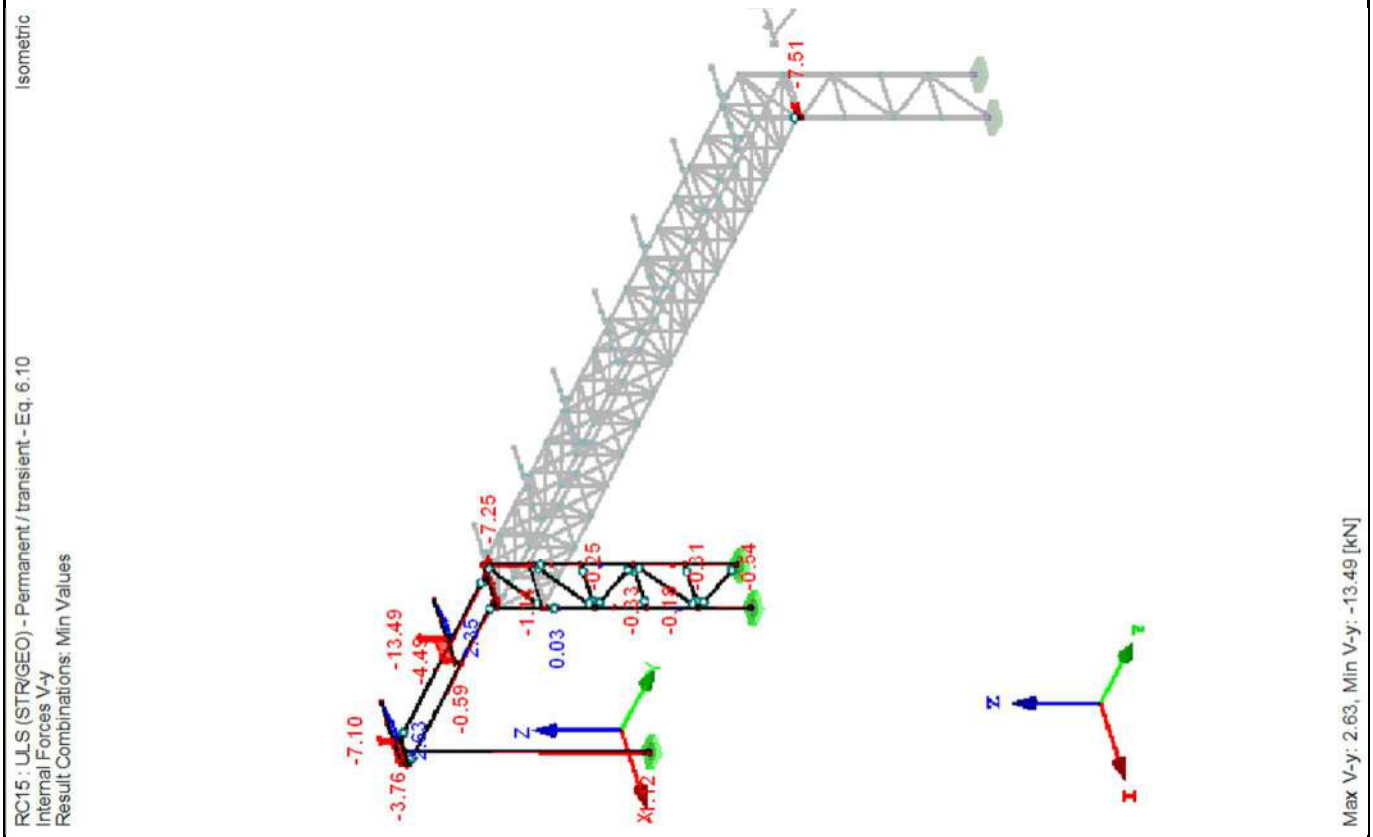
Internal forces N min



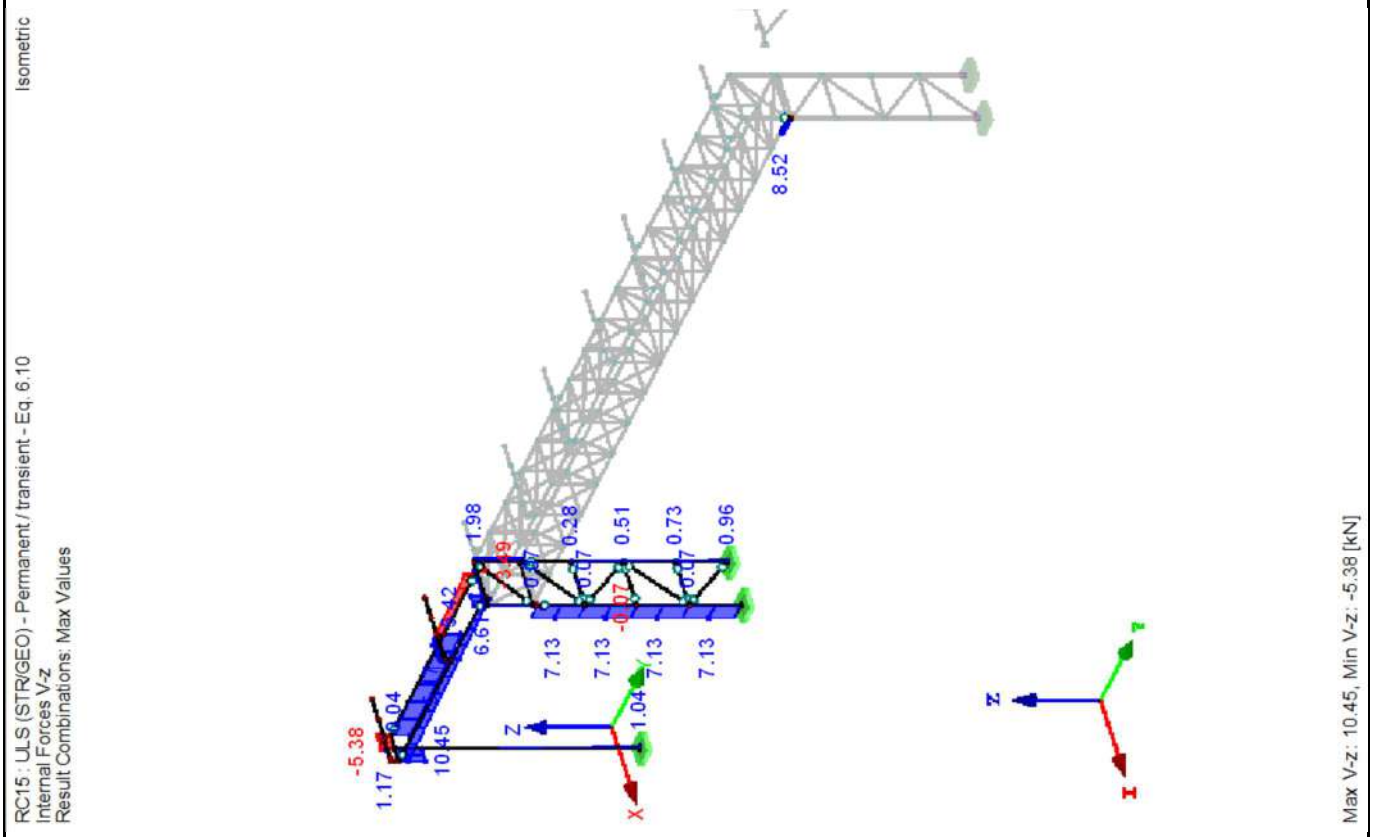
Internal forces V_y max



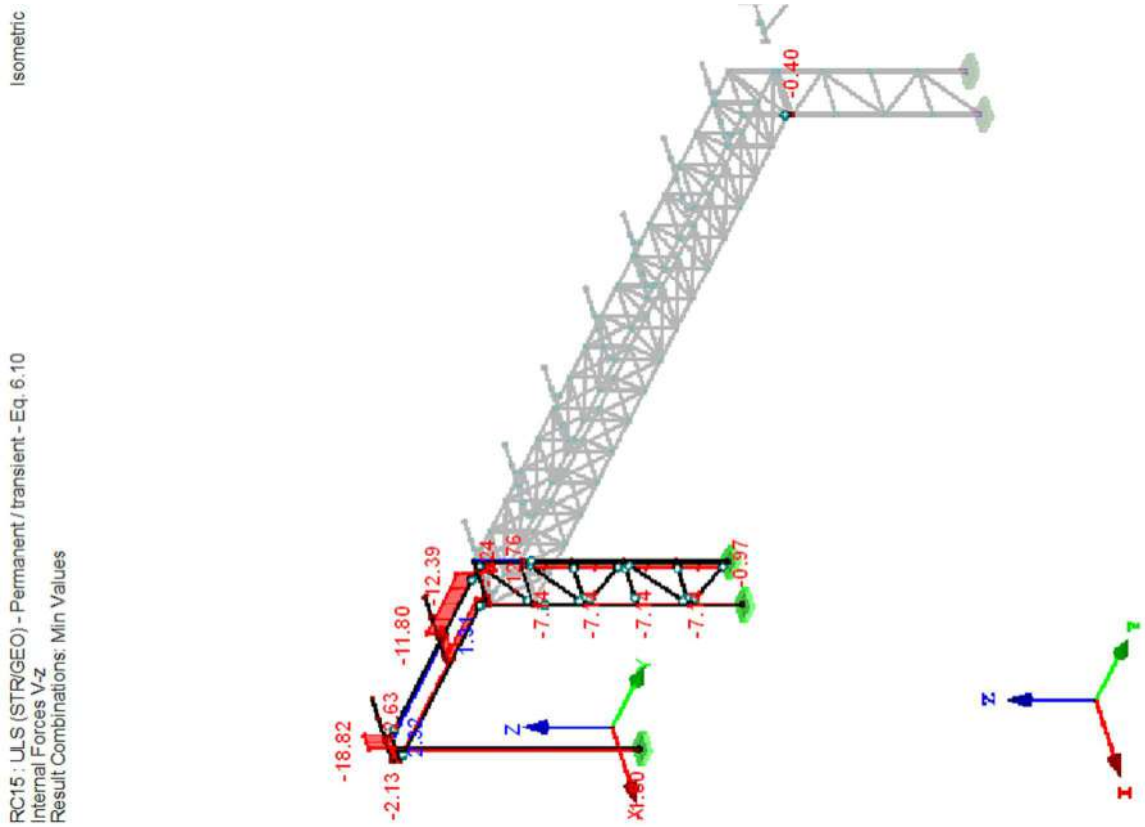
Internal forces V_y min



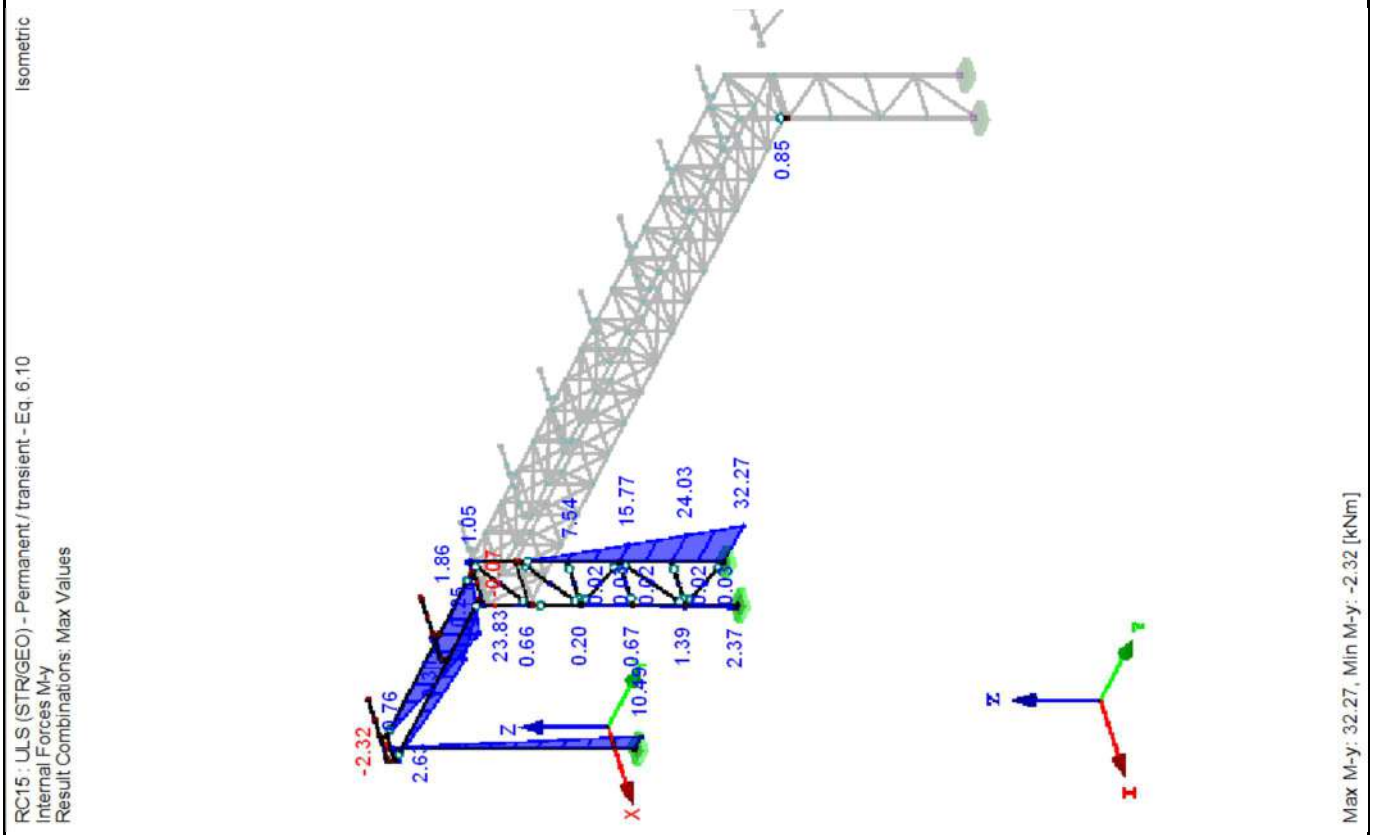
Internal forces V_z max



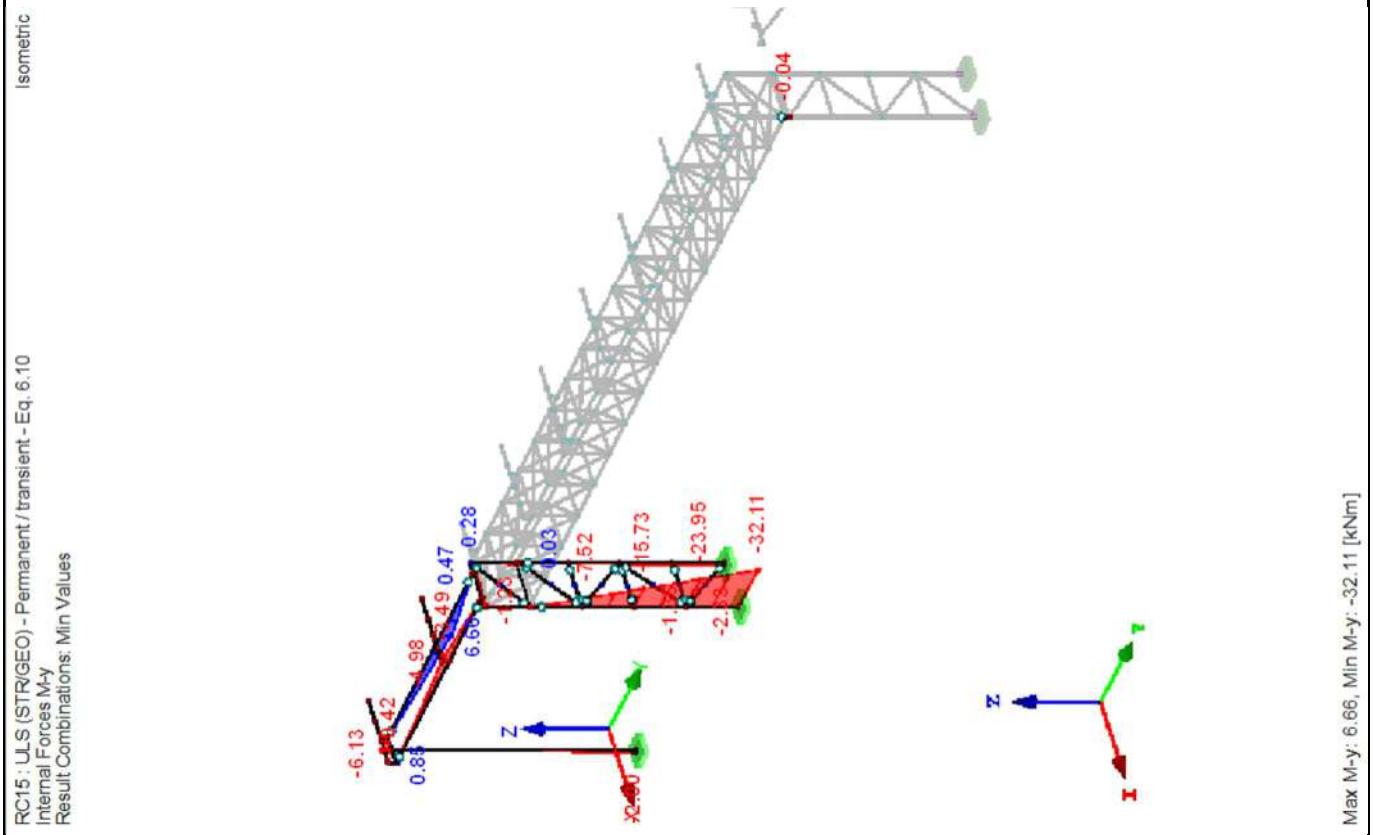
Internal forces V_z max



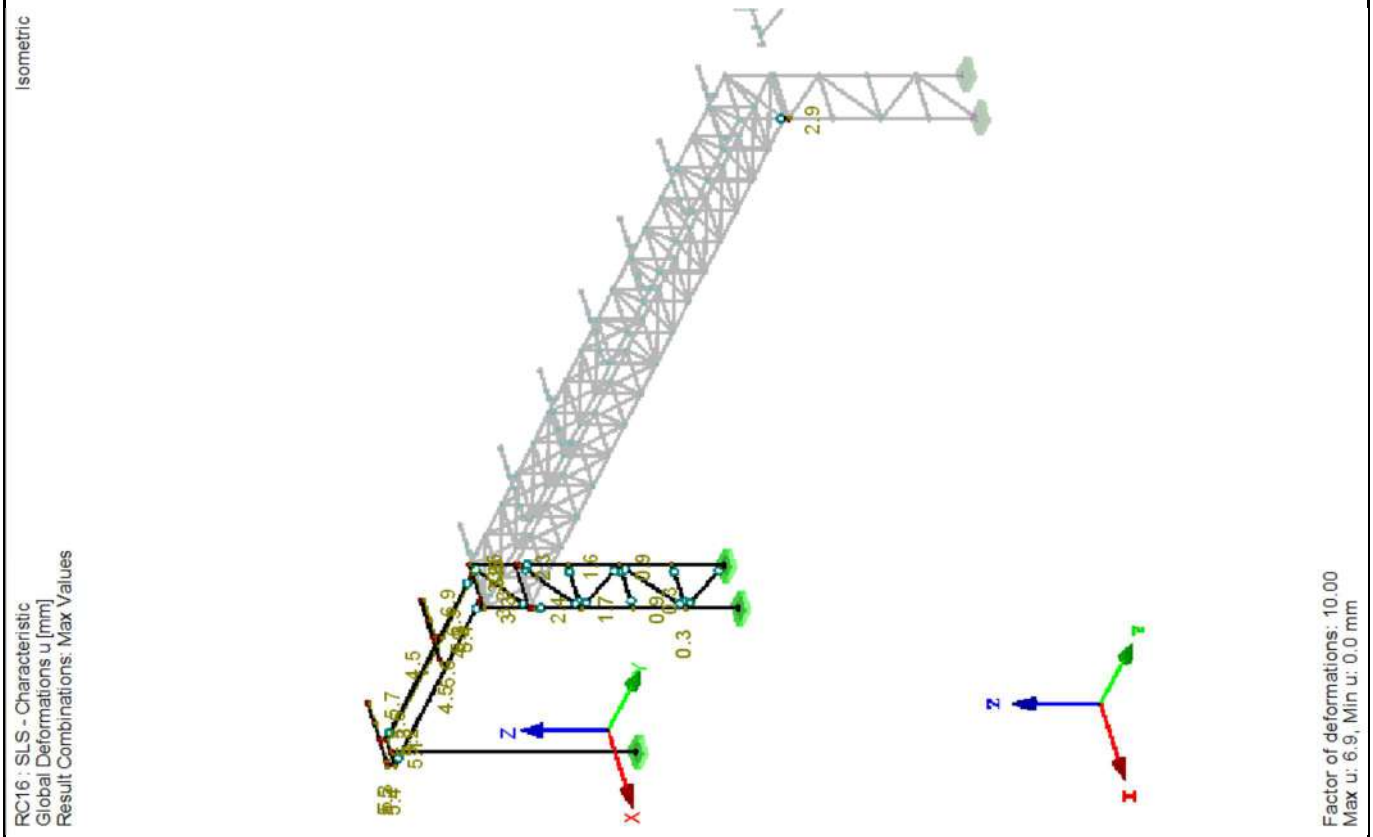
Internal forces M_y max



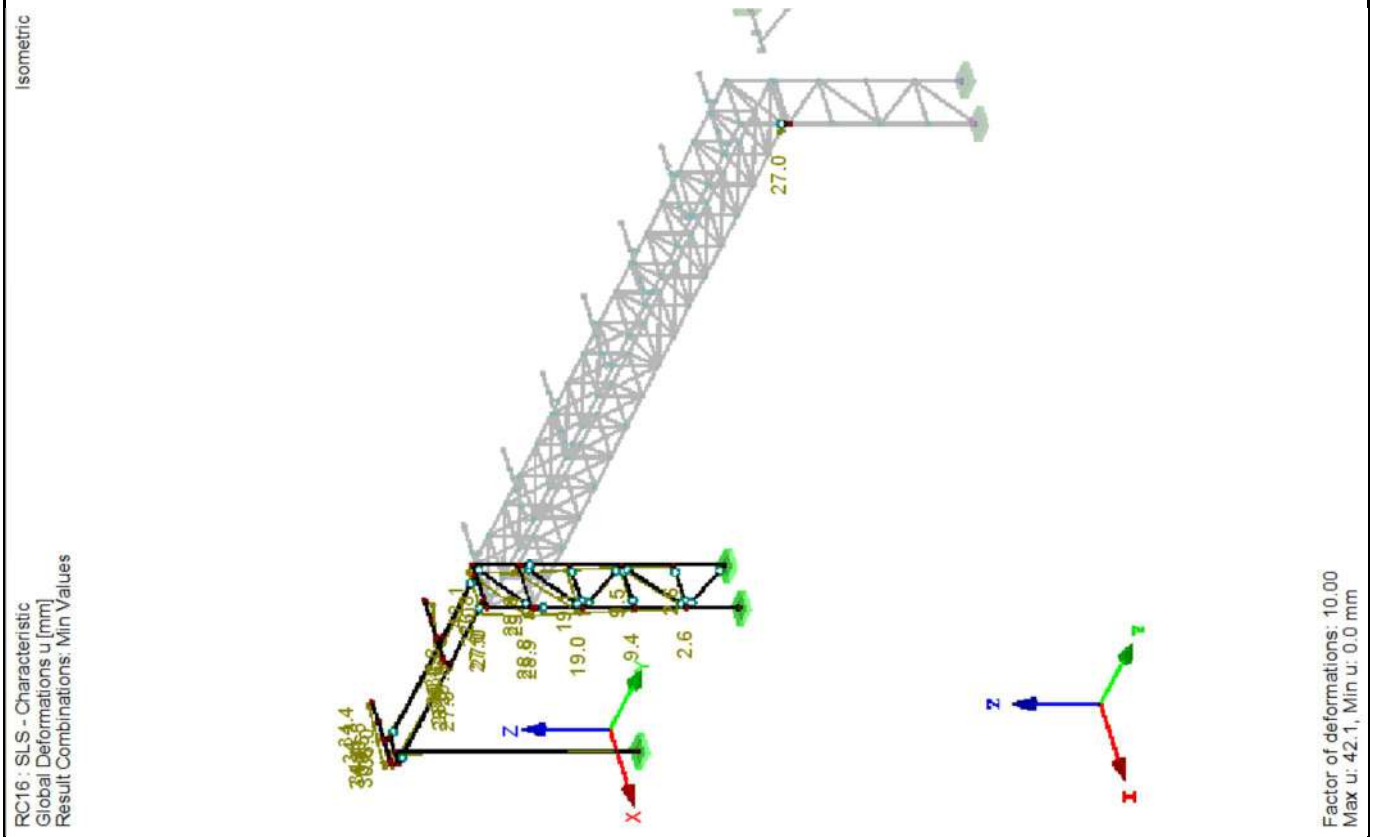
Internal forces M_y min



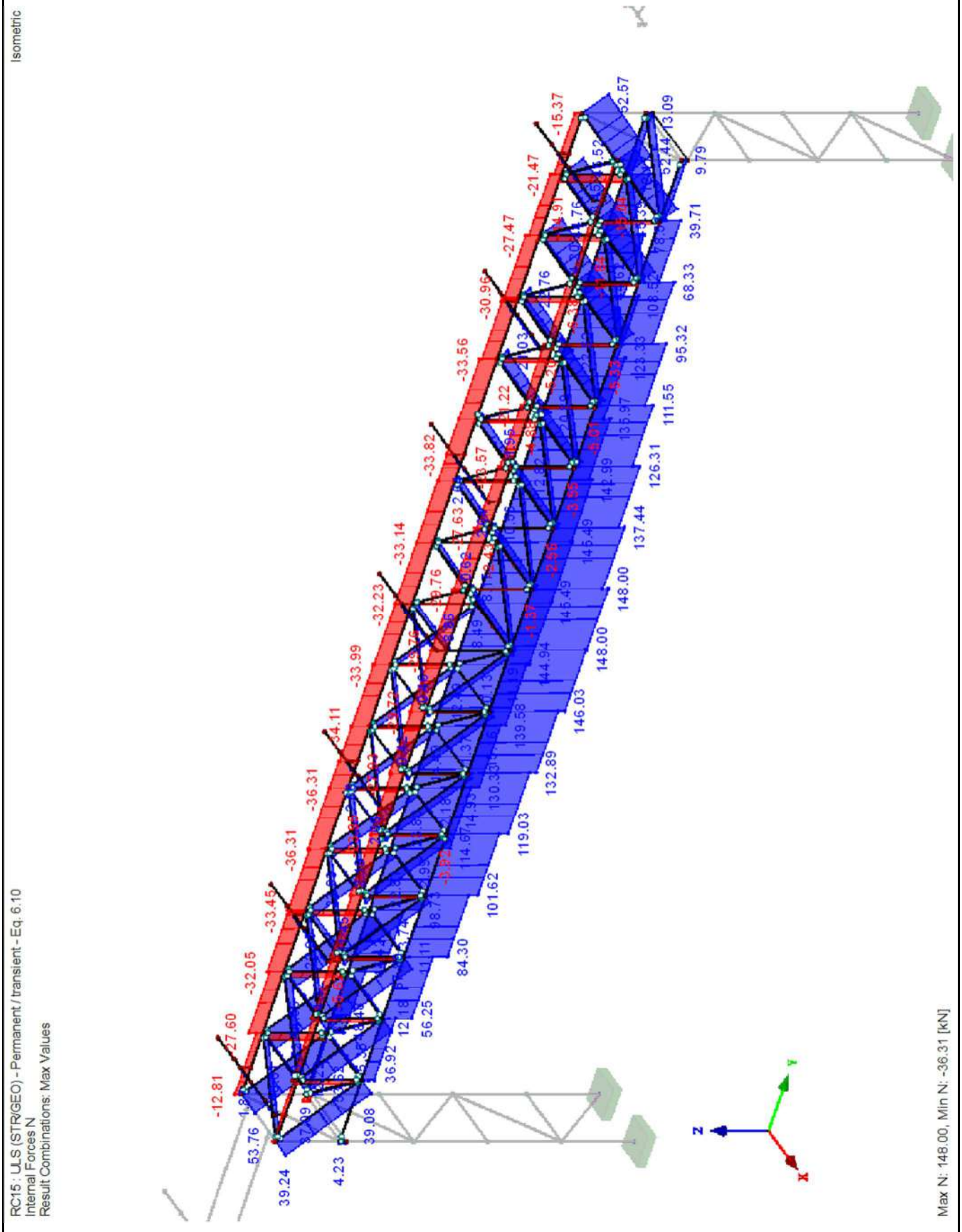
Global Deformations u max



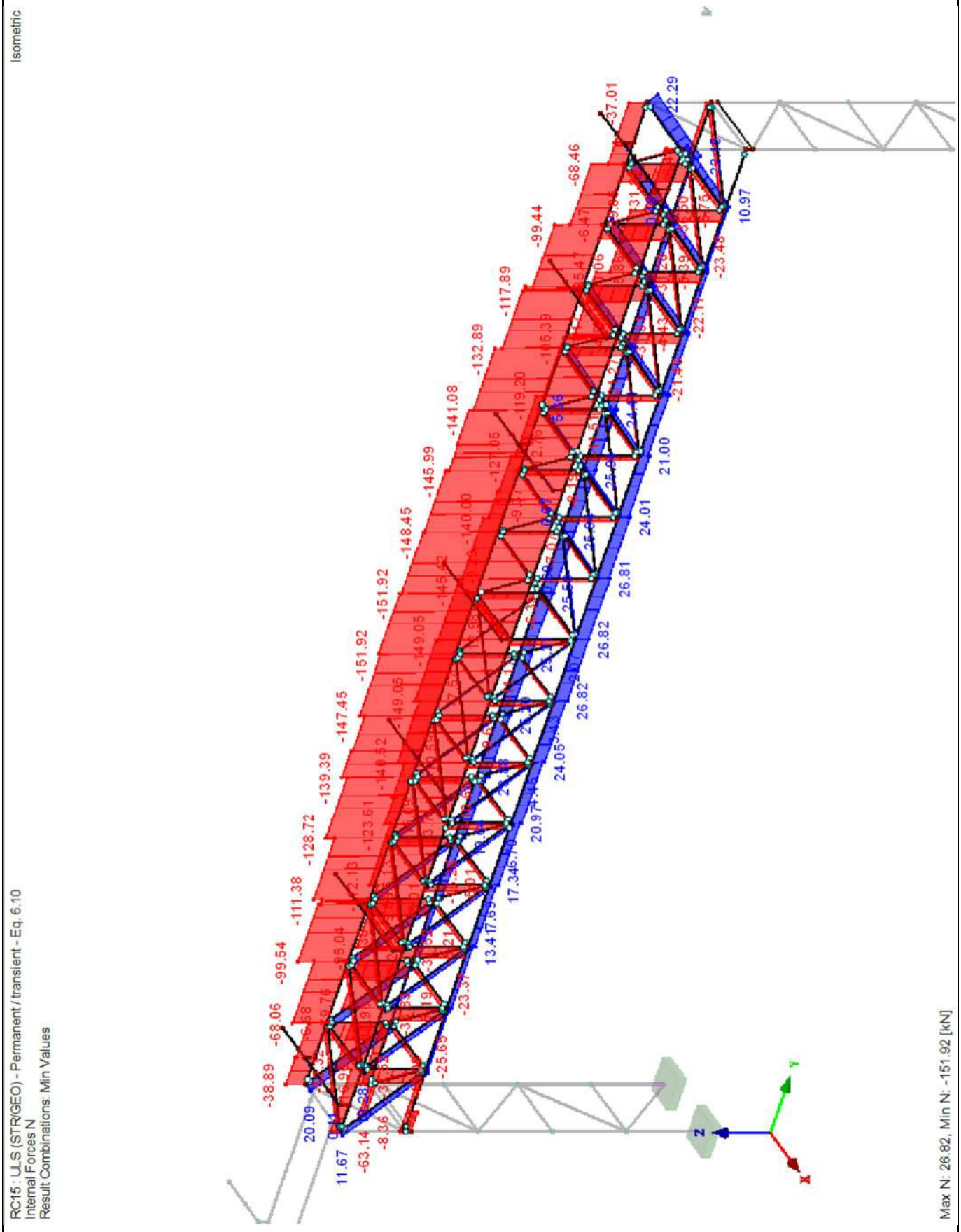
Global Deformations u min



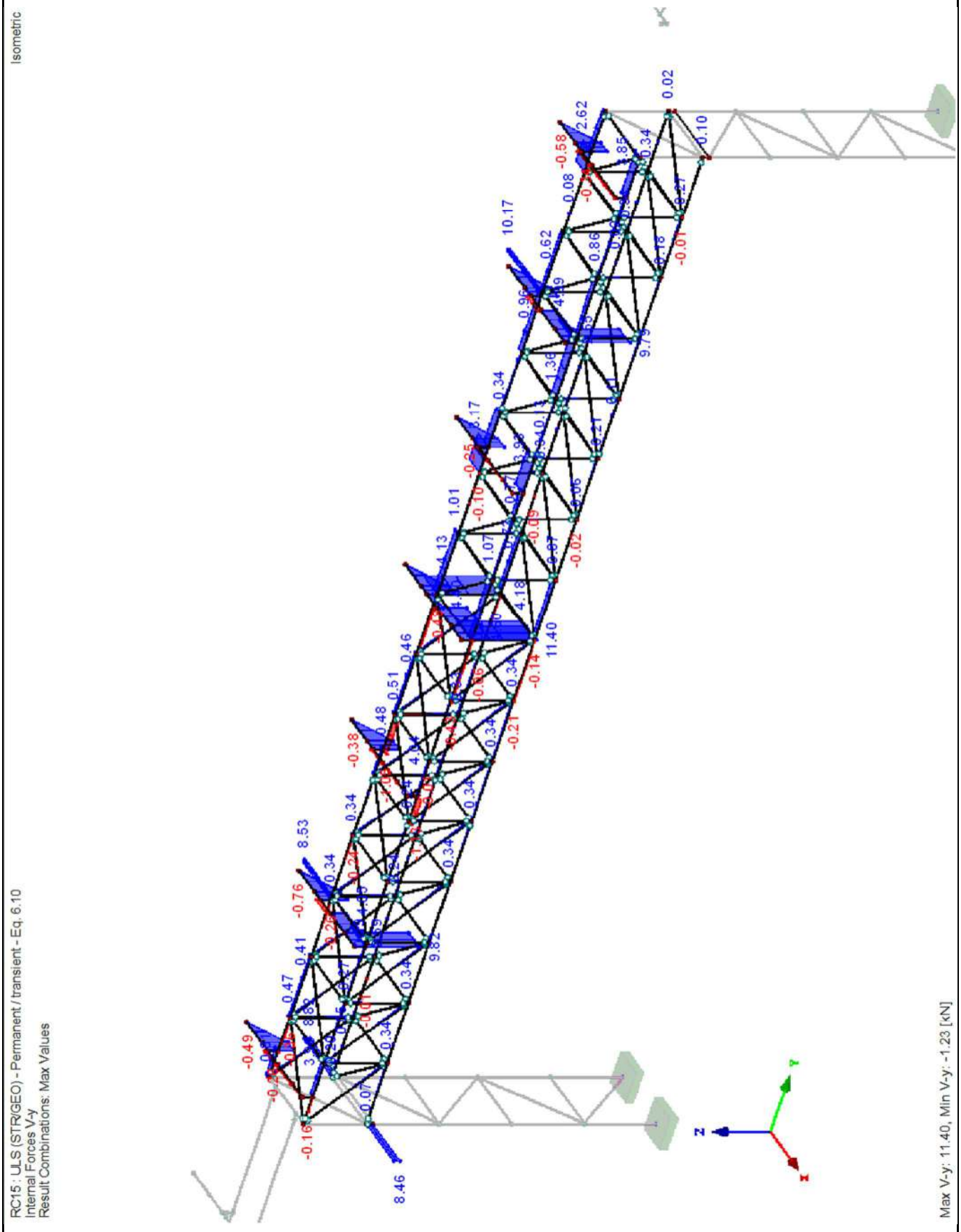
Internal forces N max



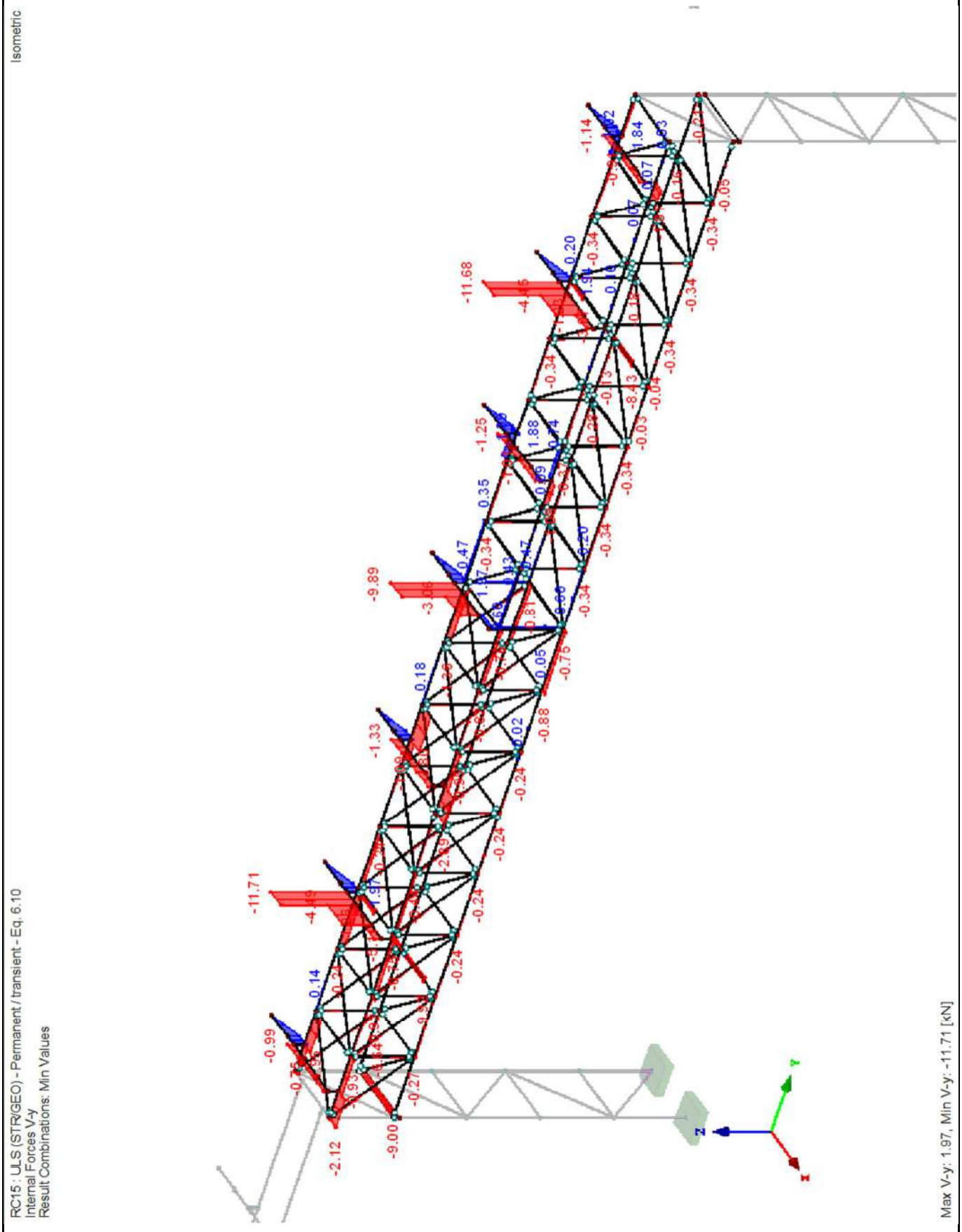
Internal forces N min



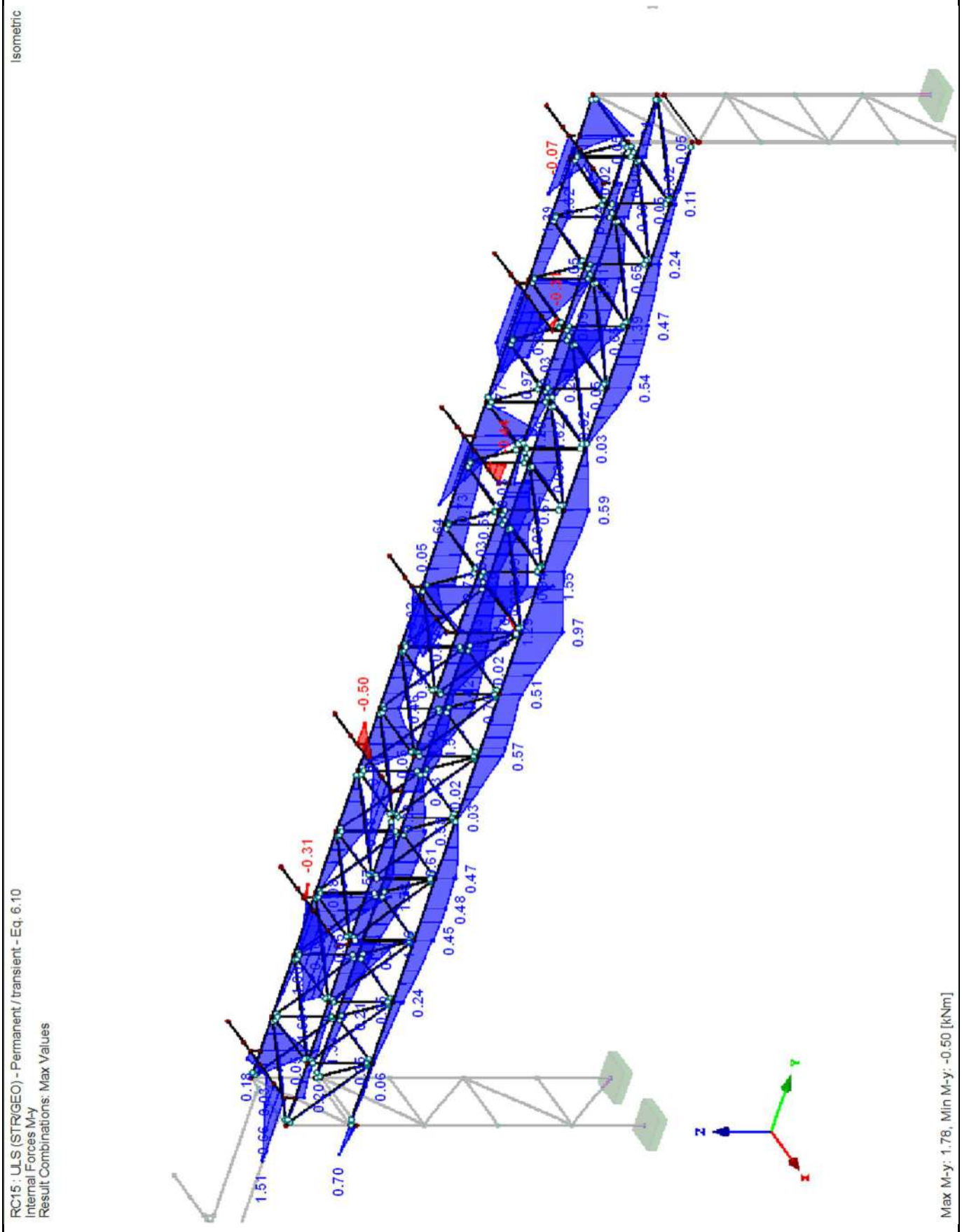
Internal forces V_y max



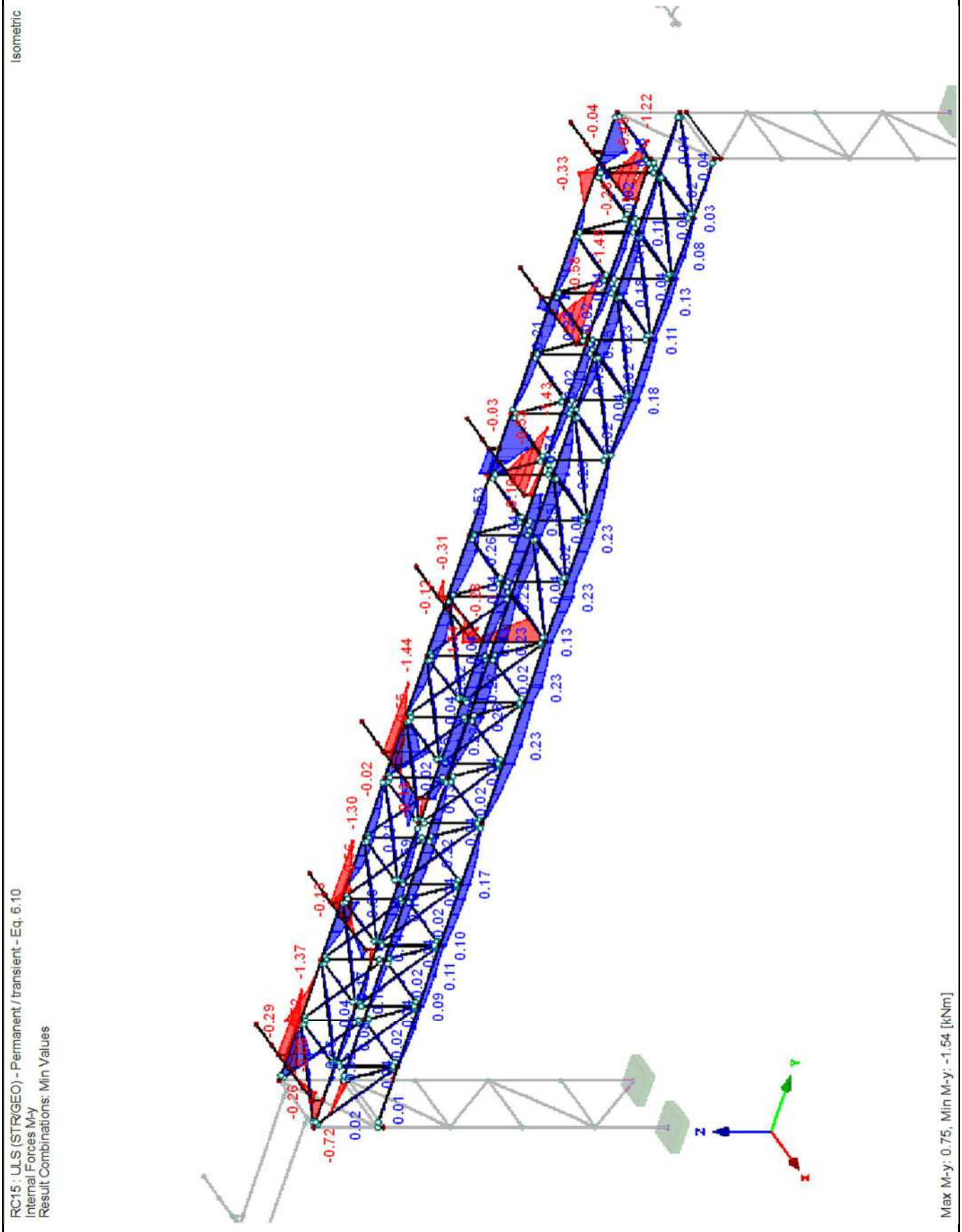
Internal forces V_y min



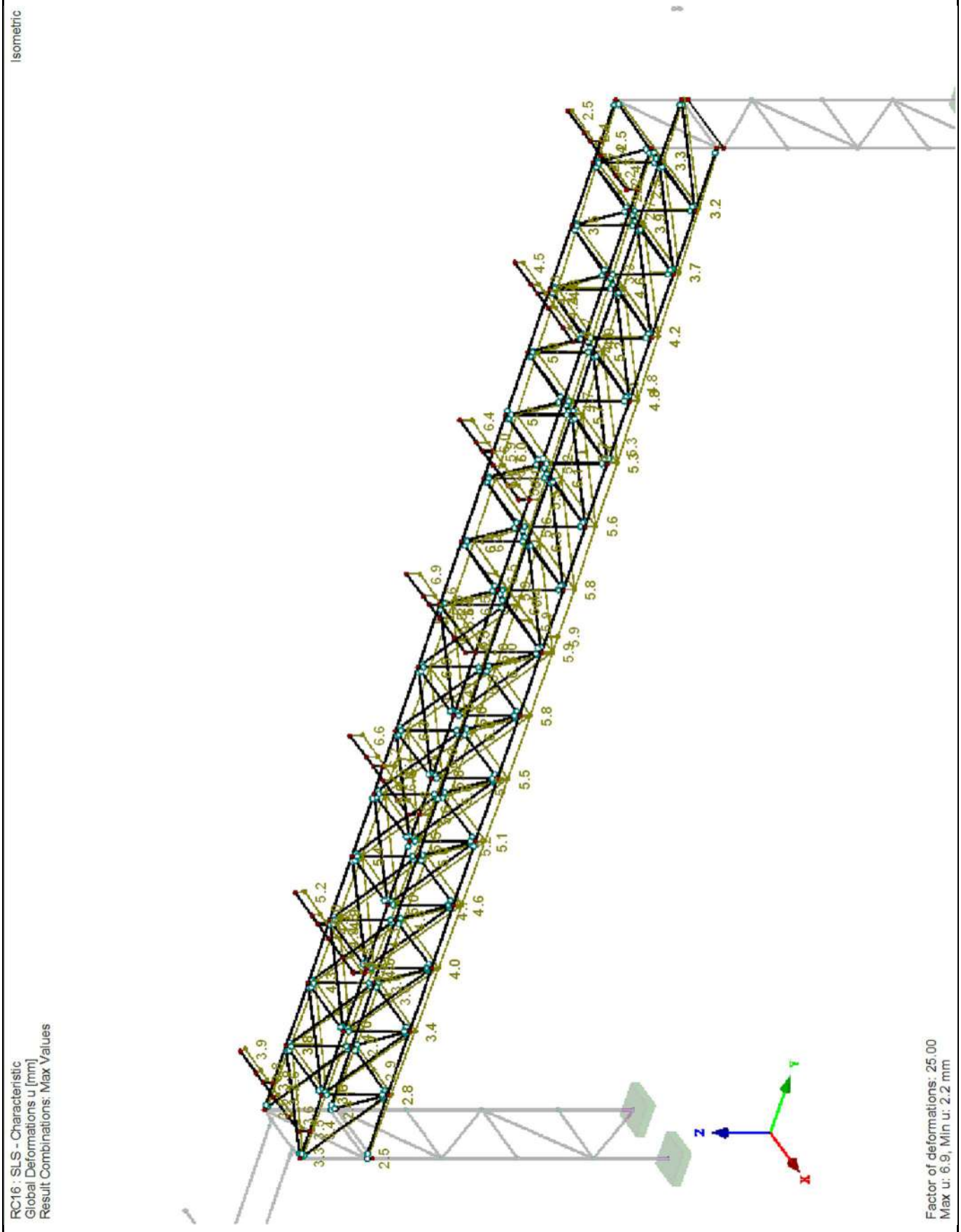
Internal forces M_y max



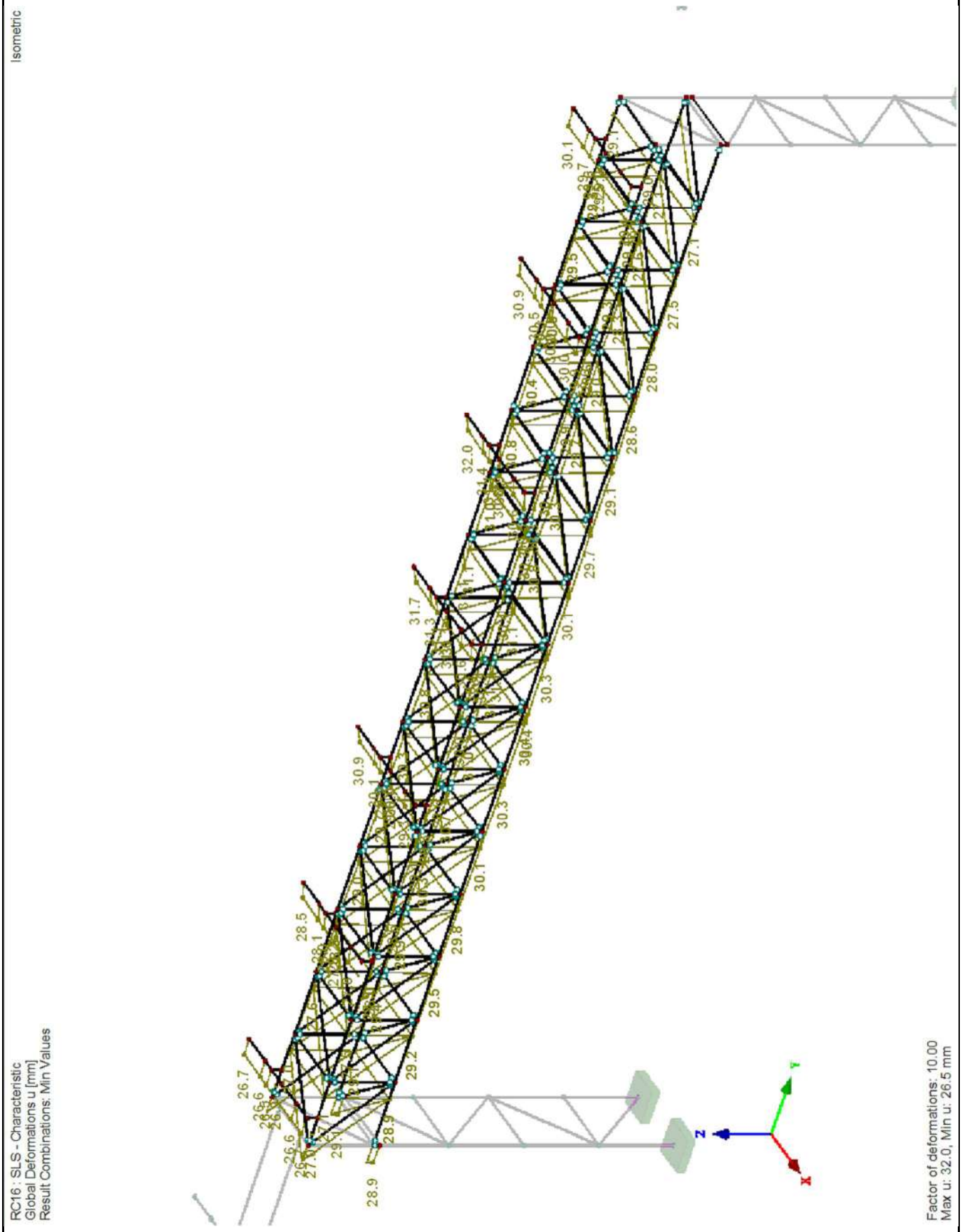
Internal forces M_y min



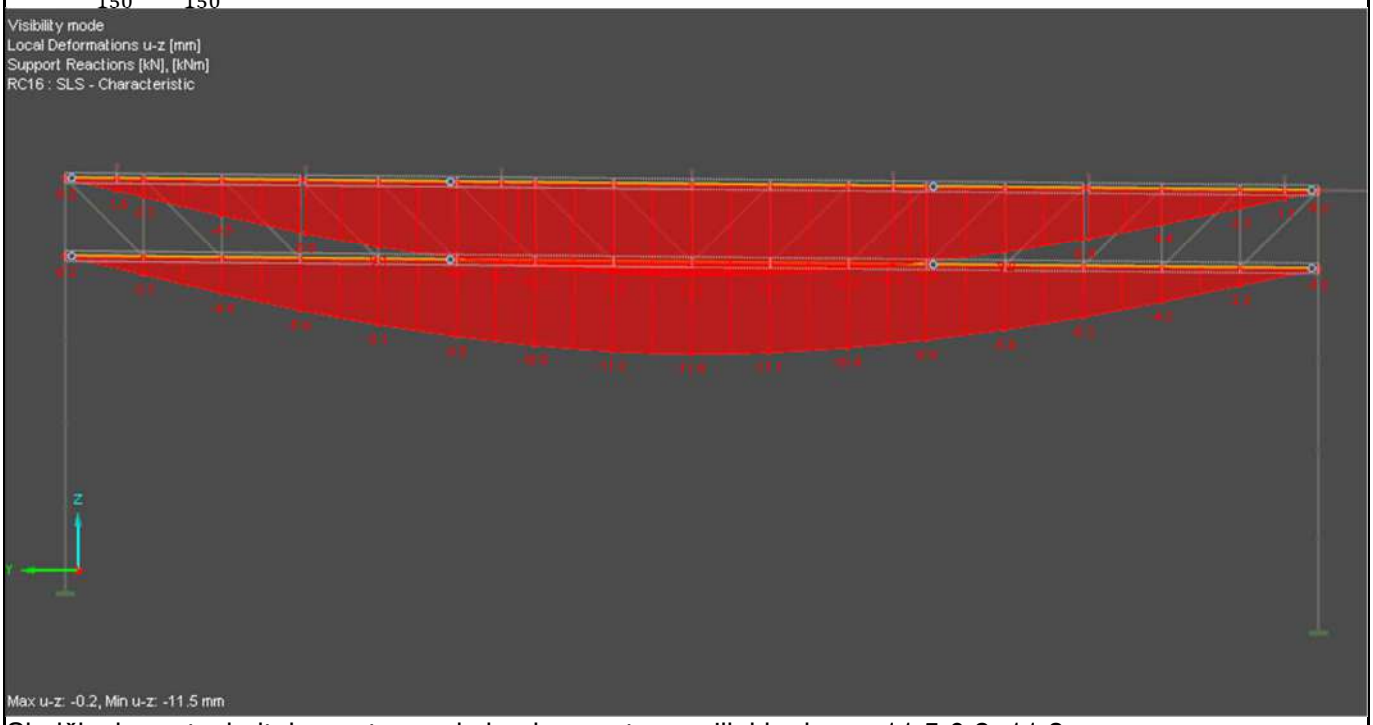
Global Deformations u max



Global Deformations u min

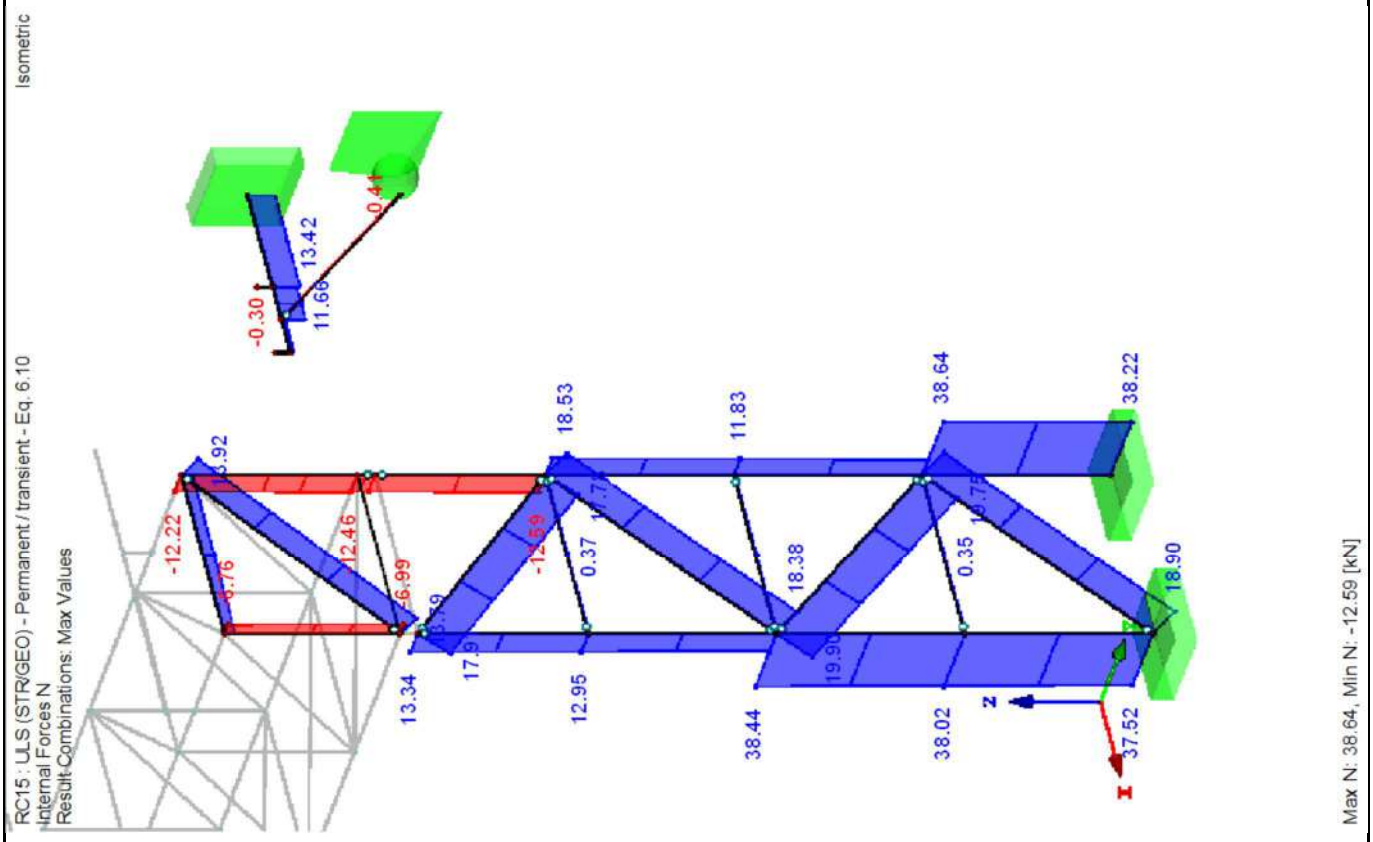


TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
SANTVARA:
Ribinis santvaros įlinkis gaunamas pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą ir yra:
$d_{\lim} = \frac{l}{150} = \frac{16000}{150} = 106{,}67\ mm.$

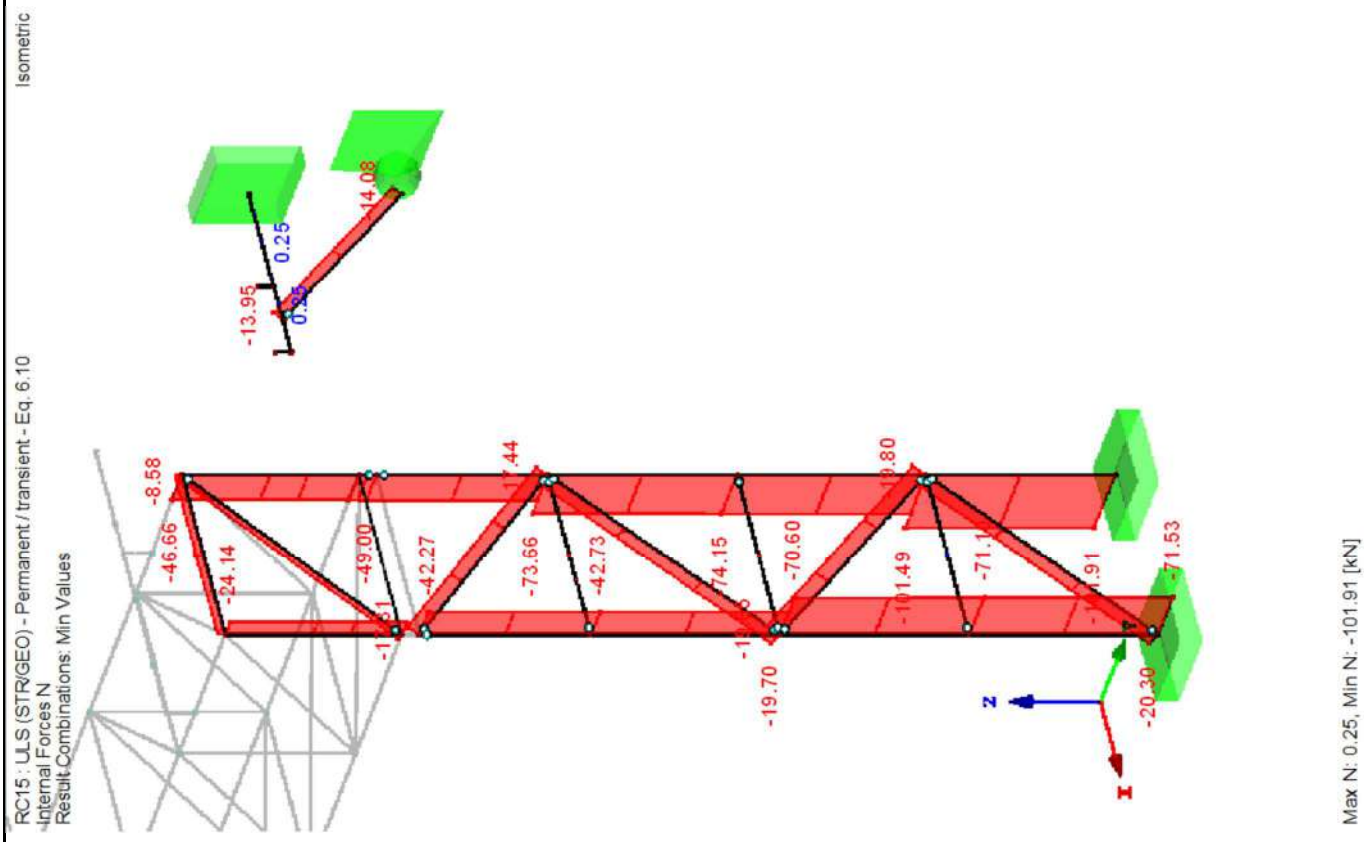


Skaičiavimų ataskaitoje gautas maksimalus santvaros įlinkis dmax=11,5-0,2=11,3mm.
d_{lim}=106,67mm>d_{max}=11,3mm.
Jei santvaros įlinkį vertinsime konservatyvesniu reikalavimu pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 2 skyrių.
Ribinis įlinkis yra:
$D_{\lim} = \frac{l}{250} = \frac{16000}{250} = 64{,}0\ mm.$
Skaičiavimų ataskaitoje gautas maksimalus sijos įlinkis dmax=11,3mm.
d_{lim}=64,0mm>d_{max}=11,3mm.
Išvada: tinkamumo ribiniai būviai tenkinami.

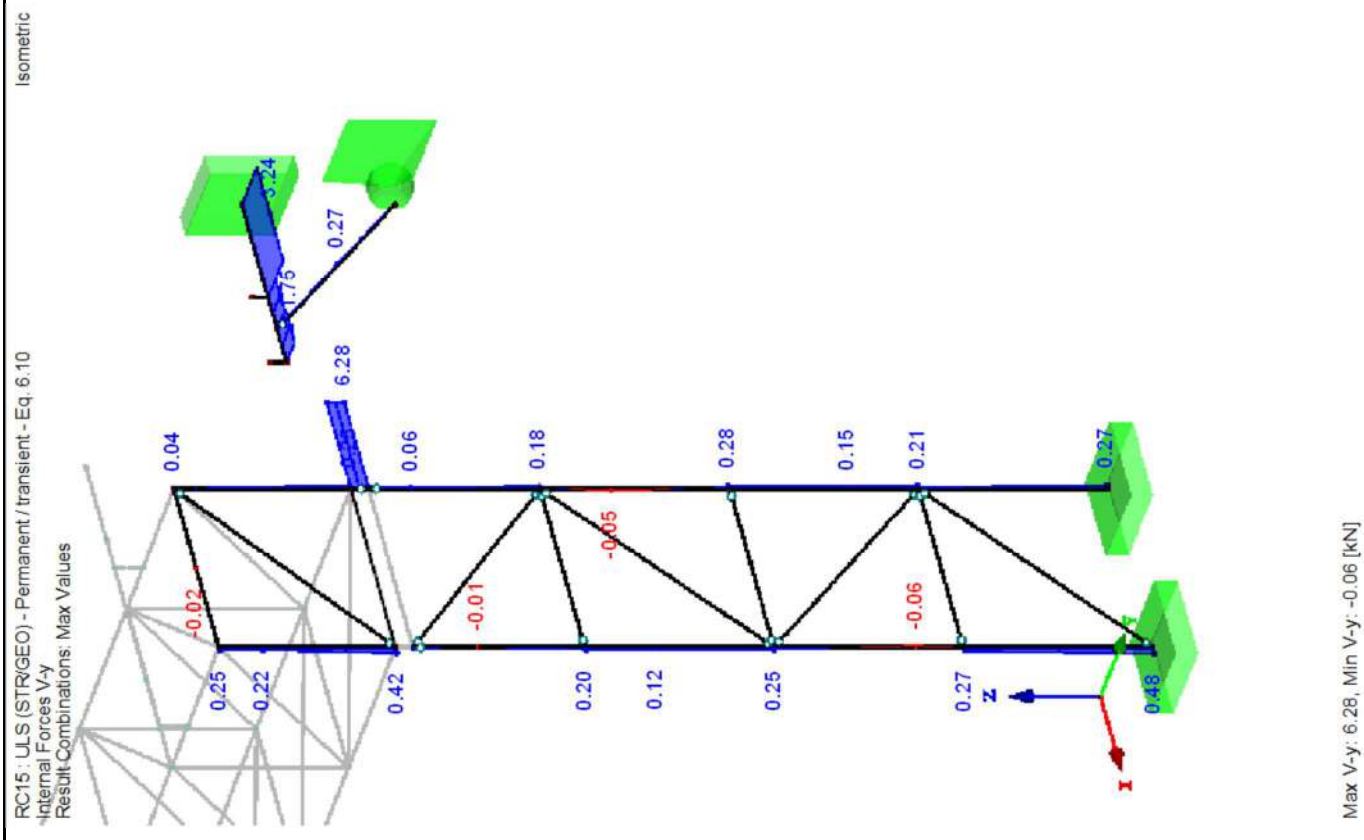
Internal forces N max



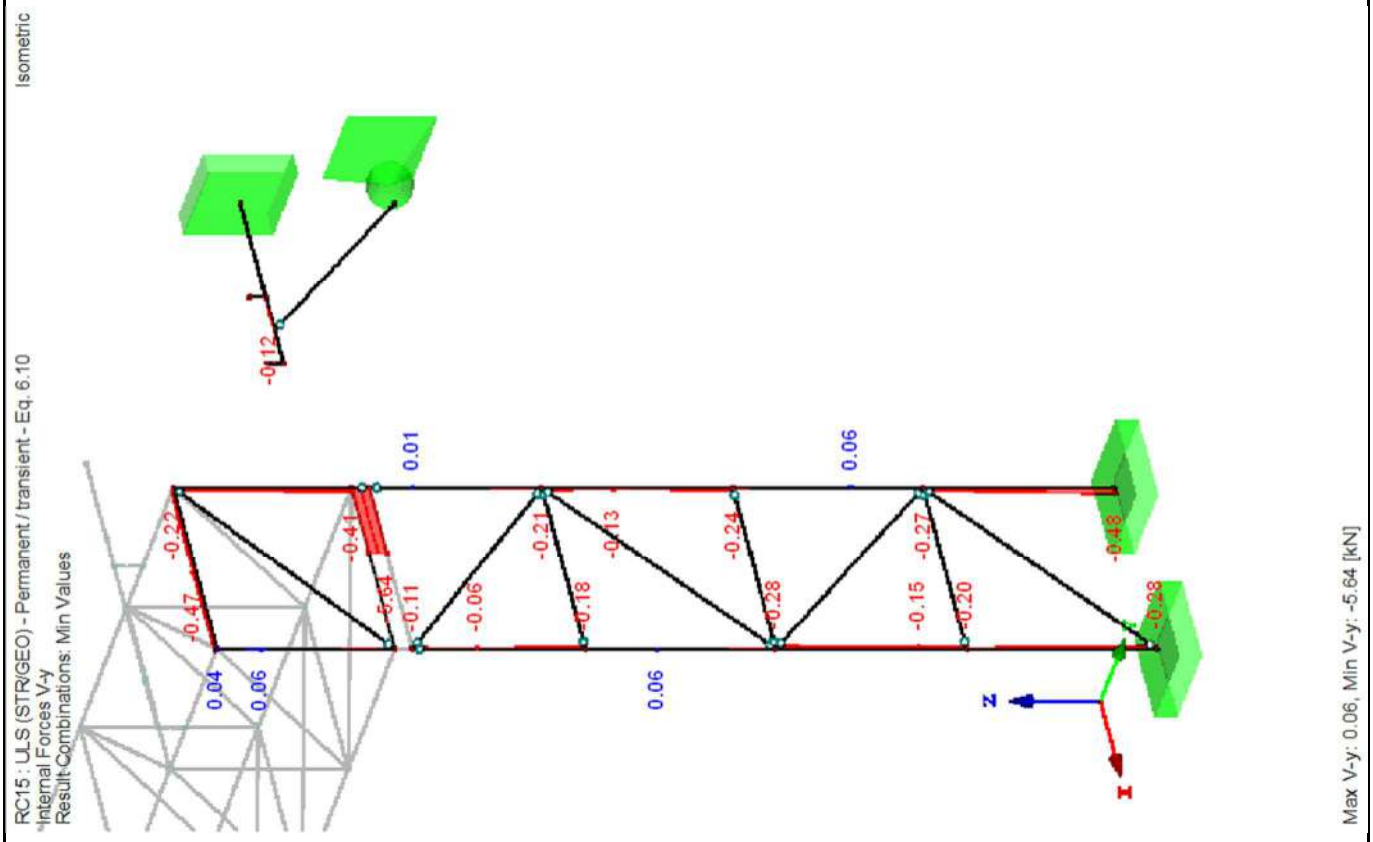
Internal forces N min



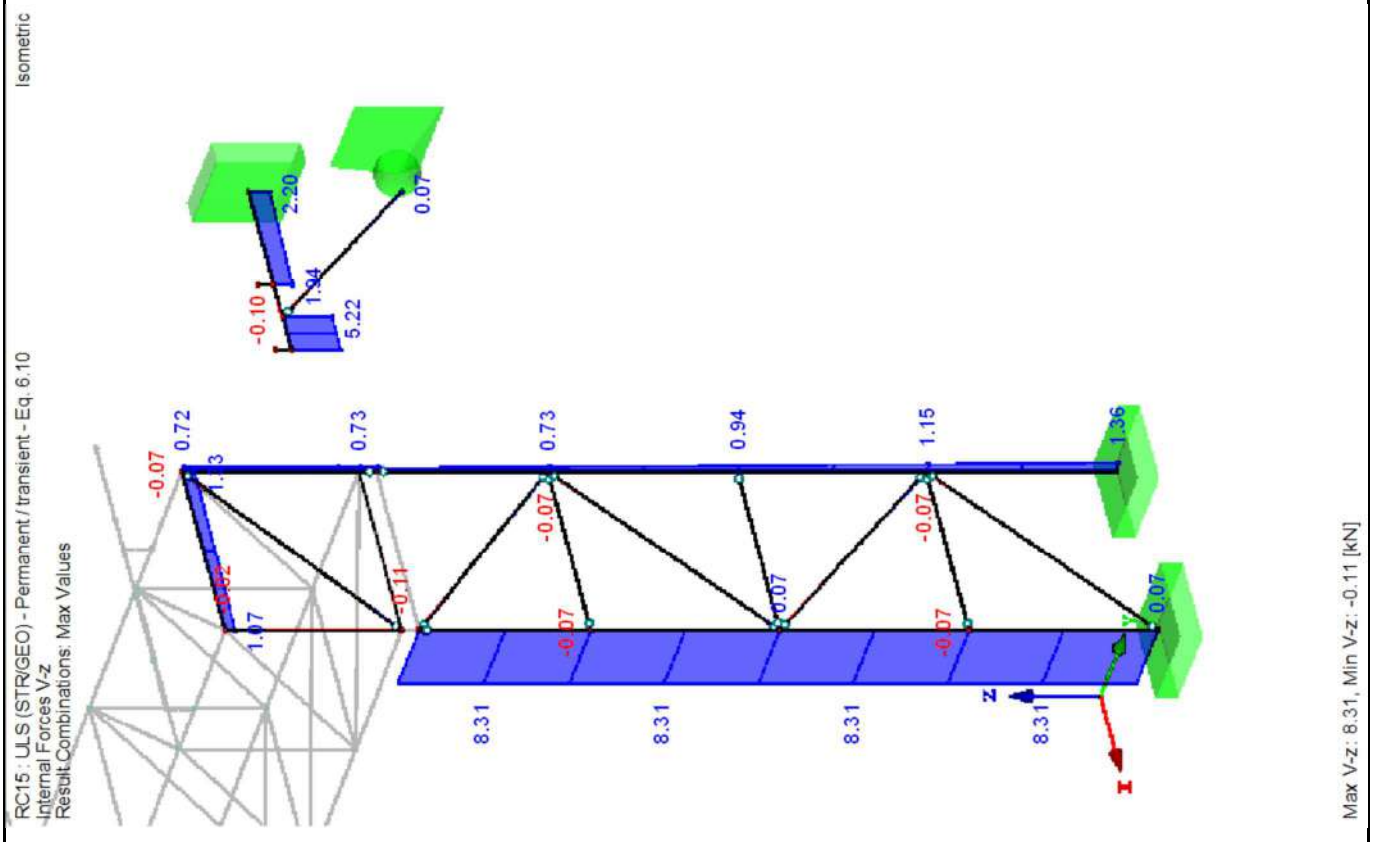
Internal forces V_y max



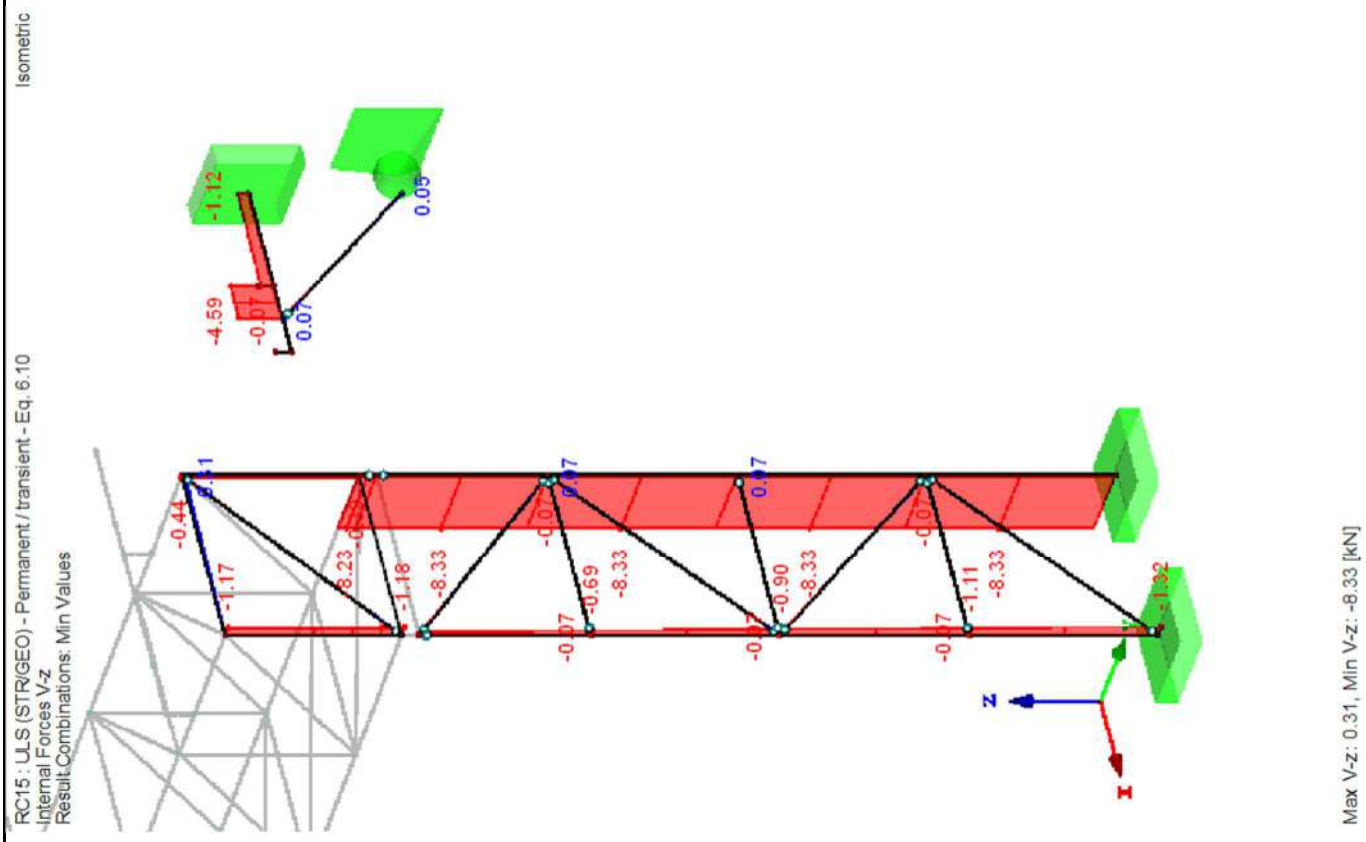
Internal forces V_y min



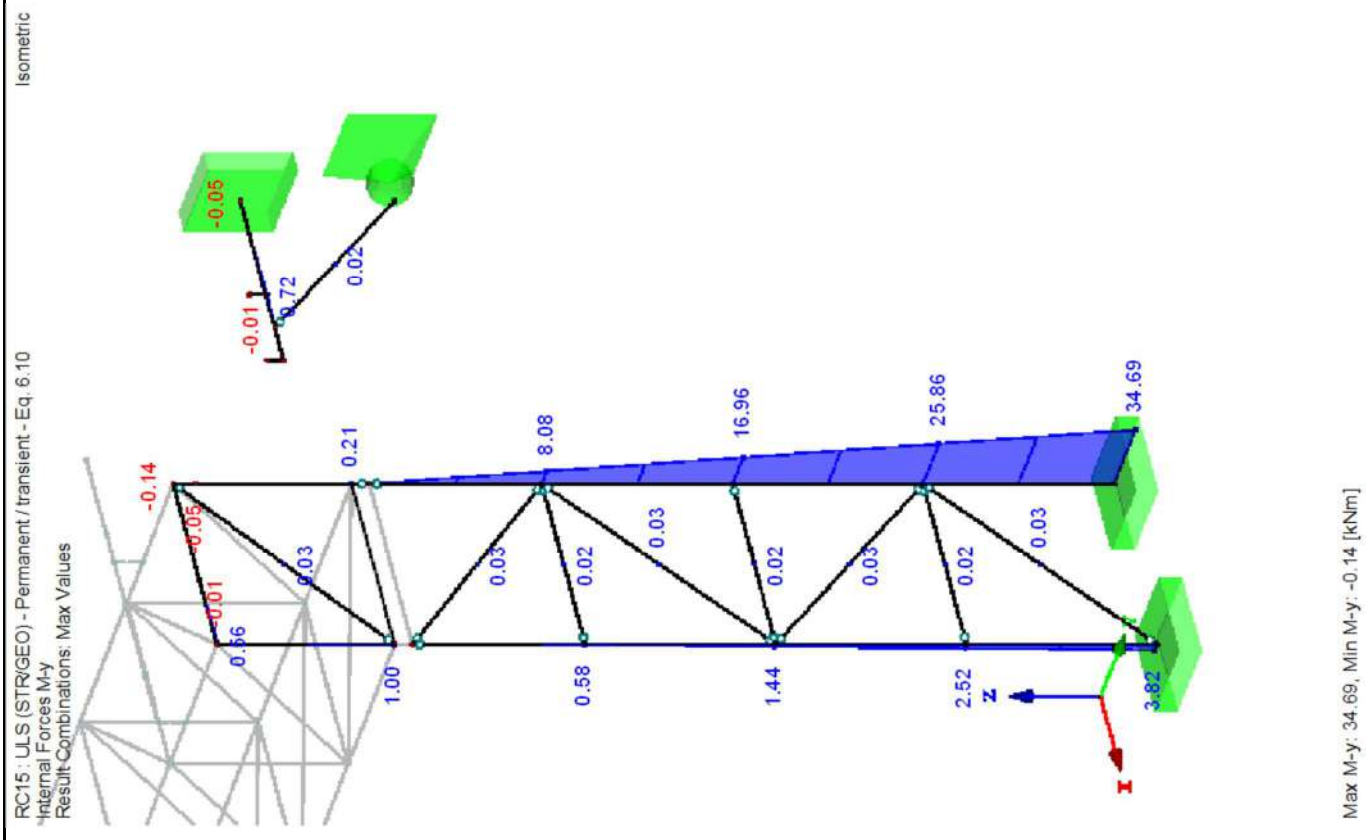
Internal forces V_z max



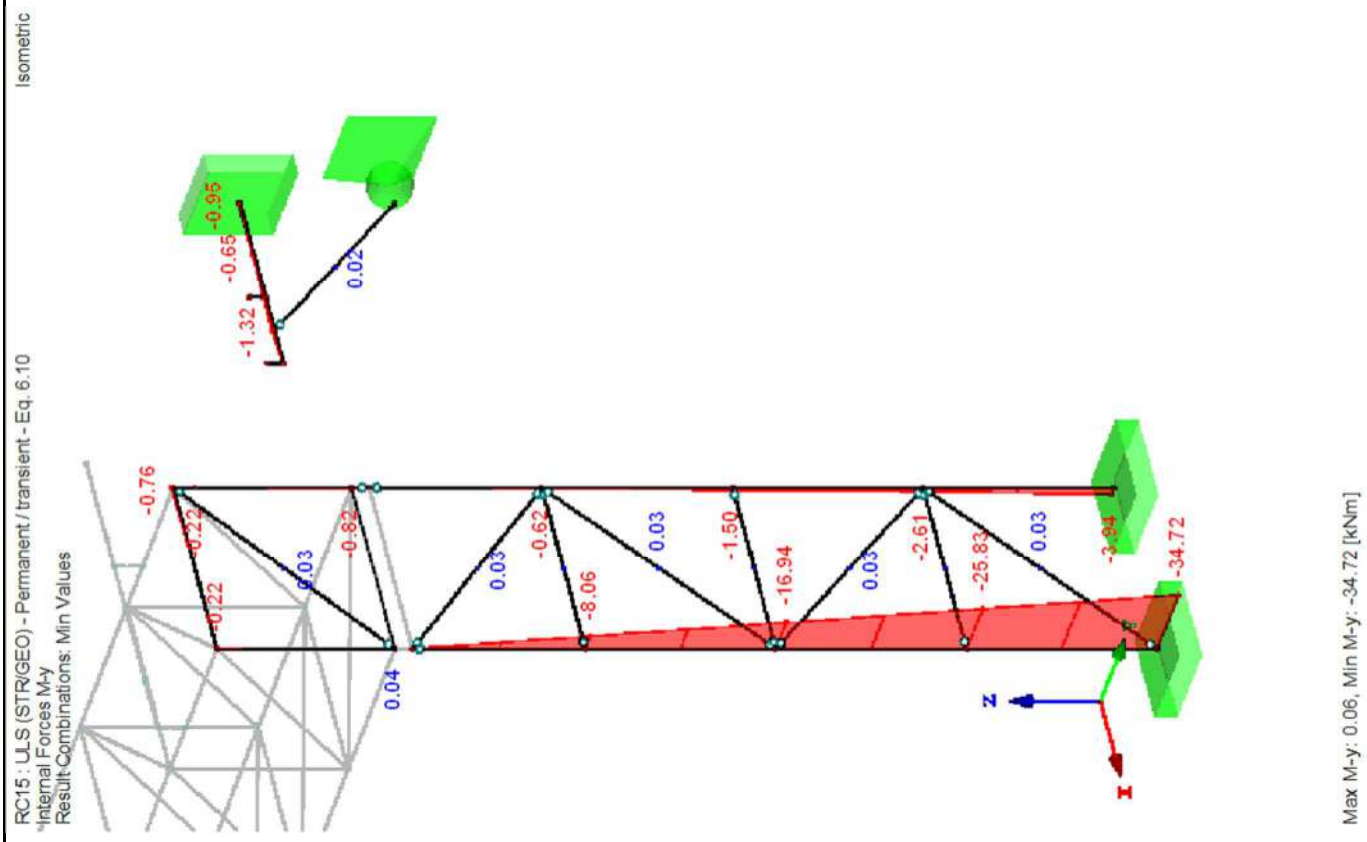
Internal forces V_z min



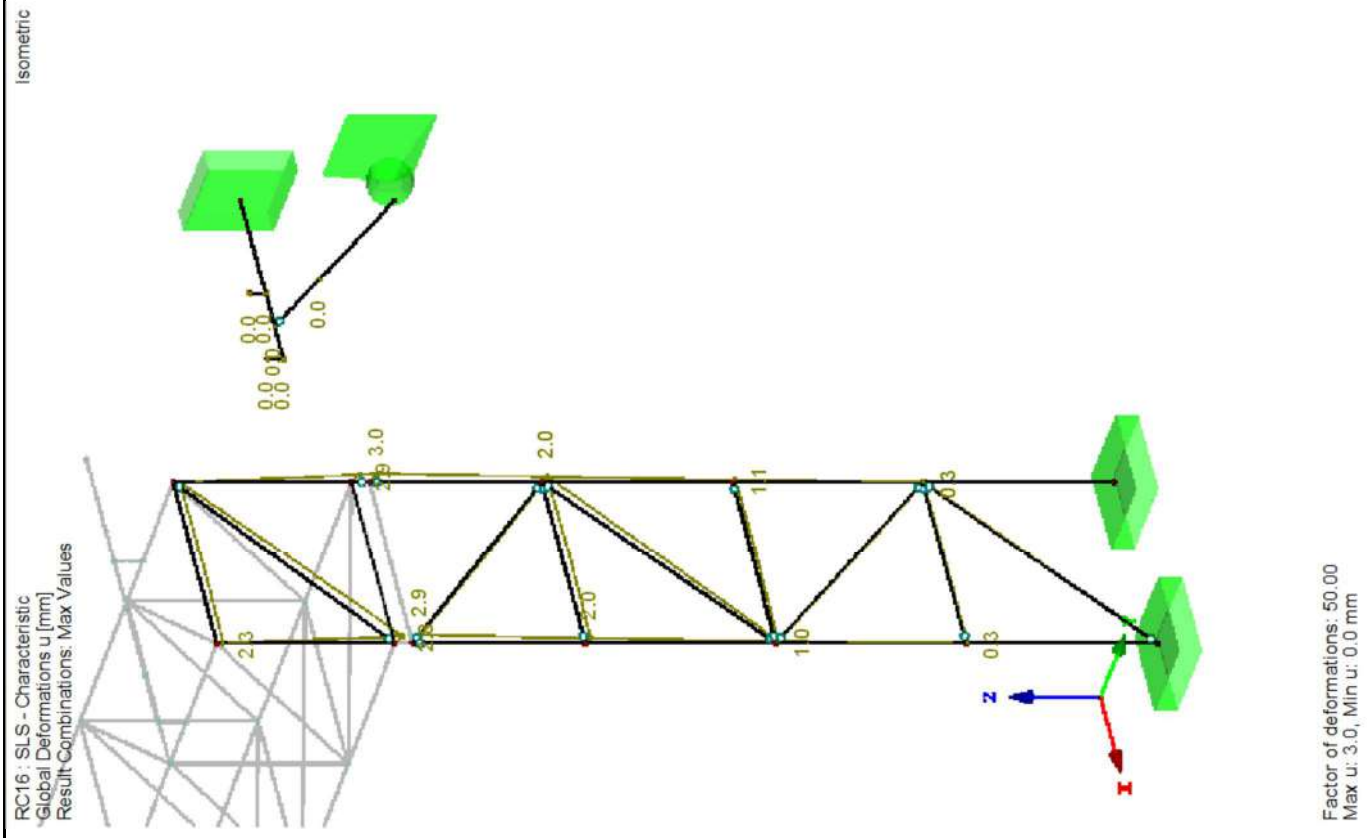
Internal forces M_y max



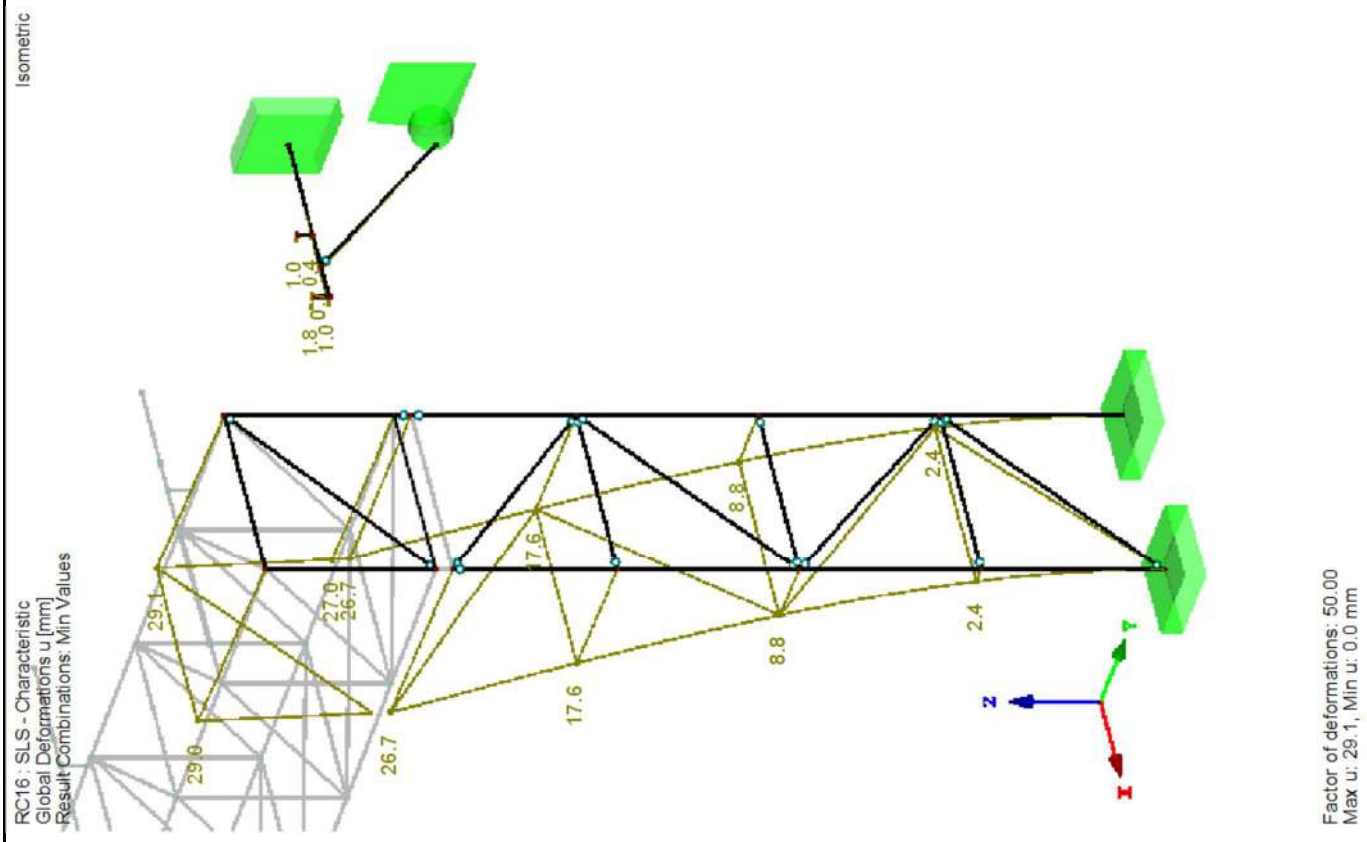
Internal forces M_y min



Global Deformations u max

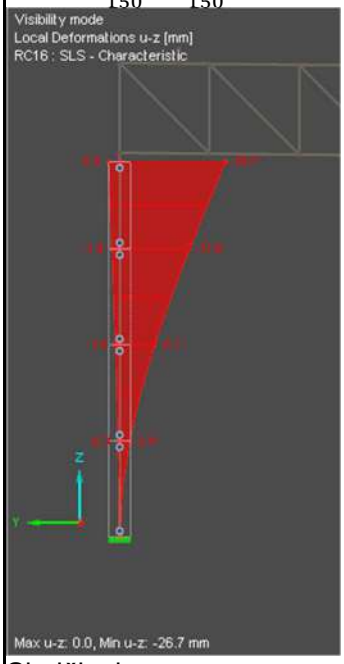


Global Deformations u min



TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
KOLONA:
ribinis kolonos poslinkis pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą

$$D_{\lim} = \frac{h_s}{150} = \frac{4380}{150} = 29{,}2\ mm.$$



Skaičiavimuose gautas maksimalus poslinkis lygus 26,7mm.
d_{lim}=29,2mm>d_{max}=26,7mm.
Išvada: tinkamumo ribiniai būviai tenkinami.

RF-STEEL EC3
CA1
Design of steel members
according to Eurocode 3

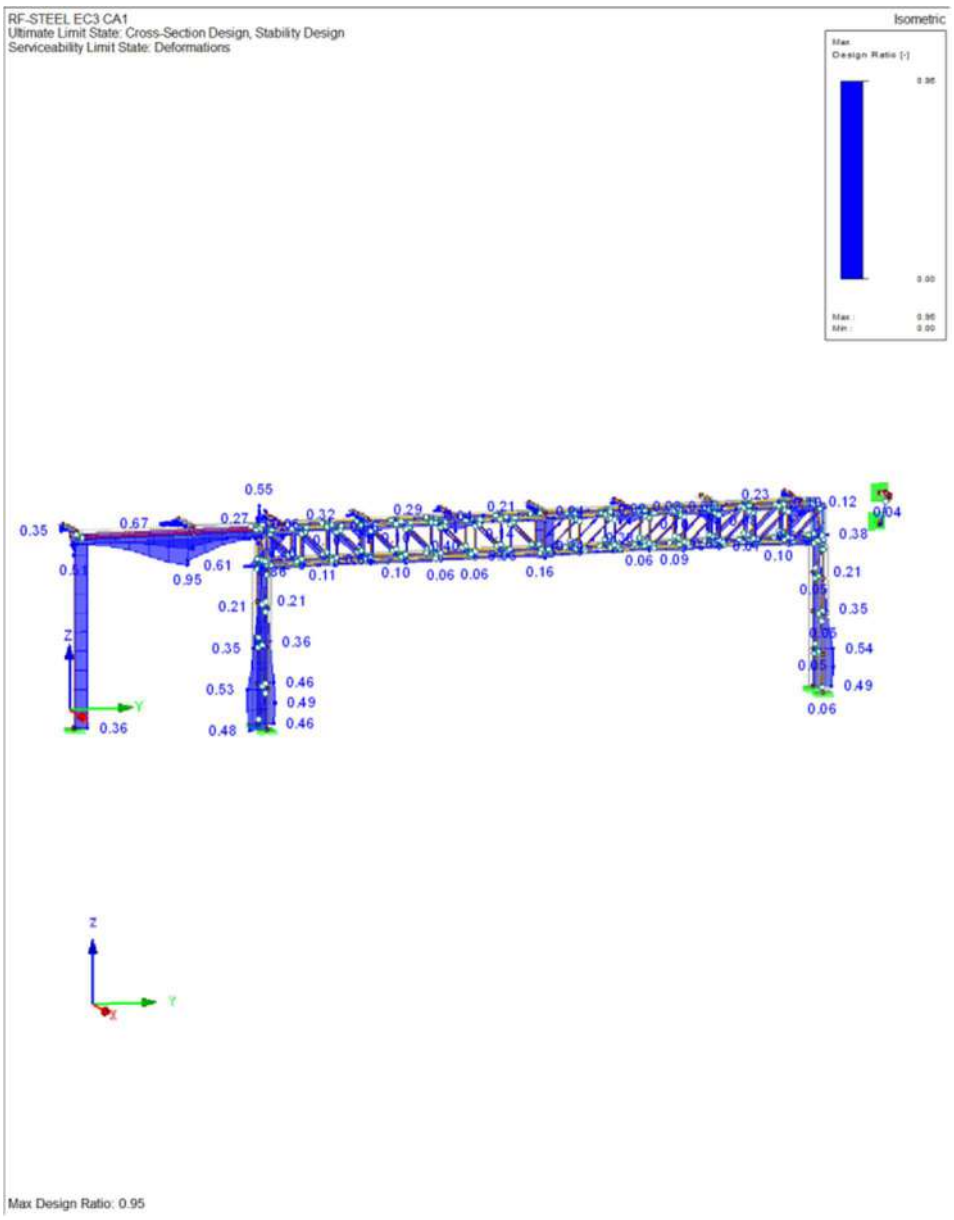
2.2 Design by Cross-Section

	22	0.225	RC16	0.02	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	279	0.213	RC16	0.67	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
5	IPE 200 | Euronorm 19-57						
	54	3.330	RC15	0.95	≤ 1	CS272)	Cross-section check - Elastic design with warping torsion analysis
	19	0.325	RC16	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	54	2.775	RC16	0.56	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	54	2.775	RC16	0.14	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
10	QRO 80x4 | EN 10219-2:2006						
	49	0.612	RC15	0.00	≤ 1	CS100)	Negligible internal forces
	49	0.000	RC15	0.03	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	49	0.000	RC15	0.00	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	49	0.000	RC15	0.03	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	49	1.223	RC15	0.04	≤ 1	ST301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	49	1.223	RC15	0.04	≤ 1	ST311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	49	0.000	RC15	0.07	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	49	0.000	RC16	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	49	0.612	RC16	0.00	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	49	0.612	RC16	0.02	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
11	UPE 200 | EN 10279						
	297	0.200	RC15	0.29	≤ 1	CS272)	Cross-section check - Elastic design with warping torsion analysis
	284	0.325	RC16	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	309	0.225	RC16	0.04	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	283	0.162	RC16	0.09	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
13	IPE 200 | Euronorm 19-57						
	14	0.225	RC15	0.55	≤ 1	CS272)	Cross-section check - Elastic design with warping torsion analysis
	14	0.000	RC16	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	23	0.000	RC16	0.03	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	21	0.650	RC16	0.02	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
17	HE A 160 | Euronorm 53-62						
	329	0.550	RC15	0.00	≤ 1	CS100)	Negligible internal forces
	329	0.000	RC15	0.00	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	329	0.000	RC15	0.01	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	329	0.000	RC15	0.00	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	329	0.000	RC15	0.00	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	329	0.000	RC15	0.01	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
18	QRO 70x70x5 | ALUKÖNIGSTAHL - EN 10210						
	181	1.487	RC15	0.00	≤ 1	CS100)	Negligible internal forces
	180	0.000	RC15	0.12	≤ 1	CS101)	Cross-section check - Tension acc. to 6.2.3
	58	0.000	RC15	0.08	≤ 1	CS102)	Cross-section check - Compression acc. to 6.2.4
	116	1.100	RC15	0.03	≤ 1	CS111)	Cross-section check - Bending about y-axis acc. to 6.2.5 - Class 1 or 2
	115	1.000	RC15	0.08	≤ 1	CS116)	Cross-section check - Bending about z-axis acc. to 6.2.5 - Class 1 or 2
	117	1.100	RC15	0.02	≤ 1	CS121)	Cross-section check - Shear force in z-axis acc. to 6.2.6
	115	1.000	RC15	0.03	≤ 1	CS123)	Cross-section check - Shear force in y-axis acc. to 6.2.6
	116	0.000	RC15	0.00	≤ 1	CS126)	Cross-section check - Shear buckling acc. to 6.2.6(6)
	116	1.100	RC15	0.03	≤ 1	CS141)	Cross-section check - Bending and shear force acc. to 6.2.5 and 6.2.8
	115	1.000	RC15	0.08	≤ 1	CS151)	Cross-section check - Bending about z-axis and shear force acc. to 6.2.5 and 6.2.8
	210	0.474	RC15	0.00	≤ 1	CS161)	Cross-section check - Biaxial bending and shear force acc. to 6.2.6, 6.2.7 and 6.2.9

2.2 Design by Cross-Section

	117	0.000	RC15	0.14	≤ 1	CS181)	Cross-section check - Bending, shear and axial force acc. to 6.2.9.1
	115	1.000	RC15	0.22	≤ 1	CS201)	Cross-section check - Bending about z-axis, shear and axial force acc. to 6.2.9.1
	114	1.000	RC15	0.07	≤ 1	CS221)	Cross-section check - Biaxial bending, shear and axial force acc. to 6.2.10 and 6.2.9
	58	0.000	RC15	0.09	≤ 1	ST301)	Stability analysis - Flexural buckling about y-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	58	0.000	RC15	0.09	≤ 1	ST311)	Stability analysis - Flexural buckling about z-axis acc. to 6.3.1.1 and 6.3.1.2(4)
	115	0.000	RC15	0.24	≤ 1	ST364)	Stability analysis - Bending and compression acc. to 6.3.3, Method 2
	58	0.000	RC16	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	61	0.550	RC16	0.05	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	173	0.550	RC16	0.06	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction
21	UPN 220 | ArcelorMittal (EN 10365:2017)						
	3	0.535	RC15	0.54	≤ 1	CS272)	Cross-section check - Elastic design with warping torsion analysis
	1	0.000	RC16	0.00	≤ 1	SE400)	Serviceability - Negligible deformations
	324	0.577	RC16	0.37	≤ 1	SE401)	Serviceability - Combination of actions 'Characteristic' - z-direction
	325	0.577	RC16	0.02	≤ 1	SE406)	Serviceability - Combination of actions 'Characteristic' - y-direction

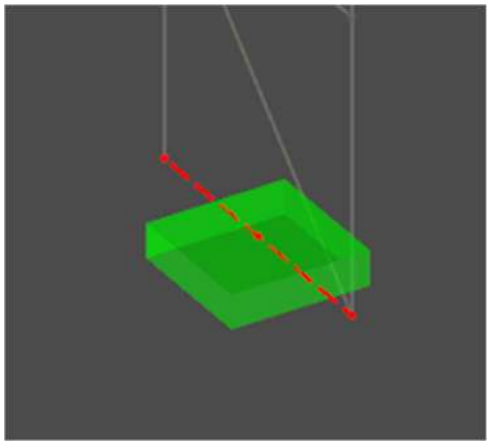
Design Ratio



IŠVADA: Laikomoji galia pakankama. Ribinis santvaros įlinkis d_{lim}=l/250=16000/250=64mm, pagal 17.1 lentelę. įlinkis BEM skaičiavimuose d_{max}=32mm . Leidžiamas maksimalus kolonų poslinkis h_s/150=4700/150=31,33mm, pagal 17.4 lentelę. maksimalus poslinkis BEM skaičiavimuose =26,7mm. Maksimalių leistinų įlinkių ir poslinkių reikšmės pagal STR. 2.05.04:2003 Poveikiai ir apkrovos XVII skyrių.

12.1. D600 STATYBINIŲ KARKASINIŲ KOLONŲ POLIŲ SKAIČIAVIMAS

Atraminei reakcijai į polių gauti pakooreguojamas skaičiuojamasis modelis(galioja superpozicijos principas) iš atramų po kolonomis į vieną bendrą standžią atramą.



Polio laikomoji geba skaičiuojama nuo šių derinių: N_{max}, $M_{y,max}$, $M_{x,max}$

Node	Support Forces [kN]			Support Moments [kNm]				
No.	**Column1**	**$P_{X'}$**	**$P_{Y'}$**	**$P_{Z'}$**	**$M_{X'}$**	**$M_{Y'}$**	**$M_{Z'}$**	**Derinys**
174	Max $M_{X'}$	14,80	-16,50	-60,16	**68,95**	59,96	0,07	LC 1-4
175	Min $M_{Y'}$	**-19,12**	-7,25	-64,27	32,77	-112,27	0,08	LC 1,2,5,8
175	Min $P_{X'}$	**-19,12**	-7,25	-64,27	32,77	-112,27	0,08	LC 1,2,5,8

Polio laikomosios galios skaičiavimai atlikti programa „GEO5 Pile CPT“.

Analysis of CPT pile

Input data

Tests

No.	Test name	Offset of the origin d_h [m]	Overall depth d_{tot} [m]
1	cpt-1_v2	0,45	15,00
2	cpt-2_v2	0,13	15,00

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	γ [kN/m^3]	γ_{su} [kN/m^3]
1	1lp-p (Mg)		24,60	16,00	6,00
2	8lst (CIL)		32,80	16,50	6,50

No.	Name	Pattern	φ_{ef} [°]	γ [kN/m^3]	γ_{su} [kN/m^3]
3	9vst (CIM)		21,00	20,00	10,00

Soil parameters

1lp-p (Mg)
Unit weight : γ = 16,00 kN/m^3
Angle of internal friction : φ_{ef} = 24,60 °
Saturated unit weight : γ_{sat} = 16,00 kN/m^3
Type of soil : sand, gravel
Magnitude OCR : OCR ≤ 2
Type of grains : sand finer than 600 nm

8lst (CIL)
Unit weight : γ = 16,50 kN/m^3
Angle of internal friction : φ_{ef} = 32,80 °
Saturated unit weight : γ_{sat} = 16,50 kN/m^3
Type of soil : silt

9vst (CIM)
Unit weight : γ = 20,00 kN/m^3
Angle of internal friction : φ_{ef} = 21,00 °
Saturated unit weight : γ_{sat} = 20,00 kN/m^3
Type of soil : silt

Construction

Type of construction : single pile
Design load Fs_d = 88,82 kN
Service load Fs = 64,00 kN

Geometry

Type of pile : continuous flight auger pile
Pile material : concrete
Reduce q_c III to 2 MPa : Yes
Elevation from the original ground = -0,53 m
Elevation from the finished grade = -1,78 m
Pile length in soil = 5,00 m
Pile head offset above terrain = 0,00 m
Depth of finished grade = 1,25 m

Pile cross-section - circular
Pile diameter d = 0,60 m

GWT

Ground water table GWT = 1,15 m

Global settings

Analysis based on tests : CPT
The analysis does not consider the influence of negative skin friction.
Partial factor on model uncertainty γ_{cal} = 1,00

Geological profile and assigned soils

Position information
Terrain elevation = -0,53 m
Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Elevation [m]	Assigned soil	Pattern
1	3,80	0,00 .. 3,80	-0,53 .. -4,33	1lp-p (Mg)	
2	4,30	3,80 .. 8,10	-4,33 .. -8,63	8lst (CIL)	
3	6,90	8,10 .. 15,00	-8,63 .. -15,53	9vst (CIM)	
4	-	15,00 .. ∞	-15,53 .. -	9vst (CIM)	

Bearing capacity calculation - EN 1997-2

Calculation of vertical bearing capacity - intermediate results of tests

Intermediate results CPT - cpt-1_v2

Total resistance	$R_{c,i}$	=	843,15	kN
Skin bearing capacity	$R_{s,i}$	=	440,06	kN
Base bearing capacity	$R_{b,i}$	=	403,10	kN
Medium magnitude of penetration resistance	$q_{cI,mean}$	=	2,73	MPa
Medium magnitude of penetration resistance	$q_{cII,mean}$	=	2,47	MPa
Medium magnitude of penetration resistance	$q_{cIII,mean}$	=	0,96	MPa
Maximum stress at pile base	$p_{max,base}$	=	1425,66	kPa
Reduced stress at pile base	$p_{max,base,red}$	=	1425,66	kPa

Intermediate results CPT - cpt-2_v2

Total resistance	$R_{c,i}$	=	1038,97	kN
Skin bearing capacity	$R_{s,i}$	=	714,73	kN
Base bearing capacity	$R_{b,i}$	=	324,24	kN
Medium magnitude of penetration resistance	$q_{cI,mean}$	=	3,30	MPa
Medium magnitude of penetration resistance	$q_{cII,mean}$	=	1,06	MPa
Medium magnitude of penetration resistance	$q_{cIII,mean}$	=	0,69	MPa
Maximum stress at pile base	$p_{max,base}$	=	1146,76	kPa
Reduced stress at pile base	$p_{max,base,red}$	=	1146,76	kPa

Calculation of vertical bearing capacity - intermediate results skin

Intermediate results CPT - cpt-1_v2

No.	Depth [m]	q_{cz} [MPa]	Coeff. [–]	Skin frict. [kPa]
1	1,25	0,00	0,0060	0,00
2	2,45	1,39	0,0060	8,34
3	2,65	2,00	0,0060	12,00
4	3,45	6,33	0,0060	37,98
5	3,80	3,19	0,0250	79,72
6	3,85	2,74	0,0250	68,50
7	4,11	2,00	0,0250	50,00
8	4,25	1,61	0,0250	40,33
9	4,73	2,00	0,0250	50,00
10	5,35	4,11	0,0250	102,75
11	5,45	4,45	0,0250	111,25
12	5,65	4,74	0,0250	118,50
13	6,25	4,19	0,0250	104,63

Intermediate results CPT - cpt-2_v2

No.	Depth [m]	q_{cz} [MPa]	Coeff. [–]	Skin frict. [kPa]
1	1,25	0,00	0,0060	0,00
2	2,13	1,55	0,0060	9,30
3	2,19	2,00	0,0060	12,00
4	2,33	3,08	0,0060	18,48
5	2,40	2,90	0,0060	17,39
6	2,75	2,00	0,0060	12,00
7	3,64	2,00	0,0060	12,00
8	3,80	2,31	0,0250	57,87
9	3,93	2,57	0,0250	64,25
10	4,13	3,33	0,0250	83,25
11	4,25	3,65	0,0250	91,20
12	5,13	5,98	0,0250	149,50
13	5,35	5,83	0,0250	145,65
14	6,13	10,65	0,0250	266,25
15	6,25	9,06	0,0250	226,56

Calculation of vertical pile bearing capacity - intermediate results

Pile diameter	d_{eq}	=	0,60	m
Pile diameter at base	$d_{s,eq}$	=	0,60	m
Pile area at base	A_b	=	0,28	m^2
Coeff. of reduc. of pile base bear. capacity	α_p	=	0,80	
Coeff. of influence of pile shape	s	=	1,00	
Coeff. of influence of pile widened base	β	=	1,00	

Calculation of vertical bearing capacity - results

Analysis carried out for all tests.

Minimum resistance of pile in compression	$R_{c,min}$	=	843,15	kN
Coefficient	ξ_4	=	1,27	
Mean resistance of pile in compression	$R_{c,mean}$	=	941,06	kN
Coefficient	ξ_3	=	1,35	
Characteristic pile bearing capacity	R_c	=	663,90	kN
Design pile bearing capacity	R_{cd}	=	635,05	kN
Design load	$F_{s,d}$	=	88,82	kN

R_{cd} = 635,05 kN > $F_{s,d}$ = 88,82 kN

Verification of pile for bearing capacity is SATISFACTORY

Settlement calculation - EN 1997-2

Settlement calculation:

Service load	F_s	=	64,00	kN
Skin bearing capacity	R_s	=	47,79	kN
Bearing capacity at base	R_b	=	16,21	kN
Pile base settlement	w_{base}	=	1,1	mm
Elastic deformation of pile	$w_{el,d}$	=	0,0	mm
Overall settlement	$w_{1,d}$	=	1,1	mm

Pile settlement calculation - results

For loading Fs = 64,00 kN the pile settlement is = 1,1 mm

Test : cpt-1_v2

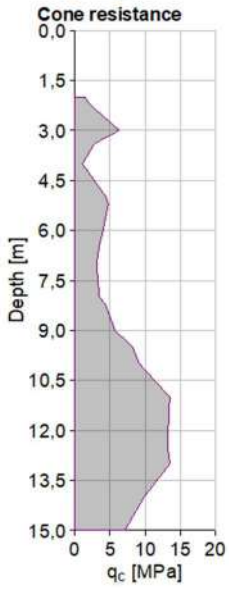


Table (CPT)

No.	Depth d [m]	Cone resistance q_c [MPa]
1	2,00	1,39
2	2,20	2,00
3	3,00	6,33
4	3,40	2,74
5	4,00	1,05
6	5,00	4,45
7	5,20	4,74
8	6,00	4,00
9	6,50	3,43
10	7,00	3,08
11	8,00	3,45
12	8,20	4,32
13	9,00	5,69
14	9,50	8,18
15	10,00	9,17
16	11,00	13,52
17	12,44	13,17
18	13,00	13,57
19	14,00	9,86
20	15,00	7,09

Test : cpt-2_v2

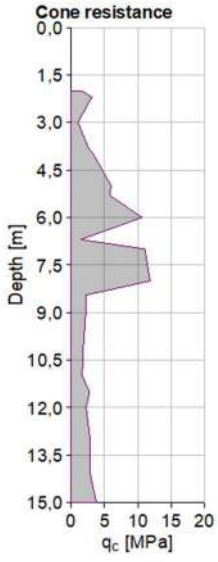


Table (CPT)

No.	Depth d [m]	Cone resistance q_c [MPa]
1	2,00	1,55
2	2,20	3,08
3	3,00	1,00
4	3,80	2,57
5	4,00	3,33
6	5,00	5,98
7	5,30	5,77
8	6,00	10,65
9	6,70	1,39
10	7,00	11,06
11	8,00	11,86
12	8,45	2,13
13	9,00	2,17
14	10,00	1,85
15	11,00	1,62
16	11,50	2,76
17	12,00	2,25
18	13,00	2,82
19	14,00	2,76
20	15,00	3,76

Polio laikomosios galios patikrinimas yra TINKAMAS

Settings

Standard - EN 1997 - DA1

Materials and standards

Concrete structures :	EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 :	standard
Circle pile shear :	simplified method
Steel structures :	EN 1993-1-1 (EC3)
Partial factor on bearing capacity of steel cross section :	γ_{M0} = 1,00
Timber structures :	EN 1995-1-1 (EC5)
Partial factor for timber property :	γ_M = 1,30
Modif. factor of load duration and moisture content :	k_{mod} = 0,50
Coeff. of effective width for shear stress :	k_{cr} = 0,67

Pile

Verification methodology :	according to EN 1997
Analysis for drained conditions :	NAVFAC DM 7.2
Load settlement curve :	linear (Poulos)
Horizontal bearing capacity :	Elastic subsoil (p-y method)
Design approach :	1 - reduction of actions and soil parameters

Partial factors on actions (A)

Permanent design situation

		Combination 1		Combination 2	
		Unfavourable	Favourable	Unfavourable	Favourable
Permanent actions :	γ_G =	1,35 [–]	1,00 [–]	1,00 [–]	1,00 [–]

Partial factors for soil parameters (M)

Permanent design situation

		Combination 1	Combination 2
Partial factor on internal friction :	γ_ϕ =	1,00 [–]	1,25 [–]
Partial factor on effective cohesion :	γ_c =	1,00 [–]	1,25 [–]

Partial factors for soil parameters (M)

Permanent design situation

Partial factor on undrained shear strength :	γ_{cu} =	1,00	[–]	1,40	[–]

Partial factors for resistances (R)

Permanent design situation

		Combination 1		Combination 2	
Partial factor on shaft resistance :	γ_s =	1,00	[–]	1,30	[–]
Partial factor on base resistance :	γ_b =	1,00	[–]	1,45	[–]
Partial factor on resistance in tension :	γ_{st} =	1,25	[–]	1,60	[–]

Basic soil parameters

No.	Name	Pattern	γ [kN/m³]	v [–]
1	1lp-p (Mg)		16,00	0,30
2	8lst (CIL)		21,70	0,30
3	9vst (CIM)		20,40	0,30

No.	Name	Pattern	E_{oed} [MPa]	E_{def} [MPa]	γ_{sat} [kN/m³]	γ_s [kN/m³]	n [–]
1	1lp-p (Mg)		-	1,50	16,00	-	-
2	8lst (CIL)		-	49,20	21,70	-	-
3	9vst (CIM)		-	15,60	20,40	-	-

No.	Name	Pattern	φ_{ef} [°]	δ [°]	K [–]	c_u [kPa]	α [–]
1	1lp-p (Mg)		24,60	-	-	-	-
2	8lst (CIL)		-	-	-	268,10	0,30
3	9vst (CIM)		-	-	-	112,00	0,40

Parameters of soils to compute modulus of subsoil reaction

No.	Name	Pattern	Type of soil	n_h [MN/m³]
1	1lp-p (Mg)		cohesionless	0,75
2	8lst (CIL)		cohesive	-

No.	Name	Pattern	Type of soil	n_h [MN/m³]
3	9vst (CIM)		cohesive	-

Soil parameters

1lp-p (Mg)

Unit weight : γ = 16,00 kN/m³
Poisson's ratio : ν = 0,30
Deformation modulus : E_{def} = 1,50 MPa
Saturated unit weight : γ_{sat} = 16,00 kN/m³
Type of soil : cohesionless
Modulus of horiz.compressibility : n_h = 0,75 MN/m³
Angle of internal friction : φ_{ef} = 24,60 °

8lst (CIL)

Unit weight : γ = 21,70 kN/m³
Poisson's ratio : ν = 0,30
Deformation modulus : E_{def} = 49,20 MPa
Saturated unit weight : γ_{sat} = 21,70 kN/m³
Type of soil : cohesive
Cohesion of soil : c_u = 268,10 kPa
Adhesion factor : α = 0,30

9vst (CIM)

Unit weight : γ = 20,40 kN/m³
Poisson's ratio : ν = 0,30
Deformation modulus : E_{def} = 15,60 MPa
Saturated unit weight : γ_{sat} = 20,40 kN/m³
Type of soil : cohesive
Cohesion of soil : c_u = 112,00 kPa
Adhesion factor : α = 0,40

Geometry

Pile profile: circular

Dimensions

Diameter d = 0,60 m
Length l = 5,00 m

Calculated cross-sectional characteristics

Area A = 2,83E-01 m²
Moment of inertia I = 6,36E-03 m⁴

Location

Off ground height h = 0,00 m
Depth of finished grade h_z = 1,25 m

Technology: CFA piles
Modulus of subsoil reaction considered according to CSN 731004.

Material of structure

Unit weight γ = 23,00 kN/m³
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 25/30

Cylinder compressive strength f_{ck} = 25,00 MPa
Tensile strength f_{ctm} = 2,60 MPa
Elasticity modulus E_{cm} = 31000,00 MPa
Shear modulus G = 12917,00 MPa

Longitudinal reinforcement: B500B
Yield strength f_{yk} = 500,00 MPa

Transverse reinforcement: B500B
Yield strength f_{yk} = 500,00 MPa

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	3,80	0,00 .. 3,80	1lp-p (Mg)	
2	4,30	3,80 .. 8,10	8lst (CIL)	
3	6,90	8,10 .. 15,00	9vst (CIM)	
4	-	15,00 .. ∞	9vst (CIM)	

Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Load No. 1	Design	88,82	64,16	74,90	11,89	14,19
2	Yes		Load No. 2	Design	60,16	68,95	59,96	14,80	-16,50
3	Yes		Load No. 3	Design	64,27	32,77	112,27	-19,12	-7,25
4	Yes		Load No. 1 - service	Service	63,44	45,83	53,50	8,49	10,14
5	Yes		Load No. 2 - service	Service	42,97	49,25	42,83	10,57	-11,79
6	Yes		Load No. 3 - service	Service	45,91	23,41	80,19	-13,66	-5,18

Verification No. 1

Input data to compute pile horizontal bearing capacity

Pile is fixed into a rock (translation at pile foot equals zero).
Analysis carried out with automatic selection of the most unfavourable load cases.
Horizontal bearing capacity verified in the direction of maximum load effect.

Distributions of internal forces and displacement of pile

Pile displacements and internal forces distributions - maximum values

Dist. [m]	Modulus k [MN/m³]	Displacement [mm]	Rotat. [mRad]	Stress [kPa]	Shear Force [kN]	Moment [kNm]
0.00	0.00	8.41	1.99	8.43	22.17	91.37
0.22	1.84	7.71	1.91	9.04	22.30	86.37
0.25	1.88	7.63	1.91	9.10	22.32	85.81
0.27	1.91	7.55	1.90	9.16	22.33	85.26
0.48	2.16	6.95	1.83	9.56	22.43	80.78
0.50	2.19	6.88	1.82	9.60	22.44	80.22
0.53	2.22	6.81	1.81	9.64	22.45	79.66
0.73	2.47	6.24	1.74	9.85	22.52	75.16
0.75	2.50	6.17	1.73	9.86	22.53	74.60

Dist. [m]	Modulus k [MN/m^3]	Displacement [mm]	Rotat. [mRad]	Stress [kPa]	Shear Force [kN]	Moment [kNm]
0.78	2.53	6.10	1.72	9.88	22.54	74.03
0.98	2.78	5.57	1.64	9.92	22.58	75.38
1.00	2.81	5.50	1.63	9.91	22.58	75.59
1.03	2.84	5.44	1.62	9.91	22.59	75.81
1.22	3.09	4.93	1.55	9.80	22.59	77.36
1.25	3.13	4.87	1.54	9.78	22.59	77.54
1.27	3.16	4.81	1.53	9.75	22.59	77.71
1.47	3.41	4.34	1.45	9.51	22.56	78.98
1.50	3.44	4.28	1.44	9.48	22.56	79.12
1.52	3.47	4.22	1.43	9.44	22.55	79.26
1.72	3.72	3.79	1.35	9.09	22.49	80.24
1.75	3.75	3.73	1.34	9.04	22.49	80.34
1.77	3.78	3.68	1.33	8.99	22.48	80.45
1.97	4.03	3.28	1.24	8.55	22.39	81.16
2.00	4.06	3.23	1.23	8.49	22.38	81.23
2.02	4.09	3.18	1.22	8.43	22.37	81.30
2.22	4.34	2.81	1.14	7.92	22.26	81.75
2.25	4.37	2.76	1.13	7.85	22.24	81.80
2.27	4.41	2.72	1.12	7.78	22.23	81.84
2.47	4.66	2.38	1.04	7.22	22.10	82.06
2.50	4.69	2.34	1.03	7.15	22.08	82.07
2.52	4.72	2.30	1.02	7.07	22.06	82.08
2.72	54.67	2.00	0.93	71.30	20.63	81.44
2.75	54.67	1.96	0.92	70.03	20.43	81.24
2.77	54.67	1.93	0.91	68.77	20.23	81.01
2.97	54.67	1.66	0.83	59.25	18.63	78.27
3.00	54.67	1.62	0.82	58.12	18.43	77.83
3.02	54.67	1.59	0.81	57.01	19.15	77.36
3.22	54.67	1.35	0.73	48.56	25.48	72.88
3.25	54.67	1.33	0.73	47.56	26.20	72.23
3.27	54.67	1.30	0.72	46.58	26.91	71.57
3.47	54.67	1.09	0.65	39.13	32.04	65.66
3.50	54.67	1.06	0.64	38.25	32.62	64.85
3.52	54.67	1.04	0.63	37.38	33.19	64.03
3.72	54.67	0.85	0.57	30.83	37.27	56.97
3.75	54.67	0.83	0.56	30.06	37.73	56.03
3.75	54.67	0.83	0.56	30.03	37.75	55.99
3.77	54.67	0.81	0.55	29.29	38.18	55.08
3.97	54.67	0.65	0.50	23.52	41.34	47.12
4.00	54.67	0.63	0.50	22.84	41.69	46.08
4.02	54.67	0.61	0.49	22.16	42.02	45.03
4.22	54.67	0.47	0.45	17.02	44.37	36.38
4.25	54.67	0.45	0.45	16.41	44.62	35.27
4.27	54.67	0.44	0.44	15.81	44.86	34.15
4.47	54.67	0.31	0.41	11.16	46.48	25.01
4.50	54.67	0.29	0.41	10.60	46.64	23.84
4.52	54.67	0.28	0.40	10.04	46.80	22.68

Dist. [m]	Modulus k [MN/m^3]	Displacement [mm]	Rotat. [mRad]	Stress [kPa]	Shear Force [kN]	Moment [kNm]
4.72	54.67	0.16	0.39	5.72	47.74	13.21
4.75	54.67	0.14	0.39	5.19	47.82	12.02
4.78	54.67	0.13	0.38	4.67	47.90	10.82
4.98	54.67	0.01	0.38	0.52	48.21	1.21
5.00	54.67	0.00	0.38	0.00	48.21	0.00

Pile displacements and internal forces distributions - minimum values

Dist. [m]	Modulus k [MN/m^3]	Displacement [mm]	Rotat. [mRad]	Stress [kPa]	Shear Force [kN]	Moment [kNm]
0.00	0.00	-5.34	-3.21	-13.28	-14.80	-116.95
0.22	1.84	-4.90	-3.08	-14.21	-14.88	-120.43
0.25	1.88	-4.85	-3.07	-14.31	-14.89	-120.79
0.27	1.91	-4.81	-3.05	-14.40	-14.90	-121.14
0.48	2.16	-4.43	-2.93	-15.00	-14.95	-123.80
0.50	2.19	-4.39	-2.92	-15.05	-14.96	-124.10
0.53	2.22	-4.34	-2.90	-15.11	-14.97	-124.40
0.73	2.47	-3.99	-2.78	-15.41	-15.00	-126.62
0.75	2.50	-3.94	-2.76	-15.43	-15.01	-126.87
0.78	2.53	-3.90	-2.75	-15.45	-15.01	-127.12
0.98	2.78	-3.57	-2.62	-15.48	-15.03	-128.88
1.00	2.81	-3.52	-2.60	-15.47	-15.03	-129.08
1.03	2.84	-3.48	-2.59	-15.46	-15.03	-129.27
1.22	3.09	-3.17	-2.46	-15.26	-15.02	-130.59
1.25	3.13	-3.13	-2.44	-15.22	-15.02	-130.73
1.27	3.16	-3.09	-2.42	-15.18	-15.02	-130.87
1.47	3.41	-2.79	-2.29	-14.78	-14.99	-131.75
1.50	3.44	-2.76	-2.27	-14.72	-14.99	-131.83
1.52	3.47	-2.72	-2.26	-14.65	-14.98	-131.91
1.72	3.72	-2.44	-2.12	-14.08	-14.93	-132.37
1.75	3.75	-2.41	-2.11	-14.00	-14.93	-132.40
1.77	3.78	-2.38	-2.09	-13.92	-14.92	-132.43
1.97	4.03	-2.12	-1.96	-13.21	-14.85	-132.77
2.00	4.06	-2.09	-1.94	-13.11	-14.85	-132.81
2.02	4.09	-2.06	-1.92	-13.02	-14.84	-132.84
2.22	4.34	-1.82	-1.79	-12.20	-14.75	-132.95
2.25	4.37	-1.79	-1.77	-12.09	-14.74	-132.94
2.27	4.41	-1.77	-1.75	-11.98	-14.73	-132.93
2.47	4.66	-1.55	-1.62	-11.09	-14.70	-132.67
2.50	4.69	-1.52	-1.60	-10.98	-14.71	-132.62
2.52	4.72	-1.50	-1.59	-10.86	-14.72	-132.56
2.72	54.67	-1.30	-1.45	-109.26	-16.71	-130.98
2.75	54.67	-1.28	-1.44	-107.28	-17.66	-130.60
2.77	54.67	-1.26	-1.42	-105.33	-19.18	-130.17
2.97	54.67	-1.08	-1.29	-90.53	-30.35	-125.39
3.00	54.67	-1.06	-1.27	-88.78	-31.63	-124.63
3.02	54.67	-1.04	-1.26	-87.05	-32.88	-123.84
3.22	54.67	-0.89	-1.14	-73.98	-42.04	-116.39
3.25	54.67	-0.87	-1.12	-72.44	-43.08	-115.32

Dist. [m]	Modulus k [MN/m^3]	Displacement [mm]	Rotat. [mRad]	Stress [kPa]	Shear Force [kN]	Moment [kNm]
3.27	54.67	-0.85	-1.11	-70.91	-44.12	-114.23
3.47	54.67	-0.72	-1.00	-59.44	-51.93	-104.61
3.50	54.67	-0.70	-0.98	-58.08	-52.81	-103.30
3.52	54.67	-0.68	-0.97	-56.75	-53.67	-101.97
3.72	54.67	-0.56	-0.87	-46.70	-59.87	-90.59
3.75	54.67	-0.55	-0.86	-45.52	-60.56	-89.09
3.75	54.67	-0.55	-0.86	-45.47	-60.59	-89.03
3.77	54.67	-0.54	-0.85	-44.35	-61.23	-87.56
3.97	54.67	-0.43	-0.77	-35.54	-66.02	-74.82
4.00	54.67	-0.42	-0.76	-34.49	-66.54	-73.16
4.02	54.67	-0.41	-0.75	-33.47	-67.05	-71.49
4.22	54.67	-0.31	-0.68	-25.66	-70.59	-57.71
4.25	54.67	-0.30	-0.67	-24.74	-70.97	-55.94
4.27	54.67	-0.29	-0.67	-23.82	-71.34	-54.17
4.47	54.67	-0.20	-0.62	-16.79	-73.77	-39.64
4.50	54.67	-0.19	-0.62	-15.94	-74.01	-37.79
4.52	54.67	-0.18	-0.61	-15.11	-74.24	-35.94
4.72	54.67	-0.10	-0.58	-8.60	-75.66	-20.94
4.75	54.67	-0.10	-0.58	-7.81	-75.79	-19.04
4.78	54.67	-0.09	-0.58	-7.02	-75.90	-17.15
4.98	54.67	-0.01	-0.57	-0.78	-76.36	-1.91
5.00	54.67	0.00	-0.57	0.00	-76.37	-0.00

Maximum internal force and deformation :

Max. pile displacement = 8,4 mm
Max. shear force = 76,37 kN
Maximum moment = 132,95 kNm

Verification of cross section in bending and compression:

Cross-section: circular, d = 0,60 m
Reinforcement - 8 pc bars 16,0 mm; cover 75,0 mm
Type of structure (reinforcement ratio) : pile
Reinforcement ratio ρ = 0,569 % > 0,500 % = ρ_{min}
Load : N_{Ed} = 64,27 kN (compression) ; M_{Ed} = 132,95 kNm
Bearing capacity : N_{Rd} = 84,40 kN; M_{Rd} = 174,58 kNm

Designed pile reinforcement is SATISFACTORY

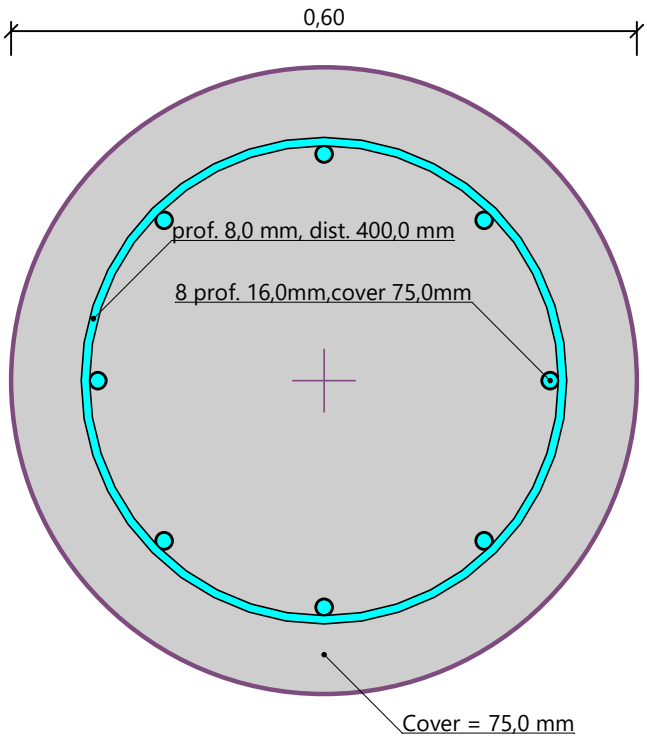
Verification of cross section in shear:

Shear reinf. - profile 8,0 mm; spacing 400,0 mm
A_{sw} = 2 x 125,7 = 251,3 mm^2
b_w = 0,53 m; d = 0,48 m
Ultimate shear force: V_{Rd} = 118,01 kN > 76,37 kN = V_{Ed}

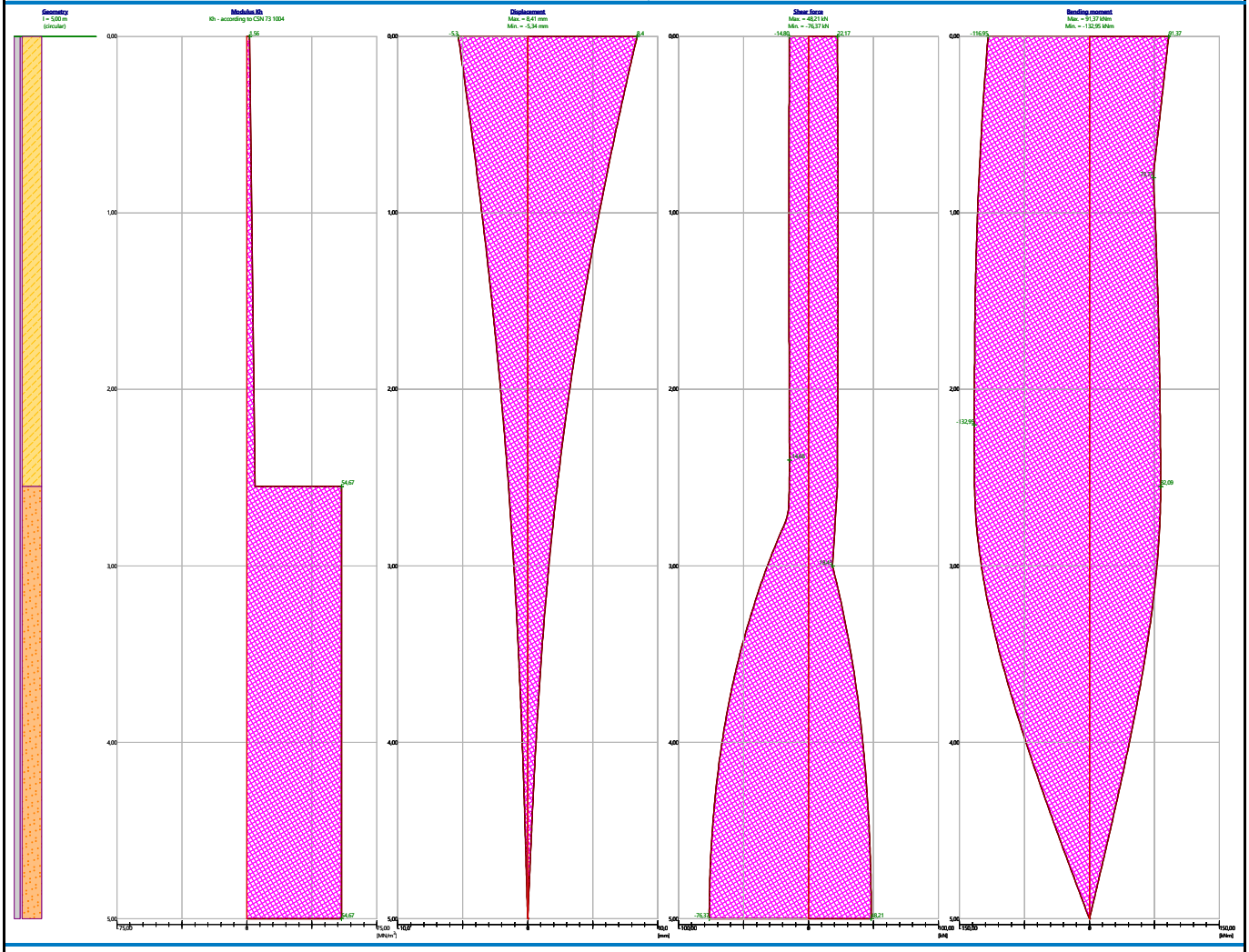
Cross-section is SATISFACTORY.

only minimal shear reinforcement

Reinforcement drawing


0,60
prof. 8,0 mm, dist. 400,0 mm
8 prof. 16,0mm,cover 75,0mm
Cover = 75,0 mm

Name : Horizontal cap. | **Stage - analysis : 1 - 1**



Polis armuojamas 8xD16 išilginiais armatūros strypais ir D8 kas 400mm skersine armatūra.

12.2. ESTAKADOS MAZGŲ TIKRINIMAS

12.2.1. FLANŠINIS MAZGAS

Name	CON1
Description	
Analysis	Stress, strain/ loads in equilibrium

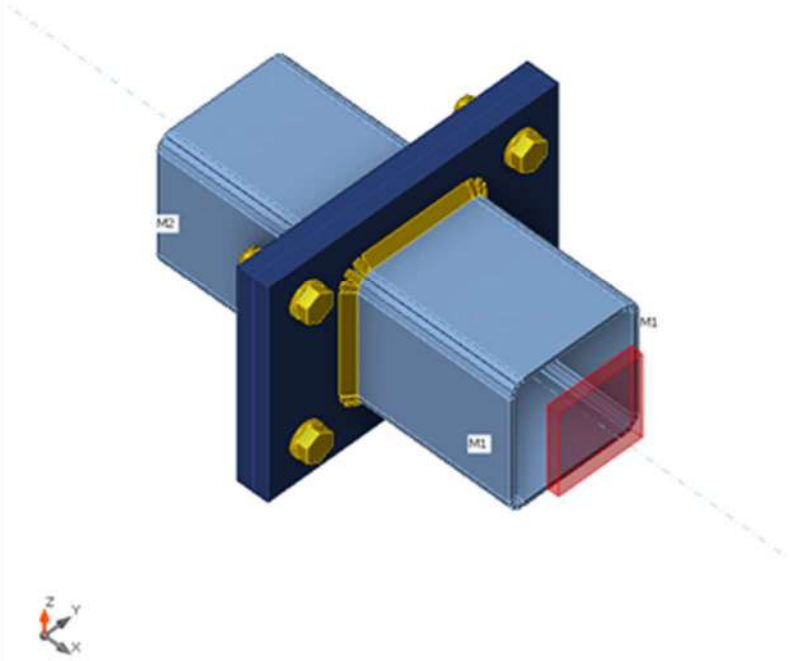
Members

Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
M1	10 - SHS120/120/5.0	0,0	0,0	0,0	0	0	0
M2	10 - SHS120/120/5.0	180,0	0,0	0,0	0	0	0

Supports and forces

Name	Support	Forces in	X [mm]
M1 / end	N-Vy-Vz-Mx-My-Mz	Node	0
M2 / end		Node	0



Cross-sections

Name	Material
10 - SHS120/120/5.0	S 355

Bolts

Name	Bolt assembly	Diameter [mm]	f_u [MPa]	Gross area [mm^2]
M16 8.8	M16 8.8	16	800,0	201

Load effects (forces in equilibrium)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	M1 / End	150,0	0,0	0,0	0,0	0,0	0,0
	M2 / End	150,0	0,0	0,0	0,0	0,0	0,0

Unbalanced forces

Name	X	Y	Z	Mx	My	Mz

	[kN]	[kN]	[kN]	[kNm]	[kNm]	[kNm]
LE1	0,0	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,1 < 5,0%	OK
Loc. deformation	0,0 < 3%	OK
Preloaded bolts	74,1 < 100%	OK
Welds	98,0 < 100%	OK
Buckling	Not calculated	
GMNA	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
M1	5,0	LE1	355,2	0,1	0,0	OK
M2	5,0	LE1	355,2	0,1	0,0	OK
PP1a	14,0	LE1	343,5	0,0	39,8	OK
PP1b	14,0	LE1	343,5	0,0	39,8	OK

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0

Symbol explanation

t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

Detailed result for M2

Design values used in the analysis

$$f_{yd} = \frac{f_{yk}}{\gamma_{M0}} = 355,0 \text{ MPa}$$

Where:

f_{yk} = 355,0 MPa – characteristic yield strength

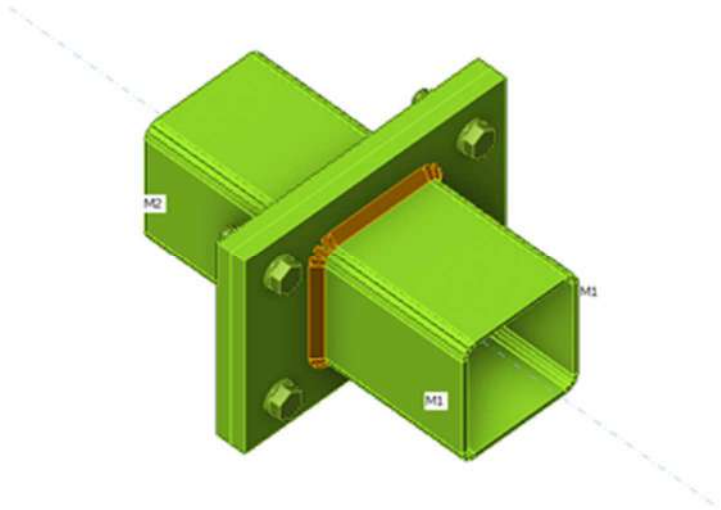
γ_{M0} = 1,00 – partial safety factor for steel material EN 1993-1-1 – 6.1

Loc. deformation

Name	d_0 [mm]	Loads	δ [mm]	δ_{lim} [mm]	δ/d_0 [%]	Check status
M1	120	LE1	0	4	0,0	OK
M2	120	LE1	0	4	0,0	OK

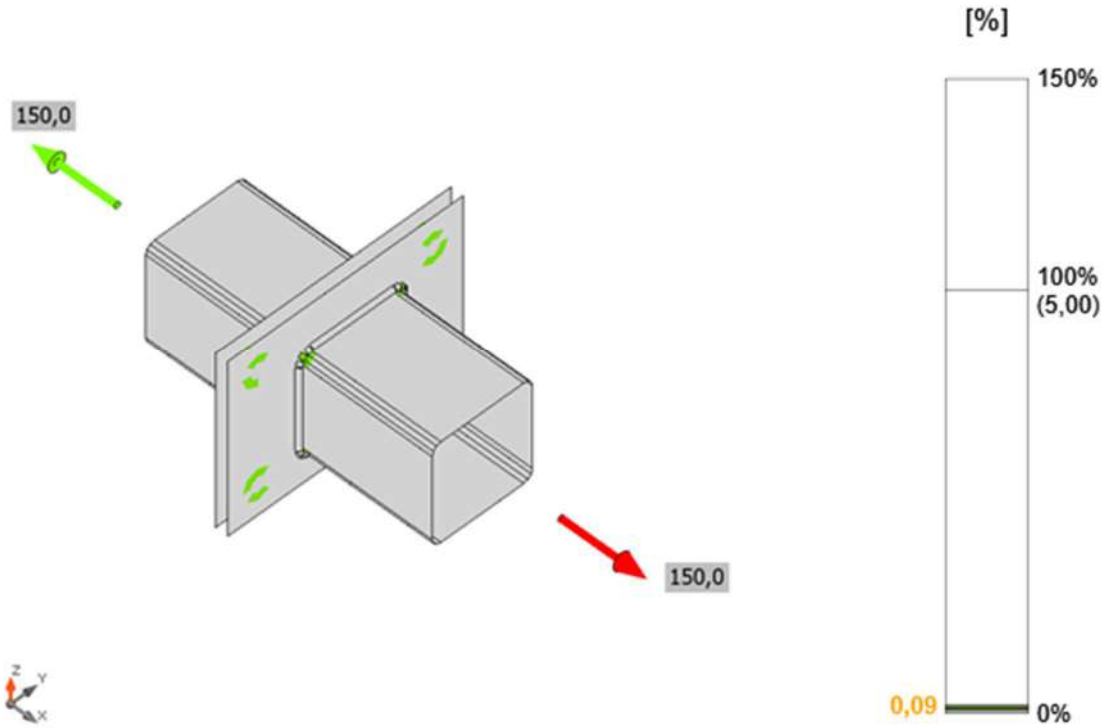
Symbol explanation

d_0 Cross-section size
δ Local cross-section deformation
δ_{lim} Allowed deformation

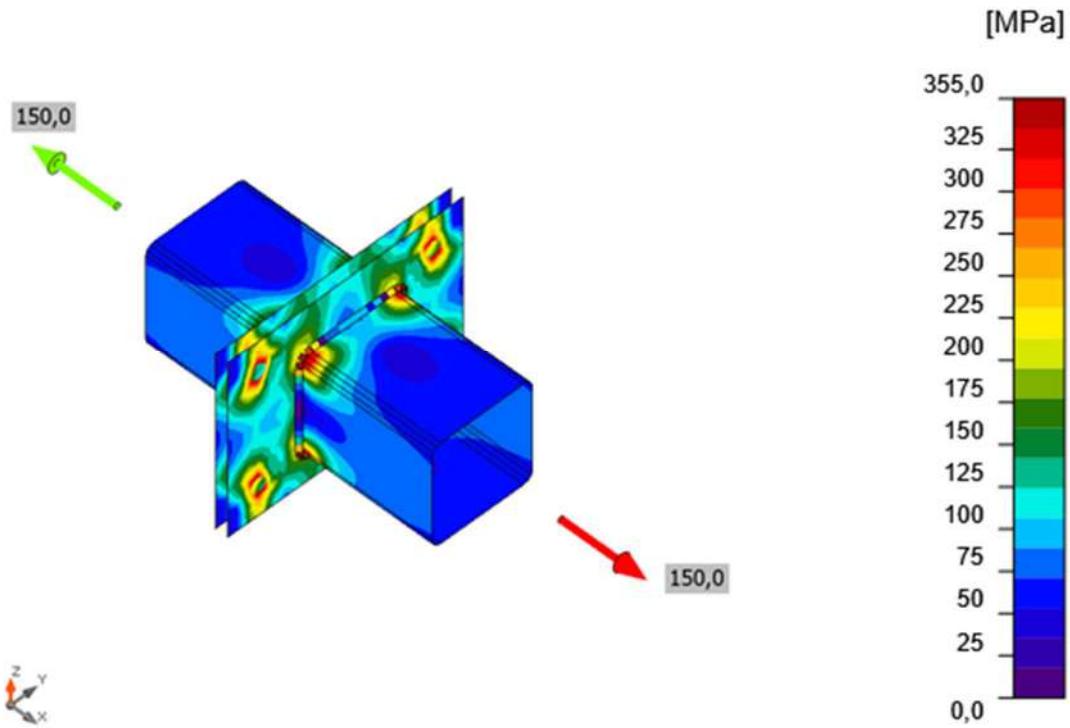




Overall check, LE1

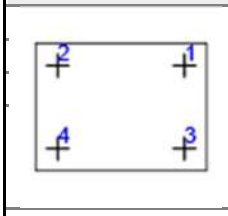


Strain check, LE1



Equivalent stress, LE1

Preloaded bolts

Shape	Item	Grade	Loads	$F_{t,Ed}$ [kN]	$F_{v,Ed}$ [kN]	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{s,Rd}$ [kN]	Ut_t [%]	Ut_s [%]	Detailing	Status
	B1	M16 8.8	LE1	67,0	0,0	90,4	262,5	8,2	74,1	0,0	OK	OK
	B2	M16 8.8	LE1	66,9	0,0	90,4	262,5	8,2	74,0	0,0	OK	OK
	B3	M16 8.8	LE1	67,0	0,0	90,4	262,5	8,2	74,1	0,0	OK	OK
	B4	M16 8.8	LE1	67,0	0,0	90,4	262,5	8,2	74,1	0,0	OK	OK

Symbol explanation

$F_{t,Ed}$	Tension force
$F_{v,Ed}$	Resultant of bolt shear forces Vy and Vz in shear planes
$F_{t,Rd}$	Bolt tension resistance EN 1993-1-8 – Tab. 3.4
$B_{p,Rd}$	Punching shear resistance EN 1993-1-8 – Tab. 3.4
$F_{s,Rd}$	Design slip resistance EN 1993-1-8 – Cl. 3.9
Ut_t	Utilization in tension
Ut_s	Utilization in shear

Detailed result for B1

Tension resistance check (EN 1993-1-8 – Table 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 90,4 kN ≥ $F_{t,Ed} =$ 67,0 kN

Where:

$k_2 =$ 0,90 – Factor

$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt

$A_s =$ 157 mm^2 – Tensile stress area of the bolt

$\gamma_{M2} =$ 1,25 – Safety factor

Punching resistance check (EN 1993-1-8 – Table 3.4)

$B_{p,Rd} = \frac{0,6 \pi d_m t_p f_u}{\gamma_{M2}} =$ 262,5 kN ≥ $F_{t,Ed} =$ 67,0 kN

Where:

$d_m =$ 25 mm – The mean of the across points and across flats dimensions of the bolt head or the nut, whichever is smaller

$t_p =$ 14 mm – Plate thickness

$f_u =$ 490,0 MPa – Ultimate strength

$\gamma_{M2} =$ 1,25 – Safety factor

Slip resistance check (EN 1993-1-8 – 3.9.1)

$F_{s,Rd} = \frac{k_s n \mu (F_{p,C} - 0,8 F_{t,Ed})}{\gamma_{M3}} =$ 8,2 kN ≥ $F_{v,Ed} =$ 0,0 kN

Where:

$k_s =$ 1,00 – Given in Table 3.6

$n = 1$ – Number of the friction surfaces

$\mu = 0{,}30$ – Slip factor

$F_{p,C} = 87{,}9$ kN – Preloading force

$F_{t,Ed} = 67{,}0$ kN – Tensile force

$\gamma_{M3} = 1{,}25$ – Safety factor

Utilization in tension

$\frac{F_{t,Ed}}{\min(F_{t,Rd}\,;\,B_{p,Rd})} = 0{,}74 \leq 1{,}0$

Where:

$F_{t,Ed} = 67{,}0$ kN – Tensile force

$F_{t,Rd} = 90{,}4$ kN – Tension resistance

$B_{p,Rd} = 262{,}5$ kN – Punching resistance

Utilization in shear

$\frac{F_{v,Ed}}{F_{s,Rd}} = 0{,}00 \leq 1{,}0$

Where:

$F_{v,Ed} = 0{,}0$ kN – Shear force (in decisive shear plane)

$F_{s,Rd} = 8{,}2$ kN – Design slip resistance

Detailing check

- Ductility, rotation capacity: Plate PP1a is too thick. Thickness should be lesser or equal to 8,6 mm. (EN 1993-1-8 – Equation 6.32)

Welds

Item	Edge	T_w [mm]	L [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	Ut [%]	Ut_c [%]	Detailing	Status
PP1a	M1	◢ 6,0	440	LE1	426,8	0,0	319,2	-123,6	107,2	98,0	58,8	OK	OK
PP1b	M2	◢ 6,0	440	LE1	426,8	0,0	319,1	-123,7	-107,2	98,0	53,4	OK	OK

Design data

Material	f_u [MPa]	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	490,0	0,90	435,6	352,8

Symbol explanation

T_w	Throat thickness a
L	Length
$\sigma_{w,Ed}$	Equivalent stress
ε_{Pl}	Strain
$\sigma_{\perp}$	Perpendicular stress

$\tau_{\perp}$	Shear stress perpendicular to weld axis
$\tau_{\parallel}$	Shear stress parallel to weld axis
Ut	Utilization
Ut_c	Weld capacity estimation
◢	Fillet weld
f_u	Ultimate strength of weld
β_w	Correlation factor EN 1993-1-8 – Tab. 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Detailed result for PP1b / M2

Weld resistance check (EN 1993-1-8 – Cl. 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0.5} =$ 426,8 MPa

$\sigma_{\perp,Rd} = 0,9 f_u / \gamma_{M2} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 319,1 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – Correlation factor EN 1993-1-8 – Tab. 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

Stress utilization

$Ut = \max(\frac{\sigma_{w,Ed}}{\sigma_{w,Rd}} ; \frac{|\sigma_{\perp}|}{\sigma_{\perp,Rd}}) =$ 0,98 ≤ 1,0

Where:

$\sigma_{w,Ed} =$ 426,8 MPa – Maximum normal stress transverse to the axis of the weld

$\sigma_{w,Rd} =$ 435,6 MPa – Equivalent stress resistance

$\sigma_{\perp} =$ 319,1 MPa – Normal stress perpendicular to the throat

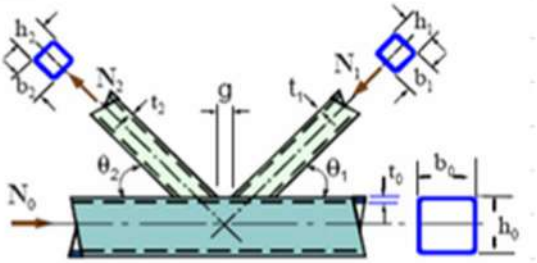
$\sigma_{\perp,Rd} =$ 352,8 MPa – Perpendicular stress resistance

12.2.2. SANTVAROS MAZGŲ K,N TIKRINIMAS

Santvaros strypų mazgas K, N su tarpu

Santvara: -

Mazgo nr. -



Viršutinė/apatinė juosta

h_0 [mm]=	120
b_0 [mm]=	120
t_0 [mm]=	6
A_0 [cm^2]=	26,12
I_0 [cm^4]=	553,69
W_0 [cm^3]=	92,28
$f_{y.0}$ [MPa]=	345
N_0 [kN]=	162
M_0 [kNm]=	1
γ_{M0}=	1,1
γ_{M1}=	1,1

Gniuždomas strypas

h_1 [mm]=	70
b_1 [mm]=	70
t_1 [mm]=	5
A_1 [cm^2]=	12,14
$f_{y.1}$ [MPa]=	345
N_1 [kN]=	50
Θ_1 [°]=	51

Tempiamas strypas

h_2 [mm]=	70
b_2 [mm]=	70
t_2 [mm]=	5
A_2 [cm^2]=	12,14
$f_{y.2}$ [MPa]=	345
N_2 [kN]=	-50
Θ_2 [°]=	48

Galiojimo ribos

1	$0.35 \le \beta \le 1.0$	ok	eilinės sąlygos strypams
2	$\beta \ge 0,1+0,01(b_0/t_0)$	ok	
3	$\eta_1=h_1/b_0 \ge 0,1+0,01(b_0/t_0)$	ok	
4	$\eta_2=h_2/b_0 \ge 0,1+0,01(b_0/t_0)$	ok	
5	$0,5 \le h_1/b_1 \le 2$	ok	
6	$0,5 \le h_2/b_2 \le 2$	ok	
7	$(b_1+h_1)/t_1 \ge 25$	ok	
8	$(b_2+h_2)/t_2 \ge 25$	ok	
9	h_1/t_1; $b_1/t_1 \le 35$	ok	sąlygos gniuždomam strypui
10	h_1/t_1; $b_1/t_1 \le 1,25\sqrt{E/f_{y.1}}$	ok	sąlygos gniuždomam strypui
11	h_2/t_2; $b_2/t_2 \le 35$	ok	sąlygos tempiamam strypui
12	h_0/t_0; $b_0/t_0 \le 35$	ok	sąlygos juostai
13	$0,5 \le h_0/b_0 \le 2$	ok	sąlygos juostai
14	$(h_0+b_0)/t_0 \ge 25$	ok	sąlygos juostai
15	$b_1 \ge 0,77*(b_1+b_2)/2$	ok	
16	$b_2 \ge 0,77*(b_1+b_2)/2$	ok	
17	$0,5*(1-\beta) \le g/b_0 \le 1,5*(1-\beta)$	ok	sąlygos tarpui tarp strypų galų
18	$g \ge t_1+t_2$	ok	sąlygos tarpui tarp strypų galų
19	$g_a/t_0 \ge 1,5$	ok	žiur. formulę 201 pusl.[4]
20	$-0,55 \le e/h_0 \le 0,25$	ok	sąlygos ekscentricitetui
21	$30 \le \Theta_1 \le 90$	ok	sąlygos kampams tarp juostos ir tinklelio

"g" žinomas suskaičiuoja "e" :

g [mm]=	30	:. e [mm]=	11,41537937
g_a [mm]=	21,45		
e [mm]=	11,42	:. g [mm]=	30

Santvaros strypų mazgas K, N su tarpu

Santvara: -

Mazgo nr. -

Juostos plokštumos takumas

Parametrai:

β =	0,58
n=	0,232
η_1 =	0,583
η_2 =	0,583
γ =	10,00
k_n=	1,00

$N_{1,Rd}$ =	238,52	ok
$N_{2,Rd}$ =	249,44	ok

Tinklelio strypo tikrinimas

Tinklelio elementu efektyvus plotis:

b_{eff1} =	42,00	=<	b_1	ok
b_{eff2} =	42,00	=<	b_2	ok

$N_{1,Rd}$ =	363,82	ok
$N_{2,Rd}$ =	363,82	ok

$N_{1,Rd}$ *sinΘ_1	>	$N_{1,Sd}$ *sinΘ_1	ok
282,74		38,86	
$N_{1,Rd}$ *sinΘ_1	>	$N_{2,Sd}$ *sinΘ_2	ok
282,74		37,16	

Juostos kirpimas

Parametrai:

A_v[mm]=	1562,88
α =	0,171
$V_{pl,Rd}$ =	283,00
V_{Sd1} =	38,86
V_{Sd2} =	-37,16

$N_{1,Rd}$ =	364,16	ok
$N_{2,Rd}$ =	380,82	ok

V_{Sd1}	<	0,5*$V_{pl,Rd}$	
	$N_{0,Rd}$ =	819,34	ok
V_{Sd2}	<	0,5*$V_{pl,Rd}$	
	$N_{0,Rd}$ =	819,34	ok

Juostos kirpimo tikrinimas

jei beta= 0,58	=<	1-1/gama = 0,9	tai reikia tikrinti	
b_{ep1} =	35,00	=<	b1= 70	ok
b_{ep2} =	35,00	=<	b2= 70	ok

$N_{1,Rd}$ =	398,64	ok
$N_{2,Rd}$ =	428,93	ok

Santvaros strypų mazgas K, N su tarpu

Santvara: -

Mazgo nr. -

Tinklelio elementų privirinimas

Virinama pusautomačiu, vielos t=1.2 mm				Rwu=	500	Vielos Rwf=	220
Viela	G 42 4 M4 G3Si					Vielos Rwz=	225
beta f=	0,7	beta z=	1	gama c=	0,95		

Gniuždomas strypas

h1 [mm]=	70	Perimetras lw [mm]		302,97819		
b1 [mm]=	70	Siūlės a[mm]=		5		
t1 [mm]=	5	$N/(\beta_f a_f l_w) \le R_{wf}\gamma_{wf}\gamma_c$				
A1 [cm^2]=	12,14	47,15097	<=	209	ok	
fy,1 [MPa]=	345	$N/(\beta_z a_f l_w) \le R_{wz}\gamma_{wz}\gamma_c$				
N1 [kN]=	50	33,00568	<=	213,75	ok	
Q1 [°]=	51					

Tempiamas strypas

h2 [mm]=	70	Perimetras lw [mm]		311,22044		
b2 [mm]=	70	Siūlės a[mm]=		5		
t2 [mm]=	5	$N/(\beta_f a_f l_w) \le R_{wf}\gamma_{wf}\gamma_c$				
A2 [cm^2]=	12,14	-45,9022	<=	209	ok	
fy,2 [MPa]=	345	$N/(\beta_z a_f l_w) \le R_{wz}\gamma_{wz}\gamma_c$				
N2 [kN]=	-50	-32,1316	<=	213,75	ok	
Q2 [°]=	48					

12.3. ESTAKADOS ATRĖMIMO MAZGO SKAIČIAVIMAS

Inkarinių varžtų laikomoji geba skaičiuojama nuo šių derinių: N_{max}, $M_{x,max}$

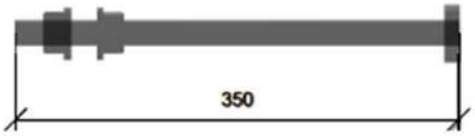
Node	Support Forces [kN]			Support Moments [kNm]				
No.	**Column1**	**$P_{X'}$**	**$P_{Y'}$**	**$P_{Z'}$**	**$M_{X'}$**	**$M_{Y'}$**	**$M_{Z'}$**	**Derinys**
6	Max $M_{X'}$	-13,92	-8,31	35,02	**34,79**	-0,34	-0,07	LC 1-3,5
1	Min P_{Xz}	-18,55	-7,14	**-138,56**	32,33	-0,25	0,07	LC 1-3,5,8
2	Max $P_{Z'}$	-0,30	-0,10	**74,46**	0,49	-0,31	0,00	LC 1,5,8

Summary

Name	Stage	#	Load Case	Page No.	Max Utilization	Status
Column 2	Final	1	Nd=35,0, Mxd=34,8, Myd=0,3, Vxd=-13,9, Vyd=-8,3	4	98%	OK
	Final	2	Nd=-138,6, Mxd=32,3, Myd=-0,3, Vxd=-18,6, Vyd=-7,1	5	28%	OK
	Final	3	Nd=74,5, Mxd=0,5, Myd=-0,3, Vxd=0,3, Vyd=-0,1	7	33%	OK

Peikko Products

Bolts: 4 x HPM20L



Totals

Product	Amount
HPM20L	4

Minimum required torque value of nuts : T_{min} = 150 Nm
Maximum allowed torque value of nuts : T_{max} = 250 Nm

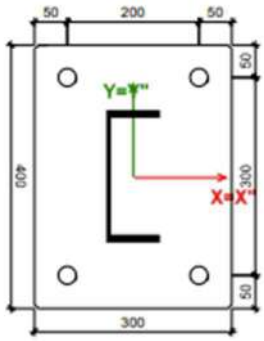
Bolt installation template: PPL20-4 200x300

Materials and Geometry

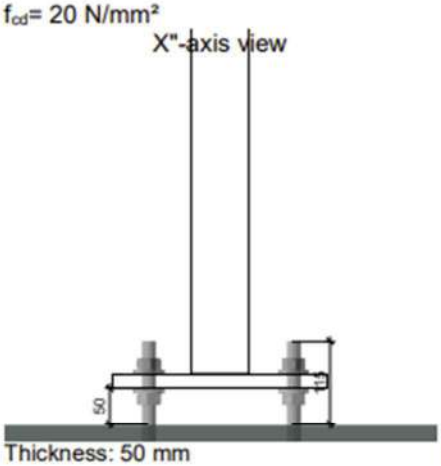
Column: 80x200

f_{cd}= 20 N/mm²

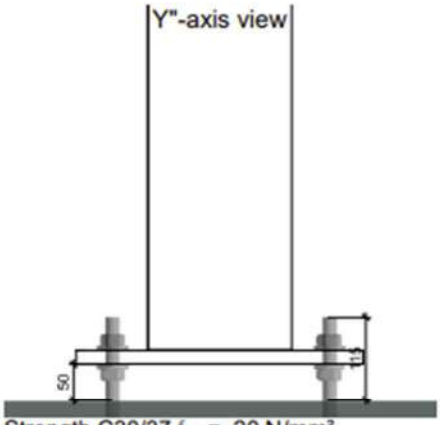
Plane View



X"-axis view



Y"-axis view



Grouting:

Thickness: 50 mm

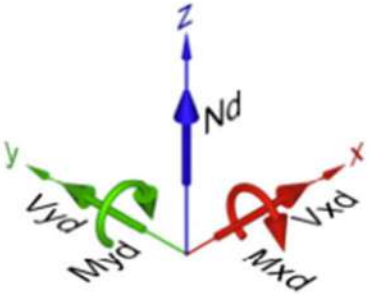
Strength C30/37 f_{cd} = 20 N/mm²

X; Y = local coordinate system of profile
X"; Y" = local coordinate system of anchors

Load Cases

NOTE: Loads are defined in the local coordinate system of the profile.

(Design loads)

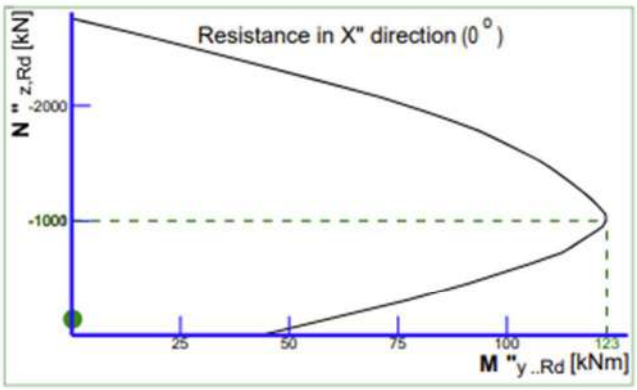


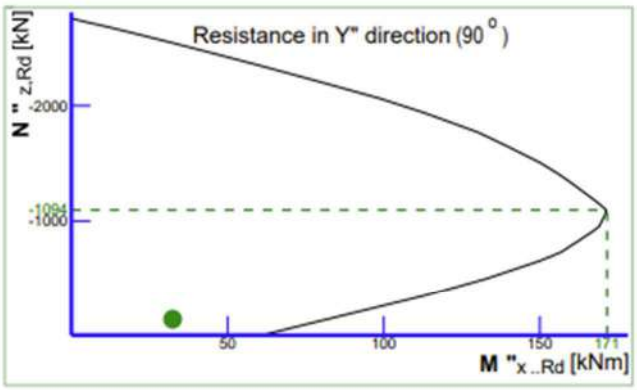
Final Stage

#	Name	N_d [kN]	M_{xd} [kNm]	M_{yd} [kNm]	V_{xd} [kN]	V_{yd} [kN]
1		35,0	34,8	0,3	-13,9	-8,3
2		-138,6	32,3	-0,3	-18,6	-7,1
3		74,5	0,5	-0,3	0,3	-0,1

Erection stage

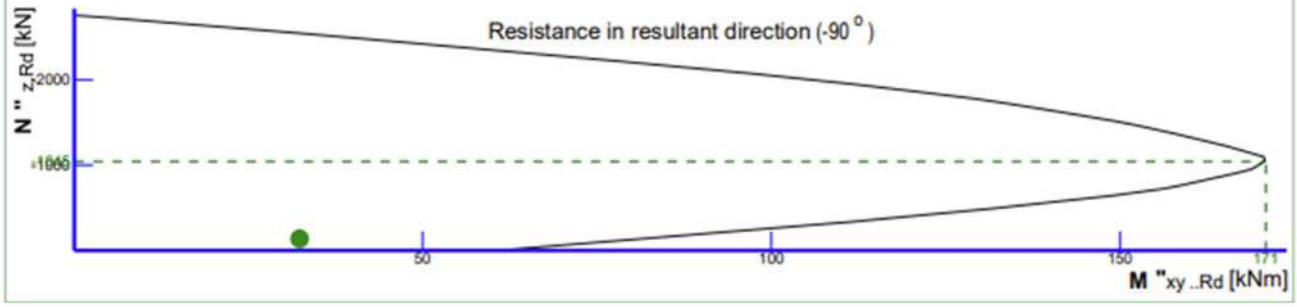
No load case for this stage defined





Resultant Diagrams per Load

Nd=-138,6, Mxd=32,3, Myd=-0,3, Vxd=-18,6, Vyd=-7,1
(loads in coordinate system of profile)
N"d=-138,6, M"xd=32,3, M"yd=-0,3, V"xd=-18,6, V"yd=-7,1
(loads in coordinate system of anchors)



Base Structure

Concrete	C25/30
Uncracked	No
Aggregate size	16 mm
Footing dimension X-axis direction (b)	1600 mm
Footing dimension Y-axis direction (h)	800 mm
Height of Footing	750 mm
Eccentricity of bolted column (e_x)	-500 mm
Eccentricity of bolted column (e_y)	0 mm

Anchor Bolts Failure Verifications

Final Stage Bolts

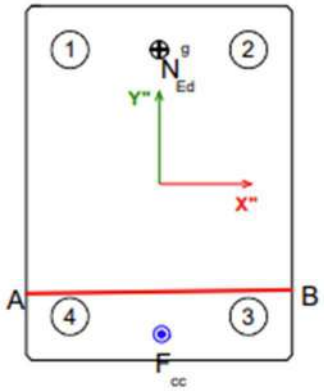
Load Case #1 : Nd=35,0, Mxd=34,8, Myd=0,3, Vxd=-13,9, Vyd=-8,3

Steel Failure: Sufficient capacity **Concrete failure: Sufficient capacity**

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	16,23	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	16,23	kN

Neutral axis in (X"/Y") = A(-150,0 / -123,8); B(150,0 / -120,0)
Resultant tension force in (X"/Y") = N^{g}_{Ed}(-0,5/150,0)
Resultant compression force (concrete) in (X"/Y") = F_{cc}(2,7/-169,9)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	64,4	88,2	73,0	4,06	31,3	13,0	65,1
2	63,8	88,2	72,3	4,06	31,3	13,0	64,6
3	-6,93	88,2	7,9	4,06	31,3	13,0	n/r
4	-6,32	88,2	7,2	4,06	31,3	13,0	n/r

Concrete failure verifications

Proof	Load [kN]	Capacity [kN]	Utilization [%]	Status
Pull-Out Failure	64,4	168,5	38,2	Ok
Cone failure				Ok
Covered with reinforcement:				
1) Foundation (Plain Concrete)	128,1	85,8	149,2	
2) Assigned Hanger Reinforcement	64,4	119,2	54,0	
3) Requirement of Strut and Tie Model	23,1	68,3	n/r	
Splitting Failure				Ok
Covered with reinforcement:				
1) Foundation (Plain Concrete)	128,1	125,8	101,8	
2)Assigned Splitting Reinforcement || X	32,0	170,7	19,0	
3)Assigned Splitting Reinforcement || Y	32,0	170,7	19,0	
Blow-Out Failure	0,0	0,0	n/r	Ok
Pry-out failure	16,2	420,7	3.9	Ok
Edge failure				Ok
Concrete decisive:				
1) -X (Left) Edge (Plain Concrete)	16,2	46,8	34,7	
2) +X (Right) Edge (Plain Concrete)	8,3	87,7	9,5	
3) +Y (Top) Edge (Plain Concrete)	13,9	156,3	8,9	
4) -Y (Bottom) Edge (Plain Concrete)	16,2	116,9	13,9	
5)Assigned Edge Reinforcement (-X)	9,9	55,5	17,8	
6)Assigned Edge Reinforcement (+X)	2,7	55,5	5,0	
7)Assigned Edge Reinforcement (+Y)	4,6	0,0	n/r	
8)Assigned Edge Reinforcement (-Y)	7,2	0,0	n/r	
Combined Resistance	$\beta_N^{2/3}+\beta_V^{2/3}\leq 1$		98,0	Ok

Explanation:

n/r - Verification of failure mode not required

n/a - Not applicable failure mode

(-) - Failure mode has no resistance to actions

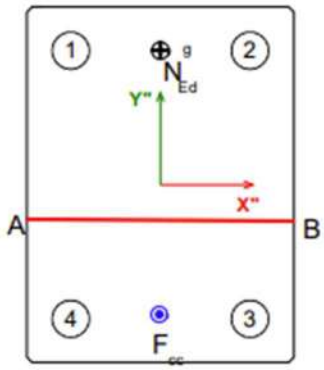
Load Case #2 : Nd=-138,6, Mxd=32,3, Myd=-0,3, Vxd=-18,6, Vyd=-7,1

Steel Failure: Sufficient capacity **Concrete failure: Sufficient capacity**

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	-138,6	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	27,72	kN
Resultant shear force	V_{sd}	19,88	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	0	kN

Neutral axis in (X"/Y") = A(-150,0 / -38,0); B(150,0 / -41,7)
Resultant tension force in (X"/Y") = N^{g}_{Ed}(0,6/150,0)
Resultant compression force (concrete) in (X"/Y") = F_{cc}(-1,3/-145,0)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	20,4	88,2	23,2	0,0	31,3	0,0	n/r
2	20,7	88,2	23,5	0,0	31,3	0,0	n/r
3	-11,8	88,2	13,4	0,0	31,3	0,0	n/r
4	-12,1	88,2	13,7	0,0	31,3	0,0	n/r

Concrete failure verifications

Proof	Load [kN]	Capacity [kN]	Utilization [%]	Status
Pull-Out Failure	20,7	168,5	12,3	Ok
Cone failure				Ok
Covered with reinforcement:				
1) Foundation (Plain Concrete)	41,2	85,8	47,9	
2) Assigned Hanger Reinforcement	20,7	119,2	17,4	
3) Requirement of Strut and Tie Model	23,1	68,3	n/r	
Splitting Failure				Ok
Covered with reinforcement:				
1) Foundation (Plain Concrete)	41,2	125,8	32,7	
2)Assigned Splitting Reinforcement || X	10,3	170,7	6,0	
3)Assigned Splitting Reinforcement || Y	10,3	170,7	6,0	
Blow-Out Failure	0,0	0,0	n/r	Ok
Pry-out failure	0,0	0,0	n/r	Ok
Edge failure				Ok
Concrete decisive:				
1) -X (Left) Edge (Plain Concrete)	0,0	0,0	n/r	
2) +X (Right) Edge (Plain Concrete)	0,0	0,0	n/r	
3) +Y (Top) Edge (Plain Concrete)	0,0	0,0	n/r	
4) -Y (Bottom) Edge (Plain Concrete)	0,0	0,0	n/r	
5)Assigned Edge Reinforcement (-X)	0,0	0,0	n/r	
6)Assigned Edge Reinforcement (+X)	0,0	0,0	n/r	
7)Assigned Edge Reinforcement (+Y)	0,0	0,0	n/r	
8)Assigned Edge Reinforcement (-Y)	0,0	0,0	n/r	
Combined Resistance	$\beta_N \leq 1$		17,4	Ok

Explanation:

n/r - Verification of failure mode not required

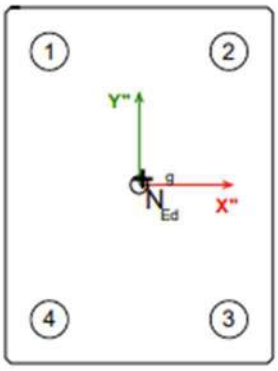
Load Case #3 : Nd=74,5, Mxd=0,5, Myd=-0,3, Vxd=0,3, Vyd=-0,1

Steel Failure: Sufficient capacity **Concrete failure: Sufficient capacity**

Steel failure verification

Design value of normal compressive force in the column	$N_{c,Ed}$	0	kN
Friction coefficient (between base plate and grout layer)	C_{fd}	0,2	
Joint friction resistance	$F_{f,Rd}$	0	kN
Resultant shear force	V_{sd}	0,32	kN
Resultant shear force taking account friction contribution	$V_{sd,f}$	0,32	kN

Resultant tension force in (X"/Y") = N^{9}_{Ed}(4,2/6,6)



Bolt Pos.	Acting axial force [kN]	Design tension resistance [kN]	Axial capacity usage [%]	Acting shear force [kN]	Design shear resistance [kN]	Shear capacity usage [%]	Interaction [%]
1	18,7	88,2	21,2	0,0791	31,3	0,3	15,4
2	20,2	88,2	22,9	0,0791	31,3	0,3	16,6
3	18,6	88,2	21,1	0,0791	31,3	0,3	15,3
4	17,0	88,2	19,3	0,0791	31,3	0,3	14,0

Concrete failure verifications

Proof	Load [kN]	Capacity [kN]	Utilization [%]	Status
Pull-Out Failure	20,2	168,5	12,0	Ok
Cone failure				Ok
Covered with reinforcement:				
1) Foundation (Plain Concrete)	74,5	125,2	59,5	
2) Assigned Hanger Reinforcement	20,2	119,2	17,0	
3) Requirement of Strut and Tie Model	23,1	68,3	n/r	
Splitting Failure				Ok
Covered with reinforcement:				
1) Foundation (Plain Concrete)	74,5	184,1	40,4	
2)Assigned Splitting Reinforcement || X	37,2	443,9	8,0	
3)Assigned Splitting Reinforcement || Y	18,6	170,7	11,0	
Blow-Out Failure	0,0	0,0	n/r	Ok
Pry-out failure	0,3	252,3	0,1	Ok
Edge failure				Ok
Concrete decisive:				
1) -X (Left) Edge (Plain Concrete)	0,1	83,9	0,1	
2) +X (Right) Edge (Plain Concrete)	0,3	45,6	0,7	
3) +Y (Top) Edge (Plain Concrete)	0,3	156,3	0,2	
4) -Y (Bottom) Edge (Plain Concrete)	0,3	137,1	0,2	
5)Assigned Edge Reinforcement (-X)	0,0	62,6	0,1	
6)Assigned Edge Reinforcement (+X)	0,2	62,6	0,3	
7)Assigned Edge Reinforcement (+Y)	0,1	0,0	n/r	
8)Assigned Edge Reinforcement (-Y)	0,1	0,0	n/r	

Combined Resistance	$\beta_N^{2/3}+\beta_V^{2/3}\leq 1$	32,8	Ok

12.4. IŠORINĖS LAIPTINĖS KONSTRUKCIJŲ SKAIČIAVIMAI

Model - General Data

General	Model name		:	Salininku - Stairs	
	Type of model		:	3D	
	Positive direction of global axis Z		:	Upward	
	Classification of load cases and combinations		:	According to Standard: EN 1990 National Annex: LST - Lithuania	
	x Automatically create combinations		:	x Load Combinations	

Options	-	RF-FORM-FINDING - Find initial equilibrium shapes of membrane and cable structures
	-	RF-CUTTING-PATTERN
	-	Piping analysis
	-	Use CQC Rule
	-	Enable CAD/BIM model
	Standard Gravity g	: 10.00 m/s^2

FE Mesh Settings

General	Target length of finite elements		l_{FE}	:	0.500 m
	Maximum distance between a node and a line to integrate it into the line		e	:	0.001 m
	Maximum number of mesh nodes (in thousands)			:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic			:	10
	x Activate member divisions for large deformation or post-critical analysis				
	x Use division also for straight members, which are not integrated in surfaces, with			:	Target length LFE of finite elements
	Minimum number of member divisions			:	2
	x Use division for members with node lying on them				
Surfaces	Maximum ratio of FE rectangle diagonals		D_D	:	1.800
	Maximum out-of-plane inclination of two finite elements		a	:	0.50 °
	Shape direction of finite elements			:	Triangles and quadrangles x Same squares where possible

1.3 Materials

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio n [-]	Spec. Weight g [kN/m³]	Coeff. of Th. Exp. a [1/°C]	Partial Factor γ_M [-]	Material Model
2	Steel S 355 JR | EN 10025-2:2004-11						
	21000.00	8076.92	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic

1.7 Nodal Supports

Support No.	Nodes No.	Axis System	Column in Z	Support Conditions u_X	u_Y	u_Z	j_X	j_Y	j_Z
1	141,142,151,152,169,170	Global X,Y,Z	-	x	x	x	-	-	x

1.13 Cross-Sections

Section No.	Matl. No.	J [cm⁴] / A [cm²]	I_y [cm⁴] / A_y [cm²]	I_z [cm⁴] / A_z [cm²]	Principal Axes a [°]	Rotation a' [°]	Overall Dimensions [mm] Width b	Height h
17	HE A 180 | Euronorm 53-62							
	2	14.90	2510.00	925.00	0.00	0.00	180.0	171.0
		45.30	28.48	8.89				
18	UPE 180 | EN 10279							
	2	6.99	1353.00	143.70	0.00	0.00	75.0	180.0
		25.10	7.77	8.49				
19	UPE 120 | EN 10279							
	2	2.90	363.50	55.40	0.00	0.00	60.0	120.0
		15.40	5.40	4.93				
20	UPE 180 | EN 10279							
	2	6.99	1353.00	143.70	0.00	0.00	75.0	180.0
		25.10	7.77	8.49				
21	QRO 100x4 | EN 10219-2:2006							
	2	362.00	226.00	226.00	0.00	0.00	100.0	100.0
		14.90	6.47	6.47				

1.14 Member Hinges

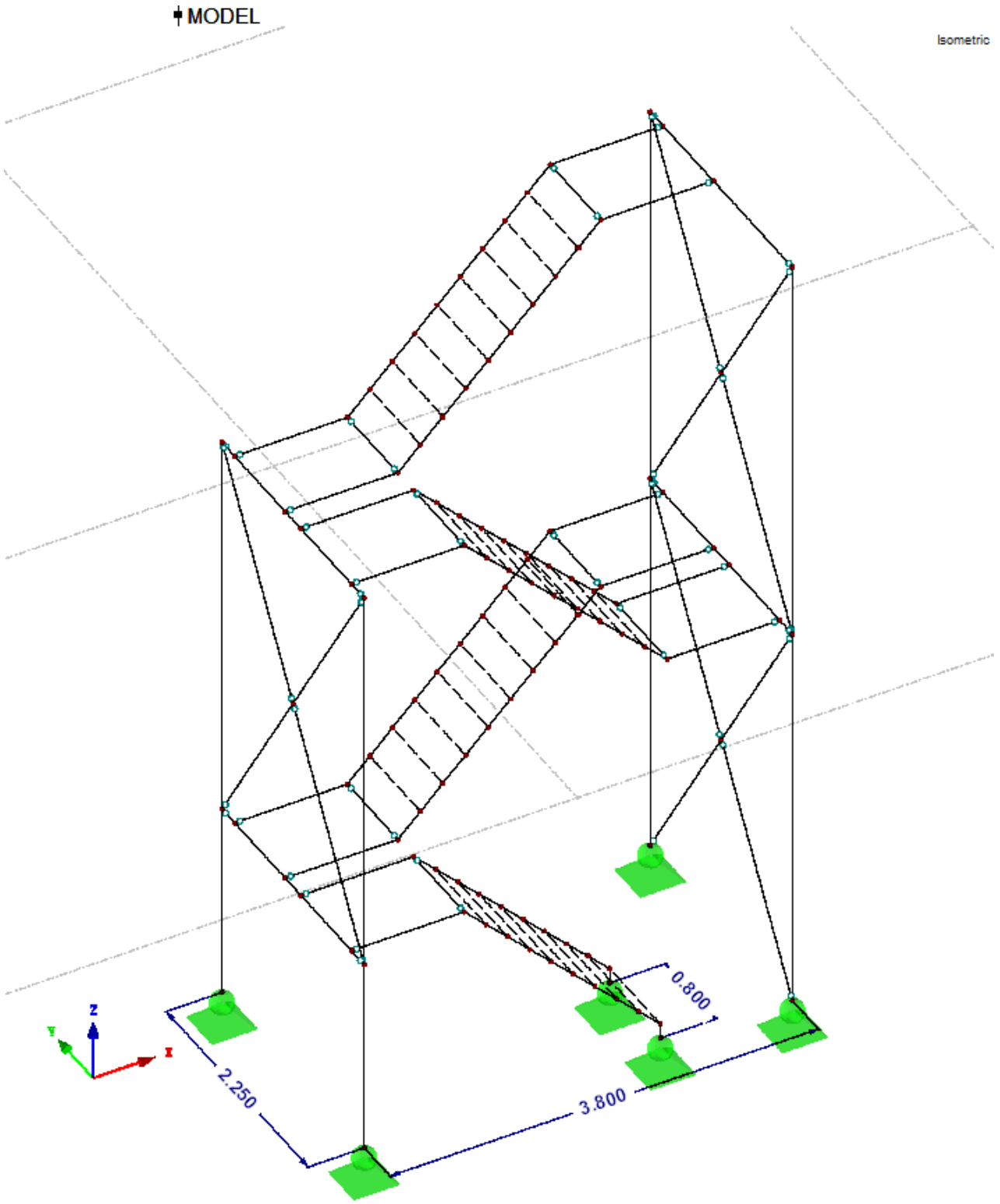
Release No.	Reference System	Axial/Shear Release or Spring [kN/m] u_x	u_y	u_z	Moment Release or Spring [kNm/rad] j_x	j_y	j_z	Comment
1	Local x,y,z	-	-	-	-	x	x	
2	Local x,y,z	x	-	-	-	x	x	
3	Local x,y,z	-	-	-	-	x	-	

1.21 Sets of Members

Set No.	Set of Members Description	Type	Member No.	Length [m]	Comment
1	Continuous Members 1	Contin. member	308,108	4.245	
2	Continuous Members 2	Contin. member	311,105	4.245	
3	Continuous Members 3	Contin. member	313,107	4.245	
4	Continuous Members 4	Contin. member	96,252	5.400	
5	Continuous Members 5	Contin. member	97,253	5.400	
6	Continuous Members 6	Contin. member	98,254	7.200	
7	Continuous Members 7	Contin. member	99,255	7.200	
8	Continuous Members 8	Contin. member	259,271,263	2.250	
9	Continuous Members 9	Contin. member	256,268,272,264,260	2.250	
10	Continuous Members 10	Contin. member	257,269,273,265,261	2.250	
11	Continuous Members 11	Contin. member	258,270,274,266,262	2.250	
12	Continuous Members 12	Contin. member	284,285,362-369,110	3.615	
13	Continuous Members 13	Contin. member	287,288,370-377,111	3.615	
14	Continuous Members 14	Contin. member	290,291,314-321,213	4.546	
15	Continuous Members 15	Contin. member	293,294,322-329,214	4.546	

1.21 Sets of Members

Set No.	Set of Members Description	Type	Member No.	Length [m]	Comment
16	Continuous Members 16	Contin. member	296,297,330-337,202	4.546	
17	Continuous Members 17	Contin. member	299,300,338-345,203	4.546	
18	Continuous Members 18	Contin. member	302,305,354-361,217	4.546	
19	Continuous Members 19	Contin. member	303,304,346-353,218	4.546	
20	Continuous Members 20	Contin. member	276	0.800	
21	Continuous Members 21	Contin. member	277	0.800	
22	Continuous Members 22	Contin. member	278	0.800	
23	Continuous Members 23	Contin. member	279	0.800	
24	Continuous Members 24	Contin. member	280	0.800	
25	Continuous Members 25	Contin. member	282	0.800	
26	Continuous Members 26	Contin. member	283	0.800	



2.1 Load Cases

Load Case	Load Case Description	EN 1990 | LST Action Category	Self-Weight - Factor in Direction			
			Active	X	Y	Z
LC1	Self-weight	Permanent	x	0.000	0.000	-1.000
LC2	Imposed load	Imposed - Category H: roofs	-			
LC3	Wind in +X	Wind	-			
LC4	Wind in -X	Wind	-			
LC5	Wind in +Y	Wind	-			

2.1.1 Load Cases - Calculation Parameters

Load Case	Load Case Description	Calculation Parameters		
LC1	Self-weight	Method of analysis	: x	Second order analysis (P-Delta)
		Method for solving system of nonlinear algebraic equations	: x	Picard
		Options	: x	Consider favorable effects due to tension
			: x	Refer internal forces to deformed system for:
				x Normal forces N
				x Shear forces V_y and V_z
				x Moments M_y, M_z and M_T
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC2	Imposed load	Method of analysis	: x	Second order analysis (P-Delta)
		Method for solving system of nonlinear algebraic equations	: x	Picard
		Options	: x	Consider favorable effects due to tension
			: x	Refer internal forces to deformed system for:
				x Normal forces N
				x Shear forces V_y and V_z
				x Moments M_y, M_z and M_T
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC3	Wind in +X	Method of analysis	: x	Second order analysis (P-Delta)
		Method for solving system of nonlinear algebraic equations	: x	Picard
		Options	: x	Consider favorable effects due to tension
			: x	Refer internal forces to deformed system for:
				x Normal forces N
				x Shear forces V_y and V_z
				x Moments M_y, M_z and M_T
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC4	Wind in -X	Method of analysis	: x	Second order analysis (P-Delta)
		Method for solving system of nonlinear algebraic equations	: x	Picard
		Options	: x	Consider favorable effects due to tension
			: x	Refer internal forces to deformed system for:
				x Normal forces N
				x Shear forces V_y and V_z
				x Moments M_y, M_z and M_T
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC5	Wind in +Y	Method of analysis	: x	Second order analysis (P-Delta)
		Method for solving system of nonlinear algebraic equations	: x	Picard
		Options	: x	Consider favorable effects due to tension
			: x	Refer internal forces to deformed system for:
				x Normal forces N
				x Shear forces V_y and V_z
				x Moments M_y, M_z and M_T
		Activate stiffness factors of:	: x	Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: x	Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)

2.5 Load Combinations

Load Combin.	Load Combination DS	Description	No.	Factor	Load Case	
CO1	STR	1.35G	1	1.35	LC1	Self-weight
CO2	STR	1.35G + 1.3Qw1	1	1.35	LC1	Self-weight
			2	1.30	LC3	Wind in +X
CO3	STR	1.35G + 1.3Qw2	1	1.35	LC1	Self-weight
			2	1.30	LC4	Wind in -X
CO4	STR	1.35G + 1.3Qw3	1	1.35	LC1	Self-weight
			2	1.30	LC5	Wind in +Y
CO5	STR	1.35G + 1.3QiH	1	1.35	LC1	Self-weight
			2	1.30	LC2	Imposed load
CO6	STR	1.35G + 1.3QiH + 0.78Qw1	1	1.35	LC1	Self-weight
			2	1.30	LC2	Imposed load
			3	0.78	LC3	Wind in +X
CO7	STR	1.35G + 1.3QiH + 0.78Qw2	1	1.35	LC1	Self-weight
			2	1.30	LC2	Imposed load
			3	0.78	LC4	Wind in -X
CO8	STR	1.35G + 1.3QiH + 0.78Qw3	1	1.35	LC1	Self-weight
			2	1.30	LC2	Imposed load
			3	0.78	LC5	Wind in +Y
CO9	S Ch	G	1	1.00	LC1	Self-weight
CO10	S Ch	G + Qw1	1	1.00	LC1	Self-weight
			2	1.00	LC3	Wind in +X
CO11	S Ch	G + Qw2	1	1.00	LC1	Self-weight
			2	1.00	LC4	Wind in -X
CO12	S Ch	G + Qw3	1	1.00	LC1	Self-weight
			2	1.00	LC5	Wind in +Y
CO13	S Ch	G + QiH	1	1.00	LC1	Self-weight
			2	1.00	LC2	Imposed load
CO14	S Ch	G + QiH + 0.6Qw1	1	1.00	LC1	Self-weight
			2	1.00	LC2	Imposed load
			3	0.60	LC3	Wind in +X
CO15	S Ch	G + QiH + 0.6Qw2	1	1.00	LC1	Self-weight
			2	1.00	LC2	Imposed load
			3	0.60	LC4	Wind in -X
CO16	S Ch	G + QiH + 0.6Qw3	1	1.00	LC1	Self-weight
			2	1.00	LC2	Imposed load
			3	0.60	LC5	Wind in +Y
CO17	S Fr	G	1	1.00	LC1	Self-weight
CO18	S Fr	G + 0.2Qw1	1	1.00	LC1	Self-weight
			2	0.20	LC3	Wind in +X
CO19	S Fr	G + 0.2Qw2	1	1.00	LC1	Self-weight
			2	0.20	LC4	Wind in -X
CO20	S Fr	G + 0.2Qw3	1	1.00	LC1	Self-weight
			2	0.20	LC5	Wind in +Y
CO21	S Qp	G	1	1.00	LC1	Self-weight

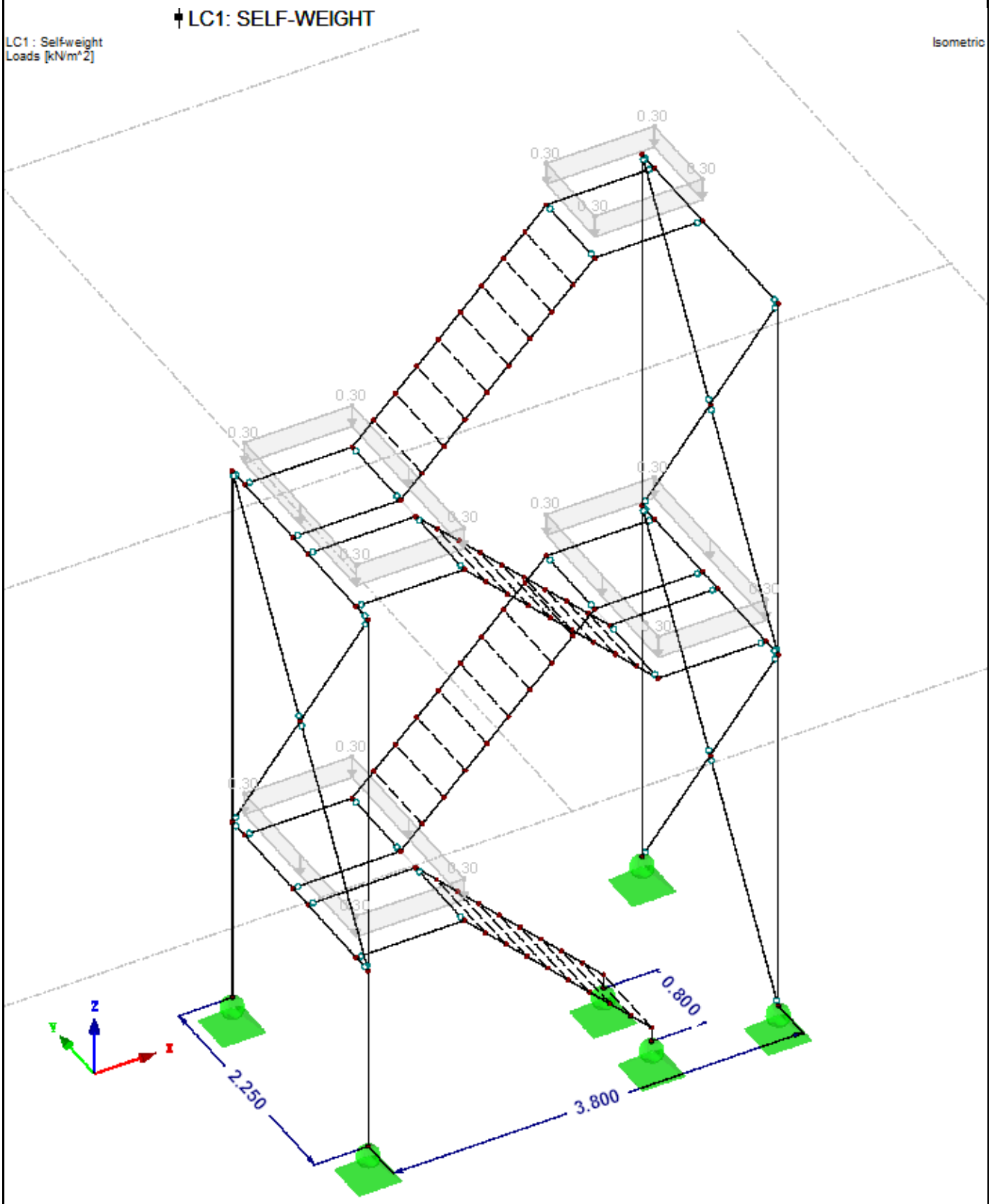
2.7 Result Combinations

Result Combin	Description	Loading
RC1	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	CO1/p or to CO8
RC2	SLS - Characteristic	CO9/p or to CO16
RC3	SLS - Frequent	CO17/p or to CO20
RC4	SLS - Quasi-permanent	CO21/p

LC1
Self-weight

3.15 Generated Loads LC1: Self-weight

No.	Load Description			
4	From Area Loads via Plane			
	Area load direction	Global relative to the projected area:	:	x ZP
	Area of load application	x Fully closed plane		
	Load distribution type:	x Combined		
	Area load magnitude	x Constant	:	-0.30 kN/m^2
	Boundary of the area load plane	Corner nodes	:	160,193,181,173; 164,199,183,175; 168,194,182,174; 202,200,184,188
		Note	:	Each row in the drop down list box denotes one plane
	Remove influence from	Members parallel to member	:	271
	Generating total loads in direction	S P $_{Areas}$ X	:	0.000 kN
		Y	:	0.000 kN
		Z	:	-1.905 kN
		SP $_{Members}$ X	:	0.000 kN
		Y	:	0.000 kN
		Z	:	-1.905 kN
	Total moment to the origin	S M $_{Areas}$ X	:	3.541 kNm
		Y	:	8.131 kNm
		Z	:	0.000 kNm
		SM $_{Members}$ X	:	3.541 kNm
		Y	:	8.131 kNm
		Z	:	0.000 kNm
	Cells selected for generating	S number of cells	:	10
		S cell area	:	6.350 m^2
	Convert loads to members No.		:	110,111,202,203,213,214,217, 218,290,293,296,299,302,303


LC1: SELF-WEIGHT
LC1 : Self-weight
Loads [kN/m^2]
Isometric
0.30
0.800
2.250
3.800
Z
Y
X

LC2
Imposed load

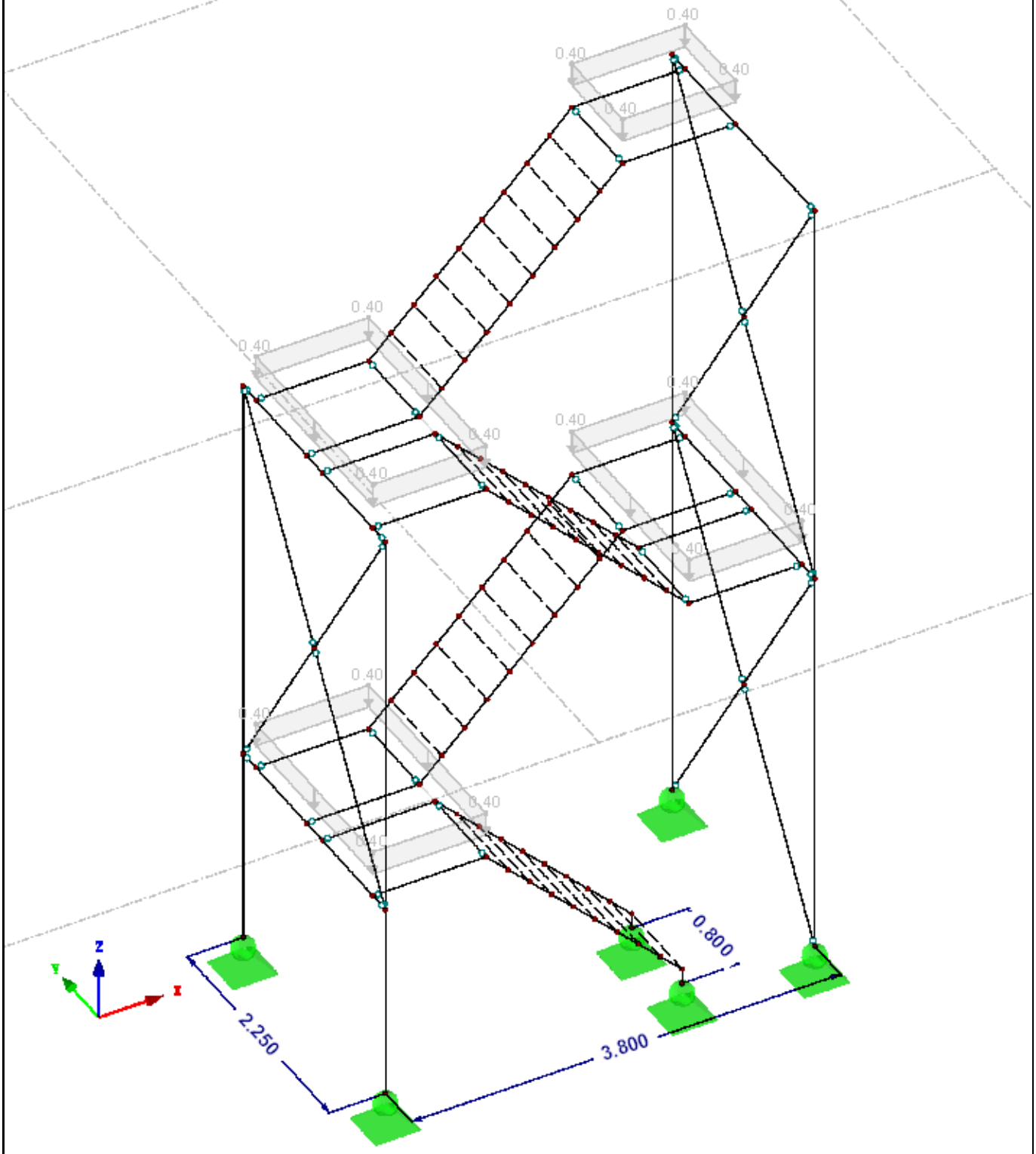
3.15 Generated Loads — LC2: Imposed load

No.	Load Description			
2	From Area Loads via Plane			
	Area load direction	Global relative to the projected area:	:	x ZP
	Area of load application	x Fully closed plane		
	Load distribution type:	x Combined		
	Area load magnitude	x Constant	:	-0.40 kN/m^2
	Boundary of the area load plane	Corner nodes	:	160,193,181,173; 164,199,183,175; 168,194,182,174; 202,200,184,188
		Note	:	Each row in the drop down list box denotes one plane
	Remove influence from	Members parallel to member	:	271
	Generating total loads in direction	S P $_{Areas}$	X :	0.000 kN
			Y :	0.000 kN
			Z :	-2.540 kN
		SP $_{Members}$	X :	0.000 kN
			Y :	0.000 kN
			Z :	-2.540 kN
	Total moment to the origin	S M $_{Areas}$	X :	4.721 kNm
			Y :	10.842 kNm
			Z :	0.000 kNm
		SM $_{Members}$	X :	4.721 kNm
			Y :	10.842 kNm
			Z :	0.000 kNm
	Cells selected for generating	S number of cells	:	10
		S cell area	:	6.350 m^2
	Convert loads to members No.		:	110,111,202,203,213,214, 217,218,290,293,296,299, 302,303

LC2: IMPOSED LOAD

LC2 : Imposed load
Loads [kN/m^2]

Isometric



LC3
Wind in +X

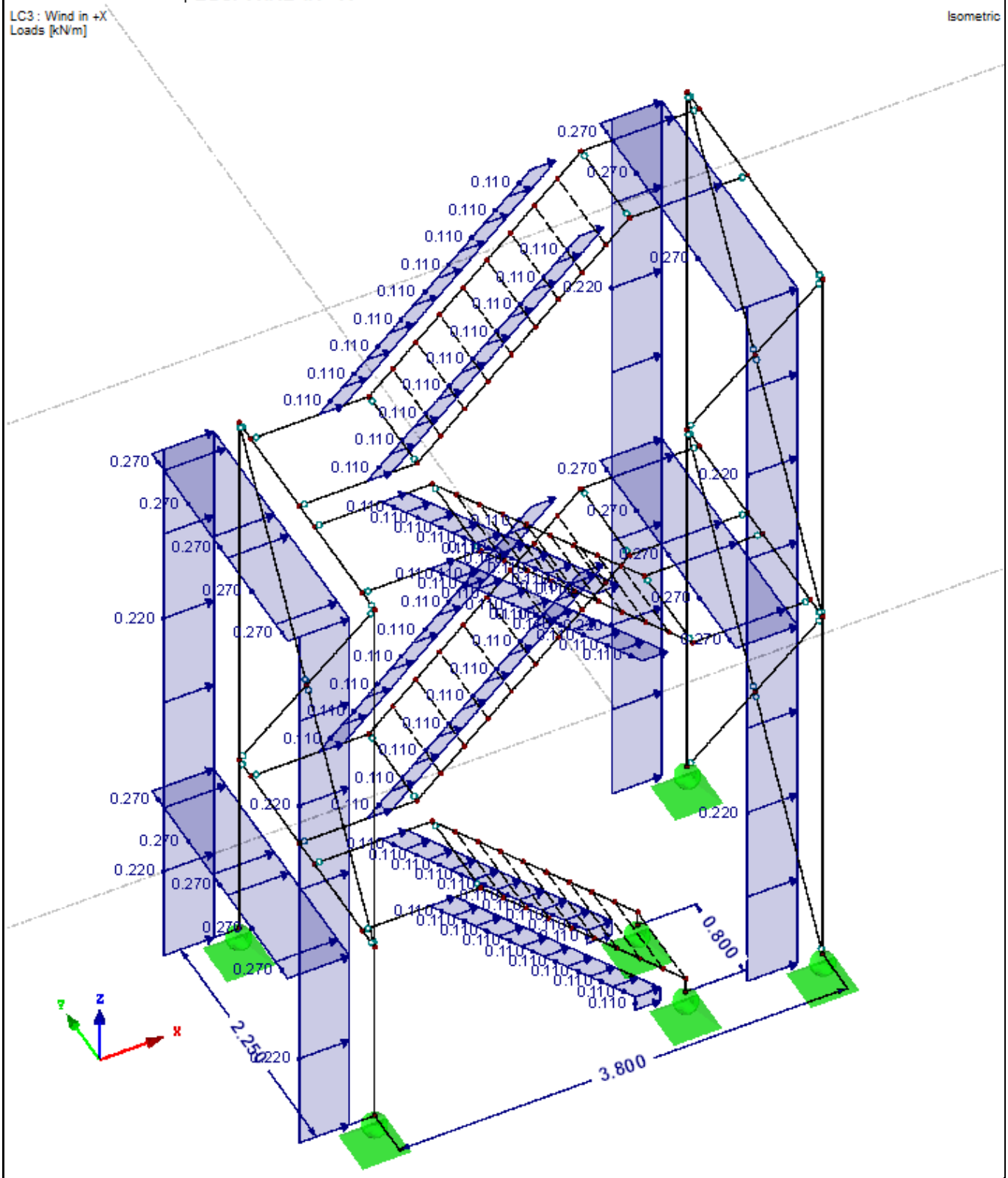
3.2 Member Loads — LC3: Wind in +X

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
3	Members	96-99,252-255	Force	Uniform	XL	True Length	p	0.220	kN/m
4	Members	256-266,268-274	Force	Uniform	XL	True Length	p	0.270	kN/m
5	Members	284,285,287,288,291,294,297,300,304,305,314-377	Force	Uniform	XL	True Length	p	0.110	kN/m

3.2/1 Member Loads - Load Eccentricity — LC3: Wind in +X

No.	Reference to	On Members No.	Absolute Offset Mbr. Start	Absolute Offset Mbr. Start	Absolute Offset Mbr. End	Absolute Offset Mbr. End	Relative Offset Mbr. Start	Relative Offset Mbr. Start	Relative Offset Mbr. End	Relative Offset Mbr. End
			e_Y [mm]	e_Z [mm]	e_Y [mm]	e_Z [mm]	y-Axis	z-Axis	y-Axis	z-Axis
3	Members	96-99,252-255	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle
4	Members	256-266,268-274	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle
5	Members	284,285,287,288, 291,294,297,300, 304,305,314-377	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle

LC3: WIND IN +X


LC3 : Wind in +X
Loads [kN/m]
Isometric
0.270
0.220
0.110
0.800
2.250
3.800
Z
X

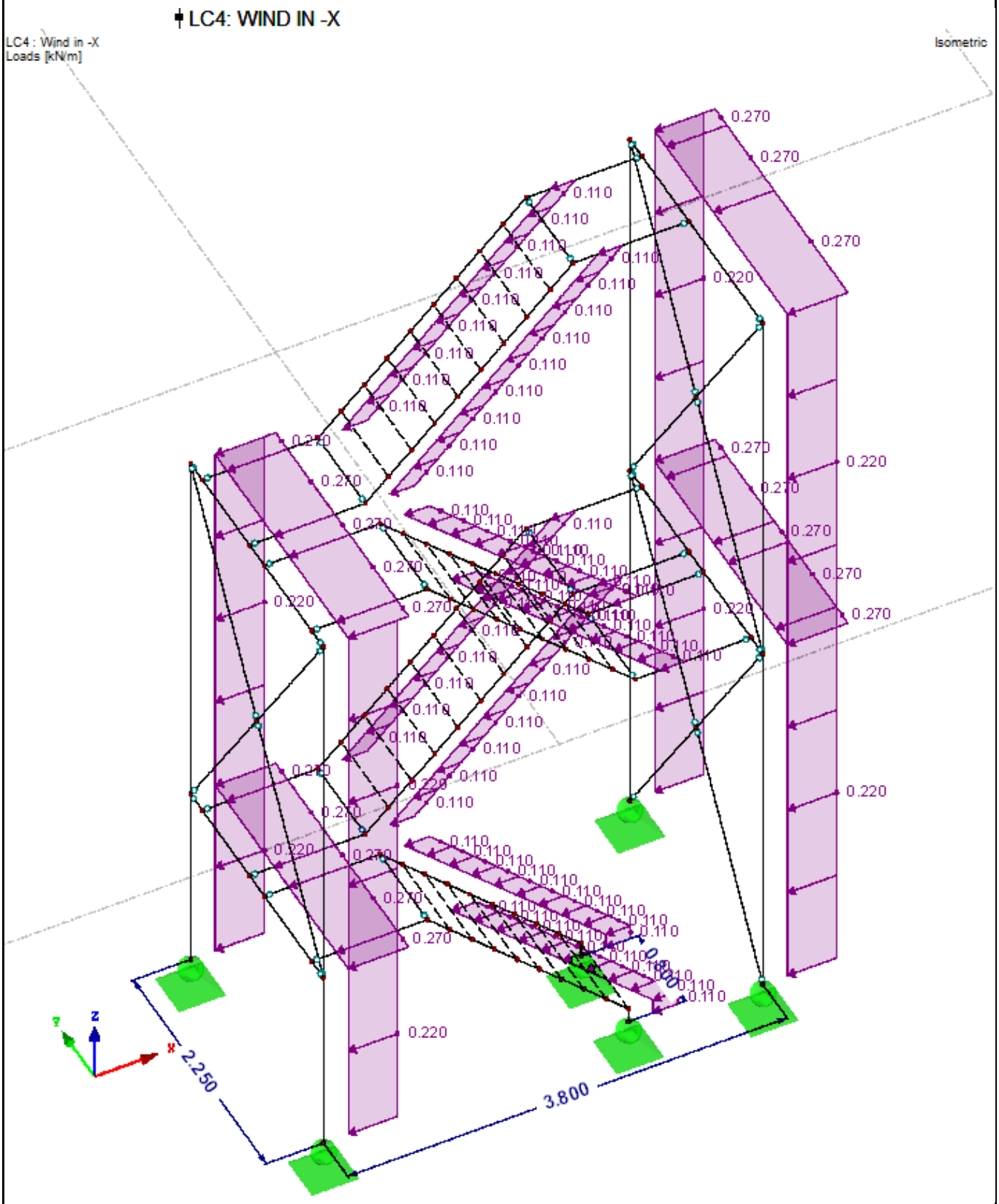
LC4
Wind in -X

3.2 Member Loads — LC4: Wind in -X

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
3	Members	96-99,252-255	Force	Uniform	XL	True Length	p	-0.220	kN/m
4	Members	256-266,268-274	Force	Uniform	XL	True Length	p	-0.270	kN/m
5	Members	284,285,287,288,291,294,297,300,304,305,314-377	Force	Uniform	XL	True Length	p	-0.110	kN/m

3.2/1 Member Loads - Load Eccentricity — LC4: Wind in -X

No.	Reference to	On Members No.	Absolute Offset Mbr. Start	Absolute Offset Mbr. Start	Absolute Offset Mbr. End	Absolute Offset Mbr. End	Relative Offset Mbr. Start	Relative Offset Mbr. Start	Relative Offset Mbr. End	Relative Offset Mbr. End
			e_Y [mm]	e_Z [mm]	e_Y [mm]	e_Z [mm]	y-Axis	z-Axis	y-Axis	z-Axis
3	Members	96-99,252-255	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle
4	Members	256-266,268-274	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle
5	Members	284,285,287,288,291,294,297,300,304,305,314-377	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle


LC4: WIND IN -X
LC4 : Wind in -X
Loads [kN/m]
Isometric
0.270
0.220
0.110
2.250
3.800
Z
X

LC5
Wind in +Y

3.2 Member Loads — LC5: Wind in +Y

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
3	Members	96-99,252-255	Force	Uniform	YL	True Length	p	0.220	kN/m
5	Members	284,285,287,288,291,294,297,300,304,305,314-377	Force	Uniform	YL	True Length	p	0.270	kN/m

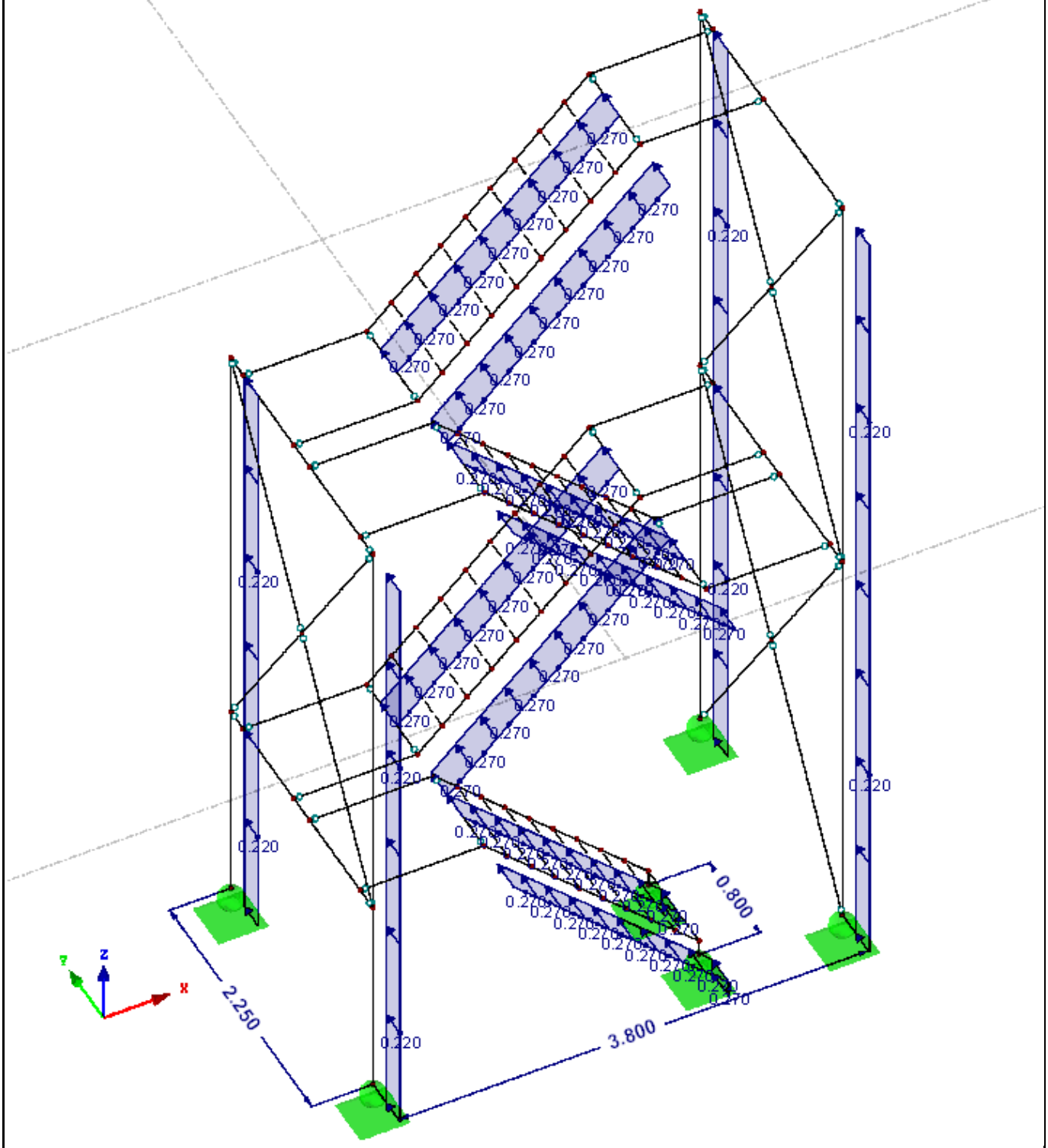
3.2/1 Member Loads - Load Eccentricity — LC5: Wind in +Y

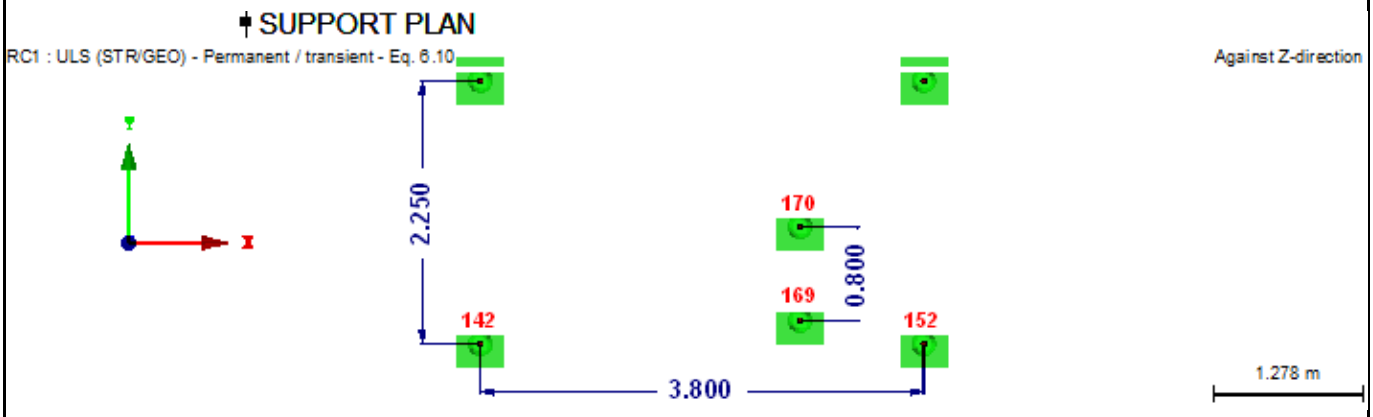
No.	Reference to	On Members No.	Absolute Offset Mbr. Start	Absolute Offset Mbr. Start	Absolute Offset Mbr. End	Absolute Offset Mbr. End	Relative Offset Mbr. Start	Relative Offset Mbr. Start	Relative Offset Mbr. End	Relative Offset Mbr. End
			e_Y [mm]	e_Z [mm]	e_Y [mm]	e_Z [mm]	y-Axis	z-Axis	y-Axis	z-Axis
3	Members	96-99,252-255	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle
5	Members	284,285,287, 288,291,294, 297,300,304, 305,314-377	0.0	0.0	0.0	0.0	Middle	Middle	Middle	Middle

LC5: WIND IN +Y

LC5 : Wind in +Y
Loads [kN/m]

Isometric





4.1 Nodes - Support Forces — Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
141	RC1	Max	1.17	2.44	-1.21	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-1.30	-0.07	-14.85	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC2	Max	0.90	1.88	-0.73	0.00	0.00	0.00	SLS - Characteristic
		Min	-1.00	-0.05	-11.21	0.00	0.00	0.00	SLS - Characteristic
	RC3	Max	0.14	0.39	-4.38	0.00	0.00	0.00	SLS - Frequent
		Min	-0.24	0.00	-6.48	0.00	0.00	0.00	SLS - Frequent
	RC4	Max	-0.05	0.01	-5.29	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	-0.05	0.01	-5.29	0.00	0.00	0.00	SLS - Quasi-permanent
142	RC1	Max	0.26	2.51	2.08	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.24	-0.07	-15.87	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC2	Max	0.20	1.92	1.79	0.00	0.00	0.00	SLS - Characteristic
		Min	-0.18	-0.05	-12.01	0.00	0.00	0.00	SLS - Characteristic
	RC3	Max	-0.05	0.39	-3.73	0.00	0.00	0.00	SLS - Frequent
		Min	-0.13	0.00	-6.49	0.00	0.00	0.00	SLS - Frequent
	RC4	Max	-0.11	0.01	-5.11	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	-0.11	0.01	-5.11	0.00	0.00	0.00	SLS - Quasi-permanent
151	RC1	Max	0.61	4.30	-4.08	0.00	0.00	0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.61	0.45	-21.12	0.00	0.00	-0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC2	Max	0.47	3.29	-2.91	0.00	0.00	0.01	SLS - Characteristic
		Min	-0.47	0.33	-16.01	0.00	0.00	-0.01	SLS - Characteristic
	RC3	Max	0.10	1.11	-5.45	0.00	0.00	0.00	SLS - Frequent
		Min	-0.09	0.52	-8.07	0.00	0.00	0.00	SLS - Frequent
	RC4	Max	0.00	0.57	-6.08	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.00	0.57	-6.08	0.00	0.00	0.00	SLS - Quasi-permanent
152	RC1	Max	0.75	2.71	5.06	0.00	0.00	0.01	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-0.80	-1.26	-11.13	0.00	0.00	-0.02	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC2	Max	0.58	2.11	4.11	0.00	0.00	0.01	SLS - Characteristic
		Min	-0.61	-0.95	-8.35	0.00	0.00	-0.02	SLS - Characteristic
	RC3	Max	0.10	-0.05	-3.66	0.00	0.00	0.00	SLS - Frequent
		Min	-0.13	-0.66	-6.15	0.00	0.00	0.00	SLS - Frequent
	RC4	Max	-0.02	-0.59	-5.60	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	-0.02	-0.59	-5.60	0.00	0.00	0.00	SLS - Quasi-permanent

4.1 Nodes - Support Forces

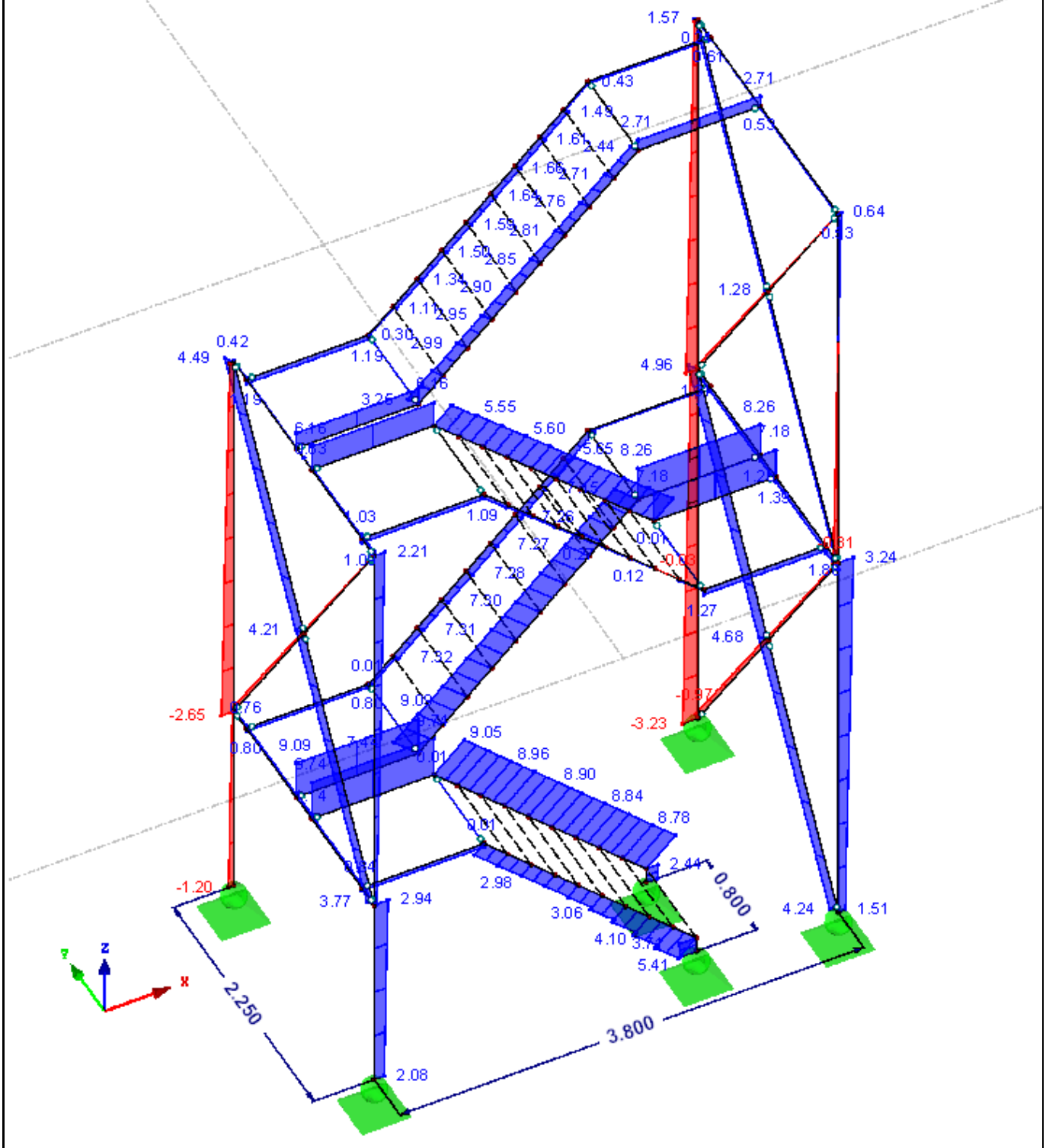
Result Combinations

Node No.	RC		Support Forces [kN] P_X	P_Y	P_Z	Support Moments [kNm] M_X	M_Y	M_Z	
169	RC1	Max	0.98	1.22	3.67	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-4.87	0.00	-4.35	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC2	Max	0.74	0.94	2.83	0.00	0.00	0.00	SLS - Characteristic
		Min	-3.75	0.00	-3.33	0.00	0.00	0.00	SLS - Characteristic
	RC3	Max	0.29	0.19	0.31	0.00	0.00	0.00	SLS - Frequent
		Min	-0.61	0.00	-0.92	0.00	0.00	0.00	SLS - Frequent
	RC4	Max	0.18	0.00	-0.32	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.18	0.00	-0.32	0.00	0.00	0.00	SLS - Quasi-permanent
170	RC1	Max	10.04	1.22	2.39	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
		Min	-10.05	0.00	-4.62	0.00	0.00	0.00	
									ULS (STR/GEO) - Permanent / transient - Eq. 6.10
	RC2	Max	7.72	0.94	1.86	0.00	0.00	0.00	SLS - Characteristic
		Min	-7.72	0.00	-3.52	0.00	0.00	0.00	SLS - Characteristic
	RC3	Max	1.55	0.19	-0.18	0.00	0.00	0.00	SLS - Frequent
		Min	-1.54	0.00	-1.25	0.00	0.00	0.00	SLS - Frequent
	RC4	Max	0.00	0.00	-0.69	0.00	0.00	0.00	SLS - Quasi-permanent
		Min	0.00	0.00	-0.69	0.00	0.00	0.00	SLS - Quasi-permanent

INTERNAL FORCES N MAX

RC1 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max Values

Isometric

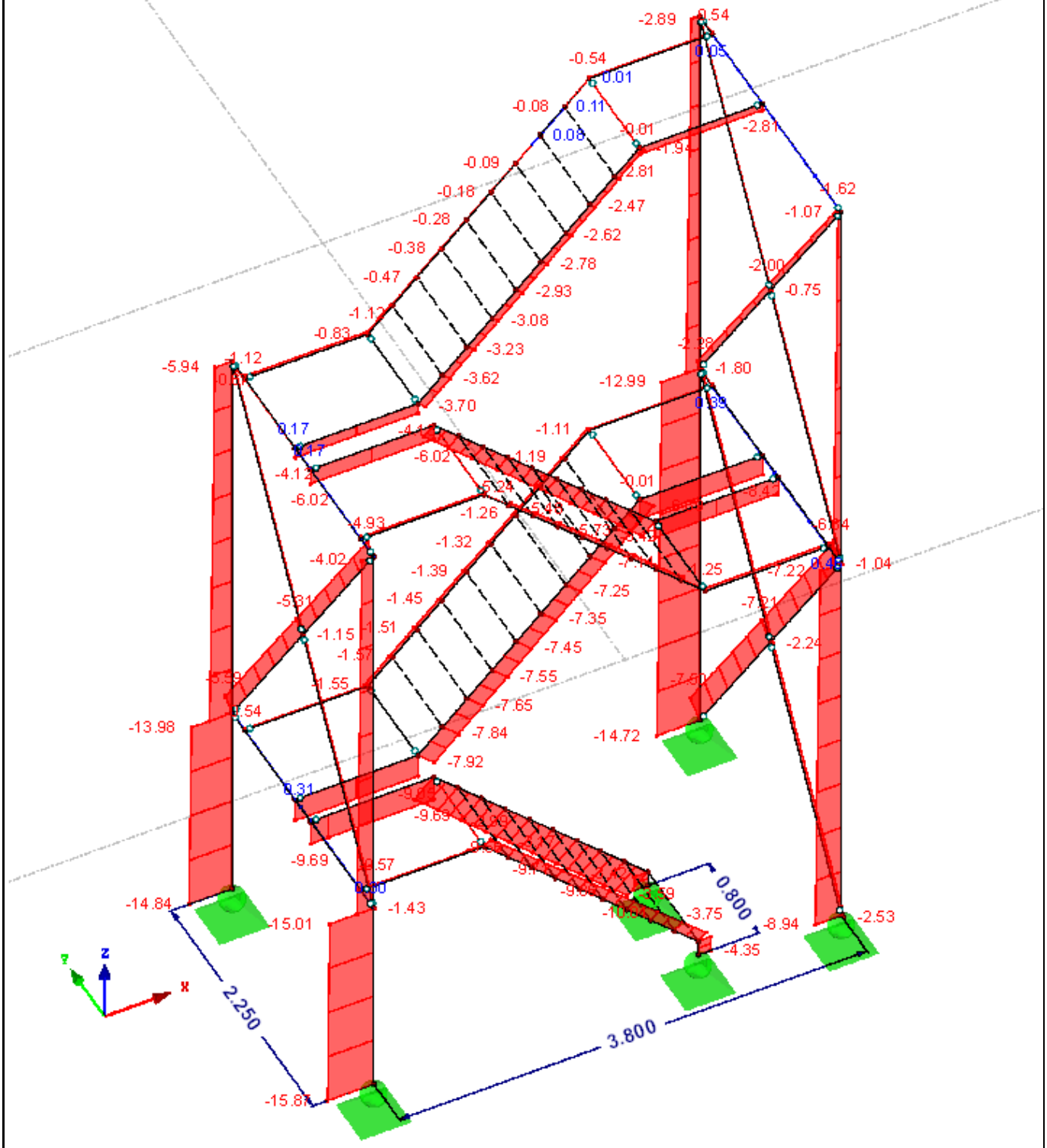


Max N: 9.74, Min N: -3.23 [kN]

INTERNAL FORCES N MIN

RC1 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Min Values

Isometric

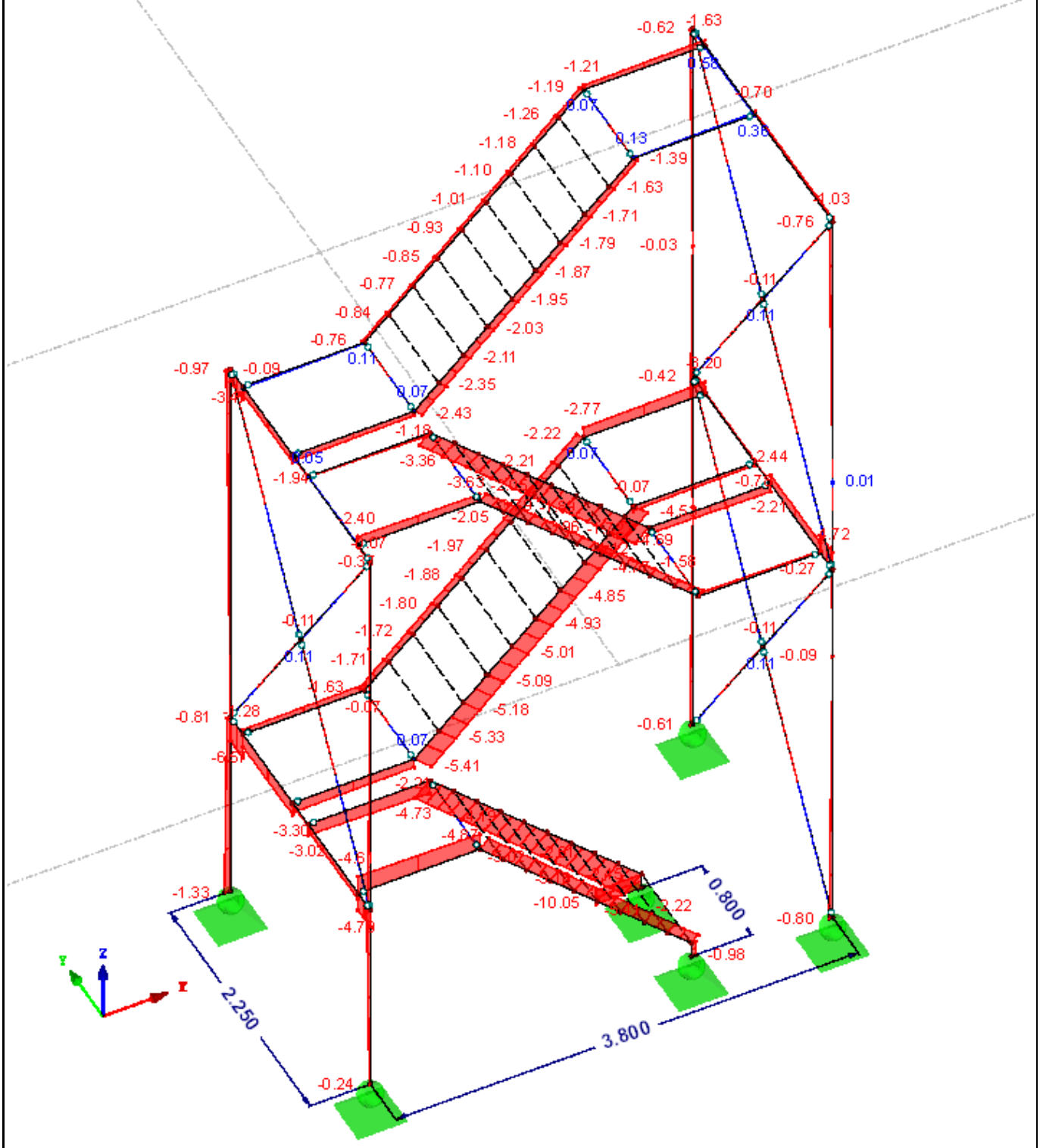


Max N: 0.54, Min N: -15.87 [kN]

INTERNAL FORCES V_z MIN

RC1 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Result Combinations: Min Values

Isometric

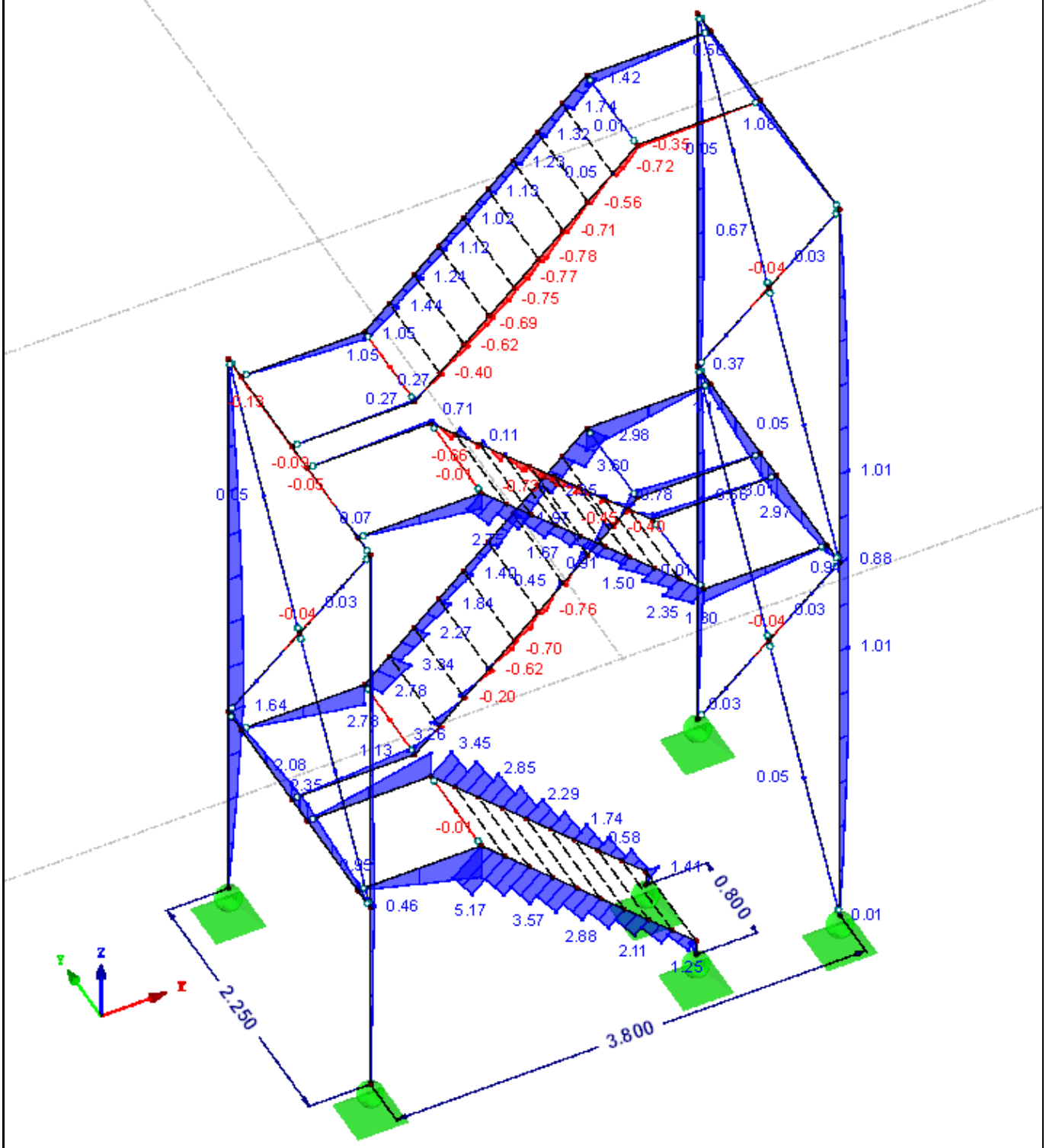


Max V-z: 0.58, Min V-z: -10.05 [kN]

INTERNAL FORCES M_y MAX

RC1 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Max Values

Isometric

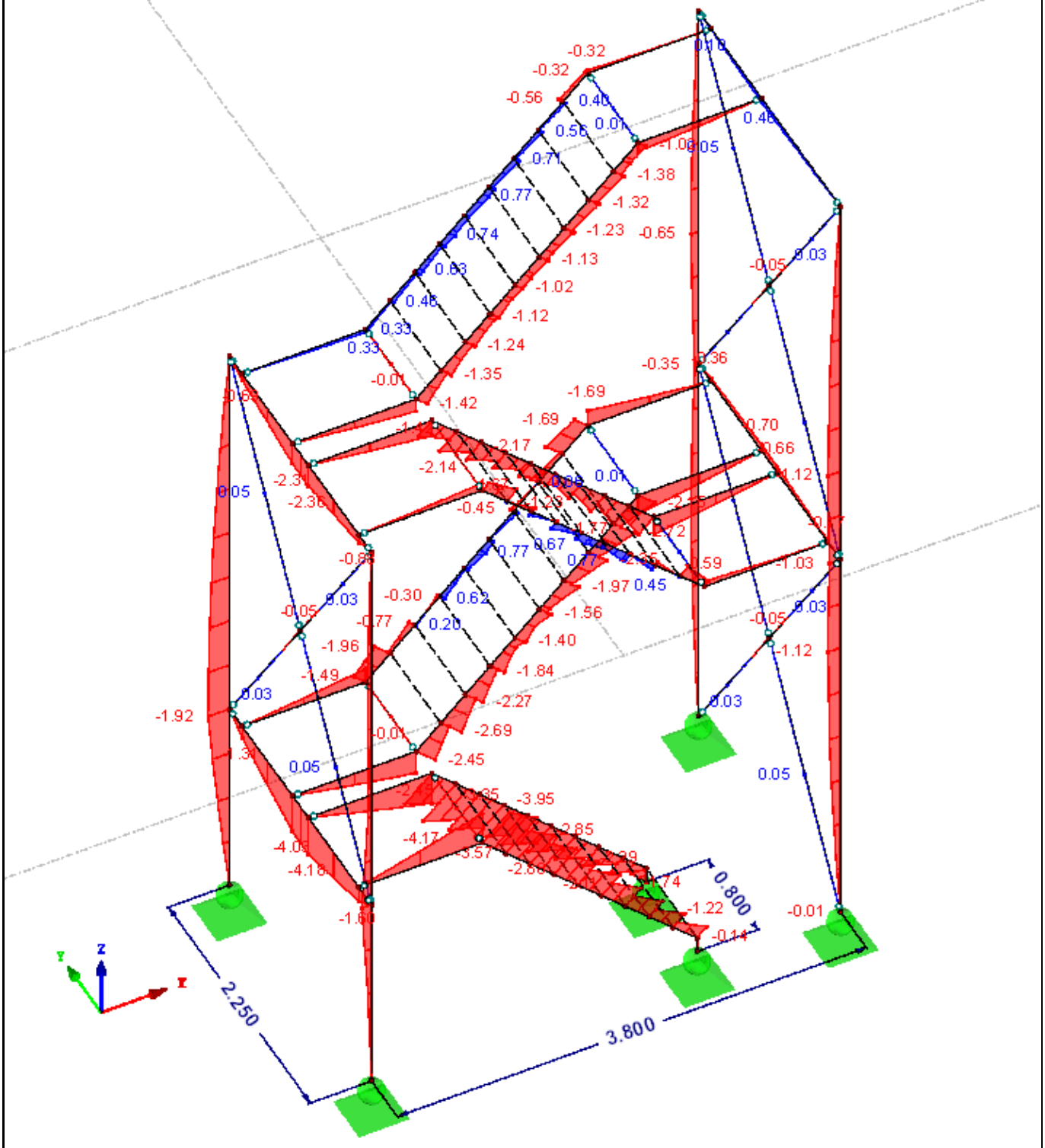


Max M-y: 5.17, Min M-y: -0.78 [kNm]

INTERNAL FORCES M_y MIN

RC1 : ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Min Values

Isometric



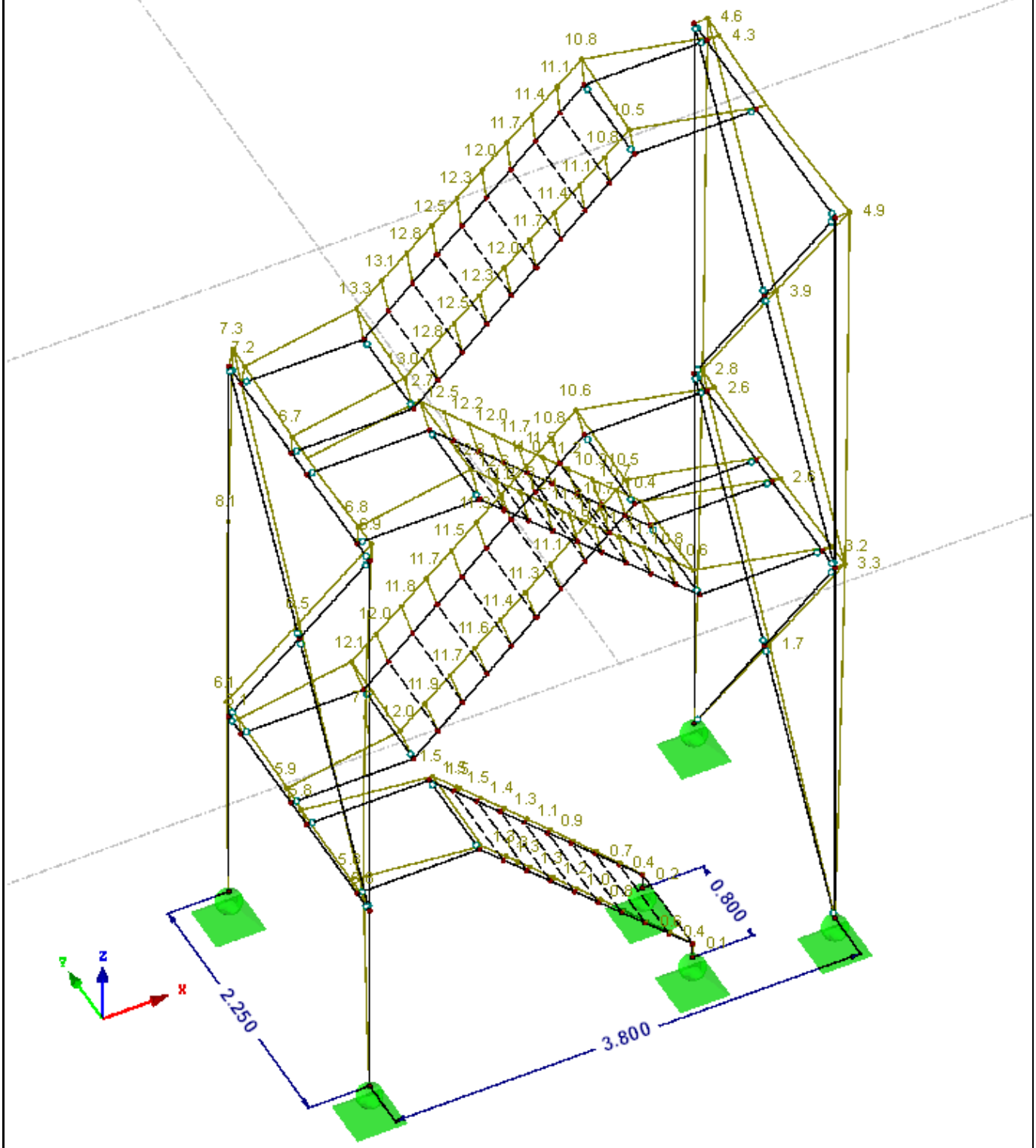
Max M-y: 0.77, Min M-y: -4.18 [kNm]

DOKUMENTO ŽYMUO	LAPAS	LAPŲ	LAIDA
23031S1TP-XX-TDP-SK _IS-001	495	516	D

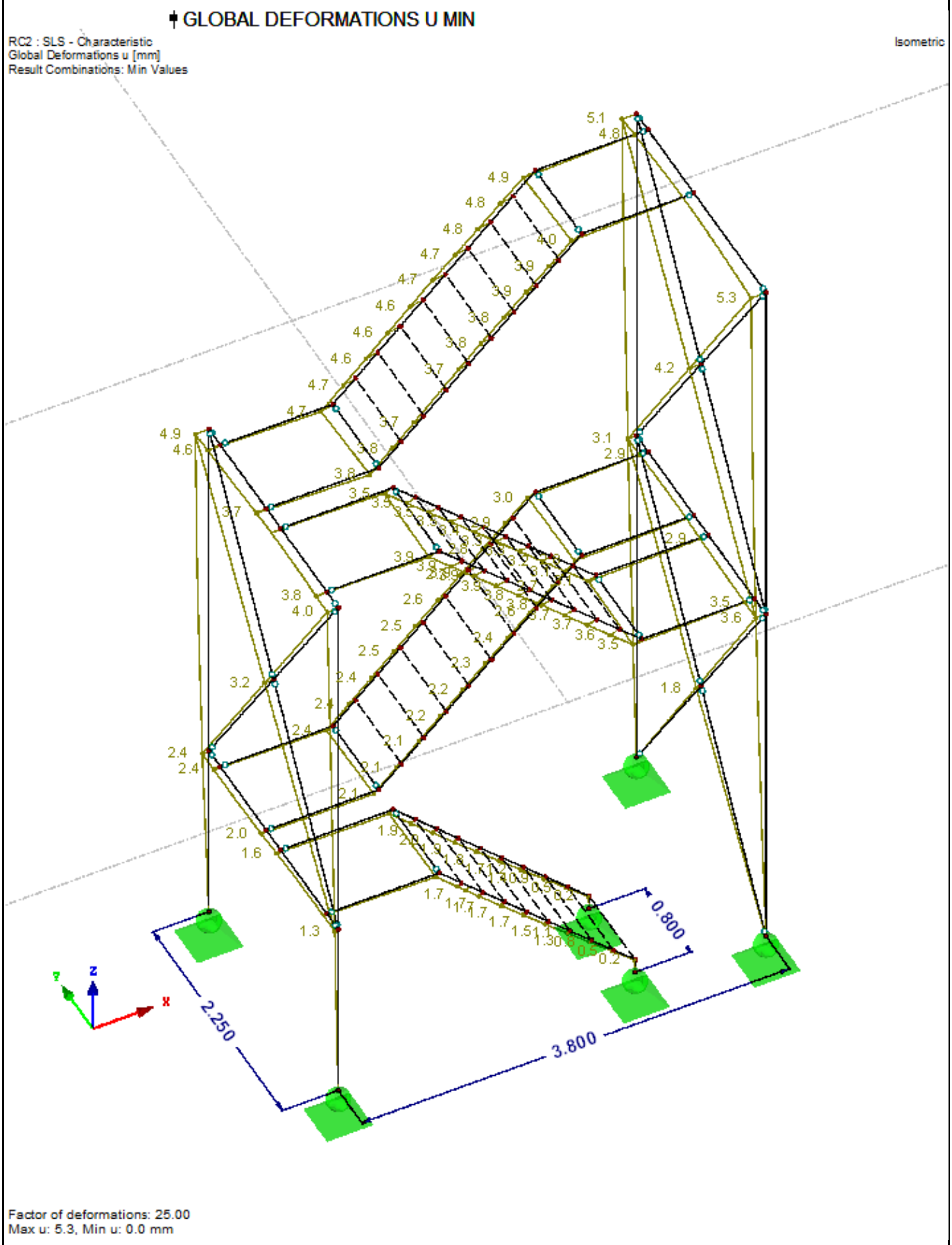
GLOBAL DEFORMATIONS U MAX

RC2 : SLS - Characteristic
Global Deformations u [mm]
Result Combinations: Max Values

Isometric



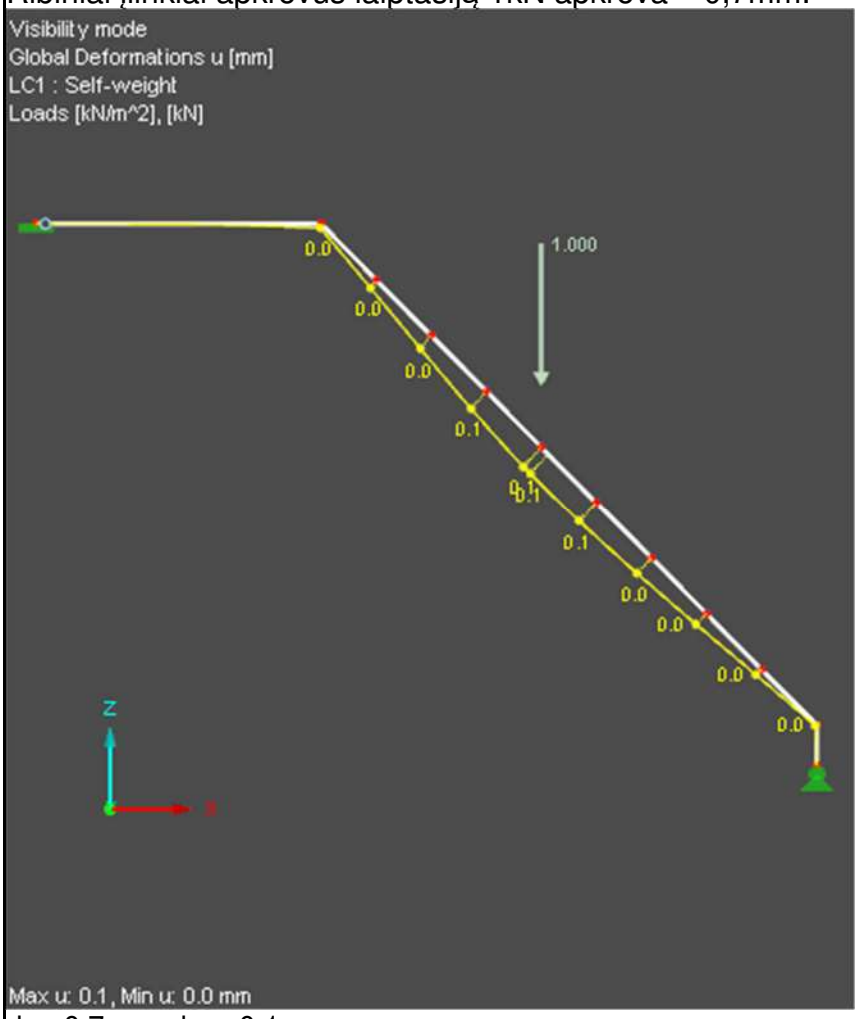
Factor of deformations: 25.00
Max u: 13.3, Min u: 0.0 mm



Laiptasija ant žemės tikrinama pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 4 skyrių.

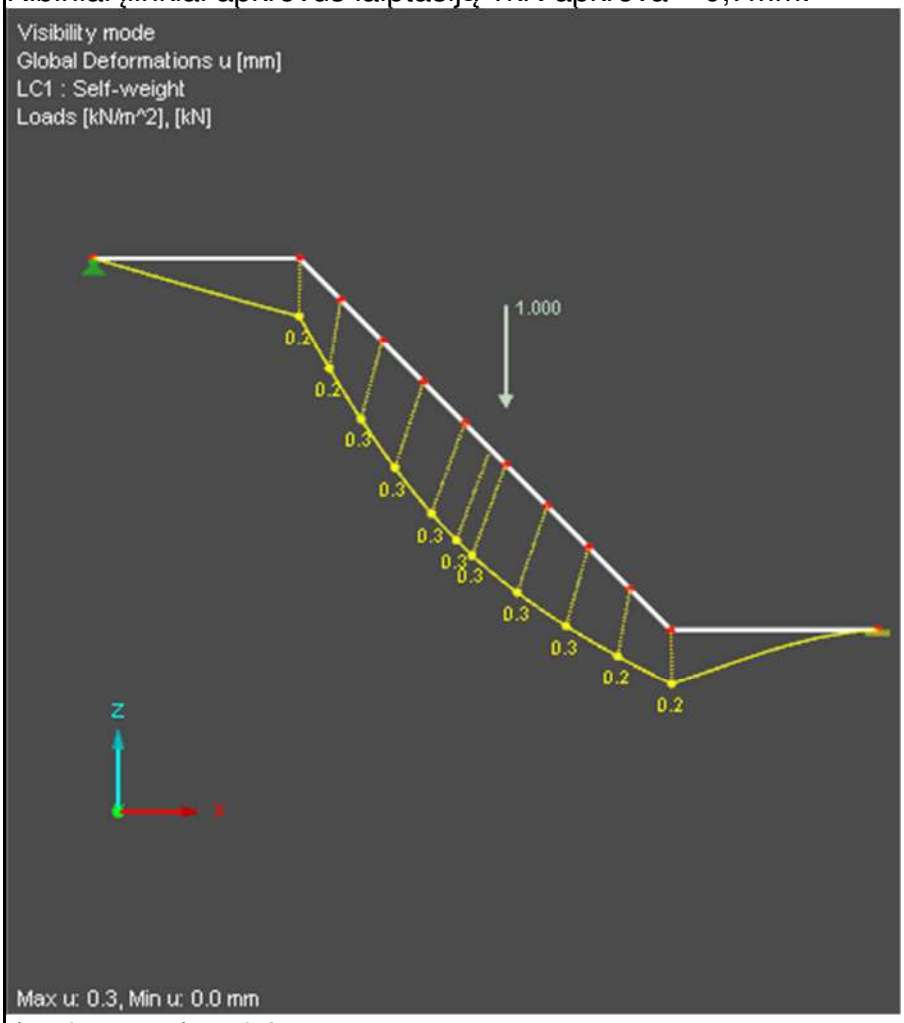
Ribiniai įlinkiai apkrovus laiptasiją 1kN apkrova – 0,7mm.

TINKAMUMO RIBINIO BŪVIO APIBENDRINIMAS:
KOLONA:
ribinis kolonos poslinkis pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 260 punktą
$D_{\lim} = \frac{h_s}{150} = \frac{5100}{150} = 34{,}0mm$. Skaičiavimuose gautas maksimalus poslinkis lygus 7,3mm.
d_{lim}=34,0mm>d_{max}=7,3mm.
Laiptasija ant žemės tikrinama pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 4 skyrių.
Ribiniai įlinkiai apkrovus laiptasiją 1kN apkrova – 0,7mm.



d_{lim}=0,7mm>d_{max}=0,1mm.

Laiptasija tarp aukštų tikrinama pagal STR 2.05.04:2003 "Poveikiai ir apkrovos" 17.1 lentelės 4 skyrių. Ribiniai įlinkiai apkrovus laiptasiją 1kN apkrova – 0,7mm.



d_{lim}=0,7mm>d_{max}=0,3mm.

Išvada: tinkamumo ribiniai būviai tenkinami.

12.5. D350 STATYBINIŲ KARKASINIŲ KOLONŲ POLIŲ SKAIČIAVIMAS

Polio laikomoji geba skaičiuojama nuo šių derinių: N_{max}.

Node	Support Forces [kN]			Support Moments [kNm]				
No.	**Column1**	**$P_{X'}$**	**$P_{Y'}$**	**$P_{Z'}$**	**$M_{X'}$**	**$M_{Y'}$**	**$M_{Z'}$**	**Derinys**
185	Max $M_{X'}$	-0.61	0.45	-21.12	0.00	0.00	-0.01	LC 1-4

Polio laikomosios galios skaičiavimai atlikti programa „GEO5 Pile CPT“.

Analysis of CPT pile

Input data

Tests

No.	Test name	Offset of the origin d_h [m]	Overall depth d_{tot} [m]
1	cpt-1_v2	0,45	15,00

No.	Test name	Offset of the origin d_h [m]	Overall depth d_{tot} [m]
2	cpt-2_v2	0,13	15,00

Test : cpt-1_v2

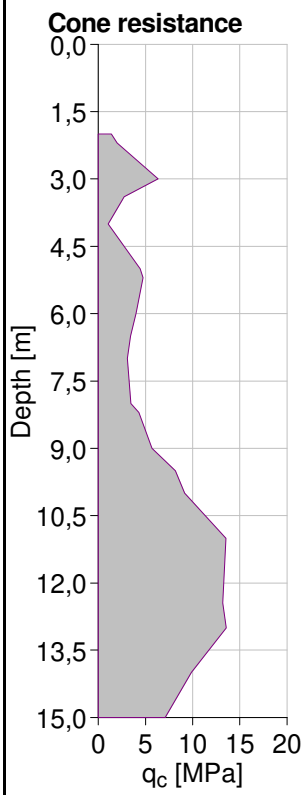


Table (CPT)

No.	Depth d [m]	Cone resistance q_c [MPa]
1	2,00	1,39
2	2,20	2,00
3	3,00	6,33
4	3,40	2,74
5	4,00	1,05
6	5,00	4,45
7	5,20	4,74
8	6,00	4,00
9	6,50	3,43
10	7,00	3,08
11	8,00	3,45
12	8,20	4,32
13	9,00	5,69
14	9,50	8,18
15	10,00	9,17
16	11,00	13,52
17	12,44	13,17
18	13,00	13,57
19	14,00	9,86

No.	Depth d [m]	Cone resistance q_c [MPa]
20	15,00	7,09

Test : cpt-2_v2

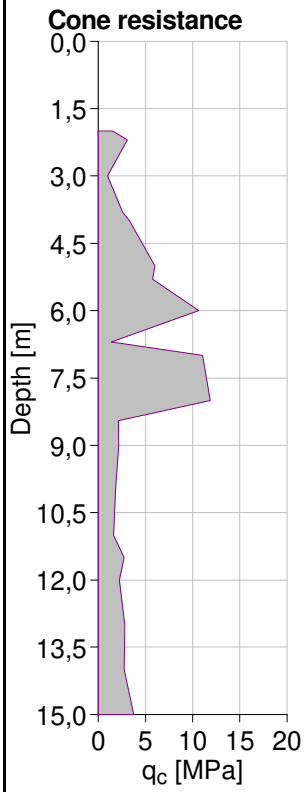
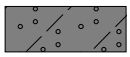


Table (CPT)

No.	Depth d [m]	Cone resistance q_c [MPa]
1	2,00	1,55
2	2,20	3,08
3	3,00	1,00
4	3,80	2,57
5	4,00	3,33
6	5,00	5,98
7	5,30	5,77
8	6,00	10,65
9	6,70	1,39
10	7,00	11,06
11	8,00	11,86
12	8,45	2,13
13	9,00	2,17
14	10,00	1,85
15	11,00	1,62
16	11,50	2,76
17	12,00	2,25
18	13,00	2,82
19	14,00	2,76

No.	Depth d [m]	Cone resistance q_c [MPa]
20	15,00	3,76

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	γ [kN/m^3]	γ_{su} [kN/m^3]
1	1lp-p (Mg)		24,60	16,00	6,00
2	8lst (CIL)		32,80	16,50	6,50
3	9vst (CIM)		21,00	20,00	10,00

Soil parameters

1lp-p (Mg)

Unit weight : γ = 16,00 kN/m^3
Angle of internal friction : φ_{ef} = 24,60 °
Saturated unit weight : γ_{sat} = 16,00 kN/m^3
Type of soil : sand, gravel
Magnitude OCR : OCR ≤ 2
Type of grains : sand finer than 600 nm

8lst (CIL)

Unit weight : γ = 16,50 kN/m^3
Angle of internal friction : φ_{ef} = 32,80 °
Saturated unit weight : γ_{sat} = 16,50 kN/m^3
Type of soil : silt

9vst (CIM)

Unit weight : γ = 20,00 kN/m^3
Angle of internal friction : φ_{ef} = 21,00 °
Saturated unit weight : γ_{sat} = 20,00 kN/m^3
Type of soil : silt

Construction

Type of construction : single pile
Design load Fs_d = 21,12 kN
Service load Fs = 15,10 kN

Geometry

Type of pile : continuous flight auger pile
Pile material : concrete
Reduce q_c III to 2 MPa : Yes
Elevation from the original ground = -0,53 m
Elevation from the finished grade = -1,78 m
Pile length in soil = 4,00 m
Pile head offset above terrain = 0,00 m
Depth of finished grade = 1,25 m

Pile cross-section - circular

Pile diameter d = 0,35 m

GWT

Ground water table GWT = 1,15 m

Global settings

Analysis based on tests : CPT
The analysis does not consider the influence of negative skin friction.
Partial factor on model uncertainty γ_{cal} = 1,00

Geological profile and assigned soils

Position information
Terrain elevation = -0,53 m
Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Elevation [m]	Assigned soil	Pattern
1	3,80	0,00 .. 3,80	-0,53 .. -4,33	1lp-p (Mg)	
2	4,30	3,80 .. 8,10	-4,33 .. -8,63	8lst (CIL)	
3	6,90	8,10 .. 15,00	-8,63 .. -15,53	9vst (CIM)	
4	-	15,00 .. ∞	-15,53 .. -	9vst (CIM)	

Bearing capacity calculation - EN 1997-2

Calculation of vertical bearing capacity - intermediate results of tests

Intermediate results CPT - cpt-1_v2

Total resistance	$R_{c,i}$	=	289,82	kN
Skin bearing capacity	$R_{s,i}$	=	135,24	kN
Base bearing capacity	$R_{b,i}$	=	154,58	kN
Medium magnitude of penetration resistance	$q_{cI,mean}$	=	3,07	MPa
Medium magnitude of penetration resistance	$q_{cII,mean}$	=	3,07	MPa
Medium magnitude of penetration resistance	$q_{cIII,mean}$	=	0,94	MPa
Maximum stress at pile base	$p_{max,base}$	=	1606,70	kPa
Reduced stress at pile base	$p_{max,base,red}$	=	1606,70	kPa

Intermediate results CPT - cpt-2_v2

Total resistance	$R_{c,i}$	=	385,55	kN
Skin bearing capacity	$R_{s,i}$	=	197,57	kN
Base bearing capacity	$R_{b,i}$	=	187,98	kN
Medium magnitude of penetration resistance	$q_{cI,mean}$	=	3,64	MPa
Medium magnitude of penetration resistance	$q_{cII,mean}$	=	3,64	MPa
Medium magnitude of penetration resistance	$q_{cIII,mean}$	=	1,25	MPa
Maximum stress at pile base	$p_{max,base}$	=	1953,81	kPa
Reduced stress at pile base	$p_{max,base,red}$	=	1953,81	kPa

Calculation of vertical bearing capacity - intermediate results skin

Intermediate results CPT - cpt-1_v2

No.	Depth [m]	q_{cz} [MPa]	Coeff. [–]	Skin frict. [kPa]
1	1,25	0,00	0,0060	0,00
2	2,45	1,39	0,0060	8,34
3	2,65	2,00	0,0060	12,00
4	3,00	3,89	0,0060	23,37

No.	Depth [m]	q_{cz} [MPa]	Coeff. [–]	Skin frict. [kPa]
5	3,45	6,33	0,0060	37,98
6	3,80	3,19	0,0250	79,72
7	3,85	2,74	0,0250	68,50
8	4,11	2,00	0,0250	50,00
9	4,72	1,98	0,0250	49,62
10	4,73	2,00	0,0250	50,00
11	5,25	3,77	0,0250	94,25

Intermediate results CPT - cpt-2_v2

No.	Depth [m]	q_{cz} [MPa]	Coeff. [–]	Skin frict. [kPa]
1	1,25	0,00	0,0060	0,00
2	2,13	1,55	0,0060	9,30
3	2,19	2,00	0,0060	12,00
4	2,33	3,08	0,0060	18,48
5	2,40	2,90	0,0060	17,39
6	2,45	2,77	0,0060	16,61
7	2,75	2,00	0,0060	12,00
8	3,00	1,34	0,0060	8,03
9	3,64	2,00	0,0060	12,00
10	3,80	2,31	0,0250	57,87
11	3,93	2,57	0,0250	64,25
12	4,13	3,33	0,0250	83,25
13	4,72	4,91	0,0250	122,67
14	5,13	5,98	0,0250	149,50
15	5,25	5,90	0,0250	147,40

Calculation of vertical pile bearing capacity - intermediate results

Pile diameter	d_{eq}	= 0,35	m
Pile diameter at base	$d_{s,eq}$	= 0,35	m
Pile area at base	A_b	= 0,10	m^2
Coeff. of reduc. of pile base bear. capacity	α_p	= 0,80	
Coeff. of influence of pile shape	s	= 1,00	
Coeff. of influence of pile widened base	β	= 1,00	

Calculation of vertical bearing capacity - results

Analysis carried out for all tests.

Minimum resistance of pile in compression	$R_{c,min}$	= 289,82	kN
Coefficient	ξ_4	= 1,27	
Mean resistance of pile in compression	$R_{c,mean}$	= 337,69	kN
Coefficient	ξ_3	= 1,35	
Characteristic pile bearing capacity	R_c	= 228,21	kN
Design pile bearing capacity	R_{cd}	= 217,14	kN
Design load	$F_{s,d}$	= 21,12	kN

R_{cd} = 217,14 kN > $F_{s,d}$ = 21,12 kN

Verification of pile for bearing capacity is SATISFACTORY

Settlement calculation - EN 1997-2

Settlement calculation:

Service load	F_s	=	15,10	kN
Skin bearing capacity	R_s	=	8,75	kN
Bearing capacity at base	R_b	=	6,35	kN
Pile base settlement	w_{base}	=	0,7	mm
Elastic deformation of pile	$w_{el,d}$	=	0,0	mm
Overall settlement	$w_{1,d}$	=	0,7	mm

Pile settlement calculation - results

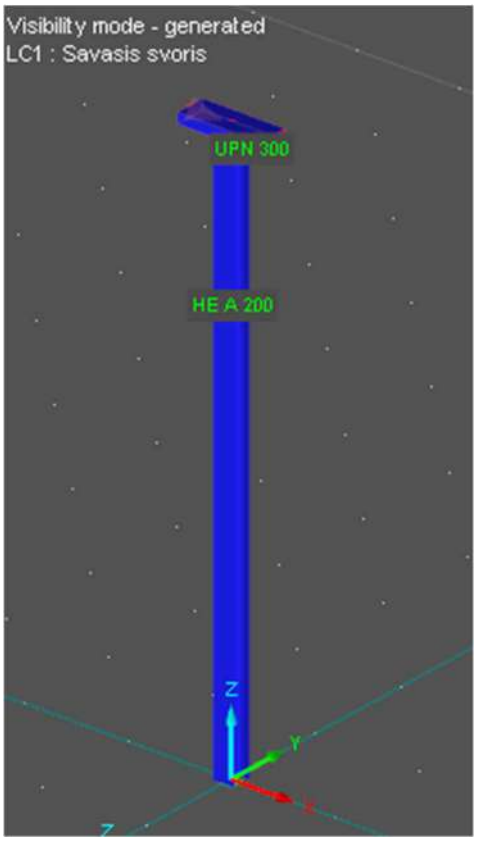
For loading Fs = 15,10 kN the pile settlement is = 0,7 mm

Polio laikomosios galios patikrinimas yra TINKAMAS BE modelyje gautos atraminės reakcijose nėra didelių ašinių jėgų, polis armuojami konstrukciškai. Išilginė armatūra: 6xD12 B500B Skersinė armatūra D8 kas 365mm

12.6. ATRAMŲ ESAMOJE KATILINĖJE SKAIČIAVIMAS

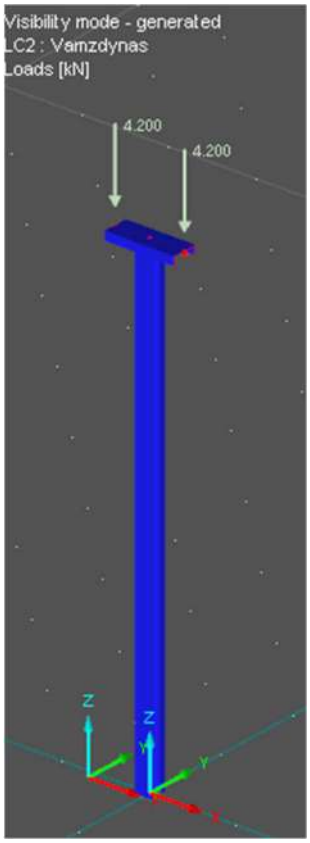
Skaičiuojama labiausiai apkrauta atrama esamoje katilinėje:

Skaičiuojami profiliai:

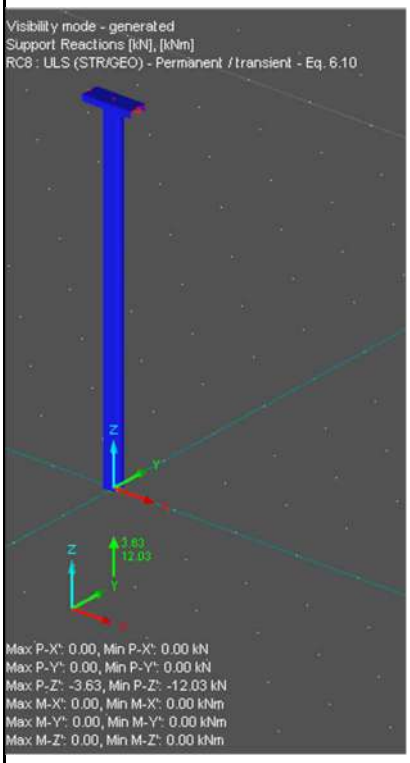


Vamzdyno apkrova:

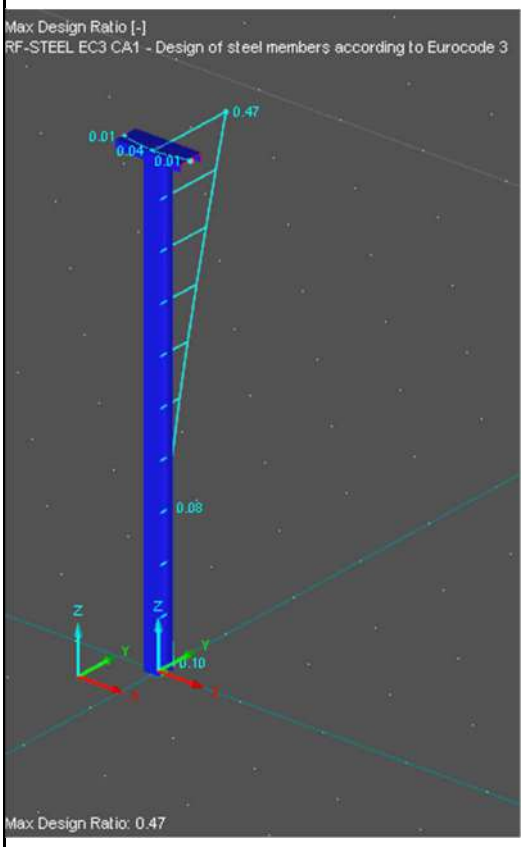
Priimama, kad maksimalus atstumas tarp atramų – 6m. Skaičiuojamas D200mm vamzdynas, kurio apkrova 70kg/m. Apkrova 6m*70kg/m=420kg=4,2kN. Ant atramos remiami du vamzdžiai:



Atraminės reakcijos:



Skerspjūvio laikomosios galios išnaudojimas:



Gelžbetoninio stulpo esamoje katilinėje skaičiavimas:

Skaičiuojamas gelžbetoninis stulpas turi atlaikyti 12,03kN ašinę jėgą. Priimama, kad esamoje katilinėje yra prastų savybių piltinis gruntas.

Settings

Standard - safety factors

Materials and standards

Concrete structures :	EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 :	standard
Circle pile shear :	simplified method

Settlement

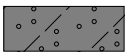
Analysis method :	Analysis using oedometric modulus
Restriction of influence zone :	by percentage of Sigma,Or
Coeff. of restriction of influence zone :	10,0 [%]

Spread Footing

Verification methodology :	Safety factors (ASD)
Analysis for drained conditions :	Standard approach
Analysis of uplift :	Standard
Allowable eccentricity :	0,333

Safety factors			
Permanent design situation			
Safety factor for vertical bearing capacity :	SF_v =	1,50	[–]
Safety factor for sliding resistance :	SF_h =	1,50	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Silty sand (SM)		29,00	5,00	18,00	8,00	

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

Silty sand (SM)

Unit weight : γ = 18,00 kN/m^3
Angle of internal friction : φ_{ef} = 29,00 °
Cohesion of soil : c_{ef} = 5,00 kPa
Oedometric modulus : E_{oed} = 13,50 MPa
Saturated unit weight : γ_{sat} = 18,00 kN/m^3

Foundation

Foundation type: centric spread footing

Depth from original ground surface h_z = 1,40 m
Depth of footing bottom d = 1,40 m
Foundation thickness t = 1,50 m
Incl. of finished grade s_1 = 0,00 °
Incl. of footing bottom s_2 = 0,00 °

Overburden

Type: input shape and soil of the fill
Assigned soil : Silty sand (SM)
Type : from the bottom edge
l_1 = 1,00 m
l_2 = 0,20 m

Geometry of structure

Foundation type: centric spread footing

Spread footing length x = 0,60 m
Spread footing width y = 0,60 m
Column shape rectangle
Column width in the direction of x c_x = 0,60 m
Column width in the direction of y c_y = 0,60 m

Spread footing volume = 0,54 m^3
Volume of excavation = 4,83 m^3
Volume of fill = 4,33 m^3

Material of structure

Unit weight γ = 23,00 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 20/25

Cylinder compressive strength f_{ck} = 20,00 MPa
Tensile strength f_{ctm} = 2,20 MPa
Elasticity modulus E_{cm} = 30000,00 MPa

Longitudinal reinforcement: B500B

Yield strength f_{yk} = 500,00 MPa

Transverse reinforcement: B500B

Yield strength f_{yk} = 500,00 MPa

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	5,00	0,00 .. 5,00	Silty sand (SM)	
2	-	5,00 .. ∞	Silty sand (SM)	

Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Load No. 1	Design	15,00	0,00	0,00	0,00	3,40
2	Yes		Load No. 1 - service	Service	10,71	0,00	0,00	0,00	2,43

Global settings

Type of analysis : analysis for drained conditions

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Load No. 1	0,00	-0,19	200,43	623,93	48,19	Yes

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 12,42 kN
Computed weight of overburden Z = 0,00 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 1. (Load No. 1)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 0,92 m
Length of slip surface l_{sp} = 2,74 m

Design bearing capacity of found. soil R_d = 623,93 kPa
Extreme contact stress σ = 200,43 kPa

Factor of safety = 3,11 > 1,50
Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0,000<0,333
Max. eccentricity in direction of base width e_y = 0,310<0,333
Max. overall eccentricity e_t = 0,310<0,333

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 1. (Load No. 1)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 44,76 kN

Horizontal bearing capacity R_{dh} = 60,65 kN

Extreme horizontal force H = 3,40 kN

Factor of safety = 17,84 > 1,50
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

Verification No. 1

Settlement and rotation of foundation - input data

Analysis carried out with automatic selection of the most unfavourable load cases.
Analysis carried out with accounting for coefficient κ_1 (influence of foundation depth).
Stress at the footing bottom considered from the finished grade.
Computed weight of spread footing G = 12,42 kN
Computed weight of overburden Z = 0,00 kN

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 0,60 m
Spread footing width (y) = 0,43 m

Settlement of mid point of edge x - 1 = 1,7 mm
Settlement of mid point of edge x - 2 = 0,4 mm
Settlement of mid point of edge y - 1 = 0,9 mm
Settlement of mid point of edge y - 2 = 0,9 mm
Settlement of foundation center point = 1,7 mm
Settlement of characteristic point = 1,3 mm

(1-max.compressed edge; 2-min.compressed edge)

Settlement and rotation of foundation - results

Foundation stiffness:
Computed weighted average modulus of deformation E_{def} = 10,03 MPa
Foundation in the longitudinal direction is rigid (k=46741,45)
Foundation in the direction of width is rigid (k=46741,45)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0,000<0,333
Max. eccentricity in direction of base width e_y = 0,262<0,333
Max. overall eccentricity e_t = 0,262<0,333

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 1,3 mm
Depth of influence zone = 1,00 m

Rotation in direction of x = 0,000 (tan*1000); (0,0E+00 °)
Rotation in direction of y = 2,188 (tan*1000); (1,3E-01 °)

Dimensioning No. 1

Analysis carried out with automatic selection of the most unfavourable load cases.

Verification of longitudinal reinforcement of foundation in the direction of x

0,00 m ≤ 0,75 m
Maximum offset of the foundation is smaller than 0,50 * thickness of foundation. **Reinforcement is not requiered**.

Verification of longitudinal reinforcement of foundation in the direction of y

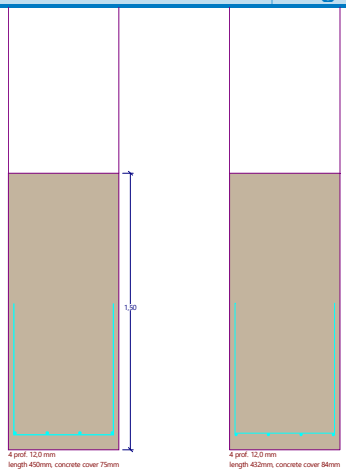
0,00 m ≤ 0,75 m
Maximum offset of the foundation is smaller than 0,50 * thickness of foundation. **Reinforcement is not requiered**.

Spread footing for punching shear failure check

Length of the critical section is equal to zero.

Spread footing for punching shear is SATISFACTORY

Name : Dimensioning	Stage - analysis : 1 - 1



Stulpas armuojamas konstrukciškai (remiantis skaičiavimais armatūros nereikia paryškinta raudona spalva) erdviniais armatūros strypais D12xD12 kas 200mm.

Atraminio mazgo skaičiavimas

1 Anchor Design

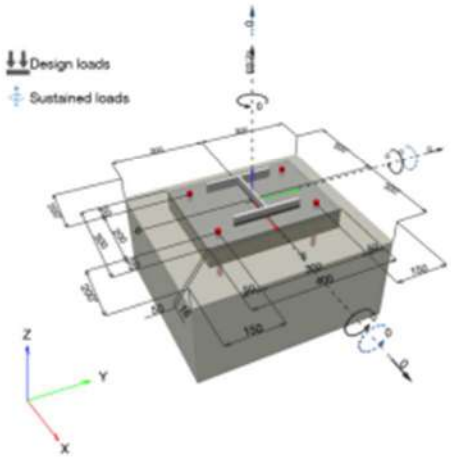
1.1 Input data



Anchor type and diameter:	**HIT-HY 200-A V3 + HAS-U 5.8 M16**
Return period (service life in years):	50
Item number:	2223830 HAS-U 5.8 M16x190 (element) / 2378171 HIT-HY 200-A V3 (adhesive)
Insert item # alternative:	2390207 HAS 5.8 M16x190
Specification text:	Hilti HAS-U 5.8 or HAS threaded rod with HIT-HY 200-A V3 injection mortar with 80 mm embedment hef, M16, Steel galvanized, Hammer drill bit installation per ETA 19/0601,
Effective embedment depth:	$h_{ef,opt}$ = 80.0 mm ($h_{ef,limit}$ = 320.0 mm)
Material:	5.8
Evaluation Service Report:	ETA 19/0601
Issued I Valid:	2024-01-29 | -
Proof:	SOFA based on EN 1992-4, Chemical
Stand-off installation:	grouted standoff; restraint level (anchor plate): 2.00; e_b = 50.0 mm; t = 16.0 mm grout compressive strength = 30.00 N/mm^2
Anchor plate^{CBFEM} :	l_x x l_y x t = 300.0 mm x 400.0 mm x 16.0 mm;
Profile:	IPBi/HEA, IPBI 200 / HE 200 A; (L x W x T x FT) = 190.0 mm x 200.0 mm x 6.5 mm x 10.0 mm
Base material:	cracked concrete, C25/30, $f_{c,cyl}$ = 25.00 N/mm^2; h =1,500.0 mm, Temp. short/long: 40/24 °C, partial material safety factor γ_c = 1.500
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	no reinforcement or reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm) no longitudinal edge reinforcement

^{CBFEM} - The anchor calculation is based on a component-based Finite Element Method (CBFEM)

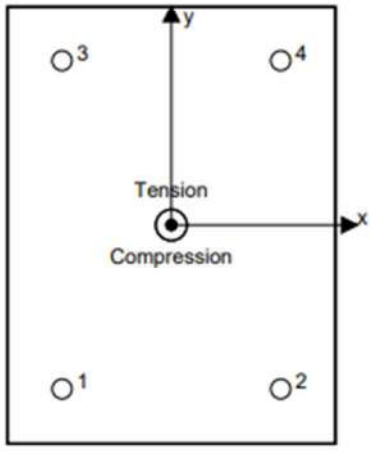
Geometry [mm] & Loading [kN, kNm]



1.1.1 Load combination

Case	Description	Forces [kN] / Moments [kNm]	Seismic	Fire	Max. Util. Anchor [%]
1	Combination 1	$N = 12.030$; $V_x = 0.000$; $V_y = 0.000$; $M_x = 0.000$; $M_y = 0.000$; $M_z = 0.000$; $N_{sus} = 0.000$; $M_{x,sus} = 0.000$; $M_{y,sus} = 0.000$;	no	no	29

1.2 Load case/Resulting anchor forces



Anchor reactions [kN]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	4.802	0.035	0.001	0.035
2	4.800	0.035	-0.001	0.035
3	4.801	0.035	0.001	-0.035
4	4.802	0.035	-0.001	-0.035

Resulting tension force in (x/y)=(-0.0/0.0): 19.204 [kN]
Resulting compression force in (x/y)=(0.0/-0.1): 7.619 [kN]

Anchor forces are calculated based on a component-based Finite Element Method (CBFEM)

1.3 Tension load (EN 1992-4, Section 7.2.1)

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel Strength*	4.802	52.333	10	OK
Combined pullout-concrete cone failure**	9.603	47.741	21	OK
Concrete Breakout Failure**	9.603	33.668	29	OK
Splitting failure**	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

1.3.1 Steel Strength

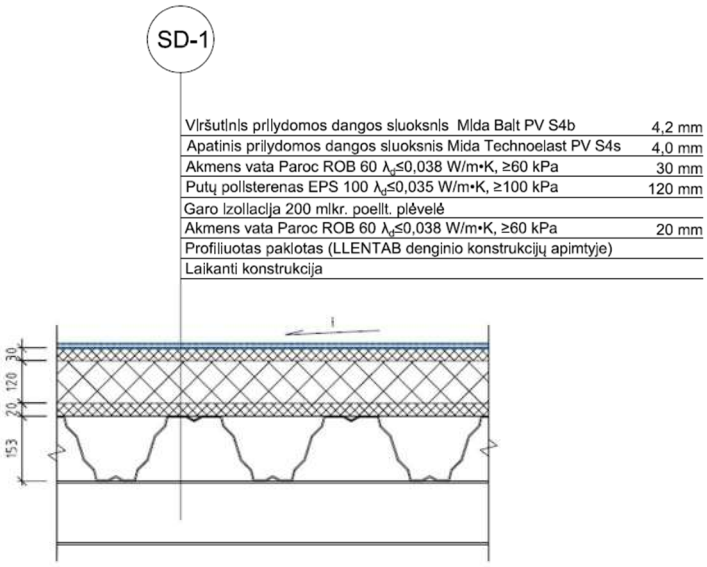
$$N_{Ed} \le N_{Rd,s} = \frac{N_{Rk,s}}{\gamma_{Ms}}$$ EN 1992-4, Table 7.1

$N_{Rk,s}$ [kN]	γ_{Ms}	$N_{Rd,s}$ [kN]	N_{Ed} [kN]
78.500	1.500	52.333	4.802

13. ATITVARŲ ŠILUMINĖ VARŽA

Pastatui energinio naudingumo reikalavimai netaikomi, tačiau planuojama taikyti B(C) energinio naudingumo klasę pramoniniams pastatams, t.y. stogo šilumos perdavimo koeficientas U numatomas ~0,22-0,25 W/(m²K), sienų ~0,26 W/(m²K).

Apskaičiuota stogo varža pagal priimtą stogo detalę SD-1 (230031S1TP-XX-TP-SK_B-021) $R_{apskaičiuota}$=4,493 (m²K)/W, šilumos perdavimo koeficientas $U_{apskaičiuotas}$=0.222 W/(m²K):



DETALĖ "SD-1"

Sutapdinto stogo ant profiliuoto pakloto šiluminės varžos ir šilumos perdavimo koeficiento skaičiavimas

Poz.	Sluoksniai	d	λ_{ds}	λ_D	$\Delta\lambda_\omega$	$\Delta\lambda_{cv}$	K_{cv}	R	R_s	R_{si}	R_{se}	R_t	θ_i	θ_e	κ	U_{pr}
		m	$W/(m\cdot K)$	$W/(m\cdot K)$	$W/(m\times K)$	$W/(m\times K)$		$m2\times K/W$	$m2\times K/W$	$m2\times K/W$	$m2\times K/W$	$m2\times K/W$	°C	°C		$W/(m2\cdot K)$
1	Ritininė bituminė danga	-	-	-	-	-	-	0,000								
2	Mineralinė vata	0,03	0,040	0,038	0,002	0	0	0,750								
3	Polistirenas	0,12	0,037	0,035	0,002	0	0	3,243								
4	Mineralinė vata	0,02	0,040	0,038	0,002	0	0	0,500								
5	Polietileno pl.	-	-	-	-	-	-	0,000	4,493	0,10	0,04	**4,633**			1,000	**0,216**
6	Profiliuotas skardos lakštas	-	-	-	-	-	-	-								

d	atitvaros sluoksnio storis
λ_D	deklaruojamoji termoizoliacinio statybos produkto šilumos laidumo koeficiento vertė
λ_{ds}	projektinis šilumos laidumo koeficientas (STR 2.01.02:2016 (3.1))
λ_{dec}	deklaruojamasis šilumos laidumo koeficientas
$\Delta\lambda_\omega$	pataisa dėl šilumos konvekcijos poveikio (STR 2.01.02:2016 3.1 lentelė)
K_{cv}	šilumos konvekcijos poveikio koeficientas (STR 2.01.02:2016 3.4 lentelė)
R	šiluminė varža
R_s	suminė šiluminė varža
R_{si}	vidaus paviršiaus šiluminė varža (STR 2.01.02:2016 2.3 lentelė)
R_{se}	išorės paviršiaus šiluminė varža (STR 2.01.02:2016 2.3 lentelė)
R_t	visuminė šiluminė varža
θ_i	patalpų vidaus oro temperatūra
θ_e	šildymo sezono vidutinė išorės oro temperatūra (RSN 156-94 2,6 lentelė)
U_N	norminis atitvaros šilumos perdavimo koeficientas (STR 2.05.01:2005 1 lentelė)
U_{pr}	atitvaros šilumos perdavimo koeficientas

$$R = d/\lambda_{ds}$$

$$\Delta\lambda_{cv} = \lambda_{dec} \times K_{cv}$$

$$\lambda_{ds} = \lambda_{dec} + \Delta\lambda_\omega + \Delta\lambda_{cv}$$

$$R_t = R_{si} + R_s + R_{se}$$

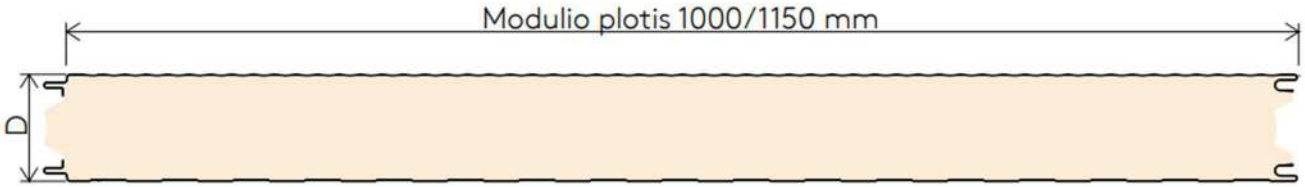
$$U = 1/R_t$$

$$\kappa = 20/(\theta_i - \theta_e)$$

Išorės sienoms priimtas 150mm storio (žiūr. SA dalį) daugiasluoksnis panelis Kingspan KS1150 TL (arba analogas), deklaruoruojami panelio techniniai duomenys pateikti žemiau. Pagal gamintojo pateiktas reikšmes, priimtas projektinis šilumos laidumo koeficientas U=0.15 (W/m2K), šiluminė varža R=1/U=6,67(m2K/W).

Duomenų lapas **Sieninė plokštė KS1150 TL IPN**

Matmenys

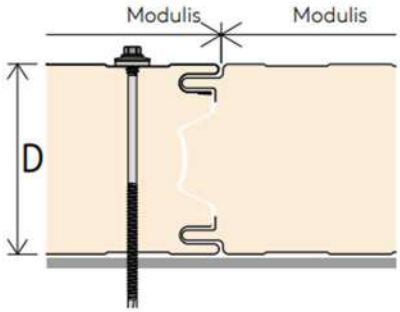


Taikymo sritis

Sieninės izoliacinės plokštės KS1150 TL su puikiomis šiluminėmis savybėmis ir aukštu atsparumu ugniai. Plokštės montuojamos tiek vertikaliai, tiek horizontaliai. Plokštės tinkamos naudoti visų tipų pastatams.
Plokštės ypač tinka pastatų fasadams, kur reikalingas atsparumas ugniai iki EW60 / EI30.

Kiekvienu atveju reikia patikrinti, ar plokštė yra tinkama projektui ir ar atitinka projektinius reikalavimus.

Jungties detalė



Techninės detalės

Produktas	Modulis [mm]	Izoliacinės šerdies storis D [mm]	Svoris [kg/m²]	Plokščių gamybinis ilgis [m]		Plokščių skaičius pakuotėje [vnt.]		Šilumos perdavimo koeficientas U [W/(m²K)] esant λ = 0,022 [W/mK] išmatuotai prie temp. +10°C	Garso izoliavimo rodiklis R_w [dB]	Oro pralaidumas V_{A50} [m³/m²h][4]	Priešgaisriniai parametrai		
			Skardos storis išor./vid. 0,5 mm / 0,5 mm	Min.[1]	Maks.	Modulis 1150	Modulis 1000				Reakcija į ugnį	Atsparumas ugniai[2] H horizontaliai	Atsparumas ugniai[2] V vertikaliai
KS1150 TL	1150[3]	100	11,67	2,9	15,0	11	11/12	0,22	25	≤ 0,5	B-s1, d0	EI 20 - 4,0 m	EI 20 - 4,0 m
		120	12,27	2,5		9	9/10	0,18				EI 20 - 4,0 m EI 15 - 7,5 m	EI 30 - 4,0 m EI 20 - 7,5 m
		150	13,17			7	7/8	0,15				EI 30 - 6,0 m EI 20 - 7,5 m	EI 30 - 7,5 m
		170	13,77			6	6/7	0,13					
		200	14,67			5	5/6	0,11					