PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Energetikos projektai
PROJEKTAVIMAS IR KONSULTACIJOS
Islandijos pl. 217-8, 2 aukštas, LT-49165
Kaunas, Tel. +370 37 211714
El. paštas: info@enpro.lt

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

STATINIO PROJEKTO PAVADINIMAS:	**110/10 kV Žeimių TP 110 kV skirstyklos elektros tinklų paskirties (inžinerinių tinklų grupės) statinio, Jonavos r. sav., Žeimių sen., Palankesių k., Dargužių g. 4, rekonstravimo projektas**
OBJEKTO PAVADINIMAS:	**110/10 kV Žeimių TP**
STATINIO ADRESAS:	**Jonavos r. sav., Žeimių sen., Palankesių k., Dargužių g. 4**
STATINIO KATEGORIJA:	**Ypatingasis statinys**
STATYBOS RŪŠIS:	**Statinio rekonstravimas**
UŽSAKOVAS:	**LITGRID AB**
STATYTOJAS:	**LITGRID AB**
INVESTICINIO PROJEKTO NR.:	**PPRK24335**
STATINIO PROJEKTO ETAPAS:	**Techninis darbo projektas**
STATINIO PROJEKTO NUMERIS:	**2025-45-01-XX-TDP**
STATINIO PROJEKTO DALIS:	**Konstrukcijų dalis** **Inžineriniai skaičiavimai**
BYLOS ŽYMUO:	**SK-IS**
BYLOS LAIDA:	**0**
BYLOS IŠLEIDIMO DATA:	**2026 05**

KAUNAS 2026

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

1. NORMATYVINIAI, KITI DOKUMENTAI IR DUOMENYS PROJEKTUI PARENGTI

1.1. Projektavimo užduotis

110/10 kV Žeimių TP 110 kV skirstyklos elektros tinklų paskirties (inžinerinių tinklų grupės) statinio, Jonavos r. sav., Žeimių sen., Palankesių k., Dargužių g. 4, rekonstravimo projekto konstrukcijų dalis parengta pagal Litgrid AB pateiktą techninę užduotį „110/10 Žeimių TP 110 kV skirstyklos rekonstravimas“, investicijų projekto Nr. PPRK24335. Šioje projekto dalyje pateikiami PSO dalies, Litgrid AB sklypo plano dalies sprendiniai.

1.2. Normatyviniai dokumentai

1.2.1. lentelė. *Normatyvinių dokumentų sąrašas*

Eil. Nr.	Pavadinimas	Žymuo
1.	**Įstatymai**	
1.1.	Lietuvos Respublikos statybos įstatymas	1996 m. kovo 19 d. Nr. I-1240
1.2.	Lietuvos Respublikos teritorijų planavimo įstatymas	1995 m. gruodžio 12 d. Nr. I-1120
1.3.	Lietuvos Respublikos elektros energetikos įstatymas	2000 m. liepos 20 d. Nr. VIII-1881
2.	**Statybos techniniai reglamentai**	
2.1.	Statinių klasifikavimas	STR 1.01.03:2017.
2.2.	Statinio statybos rūšys	STR 1.01.08:2002.
2.3.	Statinio projektavimas, projekto ekspertizė	STR 1.04.04:2017.
2.4.	Statybą leidžiantys dokumentai. Statybos užbaigimas. Statybos sustabdymas. Savavališkos statybos padarinių šalinimas. Statybos pagal neteisėtai išduotą statybą leidžiantį dokumentą padarinių šalinimas	STR 1.05.01:2017.
2.5.	Statybos darbai. Statinio statybos priežiūra	STR 1.06.01:2016.
2.6.	Statinio naudojimo paskirtis ir gyvavimo trukmė	STR 1.12.06:2002.
2.7.	Pastatų energinio naudingumo projektavimas ir sertifikavimas	STR 2.01.02:2016.
2.8.	Sandėliavimo, gamybos ir pramonės statiniai. Pagrindiniai reikalavimai	STR 2.02.07:2012.
2.9.	Pastatų atitvaros. Sienos, stogai, langai ir išorinės įėjimo durys	STR 2.04.01:2018.
2.10.	Statybinių konstrukcijų projektavimo pagrindai	STR 2.05.03:2003.
2.11.	Poveikiai ir apkrovos	STR 2.05.04:2003.
2.12.	Statybų klimatologija	STR 2.01.12:2024.
3.	**Taisyklės, reikalavimai, aprašai**	
3.1.	Bendrosios gaisrinės saugos taisyklės	2010 m. liepos 27 d. Nr. 1-223
3.2.	Pagrindiniai gaisrinės saugos reikalavimai	2010 m. gruodžio 7 d. Nr. 1-338
3.3.	Gamybos, pramonės ir sandėliavimo statinių gaisrinės saugos taisyklės	2012 m. vasario 6 d. Nr. 1-45
3.4.	Elektros tinklų statybos rūšių ir elektros įrenginių įrengimo darbų rūšių aprašas	2016 m. rugsėjo 13 d. Nr. 1-245
3.5.	Elektros įrenginių įrengimo bendrosios taisyklės	2012 m. vasario 3 d. Nr. 1-22
3.6.	Skirstyklų ir pastočių elektros įrenginių įrengimo taisyklės	2011 m. gruodžio 15 d. Nr. 1-303
3.7.	Elektros linijų ir instaliacijos įrengimo taisyklės	2011 m. gruodžio 20 Nr. 1-309
3.8.	Atliekų tvarkymo taisyklės	1999 m. liepos 14 d. Nr. 217
3.9.	Statybinių atliekų tvarkymo taisyklės	2006 m. gruodžio 29 d. Nr. D1-637
3.10.	Reglamentuojamų statybos produktų sąrašas	2017 m. vasario 7 d. Nr. D1-123
4.	**Standartai**	
4.1.	Statinio projektas. Bendrieji įforminimo reikalavimai	LST 1516:2015

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Nr.	Pavadinimas	Žymuo
4.2.	LST EN 206-1 taikymo taisyklės ir papildomieji nacionaliniai reikalavimai	LST 1974:2012
4.3.	Surenkamieji betoniniai gaminiai. Paviršiaus išvaizdos charakteristikos ir jų tikrinimo metodai	LST 2015:2020
4.4.	Betonas. Specifikacija, eksploatacinės savybės, gamyba ir atitiktis	LST EN 206+A1:2013
4.5.	Plieninių ir aliumininių konstrukcijų darbų atlikimas. 2 dalis. Techniniai plieninių konstrukcijų darbų atlikimo reikalavimai	LST EN 1090-2:2008+A1:2011
4.6.	Eurokodas. Konstrukcijų projektavimo pagrindai	LST EN 1990:2004
4.7.	Eurokodas. Konstrukcijų projektavimo pagrindai. Nacionalinis priedas	LST EN 1990:2004/NA:2010
4.8.	Eurokodas 1. Poveikiai konstrukcijoms. 1-3 dalis. Bendrieji poveikiai. Sniego apkrovos	LST EN 1991-1-3:2004
4.9.	Eurokodas 1. Poveikiai konstrukcijoms. 1-3 dalis. Bendrieji poveikiai. Sniego apkrovos. Nacionalinis priedas	LST EN 1991-1-3:2004/NA:2012
4.10.	Eurokodas 1. Poveikiai konstrukcijoms. 1-4 dalis. Bendrieji poveikiai. Vėjo poveikiai	LST EN 1991-1-4:2005
4.11.	Eurokodas 1. Poveikiai konstrukcijoms. 1-4 dalis. Bendrieji poveikiai. Vėjo poveikiai. Nacionalinis priedas	LST EN 1991-1-4:2005/NA:2012
4.12.	Eurokodas 2. Gelžbetoninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės	LST EN 1992-1-1:2005
4.13.	Eurokodas 2. Gelžbetoninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės. Nacionalinis priedas	LST EN 1992-1-1:2005/NA:2011
4.14.	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės	LST EN 1993-1-1:2005
4.15.	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-1 dalis. Bendrosios ir pastatų taisyklės. Nacionalinis priedas	LST EN 1993-1-1:2005/NA:2011
4.16.	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-8 dalis. Mazgų projektavimas	LST EN 1993-1-8:2005
4.17.	Eurokodas 3. Plieninių konstrukcijų projektavimas. 1-8 dalis. Mazgų projektavimas. Nacionalinis priedas	LST EN 1993-1-8:2005/NA:2010
4.18.	Eurokodas 7. Geotechninis projektavimas. 1 dalis. Pagrindinės taisyklės	LST EN 1997-1:2005
4.19.	Eurokodas 7. Geotechninis projektavimas. 1 dalis. Pagrindinės taisyklės. Nacionalinis priedas	LST EN 1997-1:2005/NA:2012
4.20.	Bendrosios surenkamųjų betoninių gaminių taisyklės	LST EN 13369:2013
4.21.	Betoninių konstrukcijų darbų atlikimas	LST EN 13670:2010
4.22.	Gamykliniai betoniniai gaminiai. Pamato elementai	LST EN 14991:2007
4.23.	Iš anksto neįtemptų konstrukcinių varžtų rinkiniai. 1 dalis. Bendrieji reikalavimai	LST EN 15048-1:2007
4.24.	Aukštesnės kaip 1 kV kintamosios įtampos oro linijos. 1 dalis. Bendrieji reikalavimai. Bendrieji techniniai reikalavimai	LST EN 50341-1:2013
4.25.	Trumpojo jungimo srovės. Efektų skaičiavimas. 1 dalis. Apibrėžtys ir skaičiavimo metodai	LST EN 60865-1:2012
4.26.	Didesnės kaip 1 kV kintamosios įtampos elektros įrenginiai. 1 dalis. Bendrosios taisyklės	LST EN 61936-1:2011
4.27.	Ketaus ir plieno gaminių dangos, gautos karštojo cinkavimo būdu. Techniniai reikalavimai ir bandymo metodai	LST EN ISO 1461:2009
4.28.	Plieninio pagrindo paruošimas prieš padengiant dažais ir su jais susijusiais produktais. Regimasis paviršiaus švarumo įvertinimas. 1 dalis. Nepadengtų plieninių pagrindų ir plieninių pagrindų, nuo kurių visiškai pašalinta ankstesnioji danga, surūdijimo ir paruošimo laipsniai	LST EN ISO 8501-1:2007

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Eil. Nr.	Pavadinimas	Žymuo
4.29.	Plieninio pagrindo paruošimas prieš padengiant dažais ir su jais susijusiais produktais. Regimasis paviršiaus švarumo įvertinimas. 3 dalis. Siūlių, briaunų ir kitų zonų su paviršiniais defektais paruošimo laipsniai	LST EN ISO 8501-3:2007
4.30.	Metalų ir lydinių korozija. Atmosferų koroziškumas. Klasifikavimas, nustatymas ir vertinimas	LST EN ISO 9223:2012
4.31.	Tvirtinimo detalės. Lydalinės cinko dangos	LST EN ISO 10684:2004
4.32.	Dažai ir lakai. Plieninių konstrukcijų apsauga nuo korozijos apsauginėmis dažų sistemomis. 5 dalis. Apsauginės dažų sistemos	LST EN ISO 12944-5:2020
4.33.	Mašinų sauga. Nuolatinės prieigos prie mašinų priemonės. 3 dalis. Laiptai, laiptinės kopėčios ir apsauginiai turėklai	LST EN ISO 14122-3:2016
4.34.	Šiluminės statinių charakteristikos. Pamatų šiluminių parametrų apskaičiavimas siekiant išvengti pamatų peršalimo	LST EN ISO 13793:2002
4.35.	Atmospheric icing of structures	ISO 12494:2017

1.3. Kompiuterinė programinė įranga, kuria vadovaujantis parengta ši projekto dalis

- Microsoft Windows 10 Pro;
- Microsoft Office 2021;
- ZWCAD 2020;
- Scia Engineer Steel;
- GEO-5;
- SOLIDWORKS 2025.

2. BENDRIEJI PAŽINTINIAI DUOMENYS APIE VIETOVĘ

2.1. Adresas

Jonavos r. sav., Žeimių sen., Palankesių k., Dargužių g. 4.

2.2. Klimato sąlygos

Pagal STR 2.01.12:2024 „Statybų klimatologija“ esamos vietovės klimatiniai duomenys:

- vidutinė metinė oro temperatūra +7,5°C;
- absoliutus oro temperatūros maksimumas +35,5°C;
- absoliutus oro temperatūros minimumas -36,9°C;
- santykinis metinis oro drėgnumas 78%.

Maksimalus dirvožemio įšalo gylis kartą per:

- 10 metų – 79 cm;
- 50 metų – 96 cm.

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



***2.2.1.* pav.** *Meteorologijos stočių tinklas*

2.3. Geologiniai ir hidrogeologiniai duomenys

Pagal inžinerinių geologinių tyrimų ataskaitą (UAB „Geoconsulting“, 2026 m.) tirtuose gręžiniuose geologinę sandarą sudaro:

Gr. 1 (8,1 m):

- 0,6 m storio dirbtinis gruntas (Mg): supiltas/perkastas gruntas: žvyringas smėlis, su dirvožemiu, smėlingu dulkingu moliu, tamsiai rudas, pilkai rudas.
- 0,5 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo.
- 1,1 m storio dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, purus.
- 0,3 m storio dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, vidutinio tankumo.
- 0,3 m storio dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, tankus.
- 0,3 m storio vidutinio plastiškumo molis (ClM), rudas, vidutinio stiprumo.
- 1,6 m storio dulkingas smėlis (siSa), šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas - vandeningas, tankus.
- 3,4 m storio dulkingas smėlis (siSa), šviesiai rudas, su vidutinio plastiškumo molio intarpais, vandeningas, labai tankus.

Gr. 2 (8,2 m):

- 0,8 m storio dirbtinis gruntas (Mg): supiltas/perkastas gruntas: dulkingas smėlis, dirvožemis, tamsiai rudas, pilkai rudas.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

- 0,4 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo.
- 0,8 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, silpnas.
- 0,3 m storio dulkingas smėlis (siSa), šviesiai rudas, su su vidutinio plastiškumo molio intarpu, drėgnas, purus.
- 0,4 m storio vidutinio plastiškumo molis (ClM), rudas, su dulkingo smėlio intarpais, stiprus.
- 0,4 m storio vidutinio plastiškumo molis (ClM), rudas, su dulkingo smėlio intarpais, labai stiprus.
- 2,1 m storio dulkingas smėlis (siSa), šviesiai rudas, rusvai pilkas, pilkas, drėgnas - vandeningas, labai tankus.
- 0,4 m storio vidutinio plastiškumo molis (ClM), pilkai rudas, stiprus.
- 0,8 m storio dulkingas smėlis (siSa), pilkas, vandeningas, labai tankus.
- 0,3 m storio mažo plastiškumo dulkis (SiL), pilkai rudas, labai stiprus.
- 0,4 m storio dulkingas smėlis (siSa), pilkas, rusvai pilkas, su mažo plastiškumo dulkio intarpais, vandeningas, labai tankus.
- 1,1 m storio dulkingas smėlis (siSa), pilkas, rusvai pilkas, su mažo plastiškumo dulkio intarpais, vandeningas, tankus.

Gr. 3 (10,2 m):

- 0,8 m storio dirbtinis gruntas (Mg): supiltas/perkastas gruntas: dulkingas smėlis, dirvožemis, tamsiai rudas, pilkai rudas.
- 0,4 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, silpnas.
- 0,3 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo.
- 0,5 m storio dulkingas smėlis (siSa), rudas, su mažo plastiškumo dulkio intarpu, drėgnas, purus.
- 0,3 m storio dulkingas smėlis (siSa), šviesiai rudas, drėgnas, vidutinio tankumo.
- 3,2 m storio dulkingas smėlis (siSa), šviesiai rudas, drėgnas - vandeningas, labai tankus.
- 2,4 m storio mažo plastiškumo dulkis (SiL), rusvai pilkas, labai stiprus.
- 0,3 m storio vidutinio plastiškumo molis (ClM), rusvai pilkas, pilkas, labai stiprus.
- 3,0 m storio vidutinio plastiškumo molis (ClM), rusvai pilkas, pilkas, vidutinio stiprumo

Gr. SZ-4 (10 m):

- 0,6 m storio dirvožemis (Hu), tamsiai rudas.
- 0,3 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo.
- 0,7 m storio smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, labai stiprus.
- 0,7 m storio dulkingas smėlis (siSa), rudas, drėgnas, labai tankus.
- 0,4 m storio vidutinio plastiškumo molis (ClM), tamsiai rudas, labai stiprus
- 6,2 m storio dulkingas smėlis (siSa), šviesiai rudas, drėgnas - vandeningas, labai tankus.
- 0,3 m storio dulkingas smėlis (siSa), šviesiai rudas, vandeningas, tankus.
- 0,3 m storio vidutinio plastiškumo molis (ClM), rusvai pilkas, pilkas, labai stiprus.
- 0,5 m storio vidutinio plastiškumo molis (ClM), rusvai pilkas, 0.5 pilkas, vidutinio stiprumo

Tyrimų teritorijos ribose tyrimų metu gruntinis vandeningas horizontas slūgsojo 4,1 – 4,5 m gylyje nuo žemės paviršiaus (66,0 – 66,4 m abs. a.). Požeminis vanduo susikaupęs dulkingo smėlio sluoksniuose. Priklausomai nuo sezoniškumo galima gruntinio vandens lygio kaita, kadangi sausuoju metų laikotarpiu vandens lygis krenta, o drėgnuoju – kyla. Tikėtina, kad gruntinis vanduo drenuojasis maždaug už 200 m tekančios Lankesos. Požeminio vandens iškrovos (šaltinių, versmių) tyrimų sklype nerasta.

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

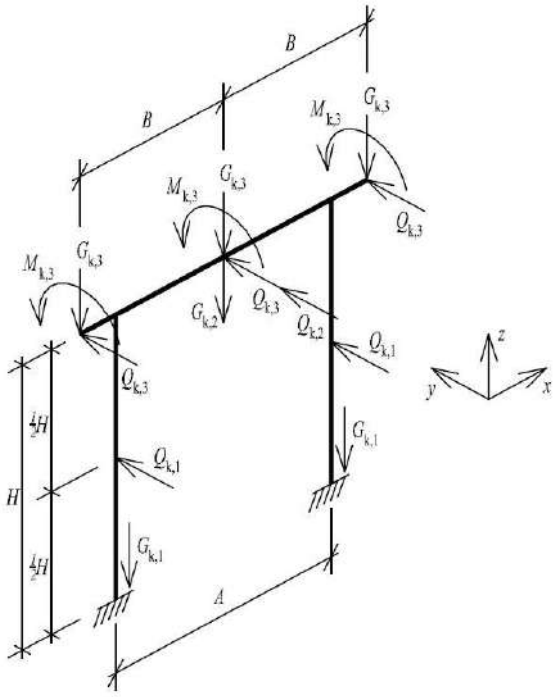
Statybos metu iškasose ir gręžiniuose kaupsis paviršinis kritulių, pasiekus gruntinio vande lygį – untinis vanduo, vyks vandeningų gruntų šlaitų slinkimas.

3. SKAIČIUOJAMOSIOS SCHEMOS IR APKROVOS

Apkrovos į atvirosios skirstyklos įrenginių atramas priimamos pagal:

- LST EN 1991-1-1:2002;
- LST EN 1991-1-4:2005;
- EĮĮBT-2012 taisyklių reikalavimus;
- STR 2.01.12:2024 Statybų klimatologija;
- Elektrotechnikos dalies išduotas užduotis.

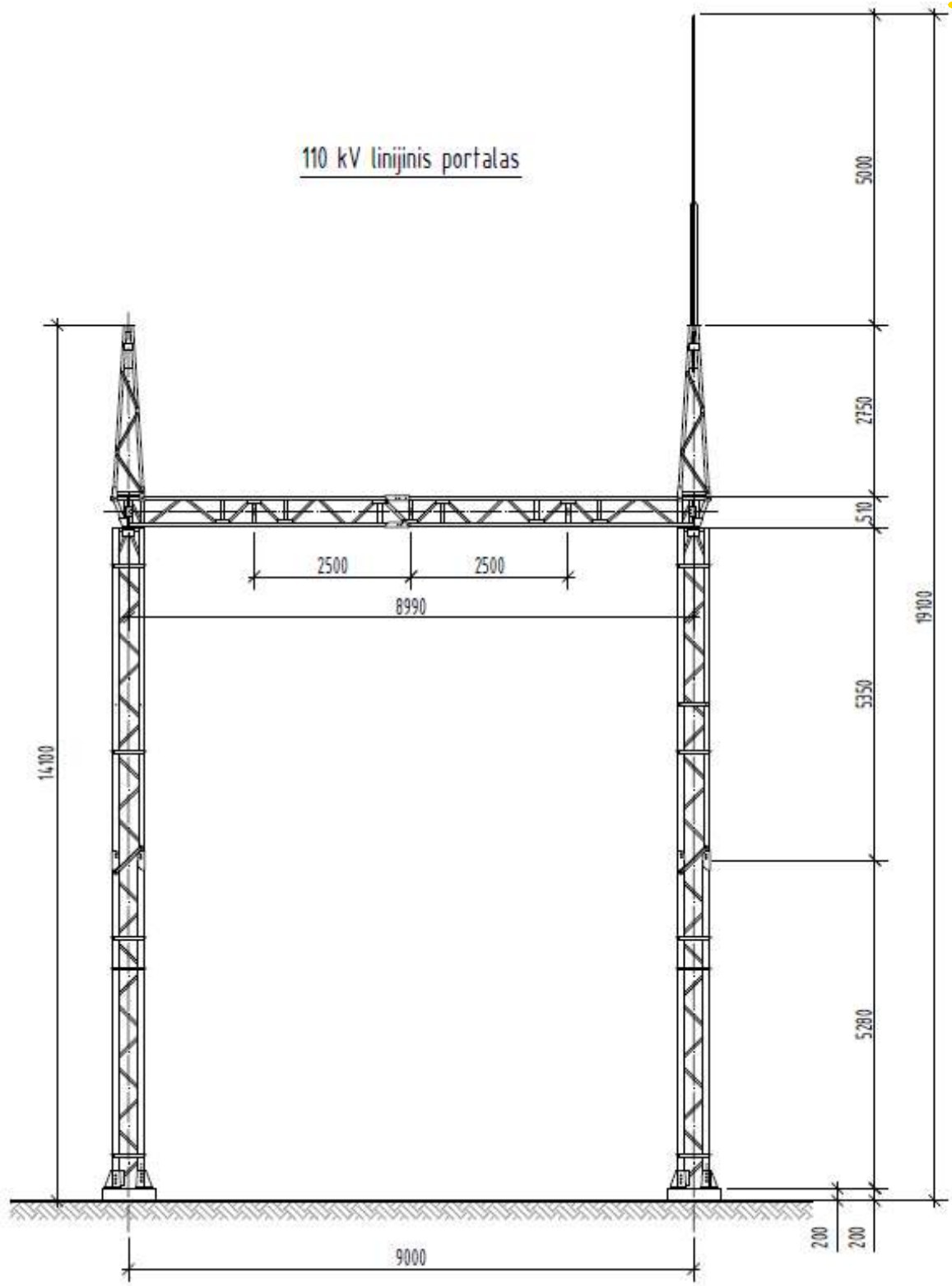
3.1. Skaičiuojamosios schemos



3.1.1. pav. *Įrenginio atramos ant dviejų kolonų principinė supaprastinta skaičiuojamoji schema*

čia: A – atstumas tarp kolonų ašių;
H – atramos aukštis;
B – atstumas tarp įrenginio skirtingų fazių;
$G_{k,i}$ – kolonos, traversos ar įrenginio savasis svoris;
$Q_{k,i}$ – vėjo apkrova, veikianti i-tąjį elementą;
$M_{k,3}$ – lenkimo momentas nuo vėjo apkrovos, veikiančios įrenginį.

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



4 pav. *19,10 m aukščio linijinio portalo siaura baze skaičiuojamoji schema (1x9 m)*

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

4. APKROVOS

Atviros skirstyklos įrenginių atramas ir portalus veikia nuolatinės ir kintamos apkrovos. Nuolatinės apkrovoms priskiriamas konstrukcijos savasis svoris, techninės įrangos svoris (palaikančiųjų ir tempiamųjų girliandų bei troso tvirtinimo armatūros), laidų ir trosų savasis svoris, laidų ir trosų tempimo jėga. Kintamoms apkrovoms priskiriamas vėjas į atramas, vėjas į laidus ir apledėjimo apkrova.

4.1. lentelė. *Nuolatinių ir kintamų apkrovų reikšmės*

Eil. Nr.	Apkrovos pavadinimas	F, kN	q, kN/m^2	Pastaba
1.	**Nuolatinės apkrovos**			
1.1.	Konstrukcijų savasis svoris			
1.2.	Betono savasis svoris	-	-	γ =25 kN/m^3
1.3.	Plienas	-	-	γ=78,50 kN/m^3
1.4.	Medis	-	-	γ=5,0 kN/m^3
1.5.	Mūras	-	-	γ=15,0 kN/m^3
1.6.	Cemento – pjuvenų plokštės	-	-	γ=14,5 kN/m^3
1.7.	Polistirenas	-	-	γ=0,01 kN/m^3
1.8.	Smėlis	-	-	γ=18,0 kN/m^3
2.	**Kintamos apkrovos**			
2.1.	Sniegas I-as raj.	-	1,2	
2.2.	Vėjas I-as raj. 24 m/s	-	0,36	
2.3.	Apledėjimas I-as raj. 10 m aukštyje STR 2.01.12:2024 Statybų klimatologija		6,2 mm	Priimta t=14,9 mm 1*
1* – apledėjimo storis priimamas nepalankesnis STR 2.01.12:2024 arba ELIĮT 2011 m. **Pastaba. Apkrovos ir jų poveikiai gamybos ir montavimo brėžinių rengimo metu privalo būti tikslinami.**				

4.2. Nuolatinės apkrovos

Nuolatinėms apkrovoms priskiriama:

- Metalo konstrukcijų savasis svoris ir kitų medžiagų savieji svoriai;
- Įrenginių svoriai bei tvirtinimo armatūra;
- Laidų sv. svoris;
- Laidų tempimai.

4.2.1. Laidų/ šynų sv. svoris

4.2.1.1. lentelė. *Laidų/ šynų savasis svoris į atvirosios skirstyklos įrenginių laikančiąsias konstrukcijas*

Laido tipas	Tarpatramis, m	g, kN/m	F_{laid}, vnt/kN	Laidų sk, vnt	ΣF, kN	Į modelį, kN
Fazinis laidas d=19,0 mm	5,0	0,00966	0,048	1	0,048	0,024
Šyna Ø100 mm	9,0	0,0557	0,501	1	0,501	0,251

4.2.1.2. lentelė. *Laidų/ trosų savasis svoris į portalo konstrukciją*

Laido tipas	Tarpatramis, m	g, kN/m	F_{laid}, vnt/kN	Laidų sk, vnt	ΣF, kN	Į modelį, kN
Fazinis laidas L1	22,4	0,00727	0,163	1	0,163	0,082
Fazinis laidas L2	24,4	0,00727	0,177	1	0,177	0,089
Fazinis laidas L3	22,6	0,00727	0,164	1	0,164	0,082
Žaibosaugos trosas	30,6	0,00482	0,148	1	0,148	0,074
ŽTŠK	27,5	0,00447	0,123	1	0,123	0,061

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

4.2. Įrenginių svoriai

4.2.1.lentelė. *Atramų žiniaraštis su pagrindinėmis charakteristikomis*

Atramos Nr.	Atramos tipas	$H_{mont.}$, m	$h_{įreng}$, m	h_{pam}, m	H_p, m	T. įreng. s. sv., kN	T. įreng. sk., vnt	Q, kN	Pastaba
1.	III iškrovos klasės 110 kV viršįtampių ribotuvo atrama	3,00	1,4	0,30	4,10	1,5	3	0,5	P12.12.17
2.	II iškrovos klasės 110 kV viršįtampių ribotuvo atrama	4,42	1,4	0,30	5,82	1,5	3	0,5	P15.15.17
3.	110 kV srovės transformatoriaus atrama	3,86	2,3	0,30	6,16	9,0	3	3,0	P15.15.17
4.	110 kV srovės transformatoriaus atrama	4,05	2,3	0,30	6,35	9,0	3	3,0	P15.15.17
5.	110 kV įtampos transformatoriaus atrama	3,76	2,0	0,30	5,76	10,5	3	3,5	P15.15.17
6.	110 kV jungtuvo atrama	2,50	3,30	0,30	5,80	12,9	3	4,3	P40.18.2 P12.12.17
7.	110 kV jungtuvo atrama	2,76	3,30	0,30	5,96	12,9	3	4,3	P40.18.2 P12.12.17
8.	110 kV skyriklio atrama	2,50	1,60	0,30	4,40	9,0	6	1,5	P12.12.17
9.	110 kV skyriklio atrama	4,19	1,60	0,30	5,79	9,0	6	1,5	P15.15.17
10.	110 kV atraminio izoliatoriaus atrama	2,50	1,20	0,30	3,70	1,6	3	0,6	P12.12.17
11.	110 kV linijinis portalas siaura baze	18,90	–	0,20	19,10	1,5	3	0,5	P24.24.20

čia: H_{mont} – įrenginio pastatymo aukštis nuo planiruojamo žemės paviršiaus;
$h_{įreng.}$ – įrenginio aukštis;
$h_{pam.}$ – pamato dalis virš planiruojamo žemės paviršiaus;
T. įreng. s. sv. – technologinio įrenginio savasis svoris;
T. įreng. sk. – technologinių įrenginių skaičius ant atramos;
H_p– konstrukcijos ir įrenginio bendrasaukštis.

4.2.3. Laidų tempimai

Laidų tempimo jėgos, vertinamos esant skirtingoms oro sąlygoms.

4.2.3.1. lentelė. *Fazinių laidų L1 tempimai tarp atramos ir portalo**

D=19,0 mm				Montažinis režimas			Nusistovėjęs režimas		
t, °C	Apšalas, mm	Vėjo slėgis, N/m^2	Apkrova, N/m	Įlinkis, m	Įtempimas, N	RTS %	Įlinkis, m	Įtempimas, N	RTS %
-5,0	0,00	550	12,728	1,47	551	0,8	1,47	551	0,8
-5,0	15,00	140	22,479	1,48	972	1,5	1,48	972	1,5
-5,0	15,00	0,0	21,407	1,48	925	1,4	1,48	925	1,4

4.2.3.2. lentelė. *Fazinių laidų L2 tempimai tarp atramos ir portalo**

D=19,0 mm				Montažinis režimas			Nusistovėjęs režimas		
t, °C	Apšalas, mm	Vėjo slėgis, N/m^2	Apkrova, N/m	Įlinkis, m	Įtempimas, N	RTS %	Įlinkis, m	Įtempimas, N	RTS %
-5,0	0,00	550	12,728	1,47	654	1,0	1,47	654	1,0

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

-5,0	15,00	140	22,479	1,47	1152	1,8	1,47	1152	1,8
-5,0	15,00	0,0	21,407	1,47	1097	1,7	1,47	1097	1,7

4.2.3.3. lentelė. *Fazinių laidų L3 tempimai tarp atramos ir portalo**

D=19,0 mm				Montažinis režimas			Nusistovėjęs režimas		
t, °C	Apšalas, mm	Vėjo slėgis, N/m^2	Apkrova, N/m	Įlinkis, m	Įtempimas, N	RTS %	Įlinkis, m	Įtempimas, N	RTS %
-5,0	0,00	550	12,728	1,63	510	0,8	1,63	510	0,8
-5,0	15,00	140	22,479	1,63	900	1,4	1,63	900	1,4
-5,0	15,00	0,0	21,407	1,63	857	1,3	1,63	857	1,3

4.2.3.4. lentelė. *Žaibosaugos troso tempimai tarp atramos ir portalo**

D=15,5 mm				Montažinis režimas			Nusistovėjęs režimas		
t, °C	Apšalas, mm	Vėjo slėgis, N/m^2	Apkrova, N/m	Įlinkis, m	Įtempimas, N	RTS %	Įlinkis, m	Įtempimas, N	RTS %
-5,0	0,00	550	9,791	1,46	795	1,8	1,46	793	1,8
-5,0	15,00	140	18,622	1,47	1500	3,4	1,47	1500	3,4
-5,0	15,00	0,00	17,499	1,47	1411	3,2	1,47	1410	3,2

4.2.3.5. lentelė. *ŽTŠK tempimai tarp atramos ir portalo**

D=12,4 mm				Montažinis režimas			Nusistovėjęs režimas		
t, °C	Apšalas, mm	Vėjo slėgis, N/m^2	Apkrova, N/m	Įlinkis, m	Įtempimas, N	RTS %	Įlinkis, m	Įtempimas, N	RTS %
-5,0	0,00	550	8,153	1,17	666	1,1	1,17	666	1,1
-5,0	15,00	140	16,937	1,18	1371	2,3	1,18	1371	2,3
-5,0	15,00	0,00	15,863	1,17	1286	2,2	1,18	1285	2,2

4.2.3.6.lentelė. *Laidų tempimai tarp AS įrenginių**

Laido tipas	Tarpatramis, m	Įtempimas, N	Į modelį, kN
Fazinis laidas	5,0	500	0,5

*Pastaba: *laidų tempimo jėgos pateiktos iš elektrotechnikos dalies užduoties;*

***tempimai pateikti vienam laidui.*

4.3. Kintamos apkrovos

4.3.1. Apledėjimo apkrova

Apledėjimo išskirstytos apkrovos charakteristinė reikšmė apvalaus skerspjūvio elementams ≤70 mm:

$$i = \pi \cdot b \cdot k \cdot \mu_1 (d + b \cdot k \cdot \mu_1) \rho \cdot g \cdot 10^{-3},\ N/m$$

čia: b – apledėjimo sienutės storis, mm, viršijamas 1 kartą per 5 metus – 10 mm skersmens apvalaus skerspjūvio elementų, esančių 10 m aukštyje virš žemės paviršiaus;

k – koeficientas, kuriuo įvertinamas apledėjimo sienutės pokytis, atsižvelgiant į aukštį virš žemės paviršiaus;

d – laidų, lynų skersmuo, mm;

μ_1 – koeficientas, kuriuo įvertinamas apledėjimo storio kitimas, atsižvelgiant į apvalaus skerspjūvio elementų skersmenį;

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

ρ – ledo tankis, imamas lygus 0,9 g/cm3;

g – laisvojo kritimo pagreitis, lygus 9,81 m/s2.

Apledėjimo išskirstytos apkrovos charakteristinė reikšmė kitiems elementams:

$$i = b \cdot k \cdot \mu_2 \cdot \rho \cdot g \cdot 10^{-3},\ N/m^2$$

čia: μ_2 – koeficientas, kuriuo įvertinamas apledėjusio paviršiaus ploto santykis su bendruoju elemento paviršiaus plotu

$$P_v = \alpha \cdot K_l \cdot C_x \cdot q_v \cdot F \cdot sin^2 \varphi,\ kPa$$

čia: α – koeficientas, įvertinantis vėjo slėgio netolygumą tarpatramyje;

K_l– koeficientas, įvertinantis vėjo apkrovos priklausomybę nuo tarpatramio ilgio, lygus:

1,0 – kai tarpatramio ilgis 250 m ir daugiau;

C_x – aerodinaminis koeficientas lygus: 1,1 - neapšalusiems laidams ir trosams, kurių skersmuo 20 mm ir didesnis; 1,2 - visiems apšalusiems laidams ir trosams, taip pat neapšalusiems laidams ir trosams, kurių skersmuo mažesnis kaip 20 mm;

q_v– skaičiuojamojo režimo vėjo slėgis kilopaskaliais į kvadratinį metrą;

F – laido išilginio pjūvio plotas kvadratiniais metrais (atsižvelgiama į apšalo sienelės storį, kai apkrova skaičiuojama apledėjus laidui);

φ – kampas tarp vėjo krypties ir portalo ašies, laipsniais.

4.3.1.1. ***lentelė.*** *Apledėjusio laido poveikio tarp atramos ir portalo*

Laido tipas	Tarpatramis, m	z, m	Ø, mm	t_{led}, mm	F_{1laid}, kN	Laidų sk, vnt	ΣF, kN	Į modelį	i, N/m
Fazinis laidas	25	25	19,0	14,9	0,448	1	0,448	0,224	17,91
Žaibosaugos trosas	31	31,5	15,5	14,9	0,604	1	0,604	0,302	19,58
ŽTŠK	28	31,5	12,4	14,9	0,527	1	0,527	0,264	18,82

4.3.1.2.lentelė. *Apledėjusio laido/ šynos poveikio į atvirosios skirstyklos konstrukciją suvestinė*

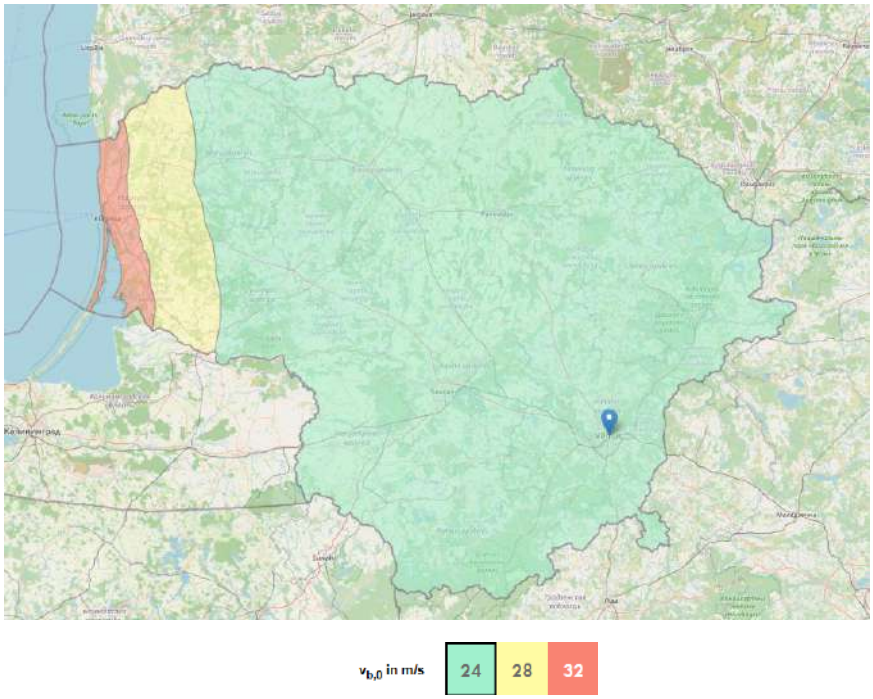
Laido tipas	Tarpatramis, m	z, m	Ø, mm	t_{led}, mm	F_{1laid}, kN	Laidų sk, vnt	ΣF, kN	Į modelį	i, N/m
Fazinis laidas	5,00	6,0	19,0	14,9	0,046	1	0,048	0,024	9,60
Šyna	9,00	6,35	100,0	14,9	0,191	1	0,191	0,096	21,17

4.3.2. Vėjo apkrova

Vėjo apkrova į įrenginius ir konstrukcijas apskaičiuojama pagal LST EN 1991-1-4:2005, LST EN 1993-3-1:2007 ir LST EN 50341-1:2013.

Apkrova priskiriama prie kintamųjų laisvųjų poveikių. Pagal teritorinį paskirstymą statinys yra I-ame vėjo greičio rajone, kur vėjo greičio pagrindinė atskaitinė reikšmė priimama $v_{ref,0}$ **= 24 m/s**. Vietovės kategorija II.

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



4.3.2.1 pav. *Lietuvos vėjo apkrovos rajonai, pagal LST EN 1991-1-4*

Pagrindinis vėjo greitis:

$v_b = c_{dir} \cdot c_{season} \cdot v_{b,0} = 1{,}0 \cdot 1{,}0 \cdot 24 = 24\ m/s;$

čia: $c_{dir} = 1{,}0$ – krypties koeficientas;
$c_{season} = 1{,}0$ – metų laiko koeficientas;

Svarbiausioji pagrindinio vėjo greičio reikšmė:

$v_{b,0} = v_{ref,0} = 24\ m/s;$

Vietovės kategorija ir parametrai:

kategorija II – žemos augalijos, pvz., žolės, ir atskirų kliūčių (medžių, pastatų), nutolusių viena nuo kitos bent per 20 kliūčių aukščių, plotai;
$z_0 = 0{,}05\ m$ – šiurkščiojo ruožo ilgis;
$z_{min} = 2{,}0\ m$ – mažiausias aukštis;
$z_{max} = 200\ m$ – didžiausias aukštis;

Vietovės koeficientas:

$$k_r = 0{,}189 \cdot \left(\frac{z_0}{z_{0,II}}\right)^{0{,}07}$$

čia: $z_{0,II} = 0{,}05\ m$ – šiurkščiojo ruožo ilgis II kategorijos vietovėje;

Vidutinis vėjo greitis aukštyje *z*:

$v_m(z) = c_r(z) \cdot c_0(z) \cdot v_b;$

čia: $c_r(z) = k_r \cdot \ln\left(\frac{z}{z_0}\right), kai\ z_{min} \le z \le z_{max}$ – šiurkštumo koeficientas;
$c_r(z) = c_r(z_{min}), kai\ z < z_{min}$

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

$c_0(z) = 1{,}0$ – kalvotumo koeficientas;

Oro tankis:

$\rho = 1{,}25\ kg/m^3$;

Vėjo turbulencijos intensyvumas aukštyje *z*:

$$I_v(z) = \frac{\sigma_v}{v_m(z)} = \frac{k_l}{c_0(z) \cdot \ln(z/z_0)}, kai\ z_{min} \le z \le z_{min}$$

$$I_v(z) = I_v(z_{min}), kai\ z < z_{min}$$

čia: $\sigma_v = k_r \cdot v_b \cdot k_l$;

čia: $k_l = 1{,}0$ – turbulencijos koeficientas;

Viršūninio greičio slėgis aukštyje *z*:

$$q_p(z) = [1 + 7 \cdot I_v(z)] \cdot \frac{1}{2} \cdot \rho \cdot v_m^2(z)$$

Vėjo apkrova, veikianti atskirą elementą svorio centro taške:

$$Q_{wt} = q_p(z) \cdot c_s c_d \cdot c_f \cdot A_{ref}$$

čia: $q_p(z)$ – viršūninio greičio slėgis aukštyje z;

$c_s c_d = 1{,}0$ – rekomenduojama konservatyvi konstrukcinio koeficiento reikšmė;

c_f – vėjo apkrovos jėgos koeficientas;

A_{ref} – elemento paviršiaus efektyvusis plotas.

Vėjo apkrovos jėgos koeficientas izoliatoriams:

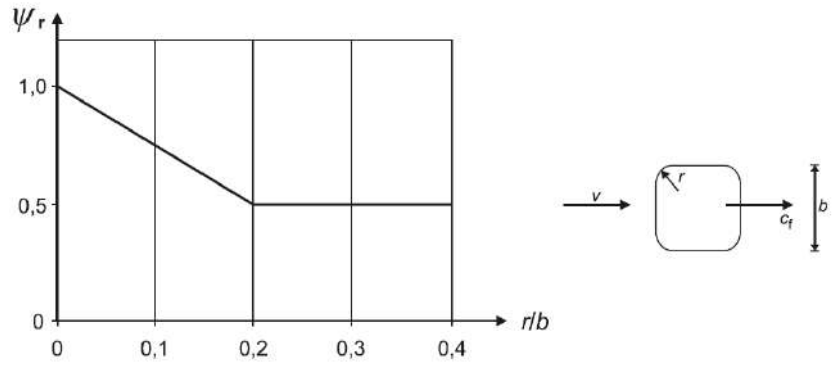
$c_f = 1{,}20$;

Vėjo apkrovos jėgos koeficientas stačiakampiams profiliams:

$c_f = c_{f,0} \cdot \psi_r$;

čia: $c_{f,0}$ – vėjo apkrovos jėgos koeficientas stačiakampiams profiliams su aštriais kampais (pagal pav.);

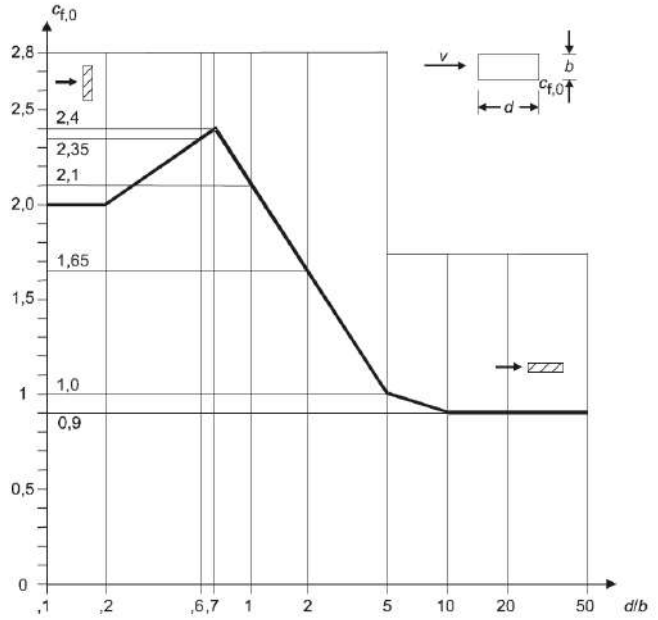
ψ_r – pataisos koeficientas, įvertinantis vėjo apkrovos jėgos koeficiento sumažėjimą stačiakampiams profiliams 4u užapvalintais kampais;



4.3.2.2 pav. *Pataisos koeficientai ψr stačiakampiams elementams su užapvalintais kampais*

DOKUMENTO ŽYMUO	LAPAS	LAPŲ	LAIDA
2025-45-01-XX-TDP-SK-IS.T	13	24	0

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



4.3.2.3 pav. *Jėgos koeficientai cf,0 stačiakampiams elementams su aštriais kampais*

4.3.1.3. lentelė. *Vėjo apkrovų reikšmės į atviros skirstyklos įrenginių atramas*

Įrenginys	Elementas	z, m	$h(Q_{wt})$, m	$q_p(z)$, kN/m^2	$c_{f,0}$	ψ_r	c_f	A_{ref}, m^2	Q_w, kN
III iškrovos klasės 110 kV viršįtampių ribotuvo atrama ($H_{mont.}$=3,00 m)	Izoliatorius	4,40	3,70	0,659	1,20	–	0,807	0,35	0,186
	Traversa	3,00	2,95	0,583	2,00	–	1,614	0,694	0,652
	Kolona	2,90	1,64	0,576	2,10	0,880	1,378	0,522	0,414
II iškrovos klasės 110 kV viršįtampių ribotuvo atrama ($H_{mont.}$=4,42 m)	Izoliatorius	5,82	5,12	0,717	1,20	–	0,807	0,35	0,203
	Traversa	4,42	4,375	0,660	2,00	–	1,614	0,694	0,739
	Kolona	4,32	2,16	0,655	2,10	0,880	1,467	0,778	0,747
110 kV srovės transformatoriaus atrama ($H_{mont.}$=3,86 m)	Izoliatorius	6,16	5,01	0,729	1,20	–	0,808	0,920	0,541
	Traversa	3,86	3,78	0,632	2,00	–	1,628	0,736	0,758
							1,289	0,075	0,077
	Kolona	3,70	1,85	0,632	2,10	0,880	1,440	0,666	0,598
	Spinta	2,00	1,50	0,667	2,00	–	1,216	0,800	0,649
							1,275	0,400	0,340
110 kV srovės transformatoriaus atrama ($H_{mont.}$=4,05 m)	Izoliatorius	6,35	5,20	0,736	1,20	–	0,808	0,920	0,546
	Traversa	4,05	3,97	0,642	2,00	–	1,628	0,736	0,769
							1,289	0,075	0,062
	Kolona	3,89	1,945	0,634	2,10	0,880	1,448	0,700	0,643
	Spinta	2,00	1,50	0,667	2,00	–	1,216	0,800	0,649
							1,275	0,400	0,340
110 kV įtampos transformatoriaus atrama ($H_{mont.}$=3,76 m)	Izoliatorius	5,76	4,76	0,715	1,20	–	0,802	0,800	0,459
	Traversa	3,76	3,68	0,627	2,00	–	1,628	0,736	0,751
							1,191	0,075	0,056
	Kolona	3,60	1,80	0,618	2,10	0,880	1,436	0,648	0,575
	Spinta	2,00	1,50	0,667	2,00	–	1,216	0,800	0,649
							1,275	0,400	0,340
110 kV jungtuvo atrama ($H_{mont.}$=2,50 m)	Izoliatorius	5,80	4,15	0,717	1,20	–	0,833	1,155	0,689
	Traversa	2,80	2,65	0,569	2,10	0,880	1,331	1,164	0,882

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Įrenginys	Elementas	z, m	$h(Q_{wt})$, m	$q_p(z)$, kN/m^2	$c_{f,0}$	ψ_r	c_f	A_{ref}, m^2	Q_{wt}, kN
	Spinta	2,66	2,19	0,559	2,00	–	1,212	1,004	
							1,246	0,484	0,337
	Kolona	2,50	1,25	0,547	2,10	0,880	1,345	0,450	0,331
110 kV jungtuvo atrama ($H_{mont.}$=2,76 m)	Izoliatorius	6,06	4,41	0,726	1,20	–	0,833	1,155	0,698
	Traversa	3,06	2,91	0,586	2,10	0,880	1,331	1,164	0,908
	Spinta	2,86	2,39	0,573	2,00	–	1,212	1,004	0,698
							1,246	0,484	0,345
	Kolona	2,76	1,38	0,566	2,10	0,880	1,367	0,497	0,385
110 kV skyriklio atrama ($H_{mont.}$=2,50 m)	Izoliatorius	4,40	3,60	0,659	1,20	–	0,805	0,480	0,255
	Traversa	2,50	2,42	0,547	2,00	–	1,607	0,672	0,591
							1,388	0,240	0,182
	Kolona	2,34	1,17	0,535	2,10	0,880	1,332	0,421	0,300
	Spinta	1,75	1,47	0,643	2,00	–	1,203	0,303	0,234
							1,283	0,110	0,091
110 kV skyriklio atrama ($H_{mont.}$=4,19 m)	Izoliatorius	5,79	4,99	0,716	1,20	–	0,805	0,480	0,277
	Traversa	4,19	4,11	0,649	2,00	–	1,607	0,672	0,701
							1,388	0,240	0,216
	Kolona	4,03	2,015	0,641	2,10	0,880	1,332	0,421	0,360
	Spinta	1,75	1,47	0,643	2,00	–	1,203	0,303	0,234
							1,283	0,110	0,091
110 kV atraminio izoliatoriaus atrama ($H_{mont.}$=2,50 m)	Izoliatorius	3,70	3,10	0,618	1,20	–	0,799	0,300	0,148
	Traversa	2,50	2,455	0,547	2,00	–	1,742	0,390	0,372
	Kolona	2,41	1,205	0,540	2,10	0,880	1,338	0,434	0,314

4.3.1.4. lentelė. *Laidų/ šynų vėjo poveikio į skirstyklos įrenginius be apledėjimo suvestiniai rezultatai, priklausomai nuo vėjo kampo φ į laidą*

Laido tipas	Alt, m	L, m	d, mm	q_w,N/m	φ, laipsniais	Q_{Wlaid}, kN	Laidų sk, vnt	ΣF, kN	Į modelį
Fazinis laidas	6,0	5,0	19,0	7,98	90	0,040	1	0,040	0,020
					45	0,028	1	0,028	0,014
Šyna	6,35	9,0	100,0	80,56	90	0,725	1	0,725	0,363
					45	0,513	1	0,513	0,257

4.3.1.5. lentelė. *Laidų/ šynų vėjo poveikio į skirstyklos įrenginius su apledėjimu suvestiniai rezultatai, priklausomai nuo vėjo kampo φ į laidą*

Laido tipas	Alt, m	L, m	d, mm	q_w, N/m	φ, laipsniais	Q_{Wlaid}, kN	Laidų sk, vnt	ΣF, kN	Į modelį
Fazinis laidas	6,0	5,0	19,0	17,54	90	0,088	1	0,088	0,044
					45	0,062	1	0,062	0,031
Šyna	6,5	8,5	100,0	92,89	90	0,836	1	0,836	0,418
					45	0,591	1	0,591	0,296

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

4.3.1.6. lentelė. *Vėjo poveikio nuo laidų į linijinį portalą be apledėjimo suvestiniai rezultatai, priklausomai nuo vėjo kampo φ į laidą*

Laido tipas	Alt, m	L, m	d, mm	q_w,N/m	φ, laipsniais	Q_{Wlaid}, kN	Laidų sk, vnt	ΣF, kN	Į modelį
Fazinis laidas	25	25	19,0	10,80	90	0,270	1	0,270	0,135
					45	0,191		0,191	0,096
Žaibosaugos trosas	31,5	31	15,5	9,21	90	0,286	1	0,286	0,143
					45	0,202		0,202	0,101
ŽTŠK	31,5	28	12,4	7,37	90	0,206	1	0,206	0,103
					45	0,146		0,146	0,073

4.3.1.7. lentelė. *Vėjo poveikio nuo laidų į linijinį portalą esant apledėjimui suvestiniai rezultatai, priklausomai nuo vėjo kampo φ į laidą*

Laido tipas	Alt, m	L, m	d, mm	q_w,N/m	φ, laipsniais	Q_{Wlaid}, kN	Laidų sk, vnt	ΣF, kN	Į modelį
Fazinis laidas	25	25	19,0	30,84	90	0,771	1	0,771	0,386
					45	0,545		0,545	0,273
Žaibosaugos trosas	31,5	31	15,5	32,88	90	1,019	1	1,019	0,510
					45	0,720		0,720	0,360
ŽTŠK	31,5	28	12,4	31,81	90	0,891	1	0,891	0,446
					45	0,630		0,630	0,315

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

ıo poveikis į portalą

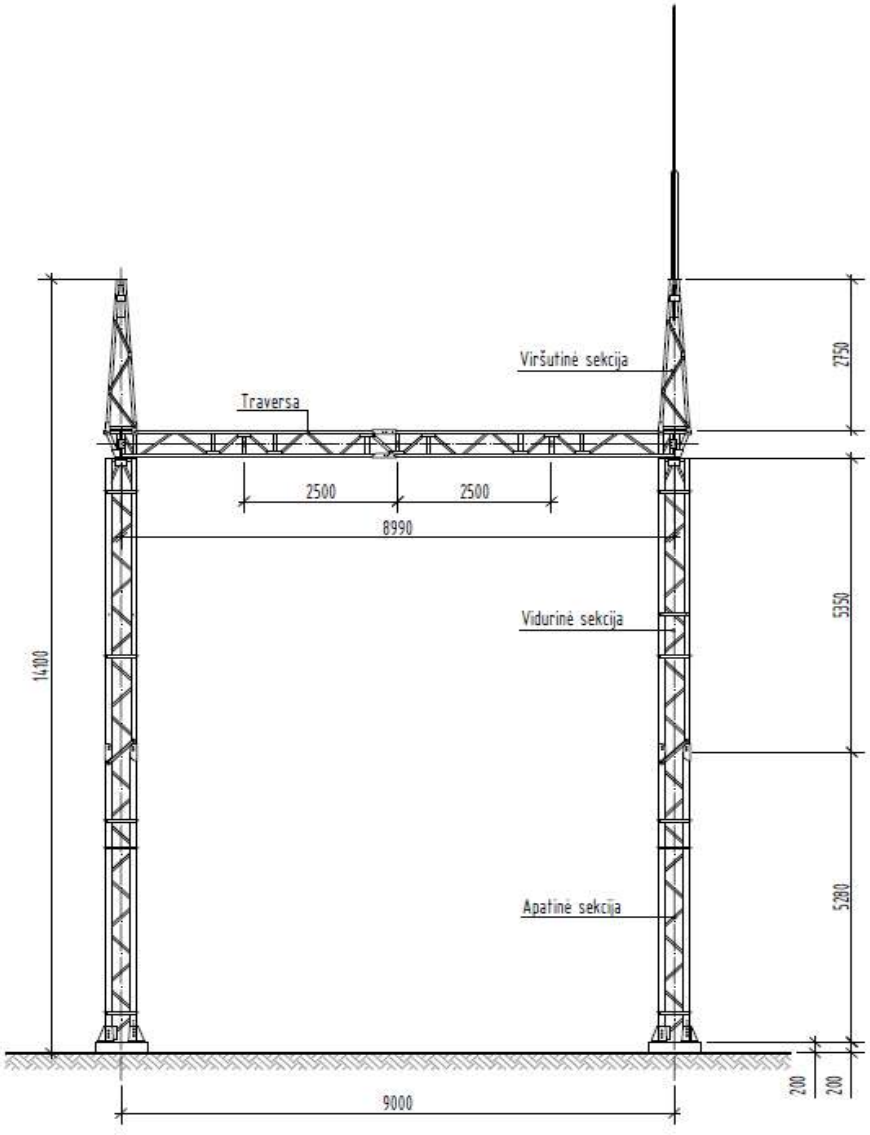
Vėjo apkrova į portalą skaičiuojama pagal LST EN 50341-1:2013 „Aukštesnės kaip kV kintamosios įtampos oro linijos. 1 dalis. Bendrieji reikalavimai. Bendrieji techniniai reikalavimai“.

Vėjo apkrova į portalą skaičiuojama kai portalas suskaidytas į atskiras sekcijas ir vėjo jėga veikia į kiekvienos iš jų svorio centrą.

Portalas suskaidytas į tris sekcijas:

- apatinę
- vidurinę;
- viršutinę.

Taip pat išskiriama laidus laikanti traversa.



8 pav. *Linijinis portalas (L=9,0 m), suskirstytas į atskiras sekcijas*

Vėjo jėga į atskirų portalų sekcijų svorio centrus:

$$Q_{wt} = q_p(z) \cdot c_s c_d \cdot (1 + 0{,}2 \cdot sin^2 2\varphi) \cdot (C_{t1} \cdot A_{t1} \cdot cos^2\varphi + C_{t2} \cdot A_{t2} \cdot sin^2\varphi);$$

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

: $q_p(z)$ – viršutinis vėjo slėgis aukštyje z;
$c_d = 1$ – rekomenduojama konservatyvi konstrukcinio koeficiento reikšmė;
C_{t1}, C_{t2} – spragoto portalo tempimo koeficientai;
A_{t1}, A_{t2} – efektyvusis spragoto portalo paviršiaus plotas;
φ – kampas tarp vėjo veikimo krypties ir portalo išilginė ašies.

Vėjo poveikis į portalą vertinamas trimis atvejais: kai vėjas pučia 0, 45 ir 90 laipsnių kampu.

Spragoto portalo tempimo koeficientas

$$C_t = 3{,}96 \cdot (1 - 1{,}5 \cdot \chi + \chi^2)$$

čia: χ – efektyvaus ir viso sekcijos paviršiaus plotų santykis.

Efektyvaus ir viso sekcijos paviršiaus plotų santykis:

$$\chi = A_t \cdot \frac{2}{h \cdot (b_1 + b_2)}$$

čia: h – sekcijos aukštis;
b_1 – sekcijos viršaus plotis;
b_2 – sekcijos apačios plotis;

4.3.2. Linijinio portalo (L=9,0 m) vėjo apkrovos skaičiavimas

Efektyvūs spragoto portalo sekcijų ir traversos paviršiaus plotai ir santykiai su visu plotu:

4.3.2.1. lentelė. *Viršutinės sekcijos elemento projekcijos konstrukcijos plokštumoje plotas*

Elementas	Plotis b, m	Ilgis l, m	Elementų skaičius	Plotas, m²	Visas elemento plotas	Santyklis su visu plotu χ
a_1	0,05	2,75	2	0,28	**0,91**	**0,41**
a_2	0,035	0,64	1	0,02		
a_3	0,035	0,7	1	0,02		
a_4	0,035	0,75	1	0,03		
a_5	0,035	0,5	1	0,02		
			A_{t1}:	**0,37**		

4.3.2.2. lentelė. *Vidurinės sekcijos elemento projekcijos konstrukcijos plokštumoje plotas*

Elementas	Plotis b, m	Ilgis l, m	Elementų skaičius	Plotas, m²	Visas elemento plotas	Santyklis su visu plotu χ
a_1	0,09	5,35	2	0,96	**2,67**	**0,52**
a_2	0,035	0,35	2	0,02		
a_3	0,05	0,62	10	0,31		
a_4	0,035	0,48	6	0,10		
			A_{t2}:	**1,40**		

4.3.2.3. lentelė. *Apatinės sekcijos elemento projekcijos konstrukcijos plokštumoje plotas*

Elementas	Plotis b, m	Ilgis l, m	Elementų skaičius	Plotas, m²	Visas elemento plotas	Santyklis su visu plotu χ
a_1	0,11	5,28	2	1,16	**2,67**	**0,51**
a_2	0,035	0,40	10	0,14		
a_3	0,035	0,48	3	0,05		

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

	A_{t3}:	**1,35**		

4.3.2.4. lentelė. *Traversos elemento projekcijos konstrukcijos plokštumoje plotas*

Elementas	Plotis b, m	Ilgis l, m	Elementų skaičius	Plotas, m^2	Visas elemento plotas	Santyklis su visu plotu χ
a_1	0,065	9,0	2	1,17	**4,5**	**0,37**
a_2	0,035	0,6	4	0,08		
a_3	0,065	0,37	9	0,22		
a_4	0,035	0,50	12	0,21		
			A_{t4}:	**1,68**		

Vėjo jėgos į atskirų portalo dalių svorio centrus skaičiavimas, kai vėjas pučia 90 laipsnių kampu:
Apatinė sekcija:

Efektyvaus ir viso sekcijos paviršiaus plotų santykis:

$$\chi = 0{,}37 \cdot \frac{2}{2{,}75 \cdot (0{,}15 + 0{,}5)} = 0{,}41$$

Spragotos atramos tempimo koeficientas

$$C_t = 3{,}96 \cdot (1 - 1{,}5 \cdot 0{,}41 + 0{,}41^2) = 2{,}18$$

Vėjo jėga į atskirų atramos sekcijų svorio centrus:

Kai φ = 0°; 90°:

$$Q_{wt} = 0{,}915 \cdot 1 \cdot \left(1 + 0{,}2 \cdot sin^2(2 \cdot 0°)\right) \cdot \left(2{,}18 \cdot 0{,}37 \cdot cos^2(0°)\right) = 0{,}74\ kN$$

Kai φ = 45°:

$$Q_{wt} = 0{,}915 \cdot 1 \cdot \left(1 + 0{,}2 \cdot sin^2(2 \cdot 45°)\right) \cdot \left(1{,}76 \cdot 0{,}74 \cdot cos^2(45°) + (1{,}74 \cdot 0{,}76 \cdot sin^2(45°)\right)$$
$$= 1{,}43\ kN$$

Priimama, kad vėjo apkrovą perima juostos. Todėl koncentuotos jėgos perskaičiuojamos į išskirstytus krūvius, kurie veikia portalo juostas.

$$q = \frac{Q_{wt}}{l \cdot n};$$

čia: Q_{wt} – vėjo koncentruota jėga į sekcijos svorio centrą;
l – sekcijos juostos ilgis;
n – juostų skaičius;

Išskirstyto krūvio skaičiavimas, kai vėjas pučia 90 laipsnių kampu į portalą:

$$q = \frac{0{,}74}{2{,}75 \cdot 2} = 0{,}134\ kN/m;$$

Išskirstyto krūvio skaičiavimas, kai vėjas pučia 45 laipsnių kampu į portalą:

$$q = \frac{1{,}43}{2{,}75 \cdot 3} \cdot \cos(45°) = 0{,}122\ kN/m;$$

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

siems portalo elementams vėjo apkrovos skaičiuojamos analogiškai. Žemiau pateikiama suvest
kaičiavimų lentelė.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4.3.2.5. *lentelė.* *Vėjo apkrovų skaičiavimo reikšmės (linijinis portalas L=9,0 m)*

Kon...	φ, °	z, m	z_0, m	z_{min}, m	$z_{0,II}$, m	k_r	v_b, m/s	δ_v	c_{rz}	v_{mz}, m/s	l_{vz}	$q_p(z)$, kN/m^2	h, m	b_1, m	b_2, m	A_t, m^2	χ	C_t	k...
Viršutinė sekcija	90	14,1	0,05	2,0	0,05	0,189	24,0	4,53	1,065	25,56	0,177	0,915	2,75	0,15	0,50	0,37	0,41	2,18	0,74
	45															0,74	0,83	1,76	1,43
	0															0,37	0,41	2,18	0,74
Vidurinė sekcija	90	10,8	0,05	2,0	0,05	0,189	24,0	4,53	1,015	24,35	0,186	0,853	5,36	0,50	0,50	1,40	0,52	1,94	2,31
	45															2,80	1,05	2,08	5,96
	0															1,40	0,52	1,94	2,31
Apatinė sekcija	90	5,48	0,05	2,0	0,05	0,189	24,0	4,53	0,886	21,28	0,213	0,705	5,28	0,50	0,50	1,35	0,51	1,96	1,86
	45															2,70	1,02	2,03	4,63
	0															1,35	0,51	1,96	1,86
Traversa	90	11,4	0,05	2,0	0,05	0,189	24,0	4,53	1,025	24,59	0,184	0,865	9,0	0,5	0,5	1,68	0,37	2,29	2,72
	45															3,36	0,75	1,73	4,92

4.3.2.6. *lentelė.* *Vėjo apkrovų suvestinė*

Linijinis portalas (L=9,0 m)			
Portalo elementas	Vėjo kryptis, °	Apkrova, kN/m x-x	Apkrova, kN/m y-y
Viršutinė sekcija	0	0,134	0,134
	45	0,122	0,122
	90	0,134	0,134
Vidurinė sekcija	0	0,216	0,216
	45	0,132	0,132
	90	0,216	0,216
Apatinė sekcija	0	0,176	0,176
	45	0,103	0,103
	90	0,176	0,176
Traversa	45	0,129	–
	90	0,151	–

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. APKROVŲ DERINIAI IR PATIKIMUMO DALINIAI KOEFICIENTAI

5.1. Skaičiuojamoji eksploatavimo trukmė, ilgaamžiškumas

Skaičiuojamoji statinio eksploatavimo trukmė – 50 metų. Skaičiuojamosios eksploatavimo trukmės kategorija pagal LST EN 1990 – 4.

5.2. Pasekmių klasė, konstrukcijų patikimumo klasė

Konstrukcijų griūties pasekmių klasė – CC2, konstrukcijų patikimumo klasė – RC2. Poveikių patikimumo koeficientas $K_{FI} = 1{,}0$.

5.3. Apkrovų deriniai

Apkrovų deriniai konstrukciniam (STR) ir geotechniniam (GEO) saugos ribiniams būviams (ULS) tikrinti:

$$\sum_{j\geq 1} \gamma_{G,j} G_{k,j} + \gamma_{Q,1} Q_{k,1};$$

$$\sum_{j\geq 1} \gamma_{G,j} G_{k,j} + \gamma_{Q,1} k Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \psi_{0,i} Q_{k,i};$$

$$\sum_{j\geq 1} \gamma_{G,j} G_{k,j} + \gamma_{Q,1} Q_{k,1} + \sum_{i>1} \gamma_{Q,i} k \psi_{0,i} Q_{k,i};$$

$$\sum_{j\geq 1} G_{k,j} + \gamma_A A_k + (\psi_{1,1} \text{ arba } \psi_{2,1}) Q_{k,1};$$

$$\sum_{j\geq 1} G_{k,j} + \gamma_A A_k + (\psi_{1,1} \text{ arba } \psi_{2,1}) k Q_{k,1} + \sum_{i>1} \psi_{2,i} Q_{k,i};$$

$$\sum_{j\geq 1} G_{k,j} + \gamma_A A_k + (\psi_{1,1} \text{ arba } \psi_{2,1}) Q_{k,1} + \sum_{i>1} k \psi_{2,i} Q_{k,i};$$

Apkrovų deriniai visuminio stabilumo (EQU) ir vertikalaus iškėlimo (UPL) saugos ribiniams būviams (ULS) tikrinti:

$$\sum_{j\geq 1} \gamma_{G,stb,j} G_{k,stb,j} + \sum_{j\geq 1} \gamma_{G,dst,j} G_{k,dst,j} + \gamma_{Q,dst,1} Q_{k,dst,1};$$

$$\sum_{j\geq 1} G_{k,stb,j} + \sum_{j\geq 1} G_{k,dst,j} + \gamma_A A_k + (\psi_{1,1} \text{ arba } \psi_{2,1}) Q_{k,dst,1};$$

Apkrovų deriniai tinkamumo (SLS) ribiniams būviams tikrinti:

$$\sum_{j\geq 1} G_{k,j} + Q_{k,1};$$

$$\sum_{j\geq 1} G_{k,j} + k Q_{k,1} + \psi_{0,i} Q_{k,i};$$

$$\sum_{j\geq 1} G_{k,j} + Q_{k,1} + k \psi_{0,i} Q_{k,i};$$

5.4. Daliniai poveikių, medžiagų ir atsparumų koeficientai

5.4.1. lentelė. *Daliniai koeficientai konstrukciniam (STR) ir geotechniniam (GEO) ribiniam būviui tikrinti*

Poveikis		Simbolis	Vertė
Nuolatinis	Nepalankus	γ_G	1,35
	Palankus		1,0
Kintamas	Nepalankus	γ_Q	1,3
	Palankus		0

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Poveikis	Simbolis	Vertė
patingasis	γ_A	1,0

5.4.2. lentelė. *Daliniai koeficientai pamatų ribiniam stabilumo būviui (EQU) tikrinti*

Poveikis		Simbolis	Vertė
Nuolatinis	Nepalankus	$\gamma_{G,dst}$	1,1
	Palankus	$\gamma_{G,stb}$	0,9
Kintamas	Nepalankus	$\gamma_{Q,dst}$	1,5
	Palankus	$\gamma_{Q,stb}$	0
Ypatingasis		γ_A	1,0

5.4.3. lentelė. *Daliniai koeficientai pamatų vertikalaus iškėlimo ribiniam būviui (UPL) tikrinti*

Poveikis		Simbolis	Vertė
Nuolatinis	Nepalankus	$\gamma_{G,dst}$	1,0
	Palankus	$\gamma_{G,stb}$	0,9
Kintamas	Nepalankus	$\gamma_{Q,dst}$	1,5
	Palankus	$\gamma_{Q,stb}$	0
Ypatingasis		γ_A	1,0

5.4.4. lentelė. *Kintamo poveikio derintinės reikšmės koeficientų ψ_0 reikšmės*

Poveikis	Skaičiuojant laidus [1)]	Skaičiuojant konstrukcijas [2)]
Sniegas	–	0,7
Vėjas [3)]	0,25	0,5
Apšalas	0	0,5

[1)] remiantis „Elektros linijų ir instaliacijos įrengimo taisyklėmis“;
[2)] remiantis LST EN 1993-3-1;
[3)] esant apšalui vėjo poveikis vertinamas su papildomu redukcijos koeficientu *k* (pagal ISO 12494).

5.4.5. lentelė. *Daliniai koeficientai medžiagų savybėms*

Medžiaga	Simbolis	Vertė
Betonas	γ_C	1,5
Armatūrinis plienas	γ_S	1,15

5.4.6. lentelė. *Daliniai koeficientai atsparumams*

Atsparumas	Simbolis	Vertė
Plieninių skerspjūvių laikomoji galia	γ_{M0}	1,0
Plieninių elementų klupumo laikomoji galia	γ_{M1}	1,0
Plieninių elementų tempiamoji laikomoji galia	γ_{M2}	1,25
Varžtinių jungčių laikomoji galia	γ_{M2}	1,25
Virintinių jungčių laikomoji galia	γ_{M2}	1,25
Gręžtinio polio pado laikomoji galia	γ_b	1,25
Gręžtinio polio šoninio paviršiaus laikomoji galia	γ_s	1,0

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

6. GALIMŲ DEFORMACIJŲ LEISTINI DYDŽIAI

6.1.1. lentelė. *Statinių arba jų konstrukcinių elementų ribinės deformacijos*

Ribinės deformacijos apibūdinimas	Reikšmė
Plieninių sijinių elementų vertikalusis įlinkis	ℓ/300
Plieninių gembinių elementų vertikalusis įlinkis	ℓ/250
Plieninių kolonų nuokrypis nuo vertikalės	ℓ/200
Pamatų santykinis nuokrypis nuo vertikalės	ℓ/150

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PRIEDAS NR. 1

110 KV ATVIROSIOS SKIRSTYKLOS ATRAMŲ PLIENINIŲ ELEMENTŲ INŽINERINIAI SKAIČIAVIMAI

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

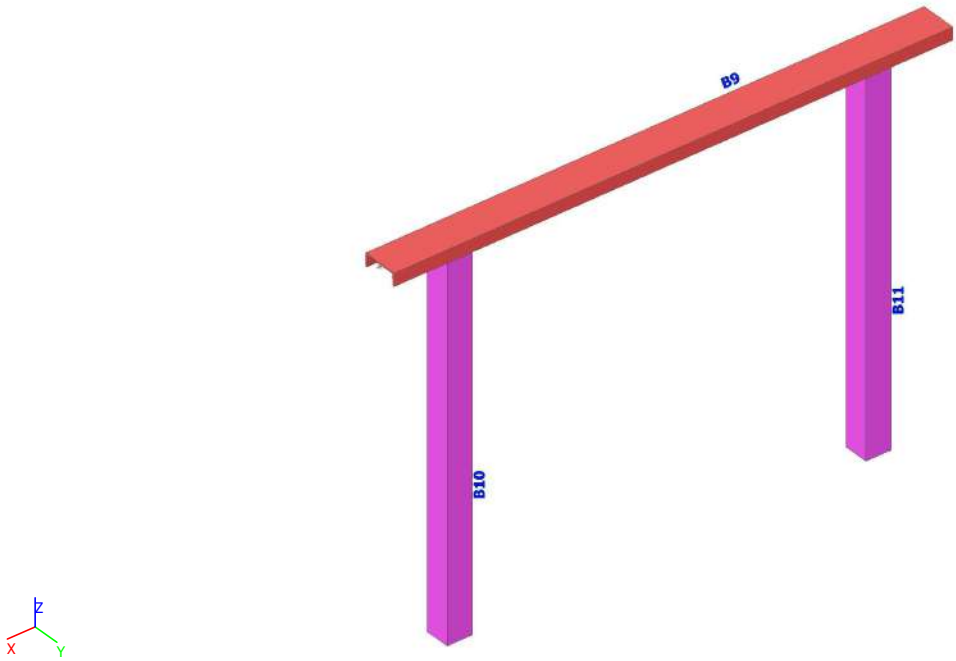
1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 9
6.1. Resultant of reactions; R_x; R_y; R_z 9
6.2. Resultant of reactions; M_x; M_y; M_z 9
6.3. Resultant of reactions 10
7. Deformations 11
7.1. 3D displacement; U_total 11
7.2. 1D deformations 11

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

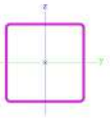
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B9	CS19 - UNP260	S 355	4.000
B10	CS14 - CFRHS180X180X5	S 355	2.700
B11	CS14 - CFRHS180X180X5	S 355	2.700

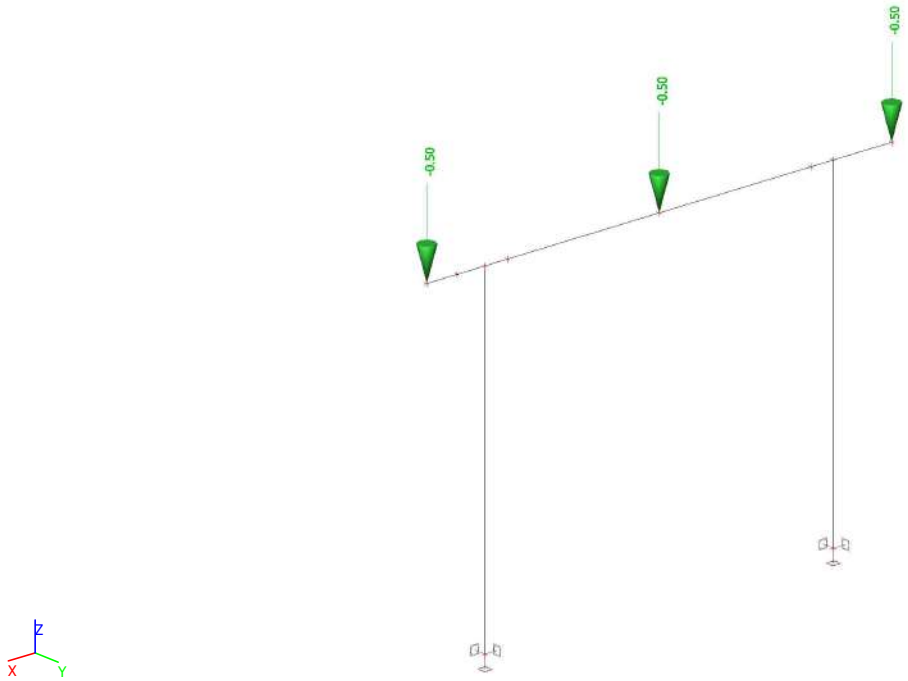
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS14	CFRHS180X180X5	S 355	
CS19	UNP260	S 355	

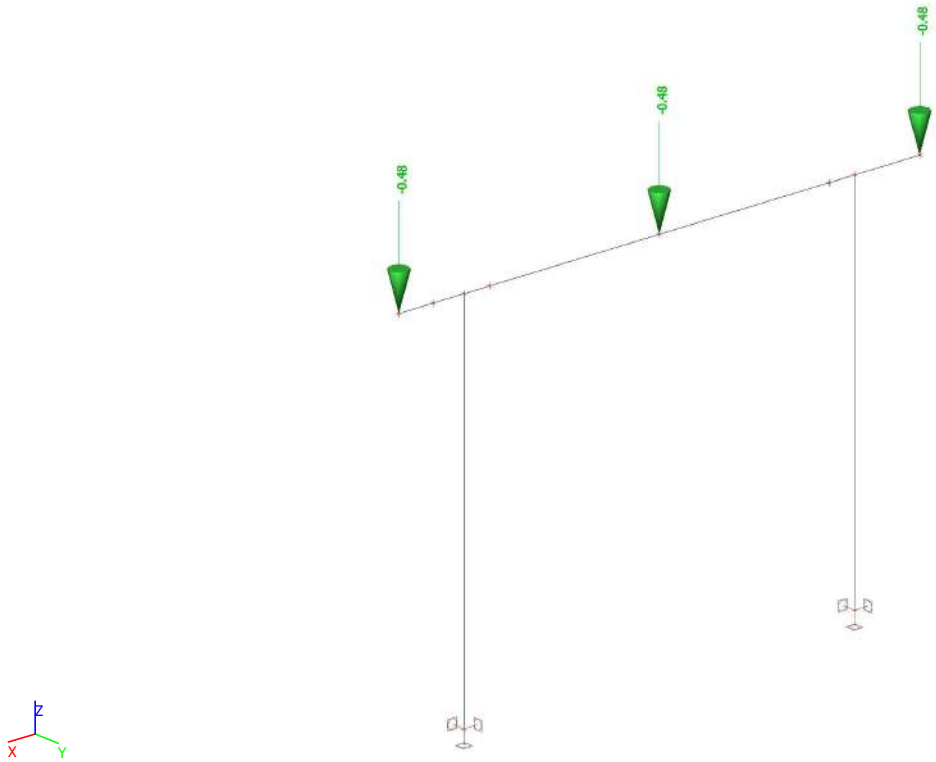
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.



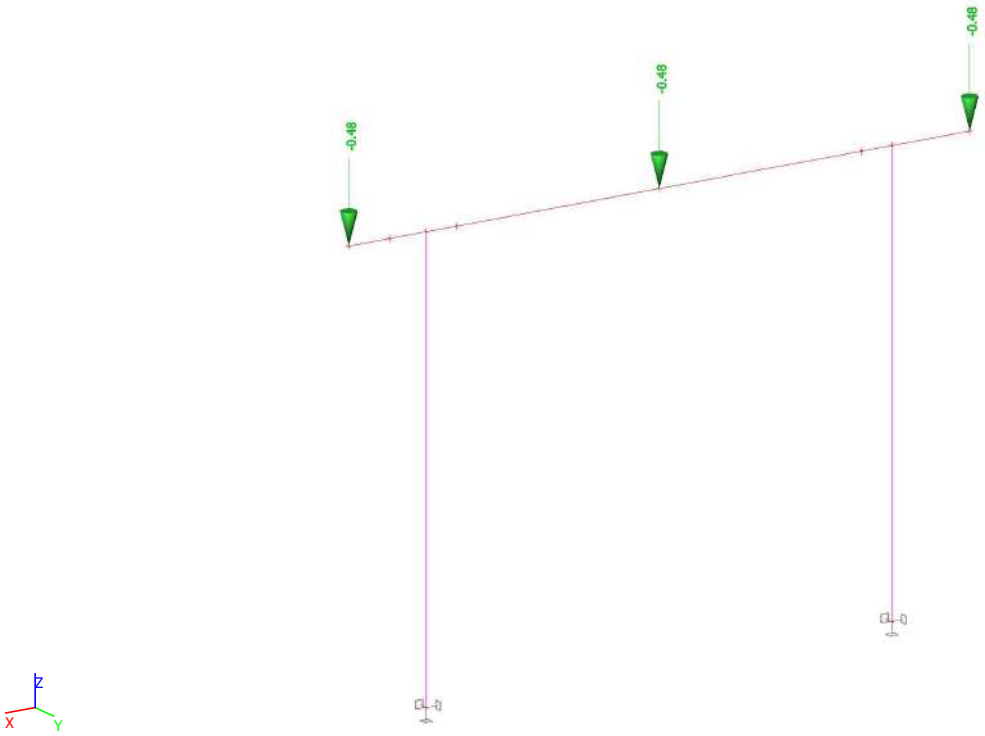
3.2. Laidų s.sv.



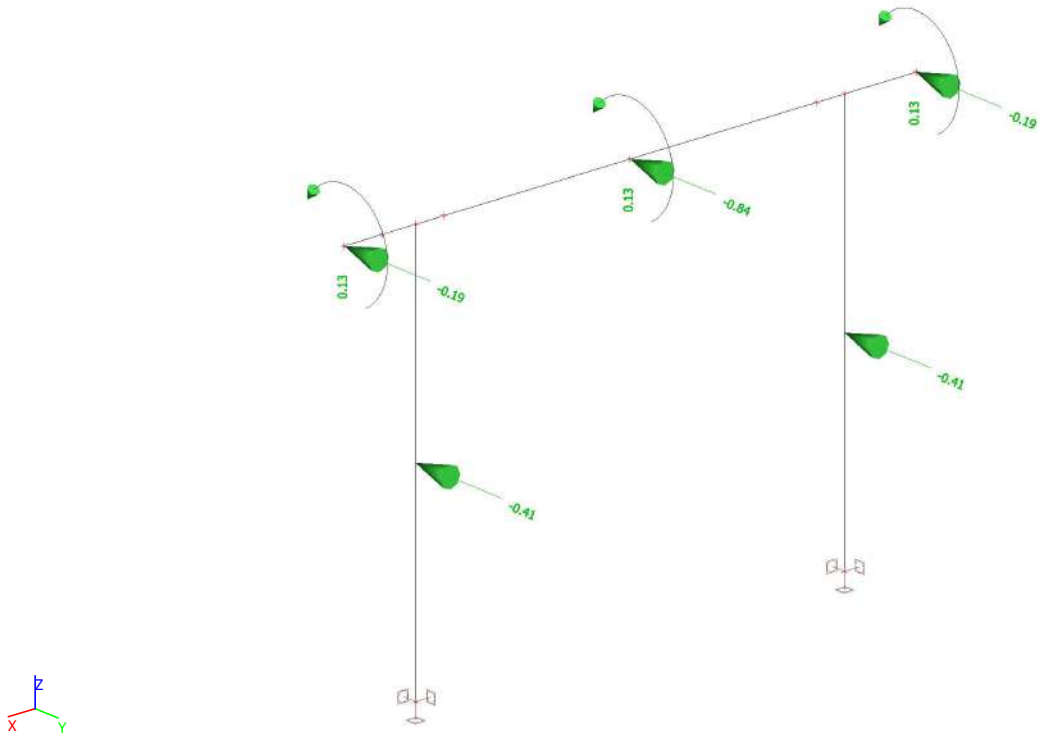
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas



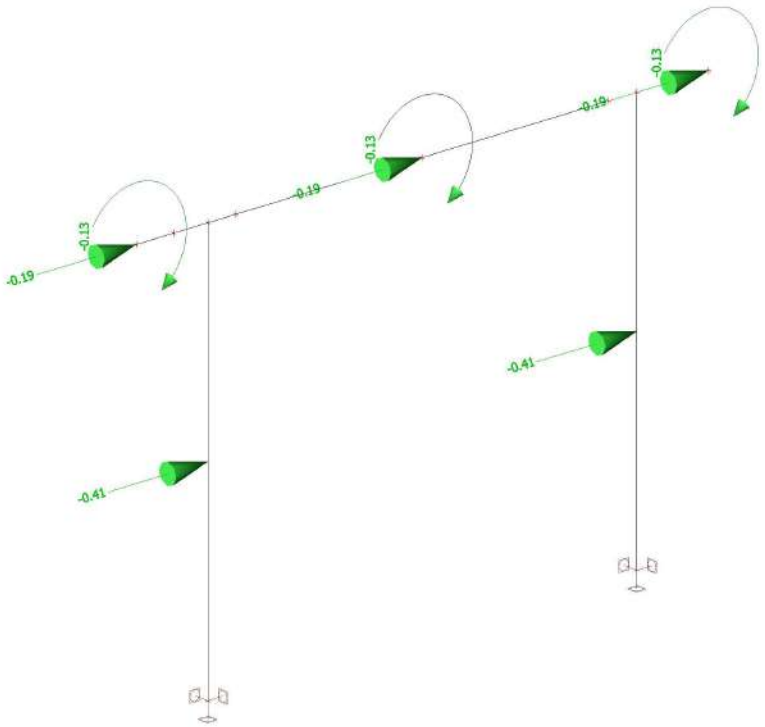
3.4. Vėjas y-y



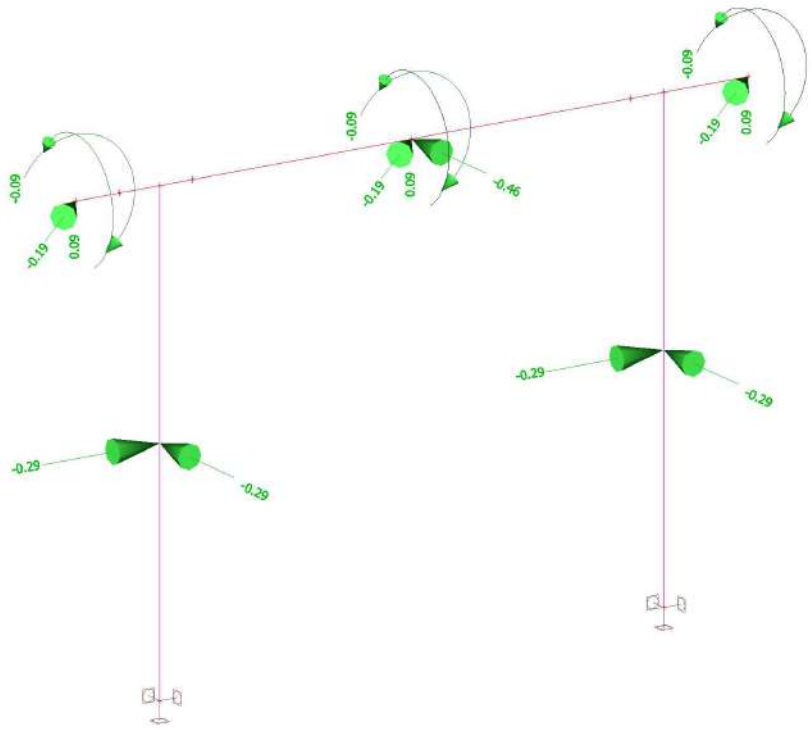
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

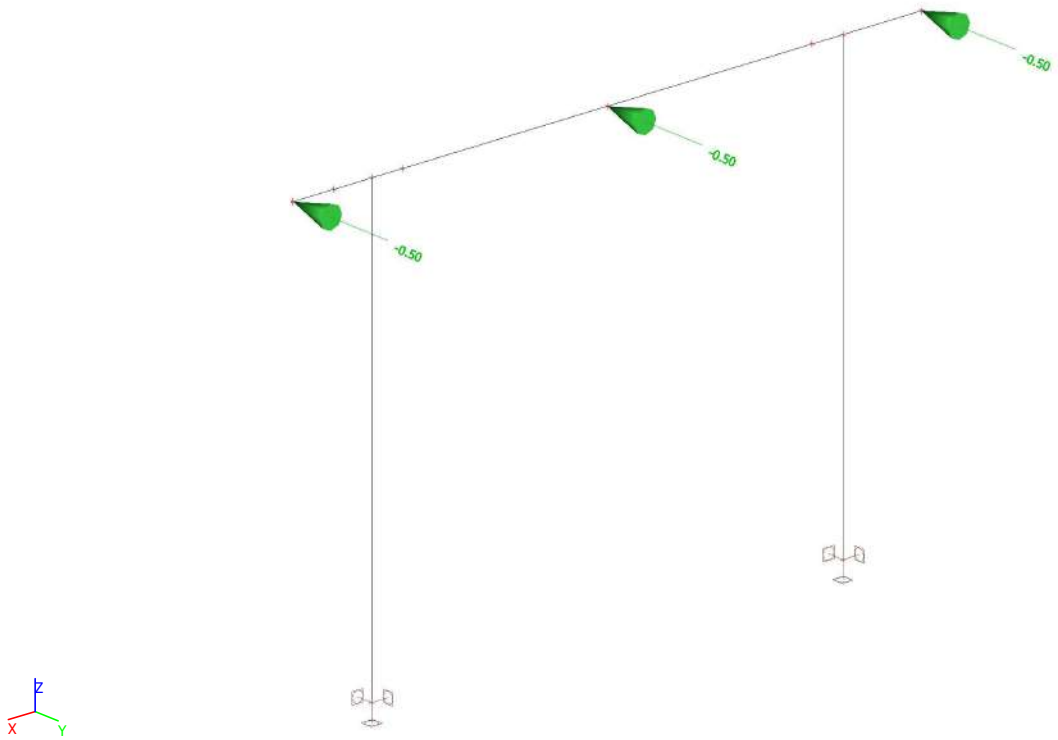
3.5. Vėjas x-x



3.6. Vėjas 45



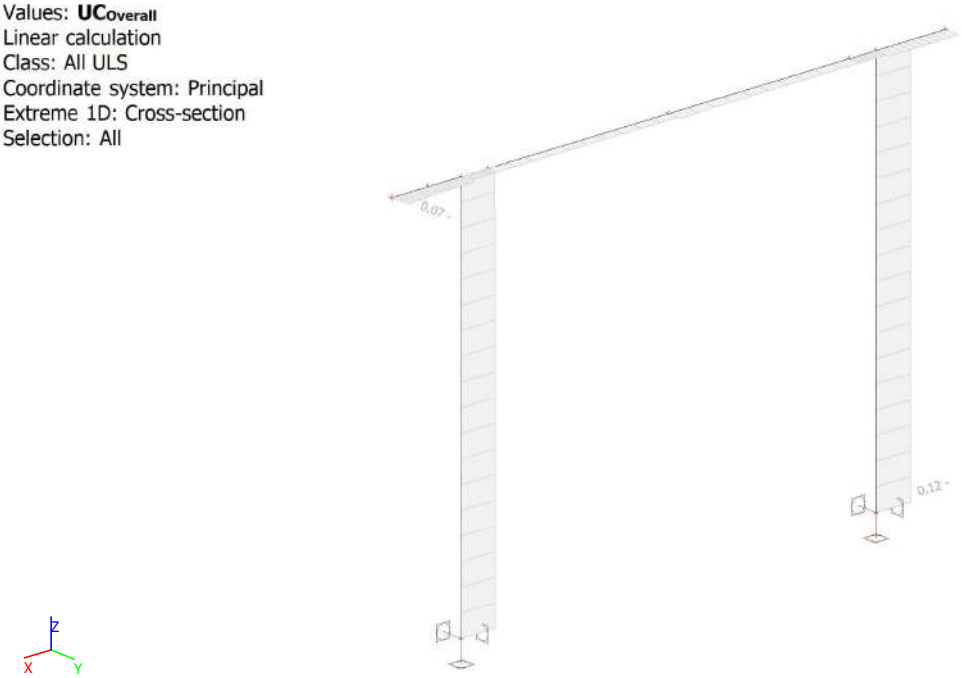
3.7. Laidų tempimai



4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B9	4.000	ULS-Set B (auto)/1	CS19 - UNP260	S 355	**0.07**	0.07	0.02
B10	0.000	ULS-Set B (auto)/1	CS14 - CFRHS180X180X5	S 355	**0.12**	0.12	0.12
B11	0.000	ULS-Set B (auto)/1	CS14 - CFRHS180X180X5	S 355	**0.12**	0.12	0.12

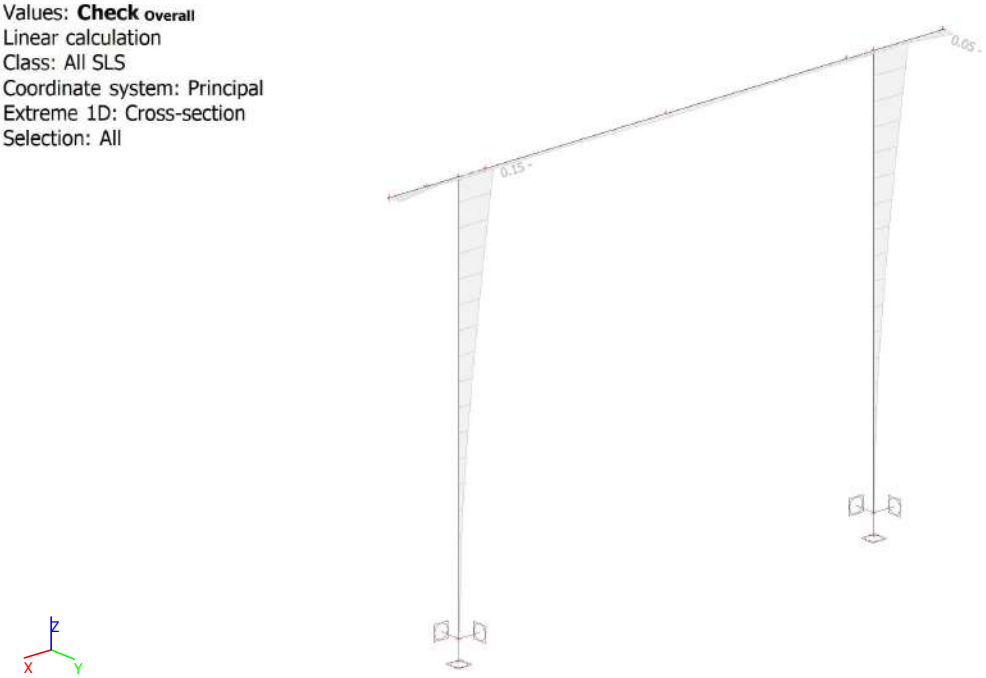
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.12.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B9	0.000	SLS-Char (auto)/1	0.2 0.0	0.1 0.0	5.0 20.0	2.8 11.1	0.04 0.00	0.05 0.00	- -	**0.05**
B10	2.700	SLS-Char (auto)/2	-3.5 0.0	-2.2 0.0	27.0 13.5	15.0 7.5	0.13 0.00	0.15 0.00	- -	**0.15**
B11	2.700	SLS-Char (auto)/2	-3.5 0.0	-2.2 0.0	27.0 13.5	15.0 7.5	0.13 0.00	0.15 0.00	- -	**0.15**

Name	Combination key
SLS-Char (auto)/1	1 + 7 + 2 + 3 + 5
SLS-Char (auto)/2	1 + 6 + 2 + 3 + 5 + 0.60*8

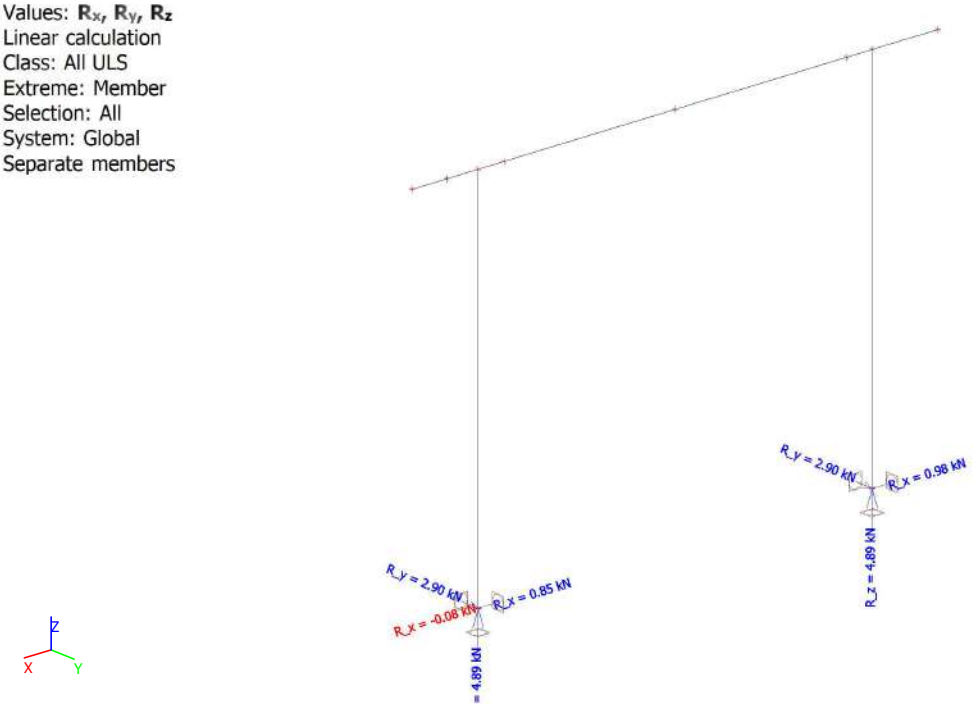
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.15.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6. Reactions

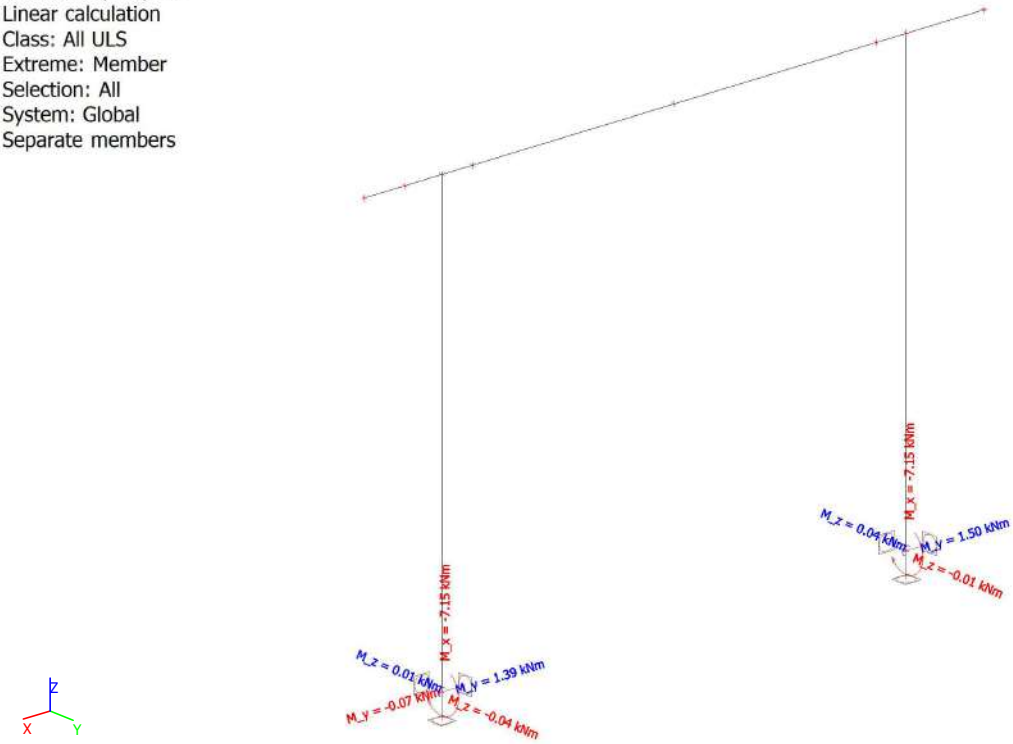
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/1	0.85	**0.75**	**2.58**	**-2.02**	1.39	0.01
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/2	-0.04	1.01	**4.89**	-2.73	-0.03	0.01
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/3	0.31	**2.90**	3.81	**-7.15**	0.54	-0.04
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/4	**-0.08**	1.01	3.95	-2.73	**-0.07**	0.01
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/5	**0.98**	1.01	4.30	-2.73	**1.50**	-0.01
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/6	0.33	2.64	2.78	-6.45	0.56	**-0.04**
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/6	0.44	2.64	3.08	-6.45	0.66	**0.04**

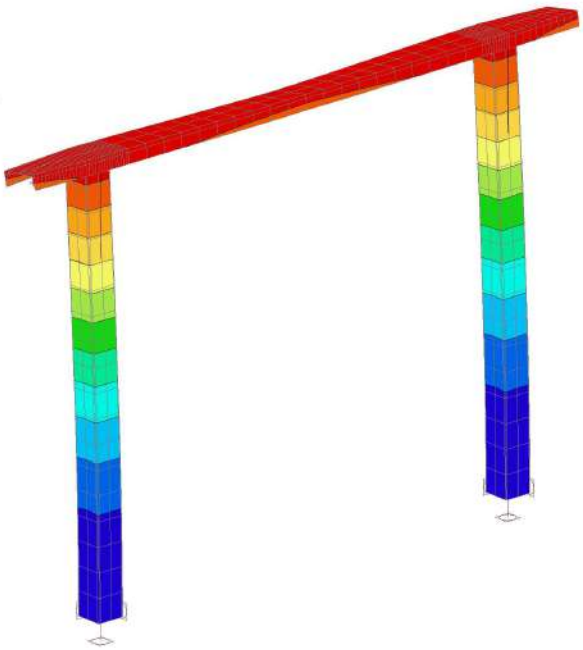
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/3	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/4	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/5	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/6	1 + 1.30*6 + 2 + 3 + 5 + 0.78*8

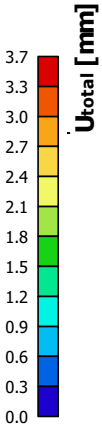
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B9	4.000	SLS-Char (auto)/1	**-0.5**	-1.4	**0.1**	0.1	-0.2	0.0	1.5
B10	1.800	SLS-Char (auto)/2	**0.0**	-0.7	0.0	0.7	0.0	0.0	0.7
B9	0.500-	SLS-Char (auto)/3	-0.2	**-3.5**	0.0	2.0	-0.1	0.0	**3.6**
B10	0.000	SLS-Char (auto)/2	0.0	**0.0**	0.0	0.0	0.0	0.0	0.0
B9	2.000-	SLS-Char (auto)/4	0.0	-1.4	**-0.5**	**-0.2**	0.0	0.0	1.5
B9	0.000	SLS-Char (auto)/3	-0.2	-3.4	-0.1	**5.4**	-0.3	0.0	3.4
B9	0.000	SLS-Char (auto)/1	-0.5	-1.4	-0.2	0.1	**-0.5**	0.0	1.5
B9	1.217	SLS-Char (auto)/4	0.0	-1.4	-0.2	0.3	**0.4**	0.0	1.4
B9	0.250	SLS-Char (auto)/3	-0.2	-3.4	-0.1	3.7	-0.2	**-0.2**	3.5
B9	1.348	SLS-Char (auto)/3	-0.2	-3.5	-0.2	3.9	0.3	**0.1**	3.5

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

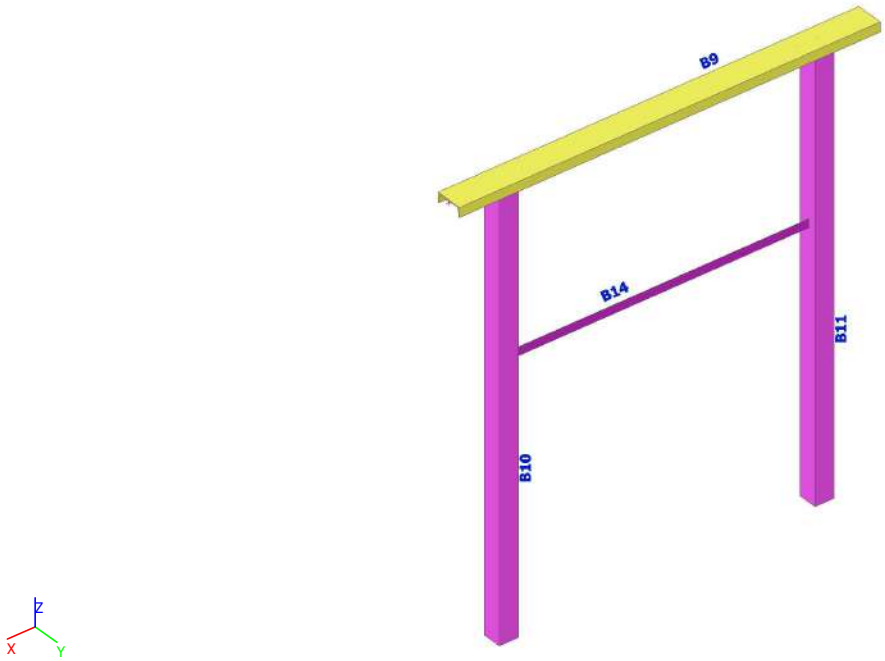
1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 9
6.1. Resultant of reactions; R_x; R_y; R_z 9
6.2. Resultant of reactions; M_x; M_y; M_z 9
6.3. Resultant of reactions 10
7. Deformations 11
7.1. 3D displacement; U_total 11
7.2. 1D deformations 11

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

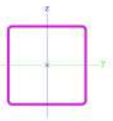
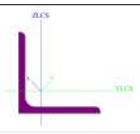
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B9	CS19 - UNP260	S 355	4.000
B10	CS14 - CFRHS180X180X5	S 355	4.120
B11	CS14 - CFRHS180X180X5	S 355	4.120
B14	CS20 - L75x75x6	S 355	3.000

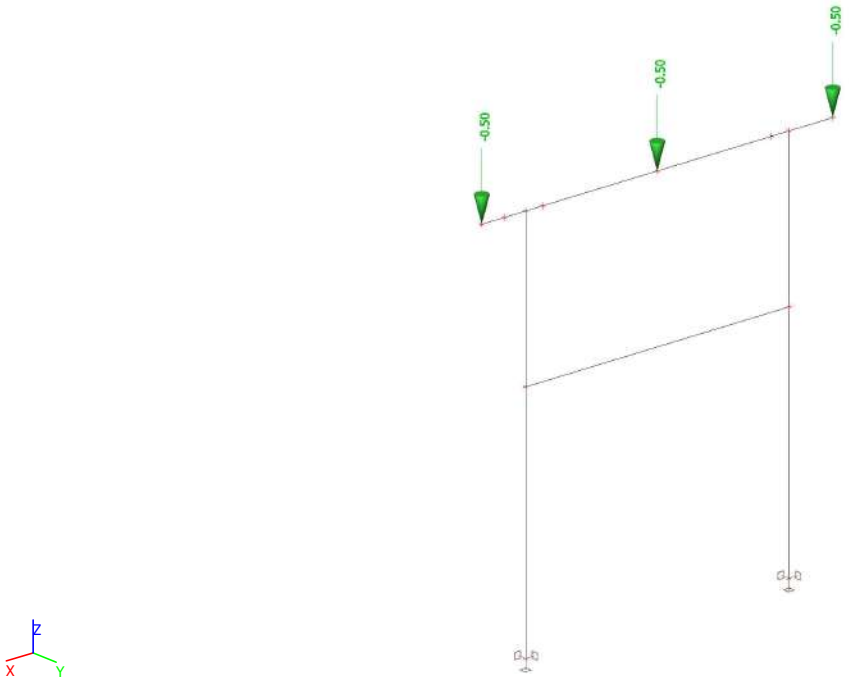
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS14	CFRHS180X180X5	S 355	
CS19	UNP260	S 355	
CS20	L75x75x6	S 355	

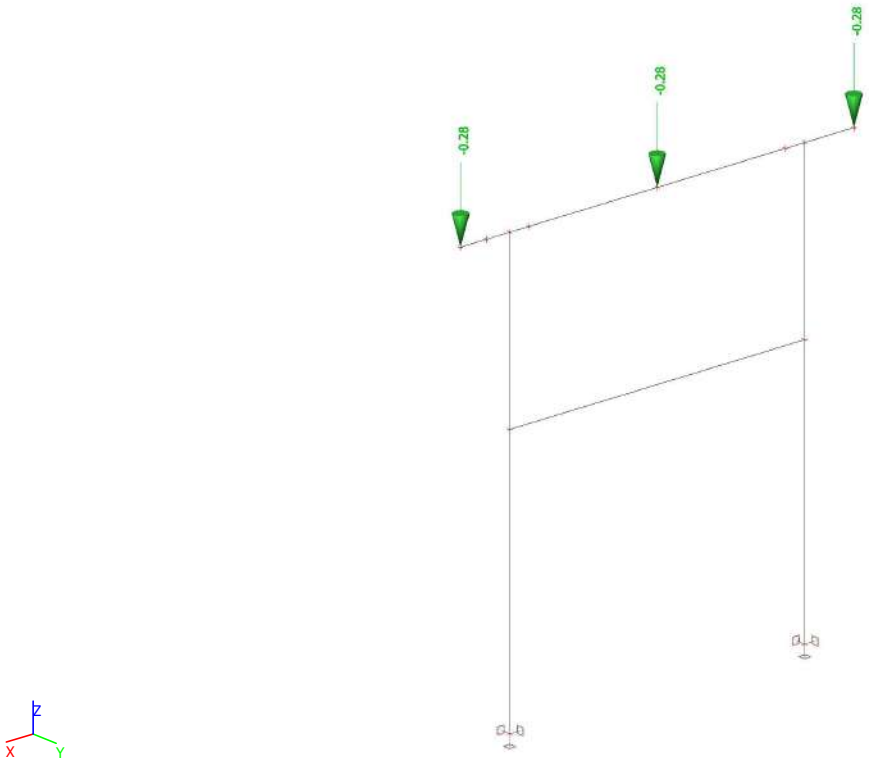
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.



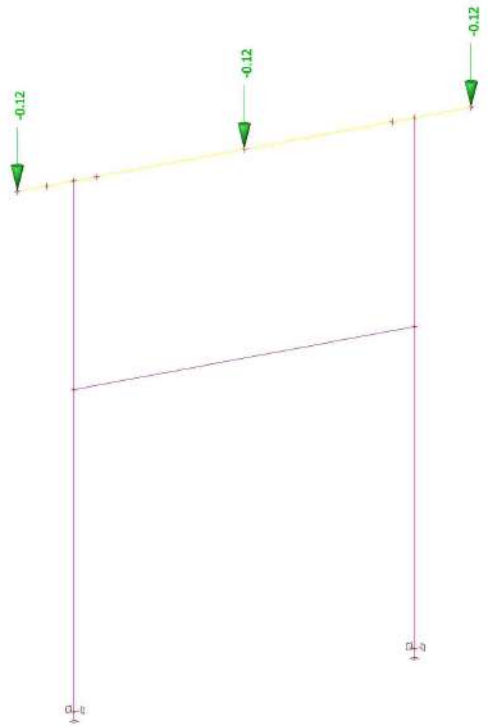
3.2. Laidų s.sv.



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

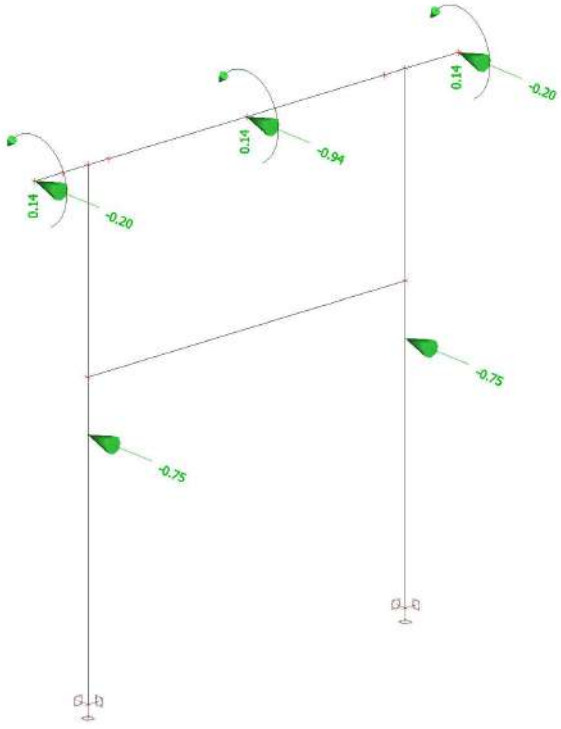
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas





3.4. Vėjas y-y

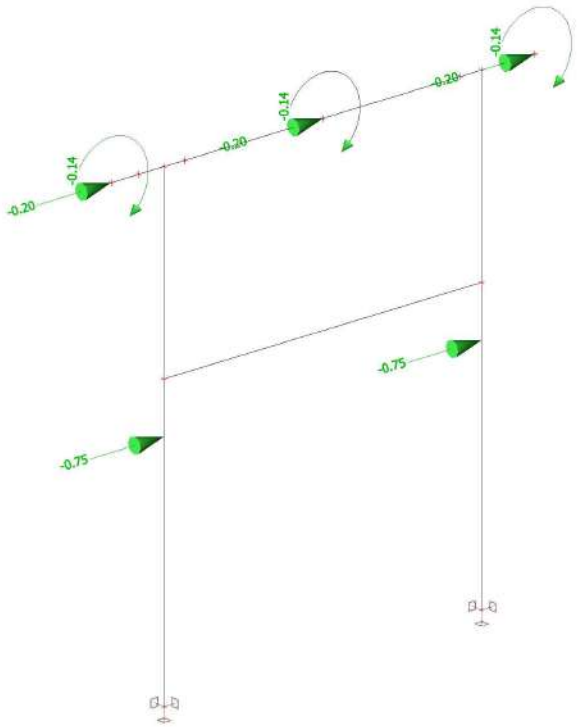




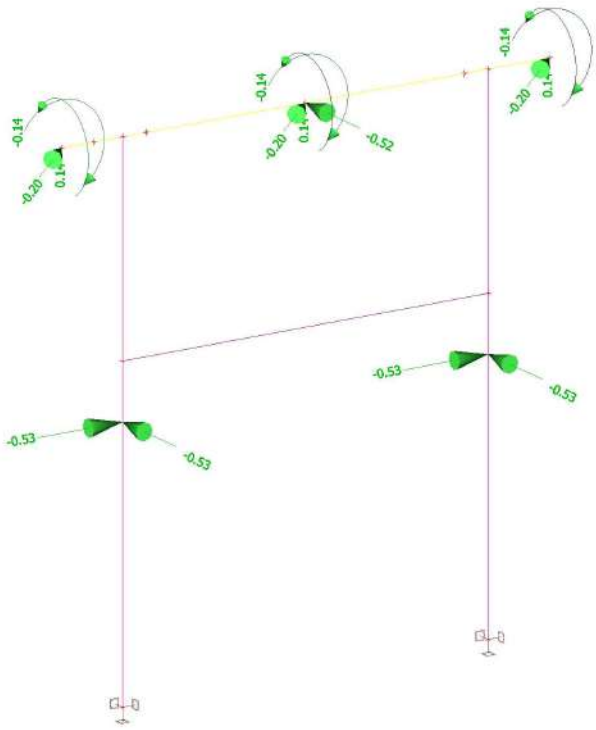
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

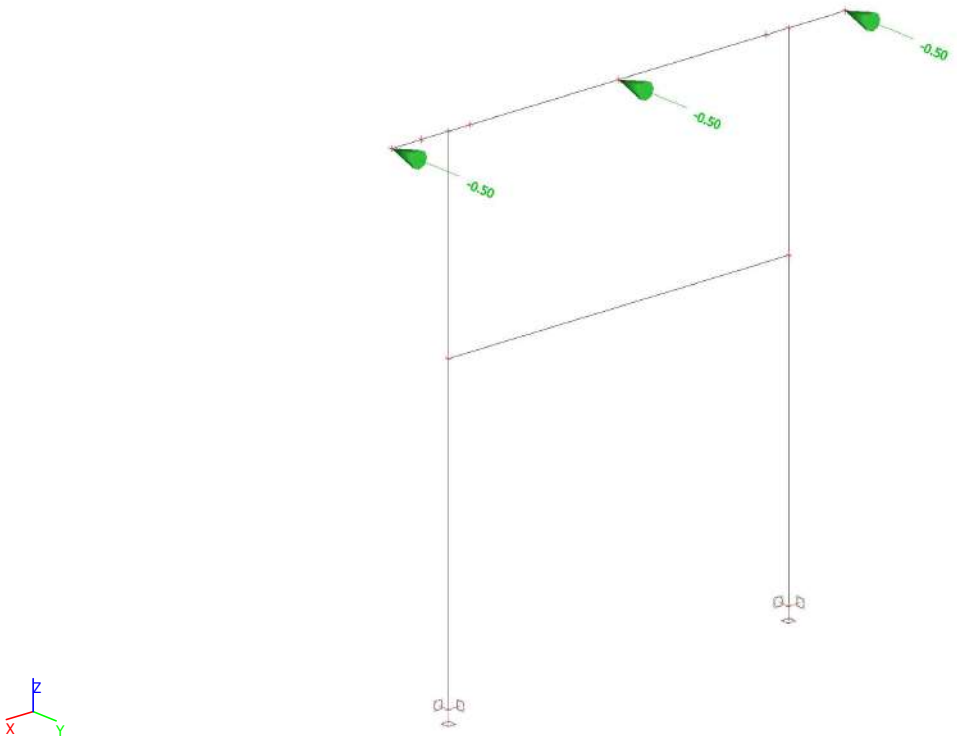
3.5. Vėjas x-x



3.6. Vėjas 45



3.7. Laidų tempimai

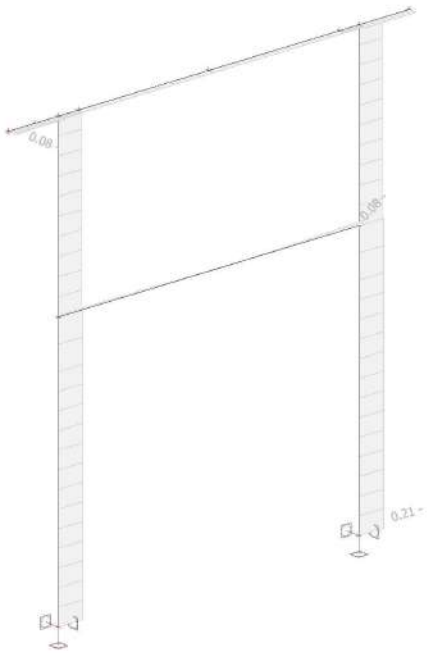


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B9	4.000	ULS-Set B (auto)/1	CS19 - UNP260	S 355	**0.08**	0.08	0.02
B10	0.000	ULS-Set B (auto)/1	CS14 - CFRHS180X180X5	S 355	**0.21**	0.21	0.21
B11	0.000	ULS-Set B (auto)/1	CS14 - CFRHS180X180X5	S 355	**0.21**	0.21	0.21
B14	3.000	ULS-Set B (auto)/2	CS20 - L75x75x6	S 355	**0.08**	0.08	0.00

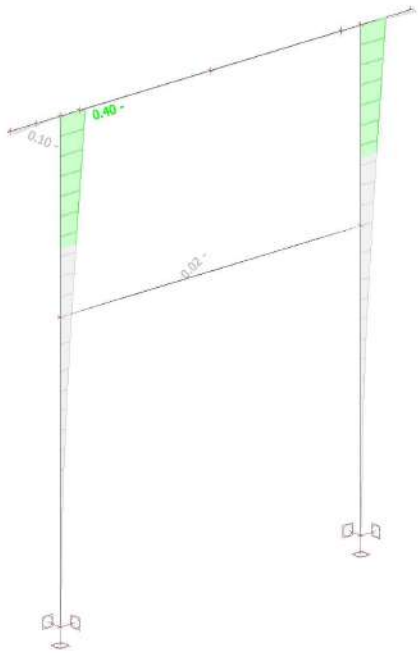
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.21.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B9	4.000	SLS-Char (auto)/1	-0.2 0.0	-0.3 0.0	5.0 20.0	2.8 11.1	0.04 0.00	0.10 0.00	- -	**0.10**
B10	4.120	SLS-Char (auto)/2	-13.9 0.0	-9.1 0.0	41.2 8.1	22.9 4.5	0.34 0.00	0.40 0.00	- -	**0.40**
B11	4.120	SLS-Char (auto)/2	-13.9 0.0	-9.1 0.0	41.2 8.1	22.9 4.5	0.34 0.00	0.40 0.00	- -	**0.40**
B14	1.167	SLS-Char (auto)/3	-0.3 -0.1	-0.1 -0.1	15.0 15.0	8.3 8.3	0.02 0.01	0.01 0.01	- -	**0.02**

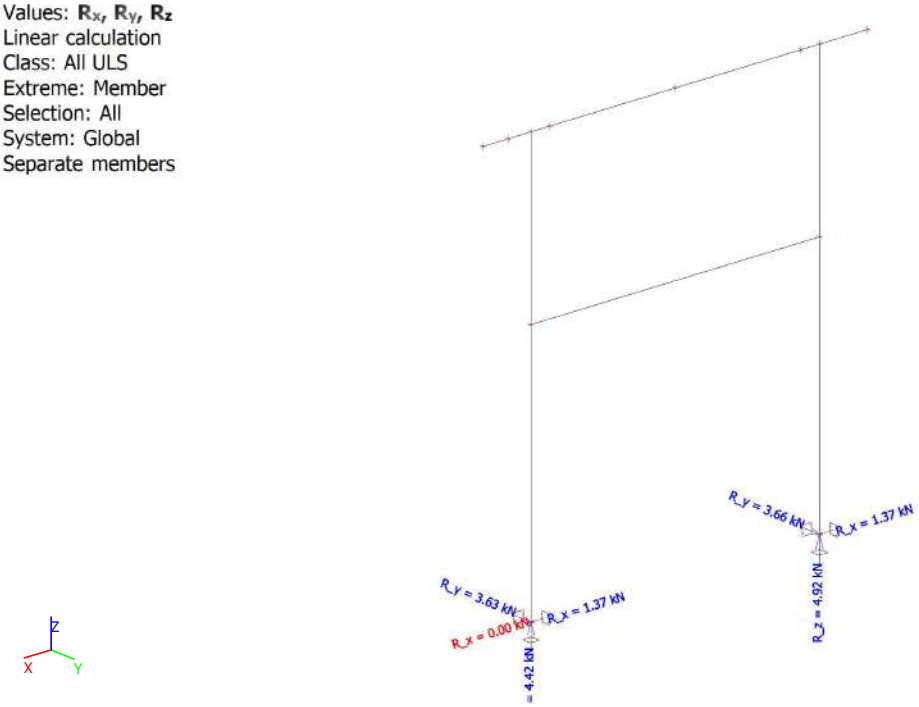
Name	Combination key
SLS-Char (auto)/1	1 + 7 + 0.60*6 + 2 + 3 + 5
SLS-Char (auto)/2	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/3	1 + 7 + 2 + 3 + 5

Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.40.

6. Reactions

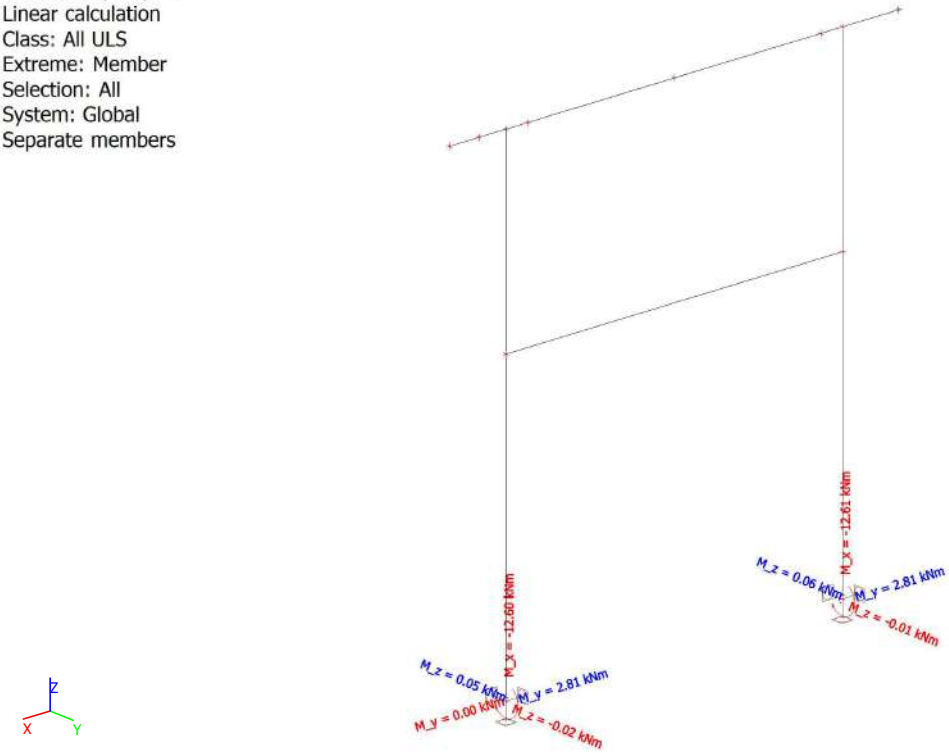
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/1	1.37	**0.72**	**2.36**	**-3.07**	2.81	0.05
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/2	0.58	**3.66**	4.52	**-12.61**	1.20	0.04
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/3	**0.00**	1.01	4.42	-4.17	**0.00**	0.01
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/4	**1.37**	1.04	**4.92**	-4.19	**2.81**	0.03
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/5	0.00	2.60	3.10	-8.98	0.00	**-0.02**
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/6	0.97	3.18	3.66	-10.88	2.00	**0.06**

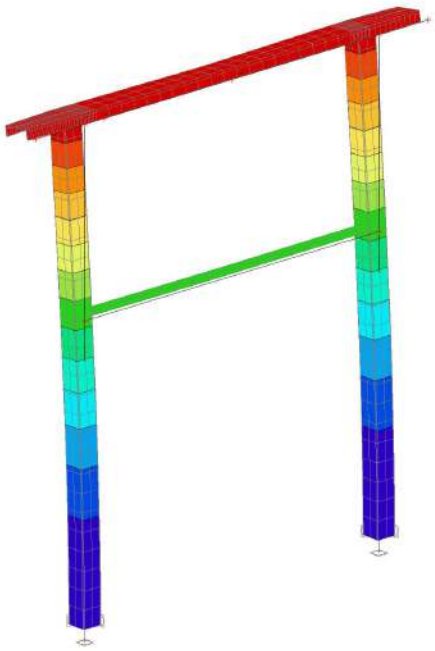
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/3	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/4	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/5	1 + 1.30*6 + 2 + 3 + 5
ULS-Set B (auto)/6	1 + 0.78*6 + 2 + 3 + 5 + 1.30*8

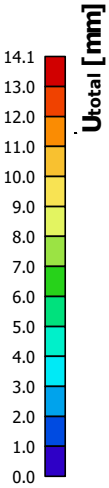
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B9	4.000	SLS-Char (auto)/1	**-2.0**	-4.9	**0.2**	1.1	-0.4	0.0	5.3
B10	3.472	SLS-Char (auto)/2	**0.0**	-8.6	0.0	3.9	0.0	0.0	8.6
B9	3.500-	SLS-Char (auto)/3	-0.9	**-13.9**	0.0	5.0	-0.2	0.0	**13.9**
B9	2.391	SLS-Char (auto)/4	-2.0	-8.6	**-0.3**	3.9	0.0	0.0	8.8
B10	0.000	SLS-Char (auto)/5	0.0	**0.0**	0.0	**0.0**	0.0	0.0	0.0
B9	2.000-	SLS-Char (auto)/3	-0.9	-13.7	-0.3	**9.7**	0.1	0.0	13.8
B9	0.000	SLS-Char (auto)/1	-2.0	-4.8	-0.3	1.1	**-0.7**	0.0	5.2
B9	1.478	SLS-Char (auto)/4	-2.0	-8.6	-0.1	3.8	**0.4**	0.0	8.8
B9	0.250	SLS-Char (auto)/6	-1.5	-13.1	-0.1	7.0	-0.5	**-0.3**	13.2
B9	1.348	SLS-Char (auto)/6	-1.5	-13.1	-0.1	7.5	0.4	**0.1**	13.2

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 9
5.1. EC-EN 1993 Steel Check SLS; Check Overall 9
5.2. EC-EN 1993 Steel Check SLS 9
6. Reactions 11
6.1. Resultant of reactions; R_x; R_y; R_z 11
6.2. Resultant of reactions; M_x; M_y; M_z 11
6.3. Resultant of reactions 12
7. Deformations 13
7.1. 3D displacement; U_total 13
7.2. 1D deformations 13

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

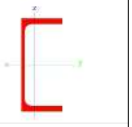
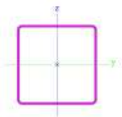
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B3	CS7 - UPE160	S 355	0.400
B4	CS7 - UPE160	S 355	0.400
B5	CS7 - UPE160	S 355	0.400
B6	CS7 - UPE160	S 355	0.400
B7	CS7 - UPE160	S 355	0.400
B8	CS7 - UPE160	S 355	4.600
B9	CS7 - UPE160	S 355	4.600
B10	CS14 - CFRHS180X180X5	S 355	3.560
B11	CS14 - CFRHS180X180X5	S 355	3.560
B12	CS7 - UPE160	S 355	0.400
B13	CS7 - UPE160	S 355	0.400

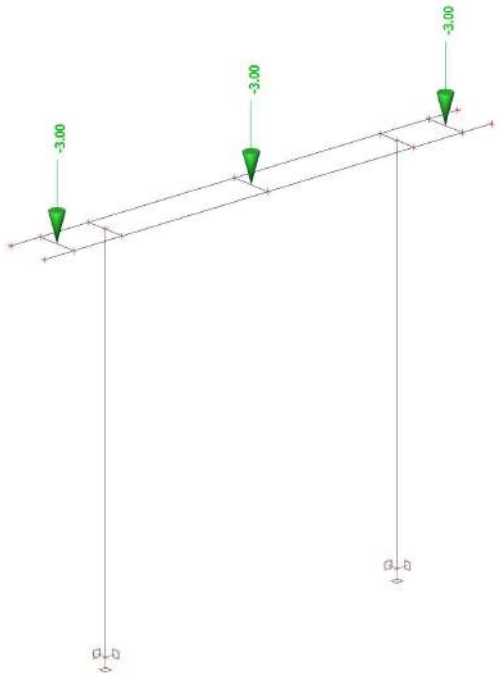
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS7	UPE160	S 355	
CS14	CFRHS180X180X5	S 355	

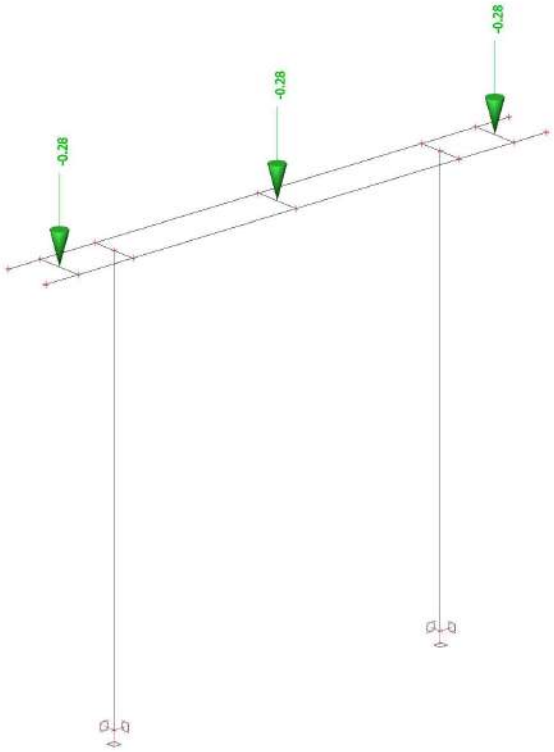
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.



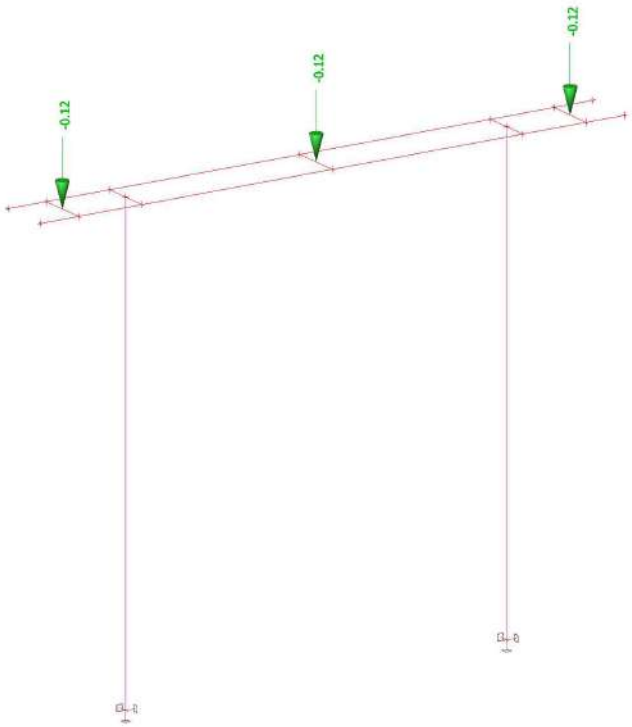
3.2. Laidų s.sv.



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

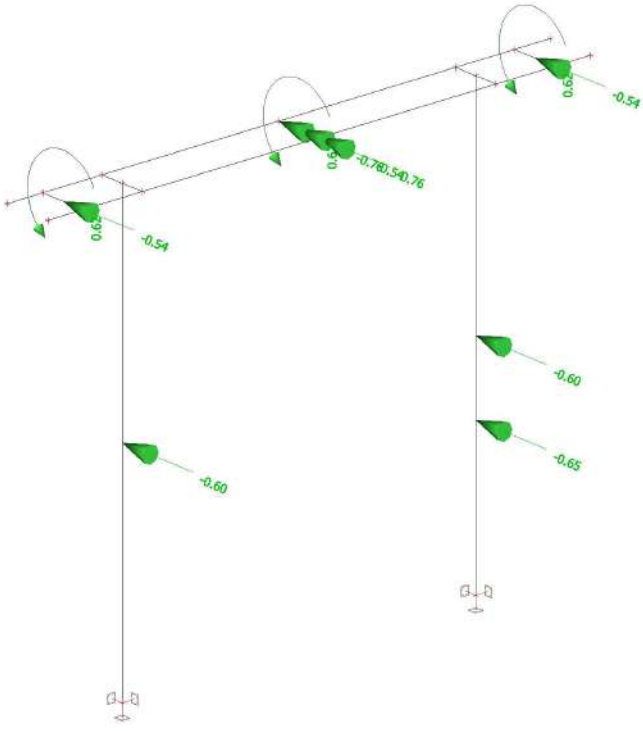
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas





3.4. Vėjas y-y

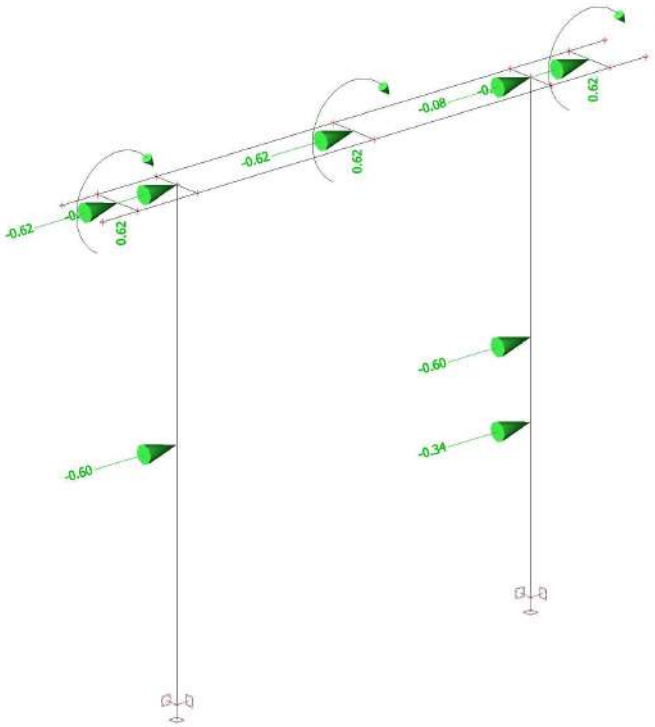




PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

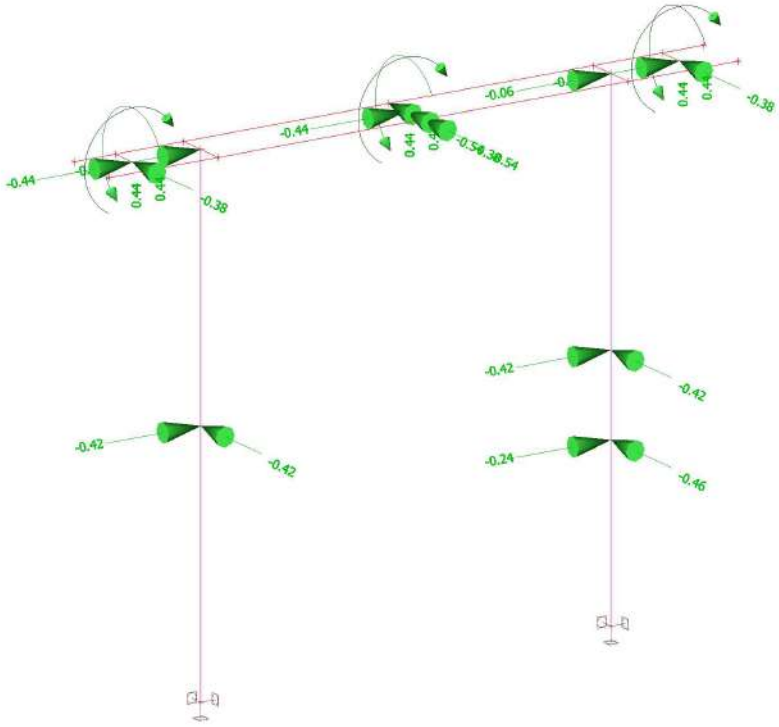
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.5. Vėjas x-x



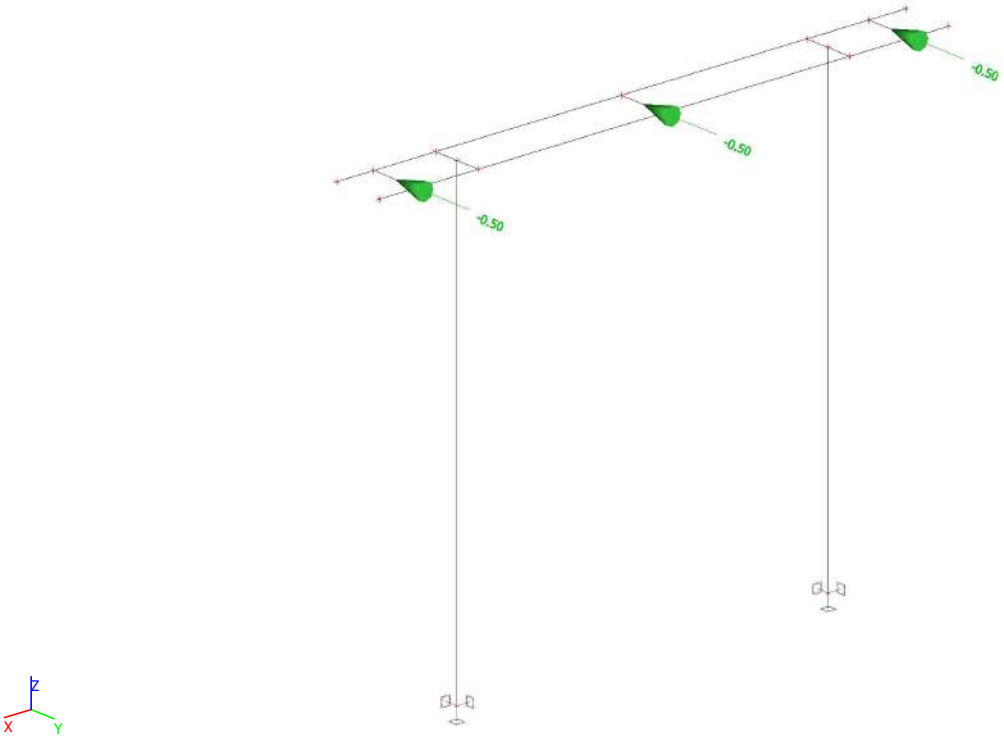


3.6. Vėjas 45





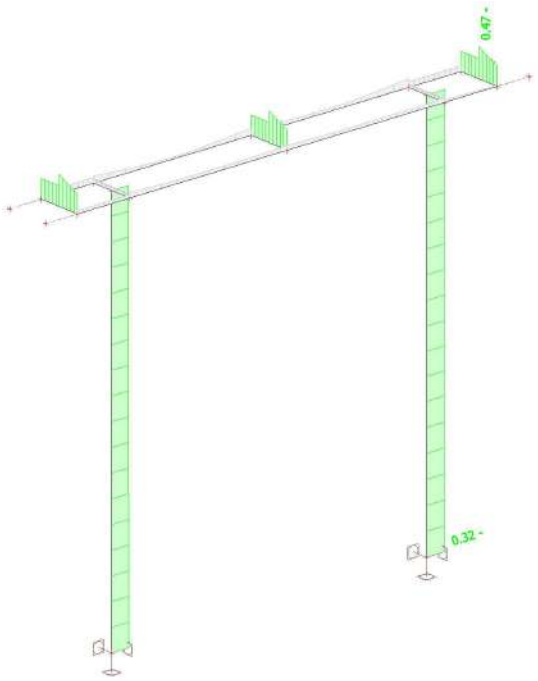
3.7. Laidų tempimai



4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B3	0.000	ULS-Set B (auto)/1	CS7 - UPE160	S 355	**0.04**	0.04	0.03
B4	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.06**	0.06	0.00
B5	0.200+	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.05**	0.05	0.03
B6	0.000	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.04**	0.04	0.02
B7	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.47**	0.47	0.00
B8	3.800-	ULS-Set B (auto)/4	CS7 - UPE160	S 355	**0.13**	0.13	0.00
B9	3.800-	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.08**	0.08	0.05
B10	0.000	ULS-Set B (auto)/5	CS14 - CFRHS180X180X5	S 355	**0.30**	0.30	0.30
B11	0.000	ULS-Set B (auto)/5	CS14 - CFRHS180X180X5	S 355	**0.32**	0.32	0.32
B12	0.200-	ULS-Set B (auto)/6	CS7 - UPE160	S 355	**0.47**	0.47	0.00
B13	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.47**	0.47	0.00

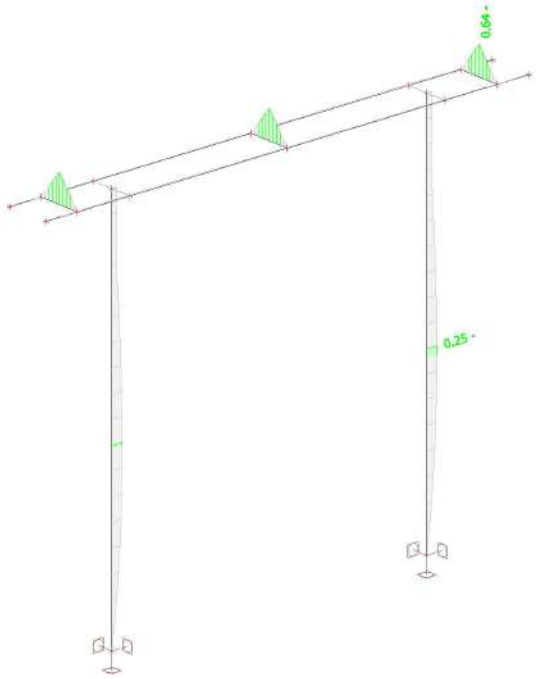
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.47.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B3	0.120	SLS-Char (auto)/1	0.0 0.0	0.0 0.0	2.0 2.0	1.1 1.1	0.00 0.00	0.00 0.00	- -	**0.00**
B4	0.300-	SLS-Char (auto)/1	0.0 0.0	0.0 0.0	2.0 1.0	1.1 0.6	0.00 0.00	0.00 0.00	- -	**0.00**
B5	0.200-	SLS-Char (auto)/2	0.0 0.0	0.0 0.0	2.0 2.0	1.1 1.1	0.00 0.00	0.00 0.00	- -	**0.00**
B6	0.320	SLS-Char (auto)15/3	0.0 0.0	0.0 0.0	1.0 1.0	0.6 0.6	0.00 0.00	0.00 0.00	- -	**0.00**
B7	0.200-	SLS-Char (auto)/4	0.0 0.5	0.0 0.7	2.0 2.0	1.1 1.1	0.00 0.26	0.00 0.64	- -	**0.64**
B8	3.650	SLS-Char (auto)/1	-0.1 0.6	-0.1 0.4	7.5 23.0	4.2 12.8	0.01 0.02	0.01 0.03	- -	**0.03**
B9	3.650	SLS-Char (auto)/1	0.1 -0.2	0.1 -0.4	7.5 23.0	4.2 12.8	0.01 0.01	0.01 0.03	- -	**0.03**
B10	1.582	SLS-Char (auto)/3	3.1 0.4	2.5 0.4	17.8 35.6	9.9 19.8	0.17 0.01	0.25 0.02	- -	**0.25**
B11	1.587	SLS-Char (auto)/3	3.1 0.4	2.5 0.4	17.8 35.6	9.9 19.8	0.17 0.01	0.25 0.02	- -	**0.25**
B12	0.200-	SLS-Char (auto)/2	0.0 0.5	0.0 0.7	2.0 2.0	1.1 1.1	0.00 0.26	0.00 0.64	- -	**0.64**

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B13	0.200-	SLS-Char (auto)/4	0.0 0.5	0.0 0.7	2.0 2.0	1.1 1.1	0.00 0.26	0.00 0.64	- -	**0.64**

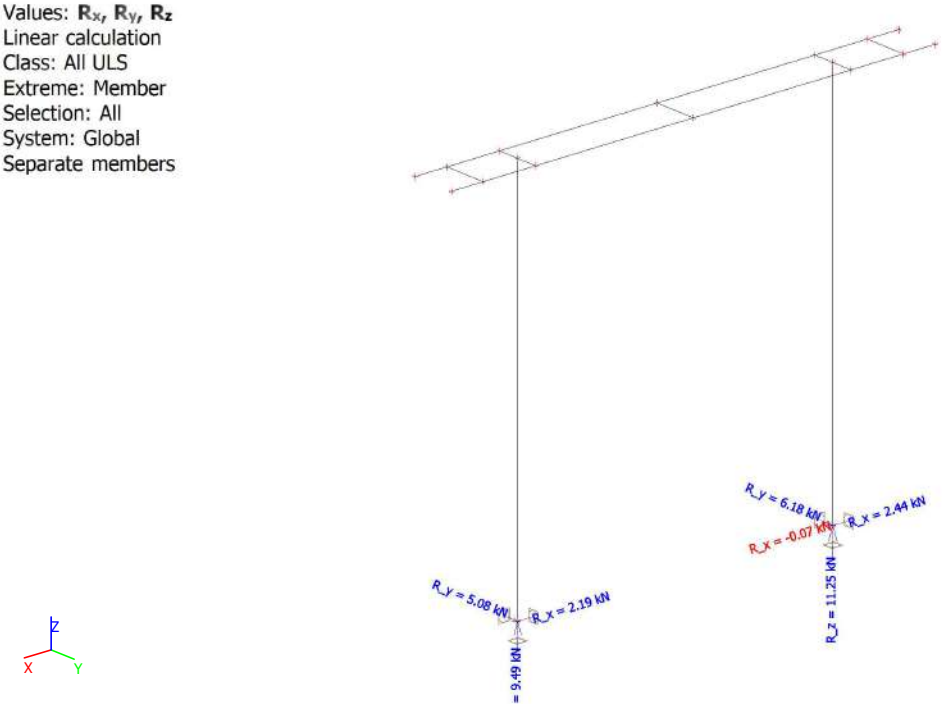
Name	Combination key
SLS-Char (auto)/1	1 + 0.60*6 + 2 + 3 + 5 + 8
SLS-Char (auto)/2	1 + 7 + 0.60*6 + 2 + 3 + 5
SLS-Char (auto)15/3	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/4	1 + 7 + 2 + 3 + 5

Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.64.

6. Reactions

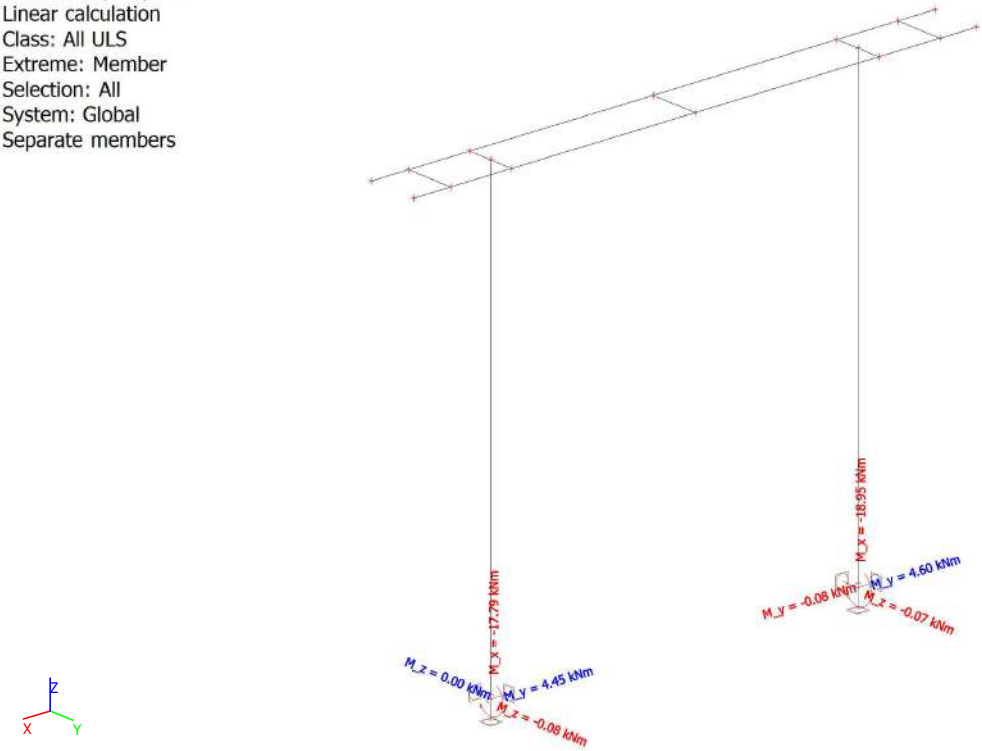
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

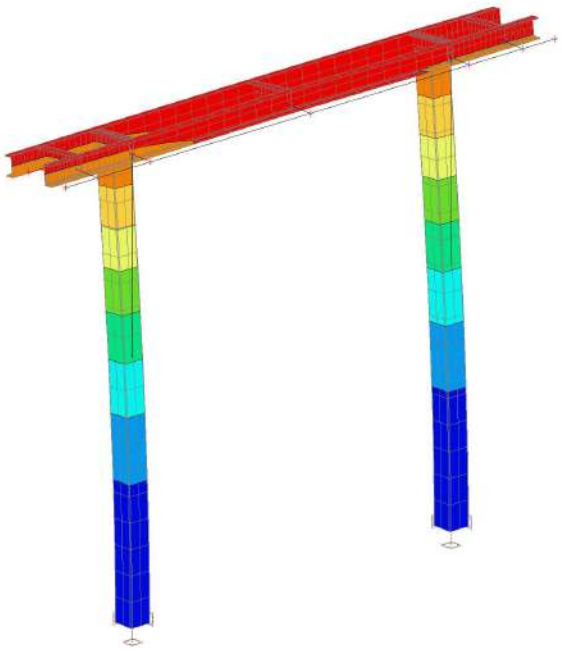
Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/1	2.17	0.75	**4.86**	-2.67	4.43	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/2	2.42	1.01	**11.25**	-3.60	4.58	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/3	0.99	**6.18**	10.10	**-18.95**	1.91	-0.07
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/4	**-0.07**	1.01	9.49	-3.60	**-0.08**	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/1	**2.44**	**0.75**	8.85	**-2.67**	**4.60**	0.00
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/5	0.95	4.81	6.01	-16.85	1.92	**-0.08**
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/2	2.19	1.01	7.26	-3.60	4.45	**0.00**

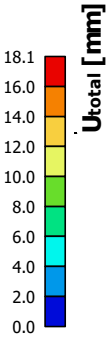
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/3	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/4	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/5	1 + 1.30*6 + 2 + 3 + 5 + 0.78*8

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B3	0.000	SLS-Char (auto)/1	**-2.7**	-8.5	0.7	3.7	-0.2	0.1	8.9
B3	0.400	SLS-Char (auto)/2	**0.0**	-12.1	-1.1	5.2	0.1	0.1	12.1
B8	4.600	SLS-Char (auto)/3	-1.1	-16.4	**-2.0**	**8.4**	-0.7	0.1	16.5
B9	4.600	SLS-Char (auto)/3	-1.2	-15.8	**1.6**	7.6	-0.2	0.1	16.0
B10	0.000	SLS-Char (auto)/4	0.0	**0.0**	0.0	**0.0**	0.0	0.0	0.0
B13	0.200-	SLS-Char (auto)/5	-2.7	-3.1	0.3	1.3	**-11.5**	0.0	4.1
B12	0.200-	SLS-Char (auto)/6	0.0	-3.1	-0.3	1.3	**4.1**	0.0	3.1
B8	3.050+	SLS-Char (auto)/3	-1.1	-16.8	-1.5	8.1	0.3	**-1.0**	16.9
B9	3.050+	SLS-Char (auto)/3	-1.2	-16.6	1.4	6.9	0.1	**1.3**	16.7
B7	0.400	SLS-Char (auto)/3	-1.1	**-17.3**	-1.7	8.0	0.0	0.1	**17.4**

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 9
5.1. EC-EN 1993 Steel Check SLS; Check Overall 9
5.2. EC-EN 1993 Steel Check SLS 9
6. Reactions 11
6.1. Resultant of reactions; R_x; R_y; R_z 11
6.2. Resultant of reactions; M_x; M_y; M_z 11
6.3. Resultant of reactions 12
7. Deformations 13
7.1. 3D displacement; U_total 13
7.2. 1D deformations 13

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

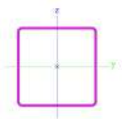
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B3	CS7 - UPE160	S 355	0.400
B4	CS7 - UPE160	S 355	0.400
B5	CS7 - UPE160	S 355	0.400
B6	CS7 - UPE160	S 355	0.400
B7	CS7 - UPE160	S 355	0.400
B8	CS7 - UPE160	S 355	4.600
B9	CS7 - UPE160	S 355	4.600
B10	CS14 - CFRHS180X180X5	S 355	3.750
B11	CS14 - CFRHS180X180X5	S 355	3.750
B12	CS7 - UPE160	S 355	0.400
B13	CS7 - UPE160	S 355	0.400

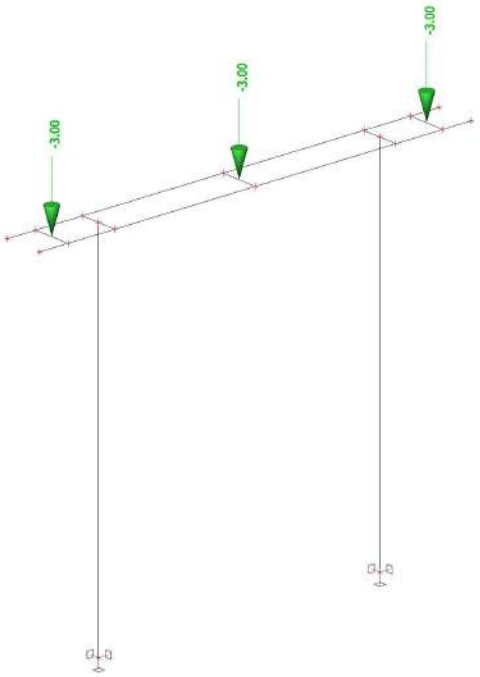
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS7	UPE160	S 355	
CS14	CFRHS180X180X5	S 355	

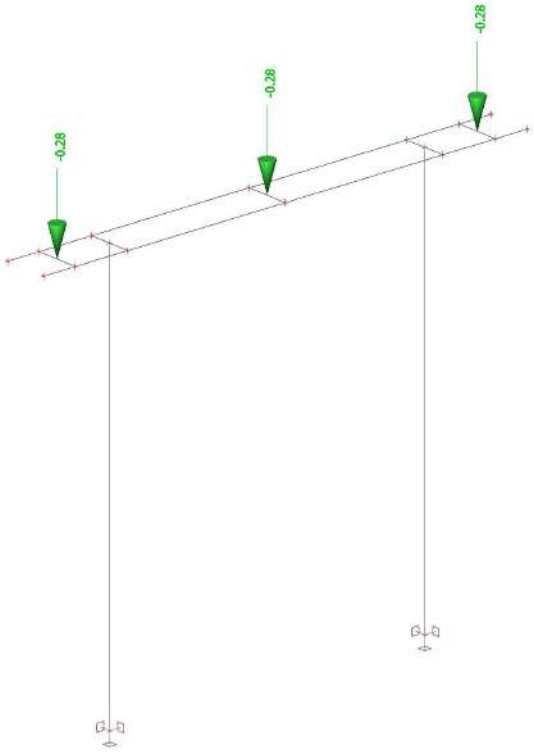
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.



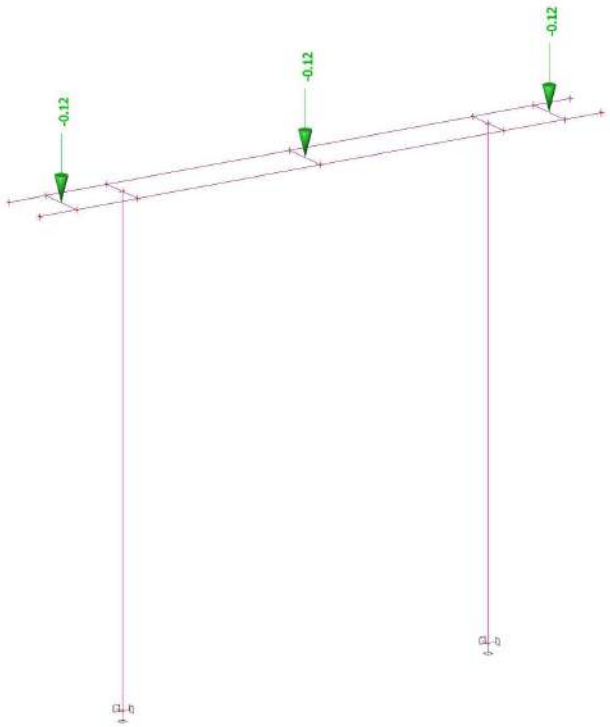
3.2. Laidų s.sv.



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

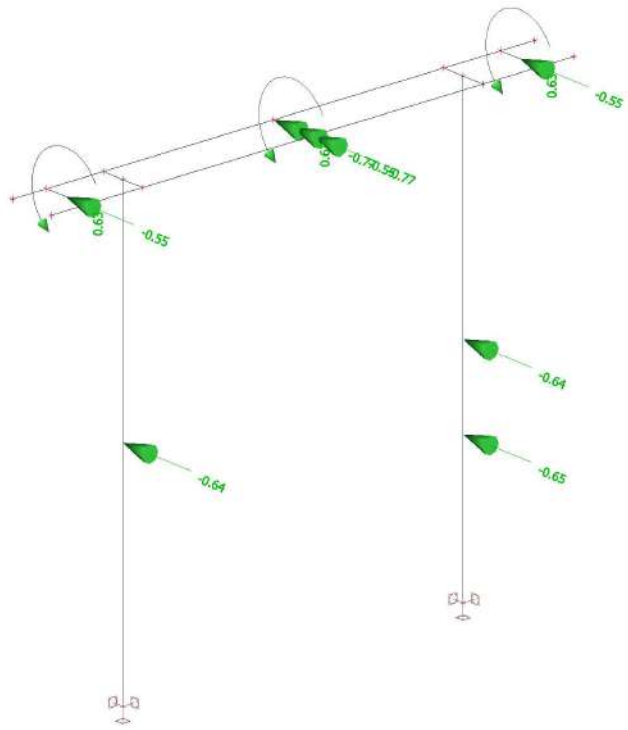
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas





3.4. Vėjas y-y

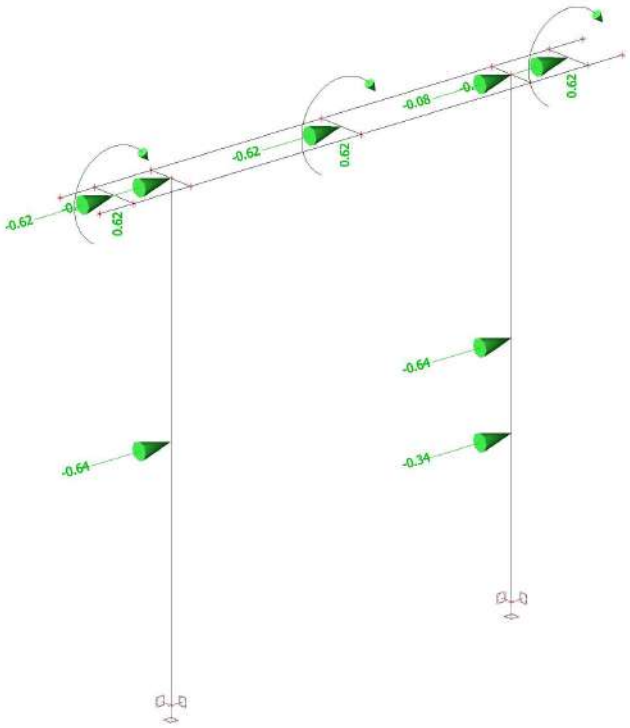




PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

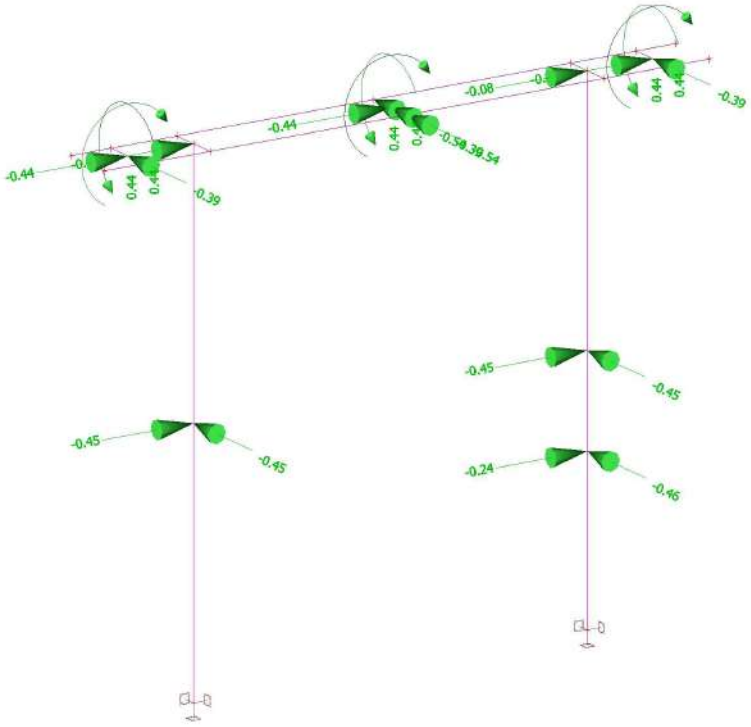
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

3.5. Vėjas x-x





3.6. Vėjas 45

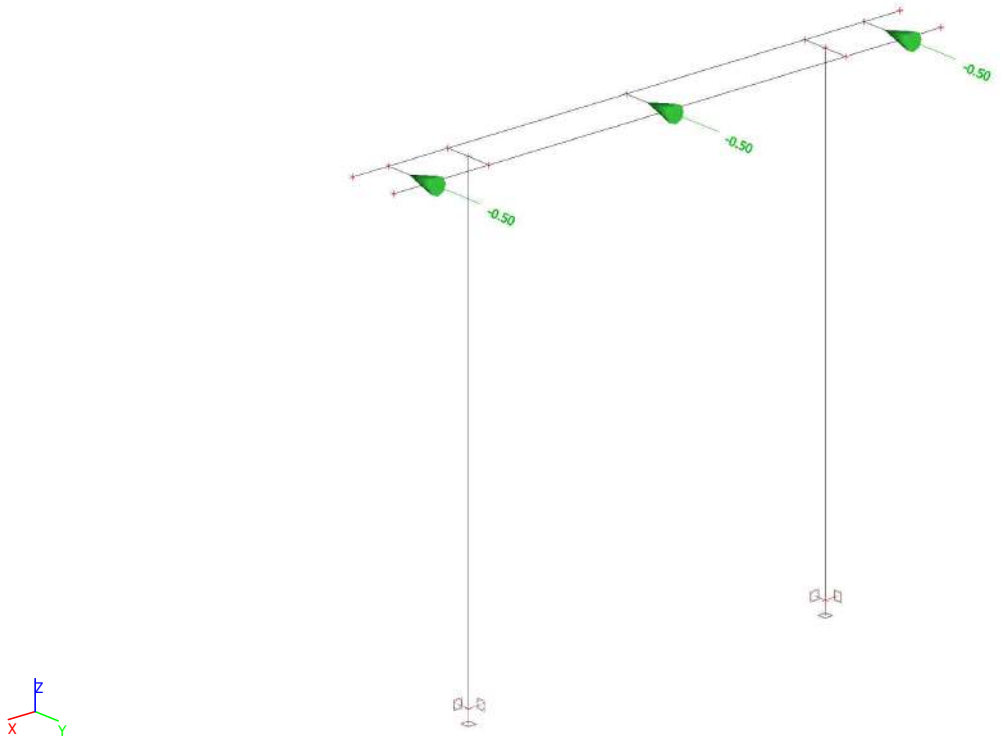




PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.7. Laidų tempimai

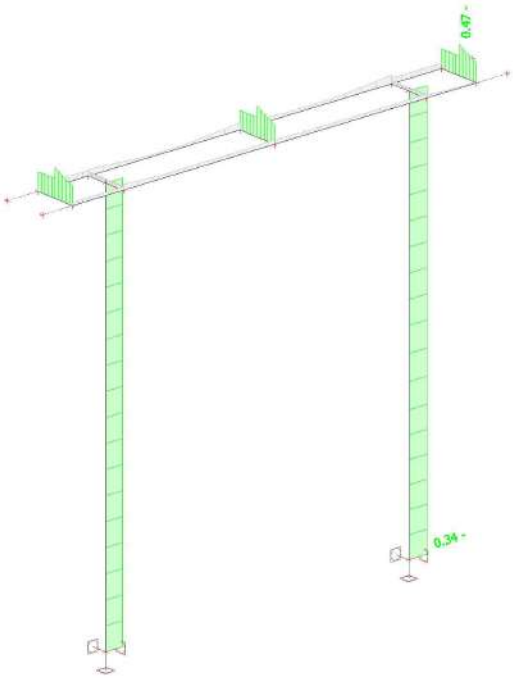


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **UC$_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





4.2. EC-EN 1993 Steel check ULS

Values: **UC$_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	UC$_{Overall}$ [-]	UC$_{Sec}$ [-]	UC$_{Stab}$ [-]
B3	0.000	ULS-Set B (auto)/1	CS7 - UPE160	S 355	**0.05**	0.05	0.03
B4	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.07**	0.07	0.00
B5	0.200+	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.06**	0.06	0.03
B6	0.000	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.05**	0.05	0.02
B7	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.47**	0.47	0.00
B8	3.800-	ULS-Set B (auto)/4	CS7 - UPE160	S 355	**0.13**	0.13	0.00
B9	3.800-	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.09**	0.09	0.05
B10	0.000	ULS-Set B (auto)/5	CS14 - CFRHS180X180X5	S 355	**0.32**	0.28	0.32
B11	0.000	ULS-Set B (auto)/5	CS14 - CFRHS180X180X5	S 355	**0.34**	0.34	0.34
B12	0.200-	ULS-Set B (auto)/6	CS7 - UPE160	S 355	**0.47**	0.47	0.00
B13	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.47**	0.47	0.00

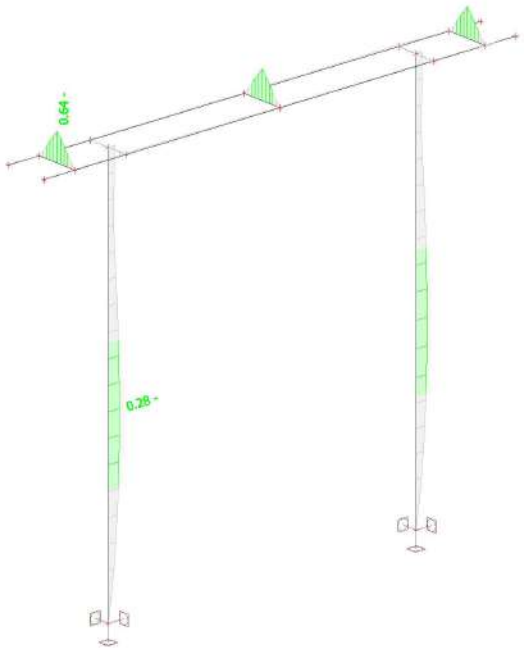
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.47.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B3	0.120	SLS-Char (auto)/1	0.0 0.0	0.0 0.0	2.0 2.0	1.1 1.1	0.00 0.00	0.00 0.00	- -	**0.00**
B4	0.300-	SLS-Char (auto)/1	0.0 0.0	0.0 0.0	2.0 1.0	1.1 0.6	0.00 0.00	0.00 0.00	- -	**0.00**
B5	0.200-	SLS-Char (auto)/2	0.0 0.0	0.0 0.0	2.0 2.0	1.1 1.1	0.00 0.00	0.00 0.00	- -	**0.00**
B6	0.320	SLS-Char (auto)/3	0.0 0.0	0.0 0.0	1.0 1.0	0.6 0.6	0.00 0.00	0.00 0.00	- -	**0.00**
B7	0.200-	SLS-Char (auto)/4	0.0 0.5	0.0 0.7	2.0 2.0	1.1 1.1	0.00 0.26	0.00 0.64	- -	**0.64**
B8	3.650	SLS-Char (auto)/1	-0.1 0.6	-0.1 0.4	7.5 23.0	4.2 12.8	0.01 0.02	0.01 0.03	- -	**0.03**
B9	3.650	SLS-Char (auto)/1	0.1 -0.2	0.1 -0.4	7.5 23.0	4.2 12.8	0.01 0.01	0.01 0.03	- -	**0.03**
B10	1.667	SLS-Char (auto)/3	3.6 0.5	2.9 0.4	18.8 37.5	10.4 20.8	0.19 0.01	0.28 0.02	- -	**0.28**
B11	1.650	SLS-Char (auto)/3	3.6 0.4	2.9 0.5	18.8 37.5	10.4 20.8	0.19 0.01	0.28 0.02	- -	**0.28**
B12	0.200-	SLS-Char (auto)/2	0.0 0.5	0.0 0.7	2.0 2.0	1.1 1.1	0.00 0.26	0.00 0.64	- -	**0.64**

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B13	0.200-	SLS-Char (auto)/4	0.0 0.5	0.0 0.7	2.0 2.0	1.1 1.1	0.00 0.26	0.00 0.64	- -	**0.64**

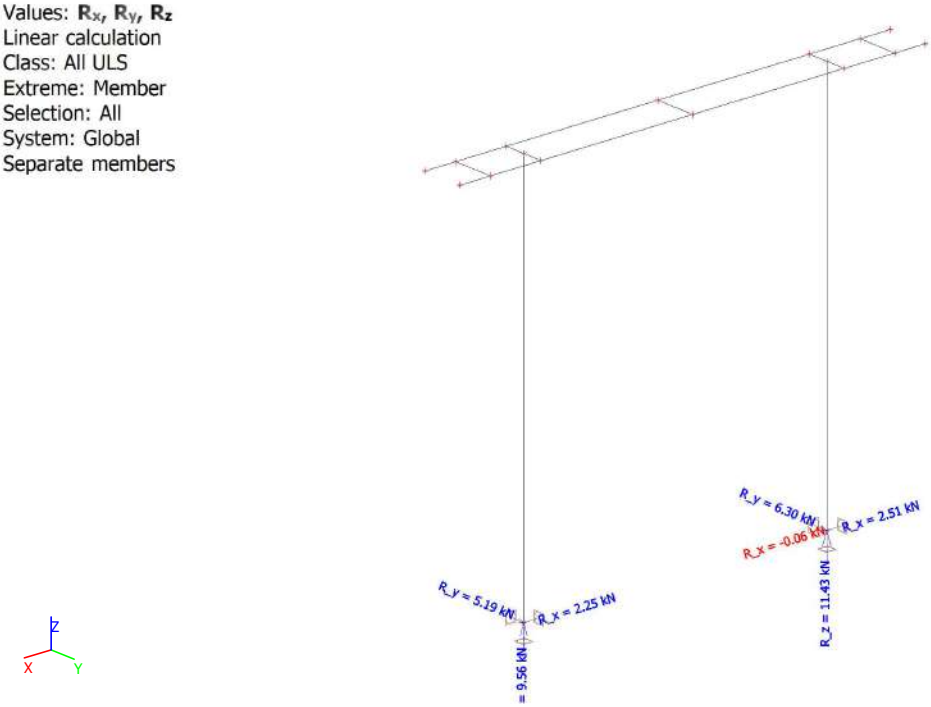
Name	Combination key
SLS-Char (auto)/1	1 + 0.60*6 + 2 + 3 + 5 + 8
SLS-Char (auto)/2	1 + 7 + 0.60*6 + 2 + 3 + 5
SLS-Char (auto)/3	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/4	1 + 7 + 2 + 3 + 5

Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.64.

6. Reactions

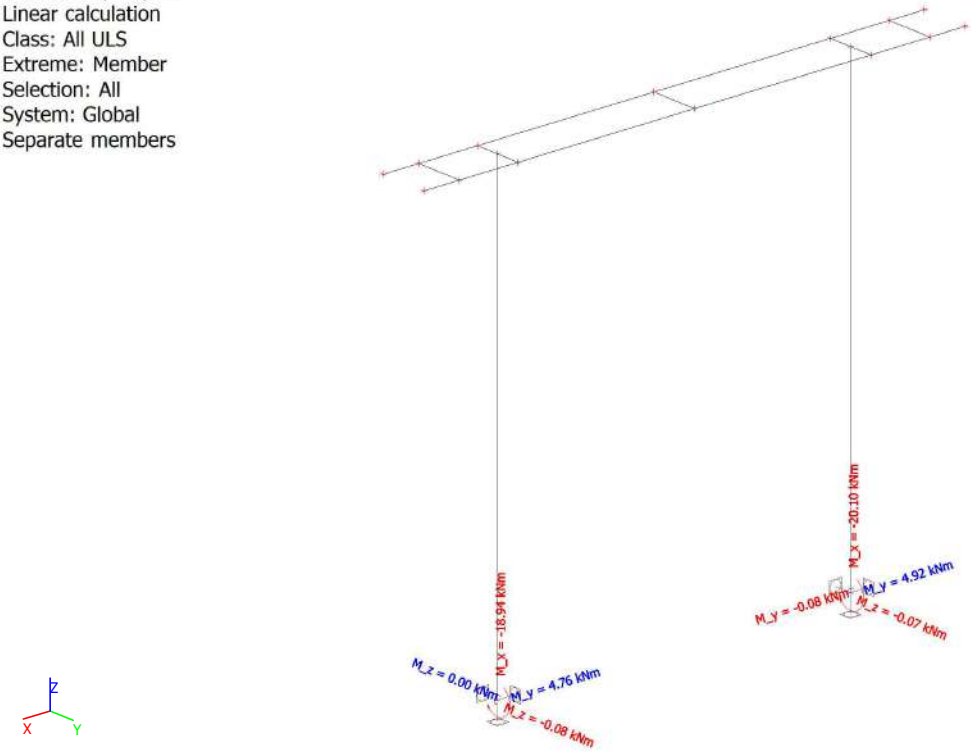
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/1	2.23	0.75	**4.81**	-2.81	4.74	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/2	2.50	1.01	**11.43**	-3.80	4.90	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/3	1.04	**6.30**	10.23	**-20.10**	2.08	-0.07
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/4	**-0.06**	1.01	9.56	-3.80	**-0.08**	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/1	**2.51**	**0.75**	9.01	**-2.81**	**4.92**	0.00
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/5	0.99	4.93	6.00	-17.96	2.09	**-0.08**
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/2	2.25	1.01	7.22	-3.80	4.76	**0.00**

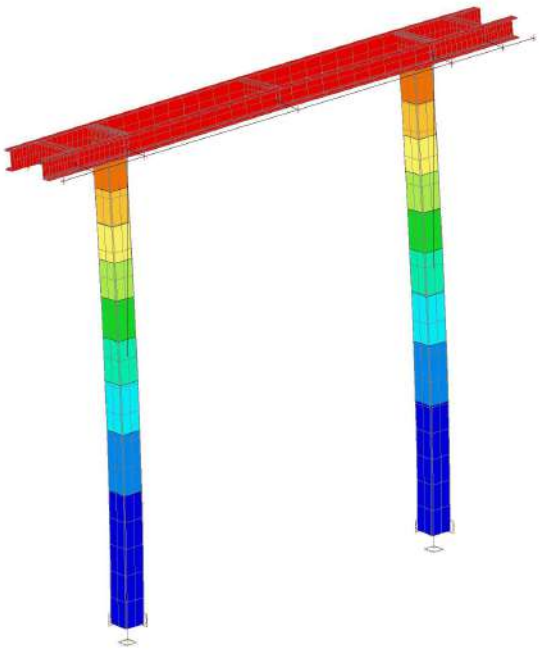
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/3	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/4	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/5	1 + 1.30*6 + 2 + 3 + 5 + 0.78*8

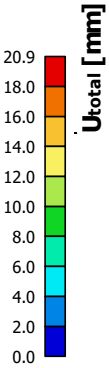
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B3	0.000	SLS-Char (auto)/1	**-3.1**	-10.0	0.8	4.1	-0.3	0.1	10.5
B3	0.400	SLS-Char (auto)/2	**0.0**	-14.2	-1.2	5.8	0.1	0.1	14.3
B8	4.600	SLS-Char (auto)/3	-1.3	-19.2	**-2.2**	9.1	-0.7	0.1	19.3
B9	4.600	SLS-Char (auto)/3	-1.4	-18.6	**1.7**	8.4	-0.2	0.1	18.8
B10	0.000	SLS-Char (auto)/4	0.0	**0.0**	0.0	**0.0**	0.0	0.0	0.0
B13	0.280	SLS-Char (auto)/3	-1.4	-19.1	-0.8	**9.1**	-2.0	0.1	19.2
B13	0.200-	SLS-Char (auto)/5	-3.1	-3.7	0.2	1.4	**-11.6**	0.0	4.8
B12	0.200-	SLS-Char (auto)/6	0.0	-3.7	-0.3	1.4	**4.1**	0.0	3.7
B8	3.050+	SLS-Char (auto)/3	-1.3	-19.6	-1.7	8.8	0.3	**-1.0**	19.7
B9	3.050+	SLS-Char (auto)/3	-1.4	-19.4	1.5	7.7	0.1	**1.3**	19.5
B7	0.400	SLS-Char (auto)/3	-1.3	**-20.1**	-1.9	8.8	0.0	0.1	**20.2**

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 9
5.1. EC-EN 1993 Steel Check SLS; Check Overall 9
5.2. EC-EN 1993 Steel Check SLS 9
6. Reactions 11
6.1. Resultant of reactions; R_x; R_y; R_z 11
6.2. Resultant of reactions; M_x; M_y; M_z 11
6.3. Resultant of reactions 12
7. Deformations 13
7.1. 3D displacement; U_total 13
7.2. 1D deformations 13

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

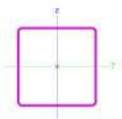
2.1. Structural model



2.2. Members

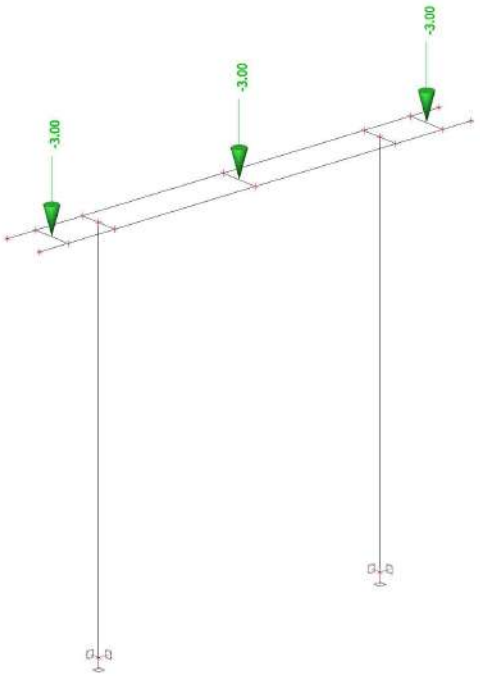
Name	Cross-section	Material	Length [m]
B3	CS7 - UPE160	S 355	0.400
B4	CS7 - UPE160	S 355	0.400
B5	CS7 - UPE160	S 355	0.400
B6	CS7 - UPE160	S 355	0.400
B7	CS7 - UPE160	S 355	0.400
B8	CS7 - UPE160	S 355	4.600
B9	CS7 - UPE160	S 355	4.600
B10	CS14 - CFRHS180X180X5	S 355	3.750
B11	CS14 - CFRHS180X180X5	S 355	3.750
B12	CS7 - UPE160	S 355	0.400
B13	CS7 - UPE160	S 355	0.400

2.3. Cross-sections

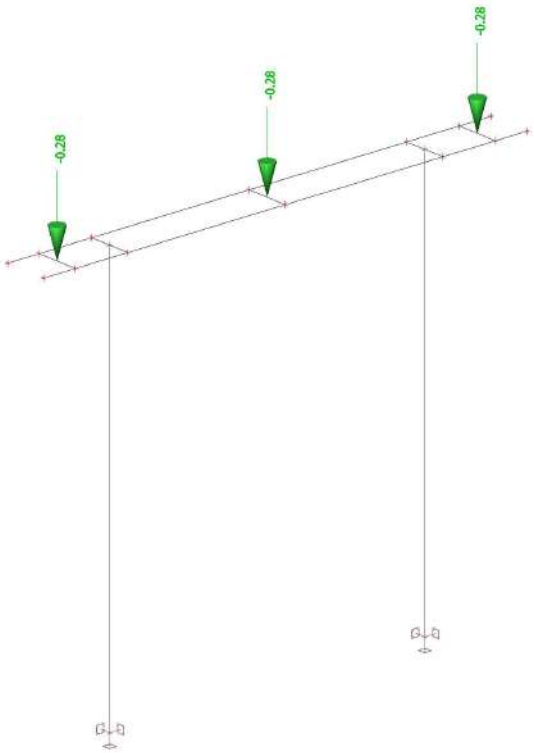
Name	Type	Item material	Picture
	Detailed		
CS7	UPE160	S 355	
CS14	CFRHS180X180X5	S 355	

3. Loads

3.1. Techn. įreng. s. sv.

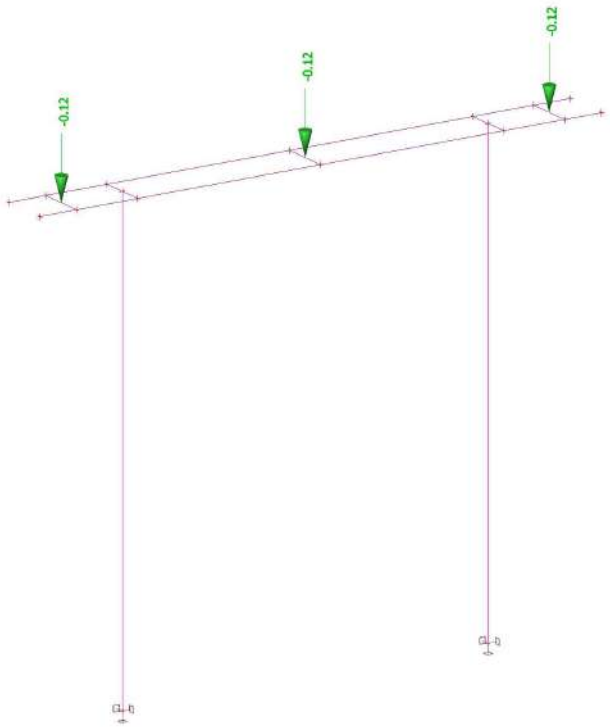


3.2. Laidų s.sv.



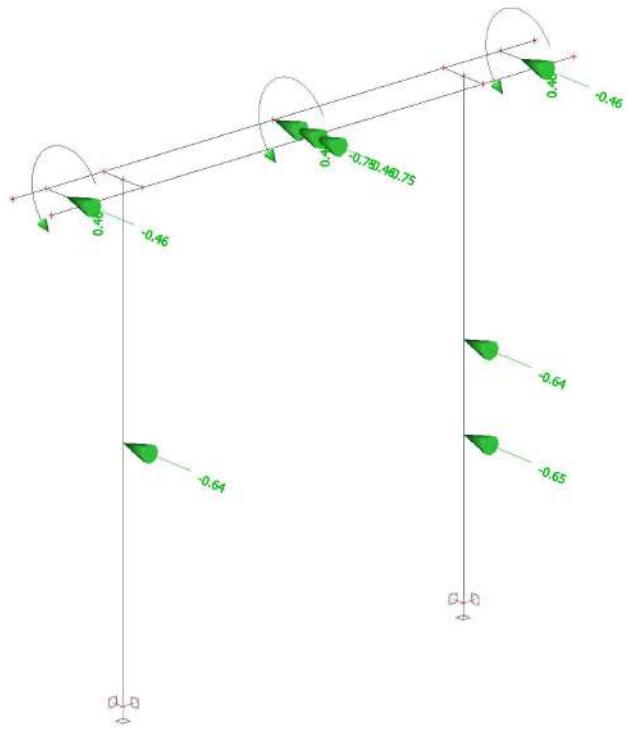
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas





3.4. Vėjas y-y

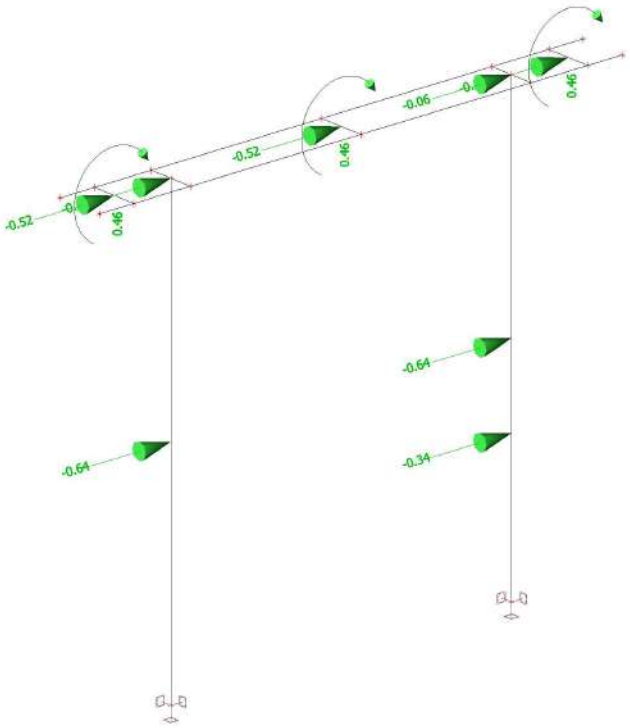




PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

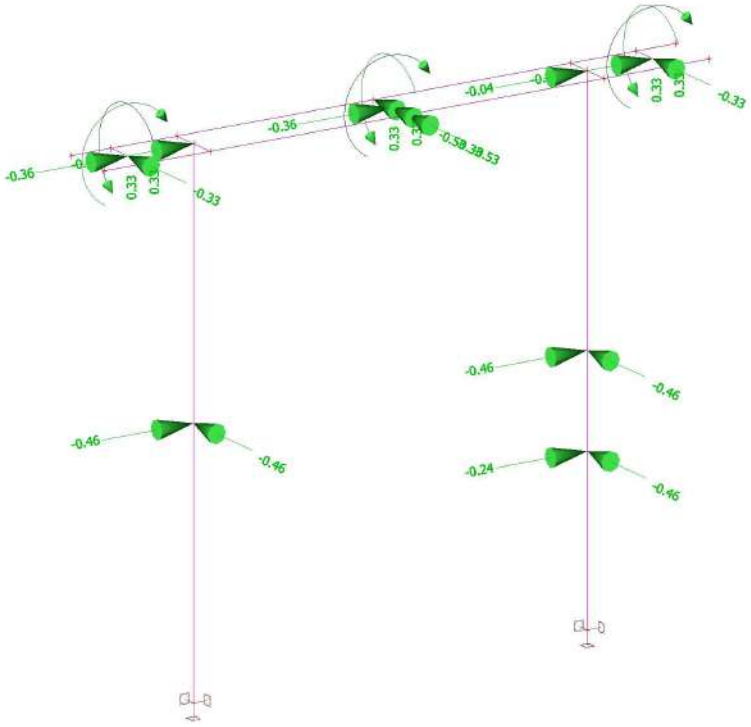
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.5. Vėjas x-x





3.6. Vėjas 45

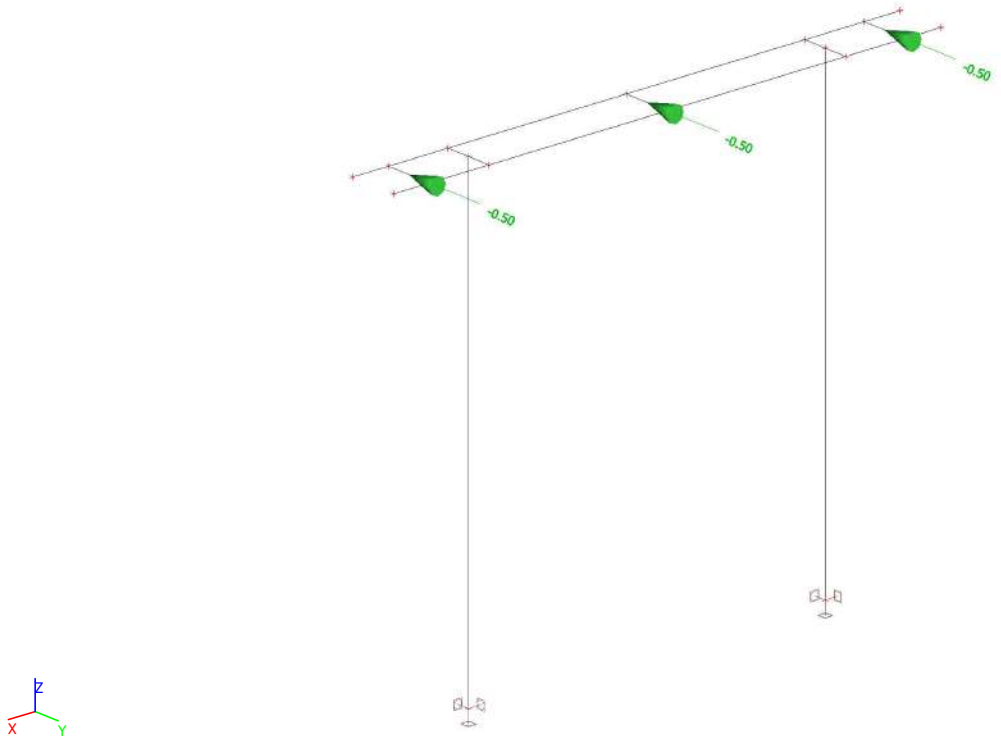




PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.7. Laidų tempimai

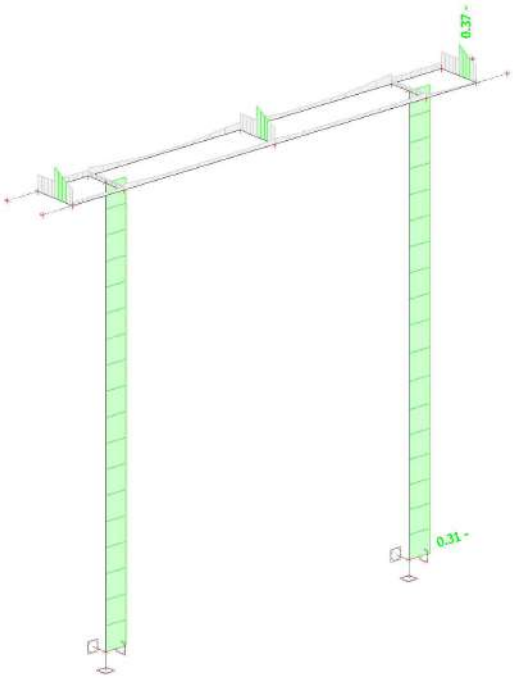


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **UC$_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





4.2. EC-EN 1993 Steel check ULS

Values: **UC$_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	UC$_{Overall}$ [-]	UC$_{Sec}$ [-]	UC$_{Stab}$ [-]
B3	0.000	ULS-Set B (auto)/1	CS7 - UPE160	S 355	**0.04**	0.04	0.03
B4	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.06**	0.06	0.00
B5	0.200+	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.05**	0.05	0.03
B6	0.000	ULS-Set B (auto)/1	CS7 - UPE160	S 355	**0.04**	0.04	0.02
B7	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.37**	0.37	0.00
B8	3.800-	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.12**	0.12	0.00
B9	3.800-	ULS-Set B (auto)/4	CS7 - UPE160	S 355	**0.07**	0.07	0.04
B10	0.000	ULS-Set B (auto)/5	CS14 - CFRHS180X180X5	S 355	**0.29**	0.29	0.29
B11	0.000	ULS-Set B (auto)/5	CS14 - CFRHS180X180X5	S 355	**0.31**	0.31	0.31
B12	0.200-	ULS-Set B (auto)/6	CS7 - UPE160	S 355	**0.37**	0.37	0.00
B13	0.200-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.37**	0.37	0.00

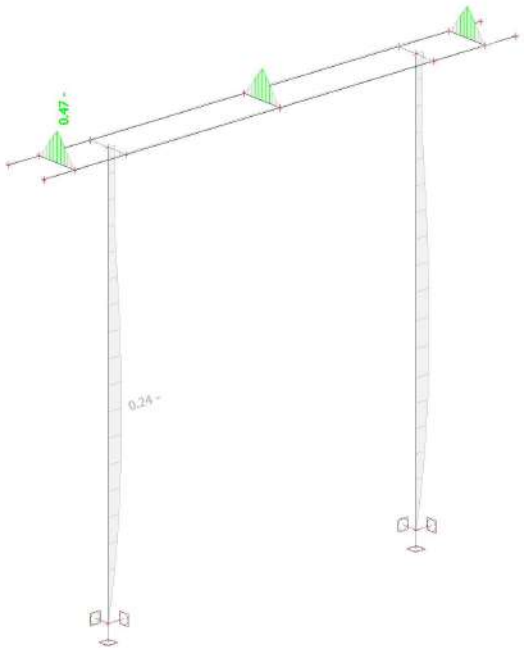
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.37.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B3	0.120	SLS-Char (auto)/1	0.0 0.0	0.0 0.0	2.0 2.0	1.1 1.1	0.00 0.00	0.00 0.00	- -	**0.00**
B4	0.300-	SLS-Char (auto)/1	0.0 0.0	0.0 0.0	2.0 1.0	1.1 0.6	0.00 0.00	0.00 0.00	- -	**0.00**
B5	0.200-	SLS-Char (auto)/2	0.0 0.0	0.0 0.0	2.0 2.0	1.1 1.1	0.00 0.00	0.00 0.00	- -	**0.00**
B6	0.320	SLS-Char (auto)15/3	0.0 0.0	0.0 0.0	1.0 1.0	0.6 0.6	0.00 0.00	0.00 0.00	- -	**0.00**
B7	0.200-	SLS-Char (auto)/4	0.0 0.3	0.0 0.5	2.0 2.0	1.1 1.1	0.00 0.17	0.00 0.47	- -	**0.47**
B8	3.650	SLS-Char (auto)/1	-0.1 0.5	0.0 0.3	7.5 23.0	4.2 12.8	0.01 0.02	0.01 0.02	- -	**0.02**
B9	2.600	SLS-Char (auto)/3	-0.1 -0.1	-0.1 -0.1	7.5 23.0	4.2 12.8	0.02 0.00	0.02 0.01	- -	**0.02**
B10	1.667	SLS-Char (auto)15/3	3.2 0.4	2.5 0.4	18.8 37.5	10.4 20.8	0.17 0.01	0.24 0.02	- -	**0.24**
B11	1.650	SLS-Char (auto)/3	3.2 0.4	2.5 0.4	18.8 37.5	10.4 20.8	0.17 0.01	0.24 0.02	- -	**0.24**
B12	0.200-	SLS-Char (auto)/4	0.0 0.3	0.0 0.5	2.0 2.0	1.1 1.1	0.00 0.17	0.00 0.47	- -	**0.47**

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B13	0.200-	SLS-Char (auto)/4	0.0 0.3	0.0 0.5	2.0 2.0	1.1 1.1	0.00 0.17	0.00 0.47	- -	**0.47**

Name	Combination key
SLS-Char (auto)/1	1 + 0.60*6 + 2 + 3 + 5 + 8
SLS-Char (auto)/2	1 + 7 + 0.60*6 + 2 + 3 + 5
SLS-Char (auto)15/3	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/4	1 + 7 + 2 + 3 + 5

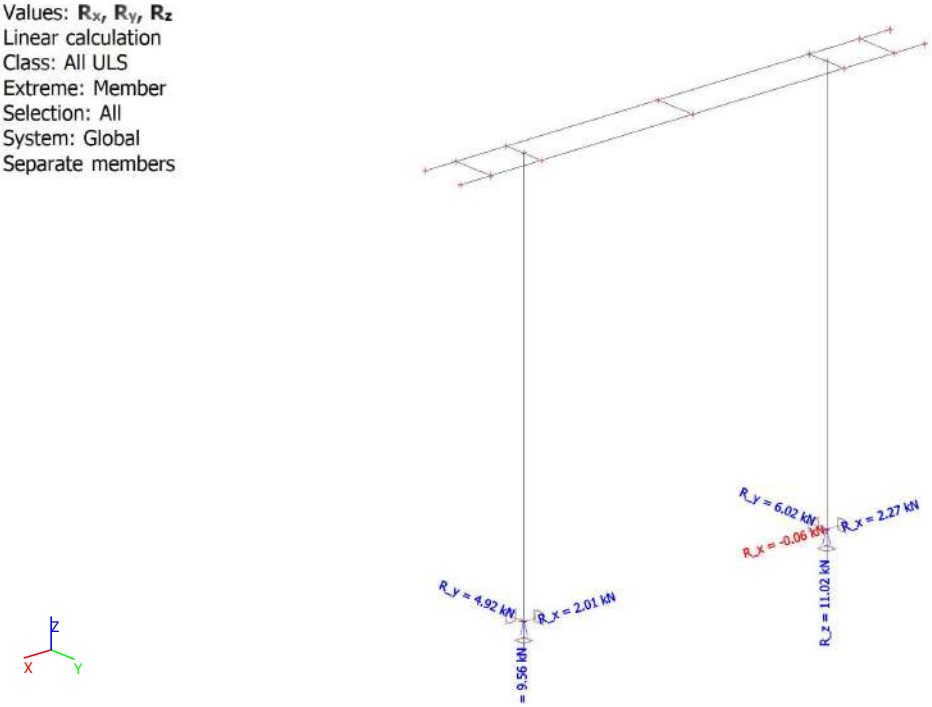
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.47.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6. Reactions

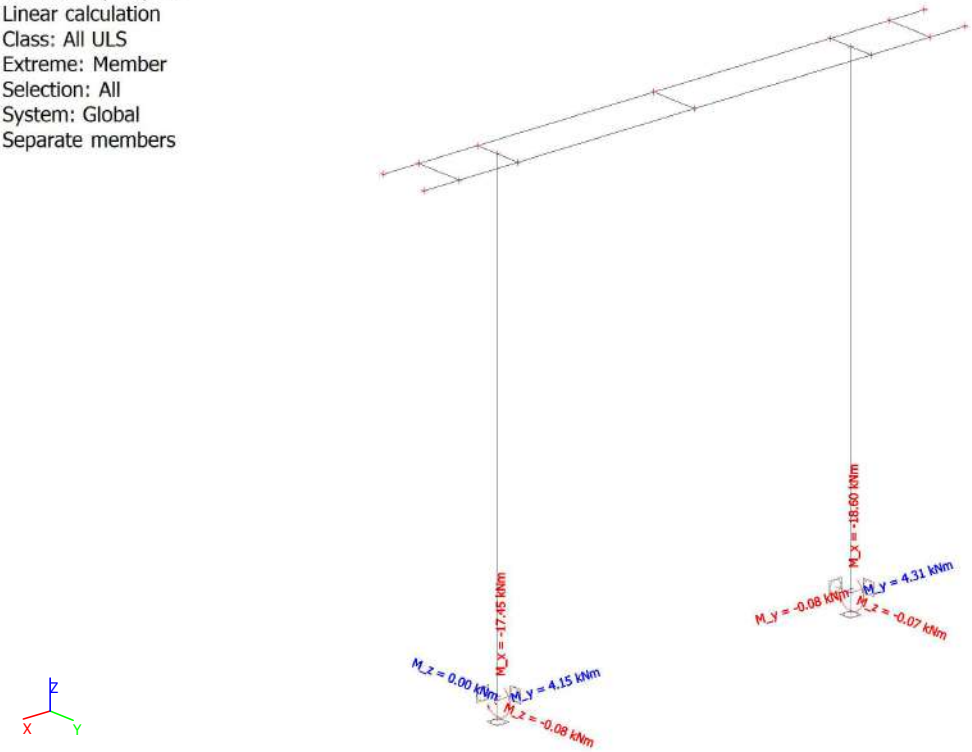
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/1	1.99	0.75	**5.21**	-2.81	4.14	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/2	2.26	1.01	**11.02**	-3.80	4.30	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/3	0.93	**6.02**	10.04	**-18.60**	1.78	-0.07
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/4	**-0.06**	1.01	9.56	-3.80	**-0.08**	0.00
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/1	**2.27**	**0.75**	8.60	**-2.81**	**4.31**	0.00
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/5	0.87	4.65	6.19	-16.46	1.79	**-0.08**
Sn1/N15	3.800	0.000	0.000	ULS-Set B (auto)/2	2.01	1.01	7.63	-3.80	4.15	**0.00**

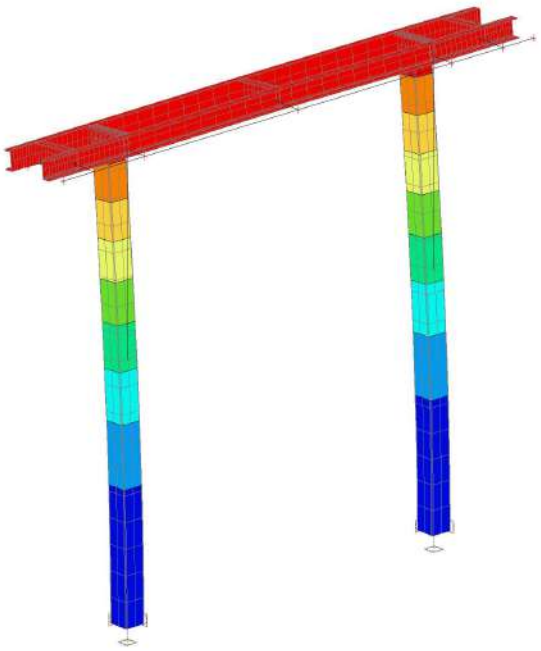
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/3	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/4	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/5	1 + 1.30*6 + 2 + 3 + 5 + 0.78*8

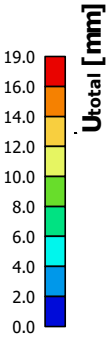
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B3	0.000	SLS-Char (auto)/1	**-2.7**	-9.3	0.7	3.7	-0.2	0.1	9.7
B3	0.400	SLS-Char (auto)/2	**0.0**	-13.0	-1.1	5.3	0.1	0.1	13.1
B8	4.600	SLS-Char (auto)/3	-1.1	-17.4	**-1.9**	**8.0**	-0.6	0.1	17.6
B9	4.600	SLS-Char (auto)/3	-1.2	-16.9	**1.5**	7.4	-0.1	0.1	17.0
B10	0.000	SLS-Char (auto)/4	0.0	**0.0**	0.0	**0.0**	0.0	0.0	0.0
B13	0.200-	SLS-Char (auto)/5	-2.7	-3.7	0.1	1.4	**-7.6**	0.0	4.5
B12	0.200-	SLS-Char (auto)/6	0.0	-3.7	-0.3	1.4	**4.1**	0.0	3.7
B8	3.050+	SLS-Char (auto)/3	-1.1	-17.8	-1.5	7.9	0.3	**-1.0**	17.9
B9	3.050+	SLS-Char (auto)/3	-1.2	-17.7	1.3	6.8	0.0	**1.2**	17.7
B7	0.400	SLS-Char (auto)/3	-1.1	**-18.3**	-1.7	7.7	0.0	0.1	**18.4**

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

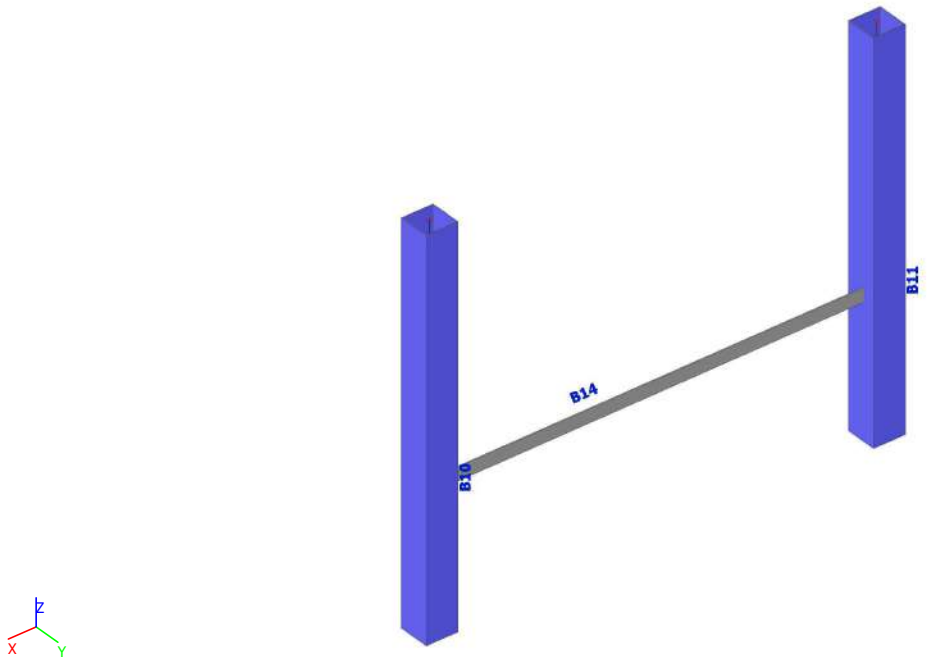
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 9
6.1. Resultant of reactions; R_x; R_y; R_z 9
6.2. Resultant of reactions; M_x; M_y; M_z 9
6.3. Resultant of reactions 10
7. Deformations 11
7.1. 3D displacement; U_total 11
7.2. 1D deformations 11

2. Geometry

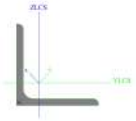
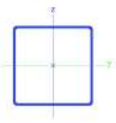
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B10	CS21 - SHS180/180/5.0	S 355	2.200
B11	CS21 - SHS180/180/5.0	S 355	2.200
B14	CS20 - L75x75x6	S 355	2.530

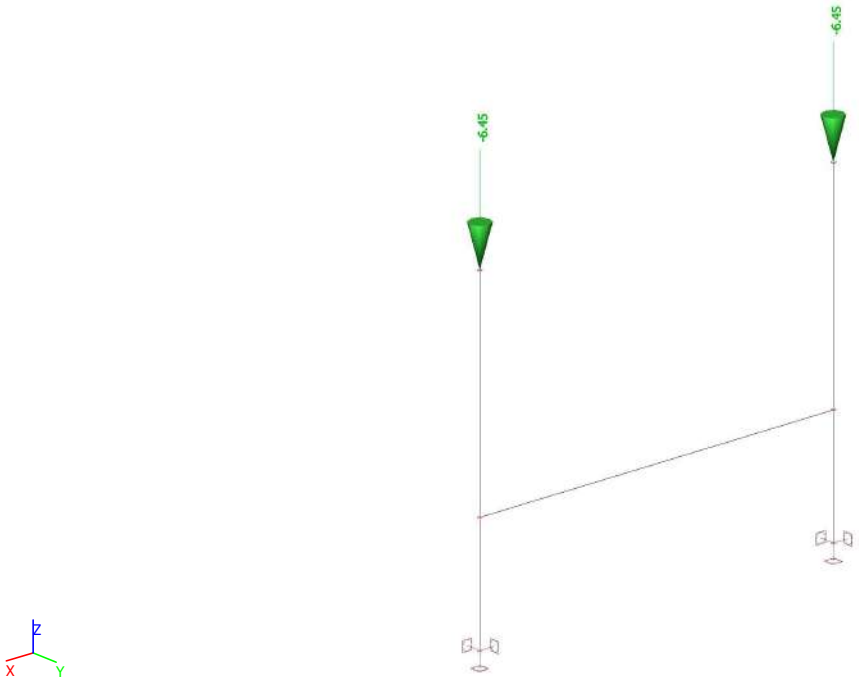
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS20	L75x75x6	S 355	
CS21	SHS180/180/5.0	S 355	

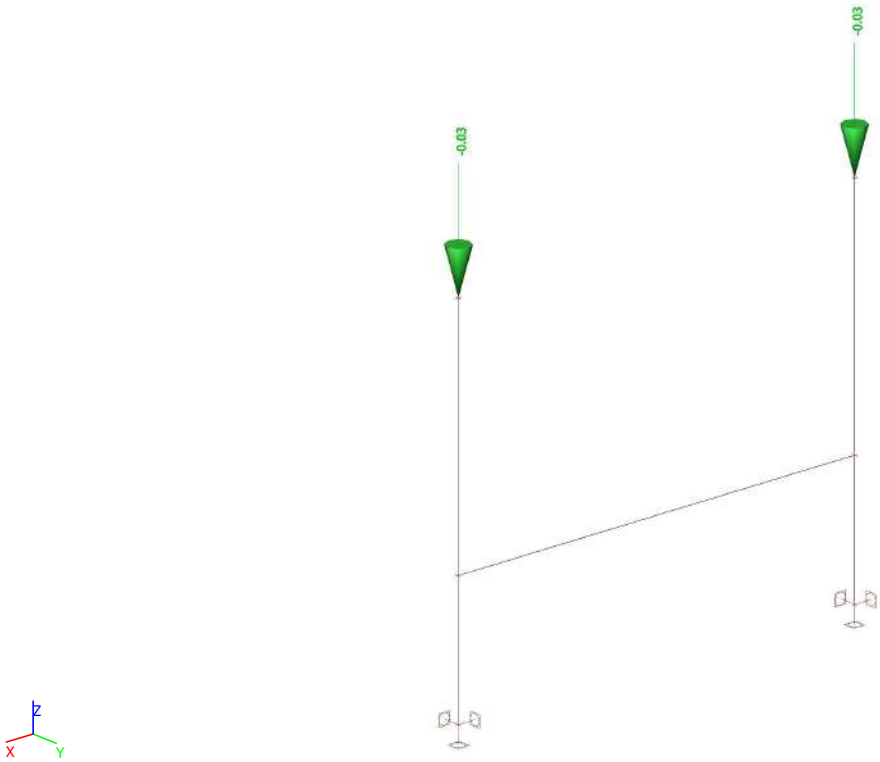
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.

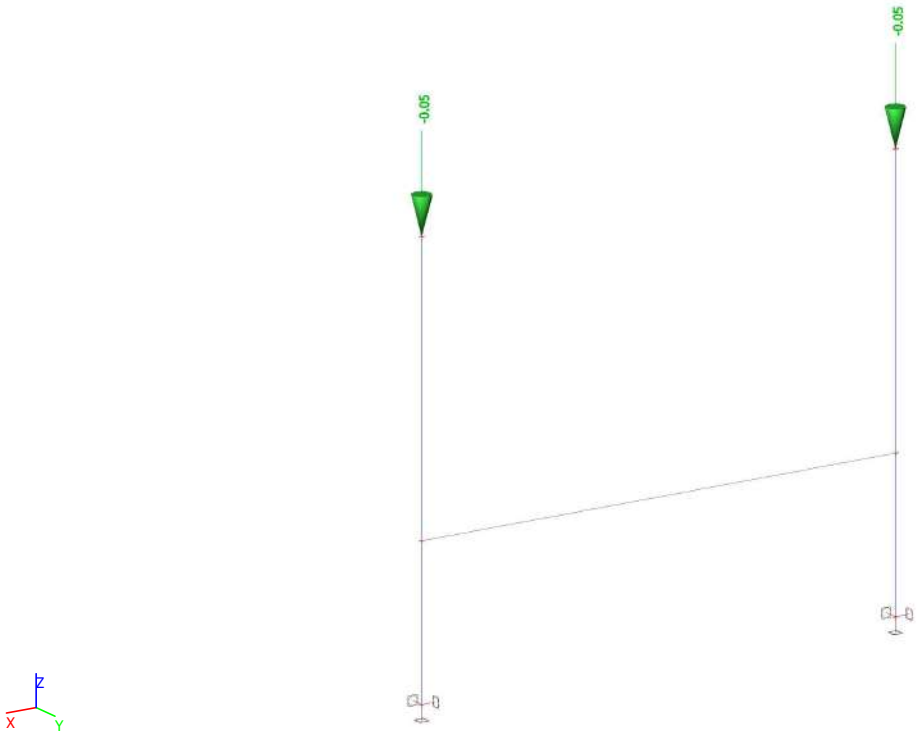


3.2. Laidų s.sv.

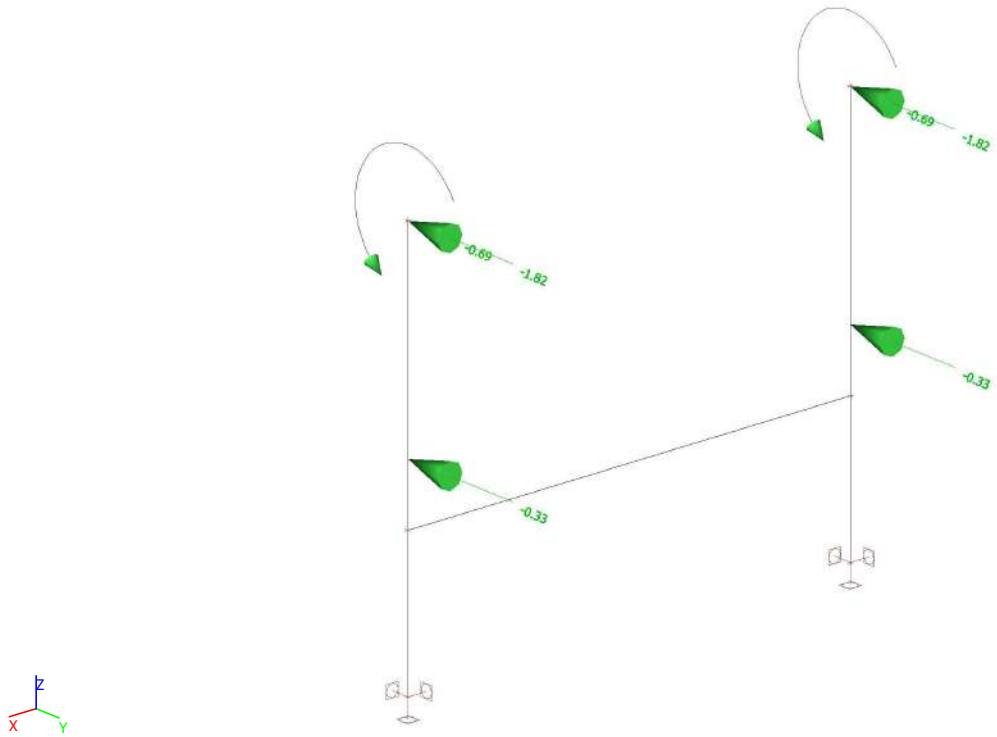


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas



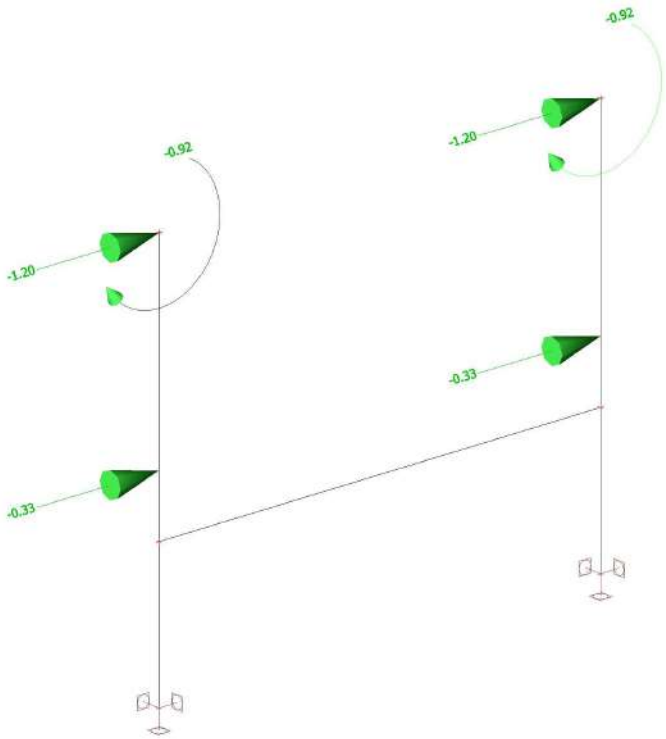
3.4. Vėjas y-y



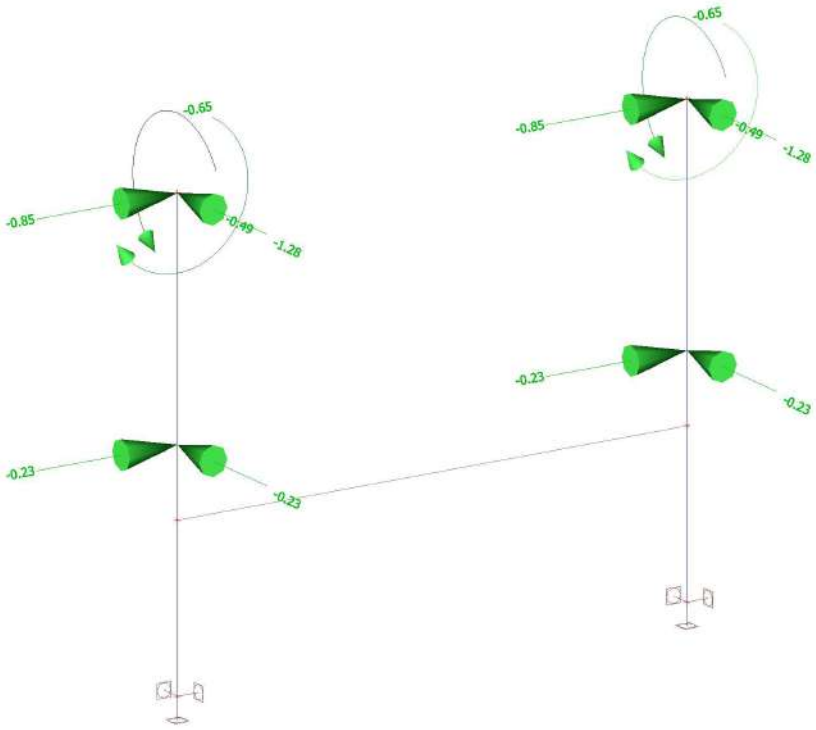
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.5. Vėjas x-x

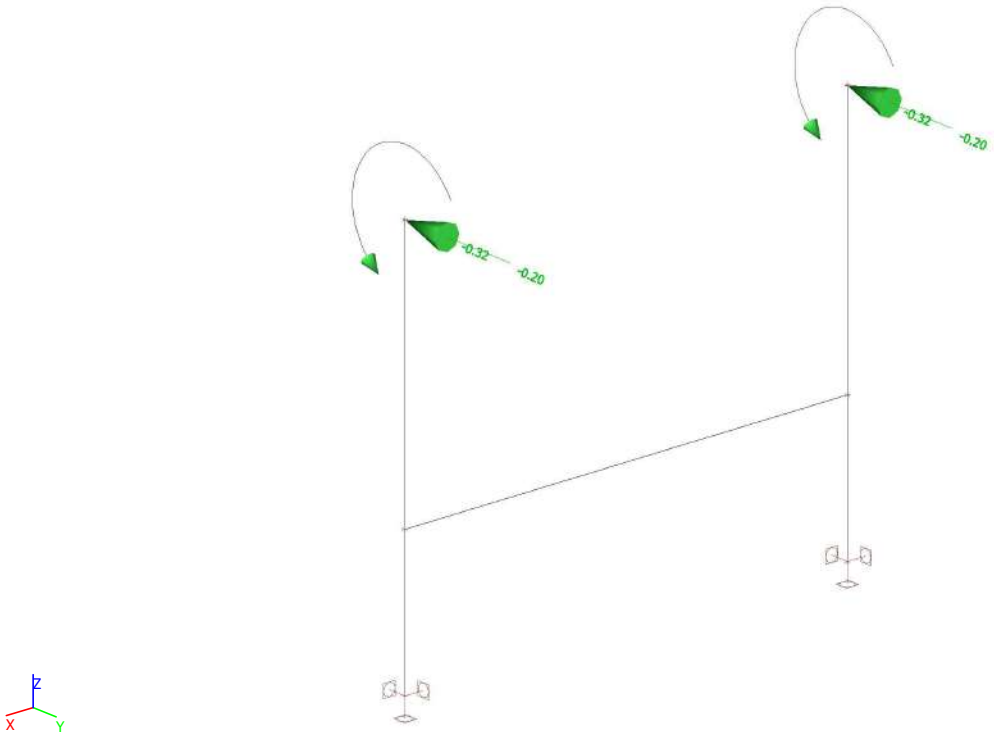


3.6. Vėjas 45



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.7. Laidų tempimai



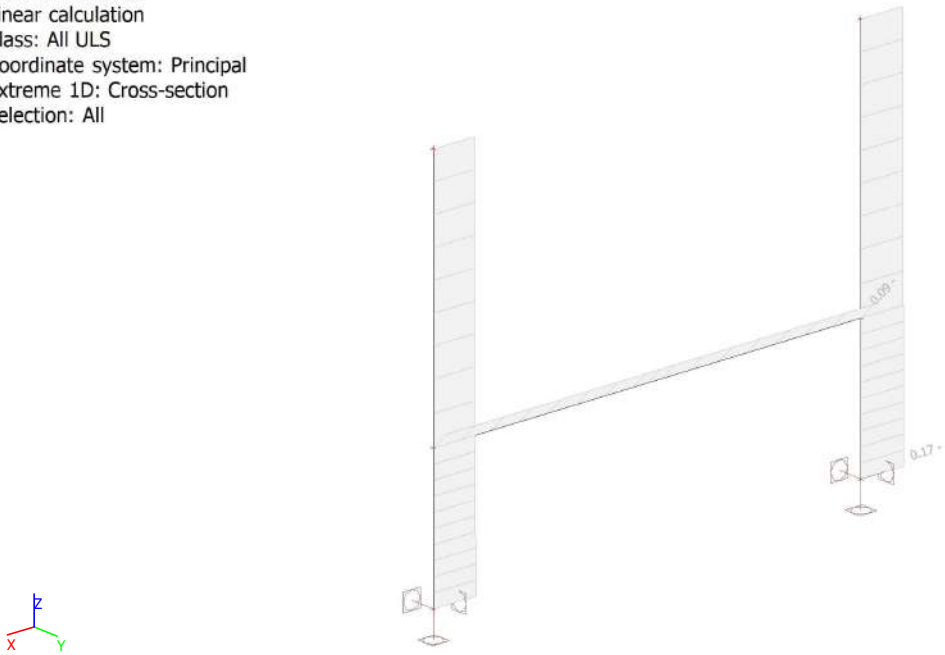
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

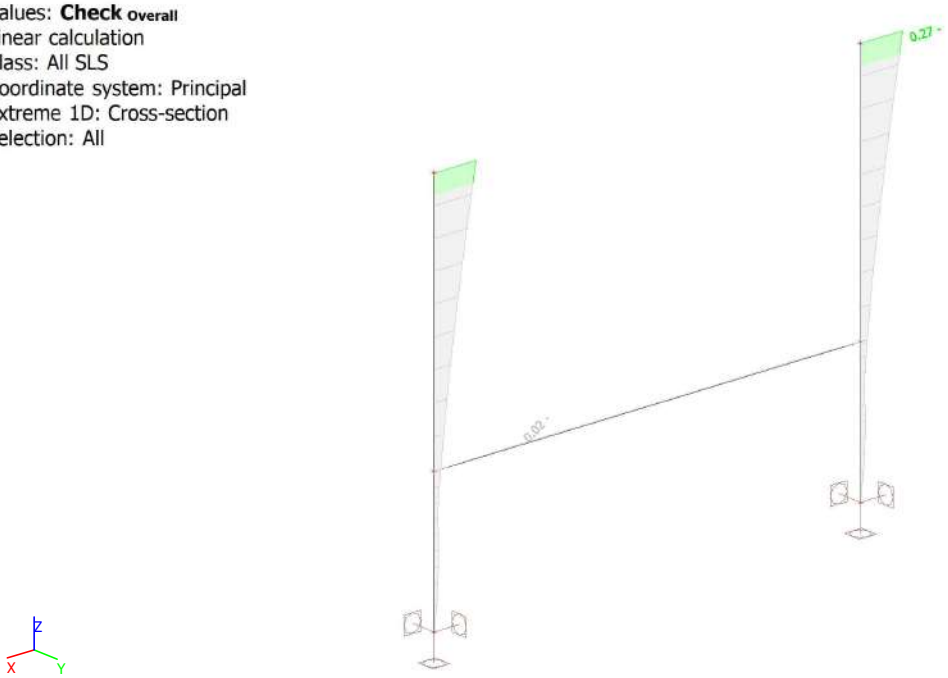
Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B10	0.000	ULS-Set B (auto)/1	CS21 - SHS180/180/5.0	S 355	**0.17**	0.15	0.17
B11	0.000	ULS-Set B (auto)/2	CS21 - SHS180/180/5.0	S 355	**0.17**	0.14	0.17
B14	2.530	ULS-Set B (auto)/3	CS20 - L75x75x6	S 355	**0.09**	0.08	0.09

Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.21.

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B10	2.200	SLS-Char (auto)/1	-3.7 0.7	-3.3 0.7	22.0 14.3	12.2 7.9	0.17 0.05	0.27 0.08	- -	**0.27**
B11	2.200	SLS-Char (auto)/1	-3.7 0.6	-3.3 0.7	22.0 14.3	12.2 7.9	0.17 0.05	0.27 0.08	- -	**0.27**
B14	2.024	SLS-Char (auto)/2	0.1 0.1	0.1 0.1	12.7 12.7	7.0 7.0	0.01 0.01	0.02 0.02	- -	**0.02**

Name	Combination key
SLS-Char (auto)/1	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/2	1 + 7 + 2 + 3 + 5

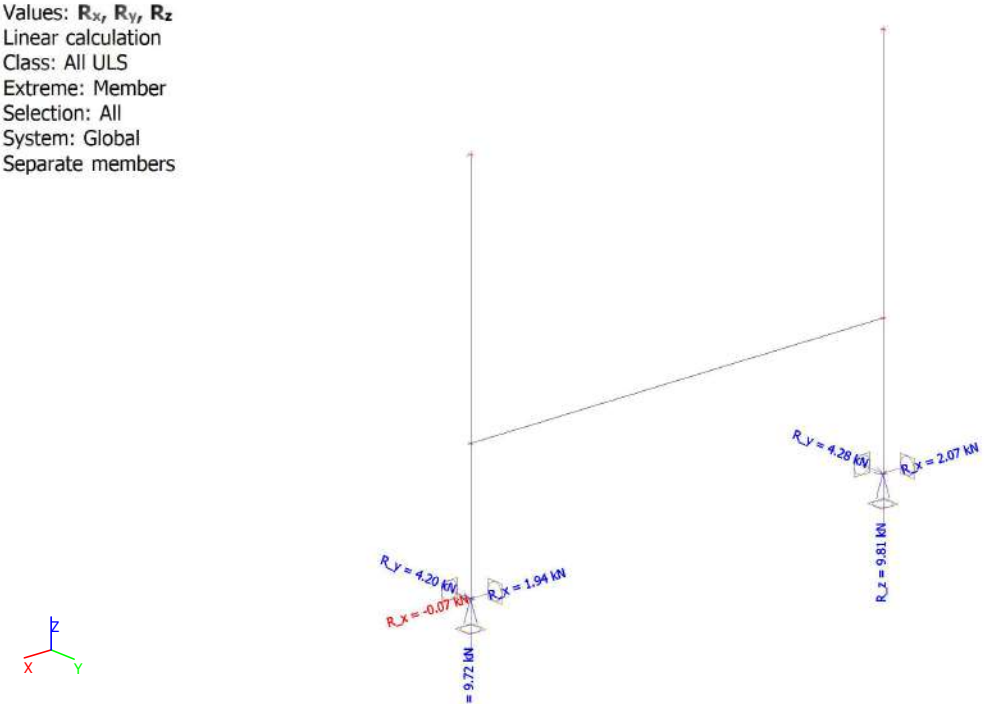
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.35.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6. Reactions

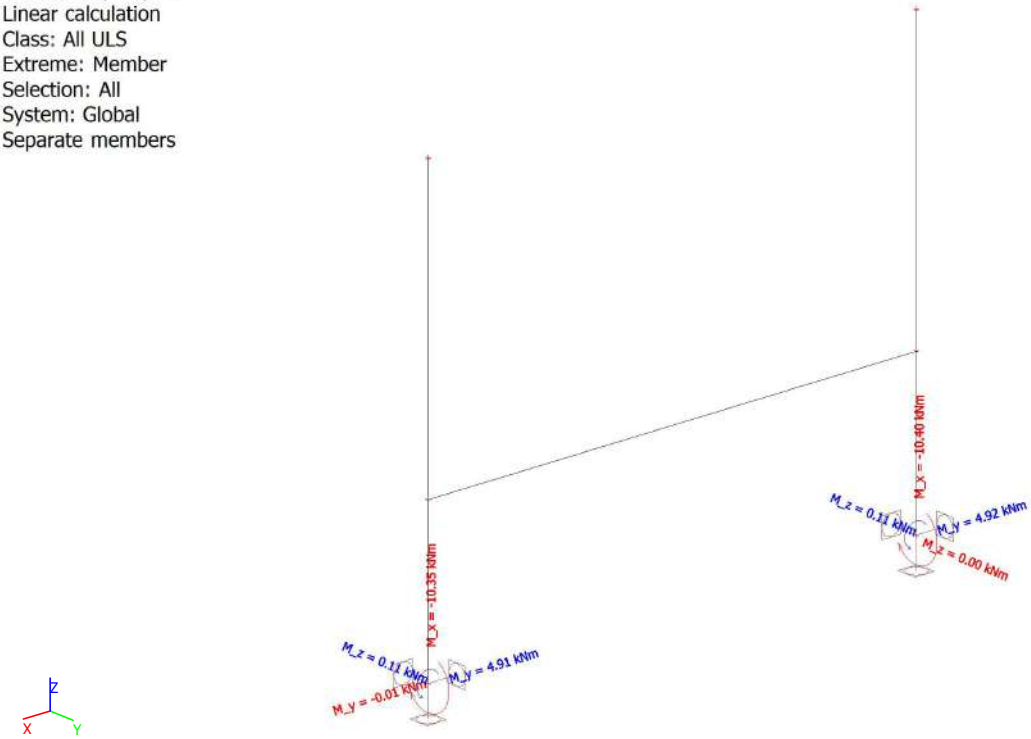
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	2.530	0.000	0.000	ULS-Set B (auto)/1	1.94	**0.11**	**7.00**	**-0.70**	4.91	0.11
Sn2/N17	0.000	0.000	0.000	ULS-Set B (auto)/2	0.92	**4.28**	9.72	**-10.40**	2.09	0.04
Sn1/N15	2.530	0.000	0.000	ULS-Set B (auto)/3	**-0.07**	0.27	9.66	-1.02	**-0.01**	0.00
Sn2/N17	0.000	0.000	0.000	ULS-Set B (auto)/4	**2.07**	0.35	**9.81**	-1.08	**4.92**	0.11
Sn2/N17	0.000	0.000	0.000	ULS-Set B (auto)/3	0.07	0.27	9.66	-1.02	0.01	**0.00**
Sn1/N15	2.530	0.000	0.000	ULS-Set B (auto)/4	1.92	0.18	9.51	-0.96	4.91	**0.11**

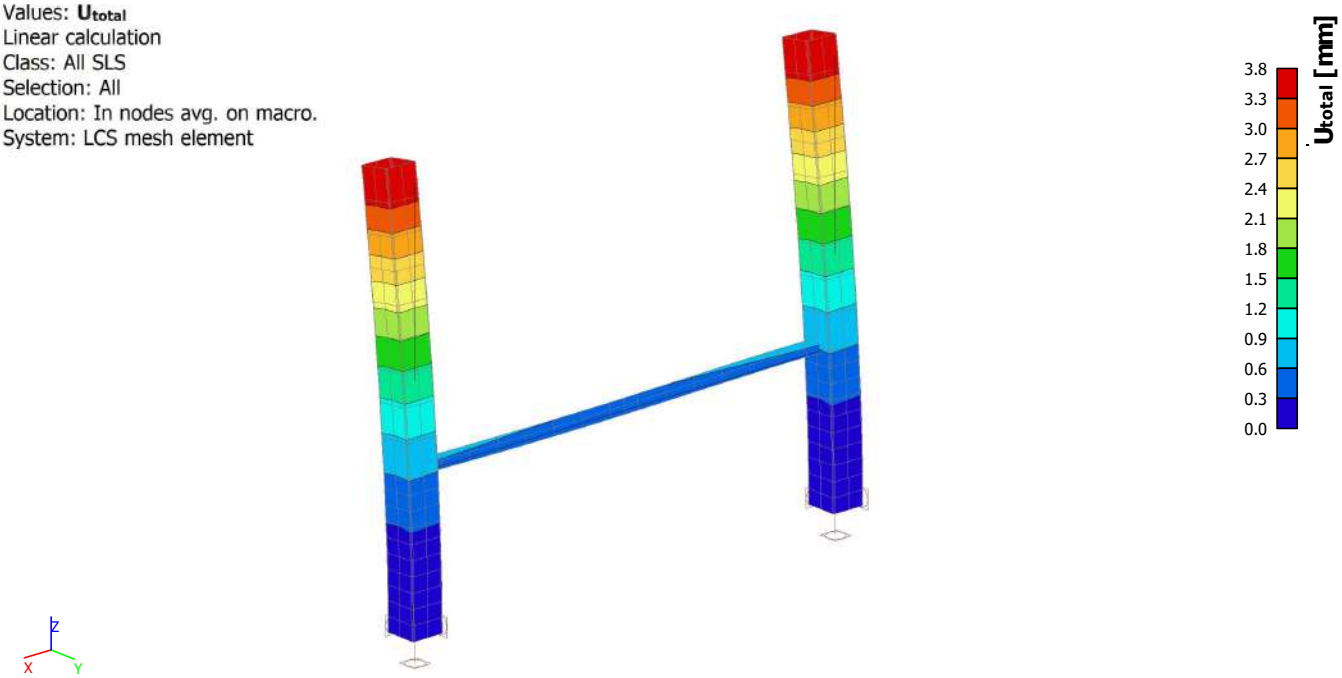
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/3	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/4	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All
Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B11	2.200	SLS-Char (auto)/1	**0.0**	-0.4	0.0	0.3	0.0	0.0	0.4
B11	2.200	SLS-Char (auto)/2	-0.8	**-3.7**	0.0	**2.7**	-0.6	0.0	**3.8**
B14	1.181	SLS-Char (auto)/3	-0.3	**0.0**	-0.2	1.3	0.3	0.0	0.3
B14	0.675	SLS-Char (auto)/3	-0.3	0.0	**-0.2**	1.0	0.0	-0.1	0.4
B14	2.193	SLS-Char (auto)/3	-0.3	-0.1	**0.1**	0.7	-0.1	0.1	0.3
B10	0.000	SLS-Char (auto)/1	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0
B10	2.200	SLS-Char (auto)/3	**-1.8**	-0.4	0.0	0.3	**-1.4**	0.0	1.9
B14	1.518	SLS-Char (auto)/3	-0.3	0.0	0.0	1.3	**0.4**	0.1	0.3
B14	0.506	SLS-Char (auto)/1	0.0	0.0	-0.1	0.9	-0.1	**-0.1**	0.1
B14	1.855	SLS-Char (auto)/3	-0.3	0.0	0.1	1.0	0.2	**0.1**	0.3

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

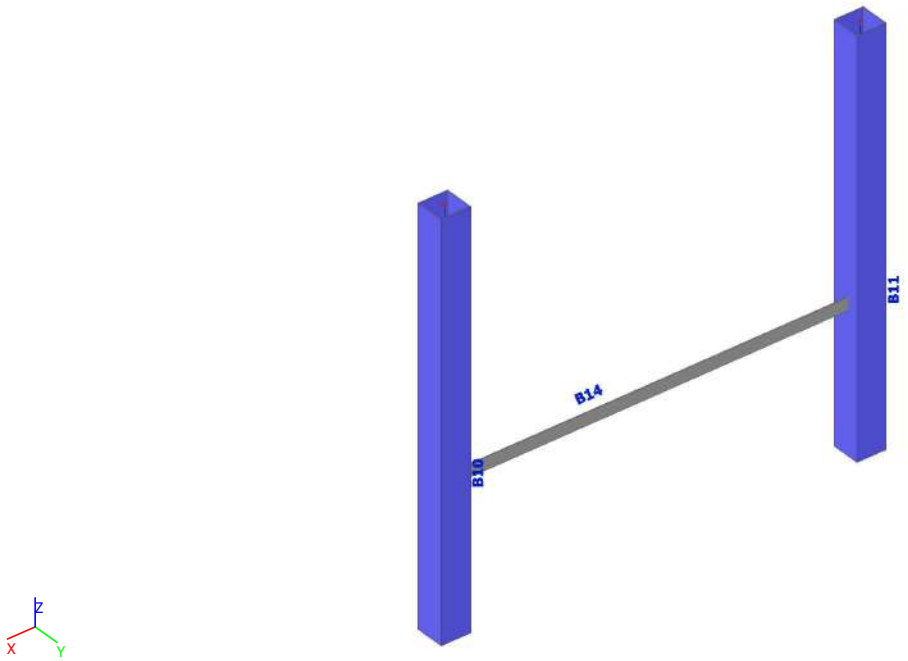
1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 9
6.1. Resultant of reactions; R_x; R_y; R_z 9
6.2. Resultant of reactions; M_x; M_y; M_z 9
6.3. Resultant of reactions 10
7. Deformations 11
7.1. 3D displacement; U_total 11
7.2. 1D deformations 11

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

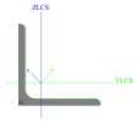
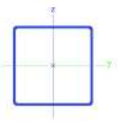
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B10	CS21 - SHS180/180/5.0	S 355	2.460
B11	CS21 - SHS180/180/5.0	S 355	2.460
B14	CS20 - L75x75x6	S 355	2.530

2.3. Cross-sections

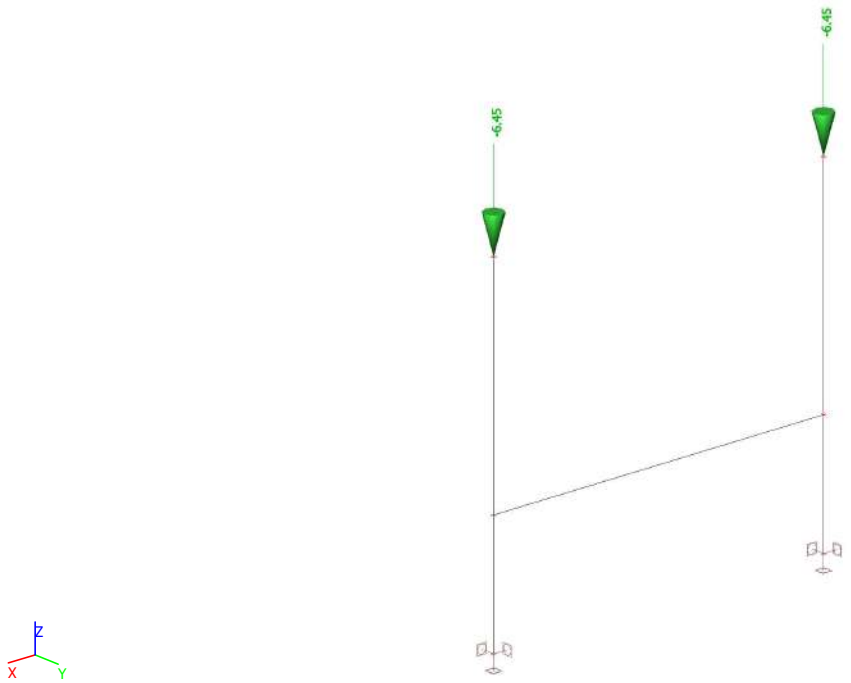
Name	Type	Item material	Picture
	Detailed		
CS20	L75x75x6	S 355	
CS21	SHS180/180/5.0	S 355	

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

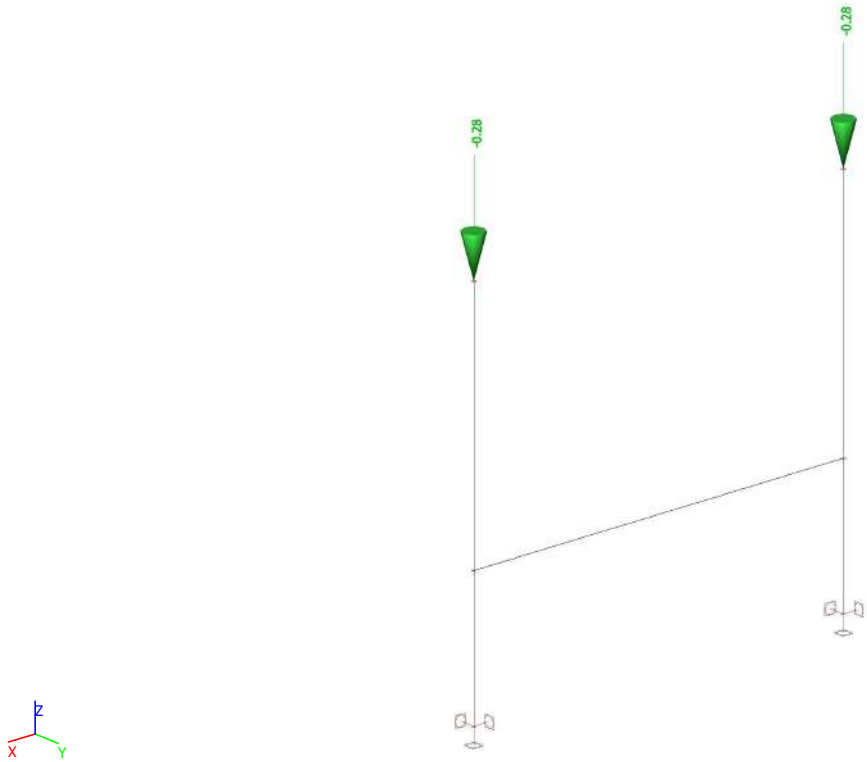
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.



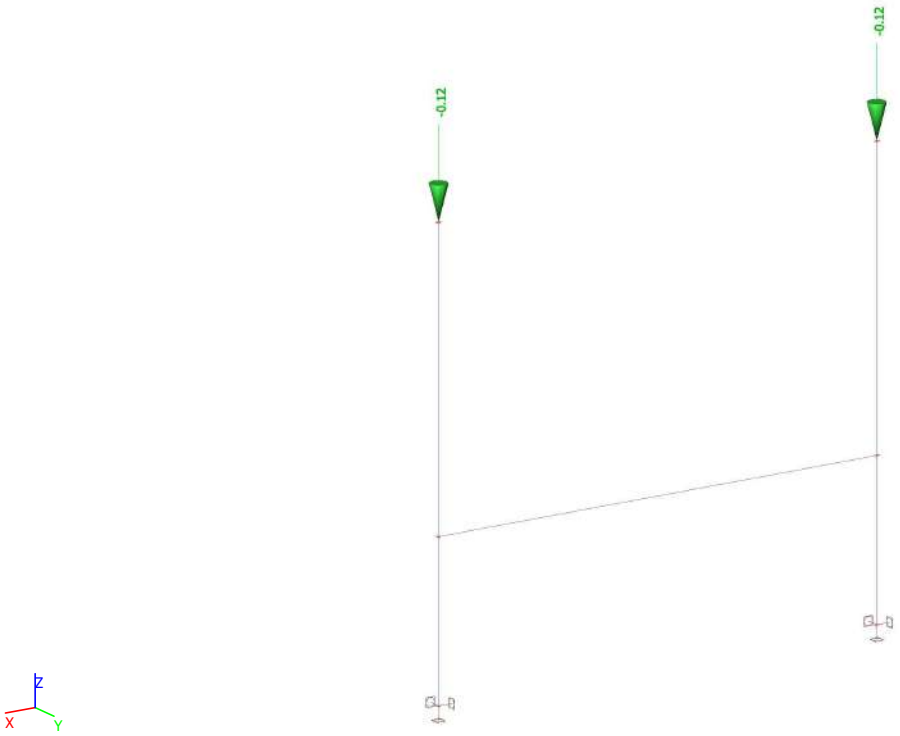
3.2. Laidų s.sv.



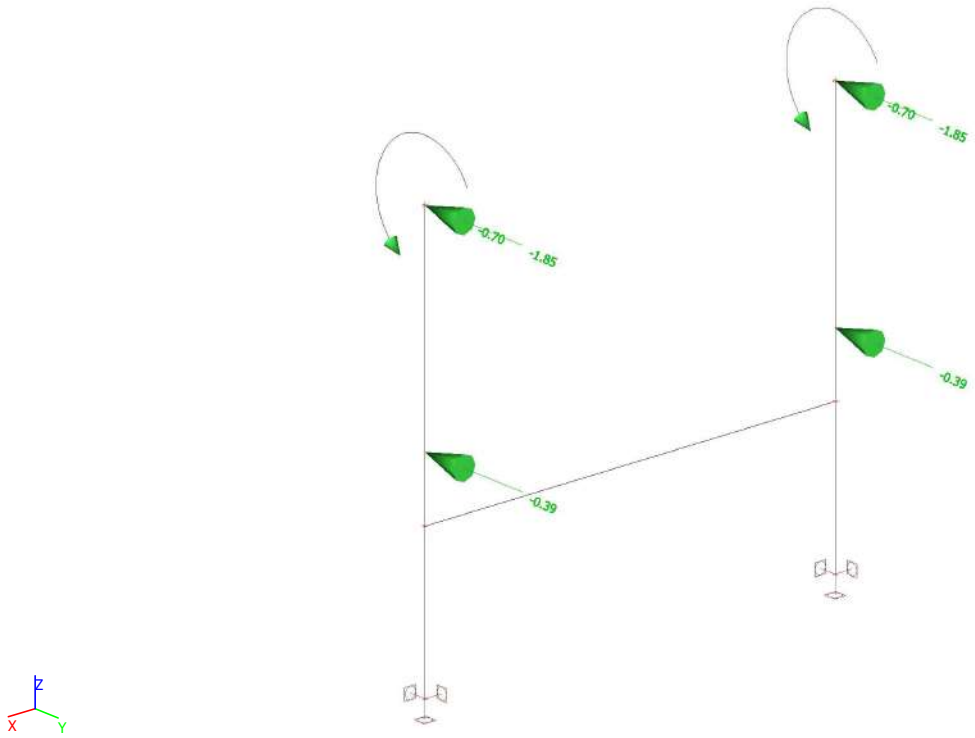
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas



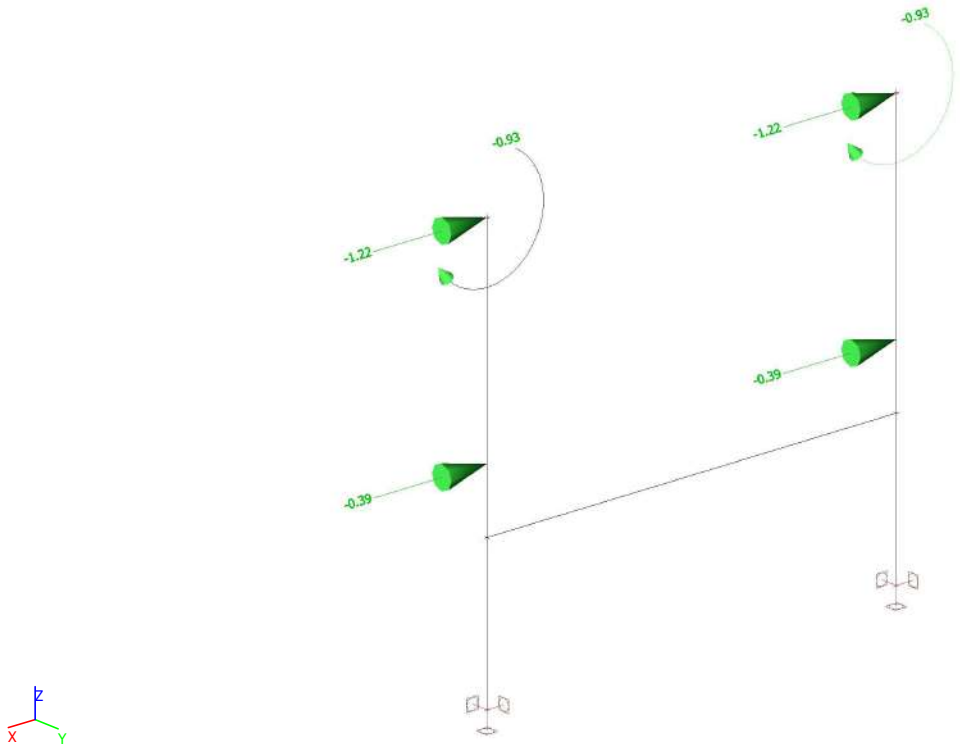
3.4. Vėjas y-y



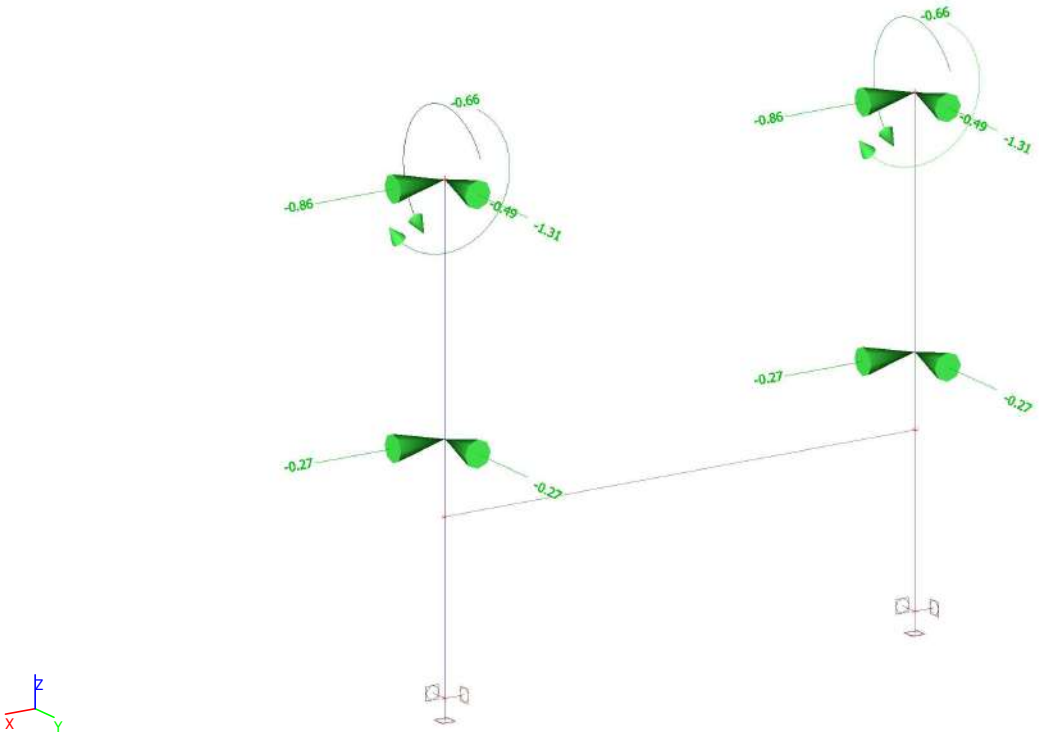
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

3.5. Vėjas x-x



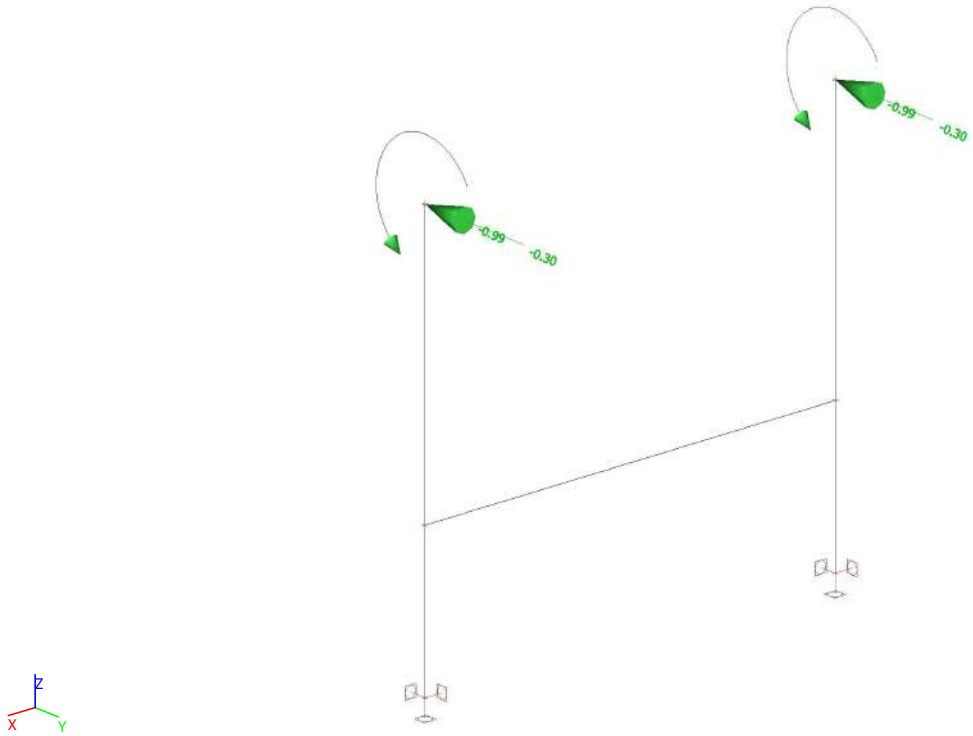
3.6. Vėjas 45



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

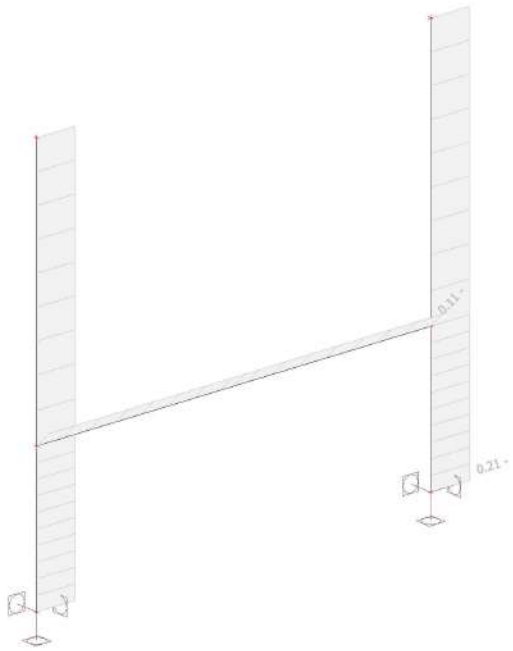
3.7. Laidų tempimai



4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B10	0.000	ULS-Set B (auto)/1	CS21 - SHS180/180/5.0	S 355	**0.21**	0.19	0.21
B11	0.000	ULS-Set B (auto)/2	CS21 - SHS180/180/5.0	S 355	**0.21**	0.17	0.21
B14	2.530	ULS-Set B (auto)/3	CS20 - L75x75x6	S 355	**0.11**	0.10	0.11

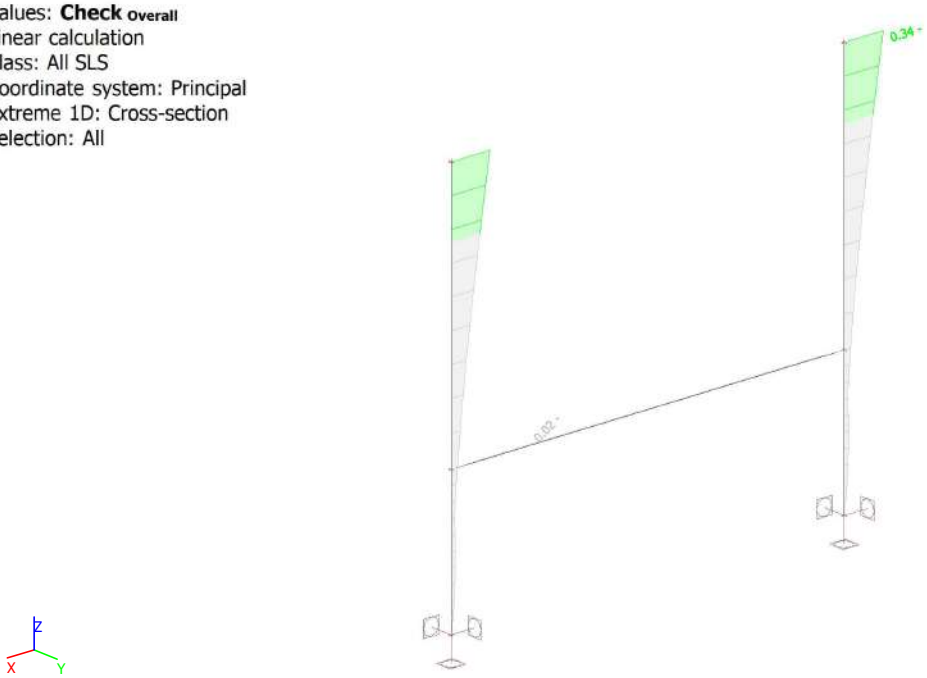
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.23.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B10	2.460	SLS-Char (auto)/1	-5.8 0.9	-4.6 0.9	24.6 16.0	13.7 8.9	0.24 0.06	0.34 0.10	- -	**0.34**
B11	2.460	SLS-Char (auto)/1	-5.8 0.9	-4.6 0.9	24.6 16.0	13.7 8.9	0.24 0.06	0.34 0.10	- -	**0.34**
B14	2.024	SLS-Char (auto)/2	0.1 0.1	0.1 0.1	12.7 12.7	7.0 7.0	0.01 0.01	0.02 0.02	- -	**0.02**

Name	Combination key
SLS-Char (auto)/1	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/2	1 + 7 + 2 + 3 + 5

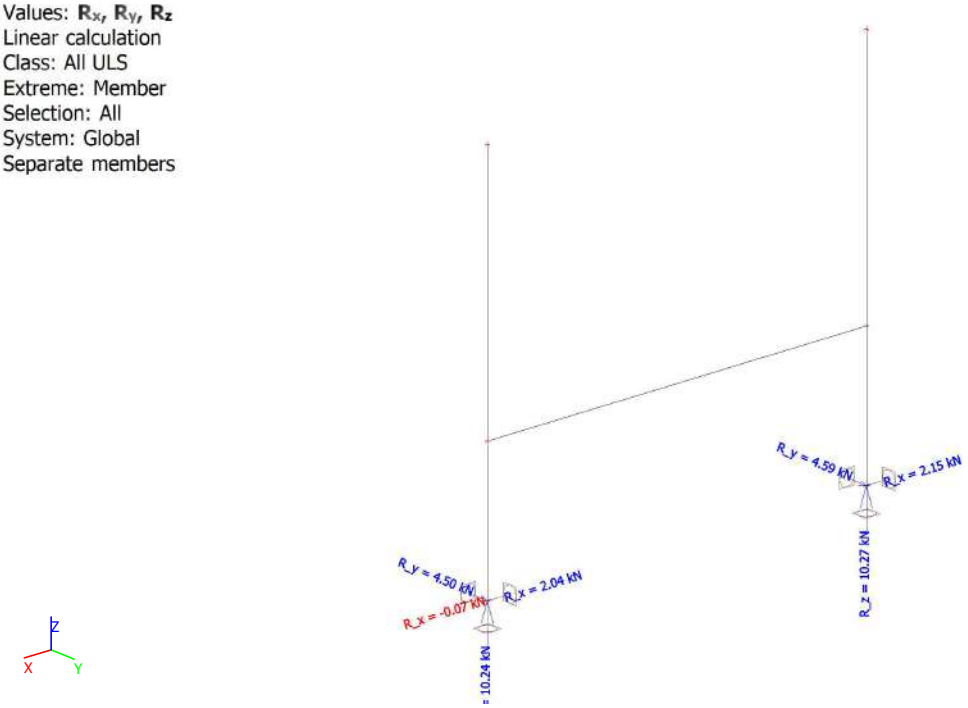
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.36.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6. Reactions

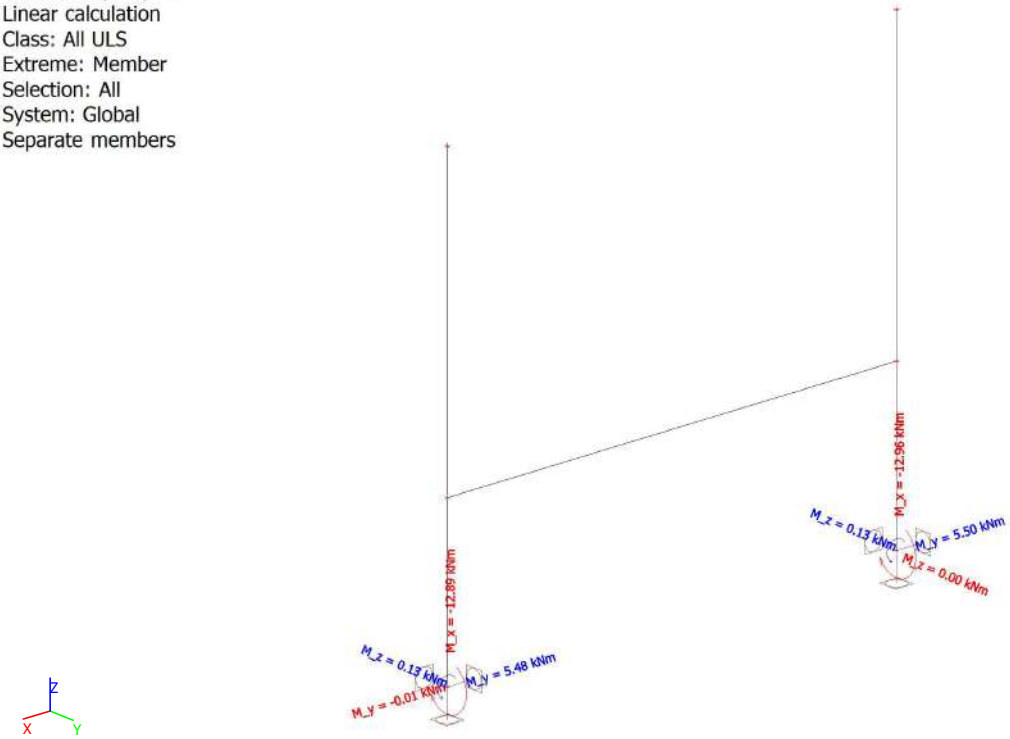
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	2.530	0.000	0.000	ULS-Set B (auto)/1	2.04	**0.20**	**7.28**	**-1.64**	5.48	0.13
Sn2/N17	0.000	0.000	0.000	ULS-Set B (auto)/2	0.95	**4.59**	10.16	**-12.96**	2.34	0.05
Sn1/N15	2.530	0.000	0.000	ULS-Set B (auto)/3	**-0.07**	0.41	10.08	-2.33	**-0.01**	0.00
Sn2/N17	0.000	0.000	0.000	ULS-Set B (auto)/4	**2.15**	0.51	**10.27**	-2.42	**5.50**	0.13
Sn2/N17	0.000	0.000	0.000	ULS-Set B (auto)/3	0.07	0.41	10.08	-2.33	0.01	**0.00**
Sn1/N15	2.530	0.000	0.000	ULS-Set B (auto)/4	2.02	0.30	9.90	-2.25	5.48	**0.13**

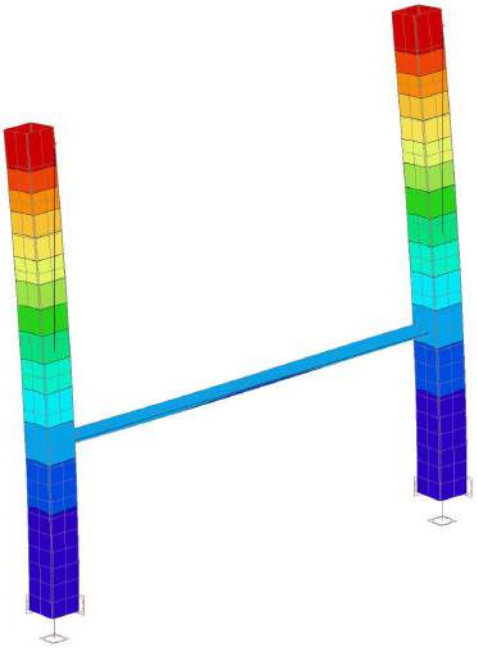
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/3	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/4	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5

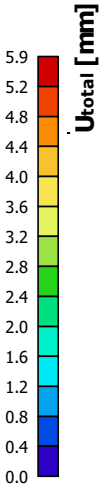
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B11	2.460	SLS-Char (auto)/1	**0.0**	-1.2	0.0	0.9	0.0	0.0	1.2
B11	2.460	SLS-Char (auto)/2	-1.1	**-5.8**	0.0	**3.8**	-0.7	0.0	**5.9**
B14	0.675	SLS-Char (auto)/3	-0.4	-0.1	**-0.3**	1.3	0.0	-0.1	0.5
B14	2.024	SLS-Char (auto)/3	-0.4	-0.2	**0.1**	1.1	0.1	0.1	0.4
B10	0.000	SLS-Char (auto)/1	0.0	**0.0**	0.0	**0.0**	0.0	0.0	0.0
B10	2.460	SLS-Char (auto)/3	**-2.5**	-1.2	0.0	0.9	**-1.7**	0.0	2.8
B14	1.518	SLS-Char (auto)/3	-0.4	-0.1	0.0	1.5	**0.4**	0.1	0.4
B14	0.506	SLS-Char (auto)/1	0.0	-0.1	-0.1	1.1	-0.1	**-0.1**	0.1
B14	1.855	SLS-Char (auto)/3	-0.4	-0.1	0.1	1.3	0.3	**0.1**	0.4

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

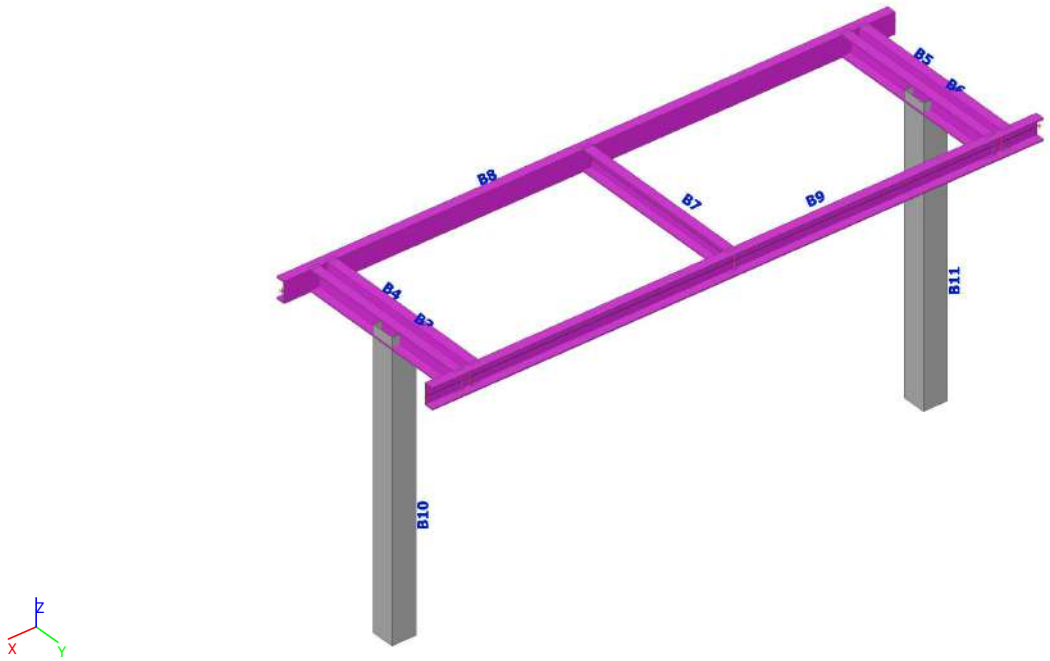
1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 10
6.1. Resultant of reactions; R_x; R_y; R_z 10
6.2. Resultant of reactions; M_x; M_y; M_z 10
6.3. Resultant of reactions 11
7. Deformations 12
7.1. 3D displacement; U_total 12
7.2. 1D deformations 12

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

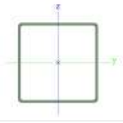
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B3	CS7 - UPE160	S 355	1.400
B4	CS7 - UPE160	S 355	1.400
B5	CS7 - UPE160	S 355	1.400
B6	CS7 - UPE160	S 355	1.400
B7	CS7 - UPE160	S 355	1.400
B8	CS7 - UPE160	S 355	4.600
B9	CS7 - UPE160	S 355	4.600
B10	CS20 - SHS180/180/5.0	S 355	2.200
B11	CS20 - SHS180/180/5.0	S 355	2.200

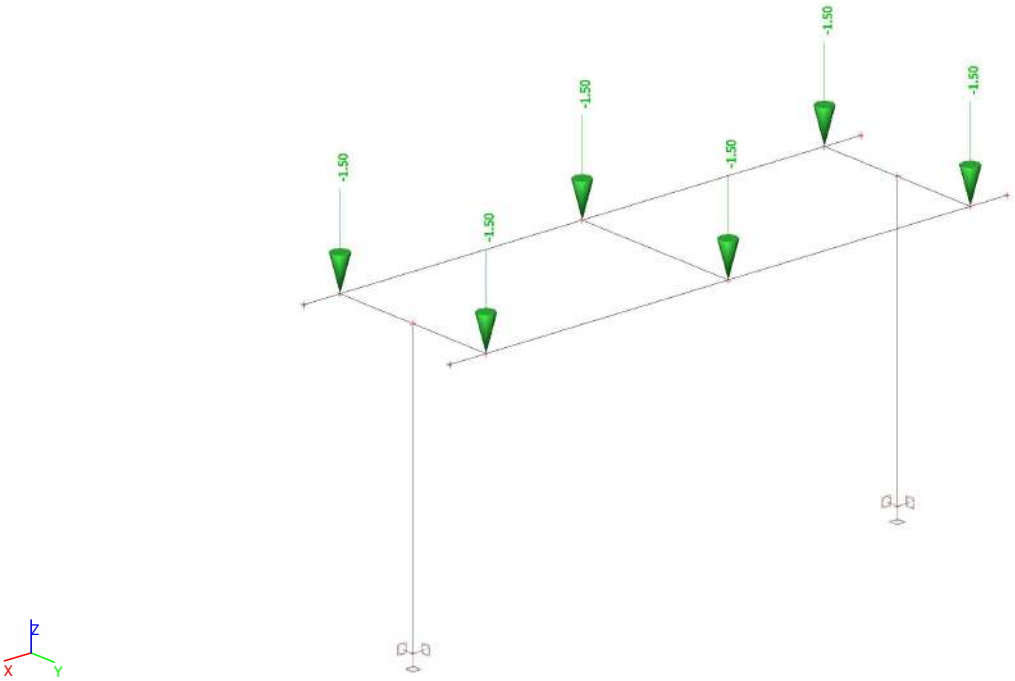
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS7	UPE160	S 355	
CS20	SHS180/180/5.0	S 355	

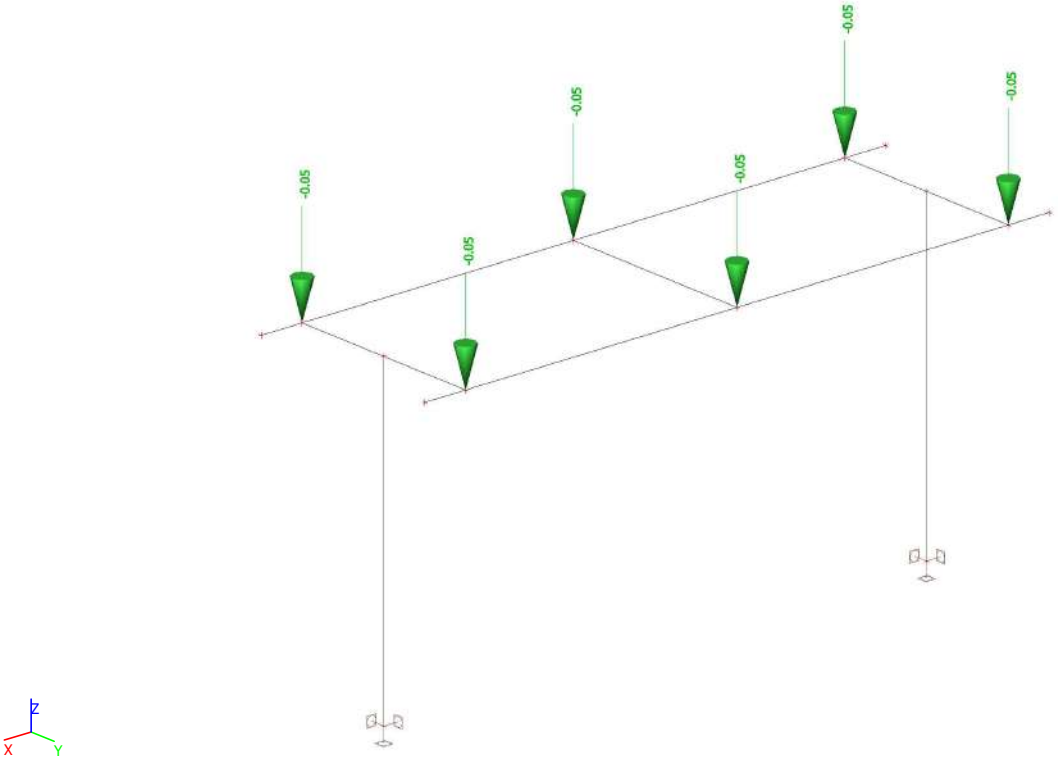
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.



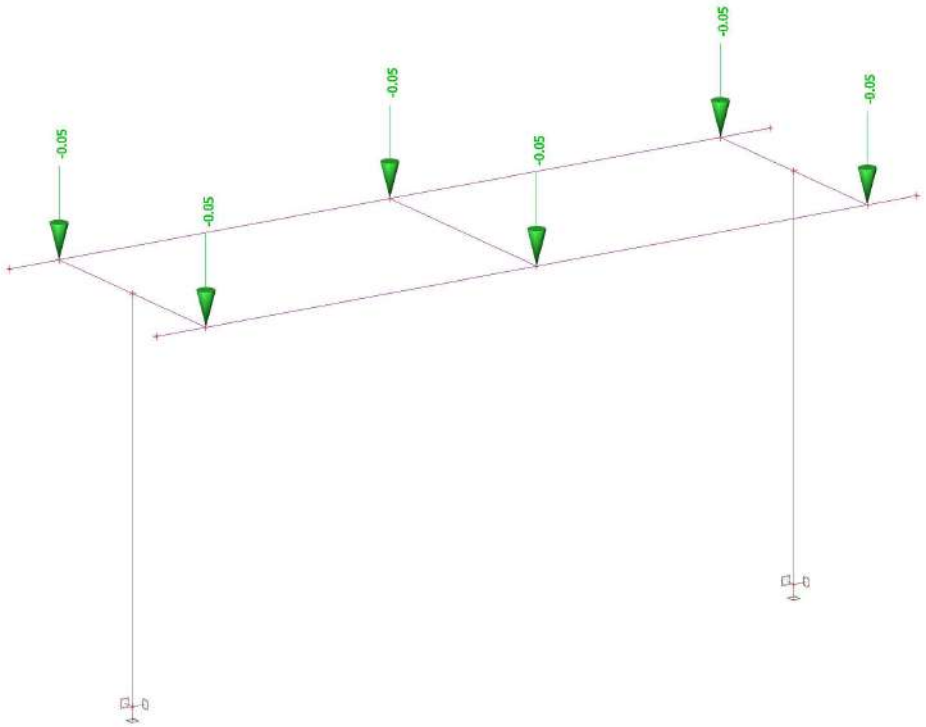
3.2. Laidų s.sv.



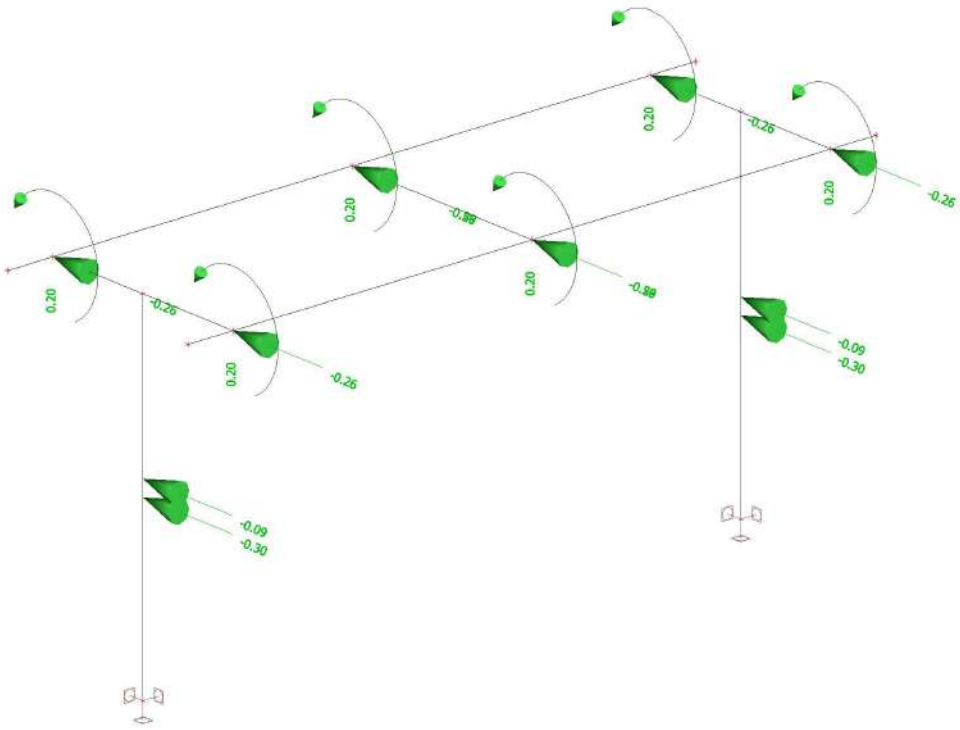
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

3.3. Apšalas



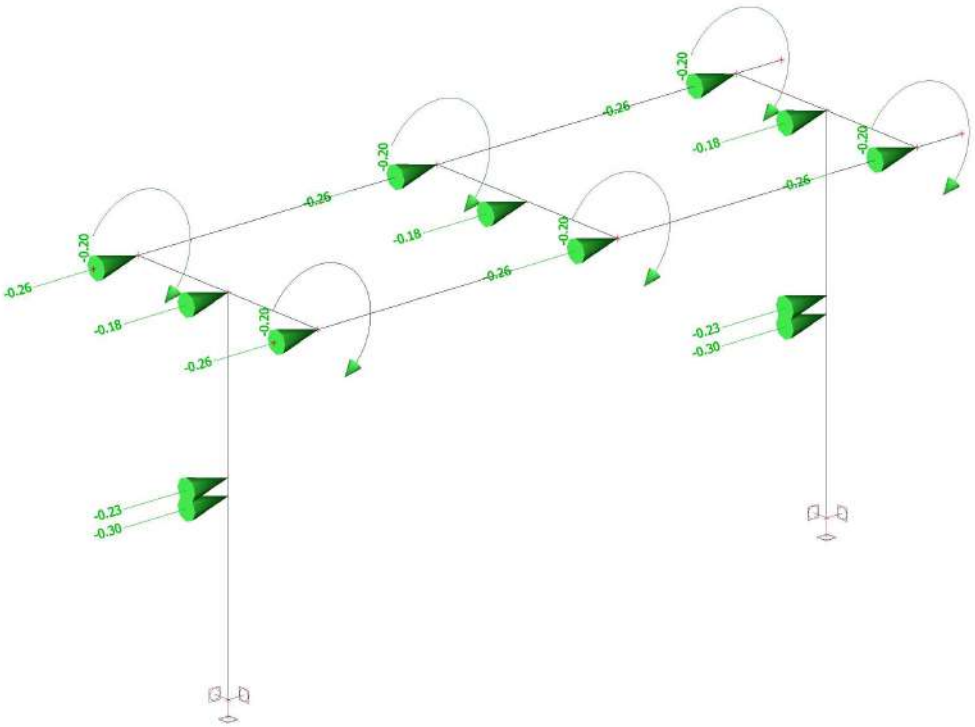
3.4. Vėjas y-y



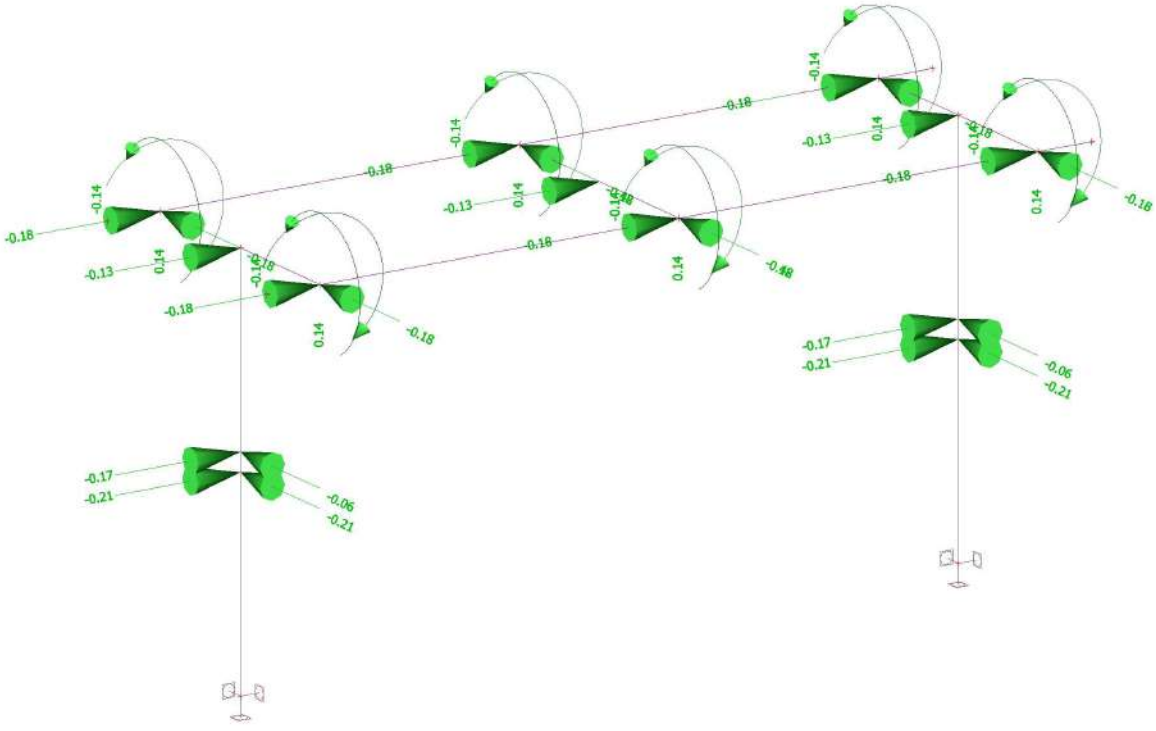
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

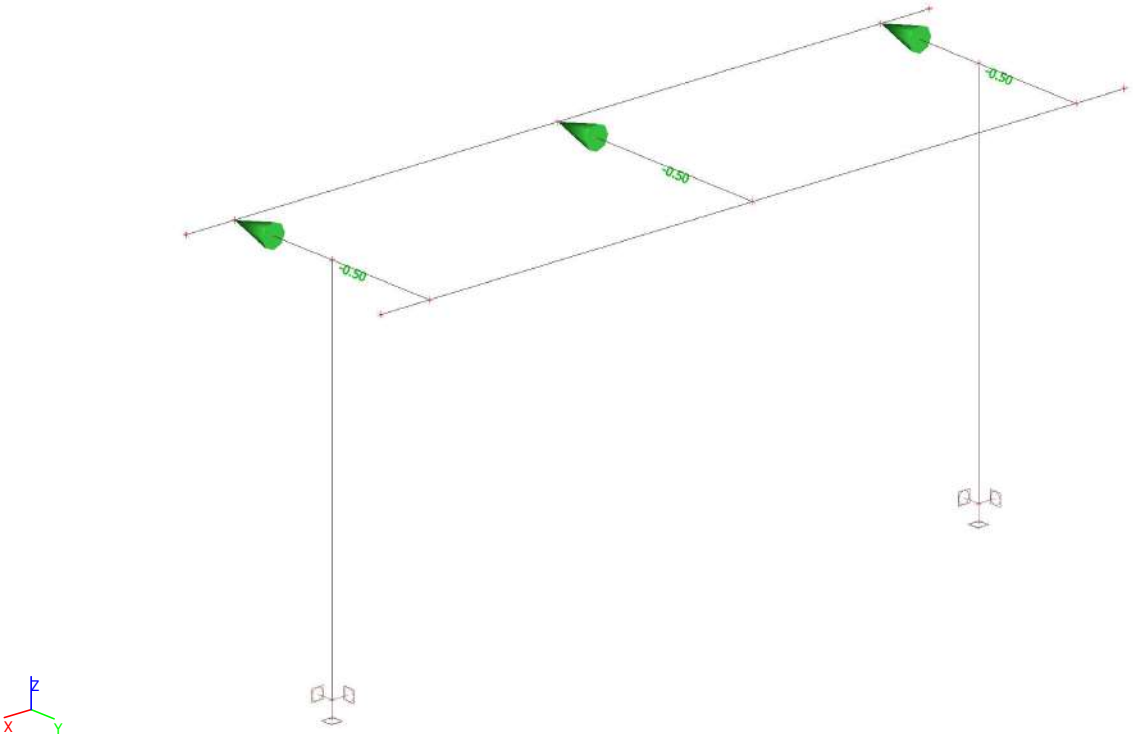
3.5. Vėjas x-x



3.6. Vėjas 45



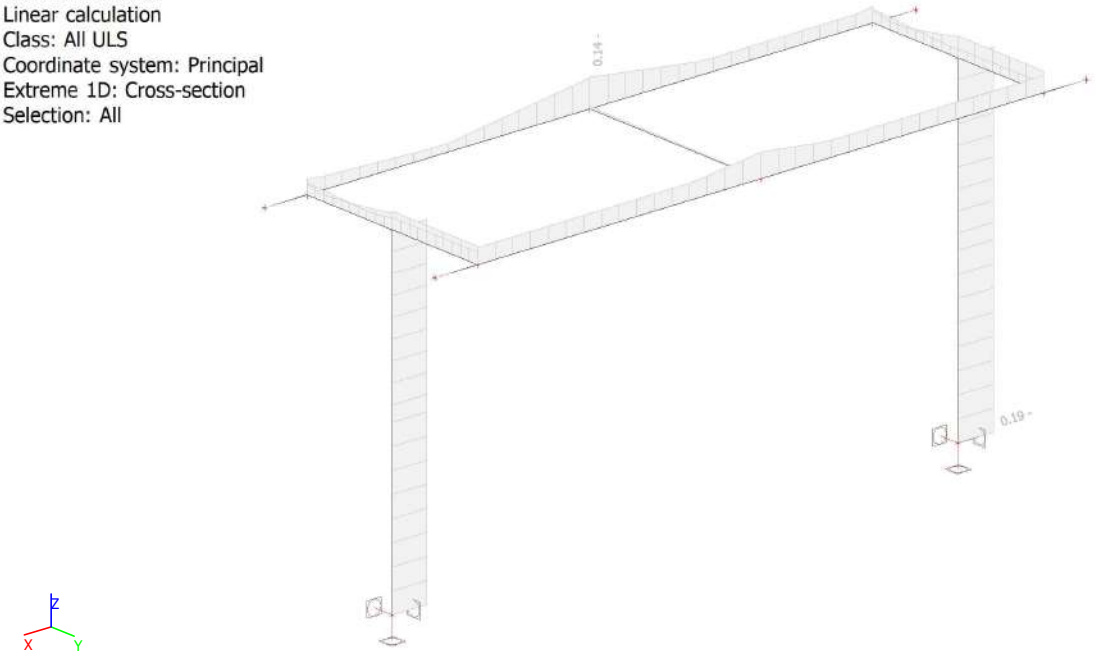
3.7. Laidų tempimai



4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B3	0.700-	ULS-Set B (auto)/1	CS7 - UPE160	S 355	**0.08**	0.06	0.08
B4	0.700+	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.05**	0.03	0.05
B5	0.700+	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.09**	0.08	0.09
B6	1.400	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.06**	0.06	0.00
B7	1.400	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.01**	0.01	0.00
B8	2.300+	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.14**	0.14	0.00
B9	2.300-	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.11**	0.11	0.07
B10	0.000	ULS-Set B (auto)/2	CS20 - SHS180/180/5.0	S 355	**0.18**	0.15	0.18
B11	0.000	ULS-Set B (auto)9/2	CS20 - SHS180/180/5.0	S 355	**0.19**	0.15	0.19

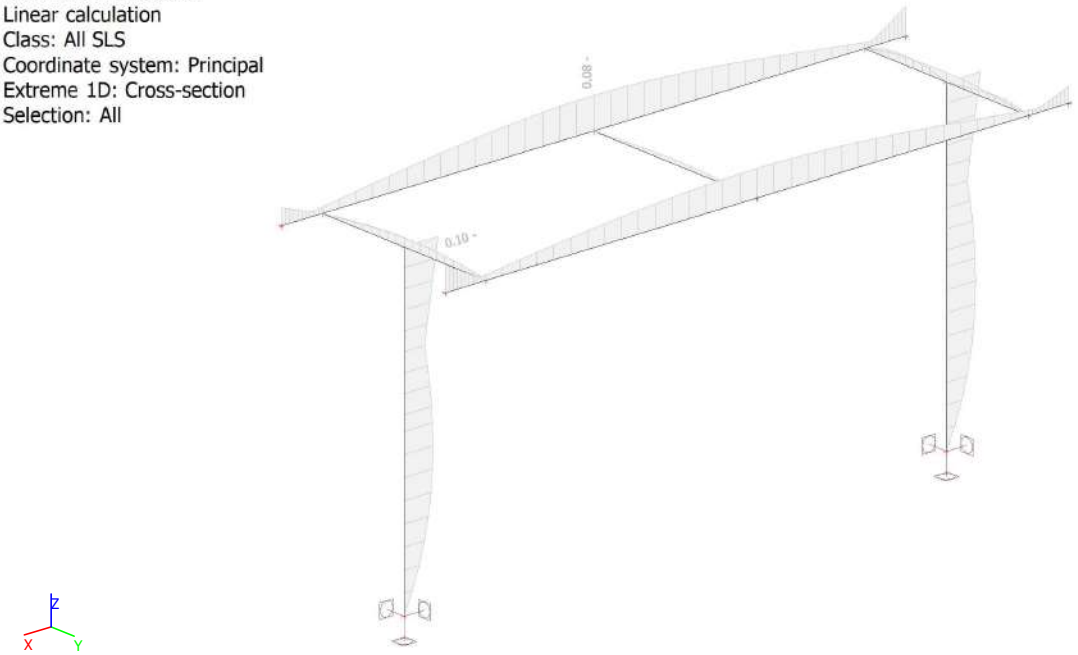
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.19.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B3	0.700-	SLS-Char (auto)/1	0.0 0.2	0.0 0.0	7.0 7.0	3.9 3.9	0.00 0.02	0.00 0.00	- -	**0.02**
B4	0.770	SLS-Char (auto)/2	-0.1 0.0	-0.1 0.0	7.0 3.5	3.9 1.9	0.01 0.00	0.02 0.00	- -	**0.02**
B5	0.700-	SLS-Char (auto)/2	-0.1 0.2	-0.1 0.0	7.0 7.0	3.9 3.9	0.01 0.02	0.02 0.00	- -	**0.02**
B6	1.050-	SLS-Char (auto)/3	0.1 0.0	0.0 0.0	3.5 3.5	1.9 1.9	0.02 0.01	0.02 0.00	- -	**0.02**
B7	0.700-	SLS-Char (auto)/4	0.0 0.0	0.0 0.0	7.0 7.0	3.9 3.9	0.01 0.00	0.01 0.00	- -	**0.01**
B8	2.300-	SLS-Char (auto)/5	0.0 -1.9	0.0 -0.4	10.0 23.0	5.6 12.8	0.00 0.08	0.00 0.03	- -	**0.08**
B9	2.300-	SLS-Char (auto)/6	0.0 -1.6	0.0 0.0	10.0 23.0	5.6 12.8	0.00 0.07	0.00 0.00	- -	**0.07**
B10	2.200	SLS-Char (auto)/4	0.0 1.2	0.0 1.2	11.0 22.0	6.1 12.2	0.00 0.06	0.00 0.10	- -	**0.10**
B11	2.200	SLS-Char (auto)/4	0.0 1.2	0.0 1.2	11.0 22.0	6.1 12.2	0.00 0.05	0.00 0.10	- -	**0.10**

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	Combination key
SLS-Char (auto)/1	1 + 0.60*6 + 2 + 3 + 5 + 4
SLS-Char (auto)/2	1 + 7 + 0.60*6 + 2 + 3 + 5
SLS-Char (auto)/3	1 + 0.60*6 + 2 + 3 + 5 + 8
SLS-Char (auto)/4	1 + 7 + 2 + 3 + 5
SLS-Char (auto)/5	1 + 6 + 2 + 3 + 5 + 0.60*8
SLS-Char (auto)/6	1 + 2 + 3 + 5 + 4

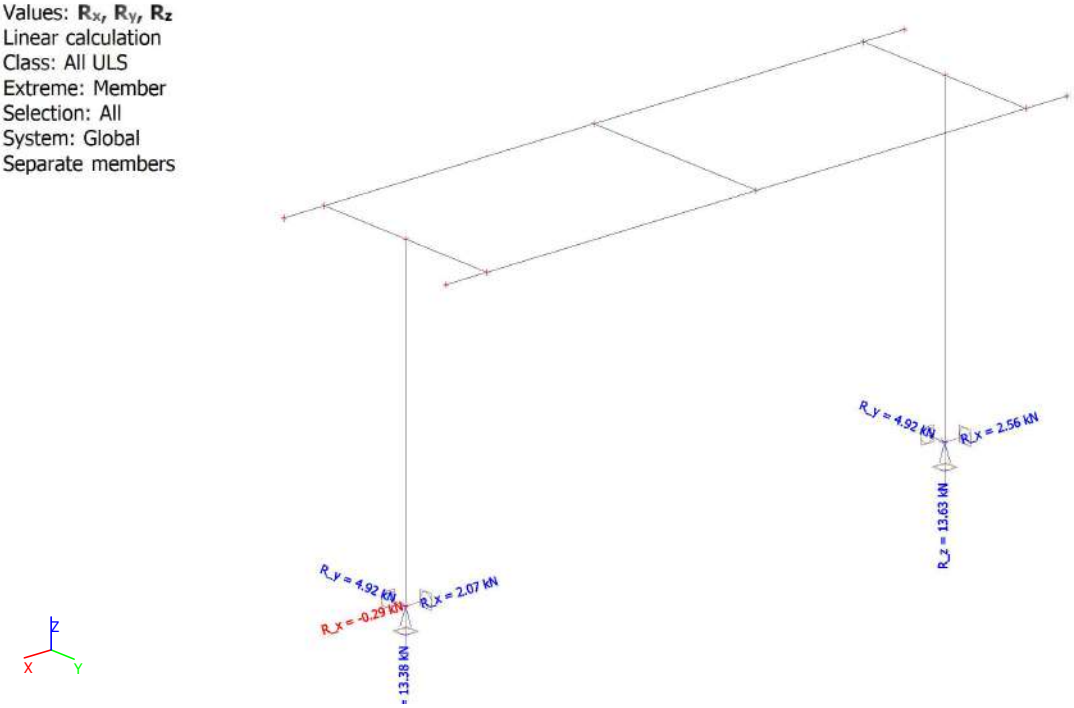
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.10.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6. Reactions

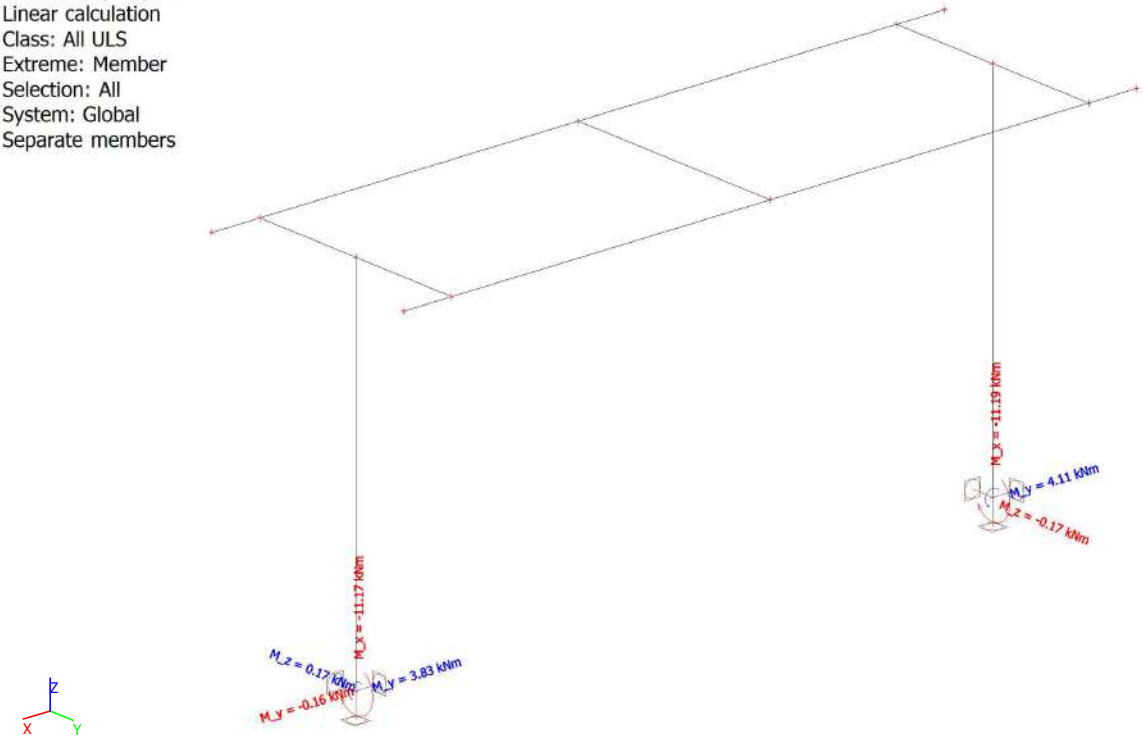
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	4.800	0.000	0.000	ULS-Set B (auto)/1	2.07	**1.25**	**9.12**	**-2.75**	3.83	0.02
Sn1/N15	4.800	0.000	0.000	ULS-Set B (auto)/2	**-0.29**	1.69	13.38	-3.71	**-0.16**	0.03
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/3	**2.56**	1.69	**13.63**	-3.71	**4.11**	-0.03
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/4	1.19	4.92	13.30	**-11.19**	1.73	**-0.17**
Sn1/N15	4.800	0.000	0.000	ULS-Set B (auto)/4	0.64	**4.92**	12.84	-11.17	1.43	**0.17**

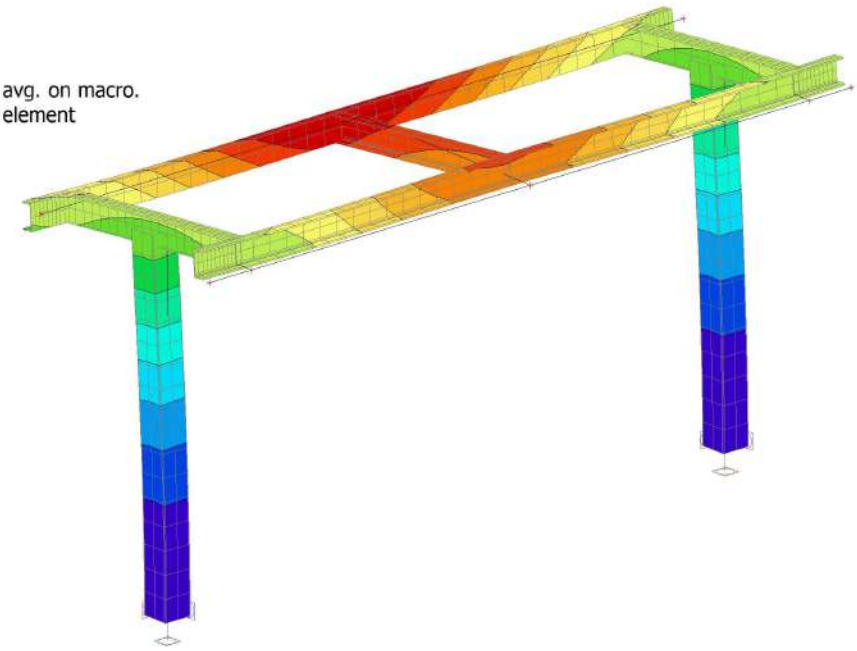
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/3	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/4	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8

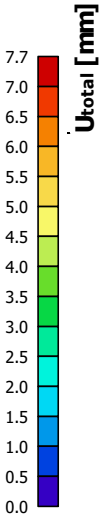
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B7	0.700-	SLS-Char (auto)/1	**-1.3**	-1.7	-1.5	0.8	0.5	0.0	2.6
B6	1.050-	SLS-Char (auto)/2	**0.0**	-3.1	-0.8	2.4	0.7	0.0	3.2
B10	0.000	SLS-Char (auto)/3	0.0	**0.0**	0.0	0.0	0.0	0.0	0.0
B7	1.400	SLS-Char (auto)/4	-0.5	**-6.4**	**-3.7**	3.2	0.0	0.0	**7.4**
B9	4.600	SLS-Char (auto)/4	-0.5	-3.7	**2.0**	2.4	-0.8	0.4	4.2
B9	1.175	SLS-Char (auto)/1	-1.3	-1.3	-0.4	**-0.3**	0.8	-0.3	1.9
B8	3.300-	SLS-Char (auto)/4	-0.5	-5.2	-3.1	**4.1**	0.9	-1.8	6.1
B3	1.400	SLS-Char (auto)/5	-0.8	-3.6	-2.0	2.9	**-1.2**	0.3	4.2
B8	4.050	SLS-Char (auto)/4	-0.5	-4.0	-2.4	3.5	**1.1**	-1.1	4.7
B9	1.300	SLS-Char (auto)/4	-0.5	-5.2	1.1	1.9	0.5	**-1.8**	5.3
B9	3.425	SLS-Char (auto)/4	-0.5	-5.0	1.1	1.8	-0.6	**1.8**	5.1

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

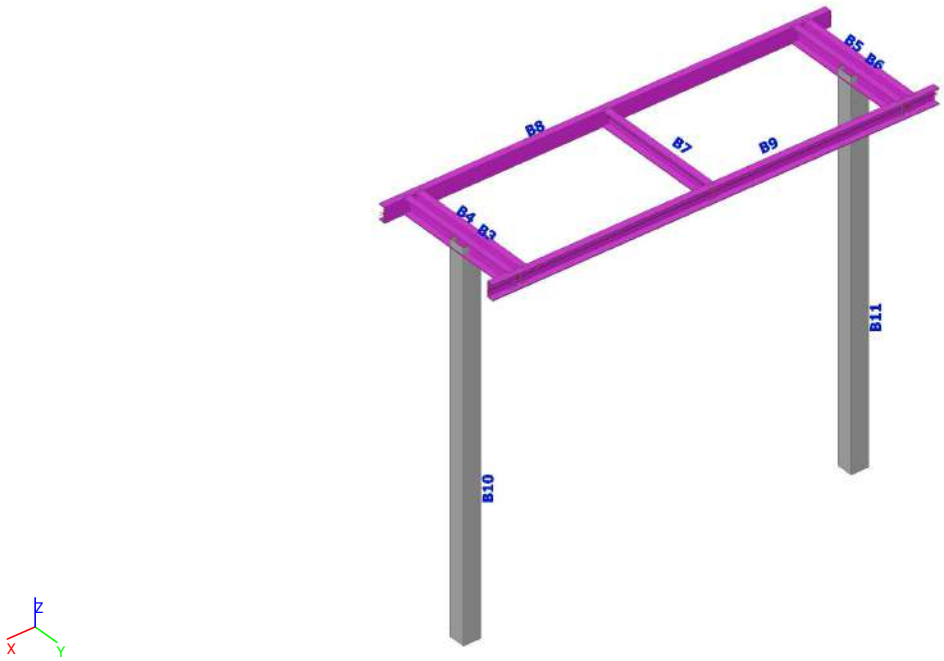
1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 10
6.1. Resultant of reactions; R_x; R_y; R_z 10
6.2. Resultant of reactions; M_x; M_y; M_z 10
6.3. Resultant of reactions 11
7. Deformations 12
7.1. 3D displacement; U_total 12
7.2. 1D deformations 12

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

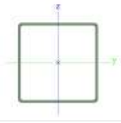
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B3	CS7 - UPE160	S 355	1.400
B4	CS7 - UPE160	S 355	1.400
B5	CS7 - UPE160	S 355	1.400
B6	CS7 - UPE160	S 355	1.400
B7	CS7 - UPE160	S 355	1.400
B8	CS7 - UPE160	S 355	4.600
B9	CS7 - UPE160	S 355	4.600
B10	CS20 - SHS180/180/5.0	S 355	3.890
B11	CS20 - SHS180/180/5.0	S 355	3.890

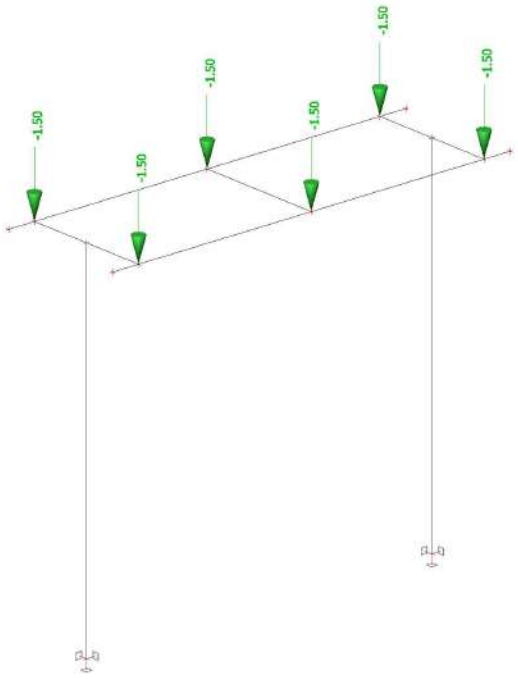
2.3. Cross-sections

Name	Type	Item material	Picture
	Detailed		
CS7	UPE160	S 355	
CS20	SHS180/180/5.0	S 355	

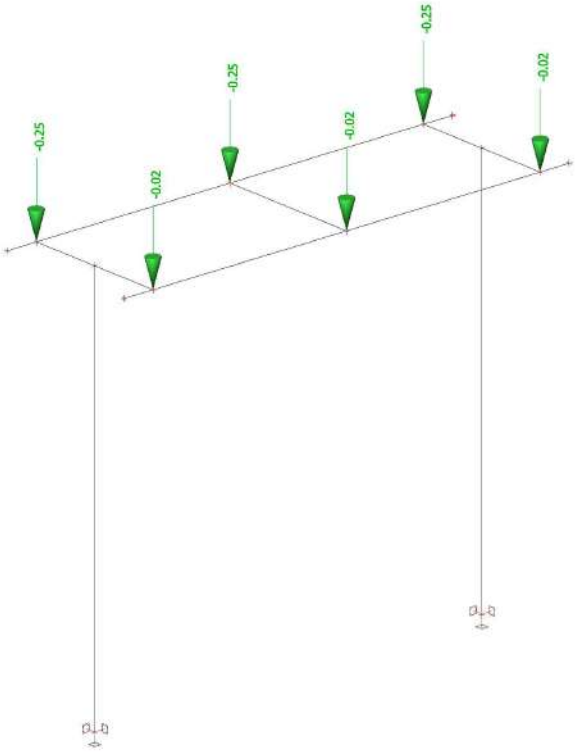
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

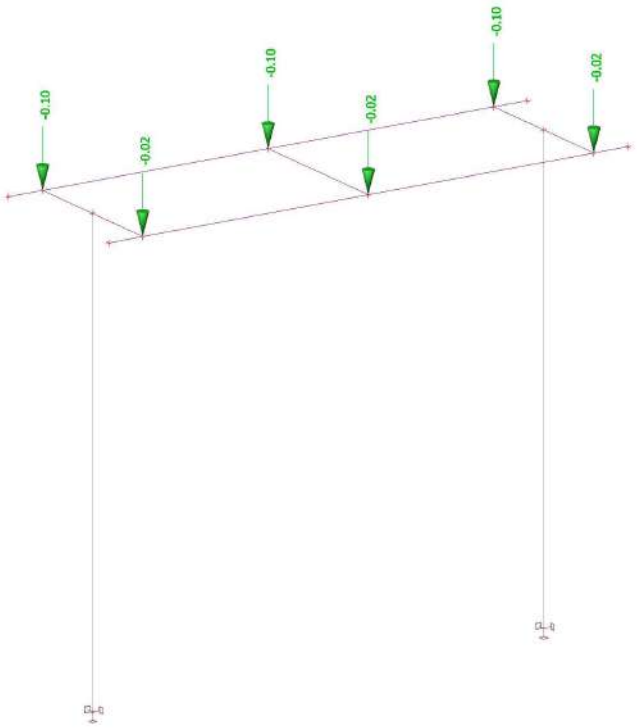
3.1. Techn. įreng. s. sv.



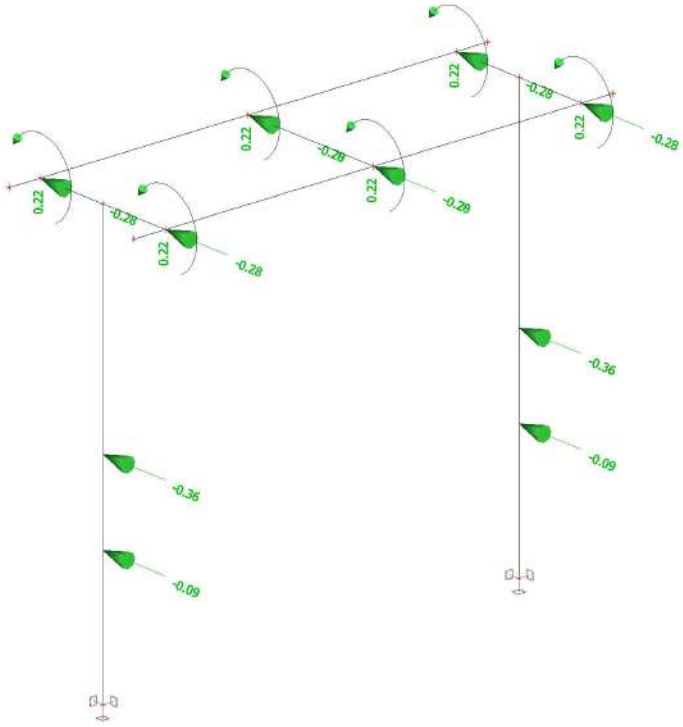
3.2. Laidų s.sv.



3.3. Apšalas



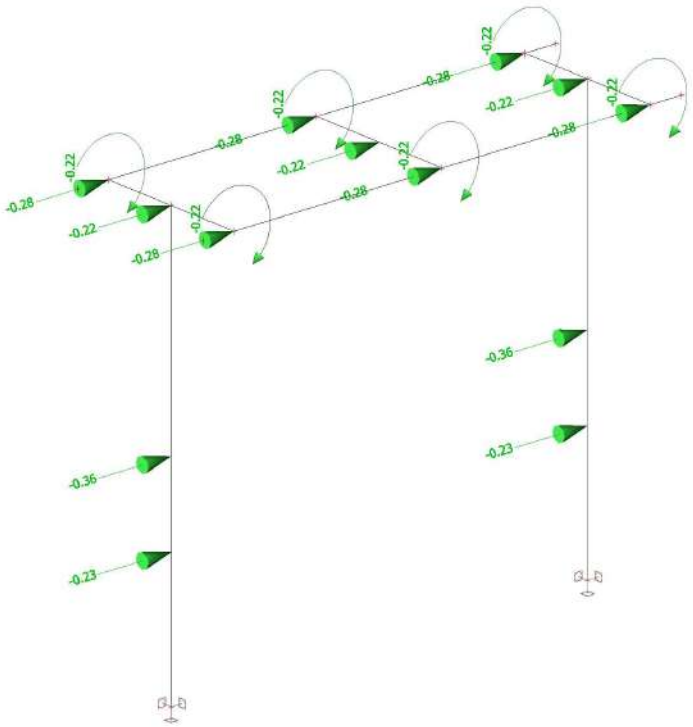
3.4. Vėjas y-y



PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

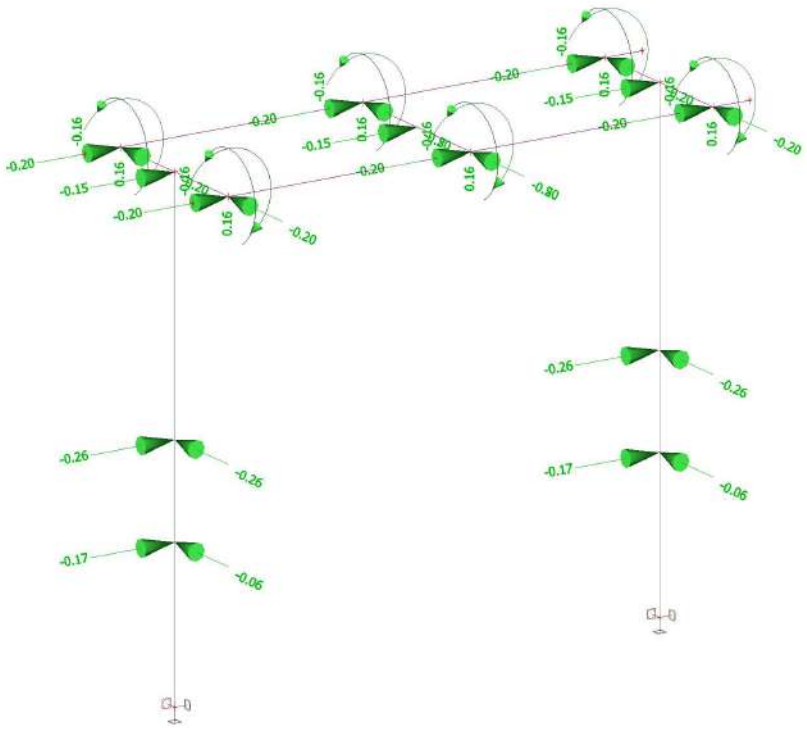
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

3.5. Vėjas x-x



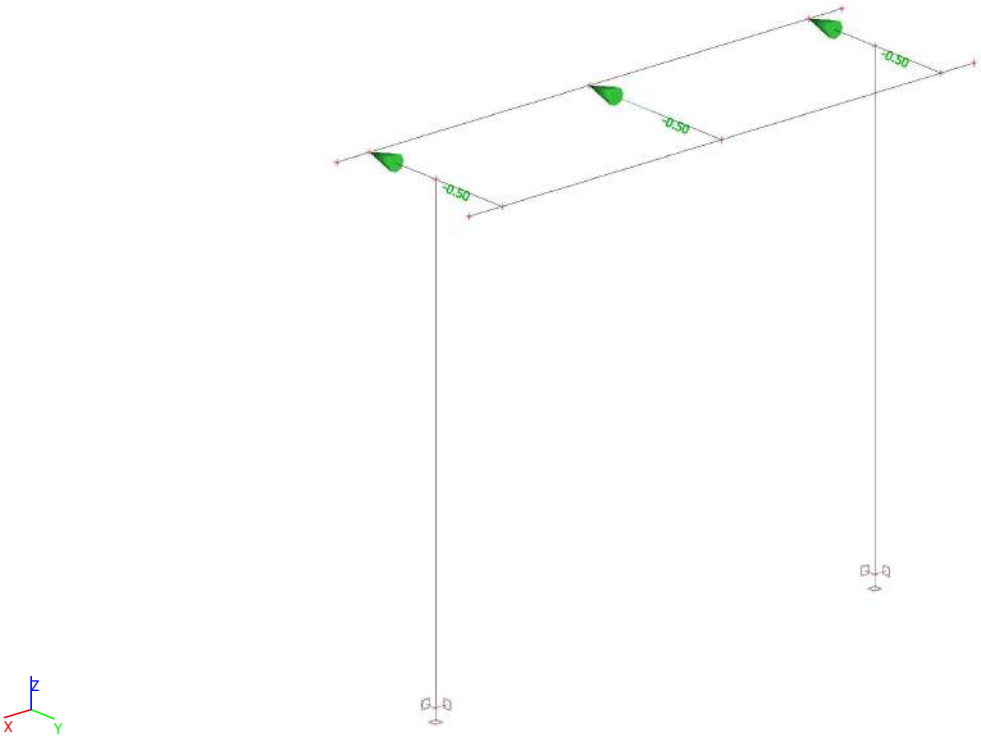


3.6. Vėjas 45





3.7. Laidų tempimai



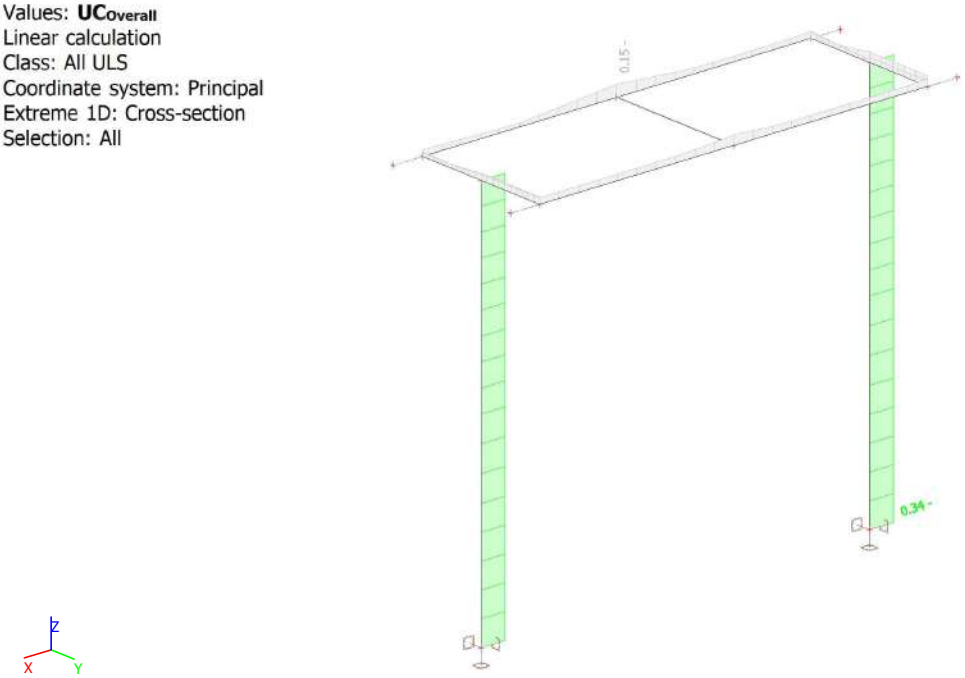
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **UC$_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



4.2. EC-EN 1993 Steel check ULS

Values: **UC$_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	UC$_{Overall}$ [-]	UC$_{Sec}$ [-]	UC$_{Stab}$ [-]
B3	0.700-	ULS-Set B (auto)/1	CS7 - UPE160	S 355	**0.08**	0.06	0.08
B4	0.700-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.08**	0.08	0.00
B5	0.700-	ULS-Set B (auto)/2	CS7 - UPE160	S 355	**0.13**	0.13	0.00
B6	1.400	ULS-Set B (auto)/3	CS7 - UPE160	S 355	**0.08**	0.08	0.00
B7	1.400	ULS-Set B (auto)/4	CS7 - UPE160	S 355	**0.01**	0.01	0.00
B8	2.300+	ULS-Set B (auto)/4	CS7 - UPE160	S 355	**0.15**	0.15	0.00
B9	2.300-	ULS-Set B (auto)/4	CS7 - UPE160	S 355	**0.12**	0.12	0.07
B10	0.000	ULS-Set B (auto)/3	CS20 - SHS180/180/5.0	S 355	**0.34**	0.28	0.34
B11	0.000	ULS-Set B (auto)9/3	CS20 - SHS180/180/5.0	S 355	**0.34**	0.28	0.34

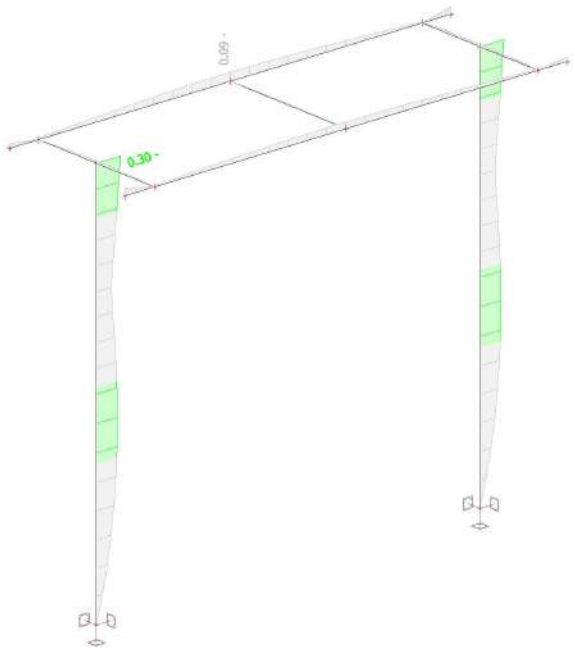
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.34.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All





5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All

Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B3	0.560	SLS-Char (auto)/1	0.1 0.1	0.1 0.0	7.0 7.0	3.9 3.9	0.01 0.02	0.02 0.00	- -	**0.02**
B4	0.840	SLS-Char (auto)/1	-0.1 0.0	-0.1 0.0	7.0 3.5	3.9 1.9	0.01 0.00	0.02 0.00	- -	**0.02**
B5	0.560	SLS-Char (auto)/1	-0.1 0.2	-0.1 0.0	7.0 7.0	3.9 3.9	0.02 0.02	0.02 0.00	- -	**0.02**
B6	1.050-	SLS-Char (auto)/2	0.1 0.0	0.0 0.0	3.5 3.5	1.9 1.9	0.02 0.01	0.03 0.00	- -	**0.03**
B7	0.700-	SLS-Char (auto)/3	0.0 0.0	0.0 0.0	7.0 7.0	3.9 3.9	0.01 0.00	0.01 0.00	- -	**0.01**
B8	2.300-	SLS-Char (auto)/4	0.0 -2.1	0.0 -0.4	10.0 23.0	5.6 12.8	0.00 0.09	0.00 0.03	- -	**0.09**
B9	4.600	SLS-Char (auto)/2	0.1 0.0	0.1 0.0	3.0 23.0	1.7 12.8	0.05 0.00	0.08 0.00	- -	**0.08**
B10	3.890	SLS-Char (auto)/3	0.0 6.4	0.0 6.4	19.4 38.9	10.8 21.6	0.00 0.17	0.00 0.30	- -	**0.30**
B11	3.890	SLS-Char (auto)/3	0.0 6.4	0.0 6.4	19.4 38.9	10.8 21.6	0.00 0.17	0.00 0.30	- -	**0.30**

Name	Combination key
SLS-Char (auto)/1	1 + 7 + 0.60*6 + 2 + 3 + 5
SLS-Char (auto)/2	1 + 0.60*6 + 2 + 3 + 5 + 8
SLS-Char (auto)/3	1 + 7 + 2 + 3 + 5
SLS-Char (auto)/4	1 + 6 + 2 + 3 + 5 + 0.60*8

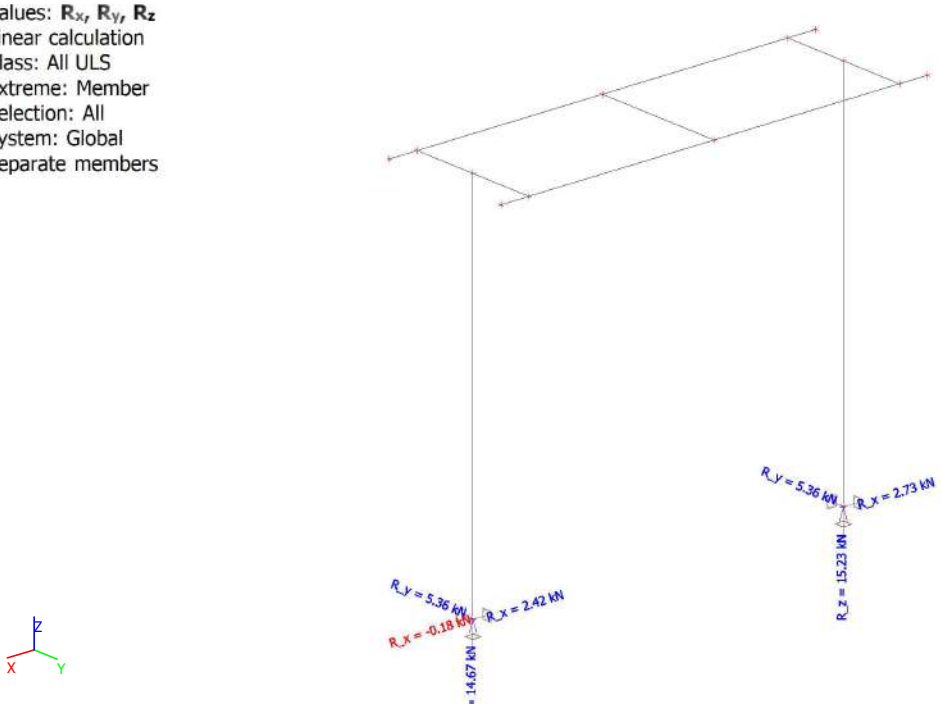
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.30.

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

6. Reactions

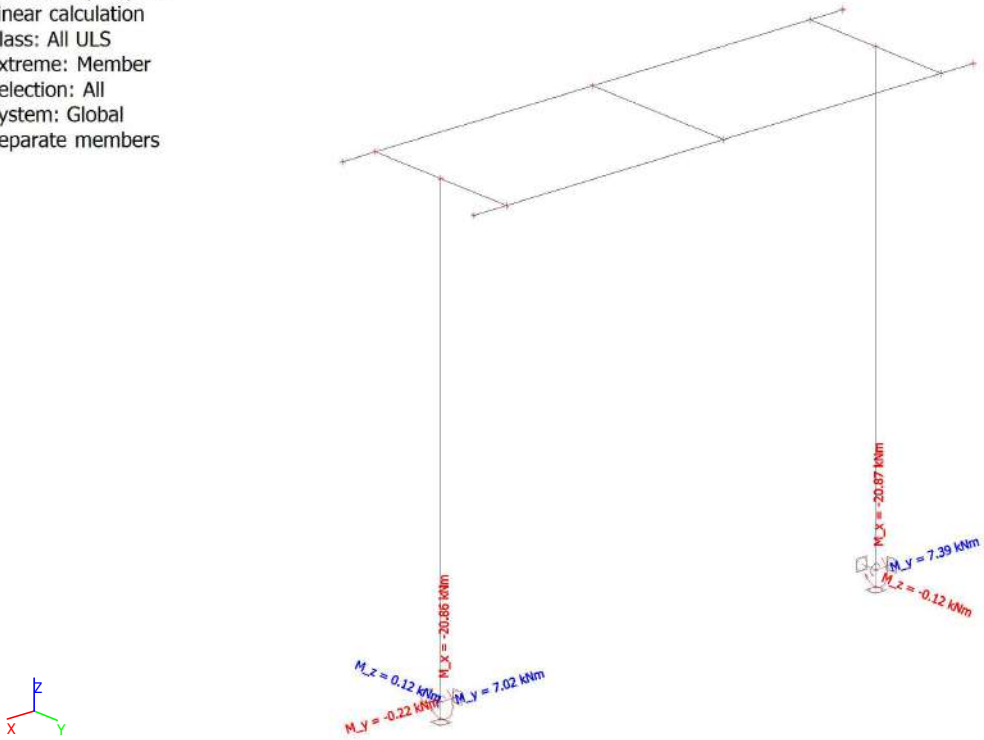
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/1	0.13	**1.25**	10.97	-5.42	0.17	-0.01
Sn1/N15	4.800	0.000	0.000	ULS-Set B (auto)/2	2.42	1.25	**9.63**	**-5.26**	7.02	0.01
Sn1/N15	4.800	0.000	0.000	ULS-Set B (auto)/3	**-0.18**	1.69	14.67	-7.26	**-0.22**	0.02
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/4	**2.73**	1.69	**15.23**	-7.10	**7.39**	-0.02
Sn2/N17	0.800	0.000	0.000	ULS-Set B (auto)/5	1.26	5.36	14.69	**-20.87**	3.27	**-0.12**
Sn1/N15	4.800	0.000	0.000	ULS-Set B (auto)/5	0.91	**5.36**	13.88	-20.86	2.83	**0.12**

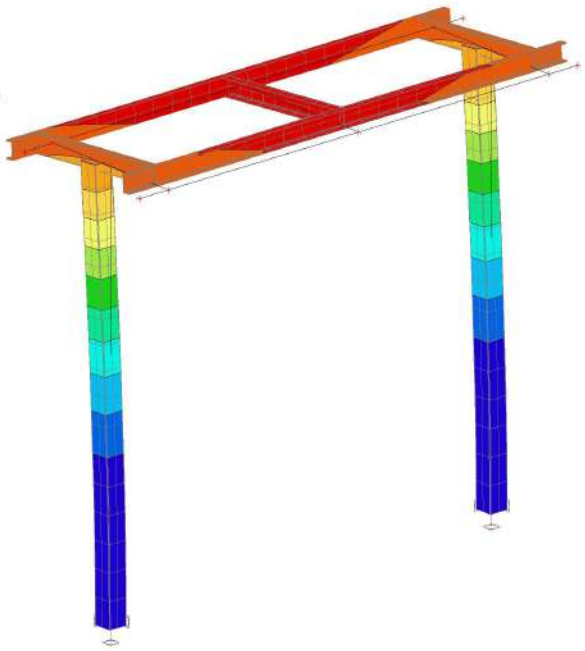
Name	Combination key
ULS-Set B (auto)/1	1 + 2 + 3 + 5 + 1.30*4
ULS-Set B (auto)/2	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/3	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/4	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/5	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8

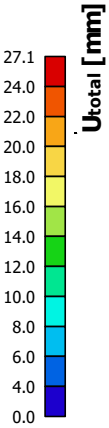
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element







7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B7	0.700-	SLS-Char (auto)/1	**-6.6**	-7.9	-1.6	3.1	0.5	0.0	10.4
B10	2.593	SLS-Char (auto)/2	**0.0**	-3.9	0.0	2.6	0.0	0.0	3.9
B7	1.400	SLS-Char (auto)/3	-2.8	**-24.8**	**-8.1**	9.4	0.0	0.0	**26.2**
B9	4.600	SLS-Char (auto)/3	-2.8	-21.8	**6.2**	8.4	-0.8	0.5	22.8
B10	0.000	SLS-Char (auto)/4	0.0	**0.0**	0.0	**0.0**	0.0	0.0	0.0
B8	3.300-	SLS-Char (auto)/3	-2.8	-23.5	-7.5	**10.2**	1.0	-2.0	24.8
B10	3.458	SLS-Char (auto)/1	-5.4	-6.2	0.0	2.9	**-2.3**	0.0	8.2
B8	4.100	SLS-Char (auto)/5	0.0	-17.9	-5.4	7.8	**1.2**	-0.8	18.7
B9	1.300	SLS-Char (auto)/3	-2.8	-23.5	5.3	8.0	0.5	**-2.0**	24.2
B8	1.300	SLS-Char (auto)/3	-2.8	-23.5	-7.5	10.2	-1.0	**2.0**	24.8

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

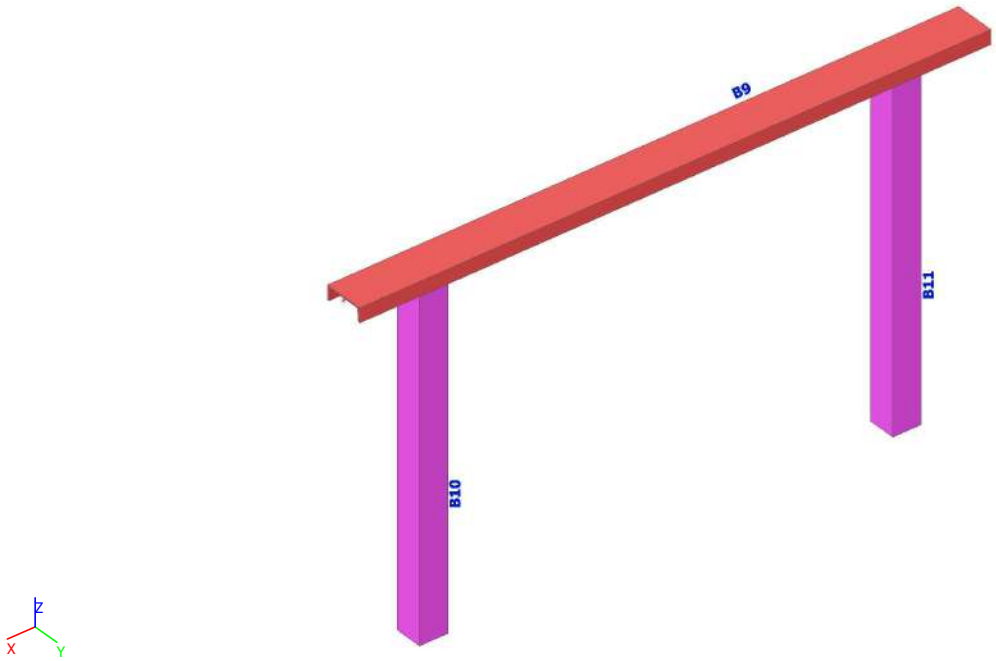
1. Table of contents

1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Members 2
2.3. Cross-sections 2
3. Loads 3
3.1. Techn. įreng. s. sv. 3
3.2. Laidų s.sv. 3
3.3. Apšalas 4
3.4. Vėjas y-y 4
3.5. Vėjas x-x 5
3.6. Vėjas 45 5
3.7. Laidų tempimai 6
4. Steel ULS check 7
4.1. EC-EN 1993 Steel check ULS; Overall check 7
4.2. EC-EN 1993 Steel check ULS 7
5. Steel SLS check 8
5.1. EC-EN 1993 Steel Check SLS; Check Overall 8
5.2. EC-EN 1993 Steel Check SLS 8
6. Reactions 9
6.1. Resultant of reactions; R_x; R_y; R_z 9
6.2. Resultant of reactions; M_x; M_y; M_z 9
6.3. Resultant of reactions 10
7. Deformations 11
7.1. 3D displacement; U_total 11
7.2. 1D deformations 11

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

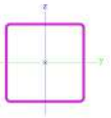
2.1. Structural model



2.2. Members

Name	Cross-section	Material	Length [m]
B9	CS19 - UNP260	S 355	4.000
B10	CS14 - CFRHS180X180X5	S 355	2.200
B11	CS14 - CFRHS180X180X5	S 355	2.200

2.3. Cross-sections

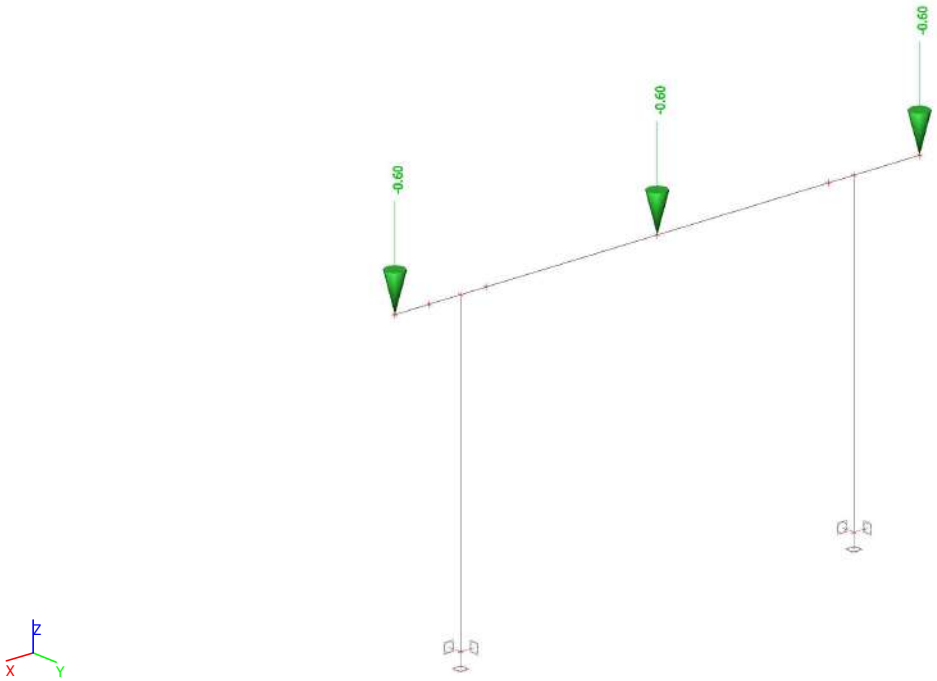
Name	Type	Item material	Picture
	Detailed		
CS14	CFRHS180X180X5	S 355	
CS19	UNP260	S 355	

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

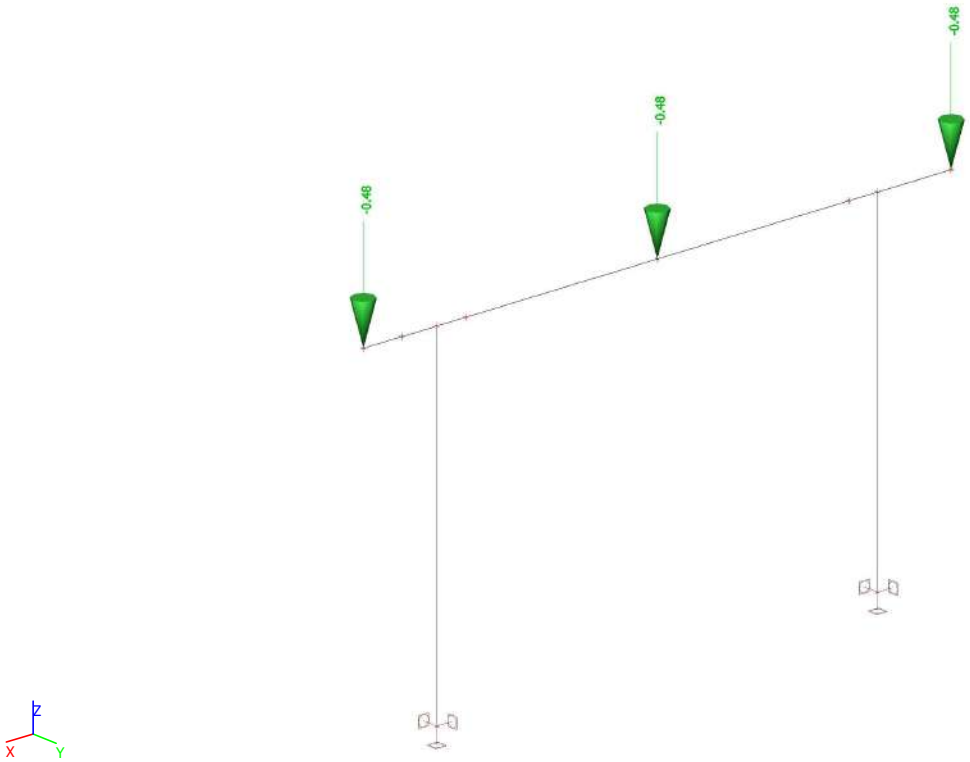
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3. Loads

3.1. Techn. įreng. s. sv.

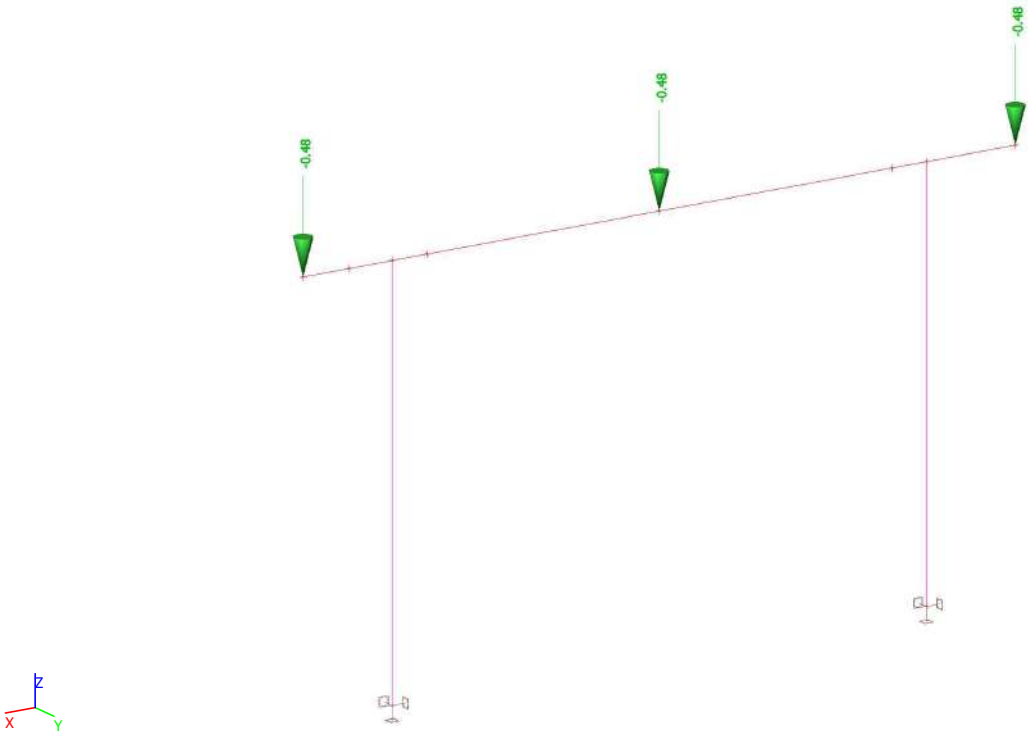


3.2. Laidų s.sv.

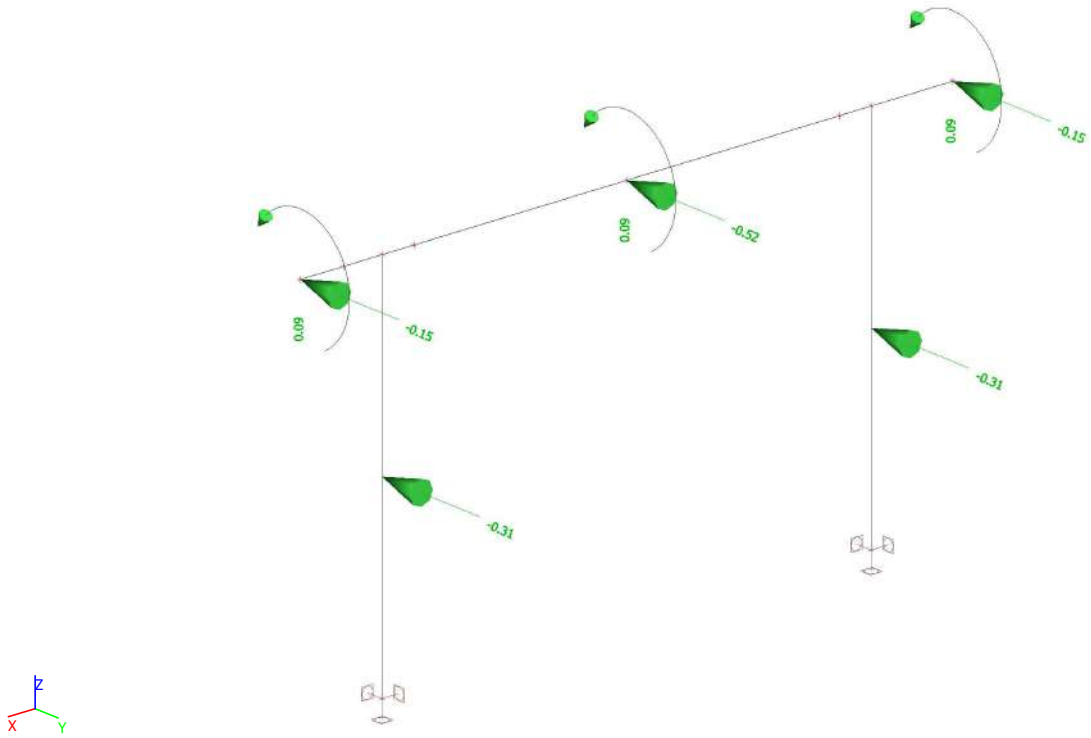


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.3. Apšalas

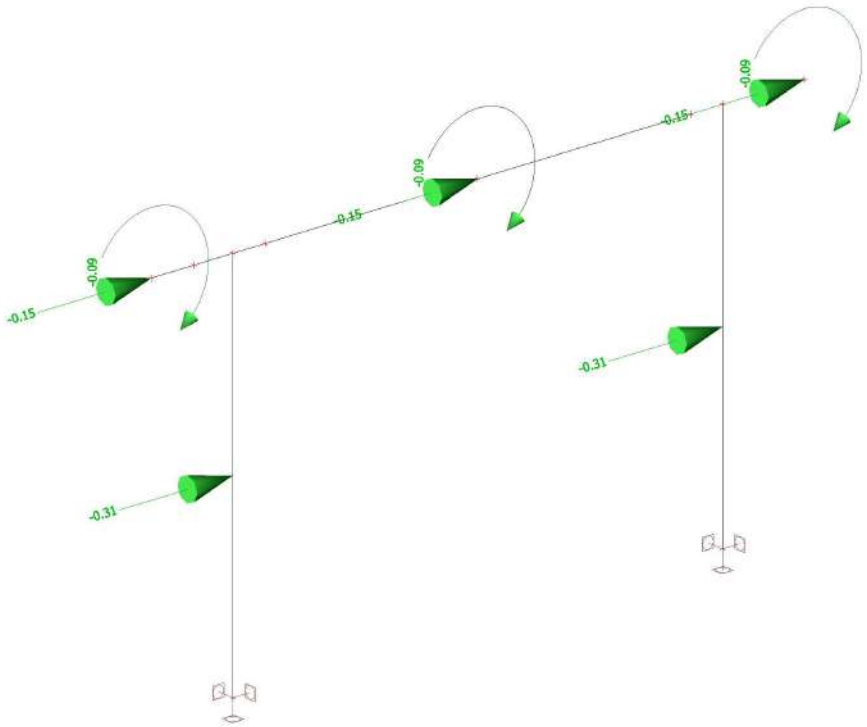


3.4. Vėjas y-y

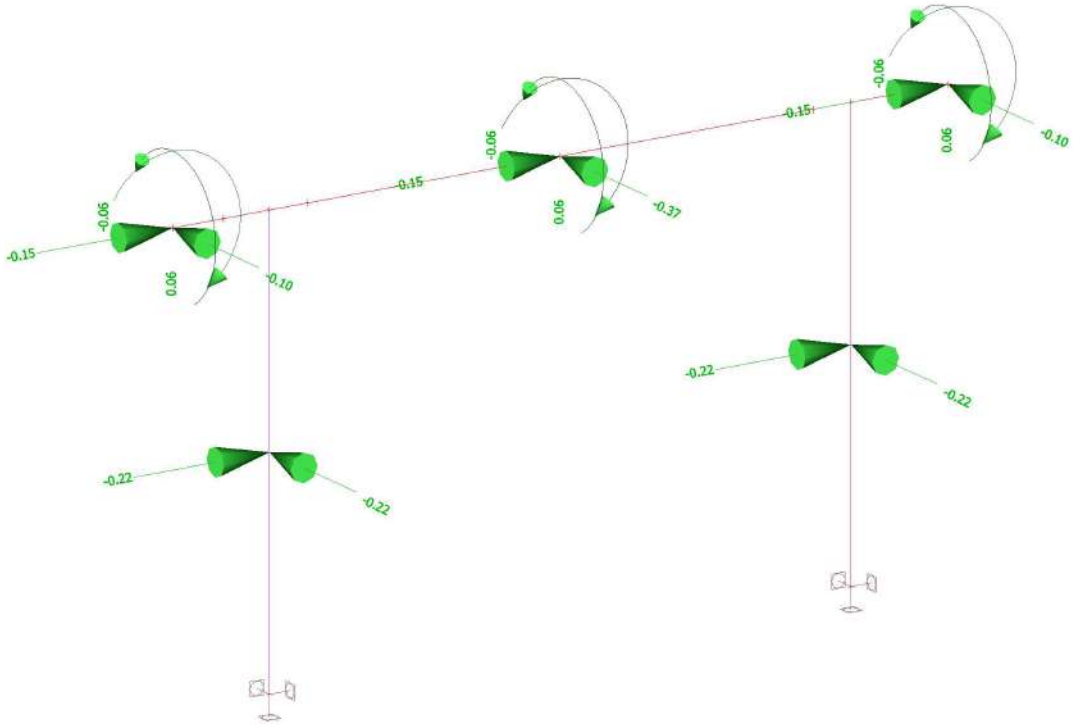


PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

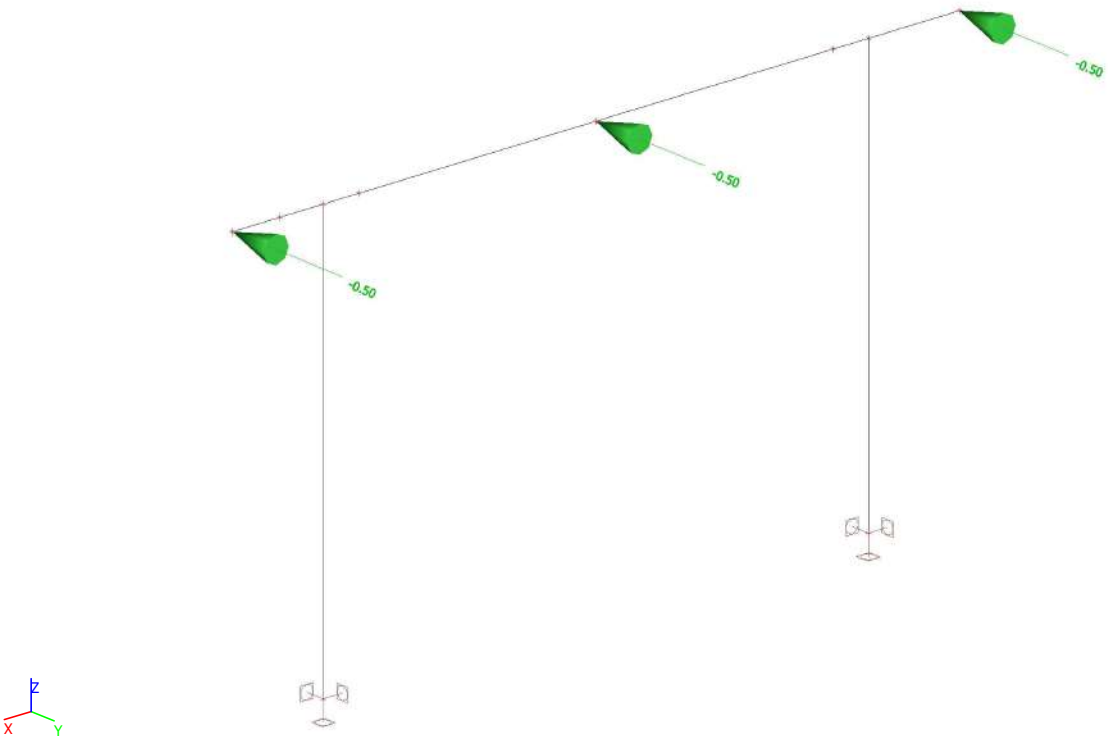
3.5. Vėjas x-x



3.6. Vėjas 45



3.7. Laidų tempimai

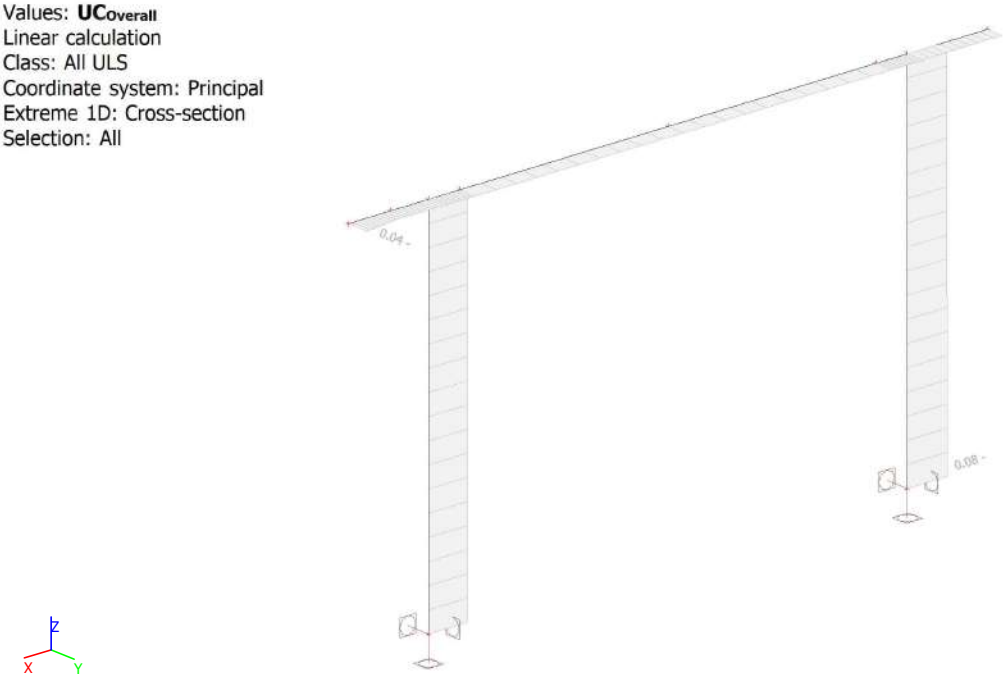


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B9	4.000	ULS-Set B (auto)/1	CS19 - UNP260	S 355	**0.04**	0.04	0.03
B10	0.000	ULS-Set B (auto)/1	CS14 - CFRHS180X180X5	S 355	**0.08**	0.08	0.08
B11	0.000	ULS-Set B (auto)/1	CS14 - CFRHS180X180X5	S 355	**0.08**	0.07	0.08

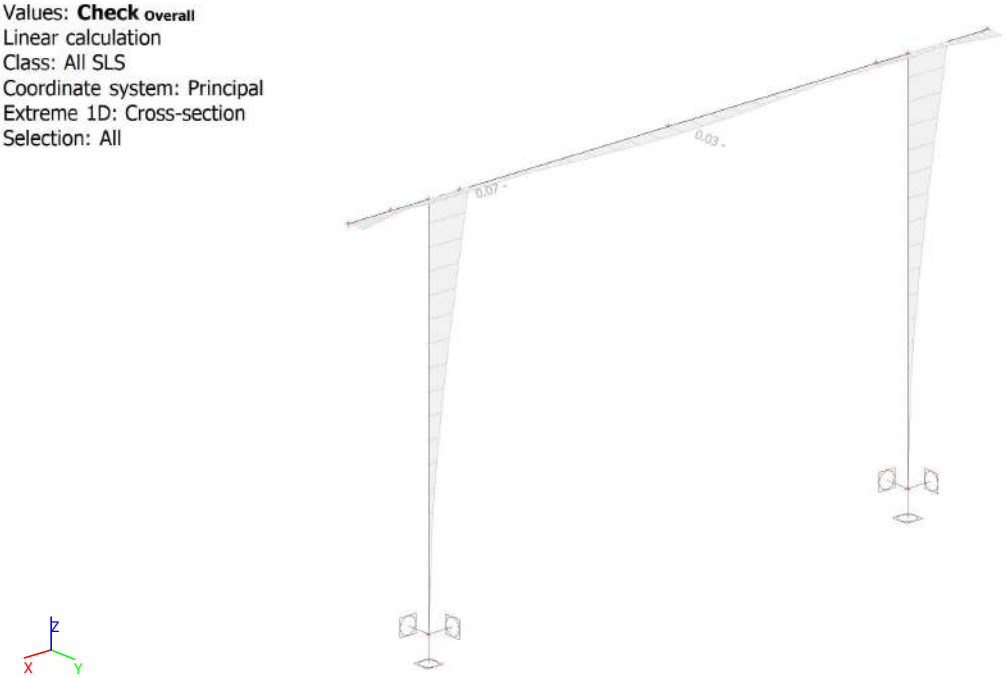
Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.08.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B9	2.000-	SLS-Char (auto)/1	0.5 0.0	0.1 0.0	15.0 20.0	8.3 11.1	0.03 0.00	0.01 0.00	- -	**0.03**
B10	2.200	SLS-Char (auto)/2	-1.6 0.0	-0.8 0.0	22.0 11.0	12.2 6.1	0.07 0.00	0.07 0.00	- -	**0.07**
B11	2.200	SLS-Char (auto)/2	-1.6 0.0	-0.8 0.0	22.0 11.0	12.2 6.1	0.07 0.00	0.07 0.00	- -	**0.07**

Name	Combination key
SLS-Char (auto)/1	1 + 2 + 3 + 5 + 4
SLS-Char (auto)/2	1 + 6 + 2 + 3 + 5 + 0.60*8

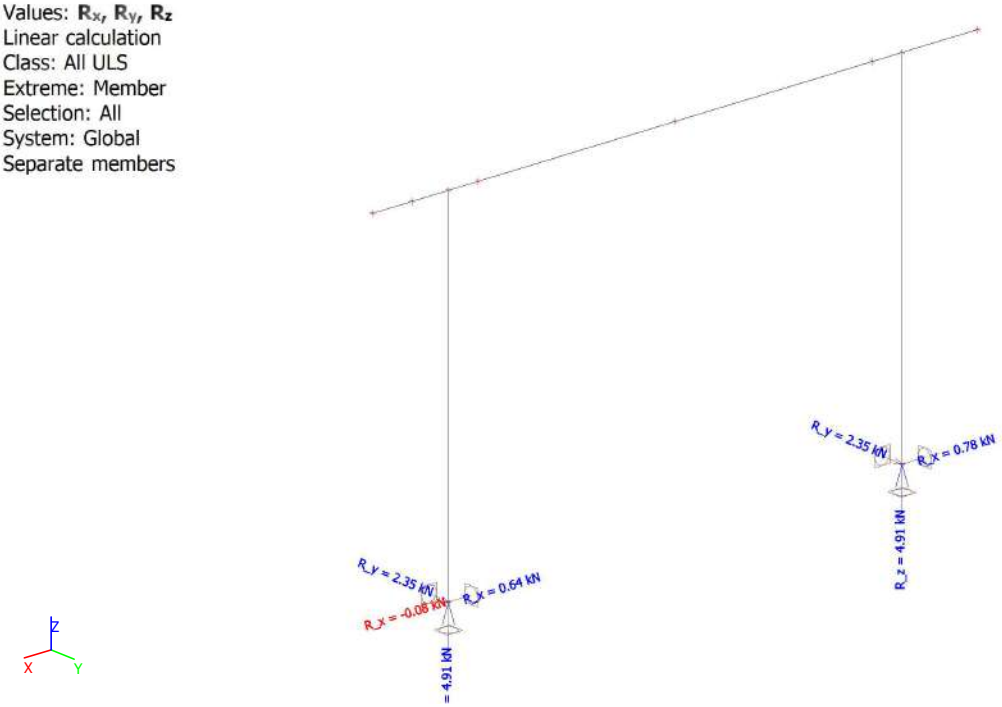
Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.07.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6. Reactions

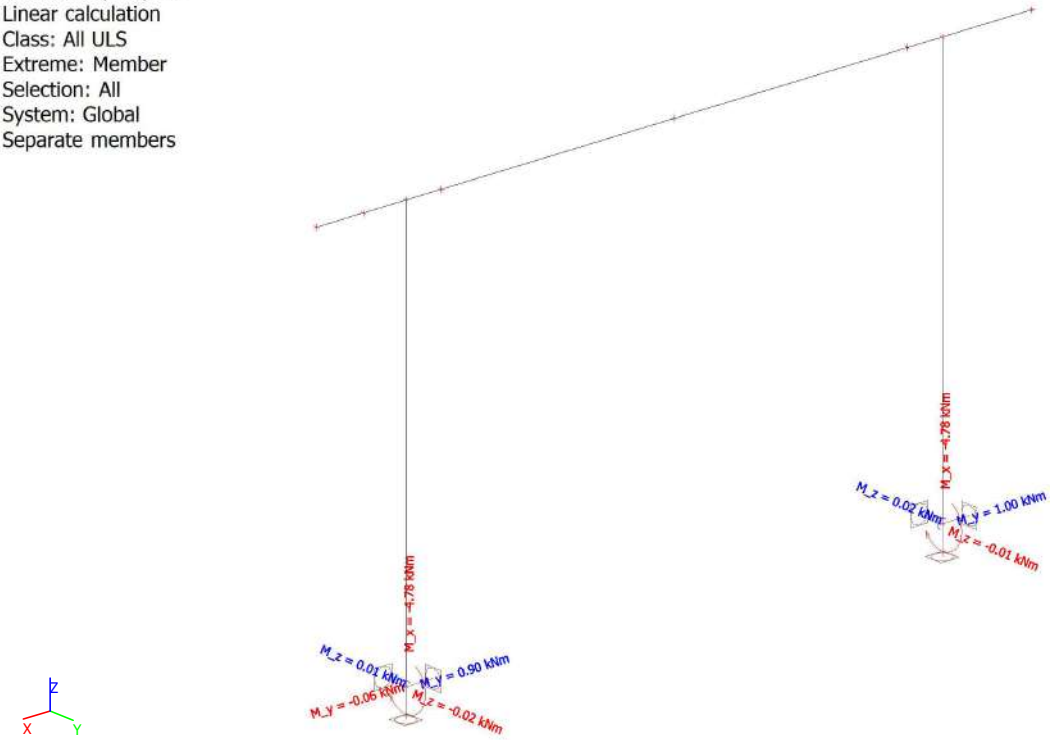
6.1. Resultant of reactions; R_x; R_y; R_z

Values: R_x, R_y, R_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



6.2. Resultant of reactions; M_x; M_y; M_z

Values: M_x, M_y, M_z
Linear calculation
Class: All ULS
Extreme: Member
Selection: All
System: Global
Separate members



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global
Separate members

Name	x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/1	0.64	**0.75**	**2.74**	**-1.65**	0.90	0.01
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/2	-0.03	1.01	**4.91**	-2.23	-0.02	0.01
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/3	0.26	**2.35**	3.87	**-4.78**	0.43	-0.02
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/4	**-0.08**	1.01	3.98	-2.23	**-0.06**	0.01
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/5	**0.78**	1.01	4.19	-2.23	**1.00**	-0.01
Sn1/N15	3.500	0.000	0.000	ULS-Set B (auto)/6	0.29	2.09	2.84	-4.20	0.44	**-0.02**
Sn2/N17	0.500	0.000	0.000	ULS-Set B (auto)/6	0.41	2.09	3.05	-4.20	0.53	**0.02**

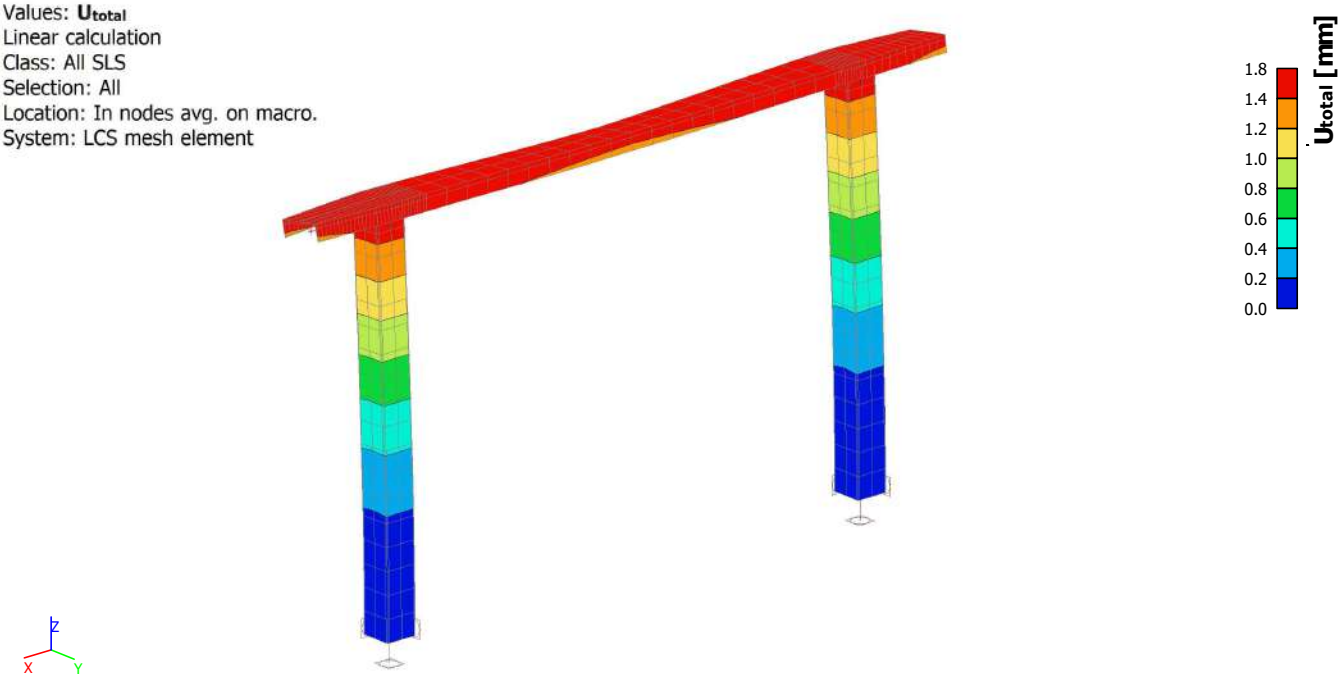
Name	Combination key
ULS-Set B (auto)/1	1 + 1.30*7 + 2 + 3 + 5
ULS-Set B (auto)/2	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5 + 1.30*4
ULS-Set B (auto)/3	1.35*1 + 1.30*6 + 1.35*2 + 1.35*3 + 1.35*5 + 0.78*8
ULS-Set B (auto)/4	1.35*1 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/5	1.35*1 + 1.30*7 + 1.35*2 + 1.35*3 + 1.35*5
ULS-Set B (auto)/6	1 + 1.30*6 + 2 + 3 + 5 + 0.78*8

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All
Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B10	1.467	SLS-Char (auto)/1	**0.0**	-0.4	0.0	0.4	0.0	0.0	0.4
B9	0.500-	SLS-Char (auto)/2	-0.1	**-1.6**	0.0	1.1	-0.1	0.0	**1.6**
B10	0.000	SLS-Char (auto)/1	0.0	**0.0**	0.0	0.0	0.0	0.0	0.0
B9	2.000-	SLS-Char (auto)/3	0.0	-0.8	**-0.5**	**-0.4**	0.0	0.0	0.9
B9	3.817	SLS-Char (auto)/4	**-0.2**	-0.8	**0.0**	0.1	0.0	0.0	0.8
B9	2.000-	SLS-Char (auto)/2	-0.1	-1.5	-0.4	**3.3**	0.0	0.0	1.5
B9	2.783	SLS-Char (auto)/3	0.0	-0.8	-0.2	0.0	**-0.5**	0.0	0.8
B9	1.217	SLS-Char (auto)/3	0.0	-0.8	-0.2	0.0	**0.5**	0.0	0.8
B9	0.250	SLS-Char (auto)/2	-0.1	-1.5	0.0	2.1	-0.2	**-0.1**	1.5
B9	1.348	SLS-Char (auto)/2	-0.1	-1.5	-0.2	2.3	0.4	**0.1**	1.6

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

1. Table of contents

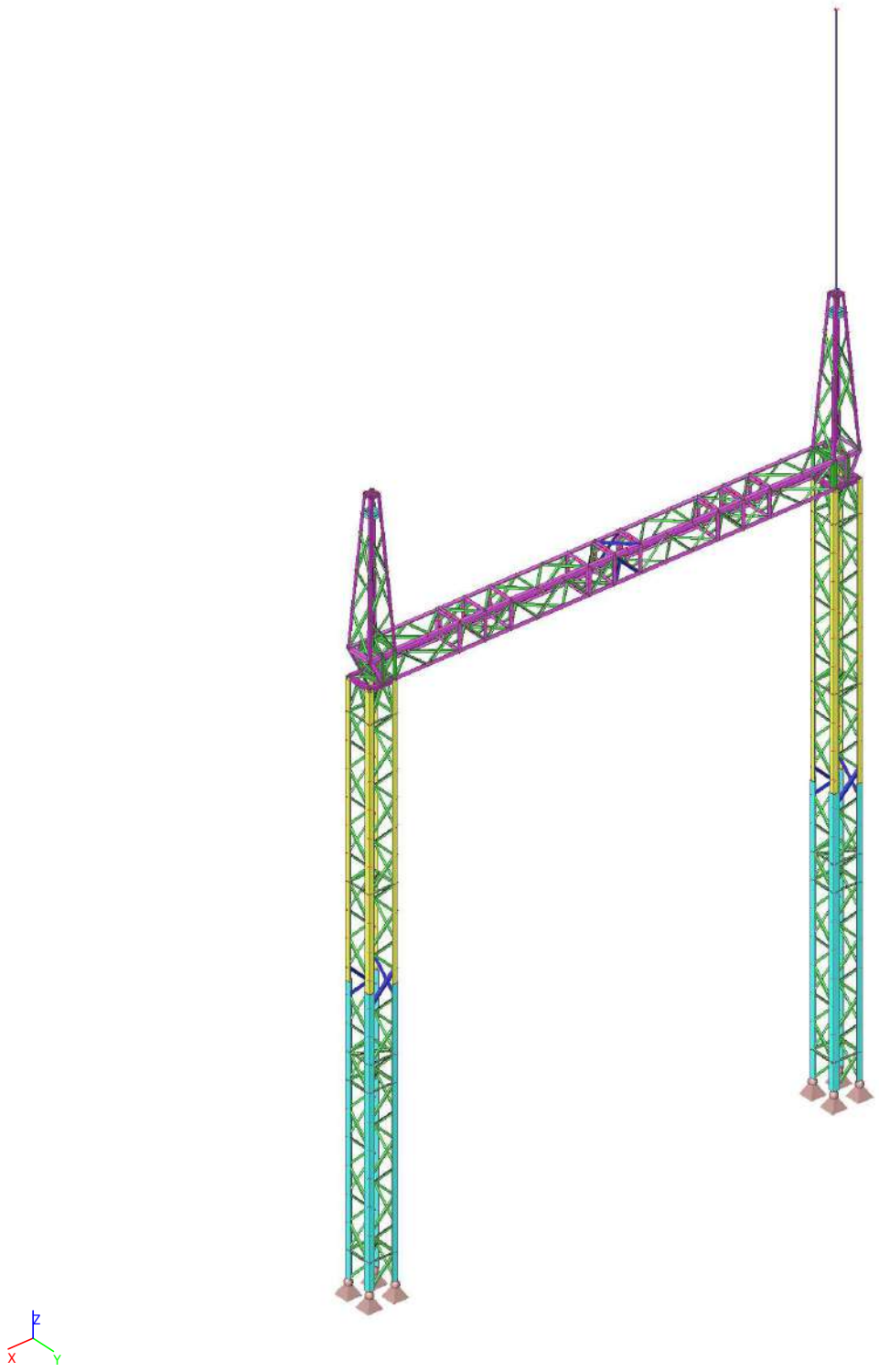
1. Table of contents 1
2. Geometry 2
2.1. Structural model 2
2.2. Cross-sections 3
3. Loads 4
3.1. Techn. įreng. s.sv. 4
3.2. Laidų s.sv. 5
3.3. Vėjas x-x 6
3.4. Vėjas y-y 7
3.5. Vėjas x-y 8
3.6. Laidų temp. -5C, apšalas, 0.25 Wmax 9
3.7. Laidų temp. -5C, be apšalo, Wmax 10
3.8. Laidų temp. -5C, apšalas, be Wmax 11
3.9. Apšalas 12
3.10. Vėjas x-x su apšalu 13
3.11. Vėjas y-y su apšalu 14
3.12. Vėjas x-y su apšalu 15
4. Steel ULS check 16
4.1. EC-EN 1993 Steel check ULS; Overall check 16
4.2. EC-EN 1993 Steel check ULS 17
5. Steel SLS check 26
5.1. EC-EN 1993 Steel Check SLS; Check Overall 26
5.2. EC-EN 1993 Steel Check SLS 27
6. Reactions 28
6.1. Resultant of reactions; M_x; M_y 28
6.2. Resultant of reactions; R_x; R_y; R_z 29
6.3. Resultant of reactions 30
7. Deformations 31
7.1. 3D displacement; U_total 31
7.2. 1D deformations 32

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

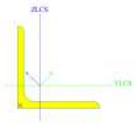
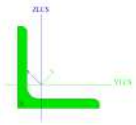
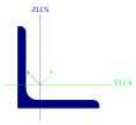
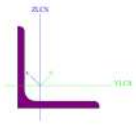
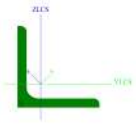
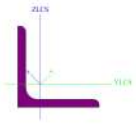
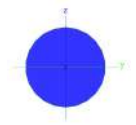
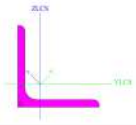
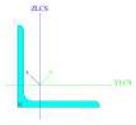
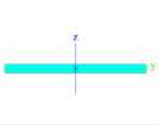
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

2. Geometry

2.1. Structural model

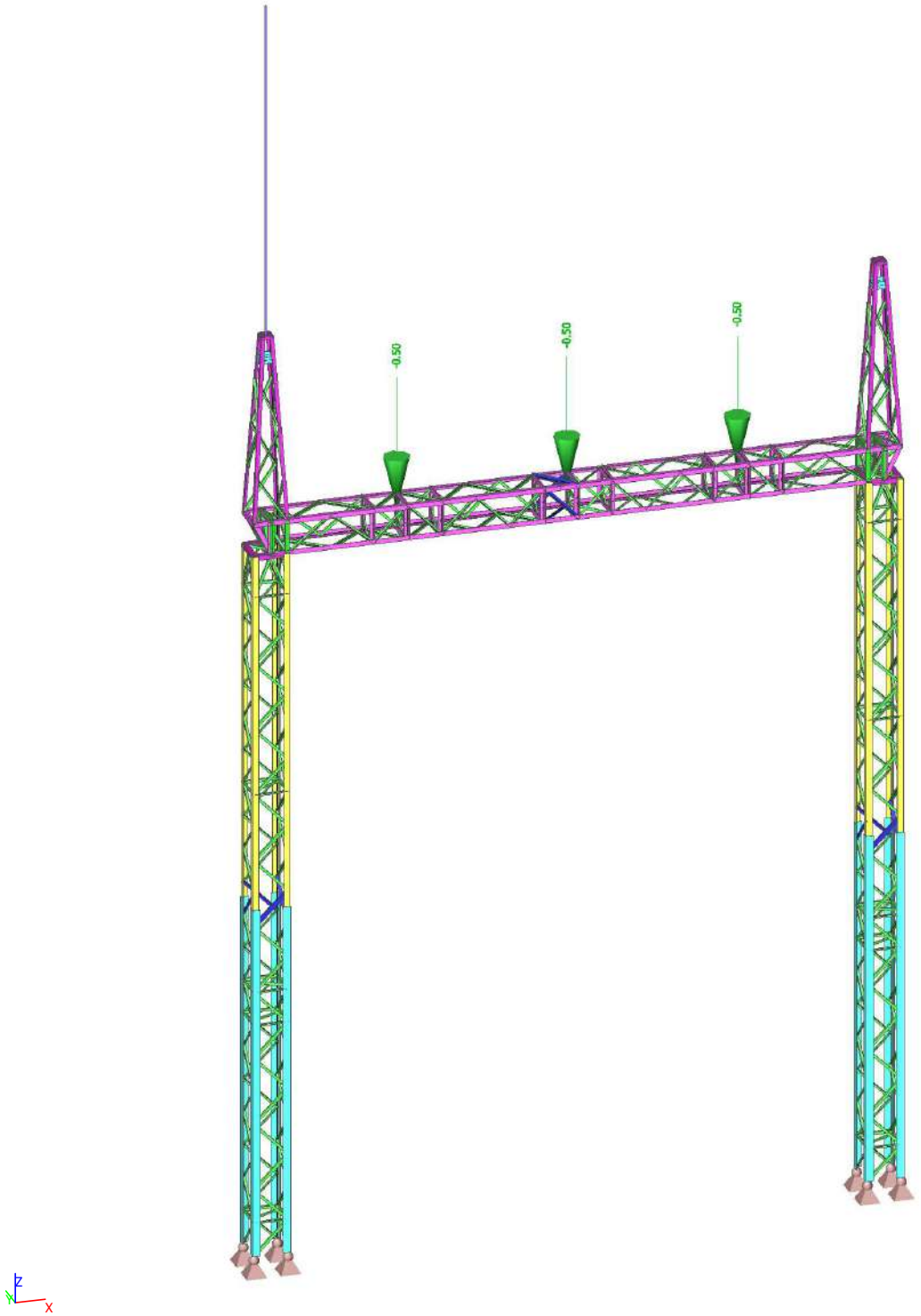


2.2. Cross-sections

Name	A [m²]	Type	Item material	Picture
		Detailed		
CS22	1.2200e-03	L90X7	S 355	
CS23	2.6700e-04	L35X4	S 355	
CS25	4.8000e-04	L50X5	S 355	
CS26	8.1300e-04	L70X6	S 355	
CS27	8.7000e-04	L65X7	S 355	
CS28	4.8000e-04	L50X5	S 355	
CS29	4.5216e-04	RD24	S 355	
CS31	7.5300e-04	L65x65x6	S 355	
CS32	1.7100e-03	L110x110x8	S 355	
CS33	6.0000e-04	FL100X6	S 355	

3. Loads

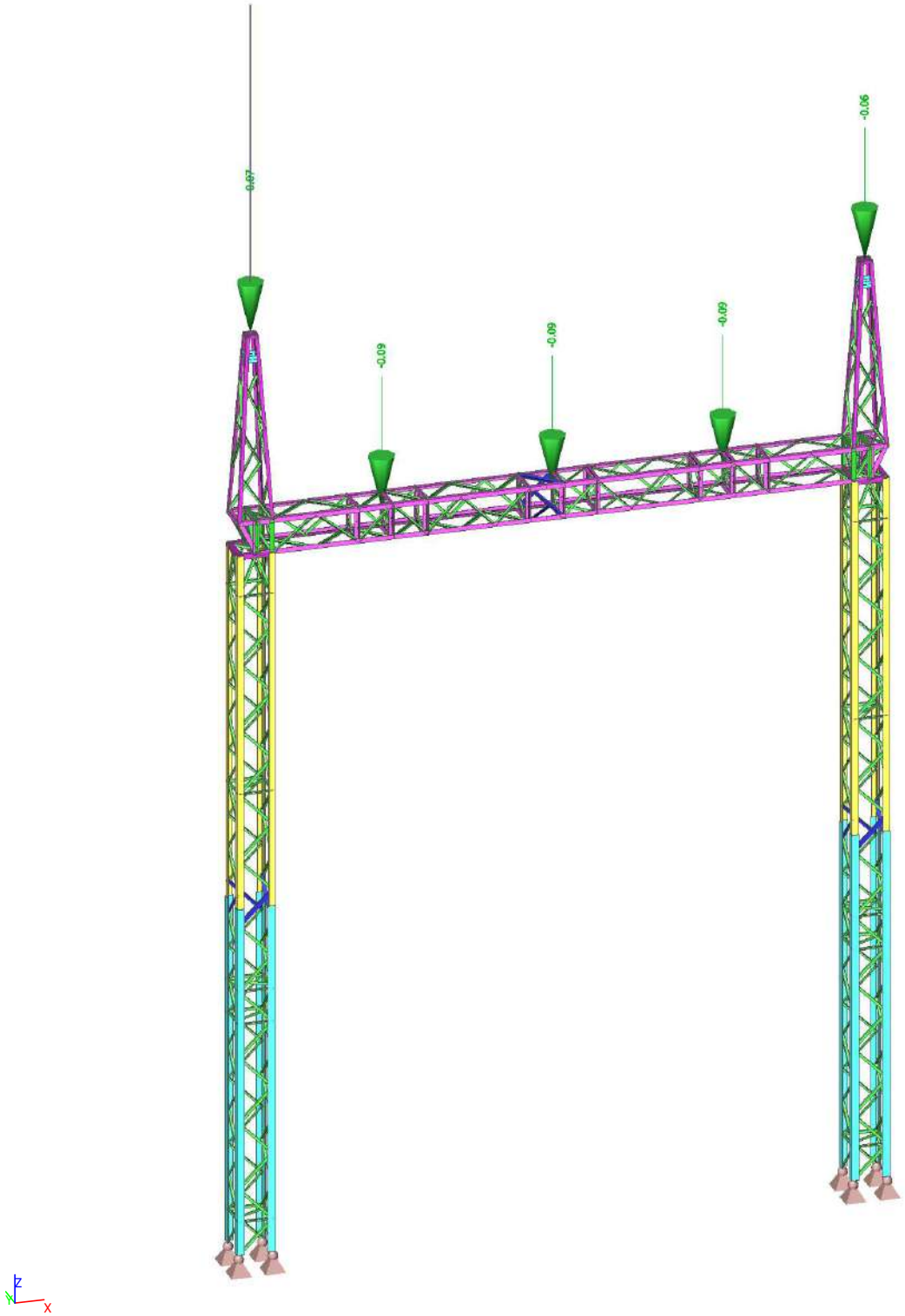
3.1. Techn. įreng. s.sv.



PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

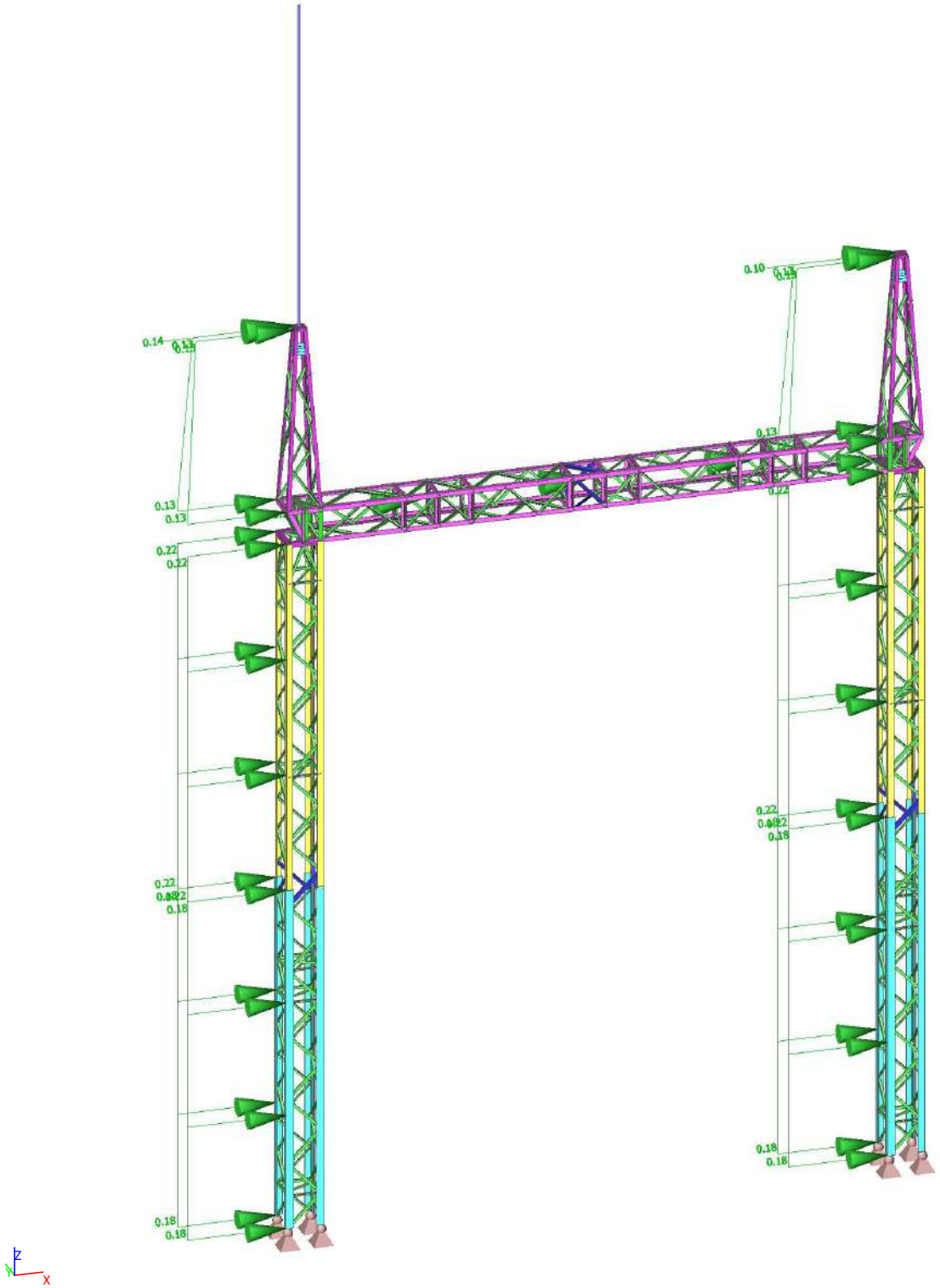
3.2. Laidų s.sv.



PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

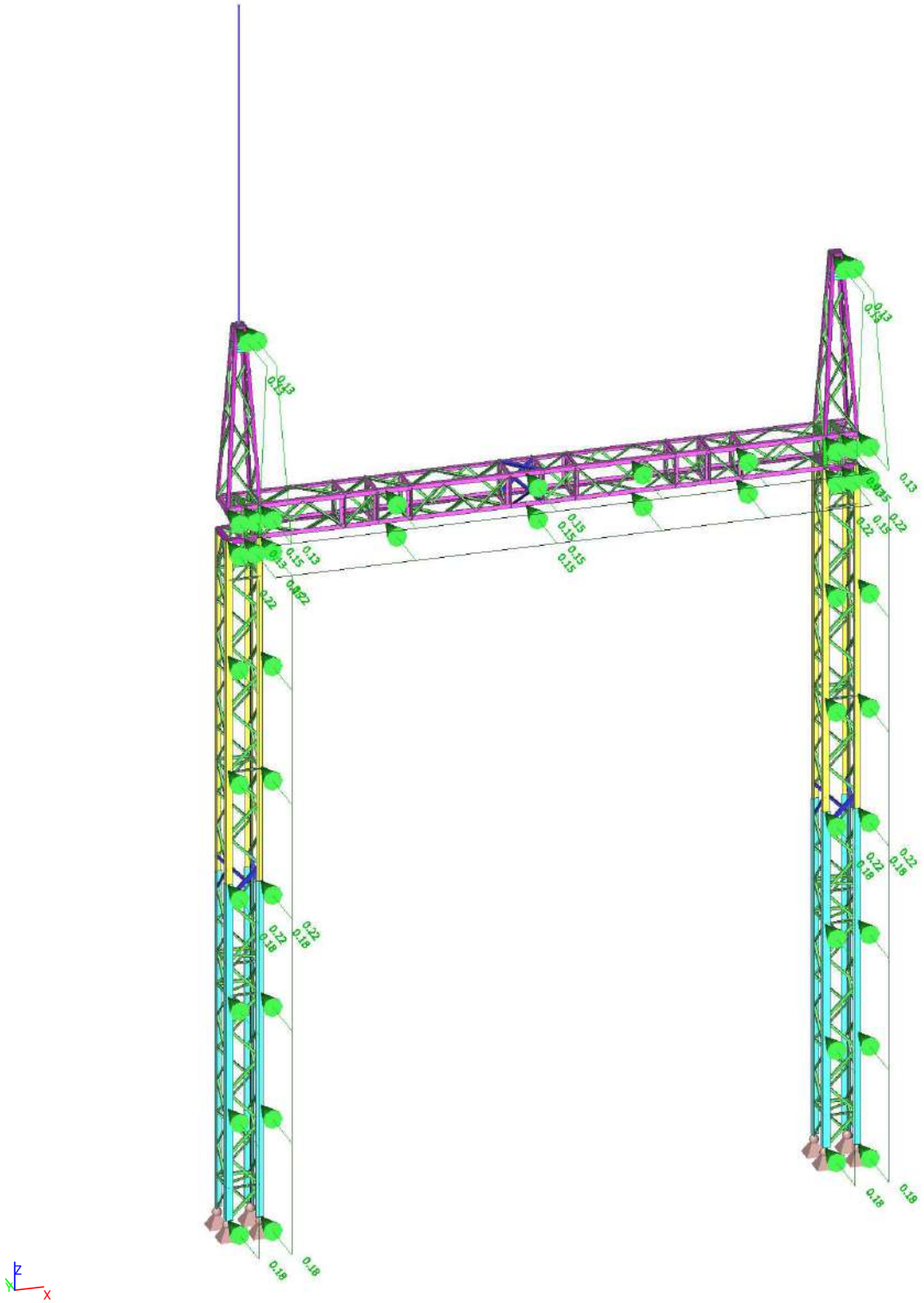
3.3. Vėjas x-x



PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

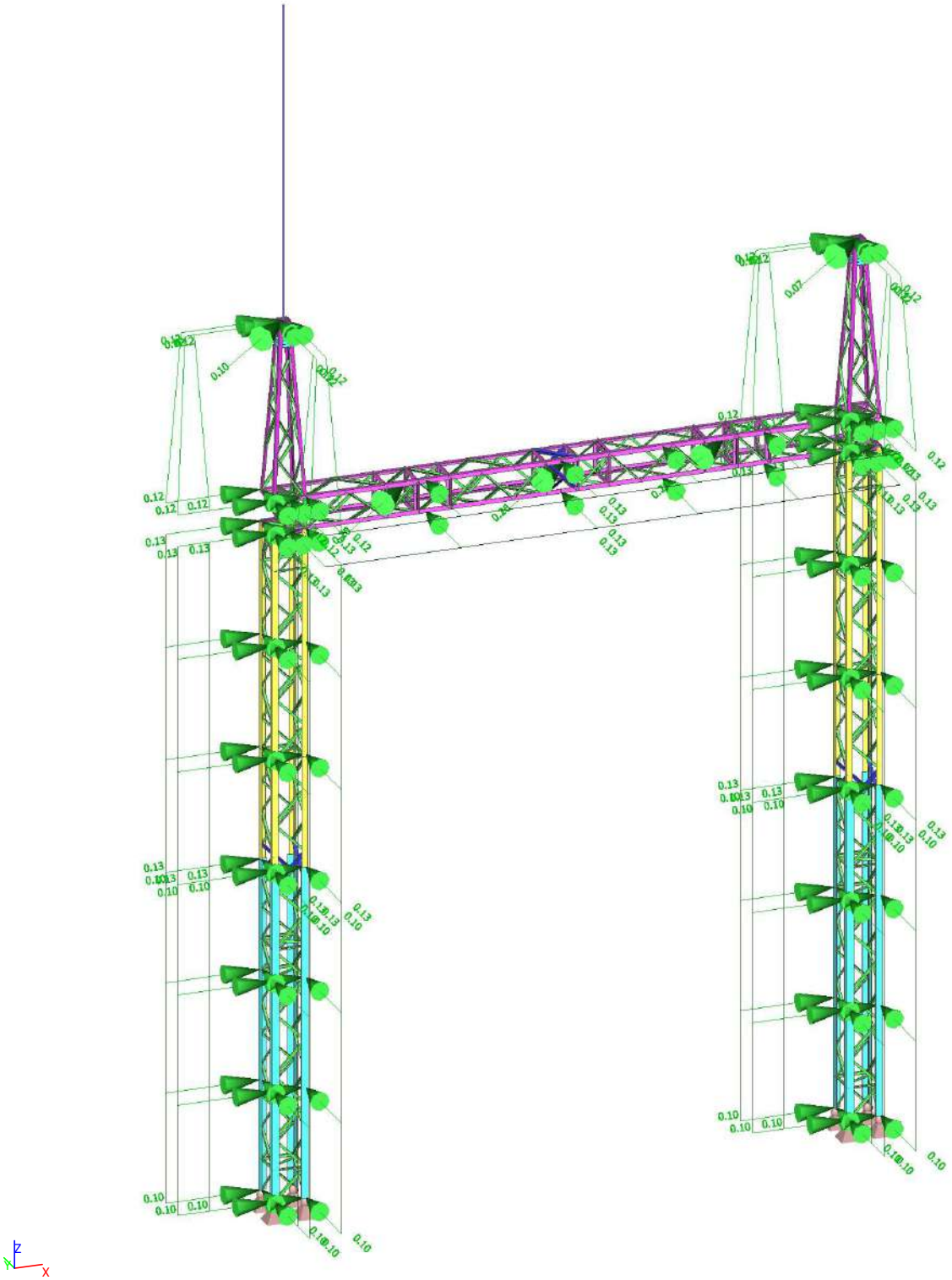
3.4. Vėjas y-y



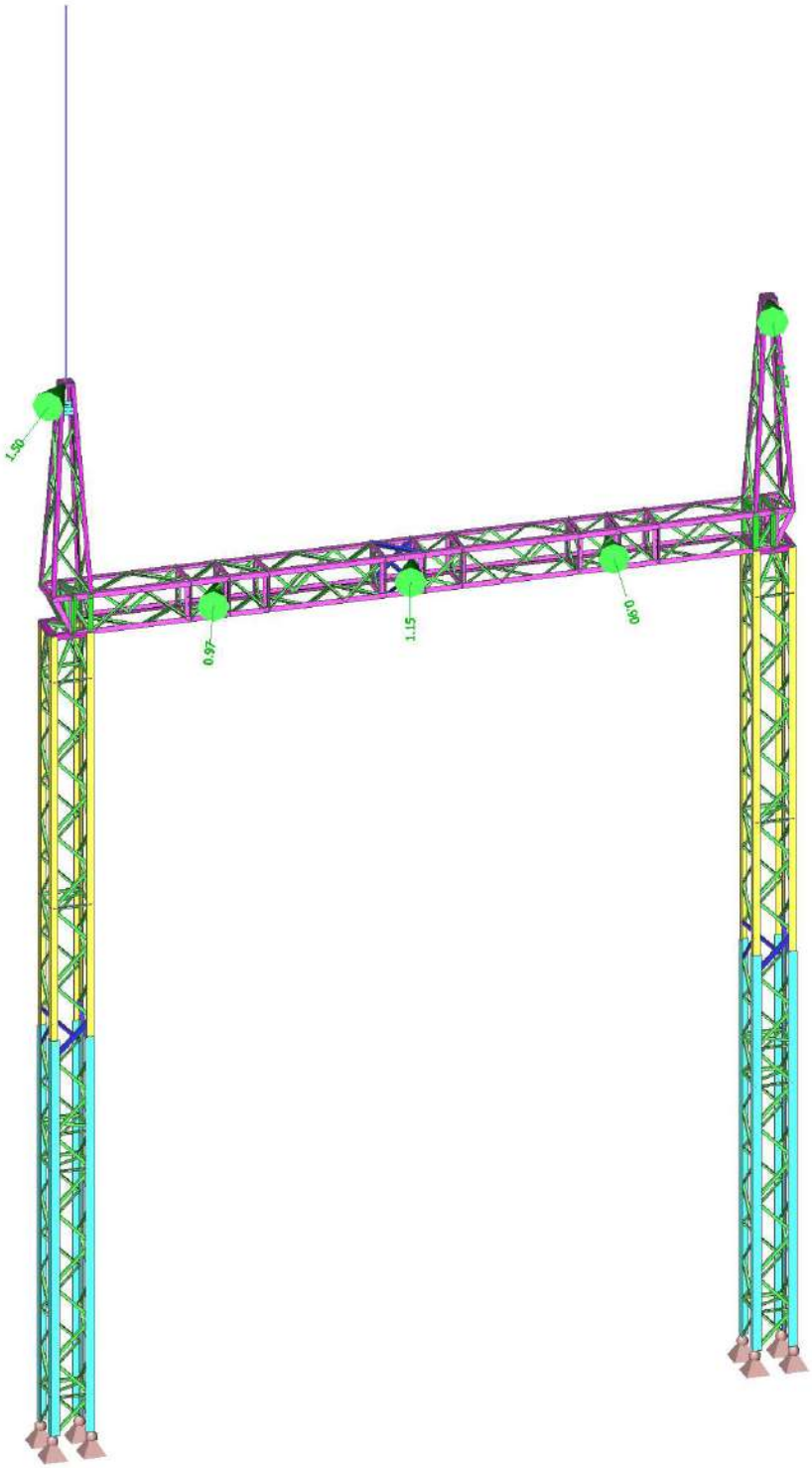
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.5. Vėjas x-y



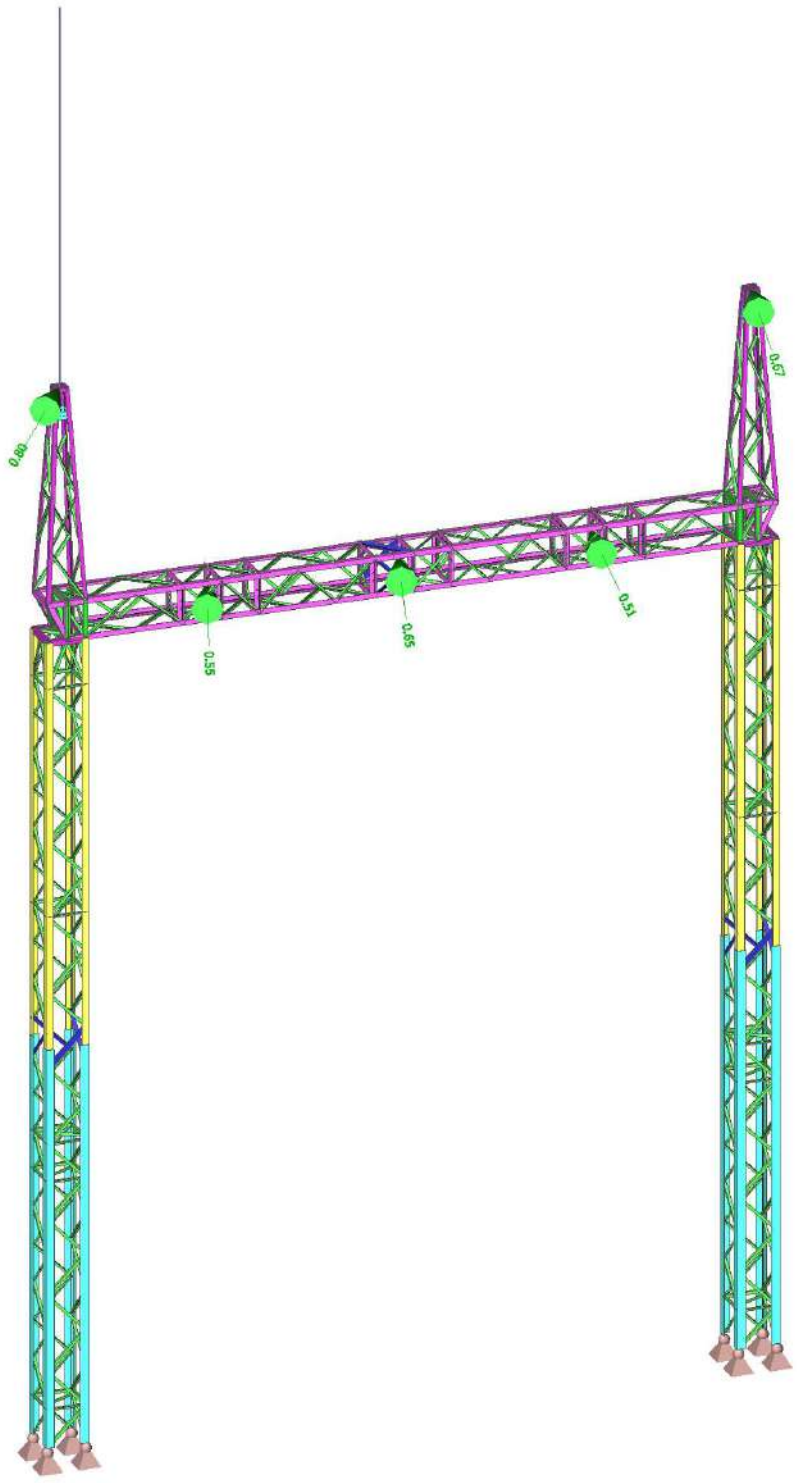
3.6. Laidų temp. -5C, apšalas, 0.25 Wmax



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

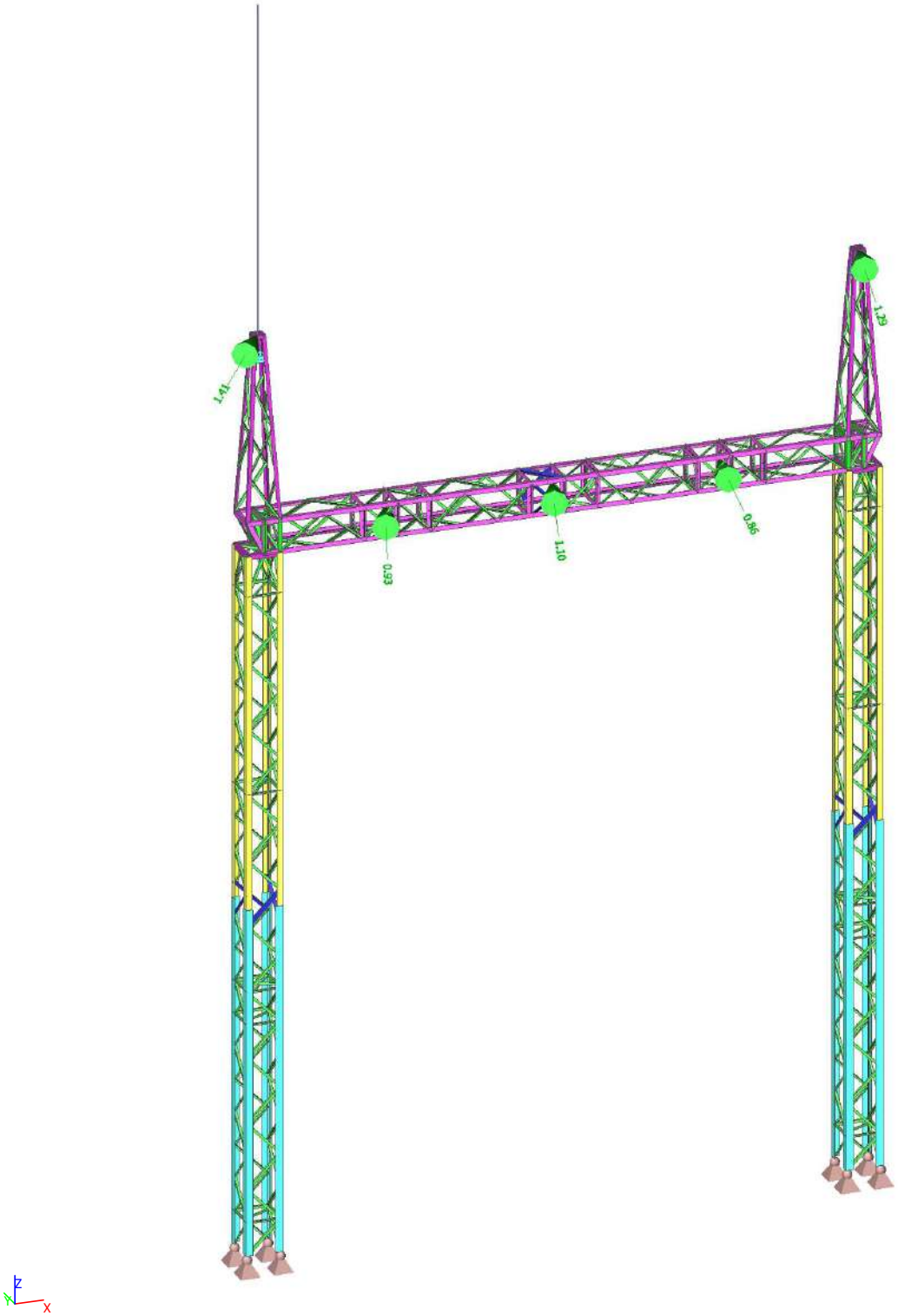
3.7. Laidų temp. -5C, be apšalo, Wmax



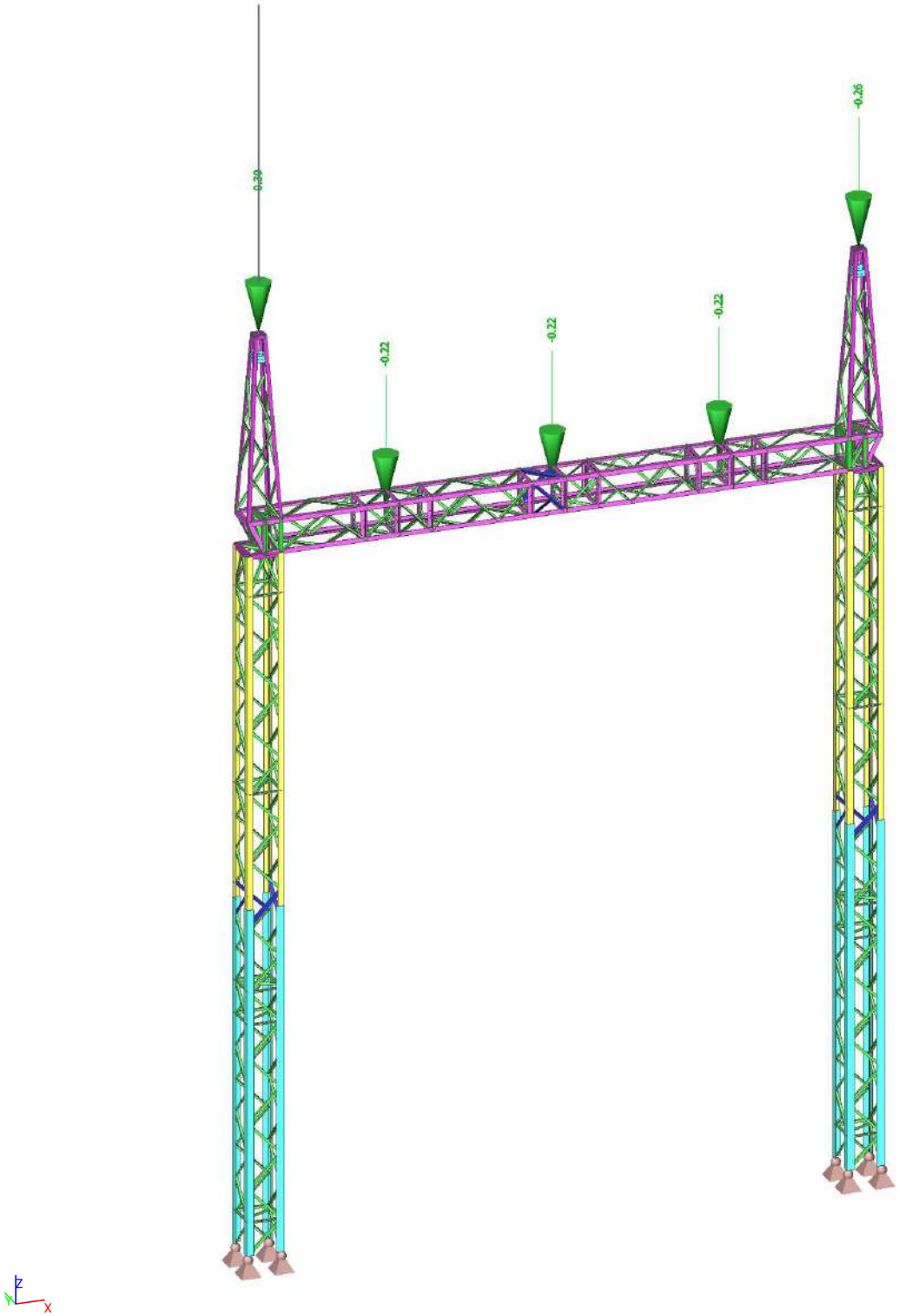
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.8. Laidų temp. -5C, apšalas, be Wmax



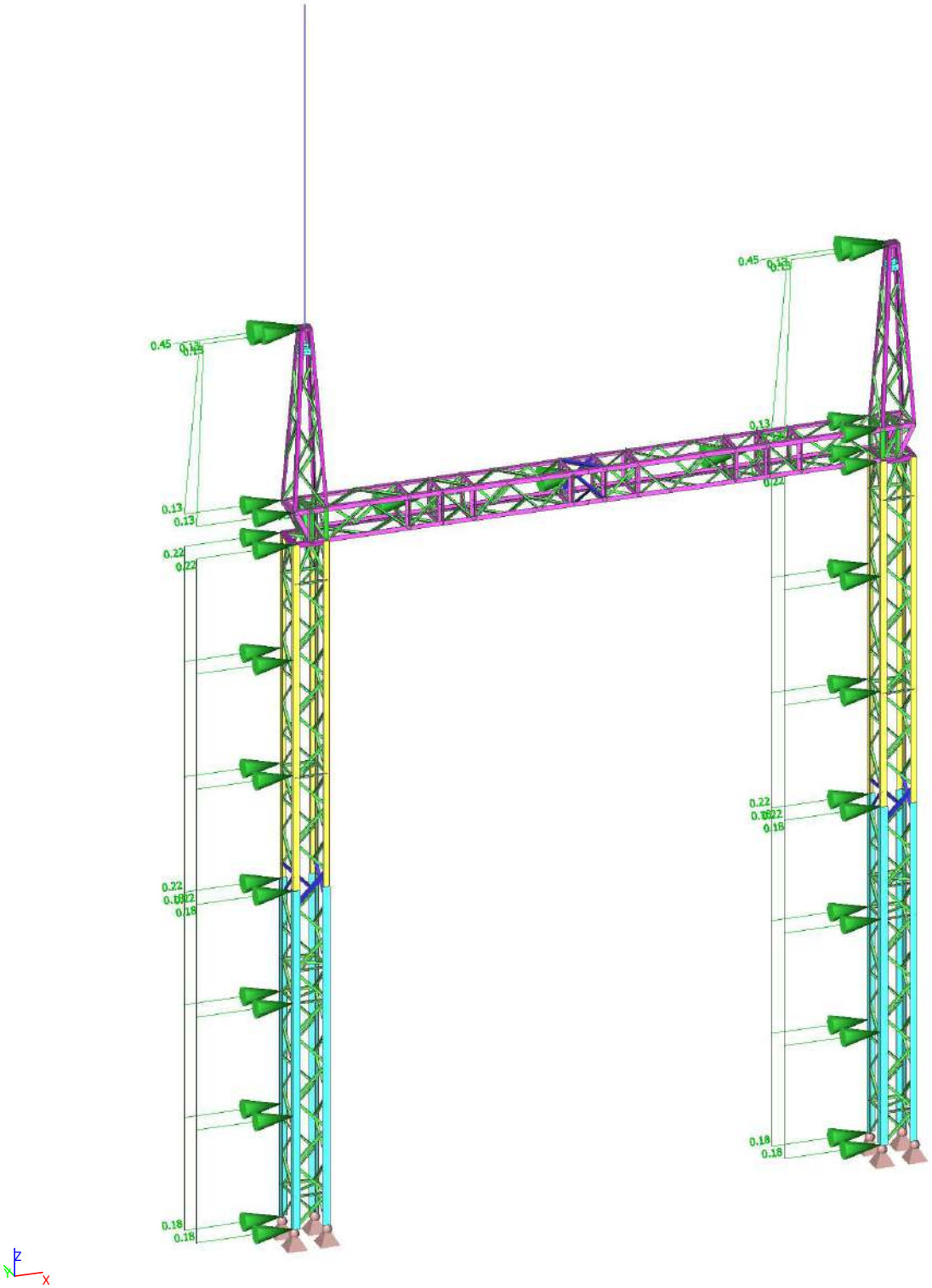
3.9. Apšalas



PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

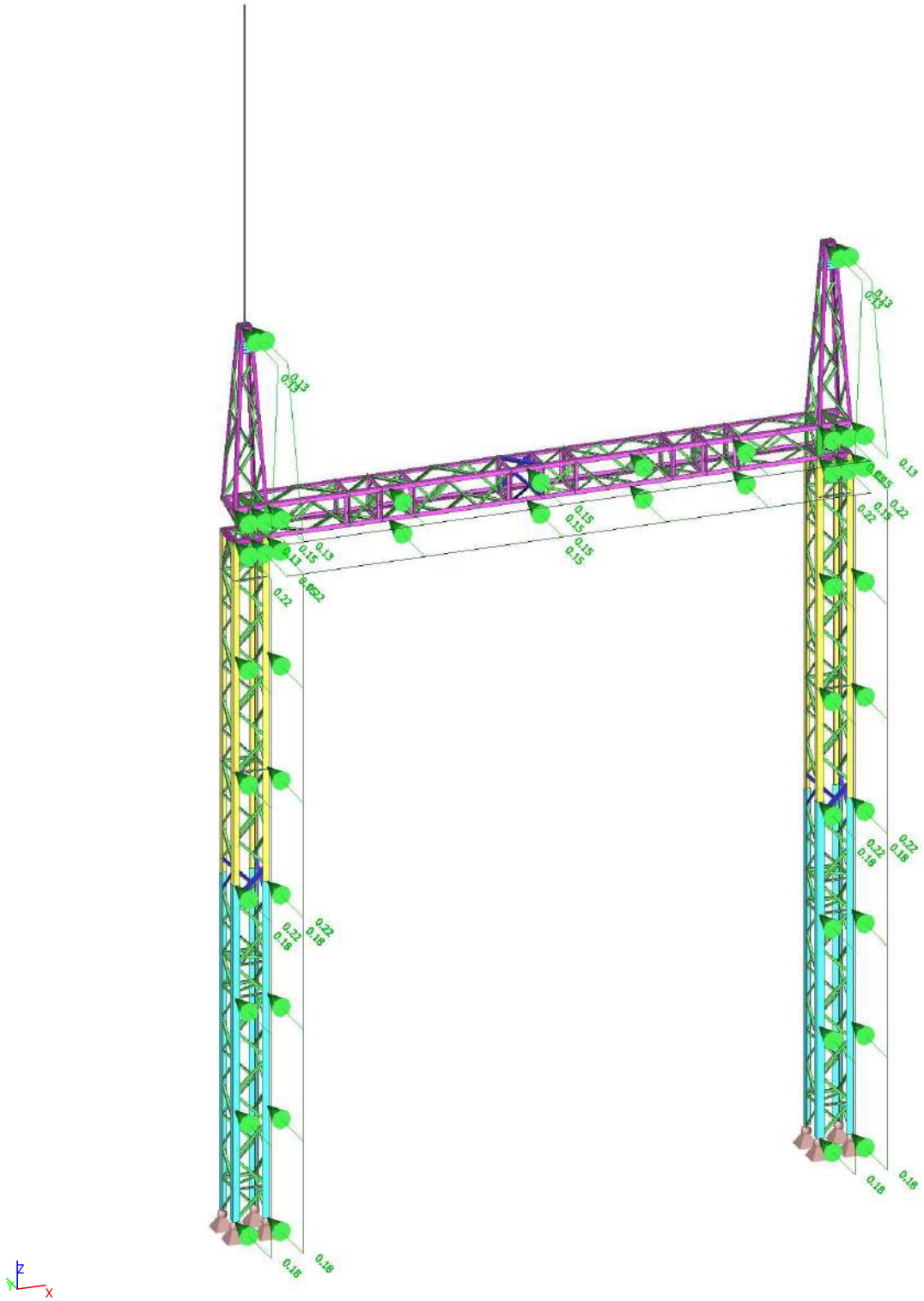
3.10. Vėjas x-x su apšalu



PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

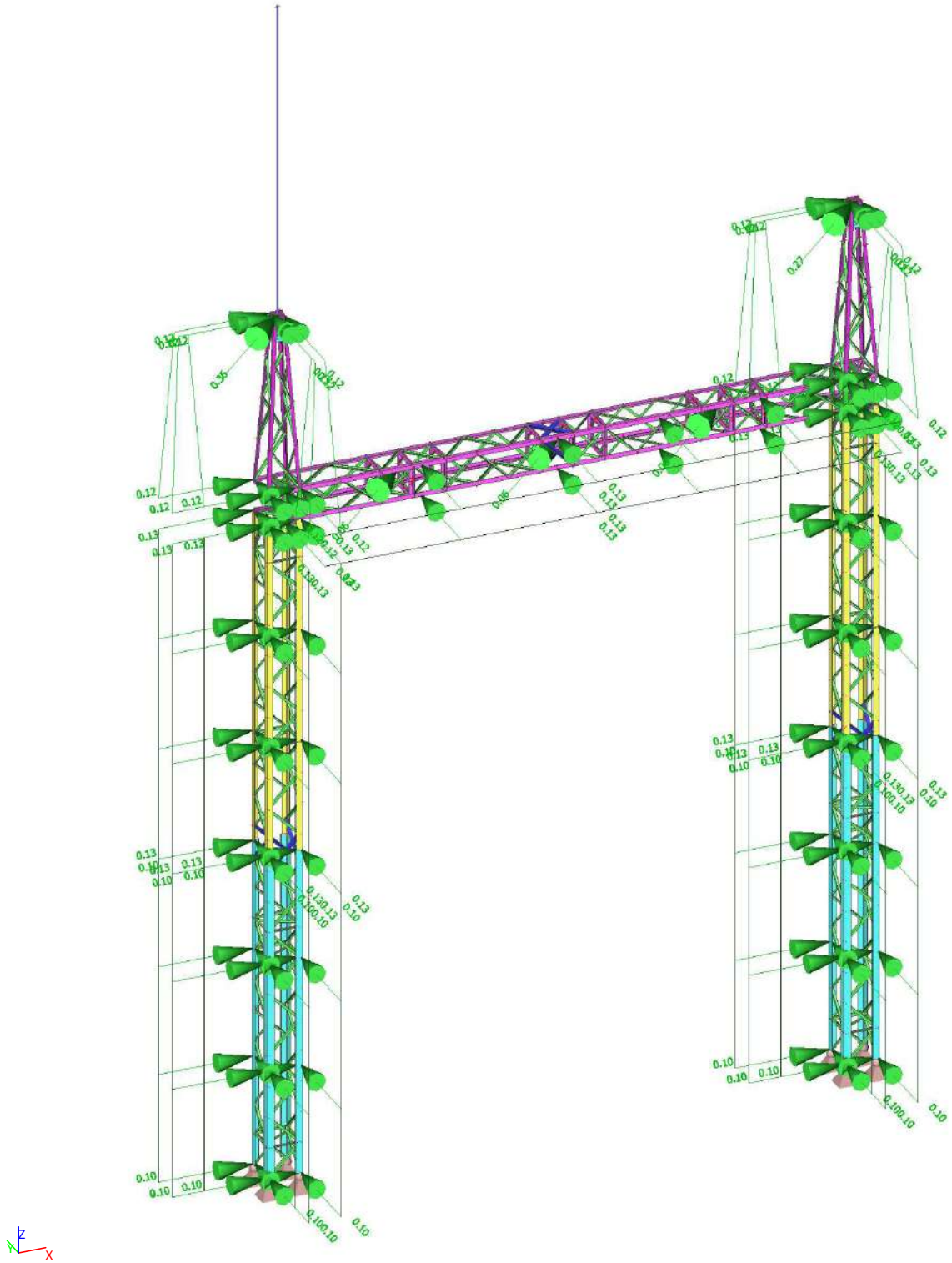
3.11. Vėjas y-y su apšalu



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

3.12. Vėjas x-y su apšalu

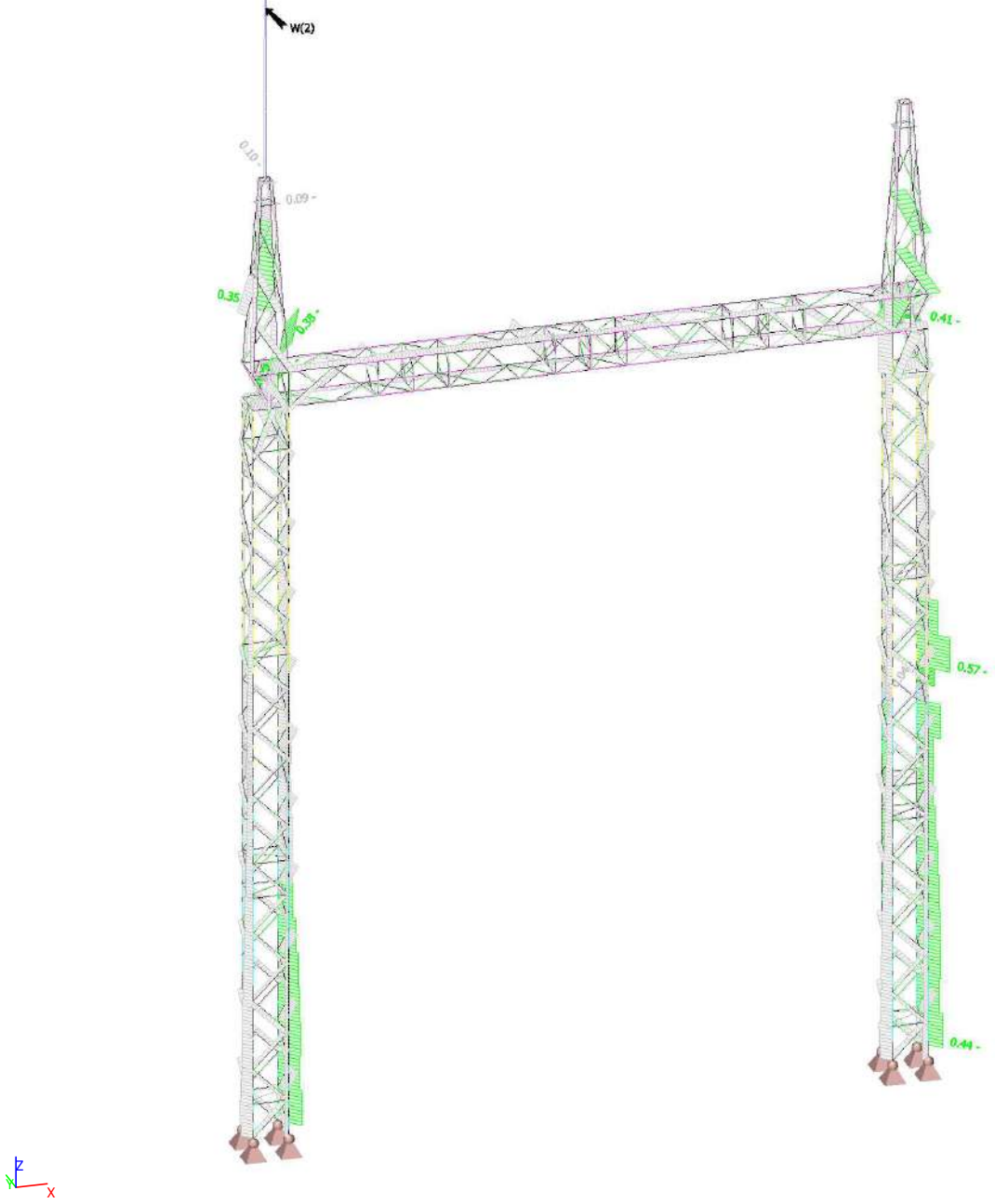


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4. Steel ULS check

4.1. EC-EN 1993 Steel check ULS; Overall check

Values: **UC**$_{Overall}$
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All
There are 2 warnings on selected members. 2 of them are shown.



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

4.2. EC-EN 1993 Steel check ULS

Values: **$UC_{Overall}$**
Linear calculation
Class: All ULS
Coordinate system: Principal
Extreme 1D: Member
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B5	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.15	0.00
B6	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.18**	0.10	0.18
B7	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.10	0.00
B8	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.17**	0.08	0.17
B9	0.707	ULS2.2/2	CS23 - L35X4	S 355	**0.08**	0.08	0.00
B10	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.16**	0.08	0.16
B11	0.707	ULS2.2/2	CS23 - L35X4	S 355	**0.08**	0.08	0.00
B12	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.17**	0.09	0.17
B13	0.707	ULS2.2/2	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B14	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.06	0.15
B15	0.354	ULS2.3/1	CS25 - L50X5	S 355	**0.04**	0.04	0.00
B16	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.17**	0.09	0.17
B17	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B18	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.07	0.15
B19	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B20	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B21	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B22	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.05	0.12
B23	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B24	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.11**	0.05	0.11
B25	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.10	0.00
B26	0.000	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.06	0.06
B27	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.08	0.00
B28	0.000	ULS2/3	CS23 - L35X4	S 355	**0.11**	0.06	0.11
B29	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B30	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.05	0.06
B31	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B32	0.707	ULS2/3	CS23 - L35X4	S 355	**0.05**	0.05	0.05
B33	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B34	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.06
B35	0.354	ULS2/3	CS25 - L50X5	S 355	**0.02**	0.02	0.00
B36	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.05	0.08
B37	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B38	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B39	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B40	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B41	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B42	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.03	0.08
B43	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B44	0.000	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.03	0.06
B45	0.000	ULS2/3	CS23 - L35X4	S 355	**0.13**	0.10	0.13
B46	0.707	ULS2.6/4	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B47	0.000	ULS2/3	CS23 - L35X4	S 355	**0.12**	0.07	0.12
B48	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B49	0.000	ULS2/3	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B50	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B51	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.07	0.12
B52	0.707	ULS2.6/4	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B53	0.000	ULS2/3	CS23 - L35X4	S 355	**0.11**	0.06	0.11
B54	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B55	0.354	ULS2/3	CS25 - L50X5	S 355	**0.02**	0.02	0.02
B56	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B57	0.000	ULS2/3	CS23 - L35X4	S 355	**0.09**	0.05	0.09
B58	0.071	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B59	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B60	0.000	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B61	0.000	ULS2/3	CS23 - L35X4	S 355	**0.07**	0.04	0.07
B62	0.141	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B63	0.000	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.03	0.06
B64	0.707	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B65	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.16**	0.14	0.16
B66	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.10	0.00
B67	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.10	0.14
B69	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.16**	0.07	0.16
B70	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.08	0.00
B71	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.15**	0.06	0.15
B72	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B73	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.05	0.13
B74	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B75	0.354	ULS2.3/1	CS25 - L50X5	S 355	**0.03**	0.03	0.03
B76	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.08	0.00
B77	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.07	0.13
B78	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B79	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.06	0.13
B80	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B81	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B82	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B83	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.11**	0.05	0.11
B84	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B85	0.000	ULS2.3/1	CS32 - L110x110x8	S 355	**0.42**	0.35	0.42
B86	0.500+	ULS2.2/2	CS32 - L110x110x8	S 355	**0.31**	0.16	0.31
B87	0.500-	ULS2.3/1	CS32 - L110x110x8	S 355	**0.24**	0.24	0.00
B88	1.000-	ULS2.2/2	CS32 - L110x110x8	S 355	**0.15**	0.15	0.00
B89	0.250+	ULS2.2/2	CS22 - L90X7	S 355	**0.15**	0.10	0.15
B90	0.000	ULS2.3/1	CS22 - L90X7	S 355	**0.24**	0.19	0.24
B91	0.250+	ULS2.6/4	CS22 - L90X7	S 355	**0.10**	0.02	0.10
B92	0.250-	ULS2.3/1	CS22 - L90X7	S 355	**0.13**	0.13	0.00
B93	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B94	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B95	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.04
B96	0.500	ULS2.2/2	CS23 - L35X4	S 355	**0.04**	0.04	0.04
B97	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B98	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B99	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.04
B100	0.125-	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.02	0.03
B101	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B102	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.03	0.04
B103	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.03
B104	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B105	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B106	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B107	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.03
B108	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.05
B109	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B110	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.19**	0.04	0.19
B111	0.500	ULS2/3	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B112	0.500	ULS2.6/4	CS23 - L35X4	S 355	**0.07**	0.02	0.07
B113	0.500	ULS2.3/1	CS26 - L70X6	S 355	**0.03**	0.03	0.00
B114	0.250+	ULS2.3/1	CS26 - L70X6	S 355	**0.32**	0.32	0.00
B115	0.000	ULS2.2/2	CS26 - L70X6	S 355	**0.03**	0.03	0.00
B116	0.250-	ULS2.6/4	CS26 - L70X6	S 355	**0.23**	0.23	0.18
B117	0.664	ULS2/3	CS23 - L35X4	S 355	**0.17**	0.08	0.17
B118	0.664	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.08	0.12
B119	0.664	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.04	0.09
B120	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B121	0.664	ULS2.6/4	CS23 - L35X4	S 355	**0.09**	0.05	0.09
B122	0.664	ULS2/3	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B123	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B124	0.664	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B125	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B126	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.01	0.06
B127	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B128	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.04	0.13
B129	0.495	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.03	0.10
B130	0.500	ULS2.3/1	CS31 - L65x65x6	S 355	**0.06**	0.05	0.06
B131	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.13**	0.13	0.12
B132	0.000	ULS2/3	CS27 - L65X7	S 355	**0.08**	0.08	0.07
B133	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.06**	0.06	0.05
B134	0.250	ULS2/3	CS31 - L65x65x6	S 355	**0.06**	0.05	0.06
B135	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.07**	0.07	0.00
B136	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.05**	0.05	0.00
B137	0.000	ULS1.7/5	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B138	0.500	ULS1.3/6	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B139	0.559	ULS1.7/5	CS23 - L35X4	S 355	**0.09**	0.01	0.09
B140	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B142	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B163	0.150	ULS1.7/5	CS28 - L50X5	S 355	**0.07**	0.07	0.00
B164	0.000	ULS1.2/7	CS28 - L50X5	S 355	**0.06**	0.06	0.03
B165	0.150	ULS1.2/7	CS28 - L50X5	S 355	**0.06**	0.06	0.03
B166	0.000	ULS1.5/8	CS28 - L50X5	S 355	**0.06**	0.06	0.00
B167	0.689-	ULS2.3/1	CS28 - L50X5	S 355	**0.13**	0.13	0.09
B169	2.410-	ULS1.7/5	CS28 - L50X5	S 355	**0.11**	0.11	0.00
B170	2.066-	ULS1.2/7	CS28 - L50X5	S 355	**0.35**	0.07	0.35
B171	0.689-	ULS2.3/1	CS28 - L50X5	S 355	**0.08**	0.08	0.00
B172	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.07	0.15
B173	0.780	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B174	0.743	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.03
B176	0.780	ULS2.3/1	CS23 - L35X4	S 355	**0.16**	0.12	0.16
B177	0.743	ULS1.7/5	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B178	0.825	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B179	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.11	0.14
B180	0.743	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B181	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.38**	0.03	0.38
B182	0.000	ULS2.6/4	CS23 - L35X4	S 355	**0.05**	0.00	0.05
B183	0.743	ULS1.2/7	CS23 - L35X4	S 355	**0.05**	0.05	0.05
B184	0.000	ULS1.3/6	CS28 - L50X5	S 355	**0.04**	0.04	0.00
B185	0.000	ULS2.3/1	CS33 - FL100X6	S 355	**0.03**	0.03	0.00
B186	0.000	ULS1.7/5	CS33 - FL100X6	S 355	**0.09**	0.09	0.00
B187	0.000	ULS2.3/1	CS33 - FL100X6	S 355	**0.08**	0.08	0.05
B188	0.000	ULS2.3/1	CS33 - FL100X6	S 355	**0.05**	0.05	0.04
B663	0.500	ULS2/3	CS27 - L65X7	S 355	**0.25**	0.25	0.00
B664	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.32**	0.32	0.26
B665	0.500	ULS2.3/1	CS27 - L65X7	S 355	**0.02**	0.02	0.02
B666	0.500	ULS2.3/1	CS27 - L65X7	S 355	**0.04**	0.04	0.03
B667	0.000	ULS2/3	CS27 - L65X7	S 355	**0.05**	0.05	0.00
B672	0.500	ULS2/3	CS27 - L65X7	S 355	**0.12**	0.12	0.00
B673	0.500	ULS2/3	CS27 - L65X7	S 355	**0.14**	0.14	0.00
B674	0.500	ULS2.3/1	CS27 - L65X7	S 355	**0.02**	0.02	0.02
B675	0.000	ULS2.3/1	CS27 - L65X7	S 355	**0.01**	0.01	0.00
B788	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B1820	0.451	ULS2/3	CS23 - L35X4	S 355	**0.30**	0.29	0.30
B1821	0.486	ULS2/3	CS23 - L35X4	S 355	**0.23**	0.23	0.00
B1822	0.451	ULS2.6/4	CS23 - L35X4	S 355	**0.15**	0.02	0.15
B1823	0.486	ULS2.2/2	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2073	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2094	0.500	ULS2.3/1	CS26 - L70X6	S 355	**0.05**	0.05	0.04
B2095	0.000	ULS2.3/1	CS26 - L70X6	S 355	**0.13**	0.13	0.13
B2096	0.000	ULS2.6/4	CS23 - L35X4	S 355	**0.11**	0.11	0.00
B2097	0.664	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2098	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B2099	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2100	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.11**	0.05	0.11
B2101	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2102	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.11**	0.05	0.11

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B2103	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2104	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2105	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.03	0.08
B2106	0.707	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2107	0.000	ULS2/3	CS23 - L35X4	S 355	**0.07**	0.04	0.07
B2108	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.21**	0.07	0.21
B2109	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2110	0.000	ULS2/3	CS23 - L35X4	S 355	**0.20**	0.20	0.00
B2111	0.000	ULS2/3	CS23 - L35X4	S 355	**0.21**	0.21	0.00
B2112	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2113	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2114	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2115	0.000	ULS1.3/6	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2116	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.02	0.10
B2117	0.000	ULS1.3/6	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2119	0.000	ULS2/3	CS27 - L65X7	S 355	**0.19**	0.19	0.15
B2120	0.500	ULS2/3	CS31 - L65x65x6	S 355	**0.14**	0.14	0.00
B2121	0.500	ULS2/3	CS31 - L65x65x6	S 355	**0.17**	0.17	0.00
B2122	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.04**	0.02	0.04
B2123	0.500	ULS2/3	CS27 - L65X7	S 355	**0.05**	0.05	0.00
B2124	0.050	ULS1.5/8	CS31 - L65x65x6	S 355	**0.04**	0.03	0.04
B2125	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.07**	0.07	0.00
B2126	0.559	ULS2.3/1	CS31 - L65x65x6	S 355	**0.16**	0.10	0.16
B2127	0.559	ULS2.6/4	CS31 - L65x65x6	S 355	**0.08**	0.08	0.08
B2128	0.000	ULS2/3	CS27 - L65X7	S 355	**0.35**	0.35	0.19
B2130	0.000	ULS2/3	CS23 - L35X4	S 355	**0.36**	0.29	0.36
B2131	0.000	ULS2/3	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2132	0.559	ULS2/3	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2134	0.500	ULS2.3/1	CS27 - L65X7	S 355	**0.03**	0.02	0.03
B2136	0.000	ULS2/3	CS27 - L65X7	S 355	**0.41**	0.41	0.00
B2137	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.07**	0.07	0.00
B2138	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00
B2139	2.410-	ULS1.7/5	CS28 - L50X5	S 355	**0.10**	0.10	0.00
B2140	0.344-	ULS1.2/7	CS28 - L50X5	S 355	**0.06**	0.06	0.04
B2141	2.410+	ULS1.7/5	CS28 - L50X5	S 355	**0.06**	0.06	0.00
B2142	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.26**	0.03	0.26
B2143	0.000	ULS1.7/5	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2144	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.03	0.13
B2145	0.000	ULS2.6/4	CS23 - L35X4	S 355	**0.06**	0.00	0.06
B2147	0.150	ULS1.7/5	CS28 - L50X5	S 355	**0.05**	0.05	0.00
B2148	0.000	ULS1/9	CS28 - L50X5	S 355	**0.03**	0.03	0.02
B2149	0.150	ULS1/9	CS28 - L50X5	S 355	**0.06**	0.06	0.03
B2150	0.000	ULS1.5/8	CS28 - L50X5	S 355	**0.03**	0.03	0.00
B2151	0.000	ULS1.2/7	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2152	0.743	ULS1.7/5	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2153	0.000	ULS2/3	CS23 - L35X4	S 355	**0.29**	0.01	0.29
B2154	0.000	ULS1.5/8	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2155	0.743	ULS1.2/7	CS23 - L35X4	S 355	**0.05**	0.05	0.04
B2156	0.212	ULS1.2/7	CS28 - L50X5	S 355	**0.07**	0.07	0.03
B2157	0.000	ULS1.2/7	CS33 - FL100X6	S 355	**0.04**	0.04	0.00
B2158	0.000	ULS1.7/5	CS33 - FL100X6	S 355	**0.05**	0.05	0.00
B2159	0.194	ULS2.3/1	CS33 - FL100X6	S 355	**0.06**	0.02	0.06
B2160	0.000	ULS1.7/5	CS33 - FL100X6	S 355	**0.09**	0.06	0.09
B2161	0.500	ULS2/3	CS23 - L35X4	S 355	**0.20**	0.07	0.20
B2162	0.250-	ULS2/3	CS26 - L70X6	S 355	**0.31**	0.31	0.00
B2163	0.000	ULS2.3/1	CS26 - L70X6	S 355	**0.05**	0.04	0.05
B2164	0.000	ULS2/3	CS23 - L35X4	S 355	**0.13**	0.13	0.00
B2165	0.664	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.05	0.10
B2167	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2168	0.000	ULS2/3	CS23 - L35X4	S 355	**0.10**	0.05	0.10
B2169	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2170	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.10**	0.05	0.10
B2171	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2172	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.06	0.13
B2173	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2174	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.06	0.12

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B2175	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2176	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.11**	0.05	0.11
B2177	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2178	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.12**	0.03	0.12
B2179	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2180	0.707	ULS2.2/2	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2181	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.05	0.13
B2182	0.354	ULS2.3/1	CS25 - L50X5	S 355	**0.03**	0.03	0.00
B2183	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.08	0.15
B2184	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2185	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.13**	0.06	0.13
B2186	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2187	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.05	0.08
B2188	0.354	ULS2/3	CS25 - L50X5	S 355	**0.03**	0.03	0.00
B2189	0.000	ULS2/3	CS23 - L35X4	S 355	**0.09**	0.06	0.09
B2190	0.707	ULS2/3	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2191	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2192	0.707	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2193	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.08	0.14
B2194	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2195	0.354	ULS2/3	CS25 - L50X5	S 355	**0.03**	0.03	0.03
B2196	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2197	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B2198	0.000	ULS2/3	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2199	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.12**	0.06	0.12
B2200	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.06	0.14
B2201	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2202	0.354	ULS2.3/1	CS25 - L50X5	S 355	**0.04**	0.04	0.04
B2203	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2204	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.07	0.14
B2205	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2206	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2207	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.03
B2208	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.02
B2209	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2210	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2211	0.500	ULS1.3/6	CS23 - L35X4	S 355	**0.03**	0.01	0.03
B2212	0.000	ULS2.8/10	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2213	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.08	0.15
B2214	0.707	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.06	0.06
B2215	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.08	0.15
B2216	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.16**	0.07	0.16
B2217	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2218	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2219	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2220	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.03	0.04
B2221	0.500	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.03
B2222	0.000	ULS2.8/10	CS23 - L35X4	S 355	**0.05**	0.01	0.05
B2223	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.14	0.00
B2224	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.17**	0.09	0.17
B2225	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2226	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.07	0.15
B2227	0.707	ULS2.2/2	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2228	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.14**	0.07	0.14
B2229	0.707	ULS2.2/2	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2230	0.000	ULS2/3	CS23 - L35X4	S 355	**0.10**	0.10	0.00
B2231	0.707	ULS2.6/4	CS23 - L35X4	S 355	**0.07**	0.07	0.07
B2232	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.08	0.00
B2233	0.000	ULS2/3	CS23 - L35X4	S 355	**0.11**	0.07	0.11
B2234	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2235	0.000	ULS2/3	CS23 - L35X4	S 355	**0.09**	0.06	0.09
B2236	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2237	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.10	0.15
B2238	0.707	ULS2/3	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2239	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.10	0.15
B2240	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.08	0.00

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B2241	0.000	ULS2/3	CS23 - L35X4	S 355	**0.14**	0.07	0.14
B2242	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2243	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.17**	0.15	0.17
B2244	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.11**	0.11	0.00
B2245	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.15**	0.10	0.15
B2246	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2247	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.17**	0.08	0.17
B2248	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2249	0.000	ULS2.3/1	CS32 - L110x110x8	S 355	**0.44**	0.36	0.44
B2250	0.500+	ULS2.2/2	CS32 - L110x110x8	S 355	**0.32**	0.15	0.32
B2251	0.500-	ULS2.3/1	CS32 - L110x110x8	S 355	**0.24**	0.24	0.00
B2252	0.000	ULS2.6/4	CS32 - L110x110x8	S 355	**0.19**	0.14	0.19
B2253	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2254	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2255	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.04
B2256	0.500	ULS2.2/2	CS23 - L35X4	S 355	**0.04**	0.04	0.03
B2257	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2258	4.750+	ULS2/3	CS22 - L90X7	S 355	**0.20**	0.07	0.20
B2259	0.250+	ULS2.3/1	CS22 - L90X7	S 355	**0.57**	0.12	0.57
B2260	0.250+	ULS2.6/4	CS22 - L90X7	S 355	**0.11**	0.02	0.11
B2261	4.750+	ULS2/3	CS22 - L90X7	S 355	**0.24**	0.06	0.24
B2264	0.000	ULS2/3	CS27 - L65X7	S 355	**0.26**	0.26	0.19
B2265	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.07	0.00
B2266	0.500	ULS2/3	CS27 - L65X7	S 355	**0.02**	0.02	0.00
B2267	0.000	ULS2.3/1	CS27 - L65X7	S 355	**0.05**	0.05	0.04
B2268	0.486	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2269	0.451	ULS2/3	CS23 - L35X4	S 355	**0.36**	0.36	0.00
B2270	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2271	2.410-	ULS1.2/7	CS28 - L50X5	S 355	**0.12**	0.12	0.08
B2272	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2273	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2274	0.875-	ULS2/3	CS31 - L65x65x6	S 355	**0.06**	0.06	0.00
B2275	2.000-	ULS2.3/1	CS31 - L65x65x6	S 355	**0.08**	0.08	0.00
B2276	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.16**	0.16	0.10
B2277	0.025	ULS2/3	CS31 - L65x65x6	S 355	**0.25**	0.25	0.22
B2278	0.000	ULS2.5/11	CS23 - L35X4	S 355	**0.07**	0.04	0.07
B2279	0.320	ULS2.5/11	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2280	0.707	ULS2.7/12	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2281	0.707	ULS2/3	CS23 - L35X4	S 355	**0.02**	0.01	0.02
B2282	0.354+	ULS2/3	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2284	0.707	ULS2/3	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2285	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.03	0.08
B2286	0.000	ULS2/3	CS23 - L35X4	S 355	**0.10**	0.05	0.10
B2287	0.000	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2288	0.000	ULS2/3	CS23 - L35X4	S 355	**0.09**	0.04	0.09
B2289	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2290	0.000	ULS2/3	CS23 - L35X4	S 355	**0.15**	0.10	0.15
B2291	0.800	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.06	0.00
B2292	0.424	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2293	0.354	ULS2/3	CS25 - L50X5	S 355	**0.01**	0.01	0.01
B2294	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2295	0.800	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2296	0.000	ULS1.3/6	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2297	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2298	0.566	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2302	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2303	0.707	ULS1.2/7	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2304	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2305	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2306	0.800	ULS2.3/1	CS23 - L35X4	S 355	**0.07**	0.03	0.07
B2307	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2308	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.02**	0.02	0.02

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B2309	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2310	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2311	0.212	ULS1.3/6	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2312	0.000	ULS1.3/6	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2313	0.354	ULS1.2/7	CS25 - L50X5	S 355	**0.01**	0.01	0.01
B2314	0.000	ULS2/3	CS23 - L35X4	S 355	**0.09**	0.09	0.00
B2315	0.000	ULS2/3	CS23 - L35X4	S 355	**0.18**	0.06	0.18
B2316	0.707	ULS2/3	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2317	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2318	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2319	0.000	ULS2/3	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2320	0.707	ULS2/3	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2321	0.000	ULS2/3	CS23 - L35X4	S 355	**0.06**	0.03	0.06
B2322	0.800	ULS1.3/6	CS23 - L35X4	S 355	**0.04**	0.04	0.00
B2323	0.000	ULS3/13	CS23 - L35X4	S 355	**0.10**	0.04	0.10
B2324	0.707	ULS1.3/6	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2325	0.000	ULS2.5/11	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2326	0.707	ULS2.7/12	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2327	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2328	0.707	ULS2/3	CS23 - L35X4	S 355	**0.23**	0.01	0.23
B2329	0.354	ULS2/3	CS25 - L50X5	S 355	**0.01**	0.01	0.00
B2330	0.080	ULS2.3/1	CS23 - L35X4	S 355	**0.04**	0.04	0.04
B2331	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2332	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2333	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2334	0.566	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2335	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2336	0.707	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2337	0.800	ULS2.3/1	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2338	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2339	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2340	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2341	0.000	ULS2.2/2	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2342	0.212	ULS1.10/14	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2343	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.09**	0.07	0.09
B2344	0.000	ULS1.10/14	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2345	0.354	ULS1.10/14	CS25 - L50X5	S 355	**0.01**	0.01	0.00
B2346	0.300+	ULS2/3	CS31 - L65x65x6	S 355	**0.01**	0.00	0.01
B2347	0.500	ULS1.3/6	CS31 - L65x65x6	S 355	**0.02**	0.02	0.00
B2348	0.500	ULS2.5/11	CS31 - L65x65x6	S 355	**0.02**	0.02	0.00
B2349	0.000	ULS2.2/2	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2350	0.250+	ULS1/9	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2351	0.500	ULS1.2/7	CS31 - L65x65x6	S 355	**0.02**	0.01	0.02
B2352	0.300-	ULS2/3	CS31 - L65x65x6	S 355	**0.04**	0.02	0.04
B2353	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2354	0.500	ULS2.2/2	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00
B2355	0.500	ULS1.3/6	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2356	0.500	ULS2.6/4	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2357	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2358	0.500	ULS2.2/2	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00
B2359	0.500	ULS1.10/14	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00
B2360	0.500	ULS2.7/12	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2361	0.500	ULS2.5/11	CS31 - L65x65x6	S 355	**0.01**	0.00	0.01
B2362	0.300+	ULS2/3	CS31 - L65x65x6	S 355	**0.04**	0.00	0.04
B2363	0.200-	ULS2.3/1	CS31 - L65x65x6	S 355	**0.02**	0.01	0.02
B2364	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.04**	0.04	0.00
B2365	0.500	ULS2.3/1	CS31 - L65x65x6	S 355	**0.02**	0.02	0.00
B2366	0.000	ULS2.6/4	CS31 - L65x65x6	S 355	**0.02**	0.02	0.00
B2367	0.200-	ULS2.3/1	CS31 - L65x65x6	S 355	**0.02**	0.01	0.02
B2368	0.300-	ULS2/3	CS31 - L65x65x6	S 355	**0.06**	0.02	0.06
B2369	0.000	ULS2/3	CS31 - L65x65x6	S 355	**0.02**	0.02	0.00
B2370	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2371	0.500	ULS2.3/1	CS31 - L65x65x6	S 355	**0.02**	0.02	0.01
B2372	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.02**	0.02	0.01
B2373	0.500	ULS2.3/1	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2374	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]
B2375	0.000	ULS2.6/4	CS31 - L65x65x6	S 355	**0.01**	0.00	0.01
B2376	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.02**	0.02	0.02
B2377	0.500	ULS2.6/4	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00
B2378	0.200+	ULS2/3	CS31 - L65x65x6	S 355	**0.02**	0.01	0.02
B2379	0.300-	ULS1.4/15	CS31 - L65x65x6	S 355	**0.01**	0.01	0.00
B2380	0.300-	ULS2/3	CS31 - L65x65x6	S 355	**0.05**	0.02	0.05
B2381	0.000	ULS2.3/1	CS31 - L65x65x6	S 355	**0.01**	0.01	0.01
B2382	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2383	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2384	0.283	ULS1.10/14	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2385	0.283	ULS1.3/6	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2386	0.283	ULS1.4/15	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2387	0.283	ULS1.4/15	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2388	0.283	ULS1.10/14	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2389	0.283	ULS2.6/4	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2390	0.000	ULS2.7/12	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2391	0.283	ULS2.7/12	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2392	0.000	ULS2.7/12	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2393	0.000	ULS2/3	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2394	0.283	ULS2.5/11	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2395	0.283	ULS2.5/11	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2396	0.000	ULS2.5/11	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2397	0.000	ULS2.6/4	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2398	0.283	ULS1.2/7	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2399	0.283	ULS1.2/7	CS23 - L35X4	S 355	**0.05**	0.01	0.05
B2400	0.283	ULS1.10/14	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2401	0.283	ULS2.6/4	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2402	0.000	ULS2/3	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2403	0.283	ULS2/3	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2404	0.000	ULS2/3	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2405	0.283	ULS2.3/1	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2406	0.283	ULS2.3/1	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2407	0.283	ULS2/3	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2408	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2409	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2410	0.283	ULS1.2/7	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2411	0.283	ULS1.4/15	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2412	0.283	ULS1.10/14	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2413	0.000	ULS2.6/4	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2414	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.00**	0.00	0.00
B2415	0.283	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2416	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.01
B2417	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.01**	0.01	0.00
B2418	0.000	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2419	0.000	ULS1/9	CS23 - L35X4	S 355	**0.03**	0.03	0.00
B2420	0.000	ULS2/3	CS23 - L35X4	S 355	**0.02**	0.02	0.00
B2425	1.250-	ULS2.5/11	CS31 - L65x65x6	S 355	**0.22**	0.03	0.22
B2426	4.750	ULS2/3	CS31 - L65x65x6	S 355	**0.29**	0.29	0.00
B2427	4.750	ULS2/3	CS31 - L65x65x6	S 355	**0.24**	0.09	0.24
B2428	1.600	ULS2.3/1	CS31 - L65x65x6	S 355	**0.17**	0.03	0.17
B2421	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.02**	0.02	0.02
B2429	0.000	ULS-Set B (auto)/16	CS29 - RD24	S 355	**0.10**	0.00	0.10
B2430	0.750	ULS2.3/1	CS23 - L35X4	S 355	**0.08**	0.04	0.08
B2431	0.000	ULS2.3/1	CS23 - L35X4	S 355	**0.05**	0.05	0.00
B2432	0.000	ULS2/3	CS23 - L35X4	S 355	**0.03**	0.03	0.00

Name	Combination key
ULS2.3/1	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.30*Wx-y + 1.35*LL2
ULS2.2/2	1.35*DL1 + 1.30*Wy-y + 1.35*DL2 + 1.35*DL21 + 1.35*LL2
ULS2/3	1.35*DL1 + 1.30*Wx-x + 1.35*DL2 + 1.35*DL21 + 1.35*LL2
ULS2.6/4	1.35*DL1 + 1.30*Wx-x + 1.35*DL2 + 1.35*DL21
ULS1.7/5	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 +

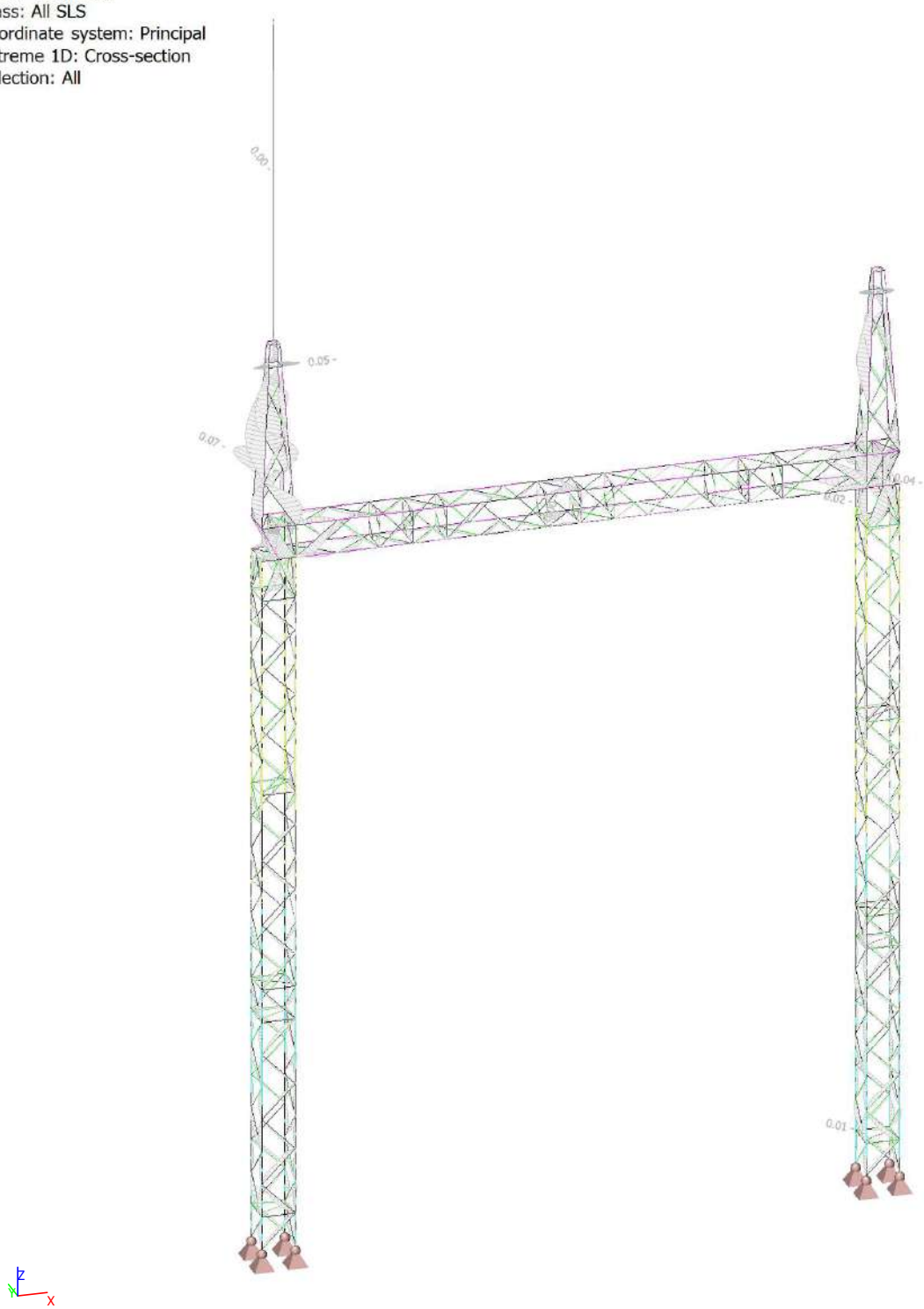
Name	Combination key
	0.32*Wx-y apšalas
ULS1.3/6	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 1.30*AP + 0.32*Wy-y apšalas
ULS1.2/7	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 1.30*AP + 0.32*Wx-y apšalas
ULS1.5/8	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 0.32*Wx-x apšalas
ULS1/9	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 1.30*AP + 0.32*Wx-x apšalas
ULS2.8/10	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.30*Wx-y
ULS2.5/11	1.35*DL1 + 1.35*DL2 + 1.35*DL21
ULS2.7/12	1.35*DL1 + 1.30*Wy-y + 1.35*DL2 + 1.35*DL21
ULS3/13	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL3 + 1.30*AP
ULS1.10/14	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 0.32*Wx-y
ULS1.4/15	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 1.30*AP
ULS-Set B (auto)/16	1.35*DL1

Išvada:
Konstrukcija atitinka saugos ribinio būvio (ULS) reikalavimus, didžiausias elemento išnaudojimas - 0.44.

5. Steel SLS check

5.1. EC-EN 1993 Steel Check SLS; Check Overall

Values: **Check** Overall
Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

5.2. EC-EN 1993 Steel Check SLS

Linear calculation
Class: All SLS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B176	0.546	SLS1.13/1	CS23 - L35X4	-0.3 0.0	- -	3.9 3.9	2.2 2.2	0.07 0.01	- -	- -	**0.07**
B2313	0.354	SLS1.7/2	CS25 - L50X5	0.0 0.0	- -	3.5 3.5	2.0 2.0	0.00 0.00	- -	- -	**0.00**
B2251	0.700	SLS1.9/3	CS32 - L110x110x8	0.0 0.0	- -	2.5 2.5	1.4 1.4	0.01 0.00	- -	- -	**0.01**
B2261	5.119	SLS1.10/4	CS22 - L90X7	0.1 -0.1	- -	3.1 3.1	1.7 1.7	0.02 0.02	- -	- -	**0.02**
B2162	0.150	SLS1.10/4	CS26 - L70X6	0.0 0.0	- -	1.3 1.3	0.7 0.7	0.04 0.02	- -	- -	**0.04**
B664	0.125-	SLS1.10/4	CS31 - L65x65x6	0.0 -0.1	- -	2.5 2.5	1.4 1.4	0.02 0.04	- -	- -	**0.04**
B2136	0.125-	SLS1.10/4	CS27 - L65X7	0.0 -0.1	- -	2.5 2.5	1.4 1.4	0.02 0.04	- -	- -	**0.04**
B167	0.413	SLS1.13/1	CS28 - L50X5	-0.3 0.1	- -	3.4 3.4	1.9 1.9	0.09 0.04	- -	- -	**0.09**
B186	0.058	SLS1.12/5	CS33 - FL100X6	0.0 0.0	- -	1.0 1.0	0.5 0.5	0.00 0.05	- -	- -	**0.05**
B2429	2.500+	SLS1.7/2	CS29 - RD24	0.0 0.0	- -	25.0 25.0	13.9 13.9	0.00 0.00	- -	- -	**0.00**

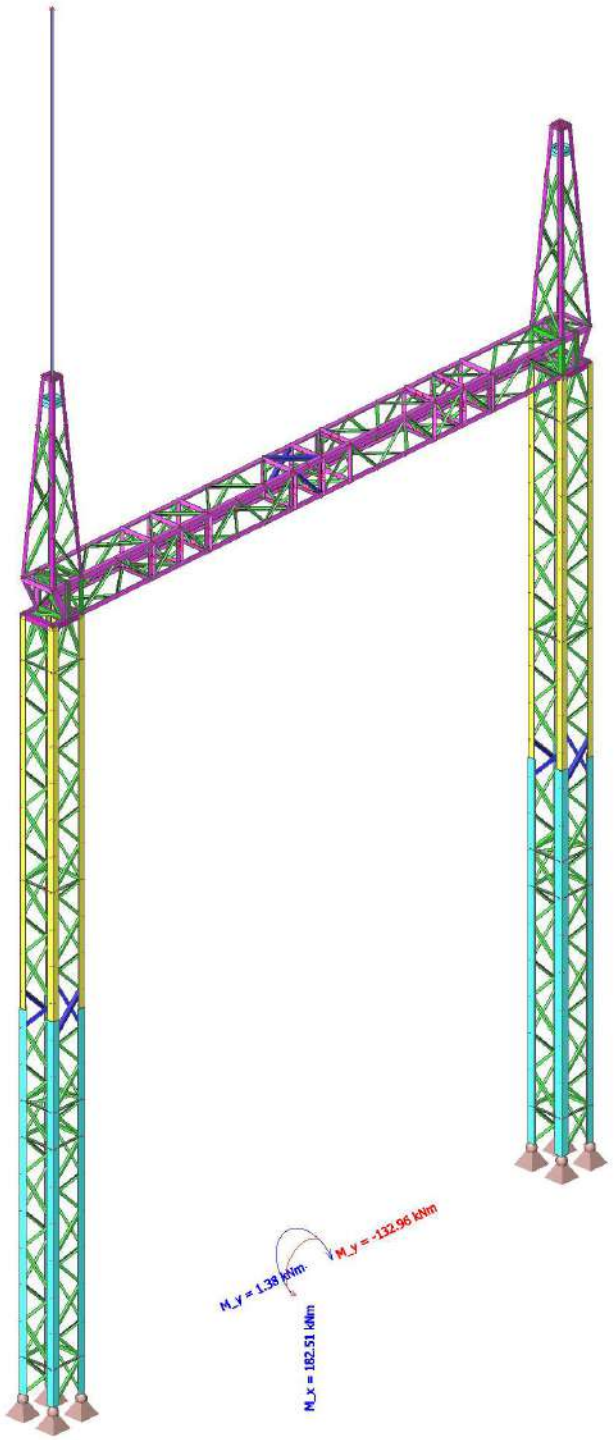
Name	Combination key
SLS1.13/1	DL1 + DL2 + DL21 + LL1 + AP + Wx-y apšalas
SLS1.7/2	DL1 + Wy-y + DL2 + DL21 + LL1
SLS1.9/3	DL1 + DL2 + DL21 + LL1 + Wx-y
SLS1.10/4	DL1 + DL2 + DL21 + LL1 + Wx-x apšalas
SLS1.12/5	DL1 + DL2 + DL21 + LL1 + Wx-y apšalas

Išvada:
Konstrukcija atitinka tinkamumo ribinio būvio (SLS) reikalavimus, didžiausias elemento išnaudojimas - 0.09.

6. Reactions

6.1. Resultant of reactions; M_x; M_y

Values: M_x, M_y
Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global

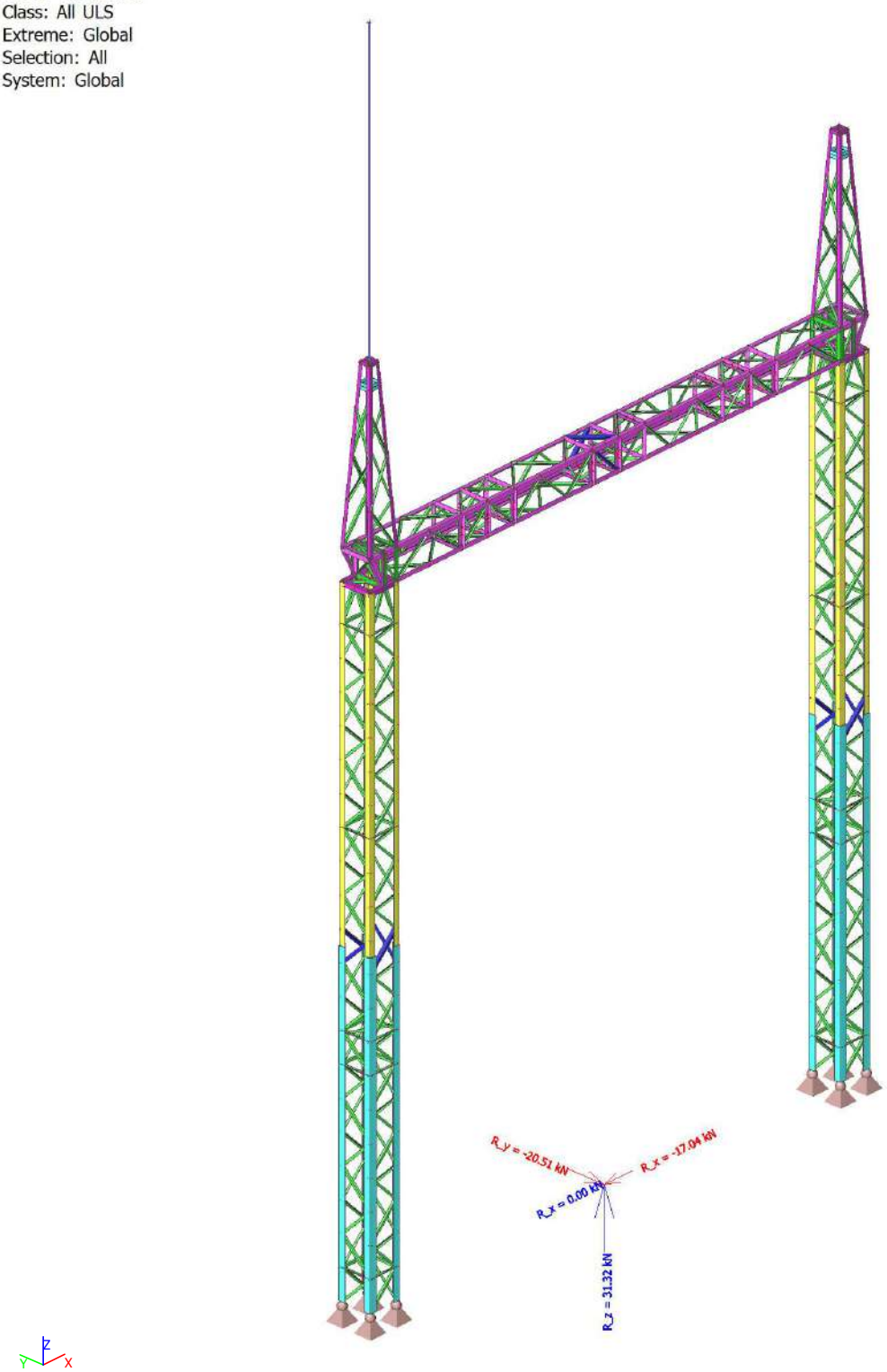


PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.2. Resultant of reactions; R_x; R_y; R_z

Values: R_z, R_y, R_x
Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

6.3. Resultant of reactions

Linear calculation
Class: All ULS
Extreme: Global
Selection: All
System: Global

x [m]	y [m]	z [m]	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
4.750	0.250	0.000	ULS2.3/1	-14.94	**-20.51**	29.71	**182.51**	-117.05	0.68
4.750	0.250	0.000	ULS2.6/2	-15.60	**0.00**	29.71	0.60	-114.97	0.66
4.750	0.250	0.000	ULS1.3/3	-2.67	-11.48	**31.32**	122.44	-31.98	-0.10
4.750	0.250	0.000	ULS-Set B (auto)/4	0.00	0.00	**20.11**	**0.00**	0.97	0.00
4.750	0.250	0.000	ULS2/5	**-17.04**	-3.99	29.71	49.27	**-132.96**	**0.98**
4.750	0.250	0.000	ULS2.7/6	**0.00**	-16.28	29.71	123.37	**1.38**	0.00
4.750	0.250	0.000	ULS1.4/7	-2.67	-7.41	31.32	91.75	-31.98	**-0.10**

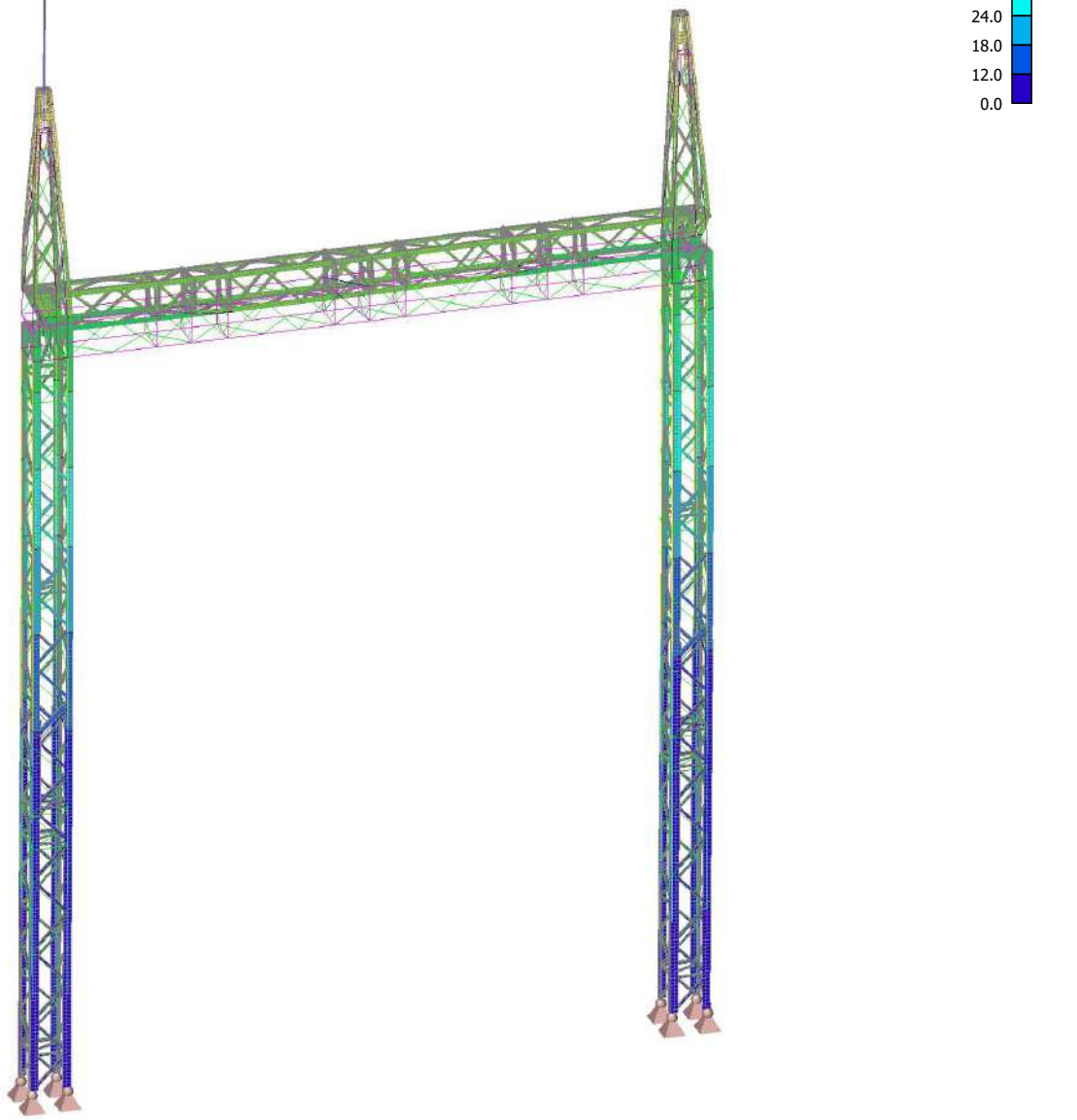
Name	Combination key
ULS2.3/1	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.30*Wx-y + 1.35*LL2
ULS2.6/2	1.35*DL1 + 1.30*Wx-x + 1.35*DL2 + 1.35*DL21
ULS1.3/3	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 1.30*AP + 0.32*Wy-y apšalas
ULS-Set B (auto)/4	DL1
ULS2/5	1.35*DL1 + 1.30*Wx-x + 1.35*DL2 + 1.35*DL21 + 1.35*LL2
ULS2.7/6	1.35*DL1 + 1.30*Wy-y + 1.35*DL2 + 1.35*DL21
ULS1.4/7	1.35*DL1 + 1.35*DL2 + 1.35*DL21 + 1.35*LL1 + 1.30*AP

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7. Deformations

7.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Class: All SLS
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

7.2. 1D deformations

Linear calculation
Class: All SLS
Coordinate system: Global
Extreme 1D: Global
Selection: All

Deformations

Name	dx [m]	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
B2156	0.106-	SLS1.3/1	**-0.7**	0.3	0.0	0.0	-0.2	0.0	0.8
B2429	5.000	SLS1.10/2	**34.4**	36.4	-0.2	-2.0	2.3	-1.8	50.1
B2429	5.000	SLS1.2/3	3.1	**-1.5**	-0.1	**0.3**	0.5	0.0	3.4
B2276	3.250-	SLS1.13/4	13.8	42.7	**-3.1**	-5.7	0.0	0.2	45.0
B2428	4.250	SLS1.9/5	13.9	38.5	**1.7**	-5.9	0.1	-0.5	41.0
B167	0.000	SLS1.13/4	13.9	41.2	-1.3	**-11.0**	0.4	0.8	43.5
B2337	0.240	SLS1.13/4	13.8	38.7	0.6	-5.8	**-0.7**	-0.6	41.1
B170	0.585	SLS1.13/4	17.2	54.8	-1.0	-6.5	**3.3**	-5.0	57.4
B167	1.377-	SLS1.13/4	15.8	52.0	-0.7	-5.6	2.4	**-7.6**	54.3
B167	0.689-	SLS1.13/4	14.6	48.0	-0.9	-7.3	1.5	**3.7**	50.2
B2429	5.000	SLS1.12/6	28.0	**82.9**	-0.2	-4.8	2.0	-3.1	**87.5**

Išvada:
Konstrukcijos poslinkiai neviršija ribinių.
d_{lim}= 14100/100=141 mm> d=87,5 mm

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PRIEDAS NR. 2

110 KV ATVIROSIOS SKIRSTYKLOS ATRAMŲ PAMATŲ INŽINERINIAI SKAIČIAVIMAI

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 01_III klases 110 kV VR atrama (H=3,00 m)
Description : P12.12.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)

Permanent design situation

		State STR		State GEO	
		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

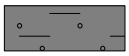
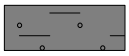
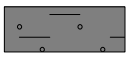
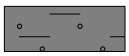
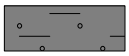
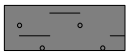
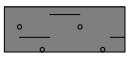
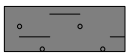
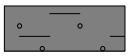
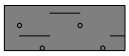
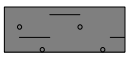
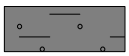
Partial factor on internal friction :	γ_ϕ =	1.25 [–]
Partial factor on effective cohesion :	γ_c =	1.25 [–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40 [–]
Partial factor on unconfined strength :	γ_v =	1.40 [–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

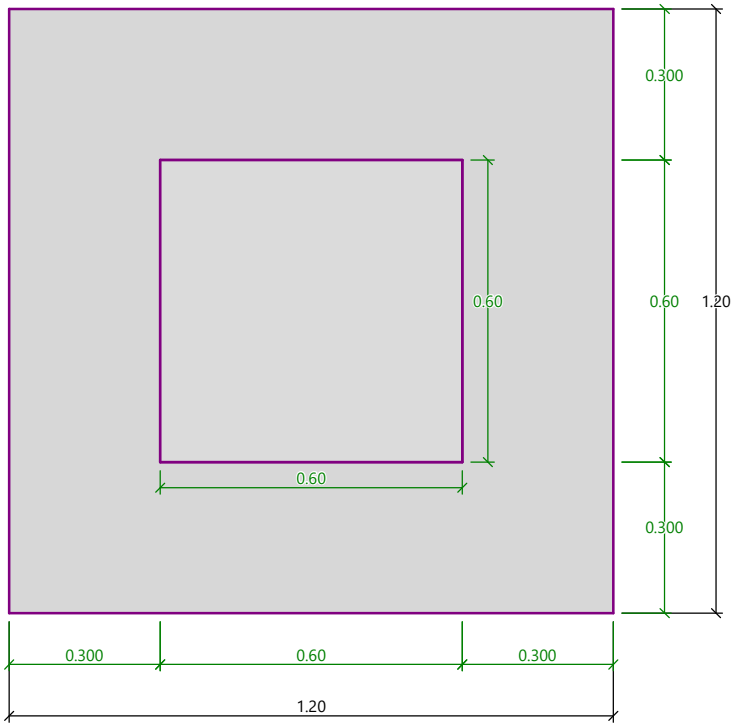
Spread footing length x = 1.20 m
Spread footing width y = 1.20 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 0.94 m3
Volume of excavation = 10.32 m3
Volume of fill = 9.49 m3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

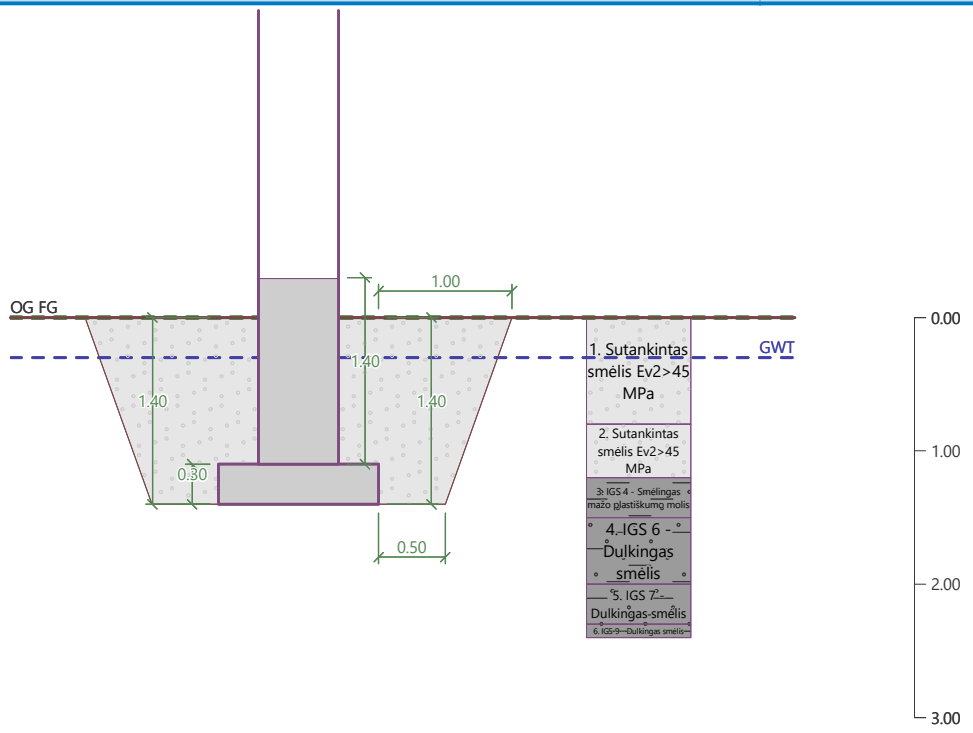
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	4.89	2.73	-0.03	0.04	1.01
2	Yes		Mmax	Design	3.81	7.15	-0.54	0.31	2.90
3	Yes		Nmax - service	Service	3.49	1.95	-0.02	0.03	0.72
4	Yes		Mmax - service	Service	2.72	5.11	-0.39	0.22	2.07

Ground water table

The ground water table is at a depth of 0.30 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.00	-0.12	31.76	118.02	26.91	Yes
Nmax	No	0.00	-0.11	35.48	118.54	29.93	Yes
Mmax	Yes	0.03	-0.34	60.19	105.63	56.99	Yes
Mmax	No	0.03	-0.30	58.48	108.28	54.01	Yes

Analysis of bearing capacity - partial results

C_d = 17.061 kPa
N_c = 5.142
S_c = 1.090
D_c = 1.000
I_c = 0.920
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 16.20 kN
Computed weight of overburden Z = 15.12 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 0.85 m
Length of slip surface l_{sp} = 1.80 m

Design bearing capacity of found. soil R_d = 105.63 kPa
Extreme contact stress σ = 60.19 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.025<0.450
Max. eccentricity in direction of base width e_y = 0.287<0.450
Max. overall eccentricity e_t = 0.288<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 39.96 kN

Horizontal bearing capacity R_{dh} = 81.64 kN
Extreme horizontal force H = 2.92 kN

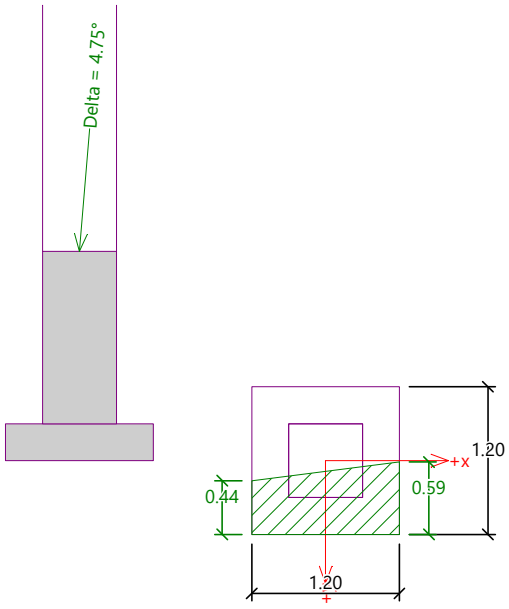
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 16.20 kN
Computed weight of overburden Z = 15.12 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	17.95	18.06	0.06
2	1.45	1.50	0.05	9.35	18.61	16.37	0.05
3	1.50	1.55	0.05	7.43	19.24	13.87	0.07
4	1.55	1.60	0.05	7.43	19.84	11.77	0.06
5	1.60	1.65	0.05	7.43	20.45	10.23	0.05
6	1.65	1.70	0.05	7.43	21.05	9.11	0.05
7	1.70	1.80	0.10	7.43	21.95	7.94	0.08
8	1.80	1.90	0.10	7.43	23.16	6.74	0.07
9	1.90	2.00	0.10	7.43	24.37	5.84	0.06
10	2.00	2.10	0.10	24.51	25.59	5.11	0.02
11	2.10	2.20	0.10	24.51	26.81	4.50	0.01
12	2.20	2.30	0.10	24.51	28.03	3.99	0.01
13	2.30	2.48	0.18	76.66	29.82	3.42	0.00

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.20 m
Spread footing width (y) = 1.04 m

Settlement of mid point of edge x - 1 = 0.8 mm
Settlement of mid point of edge x - 2 = -0.1 mm
Settlement of mid point of edge y - 1 = 0.3 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge y - 2 = 0.2 mm
Settlement of foundation center point = 0.7 mm
Settlement of characteristic point = 0.6 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} = 17.13 MPa
Foundation in the longitudinal direction is rigid (k=30.10)
Foundation in the direction of width is rigid (k=30.10)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.019<0.450
Max. eccentricity in direction of base width e_y = 0.211<0.450
Max. overall eccentricity e_t = 0.212<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.6 mm
Depth of influence zone = 1.08 m

Rotation in direction of x = 0.074 (tan*1000); (4.2E-03 °)
Rotation in direction of y = 0.742 (tan*1000); (4.3E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.29	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.40	kNm	>	0.80	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.28	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	77.82	kNm	>	1.93	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 3.81 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	0.95 kN
Force transferred by shear strength of foundation		=	2.86 kN
Considered column perimeter	u_0	=	2.40 m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.04 MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22 MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	2.30	kN
Force transferred by shear strength of foundation		=	1.51	kN
Distance of section from the column		=	0.17	m
Section perimeter	u	=	3.48	m
Shear stress at section	v_{Ed}	=	0.02	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	1.37	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 02_IIII klases 110 kV VR atrama (H=4,42 m)
Description : P15.15.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)							
Permanent design situation							
		State STR				State GEO	
		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			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on unconfined strength :	γ_v =	1.40	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

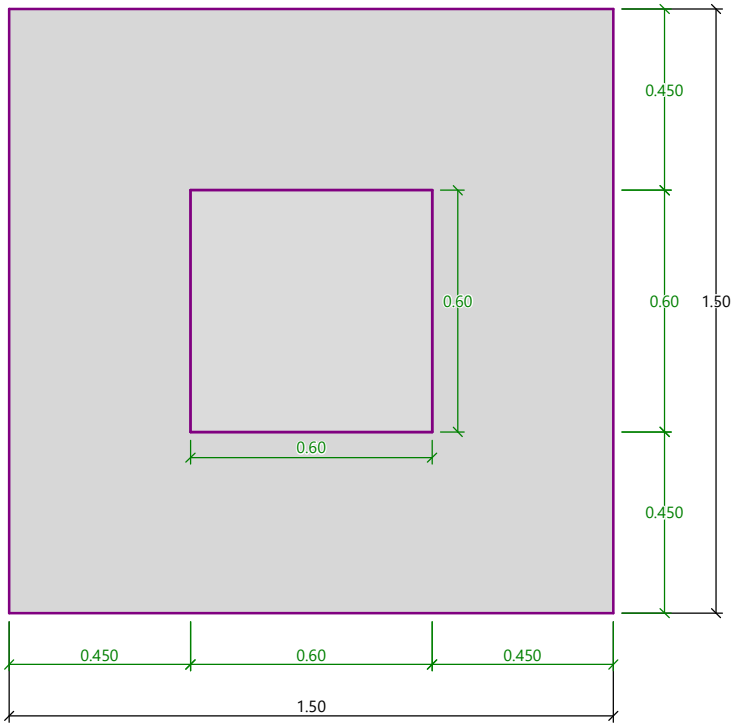
Spread footing length x = 1.50 m
Spread footing width y = 1.50 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 1.18 m³
Volume of excavation = 12.72 m³
Volume of fill = 11.65 m³

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m³
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

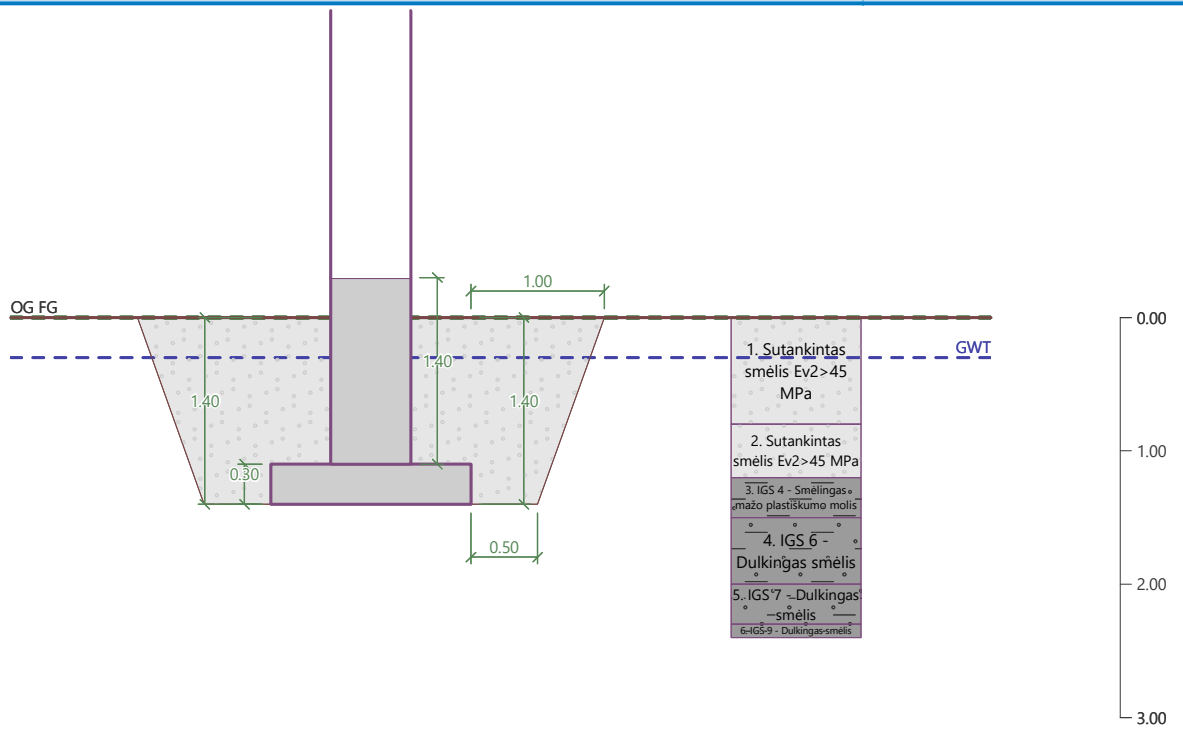
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	4.92	4.19	-2.81	1.37	1.04
2	Yes		Mmax	Design	4.52	12.61	-1.20	0.58	3.66
3	Yes		Nmax - service	Service	3.51	2.99	-2.01	0.98	0.74
4	Yes		Mmax - service	Service	3.23	9.01	-0.86	0.41	2.61

Ground water table

The ground water table is at a depth of 0.30 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.10	-0.12	31.11	113.02	27.52	Yes
Nmax	No	0.09	-0.10	33.94	113.14	30.00	Yes
Mmax	Yes	0.04	-0.37	47.36	102.32	46.29	Yes
Mmax	No	0.04	-0.33	47.83	103.83	46.06	Yes

Analysis of bearing capacity - partial results

C_d = 15.792 kPa
N_c = 5.142
S_c = 1.107
D_c = 1.000
I_c = 0.942
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 19.84 kN
Computed weight of overburden Z = 26.46 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 1.06 m
Length of slip surface l_{sp} = 2.25 m

Design bearing capacity of found. soil R_d = 102.32 kPa
Extreme contact stress σ = 47.36 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.067<0.450
Max. eccentricity in direction of base width e_y = 0.247<0.450
Max. overall eccentricity e_t = 0.249<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 49.95 kN

Horizontal bearing capacity R_{dh} = 126.60 kN
Extreme horizontal force H = 3.71 kN

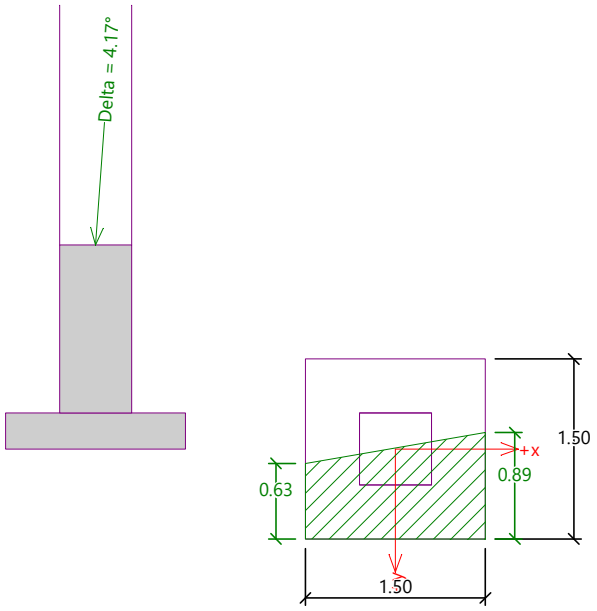
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 19.84 kN
Computed weight of overburden Z = 26.46 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	17.95	14.04	0.05
2	1.45	1.50	0.05	9.35	18.61	13.25	0.04
3	1.50	1.55	0.05	7.43	19.24	11.83	0.06
4	1.55	1.60	0.05	7.43	19.84	10.36	0.05
5	1.60	1.65	0.05	7.43	20.45	9.15	0.05
6	1.65	1.70	0.05	7.43	21.05	8.21	0.04
7	1.70	1.80	0.10	7.43	21.95	7.21	0.07
8	1.80	1.90	0.10	7.43	23.16	6.21	0.06
9	1.90	2.00	0.10	7.43	24.37	5.48	0.05
10	2.00	2.10	0.10	24.51	25.59	4.90	0.01
11	2.10	2.20	0.10	24.51	26.81	4.42	0.01
12	2.20	2.30	0.10	24.51	28.03	4.01	0.01
13	2.30	2.52	0.22	76.66	30.07	3.49	0.01

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.50 m
Spread footing width (y) = 1.44 m

Settlement of mid point of edge x - 1 = 0.7 mm
Settlement of mid point of edge x - 2 = 0.0 mm
Settlement of mid point of edge y - 1 = 0.2 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge y - 2 = 0.0 mm
Settlement of foundation center point = 0.5 mm
Settlement of characteristic point = 0.5 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} = 19.23 MPa
Foundation in the longitudinal direction is rigid (k=13.73)
Foundation in the direction of width is rigid (k=13.73)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.049<0.450
Max. eccentricity in direction of base width e_y = 0.181<0.450
Max. overall eccentricity e_t = 0.182<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.5 mm
Depth of influence zone = 1.12 m

Rotation in direction of x = 0.164 (tan*1000); (9.4E-03 °)
Rotation in direction of y = 0.472 (tan*1000); (2.7E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.23	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.01	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.89	kNm	>	2.80	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.22	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.01	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	78.30	kNm	>	4.78	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 4.52 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	0.72	kN
Force transferred by shear strength of foundation		=	3.80	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.07	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	2.17	kN
Force transferred by shear strength of foundation		=	2.35	kN
Distance of section from the column		=	0.23	m
Section perimeter	u	=	3.84	m
Shear stress at section	v_{Ed}	=	0.03	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	1.03	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 03_110 kV srovės transformatoriaus atrama (H=3,86 m)
Description : P15.15.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)							
Permanent design situation							
		State STR				State GEO	
		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			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on unconfined strength :	γ_v =	1.40	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

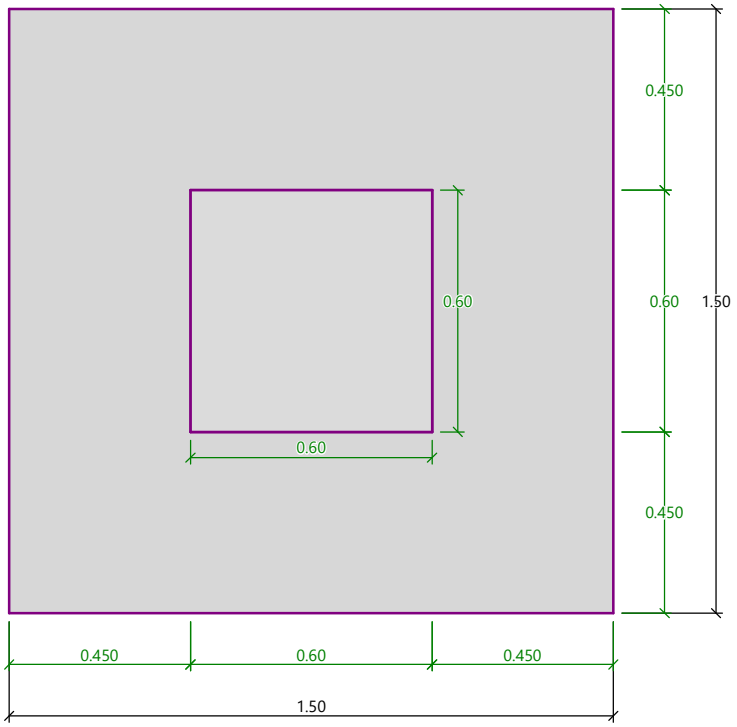
Spread footing length x = 1.50 m
Spread footing width y = 1.50 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 1.18 m3
Volume of excavation = 12.72 m3
Volume of fill = 11.65 m3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

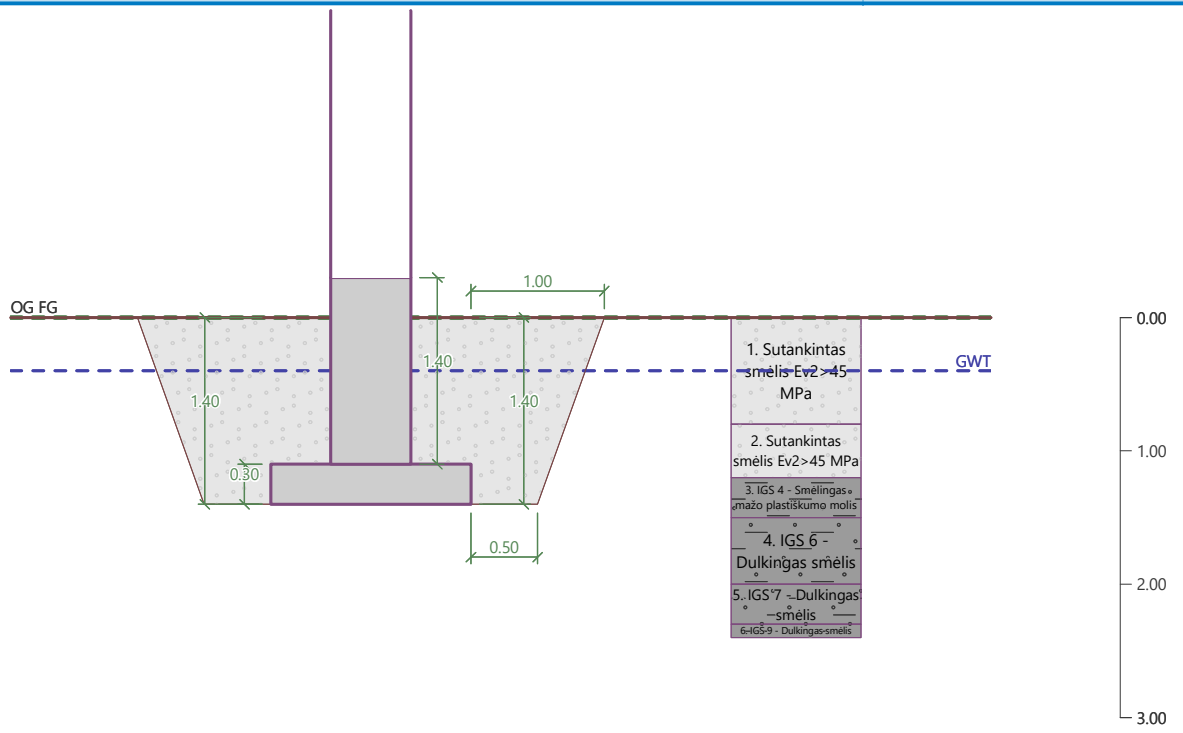
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	11.25	3.60	-4.58	2.42	1.01
2	Yes		Mmax	Design	10.10	18.95	-1.91	0.99	6.18
3	Yes		Nmax - service	Service	8.04	2.57	-3.27	1.73	0.72
4	Yes		Mmax - service	Service	7.21	13.54	-1.36	0.71	4.41

Ground water table

The ground water table is at a depth of 0.40 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.15	-0.09	37.40	112.11	33.37	Yes
Nmax	No	0.13	-0.08	40.22	112.37	35.79	Yes
Mmax	Yes	0.06	-0.50	85.92	90.33	95.12	Yes
Mmax	No	0.05	-0.45	78.29	94.80	82.58	Yes

Analysis of bearing capacity - partial results

C_d = 15.792 kPa
N_c = 5.142
S_c = 1.072
D_c = 1.000
I_c = 0.824
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 20.20 kN
Computed weight of overburden Z = 28.35 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 1.06 m
Length of slip surface l_{sp} = 2.25 m

Design bearing capacity of found. soil R_d = 90.33 kPa
Extreme contact stress σ = 85.92 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.097<0.450
Max. eccentricity in direction of base width e_y = 0.335<0.450
Max. overall eccentricity e_t = 0.337<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 50.40 kN

Horizontal bearing capacity R_{dh} = 99.16 kN
Extreme horizontal force H = 6.26 kN

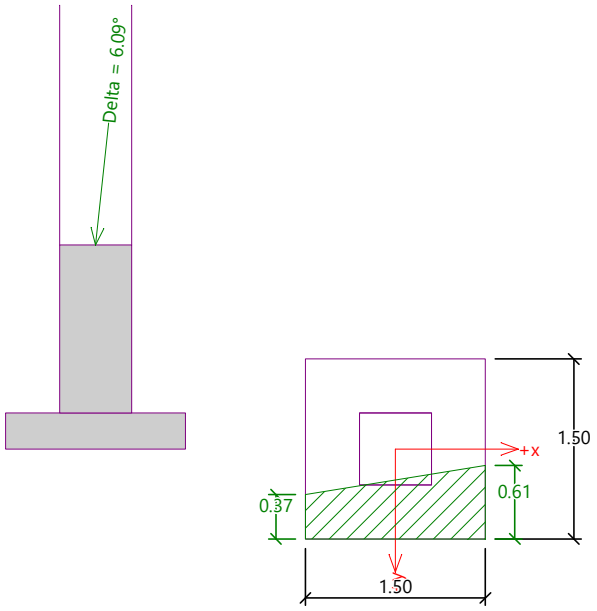
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 20.20 kN
Computed weight of overburden Z = 28.35 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	18.95	23.55	0.08
2	1.45	1.50	0.05	9.35	19.61	21.81	0.07
3	1.50	1.55	0.05	7.43	20.24	19.01	0.10
4	1.55	1.60	0.05	7.43	20.84	16.41	0.08
5	1.60	1.65	0.05	7.43	21.45	14.40	0.07
6	1.65	1.70	0.05	7.43	22.05	12.87	0.06
7	1.70	1.80	0.10	7.43	22.95	11.26	0.11
8	1.80	1.90	0.10	7.43	24.16	9.63	0.10
9	1.90	2.00	0.10	7.43	25.37	8.42	0.08
10	2.00	2.10	0.10	24.51	26.59	7.46	0.02
11	2.10	2.20	0.10	24.51	27.81	6.66	0.02
12	2.20	2.30	0.10	24.51	29.03	5.97	0.02
13	2.30	2.55	0.25	76.66	31.25	5.04	0.01
14	2.55	2.79	0.24	76.66	34.39	4.01	0.01

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.50 m
Spread footing width (y) = 1.12 m

Settlement of mid point of edge x - 1 = 1.1 mm
Settlement of mid point of edge x - 2 = -0.4 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge y - 1 = 0.5 mm
Settlement of mid point of edge y - 2 = 0.3 mm
Settlement of foundation center point = 1.0 mm
Settlement of characteristic point = 0.8 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} = 22.47 MPa
Foundation in the longitudinal direction is rigid (k=11.75)
Foundation in the direction of width is rigid (k=11.75)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.073<0.450
Max. eccentricity in direction of base width e_y = 0.252<0.450
Max. overall eccentricity e_t = 0.253<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.8 mm
Depth of influence zone = 1.39 m

Rotation in direction of x = 0.277 (tan*1000); (1.6E-02 °)
Rotation in direction of y = 0.969 (tan*1000); (5.5E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.23	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.01	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.89	kNm	>	3.92	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.22	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.01	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	78.30	kNm	>	8.36	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 10.10 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	1.62	kN
Force transferred by shear strength of foundation		=	8.48	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.11	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	5.88	kN
Force transferred by shear strength of foundation		=	4.22	kN
Distance of section from the column		=	0.29	m
Section perimeter	u	=	4.21	m
Shear stress at section	v_{Ed}	=	0.03	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	0.82	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 04_110 kV srovės transformatoriaus atrama (H=4,05 m)
Description : P15.15.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)							
Permanent design situation							
		State STR				State GEO	
		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			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on unconfined strength :	γ_v =	1.40	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	20.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

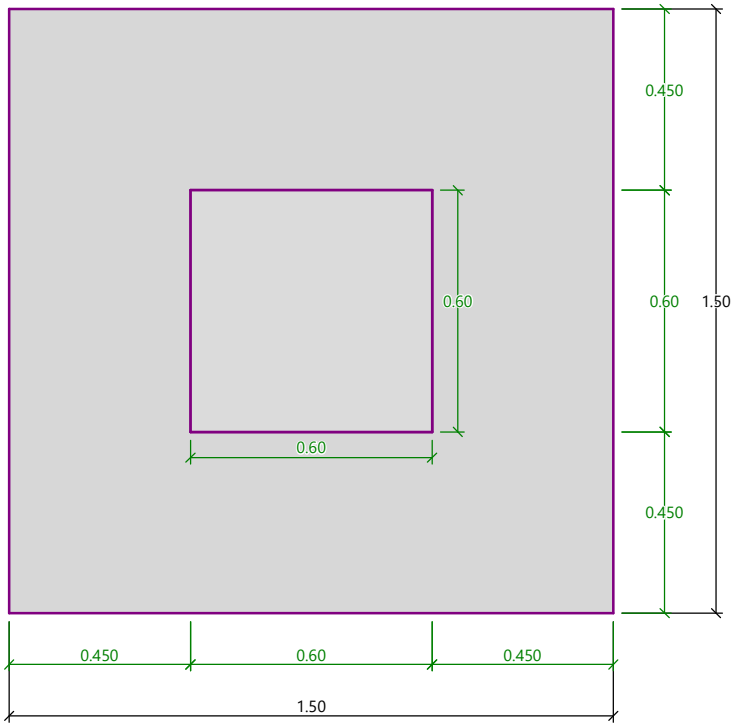
Spread footing length x = 1.50 m
Spread footing width y = 1.50 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 1.18 m^3
Volume of excavation = 12.72 m^3
Volume of fill = 11.65 m^3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m^3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

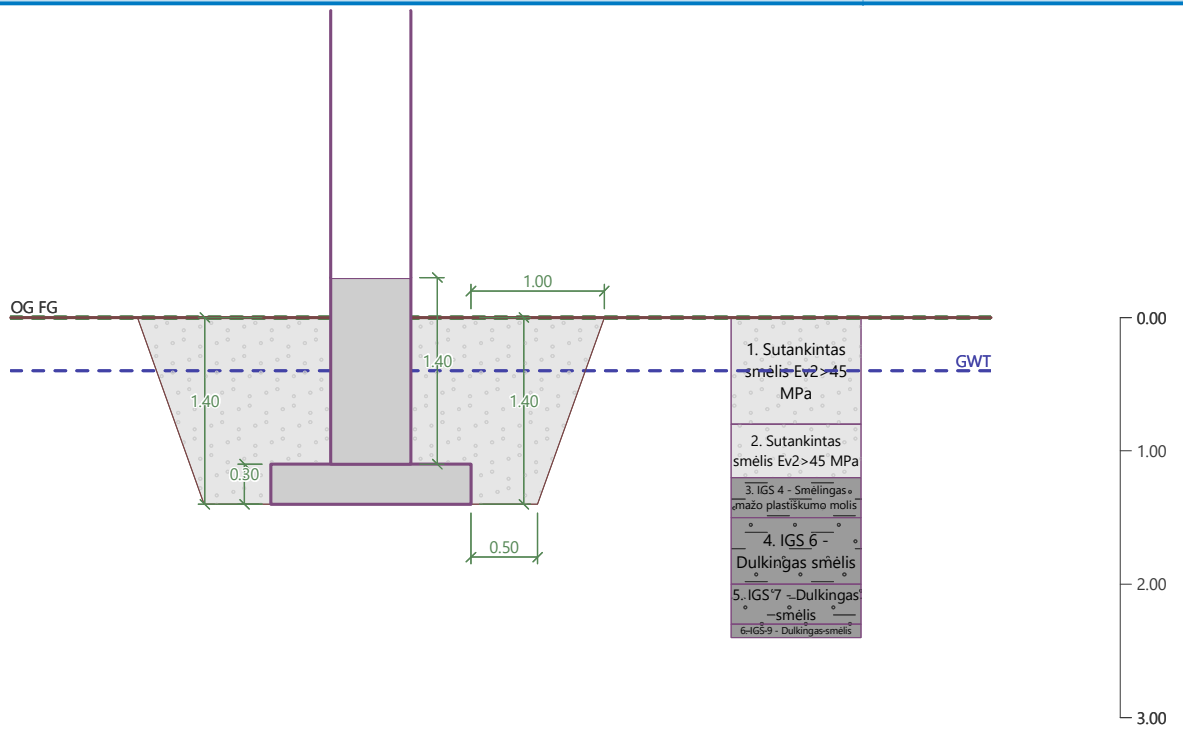
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	11.43	3.80	-4.90	2.50	1.01
2	Yes		Mmax	Design	10.23	20.10	-2.08	1.04	6.30
3	Yes		Nmax - service	Service	8.16	2.71	-3.50	1.79	0.72
4	Yes		Mmax - service	Service	7.31	14.36	-1.49	0.74	4.50

Ground water table

The ground water table is at a depth of 0.40 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.15	-0.09	38.14	120.96	31.53	Yes
Nmax	No	0.14	-0.08	40.92	121.26	33.75	Yes
Mmax	Yes	0.07	-0.52	95.04	96.05	98.95	Yes
Mmax	No	0.06	-0.47	84.37	101.57	83.07	Yes

Analysis of bearing capacity - partial results

C_d = 17.285 kPa
N_c = 5.142
S_c = 1.066
D_c = 1.000
I_c = 0.817
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 20.20 kN
Computed weight of overburden Z = 28.35 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 1.06 m
Length of slip surface l_{sp} = 2.25 m

Design bearing capacity of found. soil R_d = 96.05 kPa
Extreme contact stress σ = 95.04 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.102<0.450
Max. eccentricity in direction of base width e_y = 0.349<0.450
Max. overall eccentricity e_t = 0.352<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 50.40 kN

Horizontal bearing capacity R_{dh} = 94.58 kN
Extreme horizontal force H = 6.39 kN

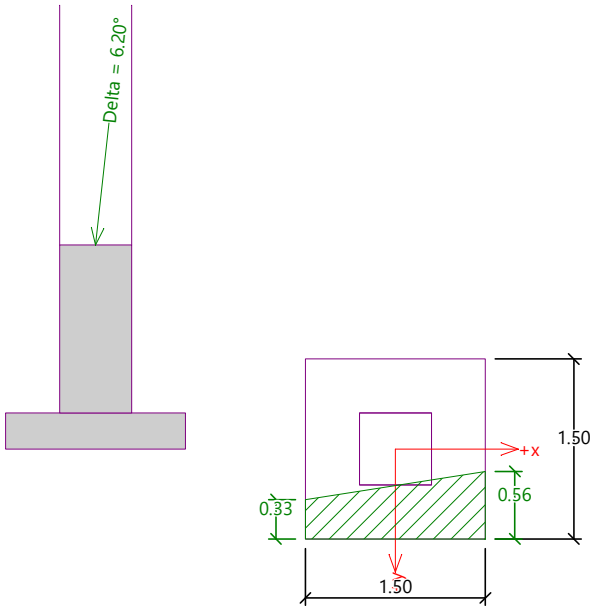
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 20.20 kN
Computed weight of overburden Z = 28.35 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	18.95	25.10	0.08
2	1.45	1.50	0.05	9.35	19.61	23.15	0.08
3	1.50	1.55	0.05	7.43	20.24	20.09	0.10
4	1.55	1.60	0.05	7.43	20.84	17.31	0.09
5	1.60	1.65	0.05	7.43	21.45	15.16	0.08
6	1.65	1.70	0.05	7.43	22.05	13.55	0.07
7	1.70	1.80	0.10	7.43	22.95	11.84	0.12
8	1.80	1.90	0.10	7.43	24.16	10.11	0.10
9	1.90	2.00	0.10	7.43	25.37	8.83	0.09
10	2.00	2.10	0.10	24.51	26.59	7.80	0.02
11	2.10	2.20	0.10	24.51	27.81	6.94	0.02
12	2.20	2.30	0.10	24.51	29.03	6.21	0.02
13	2.30	2.55	0.25	76.66	31.25	5.23	0.01
14	2.55	2.80	0.25	76.66	34.47	4.12	0.01
15	2.80	2.81	0.01	76.66	36.16	3.64	0.00

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.50 m
Spread footing width (y) = 1.07 m

Settlement of mid point of edge x - 1 = 1.1 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge x - 2 = -0.5 mm
Settlement of mid point of edge y - 1 = 0.5 mm
Settlement of mid point of edge y - 2 = 0.3 mm
Settlement of foundation center point = 1.0 mm
Settlement of characteristic point = 0.9 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} = 22.22 MPa
Foundation in the longitudinal direction is rigid (k=11.88)
Foundation in the direction of width is rigid (k=11.88)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.077<0.450
Max. eccentricity in direction of base width e_y = 0.263<0.450
Max. overall eccentricity e_t = 0.265<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.9 mm
Depth of influence zone = 1.41 m

Rotation in direction of x = 0.287 (tan*1000); (1.6E-02 °)
Rotation in direction of y = 1.069 (tan*1000); (6.1E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.23	%	> 0.15	%	=	ρ_{min}
Position of neutral axis	x	=	0.01	m	< 0.14	m	=	x_{max}
Ultimate moment	M_{Rd}	=	74.89	kNm	> 4.00	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.22	%	> 0.15	%	=	ρ_{min}
Position of neutral axis	x	=	0.01	m	< 0.14	m	=	x_{max}
Ultimate moment	M_{Rd}	=	78.30	kNm	> 8.98	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 10.23 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	1.64	kN
Force transferred by shear strength of foundation		=	8.59	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.11	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	5.96	kN
Force transferred by shear strength of foundation		=	4.27	kN
Distance of section from the column		=	0.29	m
Section perimeter	u	=	4.21	m
Shear stress at section	v_{Ed}	=	0.03	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	0.82	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 05_110 kV įtampos transformatoriaus atrama (H=3,76 m)
Description : P15.15.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)							
Permanent design situation							
		State STR				State GEO	
		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			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on unconfined strength :	γ_v =	1.40	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

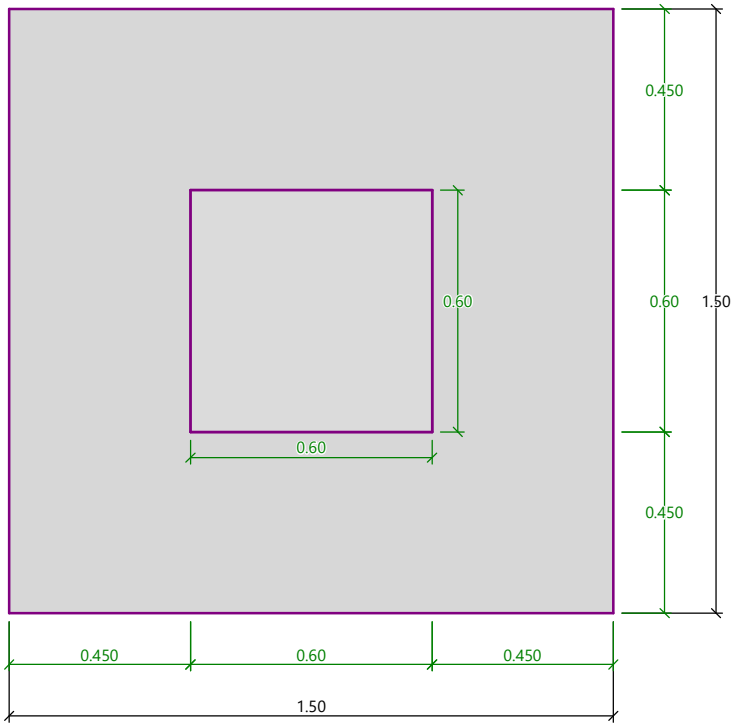
Spread footing length x = 1.50 m
Spread footing width y = 1.50 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 1.18 m³
Volume of excavation = 12.72 m³
Volume of fill = 11.65 m³

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m³
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

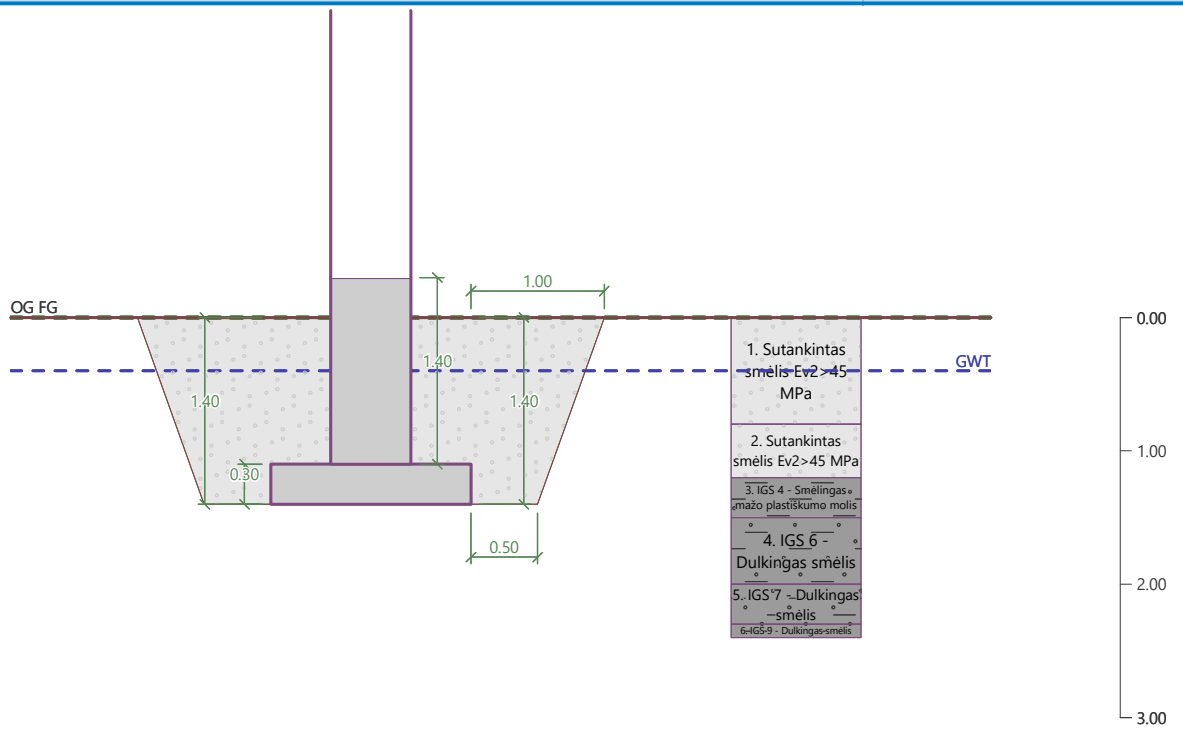
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	11.02	3.80	4.30	2.26	1.01
2	Yes		Mmax	Design	10.04	18.60	-1.78	0.93	6.02
3	Yes		Nmax - service	Service	7.87	2.71	3.07	1.61	0.72
4	Yes		Mmax - service	Service	7.17	13.29	-1.27	0.66	4.30

Ground water table

The ground water table is at a depth of 0.40 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	-0.01	-0.09	30.52	112.24	27.19	Yes
Nmax	No	-0.01	-0.08	33.60	112.47	29.88	Yes
Mmax	Yes	0.06	-0.49	82.00	91.83	89.29	Yes
Mmax	No	0.05	-0.44	75.56	95.80	78.87	Yes

Analysis of bearing capacity - partial results

C_d = 15.792 kPa
N_c = 5.142
S_c = 1.074
D_c = 1.000
I_c = 0.839
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 20.20 kN
Computed weight of overburden Z = 28.35 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 1.06 m
Length of slip surface l_{sp} = 2.25 m

Design bearing capacity of found. soil R_d = 91.83 kPa
Extreme contact stress σ = 82.00 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.038<0.450
Max. eccentricity in direction of base width e_y = 0.328<0.450
Max. overall eccentricity e_t = 0.330<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 50.40 kN

Horizontal bearing capacity R_{dh} = 101.44 kN
Extreme horizontal force H = 6.09 kN

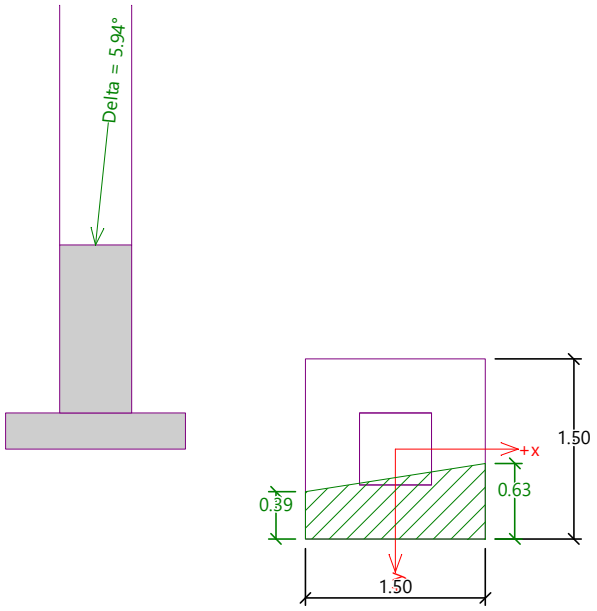
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 20.20 kN
Computed weight of overburden Z = 28.35 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	18.95	22.88	0.08
2	1.45	1.50	0.05	9.35	19.61	21.23	0.07
3	1.50	1.55	0.05	7.43	20.24	18.54	0.09
4	1.55	1.60	0.05	7.43	20.84	16.02	0.08
5	1.60	1.65	0.05	7.43	21.45	14.06	0.07
6	1.65	1.70	0.05	7.43	22.05	12.57	0.06
7	1.70	1.80	0.10	7.43	22.95	11.00	0.11
8	1.80	1.90	0.10	7.43	24.16	9.42	0.09
9	1.90	2.00	0.10	7.43	25.37	8.25	0.08
10	2.00	2.10	0.10	24.51	26.59	7.31	0.02
11	2.10	2.20	0.10	24.51	27.81	6.53	0.02
12	2.20	2.30	0.10	24.51	29.03	5.86	0.02
13	2.30	2.55	0.25	76.66	31.25	4.96	0.01
14	2.55	2.78	0.23	76.66	34.31	3.97	0.01

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.50 m
Spread footing width (y) = 1.14 m

Settlement of mid point of edge x - 1 = 1.1 mm
Settlement of mid point of edge x - 2 = -0.3 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge y - 1 = 0.4 mm
Settlement of mid point of edge y - 2 = 0.3 mm
Settlement of foundation center point = 1.0 mm
Settlement of characteristic point = 0.8 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} = 22.59 MPa
Foundation in the longitudinal direction is rigid (k=11.69)
Foundation in the direction of width is rigid (k=11.69)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.029<0.450
Max. eccentricity in direction of base width e_y = 0.246<0.450
Max. overall eccentricity e_t = 0.248<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.8 mm
Depth of influence zone = 1.38 m

Rotation in direction of x = 0.104 (tan*1000); (6.0E-03 °)
Rotation in direction of y = 0.926 (tan*1000); (5.3E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.23	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.01	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.89	kNm	>	3.07	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.22	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.01	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	78.30	kNm	>	8.10	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 10.04 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	1.61	kN
Force transferred by shear strength of foundation		=	8.43	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.11	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	5.84	kN
Force transferred by shear strength of foundation		=	4.20	kN
Distance of section from the column		=	0.29	m
Section perimeter	u	=	4.21	m
Shear stress at section	v_{Ed}	=	0.03	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	0.82	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 06_110 kV jungtuvo atrama (H=2,50 m)
Description : P12.12.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)

Permanent design situation

		State STR		State GEO	
		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

Partial factor on internal friction :	γ_ϕ =	1.25 [–]
Partial factor on effective cohesion :	γ_c =	1.25 [–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40 [–]
Partial factor on unconfined strength :	γ_v =	1.40 [–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	15.00	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	20.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	20.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	20.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	20.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

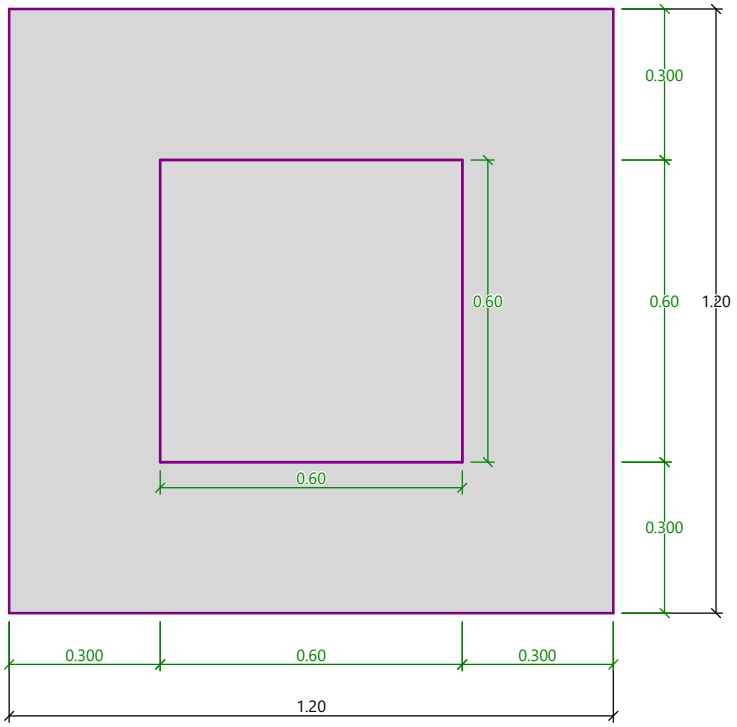
Spread footing length x = 1.20 m
Spread footing width y = 1.20 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 0.94 m3
Volume of excavation = 10.32 m3
Volume of fill = 9.49 m3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

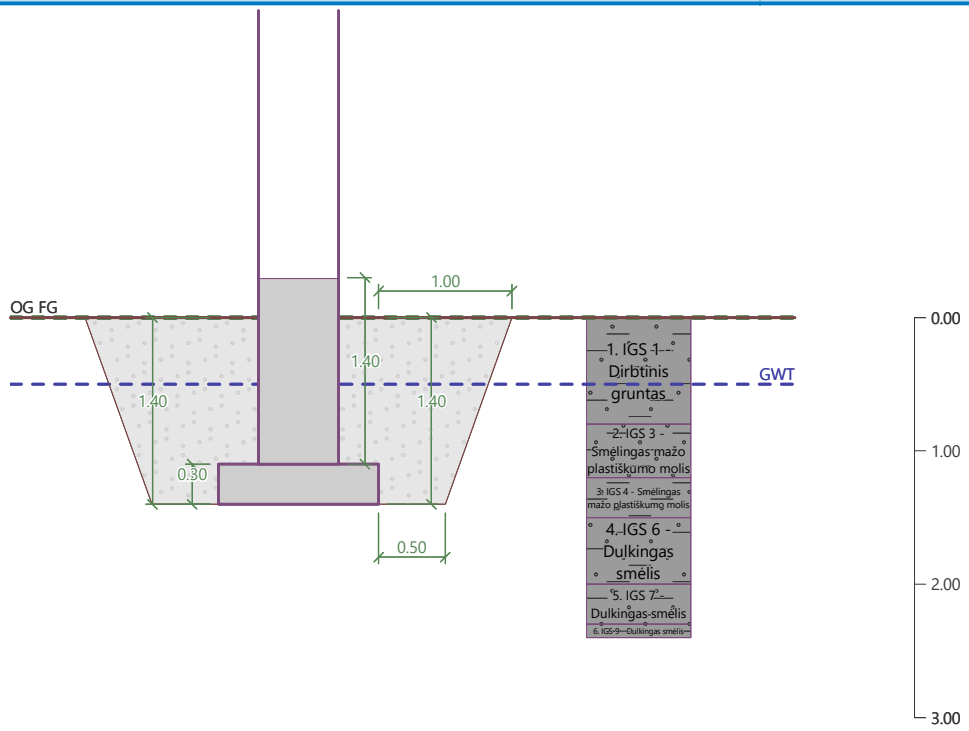
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	IGS 1 - Dirbtinis gruntas	
2	0.40	0.80 .. 1.20	IGS 3 - Smėlingas mažo plastiškumo molis	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	9.81	1.08	-4.92	2.07	0.35
2	Yes		Mmax	Design	9.72	10.40	-2.09	0.92	4.28

Ground water table

The ground water table is at a depth of 0.50 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

Settings of the stage of construction

Design situation : permanent

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.19	-0.04	47.96	137.00	35.01	Yes
Nmax	No	0.17	-0.03	51.13	137.91	37.08	Yes
Mmax	Yes	0.08	-0.40	107.55	115.70	92.96	Yes
Mmax	No	0.07	-0.35	96.42	121.53	79.34	Yes

Analysis of bearing capacity - partial results

C_d = 20.259 kPa
N_c = 5.142
S_c = 1.076
D_c = 1.000
I_c = 0.843
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 16.92 kN
Computed weight of overburden Z = 17.28 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 0.85 m
Length of slip surface l_{sp} = 1.80 m

Design bearing capacity of found. soil R_d = 115.70 kPa
Extreme contact stress σ = 107.55 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.160<0.450
Max. eccentricity in direction of base width e_y = 0.335<0.450
Max. overall eccentricity e_t = 0.342<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 53.20 kN

Horizontal bearing capacity R_{dh} = 82.37 kN
Extreme horizontal force H = 4.38 kN

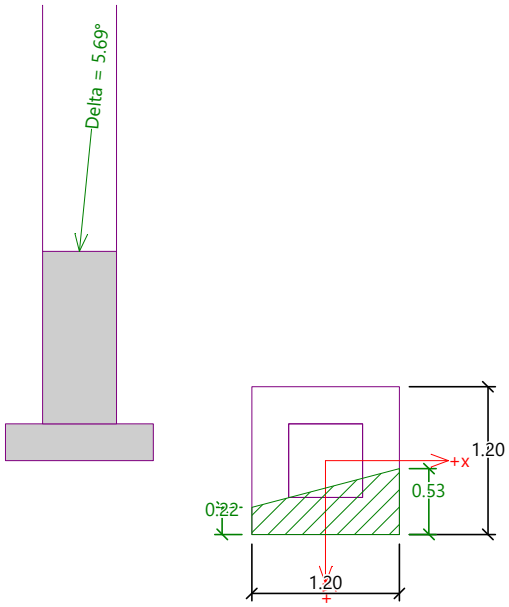
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



Verification No. 1

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.29	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.40	kNm	>	1.83	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.28	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	77.82	kNm	>	3.41	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 9.72 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	2.43	kN
Force transferred by shear strength of foundation		=	7.29	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.06	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

Critical section without shear reinforcement

Force transferred into found. soil	=	7.28	kN
Force transferred by shear strength of foundation	=	2.44	kN

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Distance of section from the column		=	0.23 m
Section perimeter	u	=	3.84 m
Shear stress at section	v_{Ed}	=	0.02 MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	1.03 MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 06_110 kV jungtuvo atrama (H=2,76 m)
Description : P12.12.17 - GR.3
Customer : LITGRID AB
Author : Martynas Mejeras
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Settlement

Analysis method : Analysis using oedometric modulus
Restriction of influence zone : by percentage of Sigma,Or
Coeff. of restriction of influence zone : 10.0 [%]

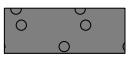
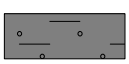
Spread Footing

Verification methodology : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)					
Permanent design situation					
		State STR		State GEO	
		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			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on unconfined strength :	γ_v =	1.40	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	15.00	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	20.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	20.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	20.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	20.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

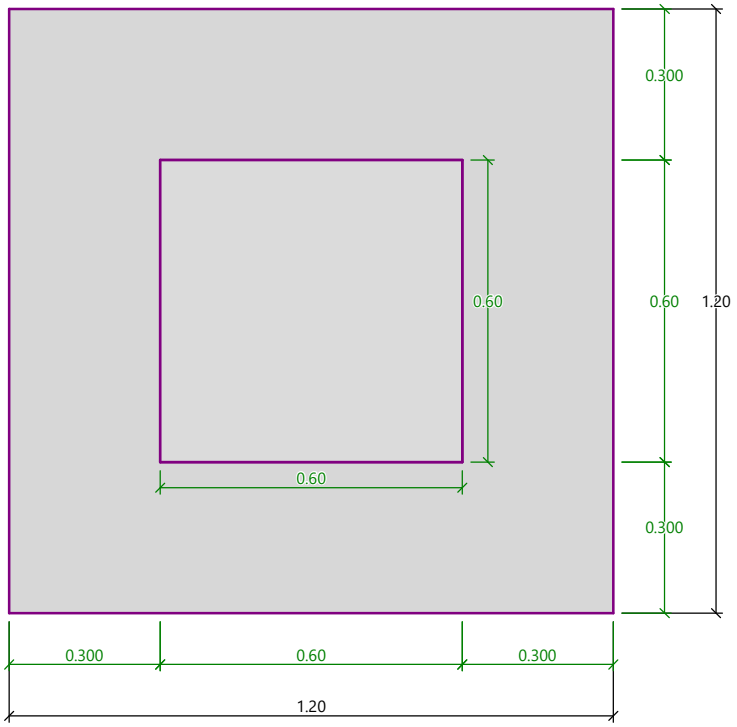
Spread footing length x = 1.20 m
Spread footing width y = 1.20 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 0.94 m3
Volume of excavation = 10.32 m3
Volume of fill = 9.49 m3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

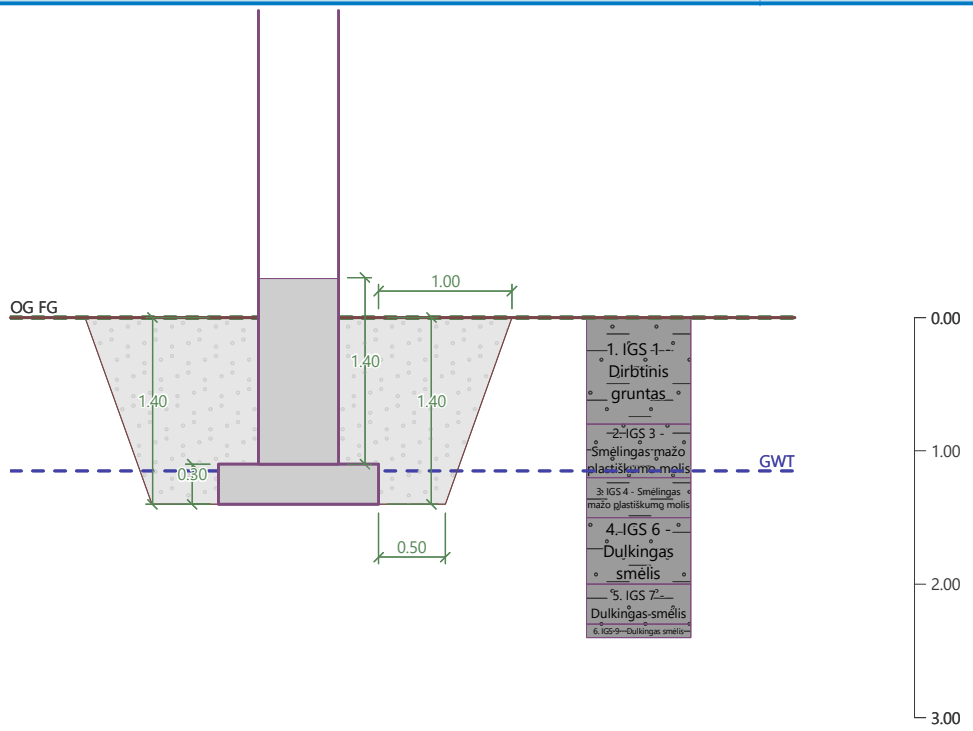
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	IGS 1 - Dirbtinis gruntas	
2	0.40	0.80 .. 1.20	IGS 3 - Smėlingas mažo plastiškumo molis	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	10.27	2.42	-5.50	2.15	0.51
2	Yes		Mmax	Design	10.16	12.96	-2.34	0.95	4.59

Ground water table

The ground water table is at a depth of 1.15 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

Settings of the stage of construction

Design situation : permanent

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.17	-0.06	58.08	143.67	40.43	Yes
Nmax	No	0.15	-0.05	61.93	144.39	42.89	Yes
Mmax	Yes	0.07	-0.39	119.51	122.08	97.89	Yes
Mmax	No	0.07	-0.34	110.04	127.15	86.54	Yes

Analysis of bearing capacity - partial results

C_d = 20.259 kPa
N_c = 5.142
S_c = 1.081
D_c = 1.000
I_c = 0.848
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 19.80 kN
Computed weight of overburden Z = 23.76 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 0.85 m
Length of slip surface l_{sp} = 1.80 m

Design bearing capacity of found. soil R_d = 122.08 kPa
Extreme contact stress σ = 119.51 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.142<0.450
Max. eccentricity in direction of base width e_y = 0.322<0.450
Max. overall eccentricity e_t = 0.328<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 55.13 kN

Horizontal bearing capacity R_{dh} = 87.23 kN
Extreme horizontal force H = 4.69 kN

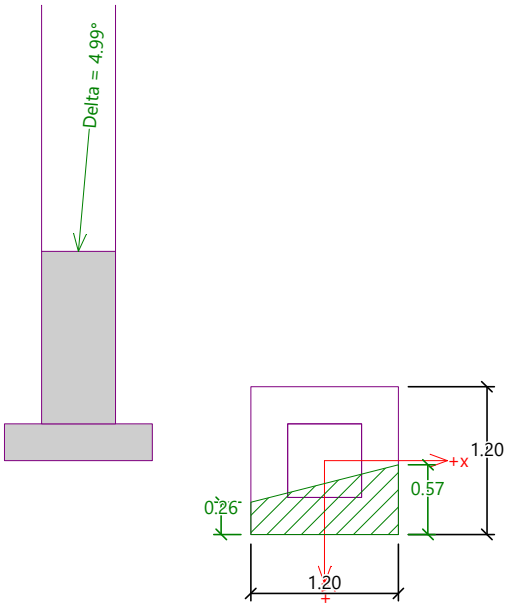
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



Verification No. 1

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.29	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.40	kNm	>	2.18	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.28	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	77.82	kNm	>	4.02	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 10.16 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	2.54	kN
Force transferred by shear strength of foundation		=	7.62	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.08	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

Critical section without shear reinforcement

Force transferred into found. soil	=	7.61	kN
Force transferred by shear strength of foundation	=	2.55	kN

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Distance of section from the column		=	0.23	m
Section perimeter	u	=	3.84	m
Shear stress at section	v_{Ed}	=	0.03	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	1.03	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 08_110 kV skyriklio atrama (H=2,50 m)
Description : P12.12.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)

Permanent design situation

		State STR		State GEO	
		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

Partial factor on internal friction :	γ_ϕ =	1.25 [–]
Partial factor on effective cohesion :	γ_c =	1.25 [–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40 [–]
Partial factor on unconfined strength :	γ_v =	1.40 [–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	20.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	20.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	20.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	20.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

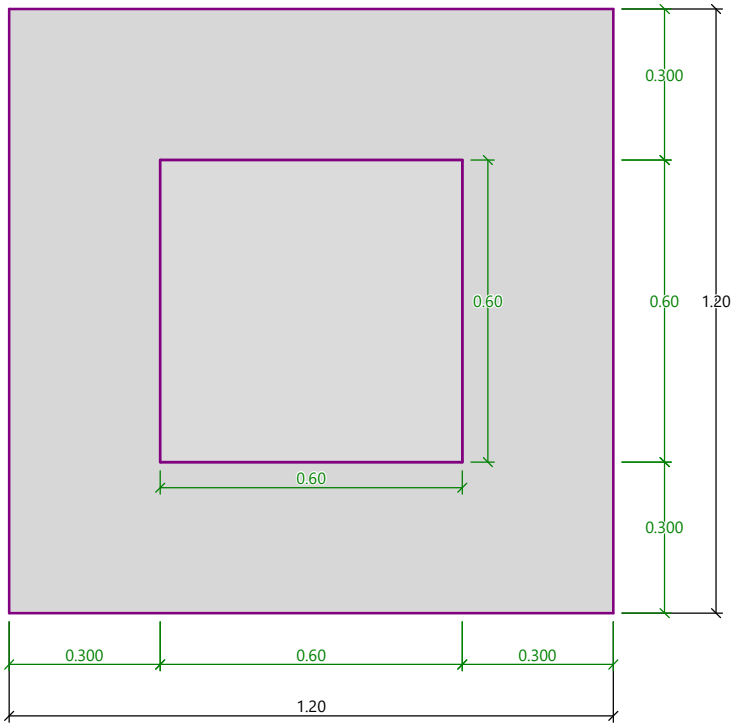
Spread footing length x = 1.20 m
Spread footing width y = 1.20 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 0.94 m3
Volume of excavation = 10.32 m3
Volume of fill = 9.49 m3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

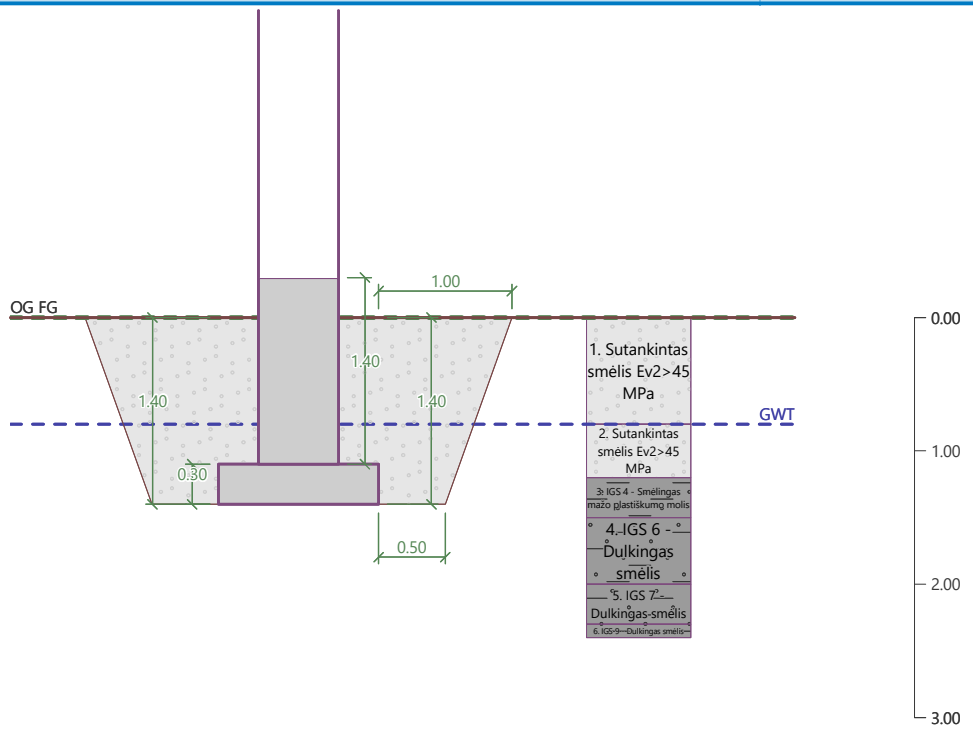
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	13.63	3.71	-4.11	2.56	1.69
2	Yes		Mmax	Design	13.30	11.19	-1.73	1.19	4.92
3	Yes		Nmax - service	Service	9.74	2.65	-2.94	1.83	1.21
4	Yes		Mmax - service	Service	9.50	7.99	-1.24	0.85	3.51

Ground water table

The ground water table is at a depth of 0.80 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.16	-0.13	62.87	140.12	44.87	Yes
Nmax	No	0.14	-0.11	65.86	140.73	46.80	Yes
Mmax	Yes	0.07	-0.38	110.29	117.75	93.66	Yes
Mmax	No	0.06	-0.34	102.96	122.54	84.02	Yes

Analysis of bearing capacity - partial results

C_d = 20.259 kPa
N_c = 5.142
S_c = 1.084
D_c = 1.000
I_c = 0.842
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 18.00 kN
Computed weight of overburden Z = 20.52 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 0.85 m
Length of slip surface l_{sp} = 1.80 m

Design bearing capacity of found. soil R_d = 117.75 kPa
Extreme contact stress σ = 110.29 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.135<0.450
Max. eccentricity in direction of base width e_y = 0.314<0.450
Max. overall eccentricity e_t = 0.320<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 41.76 kN

Horizontal bearing capacity R_{dh} = 75.32 kN
Extreme horizontal force H = 5.06 kN

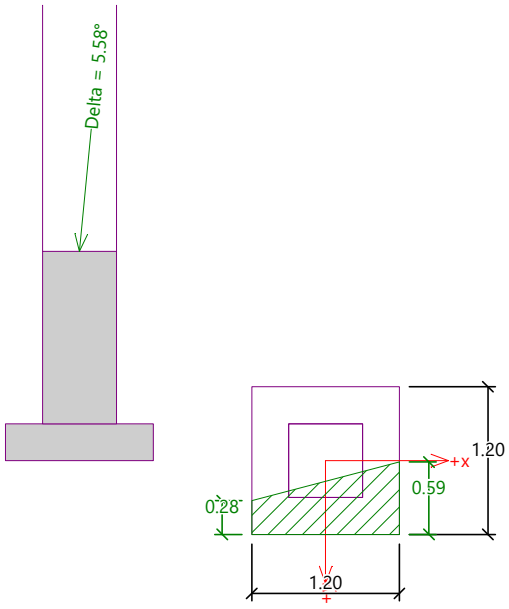
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 18.00 kN
Computed weight of overburden Z = 20.52 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	22.95	31.00	0.10
2	1.45	1.50	0.05	9.35	23.61	27.77	0.09
3	1.50	1.55	0.05	7.43	24.24	23.27	0.12
4	1.55	1.60	0.05	7.43	24.84	19.64	0.10
5	1.60	1.65	0.05	7.43	25.45	17.05	0.09
6	1.65	1.70	0.05	7.43	26.05	15.16	0.08
7	1.70	1.80	0.10	7.43	26.95	13.17	0.13
8	1.80	1.90	0.10	7.43	28.16	11.12	0.11
9	1.90	2.00	0.10	7.43	29.37	9.56	0.10
10	2.00	2.10	0.10	24.51	30.59	8.31	0.03
11	2.10	2.20	0.10	24.51	31.81	7.27	0.02
12	2.20	2.30	0.10	24.51	33.03	6.41	0.02
13	2.30	2.55	0.25	76.66	35.25	5.27	0.01
14	2.55	2.71	0.16	76.66	37.89	4.21	0.00

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.20 m
Spread footing width (y) = 0.93 m

Settlement of mid point of edge x - 1 = 1.3 mm
Settlement of mid point of edge x - 2 = -0.4 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge y - 1 = 0.6 mm
Settlement of mid point of edge y - 2 = 0.4 mm
Settlement of foundation center point = 1.2 mm
Settlement of characteristic point = 1.0 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} = 20.30 MPa
Foundation in the longitudinal direction is rigid (k=25.39)
Foundation in the direction of width is rigid (k=25.39)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.104<0.450
Max. eccentricity in direction of base width e_y = 0.242<0.450
Max. overall eccentricity e_t = 0.247<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 1.0 mm
Depth of influence zone = 1.31 m

Rotation in direction of x = 0.572 (tan*1000); (3.3E-02 °)
Rotation in direction of y = 1.397 (tan*1000); (8.0E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.29	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	74.40	kNm	>	2.15	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.28	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.14	m	= x_{max}
Ultimate moment	M_{Rd}	=	77.82	kNm	>	3.87	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 13.30 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	3.33	kN
Force transferred by shear strength of foundation		=	9.97	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.07	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	9.96	kN
Force transferred by shear strength of foundation		=	3.34	kN
Distance of section from the column		=	0.23	m
Section perimeter	u	=	3.84	m
Shear stress at section	v_{Ed}	=	0.02	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	1.03	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 09_110 kV skyriklio atrama (H=4,19 m)
Description : P15.15.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)

Permanent design situation

		State STR		State GEO	
		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

Partial factor on internal friction :	γ_ϕ =	1.25 [–]
Partial factor on effective cohesion :	γ_c =	1.25 [–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40 [–]
Partial factor on unconfined strength :	γ_v =	1.40 [–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

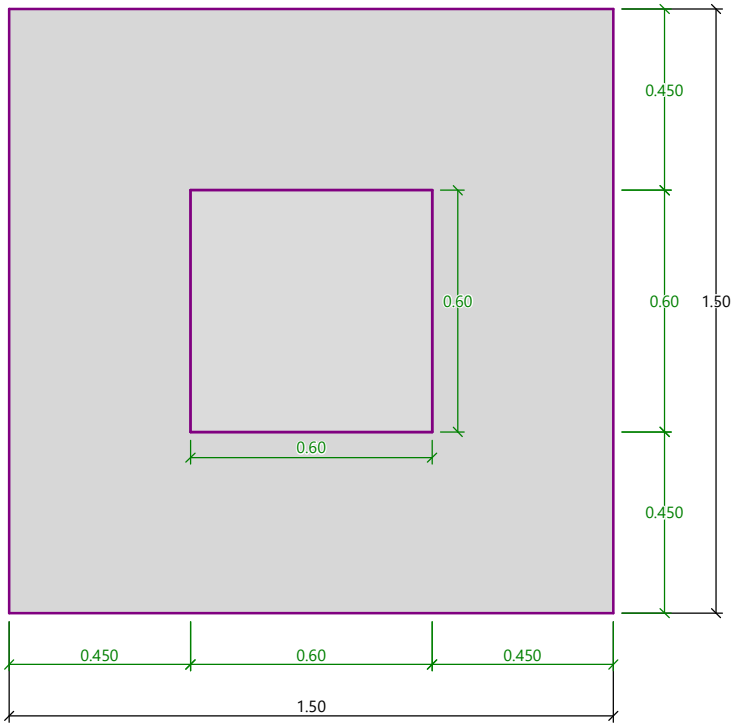
Spread footing length x = 1.50 m
Spread footing width y = 1.50 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 1.18 m³
Volume of excavation = 12.72 m³
Volume of fill = 11.65 m³

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m³
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

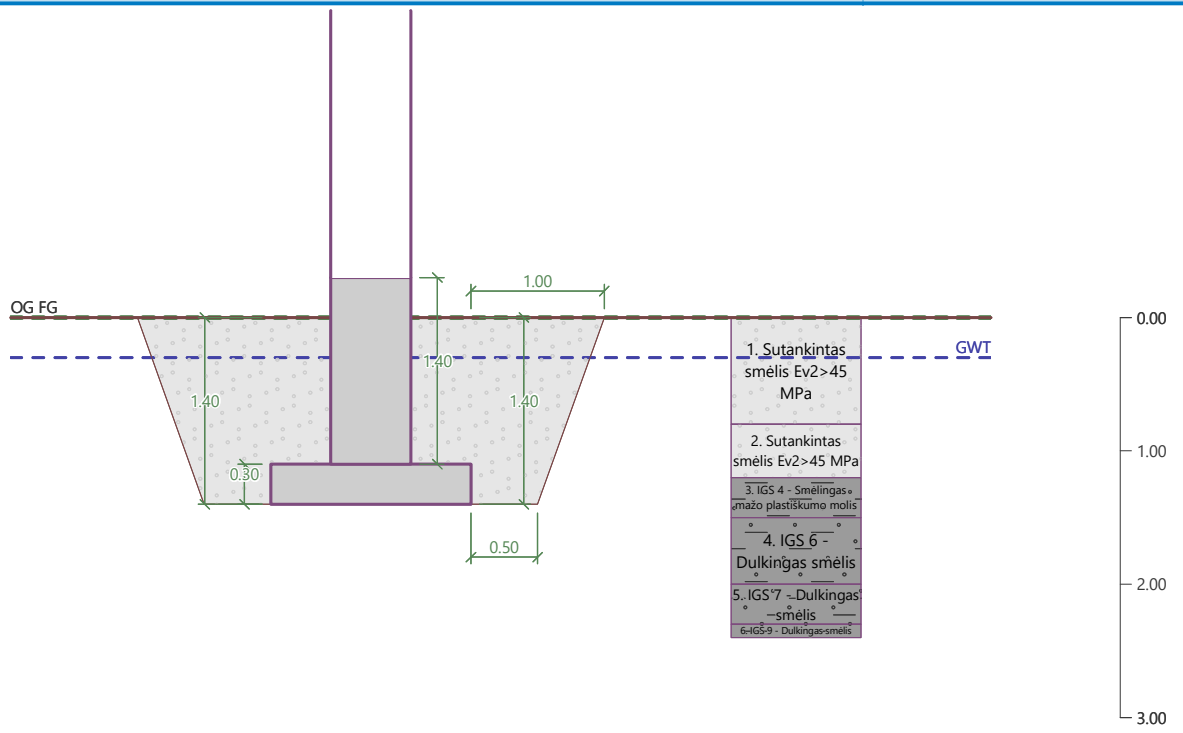
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	15.23	7.10	-7.39	2.73	1.69
2	Yes		Mmax	Design	14.69	20.87	-3.27	1.26	5.36
3	Yes		Nmax - service	Service	10.88	5.07	-5.28	1.95	1.21
4	Yes		Mmax - service	Service	10.49	14.91	-2.34	0.90	3.83

Ground water table

The ground water table is at a depth of 0.30 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.20	-0.16	47.19	110.21	42.82	Yes
Nmax	No	0.18	-0.15	49.32	110.57	44.61	Yes
Mmax	Yes	0.09	-0.49	89.22	92.03	96.95	Yes
Mmax	No	0.08	-0.44	82.08	95.69	85.78	Yes

Analysis of bearing capacity - partial results

C_d = 15.792 kPa
N_c = 5.142
S_c = 1.078
D_c = 1.000
I_c = 0.850
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 19.84 kN
Computed weight of overburden Z = 26.46 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 1.06 m
Length of slip surface l_{sp} = 2.25 m

Design bearing capacity of found. soil R_d = 92.03 kPa
Extreme contact stress σ = 89.22 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.130<0.450
Max. eccentricity in direction of base width e_y = 0.328<0.450
Max. overall eccentricity e_t = 0.333<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 49.95 kN

Horizontal bearing capacity R_{dh} = 98.78 kN
Extreme horizontal force H = 5.51 kN

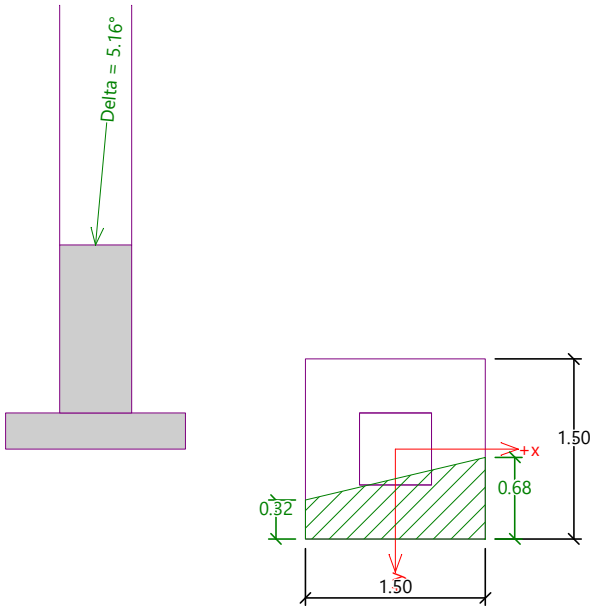
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 19.84 kN
Computed weight of overburden Z = 26.46 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	17.95	24.62	0.08
2	1.45	1.50	0.05	9.35	18.61	22.81	0.08
3	1.50	1.55	0.05	7.43	19.24	19.88	0.10
4	1.55	1.60	0.05	7.43	19.84	17.17	0.09
5	1.60	1.65	0.05	7.43	20.45	15.06	0.08
6	1.65	1.70	0.05	7.43	21.05	13.46	0.07
7	1.70	1.80	0.10	7.43	21.95	11.77	0.12
8	1.80	1.90	0.10	7.43	23.16	10.07	0.10
9	1.90	2.00	0.10	7.43	24.37	8.81	0.09
10	2.00	2.10	0.10	24.51	25.59	7.80	0.02
11	2.10	2.20	0.10	24.51	26.81	6.96	0.02
12	2.20	2.30	0.10	24.51	28.03	6.25	0.02
13	2.30	2.55	0.25	76.66	30.25	5.27	0.01
14	2.55	2.80	0.25	76.66	33.47	4.17	0.01
15	2.80	2.85	0.05	76.66	35.40	3.64	0.00

Tension was excluded during the analysis.
Dimensions of spread footing after excluding stretched edges:
Spread footing length (x) = 1.50 m
Spread footing width (y) = 1.12 m

Settlement of mid point of edge x - 1 = 1.1 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of mid point of edge x - 2 = -0.4 mm
Settlement of mid point of edge y - 1 = 0.6 mm
Settlement of mid point of edge y - 2 = 0.3 mm
Settlement of foundation center point = 1.1 mm
Settlement of characteristic point = 0.9 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} = 22.48 MPa
Foundation in the longitudinal direction is rigid (k=11.75)
Foundation in the direction of width is rigid (k=11.75)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.100<0.450
Max. eccentricity in direction of base width e_y = 0.251<0.450
Max. overall eccentricity e_t = 0.255<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.9 mm
Depth of influence zone = 1.45 m

Rotation in direction of x = 0.369 (tan*1000); (2.1E-02 °)
Rotation in direction of y = 1.015 (tan*1000); (5.8E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.23	%	> 0.15	%	=	ρ_{min}
Position of neutral axis	x	=	0.01	m	< 0.14	m	=	x_{max}
Ultimate moment	M_{Rd}	=	74.89	kNm	> 4.57	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.50 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.22	%	> 0.15	%	=	ρ_{min}
Position of neutral axis	x	=	0.01	m	< 0.14	m	=	x_{max}
Ultimate moment	M_{Rd}	=	78.30	kNm	> 8.67	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 14.69 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	2.35	kN
Force transferred by shear strength of foundation		=	12.34	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.12	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Critical section without shear reinforcement

Force transferred into found. soil		=	8.55	kN
Force transferred by shear strength of foundation		=	6.14	kN
Distance of section from the column		=	0.29	m
Section perimeter	u	=	4.21	m
Shear stress at section	v_{Ed}	=	0.04	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	0.82	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 10_110 kV atraminio izoliatoriaus atrama (H=2,50 m)
Description : P12.12.17 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)							
Permanent design situation							
		State STR				State GEO	
		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			
Partial factor on internal friction :	γ_ϕ =	1.25	[–]
Partial factor on effective cohesion :	γ_c =	1.25	[–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40	[–]
Partial factor on unconfined strength :	γ_v =	1.40	[–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.40 m
Depth of footing bottom d = 1.40 m
Thickness of top step t_v = 1.40 m
Foundation thickness t = 0.30 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

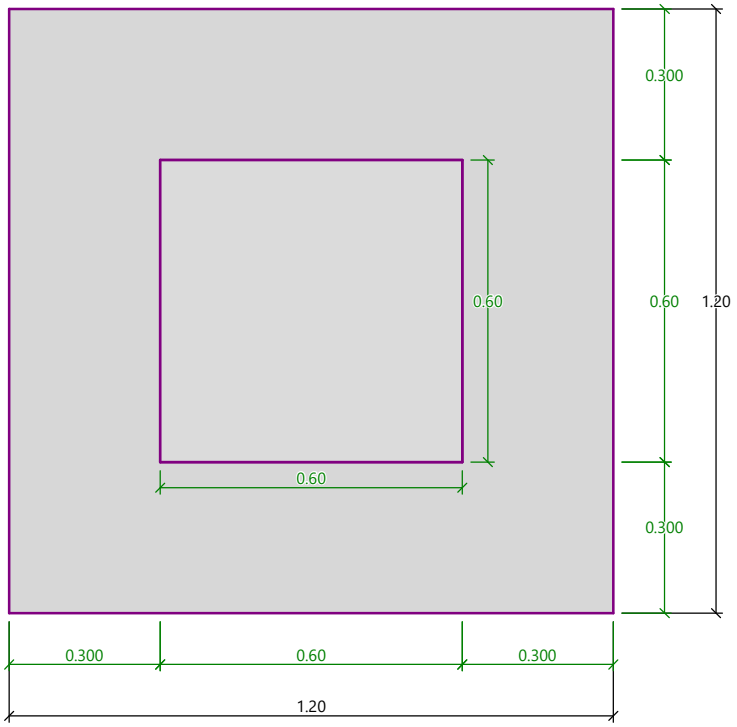
Spread footing length x = 1.20 m
Spread footing width y = 1.20 m
Column shape rectangle
Column width in the direction of x c_x = 0.60 m
Column width in the direction of y c_y = 0.60 m
Length of top step a_{vx} = 0.60 m
Width of top step a_{vy} = 0.60 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 0.94 m3
Volume of excavation = 10.32 m3
Volume of fill = 9.49 m3

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m3
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

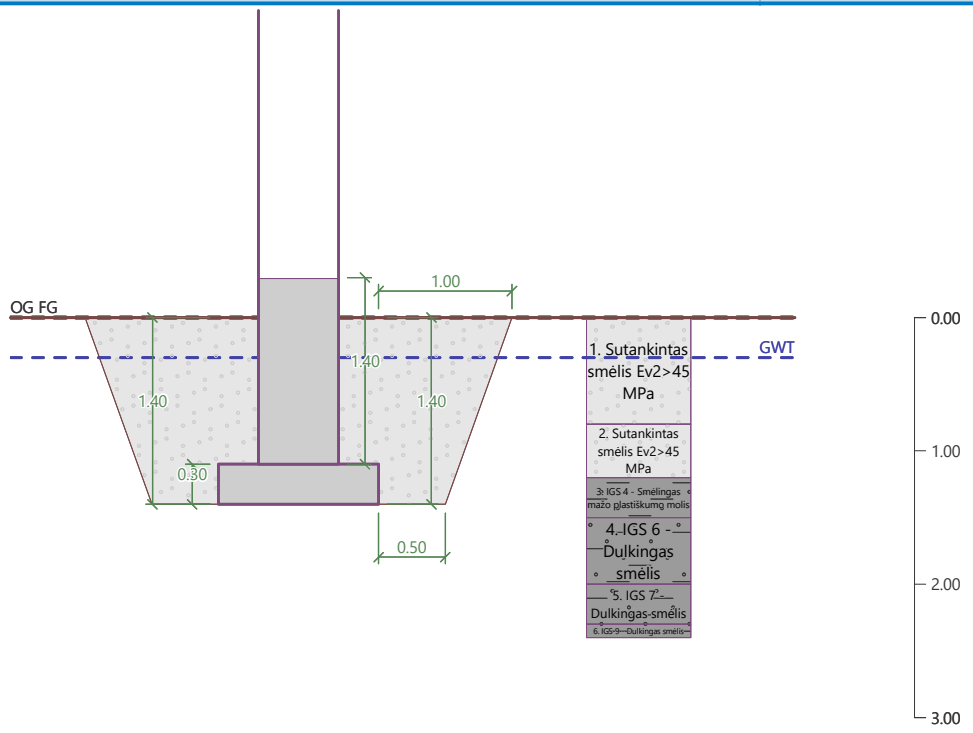
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	4.91	2.23	0.02	0.03	1.01
2	Yes		Mmax	Design	3.87	4.78	-0.43	0.26	2.35
3	Yes		Nmax - service	Service	3.51	1.59	0.01	0.02	0.72
4	Yes		Mmax - service	Service	2.76	3.41	-0.31	0.19	1.68

Ground water table

The ground water table is at a depth of 0.30 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.00	-0.11	30.79	118.42	26.00	Yes
Nmax	No	0.00	-0.09	34.56	118.88	29.07	Yes
Mmax	Yes	0.02	-0.25	43.62	111.61	39.08	Yes
Mmax	No	0.02	-0.21	45.82	113.00	40.55	Yes

Analysis of bearing capacity - partial results

C_d = 17.061 kPa
N_c = 5.142
S_c = 1.133
D_c = 1.000
I_c = 0.960
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 21.87 kN
Computed weight of overburden Z = 15.12 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 0.85 m
Length of slip surface l_{sp} = 1.80 m

Design bearing capacity of found. soil R_d = 113.00 kPa
Extreme contact stress σ = 45.82 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.021<0.450
Max. eccentricity in direction of base width e_y = 0.208<0.450
Max. overall eccentricity e_t = 0.209<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 39.96 kN

Horizontal bearing capacity R_{dh} = 97.58 kN
Extreme horizontal force H = 2.36 kN

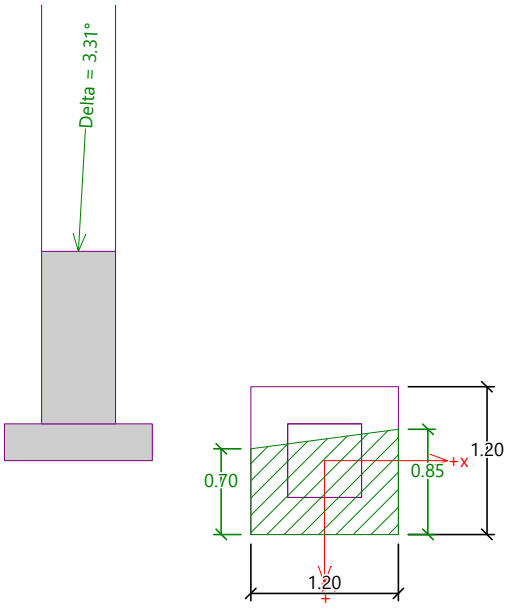
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 16.20 kN
Computed weight of overburden Z = 15.12 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.40	1.45	0.05	9.35	17.95	13.65	0.05
2	1.45	1.50	0.05	9.35	18.61	12.53	0.04
3	1.50	1.55	0.05	7.43	19.24	10.77	0.05
4	1.55	1.60	0.05	7.43	19.84	9.20	0.05
5	1.60	1.65	0.05	7.43	20.45	8.03	0.04
6	1.65	1.70	0.05	7.43	21.05	7.16	0.04
7	1.70	1.80	0.10	7.43	21.95	6.25	0.06
8	1.80	1.90	0.10	7.43	23.16	5.34	0.05
9	1.90	2.00	0.10	7.43	24.37	4.65	0.05
10	2.00	2.10	0.10	24.51	25.59	4.10	0.01
11	2.10	2.20	0.10	24.51	26.81	3.64	0.01
12	2.20	2.30	0.10	24.51	28.03	3.25	0.01
13	2.30	2.35	0.05	76.66	28.96	3.00	0.00

Settlement of mid point of edge x - 1 = 0.6 mm
Settlement of mid point of edge x - 2 = 0.0 mm
Settlement of mid point of edge y - 1 = 0.2 mm
Settlement of mid point of edge y - 2 = 0.1 mm
Settlement of foundation center point = 0.5 mm
Settlement of characteristic point = 0.5 mm

(1-max.compressed edge; 2-min.compressed edge)

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement and rotation of foundation - results

Foundation stiffness:
Computed weighted average modulus of deformation E_{def} = 11.14 MPa
Foundation in the longitudinal direction is rigid (k=46.29)
Foundation in the direction of width is rigid (k=46.29)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.015<0.450
Max. eccentricity in direction of base width e_y = 0.153<0.450
Max. overall eccentricity e_t = 0.154<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:
Foundation settlement = 0.5 mm
Depth of influence zone = 0.95 m

Rotation in direction of x = 0.089 (tan*1000); (5.1E-03 °)
Rotation in direction of y = 0.500 (tan*1000); (2.9E-02 °)

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

10 prof. 10.0 mm, cover 70.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.29	%	> 0.15	%	=	ρ_{min}
Position of neutral axis	x	=	0.02	m	< 0.14	m	=	x_{max}
Ultimate moment	M_{Rd}	=	74.40	kNm	> 0.79	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

10 prof. 10.0 mm, cover 60.0 mm
Cross-section width = 1.20 m
Cross-section depth = 0.30 m

Reinforcement ratio	ρ	=	0.28	%	> 0.15	%	=	ρ_{min}
Position of neutral axis	x	=	0.02	m	< 0.14	m	=	x_{max}
Ultimate moment	M_{Rd}	=	77.82	kNm	> 1.47	kNm	=	M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 3.87 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	0.97	kN
Force transferred by shear strength of foundation		=	2.90	kN
Considered column perimeter	u_0	=	2.40	m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.03	MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22	MPa

Critical section without shear reinforcement

Force transferred into found. soil	=	2.90	kN
Force transferred by shear strength of foundation	=	0.97	kN
Distance of section from the column	=	0.23	m
Section perimeter u	=	3.84	m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Shear stress at section	v_{Ed}	= 0.01	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	= 1.03	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing verification

Input data

Project : Žeimių TP
Part : 11_110 kV linijinis portalas siaura baze (9 m)
Description : P24.24.20 - GR.3
Customer : LITGRID AB
Author :
Date : 5/6/2026
Project number : 2025-45-01-XX-TDP-SK-IS

Settings

(input for current task)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

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 : according to EN 1997
Analysis for undrained conditions : EC 7-1 (EN 1997-1:2003)
Analysis of uplift : EN 50341
Allowable eccentricity : 0.450
Design approach : 3 - reduction of actions (GEO, STR) and soil parameters

Partial factors on actions (A)

Permanent design situation

		State STR		State GEO	
		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

Partial factor on internal friction :	γ_ϕ =	1.25 [–]
Partial factor on effective cohesion :	γ_c =	1.25 [–]
Partial factor on undrained shear strength :	γ_{cu} =	1.40 [–]
Partial factor on unconfined strength :	γ_v =	1.40 [–]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Sutankintas smėlis Ev2>45 MPa		38.50	0.10	20.00	10.00	
2	Sutankinta skalda Ev2>70 MPa		38.50	0.01	21.00	4.40	
3	IGS 1 - Dirbtinis gruntas		18.00	20.00	20.00	11.20	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Name	Pattern	φ_{ef} [°]	c_u [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
4	IGS 2 - Dirvožemis		18.00	10.00	18.00	7.00	
5	IGS 3 - Smėlingas mažo plastiškumo molis		18.00	70.00	20.80	12.96	
6	IGS 4 - Smėlingas mažo plastiškumo molis		18.00	100.00	21.20	13.12	
7	IGS 5 - Smėlingas mažo plastiškumo molis		18.00	100.00	22.00	13.61	
8	IGS 6 - Dulkingas smėlis		18.00	15.00	19.50	12.08	
9	IGS 7 - Dulkingas smėlis		18.00	15.00	20.00	12.24	
10	IGS 8 - Dulkingas smėlis		18.00	15.00	20.50	12.56	
11	IGS 9 - Dulkingas smėlis		18.00	15.00	21.00	12.88	
12	IGS 10 - Dulkingas smėlis		18.00	40.00	21.00	12.96	
13	IGS 11 - Vidutinio plastiškumo molis		18.00	85.00	20.00	12.52	
14	IGS 12 - Vidutinio plastiškumo molis		18.00	100.00	20.60	12.86	
15	IGS 13 - Vidutinio plastiškumo molis		18.00	100.00	20.50	12.86	

All soils are considered as cohesionless for at rest pressure analysis.

Foundation

Foundation type: centric spread footing with steps

Depth from original ground surface h_z = 1.80 m
Depth of footing bottom d = 1.80 m
Thickness of top step t_v = 1.60 m
Foundation thickness t = 0.40 m

Overburden

Type: input shape and soil of the fill
Assigned soil : Sutankintas smėlis Ev2>45 MPa
Type : from the bottom edge
l_1 = 1.00 m
l_2 = 0.50 m

Geometry of structure

Foundation type: centric spread footing with steps

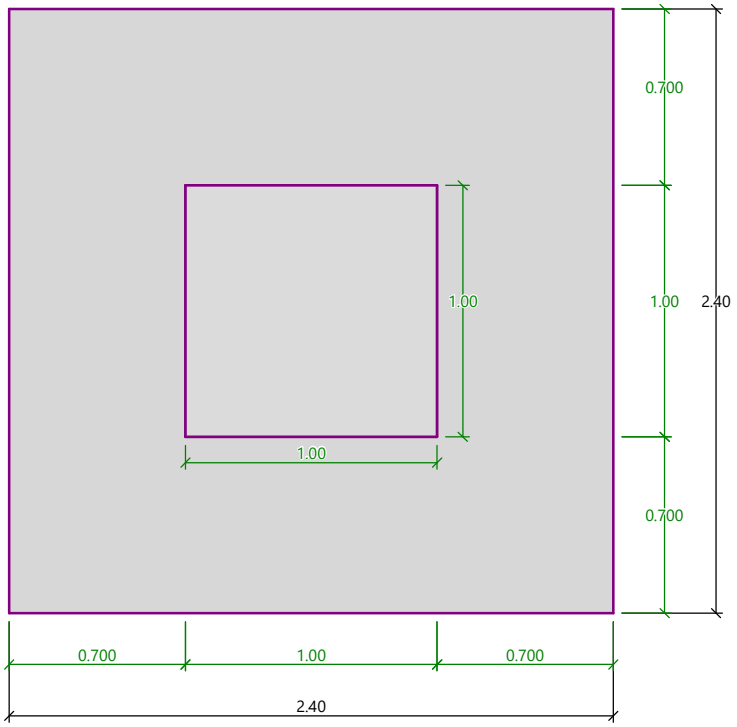
Spread footing length x = 2.40 m
Spread footing width y = 2.40 m
Column shape rectangle
Column width in the direction of x c_x = 1.00 m
Column width in the direction of y c_y = 1.00 m
Length of top step a_{vx} = 1.00 m
Width of top step a_{vy} = 1.00 m

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Spread footing volume = 3.90 m³
Volume of excavation = 27.53 m³
Volume of fill = 23.82 m³

Name : Geometry	Stage - analysis : 1 - 0



Material of structure

Unit weight γ = 25.00 kN/m³
Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete: C 30/37
Cylinder compressive strength f_{ck} = 30.00 MPa
Tensile strength f_{ctm} = 2.90 MPa
Elasticity modulus E_{cm} = 33000.00 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

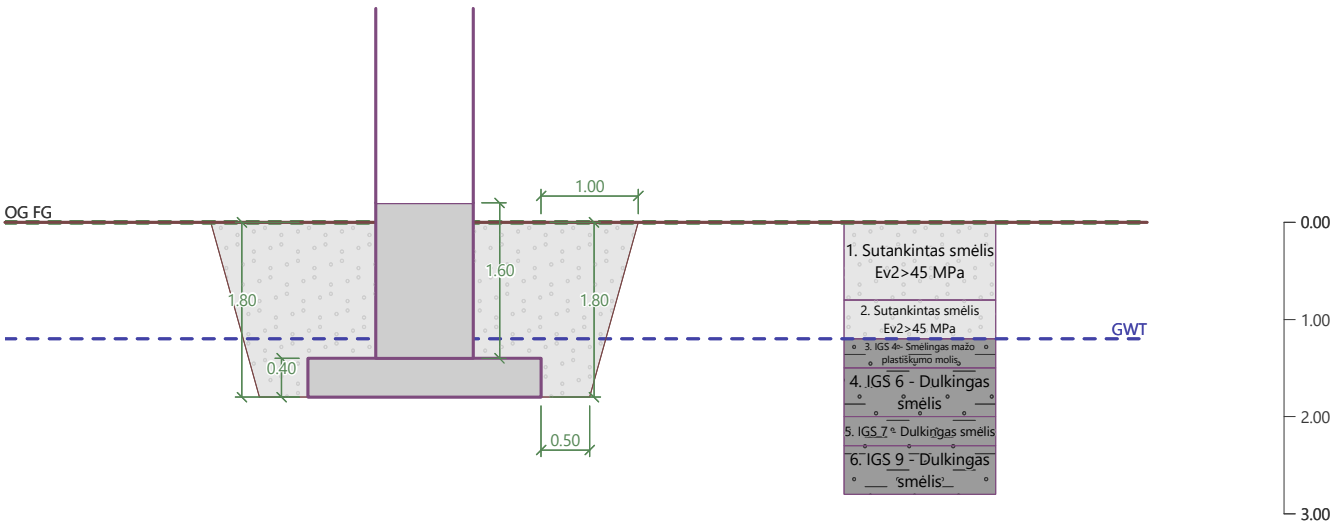
No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	0.80	0.00 .. 0.80	Sutankintas smėlis Ev2>45 MPa	
2	0.40	0.80 .. 1.20	Sutankintas smėlis Ev2>45 MPa	
3	0.30	1.20 .. 1.50	IGS 4 - Smėlingas mažo plastiškumo molis	
4	0.50	1.50 .. 2.00	IGS 6 - Dulkingas smėlis	

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
5	0.30	2.00 .. 2.30	IGS 7 - Dulkingas smėlis	
6	3.20	2.30 .. 5.50	IGS 9 - Dulkingas smėlis	
7	2.40	5.50 .. 7.90	IGS 10 - Dulkingas smėlis	
8	0.30	7.90 .. 8.20	IGS 13 - Vidutinio plastiškumo molis	
9	3.00	8.20 .. 11.20	IGS 11 - Vidutinio plastiškumo molis	
10	-	11.20 .. ∞	IGS 11 - Vidutinio plastiškumo molis	

Name : Profile and assignment | **Stage - analysis : 1 - 0**



Load

No.	Load new	Load change	Name	Type	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Yes		Nmax	Design	15.02	61.69	-1.77	0.48	8.14
2	Yes		Mmax	Design	12.05	92.13	-43.97	6.96	10.32
3	Yes		Nmax - service	Service	10.73	44.06	-1.26	0.34	5.81
4	Yes		Mmax - service	Service	8.61	65.81	-31.41	4.97	7.37

Ground water table

The ground water table is at a depth of 1.20 m from the original terrain.

Global settings

Type of analysis : analysis for undrained conditions

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfactory
Nmax	Yes	0.01	-0.37	53.56	91.17	58.74	Yes
Nmax	No	0.01	-0.33	57.20	91.67	62.40	Yes
Mmax	Yes	0.28	-0.54	85.74	85.78	99.96	Yes
Mmax	No	0.25	-0.48	85.51	87.29	97.97	Yes

Analysis of bearing capacity - partial results

C_d = 10.714 kPa
N_c = 5.142
S_c = 1.143
D_c = 1.000
I_c = 0.861
B_c = 1.000

Analysis carried out with automatic selection of the most unfavourable load cases.
Computed weight of spread footing G = 72.56 kN
Computed weight of overburden Z = 123.76 kN

Vertical bearing capacity check

Shape of contact stress : general
Most unfavorable load case No. 2. (Mmax)

Parameters of slip surface below foundation:
Depth of slip surface z_{sp} = 1.70 m
Length of slip surface l_{sp} = 3.60 m

Design bearing capacity of found. soil R_d = 85.78 kPa
Extreme contact stress σ = 85.74 kPa

Bearing capacity in the vertical direction is SATISFACTORY

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.116<0.450
Max. eccentricity in direction of base width e_y = 0.226<0.450
Max. overall eccentricity e_t = 0.253<0.450

Eccentricity of load is SATISFACTORY

Horizontal bearing capacity check

Most unfavorable load case No. 2. (Mmax)
Earth resistance: passive
Design magnitude of earth resistance S_{pd} = 77.68 kN

Horizontal bearing capacity R_{dh} = 103.72 kN
Extreme horizontal force H = 12.45 kN

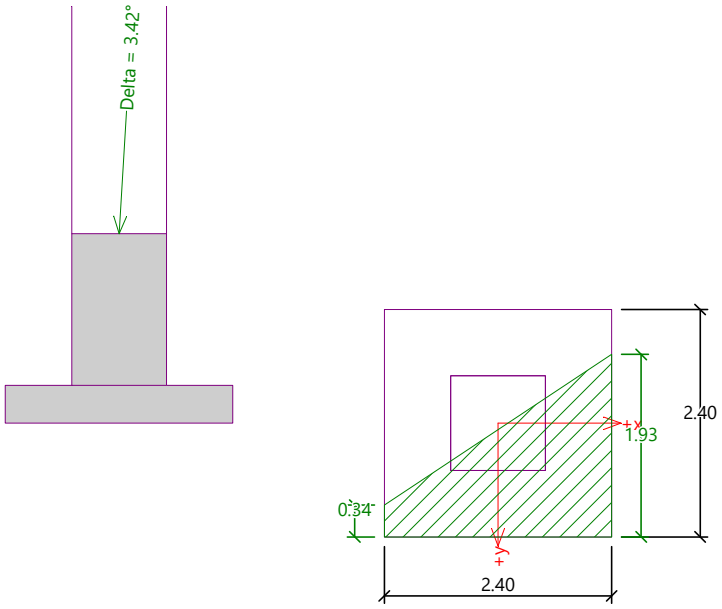
Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Name : Bearing cap.	Stage - analysis : 1 - 1



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 = 72.56 kN
Computed weight of overburden Z = 123.76 kN

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	1.80	1.85	0.05	7.43	31.86	19.44	0.10
2	1.85	1.90	0.05	7.43	32.46	19.08	0.10
3	1.90	1.95	0.05	7.43	33.07	18.23	0.09
4	1.95	2.00	0.05	7.43	33.67	17.03	0.09
5	2.00	2.05	0.05	24.51	34.28	15.73	0.02
6	2.05	2.10	0.05	24.51	34.89	14.49	0.02
7	2.10	2.20	0.10	24.51	35.81	12.97	0.04
8	2.20	2.30	0.10	24.51	37.03	11.33	0.03
9	2.30	2.40	0.10	76.66	38.29	10.13	0.01
10	2.40	2.50	0.10	76.66	39.58	9.21	0.01
11	2.50	2.60	0.10	76.66	40.86	8.47	0.01
12	2.60	2.70	0.10	76.66	42.15	7.85	0.01
13	2.70	2.95	0.25	76.66	44.41	7.01	0.02
14	2.95	3.20	0.25	76.66	47.63	6.02	0.02
15	3.20	3.36	0.16	76.66	50.26	5.35	0.01

Settlement of mid point of edge x - 1 = 0.7 mm
Settlement of mid point of edge x - 2 = 0.0 mm
Settlement of mid point of edge y - 1 = 0.3 mm
Settlement of mid point of edge y - 2 = 0.0 mm
Settlement of foundation center point = 0.5 mm

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Settlement of characteristic point = 0.6 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} = 52.16 MPa

Foundation in the longitudinal direction is rigid (k=2.93)

Foundation in the direction of width is rigid (k=2.93)

Verification of load eccentricity

Max. eccentricity in direction of base length e_x = 0.084<0.450

Max. eccentricity in direction of base width e_y = 0.164<0.450

Max. overall eccentricity e_t = 0.184<0.450

Eccentricity of load is SATISFACTORY

Overall settlement and rotation of foundation:

Foundation settlement = 0.6 mm

Depth of influence zone = 1.56 m

Rotation in direction of x = 0.142 (tan*1000); (8.2E-03 °)

Rotation in direction of y = 0.272 (tan*1000); (1.6E-02 °)

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

17 prof. 12.0 mm, cover 70.0 mm

Cross-section width = 2.40 m

Cross-section depth = 0.40 m

Reinforcement ratio	ρ	=	0.25	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.20	m	= x_{max}
Ultimate moment	M_{Rd}	=	263.56	kNm	>	21.62	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Verification of longitudinal reinforcement of foundation in the direction of y

17 prof. 12.0 mm, cover 60.0 mm

Cross-section width = 2.40 m

Cross-section depth = 0.40 m

Reinforcement ratio	ρ	=	0.24	%	>	0.15	%	= ρ_{min}
Position of neutral axis	x	=	0.02	m	<	0.21	m	= x_{max}
Ultimate moment	M_{Rd}	=	271.92	kNm	>	29.70	kNm	= M_{Ed}

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 15.02 kN

Maximum resistance at the column perimeter

Force transferred into found. soil		=	2.61 kN
Force transferred by shear strength of foundation		=	12.41 kN
Considered column perimeter	u_0	=	4.00 m
Shear stress at the column perimeter	$v_{Ed,max}$	=	0.08 MPa
Resistance at the column perimeter	$v_{Rd,max}$	=	4.22 MPa

Critical section without shear reinforcement

Force transferred into found. soil	=	8.29 kN
Force transferred by shear strength of foundation	=	6.73 kN

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Distance of section from the column		=	0.41	m
Section perimeter	u	=	6.58	m
Shear stress at section	v_{Ed}	=	0.03	MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	=	0.73	MPa

$v_{Ed} < v_{Rd,c}$ => Reinforcement is not required

Spread footing for punching shear is SATISFACTORY

[GEO5 - Spread Footing (32 bit) | version 5.2024.144.0 | hardware key 12170 / 1 | Energetikos Projektai, UAB | Copyright © 2026 Fine spol. s r.o. All Rights Reserved | www.finesoftware.eu]

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PRIEDAS NR. 3

110 KV ATVIROSIOS SKIRSTYKLOS ATRAMŲ

MAZGŲ SKAIČIAVIMAI

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project data

Project name	Atramos kolonos ir traversos mazgo skaičiavimas Project number 2025-45-01-XX-TDP-SK
Author	
Description	
Date	8/10/2026
Code	EN

Material

Steel	S 355

Project item 110 kV skyriklio atramos kolonos ir traversos mazgo skaičiavimas

Name	110 kV skyriklio atramos kolonos ir traversos mazgo skaičiavimas
Description	
Analysis	Stress, strain/ simplified loading

Design

Members

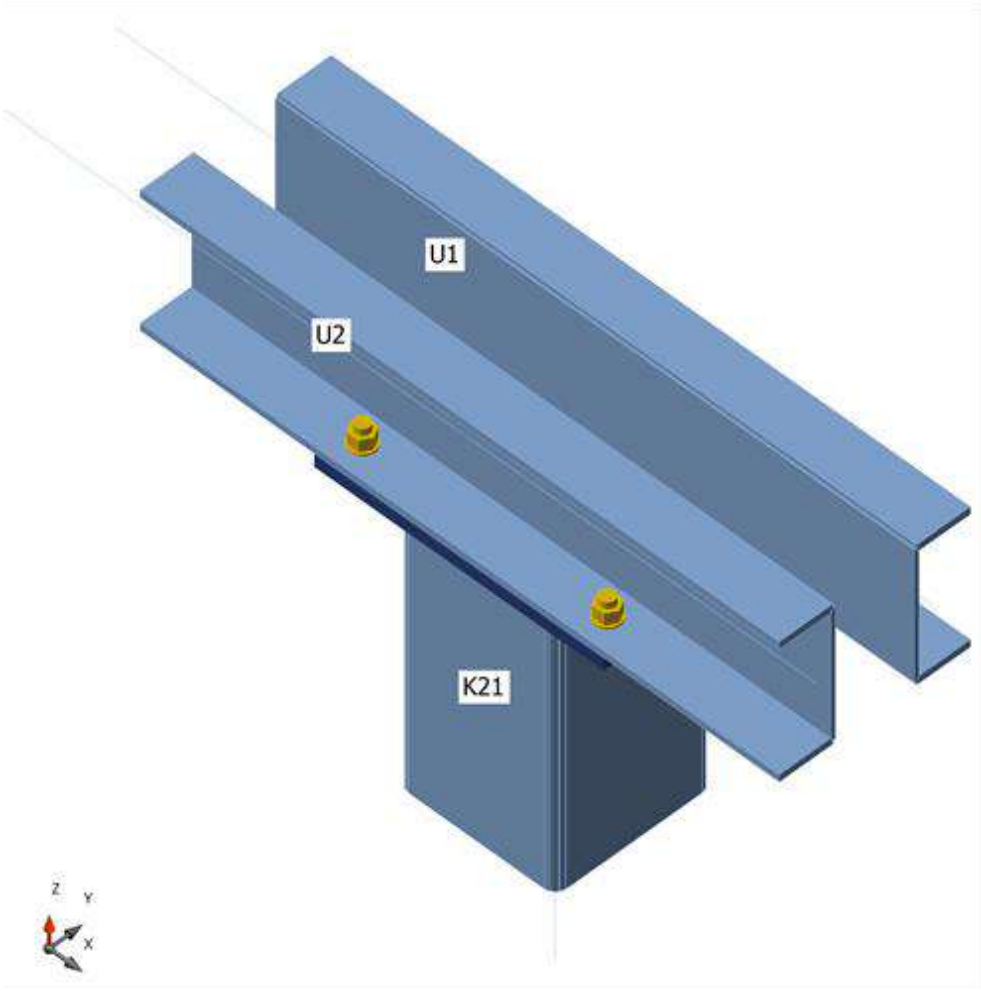
Geometry

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
U1	3 - UPE160(UPE160)	0.0	0.0	0.0	0	65	0
K21	2 - SHS180/180/5.0	0.0	-90.0	0.0	0	0	0
U2	3 - UPE160(UPE160)	0.0	0.0	0.0	0	-65	0

Supports and forces

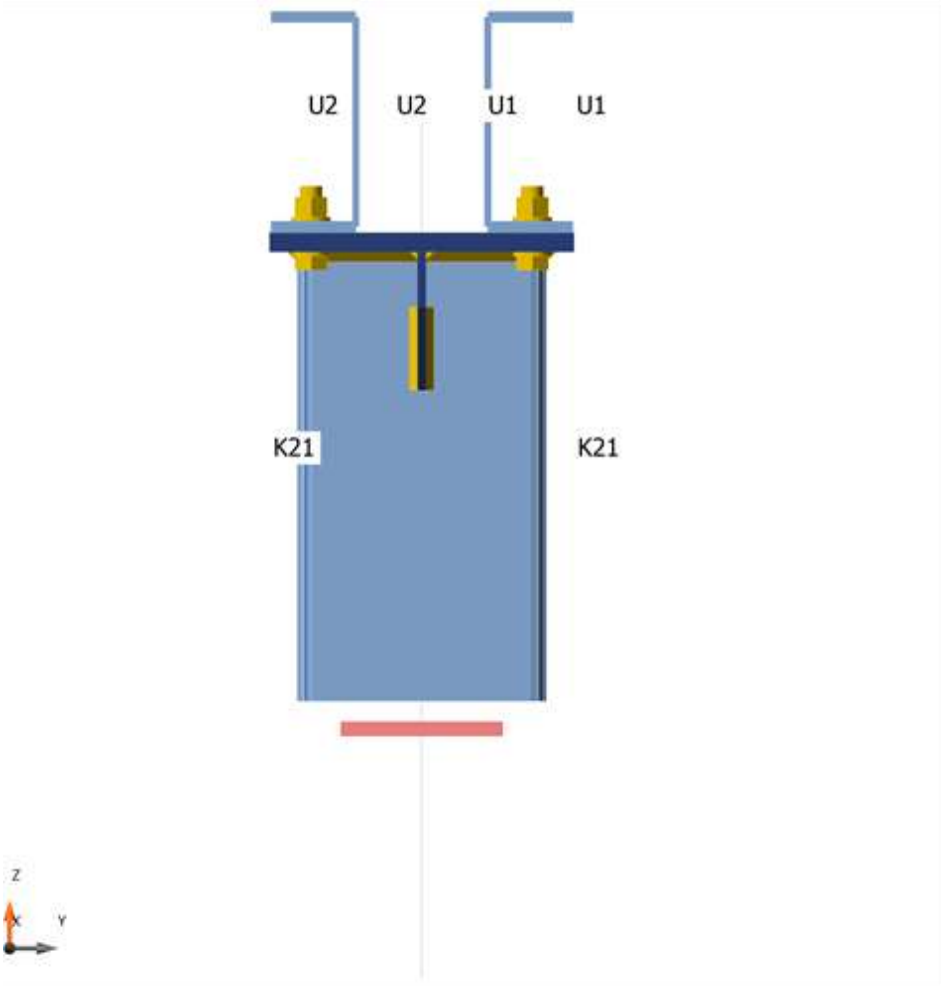
Name	Support	Forces in	X [mm]
U1 / begin		Node	0
U1 / end		Node	0
K21 / end	N-Vy-Vz-Mx-My-Mz	Node	0
U2 / begin		Node	0
U2 / end		Node	0

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



110 kV skyriklio atramos kolonos ir traversos mazgo skaičiavimas, Axonometric view

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



110 kV skyriklio atramos kolonos ir traversos mazgo skaičiavimas, X direction view

Cross-sections

Name	Material
3 - UPE160(UPE160)	S 355
2 - SHS180/180/5.0	S 355

Bolts

Name	Diameter [mm]	f_y [MPa]	f_u [MPa]	Gross area [mm^2]
M16 8.8	16	640.0	800.0	201

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	U1 / Begin	0.8	1.0	7.1	0.0	3.6	0.0
	U1 / End	1.4	0.7	-7.1	0.0	3.5	0.0
	U2 / End	1.4	0.2	-1.0	0.0	1.4	0.0
	U2 / Begin	0.8	1.0	1.0	0.0	1.3	0.0

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Check

Summary

Name	Value	Check status
Analysis	100.0%	OK
Plates	0.5 < 5.0%	OK
Bolts	75.2 < 100%	OK
Welds	57.6 < 100%	OK
Buckling	Not calculated	
GMNA	Calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
U1-bfl 1	8.2	LE1	356.1	0.5	114.1	OK
U1-tfl 1	8.2	LE1	66.3	0.0	0.0	OK
U1-w 1	5.0	LE1	343.7	0.0	0.0	OK
K21	5.0	LE1	339.8	0.0	0.0	OK
U2-bfl 1	8.2	LE1	298.1	0.0	38.5	OK
U2-tfl 1	8.2	LE1	27.2	0.0	0.0	OK
U2-w 1	5.0	LE1	153.1	0.0	0.0	OK
EP1	14.0	LE1	336.5	0.0	114.1	OK
RIB1	6.0	LE1	120.5	0.0	0.0	OK
RIB2	6.0	LE1	103.4	0.0	0.0	OK

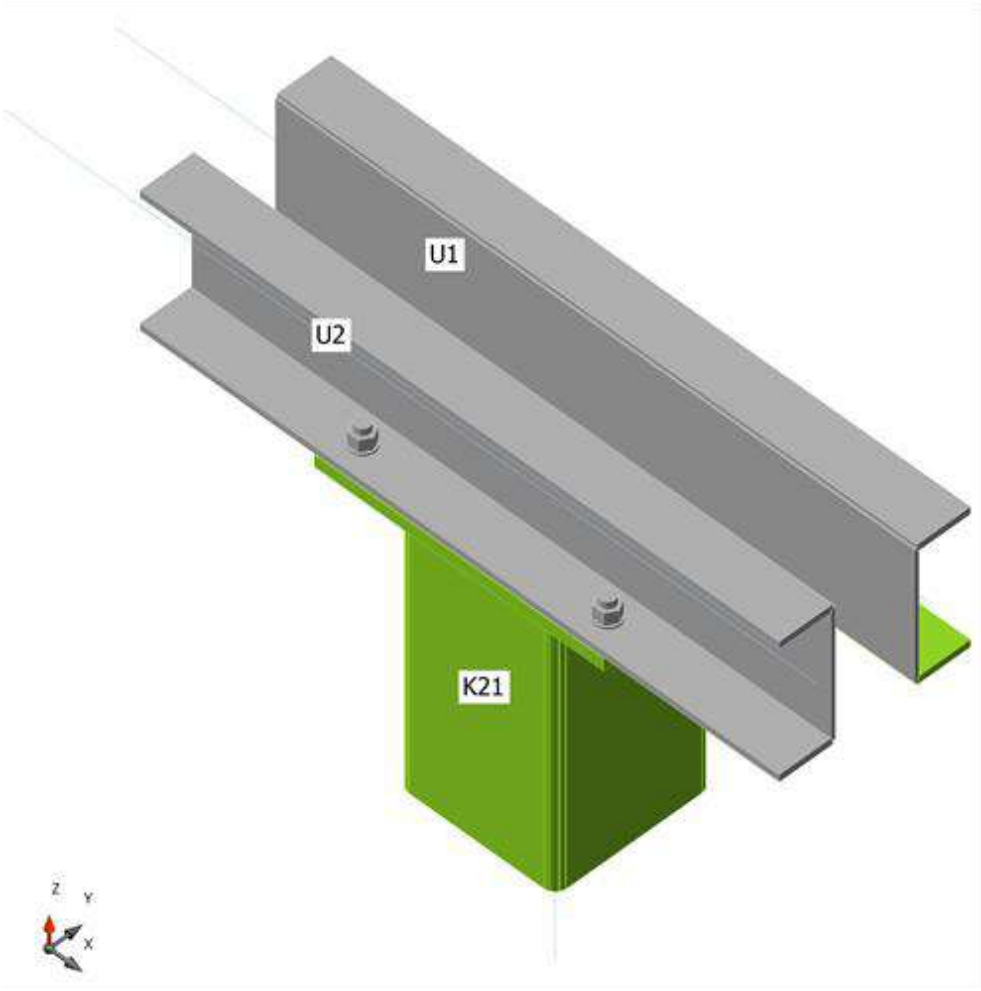
Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355.0	5.0

Symbol explanation

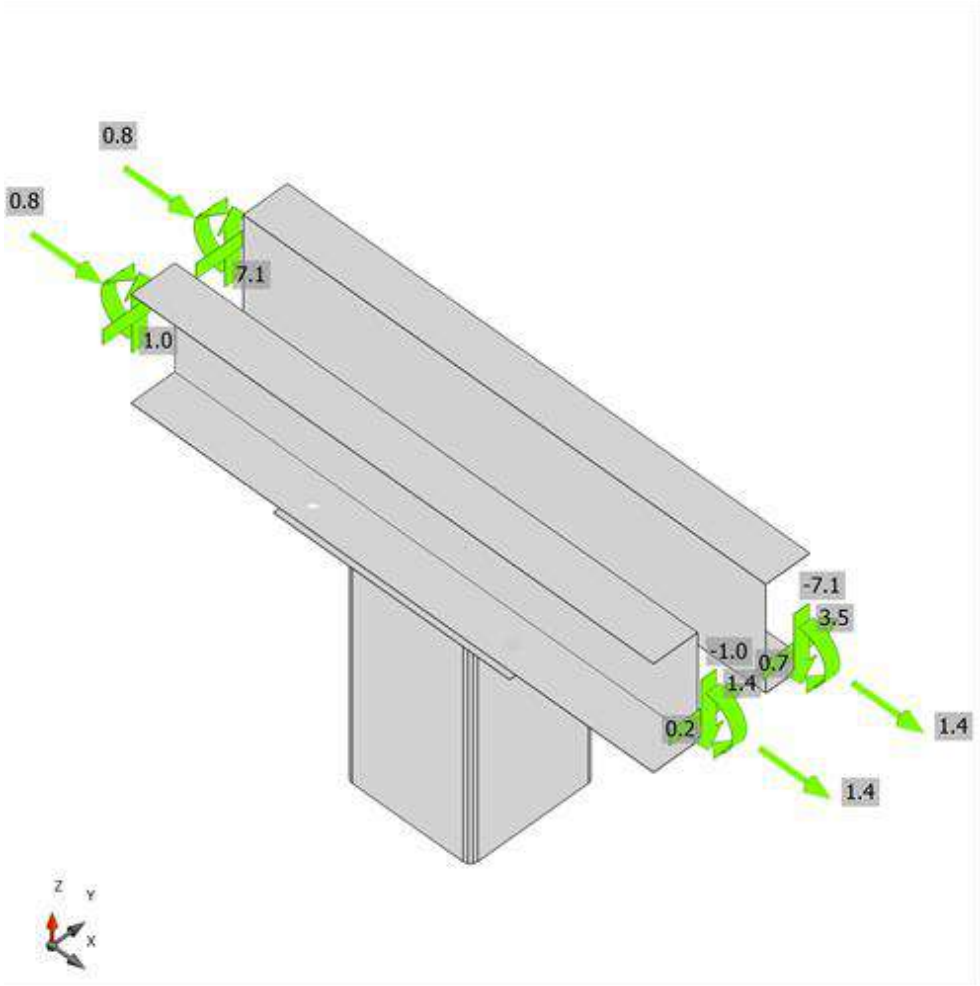
t_p	Plate thickness
σ_{Ed}	Equivalent stress
ε_{Pl}	Plastic strain
$\sigma_{c,Ed}$	Contact stress
f_y	Yield strength
ε_{lim}	Limit of plastic strain

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



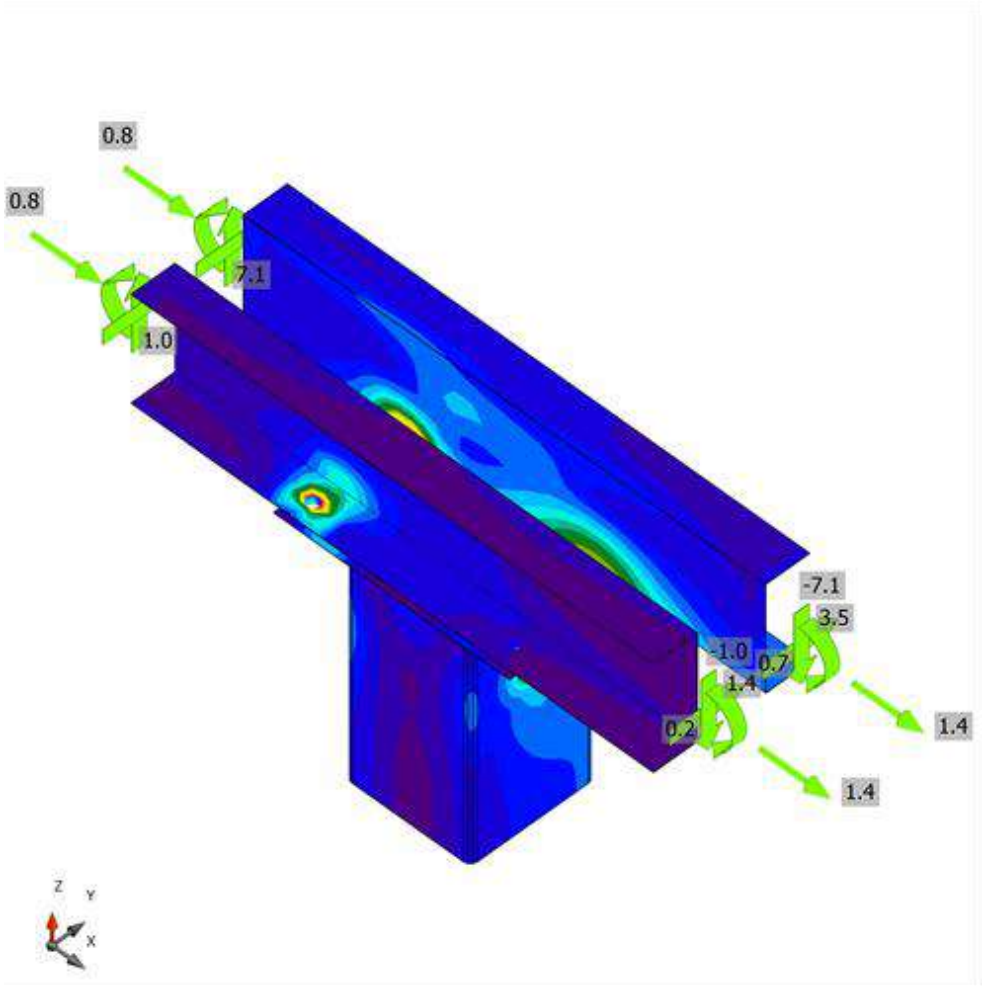
Overall check

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



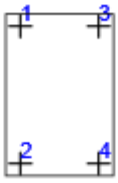
Strain check, LE1

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



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} [%]	Status
	B1	M16 8.8 - 1	LE1	0.6	1.4	91.2	0.7	2.3	2.8	OK
	B2	M16 8.8 - 1	LE1	26.2	1.1	74.1	28.9	1.8	22.5	OK
	B3	M16 8.8 - 1	LE1	1.8	1.6	86.2	2.0	2.6	4.0	OK
	B4	M16 8.8 - 1	LE1	68.0	1.2	79.8	75.2	2.0	55.7	OK

Design data

Grade	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M16 8.8 - 1	90.4	153.7	60.3

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

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 1993-1-8:2005 – Table 3.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
Ut_{ts}	Interaction of tension and shear - EN 1993-1-8:2005 – Table 3.4
$F_{t,Rd}$	Bolt tension resistance - EN 1993-1-8:2005 – Table 3.4
$B_{p,Rd}$	Punching shear resistance - EN 1993-1-8:2005 – Table 3.4
$F_{v,Rd}$	Bolt shear resistance - EN 1993-1-8:2005 – Table 3.4

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 [%]	Status
EP1	K21	◢ 5.0 L	678	LE1	202.5	0.0	47.2	112.8	13.9	46.5	30.2	OK
		◢ 5.0 L	678	LE1	250.8	0.0	108.6	-38.0	124.9	57.6	35.1	OK
EP1	RIB1	◢ 4.0 L	50	LE1	89.1	0.0	28.4	46.9	-13.4	20.5	15.3	OK
		◢ 4.0 L	50	LE1	113.5	0.0	56.0	-37.4	43.0	26.1	15.0	OK
K21-w 1	RIB1	◢ 4.0 L	60	LE1	184.3	0.0	42.5	-41.4	-94.9	42.3	23.5	OK
		◢ 4.0 L	60	LE1	176.4	0.0	37.8	38.9	91.5	40.5	21.8	OK
EP1	RIB2	◢ 4.0 L	50	LE1	93.9	0.0	-46.5	-24.8	40.0	21.5	14.0	OK
		◢ 4.0 L	50	LE1	70.4	0.0	3.7	-30.5	26.8	16.2	13.6	OK
K21-w 3	RIB2	◢ 4.0 L	60	LE1	139.5	0.0	-28.4	29.5	73.1	32.0	17.2	OK
		◢ 4.0 L	60	LE1	147.5	0.0	-33.2	-32.1	-76.5	33.9	18.8	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 1993-1-8:2005 – Table 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Buckling

Buckling analysis was not calculated.

Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1.00	-	EN 1993-1-1:2005 – 6.1
Safety factor γ_{M1}	1.00	-	EN 1993-1-1:2005 – 6.1
Safety factor γ_{M2}	1.25	-	EN 1993-1-1:2005 – 6.1, EN 1993-1-8:2005 – Table 2.1
Safety factor γ_{M3}	1.25	-	EN 1993-1-8:2005 – Table 2.1
Safety factor γ_{C}	1.50	-	EN 1992-1-1:2004 – 2.4.2.4
Safety factor γ_{Inst}	1.20	-	EN 1992-4:2018 – Table 4.1
Joint coefficient βj	0.67	-	EN 1993-1-8:2005 – 6.2.5(7)
Effective area - influence of mesh size	0.10	-	
Friction coefficient - concrete	0.25	-	EN 1993-1-8:2005
Friction coefficient in slip-resistance	0.30	-	EN 1993-1-8:2005 – Table 3.7
Limit plastic strain	0.05	-	EN 1993-1-5:2006
Detailing	No		
Distance between bolts [d0]	2.20	-	EN 1993-1-8:2005 – Table 3.3
Distance between bolts and edge [d0]	1.20	-	EN 1993-1-8:2005 – Table 3.3
Concrete breakout resistance check	Both		
Cracked concrete	Yes		EN 1992-4:2018
Local deformation check	No		
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	Yes		EN 1993-1-8:2005 – 5.2.2.5

Išvada:

Atliktų mazgų skaičiavimų rezultatai parodė, kad projektuojami mazgai atitinka saugos ribinio būvio (ULS) reikalavimus. Visų tikrintų mazgo elementų (plokščių, varžtų ir suvirinimo siūlių) išnaudojimo koeficientai neviršija leistinų reikšmių, todėl mazgų laikomoji galia yra pakankama veikiančioms apkrovoms perduoti.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project data

Project name	Kolonos su pamatu mazgas
Project number	205-45-01-XX-TDP-SK
Author	
Description	
Date	8/10/2026
Code	EN

Material

Steel	S 355
Concrete	C30/37

Project item

Name	
Description	
Analysis	Stress, strain/ simplified loading

Design

Members

Geometry

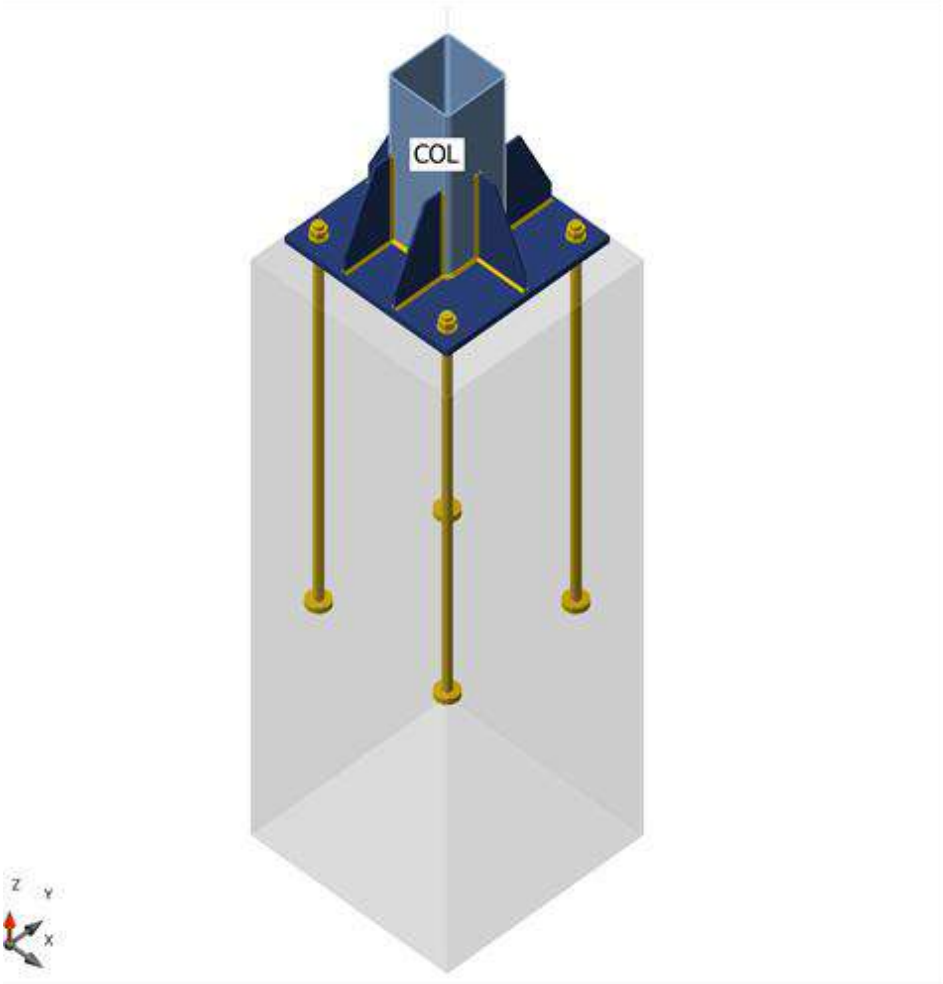
Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
COL	1 - SHS180/180/5.0	0.0	90.0	0.0	0	0	0

Supports and forces

Name	Support	Forces in	X [mm]
COL / end		Node	0

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

Proj t: Kolonos su pamatu mazgas
Pr ct no: 205-45-01-XX-TDP-SK
A thor:

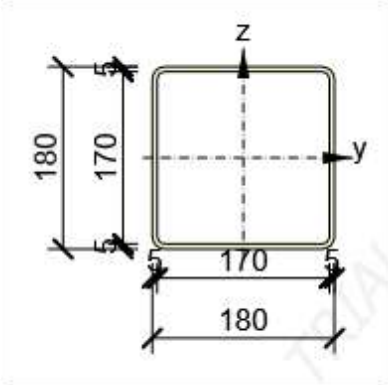


, Axonometric view

Cross-sections

Name	Material
1 - SHS180/180/5.0	S 355

Cross-sections

Name	Material	Drawing
1 - SHS180/180/5.0	S 355	

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Anchors

Name	Diameter [mm]	f_y [MPa]	f_u [MPa]	Gross area [mm^2]
M24 8.8	24	640.0	800.0	452

Load effects (Equilibrium not required)

Name	Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	COL / End	-13.5	1.3	0.2	0.0	-0.1	9.7
LE2	COL / End	-13.3	5.2	1.2	0.0	-1.8	11.8

Foundation block

Item	Value	Unit
CB 1		
Dimensions	580 x 580	mm
Depth	1700	mm
Anchor	M24 8.8	
Anchoring length	1000	mm
Shear force transfer	Anchors	
Gap	50	mm

Check

Summary

Name	Value	Check status
Analysis	100.0%	OK
Plates	0.0 < 5.0%	OK
Anchors	77.6 < 100%	OK
Welds	30.6 < 100%	OK
Concrete block	Not calculated	
Buckling	Not calculated	

Plates

Name	t_p [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	$\sigma_{c,Ed}$ [MPa]	Status
COL	5.0	LE2	147.7	0.0	0.0	OK
BP1	20.0	LE2	105.2	0.0	0.0	OK
RIB1	6.0	LE2	25.6	0.0	0.0	OK
RIB2a	6.0	LE2	79.0	0.0	0.0	OK
RIB2b	6.0	LE2	58.4	0.0	0.0	OK
RIB3	6.0	LE2	34.8	0.0	0.0	OK
RIB4a	6.0	LE2	62.4	0.0	0.0	OK
RIB4b	6.0	LE2	48.7	0.0	0.0	OK

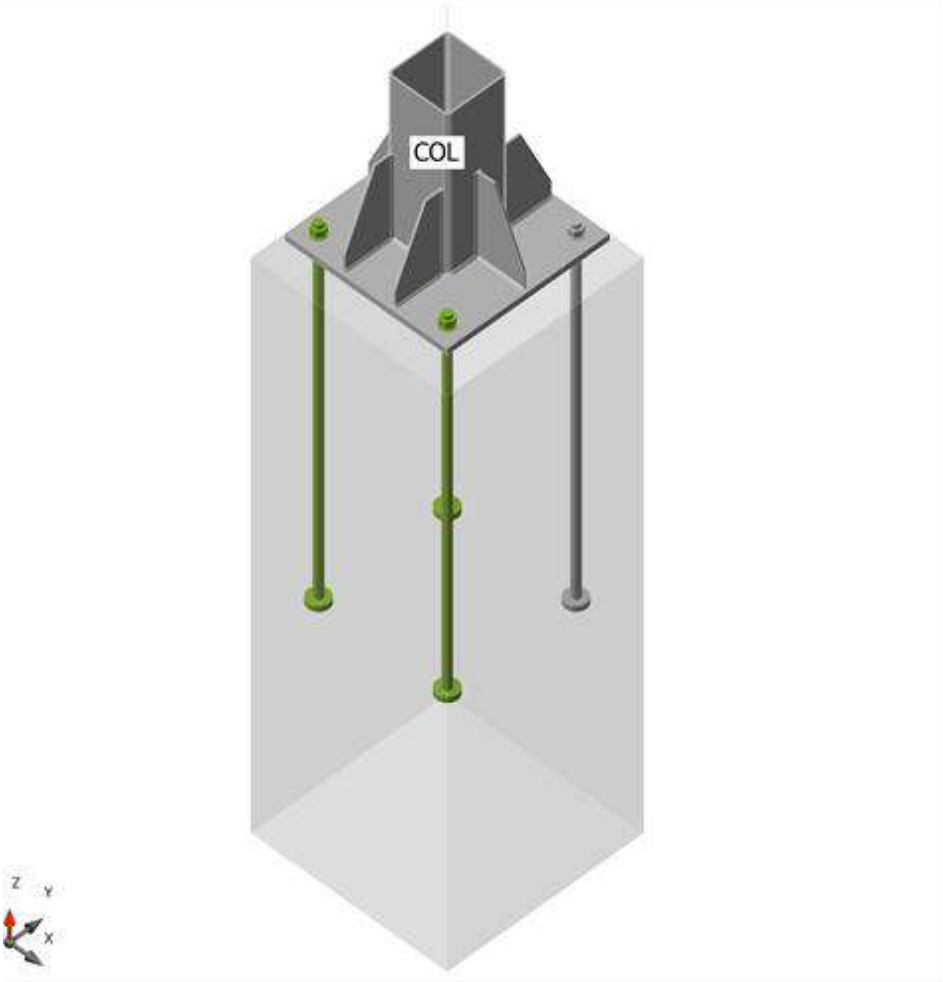
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Design data

Material	f_y [MPa]	ε_{lim} [%]
S 355	355.0	5.0

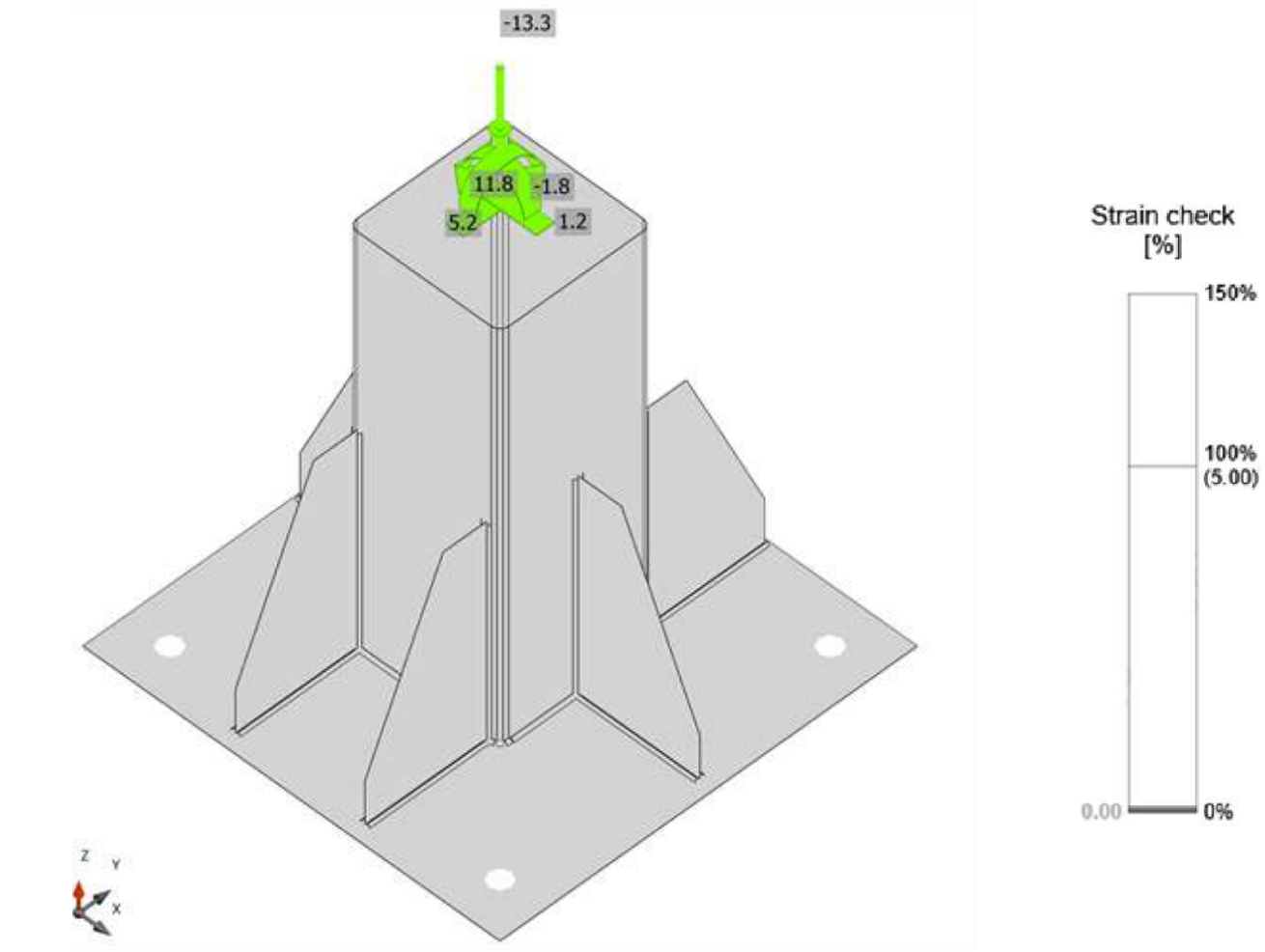
Symbol explanation

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



Overall check

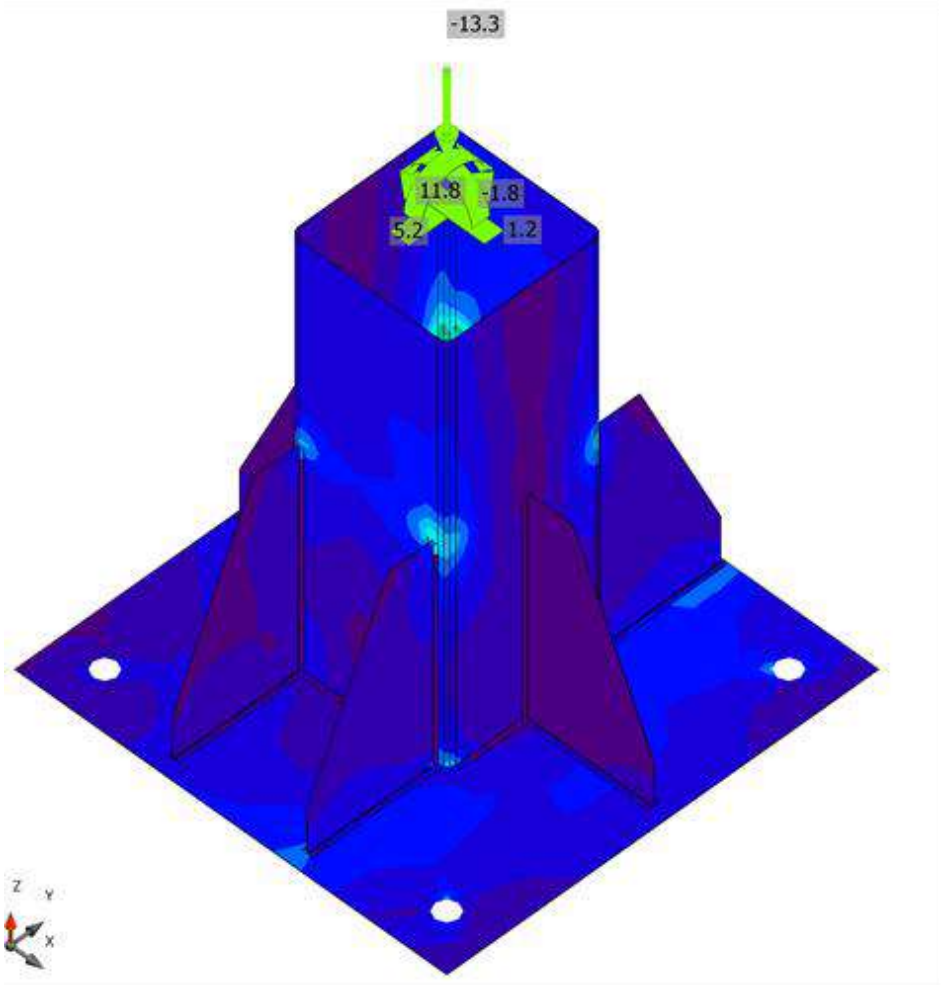
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



Strain check, LE2

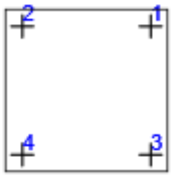
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Proj t: Kolonos su pamatu mazgas
Pr ct no: 205-45-01-XX-TDP-SK
Author:



Equivalent stress, LE2

Anchors in tension

Shape	Item	Loads	N_{Ed} [kN]	V_{Ed} [kN]	M_{Ed} [kNm]	$N_{Rd,c}$ [kN]	$N_{Rd,p}$ [kN]	$N_{Rd,cb}$ [kN]	$V_{Rd,c}$ [kN]	$V_{Rd,cp}$ [kN]	Ut_t [%]	Ut_s [%]	$Ut_{ts,s}$ [%]	$Ut_{ts,c}$ [%]
	A2	LE2	9.9	4.2	0.2	32.0	296.9	135.9	19.6	185.2	77.6	7.3	36.0	70.4
	A4	LE2	15.0	5.0	0.3	32.0	296.9	135.9	0.0	185.2	77.6	5.7	43.6	68.9

Design data

Grade	$F_{t,Rd}$ [kN]	$V_{pl,Rd}$ [kN]	$M_{pl,Rd}$ [kNm]
M24 8.8 - 1	172.8	88.1	0.8

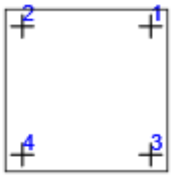
PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Symbol explanation

N_{Ed}	Tension force
V_{Ed}	Resultant of bolt shear forces Vy and Vz in shear planes
M_{Ed}	Bending moment
$N_{Rd,c}$	Design resistance in case of concrete cone failure under tension load - EN 1992-4:2018 – 7.2.1.4
$N_{Rd,p}$	Design resistance in case of pull-out failure - EN 1992-4:2018 – 7.2.1.5
$N_{Rd,cb}$	Design resistance in case of concrete blow-out failure - EN 1992-4:2018 – 7.2.1.8
$V_{Rd,c}$	Design resistance in case of concrete cone failure under shear load - EN 1992-4:2018 – 7.2.2.5
$V_{Rd,cp}$	Design resistance in case of concrete pryout failure - EN 1992-4:2018 – 7.2.2.4
Ut_t	Utilization in tension
Ut_s	Utilization in shear
$Ut_{ts,s}$	Interaction of tension and shear loading for steel failure modes
$Ut_{ts,c}$	Interaction of tension and shear loading for concrete failure modes
$F_{t,Rd}$	Design tensile resistance of an anchor bolt in case of steel failure - EN 1993-1-8:2005 – 3.6.1
$V_{pl,Rd}$	Design shear resistance of an anchor bolt in case of steel failure - EN 1993-1-1:2005 – 6.2.6
$M_{pl,Rd}$	Design bending resistance of an anchor bolt in case of steel failure - EN 1993-1-1:2005 – 6.2.5

Anchors in compression

Shape	Item	Loads	F_c [kN]	V_{Ed} [kN]	M_{Ed} [kNm]	$V_{Rd,c}$ [kN]	$V_{Rd,cp}$ [kN]	Ut_s [%]	$Ut_{ts,s}$ [%]	Status
	A1	LE2	-21.6	7.4	0.4	12.3	185.2	21.3	65.7	OK
	A3	LE2	-16.6	6.6	0.4	12.3	185.2	21.3	56.9	OK

Design data

Grade	$F_{c,Rd}$ [kN]	$V_{pl,Rd}$ [kN]	$M_{pl,Rd}$ [kNm]
M24 8.8 - 1	154.6	88.1	0.8

Symbol explanation

F_c	Compressive force
V_{Ed}	Resultant of bolt shear forces Vy and Vz in shear planes
M_{Ed}	Bending moment
$V_{Rd,c}$	Design resistance in case of concrete cone failure under shear load - EN 1992-4:2018 – 7.2.2.5
$V_{Rd,cp}$	Design resistance in case of concrete pryout failure - EN 1992-4:2018 – 7.2.2.4
Ut_s	Utilization in shear
$Ut_{ts,s}$	Linear interaction of compressive and bending loading
$F_{c,Rd}$	Design compression resistance of an anchor bolt in case of steel failure - EN 1993-1-1:2005 – 6.3
$V_{pl,Rd}$	Design shear resistance of an anchor bolt in case of steel failure - EN 1993-1-1:2005 – 6.2.6
$M_{pl,Rd}$	Design bending resistance of an anchor bolt in case of steel failure - EN 1993-1-1:2005 – 6.2.5

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

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 [%]	Status
BP1	COL	◢ 5.0 L	678	LE2	108.1	0.0	-12.4	-56.5	-25.5	24.8	15.5	OK
		◢ 5.0 L	679	LE2	97.8	0.0	-66.4	22.4	34.9	22.4	13.2	OK
BP1	RIB1	◢ 4.0 L	139	LE2	47.9	0.0	1.2	1.9	-27.6	11.0	8.7	OK
		◢ 4.0 L	139	LE2	49.6	0.0	-3.1	3.2	-28.4	11.4	8.8	OK
COL-w 1	RIB1	◢ 4.0 L	249	LE2	12.6	0.0	-2.4	6.4	-3.2	2.9	2.9	OK
		◢ 4.0 L	249	LE1	15.3	0.0	-3.6	2.1	8.3	3.5	3.5	OK
BP1	RIB2a	◢ 4.0 L	139	LE2	72.9	0.0	-3.1	-5.3	-41.7	16.7	9.8	OK
		◢ 4.0 L	140	LE2	94.9	0.0	-18.1	22.1	-49.0	21.8	15.9	OK
COL-w 2	RIB2a	◢ 4.0 L	249	LE2	119.8	0.0	-29.7	-31.9	-58.9	27.5	17.6	OK
		◢ 4.0 L	249	LE2	133.1	0.0	-34.7	32.5	66.7	30.6	21.0	OK
BP1	RIB2b	◢ 4.0 L	139	LE2	62.3	0.0	-14.6	-13.5	32.3	14.3	10.5	OK
		◢ 4.0 L	139	LE2	45.1	0.0	-2.2	4.6	25.6	10.4	7.7	OK
COL-w 2	RIB2b	◢ 4.0 L	249	LE2	105.3	0.0	-27.8	-25.8	-52.7	24.2	16.4	OK
		◢ 4.0 L	249	LE2	92.8	0.0	-22.6	24.6	45.8	21.3	13.2	OK
BP1	RIB3	◢ 4.0 L	139	LE2	59.1	0.0	-6.1	-6.2	33.4	13.6	9.5	OK
		◢ 4.0 L	139	LE2	49.5	0.0	2.8	-3.6	28.3	11.4	8.5	OK
COL-w 3	RIB3	◢ 4.0 L	249	LE2	30.0	0.0	-6.7	-4.9	-16.2	6.9	6.5	OK
		◢ 4.0 L	249	LE2	23.9	0.0	-5.2	7.0	11.5	5.5	5.5	OK
BP1	RIB4a	◢ 4.0 L	139	LE2	39.9	0.0	13.6	18.4	11.5	9.2	7.4	OK
		◢ 4.0 L	139	LE2	54.4	0.0	15.1	-14.6	26.4	12.5	10.5	OK
COL-w 4	RIB4a	◢ 4.0 L	249	LE2	99.2	0.0	23.5	26.3	49.0	22.8	14.1	OK
		◢ 4.0 L	249	LE2	114.3	0.0	29.9	-27.0	-57.7	26.2	17.4	OK
BP1	RIB4b	◢ 4.0 L	140	LE2	41.2	0.0	8.7	12.5	-19.6	9.5	8.3	OK
		◢ 4.0 L	139	LE2	34.1	0.0	-0.3	-1.5	-19.6	7.8	6.6	OK
COL-w 4	RIB4b	◢ 4.0 L	249	LE2	85.9	0.0	22.8	20.2	43.3	19.7	12.9	OK
		◢ 4.0 L	249	LE2	71.7	0.0	16.3	-18.8	-35.6	16.5	10.3	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

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

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 1993-1-8:2005 – Table 4.1
$\sigma_{w,Rd}$	Equivalent stress resistance
0.9 σ	Perpendicular stress resistance: 0.9*fu/γM2

Concrete block

Item	Loads	c [mm]	A_{eff} [mm^2]	σ [MPa]	k_j [-]	f_{jd} [MPa]	Ut [%]	Status
CB 1	LE2	0	0	0.0	0.00	0.0	-	OK

Symbol explanation

c	Bearing width
A_{eff}	Effective area
σ	Average stress in concrete
k_j	Concentration factor
f_{jd}	The ultimate bearing strength of the concrete block
Ut	Utilization

Buckling

Buckling analysis was not calculated.

Code settings

Item	Value	Unit	Reference
Safety factor γ_{M0}	1.00	-	EN 1993-1-1:2005 – 6.1
Safety factor γ_{M1}	1.00	-	EN 1993-1-1:2005 – 6.1
Safety factor γ_{M2}	1.25	-	EN 1993-1-1:2005 – 6.1, EN 1993-1-8:2005 – Table 2.1
Safety factor γ_{M3}	1.25	-	EN 1993-1-8:2005 – Table 2.1
Safety factor γ_C	1.50	-	EN 1992-1-1:2004 – 2.4.2.4
Safety factor γ_{Inst}	1.20	-	EN 1992-4:2018 – Table 4.1
Joint coefficient βj	0.67	-	EN 1993-1-8:2005 – 6.2.5(7)
Effective area - influence of mesh size	0.10	-	
Friction coefficient - concrete	0.25	-	EN 1993-1-8:2005
Friction coefficient in slip-resistance	0.30	-	EN 1993-1-8:2005 – Table 3.7

Item	Value	Unit	Reference
Limit plastic strain	0.05	-	EN 1993-1-5:2006
Detailing	No		
Distance between bolts [d0]	2.20	-	EN 1993-1-8:2005 – Table 3.3
Distance between bolts and edge [d0]	1.20	-	EN 1993-1-8:2005 – Table 3.3
Concrete breakout resistance check	Both		
Cracked concrete	Yes		EN 1992-4:2018
Local deformation check	No		
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	Yes		EN 1993-1-8:2005 – 5.2.2.5

Išvada:

Atliktų mazgų skaičiavimų rezultatai parodė, kad projektuojami mazgai atitinka saugos ribinio būvio (ULS) reikalavimus. Visų tikrintų mazgo elementų (plokščių, inkarinių varžtų ir suvirinimo siūlių) išnaudojimo koeficientai neviršija leistinų reikšmių, todėl mazgų laikomoji galia yra pakankama veikiančioms apkrovoms perduoti.

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project data

Project name	Portalo atraminės detalės su pamatu mazgas
Project number	2025-45-01-XX-TDP-SK
Author	
Description	
Date	8/10/2026
Design code	EN

Material

Steel	S 355
Concrete	C30/37

110 kV linijinio portalo atraminio mazgo skaičiavimas

Design

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]	Forces in	X [mm]
COL	2 - L110x110x8	0,0	-90,0	0,0	0	0	0	Bolts	135

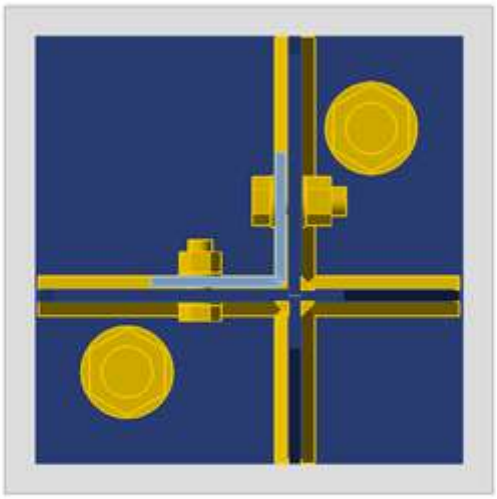
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas

Project no: 2025-45-01-XX-TDP-SK

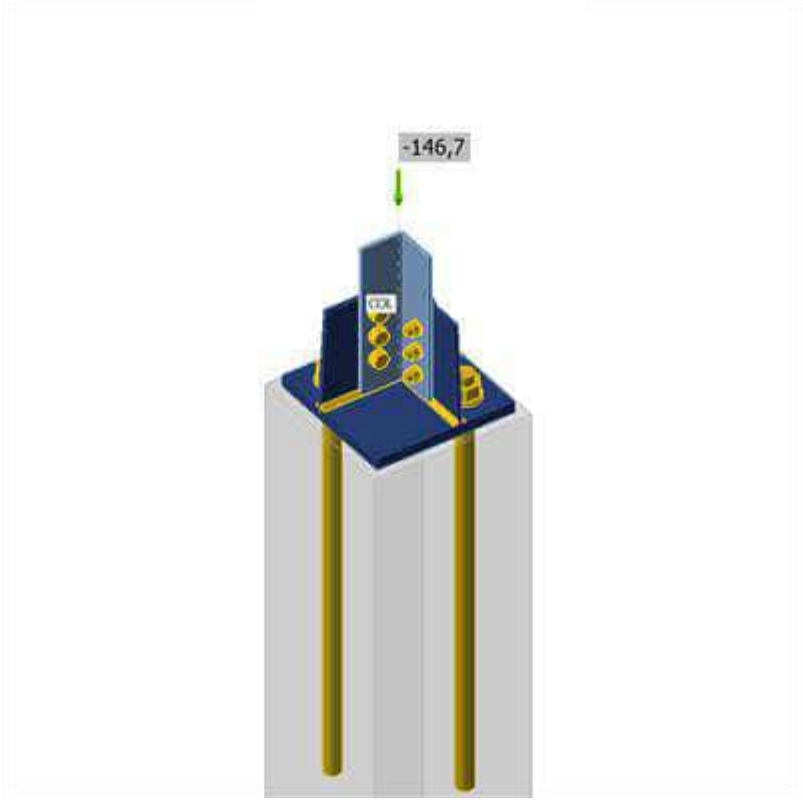
Author:





PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas
Project no: 2025-45-01-XX-TDP-SK
Author:



Cross-sections

Name	Material
2 - L110x110x8	S 355

Anchors / Bolts

Name	Bolt assembly	Diameter [mm]	fu [MPa]	Gross area [mm²]
M20 8.8	M20 8.8	20	800,0	314
M42 8.8	M42 8.8	42	800,0	1385
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]
LE5	COL	-146,7	0,0	0,0	0,0	0,0	0,0
LE6	COL	141,1	0,0	0,0	0,0	0,0	0,0

Foundation block

Item	Value	Unit
CB 1		
Dimensions	400 x 400	mm
Depth	2300	mm
Anchor	M42 8.8	
Anchoring length	1000	mm
Shear force transfer	Anchors	

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas
Project no: 2025-45-01-XX-TDP-SK
Author:

Check

Summary

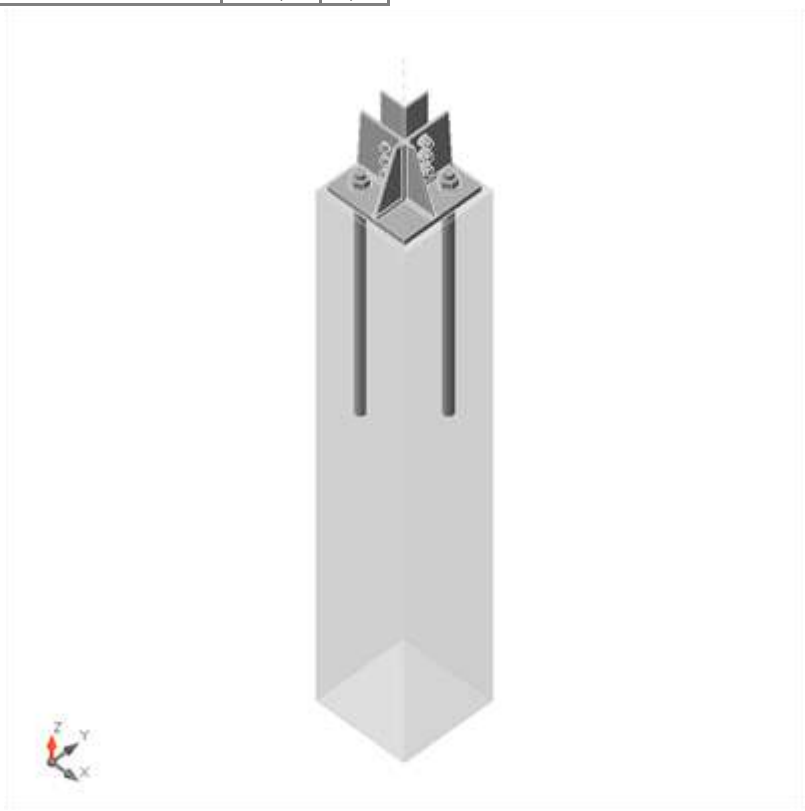
Name	Value	Status
Analysis	100,0%	OK
Plates	0,0 < 5,0%	OK
Bolts	26,9 < 100%	OK
Anchors	16,0 < 100%	OK
Welds	21,5 < 100%	OK
Concrete block	10,8 < 100%	OK
Buckling	Not calculated	

Plates

Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [%]	σc_{Ed} [MPa]	Status
COL-bfl 1	8,0	LE6	227,1	0,0	0,0	OK
COL-w 1	8,0	LE6	264,6	0,0	0,0	OK
SP1	10,0	LE5	127,6	0,0	0,0	OK
SP2	10,0	LE6	79,7	0,0	0,0	OK
SP3	10,0	LE5	126,4	0,0	0,0	OK
BP1	28,0	LE6	95,9	0,0	0,0	OK

Design data

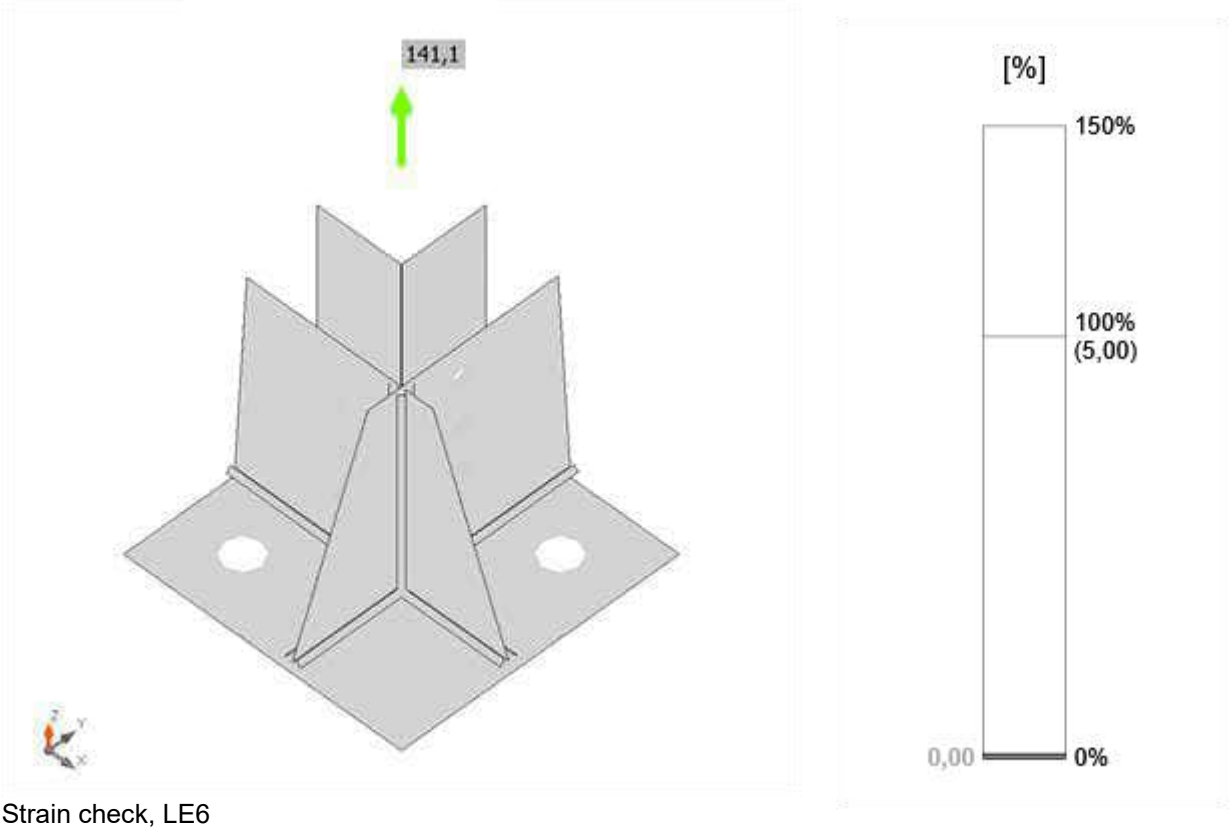
Material	f_y [MPa]	ε_{lim} [%]
S 355	355,0	5,0



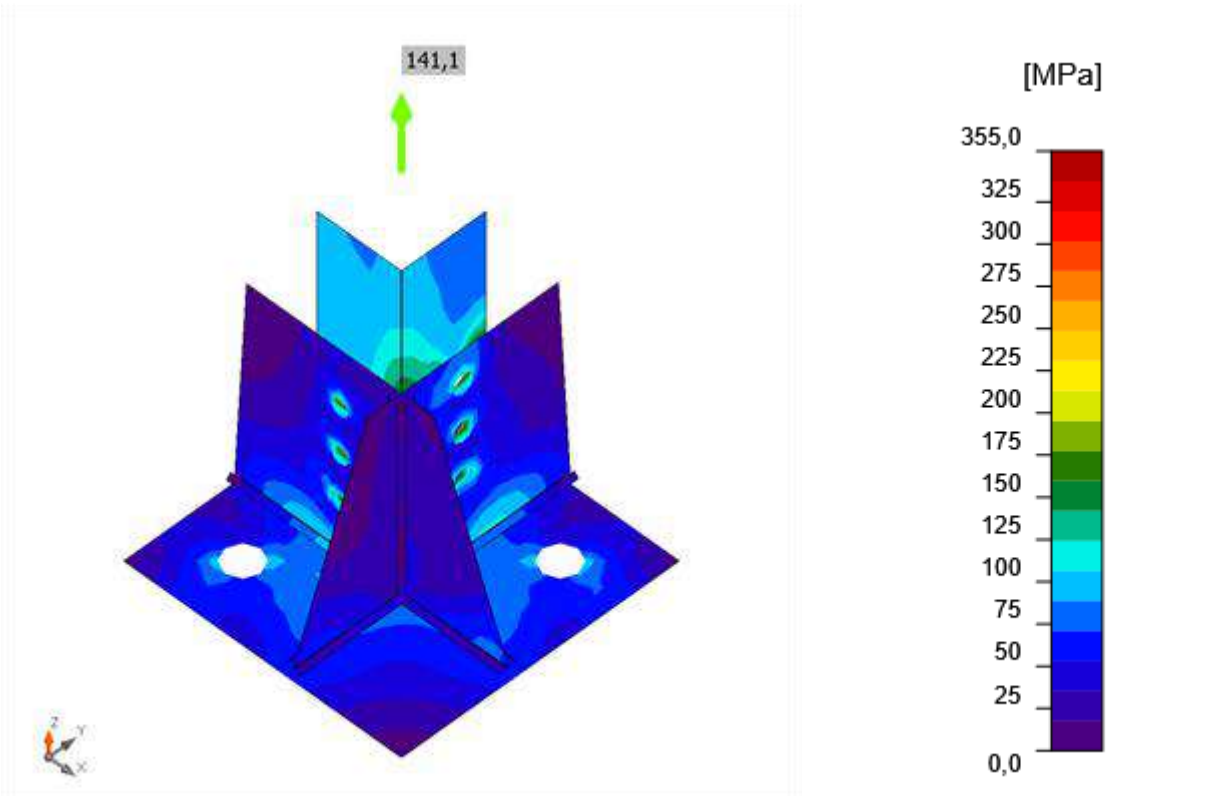
Overall check, LE6

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas
Project no: 2025-45-01-XX-TDP-SK
Author:



Strain check, LE6

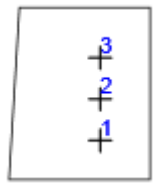
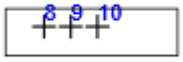


Equivalent stress, LE6

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas
Project no: 2025-45-01-XX-TDP-SK
Author:

Bolts

	Name	Grade	Loads	$F_{t,Ed}$ [kN]	V [kN]	Ut_t [%]	$F_{b,Rd}$ [kN]	Ut_s [%]	Ut_{ts} [%]	Status
	B1	M20 8.8 - 1	LE5	0,0	23,3	0,0	103,3	24,8	24,8	OK
	B2	M20 8.8 - 1	LE5	0,0	23,1	0,0	103,3	24,5	24,5	OK
	B3	M20 8.8 - 1	LE6	2,6	23,7	1,8	103,3	25,2	26,5	OK
	B8	M24 8.8 - 2	LE5	0,0	26,3	0,0	97,7	26,9	19,4	OK
	B9	M24 8.8 - 2	LE5	0,0	24,8	0,0	97,7	25,4	18,3	OK
	B10	M24 8.8 - 2	LE6	1,6	25,3	0,8	97,7	25,9	19,2	OK

Design data

Name	$F_{t,Rd}$ [kN]	$B_{p,Rd}$ [kN]	$F_{v,Rd}$ [kN]
M20 8.8 - 1	141,1	187,8	94,1
M24 8.8 - 2	203,3	224,6	135,6

Detailed result for B8

Tension resistance check (EN 1993-1-8 tab 3.4)

$F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} =$ 203,3 kN ≥ $F_t =$ 0,0 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 tab 3.4)

$B_{p,Rd} =$ 224,6 kN ≥ $F_t =$ 0,0 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

$t_p =$ 8 mm – Thickness

$f_u =$ 490,0 MPa – Ultimate strength

$\gamma_{M2} =$ 1,25 – Safety factor

Shear resistance check (EN 1993-1-8 tab 3.4)

$F_{v,Rd} = \frac{\beta_p \alpha_v f_{ub} A}{\gamma_{M2}} =$ 135,6 kN ≥ $V =$ 26,3 kN

where:

$\beta_p =$ 1,00 – Reducing factor

$\alpha_v =$ 0,60 – Reducing factor

$f_{ub} =$ 800,0 MPa – Ultimate tensile strength of the bolt

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

A = 353 mm² – Tensile stress area of the bolt

γ_{M2} = 1,25 – Safety factor

Bearing resistance check (EN 1993-1-8 tab 3.4)

$F_{b,Rd} = \frac{k_1 \alpha_b f_u d t}{\gamma_{M2}}$ = 97,7 kN ≥ V = 26,3 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

$\alpha_b = \min(\frac{e_1}{3d_0}, \frac{p_1}{3d_0} - \frac{1}{4}, \frac{f_{ub}}{f_u}, 1)$ = 0,52 – 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 = ∞ mm – Distance between bolts perpendicular to the shear force

d_0 = 26 mm – Bolt hole diameter

e_1 = 93 mm – Distance to the plate edge in the direction of the shear force

p_1 = 60 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

d = 24 mm – Nominal diameter of the fastener

t = 8 mm – Thickness of the plate

γ_{M2} = 1,25 – Safety factor

Interaction of tension and shear (EN 1993-1-8 tab 3.4)

$U_{tts} = \frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1,4F_{t,Rd}}$ = 19,4 %

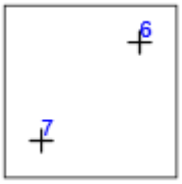
Utilization in tension

$U_{tt} = \frac{}{F_{t,Rd}}$ 0,0 %

Utilization in shear

$U_{ts} = \frac{V_{Ed}}{\min(F_{v,Rd}; F_{b,Rd})}$ = 26,9 %

Anchors

Shape	Item	Loads	N_{Ed} [kN]	V_{Ed} [kN]	Ut_t [%]	Ut_s [%]	Ut_{ts} [%]	Status
	A6	LE6	81,3	0,6	16,0	0,2	2,6	OK
	A7	LE6	81,5	0,6	16,0	0,2	2,6	OK

Design data

Grade	$N_{Rd,s}$ [kN]	$V_{Rd,s}$ [kN]
M42 8.8 - 1	508,2	358,7

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas
Project no: 2025-45-01-XX-TDP-SK
Author:

Detailed result for A7

Anchor tensile resistance (EN1992-4 - Cl. 7.2.1.3)

$N_{Rd,s} = \frac{N_{Rk,s}}{\gamma_{Ms}} =$ 508,2 kN ≥ $N_{Ed} =$ 81,5 kN

$N_{Rk,s} = c \cdot A_s \cdot f_{uk} =$ 762,3 kN

Where:

$c =$ 0,85 – reduction factor for cut thread

$A_s =$ 1121 mm² – tensile stress area

$f_{uk} =$ 800,0 MPa – minimum tensile strength of the bolt

$\gamma_{Ms} =$ 1,50 – safety factor for steel

$\gamma_{Ms} = 1,2 \cdot \frac{f_{uk}}{f_{yk}} \geq 1,4$

, where:

$f_{yk} =$

640,0 MPa – minimum yield strength of the bolt

Shear resistance (EN1992-4 - Cl.7.2.2.3.1)

$\frac{V_{Rd,s}}{V_{Rd,c}} =$ 358,7 kN ≥ $V_{Ed} =$ 0,6 kN

$V_{Rk,s} = k_7 \cdot V^0_{Rk,s} =$ 448,4 kN

Where:

$k_7 =$ 1,00 – coefficient for anchor steel ductility

$k_7 = \begin{cases} 0,8, & A < 0,08 \\ 1.0, & A \geq 0,08 \end{cases}$

, where:

$A =$

0,12 – bolt grade elongation at rupture

$V^0_{Rk,s} =$ 448,4 kN – the characteristic shear strength

$V^0_{Rk,s} = k_6 \cdot A_s \cdot f_{uk}$

, where:

$k_6 =$

0,50 – coefficient for anchor resistance in shear

$A_s =$

1121 mm² – tensile stress area

$f_{uk} =$

800,0 MPa – specified ultimate strength of anchor steel

$\gamma_{Ms} =$ 1,25 – safety factor for steel

Interaction of tensile and shear forces in steel (EN 1992-4 - Table 7.3)

$\left(\frac{N_{Ed}}{N_{Rd,s}}\right)^2 +$ 0,03 ≤ 1,0

Where:

$N_{Ed} =$ 81,5 kN – design tension force

$N_{Rd,s} =$ 508,2 kN – fastener tensile strength

$V_{Ed} =$ 0,6 kN – design shear force

$V_{Rd,s} =$ 358,7 kN – fastener shear strength

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Interaction of tensile and shear forces in concrete (EN 1992-4 - Table 7.3)

$(\frac{N_{Ed}}{N_{Rd,i}})^{1,5} +$ 0,00 ≤ 1,0

Where:

$\frac{N_{Ed}}{N_{Rd,i}}$ – the largest utilization value for tension failure modes

$\frac{V_{Ed}}{V_{Rd,i}}$ – the largest utilization value for shear failure modes

$\frac{N_{Ed,g}}{N_{Rd,c}} = 0\%$ – concrete breakout failure of anchor in tension

$\frac{N_{Ed}}{N_{Rd,p}} = 0\%$ – concrete pullout failure

$\frac{N_{Ed}}{N_{Rd,cb}} = 0\%$ – concrete blowout failure

$\frac{V_{Ed}}{V_{Rd,c}} = 0\%$ – concrete edge failure

$\frac{V_{Ed}}{V_{Rd,cb}} = 0\%$ – concrete pryout failure

Supplementary reinforcement (EN 1992-4 - Cl. 7.2.1.9; EN 1992-4 - Cl. 7.2.2.6)
Supplementary reinforcement should resist force of 162,8 kN in tension and 0,0 kN in shear.

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
SP1	SP2	◢8,0◣	250	LE5	28,7	0,0	-2,4	-16,4	-2,0	6,6	4,7	OK
		◢8,0◣	250	LE6	20,1	0,0	-4,6	4,6	-10,3	4,6	1,0	OK
SP1	SP3	◢8,0	250	LE6	34,9	0,0	-8,7	7,5	18,0	8,0	4,1	OK
BP1	SP1	◢8,0◣	350	LE6	87,9	0,0	25,1	-45,2	18,0	20,2	12,4	OK
		◢8,0◣	350	LE6	69,0	0,0	6,0	-39,6	-1,8	15,8	11,4	OK
BP1	SP2	◢8,0◣	130	LE6	43,9	0,0	-2,9	25,3	0,7	10,1	8,0	OK
		◢8,0◣	130	LE6	67,8	0,0	11,6	37,6	-8,4	15,6	12,8	OK
BP1	SP3	◢8,0◣	205	LE6	93,7	0,0	23,5	49,3	17,6	21,5	14,8	OK
		◢8,0◣	205	LE6	57,2	0,0	-2,1	32,9	2,0	13,1	9,9	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

Detailed result for BP1 SP3

Weld resistance check (EN 1993-1-8 4.5.3.2)

$\sigma_{w,Rd} = f_u/(\beta_w \gamma_{M2}) =$ 435,6 MPa ≥ $\sigma_{w,Ed} = [\sigma_{\perp}^2 + 3(\tau_{\perp}^2 + \tau_{\parallel}^2)]^{0,5} =$ 93,7 MPa

$\sigma_{\perp,Rd} =$ 352,8 MPa ≥ $|\sigma_{\perp}| =$ 23,5 MPa

where:

$f_u =$ 490,0 MPa – Ultimate strength

$\beta_w =$ 0,90 – appropriate correlation factor taken from Table 4.1

$\gamma_{M2} =$ 1,25 – Safety factor

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Project: Portalo atraminės detalės su pamatu mazgas

Project no: 2025-45-01-XX-TDP-SK

Author:

Stress utilization

$U_t =$ 21,5 %

Concrete block

Item	Loads	c [mm]	A_{eff} [mm²]	σ [MPa]	k_j [-]	F_{jd} [MPa]	Ut [%]	Status
CB 1	LE5	76	84125	1,7	1,21	16,2	10,8	OK

Detailed result for CB 1

Concrete block compressive resistance check (EN 1993-1-8 6.2.5)

$\sigma = \frac{N}{A_{eff}}$ 1,7 MPa

$F_{jd} = \alpha_{cc}\beta_j k_j f_{ck}/\gamma_c =$ 16,2 MPa

where:

$N =$ 147,0 kN – Design normal force

$A_{eff} =$ 84125 mm² – Effective area, on which the column force N is distributed

$\alpha_{cc} =$ 1,00 – Long-term effects on Fcd

$\beta_j =$ 0,67 – Joint coefficient βj

$k_j =$ 1,21 – Concentration factor

$f_{ck} =$ 30,0 MPa – Characteristic compressive concrete strength

$\gamma_c =$ 1,50 – Safety factor

Stress utilization

$U_t = \frac{\sigma}{F_{jd}} =$ 10,8 %

Išvada:

Atliktų mazgų skaičiavimų rezultatai parodė, kad projektuojami mazgai atitinka saugos ribinio būvio (ULS) reikalavimus. Visų tikrintų mazgo elementų (plokščių, inkarinių varžtų ir suvirinimo siūlių) išnaudojimo koeficientai neviršija leistinų reikšmių, todėl mazgų laikomoji galia yra pakankama veikiančioms apkrovoms perduoti.

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PRIEDAS NR. 4

INŽINERINIŲ GEOLOGINIŲ IR GEOTECHNINIŲ TYRIMŲ ATASKAITA

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

UAB "Geoconsulting"
tel.: 0-612-84305, el. paštas: info@geoconsulting.lt, www.geoconsulting.lt

Registracijos Lietuvos geologijos tarnyboje Nr.: **57599-2026**

Užsakovas: UAB „ENERGETIKOS PROJEKTAI“

Objektas: 110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.

INŽINERINIŲ GEOLOGINIŲ TYRIMŲ ATASKAITA

Tyrimų stadija: Projektiniai tyrimai

Geotechninė kategorija: Antra

Ataskaitos išleidimo data: 2026 m. sausio mėn.

Rangovas: UAB „Geoconsulting“

Direktorius/Tyrimų vadova

Inžinierė geologė

KLAIPĖDA, 2026

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

TURINYS

Tyrimų ataskaitos santrauka.....3

Aiškinamasis raštas

1. Įvadas.....3
2. Darbų metodika.....4
3. Bendrieji duomenys apie statybos sklypą.....6
4. Geologinė sandara.....6
5. Hidrogeologinės sąlygos.....6
6. Gruntų sudėtis ir inžineriniai geologiniai sluoksniai 7
7. Gruntų fizikinės ir mechaninės savybės.....8
8. Geologiniai procesai ir reiškiniai.....8
9. Išvados ir rekomendacijos.....9
10. Literatūros sąrašas.....10

Tekstiniai priedai

1. Leidimas tirti žemės gelmes Nr. 1404841.....12
2. Inžinerinių geologinių tyrimų techninė užduotis.....13
3. Įgaliojimas inžinerinių geologinių tyrimų užsakymui.....15
4. Tyrimų taškų koordinačių ir altitudžių žiniaraštis.....16
5. Geotechninių bandymų (CPT) įrangos metrologinė patikra.....17
6. Laboratorinių tyrimų rezultatai.....20
7. Ataskaitoje naudoti sutrumpinimai, dydžiai, žymenys ir matavimo vienetai.....27

Grafiniai priedai

1. Tyrimų ploto schema vietovėje.....1 lapas
2. Planas su tyrimų vietomis .....1 lapas
3. Tyrimo gręžinių stulpeliai su geotechninio bandymo CPT kreivėmis.....4 lapai
4. Inžineriniai geologiniai pjūviai..... 1 lapas

Tyrimų ataskaitos santrauka

UAB „Geoconsulting“ atliko sklypų, esančių Dargužių g. 4 ir 6, Palankesių kaime, Jonavos rajone, inžinerinius geologinius tyrimus.

Tyrimų metu 4-ose vietose sraigtiniu būdu išgręžti gręžiniai ir šalia atliktas geotechninis zondavimas (CPT – TE1). Sklypo geologinę sandarą iki 10,2 m gylio sudaro: technogeniniai dariniai (tIV), augalinis sluoksnis (pdIV), viršutinio Pleistoceno viršutinio Nemuno svitos glacialinės (gIIInm$_3$) ir limnoglacialinės nuosėdos (lgIIInm$_3$). Tyrimų metu gruntinis vandeningas horizontas slūgsojo 4,1 – 4,5 m gylyje nuo žemės paviršiaus.

Atlikus lauko ir laboratorinių tyrimų medžiagos interpretaciją, išskirta 15 inžinerinių geologinių sluoksnių (IGS). Sluoksnių pagrindinių savybių vertės pateiktos 1 lentelėje.
1 lentelė. Sluoksnių pagrindinių savybių vertės.

IGS Nr.	Grunto tipas	Stratigrafinis indeksas	Grunto pavadinimas	$\overline{q_c}$, MPa	γ, kN/m^3	ϕ, °	E_0, MPa
1	Mg	t IV	Mg	2.8	Netinkamas pamatams		
2	Hu	pd IV	Hu	1.3			
3	Cl	g III nm$_3$	saClL	0.7	20.8	-	7
4			saClL	1.5	21.2	-	15
5			saClL	6.5	22.0	-	51
6	Sa	lg III nm$_3$	siSa	3.7	-	29-32	10
7			siSa	8.0	-	32-34	33
8			siSa	14.9	-	34-37	52
9			siSa	35.9	-	37-39	98
10	Si		SiL	30.6	21.0	-	148
11	Cl		ClM	1.7	20.0	-	11
12			ClM	3.5	20.6	-	23
13			ClM	7.5	20.5	-	54

Aiškinamasis raštas

1. ĮVADAS

UAB „Geoconsulting“ atliko sklypų, esančių Dargužių g. 4 ir 6, Palankesių kaime, Jonavos rajone, inžinerinius geologinius tyrimus.

Tyrimų tikslas – gauti objektyvią informaciją apie geologinę sklypo, kuriame bus projektuojama/rekonstruojami elektros, inžineriniai tinklai, sandarą, sudaryti pagrindų skaičiavimo schemas, išskiriant inžinerinius geologinius sluoksnius (IGS) ir nustatyti jų vertes.

Tyrimų užsakovas: UAB „Energetikos projektai“

Tyrimų ploto ribų koordinatės:

Numeris	X	Y
1	6114424	512583
2	6114390	612604
3	6114369	512571
4	6114406	512549

Leidimo tirti žemės gelmes numeris: **1404841**. Data 2020-07-01

Lauko darbai atlikti š. m gruodžio mėn. 23 dieną. Darbų vykdytojai:

- Inž. geologas – lauko darbai;

- Gręžėjas Sigitas Linkis – lauko darbai;
- Geologė Toma Dagytė – laboratoriniai grunto tyrimai;
- Inž. geologė A. Bičkauskienė – tyrimų medžiagos interpretacija ir ataskaitos paruošimas.

Tyrimų metu 4 - ose vietose sraigtiniu būdu išgręžti gręžiniai, paimta 13 grunto mėginių ir šalia atliktas geotechninis zondavimas (CPT – TE1). Iš tyrimų vietos Nr. 1 buvo paimtas gruntinio vandens mėginys. Buvo nustatyta vandens cheminė sudėtis ir įvertintas jo agresyvumas betono konstrukcijoms.

Lauko darbų metu išskirti gruntai aprašyti remiantis LST EN ISO 14688-1:2018 [2] standartu, o klasifikuoti remiantis LST EN ISO 14688-2:2018 [3] standartu ir Inžinerinių geologinių ir geotechninių tyrimų gruntų klasifikacija, patvirtinta Lietuvos geologijos tarnybos prie Aplinkos ministerijos direktoriaus 2019 m. birželio 13 d. įsakymu Nr. 1-175 „Dėl Inžinerinių geologinių ir geotechninių tyrimų gruntų klasifikacijos patvirtinimo“ ir jos pakeitimo [7], [8] .

Darbų aprašymas ir metodika pateikta 2 skyriuje.

2. DARBŲ METODIKA

Bandymas kūginiu penetrometru (CPT, TE1)

CPT zondas į gruntą spaudžiamas „atskiro“ („stand alone“) tipo penetrometru (spaudimo jėga 100kN, traukimo jėga 120kN, darbinė eiga 1200mm, spaudimo greitis CPT bandymo metu 20 ± 5 mm/s), kuris ankeruojamas žemės paviršiuje grunto ankeriais.

CPT bandymo metu tiesiogiai matuojami ir 1cm ilgio intervalais kompiuteryje fiksuojami parametrai: kūginis stipris, šoninės trinties stipris, vandens porinis slėgis (u_2 tipas, tik atliekant TE2), zondo polinkio kampas, spaudimo greitis ir zondavimo ilgis. Matavimams naudojama „Geomil“ sistema, sudaryta iš:

a) CPTU „substraction”tipo zondo S10CFIIP.S241361 (kūgio pagrindo plotas 10 cm^2, kūgio kampas 60^0, kūgio skersmuo 35,7 mm, šoninės trinties movos plotas 150 cm^2, maksimali apkrova kūgiui 100kN, maksimali apkrova šoninei trinčiai 15kN, maksimali apkrova vandens poriniam slėgiui 20bar, leistina visų daviklių perkrova 150%), kurio metrologinė patikra pateikta 3 tekstiniaime priede;

b) zondavimo štangų (skersmuo 32mm, ilgis 1m);

c) duomenų registratoriaus (gylmatis, duomenų interfeisas GME500, zondavimo kabelis 30 m, lauko kompiuteris Panasonic CF-19);

d) programinės įrangos (CPTest).

Bandymai atlikti pagal LST EN ISO 22476-1 reikalavimus [4].

Gręžimo darbai, pirminė gruntų klasifikacija ir bandinių paėmimo principai

Gręžiniai išgręžti sraigtiniu būdu gręžimo staklėmis VTX 800 (skersmuo 90mm) su intervaliu uždaro tipo gruntotraukio panaudojimu. Gręžimas vykdytas 1 – 2m ilgio reisais. Gręžinio kernas tyrimų vietoje vizualiai apžiūrėtas ir atlikta pirminė grunto atpažintis nustatant pagrindinę frakciją bei aprašant antrines frakcijas [2]. Tokiu būdu gruntas priskirtas vienam iš šešių tipų, dažniausiai nusakančių pagrindines geotechnines savybes: rieduliai, gargždas, žvyras, smėlis, dulkis ir molis. Jeigu gruntas susideda iš organinių medžiagų, jis priskiriamas organiniam gruntui.

Laboratoriniai tyrimai

Grunto bandinių laboratorinius tyrimus atliko UAB „Geoconsulting“ laboratorija. Bandymų rezultatų suvestinė lentelė pateikta 6 tekstiniame priede. Atsižvelgiant į pirminės atpažinties metu nustatytą grunto tipą, parinkti atitinkami tyrimų metodai tiksliam gruntų klasifikavimui į klases:

- *granuliometrinė sudėtis* (žvyras, smėlis, dulkis ir molis). Labai rupiems gruntams neatliekama;

- *gamtinis tankis* (smulkūs gruntai), *kietųjų dalelių tankis* (smulkūs ir rupūs gruntai)
- *gamtinis, takumo* (smulkūs ir rupūs gruntai) *ir plastingumo drėgnis* (smulkūs gruntai).

Vandens mėginio laboratoriniai tyrimai atlikti UAB „Grota“ analitinėje laboratorijoje.

Ataskaitos paruošimas

Tyrimų ataskaita parengta vadovaujantis norminiais dokumentais [1-5] bei rekomendacijomis [6]. Naudota programinė įranga GME CPTask v1.20, Cpet-it v.1.6.0.43, Microsoft Office (Word, Exel), Autocad2011LT. Žemiau aprašoma geologinio modelio sudarymo metodika.

Lauko darbų metu išskirti gruntai aprašyti remiantis LST EN ISO 14688-1:2018 standartu [2], o klasifikuoti ir pavadinti pagal LST EN ISO 14688-2:2018 [3] ir „Inžinerinių geologinių ir geotechninių tyrimų gruntų klasifikacija“ [7] reikalavimus.

Kaip minėta įvade, vienas pagrindinių projektinių IG tyrimų tikslų yra sudaryti pagrindo skaičiavimo schemą išskiriant inžinerinius geologinius sluoksnius (IGS). Jų išskyrimas, be geologinių požymių visumos, dar pagrįstas sudėties, fizinės būklės ir savybių vienodumu. Sudėties vienodumas nustatomas pirminį gruntų skirstymą į tipus koreliuojant su laboratoriniais tyrimais. Koreliacijos rezultatas – galutinis gruntų klasifikavimas pagal [3] ir [7].

Atlikus IGS skirstymą pagal sudėtį, pereinama prie geologinio modelio detalizavimo. Pagal kūginio stiprio vertę gruntai skirstomi į skirtingos fizinės būklės sluoksnius (smėliai pagal tankumą, dulkis ir molis pagal stiprumą) [6], sluoksnių ribos (kraigas ir padas) tikslinamos matematinės statistikos metodais. Modelio verifikacija atliekama apjungus visuose tyrimų taškuose atliktų bandymų duomenis Cpet-it programa, gautame duomenų masyve apskaičiuojami kiekvieno IGS statistiniai parametrai (vidurkinės, ekstreminės vertės).

1. *Savitasis sunkis γ apskaičiuojamas:*

$\gamma=\rho*g$ [kN/m^3];

g = laisvojo kritimo pagreitis [m/s^2]

2. *Efektyviosios vidinės trinties kampas φ′* nustatomas žvyro ir smėlio gruntams pagal Eurokode 7 nurodytą metodiką (D priedas, lentelė D1) [5].

3. *Deformacijų modulis E_o* skaičiuojamas pagal šias priklausomybes [6]:

Piltiniam netankintam ir organiniam gruntui	$E_o = q_c$;
Labai puriam smėliui ir žvyrui	$E_o = 1,5\ q_c$;
Puriam smėliui ir žvyrui	$E_o = 3,0\ q_c$;
Vidutinio tankumo ir tankiam smėliui	$E_o = 7,8 \cdot q_c^{0,71}$;

Moreniniams smulkiesiems gruntams (smėlingam molingam dulkiui arba smėlingam dulkingam moliui):

kai $q_c < 2,5$MPa,	$E_o = 10,0\ q_c$;
kai $q_c > 2,5$MPa,	$E_o = 12,0 \cdot q_c^{0,8}$
Nemoreniniams dulkingam moliui, smėlingam dulkingam moliui	$E_o = 7,0\ q_c$
Moreniniam molingam arba dulkingam smėliui (plastingam gruntui) ir nemoreniniam dulkiui	$E_o = 5,0\ q_c$
Moliui be priemaišų (Cl)	$E_o = 8,2\ q_c$-3,1;

Pastaba: formulėse naudojama minimali kūginio stiprio vertė q_{cmin}.

3. BENDRIEJI DUOMENYS APIE STATYBOS SKLYPĄ

Gamtinės sąlygos

Tyrimų sklypas yra Jonavos rajono savivaldybėje, Palankesių kaime, Dargužių g. 4 ir 6. Geomorfologiniu požiūriu teritorija priklauso paskutiniojo apledėjimo Pabaltijo žemumų geomorfologinėje srityje esančiam Nevėžio lygumos rajono Vandžiogalos moreninės lygumos mikrorajonui.

Reljefo absoliutiniai aukščiai tyrimų vietose siekia 70,1 – 70,9 m.

Tyrimų plotas yra viename reljefo genetiniame tipe. Sklypuose reljefas gana lygus. Žemės paviršiaus nuolydis neviršija 10°. Sklype erozinių, termokarstinių, sufozinių ir kitų neigiamų reljefo formų nėra. Atstumas iki nepastovių šlaitų ir eroduojamų krantų >100m.

Norminis sezoninio įšalo gylis molingam gruntui iki 1,5 m, smėlingam gruntui – 1,2 m

4. GEOLOGINĖ SANDARA

Sklypo geologinę sandarą iki 10,2 m gylio sudaro: technogeniniai dariniai (tIV), augalinis sluoksnis (pdIV), viršutinio Pleistoceno viršutinio Nemuno svitos glacialinės (gIIInm_3) ir limnoglacialinės nuosėdos (lgIIInm_3).

Technogeninius darinius (tIV) sudaro *Dirbtinis gruntas (Mg)*: supiltas/perkastas gruntas: žvyringas smėlis, dulkingas smėlis, dirvožemis, smėlingas dulkingas molis, tamsiai rudas, pilkai rudas. Kompleksas išskirtas tyrimų taškuose Nr. 1 - Nr. 3. Jo storis – 0,6 – 0,8 m.

Augalinį sluoksnį (pdIV) sudaro *Dirvožemis (Hu)*, tamsiai rudas. Kompleksas išskirtas tyrimų taške Nr. 4. Komplekso storis – 0,6 m.

Viršutinio Pleistoceno viršutinio Nemuno svitos glacialines nuogulas (gIIInm_3) sudaro *Smėlingas mažo plastiškumo molis moreninis (saClL)*, rudas, su žvirgždu ir gargždu iki 5%. kompleksas išskirtas visuose tyrimų taškuose. Jo storis – 0,5 – 1,2 m.

Viršutinio Pleistoceno viršutinio Nemuno svitos limnoglacialines nuosėdas (lgIIInm_3) sudaro:

Dulkingas smėlis (siSa), šviesiai rudas, pilkas, rusvai pilkas, rudas, su vidutinio plastiškumo molio, mažo plastikšmo dulkio intarpais, drėgnas – vandeningas;

Mažo plastiškumo dulkis (SiL), pilkai rudas, rusvai pilkas;

Vidutinio plastiškumo molis (ClM), rudas, rusvai pilkas, pilkas, pilkai rudas, su dulkingo smėlio intarpais.

Kompleksas išskirtas visuose tyrimų taškuose. Jo padas nepasiektas. Ištirtas storis – 6,2 – 8,7 m.

Apibendrinus tyrimų rezultatus galima teigti, kad įžemio gruntą sudaro technogeniniai dariniai ir glacialinės nuogulos. Išskirti 6 litologinio grunto tipai. Ikikvarterinių uolienų nėra. Sąlygiškai silpni gruntai – dirvožemio, dirbtinio grunto, silpno smėlingo mažo plastiškumo molio moreninio ir puraus dulkingo smėlio sluoksniai (IGS 1 – IGS 3, IGS 6) aptinkami visame tiriamajame plote, iki 0,6 – 2,3 m gylio. Pjūvyje paplitę subhorizontalūs, vientisi ir nevientisi sluoksniai. Palaidoto paleoreljefo formų neaptikta.

5. HIDROGEOLOGINĖS SĄLYGOS

Tyrimų teritorijos ribose tyrimų metu gruntinis vandeningas horizontas slūgsojo 4,1 – 4,5 m gylyje nuo žemės paviršiaus (66,0 – 66,4 m abs. a.). Požeminis vanduo susikaupęs dulkingo smėlio sluoksniuose. Priklausomai nuo sezoniškumo galima gruntinio vandens lygio kaita, kadangi sausuoju metų laikotarpiu vandens lygis krenta, o drėgnuoju – kyla. Tikėtina, kad gruntinis vanduo drenuojasis maždaug už 200 m tekančios Lankesos. Požeminio vandens iškrovos (šaltinių, versmių) tyrimų sklype nerasta.

Statybos metu iškasose ir gręžiniuose kaupsis paviršinis kritulių, pasiekus gruntinio vandens lygį - gruntinis vanduo, vyks vandeningų gruntų šlaitų slinkimas.

Tyrimų metu iš tyrimų vietos Nr. 1 buvo paimtas gruntinio vandens mėginys. Pag gautus cheminės analizės rezultatus (6.7 - 6.8 tekstiniai priedai) buvo įvertintas gruntinio vandens agresyvumas betonui ir pagal STR 2.05.05:2005 [9] pateiktą metodiką.

4 lentelė. Cheminio vandens agresyvumo betonui ir metalui įvertinimas iš tyrimo vietos Nr. 1.

Cheminė charakteristika	Nustatyta vertė	Gruntinio vandens agresyvumo betonui ribinė vertė, mg/l	Gruntinio vandens agresyvumo betonui klasė
SO_4^{2-}, mg/l	67,8	≥ 200	-
pH	7,88	≤ 6,5	-
Agresyvusis CO_2, mgO2/l	<5,0	≥ 15	-
NH_4^+, mg/l	<0,1	≥ 15	-
Mg^{2+}, mg/l	37,7	≥ 300	-

Atlikus laboratorinius tyrimus nustatyta, kad gruntinio vandens cheminės charakteristikos neviršija gruntinio vandens agresyvumo betonui ribinių verčių. Gruntinis vanduo **neagresyvus** betono konstrukcijoms.

6. GRUNTŲ SUDĖTIS IR INŽINERINIAI GEOLOGINIAI SLUOKSNIAI

Atlikus lauko tyrimų medžiagos analizę, išskirta 13 inžinerinių geologinių sluoksnių (IGS). Sluoksnių aprašymai pateikti 2 lentelėje.

2 lentelė. IGS geologinis aprašymas.

IGS Nr.	**Sluoksnio geologinis aprašymas (pagal [2])**
IGS 1	Dirbtinis gruntas (Mg): supiltas/perkastas gruntas: žvyringas smėlis, dulkingas smėlis, dirvožemis, smėlingas dulkingas molis, tamsiai rudas, pilkai rudas. Kompleksas išskirtas tyrimų taškuose Nr. 1-3. Jo storis – 0,6 – 0,8 m.
IGS 2	Dirvožemis (Hu), tamsiai rudas. Kompleksas išskirtas tyrimų taške Nr. 1. Komplekso storis – 0,6 m.
IGS 3	Smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, silpnas. Sluoksnis išskirtas tyrimų taškuose Nr. ir Nr. 3. Jo storis – 0,4 – 0,8 m.
IGS 4	Smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo. Sluoksnis išskirtas visuose tyrimų taškuose. Jo storis – 0,3 – 0,5 m.
IGS 5	Smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, labai stiprus. Sluoksnis išskirtas tyrimų taške Nr. 4. Šio sluoksnio storis siekia 0,7 m.
IGS 6	Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio ir mažo plastiškumo dulkio intarpais, drėgnas, purus. Sluoksnis išskirtas tyrimų taškuose Nr. 1 - 3. Jo storis siekia 0,3 – 1,1 m.
IGS 7	Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, vidutinio tankumo. Sluoksnis išskirtas tyrimų taškuose Nr. 1, 3. Jo storis – 0,3 m.
IGS 8	Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas - vandeningas, tankus. Sluoksnis išskirtas tyrimų taške Nr. 1. Jo storis – 0,3 m.
IGS 9	Dulkingas smėlis (siSa), šviesiai rudas, pilkas, rusvai pilkas, rudas, su vidutinio plastiškumo molio, mažo plastikšmo dulkio intarpais, drėgnas - vandeningas, labai tankus. Sluoksnis išskirtas visuose tyrimų taškuose, įvairiame gylyje. Jo storis – 0,4 – 6,2 m.
IGS 10	Mažo plastiškumo dulkis (SiL), pilkai rudas, rusvai pilkas, labai stiprus. Sluoksnis išskirtas tyrimų taškuose Nr. 2, 3. Jo storis – 0,3 – 2,4 m.
IGS 11	Vidutinio plastiškumo molis (ClM), rudas, rusvai pilkas, pilkas, vidutinio stiprumo. Sluoksnis išskirtas tyrimų taškuose Nr. 1, 3, 4. Jo storis – 0,3 – 3,0 m.
IGS 12	Vidutinio plastiškumo molis (ClM), pilkai rudas, stiprus. Sluoksnis išskirtas tyrimų taške Nr. 2, įvairiame gylyje. Jo storis – 0,4 m.
IGS 13	Vidutinio plastiškumo molis (ClM), rudas, rusvai pilkas, pilkas, su dulkingo smėlio intarpais, labai stiprus. Sluoksnis išskirtas tyrimų taške Nr. 2 - 4. Jo storis – 0,3 – 0,4 m.

7. GRUNTŲ FIZIKINĖS IR MECHANINĖS SAVYBĖS

Išskirtų inžinerinių geologinių sluoksnių (IGS) geotechninio zondavimo vertės, pagrindiniai statistiniai rodikliai ir fizikinių bei mechaninių savybių suvestinės vertės pateiktos 3 lentelėje.

3 lentelė. Gruntų geotechninio zondavimo verčių, pagrindinių statistinių rodiklių, fizikinių ir mechaninių savybių verčių suvestinė lentelė.

IGS Nr.	Grunto tipas	Stratigrafinis indeksas	Grunto pavadinimas	$\bar{q}_c$, MPa	n	S	q_{cmin}, MPa	γ, kN/m³	ρ, Mg/m³	ρ_s, Mg/m³	w, %	w_L, %	w_P, %	I_P, %	I_L, vnt.d.	ϕ, °	E_0, MPa
1	Mg	t IV	Mg	2.8	208	2.05	2.5	*Netinkamas pamatų pagrindui*									
2	Hu	pd IV	Hu	1.3	56	0.43	1.2										
3	Cl	g III nm$_3$	saClL	0.7	52	0.14	0.7	20.8	2.12*	2.69*	17.9*	26.8*	15.2*	11.6*	0.23*	-	7
4			saClL	1.5	133	0.34	1.5	21.2	2.16*	2.69*	16.2*	27.3*	13.4*	13.9*	0.20*	-	15
5			saClL	6.5	61	2.11	6.1	22.0	2.24*	2.69*	16.4*	27.1*	14.7*	12.4*	0.14*	-	51
6	Sa	lg III nm$_3$	siSa	3.7	186	1.71	3.5	-	-	2.66*	14.1*	-	-	-	-	29-32	10
7			siSa	8.0	46	1.82	7.6	-	-	2.66*	15.7*	-	-	-	-	32-34	33
8			siSa	14.9	320	5.65	14.3	-	-	2.66*	23.5*	-	-	-	-	34-37	52
9			siSa	35.9	1585	12.88	35.3	-	-	2.66*	17.9*	-	-	-	-	37-39	98
10	Si		SiL	30.6	272	8.85	29.7	21.0	2.14*	2.67*	22.4*	22.7*	19.2*	3.5*	0.90*	-	148
11	Cl		ClM	1.7	349	0.53	1.7	20.0	2.04*	2.72*	27.9*	38.9*	24.5*	14.4*	0.24*	-	11
12			ClM	3.5	63	1.40	3.2	20.6	2.10*	2.72*	23.5*	37.5*	19.6*	17.9*	0.22*	-	23
13			ClM	7.5	144	3.78	7.0	20.5	2.09*	2.72*	26.5*	38.6*	23.7*	14.9*	0.19*	-	54

* - pateikti laboratorinių tyrimų rezultatai

8. GEOLOGINIAI PROCESAI IR REIŠKINIAI

Šiuolaikinių fizinių ir geologinių procesų, kurie galėtų turėti neigiamos įtakos įrengiant, rekonstruojant ir eksploatuojant statinius teritorijoje nenustatyta.

Pagal karsto sufozijos pavojingumą, teritorija priskiriama nepavojingai.

9. IŠVADOS IR REKOMENDACIJOS

1. Tyrimų sklypas yra Jonavos rajono savivaldybėje, Palankesių kaime, Dargužių g. 4 ir 6. Geomorfologiniu požiūriu teritorija priklauso paskutiniojo apledėjimo Pabaltijo žemumų geomorfologinėje srityje esančiam Nevėžio lygumos rajono Vandžiogalos moreninės lygumos mikrorajonui.
2. Reljefo absoliutiniai aukščiai tyrimų vietose siekia 70,1 – 70,9 m.
3. Sklypo geologinę sandarą iki 10,2 m gylio sudaro: technogeniniai dariniai (tIV), augalinis sluoksnis (pdIV), viršutinio Pleistoceno viršutinio Nemuno svitos glacialinės ($gIIInm_3$) ir limnoglacialinės nuosėdos ($lgIIInm_3$).
4. Šiuolaikinių fizinių ir geologinių procesų, kurie galėtų turėti neigiamos įtakos įrengiant, rekonstruojant ir eksploatuojant statinius teritorijoje nenustatyta.
5. Tyrimų teritorijos ribose tyrimų metu gruntinis vandeningas horizontas slūgsojo 4,1 – 4,5 m gylyje nuo žemės paviršiaus (66,0 – 66,4 m abs. a.). Statybos metu iškasose ir gręžiniuose kaupsis paviršinis kritulių, pasiekus gruntinį vandenį – ir gruntinis vanduo, vyks vandeningų gruntų šlaitų slinkimas.
6. Gruntinis vanduo **neagresyvus** betono konstrukcijoms.
7. Sklypo geologiniame modelyje iš viso išskirta 13 inžinerinių geologinių sluoksnių (IGS). Sluoksnių slūgsojimo sąlygos parodytos gręžinių litologiniuose stulpeliuose (3 grafinis priedas) ir inžineriniuose geologiniuose pjūviuose (4 grafinis priedas).
8. Apskaičiuotos IGS gruntų fizikinių mechaninių savybių vertės pateiktos ataskaitos 7 skyriuje (4 lentelė).
9. Tyrimų sklype išskirtą sluoksnį IGS 1 – IGS 3, IGS 6 sudaro labai silpni gruntai, kurie teritorijoje aptinkami iki 0,6 – 2,3 m gylio nuo esamo žemės paviršiaus. Šie gruntai yra netinkami būti pamatų pagrindais.
10. Dulkingi gruntai (IGS 6 – IGS 10) gali pasižymėti tiksotropinėmis savybėmis, t. y. jie gali būti jautrūs dinaminėms apkrovoms ir prie atitinkamų sąlygų gali prarasti nustatytas fizikines mechanines savybes (vibruojant - praskysti).
11. Vertinant inžinerinių geologinių sąlygų palankumą sumanyto statinio statybai/rekonstrukcijai ir naudojimui reiktų įvertinti silpnų gruntų paplitimą.
12. Statybos metu pastebėjus, kad pateiktas geologinis modelis neatitinka faktinės situacijos, būtina skubiai apie tai informuoti rangovą.

Inžinierė geologė

10. LITERATŪROS SĄRAŠAS

1. STR. 1.04.02:2011 „Inžineriniai geologiniai ir geotechniniai tyrimai“. Valstybės žinios, 2012-01-07, Nr. 5-144.
2. LST EN ISO 14688-1: 2018. Geotechniniai tyrinėjimai ir bandymai. Gruntų atpažintis ir klasifikavimas. 1 dalis. Atpažintis ir aprašymas.
3. LST EN ISO 14688-2: 2018. Geotechniniai tyrinėjimai ir bandymai. Gruntų atpažintis ir klasifikavimas. 2 dalis. Klasifikavimo principai.
4. LST EN ISO 22476-1. Geotechniniai tyrinėjimai ir bandymai. Lauko bandymai. 1 dalis. Įspaudimo bandymas, naudojant elektrinį ir pjezoelektrinį kūgį.
5. LST EN 1997-2. Eurokodas 7. Geotechninis projektavimas. 2 dalis. Pagrindo tyrinėjimai ir bandymai.
6. Projektinių inžinerinių geologinių ir geotechninių tyrimų rekomendacijos. TAR, 2015-11-16, Nr. 18162.
7. Inžinerinių geologinių ir geotechninių tyrimų gruntų klasifikacija, patvirtinta Lietuvos geologijos tarnybos prie Aplinkos ministerijos direktoriaus 2019 m. birželio 13 d. įsakymu Nr. 1-175 „Dėl Inžinerinių geologinių ir geotechninių tyrimų gruntų klasifikacijos patvirtinimo“
8. Lietuvos geologijos tarnybos prie Aplinkos ministerijos direktoriaus 2024 m. gegužės 13 d. įsakymas Nr. 1-216 „Dėl Lietuvos geologijos tarnybos prie Aplinkos ministerijos direktoriaus 2019 m. birželio 13 d. įsakymo Nr. 1-175 „Dėl inžinerinių geologinių ir geotechninių tyrimų gruntų klasifikacijos patvirtinimo“ pakeitimo“
9. STR 2.05.05:2005 „Betoninių ir gelžbetoninių konstrukcijų projektavimas“

TEKSTINIAI PRIEDAI

Dokumentą elektroniniu parašu pasirašė

Data: 2020-07-01 11:13:57

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. 1404841
Vilnius

UAB „Geoconsulting"
(juridinio asmens duomenys kaupiami ir saugomi Juridinių asmenų registre, kodas 141884781, adresas Klaipėdos m. sav., Klaipėdos m., Žolynų g. 29-1)

leidžiama atlikti:

nemetalinių naudingųjų iškasenų paiešką ir žvalgybą,
vertingųjų mineralų paiešką ir žvalgybą,
inžinerinį geologinį (geotechninį) tyrimą,
ekogeologinį tyrimą,
ekogeologinį kartografavimą,
geologinį kartografavimą,
geocheminį kartografavimą,
inžinerinį geologinį kartografavimą,
naudingųjų iškasenų išteklių kartografavimą.

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

UAB „Energetikos projektai“
Dokumento sudarytojo pavadinimas

TECHNINĖ UŽDUOTIS

2025-12-12 12/12-01.....
Dokumento data Dokumento registracijos numeris

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

Tyrimų objekto pavadinimas: 110/10 kV Žeimių TP skirstykla

Tyrimų objekto adresas: Jonavos r. sav., Žeimių sen., Palankesių k., Dargužių g. 4 ir 6.

Užsakovo duomenys (pavadinimas (v. pavardė), adresas, telefono ryšio Nr., el. pašto adresas): UAB „Energetikos projektai“, Islandijos pl. 217-8, LT-49165 Kaunas, tel.: + , el. paštas: @enpro.lt.

Projektuotojo duomenys (pavadinimas (v. pavardė), adresas, telefono ryšio Nr., el. pašto adresas) UAB „Energetikos projektai“, Islandijos pl. 217-8, LT-49165 Kaunas, tel.: 4, el. paštas: @enpro.lt.

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

Statinio paskirtis: 2. Inžineriniai tinklai: 2.6 elektros tinklai. 4.5 Kitos paskirties

Statinio kategorija (pabraukti): **ypatingas,** neypatingas, **nesudėtingas**

Nekilnojamųjų kultūros vertybių registro kodas (jei yra): Nėra.

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

Duomenys apie statinio parametrus (ilgis, plotis, aukštis, gylis, plotas):

110 kV skirstyklos įrenginių aukštis iki 10 m, portalai / žaibosaugos bokštai iki 30,00 m.

Perduodamos į pagrindą apkrovos ir jų intensyvumas: -.

Tyrimų ploto ribų koordinatės:

Numeris	X	Y
1	6114424	512583
2	6114390	512604
3	6114369	512571
4	6114406	512549

Papildomai nustatomi geotechniniai parametrai ir kiti reikalavimai:

1. Gruntų charakteristikas nustatyti pagal statinio zondavimo bandymus iki 10,0 m gylio.

2. Gręžinių kiekis – 4 vnt.

3. Atlikti laboratorinius bandymus, kurie privalomi II geotechninei kategorijai.

4. Nustatyti litologinę-geologinę sandarą ir jos ypatumus, sluoksnių geotechnines savybes, gruntinio vandens lygį. Esant silpniems gruntams, nurodyti silpnų gruntų ribas, jų slūgsojimo padą.
5. Nurodyti prognozuojamo gruntinio vandens lygį, vandens agresyvumą metalui ir betonui. 6.
7. Nurodyti grunto tinkamumą pamatų įrengimui. Atlikti geologinius pjūvius tarp gretimų gręžinių.
8. Tyrinėjimo medžiaga registruojama Lietuvos geologijos tarnyboje prie Aplinkos apsaugos ministerijos ir Užsakovui pateikiama užregistruota ataskaita bei LGT raštas apie šios ataskaitos vertinimą ir priėmimą.

Sąrašas normatyvinių dokumentų, kuriais vadovaujantis atliekami tyrimai:

1. Statybos techninis reglamentas. STR 1.04.02:2011. Inžineriniai geologiniai ir geotechniniai tyrimai.

Anksčiau sklype atlikti geologiniai tyrimai: nėra informacijos

Kiti papildomi reikalavimai:

Užsakovas: UAB „Energetikos projekt
vard

Projekto vadovas: UAB „Energetikos
vard

Tyrimų vadovas (užduotį gavau): UA
vard

ĮGALIOJIMAS

2025 m. rugpjūčio d. Nr.
Vilnius

LITGRID AB, pagal Lietuvos Respublikos įstatymus įsteigta akcinė bendrovė, juridinio asmens kodas 302564383, registruotos buveinės adresas Karlo Gustavo Emilio Manerheimo g. 8, LT-05131 Vilnius (toliau — Bendrovė), atstovaujama Bendrovės vadovo , veikiančio pagal Bendrovės įstatus, vadovaudamasi 2025 m. rugpjūčio 11 d. su „Energetikos projektai", UAB sudaryta 110/10 kV Žeimių TP 110 kV skirstyklos rekonstrukcijos projektavimo ir projekto vykdymo priežiūros paslaugų pirkimo sutartimi Nr. 25VP-SUT-185 (toliau — Sutartis), įgalioja
„Energetikos projektai", UAB, pagal Lietuvos Respublikos įstatymus įsteigtą ir veikiančią uždarąją akcinę bendrovę, juridinio asmens kodas 300583958, kurios registruota buveinė yra Islandijos pl. 217-8, LT-49165 Kaunas, Sutarties vykdymo tikslu Bendrovės vardu:
teisės aktų nustatyta tvarka parengti statinio projektą, tuo tikslu atstovauti Bendrovę visose valstybės / savivaldos institucijose bei kitose įmonėse, organizacijose, įstaigose ir šiuo tikslu Bendrovės vardu pateikti prašymus, pareiškimus, juos pasirašyti, gauti reikiamą informaciją, atlikti kitus būtinus veiksmus;
teisės aktų nustatyta tvarka organizuoti statybą leidžiančio dokumento gavimą ir jį gauti, tuo tikslu Bendrovės vardu teikti prašymus / pareiškimus, juos pasirašyti tiek fiziniu, tiek elektroniniu parašu, pateikti informaciją / reikiamus dokumentus tiesiogiai kompetentingoms valstybės / savivaldos institucijoms ir / arba per Lietuvos Respublikos statybos leidimų ir statybos valstybinės priežiūros informacinę sistemą „Infostatyba", atlikti visus kitus šiam tikslui pasiekti reikalingus veiksmus;
organizuoti inžinerinių geodezinių ir geologinių bei kitų tyrinėjimų atlikimą, ir sudarant sąlygas tyrėjui juos atlikti, šiuo tikslu atstovauti Bendrovę visose valstybės / savivaldos institucijose, taip pat kitose organizacijose, įmonėse, įstaigose;
teisės aktų nustatyta tvarka atlikti visus reikiamus veiksmus, susijusius su Bendrovei priklausančių elektros įrenginių specialiųjų žemės naudojimo sąlygų teisine registracija VĮ „Registrų centras", įskaitant, bet neapsiribojant visų reikalingų prašymų, formų ir / arba kitų dokumentų pasirašymu, gavimu, teikimu, kitų veiksmų atlikimu, kurie reikalingi naujai nustatytų ar pasikeitusių teritorijų, kuriose taikomos specialiosios žemės naudojimo sąlygos, registracijai;
teisės aktų nustatyta tvarka teikti prašymus ir gauti visus reikiamus dokumentus, atlikti kitus veiksmus, susijusius su šiuo pavedimu Bendrovės vardu ir Bendrovės interesais visose valstybės, savivaldybių institucijose, taip pat visuomeninėse ir kitose įstaigose, įmonėse ir organizacijose, bei santykiuose su trečiaisiais (fiziniais ir / arba juridiniais) asmenimis.
Šis įgaliojimas nekeičia jokių Sutarties sąlygų.
Įgaliotinis turi teisę perįgalioti kitus asmenis šiame įgaliojime numatytų veiksmų atlikimui, nepažeisdamas Sutarties sąlygų bei neviršydamas šiame įgaliojime suteiktų teisių.
Šis įgaliojimas galioja nuo jo išdavimo dienos iki 2026 m. rugsėjo 11 d., bet ne ilgiau nei tęsiasi įgaliotinio santykiai su Bendrove pagal Sutartį.

Bendrovės vadovas

Tyrimų taškų koordinačių ir altitudžių žiniaraštis

Tyrimų taškas ir jo numeris	Koordinatės (LKS’94)		Altitudė, m
	X	Y	Z
1	6114418	512583	70,4
2	6114402	512557	70,1
3	6114376	512570	70,3
4	6114390	512602	70,9

Koordinačių sistema – valstybinė (LKS’94)
Aukščių sistema - LAS`07.

calibration certificate

500 / 1-193040-005 / 1

Geomil equipment
World's first manufacturer of CPT equipment

Item	Data acquisition system	**Client**	UAB Geoconsulting
Model	GME-500 IP65		Zolynu g. 29-1
Serial no.	1-193040-005		92325 Klaipeda
Calibration date	14/Feb/20		Lithuania
Print date	14/Feb/20		

Analog channel	Input (V)	Output (counts)	Deviation (counts)	Deviation (% FSO)	Analog channel	Input (V)	Output (counts)	Deviation (counts)	Deviation (% FSO)
1	0,000	00000	00000	0,0000	5	0,000	00000	00000	0,0000
	5,000	15000	00000	0,0000		5,000	15000	00000	0,0000
	10,000	30000	00000	0,0000		10,000	30000	00000	0,0000
2	0,000	00000	00000	0,0000	6	0,000	00000	00000	0,0000
	5,000	15000	00000	0,0000		5,000	15000	00000	0,0000
	10,000	30000	00000	0,0000		10,000	30000	00000	0,0000
3	0,000	00000	00000	0,0000	7	0,000	00000	00000	0,0000
	5,000	15000	00000	0,0000		5,000	15000	00000	0,0000
	10,000	30000	00000	0,0000		10,000	29999	-00001	-0,0033
4	0,000	00000	00000	0,0000	8	0,000	00000	00000	0,0000
	5,000	15000	00000	0,0000		5,000	15000	00000	0,0000
	10,000	30000	00000	0,0000		10,000	30000	00000	0,0000

Digital channel	Function	Verified	Input (pulses)	Output (counts)	Deviation (counts)	Deviation (% FSO)	Ancillary output	Verified
P	Depth counter (pulses)	☑	1000	1000	0000	0,00	Alarm	☑
I	Cycle counter	☑						
S	System time (sec)	☑						
H	System time (1/100 sec)	☑						

Calibration instrument(s)	Certificate number(s)	Date(s)
Calibrator Fluke 715	190904-14946	05/Apr/19

Remarks We declare that the data acquisition system with serial number 1-193040-005 has been calibrated and that the specifications are according to the ISO 22476-1:2012 (Geotechnical investigation and testing – Field testing - Part 1: Electrical cone and piezocone penetration test), Application Class 1.

The calibrations are traceable to national and international standards.

Date
Calibrated by

Signature

Westbaan 240 | 2841 MC Moordrecht | The Netherlands | P.O. Box 450 | 2800 AL Gouda | The Netherlands
t: +31(0) 172 427 800 | f: +31(0) 172 427 801 | info@geomil.com | www.geomil.com
All business transacted is subject to MetaalUnie* conditions. *Dutch Organisation of Entrepreneurs in Small and Medium-Sized Business in the Metalworking and Mechanical Engineering Industry

calibration certificate

AS10CFIIP.S241361 / 002

Geomil equipment
World's first manufacturer of CPT equipment

Cone number	AS10CFIIP.S241361	**Client**	UAB Geoconsulting
Kind of cone	Subtraction		Liepu g. 54 K3
Calibration date	05-Nov-2025		92106 Klaipeda
			Lithuania

Channel 1	Cone resistance (q_c) $q_c = Q_c / A_c$	**Channel 2**	Local sleeve friction (f_s) $f_s = F_s / A_s$	**Channel 3**	Pore pressure (u)
Range	0 ... 100 kN	**Range**	0 ... 100 kN	**Range**	0 ... 20 bar
A_c	1000 mm²	**A_s**	15000 mm²		
Zero load reading	204 mV	**Zero load reading**	203 mV	**Zero load reading**	186 mV
a-factor	0.8	**b-factor**	0		
		Offset	80 mm		

Q_c Load (kN)	Eqv. q_c (MPa)	Output (mV)	F_s Load (kN)	Eqv. f_s (MPa)	Output (mV)	Pressure (bar)	Eqv. u (MPa)	Output (mV)
0	0	0	0	0.000	0	0	0.0	0
10	10	849	10	0.667	813	2	0.2	797
20	20	1693	20	1.333	1626	4	0.4	1608
30	30	2543	30	2.000	2444	6	0.6	2419
40	40	3388	40	2.667	3257	8	0.8	3227
50	50	4233	50	3.333	4071	10	1.0	4035
60	60	5076	60	4.000	4882	12	1.2	4843
70	70	5914	70	4.667	5689	14	1.4	5647
80	80	6756	80	5.333	6499	16	1.6	6452
90	90	7595	90	6.000	7305	18	1.8	7254
100	100	8434	100	6.667	8111	20	2.0	8053
90	90	7605	90	6.000	7310			
80	80	6755	80	5.333	6500			
70	70	5918	70	4.667	5695			
60	60	5077	60	4.000	4888			
50	50	4236	50	3.333	4078			
40	40	3389	40	2.667	3262			
30	30	2544	30	2.000	2452			
20	20	1699	20	1.333	1636			
10	10	850	10	0.667	819			
0	0	-1	0	0.000	-1			

Zero load error	0.01 %	**Zero load error**	0.01 %	**Zero load error**	0.00 %
Max. linearity	0.14 %	**Max. linearity**	0.16 %	**Max. linearity**	0.11 %
Max. hysteresis	0.12 %	**Max. hysteresis**	0.12 %		

Westbaan 240 | 2841 MC Moordrecht | The Netherlands | P.O. Box 450 | 2800 AL Gouda | The Netherlands
t: +31(0) 172 427 800 | f: +31(0) 172 427 801 | info@geomil.com | www.geomil.com
All business transacted is subject to MetaalUnie* conditions. *Dutch Organisation of Entrepreneurs in Small and Medium-Sized Business in the Metalworking and Mechanical Engineering Industry

cert_cal_c001_v3

calibration certificate

AS10CFIIP.S241361 / 002

Geomil equipment

World's first manufacturer of CPT equipment

Channel 4	Inclination X	**Channel 5**	Inclination Y	**Channel 6**	None
Range	-20 ... 20 °	**Range**	-20 ... 20 °		

Angle (°)	**Output (mV)**	**Angle (°)**	**Output (mV)**
-20	2535	-20	2430
-15	2603	-15	2495
-10	2676	-10	2570
-5	2747	-5	2638
0	2819	0	2711
5	2894	5	2784
10	2966	10	2854
15	3038	15	2922
20	3103	20	2990

Calibration instrument(s)	**Certificate number(s)**	**Date(s)**
TAG108-3878671C18 200KN	4017743.00501.1	20-Oct-2025

Remark

We declare that the electrical cone with serial number AS10CFIIP.S241361 has been calibrated and that the specifications are according to the ISO 22476-1:2012/Cor 1:2013 (Geotechnical investigation and testing – Field testing - Part 1: Electrical cone and piezocone penetration test). The calibrations are traceable to national and international standards.

Date	05-Nov-2025	**Date**	05-Nov-2025
Calibrated by	R. Duarte	**Approved by**	A. Duarte

Signature

cert_cal_001_v3

Westbaan 240 | 2841 MC Moordrecht | The Netherlands | P.O. Box 450 | 2800 AL Gouda | The Netherlands
t: +31(0) 172 427 800 | f: +31(0) 172 427 801 | info@geomil.com | www.geomil.com
All business transacted is subject to MetaalUnie* conditions. *Dutch Organisation of Entrepreneurs in Small and Medium-Sized Business in the Metalworking and Mechanical Engineering Industry

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

GEO CONSULTING

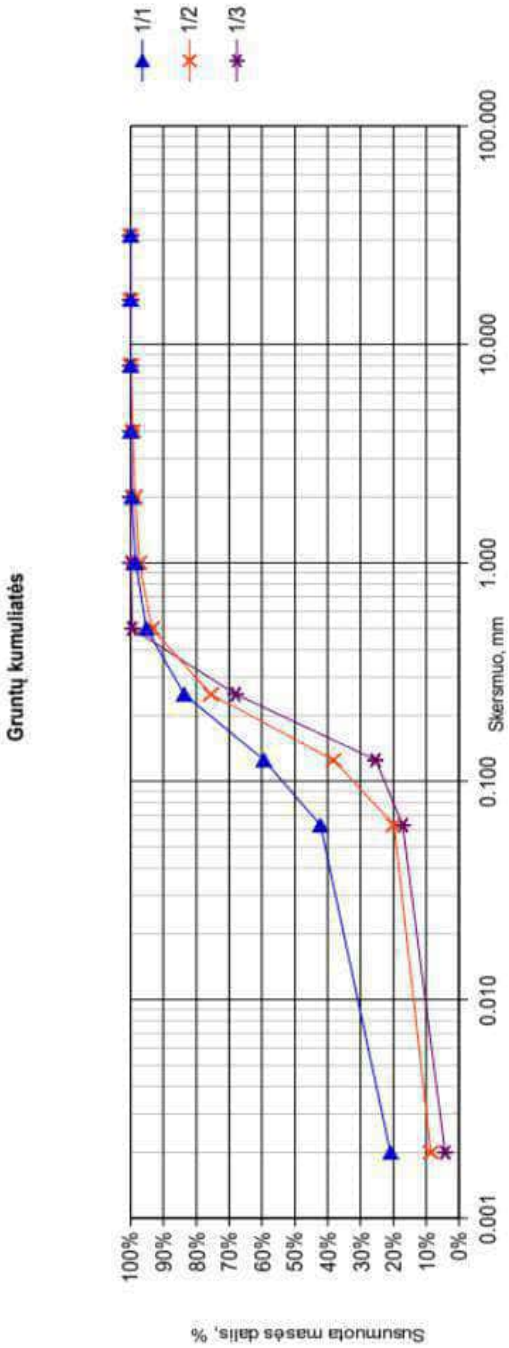
Gruntų tyrimų laboratorija

Gruntų fizinių savybių laboratorinių tyrimų suvestinis blankas

Objektas: 110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.
Data: 08/01/2026
Atliko: Inž. geologė

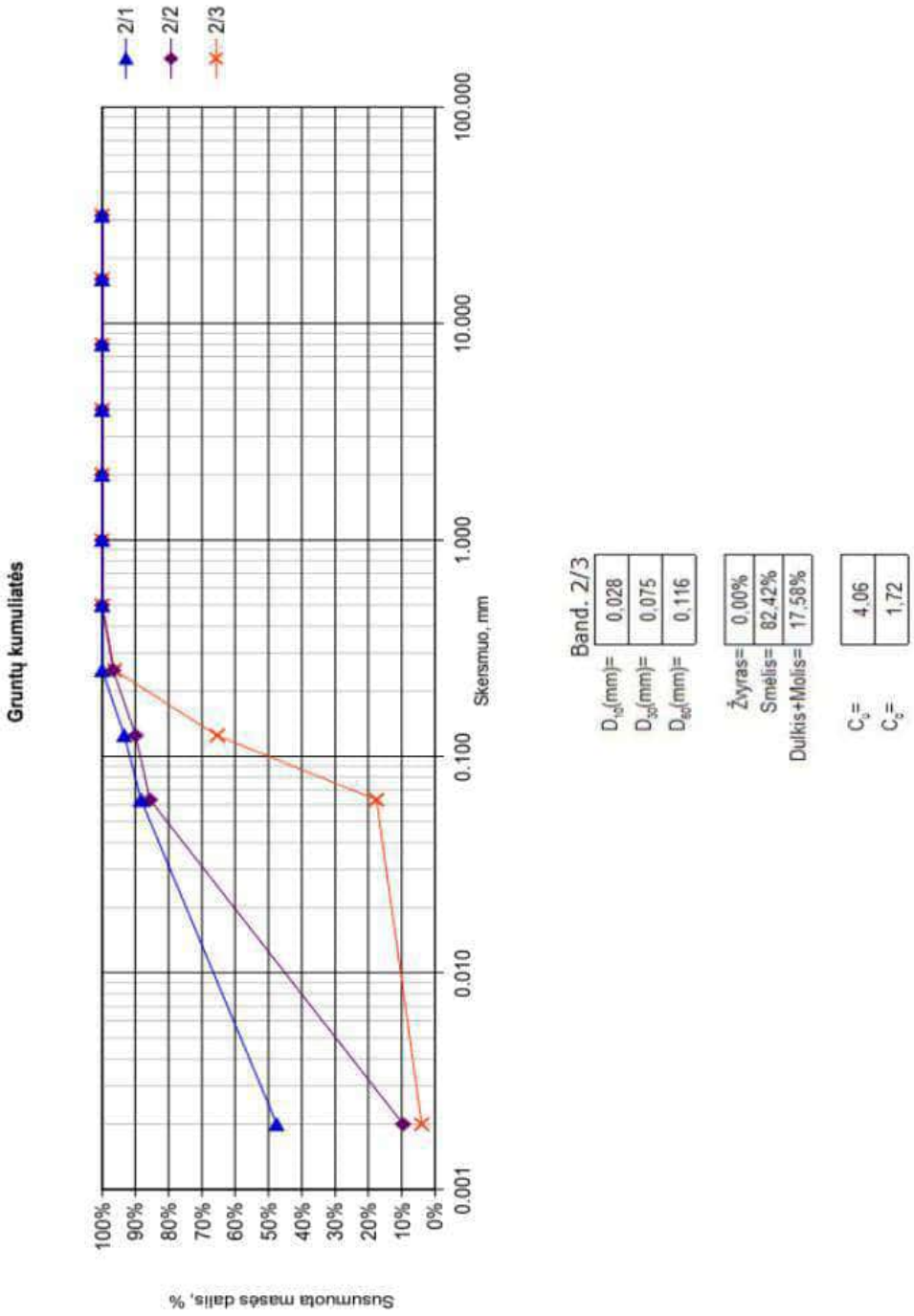
tų fizinių savybių suvestinė lentelė

Bandinio Nr.	Paėmimo gylis, m	Granuliometrinė sudėtis (gruntas/ likęs ant sieto), %										Dulkių/ molių %	Tankis, Mg/m³			Drėgnis, %	Aterbergo ribos, %				Grunto pavadinimas
		Sieto akutės dydis, mm											ρ	ρ_d	ρ_s	w	w_L	w_P	I_P	I_L	
		31.5	16	8	4	2	1	0.5	0.25	0.125	0.063										
1/1	0,7-0,8	0.0	0.0	0.0	0.0	0.4	1.2	3.2	11.5	24.3	17.2	21,4/20,9	2.16	1.86	2.69	16.2	27.3	13.4	13.9	0.20	saCIL
1/2	1,6-2,0	0.0	0.0	0.0	0.6	0.7	1.4	3.9	17.9	37.3	18.4	11,3/8,6	-	-	2.66	14.1	-	-	-	-	siSa
1/3	6,5-7,5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	31.5	42.5	8.4	12,9/4,2	-	-	2.66	17.9	-	-	-	-	siSa
2/1	2,9-3,1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	5.0	40,7/47,6	2.10	1.70	2.72	23.5	37.5	19.6	17.9	0.22	ClM
2/2	6,5-6,7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	6.7	4.3	76,1/9,5	2.14	1.75	2.67	22.4	22.7	19.2	3.5	0.90	SiL
2/3	7,2-7,8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	30.8	47.8	13,6/4,0	-	-	2.66	22.4	-	-	-	-	siSa
3/1	0,9-1,2	0.0	0.0	0.0	0.0	0.2	1.1	2.9	10.4	23.5	16.3	28,9/18,7	2.12	1.80	2.69	17.9	26.8	15.2	11.6	0.23	saCIL
3/2	2,0-2,3	0.0	0.0	0.0	0.0	1.6	2.4	4.6	18.6	35.2	19.4	13,6/4,2	-	-	2.66	15.7	-	-	-	-	siSa
3/3	6,9-7,1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	47,8/51,4	2.09	1.65	2.72	26.5	38.6	23.7	14.9	0.19	ClM
3/4	8,5-8,7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	44,6/54,9	2.04	1.59	2.72	27.9	38.9	24.5	14.4	0.24	ClM
4/1	1,0-1,3	0.0	0.0	0.0	0.0	0.4	1.2	3.2	9.5	20.3	15.4	32,1/17,9	2.24	1.92	2.69	16.4	27.1	14.7	12.4	0.14	saCIL

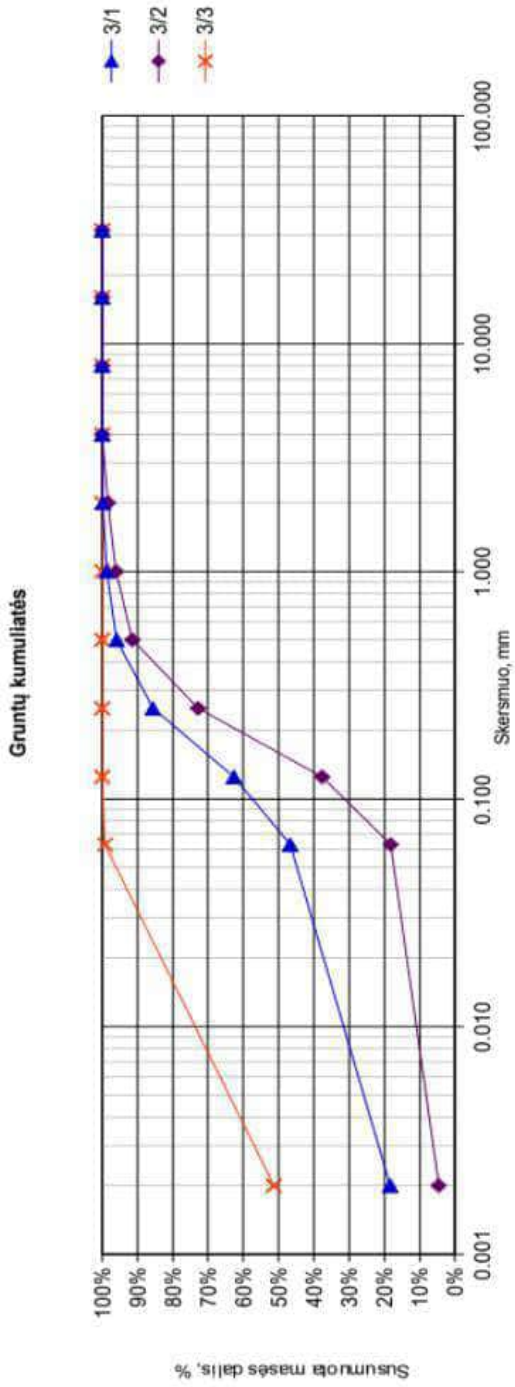


Band. 1/2	
D_{10}(mm)=	0,025
D_{30}(mm)=	0,092
D_{60}(mm)=	0,187
Žvyras=	1,31%
Smėlis=	78,82%
Dulkis+Molis=	19,87%
C_u=	7,42
C_c=	1,79

Band. 1/3	
D_{10}(mm)=	0,029
D_{30}(mm)=	0,135
D_{60}(mm)=	0,219
Žvyras=	0,00%
Smėlis=	82,92%
Dulkis+Molis=	17,08%
C_u=	7,47
C_c=	2,81



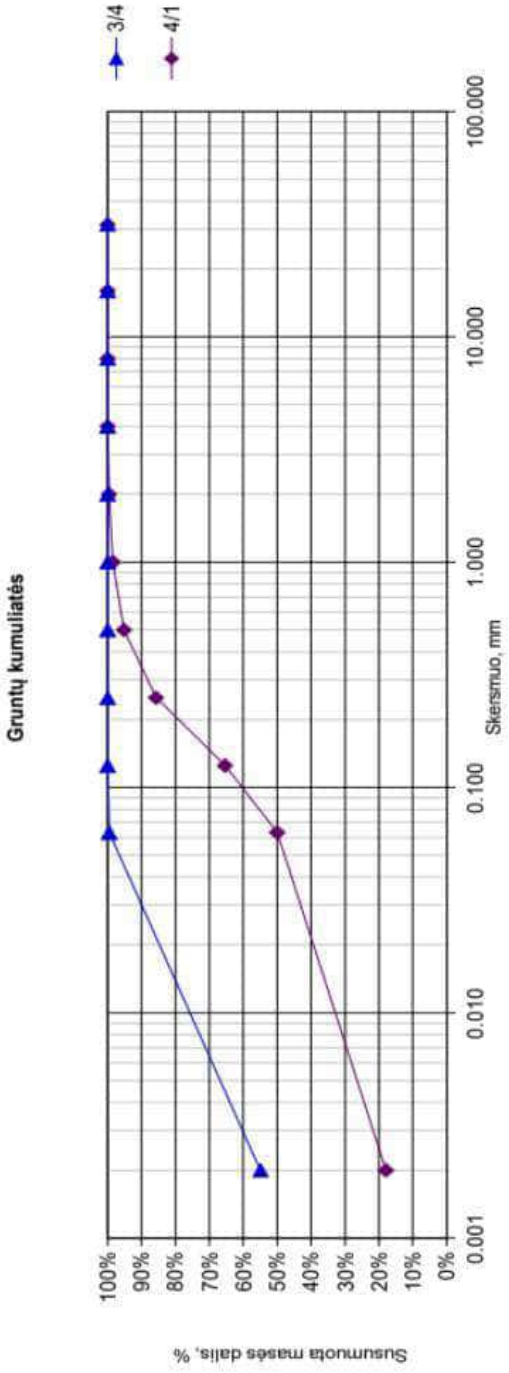
Band. 2/3	
D_{10}(mm)=	0,028
D_{30}(mm)=	0,075
D_{60}(mm)=	0,116
Žvyras=	0,00%
Smėlis=	82,42%
Dulkis+Molis=	17,58%
C_U=	4,06
C_C=	1,72



Band. 3/2	
D_{15}(mm)=	0,027
D_{30}(mm)=	0,096
D_{60}(mm)=	0,194

Žvyras=	1,63%
Smėlis=	80,15%
Dulkis+Molis=	18,22%

C_u=	7,07
C_c=	1,71


3/4
4/1
Gruntų kumuliatės
Skersmuo, mm
100.000
10.000
1.000
0.100
0.010
0.001
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Susumuota masės dalis, %

UAB „Grota“ Analitinė laboratorija, į. k. 120938642
Eišiškių pl. 26, LT-02184 Vilnius; tel. +370 5 216 4389

VANDENS BENDROSIOS CHEMINĖS ANALIZĖS REZULTATŲ PROTOKOLAS

Užsakovas Geoconsulting, UAB, vp@geoconsulting.lt
Objektas Jonavos r. sav., Palankesių k., Dargužių g. 4 ir 6
Punktas Gr. 1
Mėginio paėmimo data 2025-12-29

Tirta analitė	Nustatyta vertė			Analizės metodas
	mg/l	mg-ekv/l	ekv%	
Anijonai				
Chloridas (Cl^-)	29.8	0.841	7.87	LST EN ISO 10304-1:2009
Sulfatas (SO_4^{2-})	67.8	1.412	13.21	LST EN ISO 10304-1:2009
Hidrokarbonatas (HCO_3^-)	449	7.358	68.85	LST ISO 9963-1:1999
Karbonatas (CO_3^{2-})	1.60	0.027	0.22	Apskaičiuojama
Nitritas (NO_2^-)	<0.05	0.000	0.00	LST EN ISO 10304-1:2009
Nitratas (NO_3^-)	65.10	1.050	9.83	LST EN ISO 10304-1:2009
Katijonai				
Natris (Na^+)	9.76	0.424	3.54	LST EN ISO 14911:2000
Kalis (K^+)	3.63	0.093	0.78	LST EN ISO 14911:2000
Kalcis (Ca^{2+})	168	8.383	69.85	LST EN ISO 14911:2000
Magnis (Mg^{2+})	37.7	3.102	25.84	LST EN ISO 14911:2000
Amonis (NH_4^+)	<0.1	0.000	0.00	LST EN ISO 14911:2000
Viso anijonų:		10.687		
Viso katijonų:		12.002		
BALANSAS:		-1.315		
Kitos analitės				
Bendras kietumas	11.48	mg-ekv/l		Apskaičiuojama
Karbonatinis kietumas	7.36	mg-ekv/l		Apskaičiuojama
Nekarbonatinis kietumas	4.13	mg-ekv/l		Apskaičiuojama
Ištirpusių mineralinių medžiagų suma	832	mg/l		Apskaičiuojama
CO_2 pusiausvyrinis	11.38	mg/l		Apskaičiuojama
pH	7.88	pH vienetai		LST EN ISO 10523:2012
Savitasis elektros laidis	917	µS/cm25°C		LST EN 27888:1999
Permanganato skaičius	5.00	mgO_2/l		LST EN ISO 8467:2000

Rezultatas, mažesnis už nustatymo ribą, žymimas „<“.

Tyrimas baigtas ir protokolas paruoštas: 2026-01-06

Analizę atliko: Chemikė A

Tvirtinu: Cheminių

Užsakymo Nr.: 251231HG054
Protokolo Nr.: 3236-8342

Laboratorija už mėginių paėmimą neatsako. Tyrimų rezultatai susiję tik su konkrečiais ištirtais mėginiais ir taikytini tokiam ėminiui, koks buvo gautas. Tyrimų protokolą dalimis dauginti galima tik su laboratorijos vadovo sutikimu.

1

UAB „Grota“ Analitinė laboratorija, į. k. 120938642
Eišiškių pl. 26, LT-02184 Vilnius; tel. +370 5 216 4389

INDIVIDUALIŲ VANDENS CHEMINĖS SUDĖTIES RODIKLIŲ ANALIZĖS REZULTATŲ PROTOKOLAS

Užsakovas	Geoconsulting, UAB, vp@geoconsulting.lt
Objektas	Jonavos r. sav., Palankesių k., Dargužių g. 4 ir 6
Punktas	Gr. 1
Mėginio paėmimo data	2025-12-29

Tirta analitė	Mato vnt.	Nustatyta vertė	Analizės metodas
Kitos analitės:			
CO_2	mgCO2/l	<5.0	LST EN 13577:2007

Rezultatas, mažesnis už nustatymo ribą, žymimas „<“.

Tyrimas baigtas ir protokolas paruoštas: 2025-12-31

Analizę atliko: Chemikė-laborantė

Tvirtinu: Cheminių tyrimų l

Užsakymo Nr.: 251231HG054
Protokolo Nr.: 3236-8342

Laboratorija už mėginių paėmimą neatsako. Tyrimų rezultatai susiję tik su konkrečiais ištirtais mėginiais ir taikytini tokiam ėminiui, koks buvo gautas.. Tyrimų protokolą dalimis dauginti galima tik su laboratorijos vadovo sutikimu.

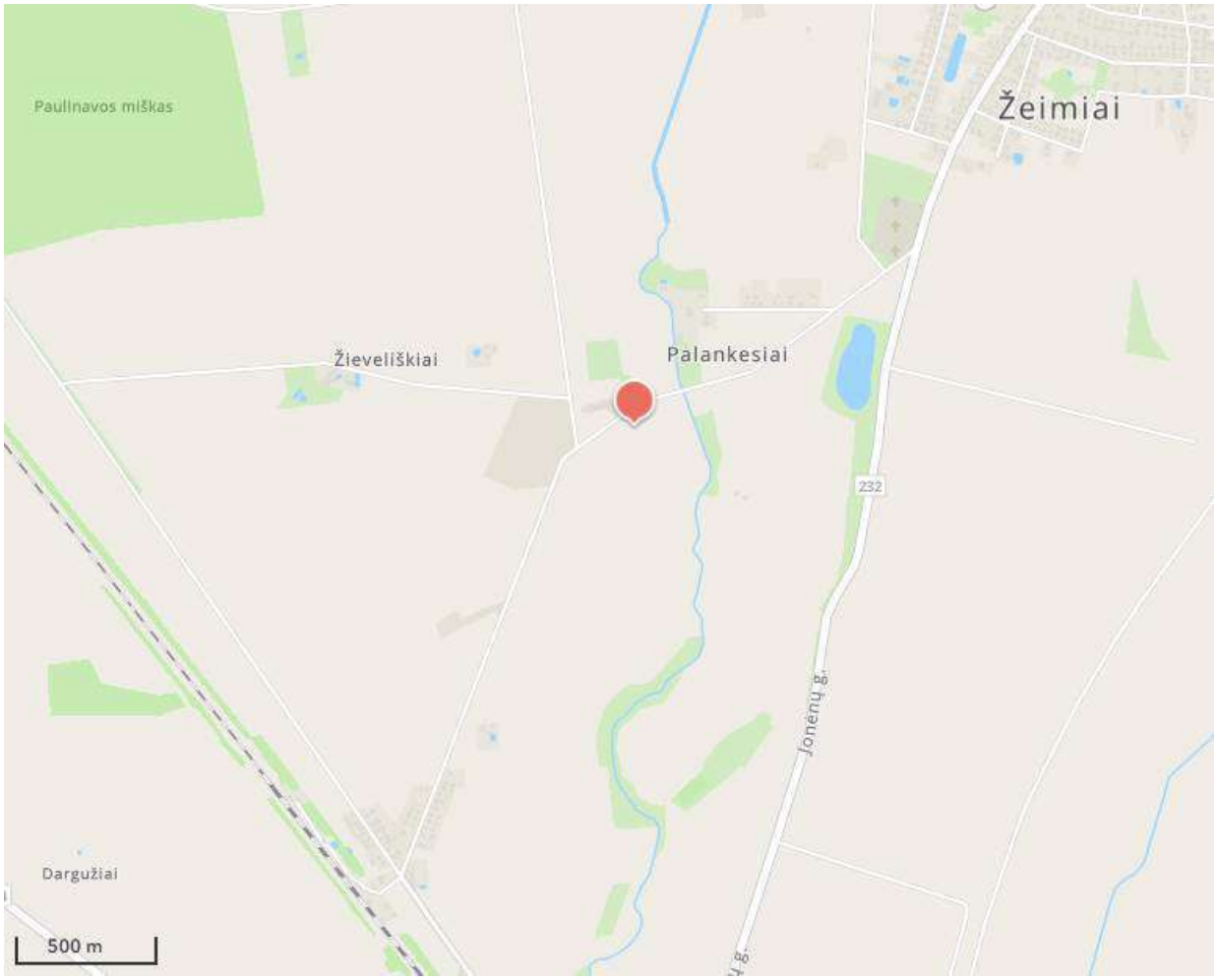
1

Ataskaitoje naudoti sutrumpinimai, dydžiai, žymenys ir matavimo vienetai

γ – savitasis sunkis, kN/m^3
γ_w – vandens savitasis sunkis, kN/m^3
ρ – gamtinis (masės) tankis, Mg /m^3
ρ_s - kietų dalelių (masės) tankis, Mg /m3
e – poringumo koeficientas, vnt.d.
w – gamtinis drėgnis, %
w_L – takumo drėgnis, %
w_p – plastingumo drėgnis, %
I_p – plastingumo rodiklis, %
I_L – takumo rodiklis, vnt.d.
I_D – tankumo rodiklis, vnt.d.
k – filtracijos koeficientas, m/d
g – laisvojo kritimo pagreitis, m/s^2
E_0 –deformacijų modulis (visuminės deformacijos modulis), MPa
φ' – efektyviosios vidinės trinties kampas, laipsniai
q_c – kūginis stipris, MPa
f_s – šoninės trinties stipris, kPa
R_f – šoninės trinties stiprio ir kūginio stiprio santykis, %
n – imtis
x – imties vidurkis
S – standartinis nuokrypis
Gr. – gręžinys
IGS – inžinerinis geologinis sluoksnis
x, y –koordinatės (LKS 94), m
Abs.a. – absoliutinis aukštis, m
GVG – gruntinio vandens slūgsojimo gylis, m
GVL – gruntinio vandens lygis, m abs.a.
PVL – pjezometrinio lygio altitudė, m
CPT – bandymas kūginiu penetrometru

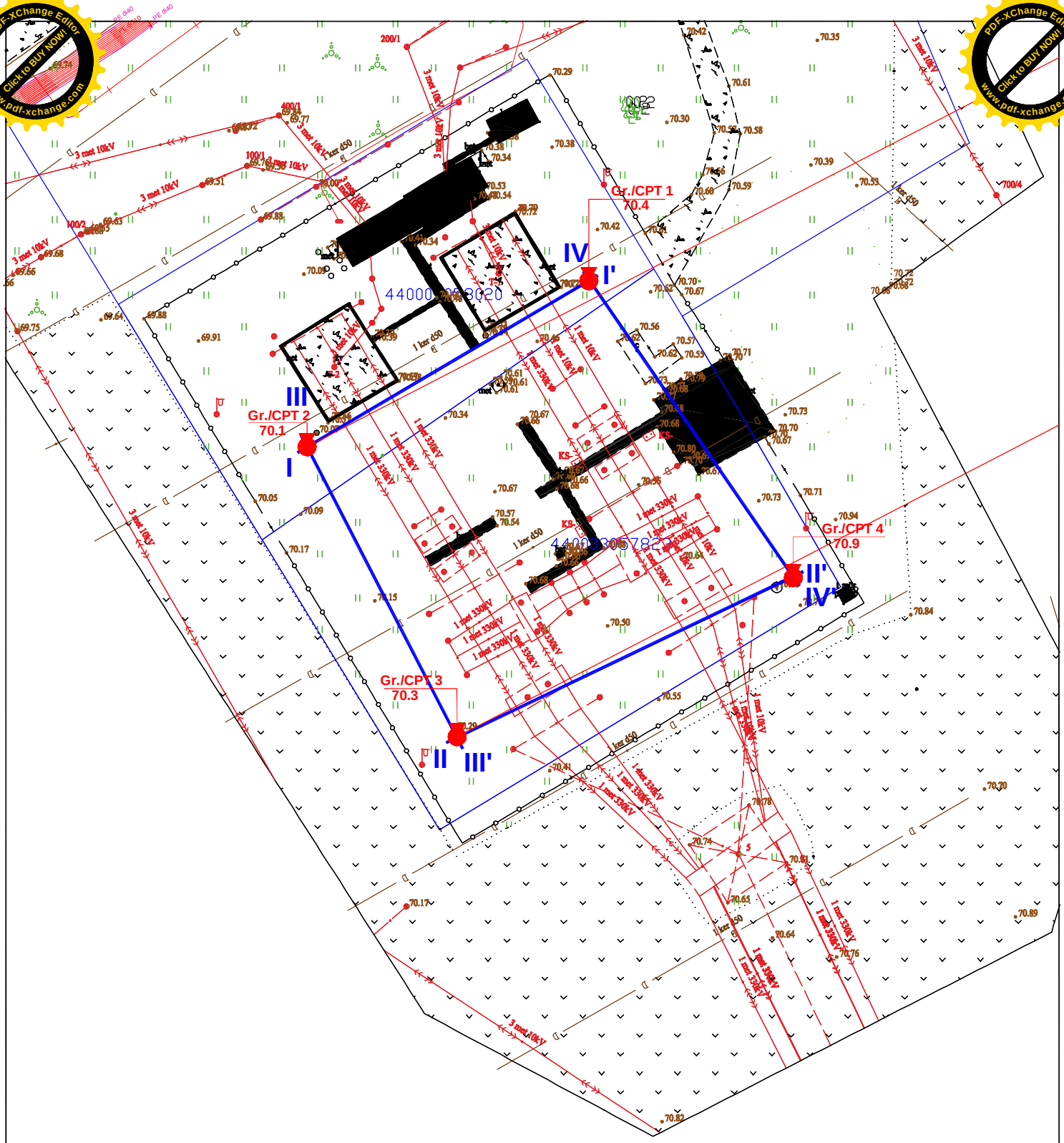
GRAFINIAI PRIEDAI

Tyrimų sklypo padėties vietovėje schema



http://www.maps.lt/map/

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com



PLANO SUTARTINIAI ŽENKLAI

Gr.1
13.0 - gręžinio vieta, jo Nr. ir žiočių altitudė

I—I' - inžinerinis geologinis pjūvis, jo Nr.

CPT-1
13.0 - CPT bandymo vieta, jo Nr. ir žiočių altitudė

Aukščių sistema - LAS07, Koordinačių sistema - LKS94

Pareigos	V. Pavardė	Parašas

Užsakovas: UAB "Energetikos projektai"

Planas su tyrimų vietomis ir pjūvio linija

10/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.

Rangovas: UAB "Geoconsulting"
tel.: 0-612-84305,
el. paštas: info@geoconsulting.lt
www.geoconsulting.lt

Leidimo Nr.	Mastelis	Data	Grafinio priedo Nr.
1404841	1:500	2026 01	2

PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Gręžinys Gr. 1 su geotechninio bandymo (CPT, TE1) kreivėmis

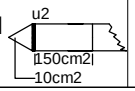
Objektas: 110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.

Gręžimo staklės VTX 800, gręžimas sraigtinis, skersmuo 90mm

Geotechninis bandymas: CPT (TE1), LST EN ISO 22476-1

Bandymo įranga: Geomil, zondo Nr. S10CFIIP.S241361

Sudarė: inž. geologė A.



Tyrimų data: 2025.12.23

Koordinatė x, m: 6114418

Koordinatė y, m: 512583

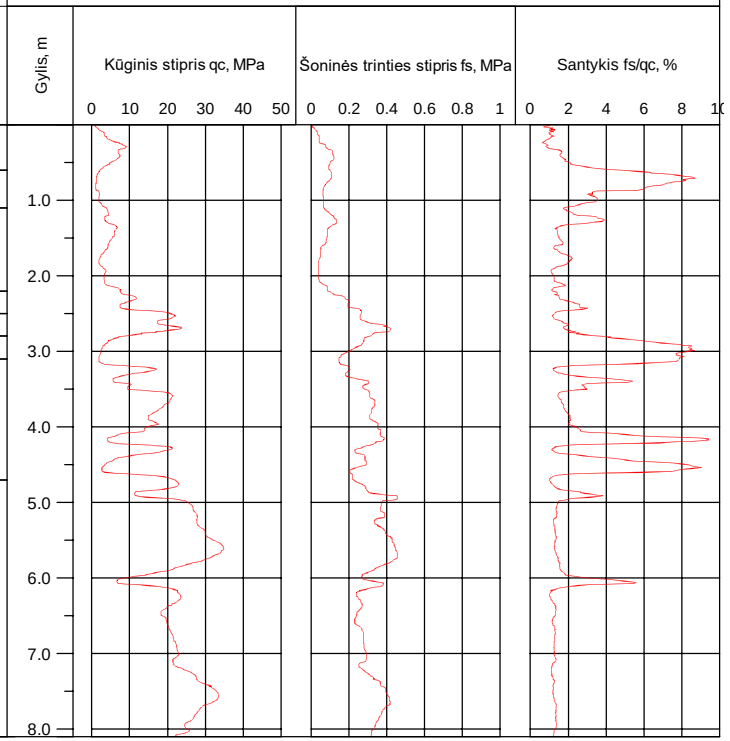
Abs. a., m: 70.4

Mvertikalus 1:100

Rangovas:

UAB "Geoconsulting"
tel.: 0-612-84305,
el. paštas: info@geoconsulting.lt
www.geoconsulting.lt

Gruntinio vandens gylis, m	Gylis, m	IGS pado gylis, m	IGS storis, m	IGS pado abs. a., m	Litologija	IGS geologinis aprašymas (pagal LST EN ISO 14688)	IGS Nr.	Grunto mėginys	Stratigrafinis - genetinis indeksas	Vid. qc, MPa	Vid. fs, kPa
		0.6	0.6	69.8		Dirbtinis gruntas (Mg): supiltas/perkastas gruntas: žvyringas smėlis, su dirvožemiu, smėlingu dulkingu moliu, tamsiai rudas, pilkai rudas	1		t IV	5.3	7.7
		1.1	0.5	69.3		Smėlingas mažo plastiškumo molis moreninis (saClL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo	4	1/1	g III nm_3	1.6	80
		2.2	1.1	68.2		Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, purus	6	1/2		4.0	70
		2.5	0.3	67.9		Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, vidutinio tankumo	7			9.1	173
		2.8	0.3	67.6			8			19.3	330
		3.1	0.3	67.3		Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, tankus	11			2.4	202
4.3		4.7	1.6	65.7		Vidutinio plastiškumo molis (ClM), rudas, vidutinio stiprumo Dulkingas smėlis (siSa), šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas - vandeningas, tankus	8		lg III nm_3	12.1	282
		8.1	3.4	62.3		Dulkingas smėlis (siSa), šviesiai rudas, su vidutinio plastiškumo molio intarpais, vandeningas, labai tankus	9	1/3		24.5	335



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Gręžinys Gr. 2 su geotechninio bandymo (CPT, TE1) kreivėmis

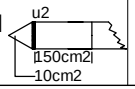
Objektas: 110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.

Gręžimo staklės VTX 800, gręžimas sraigtinis, skersmuo 90mm

Geotechninis bandymas: CPT (TE1), LST EN ISO 22476-1

Bandymo įranga: Geomil, zondo Nr. S10CFIIP.S241361

Sudarė: inž. geologė



Tyrimų data: 2025.12.23

Koordinatė x, m: 6114402

Koordinatė y, m: 512557

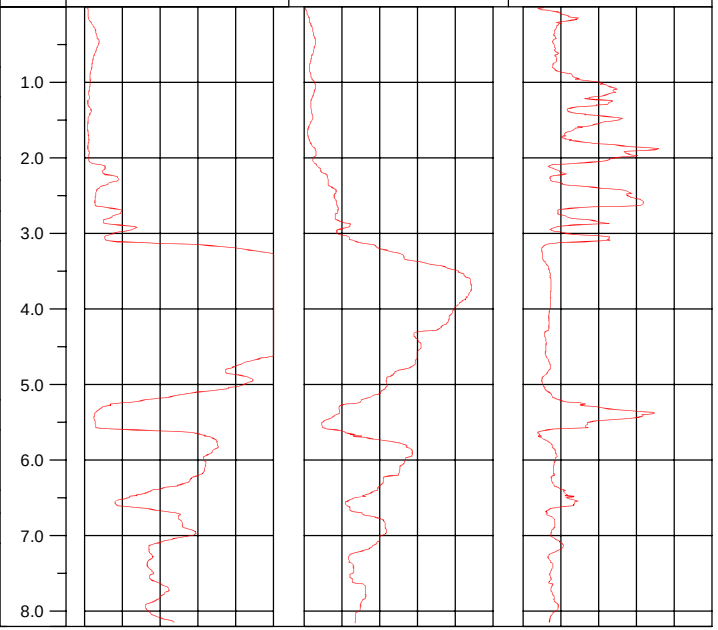
Abs. a., m: 70.1

Mvertikalus 1:100

Rangovas:

UAB "Geoconsulting"
tel.: 0-612-84305,
el. paštas: info@geoconsulting.lt
www.geoconsulting.lt

Gruntinio vandens gylis, m	Gylis, m	IGS pado gylis, m	IGS storis, m	IGS pado abs. a., m	Litologija	IGS geologinis aprašymas (pagal LST EN ISO 14688)	IGS Nr.	Grunto mėginys	Stratigrafinis - genetinis indeksas	Vid. qc, MPa	Vid. fs, kPa
		0.8	0.8	69.3		Dirbtinis gruntas (Mg): supiltas/perkastas gruntas: dulkingas smėlis, dirvožemis, tamsiai rudas, pilkai rudas	1		t IV	2.4	41
	1.0	1.2	0.4	68.9		Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo	4		g III nm$_3$	1.4	46
		2.0	0.8	68.1		Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, silpnas	3			0.9	29
	2.0	2.3	0.3	67.8		Dulkingas smėlis (siSa), šviesiai rudas, su su vidutinio plastiškumo molio intarpu, drėgnas, purus	6			4.9	87
		2.7	0.4	67.4		Vidutinio plastiškumo molis (ClM), rudas, su dulkingo smėlio intarpais, stiprus	12	2/1		3.9	157
	3.0	3.1	0.4	67.0		Vidutinio plastiškumo molis (ClM), rudas, su dulkingo smėlio intarpais, labai stiprus	13			8.0	201
4.1	4.0	5.2	2.1	64.9		Dulkingas smėlis (siSa), šviesiai rudas, rusvai pilkas, pilkas, drėgnas - vandeningas, labai tankus	9		lg III nm$_3$	48.8	634
	5.0	5.6	0.4	64.5		Vidutinio plastiškumo molis (ClM), pilkai rudas, stiprus	12			3.0	143
	6.0	6.4	0.8	63.7		Dulkingas smėlis (siSa), pilkas, vandeningas, labai tankus	9			30.2	455
		6.7	0.3	63.4		Mažo plastiškumo dulkis (SiL), pilkai rudas, labai stiprus	10	2/2		13.8	275
	7.0	7.1	0.4	63.0		Dulkingas smėlis (siSa), pilkas, rusvai pilkas, su mažo plastiškumo dulkio intarpais, vandeningas, labai tankus	9			25.5	404
	8.0	8.2	1.1	61.9		Dulkingas smėlis (siSa), pilkas, rusvai pilkas, su mažo plastiškumo dulkio intarpais, vandeningas, tankus	8	2/3		18.2	289



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Gręžinys Gr. 3 su geotechninio bandymo (CPT, TE1) kreivėmis

Rangovas:

UAB "Geoconsulting"
tel.: 0-612-84305,
el. paštas: info@geoconsulting.lt
www.geoconsulting.lt

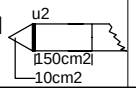
Objektas: 110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.

Gręžimo staklės VTX 800, gręžimas sraigtinis, skersmuo 90mm

Geotechninis bandymas: CPT (TE1), LST EN ISO 22476-1

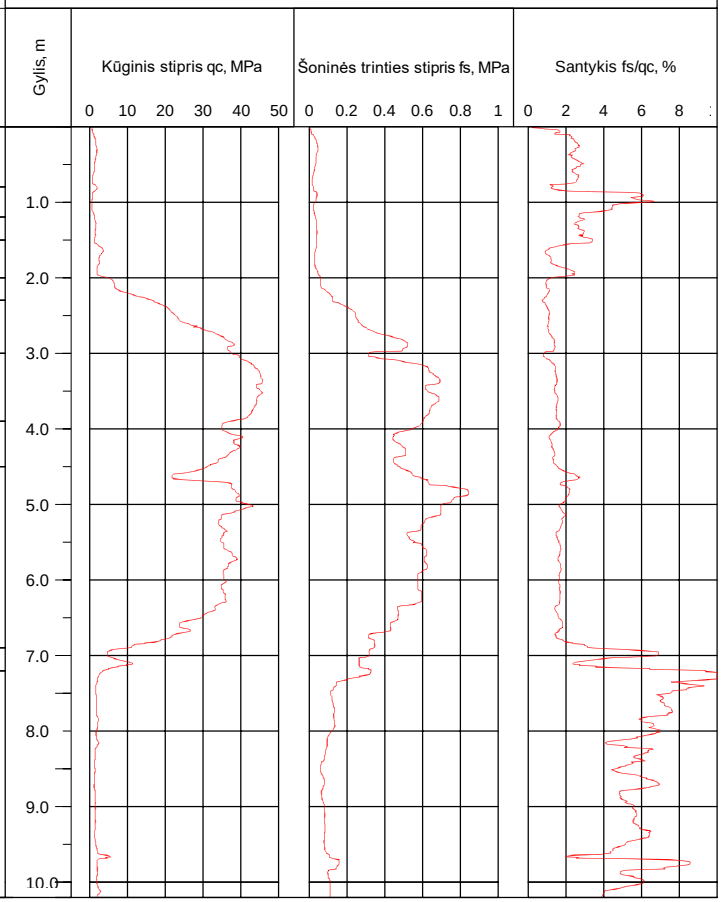
Bandymo įranga: Geomil, zondo Nr. S10CFIIP.S241361

Sudarė: inž. geologė A



Tyrimų data:	2025.12.23
Koordinatė x, m:	6114376
Koordinatė y, m:	512570
Abs. a., m:	70.3
Mvertikalus	1:100

Gruntinio vandens gylis, m	Gylis, m	IGS pado gylis, m	IGS storis, m	IGS pado abs. a., m	Litologija	IGS geologinis aprašymas (pagal LST EN ISO 14688)	IGS Nr.	Grunto mėginys	Stratigrafinis - genetinis indeksas	Vid. qc, MPa	Vid. fs, kPa
		0.8	0.8	69.5		Dirbtinis gruntas (Mg): supiltas/perkastas gruntas: dulkingas smėlis, dirvožemis, tamsiai rudas, pilkai rudas	1		t IV	1.3	30
	1.0	1.2	0.4	69.1		Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, silpnas	3	3/1	g III nm_3	0.6	32
		1.5	0.3	68.8			4			1.4	40
		2.0	0.5	68.3		Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo	6			2.5	37
	2.0	2.3	0.3	68.0			7	3/2		6.8	69
						Dulkingas smėlis (siSa), rudas, su mažo plastiškumo dulkio intarpu, drėgnas, purus				28.5	329
	3.0					Dulkingas smėlis (siSa), šviesiai rudas, drėgnas, vidutinio tankumo				43.3	608
4.1			3.2			Dulkingas smėlis (siSa), šviesiai rudas, drėgnas - vandeningas, labai tankus	9			36.5	494
	4.0	4.5		65.8							
	5.0		2.4			Mažo plastiškumo dulkis (SiL), rusvai pilkas, labai stiprus	10		lg III nm_3	32.7	572
	6.0	6.9		63.4							
	7.0	7.2	0.3	63.1		Vidutinio plastiškumo molis (ClM), rusvai pilkas, pilkas, labai stiprus	13	3/3		6.8	295
	8.0		3.0			Vidutinio plastiškumo molis (ClM), rusvai pilkas, pilkas, vidutinio stiprumo	11	3/4		1.7	101
	9.0										
	10.0	10.2		60.1							



PDF-XChange Editor Click to BUY NOW! www.pdf-xchange.com

Gręžinys Gr. 4 su geotechninio bandymo (CPT, TE1) kreivėmis

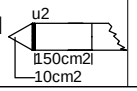
Objektas: 110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.

Gręžimo staklės VTX 800, gręžimas sraigtinis, skersmuo 90mm

Geotechninis bandymas: CPT (TE1), LST EN ISO 22476-1

Bandymo įranga: Geomil, zondo Nr. S10CFIIP.S241361

Sudarė: inž. geologė



Tyrimų data: 2025.12.23

Koordinatė x, m: 6114390

Koordinatė y, m: 512602

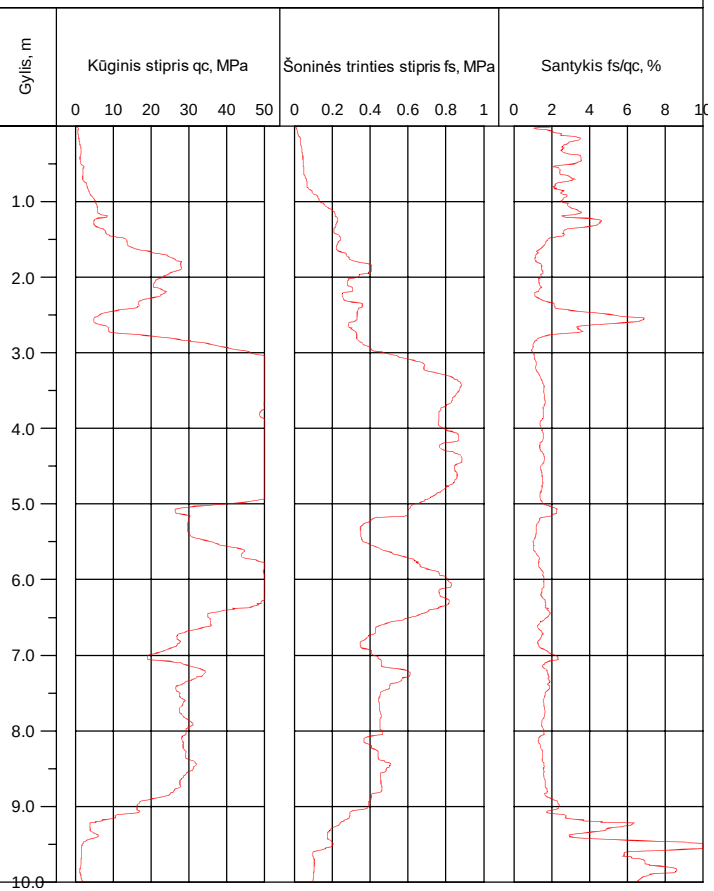
Abs. a., m: 70.9

Mvertikalus 1:100

Rangovas:

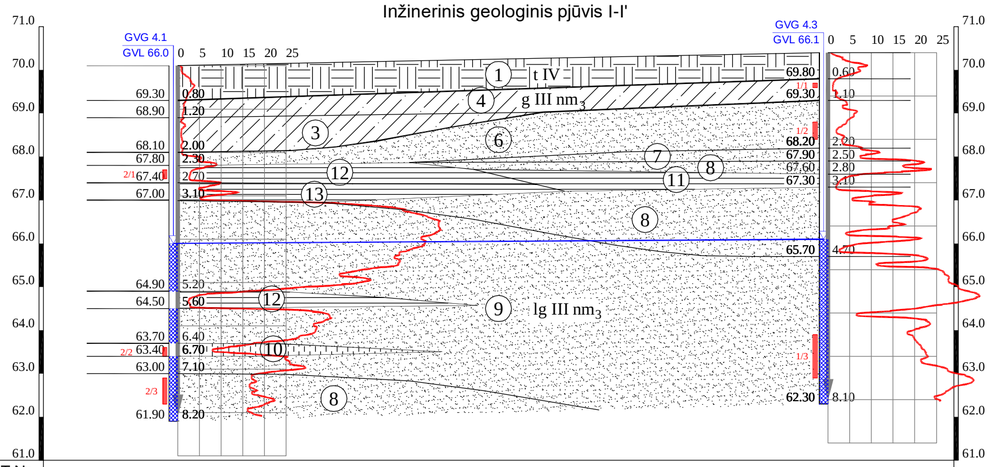
UAB "Geoconsulting"
tel.: 0-612-84305,
el. paštas: info@geoconsulting.lt
www.geoconsulting.lt

Gruntinio vandens gylis, m	Gylis, m	IGS pado gylis, m	IGS storis, m	IGS pado abs. a., m	Litologija	IGS geologinis aprašymas (pagal LST EN ISO 14688)	IGS Nr.	Grunto mėginys	Stratigrafinis - genetinis indeksas	Vid. qc, MPa	Vid. fs, kPa
		0.6	0.6	70.3		Dirvožemis (Hu), tamsiai rudas	2		pd IV	1.3	35
		0.9	0.3	70.0		Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo	4		g III nm_3	2.0	55
	1.0	1.6	0.7	69.3		Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, labai stiprus	5	4/1		6.5	193
	2.0	2.3	0.7	68.6		Dulkingas smėlis (siSa), rudas, drėgnas, labai tankus	9			23.1	305
		2.7	0.4	68.2		Vidutinio plastiškumo molis (CIM), tamsiai rudas, labai stiprus	13			10.1	319
	3.0									51.2	734
4.5	4.0					Dulkingas smėlis (siSa), šviesiai rudas, drėgnas - vandeningas, labai tankus					
	5.0								lg III nm_3	31.9	443
	6.0		6.2				9			49.2	725
	7.0									28.9	464
	8.0										
		8.9		62.0		Dulkingas smėlis (siSa), šviesiai rudas, vandeningas, tankus					
	9.0	9.2	0.3	61.7		Vidutinio plastiškumo molis (CIM), rusvai pilkas, pilkas, labai stiprus	8			14.3	337
		9.5	0.3	61.4			13			4.1	198
		10.0	0.5	60.9		Vidutinio plastiškumo molis (CIM), rusvai pilkas, pilkas, vidutinio stiprumo	11			1.5	116
	10.0										



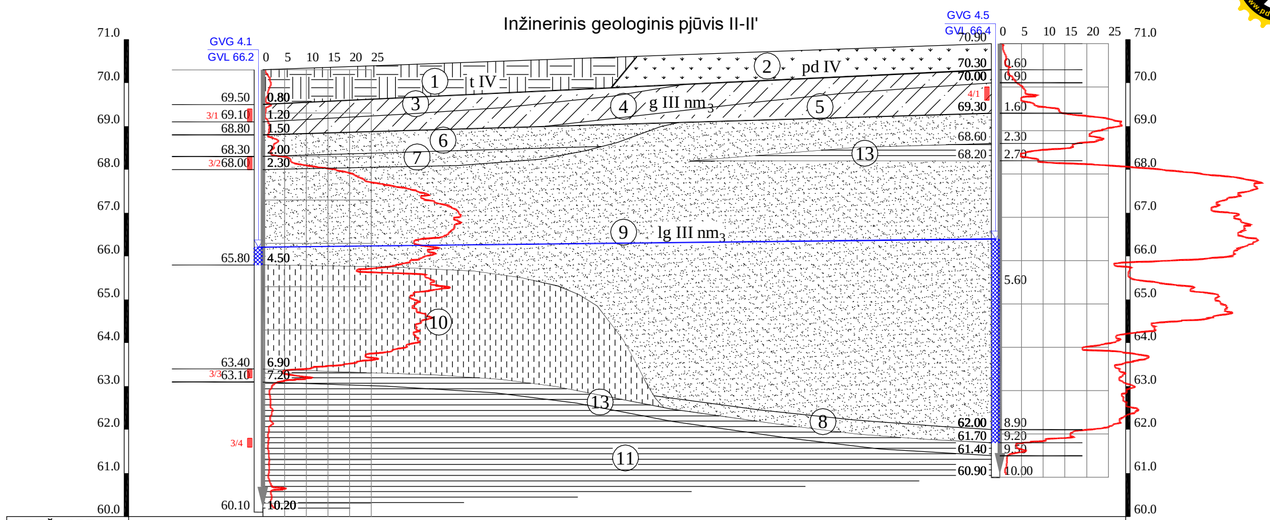
PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

Inžinerinis geologinis pjūvis I-I'

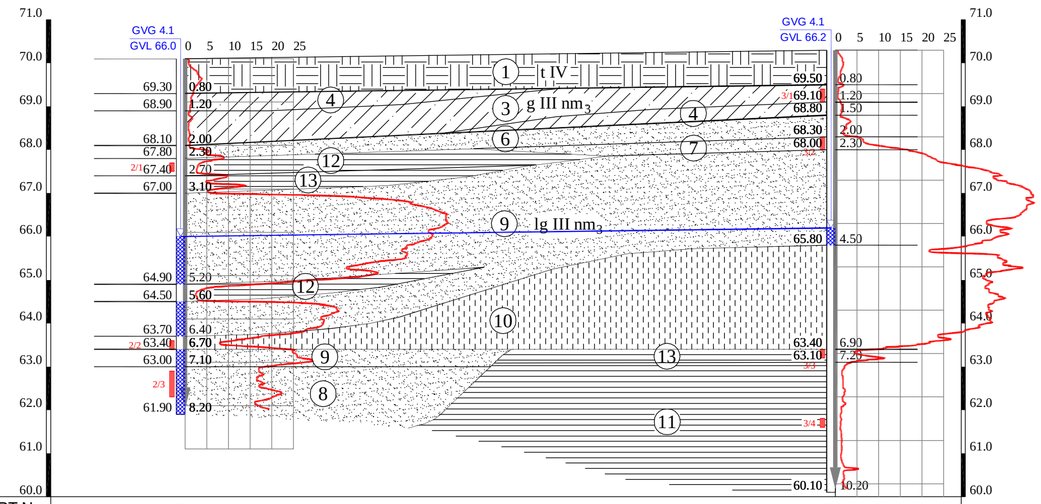


GRĘŽ./CPT Nr.	2	1
Abs.aukštis, m	70.10	70.40
Atstumas, m	30.00	
Tyrimų data	2025 12 23	2025 12 23

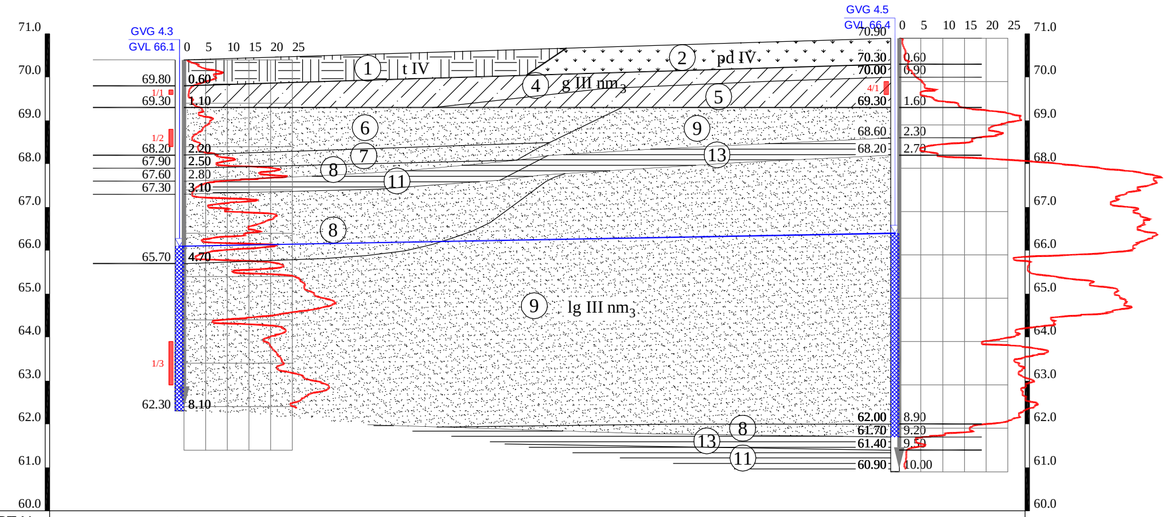
Inžinerinis geologinis pjūvis II-II'



GRĘŽ./CPT Nr.	3	4
Abs.aukštis, m	70.30	70.90
Atstumas, m	34.00	
Tyrimų data	2025 12 23	2025 12 23



GRĘŽ./CPT Nr.	2	3
Abs.aukštis, m	70.10	70.30
Atstumas, m	30.00	
Tyrimų data	2025 12 23	2025 12 23



GRĘŽ./CPT Nr.	1	4
Abs.aukštis, m	70.40	70.90
Atstumas, m	33.00	
Tyrimų data	2025 12 23	2025 12 23

I. IGS numeris ir aprašymas (pagal LST EN ISO 14688-1)

1. Dirbtinis gruntas (Mg): supiltas/perkastas gruntas: žvyringas smėlis, dulkingas smėlis, dirvožemis, smėlingas dulkingas molis, tamsiai rudas, pilkai rudas
2. Dirvožemis (Hu), tamsiai rudas
3. Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, silpnas
4. Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, vidutinio stiprumo
5. Smėlingas mažo plastiškumo molis moreninis (saCIL), rudas, su žvirgždu ir gargždu iki 5%, labai stiprus
6. Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio ir mažo plastiškumo dulkio intarpais, drėgnas, purus
7. Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas, vidutinio tankumo
8. Dulkingas smėlis (siSa), rudas, šviesiai rudas, su vidutinio plastiškumo molio intarpais, drėgnas - vandeningas, tankus
9. Dulkingas smėlis (siSa), šviesiai rudas, pilkas, rusvai pilkas, rudas, su vidutinio plastiškumo molio, mažo plastikšmo dulkio intarpais, drėgnas - vandeningas, labai tankus
10. Mažo plastiškumo dulkis (SiL), pilkai rudas, rusvai pilkas, labai stiprus
11. Vidutinio plastiškumo molis (ClM), rudas, rusvai pilkas, pilkas, vidutinio stiprumo
12. Vidutinio plastiškumo molis (ClM), pilkai rudas, stiprus
13. Vidutinio plastiškumo molis (ClM), rudas, rusvai pilkas, pilkas, su dulkingo smėlio intarpais, labai stiprus

II. Stratigrafinis - genetinis indeksavimas

t IV	Technogeniniai dariniai
pd IV	Augalinis sluoksnis
g III nm3	Viršutinio Pleistoceno viršutinio Nemuno svitos glacialinės nuogulos
lg III nm3	Viršutinio Pleistoceno viršutinio Nemuno svitos glacialinės nuogulos

III. Ribos

- stratigrafinė
- litologinė
- IGS pado (kraigo)
- gruntinio vandens lygio

IV. Kiti žymėjimai

gruntinio vandens gylis, m GVG 3.37
gruntinio vandens lygis, m abs.a. GVL 1.5
Gręžinio / CPT bandymo žiotys
IGS ribos altitudė, m abs.a. 3.37
3.37 IGS ribos gylis, m
grunto mėginys, jo Nr. 1/4
vandeningas sluoksnis
CPT bandymo kreivė q_c
7.16 CPT bandymo gylis, m
Gręžinio kirtavietės abs.a., m 7.16
7.16 Gręžinio gylis, m

Pareigos	V.,Pavardė	Parašas	Užsakovas: UAB "Energetikos projektai"
Direktorius			
Inž. geologė			
Brėžinys: Inžinerini			10/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.
Sutartiniai ženklai.			
Rangovas: UAB "Geoconsulting" tel.: 0-612-84305, el. paštas: info@geoconsulting.lt www.geoconsulting.lt			

Leidimo Nr.	Mastelis	Data	Grafinio priedo Nr.
1404841	V1:100, H1:200	2026 01	4

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

LIETUVOS GEOLOGIJOS TARNYBA
PRIE APLINKOS MINISTERIJOS

UAB „Geoconsulting"
El. p.: info@geoconsulting.lt

Į 2026-02-06 Nr. (4)-1-7-ŽGT(a)-2026-505

DĖL II GK PROJEKTINIŲ IGG TYRIMŲ Nr. 57599-2026 ATASKAITOS VERTINIMO

Lietuvos geologijos tarnyba prie Aplinkos ministerijos (toliau – Tarnyba), vadovaudamasi Tarnybos nuostatų, patvirtintų Lietuvos Respublikos aplinkos ministro 2002 m. birželio 14 d. įsakymu Nr. 316 „Dėl Lietuvos geologijos tarnybos prie Aplinkos ministerijos nuostatų patvirtinimo“, 9.1.4 papunkčiu ir Statybos techninio reglamento STR 1.04.02:2011 „Inžineriniai geologiniai (geotechniniai) tyrimai“, patvirtinto Lietuvos Respublikos aplinkos ministro 2011 m. gruodžio 29 d. įsakymu Nr. D1-1053 „Dėl Statybos techninio reglamento STR 1.04.02:2011 „Inžineriniai geologiniai (geotechniniai) tyrimai“ patvirtinimo“ (toliau – Reglamentas) 125 ir 126 punktais, prieš įregistruodama Jūsų teikiamą II geotechninės kategorijos projektinių inžinerinių geologinių tyrimų ataskaitą objektui „110/10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r. sav.“ (toliau – Tyrimų ataskaita) atliko jos vertinimą.

Tarnyba pažymi, kad Tyrimų ataskaita yra parengta pagal Reglamento nuostatas. Tyrimų ataskaita perduota Geologijos fondui.

Šis raštas per vieną mėnesį nuo jo gavimo dienos pasirinktinai gali būti skundžiamas Lietuvos administracinių ginčų komisijai (A. Goštauto g. 12-100, 01108 Vilnius) Lietuvos Respublikos ikiteisminio administracinių ginčų nagrinėjimo tvarkos įstatymo nustatyta tvarka arba Regionų administraciniam teismui (Vilniaus rūmai, Žygimantų g. 2, 01102 Vilnius; Kauno rūmai, A. Mickevičiaus g. 8A, 44312 Kaunas; Klaipėdos rūmai, Galinio Pylimo g. 9, 91230 Klaipėda; Šiaulių rūmai, Dvaro g. 80, 76298 Šiauliai; Panevėžio rūmai, Respublikos g. 62, 35158 Panevėžys, arba per Lietuvos teismų elektroninių paslaugų portalą https://e.teismas.lt) Lietuvos Respublikos administracinių bylų teisenos įstatymo nustatyta tvarka.

PRIDEDAMA.
Sąskaita faktūra Nr. LGTA 0010476

Direktorius

lgt.lt

PDF-XChange Editor
Click to BUY NOW!
www.pdf-xchange.com

Duomenys eksportuoti iš Dokumentų valdymo bendrosios informacinės sistemos
Suformuota: 2026 m. vasario 23 ... :30
Suformavo: vyresnioji specialistė Indrė F...

Siunčiamasis dokumentas

Registracijos duomenys	
Būsena	Registruota
Registracijos data	2026-02-23
Registracijos numeris	1.7-983
Dalinys	Inžinerinės geologijos skyrius
Registras	1.7: Siunčiamų dokumentų registras
Byla	2026: 1.22 Mr: Susirašinėjimo su Lietuvos Respublikos įstaigomis, įmonėmis, organizacijomis informacinio pobūdžio geologijos klausimais dokumentai
Bylos forma	Elektroniniai dokumentai
Registratorius	vyresnioji specialistė
Elektroninis dokumentas	Taip
Darbų eiga	LGT Siunčiamų dokumentų procesas [proj]
Dokumento informacija	
Siuntėjai	Lietuvos geologijos tarnyba prie Aplinkos ministerijos
Gavėjai	UAB "Geoconsulting", Klaipėda, Žolynų g. 29-1, LT-92325, 141884781
Dokumentą parengė	Patarėjas
Dokumentą derino	Vedėja Vedėja , Direktoriaus pavaduotoja (geologijai)
Dokumentą pasirašė	Direktorius
Antraštė	DĖL II GK PROJEKTINIŲ IGG TYRIMŲ Nr. 57599-2026 ATASKAITOS VERTINIMO
Dokumento rūšis	RAŠTAS
Dokumento siuntimo būdas	El. paštu
Lapų skaičius	1
Laikinas Nr.	214245879
ADOC	
Rastas_APM57599-2026EV_Geoconsulting_IGGT_IIGK-110_10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r_AT_Vert.adoc	
Rastas_APM57599-2026EV_Geoconsulting_IGGT_IIGK-110_10 kV Žeimių TP skirstykla Dargužių g. 4 ir 6, Palankesių k., Jonavos r_AT_Vert.docx	
Priedai	
LGTA0010476 geoconsulting 57784 57599 57602.pdf	
Pridedami dokumentai	

Pasibaigę darbai		
Vedėja	2026-02-19 16:41:15	Teigiamai derinta versija 1.0. Pastabos:
Vedėja	2026-02-20 13:42:19	Teigiamai derinta versija 1.0. Pastabos:
Direktoriaus pavaduotoja (geologijai)	2026-02-20 20:57:46	Teigiamai derinta versija 1.0. Pastabos:
Direktorius	2026-02-23 10:12:30	Pasirašyta versija 1.0. Pastabos:
vyresnioji specialistė	2026-02-23 10:30:37	Registruotas dokumentas: 1.7: Siunčiamų dokumentų registras 2026: 1.22 Mr: Susirašinėjimo su Lietuvos Respublikos įstaigomis, įmonėmis, organizacijomis informacinio pobūdžio geologijos klausimais dokumentai