NARUČITELJ:	**“TERAKOP” GRAĐEVINSKI OBRT, PARTIZANSKA 13, POREČ** **OIB: 79878419670**
OBJEKT:	**PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA**
LOKACIJA :	**POREČ, R. HRVATSKA** **KČ 1232/64, 1232/67, 1232/68 i 1836/25 K.O. ŽBANDAJ**
RAZINA PROJEKTA:	**GLAVNI PROJEKT**
STRUKA PROJEKTA:	**GRAĐEVINSKI PROJEKT KONSTRUKCIJE**
MAPA:	**3**
PROJEKTANT:	**IVA LAZARIĆ, mag.ing.aedif.**
DIREKTOR:	**TONI LAZARIĆ, mag.ing.arch.**
Z.O.P.	**GP 15/2017**
OZNAKA PROJEKTA:	**G15/2017**
DATUM:	**STUDENI 2017**

POPIS MAPA:

1. MAPA 1

Glavni arhitektonski projekt
Projekt dovoda i odvoda vode
Broj projekta: 15/2017
Zajednička oznaka projekta:GP 15/2017
KONZOLA ARHITEKTURA j.d.o.o., Epulonova 17, Novigrad,
Projektant: Toni Lazarić, mag.ing.arch.

2.MAPA 2

Projekt fizike zgrade
Elaborat zaštite od buke
Projekt racionalne uporabe energije i toplinske zaštite
Broj projekta: 49/2017
Zajednička oznaka projekta:GP 15/2017
Naravno d.o.o., Torbarova 13, Zagreb
Projektant: Nataša Hrsan, d.i.a.

3.MAPA 3

Građevinski projekt konstrukcije
Broj projekta: G15/2017
Zajednička oznaka projekta:GP 15/2017
KONZOLA ARHITEKTURA j.d.o.o., Epulonova 17, Novigrad,
Projektant: Iva Lazarić, mag.ing.aedif.

4. MAPA 4

Glavni elektrotehnički projekt
Broj projekta: 77/07/17
Zajednička oznaka projekta:GP 15/2017
M-PROJEKT d.o.o., Maršeti 16/I, Pazin
Projektant: Dino Ferenčić, mag.ing.el.

5. MAPA 5

Glavni projekt strojarskih instalacija
Broj projekta :840817-M/S
Zajednička oznaka projekta: GP 15/2017
ASSEQUI GRUPA d.o.o., Brajkovići 33B, Pazin
Projektant: Toni Lakošeljac, dip.ing.stroj.

6. MAPA 6

Geodetski projekt
Broj projekta: 133/2017
Zajednička oznaka projekta:GP 15/2017
GEOPLAN d.o.o., Partizanska 4, Poreč
Projektant: Goran Sandalj, mag.ing.geod.
laborati koji su prethodili izradi glavnog projekta:

-**Elaborat zaštite od požara**
Broj elaborata: 58/07/17-NK
Zajednička oznaka projekta: GP 15/2017
Ing.Labos d.o.o., Pula
Ovlaštena osoba: Nadan Kosanović, dipl.ing.stoj.

-**Elaborat zaštite na radu**
Broj elaborata: 850817-T/EZNR
Zajednička oznaka projekta: GP 15/2017

ASSEQUI GRUPA d.o.o., Brajkovići 33B, Pazin
Projektant: Toni Lakošeljac, dip.ing.stroj.

-Elaborat alternativnih sustava opskrbe energijom
Broj projekta: 15/2017
Zajednička oznaka projekta:GP 15/2017
KONZOLA ARHITEKTURA j.d.o.o., Epulonova 17, Novigrad
Projektant: Toni Lazarić, mag.ing.arch.

-Izvještaj o rezultatima inženjersko-geološko-geomehaničkim istraživanjima izvedenim na k.č. 1232/64, 1232/67, 1232/68 I 1836/25 k.o. Žbandaj – geomehanički elaborat
Broj projekta: G37/2017-04.09.2017.
Zajednička oznaka projekta:GP 15/2017
GEOS, društvo za geološka istraživanja, projektiranje i inženjering, Istarska 56, Rovinj
Rukovoditelj projekta: Glišo Rašković, dipl.ing.geol.

Broj projekta:

Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	“TERAKOP” GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3.

MAPA 3
PROJEKT KONSTRUKCIJE

Broj projekta:	
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	“TERAKOP” GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3. SADRŽAJ:

I	**OPĆI DOKUMENTI**
	Izvod iz sudskog registra
	Rješenje o imenovanju odgovornog projektanta
	Uvjerenje o položenom stručnom ispitu odgovornog projektanta
	Izjave o promjenjenim propisima i standardima za proračun
	Licence za korištenje software-a
	Projektni zadatak
II	**ANALIZA KONSTRUKCIJE**
	Plan konstrukcije
	Tehnički opis
	Statički proračun
	Iskaz procijenjenih troškova gradnje

Broj projekta:

Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	“TERAKOP” GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3. Izvod iz sudskog registra

REPUBLIKA HRVATSKA
TRGOVAČKI SUD U PAZINU

MBS:130051551
Tt-15/6005-5

R J E Š E N J E

Trgovački sud u Pazinu po višem sudskom savjetniku Marlena Pamić u registarskom postupku upisa u sudski registar osnivanja jednostavnog društva s ograničenom odgovornošću KONZOLA ARHITEKTURA jednostavno društvo s ograničenom odgovornošću za projektiranje i stručni nadzor građenja, na zahtjev predlagatelja KONZOLA ARHITEKTURA jednostavno društvo s ograničenom odgovornošću za projektiranje i stručni nadzor građenja, Novigrad, Epulonova 17, na temelju članka 58. st. 2. Zakona o sudskom registru ("Narodne novine" broj 1/95, 57/96, 1/98, 30/99, 45/99, 54/05, 40/07, 91/10, 90/11, 148/13, 93/14 i 110/15; u daljnjem tekstu: Zakon o sudskom registru), 25.11.2015. godine

r i j e š i o j e

u sudski registar ovoga suda upisuje se:

- ispravak rješenja o upisu od 13. studenoga 2015. godine pod poslovnim brojem Tt-15/6005-2 koji ispravak se odnosi na pogrešku u rješenju i to u odnosu na tvrtku subjekta upisa upisanog

pod tvrtkom / nazivom KONZOLA ARHITEKTURA jednostavno društvo s ograničenom odgovornošću za projektiranje i stručni nadzor građenja sa sjedištem u Novigrad, Epulonova 17, u registarski uložak s MBS 130051551, OIB 85176229919, prema podacima naznačenim u prilogu ovog rješenja ("Podaci za upis u glavnu knjigu sudskog registra") koji je njegov sastavni dio.

TRGOVAČKI SUD U PAZINU

U Pazinu, 25. studenoga 2015. godine

Viši sudski savjetnik

Marlena Pamić

Uputa o pravnom lijeku:

Pravo na žalbu protiv ovog rješenja ima sudionik ili druga osoba koja za to ima pravni interes. Žalba se podnosi u roku od 8 (osam) dana Visokom trgovačkom sudu Republike Hrvatske u dva primjerka, putem prvostupanjskog suda.

TRGOVAČKI SUD U PAZINU — MBS: 130051551
Tt-15/6005-5 — Datum: 25.11.2015

PODACI ZA UPIS U GLAVNU KNJIGU SUDSKOG REGISTRA
(prilog uz rješenje)

Pod brojem upisa 2 za tvrtku KONZOLA ARHITEKTURA jednostavno društvo s ograničenom odgovornošću za projektiranje i stručni nazor građenja upisuje se:

SUBJEKT UPISA

TVRTKA:

1# KONZOLA ARHITEKTURA jednostavno društvo s ograničenom odgovornošću za projektiranje i stručni nazor građenja
KONZOLA ARHITEKTURA jednostavno društvo s ograničenom odgovornošću za projektiranje i stručni nadzor građenja

Napomena: Podaci označeni s "#" prestali su važiti!

U Pazinu, 25. studenoga 2015.

Viši sudski savjetnik
Marlena Pamić

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	“TERAKOP” GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3 Rješenje o imenovanju odgovornog projektanta

ELABORAT BROJ:	**G15/2017**
ZAJEDNIČKA OZNAKA:	**GP 15/2017**
REDNI BROJ MAPE:	**3**
DATUM:	**STUDENI 2017.**
INVESTITOR:	**TERAKOP GRAĐEVINSKI OBRT, Partizanska 13, 52440 Poreč OIB: 79878419670**
GRAĐEVINA:	**PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA**
LOKACIJA:	**K.Č. 1232/64, K.Č. 1232/67, K.Č.1232/68, K.Č.1836/25 sve k.o. ŽBANDAJ KOJE SE OBJEDINJUJU U K.Č. 1232/64 K.O. ŽBANDAJ**
FAZA PROJEKTA:	**GLAVNI PROJEKT**
VRSTA PROJEKTA:	**GRAĐEVINSKI PROJEKT**
PROJEKTANT	**IVA LAZARIĆ mag.ing.aedif.**
DIREKTOR:	**TONI LAZARIĆ mag.ing.arch.**

Na osnovu članka 51. Zakona o gradnji Konzola arhitektura j.d.o.o. Novigrad, Epulonova 17 OIB 85176229919, zastupan po direktoru Toniju Lazariću mag.ing.arh. **imenuje za projektanta građevinskog projektanta**: **PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA NA K.Č. 1232/64, K.Č. 1232/67, K.Č.1232/68, K.Č.1836/25 sve k.o. ŽBANDAJ**
IVU LAZARIĆ, mag.ing.aedif., ovlaštenog arhitekta
Imenovani Projektant je odgovoran da projekt koji će izraditi ispunjavati propisane uvjete, da će građevina biti projektirana u skladu s lokacijskIm uvjetima, odnosno uvjetima za građenje građevina propisanim prostornim planom te da će ispunjavati temeljne zahtjeve za građevinu, zahtjeve propisane za energetska svojstva zgrada i druge propisane zahtjeve i uvjete.
Novigrad, studeni 2017.

direktor
Toni Lazarić, mag.ing.arh.

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	"TERAKOP" GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3. Uvjerenje o položenom stručnom ispitu odgovornog projektanta

/

REPUBLIKA HRVATSKA

HRVATSKA KOMORA
INŽENJERA GRAĐEVINARSTVA

10000 Zagreb, Ulica grada Vukovara 271

KLASA:	UP/I-360-01/17-01/5
URBROJ:	500-03-17-3
Zagreb,	19. siječnja 2017. godine

Hrvatska komora inženjera građevinarstva na temelju članka 26. stavka 5. i članka 27. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju ("Narodne novine", broj 78/15.) odlučujući o zahtjevu koji je podnijela **Iva Lazarić, Novigrad, Epulonova 17,** donosi slijedeće

RJEŠENJE

1. U Imenik ovlaštenih inženjera građevinarstva upisuje se **Iva Lazarić, mag.ing.aedif., Novigrad, Epulonova 17, OIB 80962400718,** pod rednim brojem **5668**, s danom upisa **19.01.2017**. godine.

2. Upisom u Imenik ovlaštenih inženjera građevinarstva **Iva Lazarić, mag.ing.aedif.**, stječe pravo na uporabu strukovnog naziva **"ovlaštena inženjerka građevinarstva"** i pravo na obavljanje stručnih poslova temeljem članka 48., 50., 53. stavak 1. i 2., 55. Zakona o poslovima i djelatnostima prostornog uređenja i gradnje ("Narodne novine", broj 78/15.), te ostala prava i dužnosti sukladno ovom Zakonu, posebnim zakonima i propisima donesenim temeljem tih zakona, te općim aktima Komore.

3. Ovlaštenoj inženjerki građevinarstva Hrvatska komora inženjera građevinarstva izdaje **"pečat i iskaznicu ovlaštene inženjerke građevinarstva"**, koje su vlasništvo Komore.

Obrazloženje

Dana 04.01.2017. godine Iva Lazarić, mag.ing.aedif., podnijela je zahtjev za upis u Imenik ovlaštenih inženjera građevinarstva.

U prilogu zahtjeva, podnositeljica zahtjeva je podnijela slijedeću dokumentaciju:
- presliku važećeg osobnog dokumenta,
- presliku diplome,
- presliku suplementa diplome,
- presliku Uvjerenja o položenom stručnom ispitu za obavljanje poslova prostornog uređenja i graditeljstva,
- dokaz o radnom stažu (Elektronički zapis o podacima evidentiranim u matičnoj evidenciji Hrvatskog zavoda za mirovinsko osiguranje),
- popis poslova u struci ovjeren od strane poslodavca s dokazima,
- ugovor o poslovno teh.suranji,

2

- preslike gotovih naslovnica projekata potpisane i ovjerene od odgovornog projektanta na kojima se navode suradnici u projektiranju,
- dokaz o uplati upisnine u iznosu od 1.000,00 kn,
- 70,00 kn Upravne pristojbe (biljezi RH),
- jednu fotografiju veličine 35x45 mm.

Prema odredbi članka 27. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju pravo na upis u Imenik ovlaštenih arhitekata, ovlaštenih arhitekata urbanista, odnosno ovlaštenih inženjera Komore ima fizička osoba koja kumulativno ispunjava sljedeće uvjete:

1. da je završila odgovarajući preddiplomski i diplomski sveučilišni studij ili integrirani preddiplomski i diplomski sveučilišni studij i stekla akademski naziv magistar inženjer, ili da je završila

2. odgovarajući specijalistički diplomski stručni studij i stekla stručni naziv stručni specijalist inženjer ako je tijekom cijelog svog studija stekla najmanje 300 ECTS bodova, odnosno da je na drugi način propisan posebnim propisom stekla odgovarajući stupanj obrazovanja odgovarajuće struke,

3. da je po završetku odgovarajućeg diplomskog sveučilišnog studija ili po završetku odgovarajućeg specijalističkog diplomskog stručnog studija provela na odgovarajućim poslovima u struci najmanje dvije godine, da je po završetku odgovarajućeg diplomskog sveučilišnog studija ili odgovarajućeg specijalističkog diplomskog stručnog studija provela na odgovarajućim poslovima u struci najmanje jednu godinu, ako je uz navedeno iskustvo po završetku odgovarajućeg preddiplomskog sveučilišnog ili po završetku odgovarajućeg preddiplomskog stručnog studija stekla odgovarajuće iskustvo u struci u trajanju od najmanje tri godine, odnosno bila zaposlena na stručnim poslovima graditeljstva i/ili prostornoga uređenja u tijelima državne uprave ili jedinica lokalne i područne (regionalne) samouprave, te zavodima za prostorno uređenje županije, odnosno Grada Zagreba najmanje deset godina,

4. da je ispunila uvjete sukladno posebnim propisima kojima se propisuje polaganje stručnog ispita.

U postupku koji je prethodio donošenju ovog rješenja izvršen je uvid u priloženu dokumentaciju i utvrđeno je da je zahtjev podnositeljice osnovan, te da podnositeljica udovoljava kumulativno svim uvjetima za upis u Imenik ovlaštenih inženjera građevinarstva koji su propisani člankom 27. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju.

Podnositeljica zahtjeva stekla je pravo na uporabu strukovnog naziva „ovlaštena inženjerka građevinarstva" i pravo na obavljanje stručnih poslova temeljem članka 48., 50., 53 stavak 1. i 2., 55. Zakona o poslovima i djelatnostima prostornog uređenja i gradnje, te ostala prava i dužnosti sukladno ovom Zakonu, posebnim zakonima i propisima donesenim temeljem tih zakona, te općim aktima Komore.

Ovlaštena inženjerka građevinarstva dužna je izvršavati navedene stručne poslove sukladno zakonu te temeljnim načelima i pravilima struke koje treba poštovati ovlaštena inženjerka građevinarstva.

Pravo na obavljanje navedenih stručnih poslova prestaje s prestankom članstva u Komori, u skladu s člankom 34. i 35. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju.

Ovlaštenoj inženjerki građevinarstva Hrvatska komora inženjera građevinarstva izdaje "pečat i iskaznicu ovlaštene inženjerke građevinarstva", sukladno članku 26. stavku 5. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju.

Ovlaštena inženjerka građevinarstva dužna je plaćati Hrvatskoj komori inženjera građevinarstva članarinu i ostala davanja koja utvrde tijela Komore, osim u slučaju mirovanja članstva i privremenog prekida obavljanja djelatnosti, a pri prestanku članstva u Komori dužna je podmiriti sve dospjele financijske obveze prema Komori, sve sukladno članku 13. stavku 1. točki 5. Statuta Hrvatske komore inženjera građevinarstva.

Ovlaštena inženjerka građevinarstva dobiva putem Hrvatske komore inženjera građevinarstva Potvrdu o polici osiguranja od profesionalne odgovornosti kod odabranog osiguravatelja. Polica se izdaje na razdoblje od godine dana i obnavija svake godine. Premija osiguranja plaća se sa članarinom, odnosno uračunava se u iznos članarine, sve u skladu s člankom 55. Stavcima 1. i 2. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju.

Ovlaštena inženjerka građevinarstva uplatila je za upis Hrvatskoj komori inženjera građevinarstva upisninu u iznosu od 1.000,00 kn sukladno članku 13. stavku 1. točki 4. Statuta Hrvatske komore inženjera građevinarstva.

Upravna pristojba plaćena je upravnim biljegom emisije Republike Hrvatske koji je zalijepljen na podnesak i poništen, u vrijednosti 20,00 kn (slovima: dvadeset kuna) prema tarifnom br. 1 i u vrijednosti od 50,00 kn (slovima: pedeset kuna), prema tar.br. 2. Zakona o upravnim pristojbama („Narodne novine" broj 8/96, 77/96, 95/97, 131/97, 68/98, 66/99, 145/99, 30/00- Odluka Ustavnog suda, 116/00, 163/03, 17/04, 110/04, 141/04, 150/05, 153/05, 129/06, 117/07, 25/08, 60/08, 20/10, 69/10, 126/11, 112/12, 19/13, 80/13, 40/14, 69/14, 87/14, 94/14).

Slijedom navedenog, na temelju članaka 26. i 27. Zakona o komori arhitekata i komorama inženjera u graditeljstvu i prostornom uređenju, odlučeno je kao u izreci.

Uputa o pravnom lijeku:

Protiv ovog rješenja dopuštena je žalba koja se podnosi Ministarstvu graditeljstva i prostornoga uređenja u roku 15 dana od dana dostave rješenja. Žalba se predaje neposredno ili šalje poštom u pisanom obliku, u tri primjerka, putem tijela koje je izdalo rješenje.

Na žalbu se plaća pristojba u iznosu od 50,00 kuna državnih biljega prema Tar.br. 3. Tarife upravnih pristojbi Zakona o upravnim pristojbama.

REPUBLIKA HRVATSKA
HRVATSKA KOMORA INŽENJERA GRAĐEVINARSTVA

Predsjednik
Hrvatske komore inženjera građevinarstva

Zvonimir Sever, dipl.ing.građ.

Dostaviti:
1. **Iva Lazarić,**
   52466 Novigrad, Epulonova 17
2. U Zbirku isprava Komore

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	"TERAKOP" GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3. Izjave o primijenjenim propisima i standardima za proračun

I Z J A V A   P R O J E K T A N T A
O USKLAĐENOSTI GLAVNOG PROJEKTA S ODREDBAMA POSEBNIH ZAKONA I DRUGIH PROPISA

Investitor:	**„TERAKOP“ GRAĐEVINSKI OBRT, PARTIZANSKA 13 POREČ**
Građevina:	**PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA**
Lokacija:	**K.Č. 1232/64, 1232/67, 1232/68 i 1836/25 K.O. ŽBANDAJ**
Vrsta projekta :	**Projekt konstrukcije**
Faza :	**Glavni projekt**
Oznaka projekta:	**G15/2017**

Projekt konstrukcije predmetne građevine izrađen je u skladu s posebnim uvjetima, važećim zakonima, tehničkim propisima i HR normama:

1. Zakon o gradnji (“Narodne novine”, broj 153/13, 20/17)
2. Zakon o prostornom uređenju (153/13, 65/2017)
3. Zakon o poslovima i djelatnostima prostornog uređenja i gradnje(„Narodne novine“ broj 78/15)
4. Zakon o zaštiti od požara (“Narodne novine”, broj 92/10)
5. Zakon o zaštiti na radu (“Narodne novine”, broj 71/2014)
6. Tehnički propis za građevinske konstrukcije („Narodne novine" broj 17/17.) - stupio na snagu 04. ožujka 2017. godine
7. Tehnički propis za čelične konstrukcije (“NN”, broj 112/08, 125/10, 73/12 i 136/12)
8. Tehnički propis za zidane konstrukcije (“NN”, broj 01/07)
9. Tehnički propis za betonske konstrukcije (“NN”, broj 139/09) te Izmjene i dopune tehničkog propisa za betonske konstrukcije (“NN”, broj 14/2010, 125/2010 i 136/2012) s pripadnim pravilnicima i normama
10. Geotehničko projektiranje (upućuje TPBK) _ HRN EN 1997-1:2012, 1997-1:2012/NA:2012
11. Projektiranje potresne otpornosti konstrukcija – 1. Dio: Opća pravila, potresna djelovanja i pravila za zgrade (upućuje TPBK) _ HRN EN 1998-1:2011, 1998-1:2011/NA:2011
12. Pravilnik o kontroli projekata (“Narodne novine”, broj 32/14 i 69/14)

Uz ove osnovne propise sastavni dio propisa čine i svi prateći propisi i standardi koji obrađuju ovo područje i s njima čine cjelinu (veza s ostalim propisima i standardima).

Novigrad, studeni 2017.

PROJEKTANT:
Iva Lazarić, mag.ing.aedif.

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	"TERAKOP" GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3. Licence za korištenje software-a

Korišteni programski paketi.

Za analizu i dimenzioniranje ab i čeličnih elemenata konstrukcije korišten je programski paket Tower 7.0 - 3D MODEL BUILDER, dok je za proračun i dimenzioniranje prednapregnutih elemenata korišten namjenski program „abacus“. Za proračun ošupljenih ploča korišten je specijalizirani programski paket FloorCad.

28-02-03 11:32 From- T-657 P.01/03 F-428

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I.S. EN ISO 9001

18th April 2000

T-JM/CB

RE: VETTING OF HOLLOWCORE CHECKER PROGRAM FOR FINLAY PRECAST

In May 1999, O'Connor Sutton Cronin were requested by Finlay Precast to undertake in vetting the new Windows version of the Finlays Precast Hollowcore Program written by Mr Eddie Fallon.

The program vetted is the checker program for the 500mm deep pre-cast hollowcore unit called "Finlay 500". This checker program is linked to the full version compiler program to give a breakdown of all fundamental values and design calculation results of the compiler program. The checker program was used to calculate design examples but was limited as it did not have the facility for opes and point loads. From this a thorough check was carried out in order to verify the results.

The check consisted of computing sample calculations and verifying the results by means of independent hard calculations.

The following comments of the vetting process include:

- The design calculations and methods of the program are generally based on BS8110 "Structural Use of Concrete" and design examples from "Reinforced Concrete Design" by Mosley and Bungey.

- Fundamentals such as the area of the profile, strand patterns, second moment of area values, design strength and characteristics of both concrete and reinforcing strands etc. were agreed prior to the commencement of the check.

- As various discrepancies between program results and hand calculations were encountered the program was constantly updated until agreement between computed results and hand calculations were achieved.

- **Losses:**
  The breakdown of losses include elastic shortening, relaxation of strands shrinkage and creep. Method used for calculation is based on design examples from Mosley and Bungey. Elastic shortening and creep calculations include in their equations the values of self weight stress whereas this is ignored in the design example by Mosley and Bungey.

- **Stresses:**
  The program calculates stresses for both transfer and service conditions and both are based on design examples from Mosley and Bungey.

- **Ultimate Moment of Resistance:**
  Calculation from the program is based on the design example from Mosley and Bungery but also takes into account the strain of the mesh when a structural screed is applied. Cracked moment capacity is based on calculation from BS8110 Part 1 Sec. 4. The applied ultimate bending moment diagram is calculated from pressure diagrams.

- **Uncracked Shear:**
  Method of calculation based on BS8110 Part 1 Sec. 4 and design examples from Mosley and Bungey. Applied ultimate shear loads are calculated from pressure diagrams.

- **Cracked Shear:**
  Method of calculation based on BS8110 Part 1 Sec. 4 and design examples from Mosley and Bungey.

2

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	“TERAKOP” GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

M-3. TEHNIČKI OPIS I TEHNIČKI UVJETI

TEHNIČKI OPIS KONSTRUKCIJE

Predmet projektiranja je nosiva konstrukcija proizvodnog pogona za savijanje metala, rezanje metala i izradu predgotovljenih elemenata od metala (građevine gospodarske namjene-proizvodne) čija je gradnja planirana na K.Č. 1232/64, 1232/67, 1232/68 i 1836/25 K.O. Žbandaj - Poreč R. Hrvatskoj.
Investitor objetka je „TERAKOP“ građevinski obrt Poreč.
Objekt je pravokutne osnove osnih dimenzija u osnovi 35,34x19,00 m, etažnosti prizemlja. Visina objekta je od 9,30 do 9,68 m od kote 0,00 do pod glavni krovni nosač.
Osni rasponi po dužini su 3x11,78 m a osni raspon po širini je 1x19,00 m. Na koti +7,50 m projektiran je kran nosivosti 6,30 tona (63 KN). Između osi 1-2 planirana je galerija koje će se naknadno izvesti u klasici prema potrebi investitora. Objekt je projektiran kao montažni ab. Objekt ima jednovodni krov sa nagibom krovne ravnine od 2%. Zatvaranje objekta je ab fasadnjacima debljine 20 cm. Konstrukcija objekta se sastoji od linijskih montažnih horizontalnih elemenata izrađenih od prednapregnutog betona tehnologijom adhezionog prednaprezanja i vertikalnih ab montažnih elemenata. Konstrukcija se sastoji od sljedećih elemenata konstrukcije:

- Temelji samci
- Stupovi
- Kranske grede T 80
- Glavni krovni T 140 nosači
- Glavni krovni T 80 nosači
- Sekundarni krovni nosači R63-rožnjače
- Sekundarni krovni obodni nosači T-80
- Sekundarni krovni nosači T-80 – olučne grede

Prilikom modeliranja i proračuna konstrukcije u obzir su uzete karakteristike montažnih elemenata sa točnim poprečnim presjecima, kao i karakteristike međusobnih veza među elementima, tako da je konstrukcija projektirana sa statički određenim sistemom, odnosno sve veze elemenata konstrukcije projektirane su kao zglobne, osim veza stupova i temelja koje su projektirane kao puno uklještenje. Prilikom modeliranja konstrukcije također su uzeta u obzir i sva opterećenja koja će se javiti u toku eksploatacije konstrukcije, a intenziteti pojedinih opterećenja dani su u poglavlju ''Analiza opterećenja''.
Proračun konstrukcije rađen je programskim paketima Tower 7 i Abacus čije licence su dane u ovom elaboratu.
Temeljenje objekta je projektirano sa temeljima samcima, a na osnovu statičkog proračuna i nosivosti tla prema geomehaničkom elaboratu koja je 650,00 kN/m^2

U prilogu je dat izvod iz geomehaničkog elaborata:

Neke od geomehaničkih značajki debelo uslojenih vapnenaca (koji su laboratorijski ispitani na brojnim lokalitetima u okolici) mogu se koristiti sa slijedećim vrijednostima:

Tablica br. 1 – *Geomehaničke karakteristike vapnenaca kao tehničko-građevnog kamena*

Značajke	*Podznačajke*	*Vrijednost*	*Jed.mj.*
Čvrstoća na pritisak	u suhom stanju	**187**	MPa
	u vodom zasićenom stanju	**155**	MPa
	nakon smrzavanja	**163**	MPa
Upijanje vode		**0,84**	% mase
Obujamska masa		**2 717**	kg/m^3
Otpornost na habanje (Böhme)		**20,81**	cm^3/50cm^2
Brzina prostiranja longitudinalnih valova		**5 015**	m/s

6.2. Geomehanički proračun

Obzirom na utvrđene inženjersko-geološke karakteristike tla i na preporuku za temeljenje na matičnoj stijeni (debelo uslojenim vapnencima) date su iskustvene vrijednosti koje su vjerodostojne i verificirane praćenjem ponašanja izgrađenih građevina na sličnom ili identičnom tlu u okolici istraživanog lokaliteta te na širokom prostoru u Hrvatskoj u periodu od najmanje tridesetak godina do danas.

6.2.1. Proračun nosivosti

Na temelju brojnih laboratorijskih ispitivanja obavljenih na istim ili sličnim stijenama širom Istre, dobivene su vrijednosti za dopuštene kontaktne napone na tlo za matičnu stijenu kakva je utvrđena na ovoj lokaciji i oni iznose **q_a= 650 kPa** za središnje napone dok se rubni naponi pri djelovanju dopunskih opterećenja mogu povećati za 25 %.
Modul stišljivosti iznosi 1,50 GPa.

6.2.2. Proračun slijeganja

Obzirom na izvjesna rješenja u temeljenju građevine proračun slijeganja daje se pouzdano i sigurno na temelju iskustvenih praćenja i brojnih proračuna.
Temelji izvedeni na podlozi matične stijene kakva je utvrđena na ovoj lokaciji imaju slijeganje manje od 1 cm i to kao posljedicu zatvaranja pukotina.
Nešto veće vrijednosti (2.15 cm) dobivaju se na uređenom i ojačanom tlu, ali se dvije trećine te vrijednosti realizira tijekom izgradnje građevine, a preostala jedna trećina se realizira u fazi korištenja građevine.

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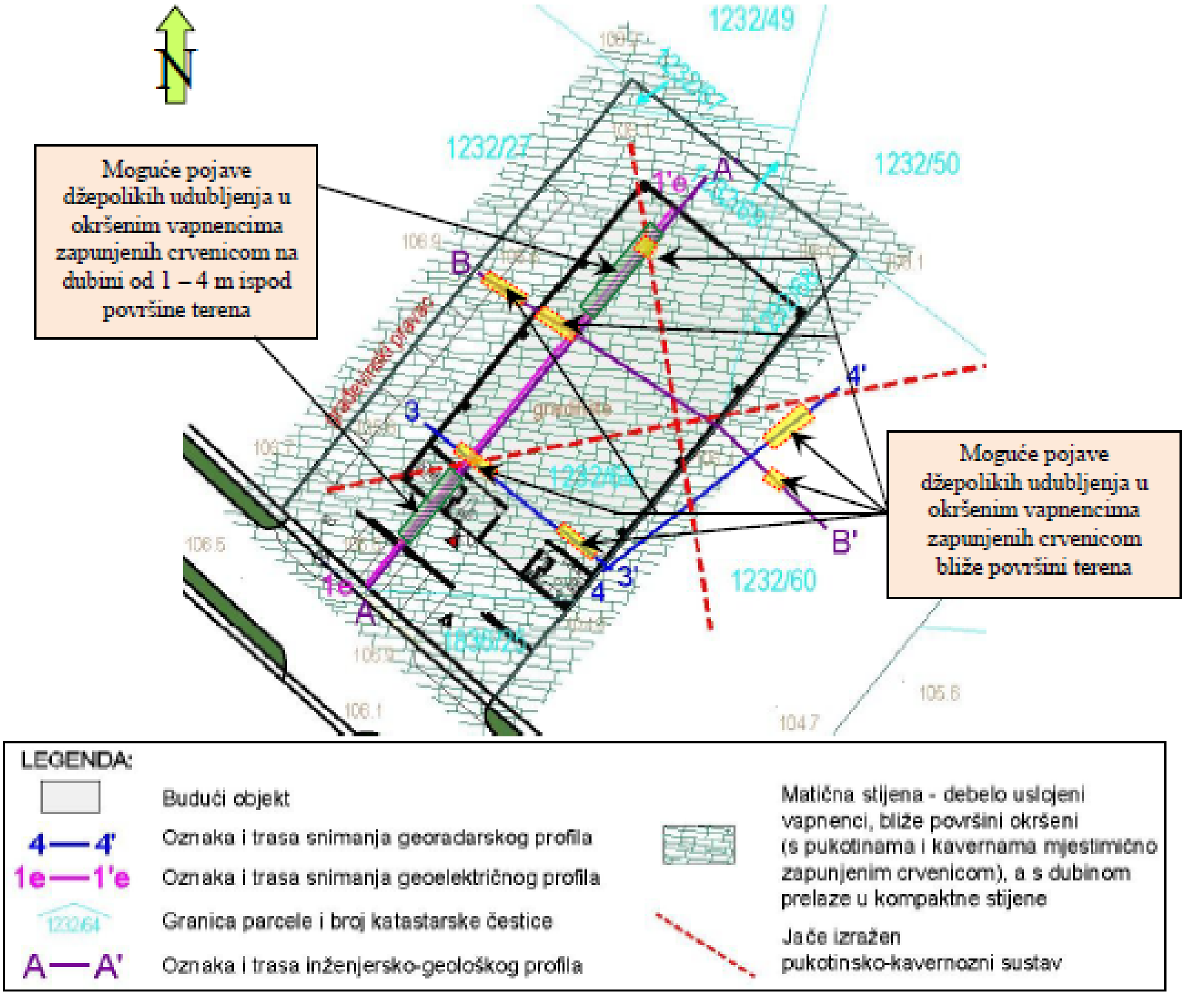
6.3. Izbor i preporuke načina uređenja temeljnog tla i prostora

Geološka građa tla i njegove geomehaničke karakteristike prikazane su na inženjersko-geološkoj karti i inženjersko-geološkim profilima u originalu (vidi grafičke priloge izvještaja). Na slijedećim slikama dani su isječci inženjersko-geološke karte istraživanog terena izrađene na površini terena te inženjersko-geološki profili A – A' i B – B':



Slika br. 21– Isječak inženjersko-geološke karte istraživanog terena s interpretacijom na dubini temeljenja

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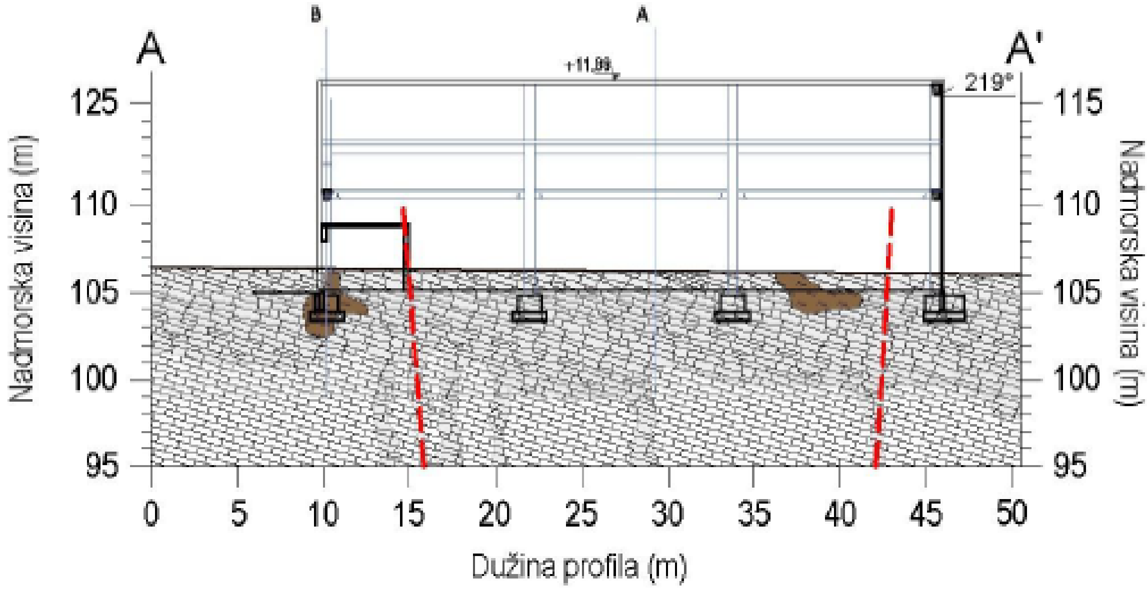
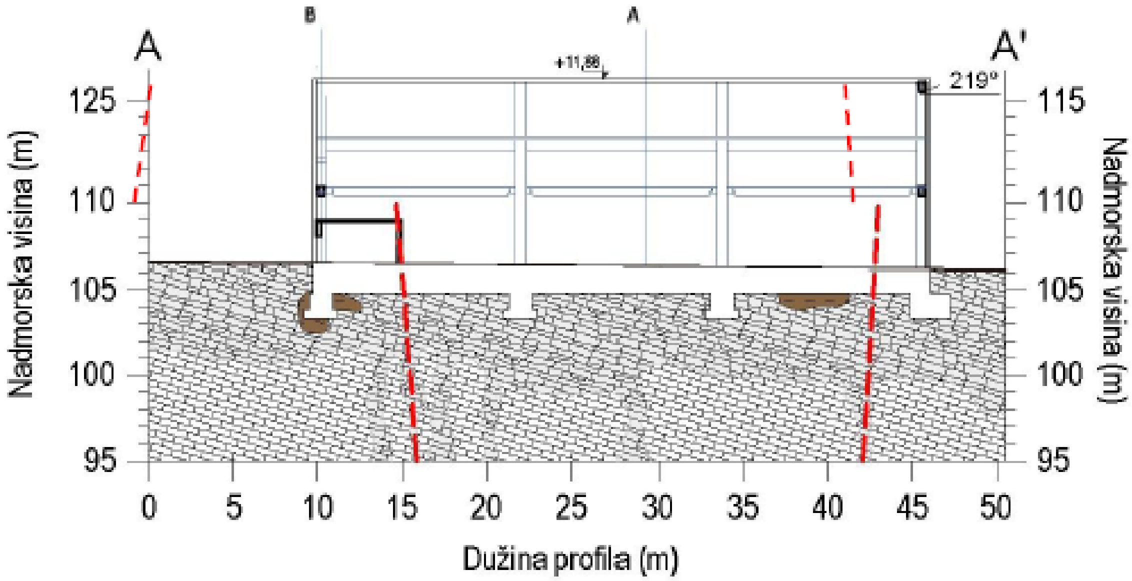
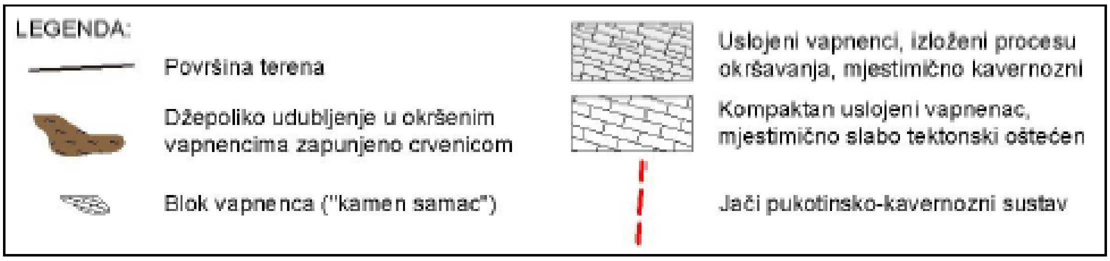
PRIJE ISKOPA



NAKON ISKOPA





Slika br. 22 – **Inženjersko-geološki profil A – A'** s pripadajućom legendom

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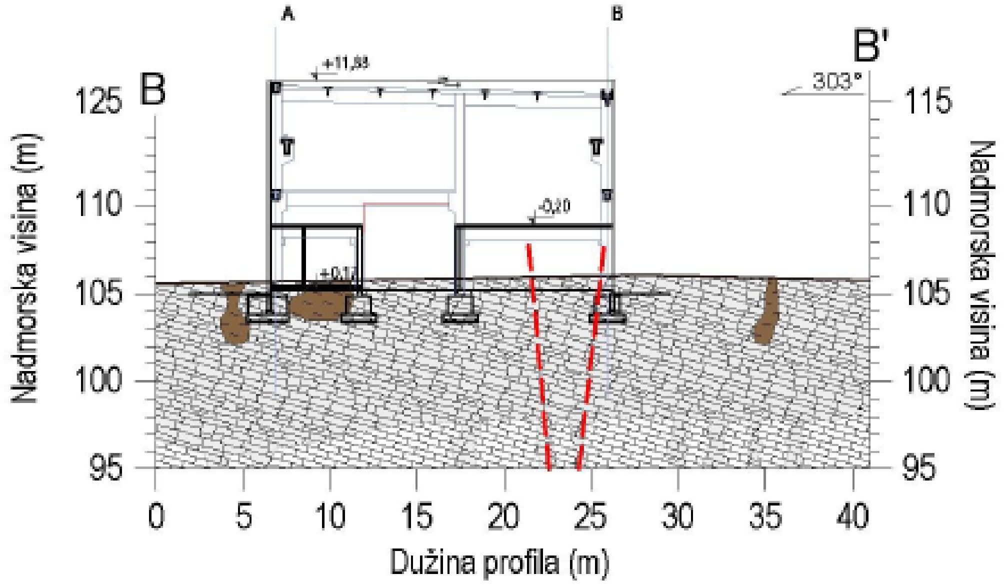
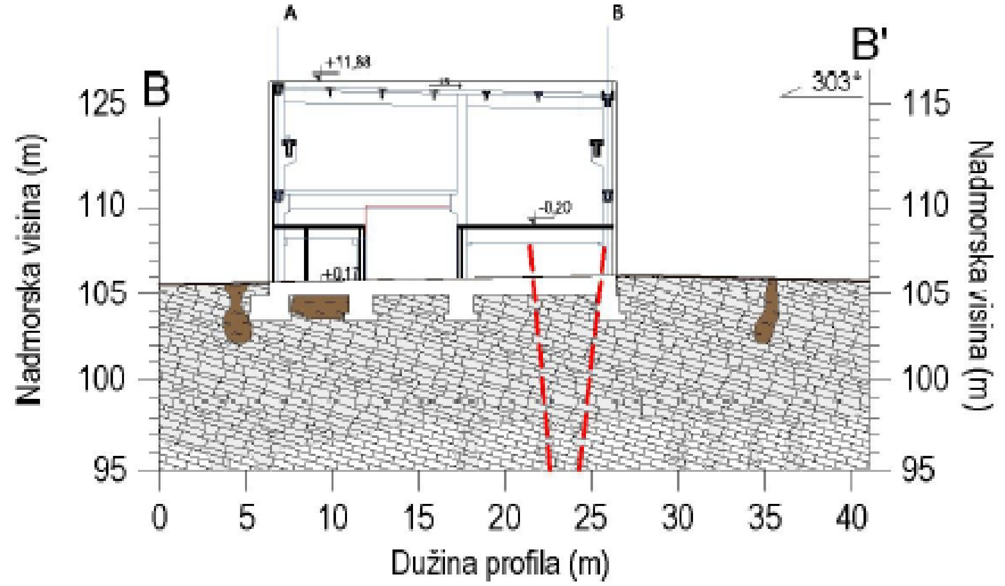
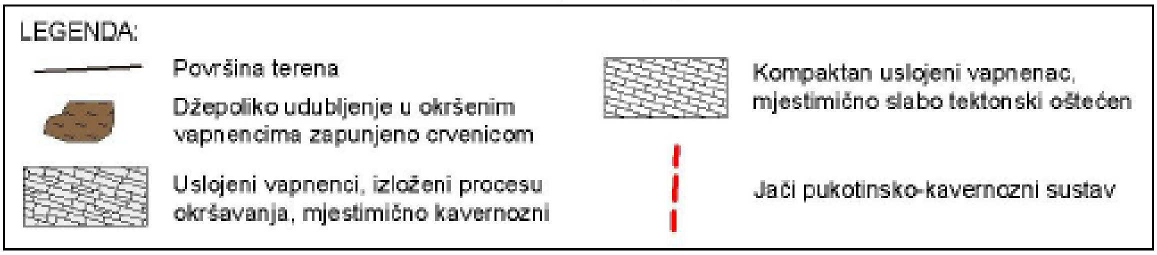
PRIJE ISKOPA



NAKON ISKOPA





Slika br. 23 – Inženjersko-geološki profil B – B' s pripadajućom legendom

Prema kategorizaciji iskopa stijenske mase, materijale determinirane na istraživanom terenu možemo svrstati u kategorije A (stijenska masa – vapnenci) i B (miješani kameni i zemljani materijali). Prema starijem načinu klasificiranja stijenska masa na istraživanom terenu može se svrstati u kategorije IV (stijene u raspadanju) i VI (čvrsta stijena).

Stariji i noviji način kategorizacije stijenske mase prema načinu iskopa materijala usporedno su prikazani na slijedećim slikama:

Kategorizacija zemljišta

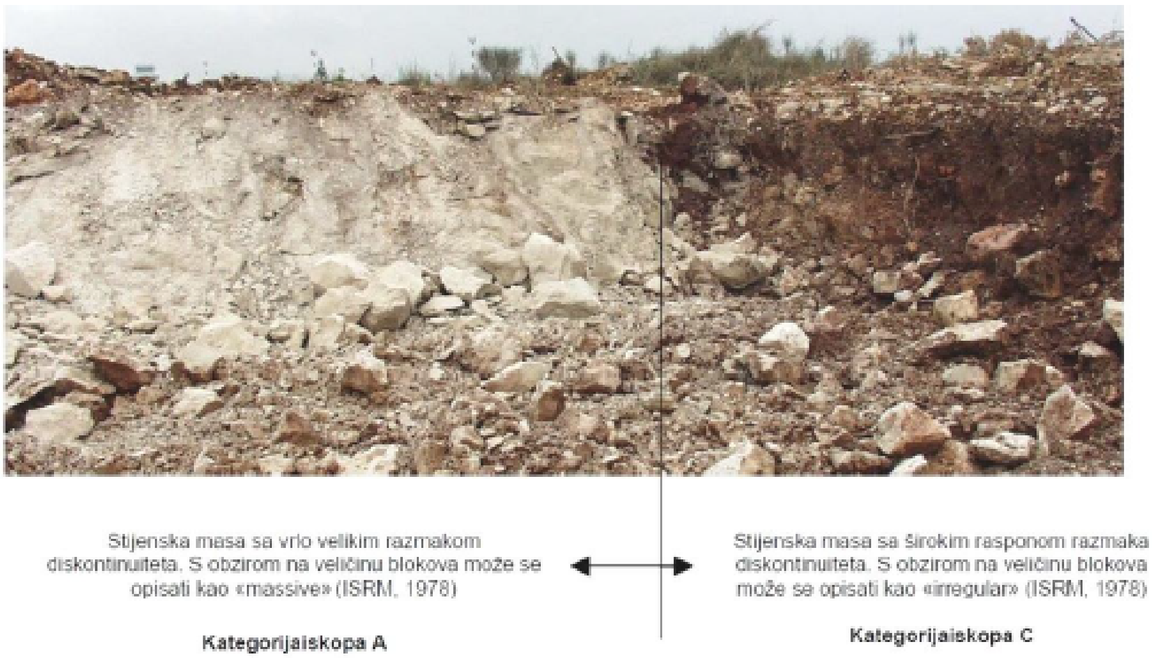
- Stari način - kategorije od I - VII
- ZEMLJA
  - I - rastresita, laka mekana zemlja, humus, pijesak
  - II - obična zemlja, laka pjeskovita glina, zbijeni pijesak, sitniji šljunak
  - III- čvrsta zemlja

- STIJENE
  - IV - stijene u raspadanju
  - V - meka stijena
  - VI - čvrsta stijena
  - VII - vrlo čvrsta stijena

- Noviji način
- Kategorije A, B i C
  - A – kategorija
  - Tvrdi materijali gdje je potrebno miniranje kod cijelog iskopa.
  - B
  - Miješani kameni i zemljani materijali gdje je potrebno djelomično miniranje, a veći se dio iskopa obavlja strojnim radom.
  - C
  - Mogu se kopati izravno bez miniranja.

Slika br. 24– Stariji (*lijevo*) i novi (*desno*) način kategorizacije iskopa stijenske mase

Ilustrativno se navedena kategorizacija stijenske mase može prikazati na slijedeći način:



Slika br. 25 – Kategorizacija iskopa stijenske mase sa slikovnim prikazom

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U seizmičkoj mikrorajonizaciji prihvaćen je europski standard za klasifikaciju tla Eurokod 8 (EC8) – projektiranje konstrukcija otpornih na potres (CEN, 2004.). Prema njemu se tla klasificiraju u sedam tipova (A, B, C, D, E, S_1 i S_2) koji su opisani stratigrafskim profilom i sa tri parametra: srednjom brzinom posmičnih valova na gornjih 30 metara tla ($V_{s,30}$), brojem udaraca standardnog penetracijskog pokusa (N_{spt}) i nedreniranom posmičnom čvrstoćom (c_u). Brzina posmičnih valova ($V_{s,30}$) je najvažniji parametar.

Kategorizacija tla prema Eurokodu 8 vidljiva je u slijedećoj tablici:

Tablica br. 2 – *Klasifikacija tla po Eurokodu 8 (CEN, 2004. godina)*

Tip tla	Opis stratigrafskog profila	$v_{s,30}$ (m/s)	N_{spt} (udarci/30 cm)	c_u (kPa)
A	**Stijena ili njoj slične geološke formacije, uključujući najviše 5 m slabijeg materijala na površini**	**>800**	**-**	**-**
B	Slojevi vrlo zbijenog pijeska, šljunka ili vrlo čvrste gline, debljine najmanje nekoliko desetina metara, karakterizirani stupnjevitim povećanjem mehaničkih svojstava sa dubinom	360 – 800	> 50	> 250
C	Slojevi zbijenog ili srednje zbijenog pijeska, šljunka ili čvrste gline, debljine od nekoliko desetina do više stotina metara	180 – 360	15 – 50	70 -250
D	Rastresiti do srednje zbijeni nevezani sedimenti (sa ili bez mekanih kohezivnih slojeva) ili predominantno mekano do čvrsto kohezivno tlo	<180	<15	<70
E	Tlo se na površini sastoji od aluvijalnih nanosa sa vrijednosti $v_{s,30}$ prema tipu C ili D i debljinom između 5 i 20 m, ispod kojeg je krući materijal sa $v_{s,30}$ > 800 m/s			
S_1	Tlo sadrži najmanje 10 m debeo sloj mekane gline sa visokim plastičnim indeksom (PI>40) i viskom sadržajem vode	<100 (indikativni pokazelj)	-	10 -20
S_2	Tlo podložno likvefakciji sa osjetljivim glinama ili bilo koji drugi profil tla koji nije uključen u kategorije A-E ili S_1			

Iz svih prethodnih rezultata istraživanja zaključuje se da se tlo na istraživanom lokalitetu prema Eurokodu 8 može svrstati u **tip tla A – stijena ili njoj slične geološke formacije, uključujući najviše 5 m slabijeg materijala na površini.**

Temeljenje buduće građevine obaviti će se na matičnoj stijeni (debelo uslojeni vapnenci) koja je većinom okršena (tektonski oštećena i mjestimično kavernozna), a mjestimično i kompaktna.

U okršenim vapnencima mjestimično se mogu pojaviti zaostala džepolika udubljenja zapunjena crvenicom. Ta džepolika udubljenja u okršenim vapnencima mogu biti maksimalne dubine do oko 3 m. Ako se prilikom iskopa za temelje buduće građevine naiđe na takvo džepoliko udubljenje zapunjeno crvenicom, njega je potrebno urediti za temeljenje na slijedeći način:

Crvenica u džepolikom udubljenju u okršenim vapnencima se treba ukloniti do dubine od 2b (b=širina temelja) i zamijeniti šljunkom granulacije od 20 do 60 mm koji se nabije do modula stišljivosti M_k=60 MN/m² ili "zalije" mršavim betonom.

Na tako pripremljenoj podlozi temeljne stope ili trake treba armirati, kako bi se izbjeglo diferencijalno slijeganje veće od dopuštenog.

Ispravno obrađen zaostali džep crvenice treba izgledati kao na narednom vizualnom prikazu:

Slika br. 26 - Slikovni prikaz ispravno obrađenih džepova crvenice

7. ZAKLJUČAK

Realiziranim programom istraživanja dobiveni su kvalitetni podaci kojima je utvrđena inženjersko-geološka građa tla.

Analizom dobivenih rezultata istraživanja utvrđeno je da će se temeljenje obaviti na matičnoj stijeni (*debelo uslojeni vapnenci*) odnosno većinom na okršenim vapnencima (tektonski oštećeni i mjestimično kavernozni), a mjestimično i na kompaktnim debelo uslojenim vapnencima.

U okršenim vapnencima mjestimično se mogu pojaviti zaostala džepolika udubljenja zapunjena crvenicom. Ta džepolika udubljenja u okršenim vapnencima mogu biti maksimalne dubine do oko 3 m. Ako se prilikom iskopa za temelje buduće građevine naiđe na takvo džepoliko udubljenje zapunjeno crvenicom, njega je potrebno urediti za temeljenje na slijedeći način:

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Na tako pripremljenoj podlozi temeljne stope ili trake treba armirati, kako bi se izbjeglo diferencijalno slijeganje veće od dopuštenog.

U proračunima nosivosti tla i slijeganja korištena su bogata praktična iskustva u tridesetogodišnjem periodu praćenja ponašanja građevina na ovakvoj vrsti tla.

Obzirom na hidrogeološke karakteristike mikrolokacije i visinu terena u zoni budućeg zahvata ne očekuju se problemi u plitkim iskopima za temeljenje pojavom podzemne vode u njima.

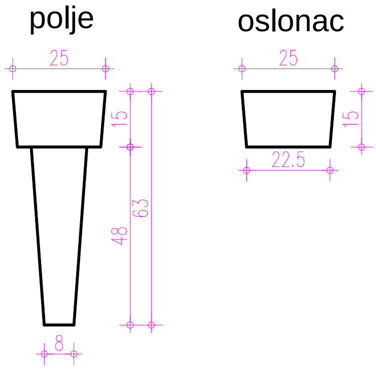
Preporučuje se za sva moguća odstupanja izvan linija geofizičkih snimanja zatražiti geomehanički pregled prilikom obavljanja iskopa temeljne jame radi davanja najkvalitetnijih preporuka za eventualna prilagođavanja rješenja temeljenja prema stvarnom stanju na terenu.

U Rovinju, rujan 2017. godine

ELEMENTI MONTAŽNE AB KONSTRUKCIJE:

SEKUNDARNI KROVNI NOSAČI-ROŽNJAČE SN-1, R-63

Sekundarni krovni nosači-rožnjače su projektirane kao prefabricirane grede tipa R-63, sa dimenzijama poprečnog presjeka prema slici.
Zadatak im je prijem i prijenos opterećenja sa krovnog pokrivača na glavne krovne nosače. Rožnjače se direktno oslanjaju na gornju ivicu glavnog krovnog nosača, a veza sa glavnim krovnim nosačem se osigurava pomoću vertikalnog ankera. Zaštitni sloj betona je 2,5 cm.
Projektirana požarna otpornost nosača je 30 minuta.

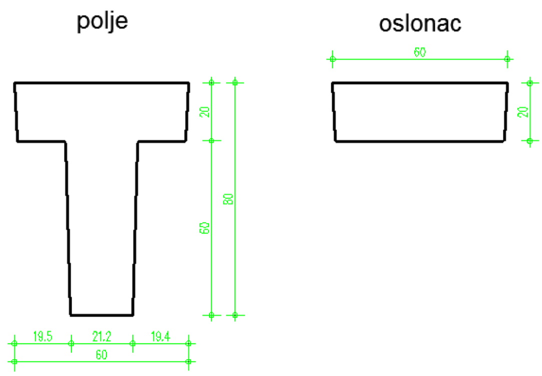


Rožnjača SN-1 R-63

Statički sistem: prosta greda-prednapregnuta
Raspon: 11,78 m
Beton: C 50/60
Armatura: B 550B
Užad za prednaprezanje: Y 1860S7

SEKUNDARNI KROVNI RUBNI NOSAČI - SN-2 T 80

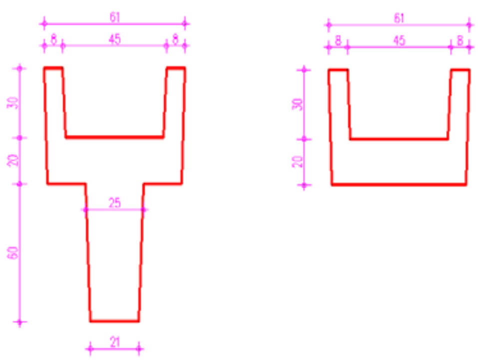
Sekundarni krovni nosači-olučna greda su projektirane kao prefabricirane grede tipa T 80.
Zadatak im je prijem i prenos opterećenja sa krovnog pokrivača na stupove kao I opterećenje od vjetra koje se prenosi preko vertikalnih fasadnih elemeanta na krovne rubne grede. Nosači se direktno oslanjaju na gornju ivicu stupa, a veza sa stupov i glavnim krovnim nosačem se osigurava pomoću vertikalnih ankera. Zaštitni sloj betona je 2,5 cm.
Projektirana pozarna otpornost nosača je 30 minuta.



Korito SN-2 T- 80
Statički sistem: prosta greda-prednapregnuta
Raspon: 11,78 m
Beton: C 50/60
Armatura: B 550B
Užad za prednaprezanje: Y 1860S7

SEKUNDARNI KROVNI NOSAČI - KORITA SN-3 T 80

Sekundarni krovni nosači-olučna greda su projektirane kao prefabricirane grede tipa T 80 sa dobetoniranim dijelom za formiranje oluka, sa dimenzijama poprečnog presjeka prema slici.
Zadatak im je prijem i prijenos opterećenja sa krovnog pokrivača i vjetra od vertikalnih fasadnih elemenata na stupove. Nosači se direktno oslanjaju na gornju ivicu stupa – glavnog nosača, a veza sa stupom se osigurava pomoću vertikalnih ankera.
Zaštitni sloj betona je 2,5 cm.
Projektirana požarna otpornost nosaca je 30 minuta.

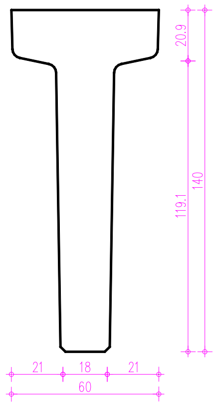


Korito SN-3 T- 80
Statički sistem: prosta greda-prednapregnuta
Raspon: 11,78 m
Beton: C 50/60
Armatura: B 550B
Užad za prednaprezanje: Y 1860S7

GLAVNI KROVNI NOSAČ GN-1 T-140

Glavni krovni nosač T-140 projektiran je kao prefabricirana greda, statičkog sistema proste grede, koja se na svojim krajevima slobodno oslanja na AB stup. Oslonac na stupu se projektira kao viljuškasti oslonac koji osigurava bočnu stabilnost grede, a veza se dodatno osigurava horizontalnim ankerima. Zaštitni sloj betona je 2,5 cm

Projektirana požarna otpornost nosača je 60 minuta.



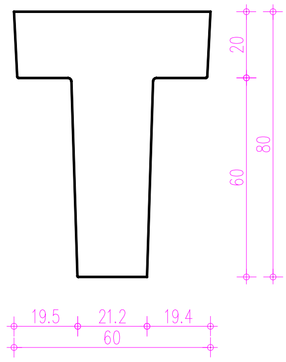
Glavni nosač T-140

Statički sistem:	prosta greda-PN
Raspon:	19,00 m
Beton:	C 50/60
Armatura:	B 550B
Užad za prednaprezanje:	Y 1860S7

GLAVNI KROVNI NOSAČ GN-2 I GN-3 T-80

Glavni krovni nosač T-80 projektiran je kao prefabricirana greda, statičkog sistema proste grede, koja se na svojim krajevima slobodno oslanja na AB stup. Oslonac na stupu se projektira kao viljuškasti oslonac koji osigurava bočnu stabilnost grede, a veza se dodatno osigurava horizontalnim ankerima. Zaštitni sloj betona je 2,5 cm.

Projektirana požarna otpornost nosača je 60 minuta.



Glavni nosač GN-2 T-80

Statički sistem:	prosta greda-PN
Raspon:	10,75 m
Beton:	C 50/60
Armatura:	B 550B
Užad za prednaprezanje:	Y 1860S7

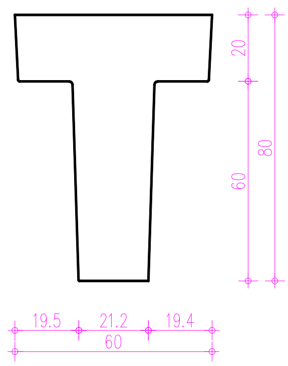
Glavni nosač GN-3 T-80

Staticki sistem:	prosta greda-PN
Raspon:	8,25 m
Beton:	C 50/60
Armatura:	B 550B
Užad za prednaprezanje:	Y 1860S7

KRANSKA GREDA KG-1, T-80

Kranska greda T-80 projektirana je kao prefabricirana greda, statičkog sistema proste grede, koja se na svojim krajevima slobodno oslanja na AB konzole na stupu. Oslonac na stupu se projektira kao viljuškasti oslonac koji osigurava bočnu stabilnost grede, a veza se dodatno osigurava vertikalnim ankerima. Zaštitni sloj betona je 2,5 cm.

Projektirana požarna otpornost nosača je 60 minuta.

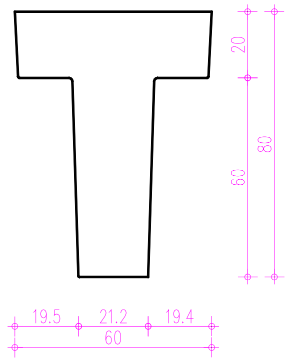


Kranska greda KG-1 T-80

Statički sistem:	prosta greda-PN
Raspon:	11,78m
Beton:	C 50/60
Armatura:	B 550B
Užad za prednaprezanje:	Y 1860S7

KRANSKA GREDA KG-1, T-80

Kranska greda T-80 projektirana je kao prefabricirana greda, statičkog sistema proste grede, koja se na svojim krajevima slobodno oslanja na AB konzole na stupu. Oslonac na stupu se projektira kao viljuškasti oslonac koji osigurava bočnu stabilnost grede, a veza se dodatno osigurava vertikalnim ankerima. Zaštitni sloj betona je 2,5 cm. Projektirana požarna otpornost nosača je 60 minuta.

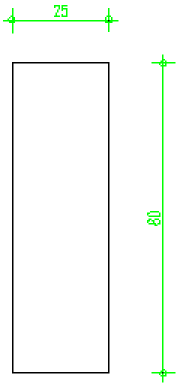


Kranska greda KG-1 T-80

Statički sistem: prosta greda-PN
Raspon: 11,78m
Beton: C 50/60
Armatura: B 550B
Užad za prednaprezanje: Y 1860S7

FASADNE GREDE FG-1 25/80

Fasadne grede 25/80 projektirane su kao prefabricirane grede, statičkog sistema proste grede, koja se na svojim krajevima slobodno oslanja na AB konzole na stupu. Oslonac na stupu se projektira kao kratki element a ankerima se osigurava veza konzole i stupa. Grede služe za prijem opterećenja od fasadnih elemenata i opterećenja od vjetra. Zaštitni sloj betona je 2,5 cm. Projektirana požarna otpornost nosača je 60 minuta.

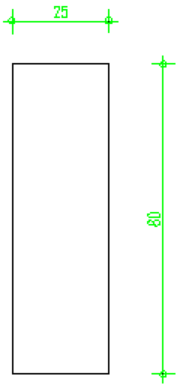


Fasadna greda FG-1 25/80

Statički sistem: prosta greda-PN
Raspon: 10,25 m
Beton: C 50/60
Armatura: B 550B
Užad za prednaprezanje: Y 1860S7

MEĐUSPRATNE GREDE GALERIJE MG 1 25/80

Međuspratne grede 25/80 projektirane su su kao prefabricirane grede, statičkog sistema proste grede, koja se na svojim krajevima slobodno oslanja na AB konzole na stupu. Oslonac na stupu se projektira kao kratki element a ankerima se osigurava veza konzole i stupa. Grede služe za prijem opterećenja od galerije, fasadnih elemenata I opterećenja od vjetra. Zaštitni sloj betona je 2,5 cm. Projektirana požarna otpornost nosača je 60 minuta.



Međuspratne grede MG 1 25/80

Statički sistem: prosta greda-PN
Raspon: 10,25 m
Beton: C 50/60
Armatura: B 550B
Užad za prednaprezanje: Y 1860S7

STUPOVI

Stupovi objekta su projektirani kao prefabricirani dimenzija 60/60 cm statičkog sistema konzole. Stupovi se na donjem kraju izvode kao hrapavi u dužini od 90 cm kako bi se postigao što veći stupanj uklještenja u temeljnu čašicu. Na stupu su projektirani kratki elementi za oslanjanje etažnih greda, kao i viljuškasti oslonci za oslanjanje krovnih greda i obodnih greda.Zaštitni sloj betona je 3,0 cm.

Stup

Statički sistem: konzola
Beton: C 50/60
Armatura: B 550B

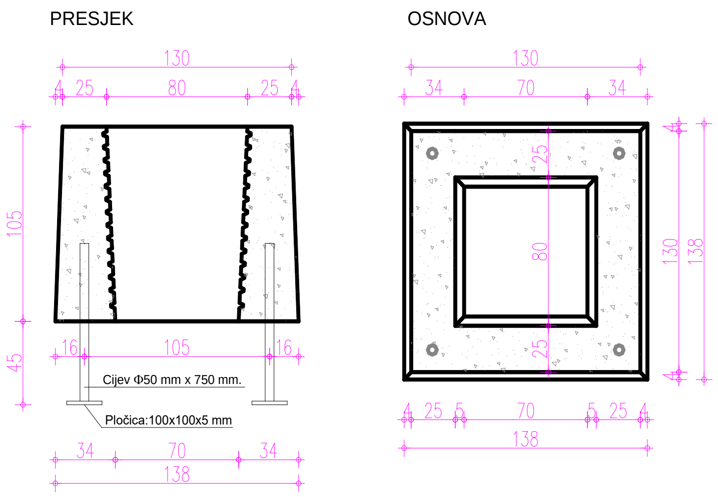
TEMELJNA KONSTRUKCIJA

Temeljna konstrukcija je projektirana od temelja samaca. Temelji samci su polumontažni. Donji dio temeljnih stopa se izvodi na gradilištu u oplati. Gornji dio – čašice stupova izrađuju se u pogonu, dopremaju na gradilište i prije betoniranja stope temelja precizno postavljaju na mjesto. Unutarnje površine temeljnih čašica su izbrazdane i hrapave kako bi se omogućilo bolje uklještenje stupa u temelj. Zaštitni sloj betona čašica je 3,0 cm a temeljne stope 5,0 cm. Dimenzije temejnih čašica prikazane su na slici ispod, dok su dimenzije temeljnih stopa prikazane na planovima oplate temelja. Temelji su dimenzionirani prema dozvoljenoj nosivosti tla od 650 kN/m^2,

Materijal za čašice je:

Beton: C 30/37

Armatura: B550B



Montažna čašica temelja

Materijal za temeljne stope je:

Beton: C 30/37

Armatura: B500B

VEZNA GREDA

Po obodu objekta temelji samci su povezani temeljnim veznim gredama. Uloga temljnih veznih greda je uvezivanje temelja u cilju postizanja jedne cjeline u horizontali ravnine. Također pored ukrute, vezna greda ima ulogu i formiranja sokla na koji se oslanjaju fasadni paneli. Proračun vezne grede izvršen je za vertikalna opterećenja koja na nju djeluju od fasadnih elemenata, a detalj plan oplate i način armiranja dani su u grafickim prilozima. Usvojene dimenzije vezne grede su 30/80 cm.

VEZNA GREDA

Statički sistem: prosta greda

Beton: C 25/30

Armatura: B 500B

AB FASADNI ELEMENTI

Ab fasadni elementi su montažni deljine 20 cm od betona C 50/60. Armatura je kvaliteta B 500B.
Objekt je projektiran sa vertikalnim fasadnim elementima pa se isti oslanjaju na vezne grede a u krovu se vežu za krovne grede tipskim elementima.
Prilikom modeliranja i proračuna konstrukcije u obzir su uzete karakteristike montažnih elemenata sa točnim poprečnim presjecima, kao i karakteristike međusobnih veza među elementima. Prilikom modeliranja konstrukcije također su uzeta u obzir i sva opterećenja koja će se javiti u toku eksploatacije konstrukcije, a intenziteti pojedinih opterećenja dani su u poglavlju "Analiza opterećenja".

LOKACIJA I OPTEREĆENJA

Sva opterećenja na konstrukciju uzeta su prema važećim propisima , tj. Europska norma EN-1991.

Lokacija građevine: Buići - Poreč 110 m.n.n

Opterećenje vjetrom

Opterećenje vjetrom odabrano je prema: EC1, Dio 2-4: Djelovanja vjetra i Europskoj normi EN 1991-2-4: Djelovanja na konstrukcije opterećenje vjetrom, te Nacionalnom dokumentu za primjenu u Republici Hrvatskoj.

Građevina je uglavnom zaštićena od djelovanja vjetra, u neposrednoj blizini objekta već su izgrađeni gospodarski objekti. Osnovna brzina vjetra uzeta je $v_{b,0}$=30m/s.

Opterećenje snijegom

Područje i opterećenja snijegom za nadmorsku visinu od 110 m.n.v je 0,50 KN/m^2 .

Korisna opterećenje

Korisna promjenjiva opterećenja koja proizilazi iz samog korištenja građevine uzeta su kao:

-q=0,50 kN/m^2 krov

Seizmičke značajke terena

Prema Seizmološkoj karti predmetna lokacija se nalazi u zoni za koju se predviđa za povratni period od 475 godina, maksimalni intenzitet potresa a/g 0,095.

Temeljno tlo se svrstava se u kategoriju „A“

Prema karti akceleracija za temeljno tlo – matičnu stijenu može se uzeti maksimalna akceleracija u iznosu a_{max}=0.095 g.

PLAN KONTROLE I OSIGURANJA KAKVOĆE

U ovom dijelu projekta daje se prikaz primijenjenih tehničkih rješenja i kontrolnih postupaka, a vezano na postizanje i zadovoljenje temeljnih svojstava bitnih za građevinu.

Sastavni dio ovog prikaza je i prikaz tehničkih rješenja zaštite na radu i zaštite od požara, tehnički opis, statički proračuni te program kontrole i osiguranja kakvoće.

OPIS TEHNIČKIH SVOJSTAVA

Pouzdanost

Obzirom na odabrane materijale, tip konstrukcije i način izvedbe građevine, predviđa se da će građevina pri normalnoj uporabi zadržati odgovarajuća svojstva u projektnom periodu. Obzirom na lokaciju same građevine u odnosu na susjedne objekte, prometne površine, komunalne i druge instalacije, građevina i korištenje građevine ne ugrožava pouzdanost susjednih građevina i stabilnost okolnog zemljišta, prometnica i sl.

Mehanička otpornost i stabilnost

Odabirom materijala i tipa konstrukcije te načinom izvedbe, građevina je projektirana tako da se ne predviđaju u toku gradnje ili korištenja, djelovanja koja bi prouzročila:

- rušenje dijelova ili cijele građevine
- nedopuštene deformacije i oštećenja uslijed istih
- oštećenja na okolnim građevinama ili ugrozila stabilnost tla na okolnom zemljištu.

Ovo se dokazuje statičkim i geomehaničkim proračunima za pojedine dijelove građevine u okviru cjelokupnog projekta, faze ili cjelinu konstrukcije, programima kontrole i osiguranja kakvoće, te primjenom odgovarajućih propisa prilikom projektiranja i izvedbe.

Sigurnost u slučaju izbijanja požara

Konstrukcija građevine i njeni djelovi su projektirani tako da je zagarantirana njihova nosivost i cjelovitost tijekom zahtjevanog vremenskog perioda od 60, 90 i 120 minuta. Projektna rješenja su izrađena u skladu s posebnim uvjetima i pravilima struke.

Zaštita od ugrožavanja zdravlja ljudi i onečišćenja okoliša

Primijena projektiranih tehnička rješenja tijekom gradnje, te kasnije održavanje i korištenje konstrukcije prema projektiranoj namjeni građevine ne ugrožava zdravlje ljudi niti nepovoljno utječe na okoliš i okolne parcele. Tijekom redovite upotrebe i redovnog održavanja konstrukcije ne koriste se štetne tvari niti se stvara otpad nepovoljan za okoliš i zdravlje ljudi. Materijali trajno ugrađeni u konstrukciju i okoliš osiguravaju da prilikom razgradnje konstrukcije neće doći do onečišćenja okoliša opasnim tvarima niti će doći do ugrožavanja zdravlja ljudi.

Zaštita korisnika

Prema odabranim materijalima i obradama pojedinih elemenata, građevina je projektirana tako da tijekom njenog korištenja neće dolaziti do nezgoda korisnika. Pri projektiranju su korištena načela slijedeće regulative:

- Tehnički propis o građevnim proizvodima (NN 33/10, 87/10, 146/10, 81/11, 100/11)
- Pravilnik o tehničkim dopuštenjima za građevne proizvode (NN 103/08)
- Pravilnik o osiguranju pristupačnosti građevina osobama s invaliditetom i smanjene pokretljivosti (NN 151/05; 61/07) .

Zaštita od buke i vibracija

Obzirom na odabrane materijale i tipove konstrukcija, razina buke u građevini i njenom okolišu neće prelazi dopuštene vrijednosti prema propisima: Zakon o zaštiti od buke (NN 20/03.).

Toplinska zaštita

Obzirom na namjenu konstrukcije, odabrane materijale i tipove konstrukcija, ne postavljaju se dodatni zahtjevi obzirom na toplinska svojstva građevine.

OPĆI PODACI I DEFINICIJE

Primjena općih tehničkih uvjeta

Ovi tehnički uvjeti i program kontrole kvalitete (u daljnjem tekstu Tehnički uvjeti) sadrže tehničke uvjete izvođenja radova, tehnologiju izvođenja, način ocjenjivanja kvalitete. Tehnički uvjeti vrijede za projektirane radove na konstrukciji i za radove koji će naknadno biti određeni na gradilištu, a koji su neophodni za potpuno dovršenje građevina. Primjena ovih Tehničkih uvjeta je obavezna za sve sudionike u građenju.

Investitor je dužan:

1. Projektiranje, građenje i nadzor povjeriti osobama ovlaštenim za obavljanje tih djelatnosti
2. Prije gradnje ishoditi građevinsku dozvolu
3. Osigurati stalan stručni i povremeni projektantski nadzor nad izvođenjem radova. Skreće se pažnja i naglašava se, na potrebu učešća projektantskog i specijalističkog stručnog nadzora za čeličnu i betonsku konstrukciju, s aspekta sigurnosti i postizanja kvalitete, i to u radionici i na montaži.
4. Po završetku gradnje poduzeti potrebne radnje za obavljanje tehničkog pregleda i ishođenje uporabne dozvole
5. Pridržavati se ostalih odredbi iz pozitivnih zakona i propisa

Izvoditelj je dužan

1. Radove izvoditi na način određen ugovorom, propisima i pravilima struke, tehničkim normativima i standardima propisanim i prihvaćenim u RH, te prema odobrenoj projektnoj dokumentaciji. Poduzeti sve potrebne mjere za sigurnost zaposlenih radnika, javnog prometa, kao i susjednih objekta pored kojih se izvode radovi.
2. Izraditi vlastiti plan mjera kontrole kvalitete koje će provoditi izvođač, isti dostaviti nadzoru, te po usuglašavanju i prihvaćanju, odgovorno i dokumentirano provoditi. Na zahtjev nadzora dati na uvid svu dokumentaciju vezano uz provođenje mjera kontrole kvalitete.
3. Organizirati kontrolu radova u terenskim i pogonskim laboratorijima, ili povjeriti tu kontrolu stručnim organizacijama koje za to imaju posebna odobrenja.
4. Ugrađivati materijal, predgotovljene elemente, uređaje i tehničku opremu koji odgovaraju propisanim standardima i tehničkim normativima.
5. Kvalitetu radova, materijala i uređaja koji mogu utjecati na stabilnost i sigurnost objekta i kvalitetu cijelog objekta, odnosno radove, dokumentirati obrađenim rezultatima ispitivanja ili ispravama izdanim u skladu sa zakonom ili propisima o tehničkim normativima i standardima.
6. Radove izvoditi po redoslijedu kojim se osigurava kvalitetno izvođenje i o izvođenju pojedinih faza na vrijeme obavijestiti stručni nadzor radi pregleda i utvrđivanja kvalitete.
7. Rezultate redovitih i kontrolnih ispitivanja Izvoditelj je dužan dostaviti nadzornom inženjeru.

8. Dužan je pribaviti sve ateste kada je to propisano tehničkim normativima ili propisima.
9. Ne smije upotrebljavati građevinske materijale bez odobrenja stručnog nadzora,
10. Tijekom građenja vršiti kontrolna mjerenja i po završetku istih pribaviti dokaze o kvaliteti upotrijebljenog građevinskog materijala, poluproizvoda i gotovih proizvoda od ovlaštenih organizacija.

Kontrolna ispitivanja

O izvršenim kontrolnim ispitivanjima materijala koji se ugrađuje u građevinu mora se cijelo vrijeme građenja voditi evidencija te sačiniti izvješće o pogodnosti ugrađenih materijala sukladno projektu, ovom programu ili citiranim pravilnicima, normama i standardima.
Izvješće o pogodnosti ugrađenih materijala mora sadržavati slijedeće dijelove:

1. Naziv materijala, laboratorijsku oznaku uzorka, količinu uzoraka, namjenu materijala, mjesto i vrijeme (datum) uzimanja uzorka te izvršenih ispitivanja, podatke o proizvođaču i investitoru, podatke o građevini za koju se uzimaju uzorci odnosno vrši ispitivanje.
2. Prikaz svih rezultata, laboratorijskih, terenskih ispitivanja za koja se izdaje uvjerenje odnosno ocjena kvalitete.
3. Ocjenu kvalitete i mišljenje o pogodnosti (uporabljivosti) materijala za primjenu na navedenoj građevini te rok do kojega vrijedi izvješće.

Uzimanje uzoraka i rezultati laboratorijskih ispitivanja moraju se upisivati u laboratorijsku i gradilišnu dokumentaciju.(građevinski dnevnik, građevinska MAPA).
Uz dokumentaciju koja prati isporuku proizvoda ili poluproizvoda proizvođač je dužan priložiti rezultate tekućih ispitivanja koja se odnose na isporučene količine. Za materijale koji podliježu obveznom atestiranju mora se izdati atestna dokumentacija sukladno propisima Sva izvješća, atesti i drugi dokazi kvalitete moraju se odmah po dobivanju dostaviti i nadzornom inženjeru.
Po završetku svih radova izvođač je obavezan izraditi geodetski elaborat izvedenog stanja građevine i katastra podzemnih instalacija te isti dostaviti nadležnim javnim tjelima.

BETONSKI, ARMIRANOBETONSKI I TESARSKI RADOVI

BETON

Tehnička svojstva i drugi zahtjevi te potvrđivanje sukladnosti betona određuju se odnosno provode prema normi HRN EN 206-1:2000 Beton – 1 dio: Specifikacije, svojstva proizvodnja i sukladnost, normama na koje ta norma upućuje i odredbama Priloga A (TPBK NN 139/09, 14/10,125/10; 136/12), te u skladu s odredbama posebnog propisa kao i zahtjevima iz ovog projekta.
Sukladno Prilogu A.2.1.2. (TPBK NN 139/09, 14/10,125/10; 136/12) za predmetnu konstrukciju beton se proizvodi kao projektirani beton (beton sa specificiranim tehničkim svojstvima)
Sukladno Prilogu A.2.1.5. (TPBK NN 139/09, 14/10,125/10; 136/12) svojstva svježeg betona specificira izvođač betonskih radova. Određena svojstva svježeg betona, kada je to potrebno ovisno o uvjetima izvedbe i uporabe betonske konstrukcije, specificiraju se u projektu betonske konstrukcije. Za predmetnu betonsku konstrukciju nije potrebno specificirati svojstva svježeg betona.
Standardi za beton – osnovni

HRN EN 206-1:2002	Beton – 1. dio: Specifikacije, svojstva, proizvodnja i sukladnost (EN 206-1:2000)
HRN EN 206-1/A1:2004	Beton – 1. dio: Specifikacija, svojstva, proizvodnja i sukladnost (EN 206-1:2000/A1:2004)
nHRN EN 206-1/A2	Beton – 1. dio: Specifikacija, svojstva, proizvodnja i sukladnost (EN 206-1:2000/prA2:2004)

Svi predviđeni ugrađeni betoni moraju zadovoljavati slijedeće norme:

HRN EN 12350-1	Ispitivanje svježeg betona – 1. dio: Uzorkovanje
HRN EN 12350-2	Ispitivanje svježeg betona – 2. dio: Ispitivanje slijeganjem
HRN EN 12350-3	Ispitivanje svježeg betona – 3. dio: VeBe ispitivanje
HRN EN 12350-4	Ispitivanje svježeg betona – 4. dio: Stupanj zbijenosti
HRN EN 12350-5	Ispitivanje svježeg betona – 5. dio: Ispitivanje rasprostiranjem
HRN EN 12350-6	Ispitivanje svježeg betona – 6. dio: Gustoća
HRN EN 12350-7	Ispitivanje svježeg betona – 7. dio: Sadržaj pora – Tlačne metode
HRN EN 12390-1	Ispitivanje očvrsnulog betona – 1. dio: Oblik, dimenzije i drugi zahtjevi za uzorke i kalupe
HRN EN 12390-2	Ispitivanje očvrsnulog betona – 2. dio: Izradba i njegovanje uzoraka za ispitivanje čvrstoće
HRN EN 12390-3	Ispitivanje očvrsnulog betona – 3. dio: Tlačna čvrstoća uzoraka
HRN EN 12390-6	Ispitivanje očvrsnulog betona – 6. dio: Vlačna čvrstoća cijepanjem uzoraka
HRN EN 12390-7	Ispitivanje očvrsnulog betona – 7. dio: Gustoća očvrsnulog betona
HRN EN 12390-8	Ispitivanje očvrsnulog betona – 8. dio: Dubina prodiranja vode pod tlakom
prCEN/TS 12390-9	Ispitivanje očvrsnulog betona – 9. dio: otpornost na smrzavanje ljuštenjem
HRN U.M1.057	Granulometrijski sastav mješavina agregata za beton
HRN U.M1.016	Beton. Ispitivanje otpornosti na djelovanje mraza
HRN EN 480-11	Dodaci betonu, mortu I injekcijskim smjesama – Metode ispitivanja – 11. dio: Utvrđivanje karakteristika zračnih pora u očvrsnulom betonu
HRN EN12504-1	Ispitivanje betona u konstrukcijama – 1. dio: Izvađeni uzorci – Uzimanje, pregled i ispitivanje tlačne čvrstoće
HRN EN 12504-2	Ispitivanje betona u konstrukcijama – 2. dio: Nerazorno ispitivanje – Određivanje veličine odskoka
HRN EN 12504-3	Ispitivanje betona u konstrukciji – 3. dio: Određivanje sile čupanja
HRN EN 12504-4	Ispitivanje betona u konstrukciji – 4. dio: Određivanje brzine ultrazvuka
prEN 13791:2003	Ocjena tlačne čvrstoće betona u konstrukcijama ili u konstrukcijskim elementima

Specificirana tehnička svojstva betona – projektirani beton

Osnovni zahtjevi

Uporabljeni beton za armiranobetonske konstrukcije predmetne građevine mora zadovoljiti normu HRN EN 206-1:2000 Beton – 1 dio: Specifikacije, svojstva proizvodnja i sukladnost , norme na koje ta norma upućuje i odredbe Priloga A (TPBK NN 139/09, 14/10,125/10; 136/12).

Razred tlačne čvrstoće

Razred tlačne čvrstoće betona za pojedine konstrukcije definiran je u slijedećoj točki i to kao razred tlačne čvrstoće (prema Prilogu A.2.1.6. TPBK NN 139/09, 14/10,125/10; 136/12) kao karakteristična vrijednost 95%-tne vjerojatnosti s kriterijima sukladnosti prema normi HRN EN 206-1:2006.

Razred izloženosti

Razred izloženosti konstrukcije u ovisnosti o okolišu

Maksimalna nazivna veličina zrna agregata

Maksimalno zrno agregata odabire se tako da se uzme u obzir debljina betona zaštitnog sloja prema Prilogu »H«, tablica “H.3”, TPBK NN 139/09, 14/10,125/10; 136/12 (vidi gornju tablicu razredi izloženosti) i najmanja širina presjeka elementa:

Dmax = 0,25 x minimalna širina presjeka = 0,25 x 20 cm = 5,0 cm

Dmax = 0,33 x debljina ploče = 0,33 x 15 cm = 4,95 cm

Odabire se maksimalna nazivna veličina zrna agregata od Dmax = 32 mm

Razred sadržaja klorida

Kloridi u betonu mogu potjecati od samih sastojaka betona (agregat i voda) te iz okoliša. Ako je sadržaj kloridnih iona veći od kritične koncentracije može doći do razaranja pasivnog zaštitnog sloja i početka procesa korozije. Sadržaj klorida u betonu izražen je kao postotak kloridnih iona na masu cementa i ne smije prijeći vrijednosti dane za odabrani razred sadržaja klorida.

Za predmetnu betonsku konstrukciju, prema uporabi betona, odabire se:

- beton ne sadrži čeličnu armaturu ni drugi ugrađeni metal osim nehrđajućih vodilica: razred sadržaja klorida 1% gdje je najveći sadržaj Cl na masu cementa 1%,
- beton sadrži armaturu ili užad za prednapinjanje: razred sadržaja klorida Cl 0,20 gdje je najveći sadržaj Cl na masu cementa 0,2%.

Otpornost betona na prodiranje klorida (samo za beton u agresivnom okolišu)

HRN U.M1.044 Beton, Dodaci betonu: Ispitivanje utjecaja dodataka na koroziju armature. NT BUILD 492 Beton, mort i proizvodi za popravak betonskih konstrukcija na osnovi cementa – Koeficijent migracije klorida na osnovi nestacionarnog ispitivanja migracije klorida. NT BUILD 443 Beton, očvrsnuli, ubrzana penetracija klorida

PREDGOTOVLJENI BETONSKI ELEMENTI

Tehnička svojstva i drugi zahtjevi te dokazivanje uporabljivosti predgotovljenog betonskog elementa izrađenog prema projektu betonske konstrukcije određuje se odnosno provodi u skladu s tim projektom.
Tehnička svojstva predgotovljenih betonskih elemenata moraju ispunjavati opće i posebne zahtjeve bitne za krajnju namjenu u građevini, i moraju biti specificirana prema odgovarajućoj tehničkoj specifikaciji odnosno prema normi HRN EN 13369 i odredbama priloga G (TPBK NN 139/09, 14/10, 125/10; 136/12). Tehnička svojstva betona i armature od kojih se izrađuje odnosno proizvodi predgotovljeni betonski element moraju biti specificirana prema Prilozima A odnosno Priloga B ovoga Propisa (TPBK NN 139/09, 14/10, 125/10; 136/12). Pri proizvodnji predgotovljenih betonskih proizvoda treba poštivati pravila određena odgovarajućom tehničkom specifikacijom za taj proizvod.
Predgotovljeni betonski proizvod proizveden prema tehničkoj specifikaciji za kojeg je sukladnost potvrđena na način određen ovim Prilogom i izdana isprava o sukladnosti, smije se ugraditi u betonsku konstrukciju ako je sukladan zahtjevima projekta te betonske konstrukcije.
Prije ugradnje predgotovljenog betonskog elementa provode se odgovarajuće nadzorne radnje određene normom HRN EN 13670-1, te druge kontrolne radnje određene Prilogom J ovoga Propisa
Norme za predgotovljeni betonske elemente

HRN EN 13369:2004,	Opća pravila za predgotovljene betonske elemente (EN 13369:2004)
HRN EN 1168: 2005	Predgotovljeni betonski proizvodi – Ploče sa šupljinama (EN 1168:2004)
HRN EN 13224:2004	Predgotovljeni betonski proizvodi – Rebrasti stropni elementi (EN 13224:2004)
HRN EN 13225:2005	Predgotovljeni betonski proizvodi – Linijski konstrukcijski elementi (EN 13225:2004)
HRN EN 13693:2005	Predgotovljeni betonski proizvodi – Posebni krovni elementi (EN 13693:2004)
HRN EN 13369:2004/Ispr.1:2008	Opća pravila za predgotovljene betonske elemente (EN 13369:2004/AC:2007)
HRN EN 13369:2004/A1:2008	Opća pravila za predgotovljene betonske elemente (EN 13369:2004/A1:2006)
HRN EN 13225:2005/Ispr.1:2008	Predgotovljeni betonski proizvodi – Linijski konstrukcijski elementi (EN 13225:2004/AC:2006)

Specifikacija betona – osnovna svojstva:

Zbog opasnosti od korozije armature u betonske konstrukcije izložene agresivnom okolišu razreda izloženosti XC nije dopuštena ugradnja betona koji sadrže cemente vrste CEM III/C i glavnog tipa CEM IV i CEM V prema normi HRN EN 197-1.

ARMATURNI ČELIK

Sukladno Prilogu B (TPBK NN 139/09, 14/10, 125/10; 136/12) ovim projektom predviđa se upotreba rebrastog i mrežastog čelika oznake B500B (fyk=500 N/mm2, ftk= 1,08 fyk).

Sva predviđena armatura mora zadovoljavati slijedeće norme:

HRN 1130-1:2008	Čelik za armiranje betona – Zavarljivi čelik za armiranje – 1. dio: Tehnički uvjeti isporuke čelika razreda A
HRN 1130-2:2008	Čelik za armiranje betona – Zavarljivi čelik za armiranje – 2. dio: Tehnički uvjeti isporuke čelika razreda B
HRN 1130-3:2008	Čelik za armiranje betona – Zavarljivi čelik za armiranje – 3. dio: Tehnički uvjeti isporuke čelika razreda C
HRN 1130-4:2008	Čelik za armiranje betona – Zavarljivi čelik za armiranje – 4. dio: Tehnički uvjeti isporuke zavarenih mreža
HRN 1130-5:2008	Čelik za armiranje betona – Zavarljivi čelik za armiranje – 5. dio: Tehnički uvjeti isporuke rešetkastih nosača
HRN EN 10080:2005	Čelik za armiranje betona – Zavarljivi armaturni čelik – Općenito (EN 10080:2005)
HRN EN 10020: 1999	Definicije i razredba vrsta čelika (EN 10020:1988)
HRN EN 10025: 2002	Toplo valjani proizvodi od nelegiranih konstrukcijskih čelika – Tehnički uvjeti isporuke (EN 10025:1990+A1:1993)
HRN EN 10027-1:2007	Sustavi označivanja za čelike – 1. dio: Nazivi čelika,(EN 10027:2005)
HRN EN 10027-2:1999	Sustavi označivanja čelika – 2. dio: Brojčani sustav (EN 10027:1992)
HRN EN 10079:2008	Definicija čeličnih proizvoda (EN 10079:2007)
HRN EN ISO 17660-1:2008	Zavarivanje – Zavarivanje čelika za armiranje – 1. dio: Nosivi zavareni spojevi (ISO 17660-1:2006; EN ISO 17660-1:2006)
HRN EN ISO 17660-2:2008	Zavarivanje – Zavarivanje čelika za armiranje – 2. dio: Nenosivi zavareni spojevi (ISO 17660-2:2006; EN ISO 17660-2:2006)
HRN EN 287-1:2004	Provjera osposobljenosti zavarivača – Zavarivanje taljenjem – 1. dio: Čelici (EN 287-1:2004)
HRN EN 287-1:2004/AC:2007	Provjera osposobljenosti zavarivača – Zavarivanje taljenjem – 1. dio: Čelici (EN 287-1:2004/AC:2004)
HRN EN 287-1:2004/A2:2008	Provjera osposobljenosti zavarivača – Zavarivanje taljenjem – 1. dio: Čelici (EN 287-1:2004/A2:2006)

Tehnička svojstva čelika za armiranje:

Za sve konstruktivne elemente predviđen je čelik za armiranje betona razreda B500B koji treba ispunjavati zahtjeve prema prilogu B Tehničkih propisa za betonske konstrukcije (TPBK) i zahtjeve normi na koje upućuju norme HRN EN 10080-1, HRN EN 10080-3 i HRN EN 10080-5.

Zaštitni sloj armature

Veličinu zaštitnog sloja betona do armature osigurati dostatnim brojem kvalitetnih distancera. Kvalitetu zaštitnog sloja osigurati kvalitetnom oplatom i ugradnjom betona. Veličina i kvaliteta zaštitnog sloja betona presudni su za trajnost građevine. U potpunosti poštivati projektirani raspored i položaj armaturnih šipki, koje trebaju biti nepomične kod betoniranja. Sva upotrijebljena armatura treba imati odgovarajuće ateste o kakvoći. Min. zaštitni slojevi - tablica specifikacija betona-dodatna svojstva.

ČELIK ZA PREDNAPINJANJE

Čelik za prednapinjanje montažnih betonskih elemenata mora zadovoljavat sljedeće norme:

nHRN EN 10138-1	Čelik za prednapinjanje – 1. dio: Opći zahtjevi (prEN 10138-1:2000)
nHRN EN 10138-2	Čelik za prednapinjanje – 2. dio: Žica (prEN 10138-2:2000)
nHRN EN 10138-3	Čelik za prednapinjanje – 3. dio: Užad (prEN 10138-3:2000)

CEMENT ZA BETON

Cement za beton definiran je prilogom C (TPBK NN 139/09, 14/10). Ovim prilogom se propisuju tehnička svojstva i drugi zahtjevi za cement za primjenu u betonu. Za predmetnu konstrukciju treba koristiti cement opće namjene oznaka CEM I ili CEM II ako ima odgovarajući razred tlačne čvrstoće.

Norme za cement :

HRN CR 14245:2004 Smjernice za primjenu EN 197-2 »Vrednovanje sukladnosti« (CR 14245:2001)
HRN EN 197-1:2005 Cement – 1. dio: Sastav, specifikacije i kriteriji sukladnosti cemenata opće namjene (uključuje amandman A1:2004) (EN 197-1:2000+A1:2004) (EN 197-1:2000/A3:2007)
HRN EN 197-2:2004 Cement – 2. dio: Vrednovanje sukladnosti (EN 197-2:2000)
HRN EN 197-4: 2006 Cement – 4. dio: Sastav, specifikacije i kriteriji sukladnosti metalurškog cemenata rane početne čvrstoće (EN 197-4:2004)
HRN EN 14216:2006 Cement – Sastav, specifikacije i kriteriji sukladnosti za posebne vrste cemenata vrlo niske topline hidratacije (EN 14216:2004)
HRN EN 14647:2006 Kalcijev aluminatni cement – Sastav, specifikacije i kriteriji sukladnosti (EN 14647:2005)
HRN EN 14647:2006/AC:2007 Kalcijev aluminatni cement – Sastav, specifikacije i kriteriji sukladnosti (EN 14647:2005/AC:2006)

AGREGAT ZA BETON

Agregat za beton mora ispunjavati odredbe (TPBK NN 139/09,14/10) i odgovarajućih normi na koje se tehnički propis poziva.

Ovim projektom je predviđeno da se upotrebljava drobljeni agregat s gustoćom zrna većom od 2000 kg/m3 (u daljnjem tekstu: agregat za beton) dobiven preradom prirodnih materijala (kamena) u pogonima za proizvodnju agregata.

Odabire se maksimalna nazivna veličina zrna agregata od Dmax = 32 mm.

Norme za agregat prema (TPBK NN 139/09, 14/10, 125/10; 136/12).
HRN EN 12620:2008 Agregati za beton (EN 12620:2002)
HRN EN12620:2003/AC:2006 Agregati za beton (EN 12620:2002/AC:2004)
HRN EN 13055-1:2003 Lagani agregati – 1. dio: Lagani agregati za beton, mort i mort za zalijevanje (EN 13055-1:2002)
HRN EN13055-1:2003/AC:2006 Lagani agregati – 1. dio: Lagani agregati za beton, mort i mort za zalijevanje (EN 13055-1:2002/AC:2004)
HRN EN 206-1:2006 Beton – 1. dio: Specifikacije, svojstva, proizvodnja i sukladnost (uključuje amandmane A1:2004 i A2:2005) (EN 206-1:2000+A1:2004+A2:2005)

VODA ZA BETON

Karakteristike vode za betonsku konstrukciju definiraju se Prilogom F (TPBK NN 139/09, 14/10, 125/10; 136/12). Sukladno stavku F.2.1.2. (TPBK NN 139/09, 14/10,125/10; 136/12) tehnička svojstva vode specificiraju se u projektu betonske konstrukcije. Ovim projektom betonske konstrukcije predviđa se da se za proizvodnju betona koristi voda za piće.

Popis norma za vodu:

HRN EN 1008:2002 Voda za pripremu betona – Specifikacije za uzorkovanje, ispitivanje i potvrđivanje prikladnosti vode, uključujući vodu za pranje iz instalacija za otpadnu vodu u industriji betona, kao vode za pripremu betona (EN 1008:2002)

HRN EN 206-1:2006 Beton – 1. dio: Specifikacije, svojstva, proizvodnja i sukladnost (uključuje amandmane A1:2004 i A2:2005) (EN 206-1:2000+A1:2004+A2:2005)

HRN EN 197-1:2005 Cement – 1. dio: Sastav, specifikacije i kriteriji sukladnosti cementa opće namjene (uključuje amandman A1:2004) (EN 197-1:2000+A1:2004)

OZNAČAVANJE BETONA

Sukladno Prilogu A.2.3.1. Projektirani beton treba na otpremnici biti označen prema HRN EN 206-1, pri čemu oznaka mora obvezno sadržavati poziv na tu normu i razred tlačne čvrstoće, te podatke o ostalim svojstvima (kao što su: granične vrijednosti sastava ili razred otpornosti prema razredima izloženosti, najveće nazivno zrno agregata, gustoća, konzistencija i dr.) kada su ta svojstva uvjetovana projektom betonske konstrukcije.

ISPITIVANJE BETONA

Sukladno Prilogu A.3.1. (TPBK NN 139/09, 14/10,125/10; 136/12) uzimanje uzoraka, priprema ispitnih uzoraka i ispitivanje svojstava svježeg i očvrsnulog betona provodi se prema normama:

HRN EN 206-1:2006 Beton -- 1. dio: Specifikacije, svojstva, proizvodnja i sukladnost (uključuje amandmane A1:2004 i A2:2005) (EN 206-1:2000+A1:2004+A2:2005)

HRN 1128:2007 Beton – Smjernice za primjenu norme HRN EN 206-1

PROGRAM UZIMANJA KONTROLNIH UZORAKA

(potrebno je ispuniti u izvedbenom projektu prema zadanim kriterijima nakon utvrđivanja stvarnih količina betona za pojedine dijelove betonske konstrukcije i u skladu s planiranom dinamikom građenja).

Uzimanje i ispitivanje kontrolnih uzoraka betona odrediti će se prema stvarnoj dinamici izvođenja radova, a sve prema navedenim kriterijima:

1. ispitivanje tlačne čvrstoće:

- min jedan uzorak za svaki dan betoniranja za svaku vrstu betona,
- min. jedan uzorak na svakih 50 m3 ugrađenog betona
-min. jedan uzorak dnevno betona za konstrukcijske elemente koji su značajni za sigurnost konstrukcije, bez obzira i na manju količinu betona koja se ugrađuje u njega

2. ispitivanje vodonepropusnosti:

-Min. jedna serija za beton razreda tlačne čvrstoće C 25/30 i C30/37 (1 seriju čine 3 probna betonska tijela) Broj uzoraka za tlačnu čvrstoću će se pri gradnji ovih objekta prilagoditi tekućoj dinamici tako da budu ispunjeni gornji uvjeti. Za materijale i elemente koji nisu navedeni u ovom Programu, a biti će isporučeni na gradilište ili su proizvedeni odnosno izrađeni na gradilištu, potrebno je za njih prije ugradbe pribaviti odgovarajuću dokaznu dokumentaciju i ugraditi ih uz odobrenje nadzornog inženjera.

PROJEKTIRANJE

Sukladno Prilogu A.4.1. (TPBK NN 139/09, 14/10, 125/10; 136/12) beton koji ima tehnička svojstva i ispunjava druge zahtjeve rabi se za betonske konstrukcije projektirane prema Prilogu »I« ovoga Propisa.

GRAĐENJE

Sukladno Prilogu A.5.1. (TPBK NN 139/09,14/10, 125/10; 136/12) pri ugradnji betona treba odgovarajuće primijeniti pravila određena Prilogom »J« istog propisa te:
- pojedinosti koje se odnose na ugradnju betona,
- pojedinosti koje se odnose na sastavne materijale od kojih se beton proizvodi te norme kojima se potvrđuje sukladnost tih proizvoda
- pojedinosti koje se odnose na uporabu i održavanje, dane projektom betonske konstrukcije i/ili tehničkom uputom za ugradnju i uporabu.

NADZOR

Sukladno EN 13670-1:2000 odabire se razred nadzora 2

ODRŽAVANJE GRAĐEVINE

Radnje u okviru održavanja betonskih konstrukcija treba provoditi prema odredbama Priloga J.3. Održavanje betonskih konstrukcija, Tehničkog propisa za betonske konstrukcije (NN RH 139/09, 14/10, 125/10; 136/12) i normama na koje upućuje Prilog J.3., te odgovarajućom primjenom odredaba ostalih priloga TPBK. Izvanredne preglede građevine provoditi nakon nekog izvanrednog događaja (ekstremne vremenske neprilike, potres, požar, eksplozija i slično) ili prema zahtjevu inspekcije. Osim ovih pregleda preporučuje se da korisnici i suvlasnici građevine vrše godišnje preglede i ukoliko primijete neku nepravilnost na konstrukciji, zatraže redoviti ili izvanredni pregled i prije roka predviđenog ovim projektom. Način obavljanja pregleda uključuje:
- vizualni pregled, u kojeg je uključeno utvrđivanje položaja i veličine napuklina i pukotina te drugih oštećenja bitnih za očuvanje mehaničke otpornosti i stabilnosti građevine,
- utvrđivanja stanja zaštitnog sloja armature, za betonske konstrukcije u umjereno ili jako agresivnom okolišu,
-utvrđivanje veličine progiba glavnih nosivih elemenata betonske konstrukcije za slučaj osnovnog djelovanja, ako se na temelju vizualnog pregleda sumnja u ispunjavanje bitnog zahtjeva mehaničke otpornosti i stabilnosti.

Nakon obavljenih pregleda konstrukcije potrebno je izraditi dokumentaciju o stanju konstrukcije nakon pregleda sa potrebnim mjerama i radovima na saniranju i održavanju konstrukcije.
Ovu i drugu dokumentaciju o održavanju betonske konstrukcije dužan je trajno čuvati vlasnik građevine. Vlasnik (ili suvlasnici) građevine dužni su postupiti prema potrebnim zahtjevima i mjerama iz dokumentacije o stanju konstrukcije te izvesti neophodne radove održavanja, obnove i izmjene uređaja i dijelova te radove popravka, ojačanja i rekonstrukcije. Sve radove pregleda i izvedbe radova na konstrukciji potrebno je povjeriti za to ovlaštenim osobama.

ČELIČNA KONSTRUKCIJA

Općenito

Izvođač radova čelične konstrukcije dužan je prije početka rada na zavarivanju predočiti nadzornom inženjeru, odnosno projektantu konstrukcije slijedeće:
- planove slijeda zavarivanja sa točnim odredbama u pogledu rasporeda i redoslijeda svakog pojedinog zavara
- plan montaže konstrukcije u kojem će biti detaljno razrađen način i slijed montaže

Tek nakon ovjere navedenih planova od strane nadzornog inženjera, odnosno projektanta izvođač može započeti s radom. Također prije početka radova izvođač je dužan dati na uvid nadzornom inženjeru slijedeće:
ateste materijala od kojih će biti izrađena čelična konstrukcija

ateste za spojni materijal (vijke, elektrode i sl.)

- ateste zavarivača koji će raditi na izradi čelične konstrukcije
- prethodno navedenu dokumentaciju tj. planove slijeda zavarivanja i plan montaže konstrukcije.

Tek nakon pregleda navedene dokumentacije i upisa u građevinski dnevnik od strane nadzornog inženjera izvođač može započeti sa radom.

Za čitavo vrijeme izrade i montaže konstrukcije izvođač mora uredno voditi zakonski propisane dnevnike (radionički, montažni i dnevnik zavarivanja). Osim toga izvođač mora imati na skicama ucrtano slijedeće:

- brojeve atesta osnovnog i spojnog materijala iz kojeg je izrađena svaka pojedina pozicija
- označene zavare sa brojem atesta elektrode i oznakom zavarivača koji je zavarivao.

Dužnost nadzornog inženjera je:

- kontrolirati u svim fazama izvedbu i montažu. Izvedba i montaža mora biti u suglasnosti sa zahtjevima ove projektne dokumentacije, pravila i standarda.
- ovjeravati prethodno navedene dokumente
- ovjeravati sve eventualno potrebne dokumente međufaznog atestiranja
- ovjeriti zapisnik o kontroli, odnosno pregledu izrađenih elemenata u radionici prije isporuke na gradilište. Ova kontrola se odnosi na izradu pojedinog montažnog elementa i pripremu površine i nanošenju prvog antikorozivnog premaza.

Ako izvođač radova smatra da pojedinom odredbom projekta dolazi do štetnih posljedica po kvaliteti, stabilnost ili trajnost konstrukcije, ili da su one u suprotnosti sa ostalim podacima danim u projektu, dužan je da pravodobno zatraži odluku o tom pitanju.

Izvođač radova garantira za kvalitetu materijala, konstrukcije i izvedbe 10 godina nakon izvršene montaže. Početak garantnog roka utvrđuje se u zapisniku tehničkog pregleda.

Investitor može predanu mu tehničku dokumentaciju upotrebljavati isključivo za izradu konstrukcije obrađene u ovom elaboratu. Čelična konstrukcija se antikorozivno zaštićuje i to u dva osnovna i dva završna premaza. Odabir materijala za antikorozivnu zaštitu vršiti u dogovoru sa projektantom konstrukcije.

Izrada u radionici

Zahtjevi za kvalitetu materijala moraju odgovarati važećim standardima i propisima u Republici Hrvatskoj, a dani su specifikaciji materijala za svaku pojedinu poziciju i toga se treba u potpunosti pridržavati. Primijenjeni su materijali prema standardu za nosive čelične konstrukcije. Kao osnovni materijal za nosivu čeličnu konstrukciju primjenjuju se opći konstruktivni čelici rednog broja i oznake prema statičkom proračunu ovog projekta. Pojedine vrste čelika odabrane su prema namjeni i statičkom opterećenju konstrukcije, pa se kod nabave materijala treba obvezno pridržavati oznake kvalitete iz ovog elaborata. U čeličnim konstrukcijama upotrebljavaju se vijci sa propisanim osobinama prema odgovarajućim propisima. Ovim elaboratom primjenjuju se vijci dimenzija i oznaka kvaliteta prema statičkom računu ovog elaborata. Izbor vrste i proizvodnje elektroda ili žice treba povjeriti nadležnom zavodu, tako da odabrana elektroda ili žica za konkretni materijal daje optimalne spojeve sa minimalnim deformacijama. Zavarivanje nosivih čeličnih konstrukcija se mora vršiti u skladu sa odgovarajućim propisima za zavarene čelične konstrukcije. Kontrole kvalitete materijala (atestiranje) treba izvršiti u skladu sa odgovarajućim propisima, a uz dogovor sa nadzornim inženjerom. Voditi računa da limove treba kontrolirati na dvoslojnost. Detaljnu tehnologiju zavarivanja suglasno raspoloživoj opremi i kadrovima predlaže Izvođač investitoru, odnosno nadzornom inženjeru i projektantu konstrukcije. Osnovni je zahtjev da predviđeni način, odnosno postupak ne daje spojeve koji imaju lošija mehanička svojstva od osnovnog materijala. Naročito se mora paziti na žilavost spoja, a koncentracije napona od zavarivanja u spojevima se moraju svesti na najmanju mjeru. Prema izabranom i ovjerenom postupku zavarivanja, ručnom, poluautomatskom, automatskom, pod zaštitom praška ili u zaštiti plinova izvođač naručuje i odgovarajući materijal. Izvođač je dužan u punoj mjeri primijeniti sve postupke za sprječavanje deformacija kod zavarivanja.

Naročitu pažnju treba posvetiti lokalnim zarezima koji bi se mogli pojaviti kod sječenja, posebno kod elemenata napregnutih na vlak. Svaki se zarez mora izbrusiti ili dovariti i izbrusiti.

Ne dozvoljava se zavarivanje na temperaturi nižoj od 0°C, ili na prostoru koji nije zaštićen od kiše.

Predviđeni postupak mora biti takav da su termički naponi u konstrukciji budu što manji.

Čitav postupak izrade i zavarivanja mora osigurati prema projektu predviđene dimenzije konstrukcije uvažavajući dozvoljene tolerancije.

Prije zavarivanja treba pregledati površine koje će se zavarivati. One moraju biti metalno čiste bez rđe, masnoća i drugih prljavština.

Svi zavari moraju biti kvalitete I. Sučeone zavare u vlačnim elementima treba obrusiti.

Ako zavari nisu besprijekornog oblika treba ih obavezno obraditi. Netočnosti u izvedbi zavara na dolje neće se tolerirati.

Radove zavarivanja smije vršiti atestirani zavarivač. Atesti zavarivača daju se na uvid nadzornom inženjeru investitora i to prije početka izvedbe. Atesti zavarivača koji će zavarivati konstrukciju ne smiju biti stariji od 6 mjeseci.

Paljenje luka može se vršiti samo na mjestima koja se naknadno zavaruju. Kapljice od prskanja luka kao i šljake moraju se u cijelosti odstraniti poslije zavarivanja.

Treba voditi računa da se sav potrebni materijal uskladištava u suhim prostorijama. Eventualno ovlaženi materijal prije upotrebe treba prosušiti u pećima.

Izvođač je dužan izraditi detaljan plan tehnološkog procesa izrade. Plan treba sadržavati, suglasno zahtjevu projekta, raspored limova i radioničkih nastavaka, oblik i dimenzije zavara, način radioničkog sklapanja konstrukcije, postupak zavarivanja s karakterističnim uputama svih faznih operacija od početka do završetka radioničkih radova.

Poslije završetka radioničkih radova na konstrukcijskim sklopovima vrši se geometrijska kontrola konstrukcije kao i ostali postupci dogovorenog načina kontrole. Nadzorni inženjer preuzima konstrukciju zapisnički u cjelini ili dijelovima i odobrava otpremu na gradilište. Temeljem ovih uvjeta čitava konstrukcija se isporučuje na gradilište sa prvim temeljnim premazom antikorozivne zaštite.

Montaža

Kako za radioničke tako i za montažne radove Izvođač prethodno mora predložiti nadzornom inženjeru detaljni tehnološki postupak radova, te sve suglasnosti i potvrde. Tehnološki postupak montažnih radova spada u sastav tehničke dokumentacije za prijem čelične konstrukcije.

Teren na gradilištu treba tako pripremiti da može primiti opterećenje od barem 1.50 kN/m2, a iz razloga da se omogući sigurno kretanje vozila i dizalice koji su potrebni za montažu konstrukcije.
Investitor daje na raspolaganje potrebnu električnu energiju za montažne radove napona 380/220 V, ako se drugačije ne dogovori u ugovoru.

Izvođač montažerskih radova vrši radove po potvrđenom tehnološkom postupku koji mora obuhvatiti jasno razrađene detalje kao: obrada montažnih spojeva, pomoćnih priprema i alata, načina sastava, postupak zavarivanja, postupak dizanja i namještanja čeličnih konstrukcija u pravilan položaj, te sve ostale detalje koji utječu na pravilno, sigurno i kvalitetno izvođenje montažerskih radova.

Izvođač je dužan kod radova osigurati odgovarajuću kvalificiranu radnu snagu za montažerske i zavarivačke radove. Također je dužan raditi protokole koje periodički uz ugovor potpisuje i nadzorni inženjer. Protokoli obuhvaćaju karakteristične faze rada sa svim nivelmanima i međufaznom kontrolom geometrije konstrukcije. Dužan je voditi i montažni dnevnik koji supotpisuje nadzorni inženjer.

Prispjela konstrukcija iz radionice deponira se na podloge i to po redu montaže. Obavezno prije početka montaže zapisnički se u dnevnik unose podaci o kontroli nivelmana betonskih radova, odnosno betonskih elemenata na koje se montira čelična konstrukcija.

Antikorozivna zaštita

Radovi na zaštiti od korozije mogu se povjeriti samo poduzeću koje je registrirano za tu djelatnost. Za izvedbu radova smiju se koristiti samo materijali s atestom izdanim od stručne organizacije registrirane za djelatnost u koju spada ispitivanje kvalitete tih materijala. Tijekom izvedbe radova na zaštiti od korozije mora se kontrolirati svaka radna operacija i rad u cjelini. Prije nanošenja premaza mora se kontrolirati:

- podobnost pripremljene čelične površine
- stanje prethodnog sloja namaza

Treba kontrolirati i debljinu slojeva namaza. Čelična konstrukcija i svi njeni dijelovi ne mogu se staviti u uporabu prije nego što se utvrdi da su zaštićeni od korozije na način kako je to projektom predviđeno.

Norme za nelegirane konstrukcijske čelike – osnovni materijal

HRN EN 10017:2007	Valjana čelična žica za vučenje i/ili hladno valjanje -- Mjere i dopuštena odstupanja
HRN EN 10020:2008	Definicije i razredba vrsta čelika
HRN EN 10021: 2008	Opći tehnički uvjeti isporuke za čelik i čelične proizvode
HRN EN 10024:2005	Toplo valjani I-profili sa skošenim pojasnicama – Dopuštena odstupanja oblika i mjera
HRN EN 10025-1:2006	Toplo valjani proizvodi od konstrukcijskih čelika – 1. dio: Opći tehnički uvjeti isporuke
HRN EN 10025-2:2007	Toplo valjani proizvodi od konstrukcijskih čelika -- 2. dio: Tehnički uvjeti isporuke za nelegirane konstrukcijske čelike
HRN EN 10025-3:2007	Toplo valjani proizvodi od konstrukcijskih čelika -- 3. dio: Tehnički uvjeti isporuke za normalizacijski žarene/normalizacijski valjane zavarljive sitnozrnate konstrukcijske čelike (EN 10025-3:2004)
HRN EN 10025-4:2007	Toplo valjani proizvodi od konstrukcijskih čelika -- 4. dio: Tehnički uvjeti isporuke za termomehanički valjane zavarljive sitnozrnate konstrukcijske čelike
HRN EN 10025-5:2007	Toplo valjani proizvodi od konstrukcijskih čelika -- 5. dio: Tehnički uvjeti isporuke za konstrukcijske čelike otporne na atmosfersku koroziju
HRN EN 10025-6:2007	Toplo valjani proizvodi od konstrukcijskih čelika -- 6. dio: Tehnički uvjeti isporuke za plosnate proizvode od konstrukcijskih čelika s visokom granicom razvlačenja u poboljšanome stanju
HRN EN 10027-1:2007	Sustavi označivanja za čelike -- 1. dio: Nazivi čelika
HRN EN 10027-2:1999	Sustavi označivanja čelika -- 2. dio: Brojčani sustav
HRN EN 10029:2000	Toplo valjani čelični limovi debljine ≥ 3 mm -- Dopuštena odstupanja dimenzija, oblika i mase
HRN EN 10034:2003	I-profili i H-profili od konstrukcijskih čelika -- Dopuštena odstupanja mjera i oblika
HRN EN 10048:2003	Toplo valjana čelična traka -- Dopuštena odstupanja mjera i oblika
HRN EN 10051:2003	Neprekinuti, neprevučeni toplo valjani lim i traka od nelegiranih ili legiranih čelika -- Dopuštena odstupanja mjera i oblika
HRN EN 10055:2005	Toplo valjani T-profil s istokračnom pojasnicom zaobljenih rubova i prijelaza -- Mjere i dopuštena odstupanja oblika i mjera
HRN EN 10056-1:2005	Čelični kutnici s jednakim i nejednakim krakovima -- 1. dio: Mjere
HRN EN 10056-2:2005	Čelični kutnici s jednakim i nejednakim krakovima -- 2. dio: Dopuštena odstupanja oblika i mjera
HRN EN 10058:2007	Toplo valjane plosnate čelične šipke za opću namjenu -- Mjere i dopuštena odstupanja oblika i mjera
HRN EN 10059:2005	Toplo valjane četverokutne čelične šipke za opću namjenu -- Mjere i dopuštena odstupanja oblika i mjera
HRN EN 10060:2005	Toplo valjane okrugle čelične šipke za opću namjenu – Mjere i dopuštena odstupanja oblika i mjera
HRN EN 10061:2005	Toplo valjane šesterokutne čelične šipke za opću namjenu -- Mjere i dopuštena odstupanja oblika i mjera
HRN EN 10080:2005	Čelik za armiranje betona – Zavarljivi armaturni čelik – Općenito
HRN EN 10130:2008	Hladno valjani plosnati proizvodi od mekog čelika za hladnu preradbu Tehnički uvjeti isporuke
HRN EN 10131:2008	Hladno valjani, neprevučeni i cinkom ili cink-nikal elektrolitski prevučeni niskougljični i s povišenom granicom razvlačenja čelični plosnati proizvodi namijenjeni hladnomu oblikovanju - Dopuštena odstupanja dimenzija i oblika
HRN EN 10139:2000	Hladno valjane trake bez prevlaka od mekih čelika za hladno oblikovanje – Tehnički uvjeti isporuke

HRN EN 10140:2008	Hladno valjana uska čelična traka - Dopuštena odstupanja dimenzija i oblika
HRN EN 10143:2008	Kontinuirani čelični lim i traka prevučeni vrućim uranjanjem - Dopuštena odstupanja dimenzija i oblika
HRN EN 10149-1:2007	Toplo valjani plosnati proizvodi od čelika s visokom granicom razvlačenja za hladno oblikovanje -- 1. dio: Opći uvjeti isporuke
HRN EN 10149-2:2007	Toplo valjani plosnati proizvodi od čelika s visokom granicom razvlačenja za hladno oblikovanje -- 2. dio: Uvjeti isporuke za termomehanički valjane čelike
HRN EN 10149-3:2007	Toplo valjani plosnati proizvodi od čelika s visokom granicom razvlačenja za hladno oblikovanje -- 3. dio: Uvjeti isporuke za normalizacijski žarene ili normalizacijski valjane čelike
HRN EN 10152:2000	Elektrolitički pocinčani hladno valjani plosnati proizvodi od čelika Tehnički uvjeti isporuke
HRN EN 10163-1:2007	Uvjeti isporuke za stanje površine toplo valjanih čeličnih ploča, širokih traka i profila -- 1. dio: Opći uvjeti
HRN EN 10163-2:2007	Uvjeti isporuke za stanje površine toplo valjanih čeličnih ploča, širokih traka i profila 2. dio: Ploča i široke trake
HRN EN 10163-3:2007	Uvjeti isporuke za stanje površine toplo valjanih čeličnih ploča, širokih traka i profila -- 3. dio: Profili
HRN EN 10164:2008	Čelični proizvodi s poboljšanim svojstvima na deformaciju okomito na površinu proizvoda -- Tehnički uvjeti isporuke
HRN EN 10169:2012	Kontinuirano organski prevučeni (prevučeni koluti) plosnati čelični proizvodi -- Tehnički uvjeti isporuke
HRN EN 10204:2007	Metalni proizvodi -- Vrste dokumenata o ispitivanju
HRN EN 10210-1:2008	Toplo oblikovani šuplji profili od nelegiranih i sitnozrnatih konstrukcijskih čelika -- 1. dio: Tehnički uvjeti isporuke
HRN EN 10210-2:2008	Toplo oblikovani šuplji profili od nelegiranih i sitnozrnatih konstrukcijskih čelika -- 2. dio: Dopuštena odstupanja, dimenzije i statičke vrijednosti presjeka
HRN EN 10219-1:2008	Hladno oblikovani šuplji profili za čelične konstrukcije od nelegiranih i sitnozrnatih čelika -- 1. dio: Tehnički uvjeti isporuke
HRN EN 10219-2:2008	Hladno oblikovani šuplji profili za čelične konstrukcije od nelegiranih i sitnozrnatih čelika -- 2. dio: Dopuštena odstupanja, dimenzije i statičke vrijednosti presjeka
HRN EN 10268:2008	Hladno valjani čelični plosnati proizvodi s visokom granicom razvlačenja za hladno oblikovanje -- Tehnički uvjeti isporuke
HRN EN 10279:2007	Toplo valjani čelični U profili -- Dozvoljena odstupanja oblika, mjera i mase
HRN EN 10292:20XX	Kontinuirano vruće pocinčana traka i lim od čelika s visokom granicom razvlačenja za hladno oblikovanje – Tehnički uvjeti isporuke
HRN EN 10326:2007	Trake i limovi od konstrukcijskih čelika s prevlakom nanesenom neprekidnim vrućim uranjanjem -- Tehnički uvjeti isporuke
HRN EN 10327:20XX	Kontinuirano vruće pocinčana traka i lim od (mekanog) niskougljičnog čelika za hladno oblikovanje – Tehnički uvjeti isporuke
HRN ISO 4997:20XX	Kontinuirano hladno valjani plosnati proizvodi iz nelegiranih konstrukcijskih čelika

Norme za konstrukcijski čelik – spojevi sa vijcima

HRN EN 15048-1:2008	Konstrukcijski vijčani spojevi bez predopterećenja -- 1. dio: Opći zahtjevi
HRN EN 898-1:2005	Mehanička svojstva spojnih elemenata izrađenih od ugljičnih i legiranih čelika – 1. dio: Vijci i svorni vijci
HRN EN 20898-2:20XX	Mehanička svojstva spojnih elemenata izrađenih od ugljičnih i legiranih čelika – 2. dio: Matice s propisanim ispitnim silama, standardni navoj
HRN EN ISO 3269:2005	Spojni elementi – Prijamno ispitivanje
HRN EN 14399-1:2008	Visokočvrsti konstrukcijski predopterećeni vijčani spojevi -- 1. dio: Opći zahtjevi
HRN EN 14399-2:2008	Visokočvrsti konstrukcijski predopterećeni vijčani spojevi -- 2. dio: Ispitivanje prikladnosti za predopterećenje
HRN EN 14399-3:2008	Visokočvrsti konstrukcijski predopterećeni vijčani spojevi -- 3. dio: Sustav HR -- Spojevi vijka sa šesterokutnom glavom i šesterokutne matice
HRN EN 14399-4:2008	isokočvrsti konstrukcijski predopterećeni vijčani spojevi -- 4. dio: Sustav HV -- Spojevi vijka sa šesterokutnom glavom i šesterokutne matice
HRN EN 14399-5:2008	Visokočvrsti konstrukcijski predopterećeni vijčani spojevi -- 5. dio: Ravne podložne pločice
HRN EN 14399-6:2008	Visokočvrsti konstrukcijski predopterećeni vijčani spojevi -- 6. dio: Ravne podložne pločice, skošene
HRN EN 14399-7:20XX	Konstrukcijski vijčani spojni elementi visoke čvrstoće za prednapinjanje – Dio 7: Vijčani sklop s upuštenom glavom
HRN EN 14399-8:20XX	Konstrukcijski vijčani spojni elementi visoke čvrstoće za prednapinjanje – Dio 8: Sustav HV – Šesterokutni vijčani sklop s upasnim vijkom

HRN EN 14399-9:20XX	Konstrukcijski vijčani spojni elementi visoke čvrstoće za prednapinjanje – Dio 9: Sustav HR ili HV – Vijčani sklop s direktnim pokazivačem vlaka
HRN EN 14399-10:20XX	Konstrukcijski vijčani spojni elementi visoke čvrstoće za prednapinjanje – Dio 10: Sustav HRC – Vijčani sklop s baždarenim prednaponom
HRN EN ISO 1479:2005	Vijci za lim sa šesterokutnom glavom
HRN EN ISO 1481:2005	Vijci za lim valjkaste glave s urezom
HRN EN ISO 2320:2005	Šesterokutne čelične matice s osiguranjem od odvijanja – Mehanička i uporabna svojstva
HRN EN ISO 3506-1:2005	Mehanička svojstva spojnih elemenata izrađenih od korozijski postojanih (nehrđajućih) čelika – 1. dio: Vijci i svorni vijci
HRN EN ISO 3506-2:2005	Mehanička svojstva spojnih elemenata izrađenih od korozijski postojanih (nehrđajućih) čelika – 2. dio: Matice
HRN EN ISO 7040:2005	Šesterokutna matica osigurana od odvijanja nemetalnim uloškom, oblik 1 – Razred čvrstoće 5, 8 i 10
HRN EN ISO 7042:2005	Šesterokutna matica osigurana od odvijanja, oblik 2 – Razred čvrstoće 5, 8, 10 i 12
HRN EN ISO 7719:2005	Šesterokutne matice s osiguranjem od odvijanja u cijelosti izrađene od metala, tip 1 – Razredi čvrstoće 5, 8 i 10
HRN EN ISO 10511:2005	Šesterokutna niska matica osigurana od odvijanja nemetalnim uloškom (nemetalni uložak)
HRN EN ISO 10512:2005	Šesterokutna matica osigurana od odvijanja nemetalnim uloškom, oblik 1, fini metrički navoj – Razred čvrstoće materijala 6, 8 i 10
HRN EN ISO 10513:2005	Šesterokutna matica osigurana od odvijanja, tip 2, fini metrički navoj – Razred čvrstoće 8, 10 i 12
HRN EN ISO 15480:2005	Samonarezni vijci sa šesterokutnom prirubnom glavom
HRN EN ISO 15976:2005	Oklopljene zakovice zatvorenog struka s prekidnim trnom i zaobljenom glavom – St/St
HRN EN ISO 15979:2005	Oklopljene zakovice šupljeg struka s prekidnim trnom i zaobljenom glavom – St/St
HRN EN ISO 15980:2005	Oklopljene zakovice šupljeg struka s prekidnim trnom i upuštenom glavom – St/St
HRN EN ISO 15983:2005	Oklopljene zakovice šupljeg struka s prekidnim trnom i zaobljenom glavom – A2/A2
HRN EN ISO 15984:2005	Oklopljene zakovice šupljeg struka s prekidnim trnom i upuštenom glavom – A2/A2

Norme za konstrukcijski čelik – dodatni materijali za zavarivanje

HRN EN 13479:2007	Dodatni i potrošni materijali za zavarivanje – Opća norma za dodatne materijale i praškove za zavarivanje metalnih materijala taljenjem
HRN EN ISO 2560:2007	Dodatni i potrošni materijali za zavarivanje – Obložene elektrode za ručno elektrolučno zavarivanje nelegiranih i sitnozrnatih čelika – Razredba
HRN EN 439:1999	Dodatni i potrošni materijali – Zaštitni plinovi za elektrolučno zavarivanje i rezanje
HRN EN 440:1997	Dodatni materijali za zavarivanje – Žice za elektrolučno zavarivanje metalnom taljivom elektrodom u zaštitnoj atmosferi plinova i metal zavara, namijenjeni za nelegirane i sitnozrnate čelike – Razvrstavanje
HRN EN 756:2004	Dodatni i potrošni materijali za zavarivanje – Kombinacije žica i praškova za zavarivanje pod praškom nelegiranih i sitnozrnatih čelika – Razredba
HRN EN 757:1999	Dodatni i potrošni materijali – Obložene elektrode za REL zavarivanje čelika povišene čvrstoće – Razredba
HRN EN 758:1999	Dodatni i potrošni materijali – Praškom punjene žice za MIG/MAG zavarivanje nelegiranih i sitnozrnatih čelika sa zaštitnim plinom i bez njega – Razredba
HRN EN 760:1999	Dodatni i potrošni materijali – Praškovi za zavarivanje pod praškom –Razredba
HRN EN 14295:2004	Dodatni i potrošni materijali za zavarivanje – Kombinacija žica i praškova za zavarivanje pod praškom čelika povišene čvrstoće – Razredba
HRN EN 13918:2001	Zavarivanje – Svornjaci i keramički prstenovi za elektrolučno zavarivanje svornjaka
HRN EN ISO 14343:2010	Dodatni i potrošni materijali za zavarivanje -- Žičane elektrode, trakaste elektrode, žice i šipke za elektrolučno zavarivanje nehrđajućih čelika i čelika otpornih na visoke temperature -- Razredba
HRN EN ISO 16834:2008	Dodatni i potrošni materijali za zavarivanje -- Žičane elektrode, žice, šipke i depoziti za elektrolučno zavarivanje u zaštiti plina za čelike povišene čvrstoće -- Razredba
HRN EN ISO 17633:2010	Dodatni i potrošni materijali za zavarivanje -- Žice punjene praškom i šipke za elektrolučno zavarivanje sa zaštitom plina i bez zaštite plina za nehrđajuće čelike i čelike otporne na visoke temperature -- Razredba

HRN EN ISO 18276:2008	Dodatni i potrošni materijali za zavarivanje -- Punjene žice za elektrolučno zavarivanje sa zaštitom plina i bez zaštite plina za čelike povišene čvrstoće -- Razredba
HRN EN 1600:1999	Dodatni i potrošni materijali – Obložene elektrode za REL zavarivanje nehrđajućih čelika i čelika otpornih na povišene temperature – Razredba
HRN EN 1668:1999	Dodatni i potrošni materijali – Šipke, žice i metal zavara/navara pri TIG zavarivanju nelegiranih i sitnozrnih čelika

ZEMLJANI RADOVI

Prije početka gradnje zemljište se mora očistiti od raslinja, smeća i otpadaka. To se isto odnosi na dio zemljišta na kojem je bila prethodno konstrukcija, a srušena je kako bi sad na istom mjestu gradila nova. Tlo na mjestu građenja potrebno je isplanirati i iskolčiti. Prilikom iskopa izvođač je dužan obavijestiti geomehaničara koji mora izvršiti kontrolu svojstava tla i napraviti kontrolu statičkog proračuna. Zemljani i kameni materijali kategorizirani su kako slijedi:

Kategorija «A»

Pod zemljanim materijalom kategorije «A» podrazumijevaju se svi čvrsti materijali, gdje je potrebno miniranje kod cijelog iskopa. U ovu grupu spadaju sve vrste čvrstih tala, kompaktnih stijena (eruptivnih i metamorfnih) u zdravom stanju uključujući i eventualno tanje slojeve rastresenog materijala na površini ili takve stijene s mjestimičnim gnijezdima gline i lokalnim trošnim, odnosno zdrobljenim zonama. U ovu grupu spadaju i tla koja sadrže više od 50% samaca za čiji je iskop također potrebno miniranje.

Kategorija «B»

Pod materijalom kategorije «B» podrazumijevaju se polučvrsta kamenita tla, gdje je potrebno djelomično miniranje, a ostali se dio iskopa obavlja izravnim strojnim radom U ovu grupu materijala spadaju: Flišni materijali uključujući i rastreseni materijal, homogeni lapori, trošni pješčenjaci i mješavine lapora i pješčenjaka, većina dolomita, jako zdrobljeni vapnenac, sve vrste škriljevca, neki konglomerati i slični materijali.

Kategorija «C»

Pod materijalom kategorije «C» podrazumijevaju se svi ostali zemljani materijali koje nije potrebno minirati, nego se mogu kopati upotrebom pogodnih strojeva (bagera, buldozera, skrepera i sl.)

Potrebno je napraviti i kontrolu geometrije i kvalitete gradiva postojeće temeljne konstrukcije. Ako se ustvrdi da geometrija odstupa od pretpostavki potrebno je napraviti dodatnu kontrolu statičkog proračuna. Sve iskope potrebno je izvesti po projektu s bočnim odsijecanjem i zaštitom bočnih strana kako ne bi došlo do urušavanja zemljišta prilikom njihova betoniranja. Sve radove, kontrolu i potvrdu parametara izvođač, geomehaničar i nadzorni inženjer su dužni upisati u građevinski dnevnik. Kod zatrpavanja i nasipanja prostora oko temelja do nivoa tla potrebno je nasipavati i nabijati u slojevima po 30 cm. Na kraju je potrebno obaviti planiranje zemljišta, zatrpavanje svih jama i uklanjanje svega nepotrebnog s gradilišta.

OSTALI RADOVI I MATERIJALI

Svi ostali materijali i proizvodi koji se ugrađuju u objekt trebaju biti kvalitetni i trajni, uz zadovoljenje svih važećih normi, propisa i pravila struke. Za sve se upotrijebljene materijale provode tekuća i kontrolna ispitivanja, odnosno prilažu atesti isporučitelja. Izvedba svih radova treba biti ispravna, kvalitetna i pod stalnim stručnim nadzorom. Za svako odstupanje primijenjenog gradiva ili gotovog proizvoda od projekta, potrebna je suglasnost Projektanta i Investitora.

Napomena: U svim tehničkim uvjetima navedene su veze s drugim hrvatskim normama o kvaliteti materijala, pa ih nećemo posebno navoditi.

KONTROLNA ISPITIVANJA

Kontrolna ispitivanja provodi nadzorni organ, a za konačnu ocjenu kvalitete materijala i radova mjerodavni su rezultati kontrolnog ispitivanja. Kontrolna ispitivanja obavljaju se u tijeku izvedbe radova po vrsti, obujmu i vremenu, kako to nalažu zakonski propisi i tehnička regulativa.

Ukoliko rezultati kontrolnih ispitivanja pokažu da kvaliteta upotrijebljenih materijala i izvedenih radova ne odgovara zahtijevanim uvjetima, nadzorni organ je dužan izdati nalog izvoditelju da nekvalitetan materijal zamjeni kvalitetnim i radove dovede u ispravno stanje.

Izvoditelj je dužan napraviti "Projekt betona" koji će zadovoljiti uvjete date ovom projektnom dokumentacijom, a istovremeno uvažiti tehnologiju proizvodnje i ugradbe betona koju primjenjuje izvoditelj, te zadovoljiti uvjete propisane. Kontrolu kvalitete betonskih radova treba povjeriti za to registriranoj organizaciji, a za kontrolna ispitivanja je potrebno primijeniti u skladu s TPBK (N.N. 139/09, 14/10, 125/10; 136/12), na slijedeći način:

Sukladno Prilogu A.3.1. (TPBK NN 139/09, 14/10, 125/10; 136/12) Uzimanje uzoraka, priprema ispitnih uzoraka i ispitivanje svojstava svježeg betona provodi se prema normama niza HRN EN 12350, a ispitivanje svojstava očvrsnulog betona prema normama niza HRN EN 12390.

Sukladno Prilogu A.3.2. (TPBK NN 139/09, 14/10, 125/10; 136/12) Uzimanje uzoraka, priprema ispitnih uzoraka i ispitivanje otpornosti betona na smrzavanje provodi se prema normi HRN U.M1.016, a ispitivanje otpornosti betona na smrzavanje i soli za odmrzavanje prema normi prCEN/TS 12390-9.

Sukladno Prilogu A.3.3. (TPBK NN 139/09, 14/10, 125/10; 136/12) Kada se betonara nalazi na gradilištu, osim postupaka iz točaka A.3.1. i A3.2. pri uzimanju uzoraka i potvrđivanju sukladnosti betona, u gradilišnoj dokumentaciji i ostaloj dokumentaciji ispitivanja navodi se obvezno oznaka pojedinačnog elementa betonske konstrukcije i mjesta u elementu betonske konstrukcije na kojem je ugrađen beton iz kojeg je uzorak iz točke A.3.1. i A.3.2. uzet.

NAČIN ZBRINJAVANJA GRAĐEVNOG OTPADA

Način zbrinjavanja građevnog otpada mora biti u skladu s propisima o otpadu. Osnovni propisi iz tog područja su:

Zakon o otpadu (NN 178/04, 111/06, 60/08, 87/09)

Prema zakonu o otpadu građevni otpad spada u interni otpad jer uopće ne sadrži ili sadrži malo tvari koje podliježu fizikalnoj, kemijskoj i biološkoj razgradnji pa ne ugrožavaju okoliš.

Nakon završetka radova gradilište treba očistiti od otpadaka i suvišnog materijala i okolni dio terena dovesti u prvobitno stanje. Pravilnikom o vrstama otpada određeno je da je proizvođač otpada čija se vrijedna sredstva mogu iskoristiti dužan otpad razvrstavati na mjestu nastanka, odvojeno skupljati po vrstama i osigurati uvjete skladištenja za očuvanje kakvoće u svrhu ponovne obrade.

Taj pravilnik predviđa slijedeće moguće postupke s otpadom:

- kemijsko-fizikalna obrada,
- biološka obrada,
- termička obrada,
- kondicioniranje otpada i
- odlaganje otpada.

Kemijsko-fizikalna obrada otpada je obrada kemijsko-fizikalnim metodama s ciljem mijenjanja njegovih kemijsko-fizikalnih, odnosno bioloških svojstava, a može biti: neutralizacija, taloženje, ekstrakcija, redukcija, oksidacija, dezinfekcija, centrifugiranje, filtracija, sedimentacija, rezervna osmoza.

Biološka obrada je obrada biološkim metodama s ciljem mijenjanja kemijskih, fizikalnih, odnosno bioloških svojstava, a može biti: aerobna i anaerobna razgradnja.

Termička obrada je obrada termičkim postupkom. Provodi se s ciljem mijenjanja kemijskih, fizikalnih, odnosno bioloških svojstava, a može biti: spaljivanje, piroliza, isparavanje, destilacija, sinteriranje, žarenje, taljenje, zataljivanje u staklo.

Kondicioniranje otpada je priprema za određeni način obrade ili odlaganja, a može biti: usitnjavanje, ovlaživanje, pakiranje, odvodnjavanje, oprašivanje, očvršćivanje te postupci kojima se smanjuje utjecaj štetnih tvari koje sadrži otpad.

S građevnim otpadom treba postupiti u skladu s Pravilnikom o uvjetima za postupanje s otpadom.

Taj pravilnik predviđa moguću termičku obradu za slijedeći otpad:

- drvo,plastiku,asfalt koji sadrži katran i proizvodi koji sadrže katran.

Kondicioniranjem se može obraditi slijedeći otpad:

- građevinski materijali na bazi azbesta,asfalt koji sadrži katran,asfalt (bez katrana),katran i proizvodi koji sadrže katran,izolacijski materijal koji sadrži azbest, izmiješani građevni otpad i otpad od rušenja.

Najveći dio građevnog otpada (prethodno obrađen ili neobrađen) može se odvesti u najbliže javno odlagalište otpada: beton, cigle, pločice i keramika, građevinski materijali na bazi gipsa, drvo, staklo, plastika, bakar, bronca, mjed, aluminij, olovo, cink, željezo i čelik, kositar, miješani materijali, kablovi, zemlja i kamenje i ostali izolacijski materijali.

Nakon završetka radova gradilište treba očistiti od otpada i suvišnog materijala, postupiti prema iznesenom, a okolni dio terena dovesti u prvobitno stanje.

PROJEKTIRANI VIJEK TRAJANJA KONSTRUKCIJE I UVJETI ODRŽAVANJA

Građevina je projektirana na upovabni vjek od minimalno 50 godina. No uz redovito održavanje, naše graditeljsko iskustvo nam to potvrđuje, i znatno duže.

Neke buduće tehnologije i razvoj proizvodnje koji će s vremenom biti usvojeni od strane investitora nužno, prije konačne odluke i usvajanja, moraju biti sagledani s aspekta stvaranja nepovoljnih utjecaja na konstrukciju i s tim povezane djelove građevine, te ako se pokaže potrebnim, primjeniti potrebne mjere za uklanjanje ugroza.

Građevina ne zahtijeva poseban tretman održavanja, jer se ne nalazi u posebno u agresivnoj sredini s obzirom na:

- upotrebu i tehnološki postupak,
- klimatske uvjete,
- događanja na susjednim česticama i okruženju,
- neagresivne podzemne vode i zdravo temeljno tlo,
- ostalo ....

Ipak, svi faktori lokacije i okoliša zahtijevaju dovoljnu mjeru opreza i praćenje stanja okoliša i svih elemenata građevine (konstruktivnih i nekonstruktivnih). Tehnološkim mjerama građenja, koje su primjenjene i navedene u ovom projektu pokušalo se dobiti što kvalitetniju i trajniju konstrukciju.

U tom smislu neophodno je poštivati i provoditi: posebne uvjete i kontrolu kvalitete izvođača, posebne tehničke uvjete ugradnje, prethodne provjere kvalitete materijala, te na koncu završnu provjeru svih elemenata konstrukcije.

Radnje u okviru održavanja betonskih konstrukcija treba provoditi prema odredbama Priloga J.3. Održavanje betonskih konstrukcija, TPBK (NN 139/09, 14/10,125/10; 136/12) i normama na koje upućuje Prilog J.3., te odgovarajućom primjenom odredaba ostalih priloga TPBK (NN 139/09, 14/10,125/10; 136/12).

A) Redoviti pregled građevine u svrhu održavanja betonske konstrukcije treba provoditi najmanje svakih 10 godina
B) Izvanredne preglede građevine provoditi nakon nekog izvanrednog događaja (ekstremne vremenske neprilike, potres, požar, eksplozija i slično) ili prema zahtjevu inspekcije.

Osim ovih pregleda preporučuje se da stručno osoblje korisnika i suvlasnika građevine vrše godišnje preglede i ukoliko primijete neku nepravilnost na konstrukciji zatraže redoviti ili izvanredni pregled i prije roka predviđenog ovim projektom. Način obavljanja pregleda uključuje:

- vizualni pregled, u kojeg je uključeno utvrđivanje položaja i veličine napuklina i pukotina te drugih oštećenja bitnih za očuvanje mehaničke otpornosti i stabilnosti građevine,
- utvrđivanja stanja zaštitnog sloja armature, za betonske konstrukcije u umjereno ili jako agresivnom okolišu, utvrđivanje veličine progiba glavnih nosivih elemenata betonske konstrukcije za slučaj osnovnog djelovanja, ako se na temelju vizualnog pregleda sumnja u ispunjavanje bitnog zahtjeva mehaničke otpornosti i stabilnosti.
- Pregled neposrednog okoliša građevine s aspekta ugroze temelja, utvrđivanje potonuća površine terena, način otjecanja površinskih voda, ispravnost funkcioniranja oborinske i sanitarne odvodnje

Nakon obavljenih pregleda konstrukcije i okoliša potrebno je izraditi dokumentaciju o stanju konstrukcije nakon pregleda sa potrebnim mjerama i radovima na saniranju i održavanju konstrukcije. Ovu i drugu dokumentaciju o održavanju betonske konstrukcije dužan je trajno čuvati vlasnik građevine.

Manje nedostatke može ispraviti stručna osoba (kućni majstor) na licu mjesta, a kod većih zahvata vlasnik (ili suvlasnici) zgrade dužni su postupiti prema potrebnim zahtjevima i mjerama iz dokumentacije o stanju konstrukcije te izvesti neophodne radove održavanja, obnove i izmjene uređaja i dijelova te radove popravka, ojačanja i rekonstrukcije.

Sve radove pregleda i izvedbe radova na konstrukciji potrebno je povjeriti za to ovlaštenim osobama.

Novigrad, studeni 2017.

PROJEKTANT:
Iva Lazarić, mag.ing.aedif.

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	"TERAKOP" GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

MAPA 3 STATIČKI PRORAČUN

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
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Predmet:	STATIČKI PRORAČUN

MAPA 3 SADRŽAJ

1.	**DISPOZICIJA SISTEMA**
2.	**ANALIZA OPTEREĆENJA**
3.	**STATIČKI PRORAČUN ELEMENATA KONSTRUKCIJE**

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	"TERAKOP" GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

1. DISPOZICIJA SISTEMA

POZICIONI PLANOVI

000+	*PPTK*	TEMELJNA KONSTRUKCIJA
050+	*PPS*	STUPOVI
100+	*PPKK*	KROVNA KONSTRUKCIJA

Broj projekta:	G15/2017
Objekt:	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
Lokacija:	POREČ, R. Hrvatska K.Č. 1232/64, 1232/67, 1232/68 I 1836/25 K.O. ŽBANDAJ
Investitor:	"TERAKOP" GRAĐEVINSKI OBRT POREČ
Predmet:	STATIČKI PRORAČUN

2. ANALIZA OPTEREĆENJA

Sva opterećenja na konstrukciju uzeta su prema važećim propisima , tj. Europska norma EN-1991.

- HRN EN 1991 - djelovanje:
- HRN EN 1991 – 2 – 1 – Vlastita težina i uporabna opterećenja
- HRN EN 1991 – 2 – 3 – Snijeg
- HRN EN 1991 –2 – 4 – Vjetar

Vlastita težina

Vlastita težina smatra se stalnim i nepomičnim djelovanjem, tj. za vlastitu težinu se smatra da će djelovati na konstrukciju tijekom cijelog vijeka trajanja konstrukcije. U statičkom proračunu automatski se proračunava od strane programskog paketa u kojem se analizira promatrana konstrukcija. Može se prikazati pomoću jedne karakteristične vrijednosti (Gk), a proračunava se na osnovu prostornih težina i nazivnih dimenzija

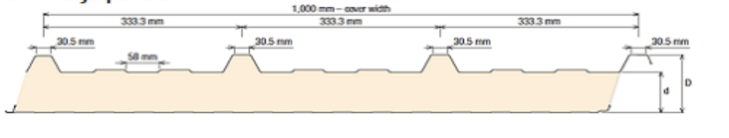
	O P T E R E Ć E N J E - R E K A P I T U L A C I J A	
STALNO OPTEREĆENJE: g (kN/m^2)		
K r o v	Slojevi krova+instalacije	= 0,50 kN/m^2
G a l e r i j a	Stalno	= 7,00 kN/m^2
KORISNO: p (kN/m^2)		
K r o v	Snijeg	= 0,50 kN/m^2
G a l e r i j a	Korisno	= 4,00 kN/m^2
Napomena: Vlastite težine elemenata krovne konstrukcije (glavni nosači i rožnjače) su navedene u analizi opterećenja odgovarajućih nosača, računate su sa odgovarajućim poprečnim presjekom i specifičnom težinom od 25kN/m^2.		
VJETAR: Wx,y (kN/m^2) , =		= 30 m/s, 110 mnm
SEIZMIKA: Sx,y (kN/m^2) , a_g/g = 0,095		

KS1000 RW Trapezni krovni panel

Primjena

Izbor karakteristika proizvoda

Dimenzije panela



d– Debljina ispune (mm)	25	40	50	60	70	80	100	120	160
D– Ukupna dimenzija - sa valom (mm)	60	75	85	95	105	115	135	155	195
Masa (kg/m^2), lim 0.5/0.4 mm	9.34	9.94	10.34	10.74	11.14	11.54	12.34	13.15	14.74

Vlastita težina panela 0,135 KN/m^2
Instalacije rasvjete 0,365 KN/m^2
Ukupno: 0,500 KN/m^2

Analiza opterećenja -vjetar

ANALIZA OPTEREĆENJA

OPĆI PODACI:

Vanjski gabariti (širina × dužina)	= 19,60 m × 36,00 m
Krovna streha (horiz.)	= 0,00 m
Nagib krovne konstrukcije	= 1,15° (jednostrešni krov)
Visina zidne plohe	= 9,50 m
Visina građevine do sljemena	= 9,89 m
Nadmorska visina	= 110,00 m.n.m.
Lokacija građevine	= Buići - Poreč

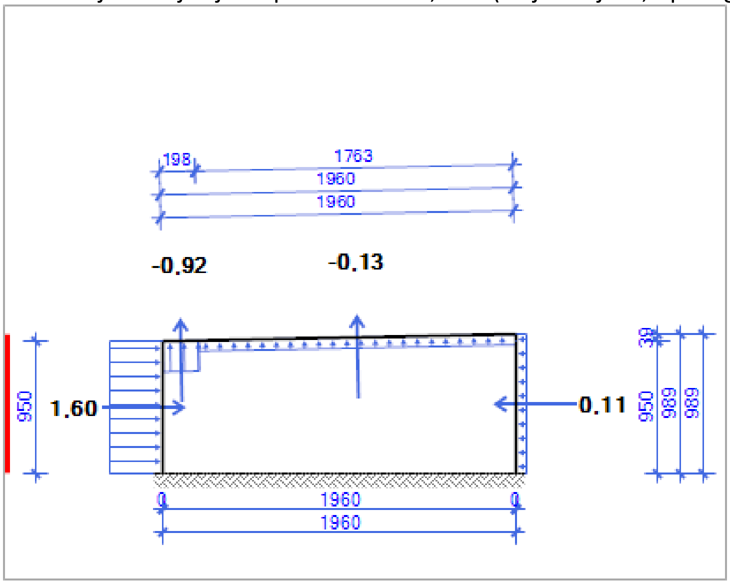
OPTEREĆENJA:

2.2. Vjetar (okomito na plohu)

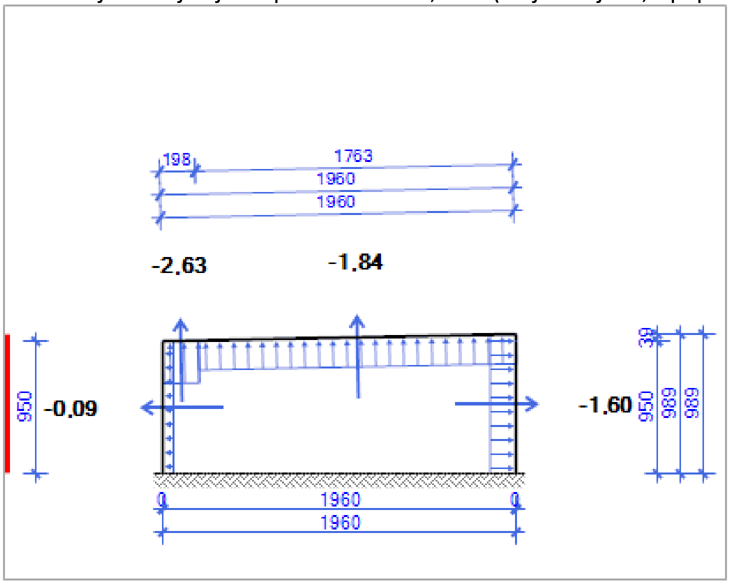
- 3. područje — $v_{b,0}$ = 30,00 m/s
- 2. Ograđeno poljoprivredno zemljište gospodarske z... — $C_{e(z)}$ = 2,34

Ref. pritisak srednje brzine vjetra: **q_B = 0,56 kN/m²**

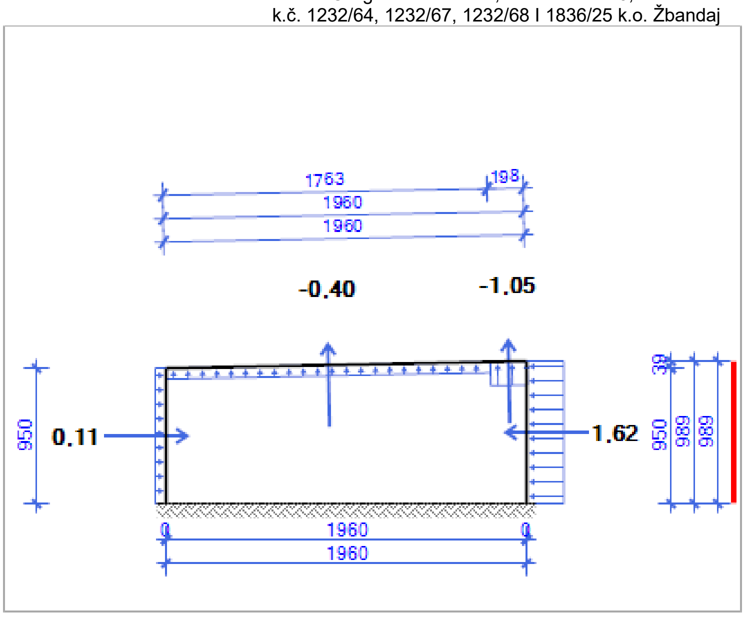
Shema djelovanja vjetra po rasteru r=1,00m (smjer s lijeva, Cpi negativan):



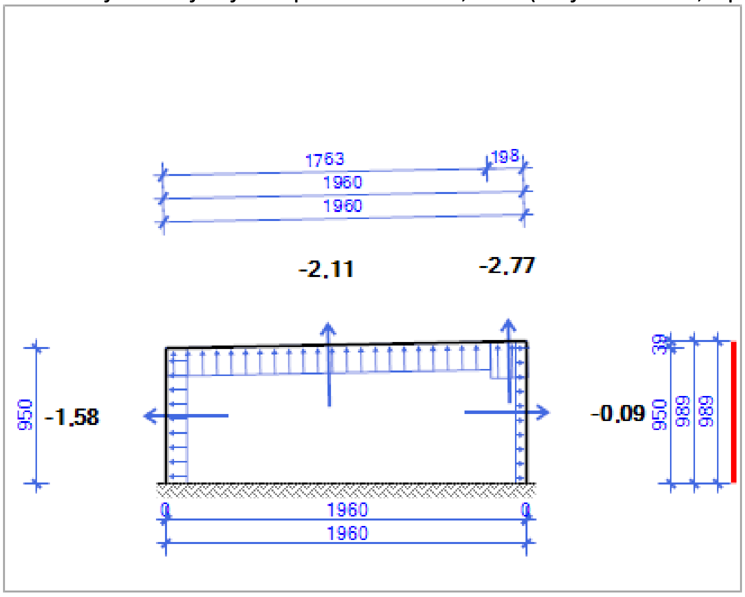
Shema djelovanja vjetra po rasteru r=1,00m (smjer s lijeva, Cpi pozitivan):



Shema djelovanja vjetra po rasteru r=1,00m (smjer s desna, Cpi negativan):



Shema djelovanja vjetra po rasteru r=1,00m (smjer s desna, Cpi pozitivan):



Kran 6,30 tona

max. R_1 = 40,95 KN
min. R_2 = 8,85 KN
max. H_1 = 6,65 KN
min. H_2 = 0,65 KN

L = 17,96 m – raspon krana
l = 2,50 m raspon točkova

Φ_1 = 1,00 + 0,1 =1,10
Φ_2 = 1,1 + 0,1 = 1,20
Φ_3 = 1,00
Φ_4 = 1,00

Određivanje vertikalnih opterećenja:
Slučaj max. opterećenja sa koeficijentom Φ_2
Max. opterećenje
max R_1 = 1,2x40,95 = 49,15 KN
min. R_2 = 1,2x8,85 = 10,65 KN

Horizontalno opterećenje – bočni udari sa koeficijentom 1,1

max Hs = 1,10 x 6,65 =7,35 KN
min Hs = 1,1 x 0,65 = 0,75 KN

Opterećenje konstrukcije od galerije

g = 7,00 x 2,50 = 17,50 KN/m
p = 4,00 x 2,50 = 10,00 KN/m

Opterećenje greda od vertikalnih fasadnjaka:

g = 3,00 x 6,0 = 18,00 KN/m

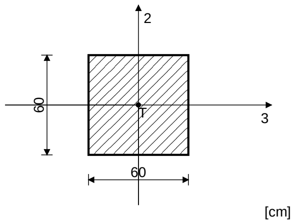
Ulazni podaci - Konstrukcija

Tabela materijala

No	Naziv materijala	E[kN/m2]	μ	γ[kN/m3]	αt[1/C]	Em[kN/m2]	μm
1	C 50/60	3.800e+7	0.20	25.00	1.000e-5	3.800e+7	0.20
2	C 30/37	3.400e+7	0.20	25.00	1.000e-5	3.400e+7	0.20

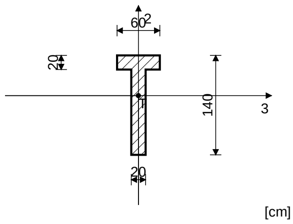
Setovi greda

Set: 1 Presek: b/d=60/60, Fiktivna ekscentričnost



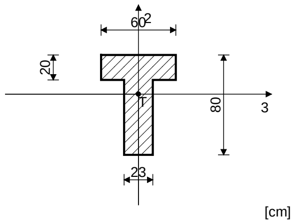
Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	3.600e-1	3.000e-1	3.000e-1	1.825e-2	1.080e-2	1.080e-2

Set: 2 Presek: T 60/140, Fiktivna ekscentričnost



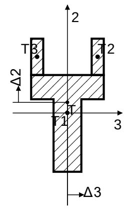
Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	3.600e-1	2.479e-1	2.484e-1	4.800e-3	4.400e-3	6.840e-2

Set: 3 Presek: T 60/80 sekundarni nosac, Fiktivna ekscentričnost



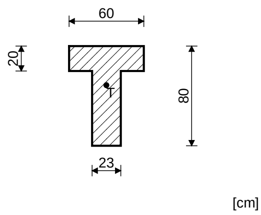
Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	2.580e-1	1.718e-1	2.160e-1	4.033e-3	4.208e-3	1.481e-2

Set: 4 Presek: Višedelni, Fiktivna ekscentričnost

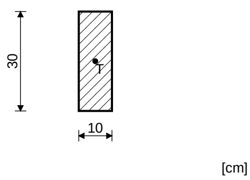


Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	3.180e-1	2.218e-1	2.660e-1	4.191e-3	8.008e-3	2.574e-2

No	Presek	Δ3 [cm]	Δ2 [cm]	α	Mat.
1	T 60/80	0.00	0.00	0.00	1
2	b/d=10/30	25.00	46.40	0.00	1
3	b/d=10/30	-25.00	46.40	0.00	1

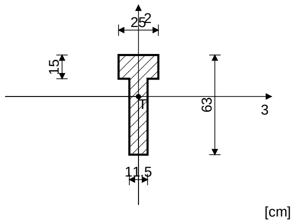


T 60/80



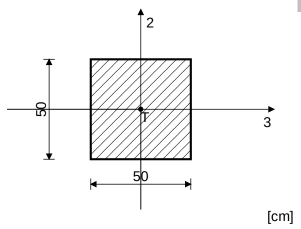
b/d=10/30

Set: 5 Presek: T 25/63, Fiktivna ekscentričnost



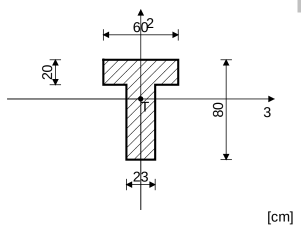
Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	9.270e-2	6.581e-2	8.175e-2	5.246e-4	2.561e-4	3.346e-3

Set: 6 Presek: b/d=50/50, Fiktivna ekscentričnost



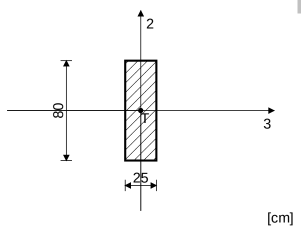
Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	2.500e-1	2.083e-1	2.083e-1	8.802e-3	5.208e-3	5.208e-3

Set: 7 Presek: T 60/80 Glavni nosac, Fiktivna ekscentričnost



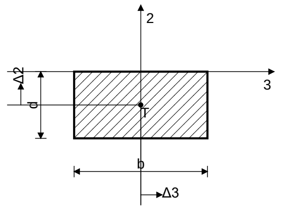
Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	2.580e-1	1.718e-1	2.160e-1	4.033e-3	4.208e-3	1.481e-2

Set: 8 Presek: b/d=25/80, Fiktivna ekscentričnost



Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	2.000e-1	1.667e-1	1.667e-1	3.347e-3	1.042e-3	1.067e-2

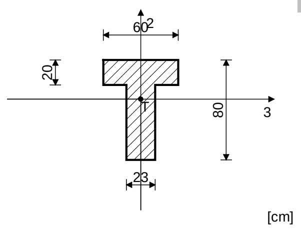
Set: 9 Presek: Promenljiv, Fiktivna ekscentričnost



Mat.	Tip promene
1 - C 50/60	Relativna linearna promena.

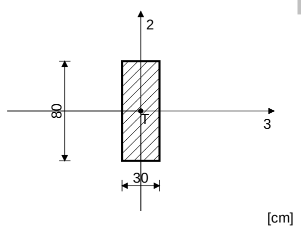
No	dL	Δ3 [cm]	Δ2 [cm]	b [cm]	d [cm]
S	0	0.00	-15.00	60.00	30.00
E	1	0.00	-35.00	60.00	70.00

Set: 10 Presek: T 60/80 Kranska greda, Fiktivna ekscentričnost



Mat.	A1	A2	A3	I1	I2	I3
1 - C 50/60	2.580e-1	1.718e-1	2.160e-1	4.033e-3	4.208e-3	1.481e-2

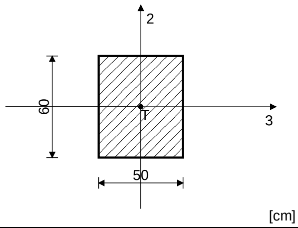
Set: 11 Presek: b/d=30/80, Fiktivna ekscentričnost

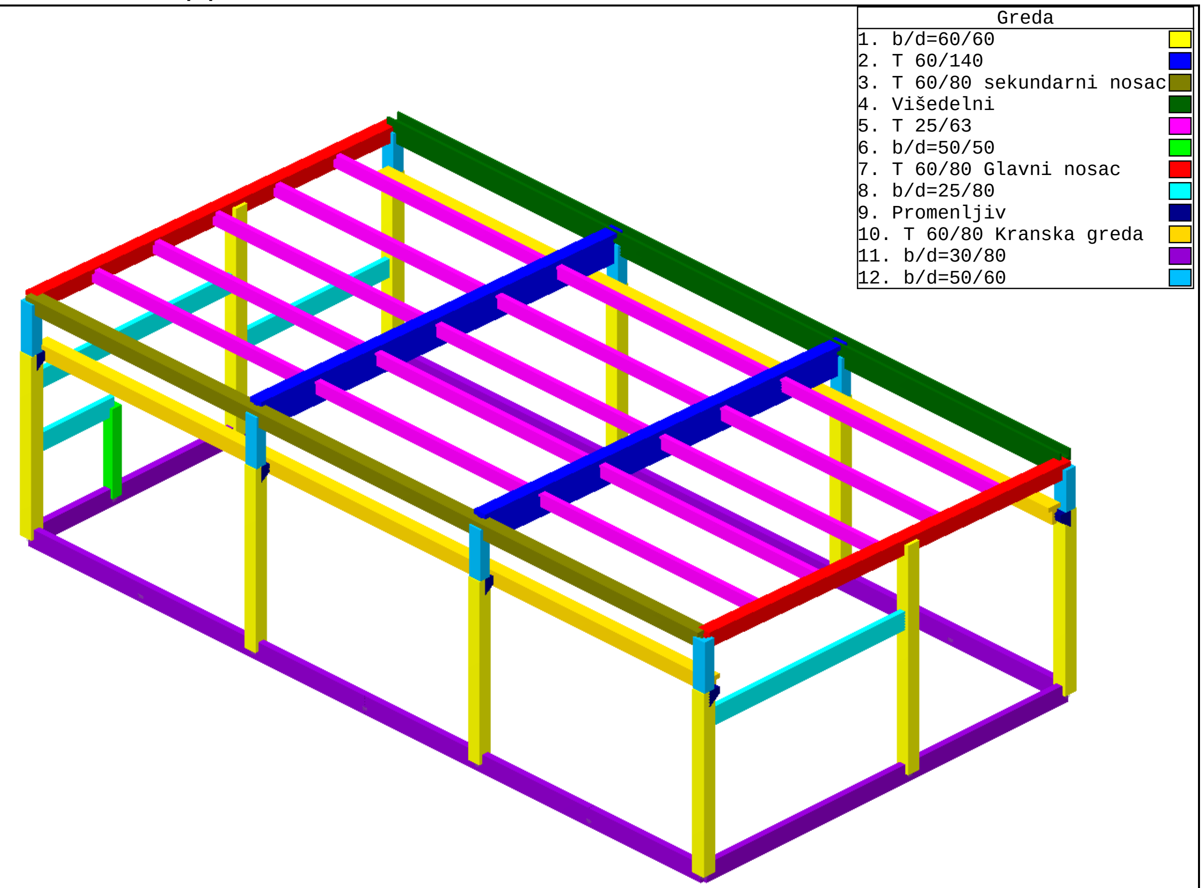


Mat.	A1	A2	A3	I1	I2	I3
2 - C 30/37	2.400e-1	2.000e-1	2.000e-1	5.502e-3	1.800e-3	1.280e-2

Set: 12 Presek: b/d=50/60, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
2 - C 30/37	3.000e-1	2.500e-1	2.500e-1	1.240e-2	6.250e-3	9.000e-3





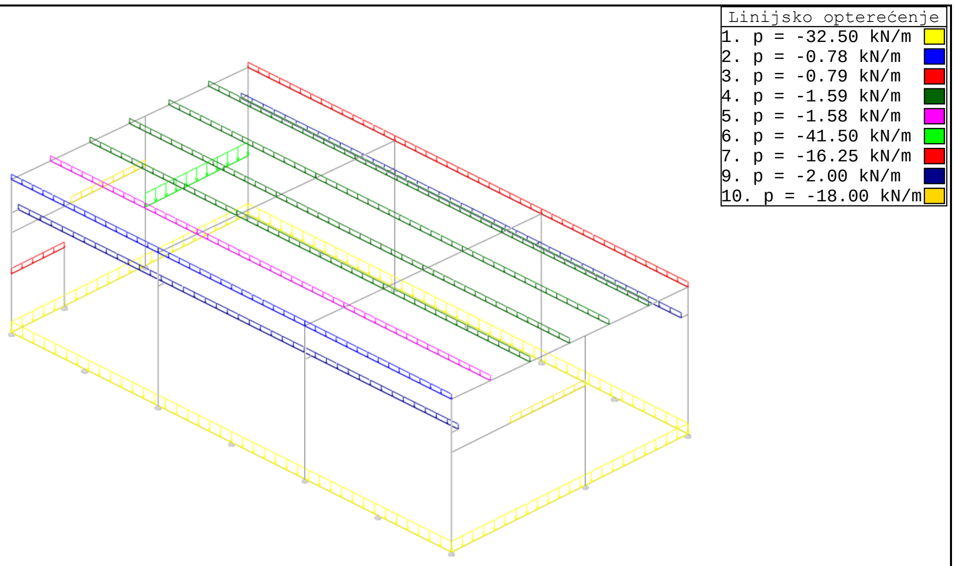
Setovi numeričkih podataka
Greda (1-12)

Ulazni podaci - Opterećenje

Lista slučajeva opterećenja

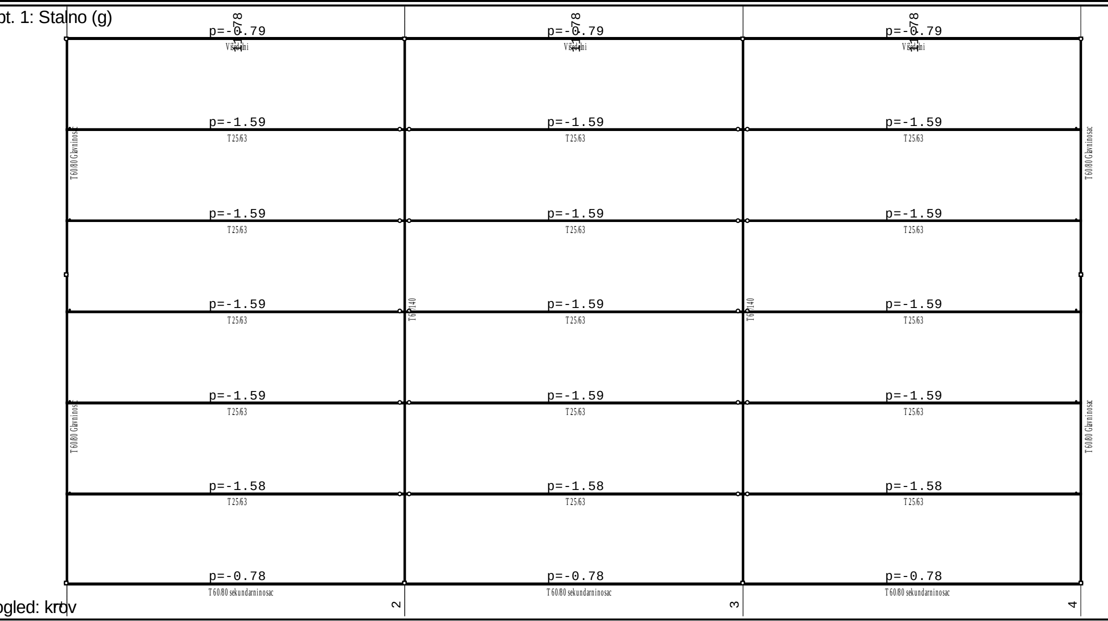
LC	Naziv
1	Stalno (g)
2	Snijeg
3	korisno
4	Kran vertikalno osa A max
5	Kran vertikalno osa B max
6	Kran horizontalno osa A max
7	Kran horizontalno osa B max
8	Vjetar +x
9	vjetar -x
10	Vjetar +y
11	vjetar -y
12	Potres x
13	Potres y

Opt. 1



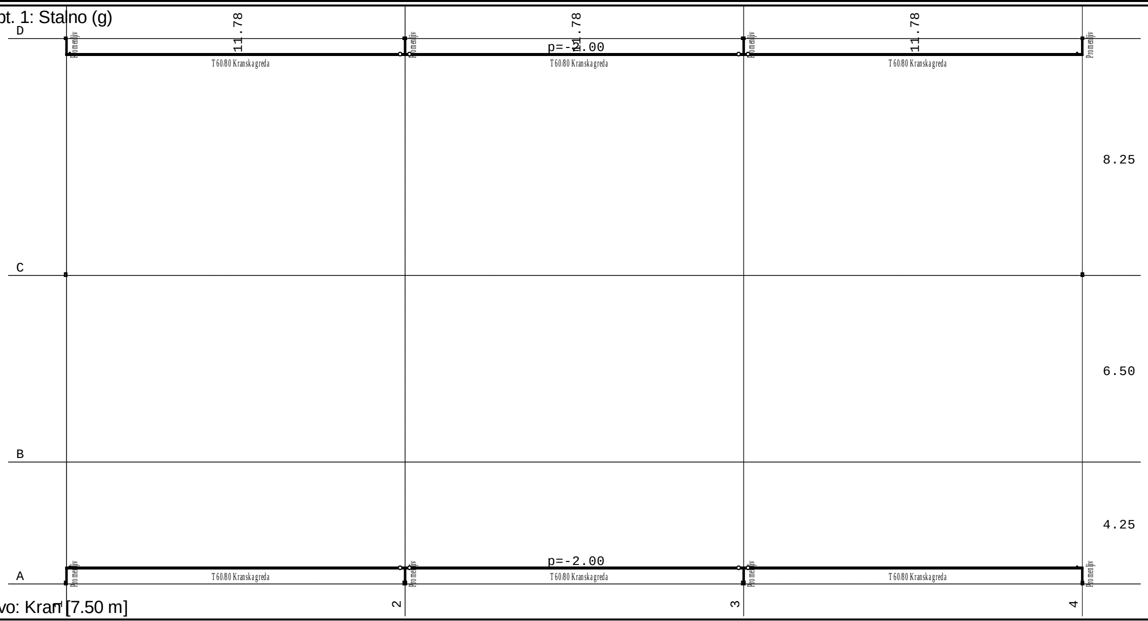
Setovi numeričkih podataka
Linijsko opterećenje (1-7,9,10)

Opt. 1: Stalno (g)

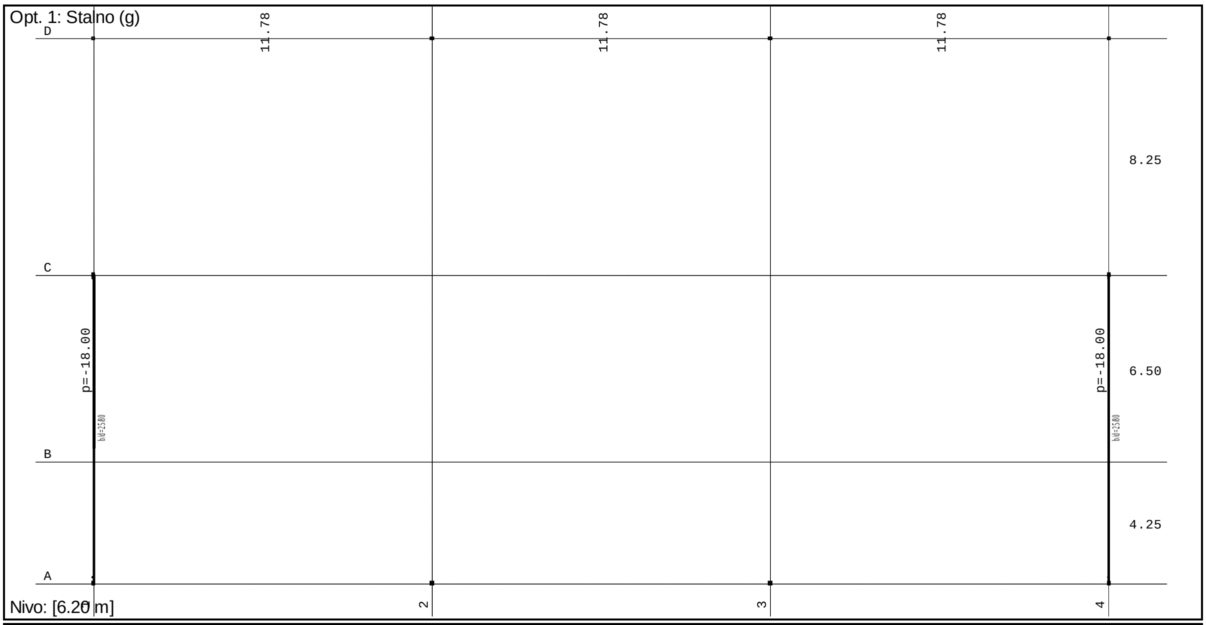


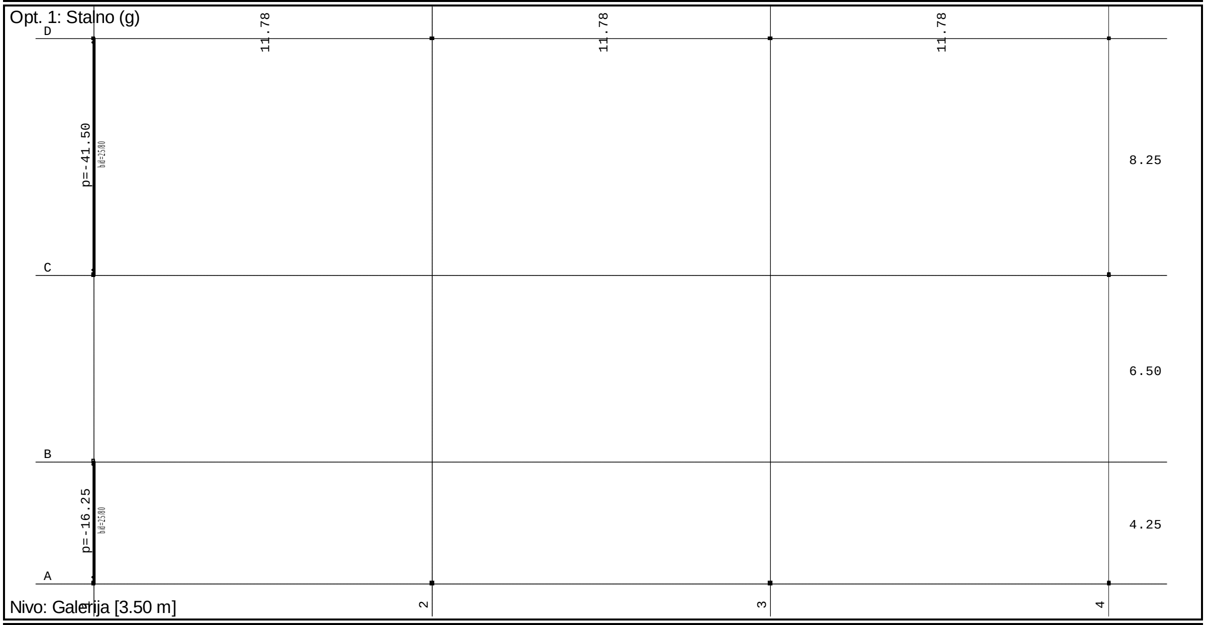
Pogled: krov

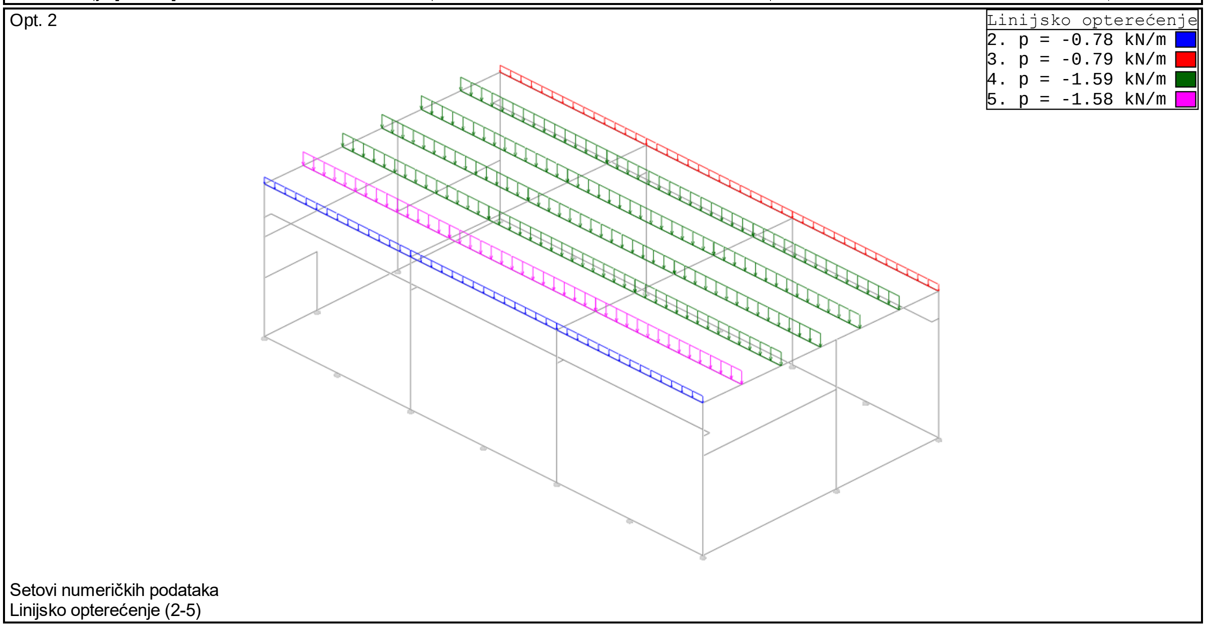
Opt. 1: Stalno (g)



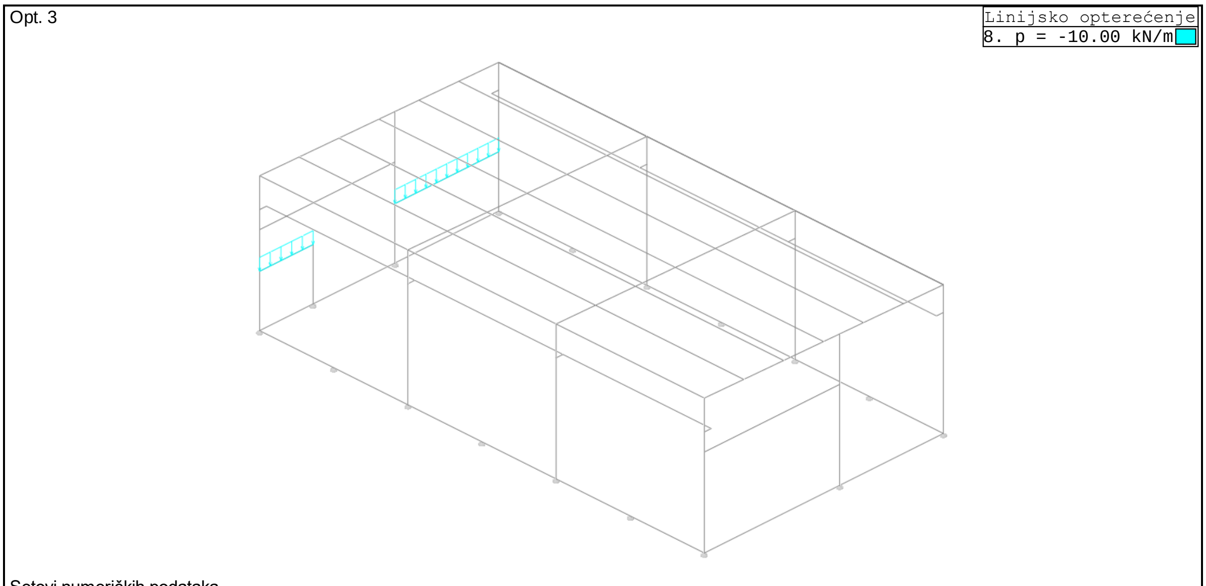
Nivo: Kran [7.50 m]


Opt. 1: Stalno (g)
D
C
B
A
11.78
11.78
11.78
8.25
6.50
4.25
p=-18.00
p=-18.00
Nivo: [6.20 m]
1
2
3
4


Opt. 1: Stalno (g)
D
C
B
A
11.78
11.78
11.78
8.25
6.50
4.25
p=-41.50
p=-16.25
Nivo: Galerija [3.50 m]
1
2
3
4

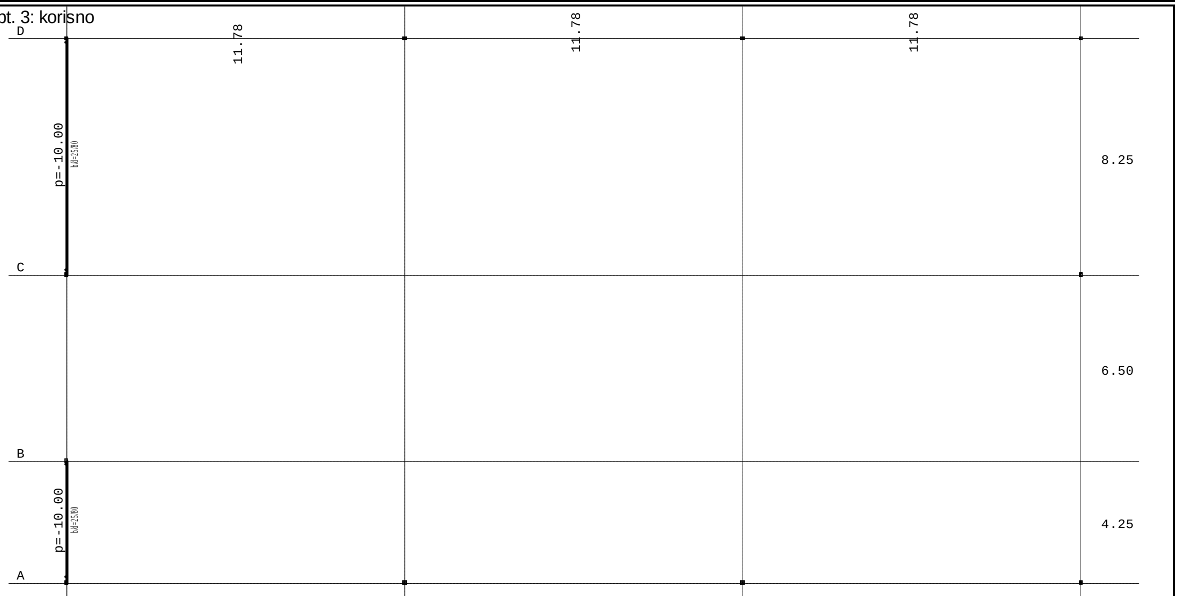

Opt. 2
Linijsko opterećenje
2. p = -0.78 kN/m
3. p = -0.79 kN/m
4. p = -1.59 kN/m
5. p = -1.58 kN/m
Setovi numeričkih podataka
Linijsko opterećenje (2-5)

Opt. 3



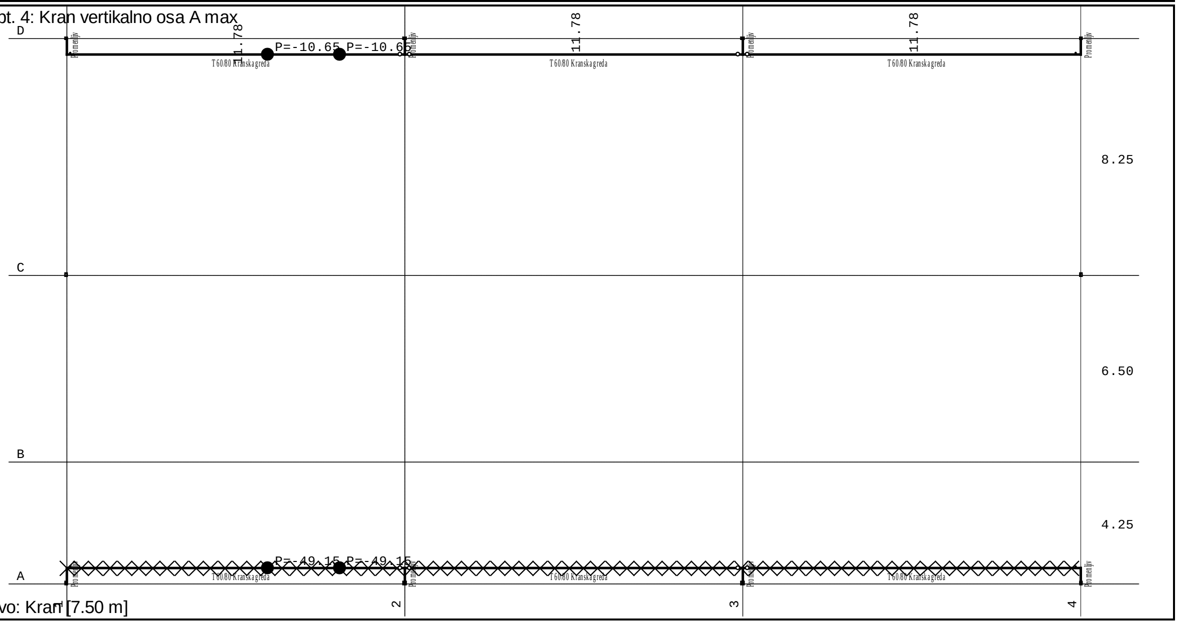
Setovi numeričkih podataka
Linijsko opterećenje (8)

Opt. 3: korisno

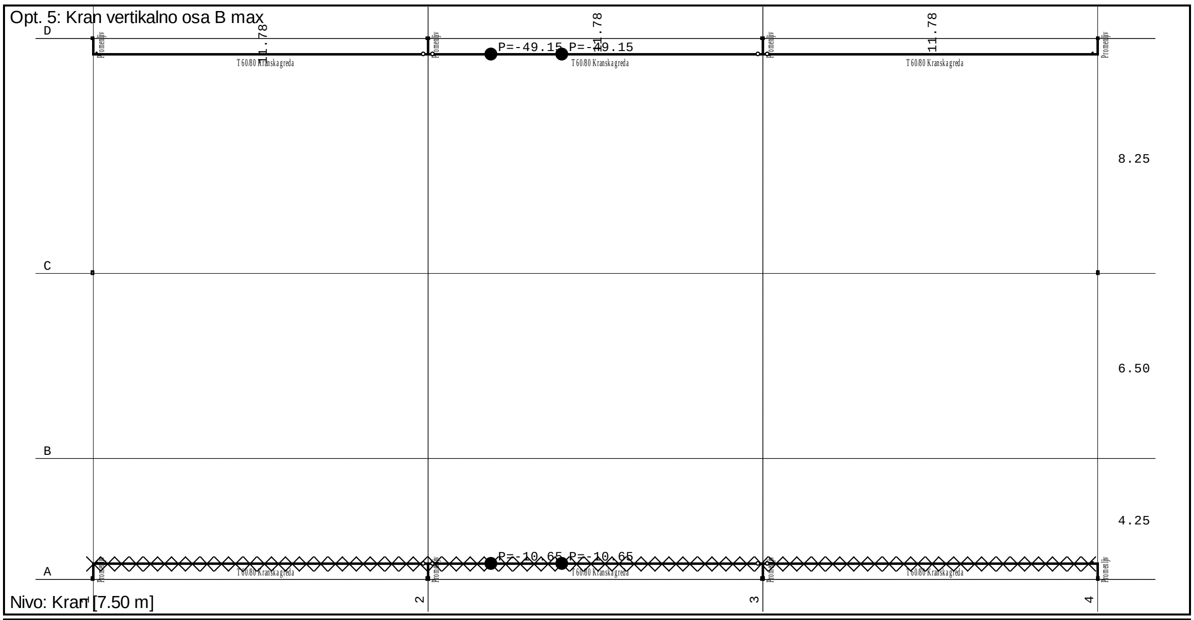


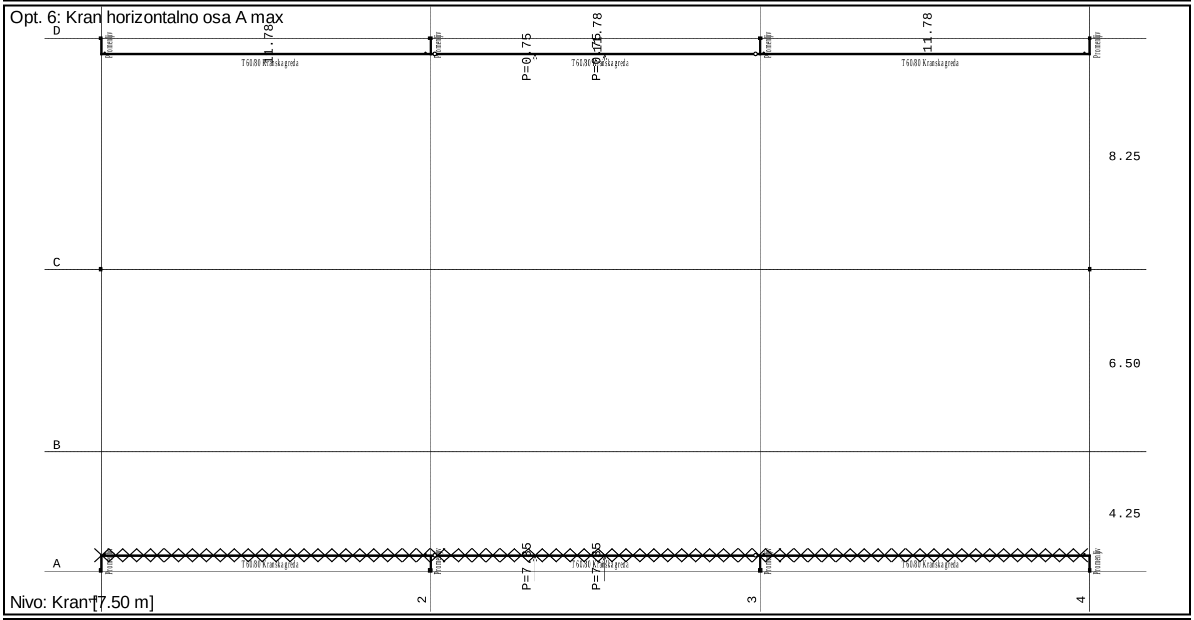
Nivo: Galerija [3.50 m]

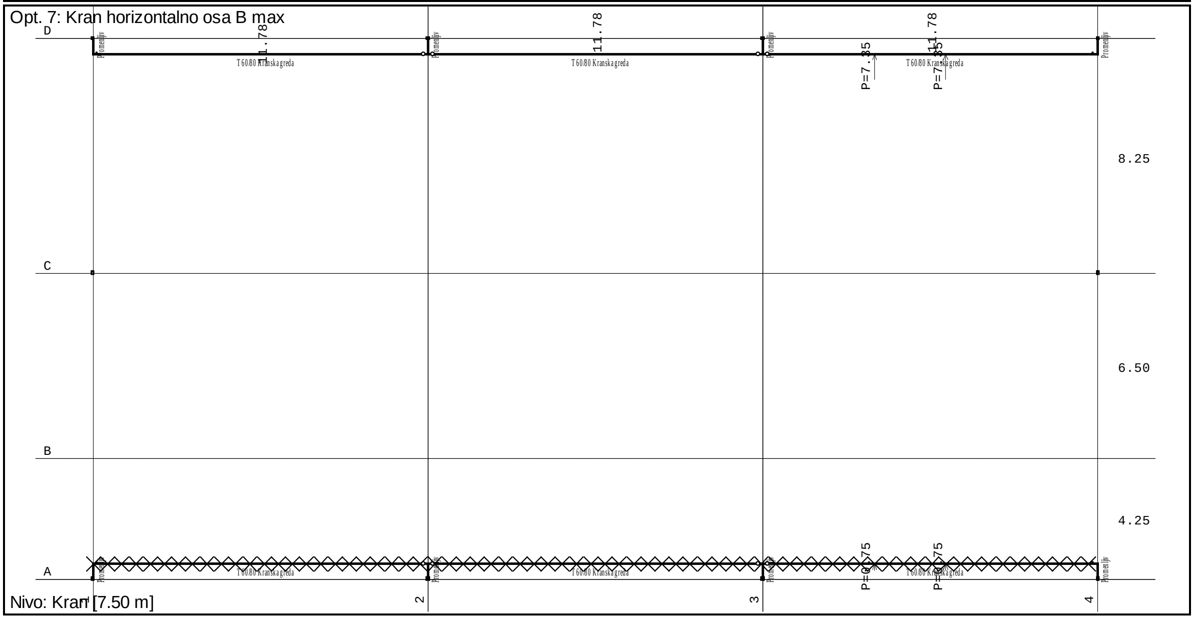
Opt. 4: Kran vertikalno osa A max



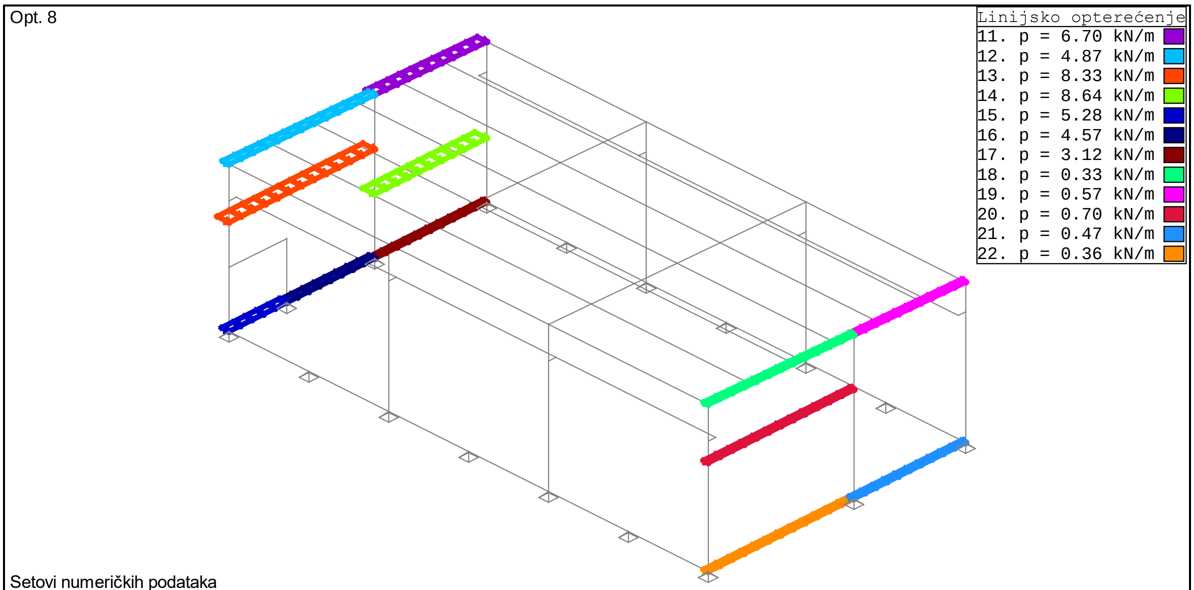
Nivo: Kran [7.50 m]


Opt. 5: Kran vertikalno osa B max
P=-49.15 P=-49.15
P=-10.65 P=-10.65
11.78
11.78
11.78
8.25
6.50
4.25
D
C
B
A
2
3
4
Nivo: Kran [7.50 m]


Opt. 6: Kran horizontalno osa A max
P=0.75 P=0.75
P=7.35 P=7.35
11.78
11.78
11.78
8.25
6.50
4.25
D
C
B
A
2
3
4
Nivo: Kran [7.50 m]

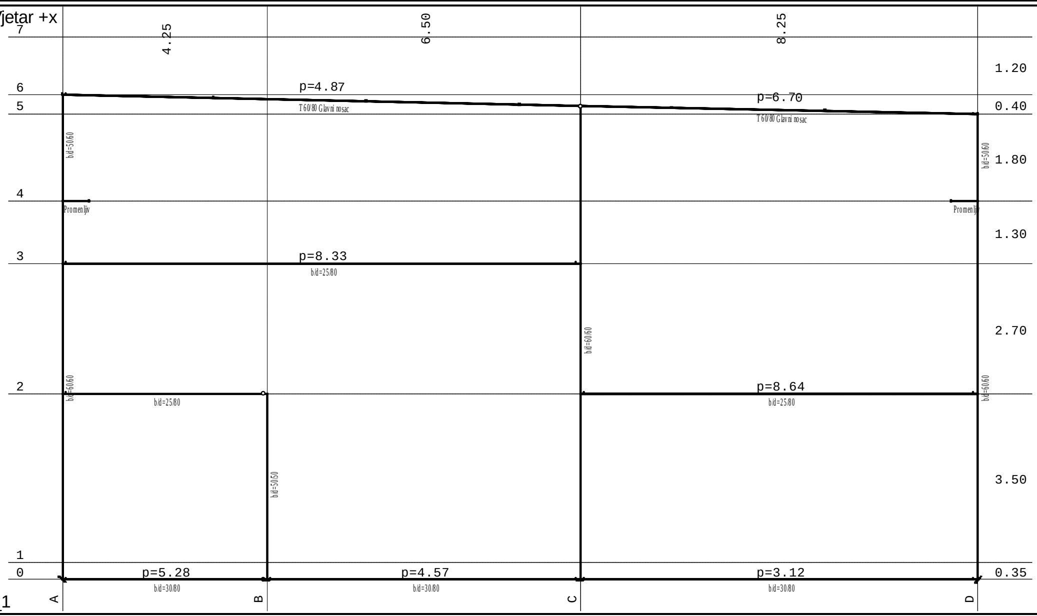

Opt. 7: Kran horizontalno osa B max
P=7.35 P=7.35
P=0.75 P=0.75
11.78
11.78
11.78
8.25
6.50
4.25
D
C
B
A
2
3
4
Nivo: Kran [7.50 m]

Opt. 8



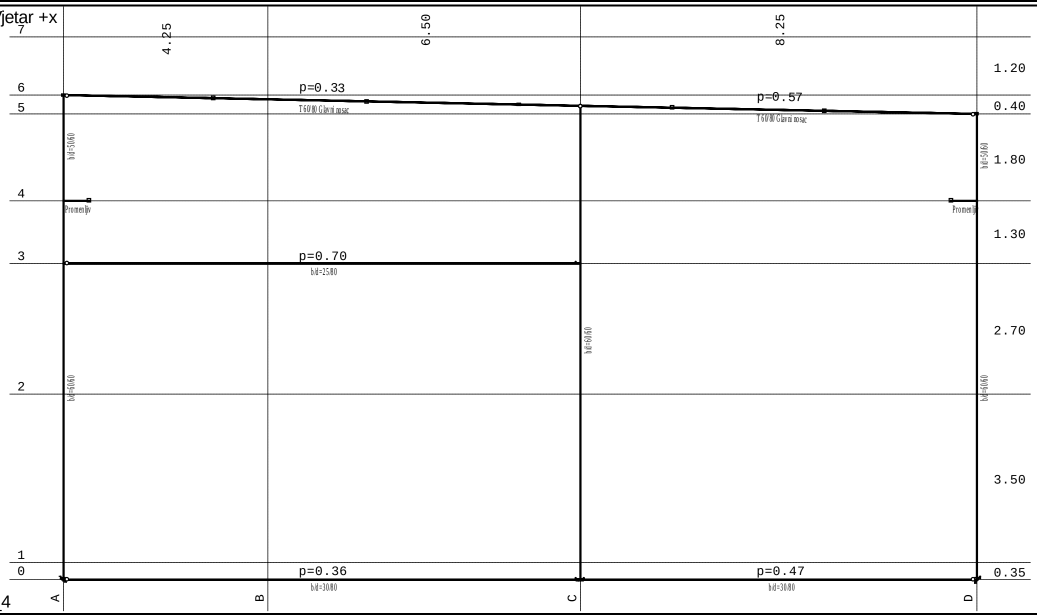
Setovi numeričkih podataka
Linijsko opterećenje (11-22)

Opt. 8: Vjetar +x



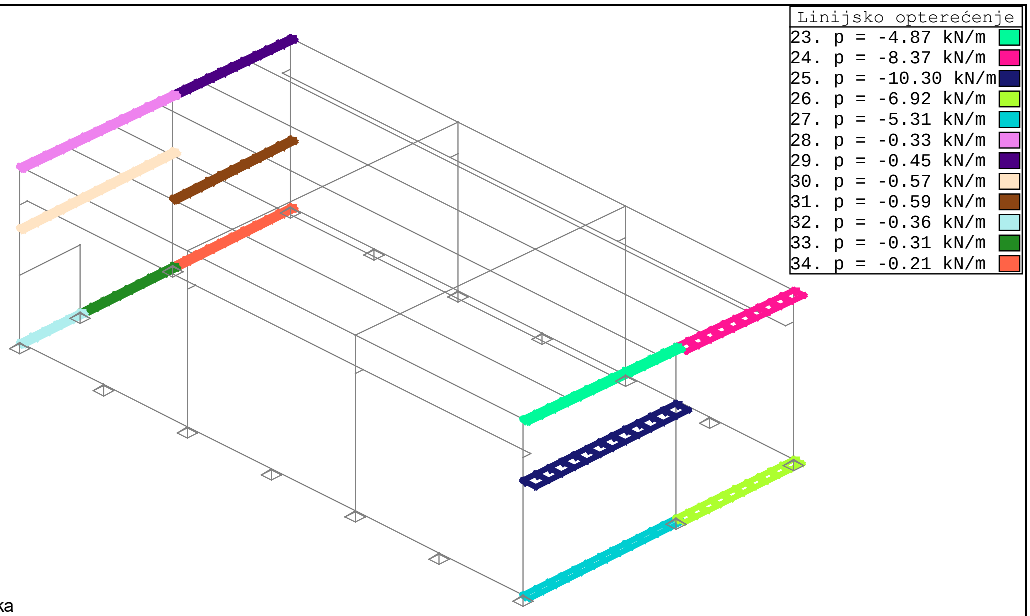
Ram: V_1

Opt. 8: Vjetar +x



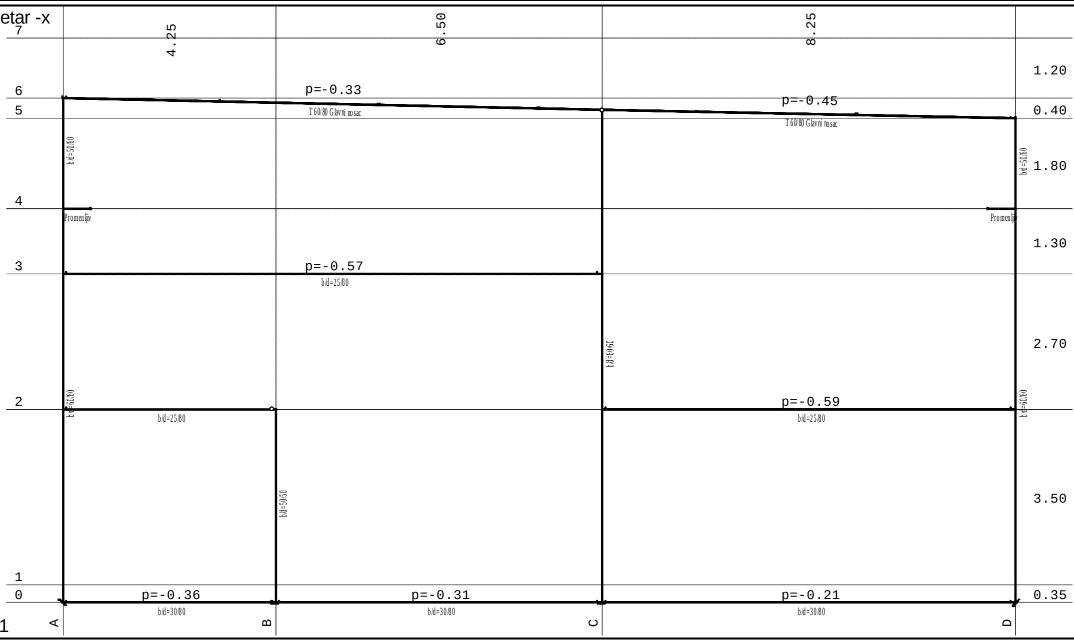
Ram: V_4

Opt. 9



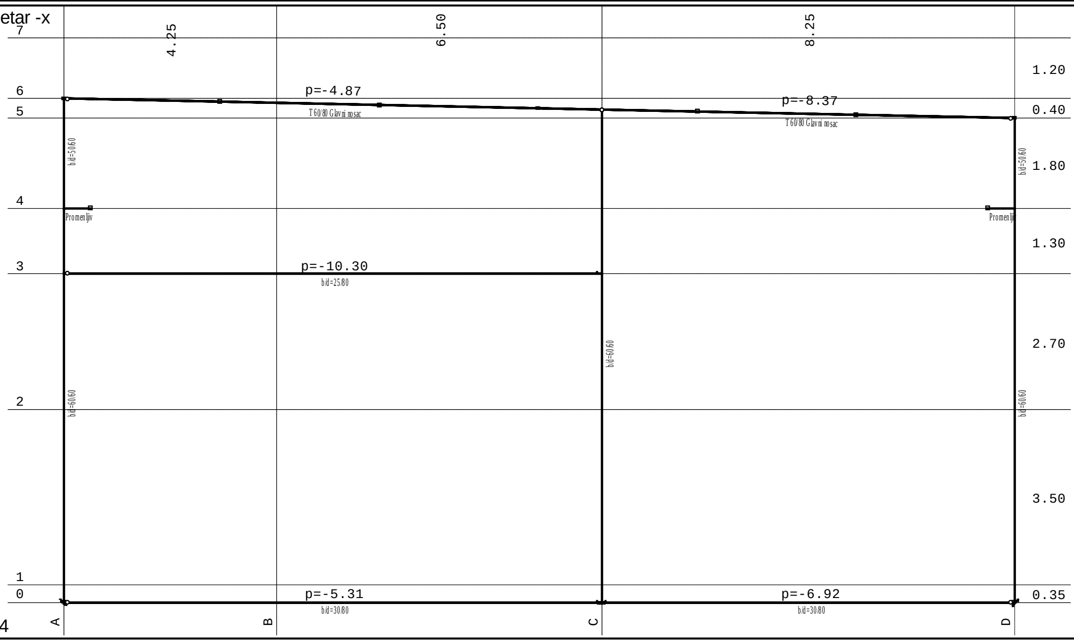
Setovi numeričkih podataka
Linijsko opterećenje (23-34)

Opt. 9: vjetar -x



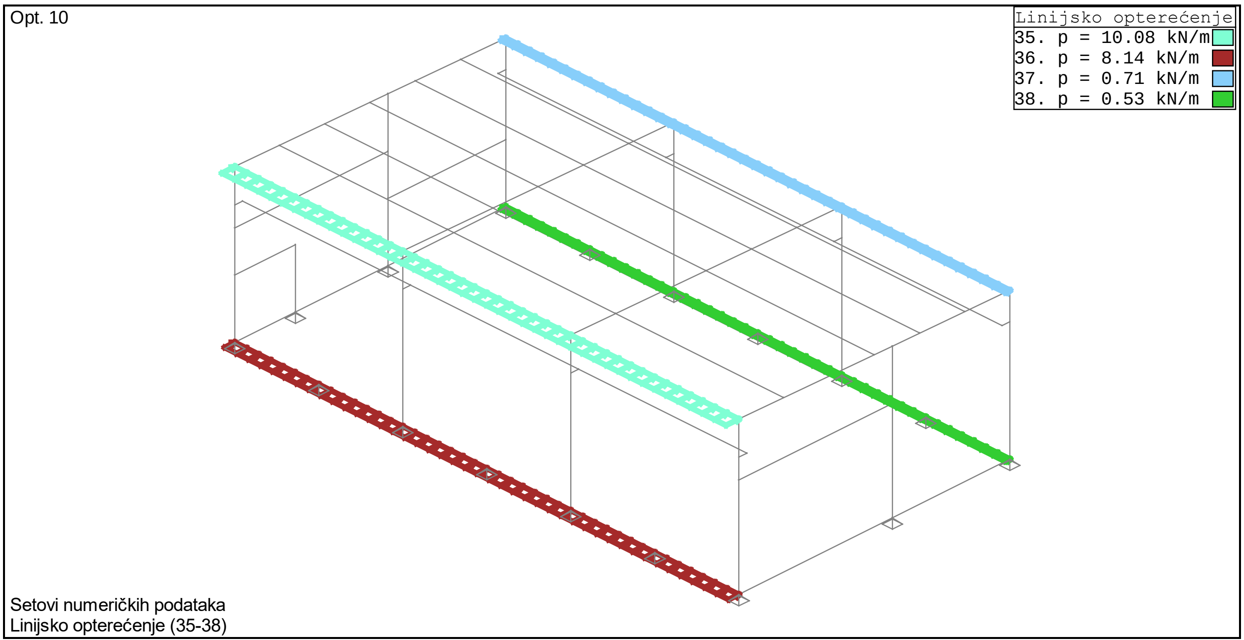
Ram: V_1

Opt. 9: vjetar -x



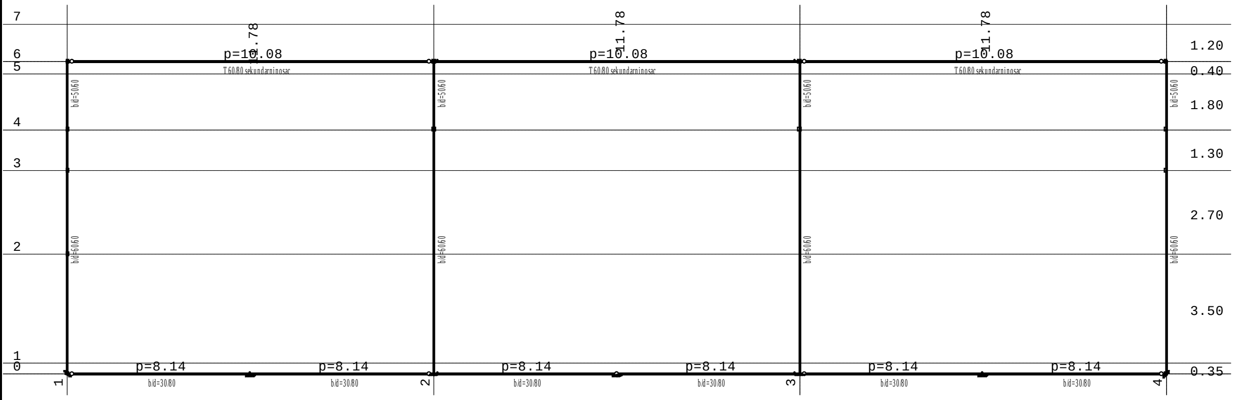
Ram: V_4

Opt. 10



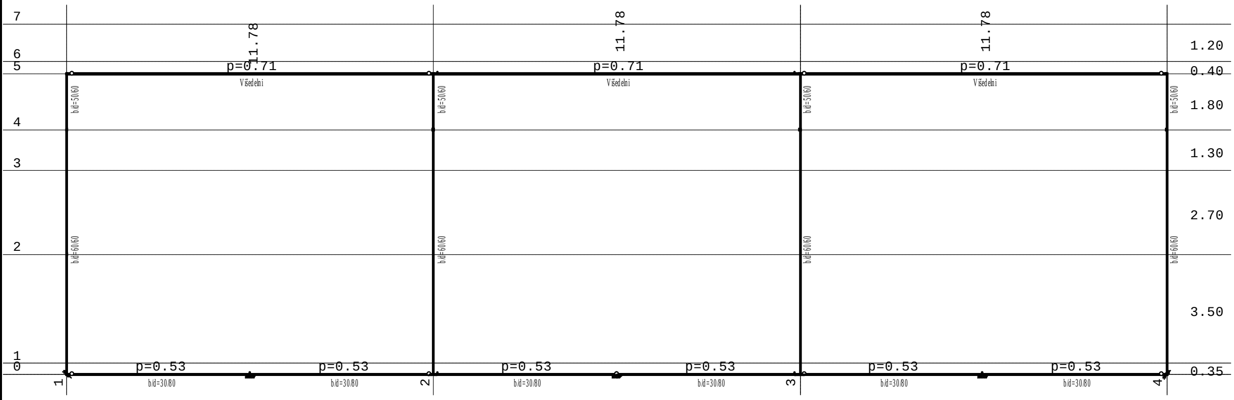
Setovi numeričkih podataka
Linijsko opterećenje (35-38)

Opt. 10: Vjetar +y



Ram: H_2

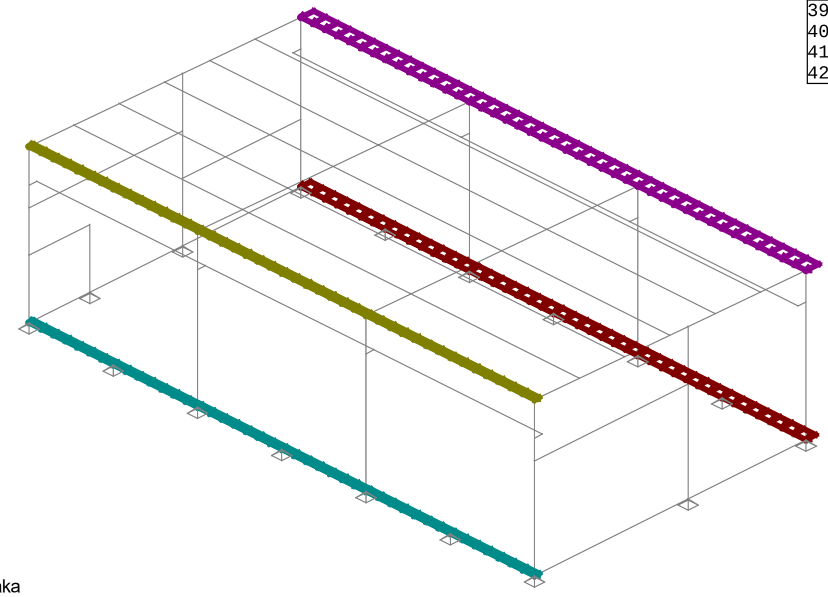
Opt. 10: Vjetar +y



Ram: H_1

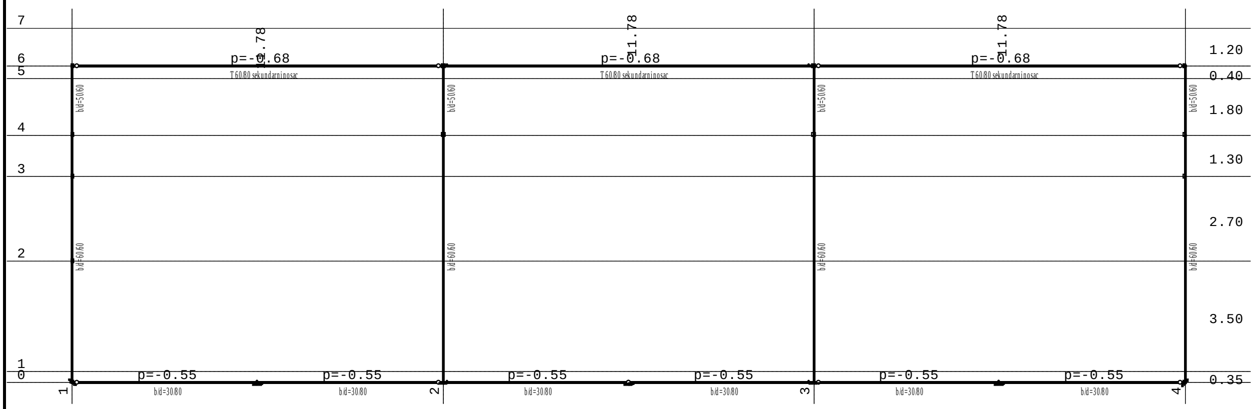
Opt. 11

Linijsko opterećenje
39. p = -10.41 kN/m
40. p = -7.82 kN/m
41. p = -0.68 kN/m
42. p = -0.55 kN/m



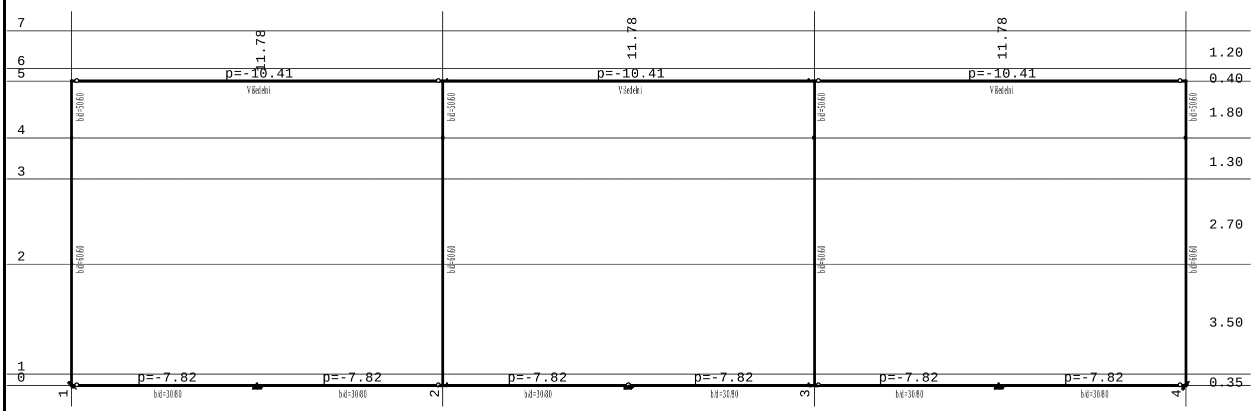
Setovi numeričkih podataka
Linijsko opterećenje (39-42)

Opt. 11: vjetar -y



Ram: H_2

Opt. 11: vjetar -y



Ram: H_1

Modalna analiza

Napredne opcije seizmičkog proračuna:

Sprečeno oscilovanje u Z pravcu

Faktori opterećenja za proračun masa

No	Naziv	Koeficijent	
1	Stalno (g)	1.00	
2	Snijeg	0.00	
3	korisno	0.50	
4	Kran vertikalno osa A max	0.00	
5	Kran vertikalno osa B max	0.00	
6	Kran horizontalno osa A max	0.00	
7	Kran horizontalno osa B max	0.00	
8	Vjetar +x	0.00	
9	vjetar -x	0.00	
10	Vjetar +y	0.00	
11	vjetar -y	0.00	

Raspored masa po visini objekta

Nivo	Z [m]	X [m]	Y [m]	Masa [T]	T/m²
Vrh fasade	10.90	0.00	0.00	0.00	
	9.70	17.67	4.25	105.39	
	9.30	17.67	16.08	91.51	
Kran	7.50	18.01	9.88	91.42	
	6.20	19.04	6.73	45.67	
Galerija	3.50	0.00	11.82	65.54	
	0.00	0.00	0.00	0.00	
	-0.35	17.79	9.51	457.22	
Ukupno:	3.40	16.49	9.63	856.75	

Položaj centara krutosti po visini objekta (približna metoda)

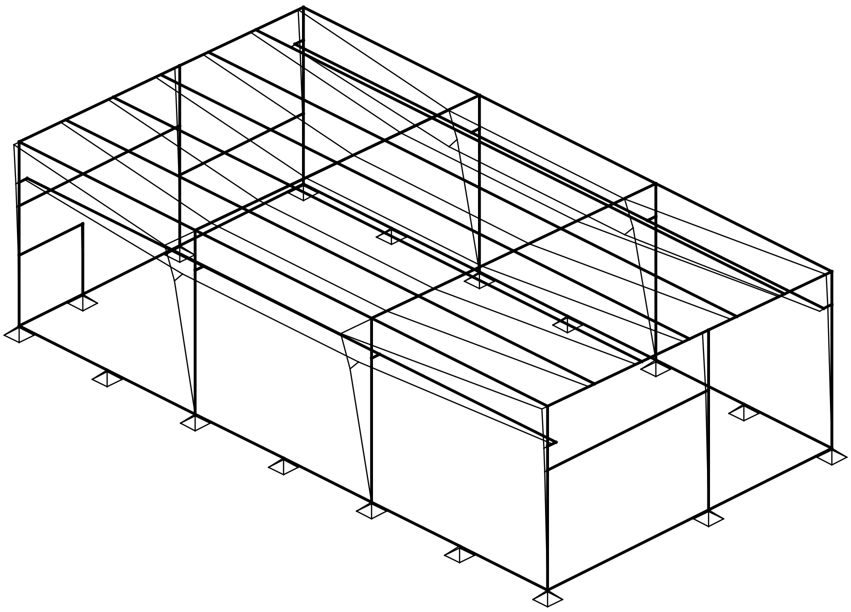
Nivo	Z [m]	X [m]	Y [m]
	9.70	17.67	0.00
	9.30	17.67	8.94
Kran	7.50	17.67	9.78
	6.20	17.67	9.75
Galerija	3.50	17.25	9.62
	0.00	16.86	9.50
	-0.35	16.86	9.50

Ekscentricitet po visini objekta (približna metoda)

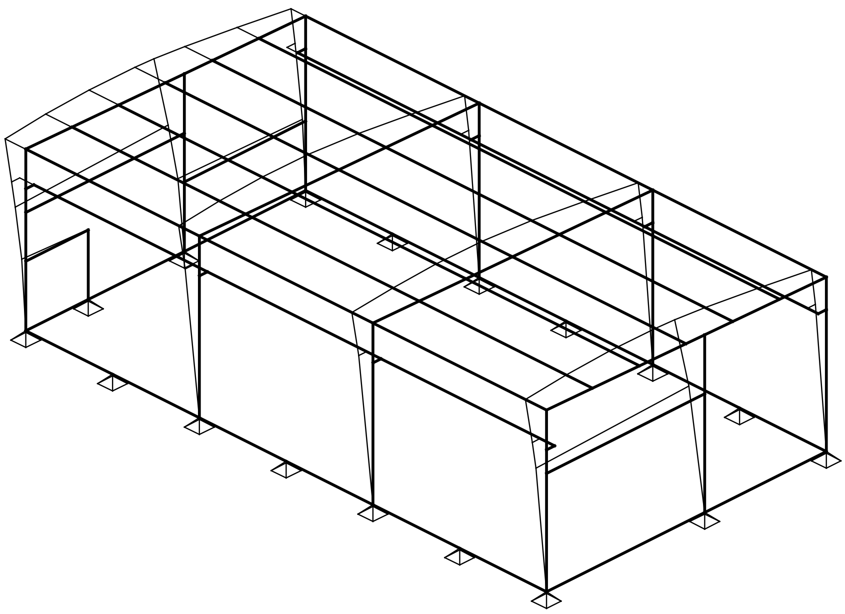
Nivo	Z [m]	eox [m]	eoy [m]
	9.70	0.00	4.25
	9.30	0.00	7.14
Kran	7.50	0.34	0.10
	6.20	1.37	3.02
Galerija	3.50	17.25	2.20
	0.00	16.86	9.50
	-0.35	0.93	0.01

Periodi oscilovanja konstrukcije

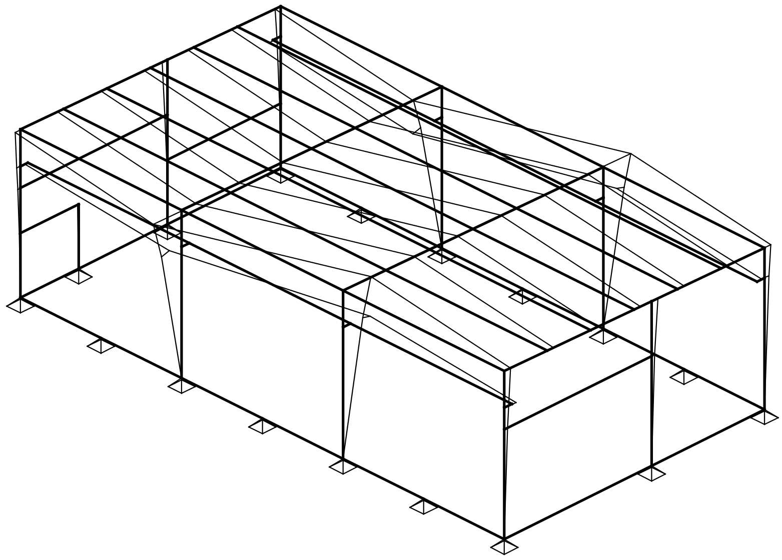
No	T [s]	f [Hz]
1	1.0147	0.9855
2	0.9412	1.0624
3	0.8998	1.1113
4	0.7122	1.4040
5	0.6866	1.4565
6	0.6608	1.5134
7	0.5255	1.9030
8	0.1942	5.1505
9	0.1599	6.2549
10	0.1509	6.6248
11	0.1272	7.8621
12	0.1258	7.9511



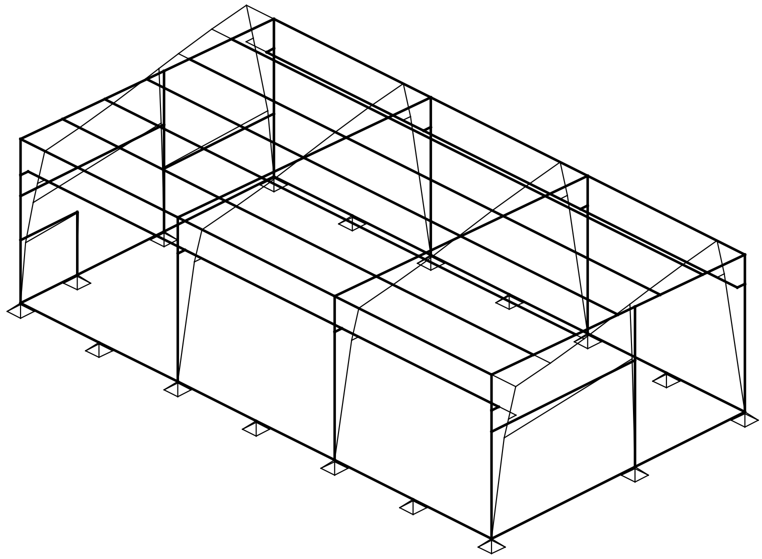
Izometrija
Forma oscilovanja: 1/12 [T=1.0147sec / f=0.99Hz]



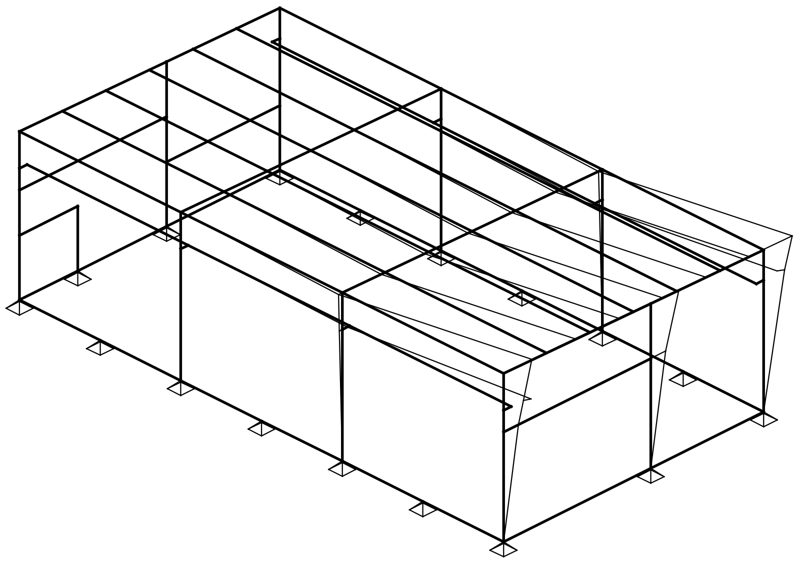
Izometrija
Forma oscilovanja: 2/12 [T=0.9412sec / f=1.06Hz]



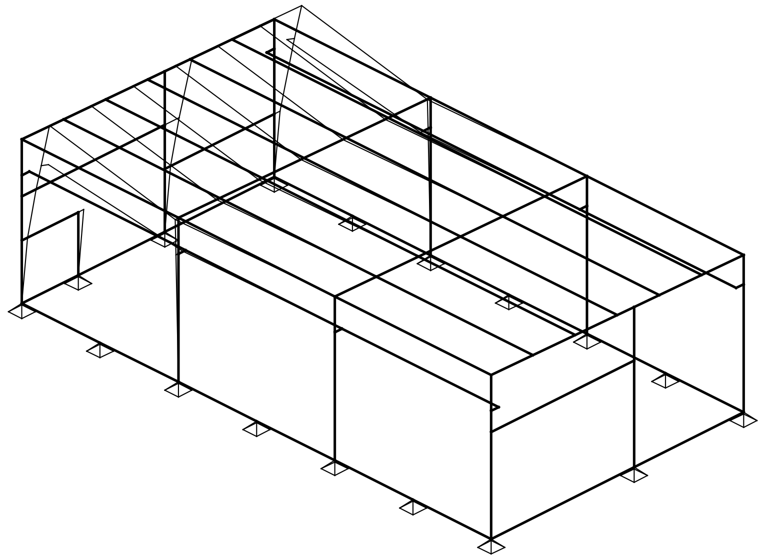
Izometrija
Forma oscilovanja: 3/12 [T=0.8998sec / f=1.11Hz]



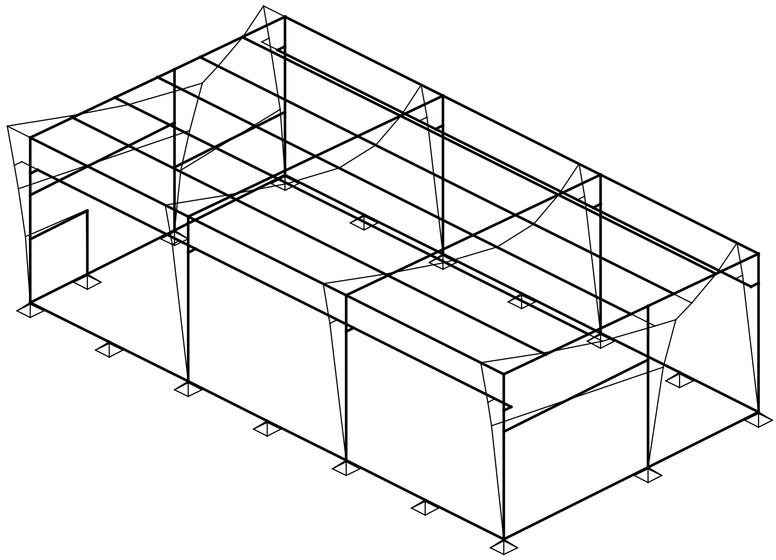
Izometrija
Forma oscilovanja: 4/12 [T=0.7122sec / f=1.40Hz]



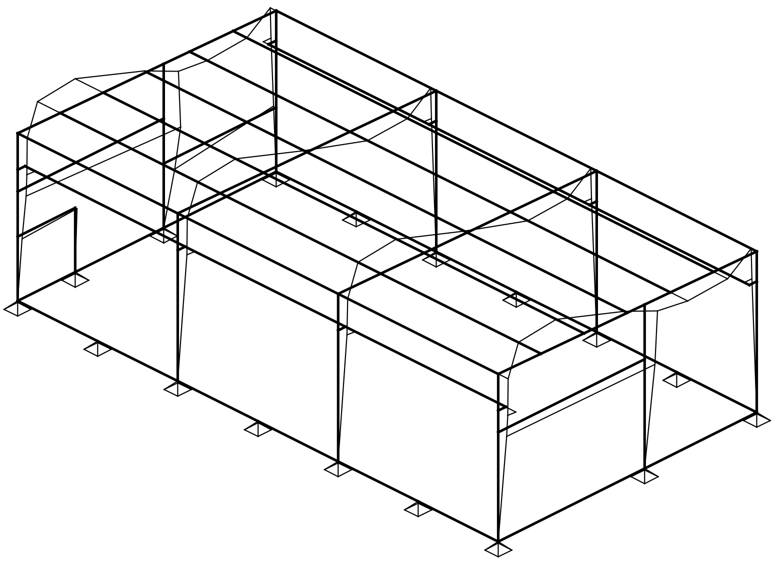
Izometrija
Forma oscilovanja: 5/12 [T=0.6866sec / f=1.46Hz]



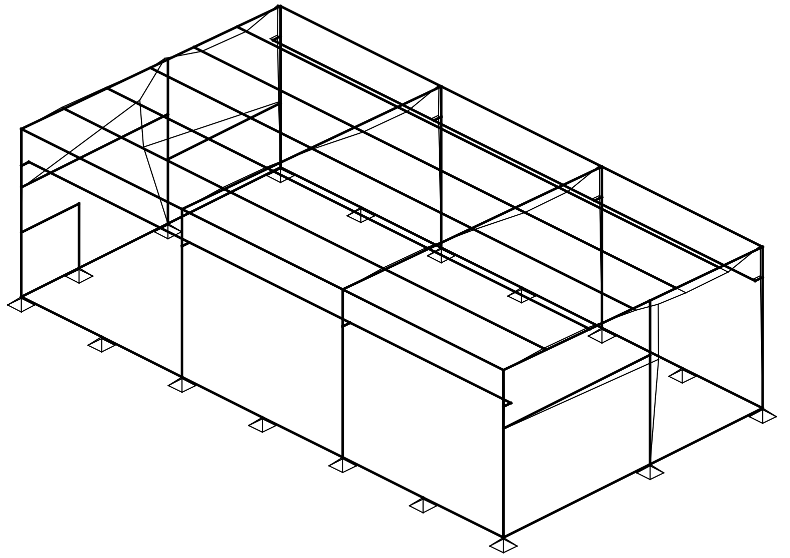
Izometrija
Forma oscilovanja: 6/12 [T=0.6608sec / f=1.51Hz]



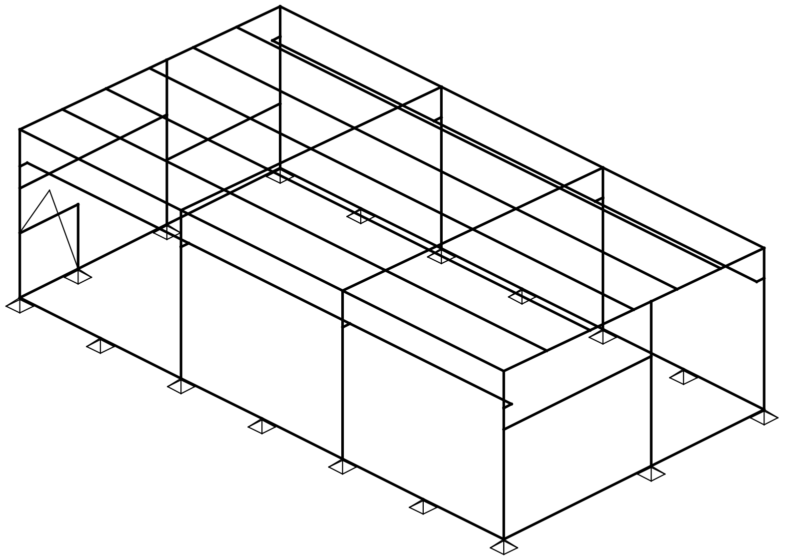
Izometrija
Forma oscilovanja: 7/12 [T=0.5255sec / f=1.90Hz]



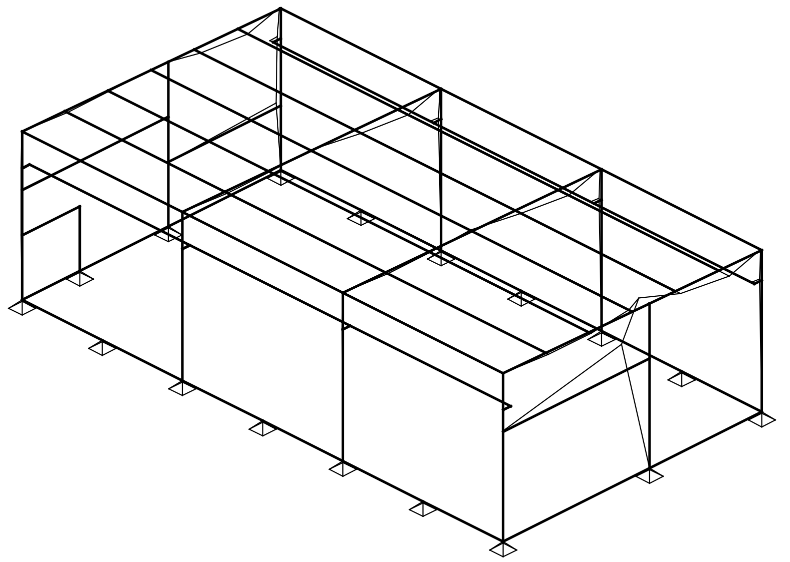
Izometrija
Forma oscilovanja: 8/12 [T=0.1942sec / f=5.15Hz]



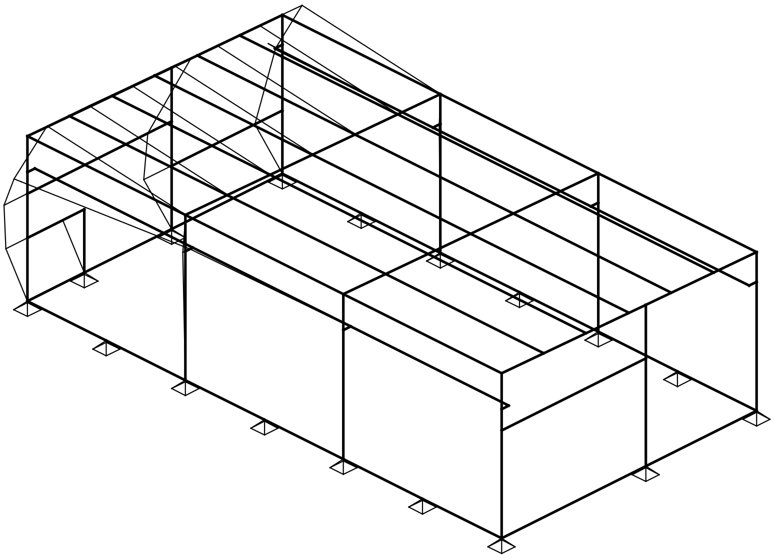
Izometrija
Forma oscilovanja: 9/12 [T=0.1599sec / f=6.25Hz]



Izometrija
Forma oscilovanja: 10/12 [T=0.1509sec / f=6.62Hz]



Izometrija
Forma oscilovanja: 11/12 [T=0.1272sec / f=7.86Hz]



Izometrija
Forma oscilovanja: 12/12 [T=0.1258sec / f=7.95Hz]

Seizmički proračun

Seizmički proračun: EC8 (HRN EN 1998-1:2011)

Kategorija tla:	A
Kategorija značaja:	II (γ=1.0)
Odnos ag/g:	0.10
Koeficijent prigušenja:	0.05

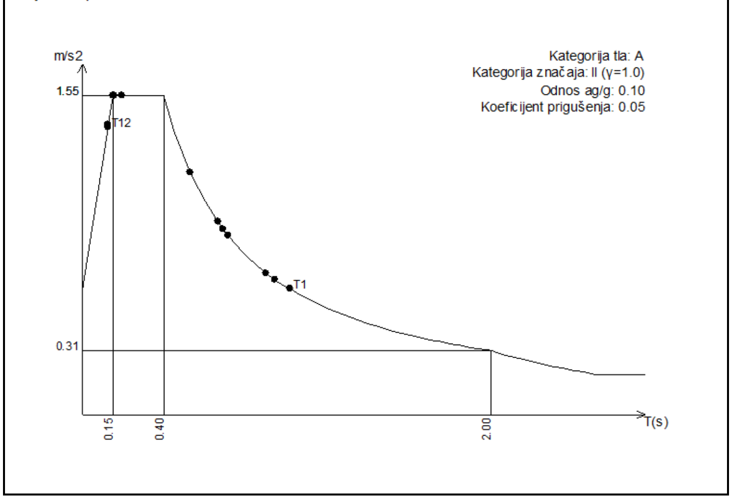
Faktori pravca zemljotresa:

Slučaj opterećenja	Ugao α[°]	k,α	k,α+90°	kz	Faktor q
Potres x	0	1.000	0.300	0.000	1.500*
Potres y	90	1.000	0.300	0.000	1.500*

Tip spektra

Slučaj opterećenja	S	Tb	Tc	Td
Potres x	1.000	0.150	0.400	2.000
Potres y	1.000	0.150	0.400	2.000

Projektni spektar



Potres x
Konstrukcija regularna po visini, , Klasa duktilnosti DCM:

Okvirni i dvojni dominantno okvirni sistem: αo=1.00, kw=1.00.
Faktor ponašanja: q=qo·kw=0.00(Usvojeno 1.5)

Nivo	Z [m]	Ton 1 Px [kN]	Ton 1 Py [kN]	Ton 1 Pz [kN]	Ton 2 Px [kN]	Ton 2 Py [kN]	Ton 2 Pz [kN]	Ton 3 Px [kN]	Ton 3 Py [kN]	Ton 3 Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	-0.00	16.36	0.01	86.62	0.00	0.00	0.00	0.00	0.00
	9.30	0.00	13.68	0.01	59.30	0.00	0.00	-0.00	-0.00	0.00
Kran	7.50	0.00	10.18	0.02	35.36	0.00	-0.00	0.00	-0.00	-0.00
	6.20	-0.00	0.87	-0.00	19.85	0.00	0.00	0.00	-0.00	-0.00
Galerija	3.50	0.00	0.40	-0.00	8.61	-0.00	-0.00	0.00	0.00	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.00
	Σ=	-0.00	41.50	0.04	209.73	0.00	0.00	0.00	0.00	-0.00

Nivo	Z [m]	Ton 4 Px [kN]	Ton 4 Py [kN]	Ton 4 Pz [kN]	Ton 5 Px [kN]	Ton 5 Py [kN]	Ton 5 Pz [kN]	Ton 6 Px [kN]	Ton 6 Py [kN]	Ton 6 Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	-7.38	0.00	0.00	-0.00	3.90	0.00	0.00	4.95	0.00
	9.30	9.58	0.00	-0.00	0.00	3.81	-0.00	-0.00	4.82	-0.00
Kran	7.50	1.18	0.00	-0.00	-0.00	2.40	0.01	-0.00	2.62	0.01
	6.20	-0.72	0.00	-0.00	0.00	3.44	0.00	0.00	3.59	0.00
Galerija	3.50	0.70	0.00	0.00	0.00	0.03	-0.00	-0.00	4.50	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00	0.00	-0.00
	Σ=	3.36	0.00	-0.00	0.00	13.58	0.01	-0.00	20.48	0.01

		Ton 7			Ton 8			Ton 9		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	-1.11	-0.00	-0.00	-13.84	0.00	-0.00	1.38	-0.00	0.00
	9.30	4.57	-0.00	0.00	8.58	-0.00	-0.00	-11.48	-0.00	0.00
Kran	7.50	25.50	0.00	-0.00	2.45	0.00	-0.00	2.81	0.00	-0.00
	6.20	-3.93	0.00	-0.00	7.36	0.00	0.00	7.53	0.00	0.00
Galerija	3.50	0.28	-0.00	0.00	3.63	0.00	0.00	20.46	0.00	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00
	Σ=	25.32	-0.00	-0.00	8.19	0.00	0.00	20.70	0.00	0.00

		Ton 10			Ton 11			Ton 12		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	-0.21	0.00	-0.00	-1.64	-0.00	0.00	-0.00	-3.70	-0.05
	9.30	-0.27	0.00	-0.00	-9.86	-0.00	0.00	0.00	-3.49	-0.01
Kran	7.50	-0.03	-0.00	0.00	5.66	0.00	-0.00	0.00	1.98	-0.05
	6.20	0.10	-0.00	-0.00	13.47	0.00	0.00	0.00	4.76	-0.00
Galerija	3.50	10.78	0.00	0.00	3.69	-0.00	-0.00	0.00	16.36	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00	0.00
	Σ=	10.38	0.00	-0.00	11.33	0.00	0.00	0.00	15.91	-0.11

Potres y
Konstrukcija regularna po visini, , Klasa duktilnosti DCM:

Okvirni i dvojni dominantno okvirni sistem: αo=1.00, kw=1.00.
Faktor ponašanja: q=qo·kw=0.00(Usvojeno 1.5)

		Ton 1			Ton 2			Ton 3		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	-0.00	54.55	0.03	-25.98	-0.00	-0.00	0.00	0.00	0.00
	9.30	0.00	45.60	0.02	-17.79	-0.00	-0.00	-0.00	-0.00	0.00
Kran	7.50	0.00	33.94	0.08	-10.61	-0.00	0.00	0.00	-0.00	-0.00
	6.20	-0.00	2.90	-0.00	-5.96	-0.00	-0.00	0.00	-0.00	-0.00
Galerija	3.50	0.00	1.35	-0.00	-2.58	0.00	0.00	0.00	0.01	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00
	Σ=	-0.00	138.34	0.13	-62.92	-0.00	-0.00	0.00	0.01	-0.00

		Ton 4			Ton 5			Ton 6		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	2.21	-0.00	-0.00	-0.00	12.99	0.00	0.00	16.50	0.00
	9.30	-2.87	-0.00	0.00	0.00	12.70	-0.00	-0.00	16.05	-0.00
Kran	7.50	-0.35	-0.00	0.00	-0.00	8.01	0.02	-0.00	8.73	0.03
	6.20	0.22	-0.00	0.00	0.00	11.45	0.00	0.00	11.97	0.00
Galerija	3.50	-0.21	-0.00	-0.00	0.00	0.11	-0.00	-0.00	15.01	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	0.00	-0.00
	Σ=	-1.01	-0.00	0.00	0.00	45.26	0.02	-0.00	68.26	0.03

		Ton 7			Ton 8			Ton 9		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	0.33	0.00	0.00	4.15	-0.00	0.00	-0.41	0.00	-0.00
	9.30	-1.37	0.00	-0.00	-2.57	0.00	0.00	3.44	0.00	-0.00
Kran	7.50	-7.65	-0.00	0.00	-0.74	-0.00	0.00	-0.84	-0.00	0.00
	6.20	1.18	-0.00	0.00	-2.21	-0.00	-0.00	-2.26	-0.00	-0.00
Galerija	3.50	-0.08	0.00	-0.00	-1.09	-0.00	-0.00	-6.14	-0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00
	Σ=	-7.60	0.00	0.00	-2.46	-0.00	-0.00	-6.21	-0.00	-0.00

		Ton 10			Ton 11			Ton 12		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
Vrh fasade	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9.70	0.06	-0.00	0.00	0.49	0.00	-0.00	-0.00	-12.33	-0.15
	9.30	0.08	-0.00	0.00	2.96	0.00	-0.00	0.00	-11.63	-0.05
Kran	7.50	0.01	0.00	-0.00	-1.70	-0.00	0.00	0.00	6.59	-0.15
	6.20	-0.03	0.00	0.00	-4.04	-0.00	-0.00	0.00	15.86	-0.00
Galerija	3.50	-3.23	-0.00	-0.00	-1.11	0.00	0.00	0.00	54.54	-0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.35	-0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00
	Σ=	-3.11	-0.00	0.00	-3.40	-0.00	-0.00	0.00	53.04	-0.36

Faktori participacije - relativno učešće

Ton \ Naziv	1. Potres x	2. Potres y
1	0.039	0.418
2	0.663	0.057
3	0.000	0.000
4	0.011	0.001
5	0.013	0.137
6	0.019	0.206
7	0.080	0.007
8	0.026	0.002
9	0.065	0.006
10	0.033	0.003
11	0.036	0.003
12	0.015	0.160

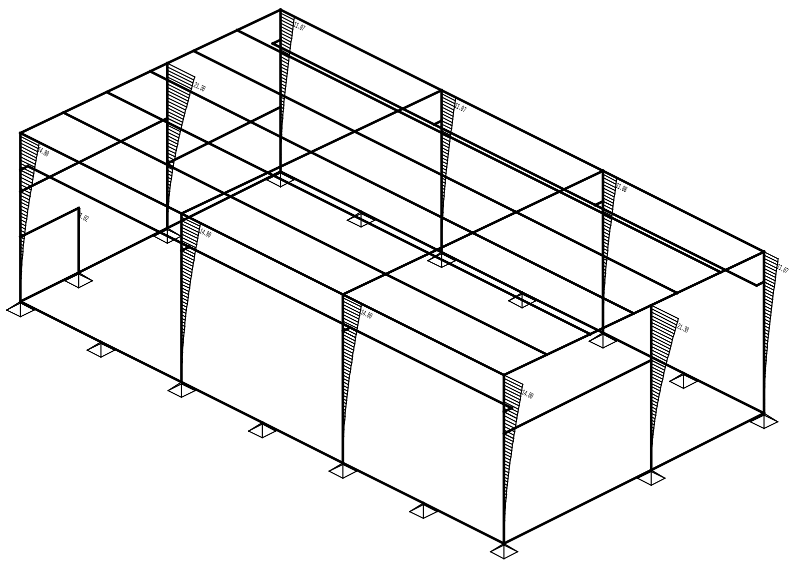
Faktori participacije - angažovanje mase

U obzir se uzima samo masa iznad kote temelja
Kota temelja: 0.00 m
Ukupna masa iznad temelja: 399.54 T
Ukupna masa celog objekta 856.75 T

Ton	U [α=0°]	U [α=90°]
1	0.00	56.66
2	79.55	0.00
3	0.00	0.00
4	0.96	0.00
5	0.00	12.54
6	0.00	18.20
7	5.36	0.00
8	1.32	0.00
9	3.34	0.00
10	1.67	0.00
11	2.01	0.00
12	0.00	9.52
ΣU (%)	94.22	96.91

HORIZONTALNI POMACI U PRAVCU X I Y OD POTRESA:

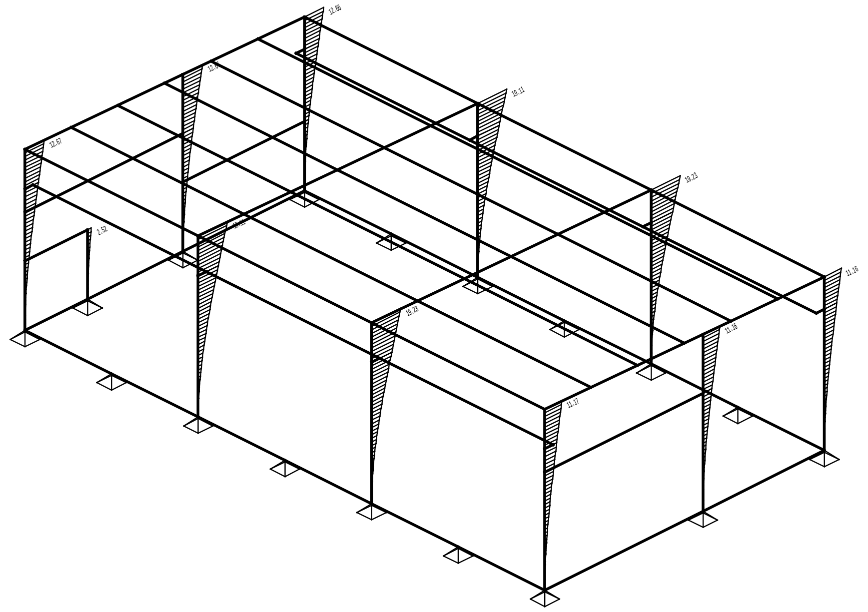
Opt. 12: Potres x



Izometrija
Uticaji u gredi: max Xp= 21.58 / min Xp= 0.00 m / 1000

X_{pmax} = 2,16 cm < h/150 = 900/150 = 6,00 cm

Opt. 13: Potres y



Izometrija
Uticaji u gredi: max Yp= 19.23 / min Yp= 0.00 m / 1000

Y_{pmax} = 1,92 cm < h/150 = 900/150 = 6,00 cm

DIMENZIONIRANJE KONSTRUKCIJE

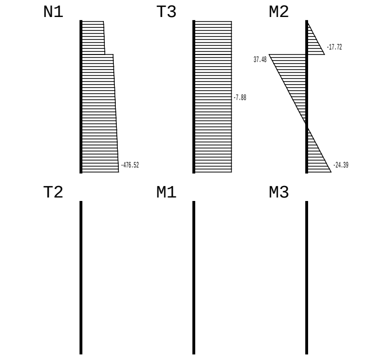
Lista slučajeva opterećenja

Naziv
Stalno (g)
Snijeg
korisno
Kran vertikalno osa A max
Kran vertikalno osa B max
Kran horizontalno osa A max
Kran horizontalno osa B max
Vjetar +x
vjetar -x
Vjetar +y
vjetar -y
Potres x
Potres y
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xV+0.9xXI
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xV+0.9xX
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xV+0.9xIX
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xV+0.9xVIII
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xIV+0.9xXI
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xIV+0.9xX
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xIV+0.9xIX
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xIV+0.9xVIII
Komb.: 1.35xI+1.5xII+1.05xIII+0.9xXI
Komb.: 1.35xI+1.5xII+1.05xIII+0.9xX
Komb.: 1.35xI+1.5xII+1.05xIII+0.9xIX
Komb.: 1.35xI+1.5xII+1.05xIII+0.9xVIII
Komb.: 1.35xI+0.75xII+1.05xIII-1.5xVI
Komb.: 1.35xI+0.75xII+1.05xIII-1.5xVII
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xXI
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xX
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xIX
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xVIII
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xVII
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xVI
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xV
Komb.: 1.35xI+0.75xII+1.05xIII+1.5xIV
Komb.: 1.35xI+0.75xII+1.5xV+0.9xXI
Komb.: 1.35xI+0.75xII+1.5xV+0.9xX
Komb.: 1.35xI+0.75xII+1.5xV+0.9xIX
Komb.: 1.35xI+0.75xII+1.5xV+0.9xVIII
Komb.: 1.35xI+0.75xII+1.5xIV+0.9xXI
Komb.: 1.35xI+0.75xII+1.5xIV+0.9xX
Komb.: 1.35xI+0.75xII+1.5xIV+0.9xIX
Komb.: 1.35xI+0.75xII+1.5xIV+0.9xVIII
Komb.: 1.35xI+0.75xII+1.5xIII+0.9xXI
Komb.: 1.35xI+0.75xII+1.5xIII+0.9xX
Komb.: 1.35xI+0.75xII+1.5xIII+0.9xIX
Komb.: 1.35xI+0.75xII+1.5xIII+0.9xVIII
Komb.: I-1xXII
Komb.: I-1xXIII
Komb.: I+XIII
Komb.: I+XII

DIMENZIONIRANJE STUPOVA U OSI A

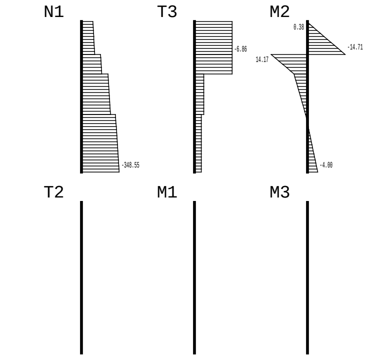
Grupa greda

Opt. 1: Stalno (g)



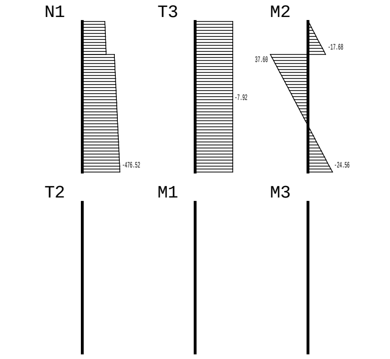
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



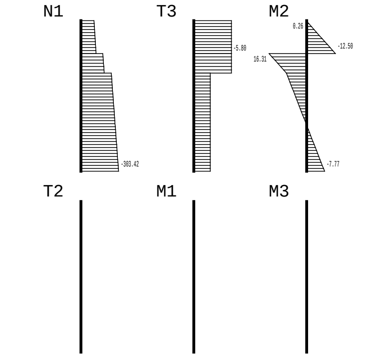
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



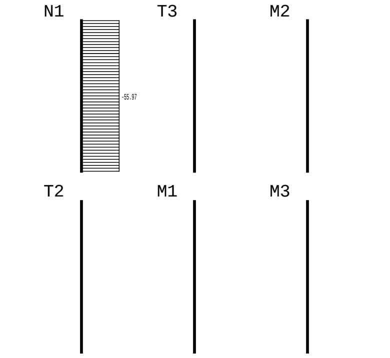
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



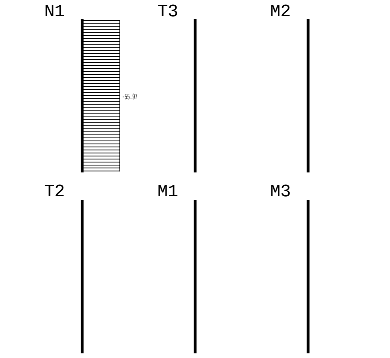
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



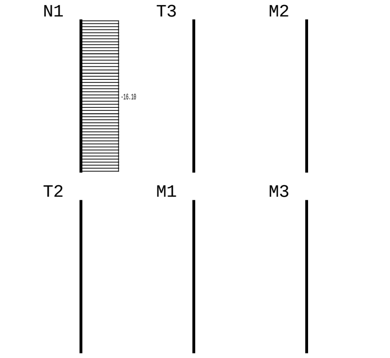
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



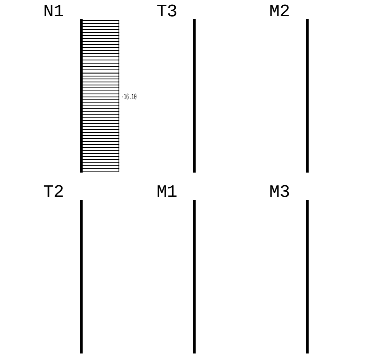
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



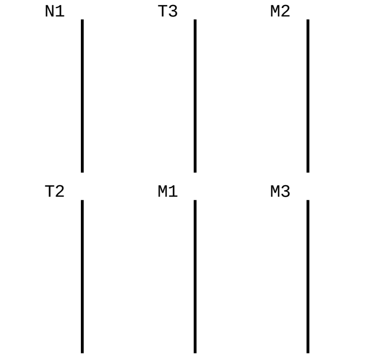
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



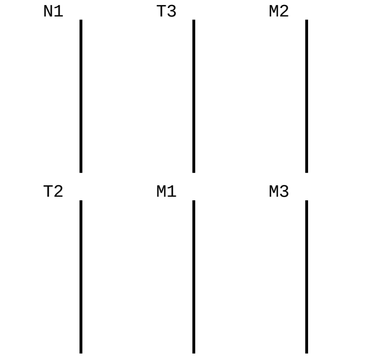
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



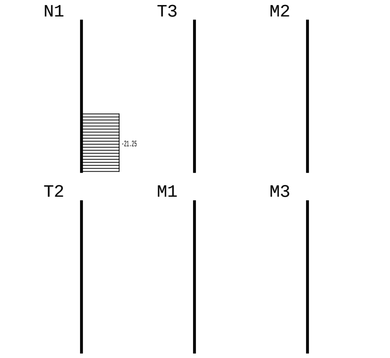
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



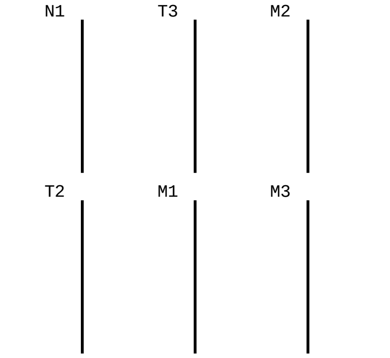
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



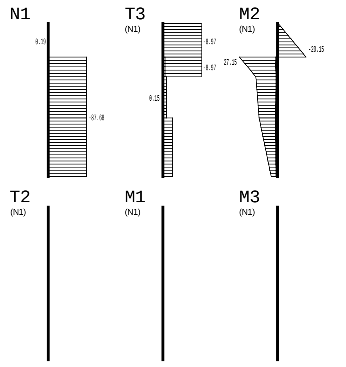
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



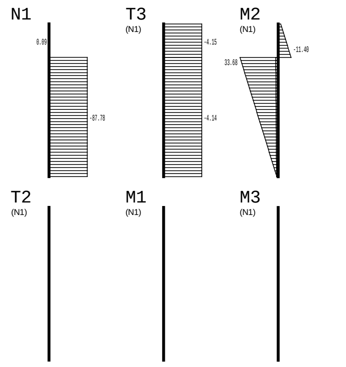
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



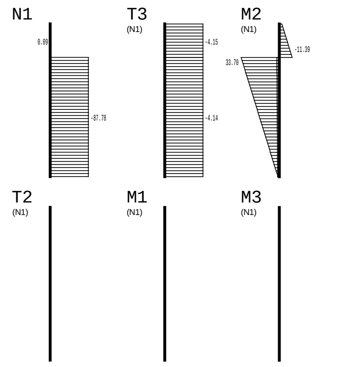
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



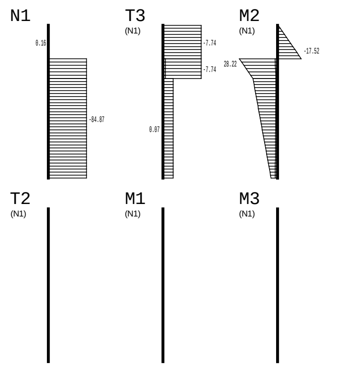
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



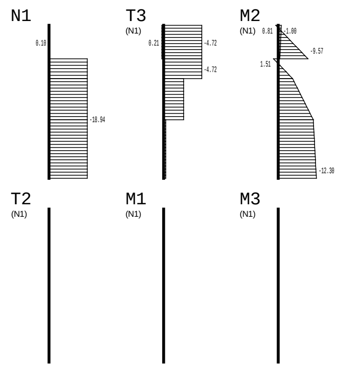
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



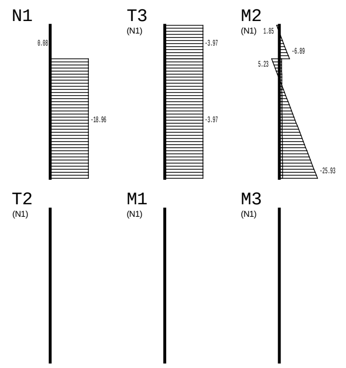
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



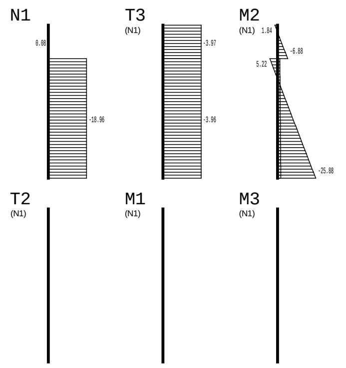
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



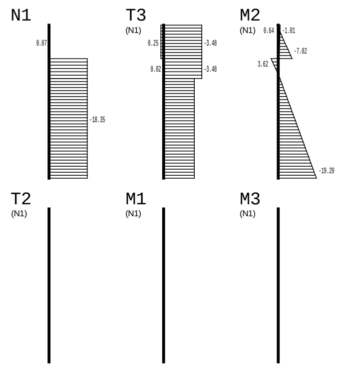
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



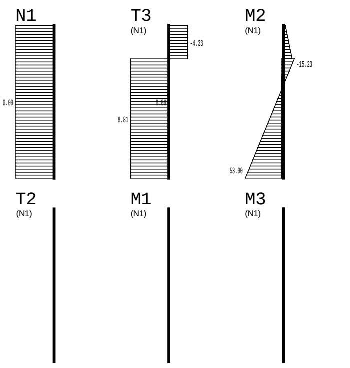
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



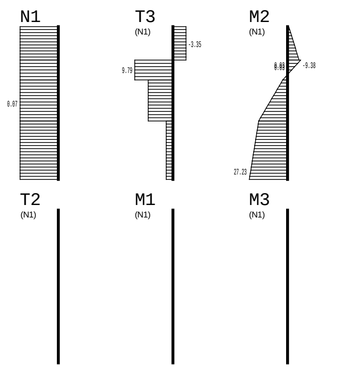
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



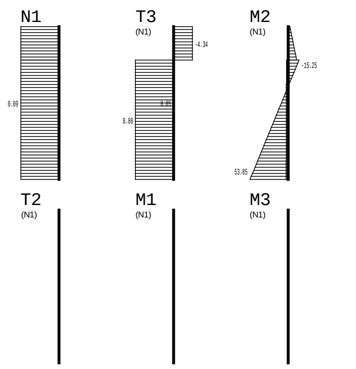
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



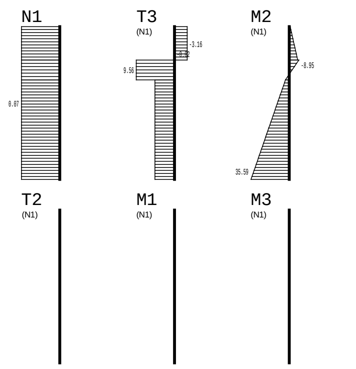
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



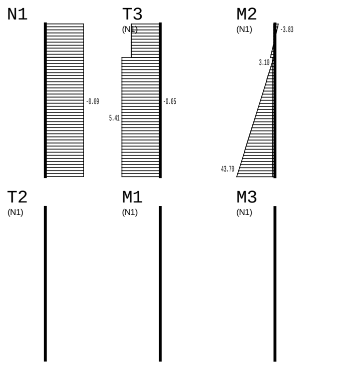
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

KONZOLA ARHITEKTURA j.d.o.o.
Epulonova 17, Novigrad
OIB 85176229919

Proizvodni pogon za savijanje metala, rezanje metala
i izradu predgotovljenih elemenata od metala
TERAKOP građevinski obrt, Partizanska 13, Poreč
k.č. 1232/64, 1232/67, 1232/68 I 1836/25 k.o. Žbandaj

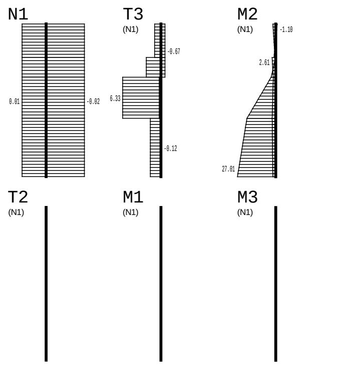
MAPA 3
BR.PROJEKTA G15/2017

Opt. 7: Kran horizontalno osa B max



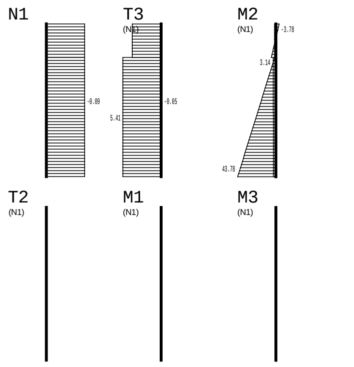
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



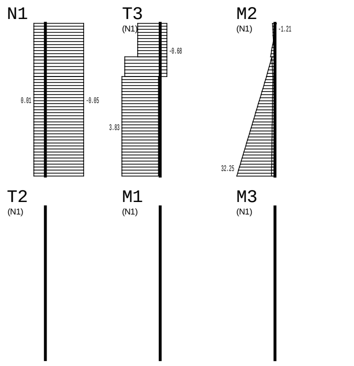
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



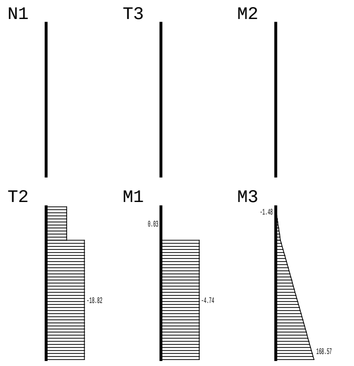
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



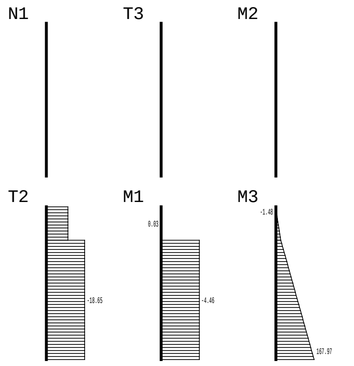
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



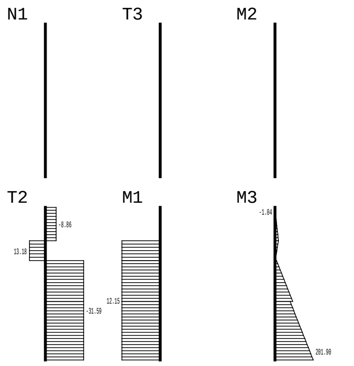
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



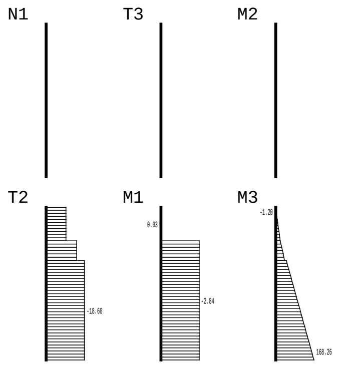
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



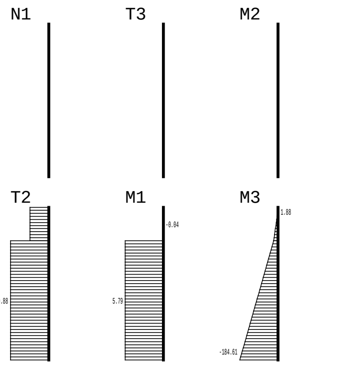
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



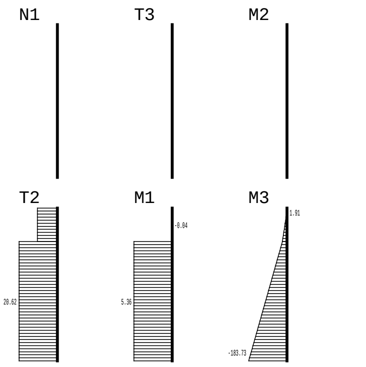
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



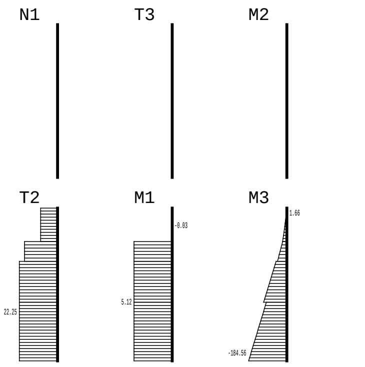
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



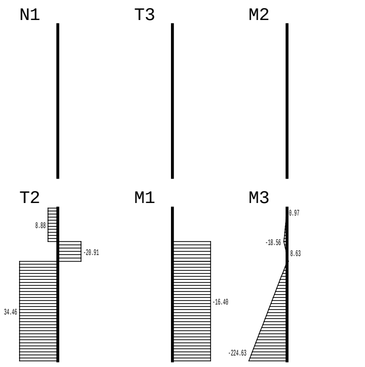
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



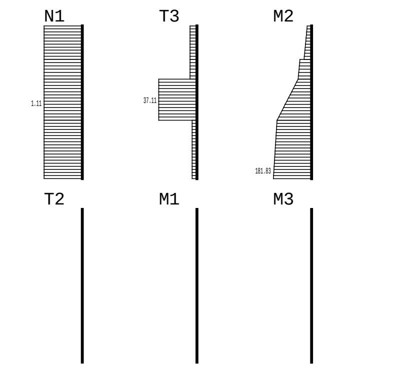
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



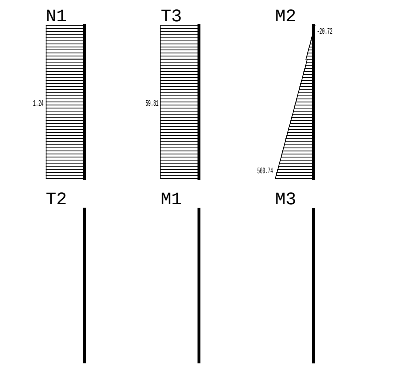
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



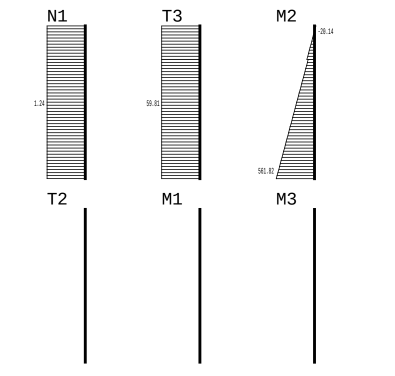
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



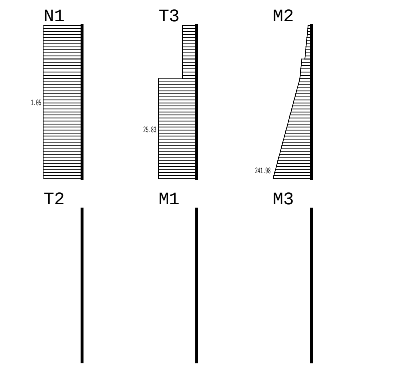
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



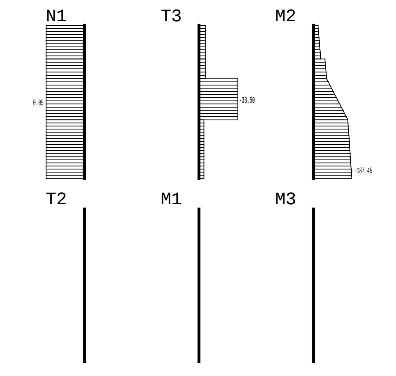
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



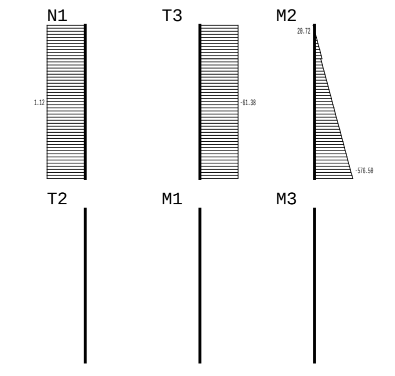
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



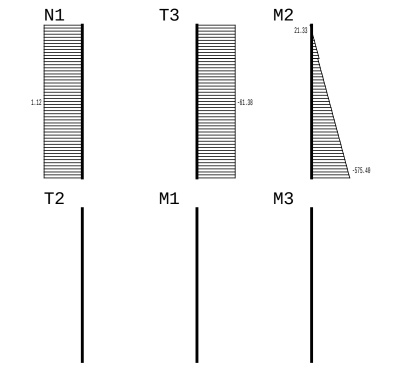
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



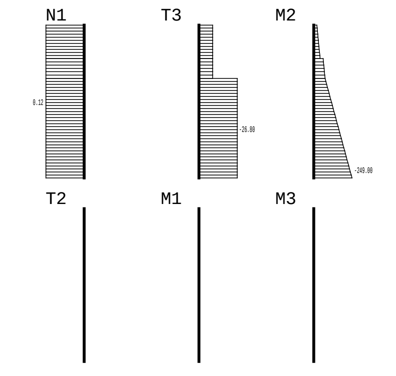
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



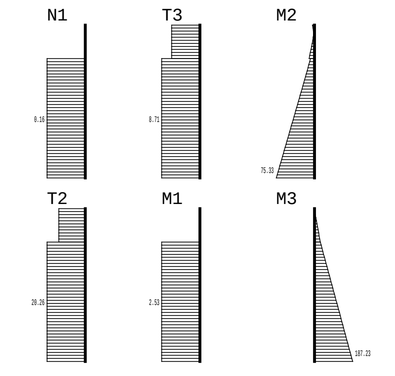
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



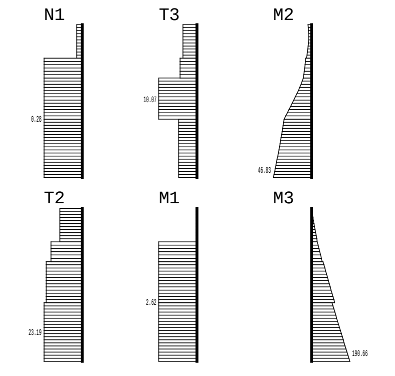
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



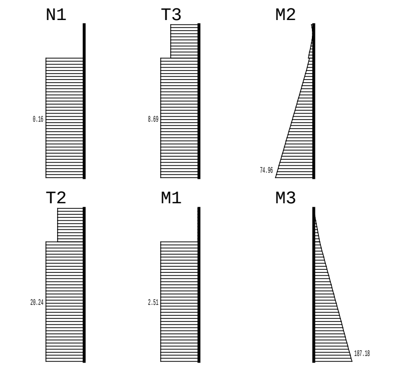
Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



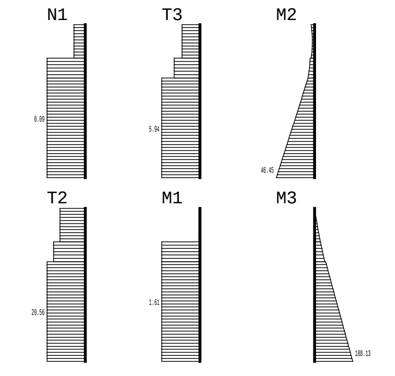
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



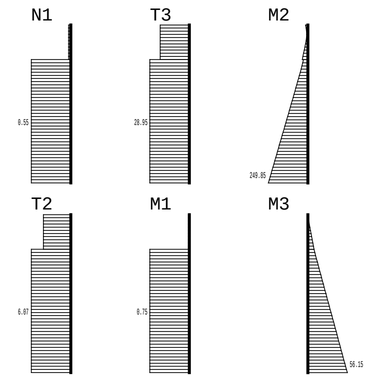
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



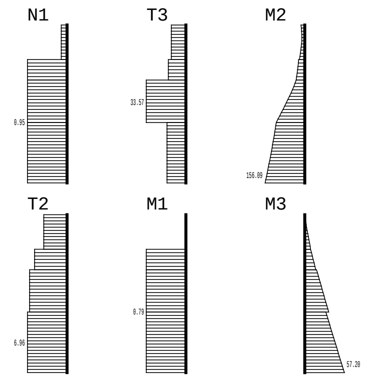
Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



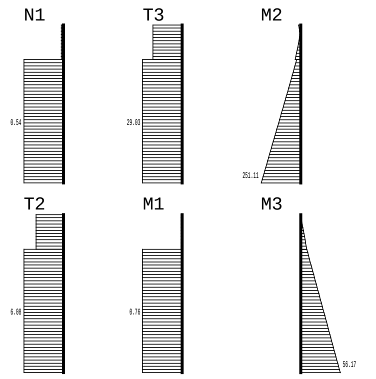
Uticaji u gredi: S1 (11-19-22)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



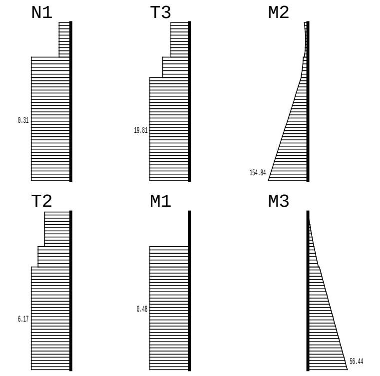
Uticaji u gredi: S2 (1-6-9)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



Uticaji u gredi: S1 (25-36-38)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

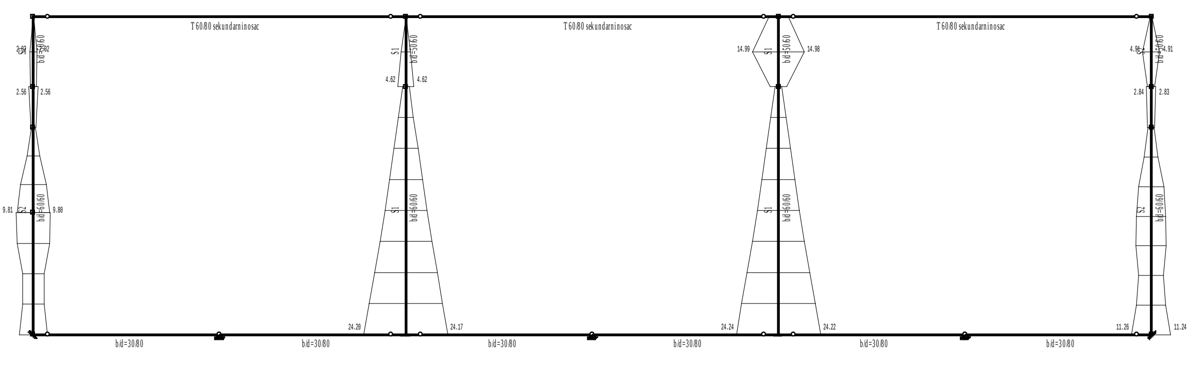
Opt. 13: Potres y



Uticaji u gredi: S2 (40-51-53)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

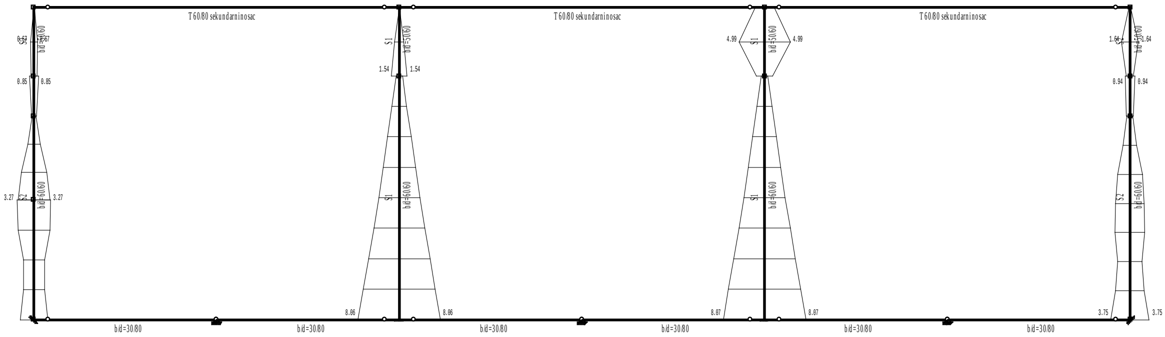
Ram: H_2

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



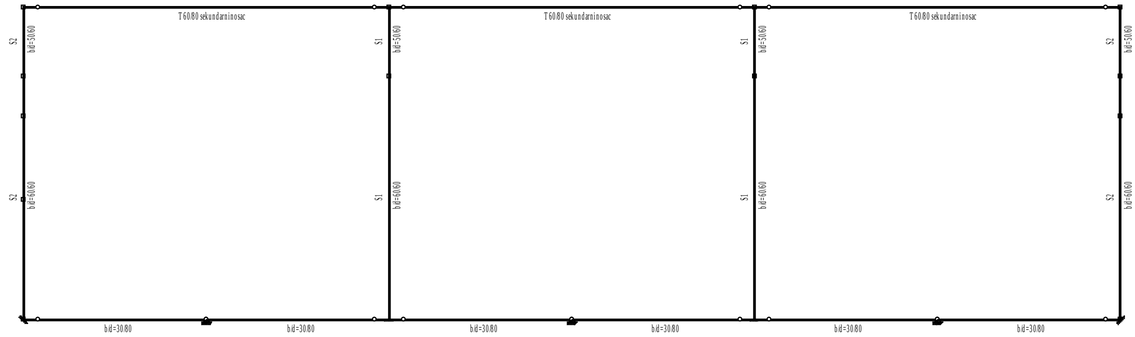
Ram: H_2
Armatura u gredama: max Aa2/Aa1= 24.22 / 24.24 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



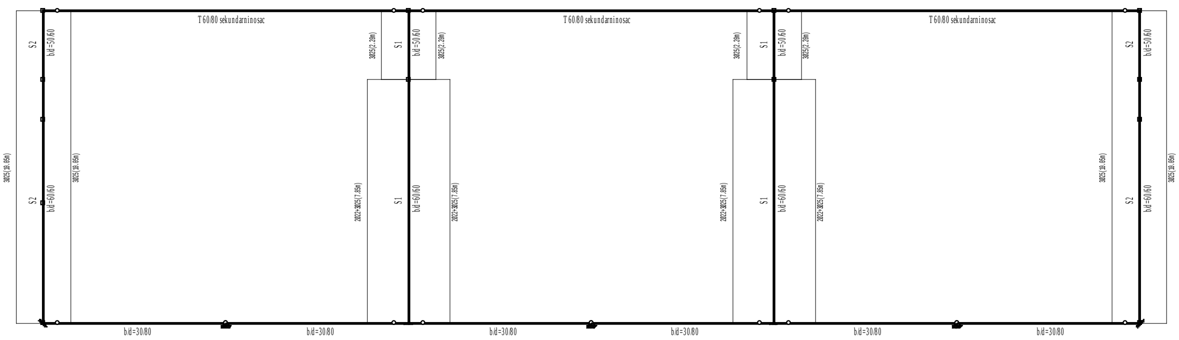
Ram: H_2
Armatura u gredama: max Aa3/Aa4= 8.07 / 8.07 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



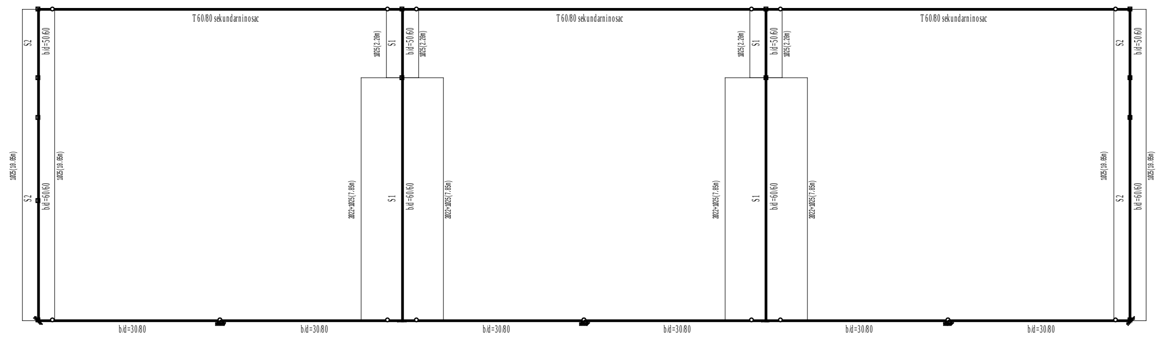
Ram: H_2
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



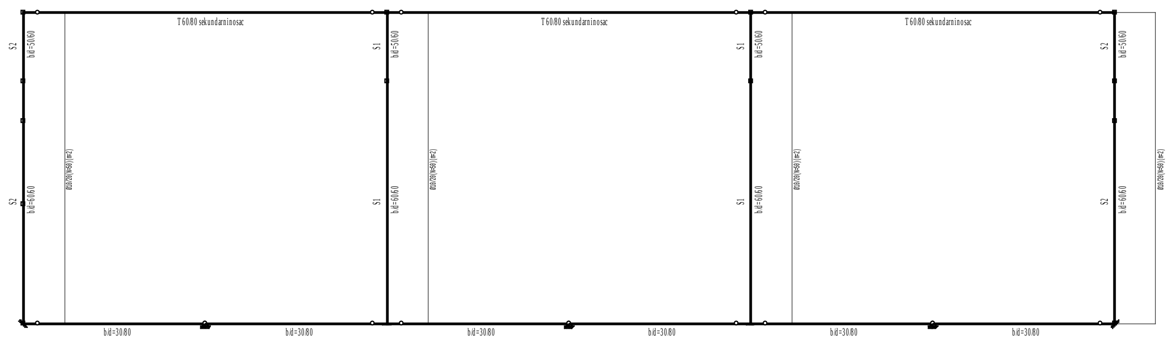
Ram: H_2
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



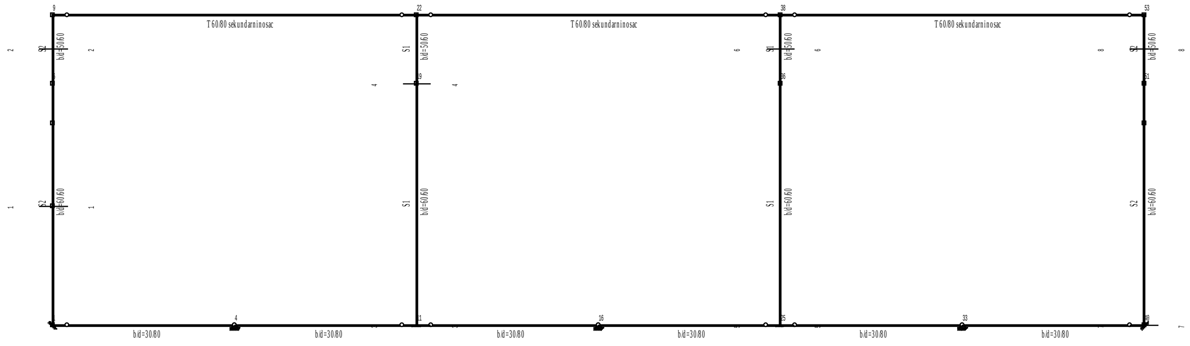
Ram: H_2
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: H_2
Armatura u gredama: Aa,uz

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

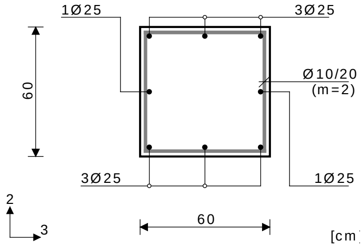


Ram: H_2
Dispozicija greda

S2 (6-1)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 15.70 m (λ2 = 90.64)
li,3 = 7.85 m (λ3 = 45.32)
Pomerljiva konstrukcija

Presek 1-1 x = 4.00m



Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
N1u = -458.08 kN
M2u = -250.99 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 5.9<e0> + 37.9<eII> = 43.8 cm
|ΔM2| = 200.72 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xVIII
T2u = -47.39 kN
T3u = -1.65 kN
M1u = 0.00 kNm

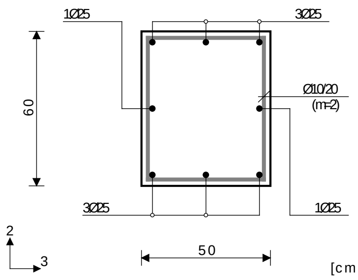
εb/εa = -3.449/25.000 ‰
Aa1 = 9.81 cm²
Aa2 = 9.80 cm²
Aa3 = 3.27 cm²
Aa4 = 3.27 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.09%

S2 (9-6)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 6.60 m (λ2 = 45.73)
li,3 = 6.60 m (λ3 = 38.11)
Pomerljiva konstrukcija

Presek 2-2 x = 1.10m



Merodavna kombinacija za savijanje:
1.00xI+0.75xII+1.05xIII-1.50xVI
N1u = -125.77 kN
M2u = -0.31 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 67.7<eII> = 71.7 cm
|ΔM2| = 90.12 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIV
+0.90xXI
T2u = 0.00 kN
T3u = -28.43 kN
M1u = 0.00 kNm

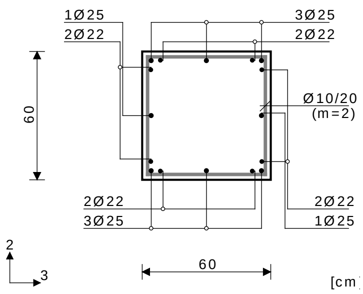
εb/εa = -1.676/25.000 ‰
Aa1 = 2.02 cm²
Aa2 = 2.02 cm²
Aa3 = 0.67 cm²
Aa4 = 0.67 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.31%

S1 (19-11)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 7.85 m (λ2 = 45.32)
li,3 = 15.70 m (λ3 = 90.64)
Pomerljiva konstrukcija

Presek 3-3 x = 7.85m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xXI
N1u = -474.84 kN
M2u = -887.50 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 18.99 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
T2u = 0.00 kN
T3u = -102.72 kN
M1u = 0.00 kNm

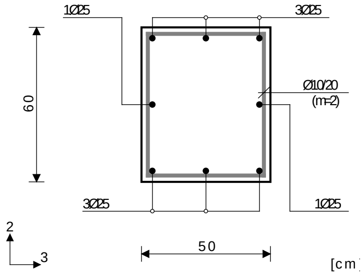
εb/εa = -3.500/16.157 ‰
Aa1 = 24.20 cm²
Aa2 = 24.17 cm²
Aa3 = 8.06 cm²
Aa4 = 8.06 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.94%

S1 (22-19)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 6.60 m (λ2 = 45.73)
li,3 = 6.60 m (λ3 = 38.11)
Pomerljiva konstrukcija

Presek 4-4 x = 2.20m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xXI
N1u = -300.52 kN
M2u = -188.30 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 12.02 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
T2u = 0.00 kN
T3u = -102.72 kN
M1u = 0.00 kNm

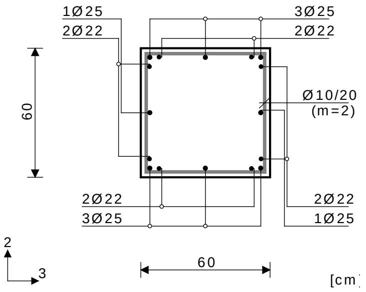
εb/εa = -2.816/25.000 ‰
Aa1 = 4.62 cm²
Aa2 = 4.62 cm²
Aa3 = 1.54 cm²
Aa4 = 1.54 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.31%

S1 (36-25)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 7.85 m (λ2 = 45.32)
li,3 = 15.70 m (λ3 = 90.64)
Pomerljiva konstrukcija

Presek 5-5 x = 7.85m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xXI
N1u = -474.84 kN
M2u = -889.31 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 18.99 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
T2u = 0.00 kN
T3u = -102.76 kN
M1u = 0.00 kNm

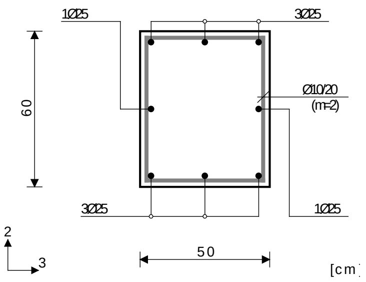
εb/εa = -3.500/16.142 ‰
Aa1 = 24.24 cm²
Aa2 = 24.22 cm²
Aa3 = 8.07 cm²
Aa4 = 8.07 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.94%

S1 (38-36)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 6.60 m (λ2 = 45.73)
li,3 = 6.60 m (λ3 = 38.11)
Pomerljiva konstrukcija

Presek 6-6 x = 1.10m



Merodavna kombinacija za savijanje:
1.00xI+0.75xII+1.05xIII-1.50xVI
N1u = -336.07 kN
M2u = 1.73 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 135.8<eII> = 139.8 cm
|ΔM2| = 469.95 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
T2u = 0.00 kN
T3u = -102.76 kN
M1u = 0.00 kNm

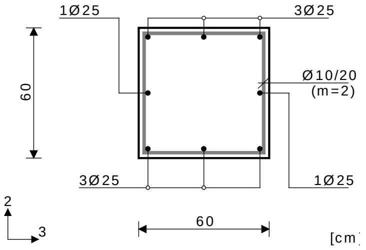
εb/εa = -3.500/17.861 ‰
Aa1 = 14.99 cm²
Aa2 = 14.98 cm²
Aa3 = 4.99 cm²
Aa4 = 4.99 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.31%

S2 (51-40)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 15.70 m (λ2 = 90.64)
li,3 = 7.85 m (λ3 = 45.32)
Pomerljiva konstrukcija

Presek 7-7 x = 7.85m



Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
N1u = -421.51 kN
M2u = -384.00 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 5.9<e0> + 19.0<eII> = 24.9 cm
|ΔM2| = 105.06 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX
T2u = 51.69 kN
T3u = -3.41 kN
M1u = 0.00 kNm

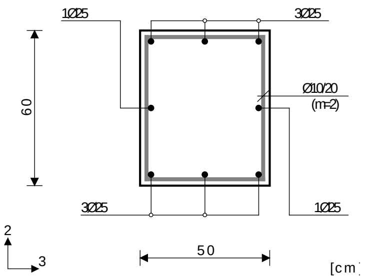
εb/εa = -3.500/24.572 ‰
Aa1 = 11.26 cm²
Aa2 = 11.24 cm²
Aa3 = 3.75 cm²
Aa4 = 3.75 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.09%

S2 (53-51)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 6.60 m (λ2 = 45.73)
li,3 = 6.60 m (λ3 = 38.11)
Pomerljiva konstrukcija

Presek 8-8 x = 1.10m



Merodavna kombinacija za savijanje:
1.00xI+0.75xII+1.05xIII-1.50xVI
N1u = -125.73 kN
M2u = -2.66 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 129.5<eII> = 133.5 cm
|ΔM2| = 167.90 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIV
+0.90xXI
T2u = 0.00 kN
T3u = -28.02 kN
M1u = 0.00 kNm

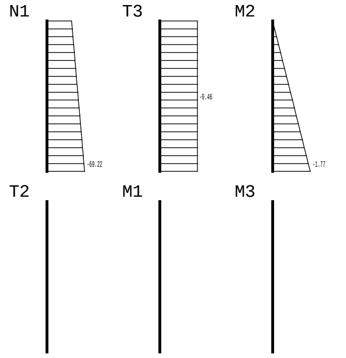
εb/εa = -2.440/25.000 ‰
Aa1 = 4.91 cm²
Aa2 = 4.91 cm²
Aa3 = 1.64 cm²
Aa4 = 1.64 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.31%

DIMENZIONIRANJE STUPOVA U OSI A1

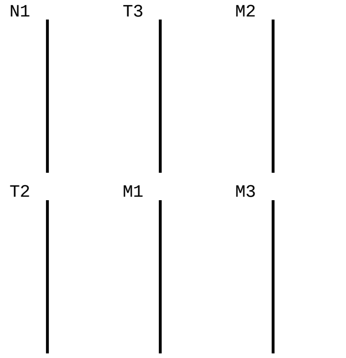
Grupa greda

Opt. 1: Stalno (g)



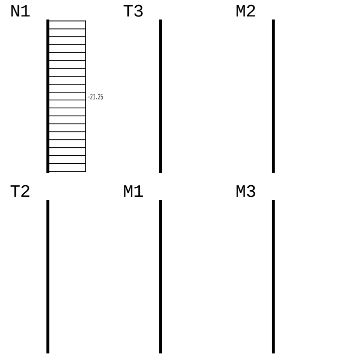
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



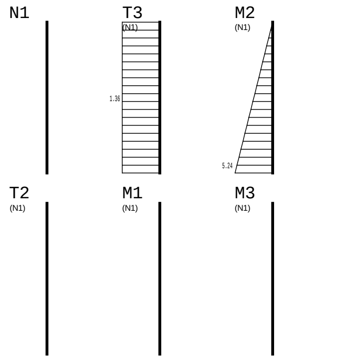
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



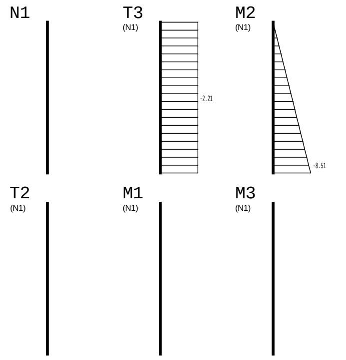
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



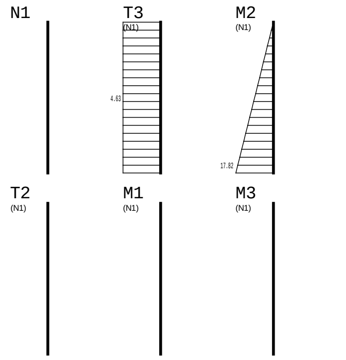
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



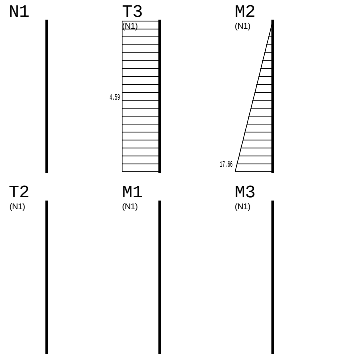
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



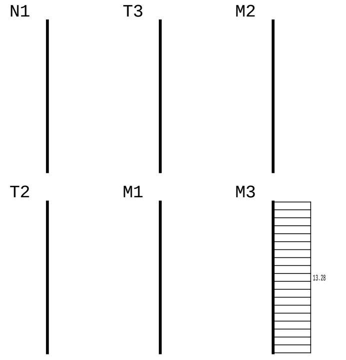
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



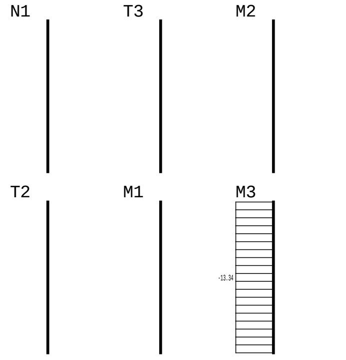
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



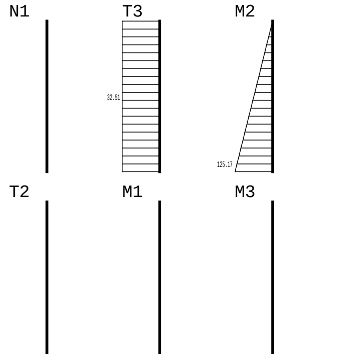
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



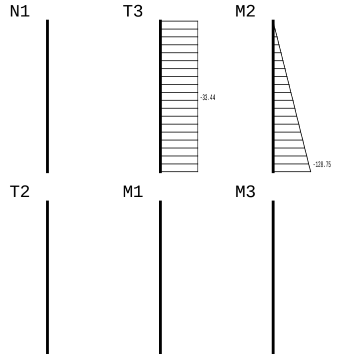
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



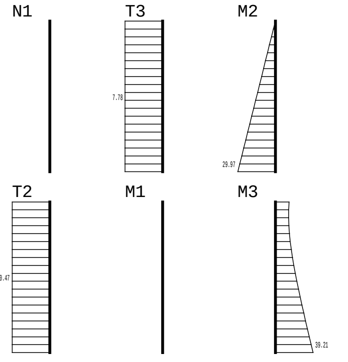
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



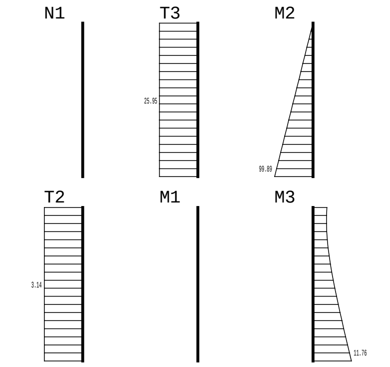
Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

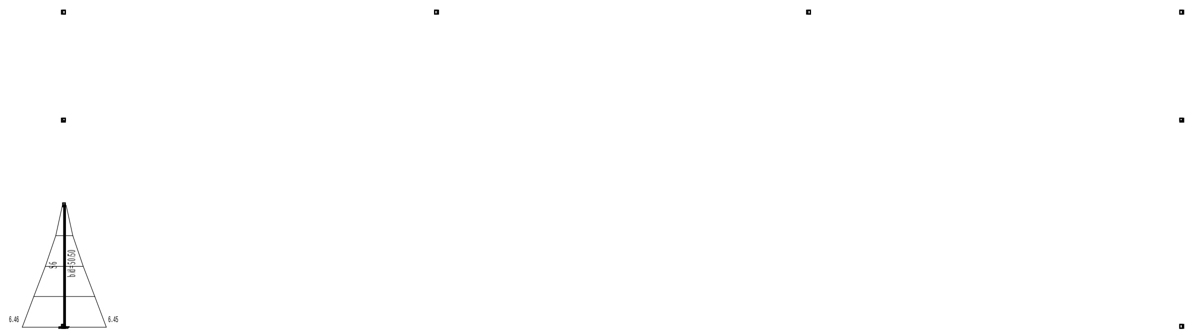
Opt. 13: Potres y



Uticaji u gredi: S6 (3-7)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

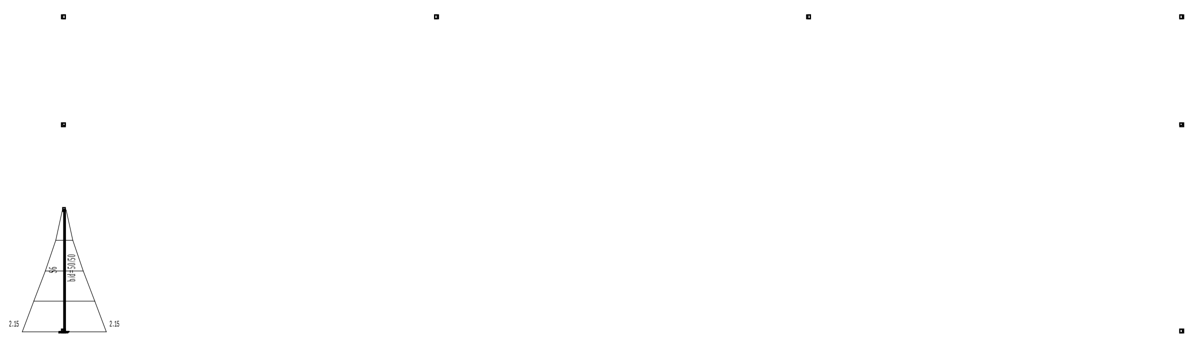
Ram: H_3

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: H_3
Armatura u gredama: max Aa2/Aa1= 6.45 / 6.46 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: H_3
Armatura u gredama: max Aa3/Aa4= 2.15 / 2.15 cm²

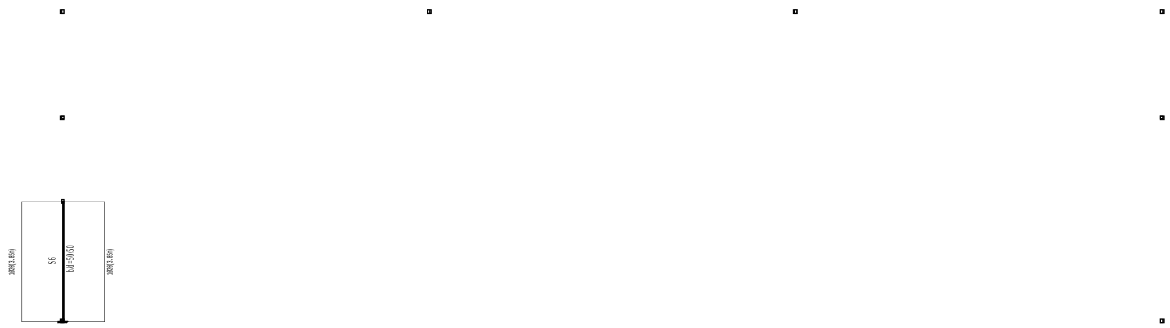
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_3
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B

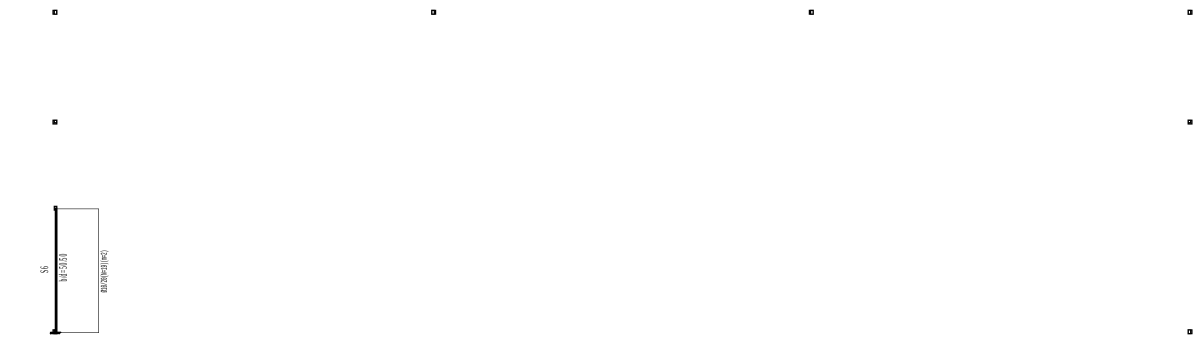
Ram: H_3
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: H_3
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: H_3
Armatura u gredama: Aa,uz

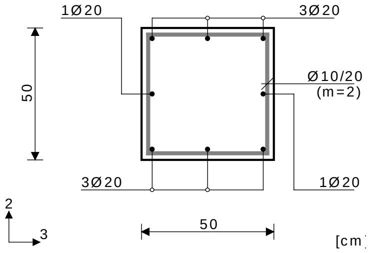
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_3
Dispozicija greda

S6 (7-3)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 7.70 m (λ2 = 53.35)
li,3 = 7.70 m (λ3 = 53.35)
Pomerljiva konstrukcija

Presek 1-1 x = 3.85m



Merodavna kombinacija za savijanje:
1.00xI+0.75xII+1.50xXI

N1u =	-69.22	kN
M2u =	-194.89	kNm
M3u =	0.00	kNm

Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 2.77 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xXI

T2u =	0.00	kN
T3u =	-50.78	kN
M1u =	0.00	kNm

εb/εa = -2.930/25.000 ‰

Aa1 =	6.46	cm²	
Aa2 =	6.45	cm²	
Aa3 =	2.15	cm²	
Aa4 =	2.15	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

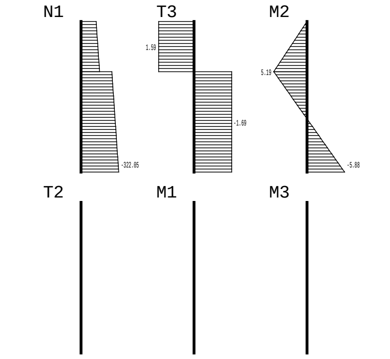
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.01%

DIMENZIONIRANJE STUPOVA U OSI A2

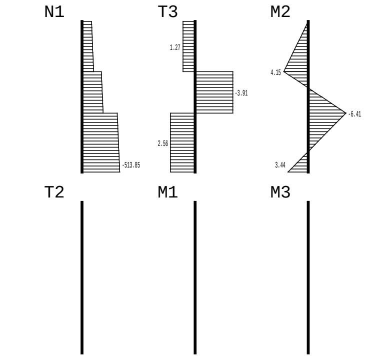
Grupa greda

Opt. 1: Stalno (g)



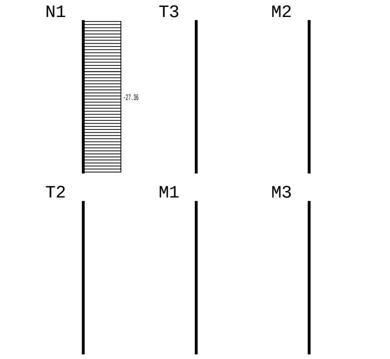
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



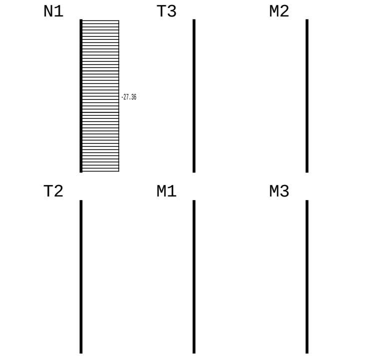
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



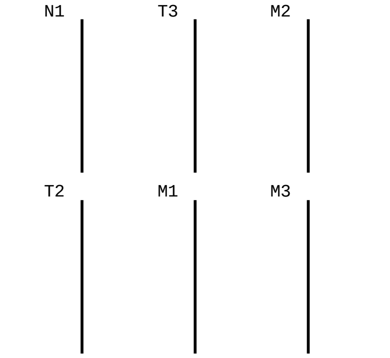
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



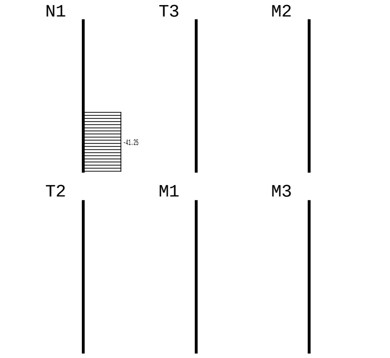
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



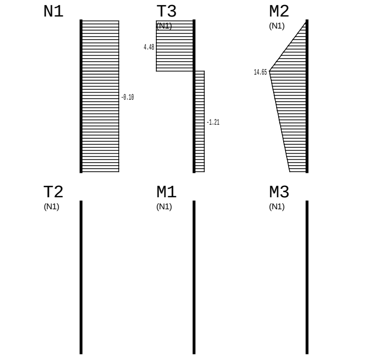
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



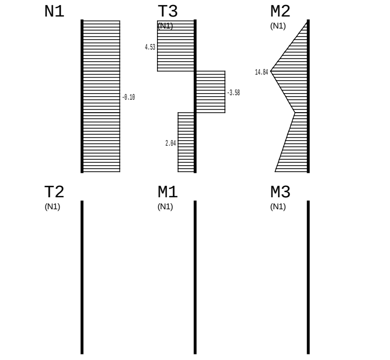
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



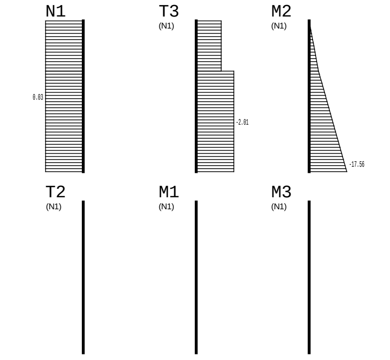
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



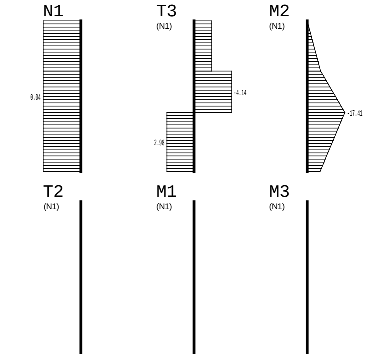
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



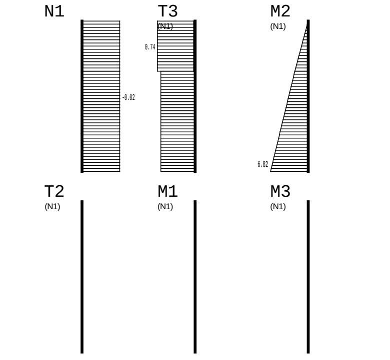
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



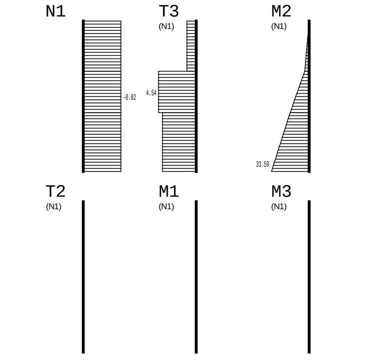
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



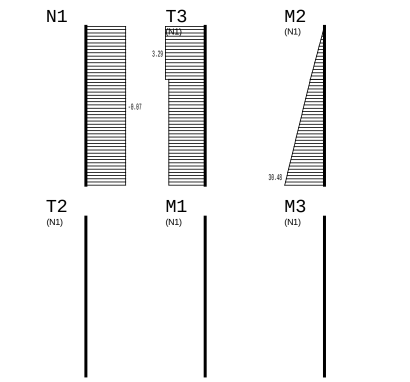
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



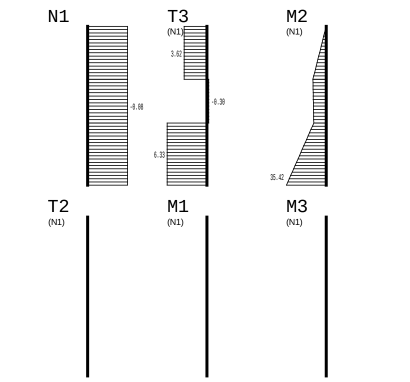
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



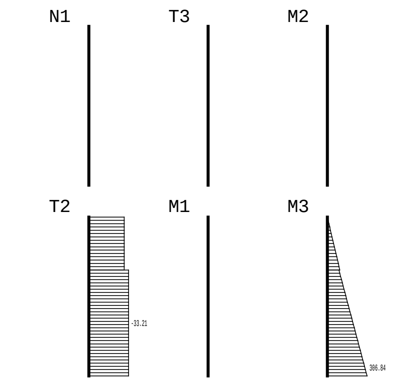
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



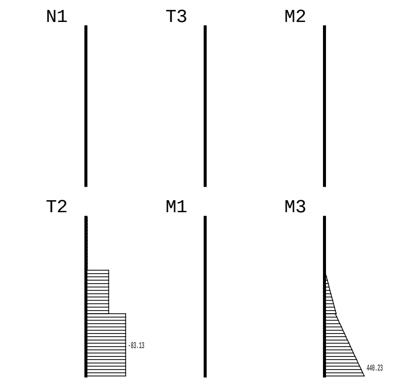
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



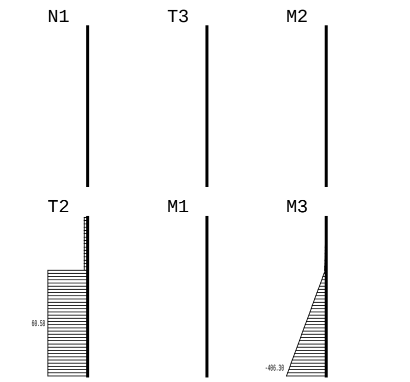
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



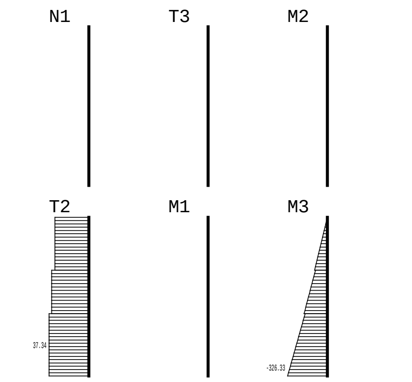
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



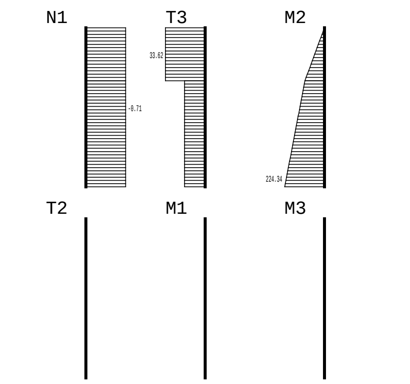
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



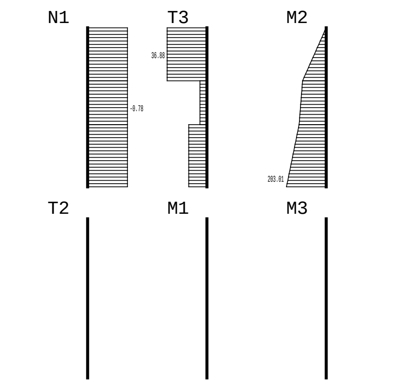
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



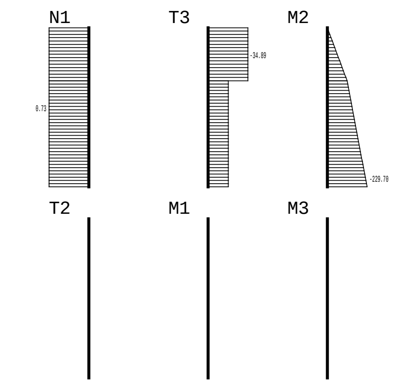
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



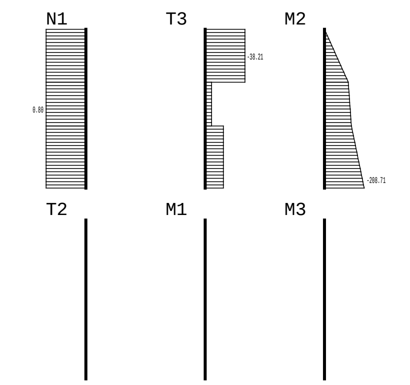
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



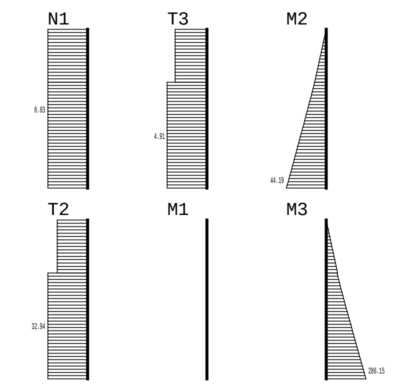
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



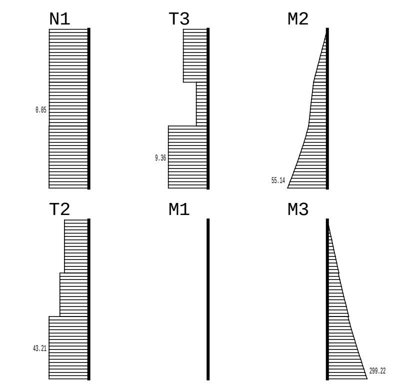
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



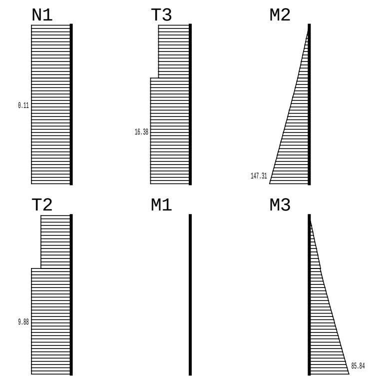
Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



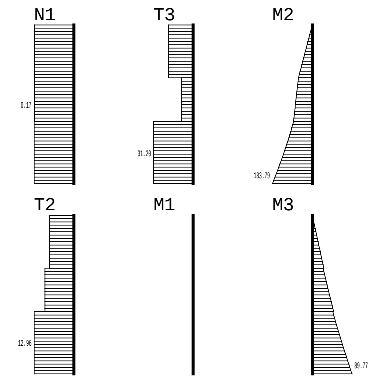
Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



Uticaji u gredi: S5 (55-66)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



Uticaji u gredi: S5 (10-21)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Ram: H_4

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_4
Armatura u gredama: max Aa2/Aa1= 17.15 / 17.17 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_4
Armatura u gredama: max Aa3/Aa4= 5.72 / 5.72 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_4
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_4
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_4
Armatura u gredama: Aa,uz

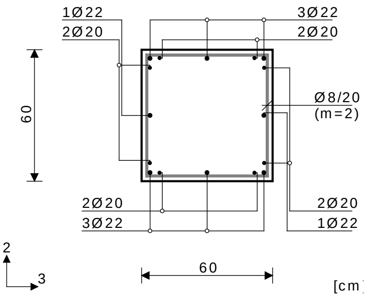
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

Ram: H_4
Dispozicija greda

S5 (21-10)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 19.65 m (λ2 = 113.43)
li,3 = 9.82 m (λ3 = 56.72)
Pomerljiva konstrukcija

Presek 1-1 x = 9.82m



Merodavna kombinacija za savijanje:
1.00xI+1.50xVIII

N1u =	-513.85	kN
M2u =	3.44	kNm
M3u =	660.34	kNm

Uvećanje momenta savijanja usled izvijanja
Δe2 = 7.4<e0> + 17.7<eII> = 25.1 cm

|ΔM2| =	128.88	kNm

Δe3 = 4.9<e0> + 0.0<eII> = 4.9 cm

|ΔM3| =	25.24	kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xVIII

T2u =	-124.69	kN
T3u =	3.45	kN
M1u =	0.00	kNm

εb/εa = -3.500/11.921 ‰

Aa1 =	17.17	cm²	
Aa2 =	17.15	cm²	
Aa3 =	5.72	cm²	
Aa4 =	5.72	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

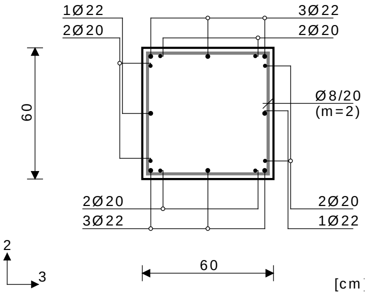
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 1.54%

S5 (66-55)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 19.65 m (λ2 = 113.43)
li,3 = 9.82 m (λ3 = 56.72)
Pomerljiva konstrukcija

Presek 2-2 x = 9.82m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xIX

N1u =	-322.05	kN
M2u =	-5.88	kNm
M3u =	-609.44	kNm

Uvećanje momenta savijanja usled izvijanja
Δe2 = 7.4<e0> + 17.8<eII> = 25.2 cm

|ΔM2| =	81.10	kNm

Δe3 = 4.9<e0> + 0.0<eII> = 4.9 cm

|ΔM3| =	15.82	kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX

T2u =	90.87	kN
T3u =	-2.28	kN
M1u =	0.00	kNm

εb/εa = -3.500/15.505 ‰

Aa1 =	16.50	cm²	
Aa2 =	16.48	cm²	
Aa3 =	5.49	cm²	
Aa4 =	5.49	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

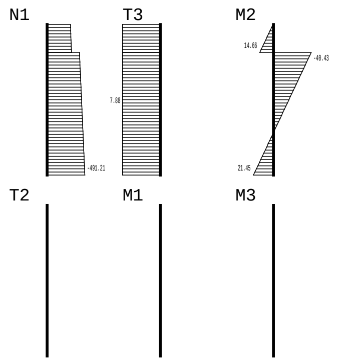
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 1.54%

DIMENZIONIRANJE STUPOVA U OSI B

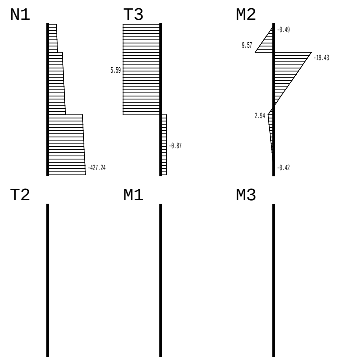
Grupa greda

Opt. 1: Stalno (g)



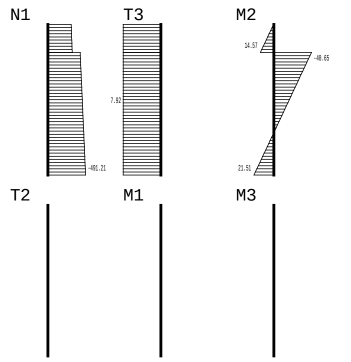
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



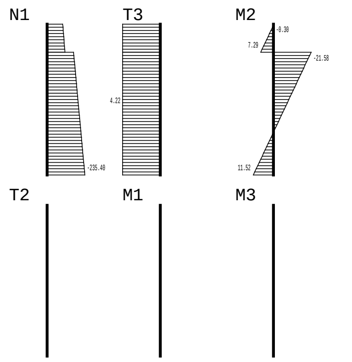
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



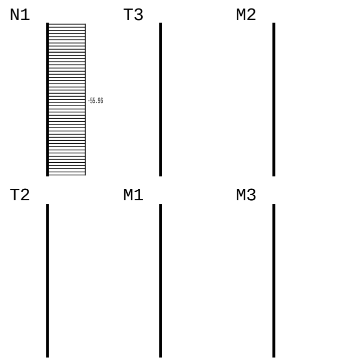
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 1: Stalno (g)



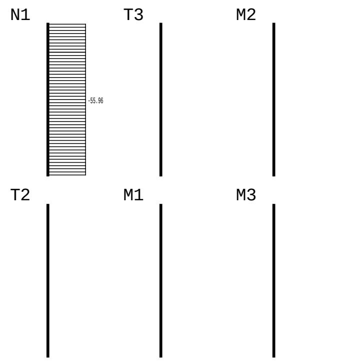
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



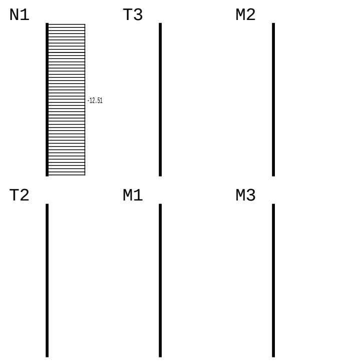
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



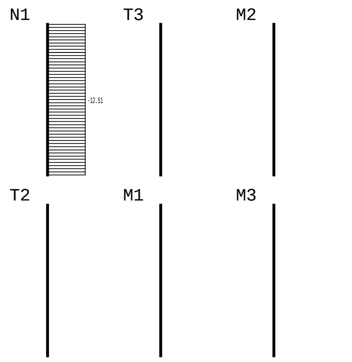
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



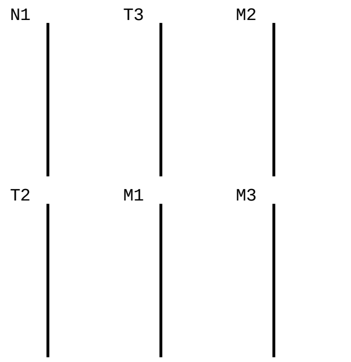
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 2: Snijeg



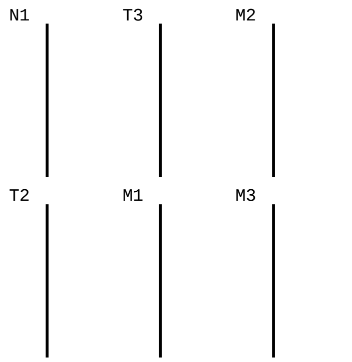
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



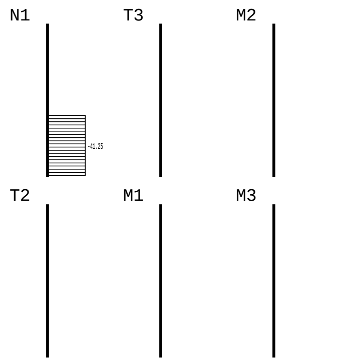
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



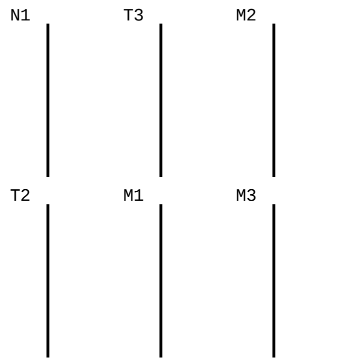
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



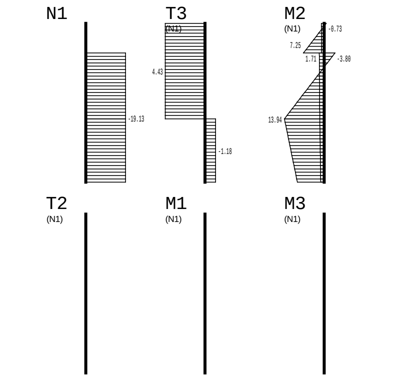
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 3: korisno



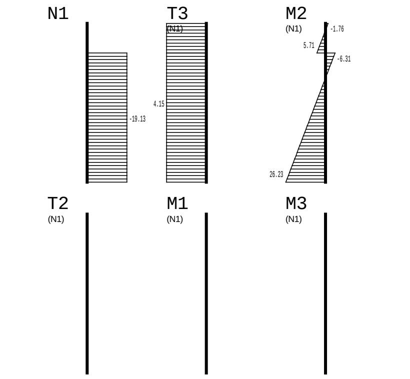
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



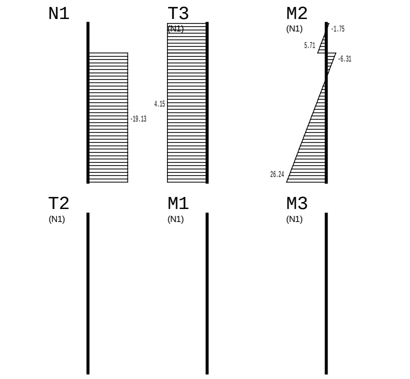
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



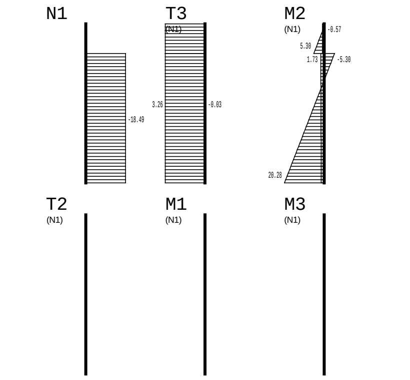
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



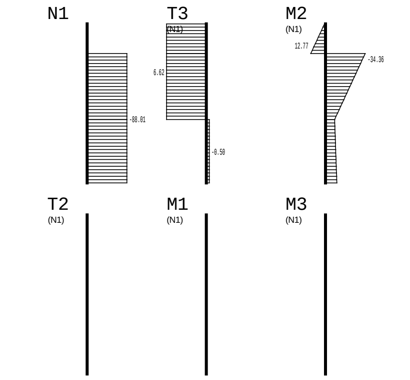
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 4: Kran vertikalno osa A max



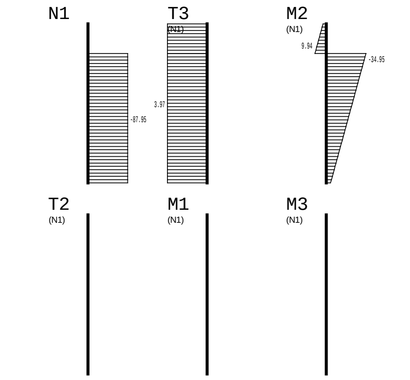
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



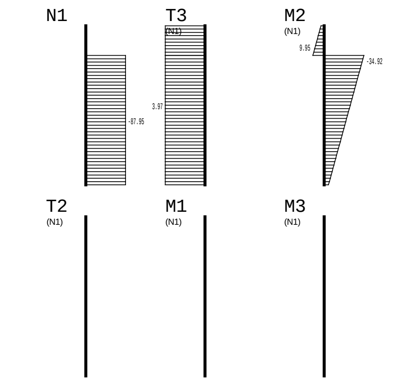
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



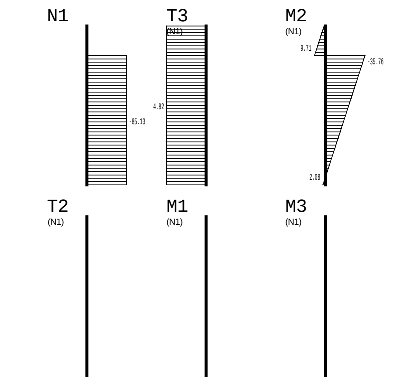
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



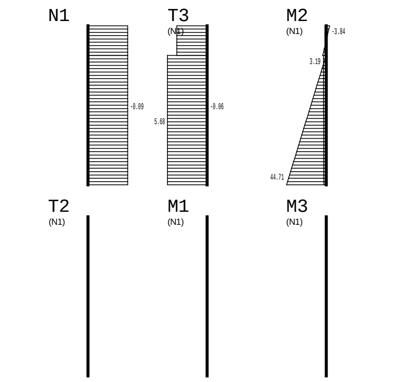
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 5: Kran vertikalno osa B max



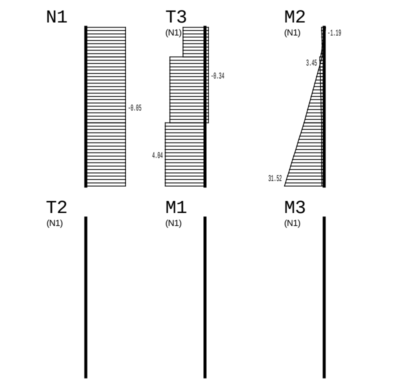
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



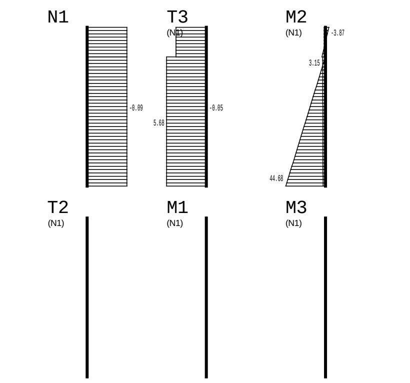
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



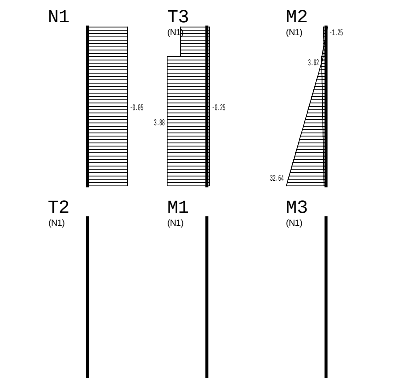
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



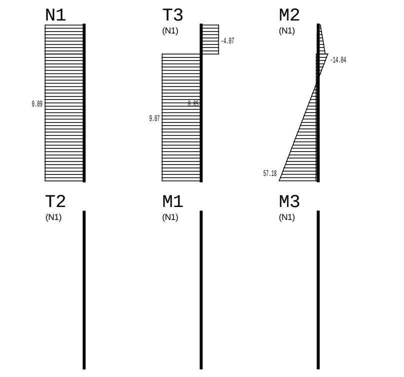
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 6: Kran horizontalno osa A max



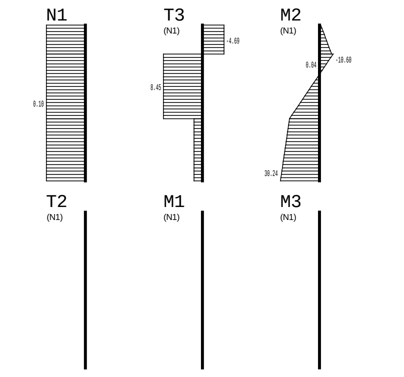
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



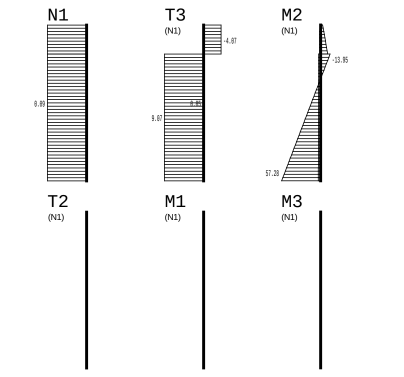
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



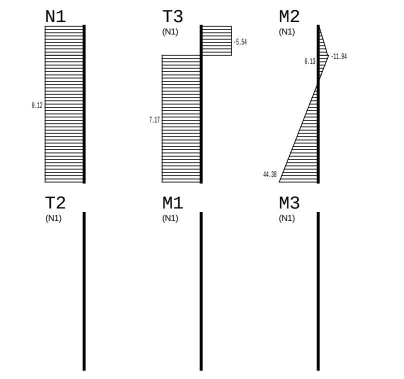
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



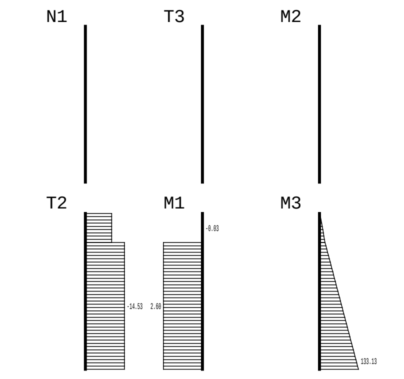
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 7: Kran horizontalno osa B max



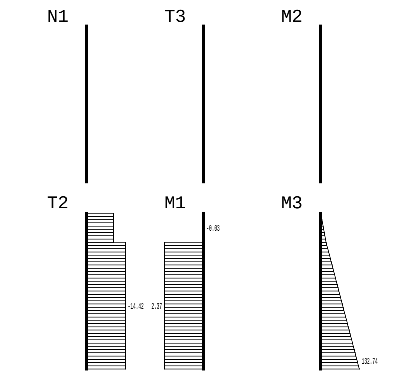
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



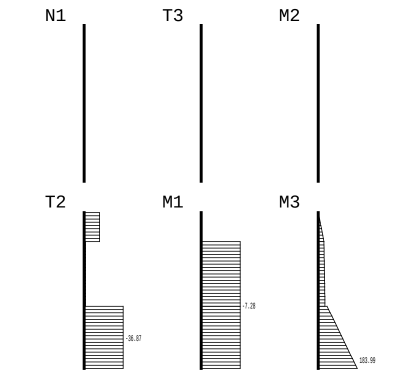
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



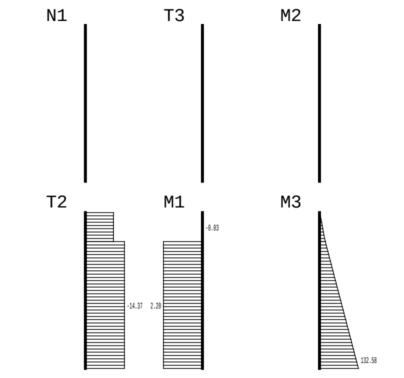
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



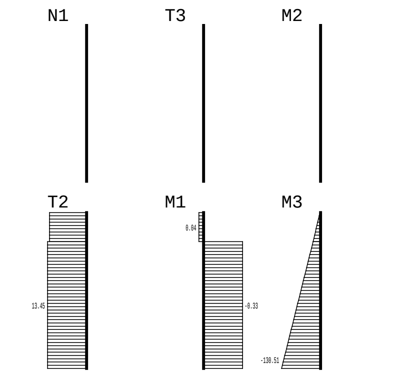
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 8: Vjetar +x



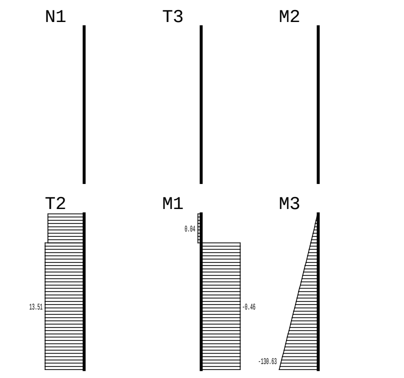
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



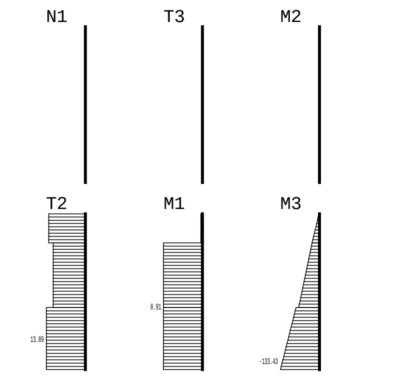
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



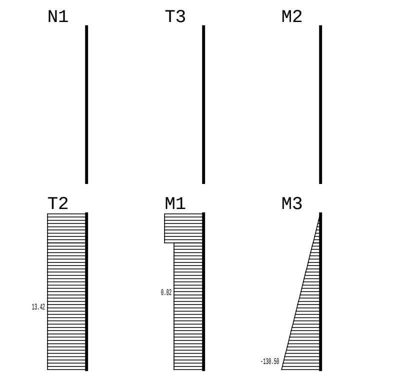
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



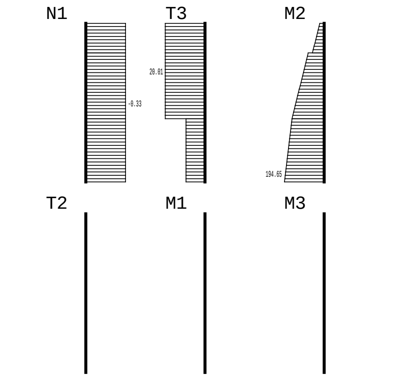
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 9: vjetar -x



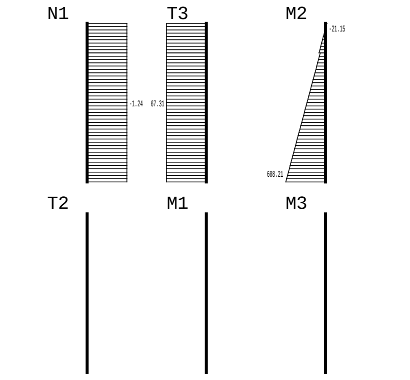
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



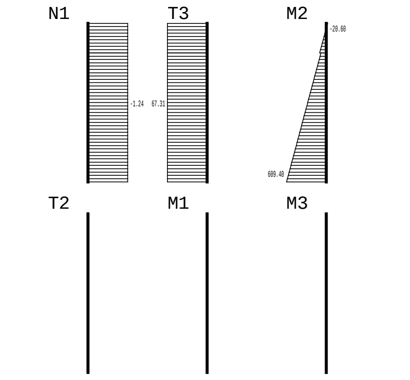
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



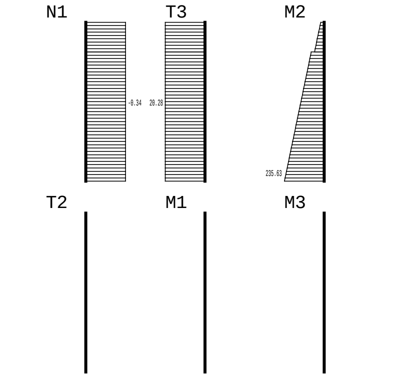
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



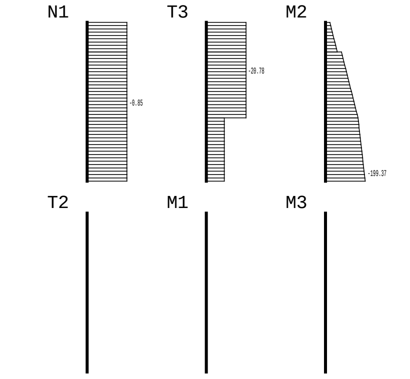
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 10: Vjetar +y



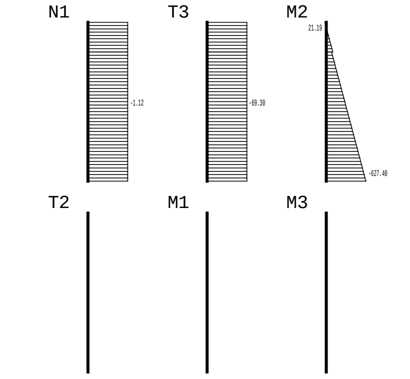
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



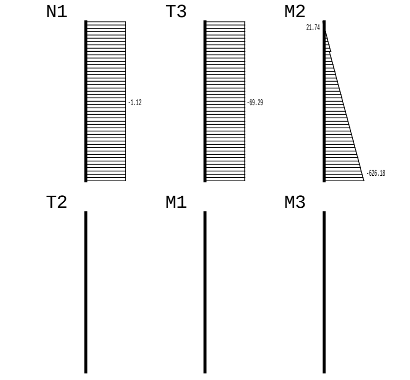
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



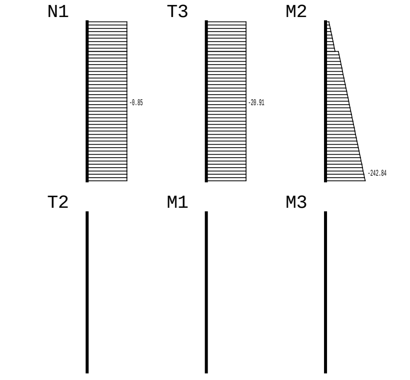
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



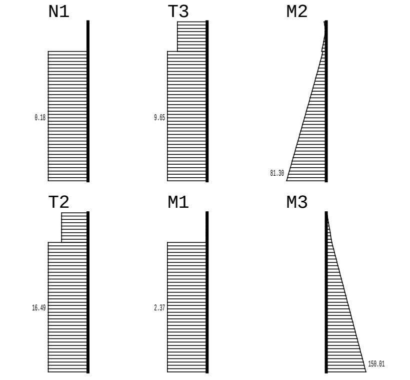
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 11: vjetar -y



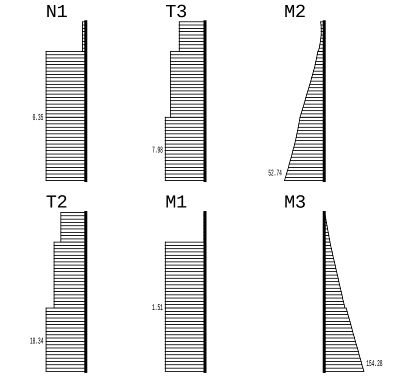
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



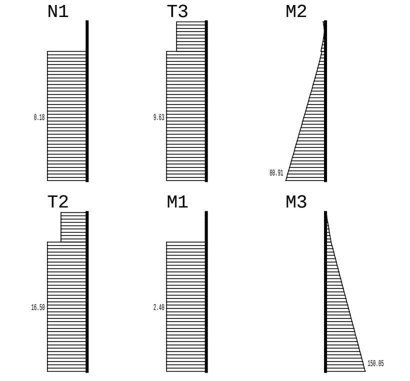
Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



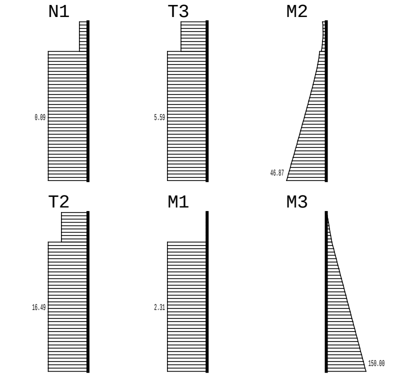
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



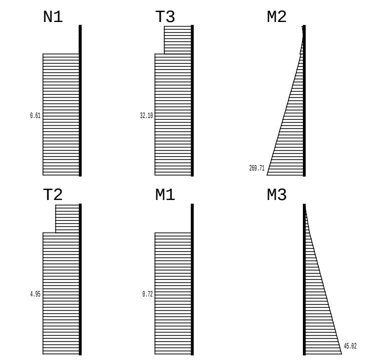
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 12: Potres x



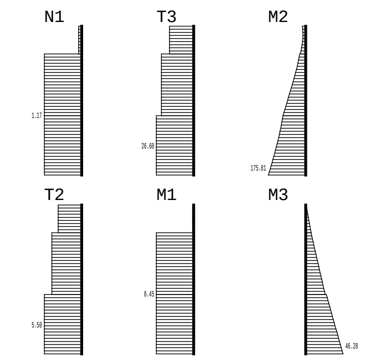
Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



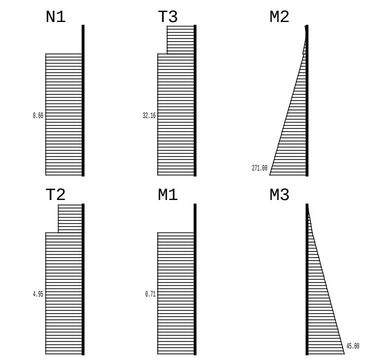
Uticaji u gredi: S3 (34-45-47)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



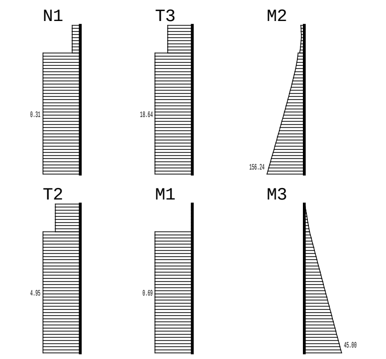
Uticaji u gredi: S4 (17-30-32)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

Opt. 13: Potres y



Uticaji u gredi: S3 (49-60-62)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

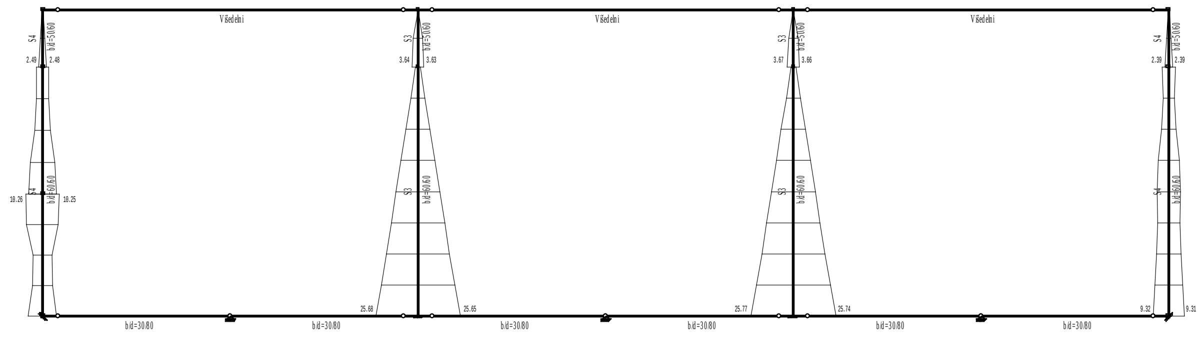
Opt. 13: Potres y



Uticaji u gredi: S4 (64-70-71)
N1 [kN], T2 [kN], T3 [kN], M1 [kNm], M2 [kNm]...

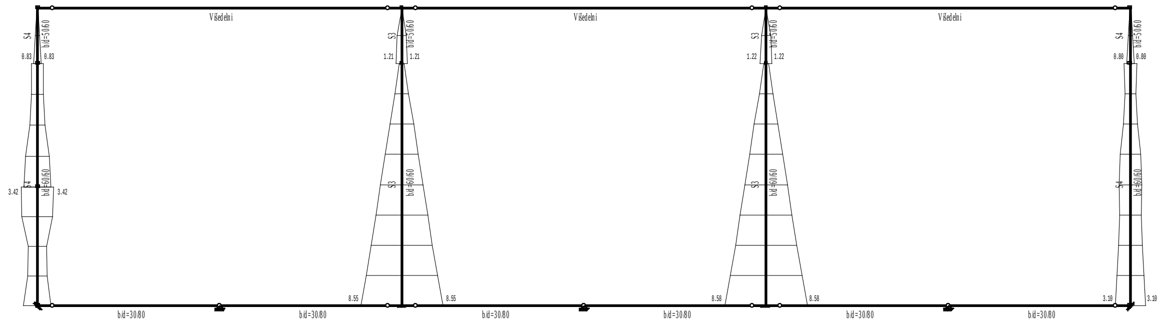
Ram: H_1

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



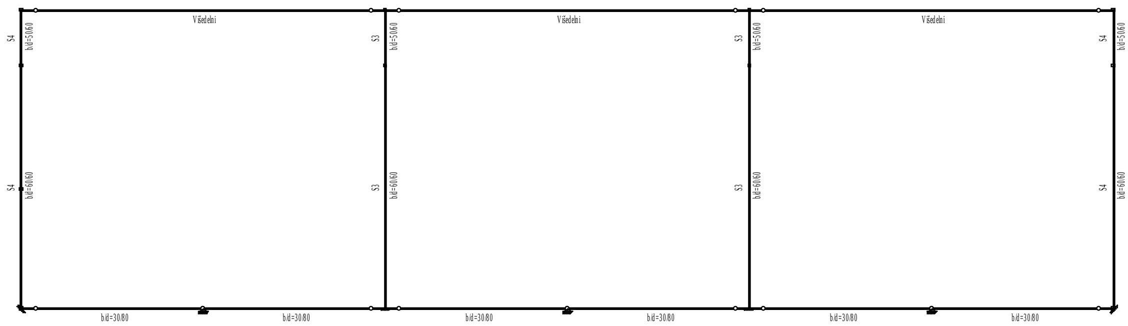
Ram: H_1
Armatura u gredama: max Aa2/Aa1= 25.74 / 25.77 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



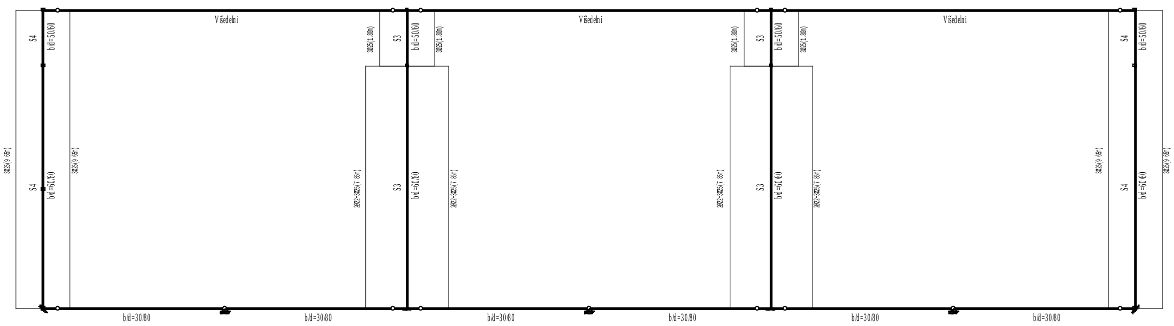
Ram: H_1
Armatura u gredama: max Aa3/Aa4= 8.58 / 8.58 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



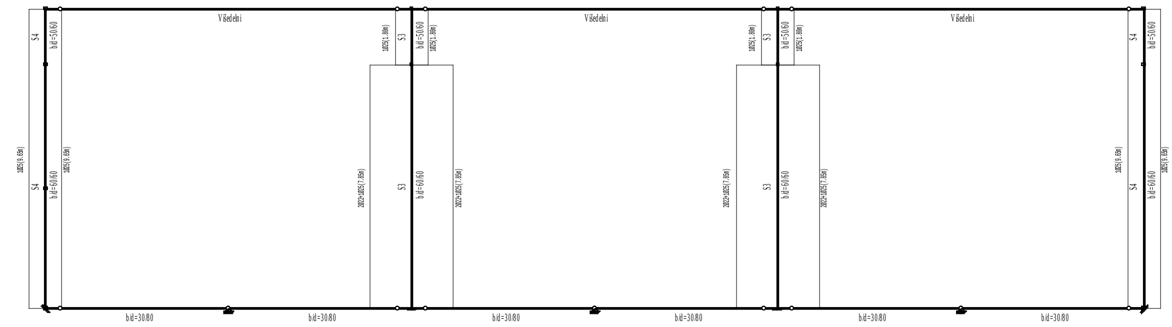
Ram: H_1
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



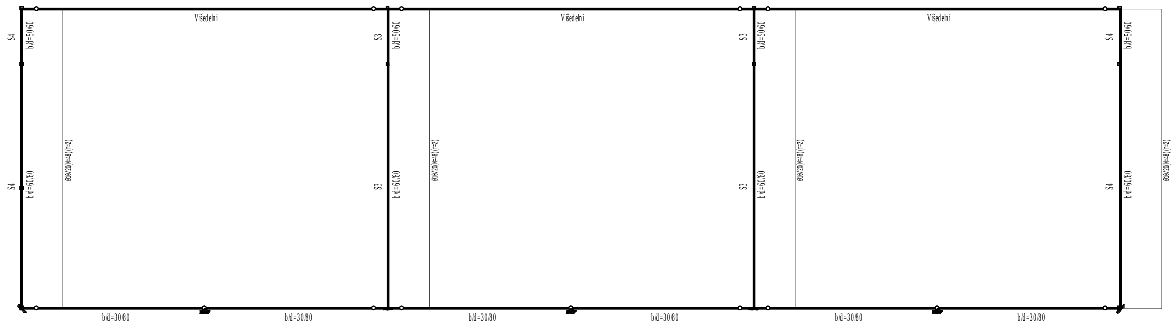
Ram: H_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



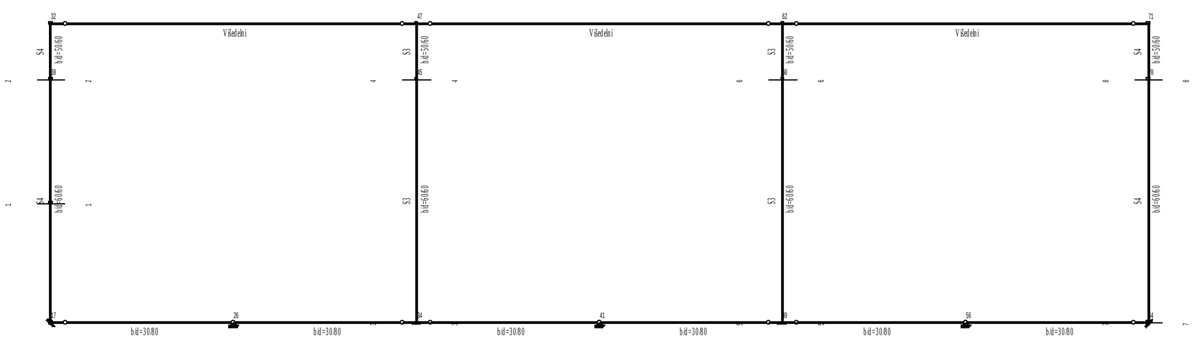
Ram: H_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: H_1
Armatura u gredama: Aa,uz

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B

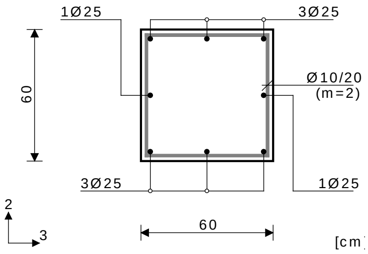


Ram: H_1
Dispozicija greda

S4 (30-17)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 15.70 m (λ2 = 90.64)
li,3 = 7.85 m (λ3 = 45.32)
Pomerljiva konstrukcija

Presek 1-1 x = 4.00m



Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.05xIII+1.50xX
N1u = -583.19 kN
M2u = 240.50 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 5.9<e0> + 37.8<eII> = 43.7 cm
|ΔM2| = 255.00 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xVIII
T2u = -55.30 kN
T3u = -1.18 kN
M1u = 0.00 kNm

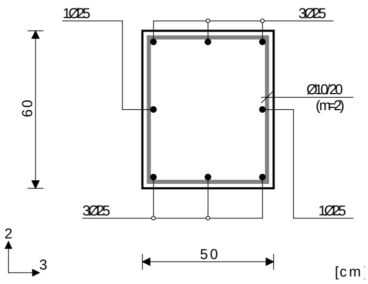
εb/εa = -3.500/22.971 ‰
Aa1 = 10.26 cm^2
Aa2 = 10.25 cm^2
Aa3 = 3.42 cm^2
Aa4 = 3.42 cm^2
Aa,uz = 0.00 cm^2/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm^2/m]

Procenat armiranja: 1.09%

S4 (32-30)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 5.40 m (λ2 = 37.41)
li,3 = 5.40 m (λ3 = 31.18)
Pomerljiva konstrukcija

Presek 2-2 x = 1.80m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -111.38 kN
M2u = 95.56 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 4.46 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 37.57 kN
M1u = 0.00 kNm

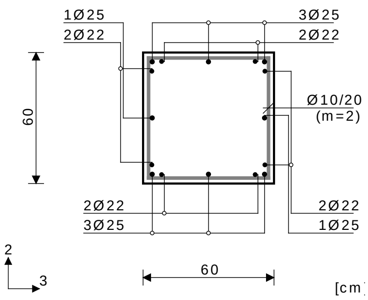
εb/εa = -1.765/25.000 ‰
Aa1 = 2.49 cm^2
Aa2 = 2.48 cm^2
Aa3 = 0.83 cm^2
Aa4 = 0.83 cm^2
Aa,uz = 0.00 cm^2/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm^2/m]

Procenat armiranja: 1.31%

S3 (45-34)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 7.85 m (λ2 = 45.32)
li,3 = 15.70 m (λ3 = 90.64)
Pomerljiva konstrukcija

Presek 3-3 x = 7.85m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -493.08 kN
M2u = 933.77 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 19.72 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 111.61 kN
M1u = 0.00 kNm

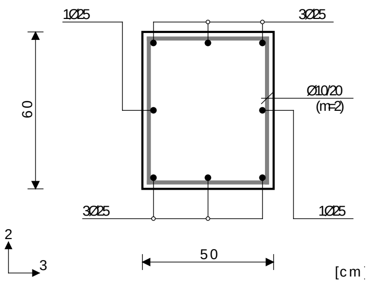
εb/εa = -3.500/15.577 ‰
Aa1 = 25.68 cm^2
Aa2 = 25.65 cm^2
Aa3 = 8.55 cm^2
Aa4 = 8.55 cm^2
Aa,uz = 0.00 cm^2/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm^2/m]

Procenat armiranja: 1.94%

S3 (47-45)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 5.40 m (λ2 = 37.41)
li,3 = 5.40 m (λ3 = 31.18)
Pomerljiva konstrukcija

Presek 4-4 x = 1.80m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -318.76 kN
M2u = 164.68 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 12.75 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 111.61 kN
M1u = 0.00 kNm

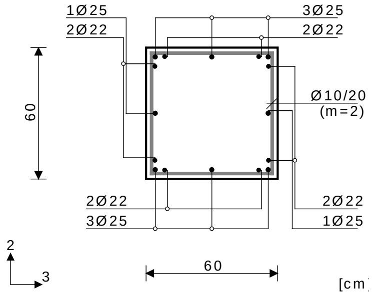
εb/εa = -2.636/25.000 ‰
Aa1 = 3.64 cm^2
Aa2 = 3.63 cm^2
Aa3 = 1.21 cm^2
Aa4 = 1.21 cm^2
Aa,uz = 0.00 cm^2/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm^2/m]

Procenat armiranja: 1.31%

S3 (60-49)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 7.85 m (λ2 = 45.32)
li,3 = 15.70 m (λ3 = 90.64)
Pomerljiva konstrukcija

Presek 5-5 x = 7.85m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -493.08 kN
M2u = 935.61 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 19.72 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 111.66 kN
M1u = 0.00 kNm

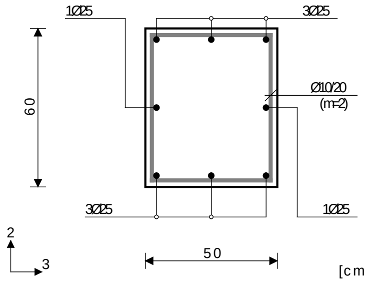
εb/εa = -3.500/15.548 ‰
Aa1 = 25.77 cm²
Aa2 = 25.74 cm²
Aa3 = 8.58 cm²
Aa4 = 8.58 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.94%

S3 (62-60)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 5.40 m (λ2 = 37.41)
li,3 = 5.40 m (λ3 = 31.18)
Pomerljiva konstrukcija

Presek 6-6 x = 1.80m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -318.76 kN
M2u = 165.41 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 12.75 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 111.66 kN
M1u = 0.00 kNm

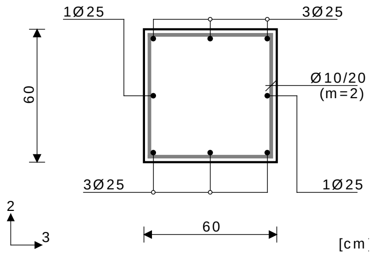
εb/εa = -2.643/25.000 ‰
Aa1 = 3.67 cm²
Aa2 = 3.66 cm²
Aa3 = 1.22 cm²
Aa4 = 1.22 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.31%

S4 (70-64)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 15.70 m (λ2 = 90.64)
li,3 = 7.85 m (λ3 = 45.32)
Pomerljiva konstrukcija

Presek 7-7 x = 7.85m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -235.91 kN
M2u = 364.96 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 5.9<e0> + 0.0<eII> = 5.9 cm
|ΔM2| = 13.98 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 36.12 kN
M1u = 0.00 kNm

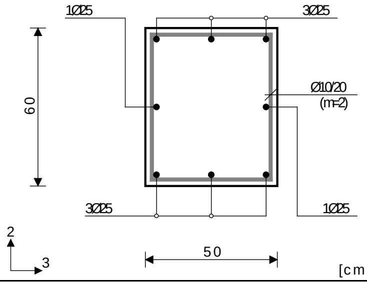
εb/εa = -2.954/25.000 ‰
Aa1 = 9.32 cm²
Aa2 = 9.31 cm²
Aa3 = 3.10 cm²
Aa4 = 3.10 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.09%

S4 (71-70)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

li,2 = 5.40 m (λ2 = 37.41)
li,3 = 5.40 m (λ3 = 31.18)
Pomerljiva konstrukcija

Presek 8-8 x = 1.80m



Merodavna kombinacija za savijanje:
1.00xI+1.05xIII+1.50xX
N1u = -111.36 kN
M2u = 92.72 kNm
M3u = 0.00 kNm
Uvećanje momenta savijanja usled izvijanja
Δe2 = 4.0<e0> + 0.0<eII> = 4.0 cm
|ΔM2| = 4.45 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xX
T2u = 0.00 kN
T3u = 36.12 kN
M1u = 0.00 kNm

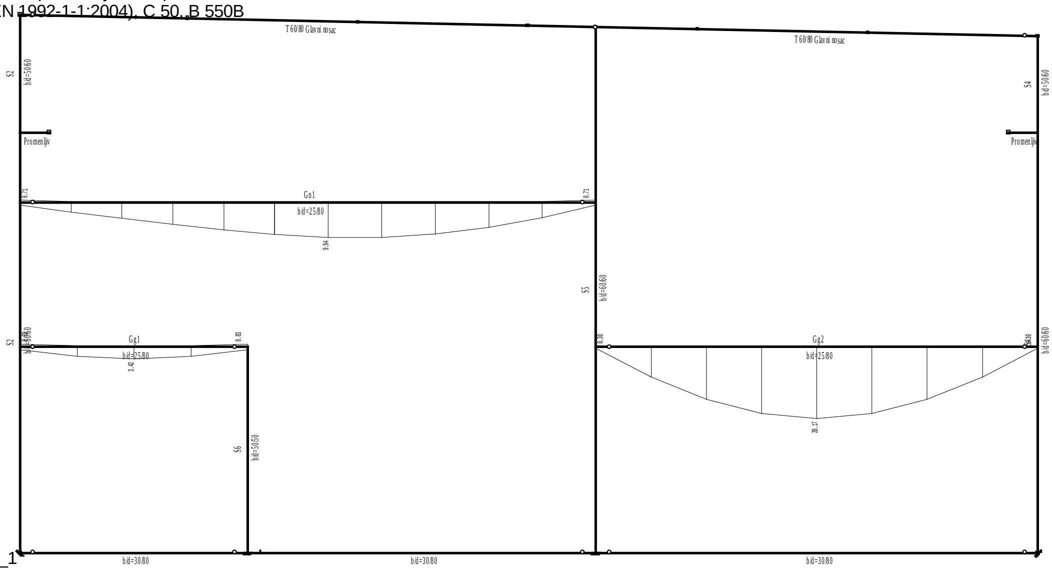
εb/εa = -1.745/25.000 ‰
Aa1 = 2.39 cm²
Aa2 = 2.39 cm²
Aa3 = 0.80 cm²
Aa4 = 0.80 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø10/20(m=2) = 7.85 cm²/m]

Procenat armiranja: 1.31%

DIMENZIONIRANJE GREDA U OSI

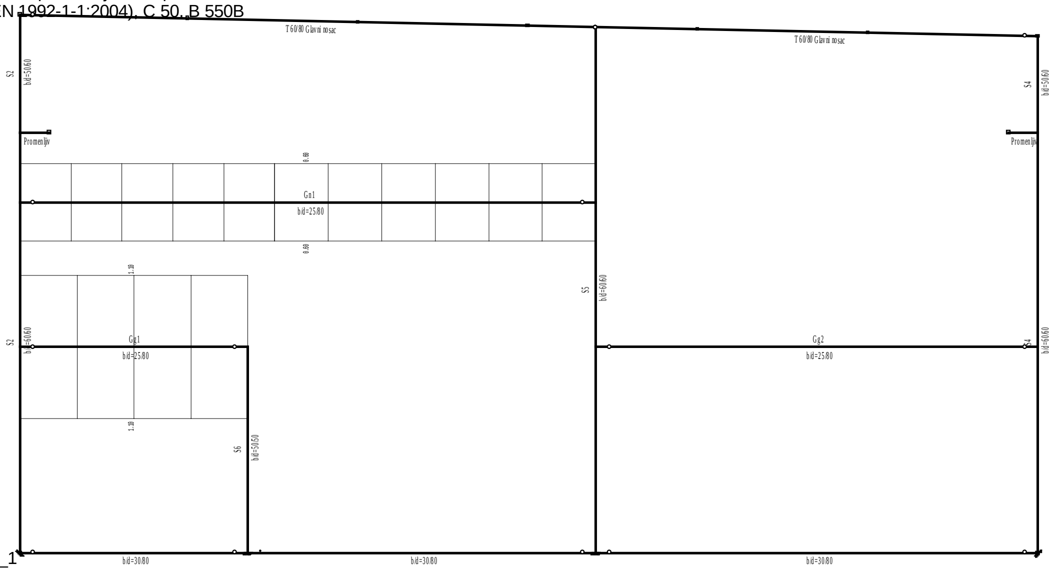
Ram: V_1

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



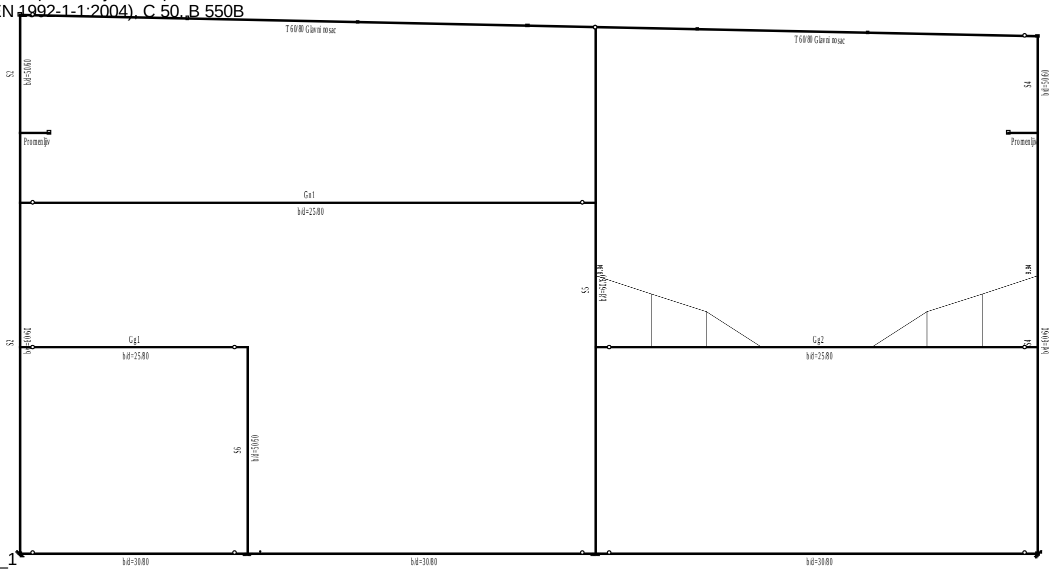
Ram: V_1
Armatura u gredama: max Aa2/Aa1= 0.83 / 20.17 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_1
Armatura u gredama: max Aa3/Aa4= 1.10 / 1.10 cm²

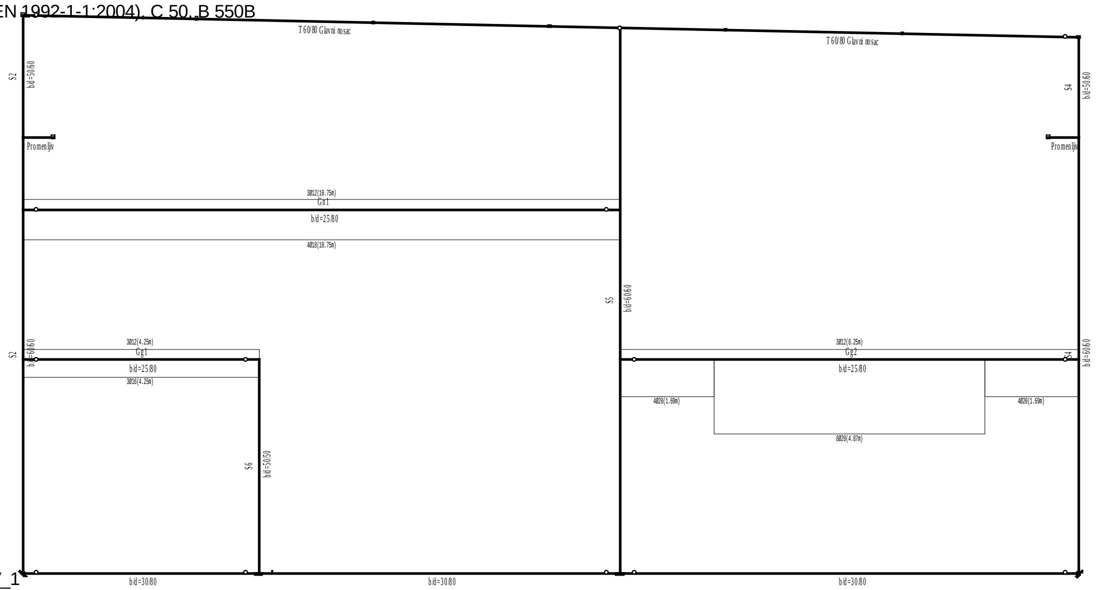
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_1
Armatura u gredama: max Aa,uz= 9.94 cm²

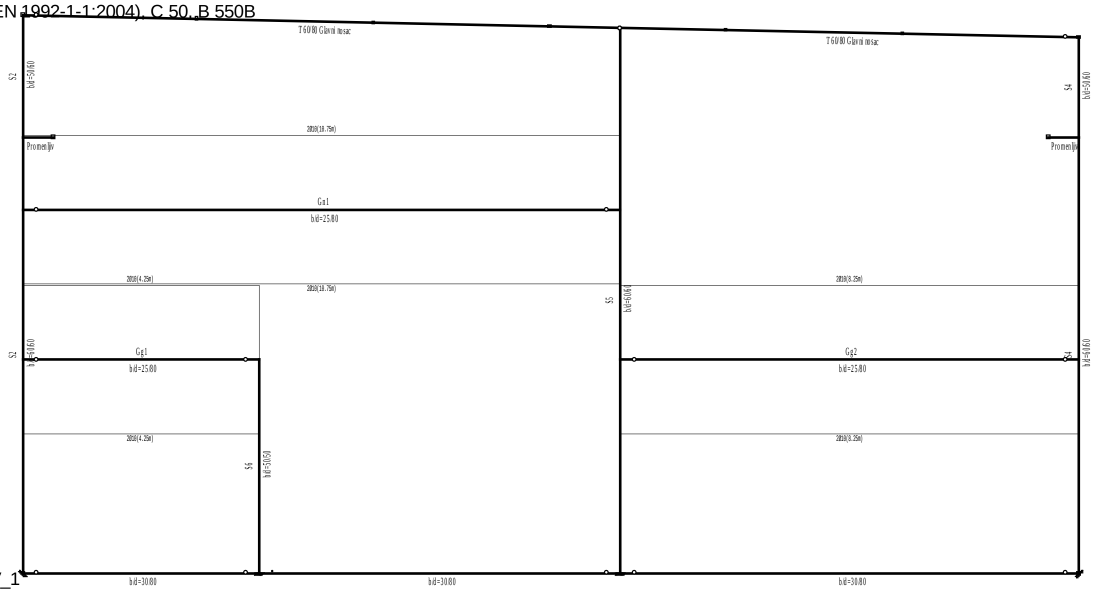
1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



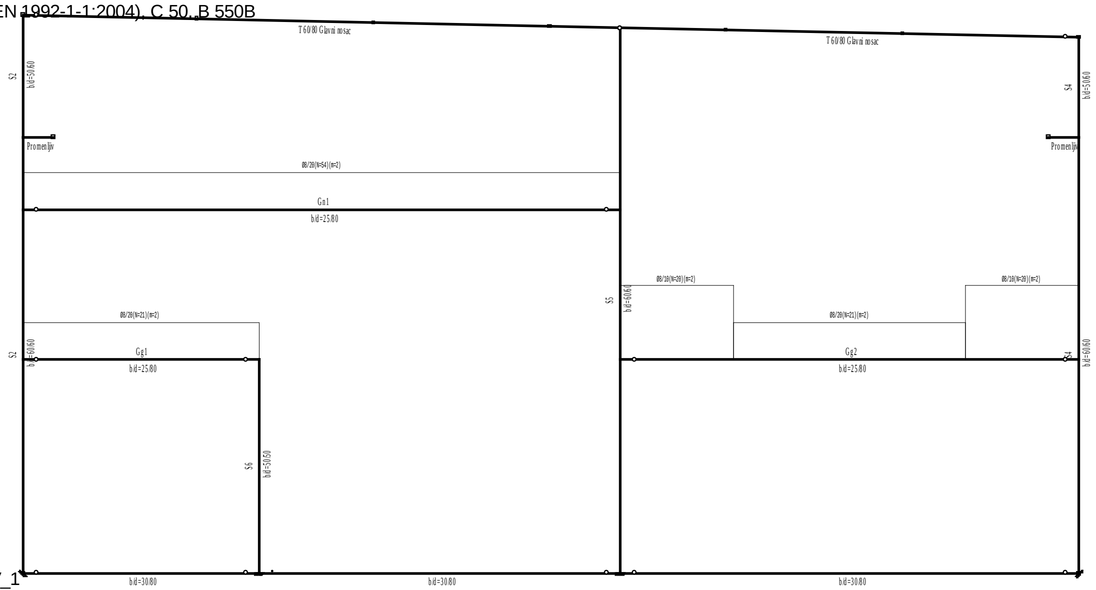
Ram: V_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



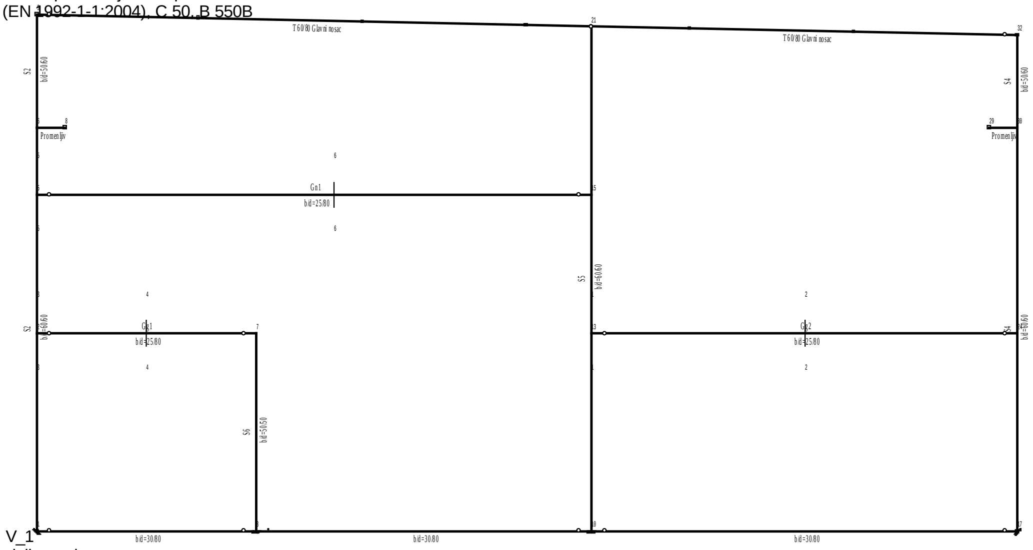
Ram: V_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_1
Armatura u gredama: Aa,uz

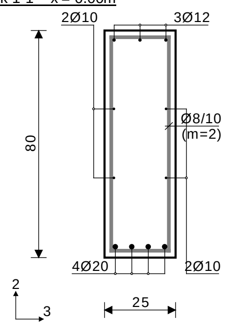
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_1
Dispozicija greda

Gg2 (13-24)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 1-1 x = 0.00m



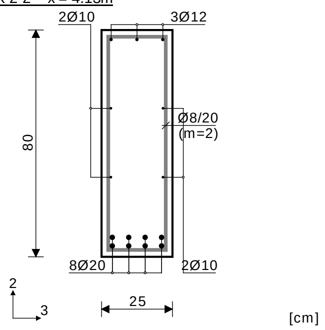
Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.05xIII+1.50xV+0.90xX
N1u = 28.78 kN
M2u = 0.00 kNm
M3u = 0.00 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.50xIII+0.90xXI
T2u = -320.82 kN
T3u = 0.00 kN
M1u = 0.00 kNm

εb/εa = 0.775/25.000 ‰
Aa1 = 0.30 cm²
Aa2 = 0.30 cm²
Aa3 = 0.00 cm²
Aa4 = 0.00 cm²
Aa,uz = 9.94 cm²/m (m=1)
[Usvojeno Aa,uz = Ø8/10(m=2) = 10.05 cm²/m]

Procenat armiranja: 0.96%

Presek 2-2 x = 4.13m



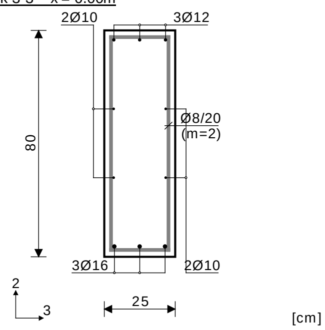
Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.50xIII+0.90xX
N1u = 18.10 kN
M2u = 0.00 kNm
M3u = 661.30 kNm

εb/εa = -3.500/15.299 ‰
Aa1 = 20.17 cm²
Aa2 = 0.00 cm²
Aa3 = 0.00 cm²
Aa4 = 0.00 cm²
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 1.58%

Gg1 (2-7)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 3-3 x = 0.00m



Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.05xIII+1.50xXI
N1u = 50.78 kN
M2u = 0.00 kNm
M3u = 0.00 kNm

Merodavna kombinacija za torziju:
1.35xI+0.75xII+1.05xIII+1.50xIX
M1u = 20.01 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX
T2u = -83.27 kN
T3u = 0.00 kN
M1u = 20.01 kNm

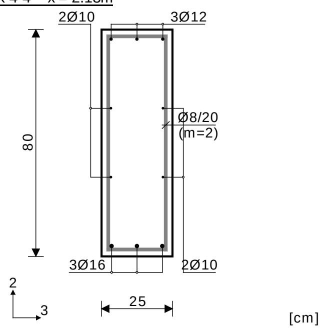
εb/εa = 0.775/25.000 ‰

Aa1 =	0.53	+	0.30`	=	0.83	cm²
Aa2 =	0.53	+	0.30`	=	0.83	cm²
Aa3 =	0.00	+	1.10`	=	1.10	cm²
Aa4 =	0.00	+	1.10`	=	1.10	cm²

Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.63%
`) - dodatna podužna armatura za prijem torzije.

Presek 4-4 x = 2.13m



Merodavna kombinacija za savijanje:
1.35xI+0.75xII+1.50xIII+0.90xXI
N1u = 30.72 kN
M2u = 0.00 kNm
M3u = 98.41 kNm

Merodavna kombinacija za torziju:
1.35xI+0.75xII+1.05xIII+1.50xIX
M1u = 20.01 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX
T2u = 0.00 kN
T3u = 0.00 kN
M1u = 20.01 kNm

εb/εa = -1.103/25.000 ‰

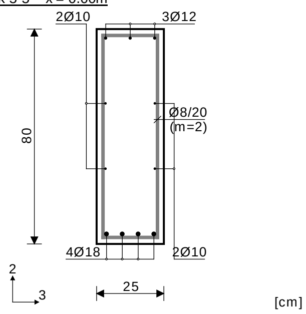
Aa1 =	3.12	+	0.30`	=	3.42	cm²
Aa2 =	0.00	+	0.30`	=	0.30	cm²
Aa3 =	0.00	+	1.10`	=	1.10	cm²
Aa4 =	0.00	+	1.10`	=	1.10	cm²

Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.63%

Gn1 (5-15)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 5-5 x = 0.00m



Merodavna kombinacija za savijanje:
1.35xI+1.50xX

N1u =	52.64	kN
M2u =	0.00	kNm
M3u =	0.00	kNm

Merodavna kombinacija za torziju:
1.35xI+0.75xII+1.05xIII+1.50xIX

M1u =	-10.84	kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX

T2u =	-76.97	kN
T3u =	-4.56	kN
M1u =	-10.84	kNm

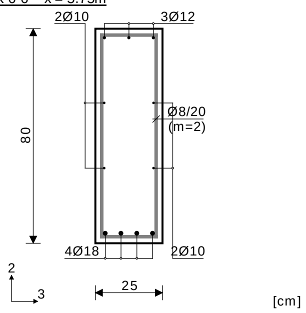
εb/εa = 0.775/25.000 ‰

Aa1 =	0.55	+	0.16`	=	0.71	cm²
Aa2 =	0.55	+	0.16`	=	0.71	cm²
Aa3 =	0.00	+	0.60`	=	0.60	cm²
Aa4 =	0.00	+	0.60`	=	0.60	cm²
Aa,uz =					0.00	cm²/m (m=1)

[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.84%
`) - dodatna podužna armatura za prijem torzije.

Presek 6-6 x = 5.75m



Merodavna kombinacija za savijanje:
1.35xI+1.50xX

N1u =	52.64	kN
M2u =	0.00	kNm
M3u =	318.84	kNm

Merodavna kombinacija za torziju:
1.35xI+0.75xII+1.05xIII+1.50xIX

M1u =	-10.84	kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX

T2u =	-13.86	kN
T3u =	0.32	kN
M1u =	-10.84	kNm

εb/εa = -2.490/25.000 ‰

Aa1 =	9.78	+	0.16`	=	9.94	cm²
Aa2 =	0.00	+	0.16`	=	0.16	cm²
Aa3 =	0.00	+	0.60`	=	0.60	cm²
Aa4 =	0.00	+	0.60`	=	0.60	cm²
Aa,uz =					0.00	cm²/m (m=1)

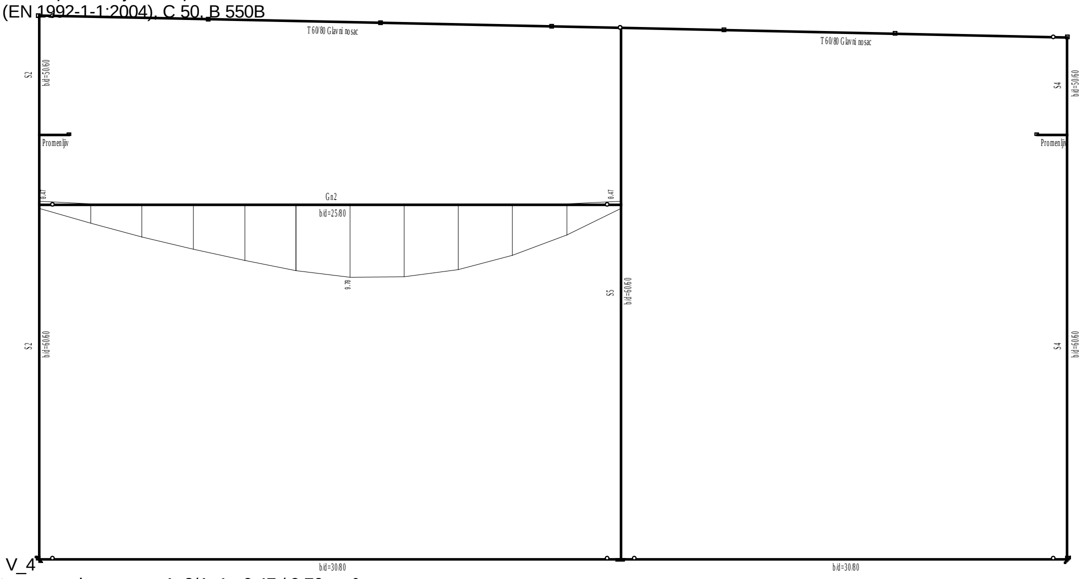
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.84%

DIMENZIONIRANJE GREDA U OSI

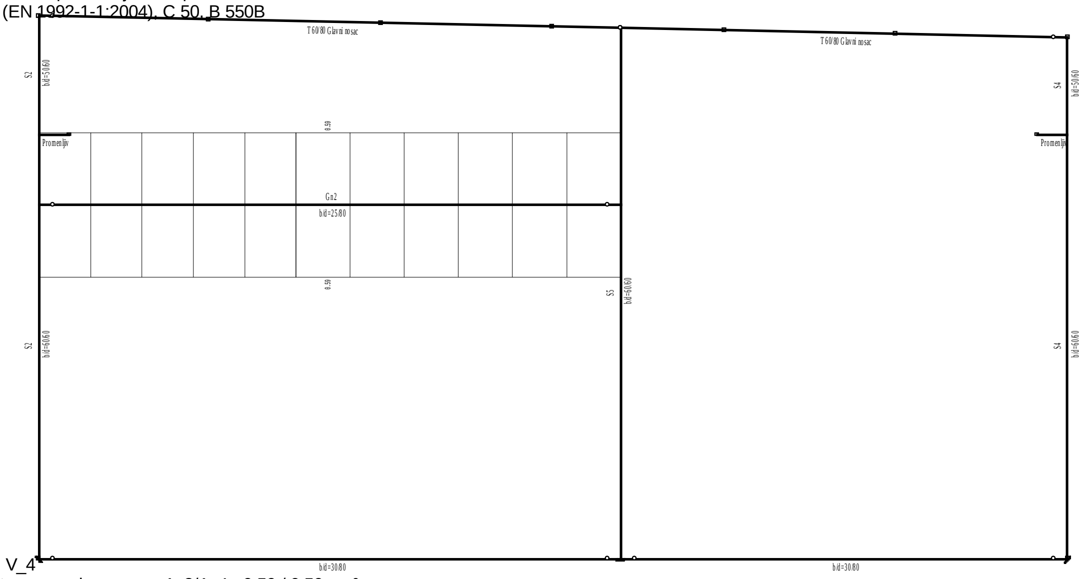
_Ram: V_4_

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_4
Armatura u gredama: max Aa2/Aa1= 0.47 / 9.70 cm²

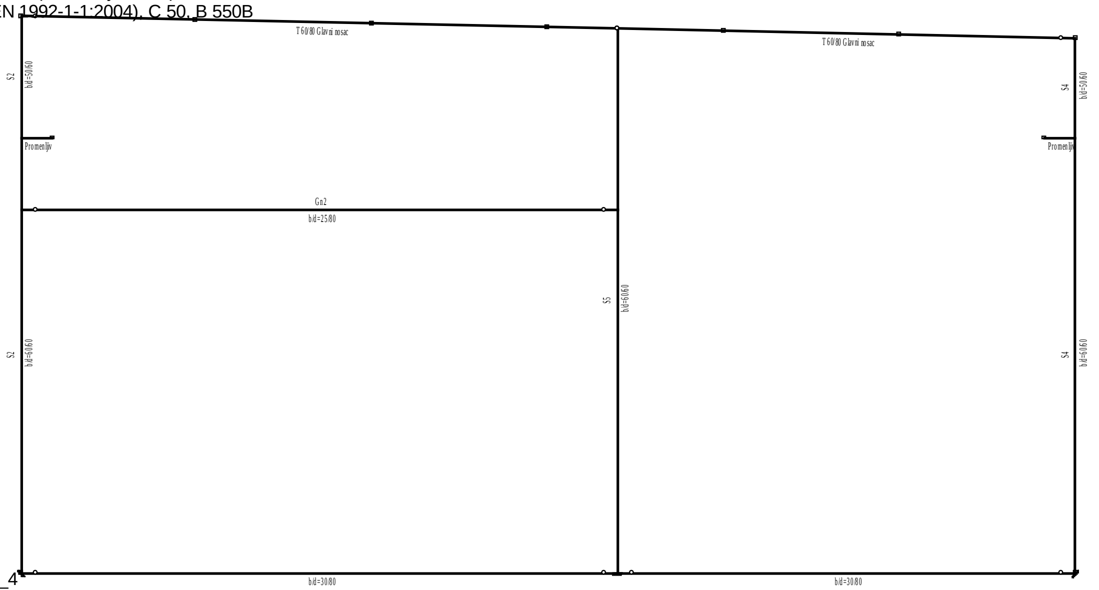
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_4
Armatura u gredama: max Aa3/Aa4= 0.59 / 0.59 cm²

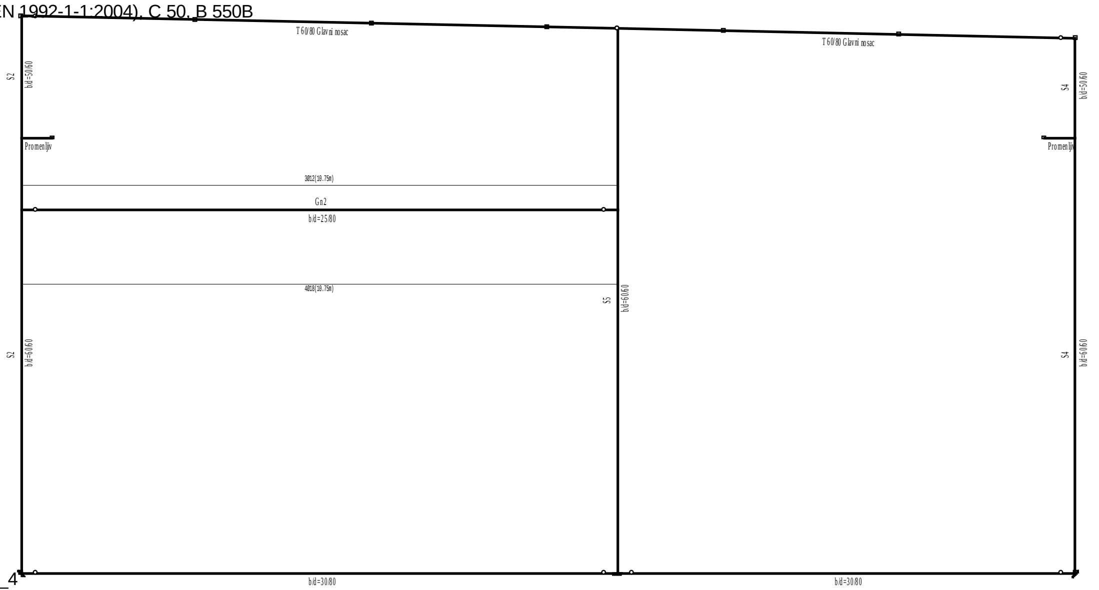
4

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



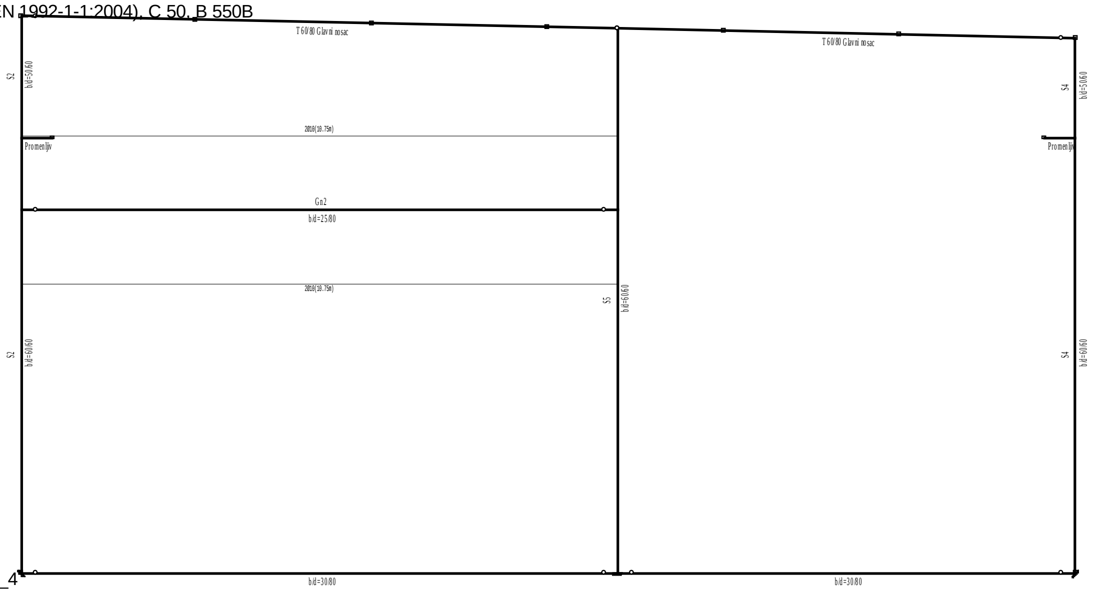
Ram: V_4
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



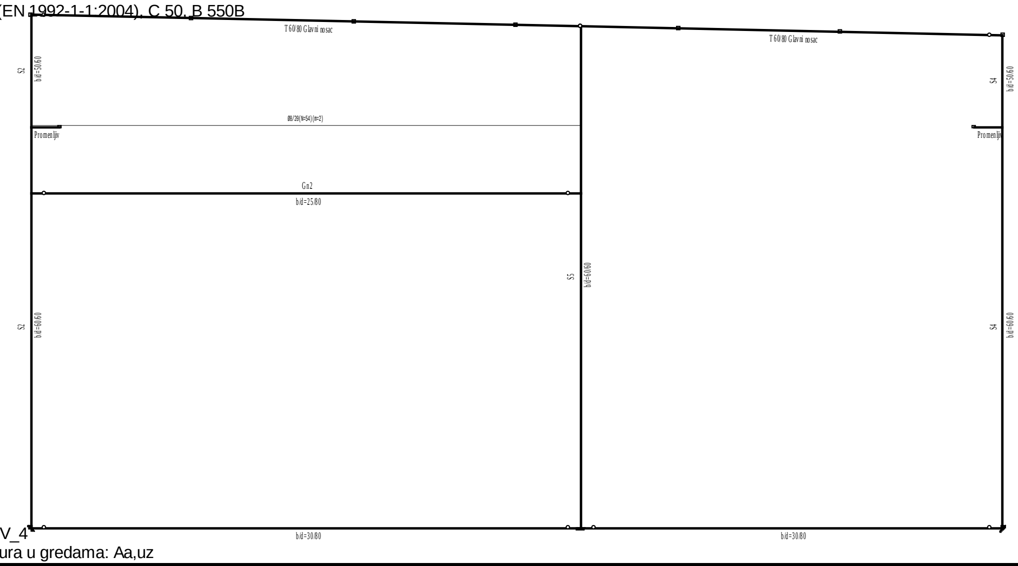
Ram: V_4
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



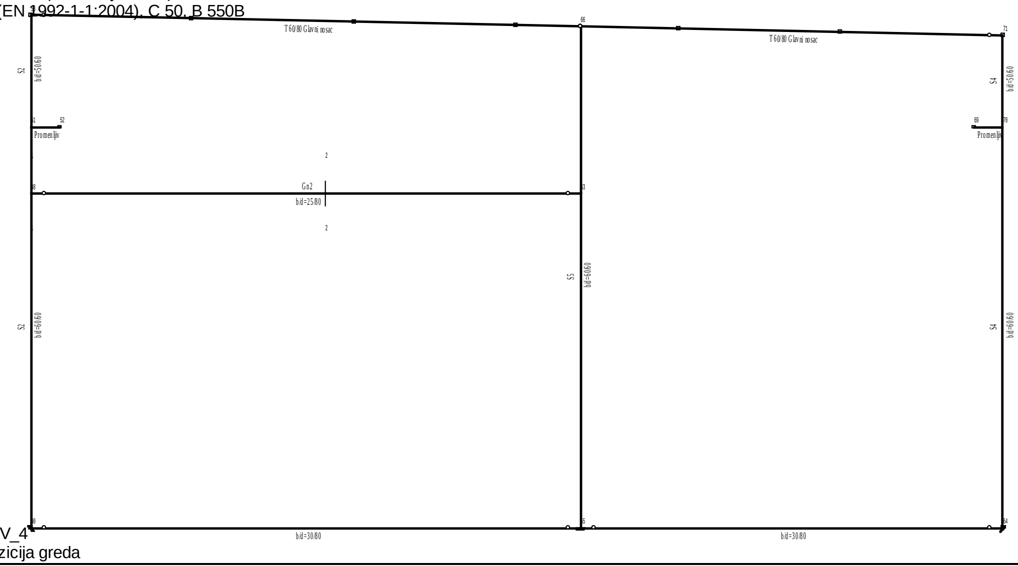
Ram: V_4
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 50, B 550B



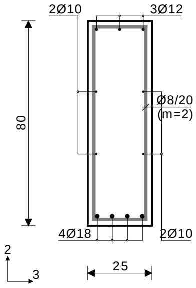
Ram: V_4
Armatura u gredama: Aa,uz

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 50, B 550B



Ram: V_4
Dispozicija greda

Gn2 (48-63)
EC 2 (EN 1992-1-1:2004)
C 50 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja
Presek 1-1 x = 0.00m



Merodavna kombinacija za savijanje:
1.35xI+1.05xIII+1.50xX

N1u =	28.68	kN
M2u =	0.00	kNm
M3u =	0.00	kNm

Merodavna kombinacija za torziju:
1.35xI+0.75xII+1.05xIII+1.50xIX
M1u = -11.34 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX

T2u =	-76.97	kN
T3u =	-83.05	kN
M1u =	-11.34	kNm

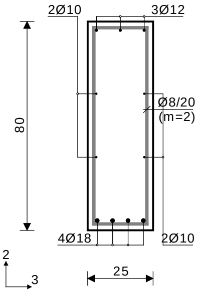
εb/εa = 0.775/25.000 ‰

Aa1 =	0.30	+	0.17`	=	0.47	cm²
Aa2 =	0.30	+	0.17`	=	0.47	cm²
Aa3 =	0.00	+	0.59`	=	0.59	cm²
Aa4 =	0.00	+	0.59`	=	0.59	cm²

Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.84%
`) - dodatna podužna armatura za prijem torzije.

Presek 2-2 x = 5.75m



Merodavna kombinacija za savijanje:
1.35xI+1.05xIII+1.50xX

N1u =	28.68	kN
M2u =	0.00	kNm
M3u =	318.84	kNm

Merodavna kombinacija za torziju:
1.35xI+0.75xII+1.05xIII+1.50xIX
M1u = -11.34 kNm

Merodavna kombinacija za smicanje:
1.35xI+0.75xII+1.05xIII+1.50xIX

T2u =	-13.86	kN
T3u =	5.79	kN
M1u =	-11.34	kNm

εb/εa = -2.547/25.000 ‰

Aa1 =	9.53	+	0.17`	=	9.70	cm²
Aa2 =	0.00	+	0.17`	=	0.17	cm²
Aa3 =	0.00	+	0.59`	=	0.59	cm²
Aa4 =	0.00	+	0.59`	=	0.59	cm²

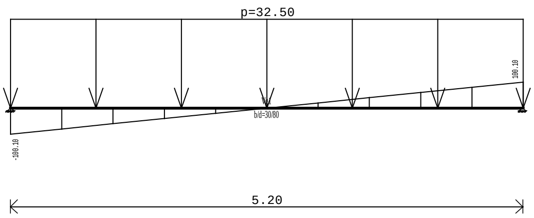
Aa,uz = 0.00 cm²/m (m=1)
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.84%

DIMENZIONIRANJE TEMELJNIH VEZNIH GREDA U OSI A I B OZNAKE Vg1

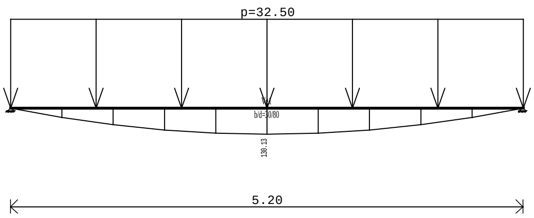
_Ram: H_1_

Opt. 1: stalno (g)



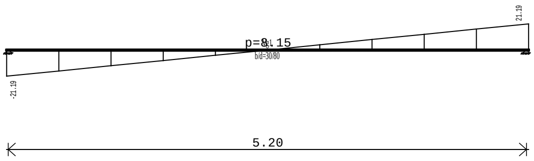
Ram: H_1
Uticaji u gredi: max T2= 100.10 / min T2= -100.10 kN

Opt. 1: stalno (g)



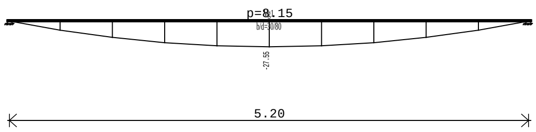
Ram: H_1
Uticaji u gredi: max M3= 130.13 / min M3= -0.00 kNm

Opt. 2: Vjetar



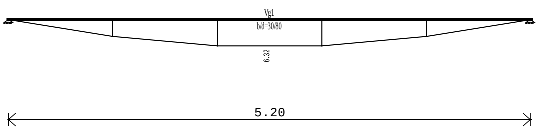
Ram: H_1
Uticaji u gredi: max T3= 21.19 / min T3= -21.19 kN

Opt. 2: Vjetar



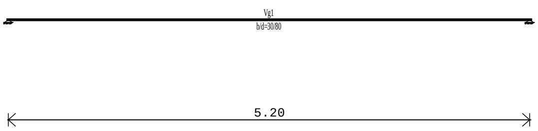
Ram: H_1
Uticaji u gredi: max M2= 0.00 / min M2= -27.55 kNm

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



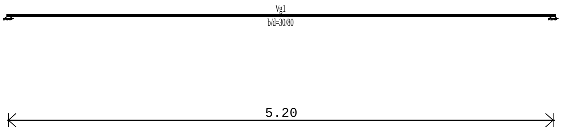
Ram: H_1
Armatura u gredama: max Aa2/Aa1= 6.32 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



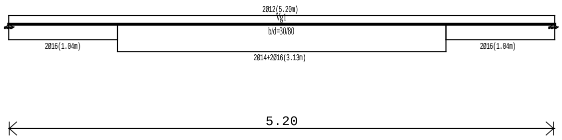
Ram: H_1
Armatura u gredama: max Aa3/Aa4= 0.00 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



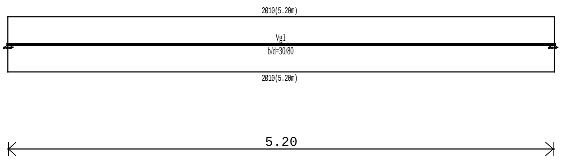
Ram: H_1
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



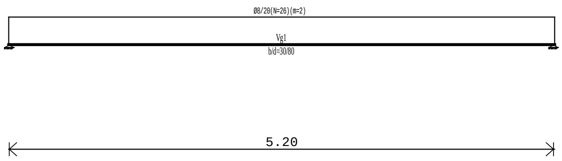
Ram: H_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



Ram: H_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B

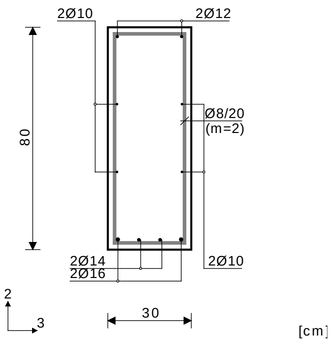


Ram: H_1
Armatura u gredama: Aa,uz

Dimenzionisanje (beton)

Vg1 (1-2)
EC 2 (EN 1992-1-1:2004)
C 30/37 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 1-1 x = 2.08m



Merodavna kombinacija za savijanje:
1.35xI+1.50xII

N1u =	0.00	kN
M2u =	-39.67	kNm
M3u =	168.65	kNm

Merodavna kombinacija za smicanje:
1.35xI+1.50xII

T2u =	-27.03	kN
T3u =	-6.36	kN
M1u =	0.00	kNm

εb/εa = -3.500/14.398 ‰

Aa1 =	6.32	cm²	
Aa2 =	0.00	cm²	
Aa3 =	0.00	cm²	
Aa4 =	0.00	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

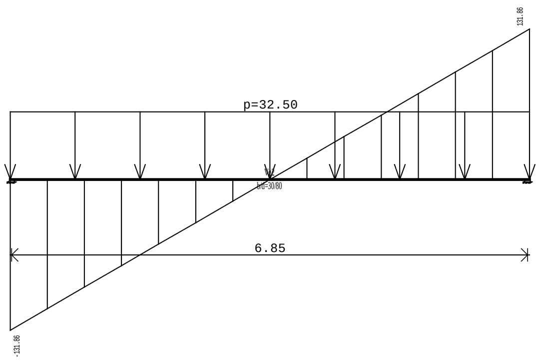
[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.52%

DIMENZIONIRANJE TEMELJNIH VEZNIH GREDA U OSI 1 I 4 OZNAKE Vg2

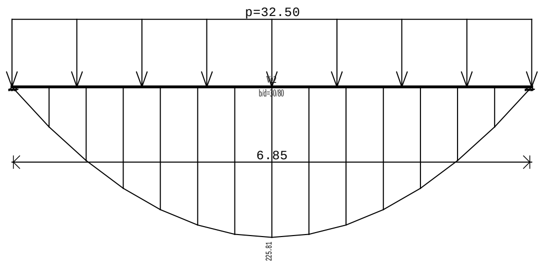
Ram: H_1

Opt. 1: stalno (g)



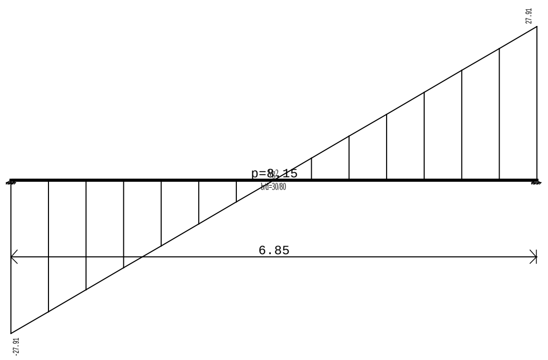
Ram: H_1
Uticaji u gredi: max T2= 131.86 / min T2= -131.86 kN

Opt. 1: stalno (g)



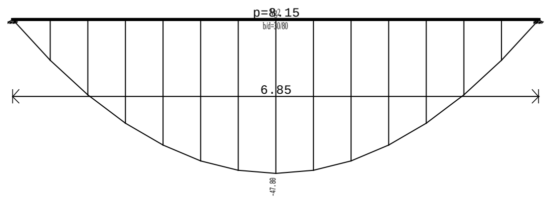
Ram: H_1
Uticaji u gredi: max M3= 225.81 / min M3= 0.00 kNm

Opt. 2: Vjetar



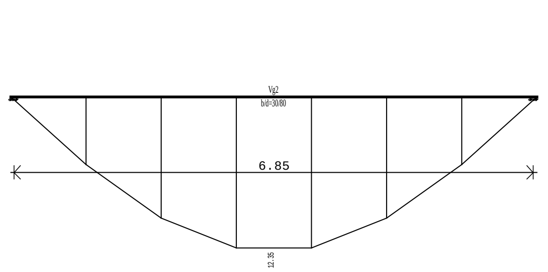
Ram: H_1
Uticaji u gredi: max T3= 27.91 / min T3= -27.91 kN

Opt. 2: Vjetar



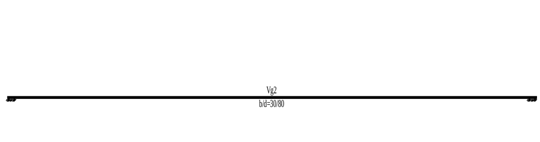
Ram: H_1
Uticaji u gredi: max M2= 0.00 / min M2= -47.80 kNm

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



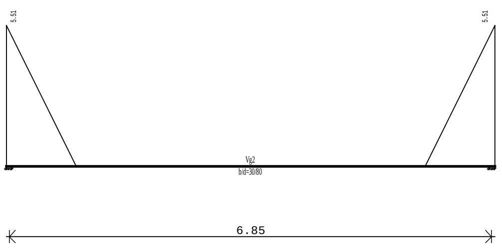
Ram: H_1
Armatura u gredama: max Aa2/Aa1= 12.35 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



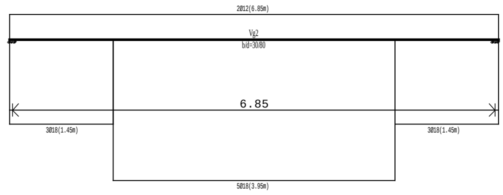
Ram: H_1
Armatura u gredama: max Aa3/Aa4= 0.00 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



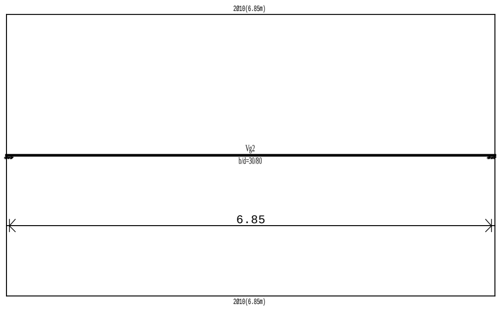
Ram: H_1
Armatura u gredama: max Aa,uz= 5.51 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



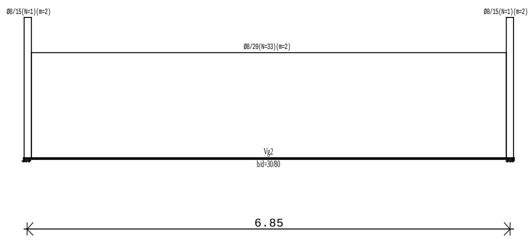
Ram: H_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



Ram: H_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B

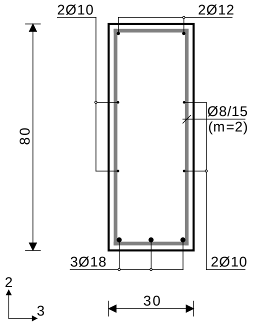


Ram: H_1
Armatura u gredama: Aa,uz

Dimenzionisanje (beton)

Vg2 (1-2)
EC 2 (EN 1992-1-1:2004)
C 30/37 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 1-1 x = 0.00m



[cm]

Merodavna kombinacija za smicanje:
1.35xI+1.50xII

T2u =	-178.01	kN
T3u =	-41.87	kN
M1u =	0.00	kNm

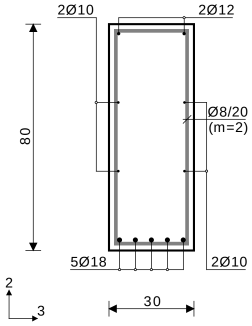
εb/εa = 25.000/25.000 ‰

Aa1 =	0.00	cm²	
Aa2 =	0.00	cm²	
Aa3 =	0.00	cm²	
Aa4 =	0.00	cm²	
Aa,uz =	5.51	cm²/m	(m=1)

[Usvojeno Aa,uz = Ø8/15(m=2) = 6.70 cm²/m]

Procenat armiranja: 0.54%

Presek 2-2 x = 2.94m



[cm]

Merodavna kombinacija za savijanje:
1.35xI+1.50xII

N1u =	0.00	kN
M2u =	-70.24	kNm
M3u =	298.63	kNm

Merodavna kombinacija za smicanje:
1.35xI+1.50xII

T2u =	-25.43	kN
T3u =	-5.98	kN
M1u =	0.00	kNm

εb/εa = -3.500/8.578 ‰

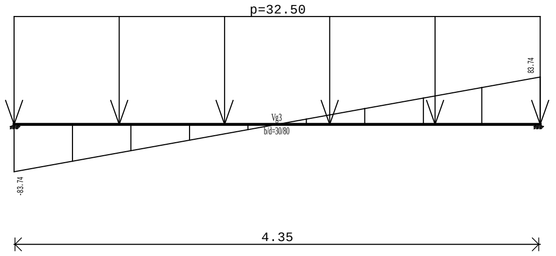
Aa1 =	12.35	cm²	
Aa2 =	0.00	cm²	
Aa3 =	0.00	cm²	
Aa4 =	0.00	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.76%

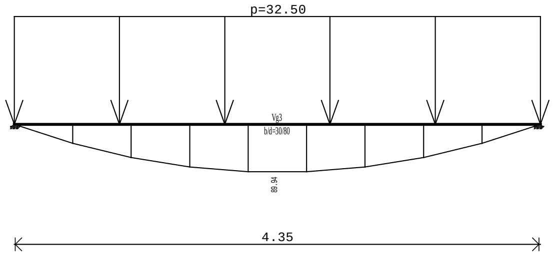
DIMENZIONIRANJE TEMELJNIH VEZNIH GREDA U OSI 4 OZNAKE Vg3

Opt. 1: stalno (g)



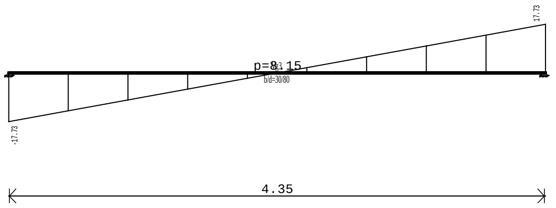
Ram: H_1
Uticaji u gredi: max T2= 83.74 / min T2= -83.74 kN

Opt. 1: stalno (g)



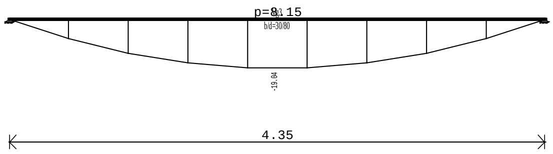
Ram: H_1
Uticaji u gredi: max M3= 89.94 / min M3= 0.00 kNm

Opt. 2: Vjetar



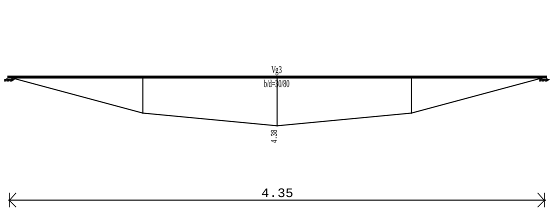
Ram: H_1
Uticaji u gredi: max T3= 17.73 / min T3= -17.73 kN

Opt. 2: Vjetar



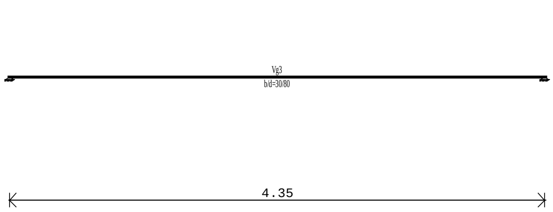
Ram: H_1
Uticaji u gredi: max M2= 0.00 / min M2= -19.04 kNm

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



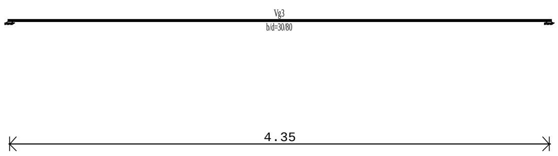
Ram: H_1
Armatura u gredama: max Aa2/Aa1= 4.38 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



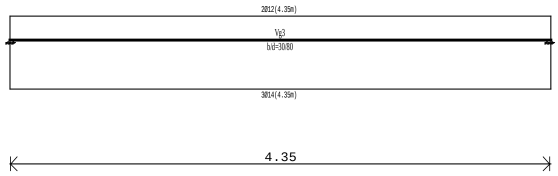
Ram: H_1
Armatura u gredama: max Aa3/Aa4= 0.00 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



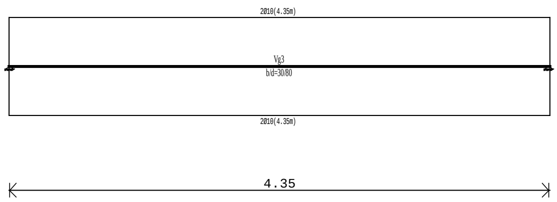
Ram: H_1
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



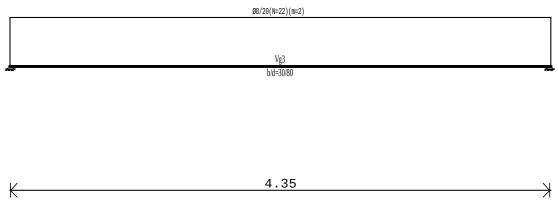
Ram: H_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



Ram: H_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B

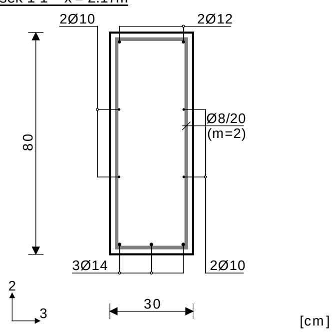


Ram: H_1
Armatura u gredama: Aa,uz

Dimenzionisanje (beton)

Vg3 (1-2)
EC 2 (EN 1992-1-1:2004)
C 30/37 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 1-1 x = 2.17m



Merodavna kombinacija za savijanje:
1.35xI+1.50xII

N1u =	0.00	kN
M2u =	-28.56	kNm
M3u =	121.42	kNm

εb/εa = -3.500/19.043 ‰

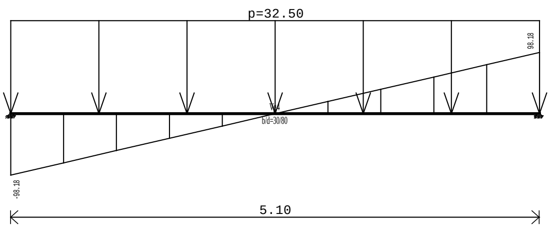
Aa1 =	4.38	cm²	
Aa2 =	0.00	cm²	
Aa3 =	0.00	cm²	
Aa4 =	0.00	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.42%

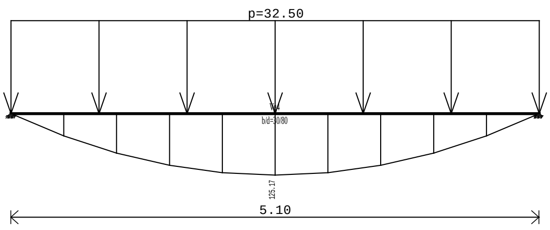
DIMENZIONIRANJE TEMELJNIH VEZNIH GREDA U OSI 1 OZNAKE Vg4

Opt. 1: stalno (g)



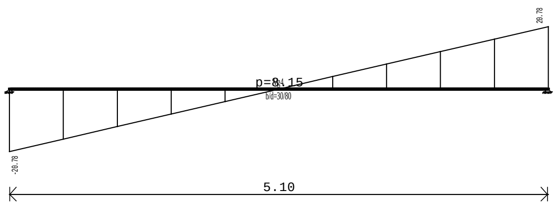
Ram: H_1
Uticaji u gredi: max T2= 98.18 / min T2= -98.18 kN

Opt. 1: stalno (g)



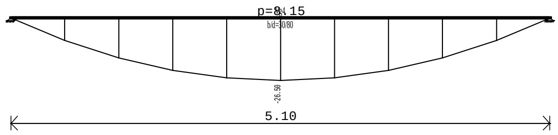
Ram: H_1
Uticaji u gredi: max M3= 125.17 / min M3= 0.00 kNm

Opt. 2: Vjetar



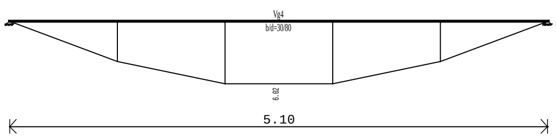
Ram: H_1
Uticaji u gredi: max T3= 20.78 / min T3= -20.78 kN

Opt. 2: Vjetar



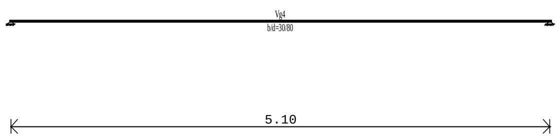
Ram: H_1
Uticaji u gredi: max M2= 0.00 / min M2= -26.50 kNm

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



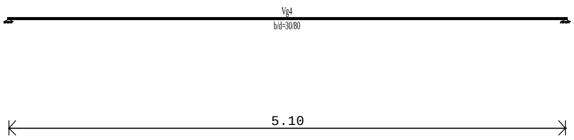
Ram: H_1
Armatura u gredama: max Aa2/Aa1= 6.02 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



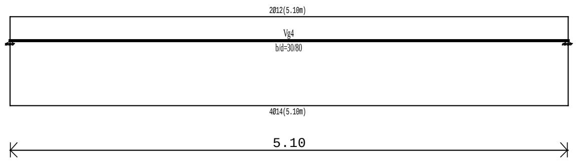
Ram: H_1
Armatura u gredama: max Aa3/Aa4= 0.00 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



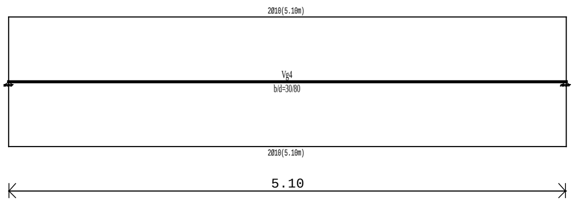
Ram: H_1
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



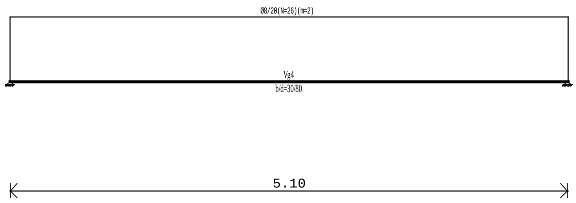
Ram: H_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



Ram: H_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B

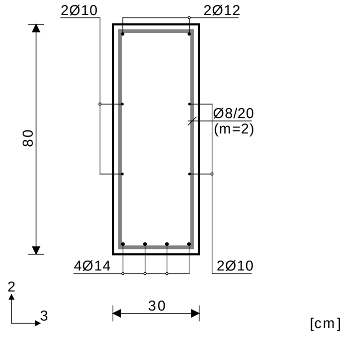


Ram: H_1
Armatura u gredama: Aa,uz

Dimenzionisanje (beton)

Vg4 (1-2)
EC 2 (EN 1992-1-1:2004)
C 30/37 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 1-1 x = 2.04m



Merodavna kombinacija za savijanje:
1.35xI+1.50xII

N1u =	0.00	kN
M2u =	-38.16	kNm
M3u =	162.22	kNm

Merodavna kombinacija za smicanje:
1.35xI+1.50xII

T2u =	-26.51	kN
T3u =	-6.23	kN
M1u =	0.00	kNm

εb/εa = -3.500/14.955 ‰

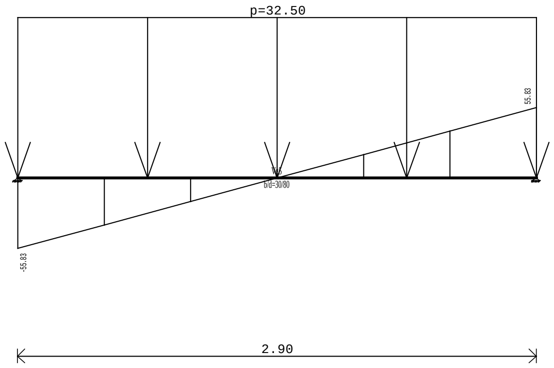
Aa1 =	6.02	cm²	
Aa2 =	0.00	cm²	
Aa3 =	0.00	cm²	
Aa4 =	0.00	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.48%

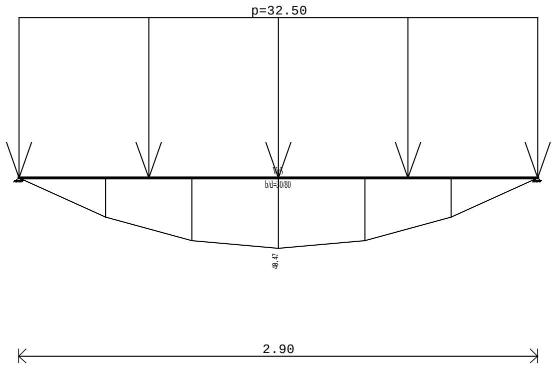
DIMENZIONIRANJE TEMELJNIH VEZNIH GREDA U OSI 1 OZNAKE Vg5

Opt. 1: stalno (g)



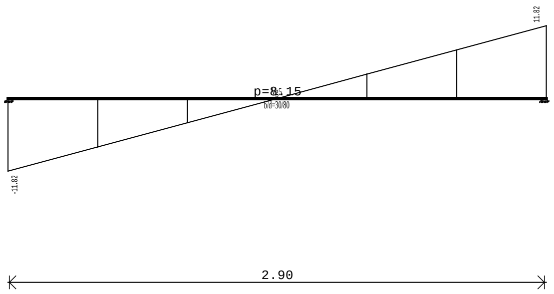
Ram: H_1
Uticaji u gredi: max T2= 55.83 / min T2= -55.83 kN

Opt. 1: stalno (g)



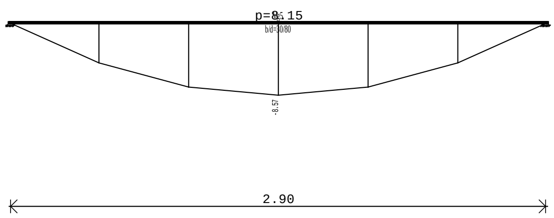
Ram: H_1
Uticaji u gredi: max M3= 40.47 / min M3= -0.00 kNm

Opt. 2: Vjetar



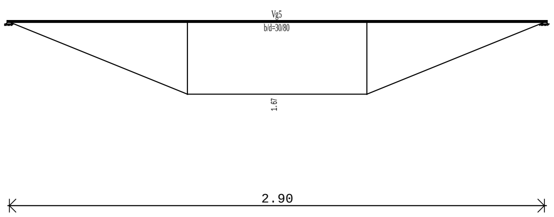
Ram: H_1
Uticaji u gredi: max T3= 11.82 / min T3= -11.82 kN

Opt. 2: Vjetar



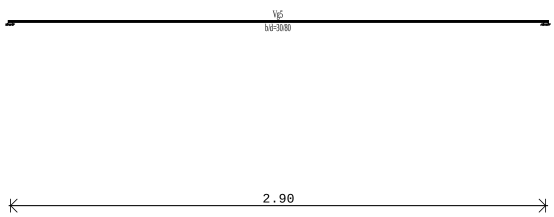
Ram: H_1
Uticaji u gredi: max M2= 0.00 / min M2= -8.57 kNm

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



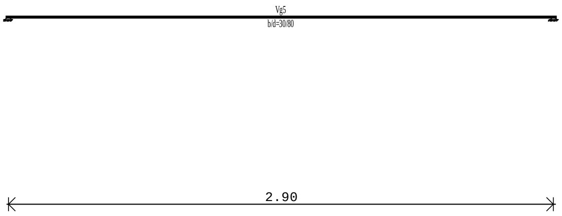
Ram: H_1
Armatura u gredama: max Aa2/Aa1= 1.67 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



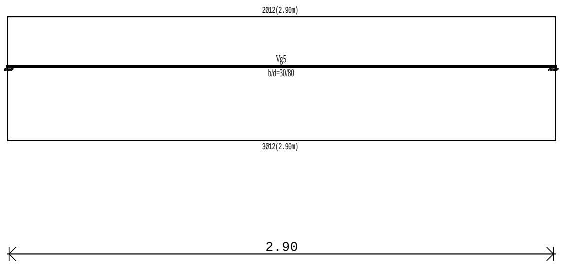
Ram: H_1
Armatura u gredama: max Aa3/Aa4= 0.00 cm²

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



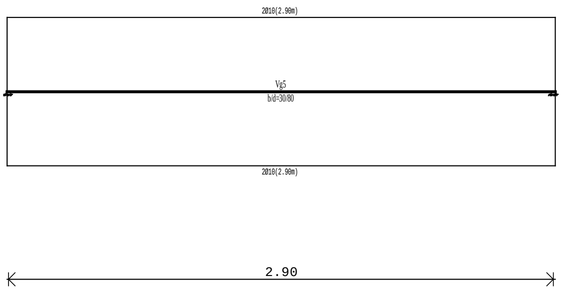
Ram: H_1
Armatura u gredama: max Aa,uz= 0.00 cm²

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



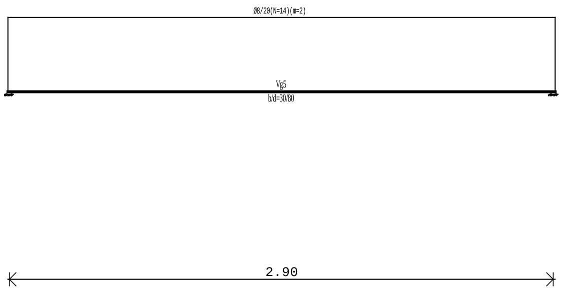
Ram: H_1
Armatura u gredama: Aa2/Aa1

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B



Ram: H_1
Armatura u gredama: Aa3/Aa4

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B

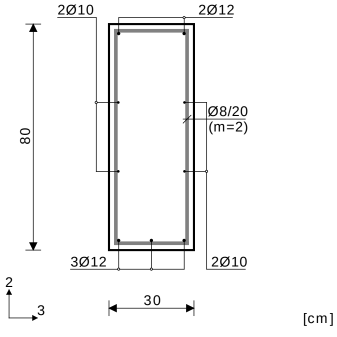


Ram: H_1
Armatura u gredama: Aa,uz

Dimenzionisanje (beton)

Vg5 (1-2)
EC 2 (EN 1992-1-1:2004)
C 30/37 (γC = 1.50, γS = 1.15) [SP]
B 550B
Kompletna šema opterećenja

Presek 1-1 x = 0.97m



Merodavna kombinacija za savijanje:
1.35xI+1.50xII

N1u =	0.00	kN
M2u =	-11.42	kNm
M3u =	48.57	kNm

Merodavna kombinacija za smicanje:
1.35xI+1.50xII

T2u =	-25.12	kN
T3u =	-5.91	kN
M1u =	0.00	kNm

εb/εa = -2.424/25.000 ‰

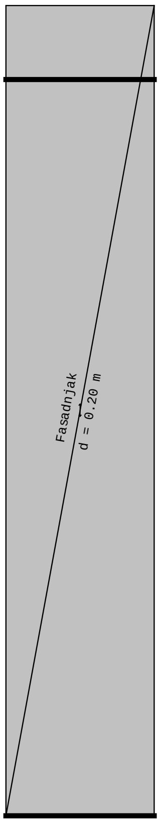
Aa1 =	1.67	cm²	
Aa2 =	0.00	cm²	
Aa3 =	0.00	cm²	
Aa4 =	0.00	cm²	
Aa,uz =	0.00	cm²/m	(m=1)

[Usvojeno Aa,uz = Ø8/20(m=2) = 5.03 cm²/m]

Procenat armiranja: 0.37%

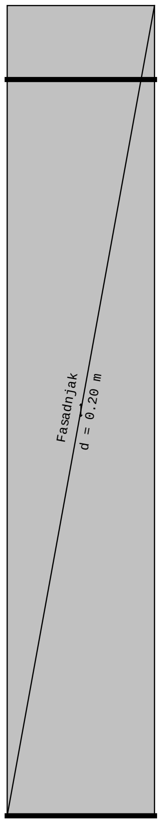
DIMENZIONIRANJE AB FASADNIH PANELA

Opt. 1: stalno (g)



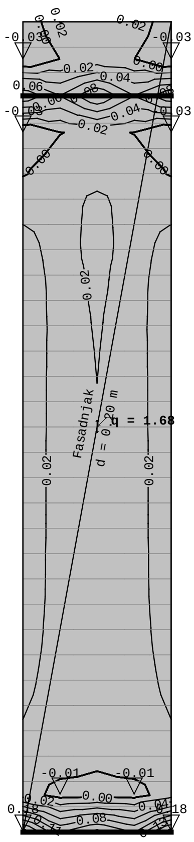
Ram: H_1
Uticaji u ploči: Mx

Opt. 1: stalno (g)



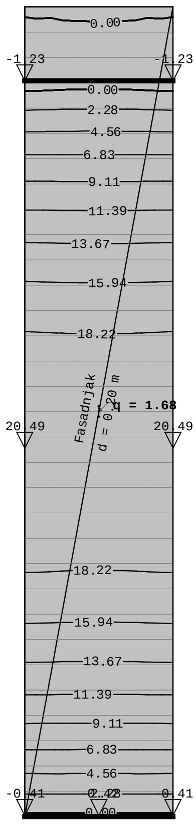
Ram: H_1
Uticaji u ploči: My

Opt. 2: vjetar



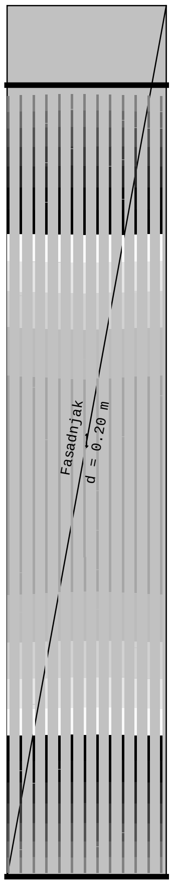
Ram: H_1
Uticaji u ploči: max Mx= 0.18 / min Mx= -0.03 kNm/m

Opt. 2: vjetar



Ram: H_1
Uticaji u ploči: max My= 20.49 / min My= -1.23 kNm/m

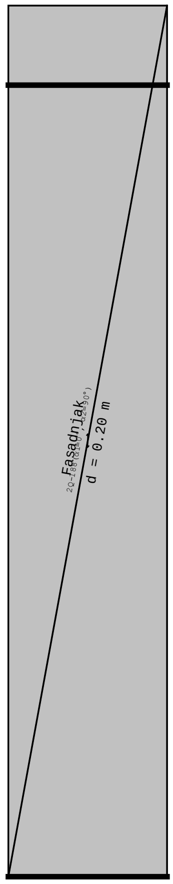
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B, a=2.00 cm



Aa - d.zona [cm²/m]
0.00
0.31
0.61
0.92
1.23
1.53
1.84
2.15
2.45
2.76
3.07
3.37
3.68

Ram: H_1
Aa - d.zona - max Aa,d= 3.67 cm²/m

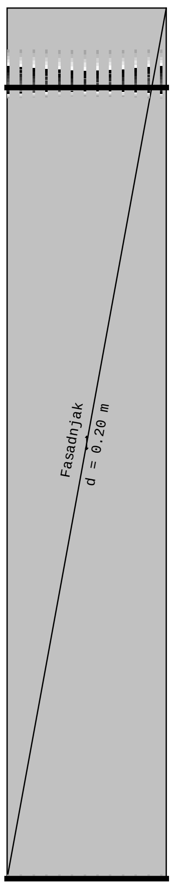
Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B, a=2.00 cm



Aa - d.zona [cm²/m]
0.00
0.31
0.61
0.92
1.23
1.53
1.84
2.15
2.45
2.76
3.07
3.37
3.68

Ram: H_1
Aa - d.zona

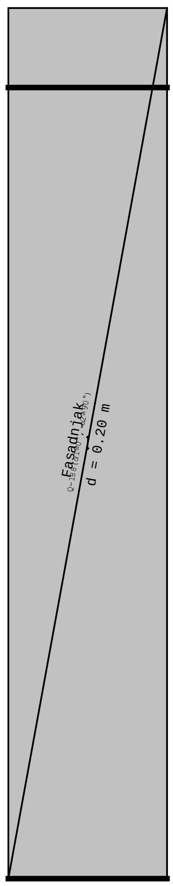
Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B, a=2.00 cm



Aa - g.zona [cm²/m]
-0.22
-0.20
-0.18
-0.17
-0.15
-0.13
-0.11
-0.09
-0.07
-0.06
-0.04
-0.02
0.00

Ram: H_1
Aa - g.zona - max Aa,g= -0.22 cm²/m

Usvojena armatura
EC 2 (EN 1992-1-1:2004), C 30/37, B 550B, a=2.00 cm



Aa - g.zona [cm²/m]
-0.22
-0.20
-0.18
-0.17
-0.15
-0.13
-0.11
-0.09
-0.07
-0.06
-0.04
-0.02
0.00

Ram: H_1
Aa - g.zona

Dimenzionisanje (beton)

Ram: H_1
EC 2 (EN 1992-1-1:2004)
Fasadnjak (d,pl=20.0 cm)
C 30/37 (γC = 1.50, γS = 1.15) [SP]
Gornja zona: B 550B (a=2.0 cm)
Donja zona: B 550B (a=2.0 cm)
Kompletna šema opterećenja

Tačka 1
X=0.00 m; Y=0.00 m; Z=9.95 m
Pravac 1: (α=0°)
Merodavna kombinacija:
1.35xI+1.50xII
Mu = 0.16 kNm
Nu = 0.00 kN
εb/εa = -0.111/25.000 ‰
Nije potrebna armatura.
Usvojeno (gornja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Usvojeno (donja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Q-188 Ø6/15 (1.88 cm²/m)
Procenat armiranja: 0.28%

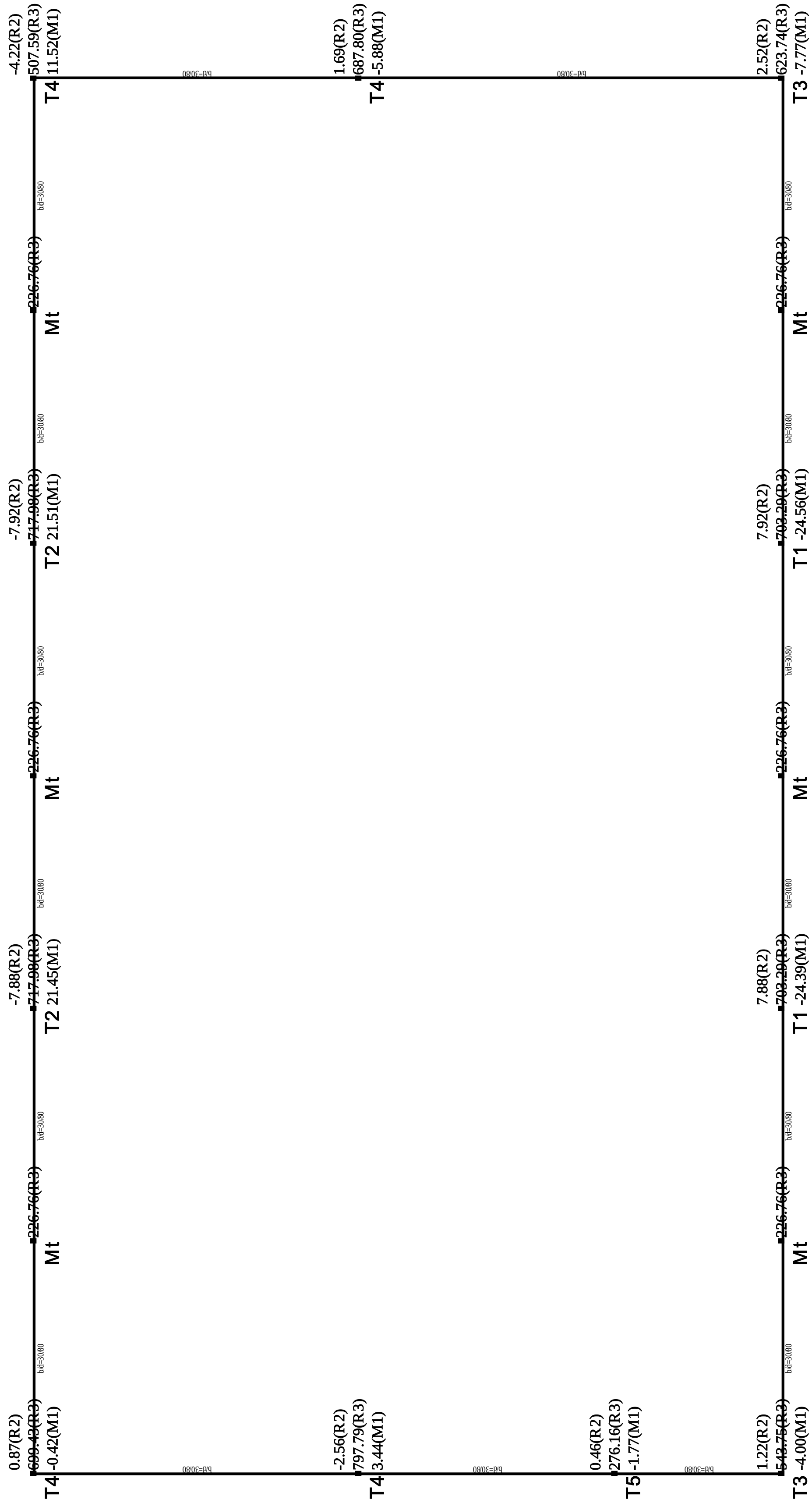
Pravac 2: (α=90°)
Merodavna kombinacija:
1.35xI+1.50xII
Mu = -1.85 kNm
Nu = 0.00 kN
εb/εa = -0.395/25.000 ‰
Ag2 = 0.22 cm²/m
Ad2 = 0.00 cm²/m
Usvojeno (gornja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Usvojeno (donja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Q-188 Ø6/15 (1.88 cm²/m)
Procenat armiranja: 0.28%

Tačka 2
X=0.00 m; Y=0.00 m; Z=4.97 m
Pravac 1: (α=0°)
Merodavna kombinacija:
1.35xI+1.50xII
Mu = 0.05 kNm
Nu = 0.00 kN
εb/εa = -0.061/25.000 ‰
Nije potrebna armatura.
Usvojeno (gornja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Usvojeno (donja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Q-188 Ø6/15 (1.88 cm²/m)
Procenat armiranja: 0.28%

Pravac 2: (α=90°)
Merodavna kombinacija:
1.35xI+1.50xII
Mu = 30.74 kNm
Nu = 0.00 kN
εb/εa = -1.986/25.000 ‰
Ag2 = 0.00 cm²/m
Ad2 = 3.67 cm²/m
Usvojeno (gornja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Usvojeno (donja zona):
Q-188 Ø6/15 (1.88 cm²/m)
Q-188 Ø6/15 (1.88 cm²/m)
Procenat armiranja: 0.28%

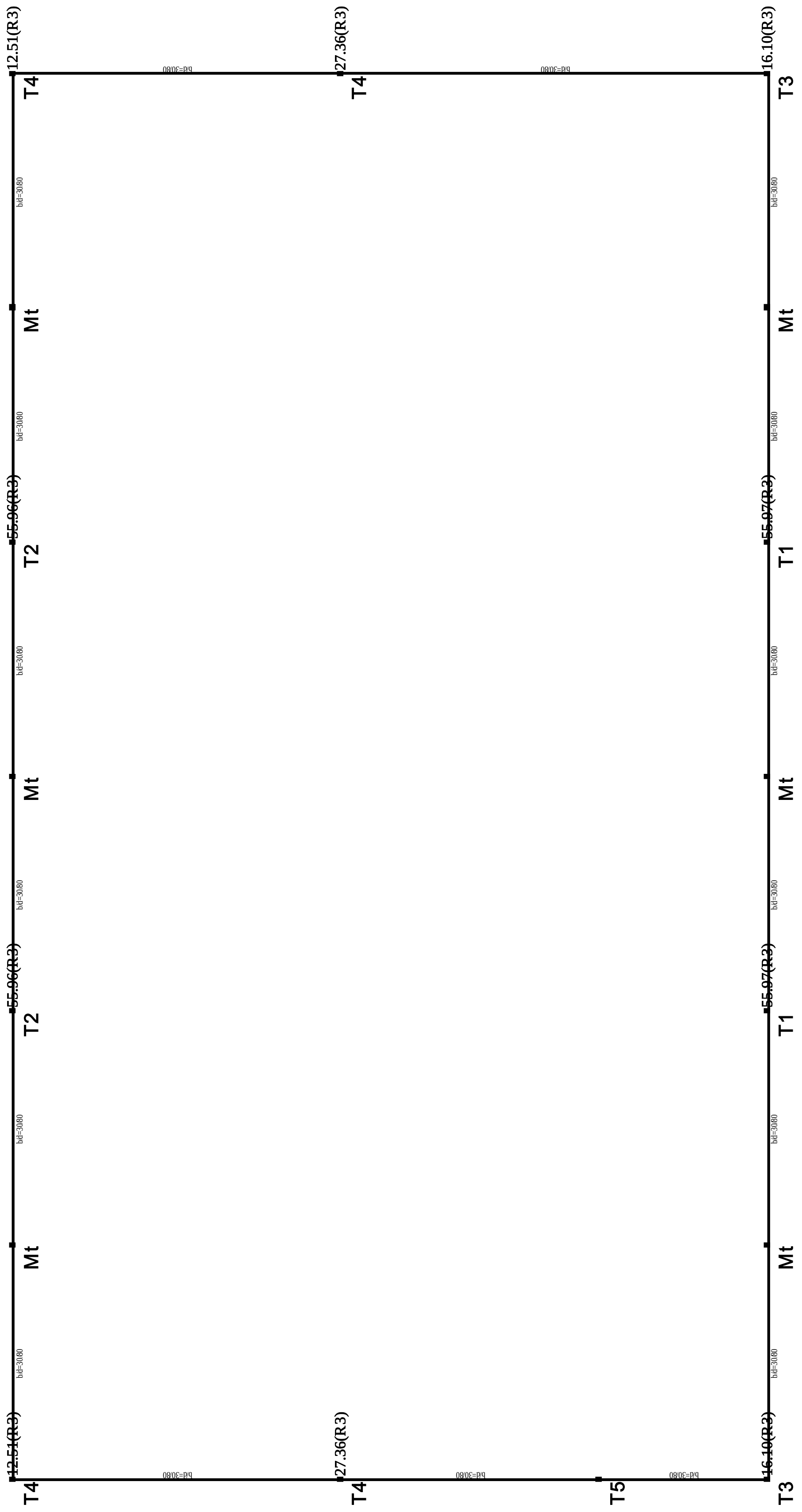
DIMENZIONIRANJE TEMELJNE KONSTRUKCIJE

Opt. 1: Stalno (g)



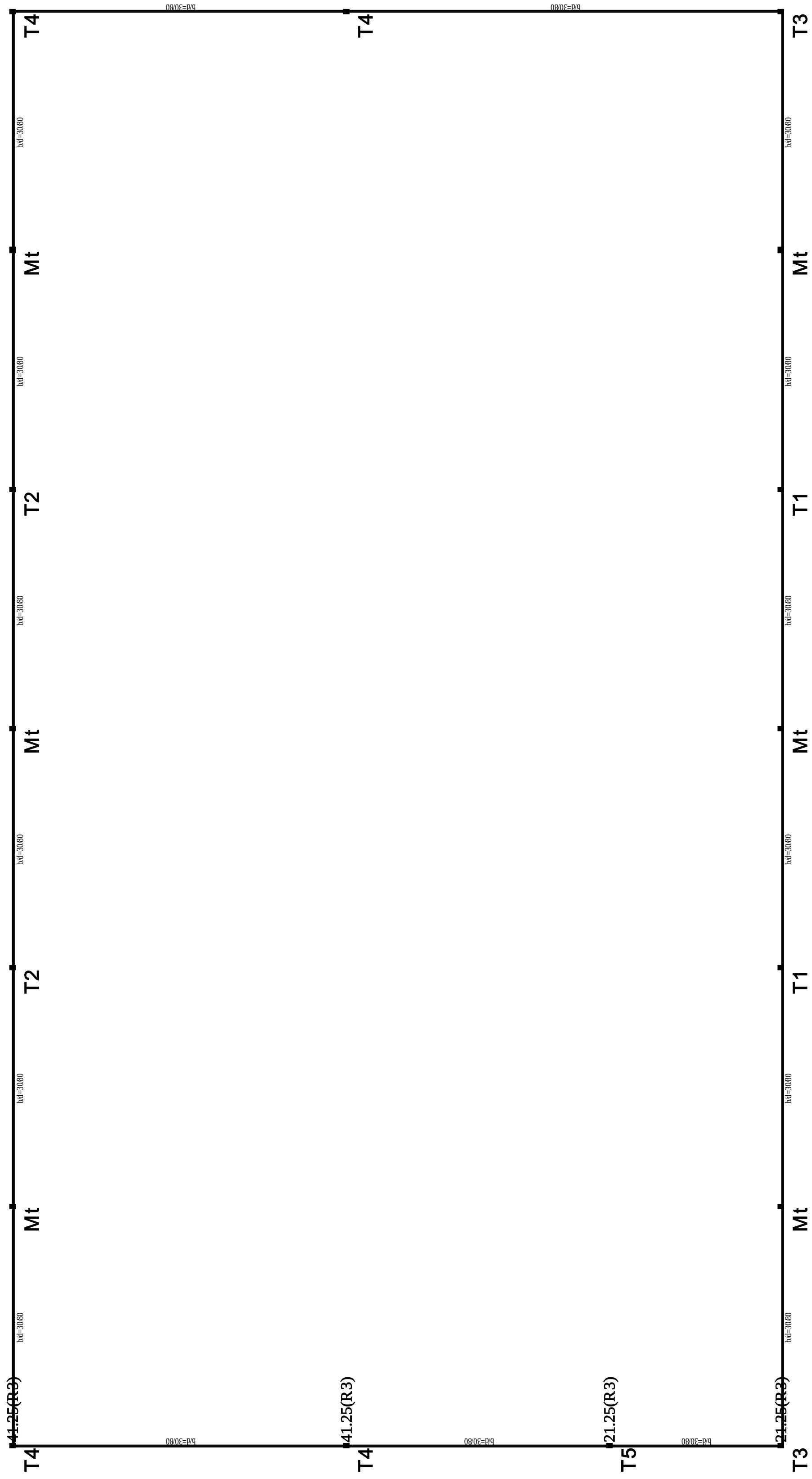
Nivo: [-0.35 m]
Reakcije oslonaca

Opt. 2: Snijeg



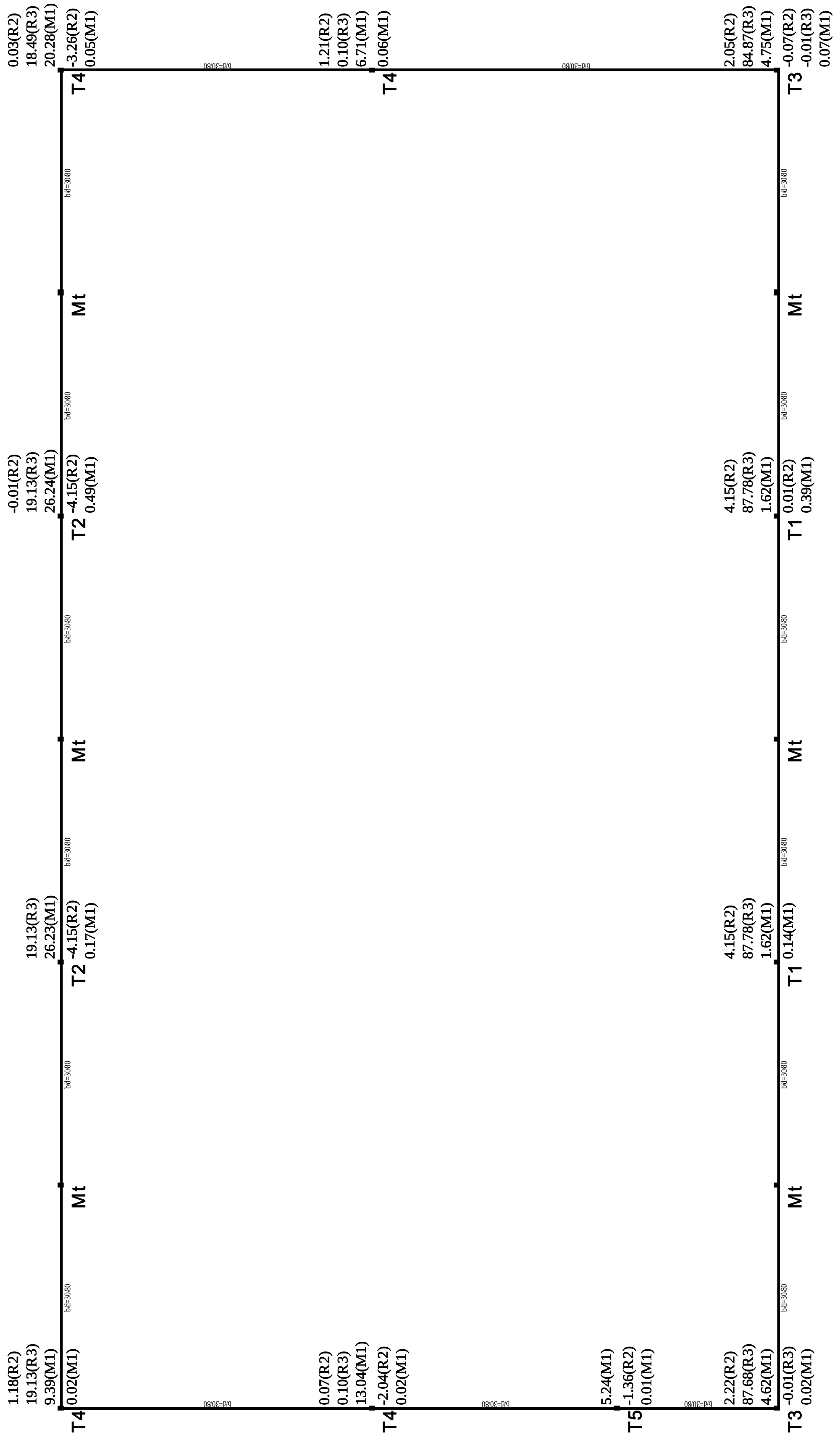
Nivo: [-0.35 m]
Reakcije oslonaca

Opt. 3: korisno



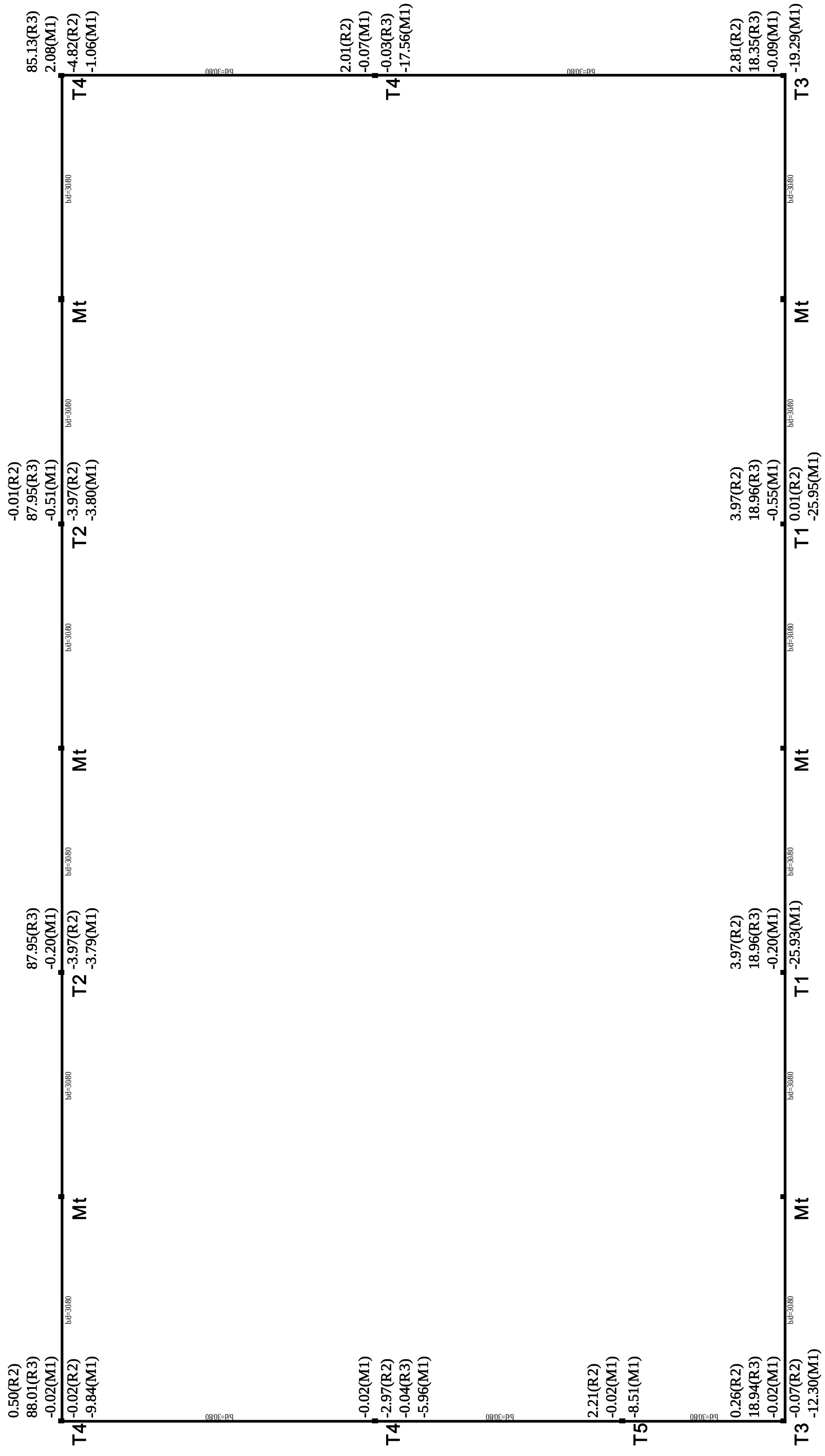
Nivo: [-0.35 m]
Reakcije oslonaca

Opt. 4: Kran vertikalno osa A max



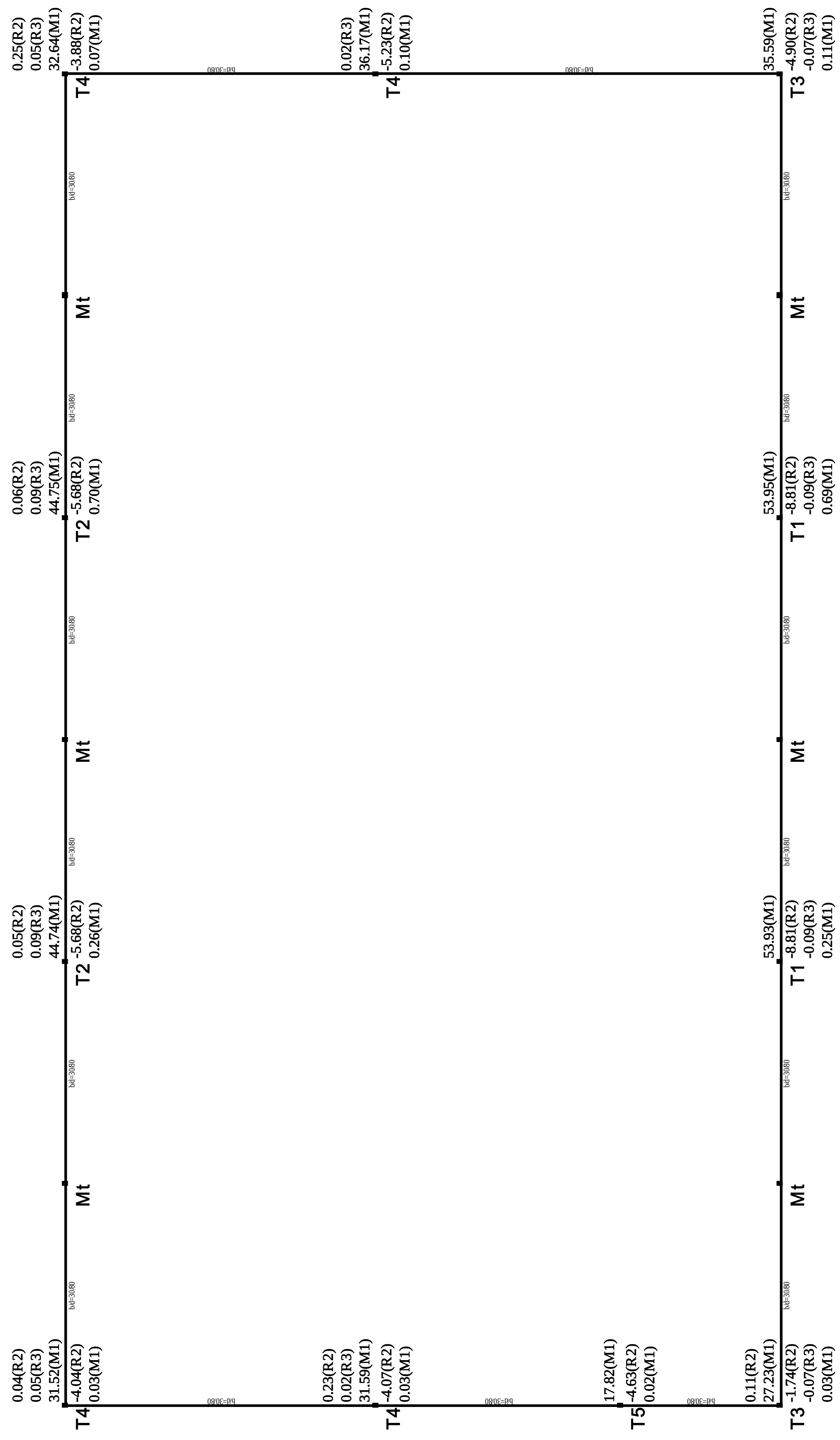
Nivo: [-0.35 m]
Reakcije oslonaca (Min/Max)

Opt. 5: Kran vertikalno osa B max



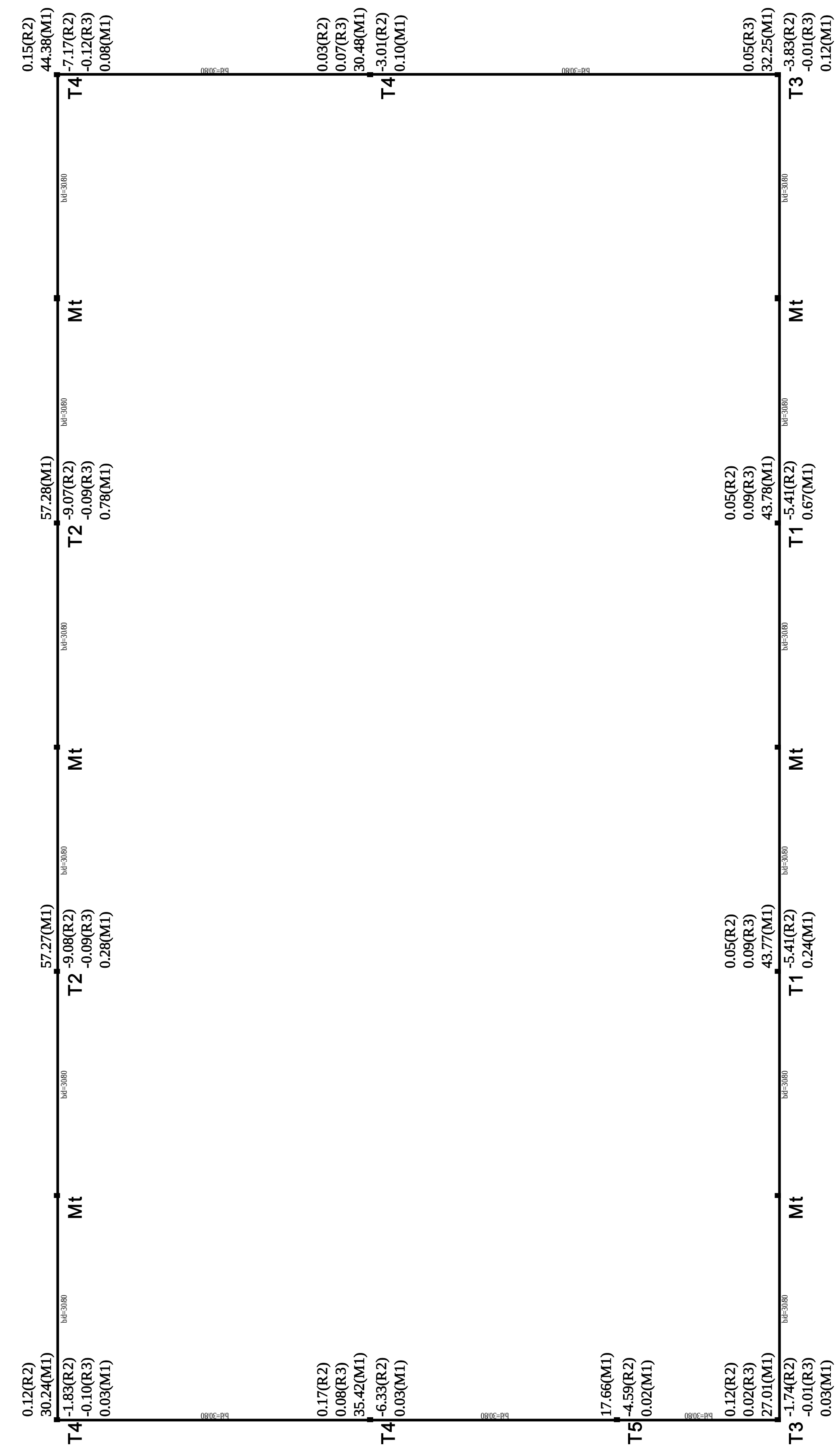
Nivo: [-0.35 m]
Reakcije oslonaca (Min/Max)

Opt. 6: Kran horizontalno osa A max



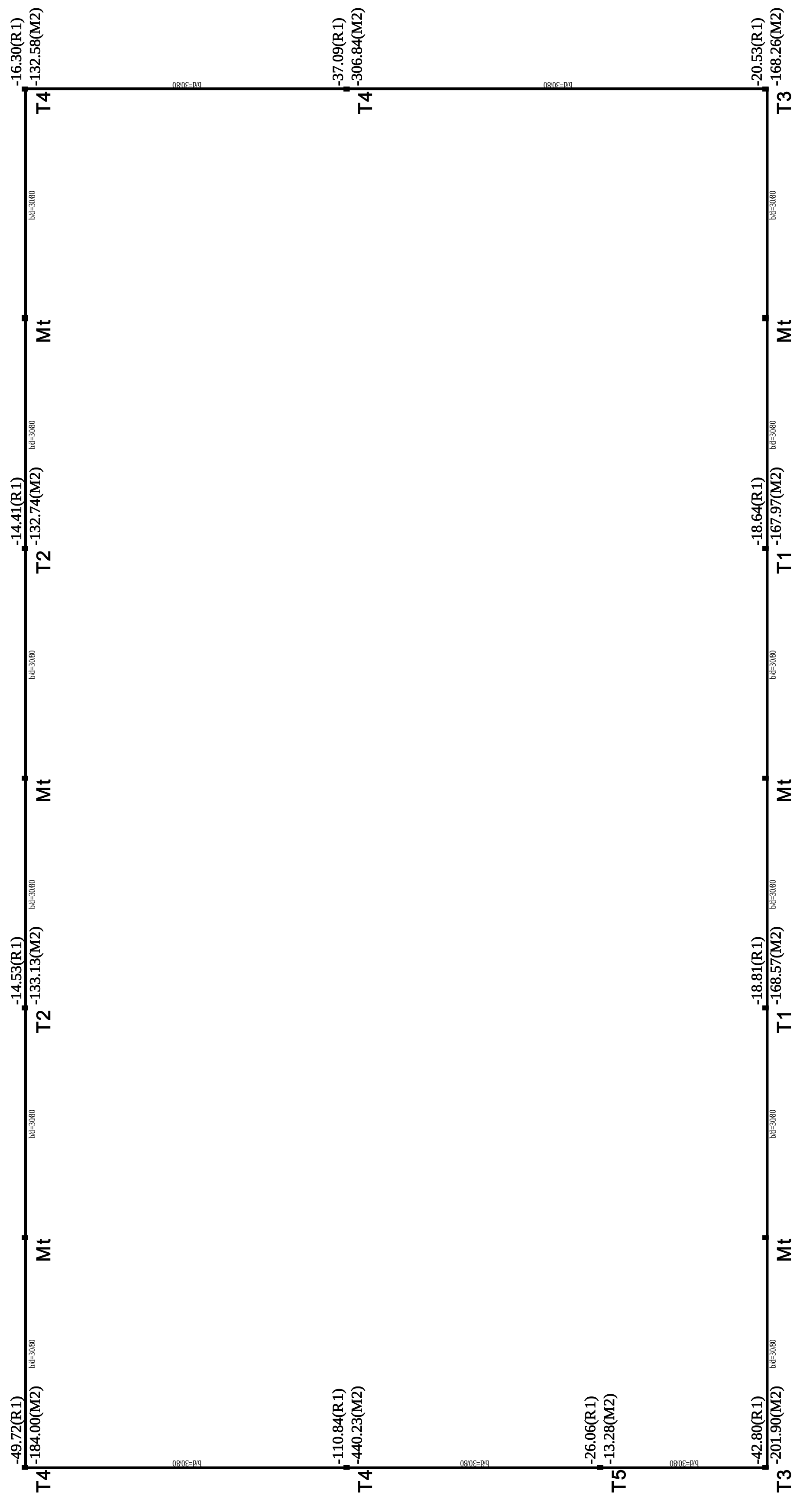
Nivo: [-0.35 m]
Reakcije oslonaca (Min/Max)

Opt. 7: Kran horizontalno osa B max



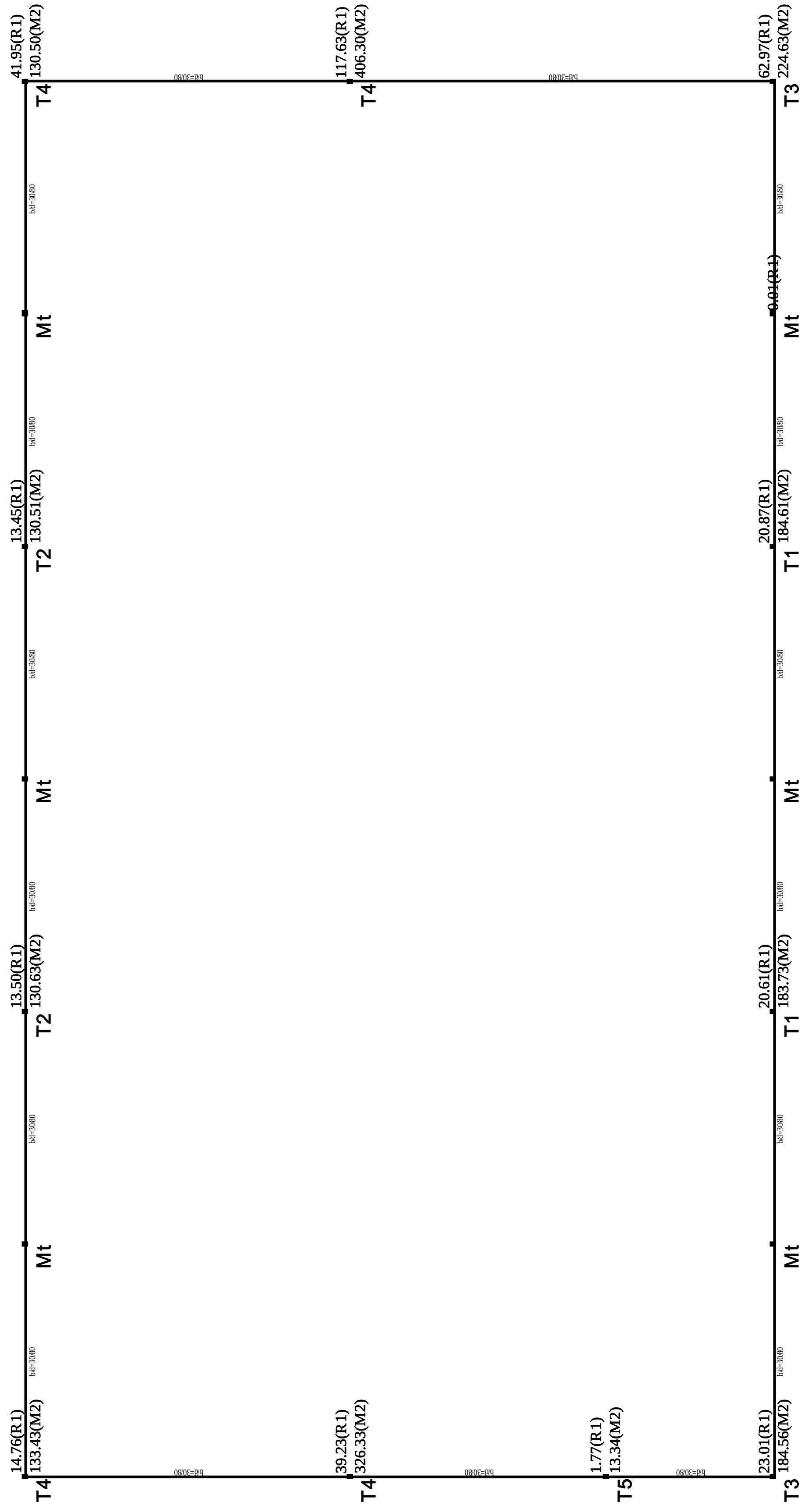
Nivo: [-0.35 m]
Reakcije oslonaca (Min/Max)

Opt. 8: Vjetar +x



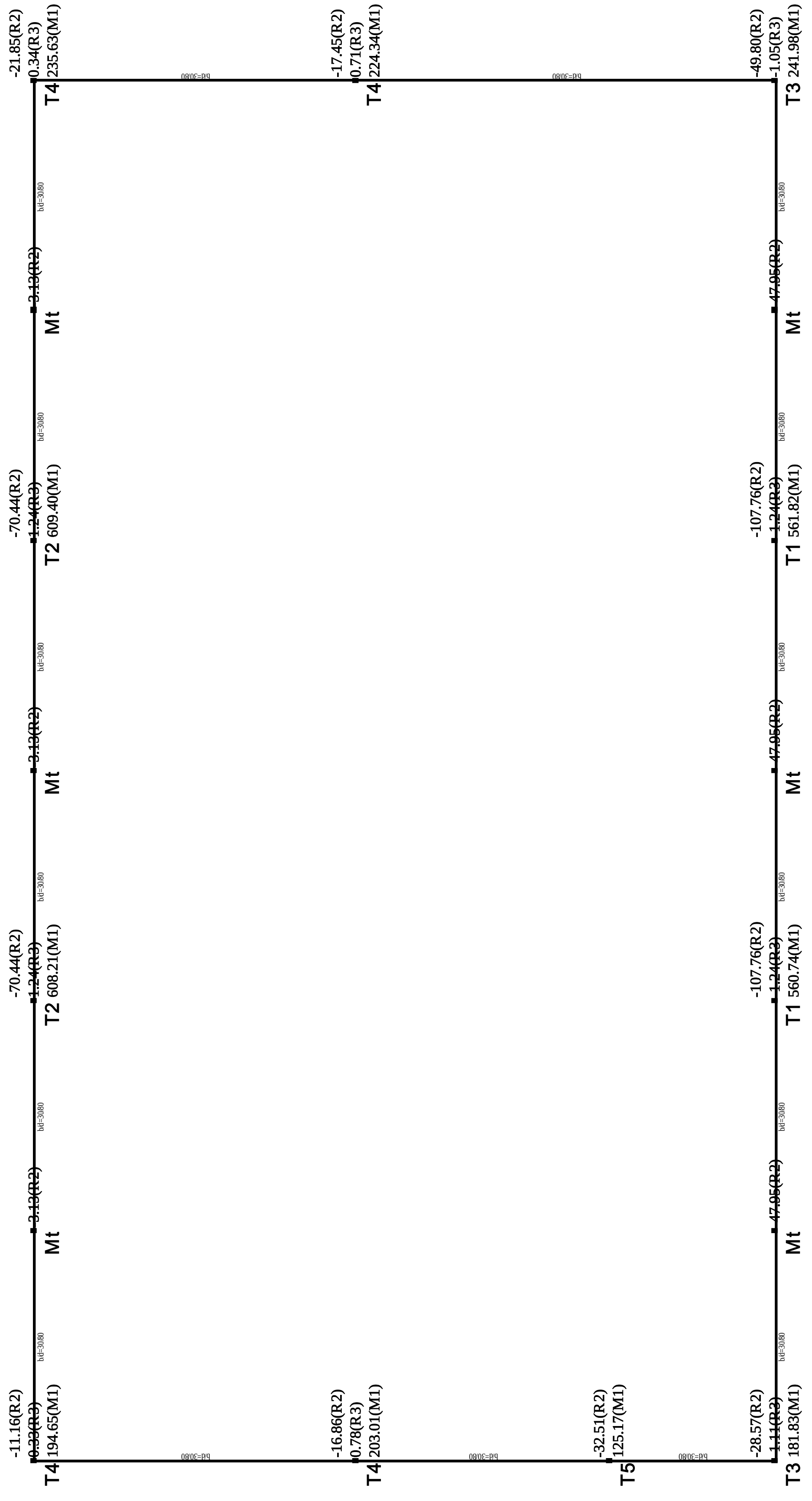
Nivo: [-0.35 m]
Reakcije oslonaca

Opt. 9: vjetar -x



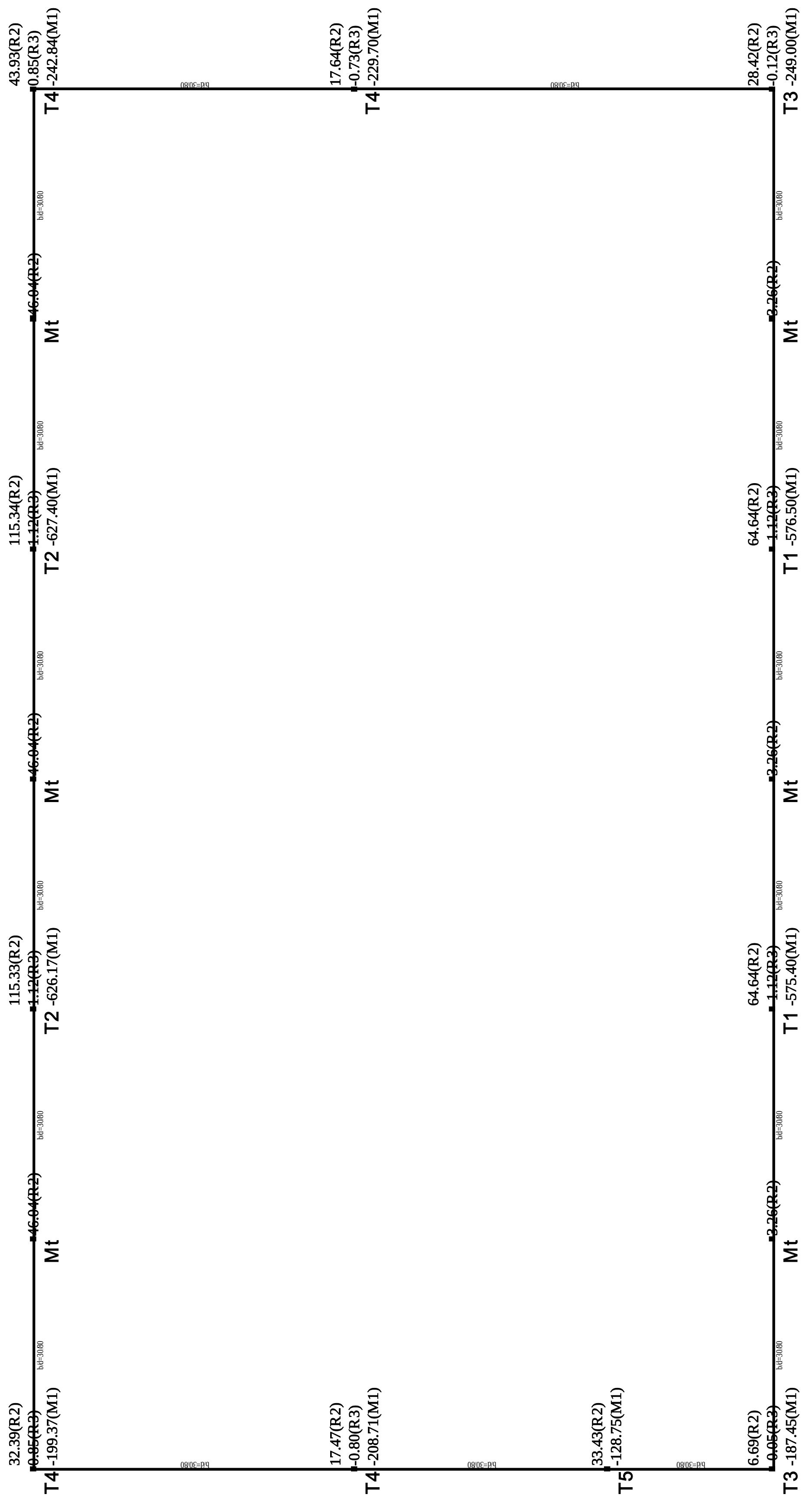
Nivo: [-0.35 m]
Reakcije oslonaca

Opt. 10: Vjetar +y



Nivo: [-0.35 m]
Reakcije oslonaca

Opt. 11: vjetar -y



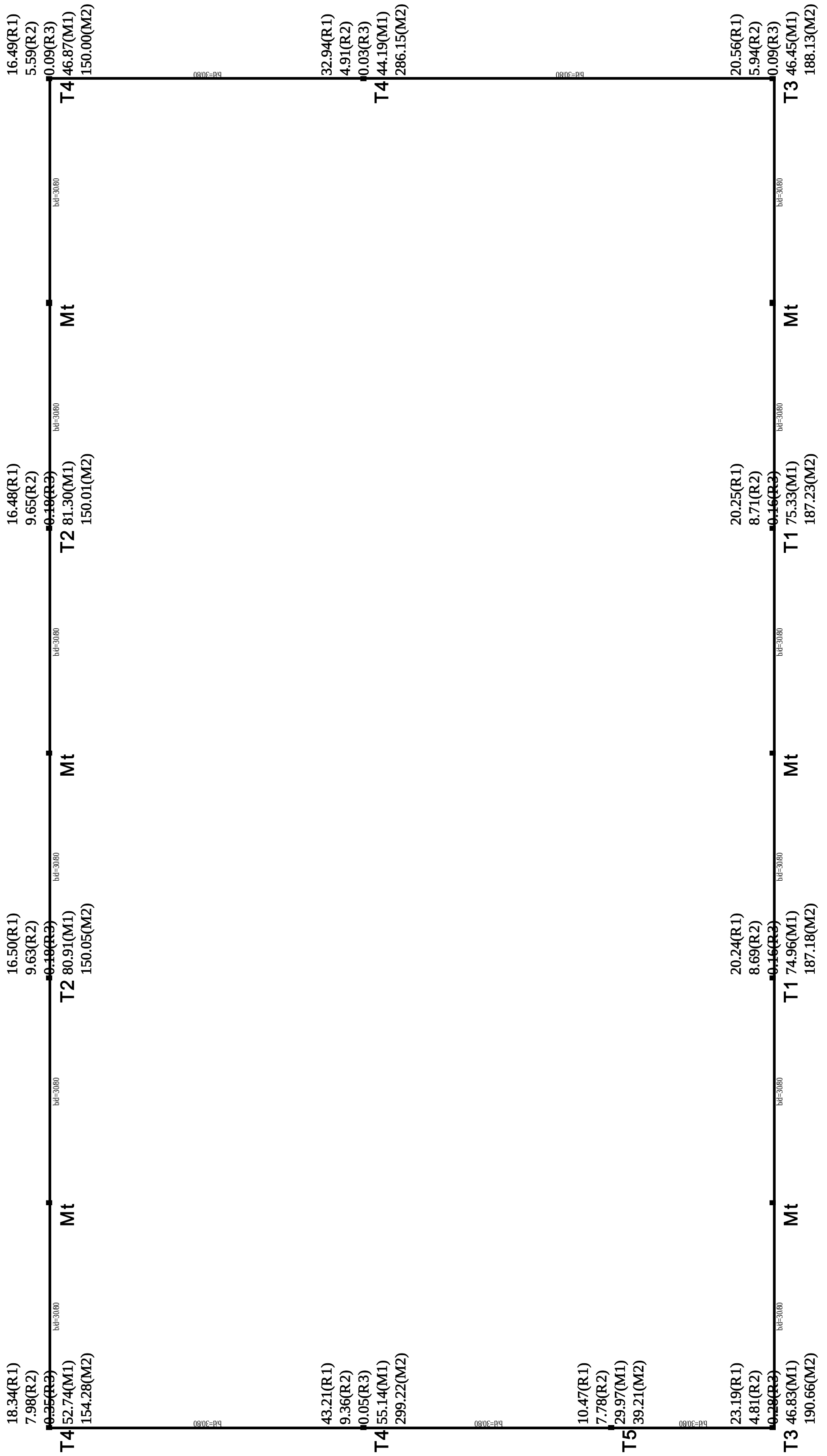
Nivo: [-0.35 m]
Reakcije oslonaca

KONZOLA ARHITEKTURA j.d.o.o.
Epulonova 17, Novigrad
OIB 85176229919

Proizvodni pogon za savijanje metala, rezanje metala
i izradu predgotovljenih elemenata od metala
TERAKOP građevinski obrt, Partizanska 13, Poreč
k.č. 1232/64, 1232/67, 1232/68 I 1836/25 k.o. Žbandaj

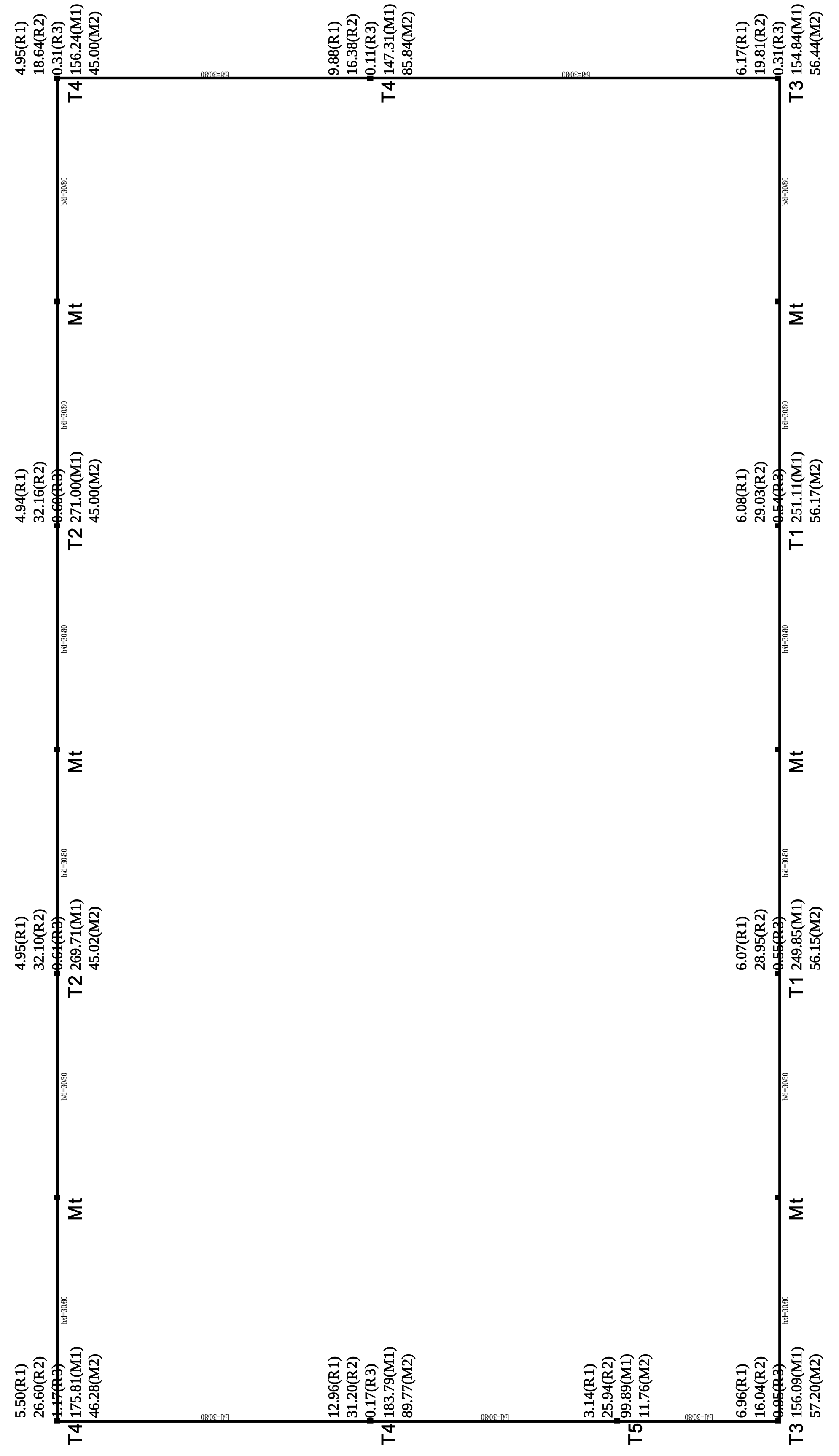
MAPA 3
BR.PROJEKTA G15/2017

Opt. 12: Potres x



Nivo: [-0.35 m]
Reakcije oslonaca

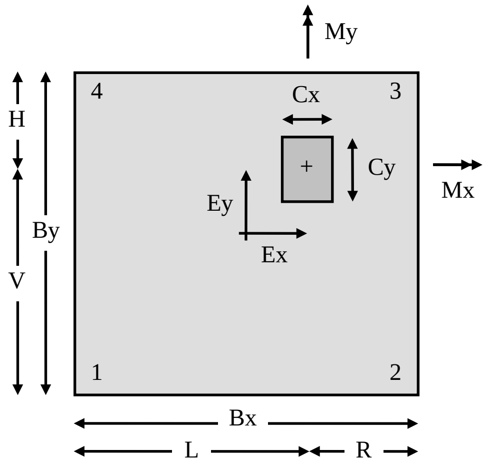
Opt. 13: Potres y



Nivo: [-0.35 m]
Reakcije oslonaca

Terakop Porec T1_VJETAR

SYSTEM CHARACTERISTICS:



Column:	Cx(m) = 0.60	Cy(m) = 1.20
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.30	By(m) = 3.00
Enlargement of foundation size with step size:		delta(m) = 0.00

Inputs for Sleeve Foundation:

Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 2.00

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		1407.00	49.00	49.00	16.00	0.00	0.00	0.00
2	QG		176.00	52.00	52.00	39.00	18.00	18.00	3.00
3	S1		112.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W	A1	0.00	580.00	580.00	65.00	0.00	0.00	0.00
5	W	A1	0.00	0.00	0.00	0.00	184.00	184.00	21.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 2.00** **T(m)= 1.05**

Column: C50/60	fbd (N/mm2)= 4.51	(Bond Condition II with Transverse Pressure)
Long. Reinforcement	ds(mm)= 2	Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
4	Y-Direction	Ho	940.23	Horizontal Top	10.81	per wall
8	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
4		Zv	555.19	Vertical	6.38	per corner

Definite Dimension of Foundation: **Bx(m)= 2.30** **By(m)= 3.00** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
2	LC1	1695.00	681.00	681.00	120.00	18.00	18.00	3.00
3	LC1	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
4	LC1	1695.00	101.00	101.00	55.00	202.00	202.00	24.00
5	LC1	1519.00	629.00	629.00	81.00	0.00	0.00	0.00
6	LC1	1583.00	101.00	101.00	55.00	18.00	18.00	3.00
7	LC1	1695.00	101.00	101.00	55.00	18.00	18.00	3.00
8	LC1	1407.00	629.00	629.00	81.00	0.00	0.00	0.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	1694.61	24.20 0.00	0.005 0.000	0.167 0.005	0.239 0.253	0.239 0.253	0.650 0.248
2	G+Q 21110	1982.61	495.00 22.65	0.083 0.005		0.135 0.422	0.152 0.439	0.650 **0.348**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
8	LC1 10010	1694.61	503.45 0.00	0.099 0.000	0.333 0.099

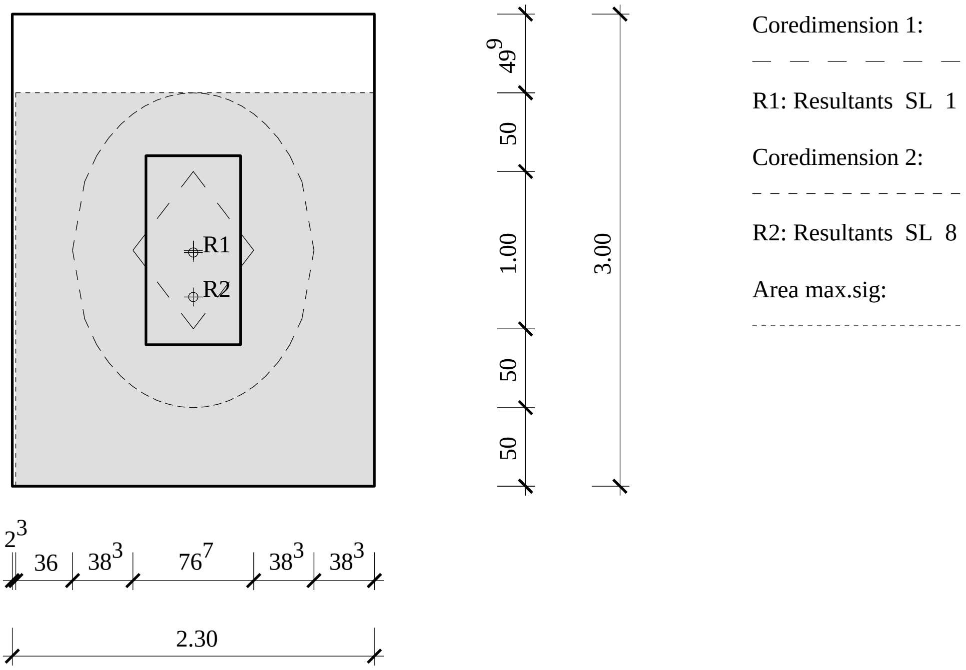
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
2	LC1 21110	1982.61	120.00 3.00	120.04	1.50	**7.73**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
2	LC1 21110	1982.61	495.00 22.65	0.083 0.005	120.00 3.00	1.25 2.00	2.00	fc fc	**0.98** 1.12

Relevant Eccentricities **M 1 : 48**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	W	A1	0.00	1.50	1.00	0.60	0.50	0.00
5	W	A1	0.00	1.50	1.00	0.60	0.50	0.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	2252.25	642.75	642.75	121.05	18.90	18.90	3.15
2	sEk	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
3	sEk	2168.25	120.75	120.75	62.55	294.90	294.90	34.65
4	sEk	2168.25	990.75	990.75	160.05	18.90	18.90	3.15
5	sEk	1983.45	936.15	936.15	119.10	0.00	0.00	0.00
6	sEk	1671.00	127.00	127.00	74.50	27.00	27.00	4.50
7	sEk	2252.25	120.75	120.75	62.55	18.90	18.90	3.15
8	sEk	1407.00	919.00	919.00	113.50	0.00	0.00	0.00

SL	Place Comb.	MEd(kNm)	Dir.	D(m) B1-4(m) B5-8(m)	eps.c As1 As5	eps.s As2 As6	x/d As3 As7	Total As As4 As8	(cm2) (cm2) (cm2)
3	R	160.59	X	0.430	-1.07	25.00	0.04	8.30	Bottom
	21102			0.375	1.04	1.04	1.04	1.04	V
				0.375	1.04	1.04	1.04	1.04	H
4	V	145.73	Y	0.450	-1.12	25.00	0.04	7.20	Bottom
	21120			0.287	0.90	0.90	0.90	0.90	L
				0.287	0.90	0.90	0.90	0.90	R

SAFETY AGAINST PUNCHING: (Heft 525)

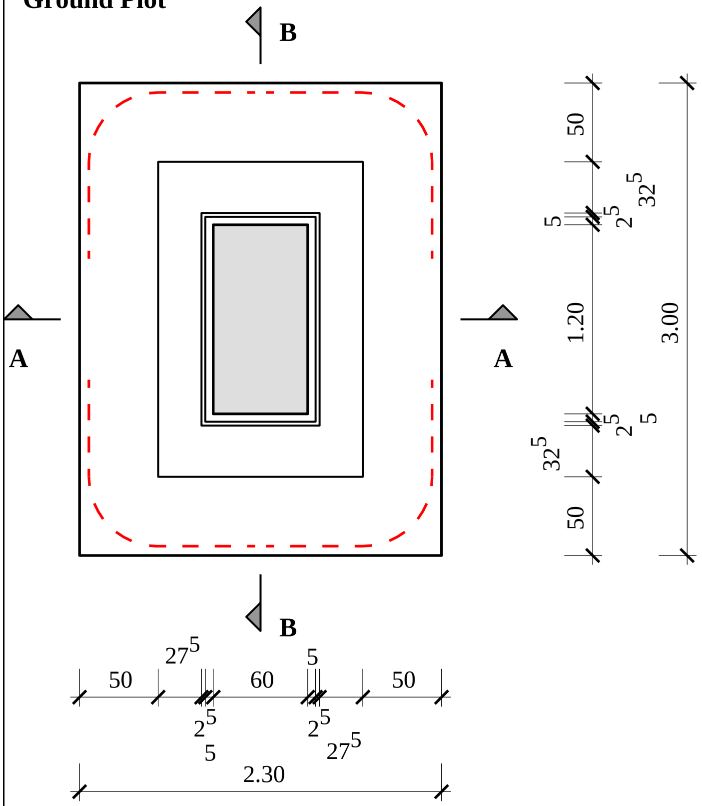
SL 4 Comb. 21120 V0d = 2168.25 kN
Resisting Shear Force VEd = 813.18 kN Coefficient beta = 1.18

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	124.83	156.10	0.06	0.07	234.15

In X-Direction required because of minimum moment:
mEdx = 101.65 kNm/m: req.asx = 5.05 cm2/m eff. Width = 0.90 m

In Y-Direction required because of minimum moment:
mEdy = 101.65 kNm/m: req.asy = 5.29 cm2/m eff. Width = 0.69 m

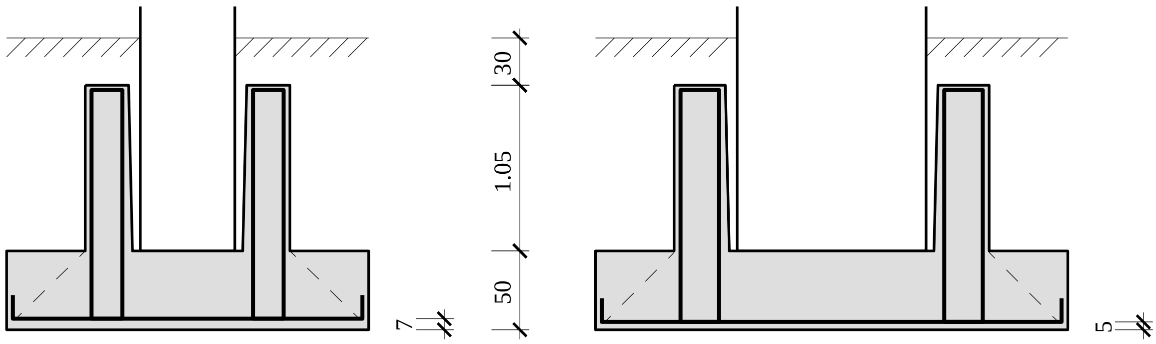
Ground Plot **M 1 : 48**

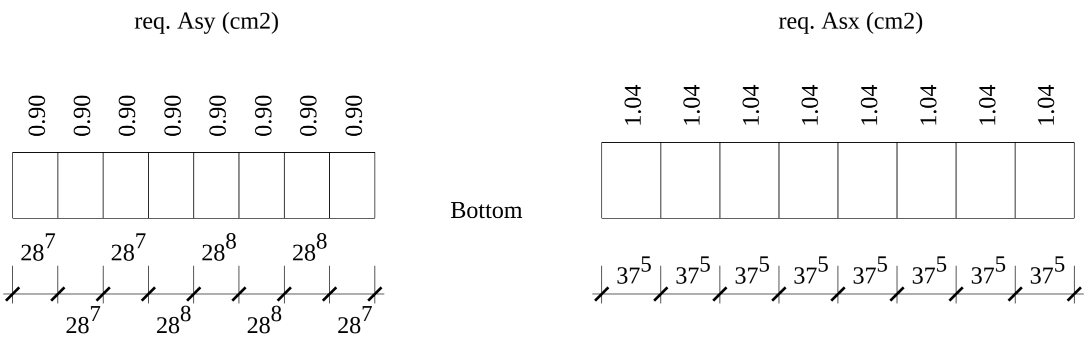


For Punching Shear Resisting:

Critical Section k

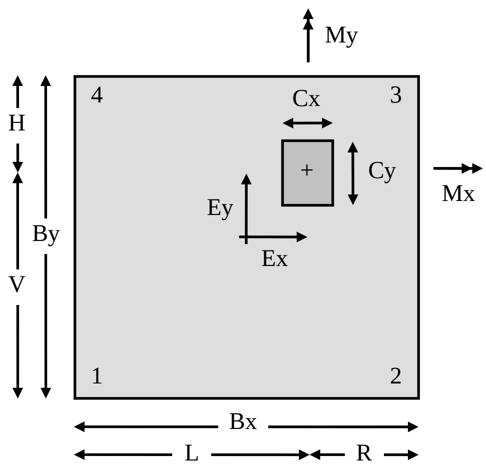
Section A - A **Section B - B**





Terakop Porec T1_POTRES

SYSTEM CHARACTERISTICS:



Column:	Cx(m) = 0.60	Cy(m) = 1.20
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.30	By(m) = 3.00
Enlargement of foundation size with step size:		delta(m) = 0.00
Inputs for Sleeve Foundation:		
Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 2.00

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		1407.00	49.00	49.00	16.00	0.00	0.00	0.00
2	QG		176.00	52.00	52.00	39.00	18.00	18.00	3.00
3	S1		112.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EA	A1	0.00	500.00	500.00	58.00	0.00	0.00	0.00
5	EA	A1	0.00	0.00	0.00	0.00	374.00	374.00	41.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 2.00** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
6	Y-Direction	Ho	544.94	Horizontal Top	5.45	per wall
12	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
8		Zv	464.18	Vertical	4.64	per corner

Definite Dimension of Foundation: **Bx(m)= 2.30** **By(m)= 3.00** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 5
Stability LF 3: Accidental Ek: SL 6 - 12

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
2	LC1	1695.00	101.00	101.00	55.00	18.00	18.00	3.00
3	LC1	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
4	LC1	1519.00	49.00	49.00	16.00	0.00	0.00	0.00
5	LC1	1583.00	101.00	101.00	55.00	18.00	18.00	3.00
6	LC3	1695.00	601.00	601.00	113.00	18.00	18.00	3.00
7	LC3	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
8	LC3	1695.00	101.00	101.00	55.00	392.00	392.00	44.00
9	LC3	1519.00	549.00	549.00	74.00	0.00	0.00	0.00
10	LC3	1583.00	101.00	101.00	55.00	18.00	18.00	3.00
11	LC3	1695.00	101.00	101.00	55.00	18.00	18.00	3.00
12	LC3	1407.00	49.00	49.00	16.00	374.00	374.00	41.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	1694.61	24.20 0.00	0.005 0.000	0.167 0.005	0.239 0.253	0.239 0.253	0.650 0.248

SL	Kind / Comb.	VSd	MxISd / MyISd	EyI/By / ExI/Bx	perm.BER1 / prov.BER1	sig.4 / sig.1	sig.3 / sig.2	perm.sig / max.sig
2	G+Q	1982.61	15.75	0.003		0.274	0.291	0.650
	21100		22.65	0.005		0.283	0.300	**0.292**

Steadiness: BER2 = Specific Eccentricity

SL	Kind / Comb.	VSd	MxIISd / MyIISd	EyII/By / ExII/Bx	perm.BER2 / prov.BER2
5	LC1	1870.61	15.75	0.003	0.333
	11000		22.65	0.005	0.006
12	LC3	1694.61	24.20	0.005	0.333
	10001		437.55	0.112	0.112

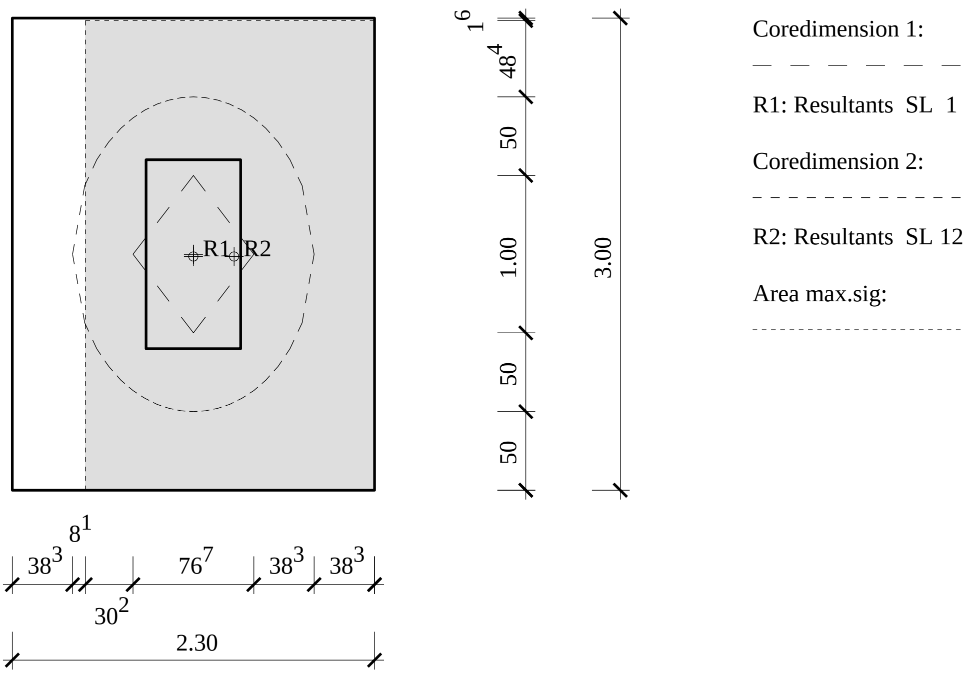
Slide Stability eta:

SL	Kind / Comb.	VSd	Hxd / Hyd	Res.Hd	req.eta	prov.eta
5	LC1	1870.61	55.00	55.08	1.50	**15.88**
	11000		3.00			
6	LC3	1982.61	113.00	113.04	1.20	**8.20**
	21110		3.00			

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind / Comb.	VSd	MxIISd / MyIISd	EyII/By / ExII/Bx	ass.Hd / ass.Hd	eta.f / eta.c	eta.p		IAB.y / IAB.x
2	LC1	1982.61	15.75	0.003	55.00	1.25	2.00	p	1.14
	21100		22.65	0.005	3.00	2.00		p	1.21
8	LC3	1982.61	15.75	0.003	55.00	1.10	1.30	p	1.32
	21101		460.20	0.101	44.00	1.30		p	1.36

Relevant Eccentricities **M 1 : 48**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00
5	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 5
Design Accidental Ek: SL 6 - 12

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	2252.25	120.75	120.75	62.55	18.90	18.90	3.15
2	sEk	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
3	sEk	2247.45	144.15	144.15	80.10	27.00	27.00	4.50
4	sEk	2067.45	66.15	66.15	21.60	0.00	0.00	0.00
5	sEk	1671.00	127.00	127.00	74.50	27.00	27.00	4.50
6	aEk	1495.11	575.00	575.00	93.50	9.00	9.00	1.50
7	aEk	1407.00	49.00	49.00	16.00	0.00	0.00	0.00
8	aEk	1495.11	75.00	75.00	35.50	383.00	383.00	42.50
9	aEk	1429.40	549.00	549.00	74.00	0.00	0.00	0.00
10	aEk	1495.00	75.00	75.00	35.50	9.00	9.00	1.50
11	aEk	1482.20	64.60	64.60	27.70	5.40	5.40	0.90
12	aEk	1407.00	49.00	49.00	16.00	374.00	374.00	41.00

SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
8	R	136.16	X	0.450	-0.85	25.00	0.03	6.12	Bottom
	21101			0.375	0.77	0.77	0.77	0.77	V
				0.375	0.77	0.77	0.77	0.77	H
1	V	95.98	Y	0.430	-0.85	25.00	0.03	4.52	Bottom

SL	Place Comb.	MEd(kNm)	Dir.	D(m) B1-4(m) B5-8(m)	eps.c As1 As5	eps.s As2 As6	x/d As3 As7	Total As As4 As8	(cm2) (cm2) (cm2)
	21100			0.287	0.56	0.56	0.56	0.56	L
				0.287	0.56	0.56	0.56	0.56	R

SAFETY AGAINST PUNCHING: (Heft 525)

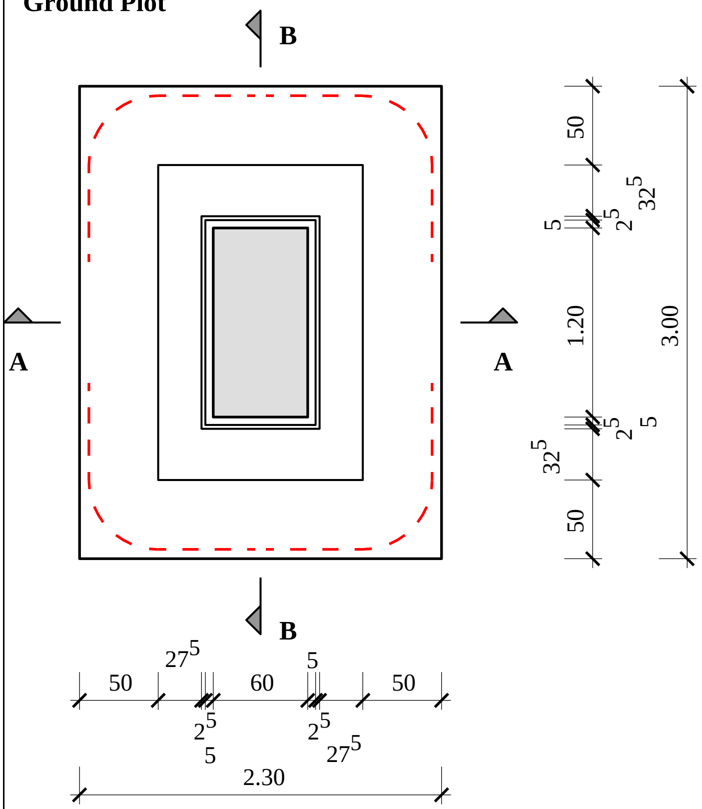
SL 1 Comb. 21100 V0d = 2252.25 kN
Resisting Shear Force VEd = 844.90 kN Coefficient beta = 1.06

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	116.06	137.27	0.05	0.04	205.91

In X-Direction required because of minimum moment:
mEdx = 105.61 kNm/m: req.asx = 4.78 cm2/m eff. Width = 0.90 m

In Y-Direction required because of minimum moment:
mEdy = 105.61 kNm/m: req.asy = 5.01 cm2/m eff. Width = 0.69 m

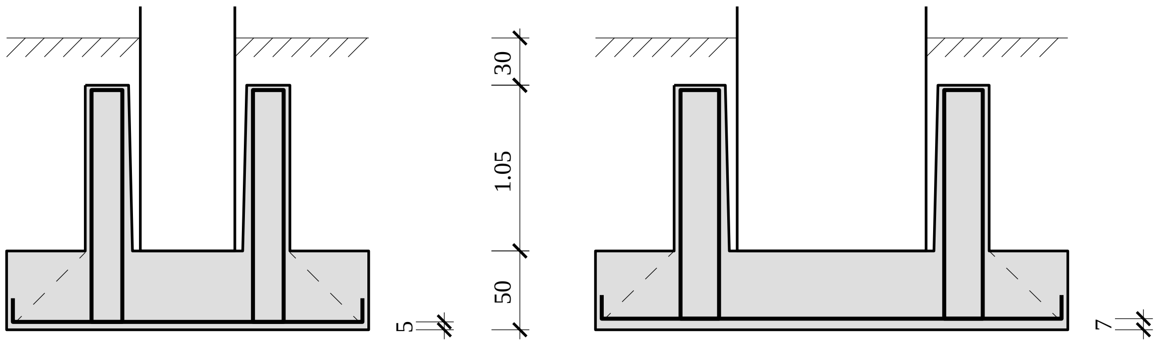
Ground Plot **M 1 : 48**



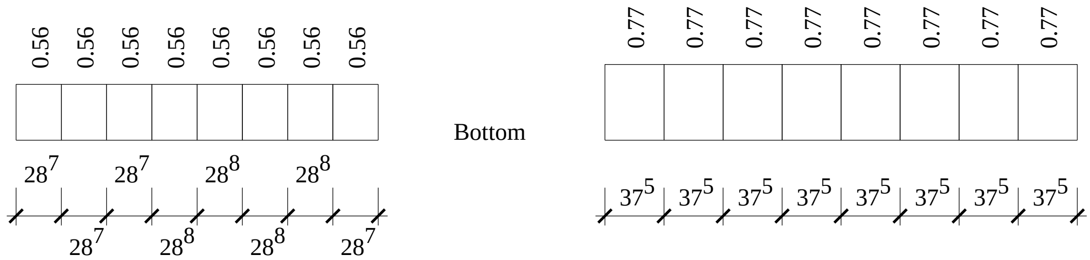
For Punching Shear Resisting:

Critical Section k

Section A - A **Section B - B**



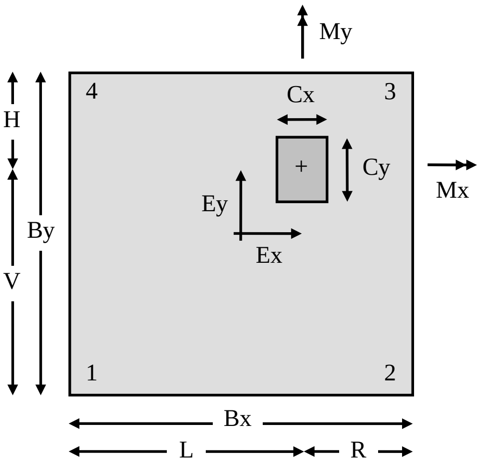
req. Asy (cm2) req. Asx (cm2)



Terakop Porec T2_VJETAR

SYSTEM CHARACTERISTICS:

Column:	Cx(m) = 0.60	Cy(m) = 0.60
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.40	By(m) = 2.30
Enlargement of foundation size with step size:		delta(m) = 0.00
Inputs for Sleeve Foundation:		
Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 1.40



Soil Characteristics: Unit Weight of Soil

Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		718.00	22.00	22.00	8.00	0.00	0.00	0.00
2	QG		88.00	26.00	26.00	19.00	0.00	0.00	0.00
3	S1		56.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W	A1	0.00	628.00	628.00	116.00	0.00	0.00	0.00
5	W	A1	0.00	0.00	0.00	0.00	134.00	134.00	15.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 1.40** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
4	Y-Direction	Ho	896.01	Horizontal Top	10.30	per wall
8	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
4		Zv	763.03	Vertical	8.77	per corner

Definite Dimension of Foundation: **Bx(m)= 2.40** **By(m)= 2.30** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	718.00	22.00	22.00	8.00	0.00	0.00	0.00
2	LC1	862.00	676.00	676.00	143.00	0.00	0.00	0.00
3	LC1	718.00	22.00	22.00	8.00	0.00	0.00	0.00
4	LC1	862.00	48.00	48.00	27.00	134.00	134.00	15.00
5	LC1	774.00	650.00	650.00	124.00	0.00	0.00	0.00
6	LC1	806.00	48.00	48.00	27.00	0.00	0.00	0.00
7	LC1	862.00	48.00	48.00	27.00	0.00	0.00	0.00
8	LC1	718.00	650.00	650.00	124.00	0.00	0.00	0.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	948.32	9.60 0.00	0.004 0.000	0.167 0.004	0.167 0.176	0.167 0.176	0.650 0.173
2	G+Q	1092.32	454.35	0.181		0.000	0.000	0.650

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
	21110		0.00	0.000		0.413	0.413	**0.310**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
8	LC1	948.32	457.80	0.210	0.333
	10010		0.00	0.000	0.210

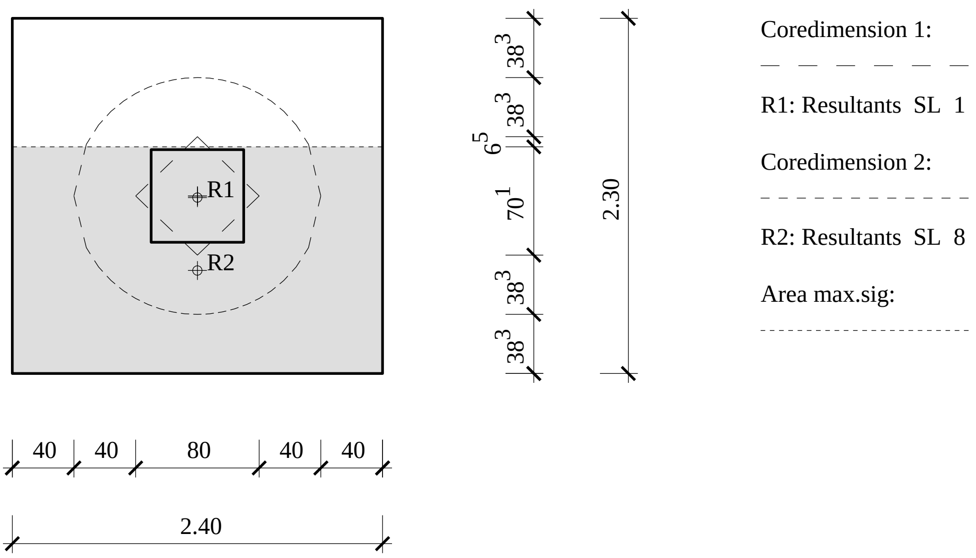
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
2	LC1	1092.32	143.00	143.00	1.50	**3.57**
	21110		0.00			

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
2	LC1	1092.32	454.35	0.181	143.00	1.25	2.00	fc	**0.94**
	21110		0.00	0.000	0.00	2.00		fc	1.12

Relevant Eccentricities **M 1 : 49**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	W	A1	0.00	1.50	1.00	0.60	0.50	0.00
5	W	A1	0.00	1.50	1.00	0.60	0.50	0.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	1145.70	622.20	622.20	135.15	0.00	0.00	0.00
2	sEk	718.00	22.00	22.00	8.00	0.00	0.00	0.00
3	sEk	1103.70	57.00	57.00	30.75	201.00	201.00	22.50
4	sEk	1103.70	999.00	999.00	204.75	0.00	0.00	0.00
5	sEk	1011.30	971.70	971.70	184.80	0.00	0.00	0.00
6	sEk	850.00	61.00	61.00	36.50	0.00	0.00	0.00
7	sEk	1145.70	57.00	57.00	30.75	0.00	0.00	0.00
8	sEk	718.00	964.00	964.00	182.00	0.00	0.00	0.00

SL	Place / Comb.	MEd(kNm)	Dir.	D(m) / B1-4(m) / B5-8(m)	eps.c / As1 / As5	eps.s / As2 / As6	x/d / As3 / As7	Total As / As4 / As8	(cm2)
8	V	-13.36	Y	0.460	-0.29	25.00	0.01	0.64	Top
	10020								
3	R	101.52	X	0.430	-0.94	25.00	0.04	5.24	Bottom
	21102			0.287	0.65	0.65	0.65	0.65	V
				0.287	0.65	0.65	0.65	0.65	H
4	V	118.86	Y	0.450	-0.95	25.00	0.04	5.86	Bottom
	21120			0.300	0.73	0.73	0.73	0.73	L
				0.300	0.73	0.73	0.73	0.73	R

SAFETY AGAINST PUNCHING: (Heft 525)

SL 8 Comb. 10020 V0d = 718.00 kN
Resisting Shear Force VEd = 416.72 kN Coefficient beta = 1.44

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	77.95	144.98	0.05	0.06	217.48

In X-Direction required because of minimum moment:
mEdx = 52.09 kNm/m: req.asx = 2.57 cm2/m eff. Width = 0.69 m

In Y-Direction required because of minimum moment:
mEdy = 52.09 kNm/m: req.asy = 2.69 cm2/m eff. Width = 0.72 m

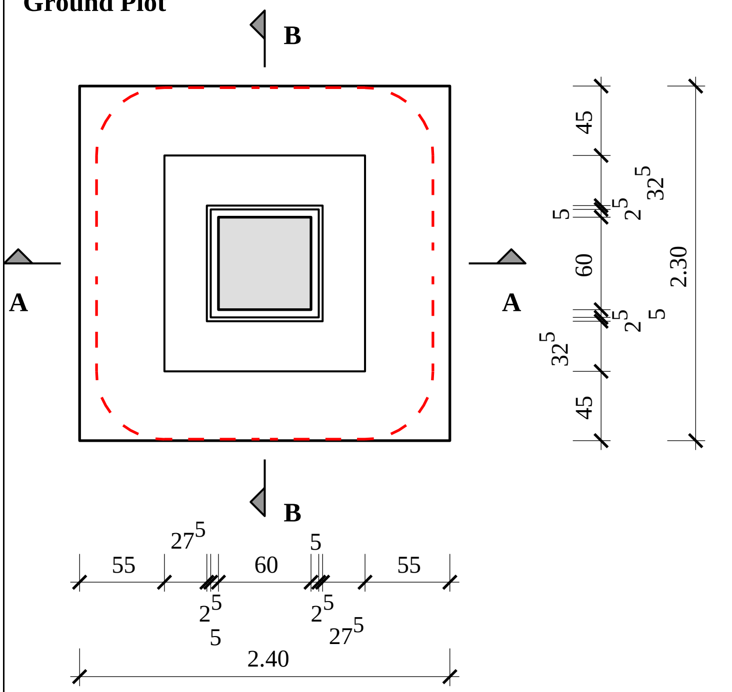
KONZOLA ARHITEKTURA j.d.o.o.
Epulonova 17, Novigrad
OIB 85176229919

Proizvodni pogon za savijanje metala, rezanje metala
i izradu predgotovljenih elemenata od metala
TERAKOP građevinski obrt, Partizanska 13, Poreč
k.č. 1232/64, 1232/67, 1232/68 I 1836/25 k.o. Žbandaj

MAPA 3
BR.PROJEKTA G15/2017

Ground Plot

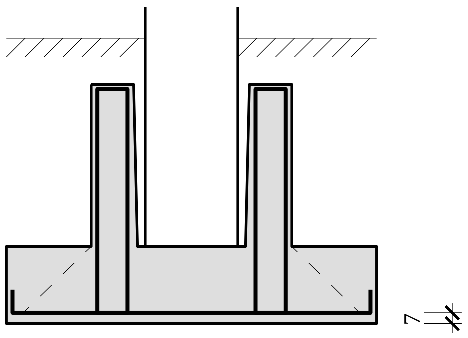
M 1 : 49



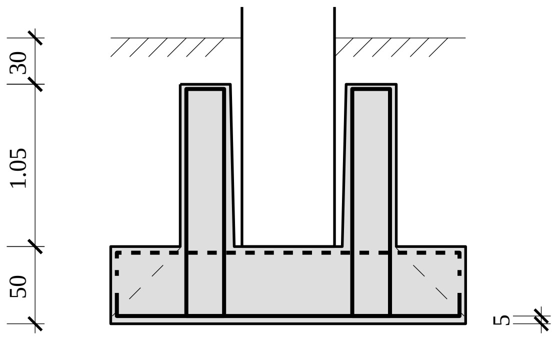
For Punching Shear Resisting:

Critical Section k

Section A - A

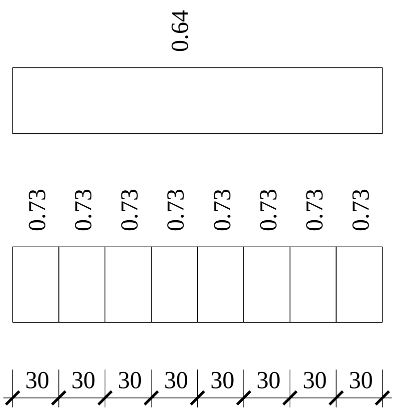


Section B - B



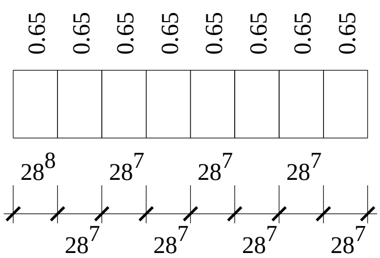
req. Asy (cm2)

req. Asx (cm2)



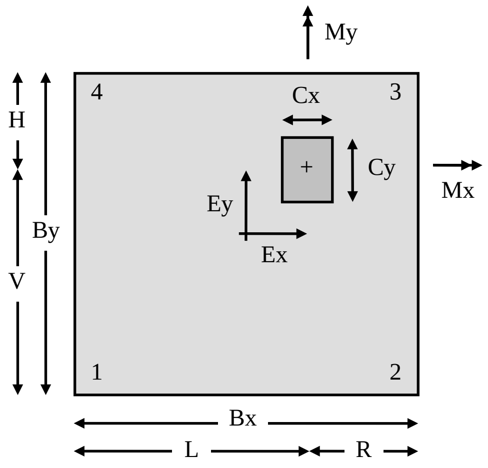
Top

Bottom



Terakop Porec T2_POTRES

SYSTEM CHARACTERISTICS:



Column: Cx(m) = 0.60 Cy(m) = 0.60
Ex(m) = 0.00 Ey(m) = 0.00

Layer of Soil: He(m) = 1.35

Type: Individual Foundation Default:
Depth of Foundation: H (m) =-0.50

Dimensions: Bx(m) = 2.40 By(m) = 2.30

Enlargement of foundation size
with step size: delta(m) = 0.00

Inputs for Sleeve Foundation:
Surface Column-Sleeve: rough
Anchoring Depth: T (m) = 1.05
Distance Column Base-Top Found.: A (m) = 0.00
Dimensions: Dx(m) = 1.30 Dy(m) = 1.40

Soil Characteristics:

				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		718.00	22.00	22.00	8.00	0.00	0.00	0.00
2	QG		88.00	26.00	26.00	19.00	0.00	0.00	0.00
3	S1		56.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EA	A1	0.00	271.00	271.00	33.00	0.00	0.00	0.00
5	EA	A1	0.00	0.00	0.00	0.00	150.00	150.00	15.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 1.40** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
6	Y-Direction	Ho	289.11	Horizontal Top	2.89	per wall
12	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
6		Zv	246.20	Vertical	2.46	per corner

Definite Dimension of Foundation: **Bx(m)= 2.40** **By(m)= 2.30** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 5
Stability LF 3: Accidental Ek: SL 6 - 12

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	718.00	22.00	22.00	8.00	0.00	0.00	0.00
2	LC1	862.00	48.00	48.00	27.00	0.00	0.00	0.00
3	LC1	718.00	22.00	22.00	8.00	0.00	0.00	0.00
4	LC1	774.00	22.00	22.00	8.00	0.00	0.00	0.00
5	LC1	806.00	48.00	48.00	27.00	0.00	0.00	0.00
6	LC3	862.00	319.00	319.00	60.00	0.00	0.00	0.00
7	LC3	718.00	22.00	22.00	8.00	0.00	0.00	0.00
8	LC3	862.00	48.00	48.00	27.00	150.00	150.00	15.00
9	LC3	774.00	293.00	293.00	41.00	0.00	0.00	0.00
10	LC3	806.00	48.00	48.00	27.00	0.00	0.00	0.00
11	LC3	862.00	48.00	48.00	27.00	0.00	0.00	0.00
12	LC3	718.00	293.00	293.00	41.00	0.00	0.00	0.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	948.32	9.60 0.00	0.004 0.000	0.167 0.004	0.167 0.176	0.167 0.176	0.650 0.173
2	G+Q 21100	1092.32	6.15 0.00	0.002 0.000		0.195 0.201	0.195 0.201	0.650 **0.199**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
1	LC1 20000	948.32	9.60 0.00	0.004 0.000	0.333 0.004
12	LC3 10010	948.32	229.45 0.00	0.105 0.000	0.333 0.105

Slide Stability eta:

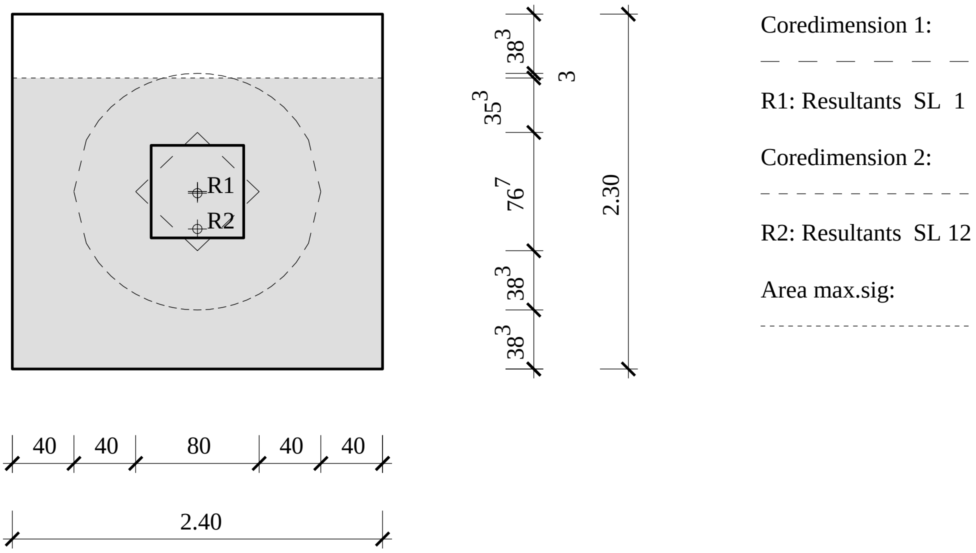
SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
5	LC1 11000	1036.32	27.00 0.00	27.00	1.50	**17.95**
6	LC3 21110	1092.32	60.00 0.00	60.00	1.20	**8.52**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
2	LC1 21100	1092.32	6.15 0.00	0.002 0.000	27.00 0.00	1.25 2.00	2.00	p p	1.74 1.84

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
6	LC3	1092.32	226.00	0.090	60.00	1.10	1.30	p	1.96
	21110		0.00	0.000	0.00	1.30		p	2.18

Relevant Eccentricities **M 1 : 49**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance
of Reinforcement:

H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00
5	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 5
Design Accidental Ek: SL 6 - 12

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	1145.70	57.00	57.00	30.75	0.00	0.00	0.00
2	sEk	718.00	22.00	22.00	8.00	0.00	0.00	0.00
3	sEk	1143.30	68.70	68.70	39.30	0.00	0.00	0.00
4	sEk	1053.30	29.70	29.70	10.80	0.00	0.00	0.00
5	sEk	850.00	61.00	61.00	36.50	0.00	0.00	0.00
6	aEk	762.06	306.00	306.00	50.50	0.00	0.00	0.00
7	aEk	718.00	22.00	22.00	8.00	0.00	0.00	0.00
8	aEk	762.06	35.00	35.00	17.50	150.00	150.00	15.00
9	aEk	729.20	293.00	293.00	41.00	0.00	0.00	0.00
10	aEk	762.00	35.00	35.00	17.50	0.00	0.00	0.00
11	aEk	762.06	35.00	35.00	17.50	0.00	0.00	0.00
12	aEk	718.00	293.00	293.00	41.00	0.00	0.00	0.00

SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
1	L	72.68	X	0.450	-0.70	25.00	0.03	3.26	Bottom
	21100			0.287	0.41	0.41	0.41	0.41	V
				0.287	0.41	0.41	0.41	0.41	H
6	V	56.62	Y	0.430	-0.62	25.00	0.02	2.66	Bottom
	21110			0.300	0.33	0.33	0.33	0.33	L
				0.300	0.33	0.33	0.33	0.33	R

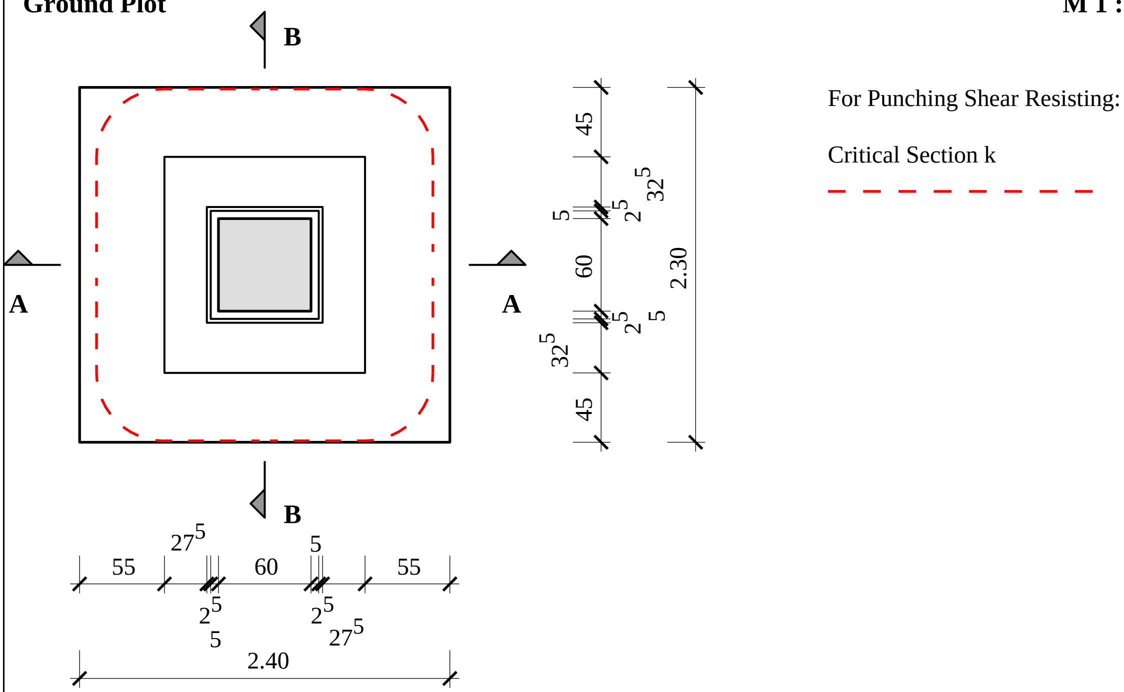
SAFETY AGAINST PUNCHING: (Heft 525)

SL 1 Comb. 21100 V0d = 1145.70 kN
Resisting Shear Force VEd = 248.53 kN Coefficient beta = 1.05

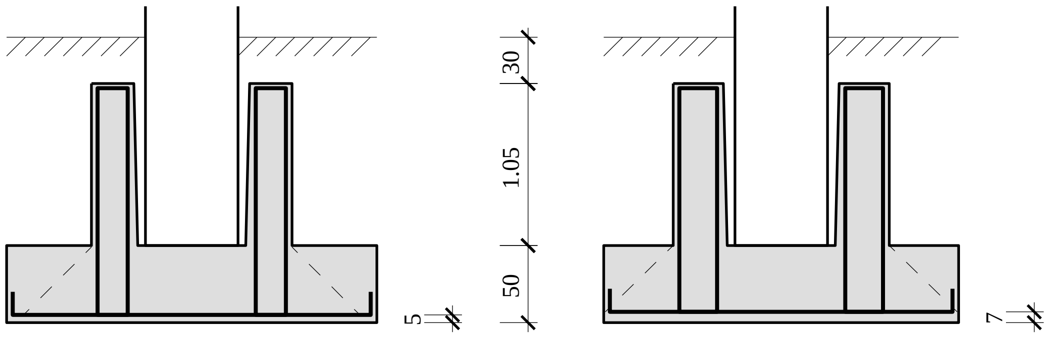
Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	34.04	117.41	0.03	0.03	176.12

In Y-Direction required because of minimum moment:
mEdy = 31.07 kNm/m: req.asy = 1.46 cm2/m eff. Width = 0.72 m

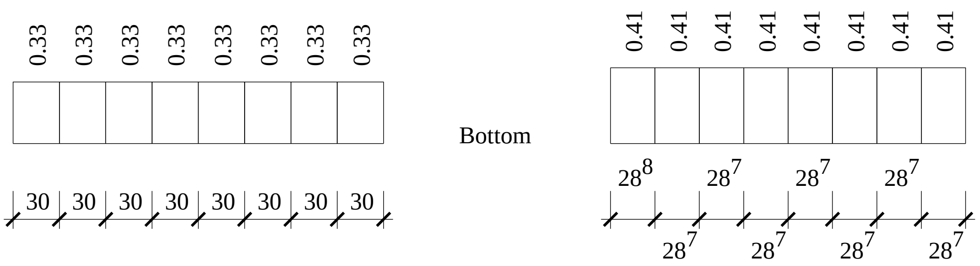
Ground Plot **M 1 : 49**



Section A - A **Section B - B**

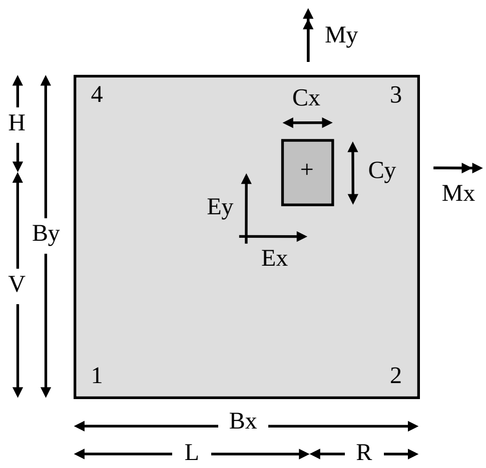


req. Asy (cm2) req. Asx (cm2)



Terakop Porec T3_VJETAR

SYSTEM CHARACTERISTICS:



Column:	Cx(m) = 0.60	Cy(m) = 1.20
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.30	By(m) = 3.00
Enlargement of foundation size with step size:		delta(m) = 0.00

Inputs for Sleeve Foundation:

Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 2.00

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		1247.00	16.00	16.00	6.00	0.00	0.00	0.00
2	QG		176.00	39.00	39.00	37.00	0.00	0.00	0.00
3	S1		32.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W	A1	0.00	250.00	250.00	29.00	0.00	0.00	0.00
5	W	A1	0.00	0.00	0.00	0.00	225.00	225.00	64.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 2.00** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
8	X-Direction	Ho	500.91	Horizontal Top	5.76	per wall
8	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
3		Zv	460.82	Vertical	5.30	per corner

Definite Dimension of Foundation: **Bx(m)= 2.30** **By(m)= 3.00** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
2	LC1	1455.00	305.00	305.00	72.00	0.00	0.00	0.00
3	LC1	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
4	LC1	1455.00	55.00	55.00	43.00	225.00	225.00	64.00
5	LC1	1279.00	266.00	266.00	35.00	0.00	0.00	0.00
6	LC1	1423.00	55.00	55.00	43.00	0.00	0.00	0.00
7	LC1	1455.00	55.00	55.00	43.00	0.00	0.00	0.00
8	LC1	1247.00	16.00	16.00	6.00	225.00	225.00	64.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	1534.61	6.70 0.00	0.001 0.000	0.167 0.001	0.220 0.224	0.220 0.224	0.650 0.223
4	G+Q 21101	1742.61	-11.65 324.20	-0.002 0.081		0.133 0.127	0.379 0.372	0.650 **0.303**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
8	LC1 10001	1534.61	6.70 324.20	0.001 0.092	0.333 0.092

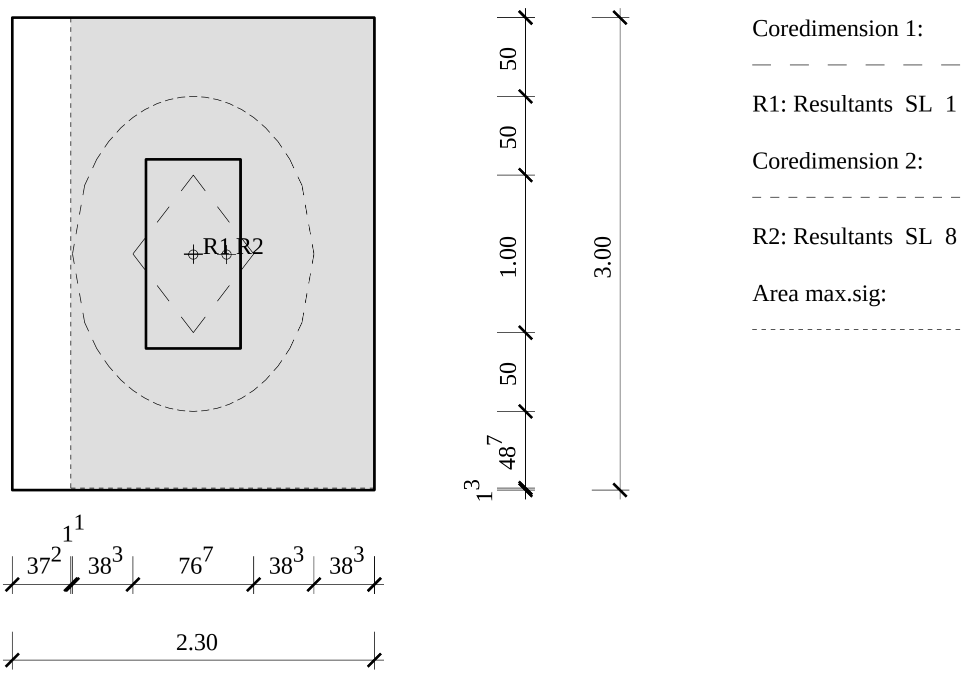
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
4	LC1 21101	1742.61	43.00 64.00	77.10	1.50	**10.57**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
4	LC1 21101	1742.61	-11.65 324.20	-0.002 0.081	43.00 64.00	1.25 2.00	2.00	p p	1.05 1.04

Relevant Eccentricities **M 1 : 48**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm, H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	W	A1	0.00	1.50	1.00	0.60	0.50	0.00
5	W	A1	0.00	1.50	1.00	0.60	0.50	0.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	1971.45	305.10	305.10	89.70	0.00	0.00	0.00
2	sEk	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
3	sEk	1892.25	62.55	62.55	46.95	337.50	337.50	96.00
4	sEk	1892.25	437.55	437.55	90.45	0.00	0.00	0.00
5	sEk	1707.45	396.60	396.60	51.60	0.00	0.00	0.00
6	sEk	1511.00	74.50	74.50	61.50	0.00	0.00	0.00
7	sEk	1916.25	62.55	62.55	46.95	0.00	0.00	0.00
8	sEk	1247.00	16.00	16.00	6.00	337.50	337.50	96.00

SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
3	R	162.28	X	0.450	-1.02	25.00	0.04	8.01	Bottom
	21102			0.375	1.00	1.00	1.00	1.00	V
				0.375	1.00	1.00	1.00	1.00	H
4	V	101.25	Y	0.430	-0.94	25.00	0.04	5.22	Bottom
	21120			0.287	0.65	0.65	0.65	0.65	L
				0.287	0.65	0.65	0.65	0.65	R

SAFETY AGAINST PUNCHING: (Heft 525)

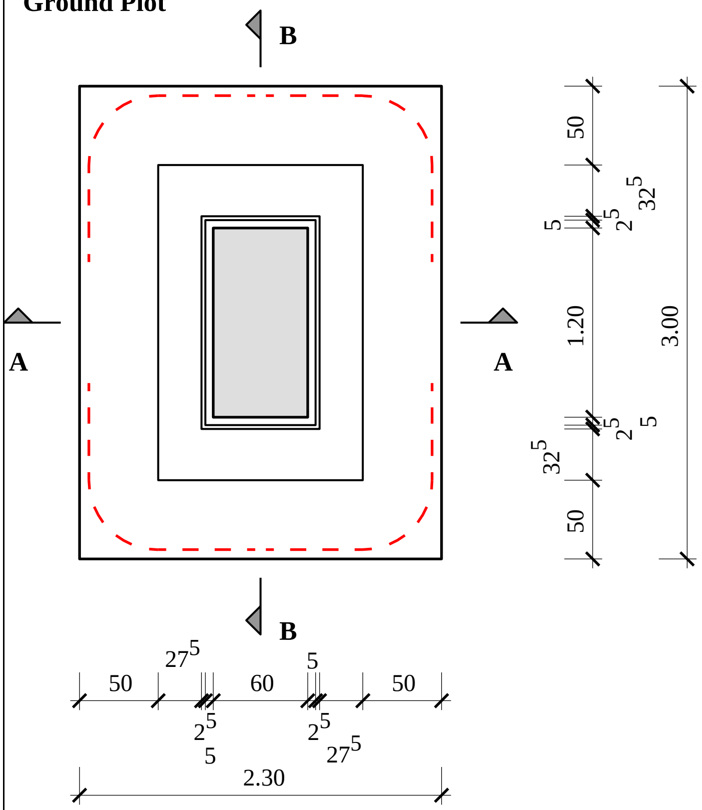
SL 3 Comb. 21102 V0d = 1892.25 kN
Resisting Shear Force VEd = 708.96 kN Coefficient beta = 1.18

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	108.31	147.09	0.06	0.05	220.64

In X-Direction required because of minimum moment:
mEdx = 88.62 kNm/m: req.asx = 4.39 cm2/m eff. Width = 0.90 m

In Y-Direction required because of minimum moment:
mEdy = 88.62 kNm/m: req.asy = 4.60 cm2/m eff. Width = 0.69 m

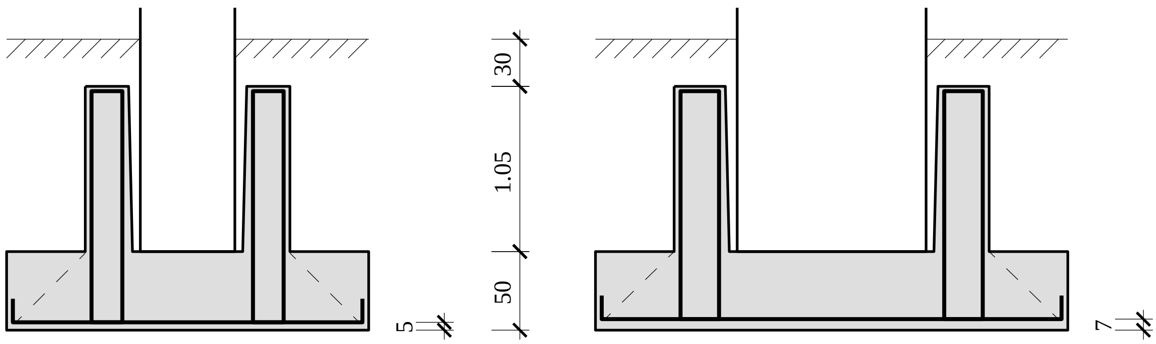
Ground Plot **M 1 : 48**



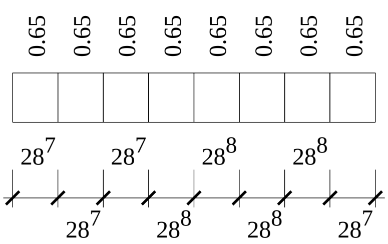
For Punching Shear Resisting:

Critical Section k

Section A - A **Section B - B**

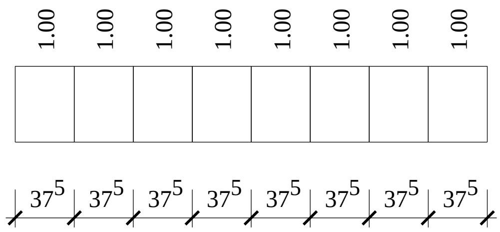


req. Asy (cm2)



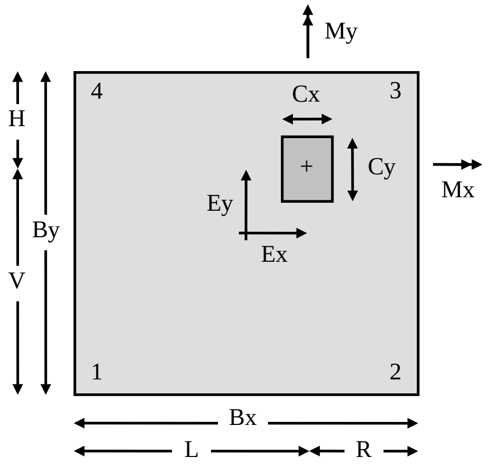
Bottom

req. Asx (cm2)



Terakop Porec T3_POTRES

SYSTEM CHARACTERISTICS:



Column:	Cx(m) = 0.60	Cy(m) = 1.20
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.30	By(m) = 3.00
Enlargement of foundation size with step size:		delta(m) = 0.00

Inputs for Sleeve Foundation:

Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 2.00

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		1247.00	16.00	16.00	6.00	0.00	0.00	0.00
2	QG		176.00	39.00	39.00	37.00	0.00	0.00	0.00
3	S1		32.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EA	A1	0.00	313.00	313.00	33.00	0.00	0.00	0.00
5	EA	A1	0.00	0.00	0.00	0.00	382.00	382.00	46.40

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve:	**Wx(m)= 0.27**	**Wy(m)= 0.32**	
	Dx(m)= 1.30	**Dy(m)= 2.00**	**T(m)= 1.05**

Column: C50/60	fbd (N/mm2)= 4.51	(Bond Condition II with Transverse Pressure)
Long. Reinforcement	ds(mm)= 2	Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
11	X-Direction	Ho	492.25	Horizontal Top	4.92	per wall
11	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
8		Zv	450.94	Vertical	4.51	per corner

Definite Dimension of Foundation: **Bx(m)= 2.30** **By(m)= 3.00** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 5
Stability LF 3: Accidental Ek: SL 6 - 12

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
2	LC1	1455.00	55.00	55.00	43.00	0.00	0.00	0.00
3	LC1	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
4	LC1	1279.00	16.00	16.00	6.00	0.00	0.00	0.00
5	LC1	1423.00	55.00	55.00	43.00	0.00	0.00	0.00
6	LC3	1455.00	368.00	368.00	76.00	0.00	0.00	0.00
7	LC3	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
8	LC3	1455.00	55.00	55.00	43.00	382.00	382.00	46.40
9	LC3	1279.00	329.00	329.00	39.00	0.00	0.00	0.00
10	LC3	1423.00	55.00	55.00	43.00	0.00	0.00	0.00
11	LC3	1455.00	55.00	55.00	43.00	0.00	0.00	0.00
12	LC3	1247.00	16.00	16.00	6.00	382.00	382.00	46.40

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind / Comb.	VSd	MxISd / MyISd	EyI/By / ExI/Bx	perm.BER1 / prov.BER1	sig.4 / sig.1	sig.3 / sig.2	perm.sig / max.sig
1	G	1534.61	6.70	0.001	0.167	0.220	0.220	0.650
	20000		0.00	0.000	0.001	0.224	0.224	0.223
2	G+Q	1742.61	-11.65	-0.002		0.256	0.256	0.650
	21100		0.00	0.000		0.249	0.249	**0.254**

Steadiness: BER2 = Specific Eccentricity

SL	Kind / Comb.	VSd	MxIISd / MyIISd	EyII/By / ExII/Bx	perm.BER2 / prov.BER2
5	LC1	1710.61	-11.65	-0.002	0.333
	11000		0.00	0.000	0.002
12	LC3	1534.61	6.70	0.001	0.333
	10001		453.92	0.129	0.129

Slide Stability eta:

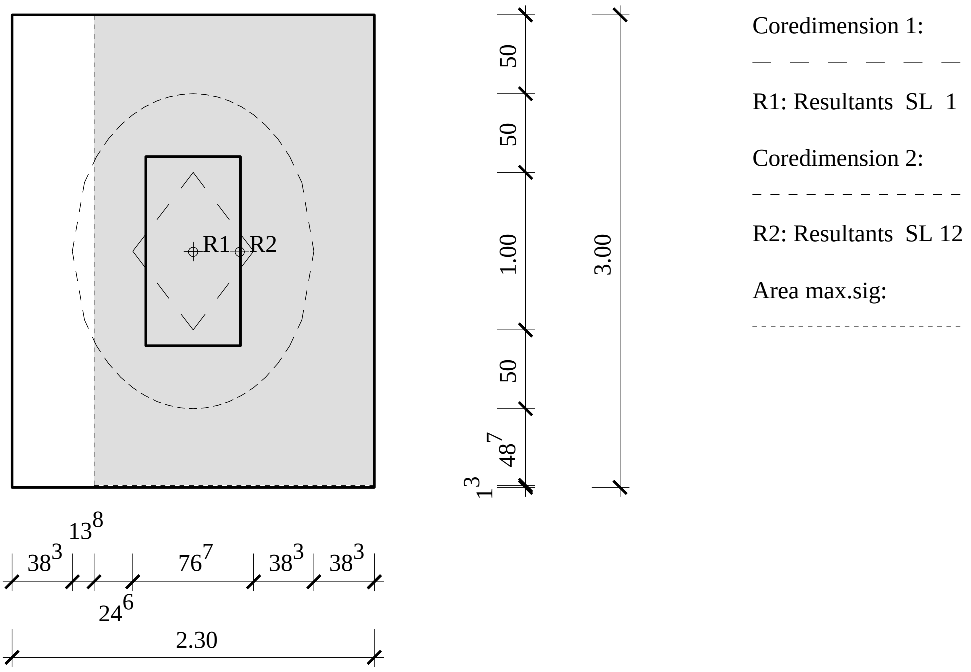
SL	Kind / Comb.	VSd	Hxd / Hyd	Res.Hd	req.eta	prov.eta
5	LC1	1710.61	43.00	43.00	1.50	**18.61**
	11000		0.00			
6	LC3	1742.61	76.00	76.00	1.20	**10.72**
	21110		0.00			

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind / Comb.	VSd	MxIISd / MyIISd	EyII/By / ExII/Bx	ass.Hd / ass.Hd	eta.f / eta.c	eta.p		IAB.y / IAB.x
2	LC1	1742.61	-11.65	-0.002	43.00	1.25	2.00	p	1.33
	21100		0.00	0.000	0.00	2.00		p	1.41

SL	Kind	VSd	MxIISd	EyII/By	ass.Hd	eta.f	eta.p		IAB.y
	Comb.		MyIISd	ExII/Bx	ass.Hd	eta.c			IAB.x
8	LC3	1742.61	-11.65	-0.002	43.00	1.10	1.30	p	1.45
	21101		453.92	0.113	46.40	1.30		p	1.48

Relevant Eccentricities **M 1 : 48**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00
5	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 5
Design Accidental Ek: SL 6 - 11

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	1971.45	80.10	80.10	63.60	0.00	0.00	0.00
2	sEk	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
3	sEk	1916.25	62.55	62.55	46.95	0.00	0.00	0.00
4	sEk	1731.45	21.60	21.60	8.10	0.00	0.00	0.00
5	sEk	1511.00	74.50	74.50	61.50	0.00	0.00	0.00
6	aEk	1335.03	348.50	348.50	57.50	0.00	0.00	0.00
7	aEk	1247.00	16.00	16.00	6.00	0.00	0.00	0.00
8	aEk	1335.03	35.50	35.50	24.50	382.00	382.00	46.40
9	aEk	1253.40	329.00	329.00	39.00	0.00	0.00	0.00
10	aEk	1335.00	35.50	35.50	24.50	0.00	0.00	0.00
11	aEk	1247.00	16.00	16.00	6.00	382.00	382.00	46.40

SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
8	R	128.07	X	0.450	-0.82	25.00	0.03	5.76	Bottom
	21101			0.375	0.72	0.72	0.72	0.72	V
				0.375	0.72	0.72	0.72	0.72	H
1	H	83.89	Y	0.430	-0.79	25.00	0.03	3.94	Bottom
	22100			0.287	0.49	0.49	0.49	0.49	L
				0.287	0.49	0.49	0.49	0.49	R

SAFETY AGAINST PUNCHING: (Heft 525)

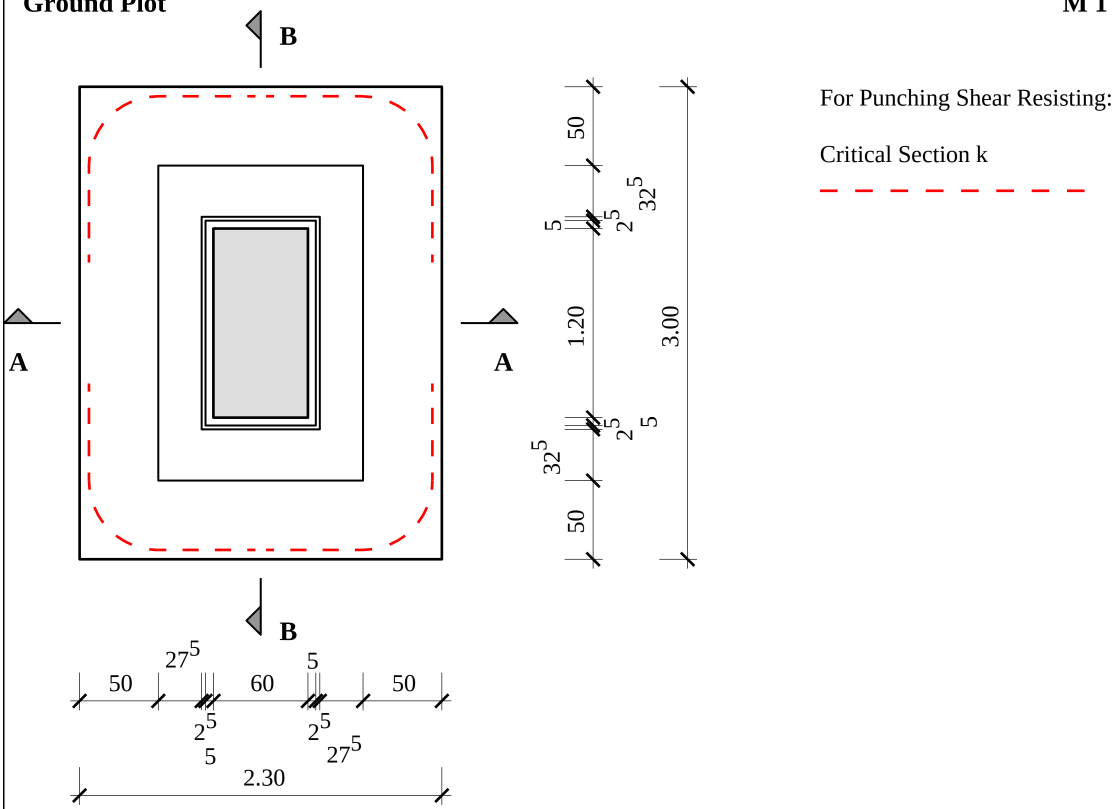
SL 1 Comb. 22100 V0d = 1971.45 kN
Resisting Shear Force VEd = 738.87 kN Coefficient beta = 1.05

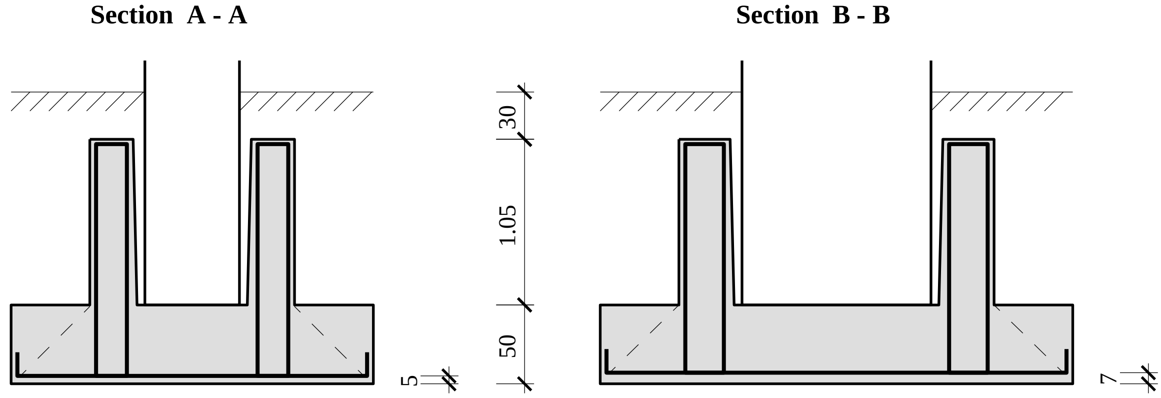
Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	101.19	132.84	0.04	0.04	199.25

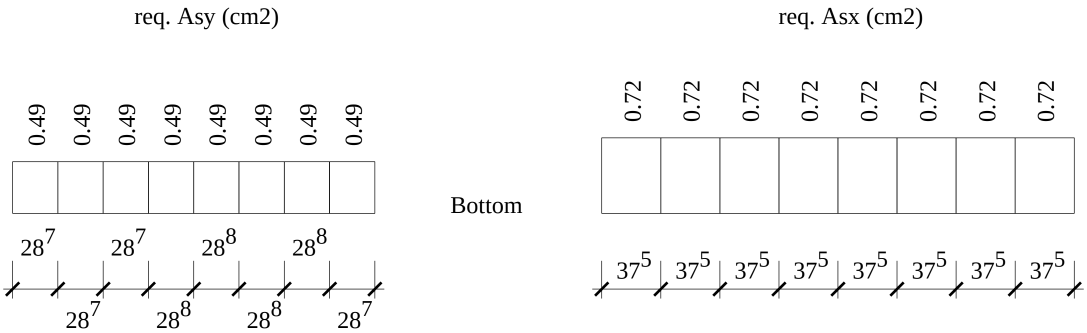
In X-Direction required because of minimum moment:
mEdx = 92.36 kNm/m: req.asx = 4.18 cm2/m eff. Width = 0.90 m

In Y-Direction required because of minimum moment:
mEdy = 92.36 kNm/m: req.asy = 4.37 cm2/m eff. Width = 0.69 m

Ground Plot **M 1 : 48**



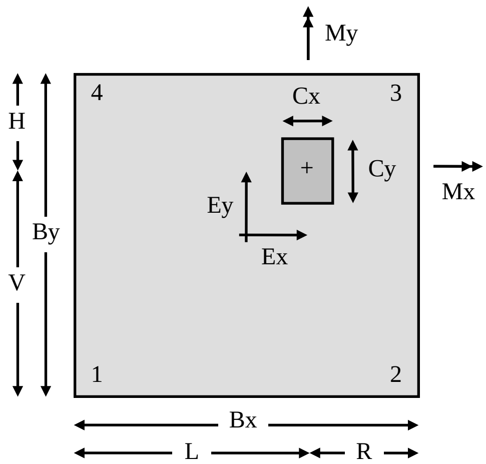




Terakop Porec T4_VJETAR

SYSTEM CHARACTERISTICS:

Column:	Cx(m) = 0.60	Cy(m) = 0.60
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.30	By(m) = 2.40
Enlargement of foundation size with step size:		delta(m) = 0.00



Inputs for Sleeve Foundation:		
Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 1.40

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		799.00	4.00	4.00	3.00	0.00	0.00	0.00
2	QG		0.00	36.00	36.00	6.00	0.00	0.00	0.00
3	S1		69.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W	A1	0.00	230.00	230.00	18.00	0.00	0.00	0.00
5	W	A1	0.00	0.00	0.00	0.00	441.00	441.00	111.00

Design According: Concrete Grade C30/37 gamma.c = 1.50 aEk: 1.30
DIN 1045 / 2001 Reinforcement BSt500 gamma.s = 1.15 aEk: 1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 1.40** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
8	X-Direction	Ho	955.80	Horizontal Top	10.99	per wall
8	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
3		Zv	891.59	Vertical	10.25	per corner

Definite Dimension of Foundation: **Bx(m)= 2.30** **By(m)= 2.40** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 6

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	799.00	4.00	4.00	3.00	0.00	0.00	0.00
2	LC1	868.00	270.00	270.00	27.00	0.00	0.00	0.00
3	LC1	799.00	4.00	4.00	3.00	0.00	0.00	0.00
4	LC1	868.00	40.00	40.00	9.00	441.00	441.00	111.00
5	LC1	868.00	40.00	40.00	9.00	0.00	0.00	0.00
6	LC1	799.00	4.00	4.00	3.00	441.00	441.00	111.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind / Comb.	VSd	MxISd / MyISd	EyI/By / ExI/Bx	perm.BER1 / prov.BER1	sig.4 / sig.1	sig.3 / sig.2	perm.sig / max.sig
1	G	1029.32	-0.65	0.000	0.167	0.187	0.187	0.650
	20000		0.00	0.000	0.000	0.186	0.186	0.187
4	G+Q	1098.32	26.05	0.010		0.000	0.500	0.650
	21101		613.05	0.243		0.000	0.531	**0.394**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
6	LC1 10001	1029.32	-0.65 613.05	0.000 0.259	0.333 0.259

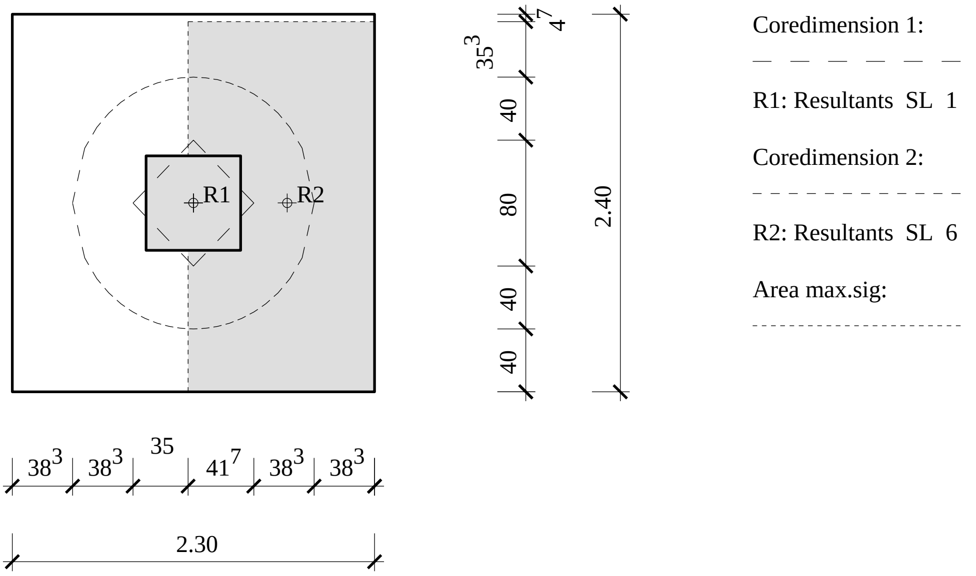
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
6	LC1 10001	1029.32	3.00 111.00	111.04	1.50	**4.34**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
6	LC1 10001	1029.32	-0.65 613.05	0.000 0.259	3.00 111.00	1.25 2.00	2.00	fc fc	**0.84** 0.75

Relevant Eccentricities **M 1 : 48**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	W	A1	0.00	1.50	1.00	0.60	0.50	0.00
5	W	A1	0.00	1.50	1.00	0.60	0.50	0.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	1182.15	250.20	250.20	26.55	0.00	0.00	0.00
2	sEk	799.00	4.00	4.00	3.00	0.00	0.00	0.00
3	sEk	1130.40	43.20	43.20	10.35	661.50	661.50	166.50
4	sEk	1130.40	388.20	388.20	37.35	0.00	0.00	0.00
5	sEk	850.75	386.80	386.80	36.30	0.00	0.00	0.00
6	sEk	1078.65	5.40	5.40	4.05	0.00	0.00	0.00
7	sEk	1182.15	43.20	43.20	10.35	0.00	0.00	0.00
8	sEk	799.00	4.00	4.00	3.00	661.50	661.50	166.50

SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
3	L	-16.49	X	0.470	-0.32	25.00	0.01	0.77	Top
	21102								
8	R	221.49	X	0.450	-1.40	25.00	0.05	10.99	Bottom
	10002			0.300	1.37	1.37	1.37	1.37	V
				0.300	1.37	1.37	1.37	1.37	H
4	V	96.30	Y	0.430	-0.92	25.00	0.04	4.97	Bottom
	21120			0.287	0.62	0.62	0.62	0.62	L
				0.287	0.62	0.62	0.62	0.62	R

SAFETY AGAINST PUNCHING: (Heft 525)

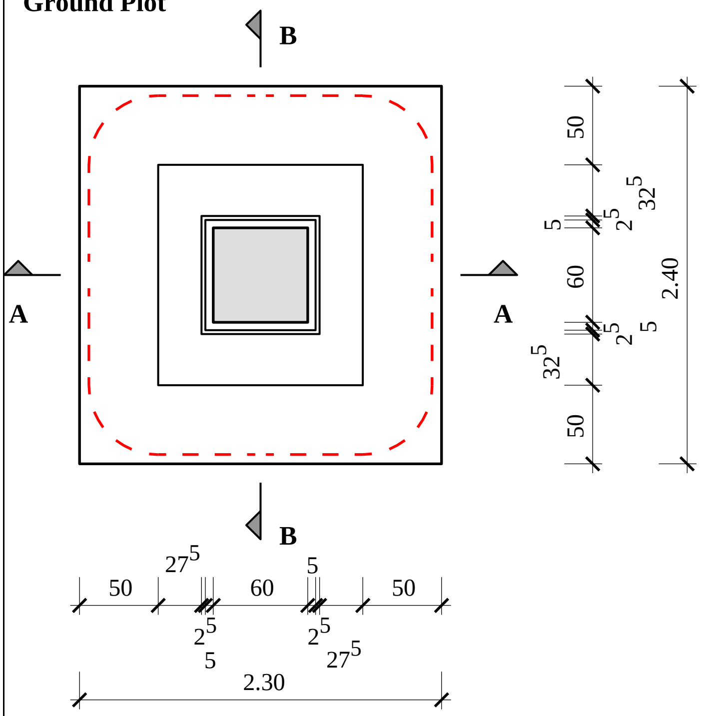
SL 8 Comb. 10002 V0d = 799.00 kN
Resisting Shear Force VEd = 799.00 kN Coefficient beta = 1.50

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	155.80	159.58	0.10	0.05	239.38

In X-Direction required because of minimum moment:
mEdx = 99.88 kNm/m: req.asx = 4.96 cm2/m eff. Width = 0.72 m

In Y-Direction required because of minimum moment:
mEdy = 99.88 kNm/m: req.asy = 5.20 cm2/m eff. Width = 0.69 m

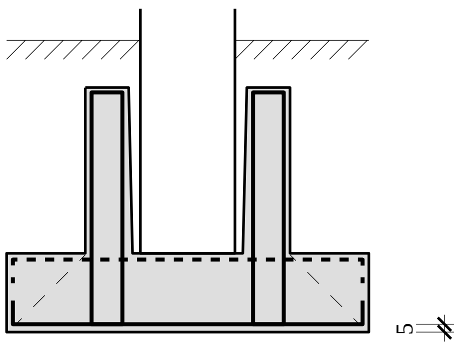
Ground Plot **M 1 : 48**



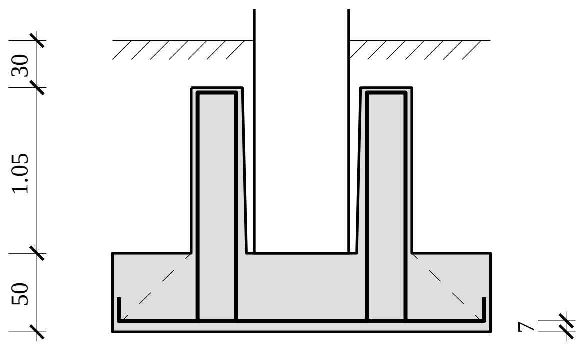
For Punching Shear Resisting:

Critical Section k

Section A - A



Section B - B

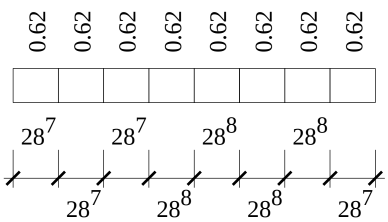


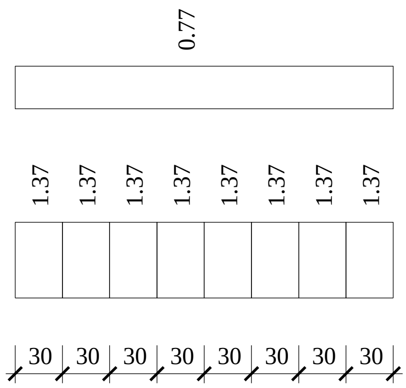
req. Asy (cm2)

req. Asx (cm2)

Top

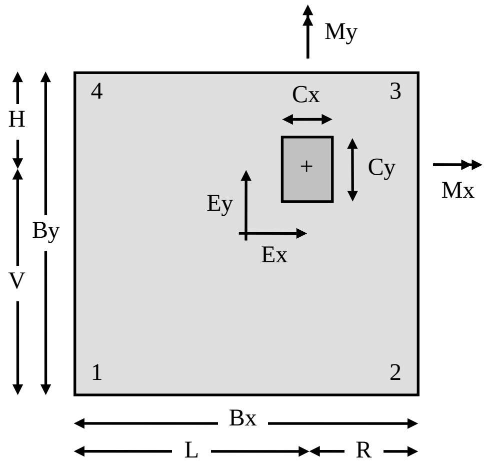
Bottom





Terakop Porec T4_POTRES

SYSTEM CHARACTERISTICS:



Column:	Cx(m) = 0.60	Cy(m) = 0.60
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.30	By(m) = 2.40
Enlargement of foundation size with step size:		delta(m) = 0.00

Inputs for Sleeve Foundation:

Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.30	Dy(m) = 1.40

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		799.00	4.00	4.00	3.00	0.00	0.00	0.00
2	QG		0.00	36.00	36.00	6.00	0.00	0.00	0.00
3	S1		69.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W	A1	0.00	184.00	184.00	13.00	0.00	0.00	0.00
5	W	A1	0.00	0.00	0.00	0.00	300.00	300.00	44.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.27** **Wy(m)= 0.32**
Dx(m)= 1.30 **Dy(m)= 1.40** **T(m)= 1.05**

Column: C50/60	fbd (N/mm2)= 4.51	(Bond Condition II with Transverse Pressure)
Long. Reinforcement	ds(mm)= 2	Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
8	X-Direction	Ho	593.49	Horizontal Top	6.83	per wall
8	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
3		Zv	563.91	Vertical	6.49	per corner

Definite Dimension of Foundation: **Bx(m)= 2.30** **By(m)= 2.40** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 6

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	799.00	4.00	4.00	3.00	0.00	0.00	0.00
2	LC1	868.00	224.00	224.00	22.00	0.00	0.00	0.00
3	LC1	799.00	4.00	4.00	3.00	0.00	0.00	0.00
4	LC1	868.00	40.00	40.00	9.00	300.00	300.00	44.00
5	LC1	868.00	40.00	40.00	9.00	0.00	0.00	0.00
6	LC1	799.00	4.00	4.00	3.00	300.00	300.00	44.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	1029.32	-0.65 0.00	0.000 0.000	0.167 0.000	0.187 0.186	0.187 0.186	0.650 0.187
4	G+Q 21101	1098.32	26.05 368.20	0.010 0.146		0.013 0.037	0.361 0.385	0.650 **0.287**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
6	LC1 10001	1029.32	-0.65 368.20	0.000 0.156	0.333 0.156

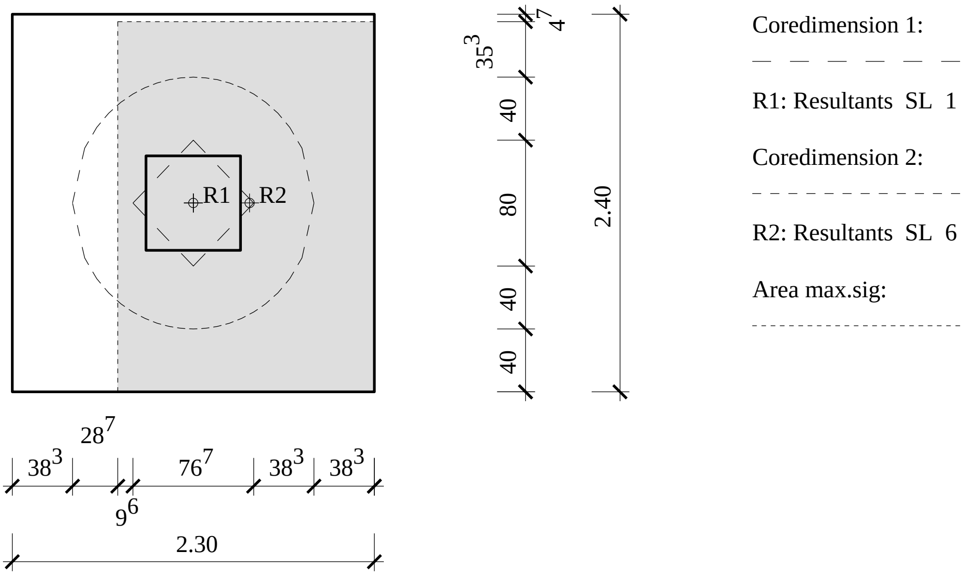
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
6	LC1 10001	1029.32	3.00 44.00	44.10	1.50	**10.92**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
4	LC1 21101	1098.32	26.05 368.20	0.010 0.146	9.00 44.00	1.25 2.00	2.00	p p	1.12 1.07

Relevant Eccentricities **M 1 : 48**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	W	A1	0.00	1.50	1.00	0.60	0.50	0.00
5	W	A1	0.00	1.50	1.00	0.60	0.50	0.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	1182.15	208.80	208.80	22.05	0.00	0.00	0.00
2	sEk	799.00	4.00	4.00	3.00	0.00	0.00	0.00
3	sEk	1130.40	43.20	43.20	10.35	450.00	450.00	66.00
4	sEk	1130.40	319.20	319.20	29.85	0.00	0.00	0.00
5	sEk	850.75	317.80	317.80	28.80	0.00	0.00	0.00
6	sEk	1078.65	5.40	5.40	4.05	0.00	0.00	0.00
7	sEk	1182.15	43.20	43.20	10.35	0.00	0.00	0.00
8	sEk	799.00	4.00	4.00	3.00	450.00	450.00	66.00

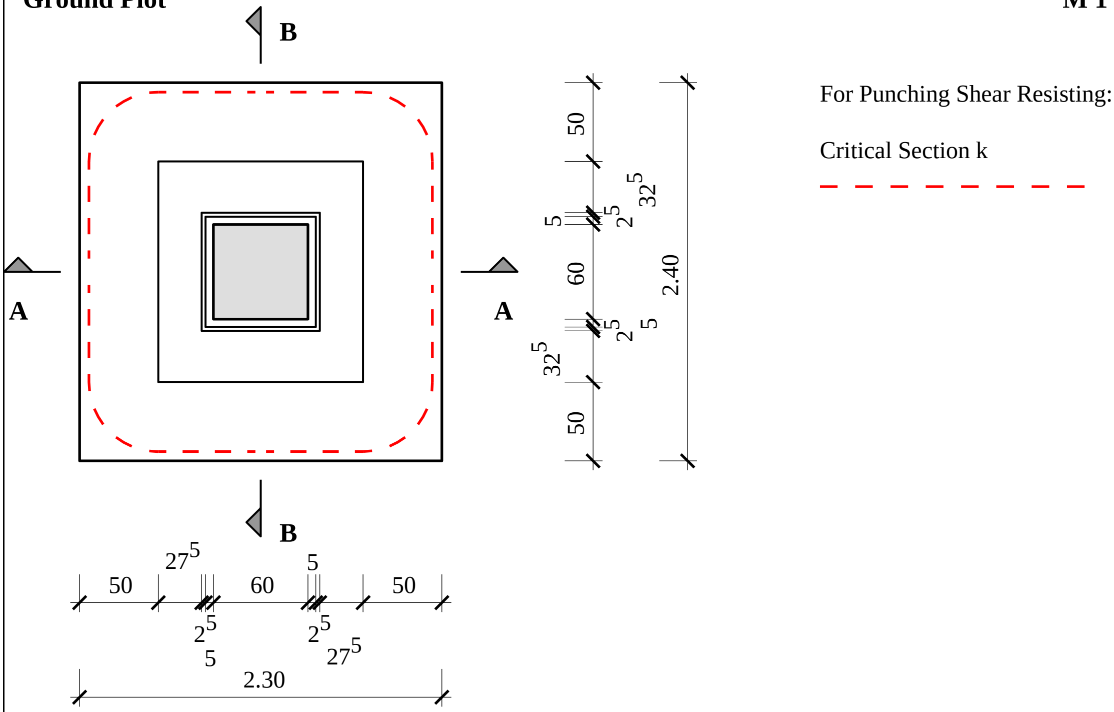
SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
8	L	-12.69	X	0.470	-0.28	25.00	0.01	0.59	Top
	10002								
3	R	128.80	X	0.450	-0.99	25.00	0.04	6.35	Bottom
	21102			0.300	0.79	0.79	0.79	0.79	V
				0.300	0.79	0.79	0.79	0.79	H
4	V	89.87	Y	0.430	-0.88	25.00	0.03	4.63	Bottom
	21120			0.287	0.58	0.58	0.58	0.58	L
				0.287	0.58	0.58	0.58	0.58	R

SAFETY AGAINST PUNCHING: (Heft 525)

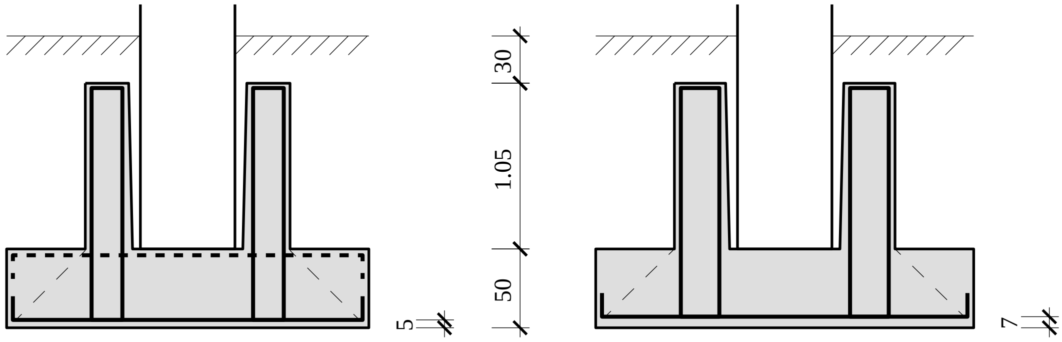
SL 3 Comb. 21102 V0d = 1130.40 kN
Resisting Shear Force VEd = 245.24 kN Coefficient beta = 1.28

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	7.69	40.65	143.98	0.06	0.05	215.97

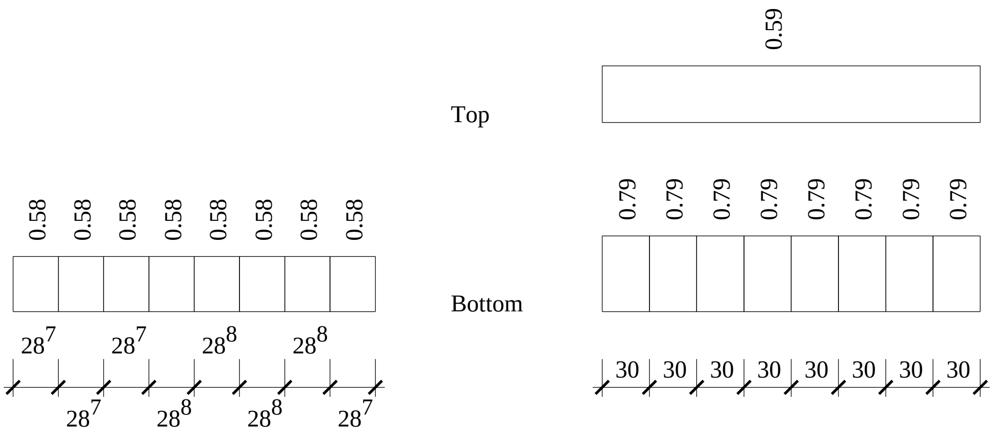
Ground Plot **M 1 : 48**



Section A - A **Section B - B**

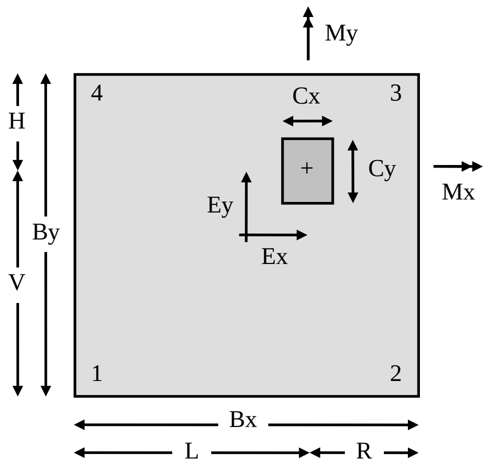


req. Asy (cm2) req. Asx (cm2)



Terakop Porec T5_VJETAR

SYSTEM CHARACTERISTICS:



Column: Cx(m) = 0.50 Cy(m) = 0.50
Ex(m) = 0.00 Ey(m) = 0.00

Layer of Soil: He(m) = 1.35

Type: Individual Foundation Default:
Depth of Foundation: H (m) =-0.50

Dimensions: Bx(m) = 2.10 By(m) = 2.10

Enlargement of foundation size
with step size: delta(m) = 0.00

Inputs for Sleeve Foundation:
Surface Column-Sleeve: rough
Anchoring Depth: T (m) = 1.05
Distance Column Base-Top Found.: A (m) = 0.00
Dimensions: Dx(m) = 1.20 Dy(m) = 1.30

Soil Characteristics:				Unit Weight of Soil			
Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		277.00	22.00	22.00	8.00	0.00	0.00	0.00
2	QG		0.00	27.00	27.00	7.00	0.00	0.00	0.00
3	S1		22.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W	A1	0.00	129.00	129.00	34.00	0.00	0.00	0.00
5	W	A1	0.00	0.00	0.00	0.00	14.00	14.00	27.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.28** **Wy(m)= 0.32**
Dx(m)= 1.20 **Dy(m)= 1.30** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
4	Y-Direction	Ho	204.51	Horizontal Top	2.35	per wall
6	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
4		Zv	189.86	Vertical	2.18	per corner

Definite Dimension of Foundation: **Bx(m)= 2.10** **By(m)= 2.10** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 5

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	277.00	22.00	22.00	8.00	0.00	0.00	0.00
2	LC1	299.00	178.00	178.00	49.00	0.00	0.00	0.00
3	LC1	277.00	22.00	22.00	8.00	0.00	0.00	0.00
4	LC1	299.00	49.00	49.00	15.00	14.00	14.00	27.00
5	LC1	277.00	151.00	151.00	42.00	0.00	0.00	0.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	461.70	9.60 0.00	0.010 0.000	0.167 0.010	0.098 0.111	0.098 0.111	0.650 0.107
2	G+Q 21110	483.70	102.05 0.00	0.100 0.000		0.044 0.176	0.044 0.176	0.650 **0.137**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
2	LC1 21110	483.70	102.05 0.00	0.100 0.000	0.333 0.100

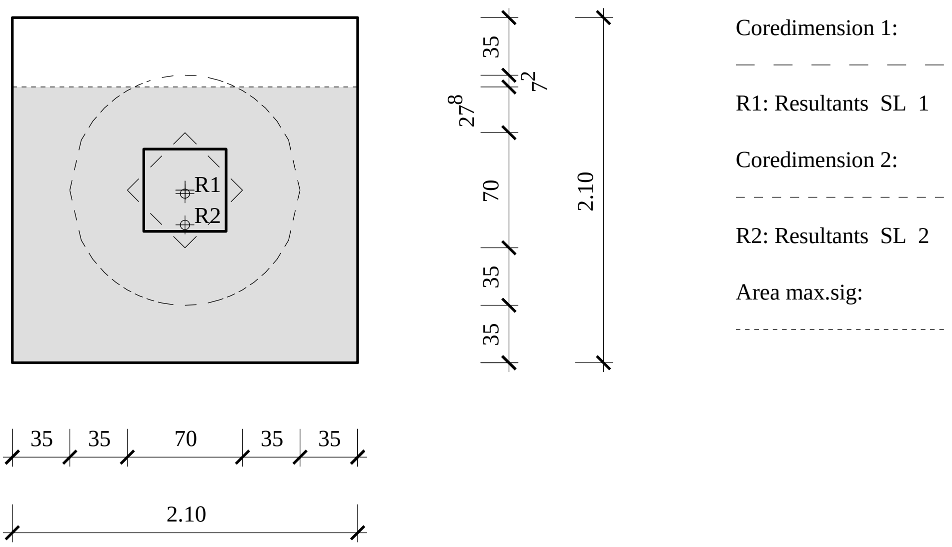
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
2	LC1 21110	483.70	49.00 0.00	49.00	1.50	**4.62**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
2	LC1 21110	483.70	102.05 0.00	0.100 0.000	49.00 0.00	1.25 2.00	2.00	p p	2.00 2.45

Relevant Eccentricities **M 1 : 46**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance
of Reinforcement:

H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30
3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	W	A1	0.00	1.50	1.00	0.60	0.50	0.00
5	W	A1	0.00	1.50	1.00	0.60	0.50	0.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 6

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	406.95	174.15	174.15	48.75	0.00	0.00	0.00
2	sEk	277.00	22.00	22.00	8.00	0.00	0.00	0.00
3	sEk	390.45	58.05	58.05	18.15	21.00	21.00	40.50
4	sEk	390.45	251.55	251.55	69.15	0.00	0.00	0.00
5	sEk	406.95	58.05	58.05	18.15	12.60	12.60	24.30
6	sEk	277.00	215.50	215.50	59.00	0.00	0.00	0.00

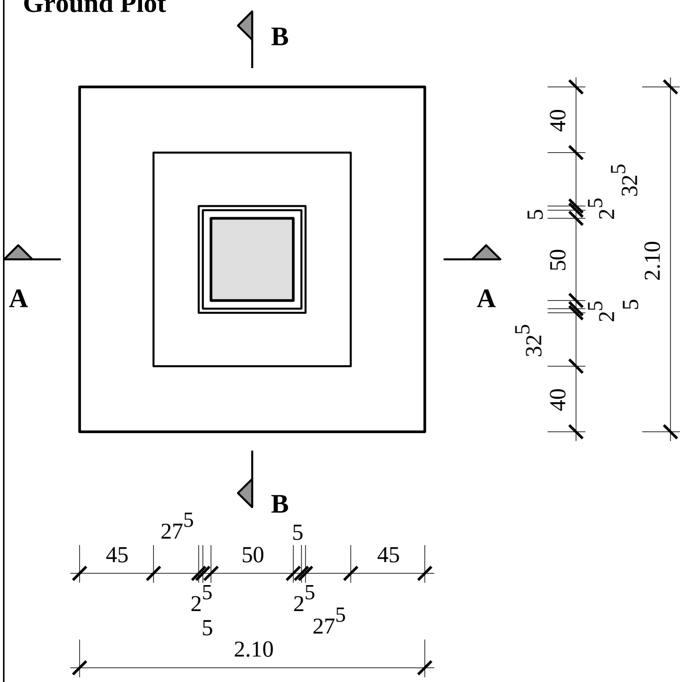
SL	Place / Comb.	MEd(kNm)	Dir.	D(m) / B1-4(m) / B5-8(m)	eps.c / As1 / As5	eps.s / As2 / As6	x/d / As3 / As7	Total As / As4 / As8	(cm2)
6	V	-0.97	Y	0.460	-0.08	25.00	0.00	0.05	Top
	10020								
3	R	29.05	X	0.450	-0.49	25.00	0.02	1.42	Bottom
	21102			0.262	0.18	0.18	0.18	0.18	V
				0.262	0.18	0.18	0.18	0.18	H
4	V	28.86	Y	0.430	-0.51	25.00	0.02	1.48	Bottom
	21120			0.262	0.19	0.19	0.19	0.19	L
				0.262	0.19	0.19	0.19	0.19	R

SAFETY AGAINST PUNCHING: (Heft 525)

SL 1 Comb. 21210 V0d = 406.95 kN
Resisting Shear Force VEd = 0.15 kN Coefficient beta = 1.15

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	0.00	0.00	80.26	0.02	0.02	120.38

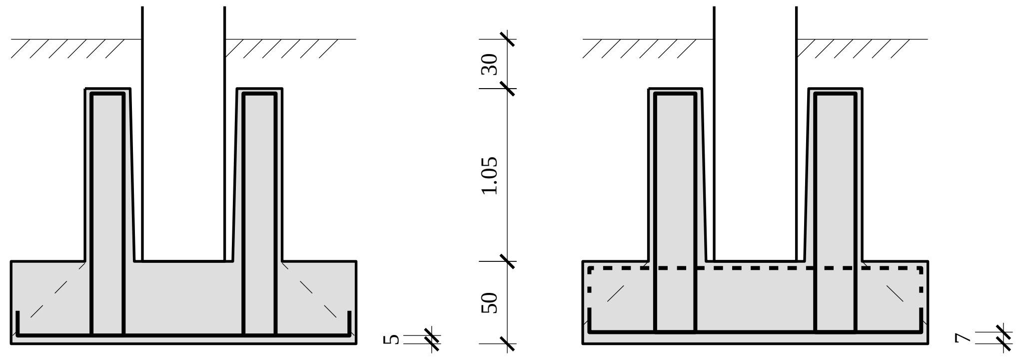
Ground Plot **M 1 : 46**



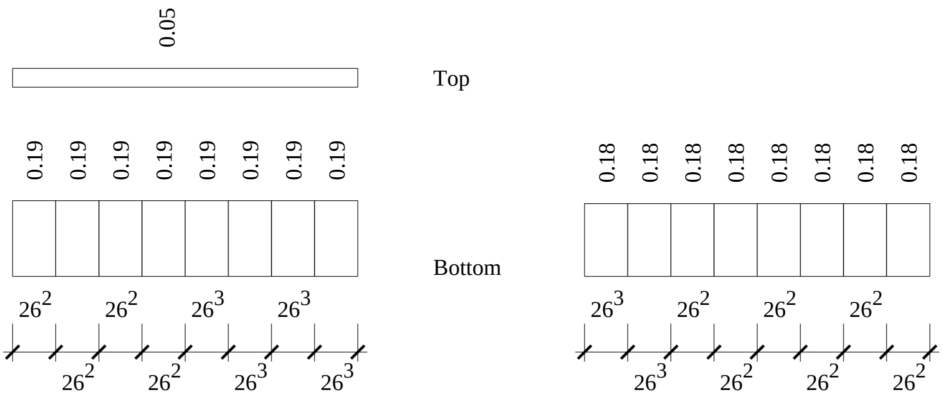
For Punching Shear Resisting:

Critical Section k

Section A - A **Section B - B**

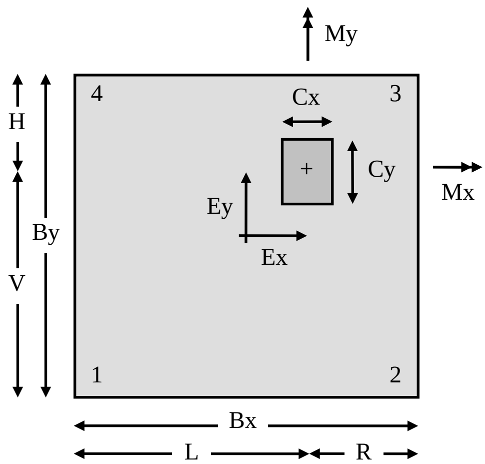


req. Asy (cm2) req. Asx (cm2)



Terakop Porec T5_POTRES

SYSTEM CHARACTERISTICS:



Column:	Cx(m) = 0.50	Cy(m) = 0.50
	Ex(m) = 0.00	Ey(m) = 0.00
Layer of Soil:		He(m) = 1.35
Type: Individual Foundation		Default:
Depth of Foundation:		H (m) =-0.50
Dimensions:	Bx(m) = 2.10	By(m) = 2.10
Enlargement of foundation size with step size:		delta(m) = 0.00

Inputs for Sleeve Foundation:		
Surface Column-Sleeve:		rough
Anchoring Depth:		T (m) = 1.05
Distance Column Base-Top Found.:		A (m) = 0.00
Dimensions:	Dx(m) = 1.20	Dy(m) = 1.30

Soil Characteristics: Unit Weight of Soil

Friction Angle	phi(degrees)	=	25.00	Upside Bottom	gam1(kN/m3)	=	20.90
Cohesion	c (kN/m2)	=	0.00	Below Bottom	gam2(kN/m3)	=	20.90

LOADS FROM COLUMN: V,H(kN),M(kNm) Ex(m) = 0.00 Ey(m) = 0.00

LC	Kind	Alt.	Vk	MxIk	MxIIk	ass.Hk	MyIk	MyIIk	ass.Hk
1	G		277.00	22.00	22.00	8.00	0.00	0.00	0.00
2	QG		0.00	27.00	27.00	7.00	0.00	0.00	0.00
3	S1		22.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EA	A1	0.00	100.00	100.00	26.00	0.00	0.00	0.00
5	EA	A1	0.00	0.00	0.00	0.00	40.00	40.00	11.00

Design According:	Concrete Grade	C30/37	gamma.c =	1.50	aEk:	1.30
DIN 1045 / 2001	Reinforcement	BSt500	gamma.s =	1.15	aEk:	1.00

DESIGN OF SLEEVE:

Definite Dimensions of the Sleeve: **Wx(m)= 0.28** **Wy(m)= 0.32**
Dx(m)= 1.20 **Dy(m)= 1.30** **T(m)= 1.05**

Column: C50/60 fbd (N/mm2)= 4.51 (Bond Condition II with Transverse Pressure)
Long. Reinforcement ds(mm)= 2 Req. Anchorage Length Lb(m)= 0.10

Sleeve Reinforcement:

SL	Relevant		Loads (kN)	Layer	As(cm2)	
7	Y-Direction	Ho	109.86	Horizontal Top	1.10	per wall
8	Y-Direction	Hu	0.00	Horizontal Bottom	0.00	per wall
7		Zv	101.99	Vertical	1.02	per corner

Definite Dimension of Foundation: **Bx(m)= 2.10** **By(m)= 2.10** **H(m)= 0.50**

STABILITY: (Index S: Stress resultants relating to the bottom)
Serviceability According DIN 1054:

Combinations of Actions Ek: LF 1: Permanent + Regular Ek: SL 1 - 3
Stability LF 3: Accidental Ek: SL 4 - 6

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	LC1	277.00	22.00	22.00	8.00	0.00	0.00	0.00
2	LC1	299.00	49.00	49.00	15.00	0.00	0.00	0.00
3	LC1	277.00	22.00	22.00	8.00	0.00	0.00	0.00
4	LC3	299.00	149.00	149.00	41.00	0.00	0.00	0.00
5	LC3	277.00	22.00	22.00	8.00	0.00	0.00	0.00
6	LC3	299.00	49.00	49.00	15.00	40.00	40.00	11.00

Ground Pressing sig(N/mm2): Border Pressing sig.1-4, Equivalent Pressing max.sig

SL	Kind Comb.	VSd	MxISd MyISd	EyI/By ExI/Bx	perm.BER1 prov.BER1	sig.4 sig.1	sig.3 sig.2	perm.sig max.sig
1	G 20000	461.70	9.60 0.00	0.010 0.000	0.167 0.010	0.098 0.111	0.098 0.111	0.650 0.107
2	G+Q 21100	483.70	25.75 0.00	0.025 0.000		0.093 0.126	0.093 0.126	0.650 **0.116**

Steadiness: BER2 = Specific Eccentricity

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	perm.BER2 prov.BER2
2	LC1 21100	483.70	25.75 0.00	0.025 0.000	0.333 0.025
4	LC3 21110	483.70	85.45 0.00	0.084 0.000	0.333 0.084

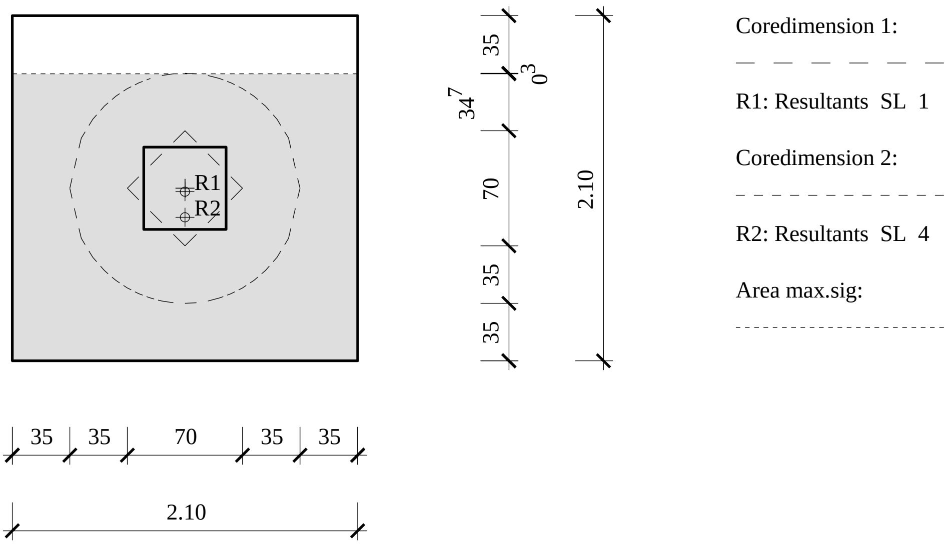
Slide Stability eta:

SL	Kind Comb.	VSd	Hxd Hyd	Res.Hd	req.eta	prov.eta
2	LC1 21100	483.70	15.00 0.00	15.00	1.50	**15.08**
4	LC3 21110	483.70	41.00 0.00	41.00	1.20	**5.52**

Safety Against Base Failure According DIN 4017: (IAB = vorh.eta/req.eta)

SL	Kind Comb.	VSd	MxIISd MyIISd	EyII/By ExII/Bx	ass.Hd ass.Hd	eta.f eta.c	eta.p		IAB.y IAB.x
2	LC1 21100	483.70	25.75 0.00	0.025 0.000	15.00 0.00	1.25 2.00	2.00	p p	2.87 3.08
4	LC3 21110	483.70	85.45 0.00	0.084 0.000	41.00 0.00	1.10 1.30	1.30	p p	3.34 3.97

Relevant Eccentricities **M 1 : 46**



SAFETY AGAINST RUPTURE:
MEd: At the Face, without Ductility Reinf.

Edge Distance of Reinforcement: H'u1 = -5.0 cm
H'u2 = -7.0 cm

Automatische Berücksichtigung der Kombinationsbeiwerte **According DIN1055-100**

LC	Action Type	Alt.	gamma.inf	gamma.sup	gamma.a	psi0	psi1	psi2
1	G		1.00	1.35	1.00	1.00	1.00	1.00
2	QG		0.00	1.50	1.00	0.70	0.50	0.30

3	S1		0.00	1.50	1.00	0.50	0.20	0.00
4	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00
5	EA	A1	0.00	1.00	1.00	1.00	1.00	1.00

Combinations of Actions Ek: Permanent + Permanent Ek: SL 1 - 3
Design Accidental Ek: SL 4 - 8

SL	Kind	Vd	MxId	MxIId	ass.Hd	MyId	MyIId	ass.Hd
1	sEk	406.95	58.05	58.05	18.15	0.00	0.00	0.00
2	sEk	277.00	22.00	22.00	8.00	0.00	0.00	0.00
3	sEk	390.45	70.20	70.20	21.30	0.00	0.00	0.00
4	aEk	281.40	130.10	130.10	36.10	0.00	0.00	0.00
5	aEk	277.00	22.00	22.00	8.00	0.00	0.00	0.00
6	aEk	277.02	35.50	35.50	11.50	40.00	40.00	11.00
7	aEk	277.02	135.50	135.50	37.50	0.00	0.00	0.00
8	aEk	281.40	30.10	30.10	10.10	40.00	40.00	11.00

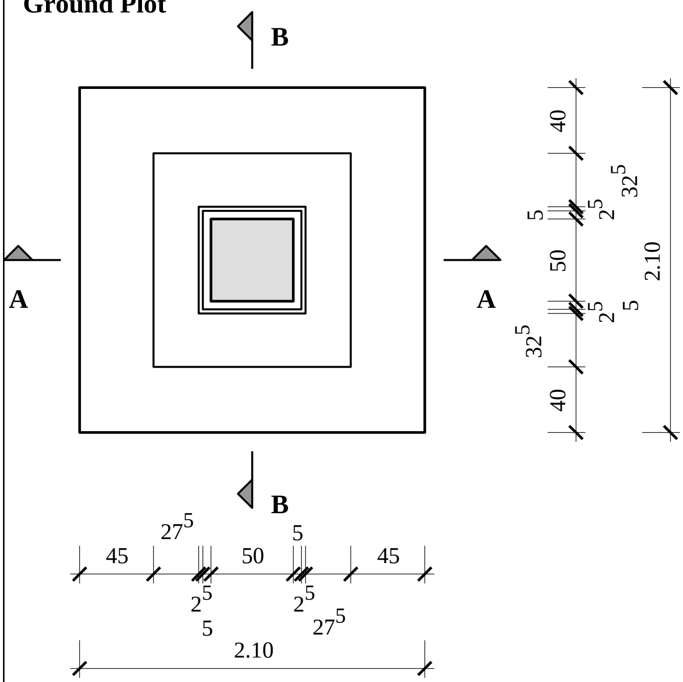
SL	Place	MEd(kNm)	Dir.	D(m)	eps.c	eps.s	x/d	Total As	(cm2)
	Comb.			B1-4(m)	As1	As2	As3	As4	(cm2)
				B5-8(m)	As5	As6	As7	As8	(cm2)
8	R	20.64	X	0.450	-0.38	25.00	0.01	0.92	Bottom
	21201			0.262	0.12	0.12	0.12	0.12	V
				0.262	0.12	0.12	0.12	0.12	H
3	V	18.67	Y	0.430	-0.38	25.00	0.01	0.87	Bottom
	22100			0.262	0.11	0.11	0.11	0.11	L
				0.262	0.11	0.11	0.11	0.11	R

SAFETY AGAINST PUNCHING: (Heft 525)

SL 1 Comb. 21100 V0d = 406.95 kN
Resisting Shear Force VEd = 0.15 kN Coefficient beta = 1.08

Section	r(m)	U(m)	vEd (kN/m)	vRdct	rho.x (%)	rho.y	vRdmax(kN/m)
k	0.440	0.00	0.00	68.36	0.01	0.01	102.54

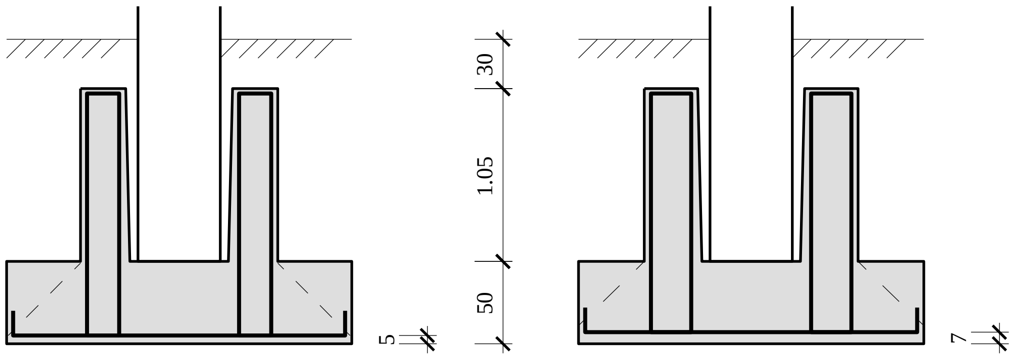
Ground Plot **M 1 : 46**

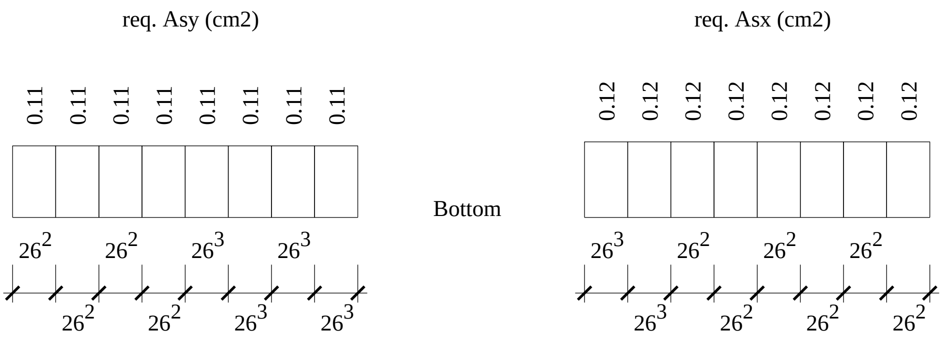


For Punching Shear Resisting:

Critical Section k

Section A - A **Section B - B**





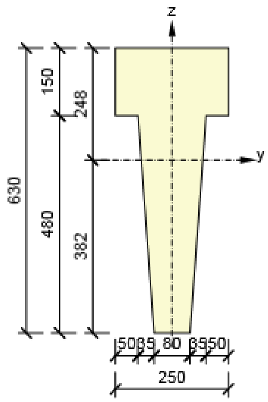
1 Project Data

Title of the project	**SN-1 R 63**
Identification of project	01
Author	
Description	tip R-63
Date	21.11.2017
Design code	EN
Type of beam	Pre-fabricated pre-tensioned concrete beam

2 Cross-Sections

1. R-63(T Shape 630, 250)

Symbol	Value	Unit
Material	C50/60	
A	92700	[mm^2]
S_y	0	[mm^3]
S_z	0	[mm^3]
I_y	2983846286	[mm^4]
I_z	261782500	[mm^4]
C_{gy}	0	[mm]
C_{gz}	0	[mm]
i_y	179	[mm]
i_z	53	[mm]



3 Material

Concrete

Name	f_{ck} [MPa]	f_{cm} [MPa]	f_{ctm} [MPa]	E_{cm} [MPa]	μ [-]	Unit mass [kg/m^3]
C50/60	50,0	58,0	4,1	37277,9	0,20	2500
	ε_{c2} = 20,0 1e-4,ε_{cu2} = 35,0 1e-4,ε_{c3} = 17,5 1e-4,ε_{cu3} = 35,0 1e-4, Exponent - n: 2,00,Aggregate size = 16 mm,Cement class: R (s = 0,20),Diagram type: Parabolic					

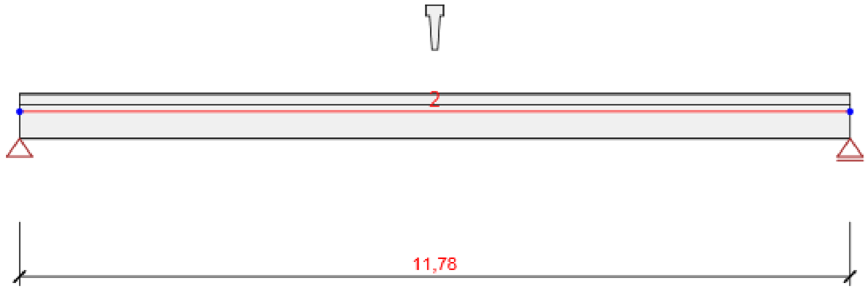
Reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 500B	500,0	540,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Prestressing steel

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-15.2	1860,0	1640,0	195000,0	0,15	7850
	F_m = 259,0 kN,F_{p01} = 227,9 kN,F_r = 190,0 MPa,ρ_{1000} = 0,03,ρ_∞ = 0,06, Φ = 15 mm,Area = 139 mm2,ε_{uk} = 350,0 1e-4,A_{gt} = 350,0 1e-4,Type: Strand Surface characteristic: Plain,Relaxation class: Class2,Production: Low relaxation, Diagram type: Bilinear with an inclined top branch,Number of wires: 7				

4 Geometry



Structural scheme

Members

Member	Length [m]	End of Member [m]	Cross-Section
2	11,78	11,78	1 - R-63 (T Shape 630, 250)

Nodes

Node	X [m]	Support
1	0,00	XZ
3	11,78	Z

5 Load Cases

Name	Type	C.Stage	Load Group	Load [kN/m]
SW (1)	Permanent	1	LG1	-2,3
R (2)	Permanent	2	LG1	0,0
G (2)	Permanent	2	LG1	0,0
PRE (2)	Permanent	2	LG1	0,0
R (3)	Permanent	3	LG1	0,0
G (3)	Permanent	3	LG1	0,0
R (4)	Permanent	4	LG1	0,0
G (4)	Permanent	4	LG1	0,0
R (5)	Permanent	5	LG1	0,0
G (5)	Permanent	5	LG1	0,0
R (6)	Permanent	6	LG1	0,0
Stalno (6)	Permanent	6	LG1	-1,6
R (7)	Permanent	7	LG1	0,0
G (7)	Permanent	7	LG1	0,0
Snijeg	Variable		Snijeg	-1,6

Permanent load groups

Name	$\gamma_{G,\,sub}$ [-]	$\gamma_{G,\,inf}$ [-]	ξ [-]
LG1	1,35	1,00	0,85

Variable load groups

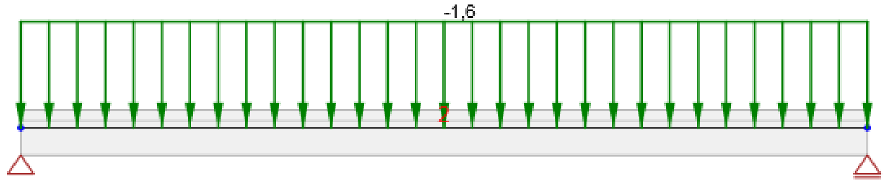
Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Snijeg	Standard	1,50	0,50	0,20	0,00
Vjetar	Standard	1,50	0,60	0,20	0,00

6 Loads

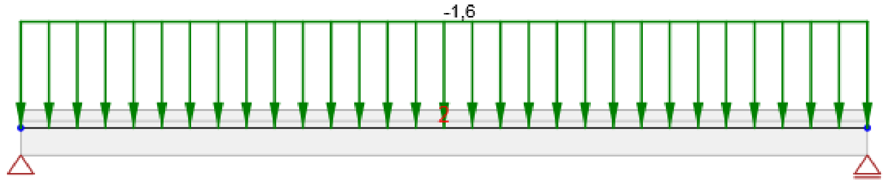
Load Case PRE (2)

Line Loads

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Angle [°]	Location
2	222,7	222,7	0,00	0,60	Global X	0,0	Length
2	-222,7	-222,7	11,18	11,78	Global X	0,0	Length



Load Case Stalno (6)



Load Case Snijeg

7 Load Combinations

Name	Type	C.Stage	Evaluation
ULS Fundamental ST(2)	ULS Fundamental	2	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2)			
SLSC ST(2)	SLS Char	2	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2)			
SLSF ST(2)	SLS Freq	2	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2)			
SLSQ ST(2)	SLS Quasi	2	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2)			
ULS Fundamental ST(3)	ULS Fundamental	3	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSC ST(3)	SLS Char	3	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSF ST(3)	SLS Freq	3	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSQ ST(3)	SLS Quasi	3	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
ULS Fundamental ST(4)	ULS Fundamental	4	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSC ST(4)	SLS Char	4	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSF ST(4)	SLS Freq	4	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSQ ST(4)	SLS Quasi	4	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
ULS Fundamental ST(5)	ULS Fundamental	5	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSC ST(5)	SLS Char	5	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSF ST(5)	SLS Freq	5	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			

Name	Type	C.Stage	Evaluation
SLSQ ST(5)	SLS Quasi	5	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
ULS Fundamental ST(6)	ULS Fundamental	6	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSC ST(6)	SLS Char	6	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSF ST(6)	SLS Freq	6	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSQ ST(6)	SLS Quasi	6	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
ULS Fundamental ST(7)	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSC ST(7)	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSF ST(7)	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSQ ST(7)	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
ULS-W	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSCh-W	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSFr-W	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSQa-W	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			

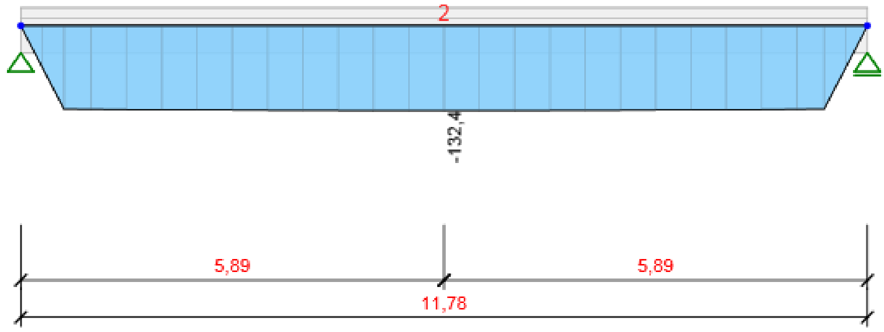
8 Construction stages

	Name	Time [d]	Beam spans [m]
1	Casting	0	
2	Transfer of prestressing	5	11,78
	Support 0,00 m: to design position Support 11,78 m: to design position User-specified concrete strength f_{ck} = 36,1 MPa		
3	Storage yard	5,1	0,98 - 9,82 - 0,98
	Support 0,98 m: to design position Support 10,80 m: to design position		
4	Transport	14	0,98 - 9,82 - 0,98
	Support 0,98 m: to design position Support 10,80 m: to design position		
5	Final supports	17	
6	Superimposed dead load	45	
7	End of design working life	18250	

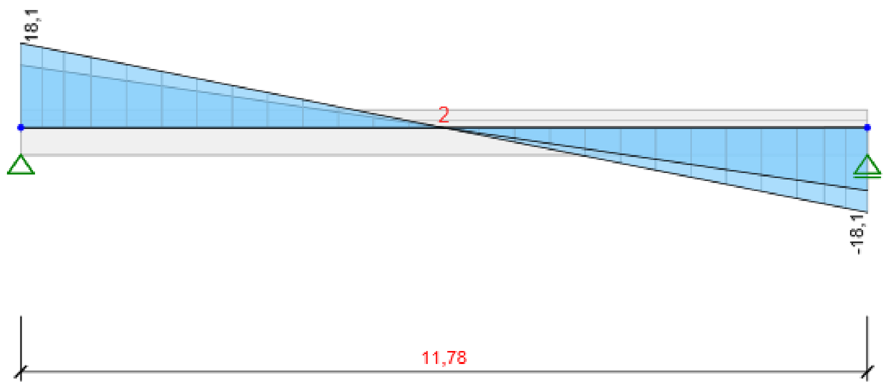
9 Results

Note: Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time depend analysis.

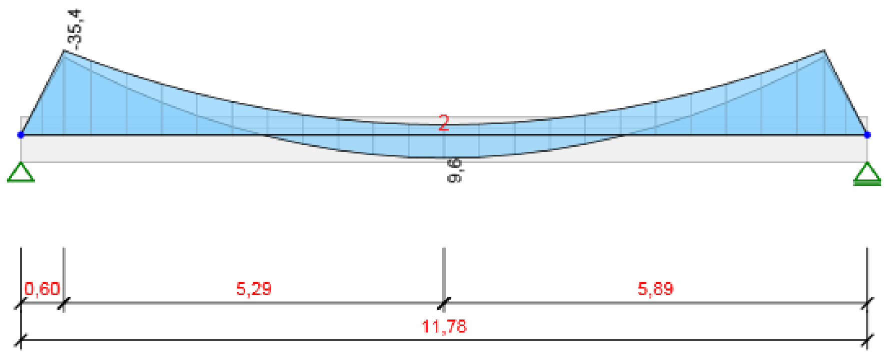
Construction Stage Transfer of prestressing
Envelopes



Transfer of prestressing, All combinations, N [kN], Centroidal forces, Entire centroid



Transfer of prestressing, All combinations, Vz [kN], Centroidal forces, Entire centroid



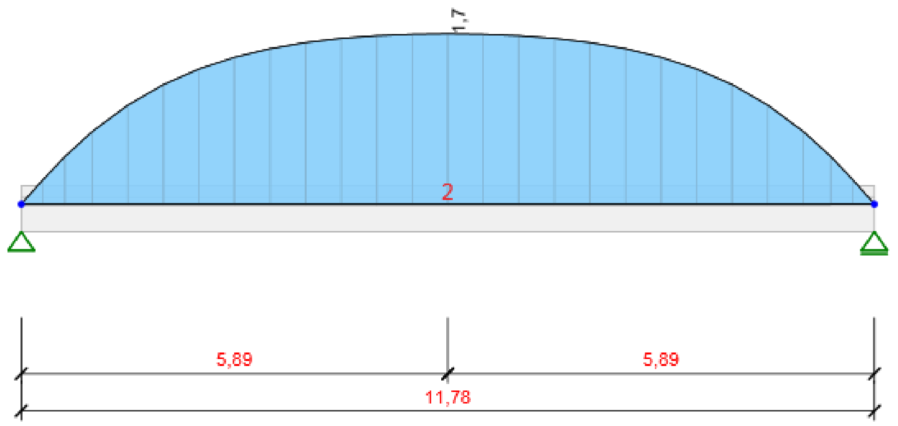
Transfer of prestressing, All combinations, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(2)(1)	5,89	-132,4	0,0	9,6
2	ULS Fundamental ST(2)(1)	11,78	0,0	-18,1	0,0
2	ULS Fundamental ST(2)(1)	0,00	0,0	18,1	0,0
2	ULS Fundamental ST(2)(2)	0,60	-129,8	12,0	-35,4

Combination	Critical load effect description

Combination	Critical load effect description
ULS Fundamental ST(2)(1)	SW (1) + R (2) + 1,35*G (2) + PRE (2)
ULS Fundamental ST(2)(2)	SW (1) + R (2) + G (2) + PRE (2)



Transfer of prestressing, All combinations, Displacement uz [mm]

Deformations, Member Extreme,

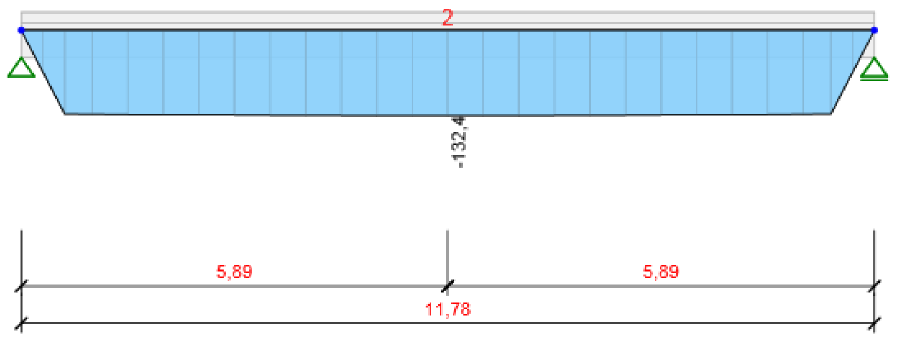
Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
2	SLSC ST(2)(76)	11,78	-0,8	0,0	0,8
2	SLSC ST(2)(76)	0,00	-0,3	0,0	-0,8
2	SLSC ST(2)(76)	5,89	-0,5	1,7	0,0

Combination	Critical load effect description
SLSC ST(2)(76)	SW (1) + R (2) + G (2) + PRE (2)

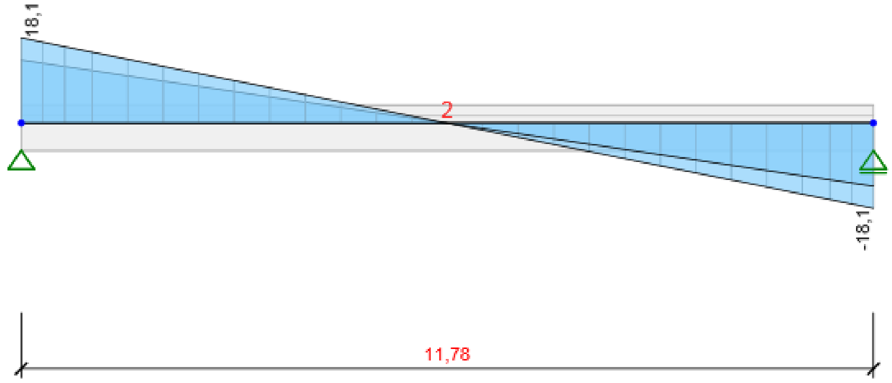
Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
5	ULS Fundamental ST(2)(3)	0,0	18,1	0,0
5	ULS Fundamental ST(2)(102)	0,0	13,4	0,0
6	ULS Fundamental ST(2)(3)	0,0	18,1	0,0
6	ULS Fundamental ST(2)(102)	0,0	13,4	0,0

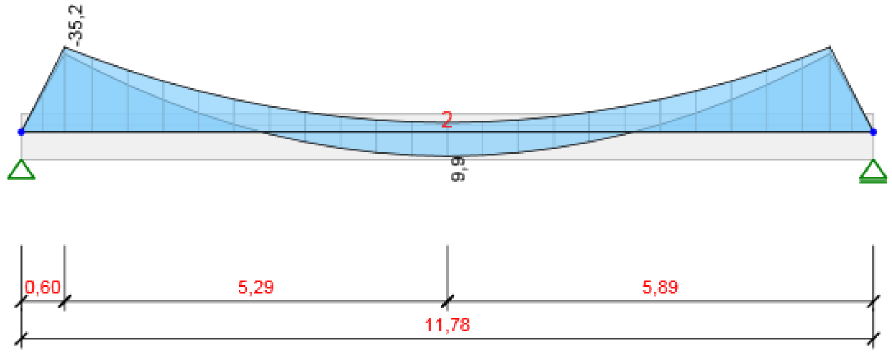
Combination	Critical load effect description
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)
ULS Fundamental ST(2)(102)	1,35*SW (1) + R (2) + G (2) + PRE (2)



Transfer of prestressing, All combinations, N [kN], Centroidal forces, Current centroid



Transfer of prestressing, All combinations, Vz [kN], Centroidal forces, Current centroid



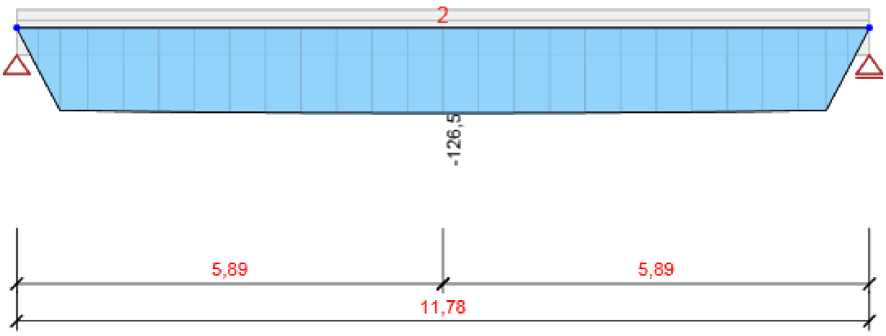
Transfer of prestressing, All combinations, My [kNm], Centroidal forces, Current centroid

Internal forces, Member Extreme, Centroidal forces, Current centroid

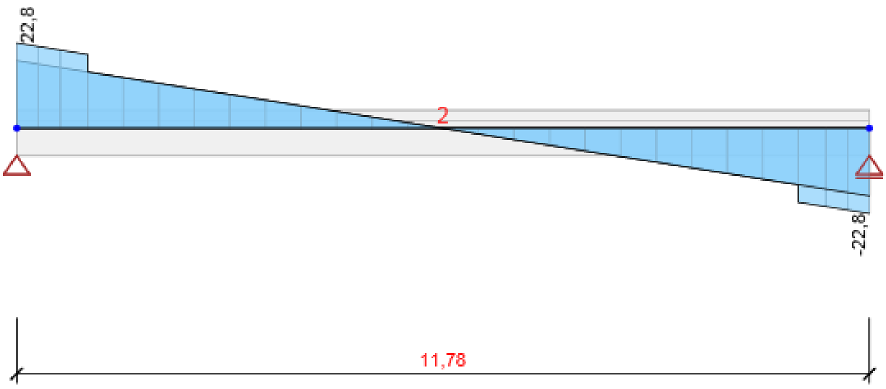
Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(2)(1)	5,89	-132,4	0,0	9,9
2	ULS Fundamental ST(2)(1)	11,78	0,0	-18,1	0,0
2	ULS Fundamental ST(2)(1)	0,00	0,0	18,1	0,0
2	ULS Fundamental ST(2)(2)	0,60	-129,8	12,0	-35,2

Combination	Critical load effect description
ULS Fundamental ST(2)(1)	SW (1) + R (2) + 1,35*G (2) + PRE (2)
ULS Fundamental ST(2)(2)	SW (1) + R (2) + G (2) + PRE (2)

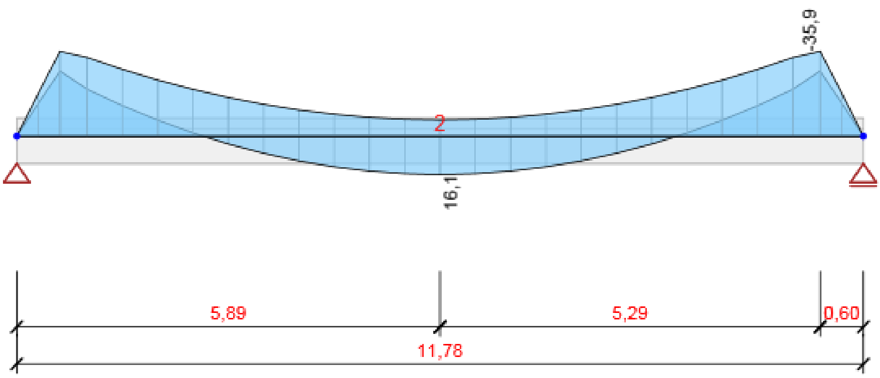
Construction Stage Final supports
Envelopes



Final supports, All combinations, N [kN], Centroidal forces, Entire centroid



Final supports, All combinations, Vz [kN], Centroidal forces, Entire centroid



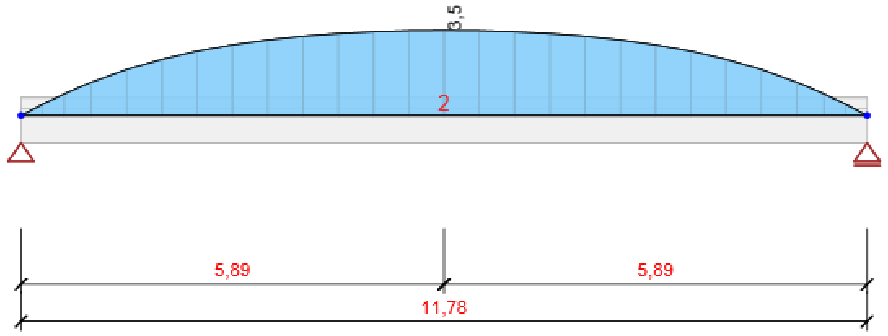
Final supports, All combinations, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(5)(18)	5,89	-126,5	0,0	16,1
2	ULS Fundamental ST(5)(18)	11,78	0,0	-22,8	0,0
2	ULS Fundamental ST(5)(18)	0,00	0,0	22,8	0,0
2	ULS Fundamental ST(5)(25)	11,18	-122,7	-7,3	-35,9

Combination	Critical load effect description

Combination	Critical load effect description
ULS Fundamental ST(5)(18)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(25)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + G (5)



Final supports, All combinations, Displacement uz [mm]

Deformations, Member Extreme,

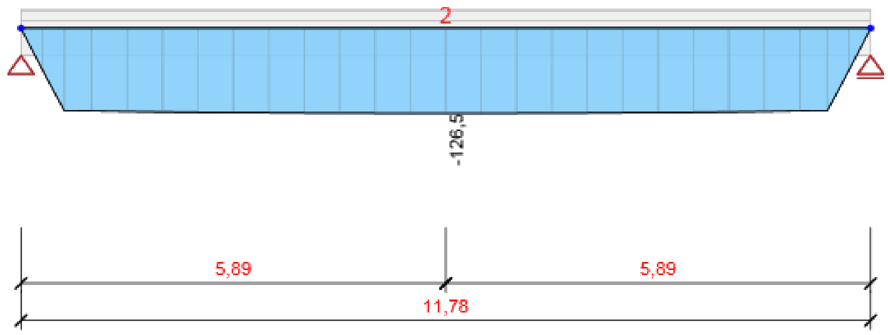
Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
2	SLSC ST(5)(79)	11,78	-1,8	0,0	1,6
2	SLSC ST(5)(79)	0,00	0,2	0,0	-1,6
2	SLSC ST(5)(79)	5,89	-0,8	3,5	0,0

Combination	Critical load effect description
SLSC ST(5)(79)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)

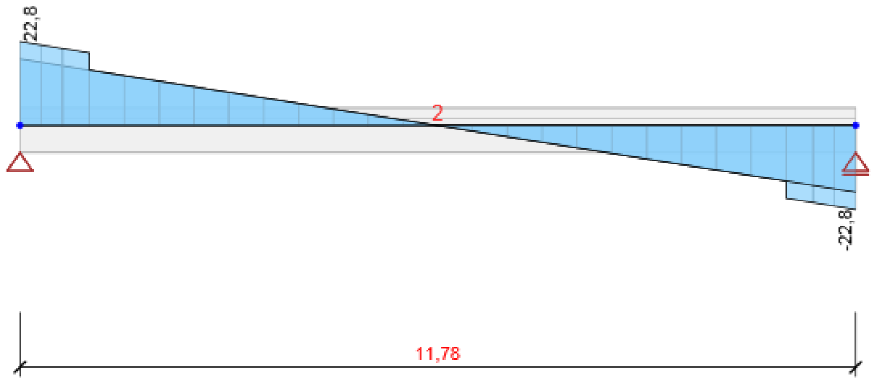
Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
1	ULS Fundamental ST(5)(113)	0,0	13,4	0,0
1	ULS Fundamental ST(5)(21)	0,0	18,1	0,0
2	ULS Fundamental ST(5)(21)	0,0	18,1	0,0
2	ULS Fundamental ST(5)(113)	0,0	13,4	0,0

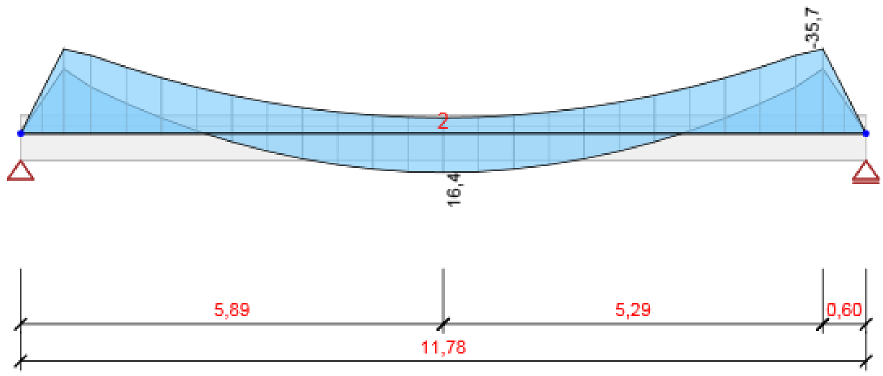
Combination	Critical load effect description
ULS Fundamental ST(5)(113)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
ULS Fundamental ST(5)(21)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5)



Final supports, All combinations, N [kN], Centroidal forces, Current centroid



Final supports, All combinations, Vz [kN], Centroidal forces, Current centroid



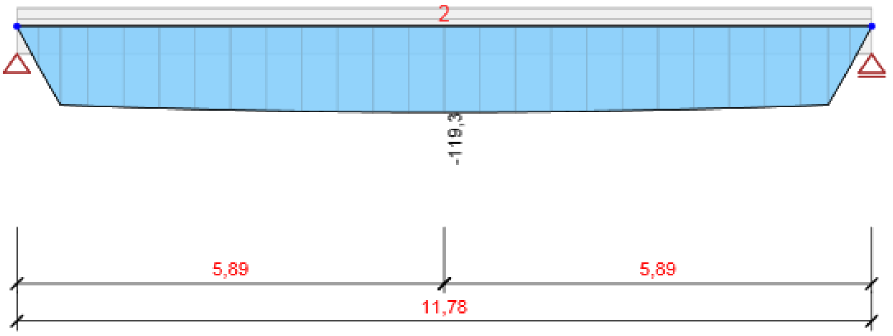
Final supports, All combinations, My [kNm], Centroidal forces, Current centroid

Internal forces, Member Extreme, Centroidal forces, Current centroid

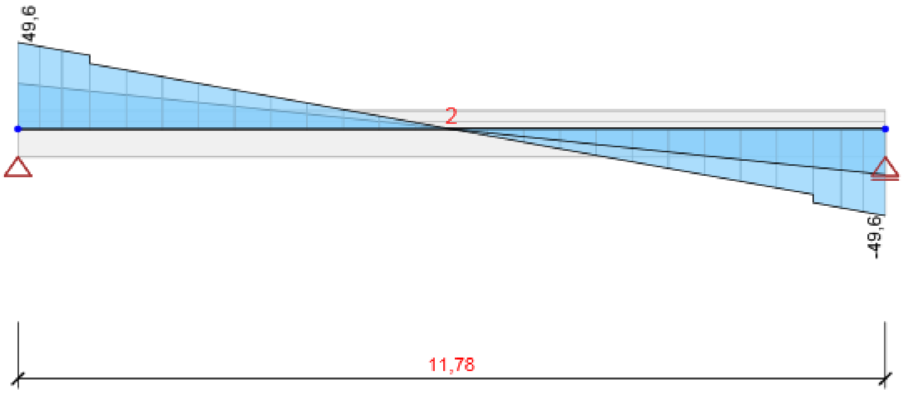
Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(5)(18)	5,89	-126,5	0,0	16,4
2	ULS Fundamental ST(5)(18)	11,78	0,0	-22,8	0,0
2	ULS Fundamental ST(5)(18)	0,00	0,0	22,8	0,0
2	ULS Fundamental ST(5)(25)	11,18	-122,7	-7,3	-35,7

Combination	Critical load effect description
ULS Fundamental ST(5)(18)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(25)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + G (5)

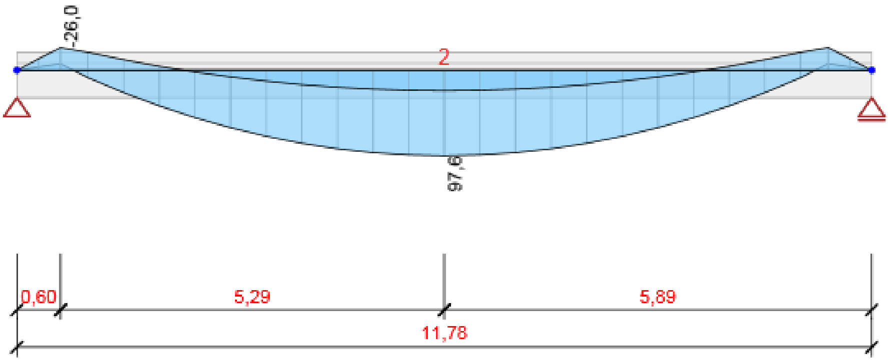
Construction Stage End of design working life
Envelopes



End of design working life, All combinations, N [kN], Centroidal forces, Entire centroid



End of design working life, All combinations, Vz [kN], Centroidal forces, Entire centroid



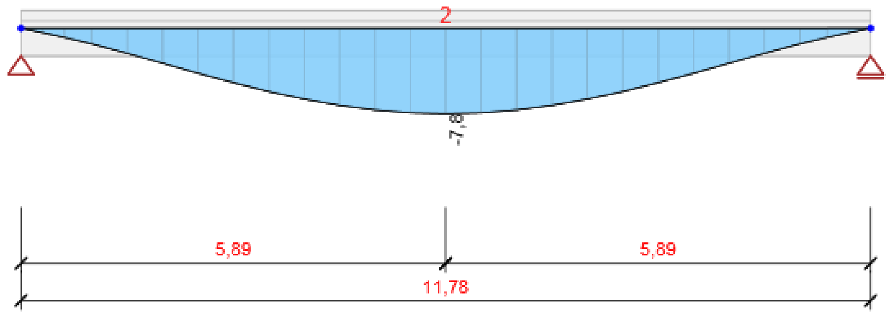
End of design working life, All combinations, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(7)(38)	5,89	-119,3	0,0	97,6
2	ULS Fundamental ST(7)(38)	11,78	0,0	-49,6	0,0
2	ULS Fundamental ST(7)(38)	0,00	0,0	49,6	0,0
2	ULS Fundamental ST(7)(44)	0,60	-109,2	15,8	-26,0

Combination	Critical load effect description

Combination	Critical load effect description
ULS Fundamental ST(7)(38)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + G (7)
ULS Fundamental ST(7)(44)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)



End of design working life, All combinations, Displacement uz [mm]

Deformations, Member Extreme,

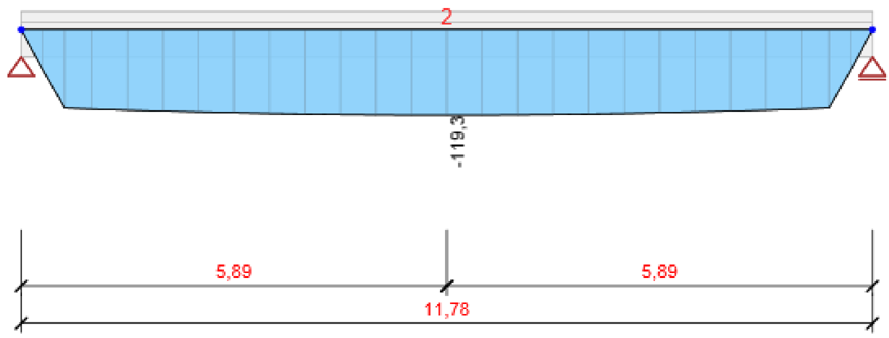
Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
2	SLSC ST(7)(83)	11,78	-6,2	0,0	-0,4
2	SLSC ST(7)(82)	0,00	1,3	0,0	1,3
2	SLSC ST(7)(82)	5,89	-2,3	-7,8	0,0
2	SLSC ST(7)(82)	9,82	-4,7	-3,2	-1,9
2	SLSC ST(7)(82)	1,96	0,1	-3,2	1,9

Combination	Critical load effect description
SLSC ST(7)(83)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSC ST(7)(82)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)

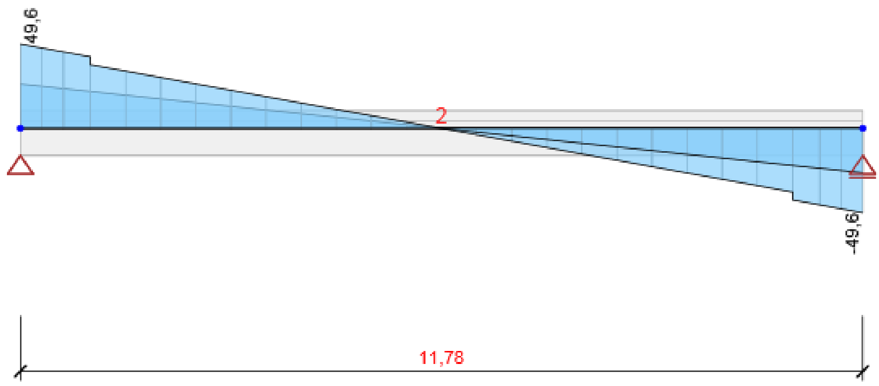
Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
1	ULS Fundamental ST(7)(129)	0,0	22,8	0,0
1	ULS Fundamental ST(7)(39)	0,0	44,9	0,0
2	ULS Fundamental ST(7)(39)	0,0	44,9	0,0
2	ULS Fundamental ST(7)(129)	0,0	22,8	0,0

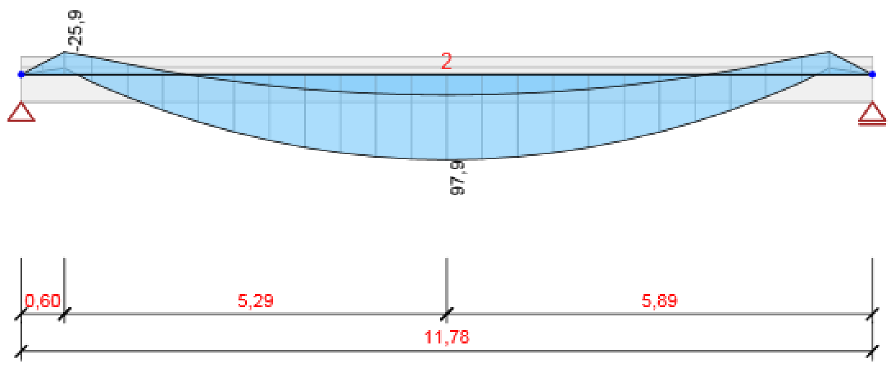
Combination	Critical load effect description
ULS Fundamental ST(7)(129)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS Fundamental ST(7)(39)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)



End of design working life, All combinations, N [kN], Centroidal forces, Current centroid



End of design working life, All combinations, Vz [kN], Centroidal forces, Current centroid



End of design working life, All combinations, My [kNm], Centroidal forces, Current centroid

Internal forces, Member Extreme, Centroidal forces, Current centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(7)(38)	5,89	-119,3	0,0	97,9
2	ULS Fundamental ST(7)(38)	11,78	0,0	-49,6	0,0
2	ULS Fundamental ST(7)(38)	0,00	0,0	49,6	0,0
2	ULS Fundamental ST(7)(44)	0,60	-109,2	15,8	-25,9

Combination	Critical load effect description

Combination	Critical load effect description
ULS Fundamental ST(7)(38)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + G (7)
ULS Fundamental ST(7)(44)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

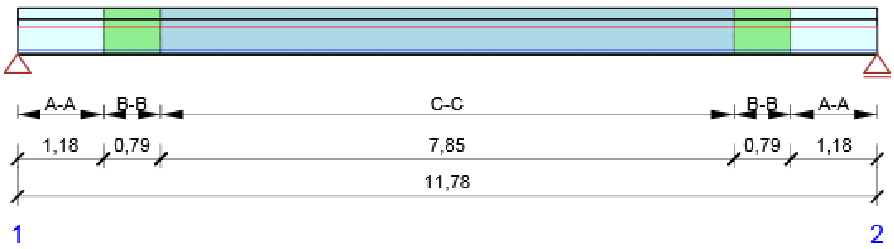
10 Concrete design

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

Note:Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time dependent analysis.

Scheme of reinforcement



Summary of checks

Construction stage	Type of check	Combination	Position	Value [%]	Check
Transfer of prestressing (5,0d)	Stress Limitation	SLSC ST(2)(76)	Section 4 (5,91m)	68,3	OK
Final supports (17,0d)	Stress Limitation	SLSC ST(5)(79)	Section 4 (5,91m)	65,2	OK
End of design working life (18250,0d)	Capacity N-M-M	ULS Fundamental ST(7)(42)	Section 4 (5,91m)	80,1	OK

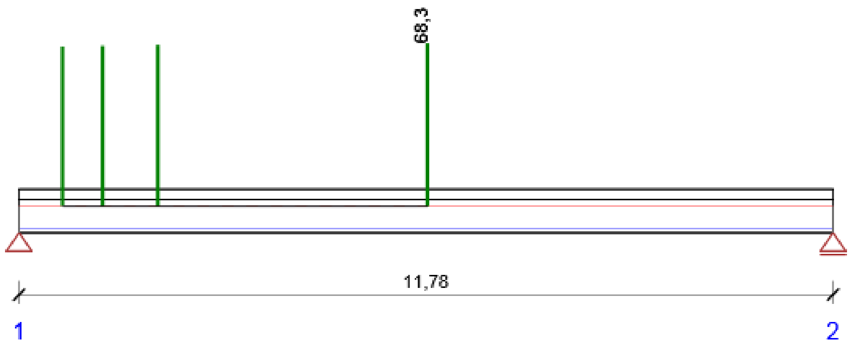
Construction stage: Transfer of prestressing (5,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Intermediate results of redistribution and reduction

Redistribution and reduction not calculated yet.



Overall sections check

Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,63m)	A-A	Stress Limitation	66,9	OK
Section 2 (1,21m)	B-B	Stress Limitation	67,2	OK
Section 3 (2,01m)	C-C	Stress Limitation	67,5	OK
Section 4 (5,91m)	C-C	Stress Limitation	68,3	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 4 (5,91m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(2)(76)	-132,4	-4,3	0,0	68,3	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(2)(3)	0,0	53,5	-0,1	31,6	OK
Shear					
ULS Fundamental ST(2)(3)	-132,4	9,5	-0,1	0,1	OK
Stress Limitation					
SLSC ST(2)(76)	-132,4	-4,3	0,0	68,3	OK
Crack Width					
SLSF ST(2)(84)	-125,7	-2,1	0,0	0,0	OK

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)
SLSC ST(2)(76)	SW (1) + R (2) + G (2) + PRE (2)
SLSF ST(2)(84)	SW (1) + R (2) + G (2) + PRE (2)

Construction stage: Final supports (17,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	5,89	ULS Fundamental ST(5)(18)	-126,5	0,0	16,1
2	11,78	ULS Fundamental ST(5)(18)	0,0	-21,5	0,0
2	0,00	ULS Fundamental ST(5)(18)	0,0	21,5	0,0
2	11,78	ULS Fundamental ST(5)(18)	0,0	-21,5	0,0
2	11,18	ULS Fundamental ST(5)(19)	-122,7	-7,1	-35,9

Combination	Critical load effect description
ULS Fundamental ST(5)(18)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(19)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5)

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(5)(26)

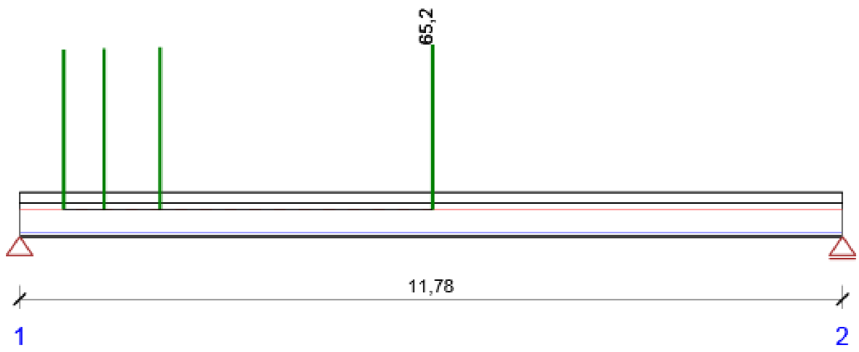
Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	22,8	0,0	-1,2
2 Left	-22,8	0,0	1,2

Combination: SLSC ST(5)(79)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	13,4	0,0	-1,6
2 Left	-13,4	0,0	1,6

Combination: SLSF ST(5)(87)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	13,4	0,0	-1,6
2 Left	-13,4	0,0	1,6



Overall sections check

Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,63m)	A-A	Stress Limitation	63,3	OK
Section 2 (1,21m)	B-B	Stress Limitation	63,6	OK
Section 3 (2,01m)	C-C	Stress Limitation	64,1	OK
Section 4 (5,91m)	C-C	Stress Limitation	65,2	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 4 (5,91m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(5)(79)	-126,5	-2,4	0,0	65,2	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(5)(26)	0,0	58,1	-0,1	34,0	OK
Shear					
ULS Fundamental ST(5)(26)	-126,5	16,1	-0,1	0,1	OK
Stress Limitation					
SLSC ST(5)(79)	-126,5	-2,4	0,0	65,2	OK
Crack Width					
SLSF ST(5)(87)	-120,2	-0,3	0,0	0,0	OK

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(5)(26)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5)
SLSC ST(5)(79)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSF ST(5)(87)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)

Construction stage: End of design working life (18250,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	5,89	ULS Fundamental ST(7)(38)	-119,3	0,0	97,6
2	11,78	ULS Fundamental ST(7)(38)	0,0	-48,4	0,0
2	0,00	ULS Fundamental ST(7)(38)	0,0	48,4	0,0
2	0,60	ULS Fundamental ST(7)(44)	-109,2	15,4	-26,0

Combination	Critical load effect description
ULS Fundamental ST(7)(38)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + G (7)
ULS Fundamental ST(7)(44)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(7)(42)

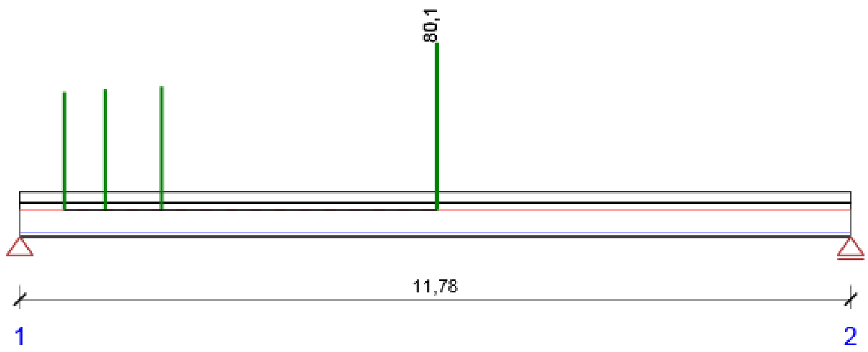
Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	49,6	0,0	-1,2
2 Left	-49,6	0,0	1,2

Combination: SLSC ST(7)(82)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	32,2	0,0	-3,9
2 Left	-32,2	0,0	3,9

Combination: SLSF ST(7)(90)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	24,7	0,0	-3,0
2 Left	-24,7	0,0	3,0



Overall sections check

Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,63m)	A-A	Stress Limitation	56,6	OK
Section 2 (1,21m)	B-B	Stress Limitation	57,7	OK
Section 3 (2,01m)	C-C	Stress Limitation	59,2	OK
Section 4 (5,91m)	C-C	Capacity N-M-M	80,1	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 4 (5,91m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M	ULS Fundamental ST(7)(42)	0,0	137,1	-0,2	80,1	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(7)(42)	0,0	137,1	-0,2	80,1	OK
Shear					
ULS Fundamental ST(7)(42)	-119,3	97,5	-0,2	0,2	OK
Stress Limitation					
SLSC ST(7)(82)	-119,3	55,5	-0,1	75,4	OK
Crack Width					
SLSF ST(7)(90)	-113,3	35,3	-0,1	30,0	OK

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(7)(42)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
SLSC ST(7)(82)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)
SLSF ST(7)(90)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg + R (7) + G (7)

Check of deflections
Deflections: local extremes in spans

Combination: SLSC ST(2)(76), Total deflection

d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,ll}$ [mm]	$u_{z,lt}$ [mm]	$u_{z,lim (\pm)}$ [mm]
8,34	1,5	1,4	1,4	1,4	

Combination: SLSC ST(2)(76), Deflection increment

d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,ll}$ [mm]	$u_{z,incr}$ [mm]	$u_{z,lim (\pm)}$ [mm]
5,89	1,7	1,5	1,3	-0,2	
10,31	1,0	0,9	1,1	0,2	

Long-term losses coefficient

Design member	Load case	Long-term losses coefficient [-]

Design member	Load case	Long-term losses coefficient [-]
DM1	PRE (2)	0,87

Stiffness: extremes on design member

Combination: SLSC ST(2)(76)

Position		Immediate effects of long-term load		Long-term effects of long-term load			Immediate effects of total load	
Begin [m]	End [m]	EA_x [MN]	EI_y [MNm^2]	EA_x [MN]	EI_y [MNm^2]	φ (t,t0) [-]	EA_x [MN]	EI_y [MNm^2]
0,00	0,59	3809	126	1532	53	1,78	3809	126
11,19	11,78	3809	126	1532	53	1,78	3809	126

Explanation

Symbol	Explanation
EAx	Axial stiffness
EIy	Flexural stiffness around y axis
φ (t,t0)	Calculated value of creep coefficient

Combinations selected for check of deflection

Name	Type	Description
SLSC ST(2)(76)	Total	SW (1) + R (2) + G (2) + PRE (2)
	Long-term	SW (1) + R (2) + G (2) + PRE (2)

Design member data

Member type	Beam
Exposure class	XC1
Relative humidity	65 %
Creep coeficient	Calculated
Structural member importance	Major
Redistribution of moments	Off
Reduction of moments	Off
Reduction of shear force	On
Limited interaction check	On

Data of beam spans

Span	Length [m]	Check acc. 7.4.1 (4)		Check acc. 7.4.1 (5)	
		Check	Deflection limits [mm]	Check	Deflection limits [mm]
1	11,78	False		False	

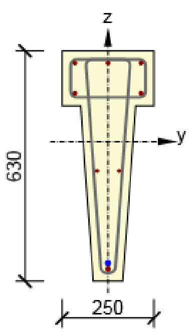
Supports definition

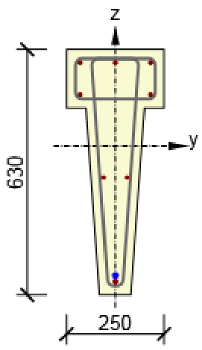
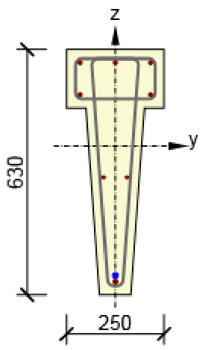
Node	Support width [mm]	Beam or slab is
1	300	Continuous over a support
3	300	Continuous over a support

Reinforcement zones

Zone	Begin [m]	End [m]	Length [m]	Reinforcement	Check
1	0,00	1,18	1,18	A-A	Yes
2	1,18	1,96	0,79	B-B	Yes
3	1,96	9,82	7,85	C-C	Yes
4	9,82	10,60	0,79	B-B	Yes
5	10,60	11,78	1,18	A-A	Yes

Reinforcement for position

Position	Reinforced cross-section	Reinforcement
Section 1 (0,63m)		Reinforcement: 3ø10 (236mm²) (B 500B), z = 215 mm 2ø10 (157mm²) (B 500B), z = 132 mm 2ø8 (101mm²) (B 500B), z = -80 mm 1ø12 (113mm²) (B 500B), Position 0, -348 mm Stirrups: ø8 (B 500B) - 150 mm ø8 (B 500B) - 150 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -332 mm

Position	Reinforced cross-section	Reinforcement
Section 2 (1,21m)		Reinforcement: 3ø10 (236mm²) (B 500B), z = 215 mm 2ø10 (157mm²) (B 500B), z = 132 mm 2ø8 (101mm²) (B 500B), z = -80 mm 1ø12 (113mm²) (B 500B), Position 0, -348 mm Stirrups: ø8 (B 500B) - 200 mm ø8 (B 500B) - 200 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -332 mm
Section 3 (2,01m), Section 4 (5,91m)		Reinforcement: 3ø10 (236mm²) (B 500B), z = 215 mm 2ø10 (157mm²) (B 500B), z = 132 mm 2ø8 (101mm²) (B 500B), z = -80 mm 1ø12 (113mm²) (B 500B), Position 0, -348 mm Stirrups: ø8 (B 500B) - 250 mm ø8 (B 500B) - 250 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -332 mm

Material of reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m³]
B 500B	500,0	540,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08, ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Code and calculation settings

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Persistent, transient		1,50-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ c - Accidental		1,20-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Persistent, transient		1,15-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Accidental		1,00-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ sp		1,15-	Partial factor for prestressing steel EC2-1-1 (3.15),(3.16)
5.5	k1		0,44-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k2		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k3		0,54-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k4		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)

Clause	Name		Value	Description
5.5	k5		0,70-	Coefficient used for calculation of moment redistribution EC2-1-1
5.5	k6		0,80-	Coefficient used for calculation of moment redistribution EC2-1-1
6.2.2	Values for shear check d = h *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2	Values for shear check z = d *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2(1)	C rdc		0,18-	Coeficient Crdc / gamma_c EC2-1-1 (6.2a)
6.2.2(1)	k1		0,15-	Coefficient k1 EC2-1-1 (6.2a)
6.2.2(2)	Neglect cracking status		On	Neglect the status without flexural cracks in calculation of shear resistance. Shear resistance will always be calculated acc. to clause 6.2.2 (1) as if the cross-section was cracked bending EC2-1-1 (6.2.2(1))
6.2.3(1)	θ		40,0°	Angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1 (6.8), (6.9), (6.13), (6.14)
6.2.3(2)	θ min		21,8°	Minimal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	θ max		45,0°	Maximal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	Calculate angle of concrete compression strut	Check Type	On Stirrups	Calculate angle of concrete compression strut to optimize the use of selected component of truss analogy. In the case that any other component of truss analogy is not satisfactory, the value of angle from code settings will be used. EC2-1-1
6.2.3(3)	α cw	Check	Off 1,00-	Coefficient taking account of the state of the stress in the compression chord EC2-1-1 (6.9), (6.14)
6.2.3(3)	ρ w,max		On	Maximal reinforcement ratio for shear reinforcement EC2-1-1 (6.12)
6.2.5 (1)	Shear stress calculation in joints		Difference of normal forces	Shear stress in joint is calculated according to settings
	Limit is defined as numerical value		Off	Deflection will be checked against limit value defined numerically
	Numerical value of deflection limit		25mm	Deflection will be checked against limit value defined numerically.
	Limit value for deflections acc. 7.4.1 (4) as length of span /		250,00-	Calculated deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (4).

Clause	Name		Value	Description
	Limit value for deflections acc. 7.4.1 (5) as length of span /		500,00-	Calculated increment of deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (5).
7.3.1(5)	wmax for reinforced members: Exposure class	X0, XC1 XC2, XC3, XC4 XD, XS	0,400mm 0,300mm 0,300mm	Recommended values of wmax for reinforced members and quasi-permanent combination EC2-1-1 7.1N
7.3.1(5)	wmax for prestressed members: Exposure class	X0, XC1 XC2, XC3, XC4	0,200mm 0,200mm	Recommended values of wmax for prestressed members and frequent combination EC2-1-1 7.1N
7.3.1(5)	Decompression for prestressed members: Exposure class	XC2, XC3, XC4 XD, XS	25mm 25mm	Recommended values of decompression for prestressed members and frequent combination EC2-1-1 7.1N
8.2(2)	s l,min	Check Distance k1(multiple) k2(increment)	On 20mm 1,00- 5mm	Minimal clear distance of longitudinal reinforcement EC2-1-1
8.3(2)	Φ m,min	Check Φs <= 16mm (increment Φs) Φs > 16mm (increment Φs)	On 3,00- 7,00-	Minimum mandrel diameter of stirrup as multiple of stirrup diameter EC2-1-1 Table 8.1N
9.2.1.1(1)	ρ l,min	Check Ratio Factor	On 0,13% 0,26-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.1N)
9.2.1.1(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.2.2(5)	ρ w,min	Check	On 0,08-	Minimal reinforcement ratio for shear reinforcement EC2-1-1 (9.5N)
9.2.2(6)	s w,max	Check	On 0,75-	Maximal distance of stirrups EC2-1-1 (9.6N)
9.2.2(8)	s t,max	Check Check Distance Factor	On On 600mm 0,75-	Maximal transversal distance of branches of stirrups EC2-1-1 (9.8N)
9.2.3(4)	s l,max	Check	On 350mm	Maximal axial distance of longitudinal reinforcement EC2-1-1
9.5.2(1)	Φ min	Check	On 8mm	Minimal diameter of longitudinal reinforcement EC2-1-1
9.5.2(2)	ρ l,min	Check Ratio Factor	On 0,20% 0,10-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.12N)
9.5.2(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.5.2(4)	n Φ	Check	On 4	Minimal number of bars of longitudinal reinforcement EC2-1-1
9.5.3(1)	Φ w,min	Check	On 6mm	Minimal diameter of shear reinforcement EC2-1-1
9.5.3(3)	s ct,tmax	Check Distance Factor	On 400mm 20,00-	Maximal distance of stirrups EC2-1-1

Clause	Name		Value	Description
	Don't exclude tendons		Off	Don't exclude tendons from calculation model of reinforced cross-section if tendons are outside of cross-section
	Neglect redistribution of moments		10,00%	Neglect redistribution of moments My, Mz, if the ratio My/Mz is less than 10%
	Limit value of exploitation		100,00%	Limit value of the exploitation of the cross-section
	Number of iteration steps		20	Number of iteration steps
	Use simplified model of cross-section		On	Use simplified calculation model of cross-section to increase the speed of checks
	Evaluation of interaction diagram		NuMuMu	Evaluation of interaction diagram
	Direction of imperfection		Resultant of moments	Type of direction for calculation of imperfections for columns
	Interpolation curve		Parabolic	Type of interpolation curve of bending moment for calculation of imperfection
	Maximum length of subzone		1,00m	The stiffness of cross-section for the calculation of deflection is considered to be constant in the subzone.

1 Project data

Project title	**SN-1 R 63**
Project number	01
Description	tip R-63
Author	SIRBEGOVIC inzenjering
Date of creation	21.11.2017

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

2 Design Members

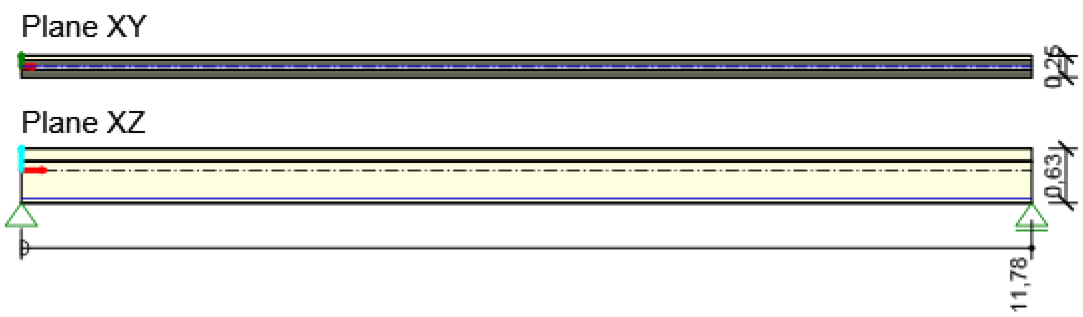
2.1 DM1

Description	Type	Members	Tendons	Valid
	Pre-tensioned	2	G1	✓

Stressing bed: SB1

Length of prestressing units	50,00 m
Stressing procedure	Pretenesioned - correction of relaxation
Calculation of relaxation	By time
Duration of keeping stress constant	300 s
Duration of short-term relaxation	57600 s
Loss due to deformation of end abutments	On
Defining of number of prestresing units	By groups
Shortening of stressing bed	1 mm
Anchorage set	2 mm
Loss due to the difference in temperature	On
Code coefficient	0,50 -
T_{max}	50 °C
T_0	20 °C
Tendon releasing	Gradual releasing

Geometry of design member



2.1.1 Prestressing

Name	Material	A_p [mm^2]	Length [m]	L_s [m]	L_{arc} [m]	R_{min} [m]	θ [°]
	Strands	σ_a [MPa]	σ_{min} [MPa]	σ_{max} [MPa]	e_{ba} [mm]	e_{aa} [mm]	L_{set} [m]
G1	Y1860S7-15.2	139	11,78	11,78	0,00	0,00	0,0
	1	1000,0	466,7	952,2	256,4	254,4	0,00

Name	$\sigma_{ini,max}$ [MPa]	$\sigma_{p,max}$ [MPa]	Check 5.10.2.1(1)P	σ_{min} [MPa]	σ_{max} [MPa]	σ_{pm0} [MPa]	Check 5.10.3(2)P
G1	1000,0	1476,0	✓	466,7	952,2	1394,0	✓

Explanation

Symbol	Explanation
A_p	Area of tendon
Length	Length of tendon
L_s	Sum of lengths of straight parts of tendon
L_{arc}	Sum of lengths of curved parts of tendon
R_{min}	Smallest curve radius found in specified geometry of current tendon
θ	Cumulative angular change
σ_a	Anchorage stress

σ_{min}	Minimum stress along the length of tendon after anchoring
σ_{max}	Maximum stress along the length of tendon after anchoring
e_{ba}	Theoretical tendon elongation before anchoring
e_{aa}	Theoretical tendon elongation after anchoring
L_{set}	Length affected by anchorage set
$\sigma_{ini,max}$	Maximum initial stress in tendon
$\sigma_{p,max}$	Limit value of tendon stress applied to the tendon acc. to 5.10.2.1 (1)P
Check 5.10.2.1(1)P	Check of criterion according to provision 5.10.2.1 (1)P
σ_{pm0}	Limit value of tendon stress applied to the tendon acc. to 5.10.3 (2)
Check 5.10.3(2)P	Check of criterion according to provision 5.10.3 (2)P

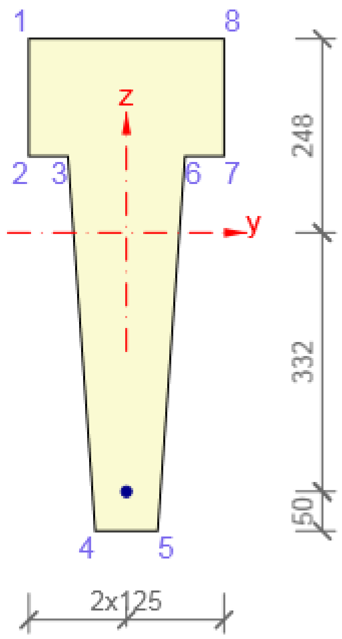
3 Tendons

3.1 Tendon: G1

Material	Number of strands	Load case	Area [mm²]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-15.2	1	PRE (2)	139	15,2	1000,0	1476,0	✓

3.1.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
1	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	0	-332

Tendon coordinates calculated in defined distance X

X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	0	-125	125	-332	-50	580
1,00	1,00	0	-125	125	-332	-50	580
2,00	2,00	0	-125	125	-332	-50	580
3,00	3,00	0	-125	125	-332	-50	580
4,00	4,00	0	-125	125	-332	-50	580
5,00	5,00	0	-125	125	-332	-50	580
6,00	6,00	0	-125	125	-332	-50	580
7,00	7,00	0	-125	125	-332	-50	580
8,00	8,00	0	-125	125	-332	-50	580

9,00	9,00	0	-125	125	-332	-50	580
10,00	10,00	0	-125	125	-332	-50	580
11,00	11,00	0	-125	125	-332	-50	580
11,78	11,78	0	-125	125	-332	-50	580

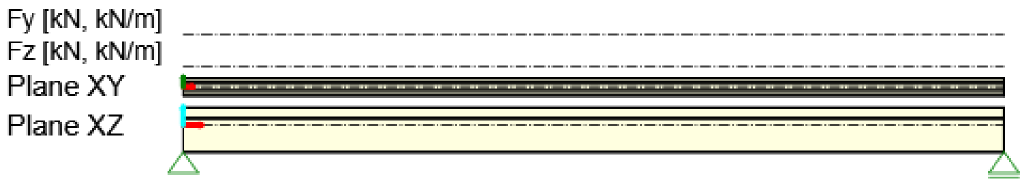
3.1.2 Equivalent load caused by prestressing

Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G1	1	0,03	13,4	0,0	0,0	0,0	-4,4	0,0
	2	0,09	13,4	0,0	0,0	0,0	-4,4	0,0
	3	0,15	13,4	0,0	0,0	0,0	-4,4	0,0
	4	0,21	13,4	0,0	0,0	0,0	-4,4	0,0
	5	0,27	13,4	0,0	0,0	0,0	-4,4	0,0
	6	0,33	13,4	0,0	0,0	0,0	-4,4	0,0
	7	0,39	13,4	0,0	0,0	0,0	-4,4	0,0
	8	0,45	13,4	0,0	0,0	0,0	-4,4	0,0
	9	0,51	13,4	0,0	0,0	0,0	-4,4	0,0
	10	0,57	10,0	0,0	0,0	0,0	-3,3	0,0
	11	0,60	3,3	0,0	0,0	0,0	-1,1	0,0
	12	11,18	-3,3	0,0	0,0	0,0	1,1	0,0
	13	11,21	-10,0	0,0	0,0	0,0	3,3	0,0
	14	11,27	-13,4	0,0	0,0	0,0	4,4	0,0
	15	11,33	-13,4	0,0	0,0	0,0	4,4	0,0
	16	11,39	-13,4	0,0	0,0	0,0	4,4	0,0
	17	11,45	-13,4	0,0	0,0	0,0	4,4	0,0
	18	11,51	-13,4	0,0	0,0	0,0	4,4	0,0
	19	11,57	-13,4	0,0	0,0	0,0	4,4	0,0
	20	11,63	-13,4	0,0	0,0	0,0	4,4	0,0
	21	11,69	-13,4	0,0	0,0	0,0	4,4	0,0
	22	11,75	-13,4	0,0	0,0	0,0	4,4	0,0

Explanation

Symbol	Explanation
Tendon name	Tendon name
Index	Index of current impulse of concentrated load
x	x - coordinate in coordinate system of Design Member
F_x	Magnitude of concentrated force in x direction
F_y	Magnitude of concentrated force in y direction
F_z	Magnitude of concentrated force in z direction
M_x	Magnitude of concentrated moment about x axis
M_y	Magnitude of concentrated moment about y axis
M_z	Magnitude of concentrated moment about z axis

Equivalent load



3.1.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1000,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check
952,2	1394,0	✓

Input values and intermediate results

Area of tendon	139 mm^2
Length of tendon	11,78 m
Maximum stress during tensioning	1000,0 MPa

Maximum stress after transfer	952,2 MPa
Theoretical tendon elongation before anchoring	256,4 mm
Theoretical tendon elongation after anchoring	254,4 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,60 m
Transmission length - end	0,60 m
Blanketed length - begin	0,00 m
Blanketed length - end	0,00 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	962,5	4,6	0,60	0,48	0,72

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	962,5	4,6	0,60	0,48	0,72

Short-term losses

d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	0,0	-0,4	991,8	-29,3	0,0	0,0	-0,5	0,0
0,60	-7,8	0,0	-0,4	991,8	-29,3	-28,9	933,7	-0,5	-16,2
1,00	-7,8	0,0	-0,4	991,8	-29,3	-26,2	936,4	-0,5	-16,2
2,00	-7,8	0,0	-0,4	991,8	-29,3	-20,3	942,2	-0,5	-16,2
3,00	-7,8	0,0	-0,4	991,8	-29,3	-15,8	946,7	-0,5	-16,2
4,00	-7,8	0,0	-0,4	991,8	-29,3	-12,7	949,8	-0,5	-16,2
5,00	-7,8	0,0	-0,4	991,8	-29,3	-10,9	951,7	-0,5	-16,2
6,00	-7,8	0,0	-0,4	991,8	-29,3	-10,4	952,2	-0,5	-16,2
7,00	-7,8	0,0	-0,4	991,8	-29,3	-11,2	951,4	-0,5	-16,2
8,00	-7,8	0,0	-0,4	991,8	-29,3	-13,3	949,2	-0,5	-16,2
9,00	-7,8	0,0	-0,4	991,8	-29,3	-16,7	945,8	-0,5	-16,2
10,00	-7,8	0,0	-0,4	991,8	-29,3	-21,5	941,0	-0,5	-16,2
11,00	-7,8	0,0	-0,4	991,8	-29,3	-27,7	934,9	-0,5	-16,2
11,18	-7,8	0,0	-0,4	991,8	-29,3	-28,9	933,7	-0,5	-16,2
11,78	-7,8	0,0	-0,4	991,8	-29,3	0,0	0,0	-0,5	0,0

Long-term losses

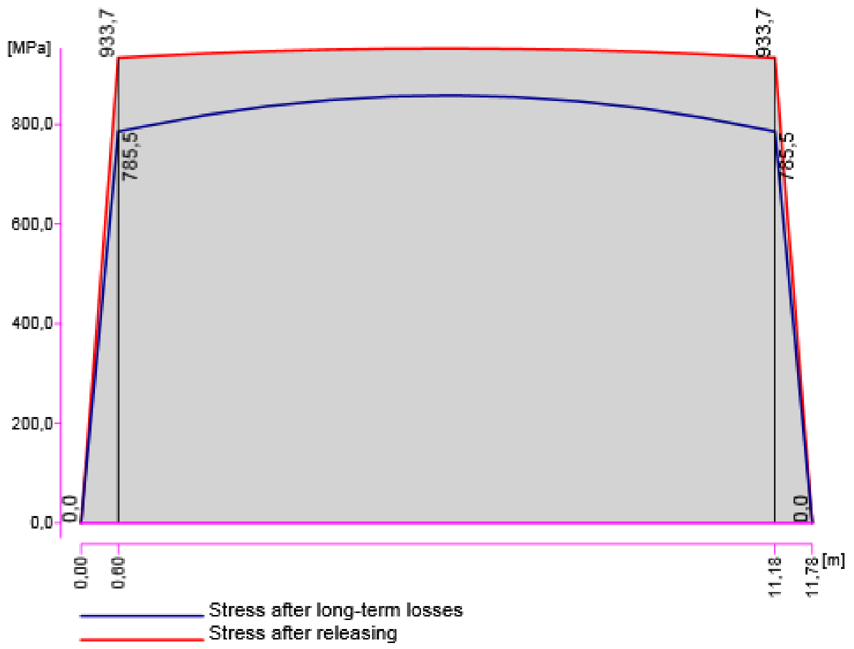
d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
0,60	933,7	148,1	785,5	0,84
1,00	936,4	140,9	795,5	0,85
2,00	942,2	123,6	818,6	0,87
3,00	946,7	110,4	836,3	0,88
4,00	949,8	101,0	848,8	0,89
5,00	951,7	95,6	856,1	0,90
6,00	952,2	94,1	858,1	0,90
7,00	951,4	96,5	854,9	0,90
8,00	949,2	102,8	846,5	0,89
9,00	945,8	113,0	832,8	0,88
10,00	941,0	127,2	813,9	0,86
11,00	934,9	144,9	790,0	0,85
11,18	933,7	148,1	785,5	0,84

Explanation

Symbol	Explanation
l_{pt1}	0.8 lpt
l_{pt2}	1.2 lpt
$\Delta\sigma_{pw}$	Anchorage set loss
$\Delta\sigma_{pA}$	Loss due the deformation of ends abutments of the stressing bed
$\Delta\sigma_{pr}$	Relaxation loss
$\sigma_{pr,cor}$	Stress after short-term relaxation
$\Delta\sigma_{pT}$	Loss due to the difference in temperature of prestressing steel and stressing bed
$\Delta\sigma_{pe}$	Loss due to the immediate elastic concrete strain
σ_{pa}	Stress after short-term losses - stress in the prestressing steel immediately after the anchoring, or – in the case of pre-tensioned concrete – after the transfer of prestressing into the concrete.
$\Delta\sigma_{pr,occur}$	Relaxation that already took place (occurred)
$\Delta\sigma_{pr,cap}$	Remaining relaxation capacity, i.e. potential stress decrease in prestressing reinforcement due to relaxation at infinite time
$\Delta\sigma_\infty$	Loss of stress in the prestressing steel due to relaxation of prestressing steel, concrete creep and shrinkage, and due to immediate elastic concrete strain caused by permanent actions applied after transfer of prestressing.
σ_∞	Stress after long-term losses - stress in the prestressing steel due to all permanent actions including prestressing at the time close to infinity.

$\sigma_\infty/\sigma_{pa}$	The ratio of stress after long-term losses, and the stress after short -term losses.

Losses



4 List of used materials

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-15.2	1860,0	1640,0	195000,0	0,15	7850
	F_m = 259,0 kN, F_{p01} = 227,9 kN, F_r = 190,0 MPa, ρ_{1000} = 0,03, ρ_∞ = 0,06, Φ = 15 mm, Area = 139 mm2, ε_{uk} = 350,0 1e-4, A_{gt} = 350,0 1e-4, Type: Strand Surface characteristic: Plain, Relaxation class: Class2, Production: Low relaxation, Diagram type: Bilinear with an inclined top branch, Number of wires: 7				

Explanation

Symbol	Explanation
f_{pk}	Characteristic tensile strength
f_{p01k}	Characteristic 0,1% proof force
E	Modulus of elasticity of prestressing steel
F_m	Characteristic value of maximum force
F_{p01}	Characteristic 0,1% proof force
F_r	Fatigue stress range
ρ_{1000}	The value of relaxation loss (ratio), at 1000 hours after tensioning and at a mean temperature of 20°C
ρ_∞	The value of relaxation loss (ratio), at 500 000 hours after tensioning and at a mean temperature of 20°C
ε_{uk}	Characteristic strain of reinforcement or prestressing steel at maximum load
A_{gt}	Total elongation at maximum force
Type	Type of prestressing steel
Diagram type	The type of stress-strain diagram

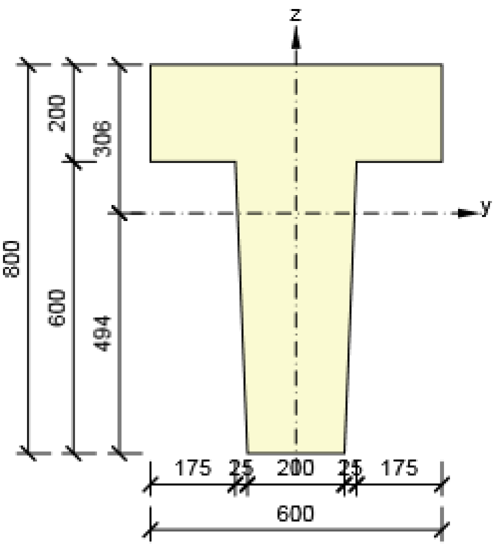
1 Project Data

Title of the project	**SN-2 T 80**
Identification of project	002
Author	SIRBEGOVIC Inzenjering
Description	olucna greda t80
Date	21.11.2017
Design code	EN
Type of beam	Pre-fabricated pre-tensioned concrete beam

2 Cross-Sections

2. T-80(T Shape 800, 600)

Symbol	Value	Unit
Material	C50/60	
A	255000	[mm^2]
S_y	0	[mm^3]
S_z	0	[mm^3]
I_y	14041176471	[mm^4]
I_z	4176562500	[mm^4]
C_{gy}	0	[mm]
C_{gz}	0	[mm]
i_y	235	[mm]
i_z	128	[mm]



3 Material

Concrete

Name	f_{ck} [MPa]	f_{cm} [MPa]	f_{ctm} [MPa]	E_{cm} [MPa]	μ [-]	Unit mass [kg/m^3]
C50/60	50,0	58,0	4,1	37277,9	0,20	2500
	ε_{c2} = 20,0 1e-4,ε_{cu2} = 35,0 1e-4,ε_{c3} = 17,5 1e-4,ε_{cu3} = 35,0 1e-4, Exponent - n: 2,00,Aggregate size = 16 mm,Cement class: R (s = 0,20),Diagram type: Parabolic					

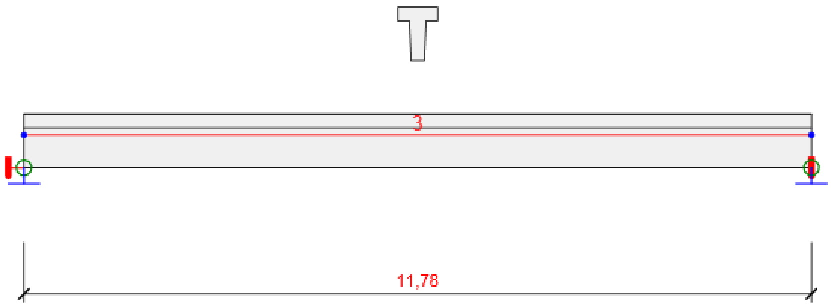
Reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 500B	500,0	540,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Prestressing steel

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-12.5	1860,0	1640,0	195000,0	0,15	7850
	F_m = 173,0 kN,F_{p01} = 152,2 kN,F_r = 190,0 MPa,ρ_{1000} = 0,03,ρ_∞ = 0,06, Φ = 13 mm,Area = 93 mm2,ε_{uk} = 350,0 1e-4,A_{gt} = 350,0 1e-4,Type: Strand Surface characteristic: Plain,Relaxation class: Class2,Production: Low relaxation, Diagram type: Bilinear with an inclined top branch,Number of wires: 7				

4 Geometry



Structural scheme

Loads direction and boundary conditions in uncoiled view may not correspond the real directions in 3D

Members

Member	Length [m]	Delta X [m]	Delta Y [m]	Cross-Section
3	11,78	11,78	0,00	2 - T-80 (T Shape 800, 600)

Nodes

Node	X [m]	Y [m]	Z [m]	Support
1	0,00	0,00	0,00	XYZRx
4	11,78	0,00	0,00	YZRx

5 Load Cases

Name	Type	C.Stage	Load Group	Load [kN/m]
SW (1)	Permanent	1	LG1	-6,3
R (2)	Permanent	2	LG1	0,0
G (2)	Permanent	2	LG1	0,0
PRE (2)	Permanent	2	LG1	0,0
R (5)	Permanent	5	LG1	0,0
G (5)	Permanent	5	LG1	0,0
R (6)	Permanent	6	LG1	0,0
Stalno (6)	Permanent	6	LG1	-2,0
R (7)	Permanent	7	LG1	0,0
G (7)	Permanent	7	LG1	0,0
Snijeg	Variable		Snijeg	-2,0
vjetar	Variable		Vjetar	0,0

Permanent load groups

Name	$\gamma_{G,\,sub}$ [-]	$\gamma_{G,\,inf}$ [-]	ξ [-]
LG1	1,35	1,00	0,85

Variable load groups

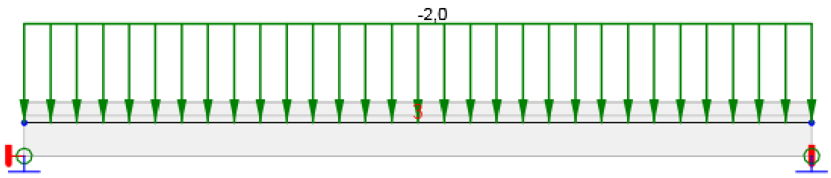
Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Snijeg	Standard	1,50	0,50	0,20	0,00
Vjetar	Standard	1,50	0,60	0,20	0,00

6 Loads

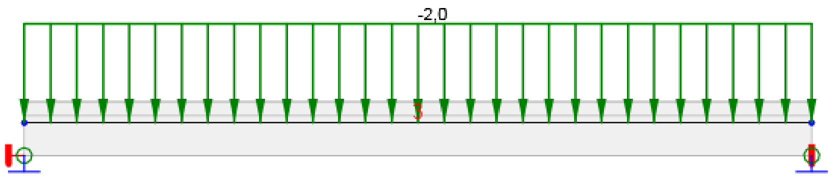
Load Case PRE (2)

Line Loads

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Location	Begin Ey [m]	End Ey [m]	Begin Ez [m]	End Ez [m]
3	362,3	362,3	0,00	0,60	Global X	Length	0,00	0,00	0,00	0,00
3	-362,3	-362,3	11,18	11,78	Global X	Length	0,00	0,00	0,00	0,00



Load Case Stalno (6)



Load Case Snijeg

Load Case vjetar

Load Case vjetar

Line Loads

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Location	Begin Ey [m]	End Ey [m]	Begin Ez [m]	End Ez [m]
3	10,1	10,1	0,00	11,78	Global Y	Length	0,00	0,00	0,00	0,00

7 Load Combinations

Name	Type	C.Stage	Evaluation
ULS Fundamental ST(2)	ULS Fundamental	2	Eurocode, formula 6.10 a,b
SW (1); R (2); G (2); PRE (2)			
SLSC ST(2)	SLS Char	2	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2)			
SLSF ST(2)	SLS Freq	2	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2)			
SLSQ ST(2)	SLS Quasi	2	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2)			
ULS Fundamental ST(5)	ULS Fundamental	5	Eurocode, formula 6.10 a,b
SW (1); R (2); G (2); PRE (2); R (5); G (5)			
SLSC ST(5)	SLS Char	5	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (5); G (5)			
SLSF ST(5)	SLS Freq	5	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (5); G (5)			
SLSQ ST(5)	SLS Quasi	5	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (5); G (5)			
ULS Fundamental ST(6)	ULS Fundamental	6	Eurocode, formula 6.10 a,b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSC ST(6)	SLS Char	6	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSF ST(6)	SLS Freq	6	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSQ ST(6)	SLS Quasi	6	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); Snijeg			
ULS Fundamental ST(7)	ULS Fundamental	7	Eurocode, formula 6.10 a,b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSC ST(7)	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSF ST(7)	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSQ ST(7)	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
ULS-W	ULS Fundamental	7	Eurocode, formula 6.10 a,b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSCh-W	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSFr-W	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7)			

Name	Type	C.Stage	Evaluation
SLSQa-W	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (5); G (5); R (6); Stalno (6); R (7); G (7)			

8 Construction stages

	Name	Time [d]	Beam spans [m]
1	Casting	0	
2	Transfer of prestressing	5	11,78
	Support 0,00 m: to design position Support 11,78 m: to design position User-specified concrete strength f_{ck} = 36,1 MPa		
5	Final supports	17	
6	Superimposed dead load	45	
7	End of design working life	18250	

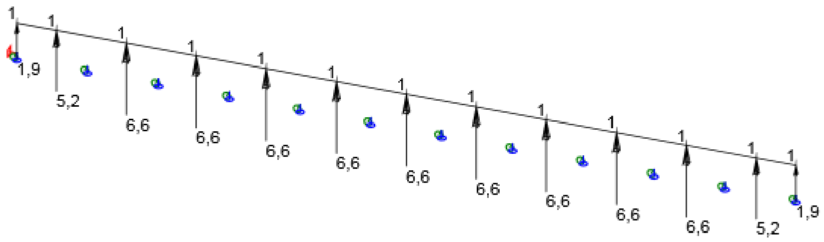
9 Results

Note: Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time depend analysis.

Load Case SW (1)

Internal forces, Member Extreme, Centroidal forces, Entire centroid

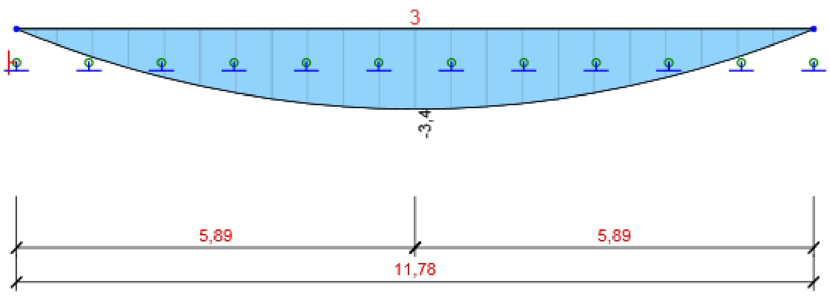
Deformations, Member Extreme,



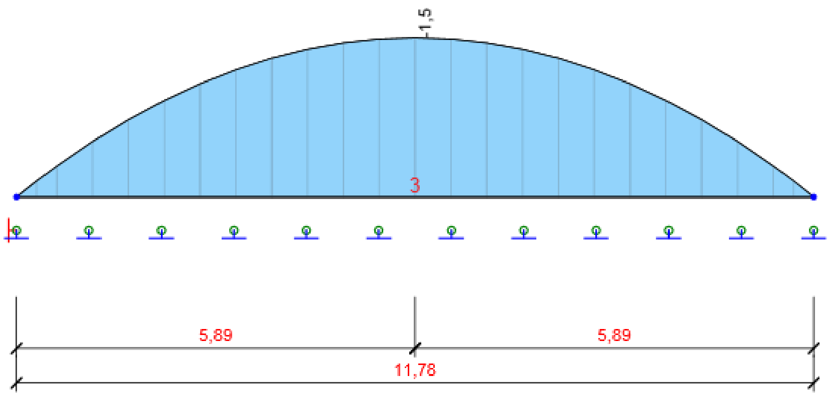
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SW (1)	0,0	0,0	1,9	0,0	0,0	0,0
1	SW (1)	0,0	0,0	1,9	0,0	0,0	0,0
1	SW (1)	0,0	0,0	6,6	0,0	0,0	0,0
4	SW (1)	0,0	0,0	0,0	0,0	0,0	0,0

Load Case R (2)



Load Case R (2), N [kN], Centroidal forces, Entire centroid

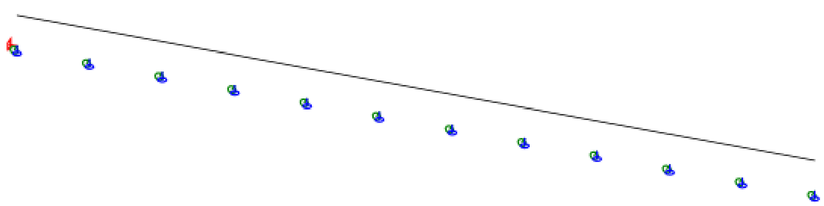


Load Case R (2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

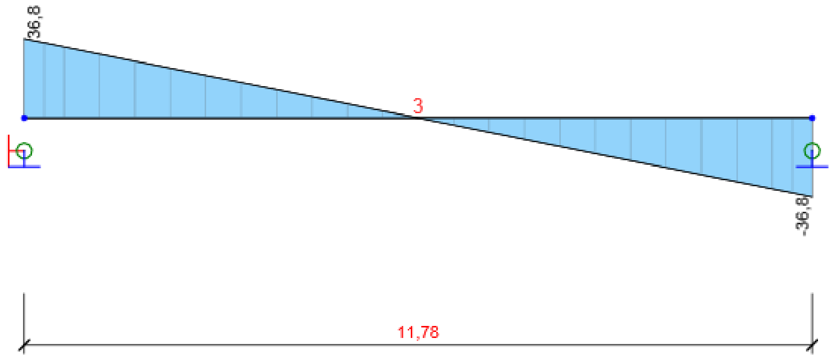
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	R (2)	5,89	-3,4	0,0	0,0	0,0	-1,5	0,0
3	R (2)	0,00	0,0	0,0	0,0	0,0	0,0	0,0

Deformations, Member Extreme,

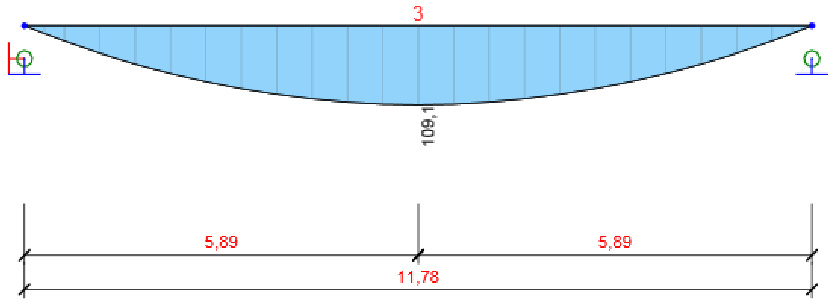


Reactions

Load Case G (2)



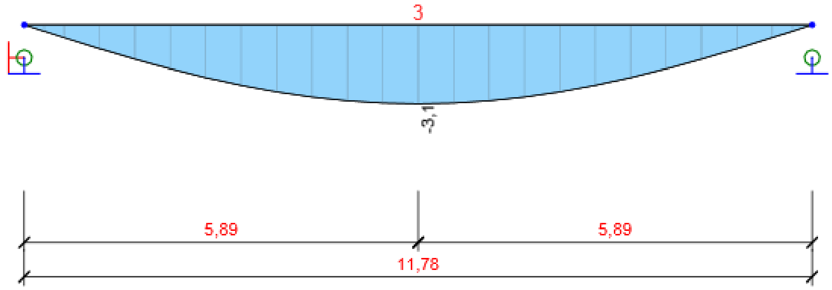
Load Case G (2), Vz [kN], Centroidal forces, Entire centroid



Load Case G (2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	G (2)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	G (2)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	G (2)	5,89	0,0	0,0	0,0	0,0	109,1	0,0

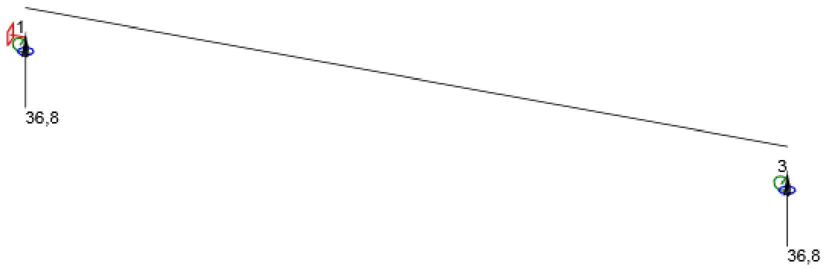


Load Case G (2), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	G (2)	11,18	0,4	0,0	-0,5	0,0	-0,8	0,0
3	G (2)	0,00	0,4	0,0	0,0	0,0	0,8	0,0
3	G (2)	5,89	0,4	0,0	-3,1	0,0	0,0	0,0

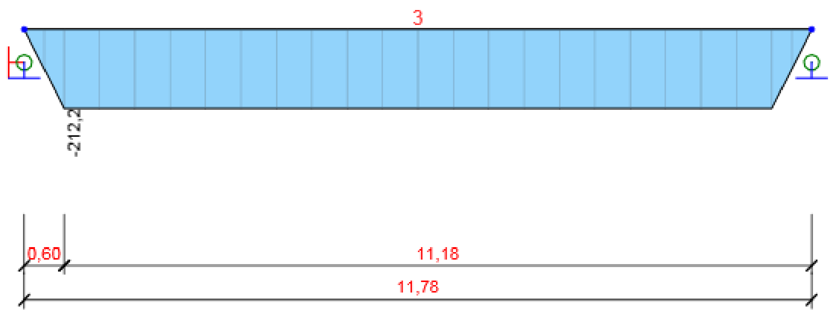
Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	G (2)	11,78	0,4	0,0	0,0	0,0	-0,8	0,0



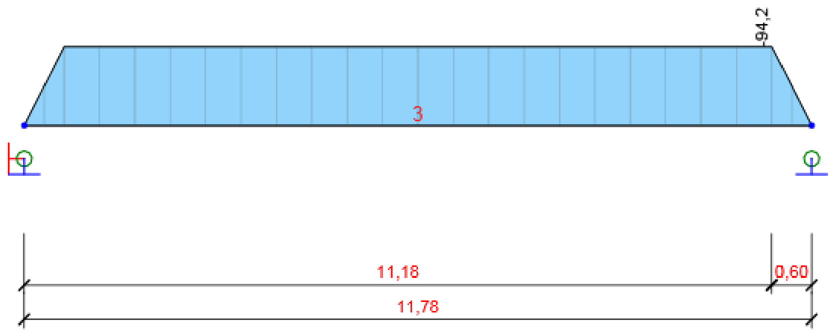
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	G (2)	0,0	0,0	36,8	0,0	0,0	0,0
3	G (2)	0,0	0,0	36,8	0,0	0,0	0,0

Load Case PRE (2)



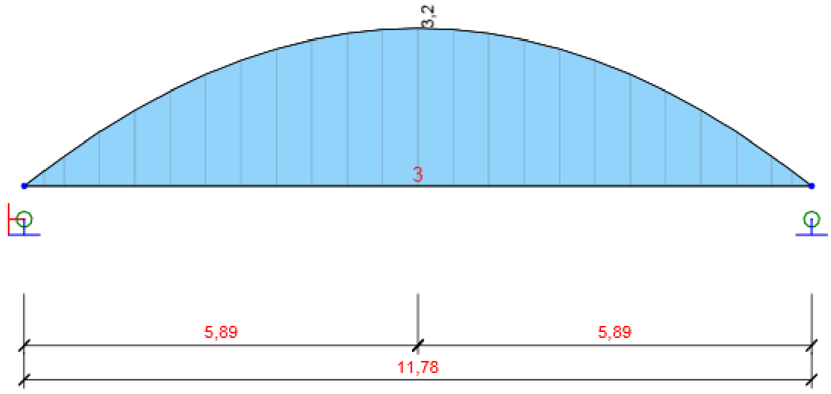
Load Case PRE (2), N [kN], Centroidal forces, Entire centroid



Load Case PRE (2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

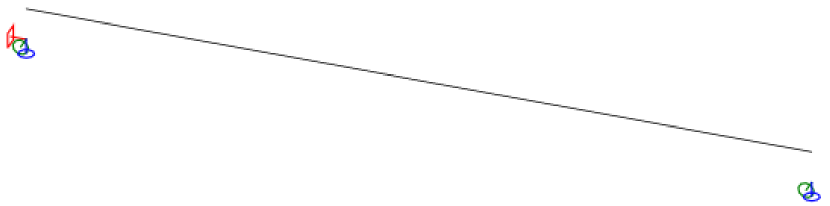
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	PRE (2)	0,60	-212,2	0,0	0,0	0,0	-94,2	0,0
3	PRE (2)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	PRE (2)	11,18	-212,2	0,0	0,0	0,0	-94,2	0,0



Load Case PRE (2), Displacement uz [mm]

Deformations, Member Extreme,

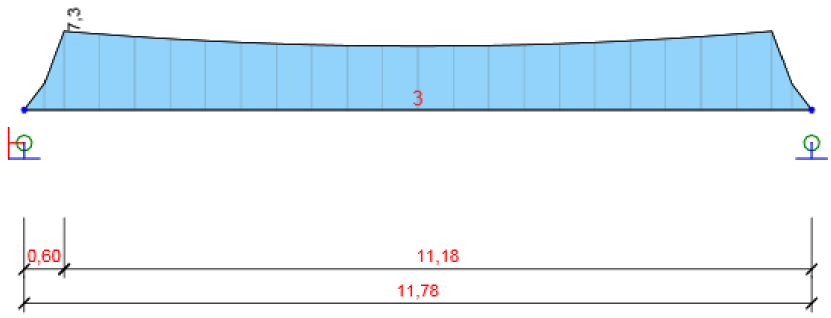
Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	PRE (2)	11,78	-0,8	0,0	0,0	0,0	1,0	0,0
3	PRE (2)	0,00	-0,5	0,0	0,0	0,0	-1,0	0,0
3	PRE (2)	5,89	-0,6	0,0	3,2	0,0	0,0	0,0



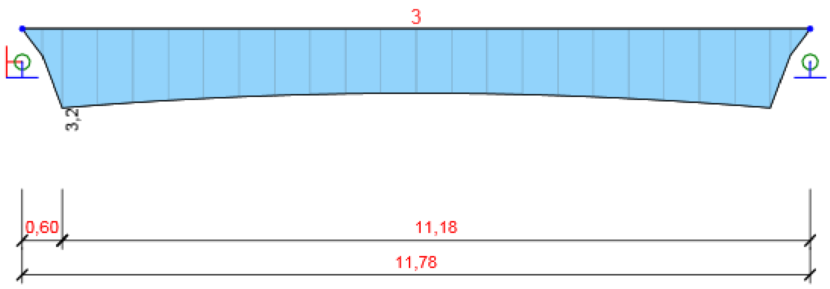
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	PRE (2)	0,0	0,0	0,0	0,0	0,0	0,0
3	PRE (2)	0,0	0,0	0,0	0,0	0,0	0,0

Load Case R (5)



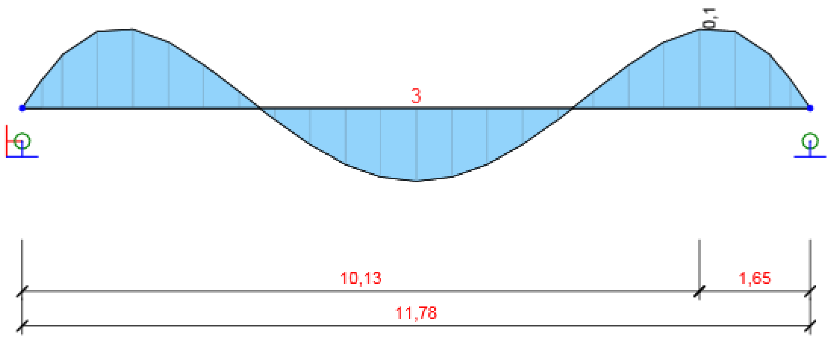
Load Case R (5), N [kN], Centroidal forces, Entire centroid



Load Case R (5), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

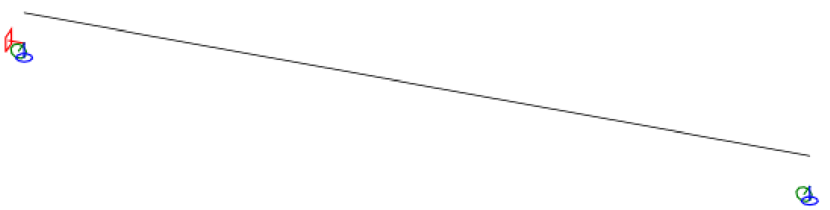
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	R (5)	11,78	0,0	0,0	0,0	0,0	0,0	0,0
3	R (5)	0,60	7,3	0,0	0,0	0,0	3,2	0,0
3	R (5)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	R (5)	0,60	7,3	0,0	0,0	0,0	3,2	0,0



Load Case R (5), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	R (5)	11,78	-0,9	0,0	0,0	0,0	0,1	0,0
3	R (5)	0,00	0,0	0,0	0,0	0,0	-0,1	0,0
3	R (5)	5,89	-0,5	0,0	0,0	0,0	0,0	0,0
3	R (5)	10,13	-0,8	0,0	0,1	0,0	0,0	0,0



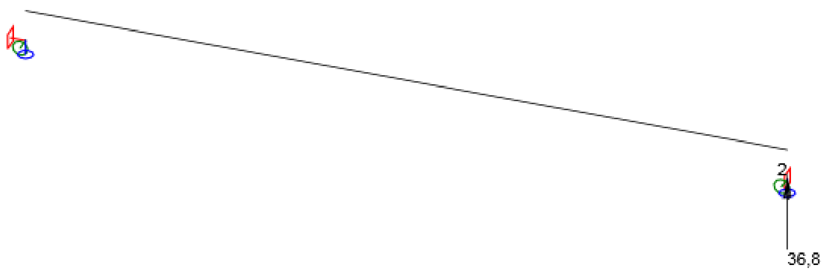
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	R (5)	0,0	0,0	0,0	0,0	0,0	0,0
3	R (5)	0,0	0,0	0,0	0,0	0,0	0,0

Load Case G (5)

Internal forces, Member Extreme, Centroidal forces, Entire centroid

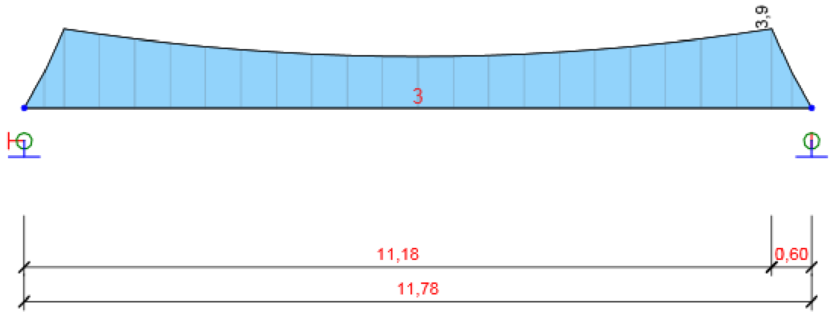
Deformations, Member Extreme,



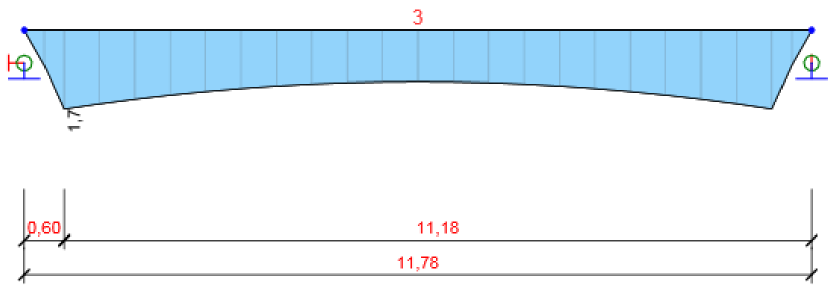
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	G (5)	0,0	0,0	0,0	0,0	0,0	0,0
2	G (5)	0,0	0,0	36,8	0,0	0,0	0,0

Load Case R (6)



Load Case R (6), N [kN], Centroidal forces, Entire centroid

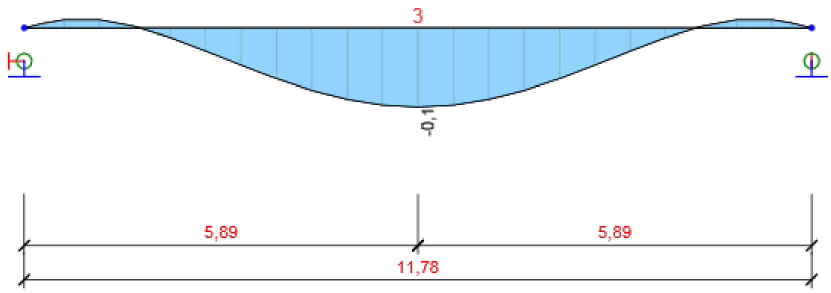


Load Case R (6), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	R (6)	11,78	0,0	0,0	0,0	0,0	0,0	0,0
3	R (6)	11,18	3,9	0,0	0,0	0,0	1,7	0,0

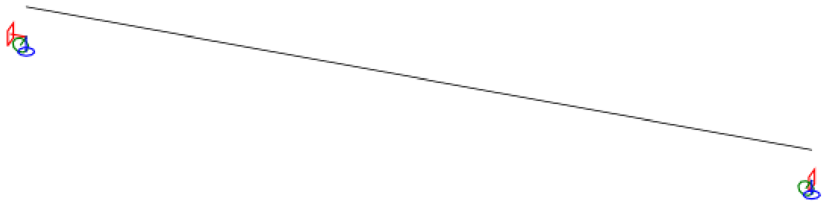
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	R (6)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	R (6)	0,60	3,9	0,0	0,0	0,0	1,7	0,0



Load Case R (6), Displacement uz [mm]

Deformations, Member Extreme,

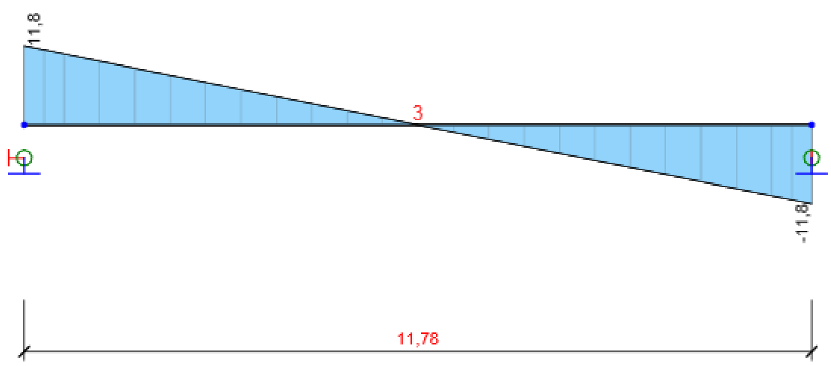
Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	R (6)	11,78	-1,1	0,0	0,0	0,0	0,0	0,0
3	R (6)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	R (6)	5,89	-0,6	0,0	-0,1	0,0	0,0	0,0
3	R (6)	11,18	-1,0	0,0	0,0	0,0	0,0	0,0
3	R (6)	8,54	-0,8	0,0	0,0	0,0	0,0	0,0
3	R (6)	3,24	-0,3	0,0	0,0	0,0	0,0	0,0



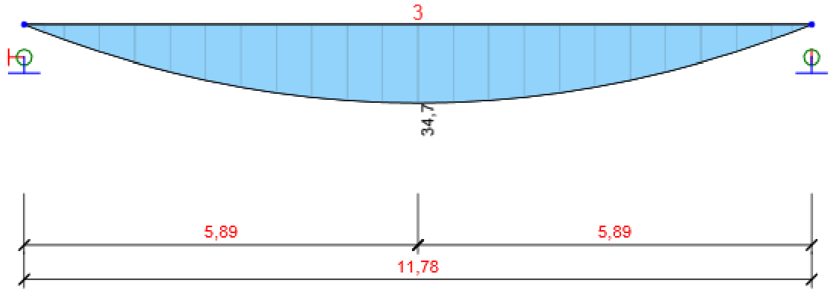
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	R (6)	0,0	0,0	0,0	0,0	0,0	0,0
2	R (6)	0,0	0,0	0,0	0,0	0,0	0,0

Load Case Stalno (6)



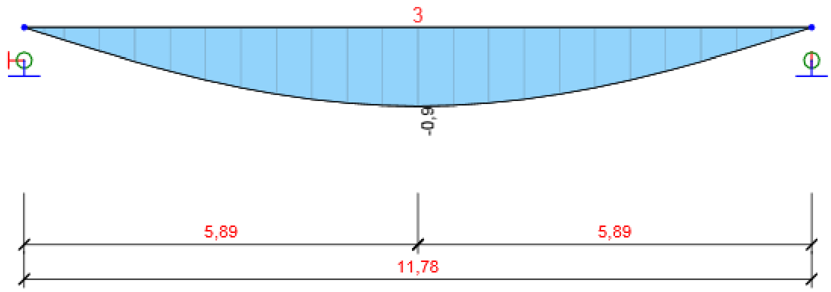
Load Case Stalno (6), Vz [kN], Centroidal forces, Entire centroid



Load Case Stalno (6), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

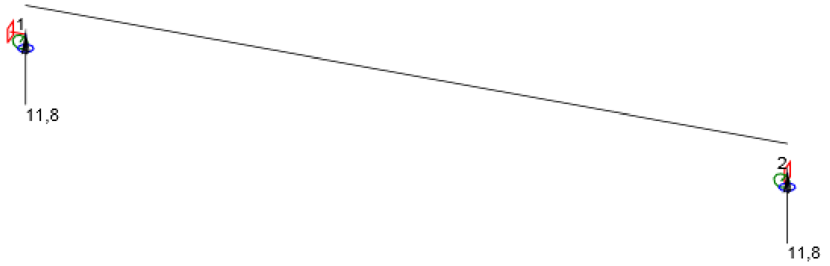
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	Stalno (6)	0,00	0,0	0,0	11,8	0,0	0,0	0,0
3	Stalno (6)	11,78	0,0	0,0	-11,8	0,0	0,0	0,0
3	Stalno (6)	5,89	0,0	0,0	0,0	0,0	34,7	0,0



Load Case Stalno (6), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	Stalno (6)	11,18	0,1	0,0	-0,1	0,0	-0,2	0,0
3	Stalno (6)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	Stalno (6)	5,89	0,1	0,0	-0,9	0,0	0,0	0,0
3	Stalno (6)	11,78	0,1	0,0	0,0	0,0	-0,2	0,0

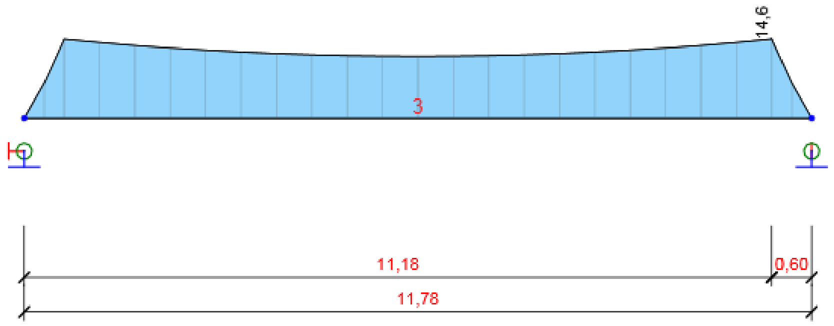


Reactions

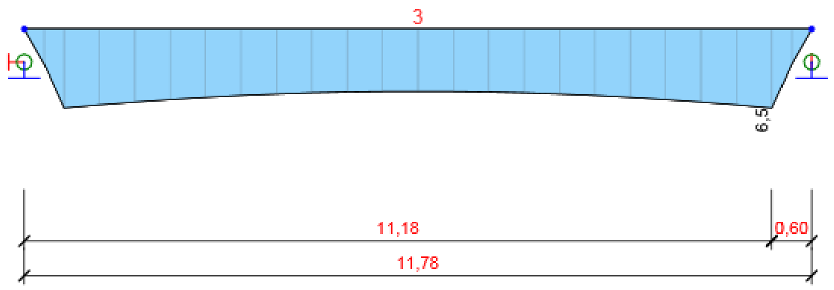
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	Stalno (6)	0,0	0,0	11,8	0,0	0,0	0,0
2	Stalno (6)	0,0	0,0	11,8	0,0	0,0	0,0

Load Case R (7)



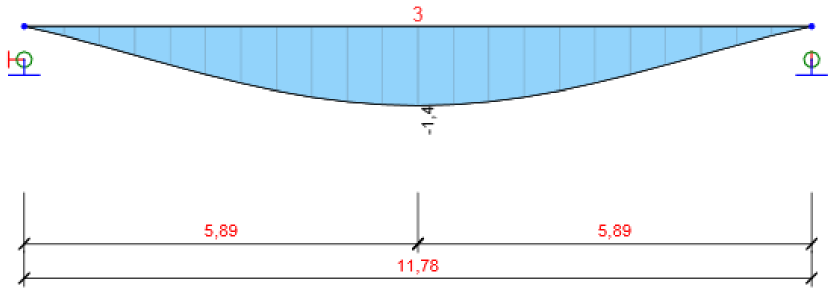
Load Case R (7), N [kN], Centroidal forces, Entire centroid



Load Case R (7), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

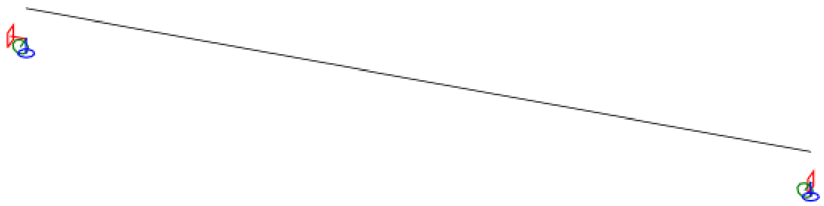
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	R (7)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	R (7)	11,18	14,6	0,0	0,0	0,0	6,5	0,0



Load Case R (7), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	R (7)	11,78	-3,6	0,0	0,0	0,0	-0,3	0,0
3	R (7)	0,00	0,1	0,0	0,0	0,0	0,3	0,0
3	R (7)	5,89	-1,8	0,0	-1,4	0,0	0,0	0,0
3	R (7)	10,13	-3,1	0,0	-0,5	0,0	-0,3	0,0
3	R (7)	1,65	-0,4	0,0	-0,5	0,0	0,3	0,0



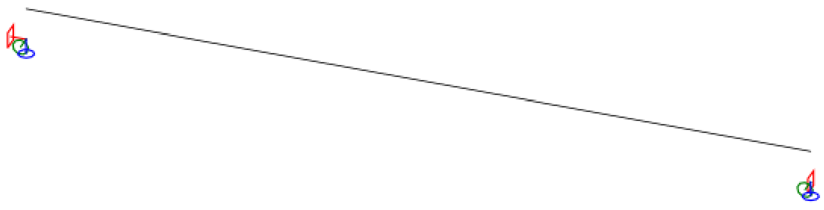
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	R (7)	0,0	0,0	0,0	0,0	0,0	0,0
2	R (7)	0,0	0,0	0,0	0,0	0,0	0,0

Load Case G (7)

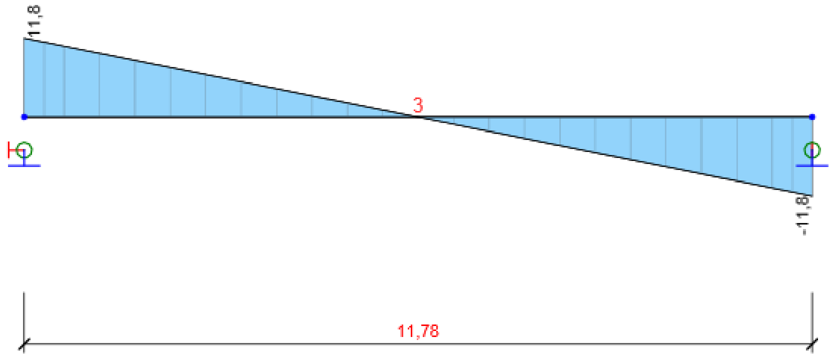
Internal forces, Member Extreme, Centroidal forces, Entire centroid

Deformations, Member Extreme,



Reactions

Load Case Snijeg



Load Case Snijeg, Vz [kN], Centroidal forces

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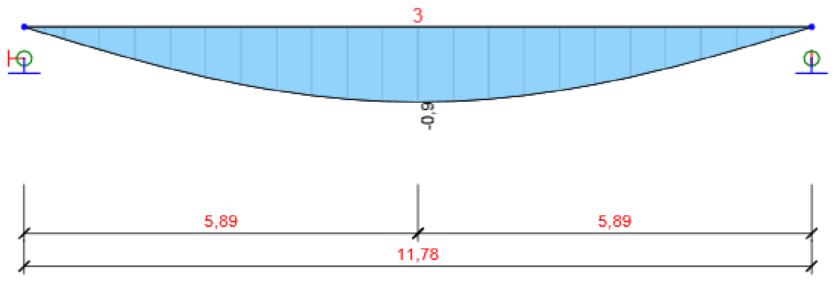
Internal forces, Member Extreme, Centroidal forces, Entire centroid

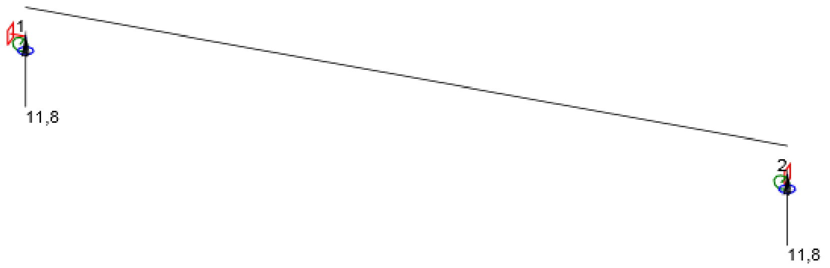
Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	Snijeg	0,00	0,0	0,0	11,8	0,0	0,0	0,0
3	Snijeg	11,78	0,0	0,0	-11,8	0,0	0,0	0,0
3	Snijeg	5,89	0,0	0,0	0,0	0,0	34,7	0,0



Load Case Snijeg, Displacement uz [mm]

Deformations, Member Extreme,

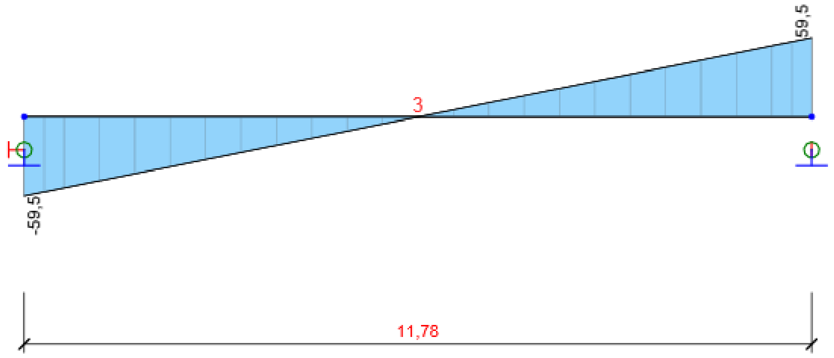
Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	Snijeg	11,18	0,1	0,0	-0,1	0,0	-0,2	0,0
3	Snijeg	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	Snijeg	5,89	0,1	0,0	-0,9	0,0	0,0	0,0
3	Snijeg	11,78	0,1	0,0	0,0	0,0	-0,2	0,0



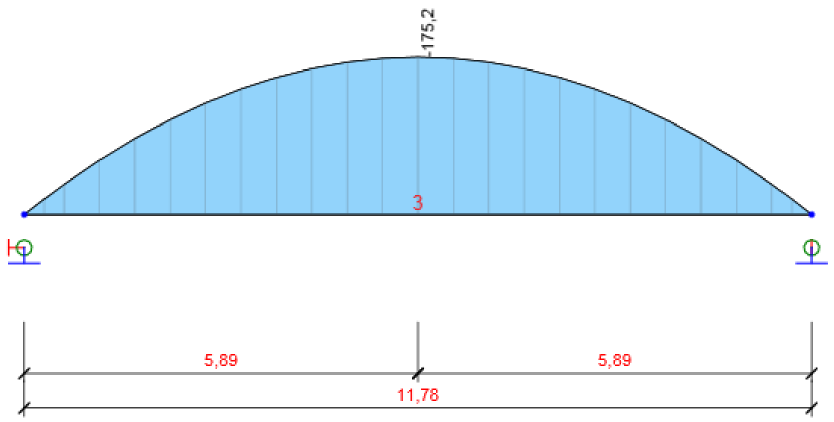
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	Snijeg	0,0	0,0	0,0	0,0	0,0	0,0
1	Snijeg	0,0	0,0	11,8	0,0	0,0	0,0
2	Snijeg	0,0	0,0	11,8	0,0	0,0	0,0
3	Snijeg	0,0	0,0	0,0	0,0	0,0	0,0
4	Snijeg	0,0	0,0	0,0	0,0	0,0	0,0

Load Case vjetar



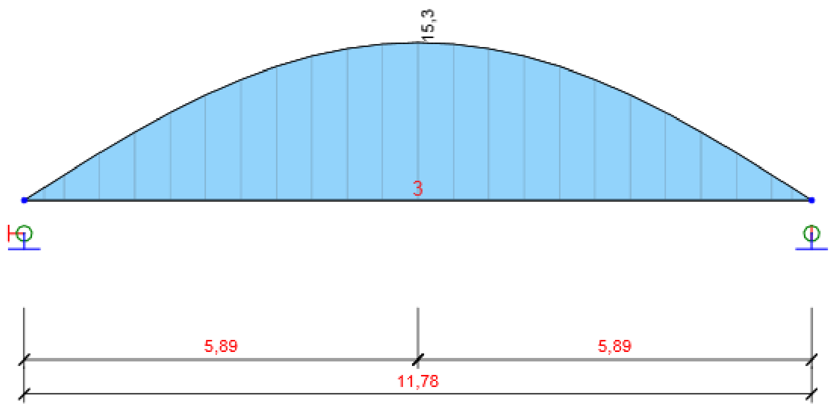
Load Case vjetar, Vy [kN], Centroidal forces



Load Case vjetar, Mz [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	vjetar	0,00	0,0	-59,5	0,0	0,0	0,0	0,0
3	vjetar	11,78	0,0	59,5	0,0	0,0	0,0	0,0
3	vjetar	11,18	0,0	53,5	0,0	0,0	0,0	-33,7
3	vjetar	5,89	0,0	0,0	0,0	0,0	0,0	-175,2

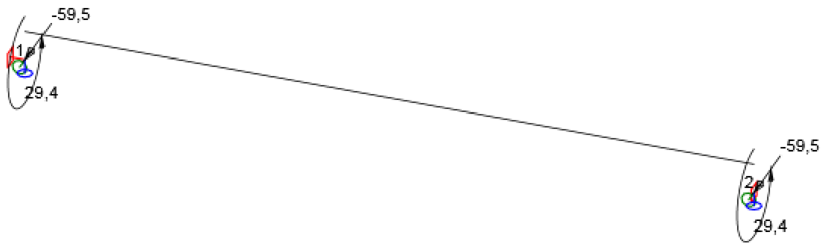


Load Case vjetar, Displacement uy [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]

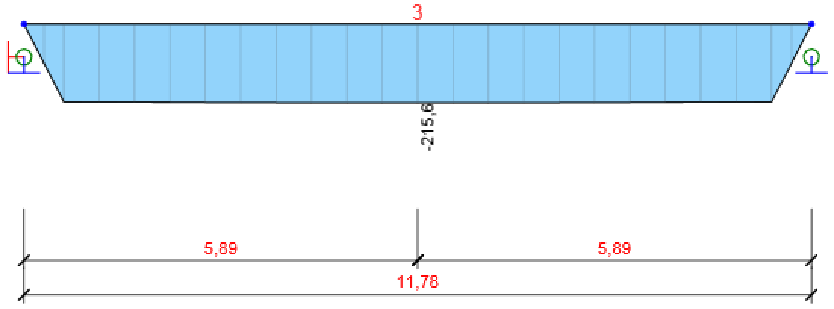
Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	vjetar	0,00	0,0	0,0	0,0	0,0	0,0	4,2
3	vjetar	5,89	0,0	15,3	0,0	0,0	0,0	0,0
3	vjetar	11,78	0,0	0,0	0,0	0,0	0,0	-4,2



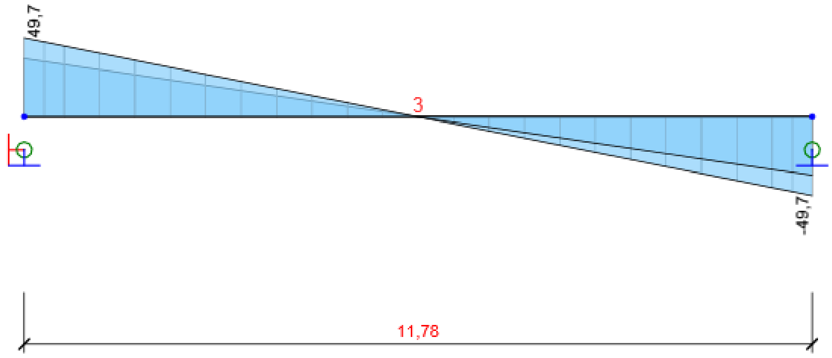
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	vjetar	0,0	0,0	0,0	0,0	0,0	0,0
1	vjetar	0,0	-59,5	0,0	29,4	0,0	0,0
2	vjetar	0,0	-59,5	0,0	29,4	0,0	0,0
3	vjetar	0,0	0,0	0,0	0,0	0,0	0,0
4	vjetar	0,0	0,0	0,0	0,0	0,0	0,0

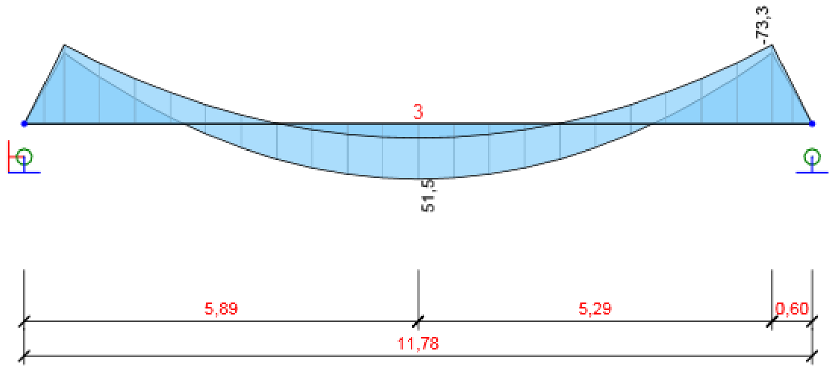
Combination ULS Fundamental ST(2)



Combination ULS Fundamental ST(2), N [kN], Centroidal forces, Entire centroid



Combination ULS Fundamental ST(2), Vz [kN], Centroidal forces, Entire centroid

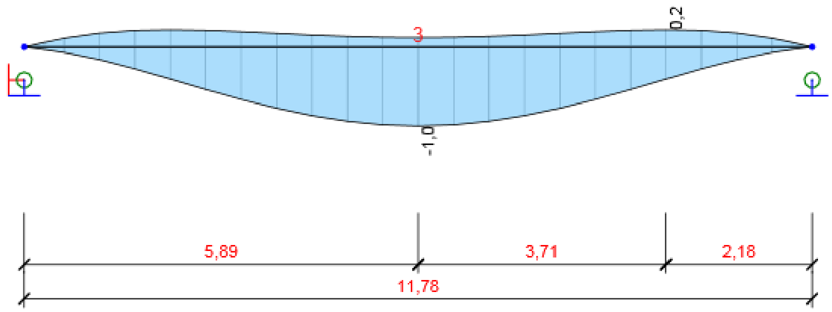


Combination ULS Fundamental ST(2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	ULS Fundamental ST(2)(1)	5,89	-215,6	0,0	0,0	0,0	13,3	0,0
3	ULS Fundamental ST(2)(1)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	ULS Fundamental ST(2)(2)	11,78	0,0	0,0	-49,7	0,0	0,0	0,0
3	ULS Fundamental ST(2)(2)	0,00	0,0	0,0	49,7	0,0	0,0	0,0
3	ULS Fundamental ST(2)(1)	11,18	-212,8	0,0	-33,1	0,0	-73,3	0,0
3	ULS Fundamental ST(2)(2)	5,89	-215,6	0,0	0,0	0,0	51,5	0,0

Combination	Critical load effect description
ULS Fundamental ST(2)(1)	SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(2)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

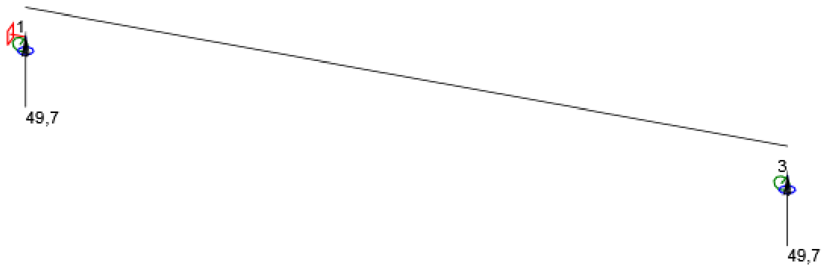


Combination ULS Fundamental ST(2), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	ULS Fundamental ST(2)(1)	11,78	-0,4	0,0	0,0	0,0	0,2	0,0
3	ULS Fundamental ST(2)(2)	0,00	0,0	0,0	0,0	0,0	0,1	0,0
3	ULS Fundamental ST(2)(1)	0,00	-0,1	0,0	0,0	0,0	-0,2	0,0
3	ULS Fundamental ST(2)(2)	5,89	-0,1	0,0	-1,0	0,0	0,0	0,0
3	ULS Fundamental ST(2)(1)	9,60	-0,3	0,0	0,2	0,0	0,0	0,0
3	ULS Fundamental ST(2)(2)	9,60	-0,2	0,0	-0,4	0,0	-0,2	0,0
3	ULS Fundamental ST(2)(2)	2,18	0,0	0,0	-0,4	0,0	0,2	0,0

Combination	Critical load effect description
ULS Fundamental ST(2)(1)	SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(2)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

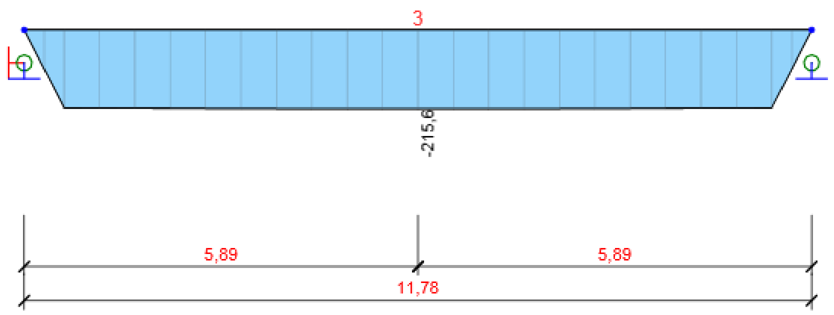


Reactions

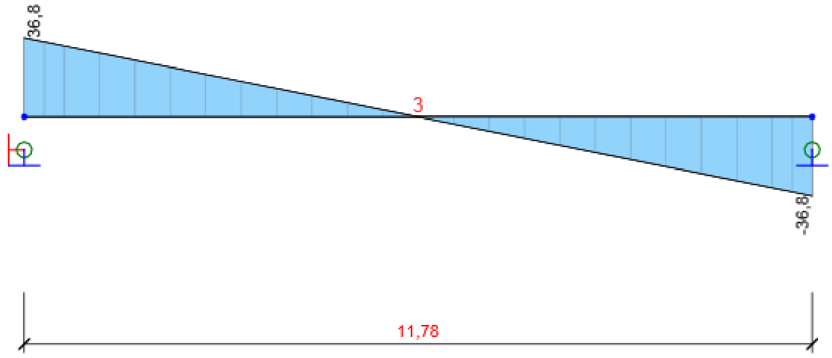
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	ULS Fundamental ST(2)(9)	0,0	0,0	49,7	0,0	0,0	0,0
1	ULS Fundamental ST(2)(1)	0,0	0,0	36,8	0,0	0,0	0,0
3	ULS Fundamental ST(2)(9)	0,0	0,0	49,7	0,0	0,0	0,0
3	ULS Fundamental ST(2)(1)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
ULS Fundamental ST(2)(9)	SW (1) + R (2) + 1,35*G (2) + PRE (2)
ULS Fundamental ST(2)(1)	SW (1) + R (2) + G (2) + PRE (2)

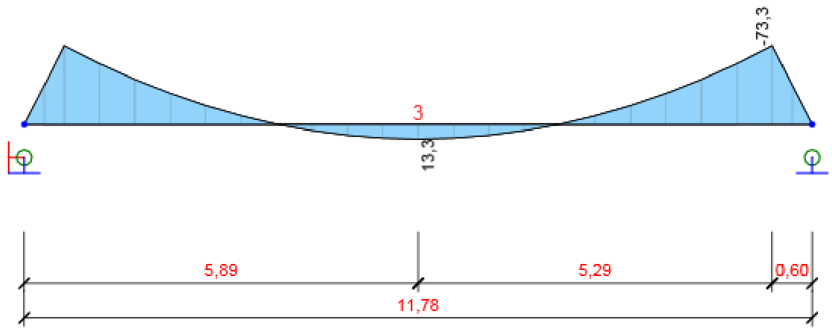
Combination SLSC ST(2)



Combination SLSC ST(2), N [kN], Centroidal forces, Entire centroid



Combination SLSC ST(2), Vz [kN], Centroidal forces, Entire centroid

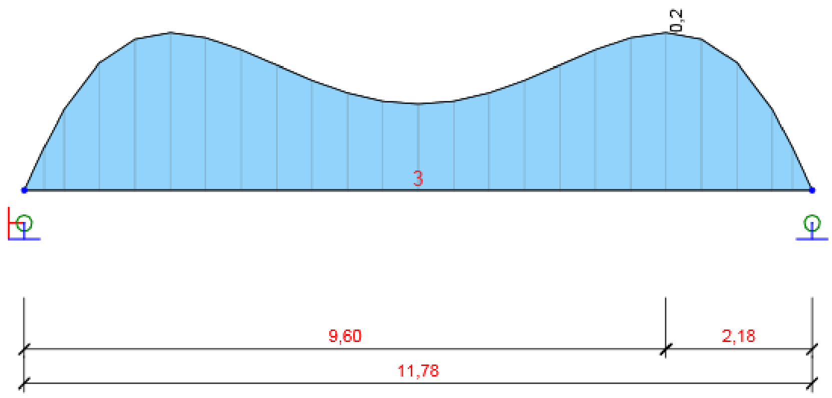


Combination SLSC ST(2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSC ST(2)(18)	5,89	-215,6	0,0	0,0	0,0	13,3	0,0
3	SLSC ST(2)(18)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSC ST(2)(18)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	SLSC ST(2)(18)	11,18	-212,8	0,0	-33,1	0,0	-73,3	0,0

Combination	Critical load effect description
SLSC ST(2)(18)	SW (1) + R (2) + G (2) + PRE (2)



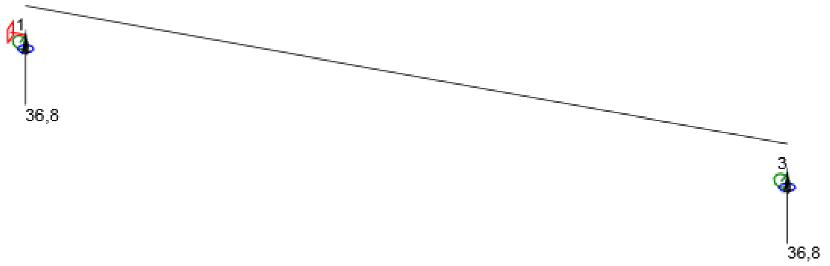
Combination SLSC ST(2), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSC ST(2)(18)	11,78	-0,4	0,0	0,0	0,0	0,2	0,0
3	SLSC ST(2)(18)	0,00	-0,1	0,0	0,0	0,0	-0,2	0,0
3	SLSC ST(2)(18)	9,60	-0,3	0,0	0,2	0,0	0,0	0,0

Combination	Critical load effect description
SLSC ST(2)(18)	SW (1) + R (2) + G (2) + PRE (2)

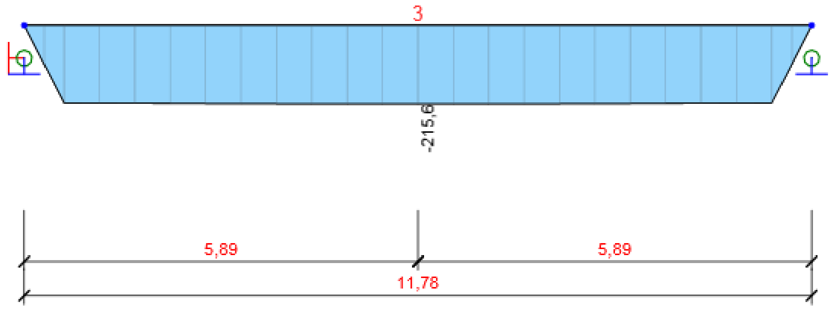


Reactions

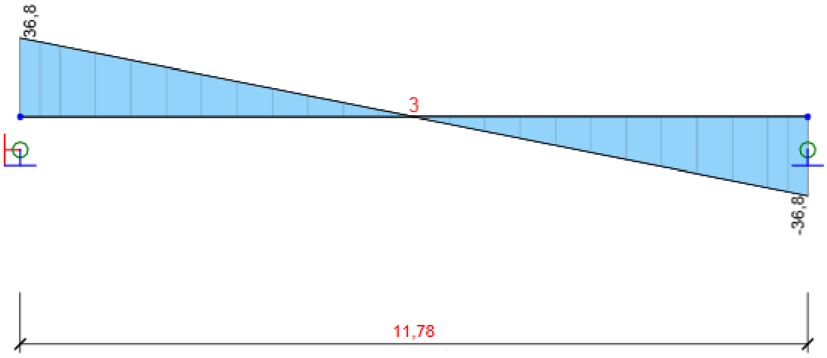
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSC ST(2)(18)	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSC ST(2)(18)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
SLSC ST(2)(18)	SW (1) + R (2) + G (2) + PRE (2)

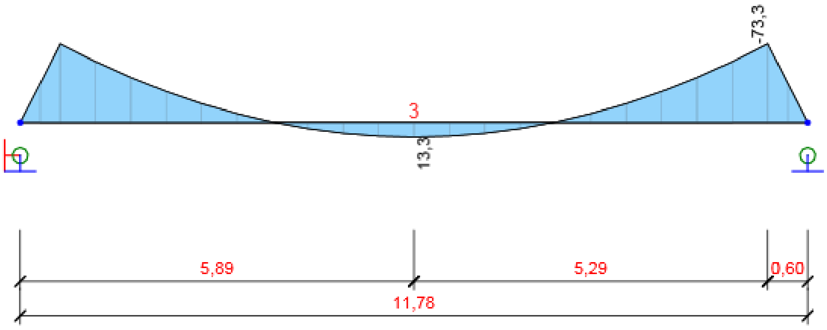
Combination SLSF ST(2)



Combination SLSF ST(2), N [kN], Centroidal forces, Entire centroid



Combination SLSF ST(2), Vz [kN], Centroidal forces, Entire centroid

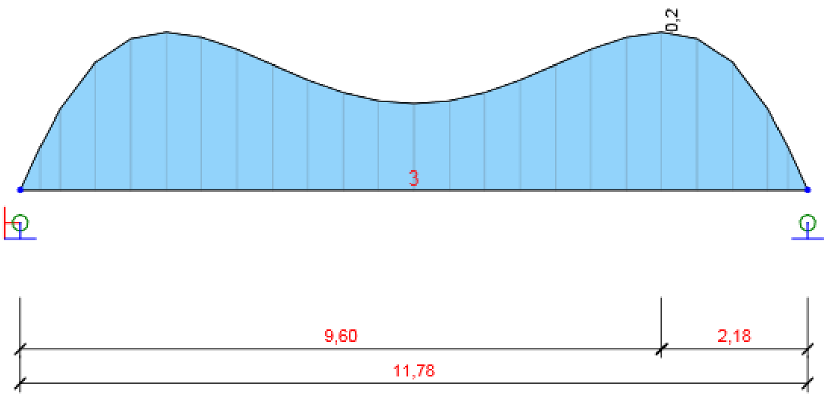


Combination SLSF ST(2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSF ST(2)(24)	5,89	-215,6	0,0	0,0	0,0	13,3	0,0
3	SLSF ST(2)(24)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSF ST(2)(24)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	SLSF ST(2)(24)	11,18	-212,8	0,0	-33,1	0,0	-73,3	0,0

Combination	Critical load effect description
SLSF ST(2)(24)	SW (1) + R (2) + G (2) + PRE (2)

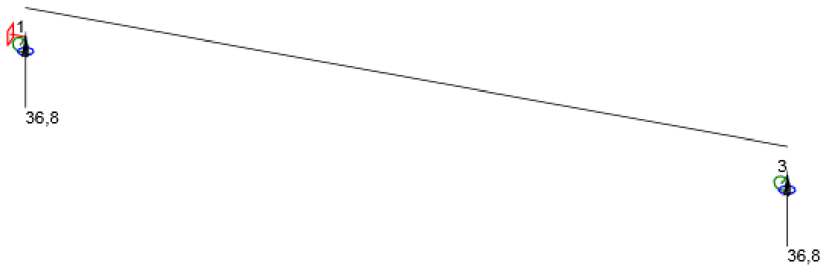


Combination SLSF ST(2), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSF ST(2)(24)	11,78	-0,4	0,0	0,0	0,0	0,2	0,0
3	SLSF ST(2)(24)	0,00	-0,1	0,0	0,0	0,0	-0,2	0,0
3	SLSF ST(2)(24)	9,60	-0,3	0,0	0,2	0,0	0,0	0,0

Combination	Critical load effect description
SLSF ST(2)(24)	SW (1) + R (2) + G (2) + PRE (2)

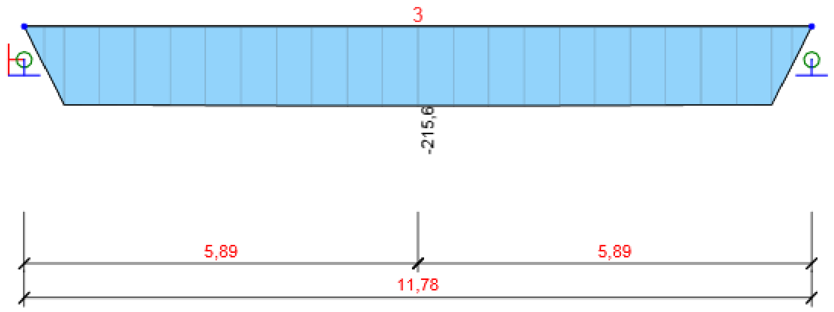


Reactions

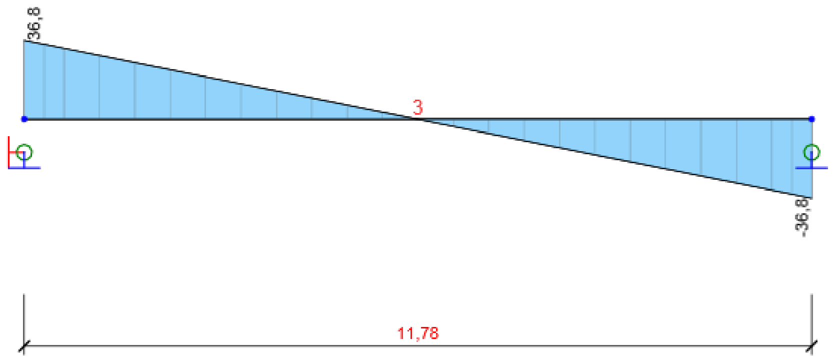
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSF ST(2)(24)	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSF ST(2)(24)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
SLSF ST(2)(24)	SW (1) + R (2) + G (2) + PRE (2)

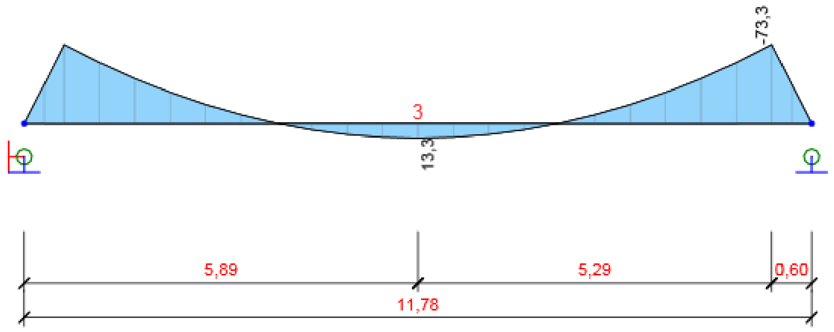
Combination SLSQ ST(2)



Combination SLSQ ST(2), N [kN], Centroidal forces, Entire centroid



Combination SLSQ ST(2), Vz [kN], Centroidal forces, Entire centroid

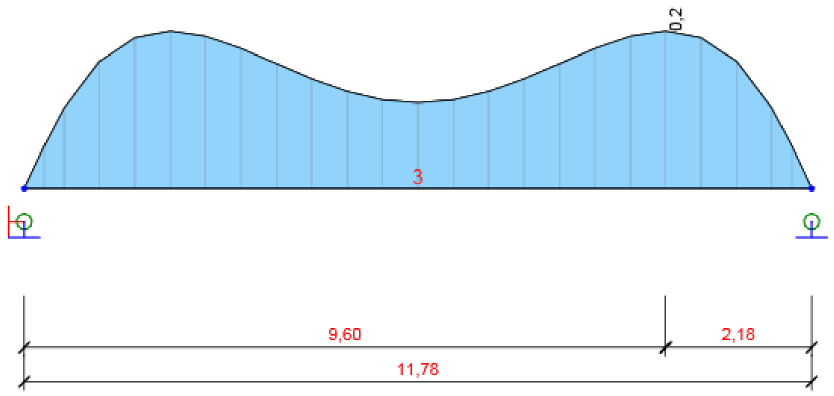


Combination SLSQ ST(2), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSQ ST(2)(30)	5,89	-215,6	0,0	0,0	0,0	13,3	0,0
3	SLSQ ST(2)(30)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSQ ST(2)(30)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	SLSQ ST(2)(30)	11,18	-212,8	0,0	-33,1	0,0	-73,3	0,0

Combination	Critical load effect description
SLSQ ST(2)(30)	SW (1) + R (2) + G (2) + PRE (2)

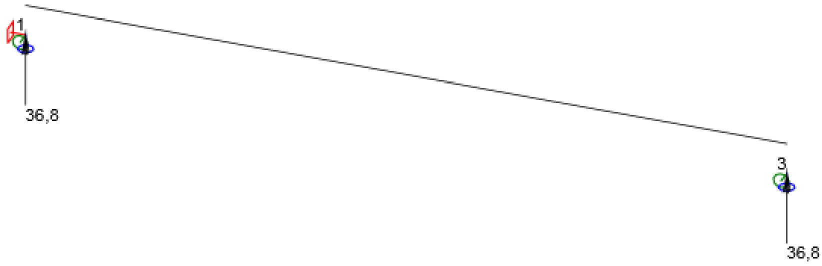


Combination SLSQ ST(2), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSQ ST(2)(30)	11,78	-0,4	0,0	0,0	0,0	0,2	0,0
3	SLSQ ST(2)(30)	0,00	-0,1	0,0	0,0	0,0	-0,2	0,0
3	SLSQ ST(2)(30)	9,60	-0,3	0,0	0,2	0,0	0,0	0,0

Combination	Critical load effect description
SLSQ ST(2)(30)	SW (1) + R (2) + G (2) + PRE (2)

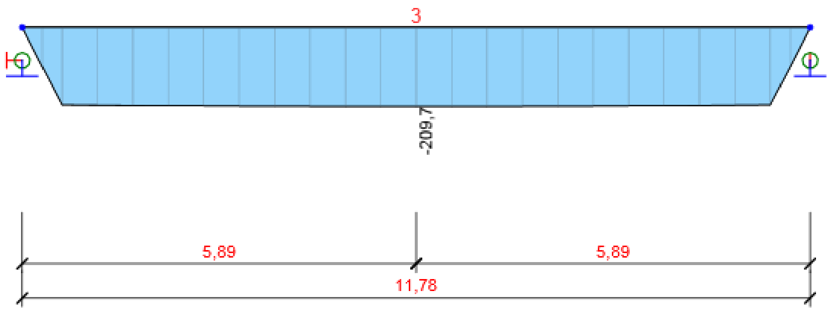


Reactions

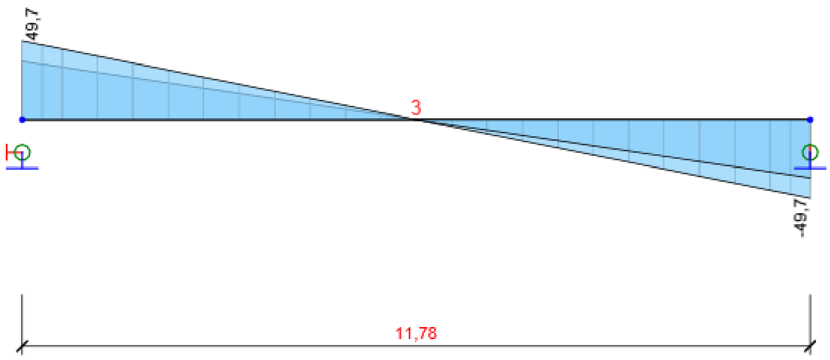
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSQ ST(2)(30)	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSQ ST(2)(30)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
SLSQ ST(2)(30)	SW (1) + R (2) + G (2) + PRE (2)

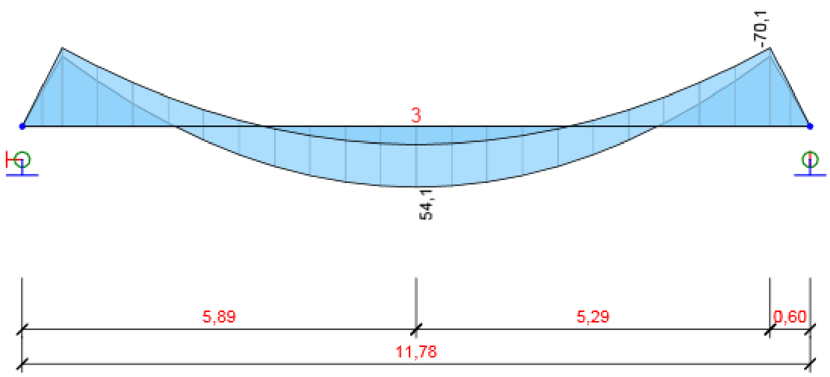
Combination ULS Fundamental ST(5)



Combination ULS Fundamental ST(5), N [kN], Centroidal forces, Entire centroid



Combination ULS Fundamental ST(5), Vz [kN], Centroidal forces, Entire centroid

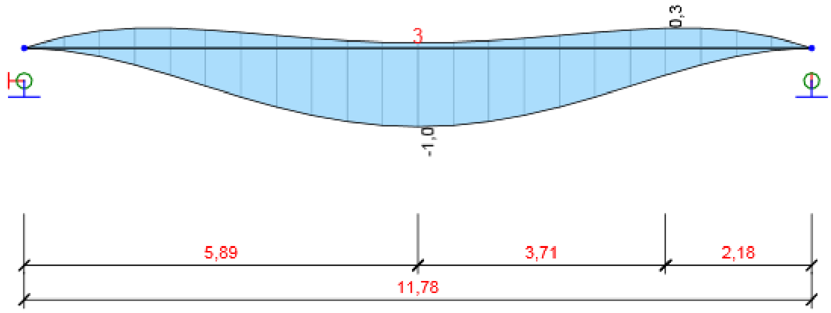


Combination ULS Fundamental ST(5), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	ULS Fundamental ST(5)(3)	5,89	-209,7	0,0	0,0	0,0	15,9	0,0
3	ULS Fundamental ST(5)(3)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	ULS Fundamental ST(5)(4)	11,78	0,0	0,0	-49,7	0,0	0,0	0,0
3	ULS Fundamental ST(5)(4)	0,00	0,0	0,0	49,7	0,0	0,0	0,0
3	ULS Fundamental ST(5)(3)	11,18	-205,6	0,0	-33,1	0,0	-70,1	0,0
3	ULS Fundamental ST(5)(4)	5,89	-209,7	0,0	0,0	0,0	54,1	0,0

Combination	Critical load effect description
ULS Fundamental ST(5)(3)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)
ULS Fundamental ST(5)(4)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5)

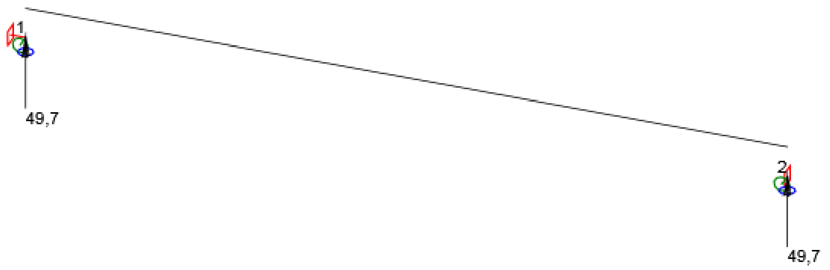


Combination ULS Fundamental ST(5), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	ULS Fundamental ST(5)(3)	11,78	-1,3	0,0	0,0	0,0	0,3	0,0
3	ULS Fundamental ST(5)(4)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	ULS Fundamental ST(5)(3)	0,00	-0,1	0,0	0,0	0,0	-0,3	0,0
3	ULS Fundamental ST(5)(4)	5,89	-0,6	0,0	-1,0	0,0	0,0	0,0
3	ULS Fundamental ST(5)(3)	9,60	-1,1	0,0	0,3	0,0	0,0	0,0

Combination	Critical load effect description
ULS Fundamental ST(5)(3)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)
ULS Fundamental ST(5)(4)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5)

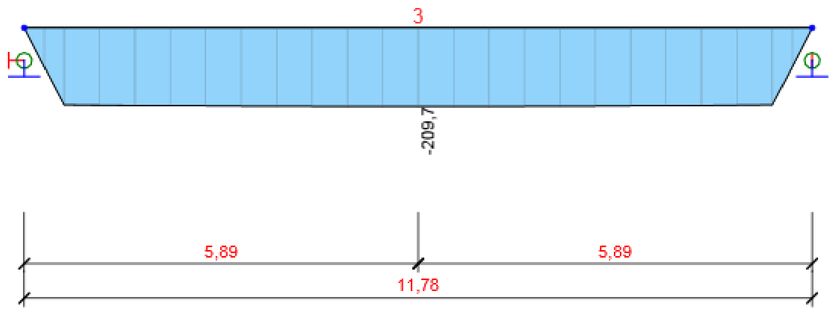


Reactions

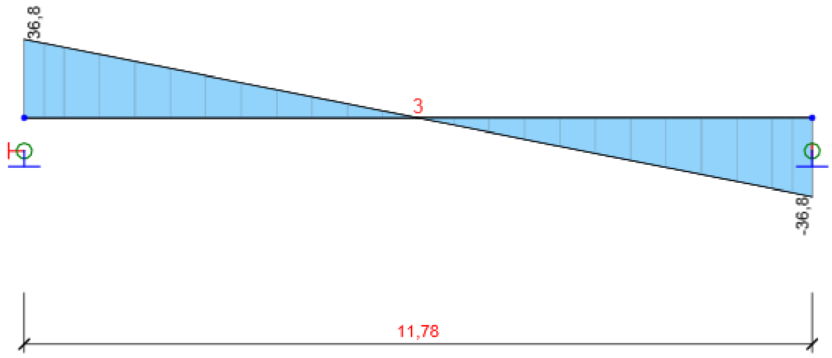
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	ULS Fundamental ST(5)(10)	0,0	0,0	49,7	0,0	0,0	0,0
1	ULS Fundamental ST(5)(3)	0,0	0,0	36,8	0,0	0,0	0,0
2	ULS Fundamental ST(5)(10)	0,0	0,0	36,8	0,0	0,0	0,0
2	ULS Fundamental ST(5)(4)	0,0	0,0	49,7	0,0	0,0	0,0

Combination	Critical load effect description
ULS Fundamental ST(5)(10)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + G (5)
ULS Fundamental ST(5)(3)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)
ULS Fundamental ST(5)(4)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5)

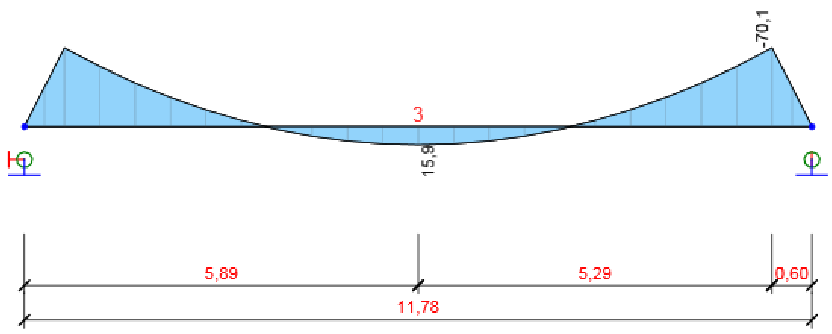
Combination SLSC ST(5)



Combination SLSC ST(5), N [kN], Centroidal forces, Entire centroid



Combination SLSC ST(5), Vz [kN], Centroidal forces, Entire centroid

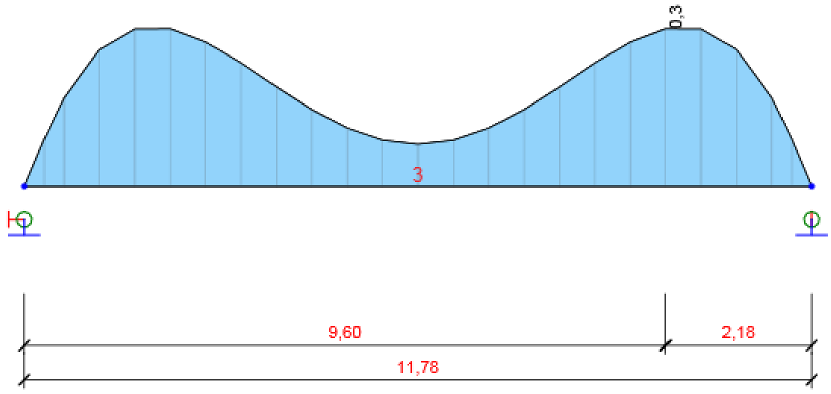


Combination SLSC ST(5), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSC ST(5)(19)	5,89	-209,7	0,0	0,0	0,0	15,9	0,0
3	SLSC ST(5)(19)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSC ST(5)(19)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	SLSC ST(5)(19)	11,18	-205,6	0,0	-33,1	0,0	-70,1	0,0

Combination	Critical load effect description
SLSC ST(5)(19)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

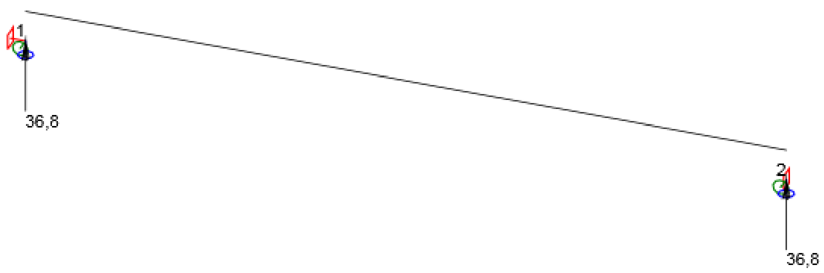


Combination SLSC ST(5), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSC ST(5)(19)	11,78	-1,3	0,0	0,0	0,0	0,3	0,0
3	SLSC ST(5)(19)	0,00	-0,1	0,0	0,0	0,0	-0,3	0,0
3	SLSC ST(5)(19)	9,60	-1,1	0,0	0,3	0,0	0,0	0,0

Combination	Critical load effect description
SLSC ST(5)(19)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

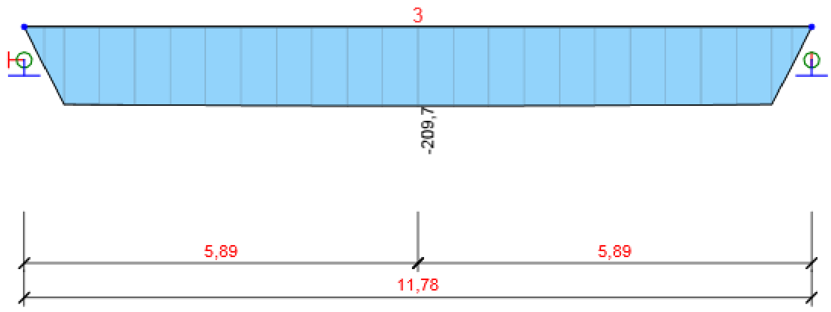


Reactions

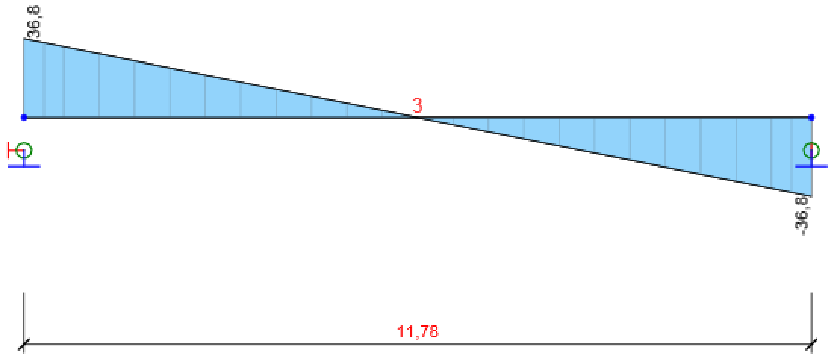
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSC ST(5)(19)	0,0	0,0	36,8	0,0	0,0	0,0
2	SLSC ST(5)(19)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
SLSC ST(5)(19)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

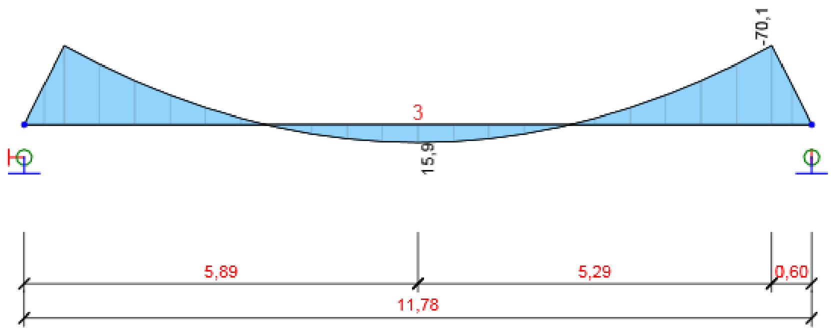
Combination SLSF ST(5)



Combination SLSF ST(5), N [kN], Centroidal forces, Entire centroid



Combination SLSF ST(5), Vz [kN], Centroidal forces, Entire centroid

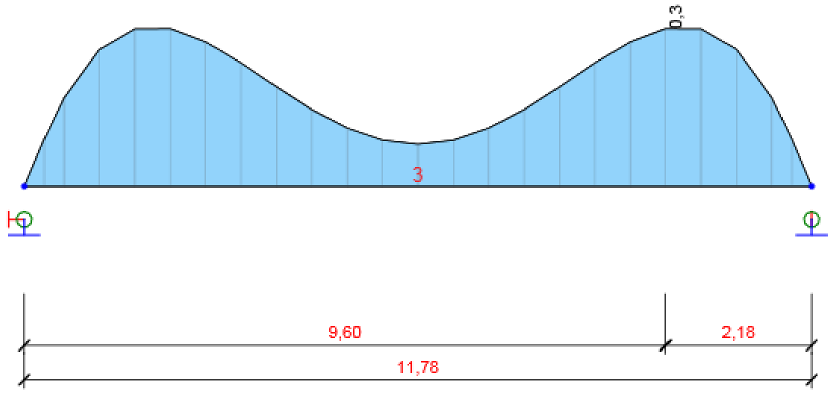


Combination SLSF ST(5), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSF ST(5)(25)	5,89	-209,7	0,0	0,0	0,0	15,9	0,0
3	SLSF ST(5)(25)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSF ST(5)(25)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	SLSF ST(5)(25)	11,18	-205,6	0,0	-33,1	0,0	-70,1	0,0

Combination	Critical load effect description
SLSF ST(5)(25)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

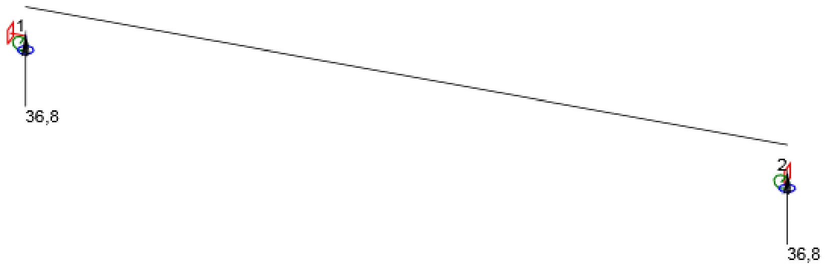


Combination SLSF ST(5), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSF ST(5)(25)	11,78	-1,3	0,0	0,0	0,0	0,3	0,0
3	SLSF ST(5)(25)	0,00	-0,1	0,0	0,0	0,0	-0,3	0,0
3	SLSF ST(5)(25)	9,60	-1,1	0,0	0,3	0,0	0,0	0,0

Combination	Critical load effect description
SLSF ST(5)(25)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

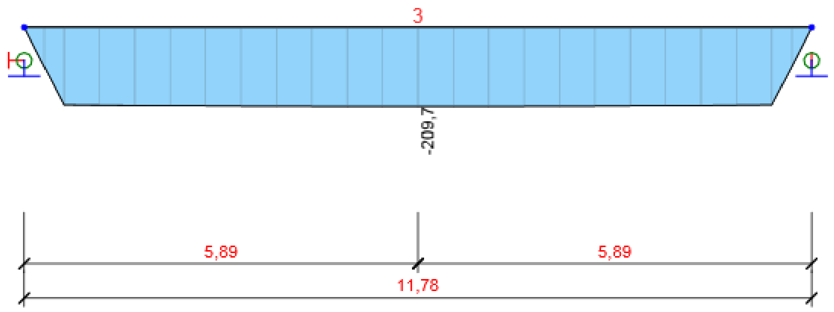


Reactions

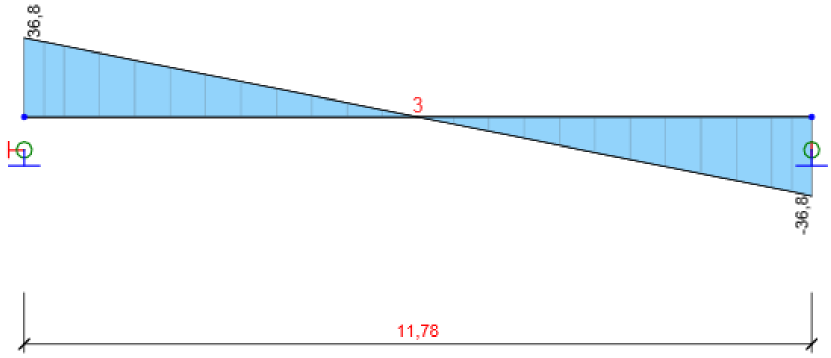
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSF ST(5)(25)	0,0	0,0	36,8	0,0	0,0	0,0
2	SLSF ST(5)(25)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
SLSF ST(5)(25)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

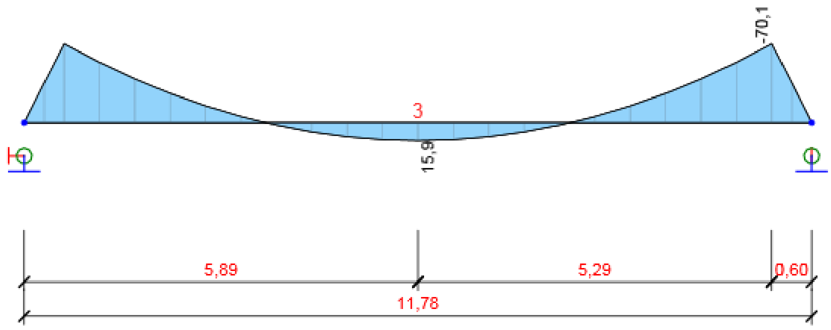
Combination SLSQ ST(5)



Combination SLSQ ST(5), N [kN], Centroidal forces, Entire centroid



Combination SLSQ ST(5), Vz [kN], Centroidal forces, Entire centroid

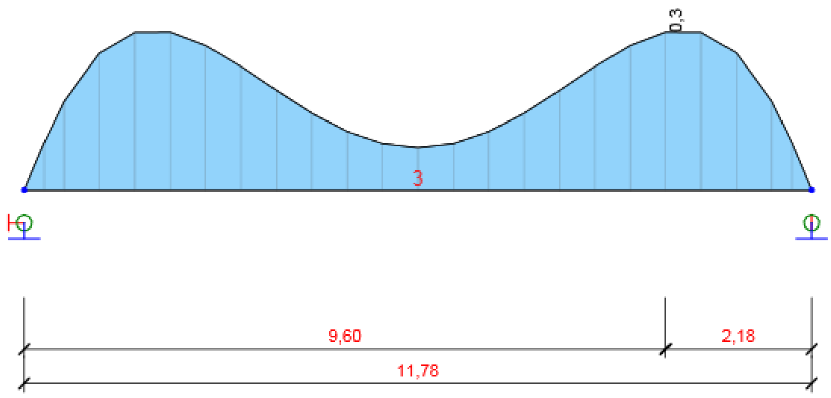


Combination SLSQ ST(5), My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSQ ST(5)(31)	5,89	-209,7	0,0	0,0	0,0	15,9	0,0
3	SLSQ ST(5)(31)	0,00	0,0	0,0	36,8	0,0	0,0	0,0
3	SLSQ ST(5)(31)	11,78	0,0	0,0	-36,8	0,0	0,0	0,0
3	SLSQ ST(5)(31)	11,18	-205,6	0,0	-33,1	0,0	-70,1	0,0

Combination	Critical load effect description
SLSQ ST(5)(31)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

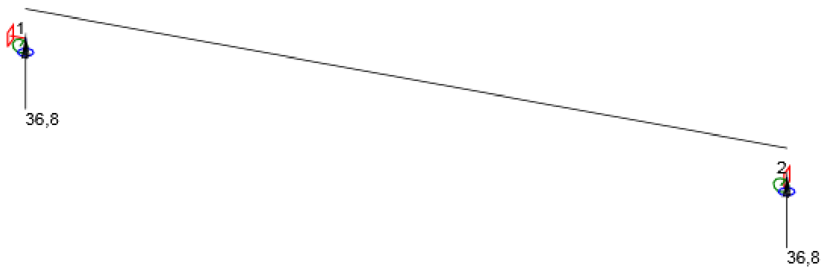


Combination SLSQ ST(5), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSQ ST(5)(31)	11,78	-1,3	0,0	0,0	0,0	0,3	0,0
3	SLSQ ST(5)(31)	0,00	-0,1	0,0	0,0	0,0	-0,3	0,0
3	SLSQ ST(5)(31)	9,60	-1,1	0,0	0,3	0,0	0,0	0,0

Combination	Critical load effect description
SLSQ ST(5)(31)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

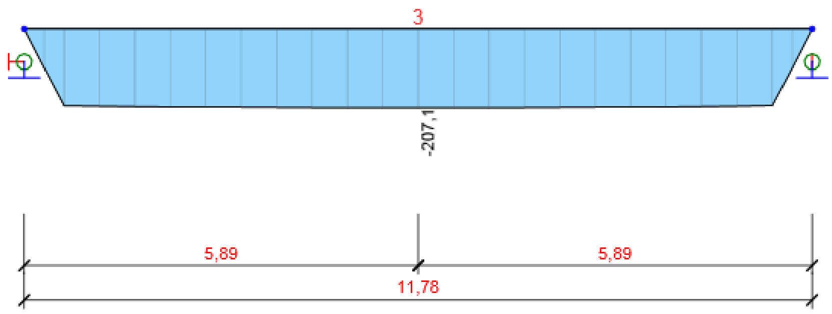


Reactions

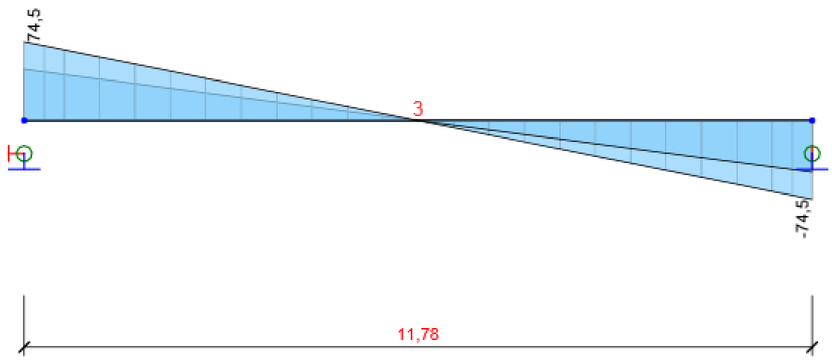
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSQ ST(5)(31)	0,0	0,0	36,8	0,0	0,0	0,0
2	SLSQ ST(5)(31)	0,0	0,0	36,8	0,0	0,0	0,0

Combination	Critical load effect description
SLSQ ST(5)(31)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5)

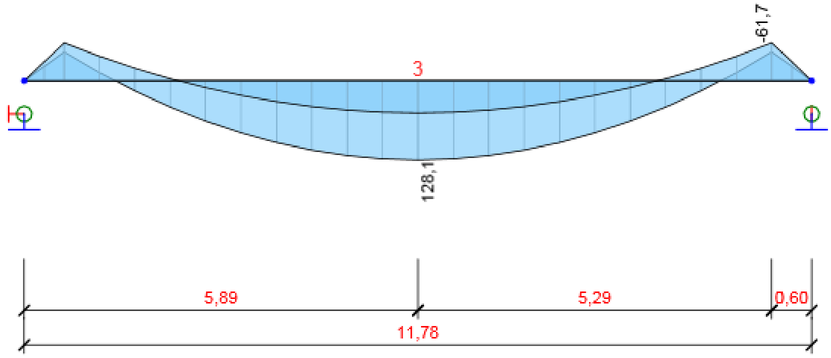
Combination ULS Fundamental ST(6)



Combination ULS Fundamental ST(6), N [kN], Centroidal forces



Combination ULS Fundamental ST(6), Vz [kN], Centroidal forces

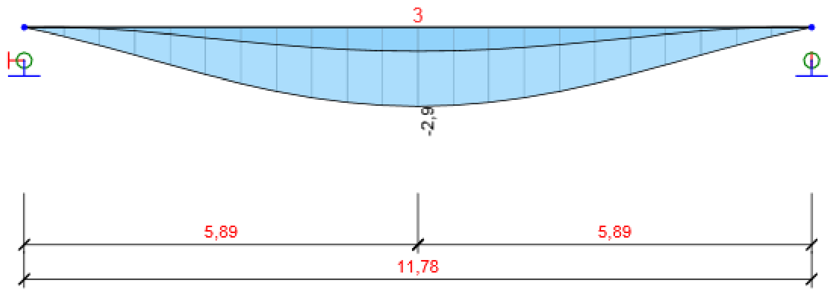


Combination ULS Fundamental ST(6), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	ULS Fundamental ST(6)(5)	5,89	-207,1	0,0	0,0	0,0	51,8	0,0
3	ULS Fundamental ST(6)(5)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	ULS Fundamental ST(6)(6)	11,78	0,0	0,0	-74,5	0,0	0,0	0,0
3	ULS Fundamental ST(6)(6)	0,00	0,0	0,0	74,5	0,0	0,0	0,0
3	ULS Fundamental ST(6)(5)	11,18	-201,7	0,0	-43,7	0,0	-61,7	0,0
3	ULS Fundamental ST(6)(6)	5,89	-207,1	0,0	0,0	0,0	128,1	0,0

Combination	Critical load effect description
ULS Fundamental ST(6)(5)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
ULS Fundamental ST(6)(6)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg

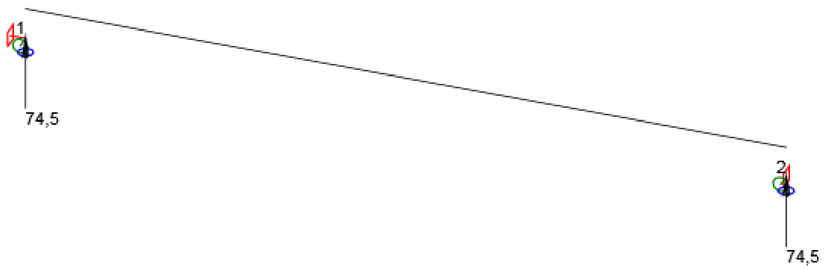


Combination ULS Fundamental ST(6), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	ULS Fundamental ST(6)(5)	11,78	-2,2	0,0	0,0	0,0	0,0	0,0
3	ULS Fundamental ST(6)(6)	0,00	0,3	0,0	0,0	0,0	0,5	0,0
3	ULS Fundamental ST(6)(5)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	ULS Fundamental ST(6)(6)	5,89	-0,9	0,0	-2,9	0,0	0,0	0,0
3	ULS Fundamental ST(6)(5)	11,48	-2,2	0,0	0,0	0,0	0,0	0,0
3	ULS Fundamental ST(6)(6)	10,13	-1,7	0,0	-1,0	0,0	-0,7	0,0
3	ULS Fundamental ST(6)(6)	1,65	0,0	0,0	-1,0	0,0	0,7	0,0

Combination	Critical load effect description
ULS Fundamental ST(6)(5)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
ULS Fundamental ST(6)(6)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg

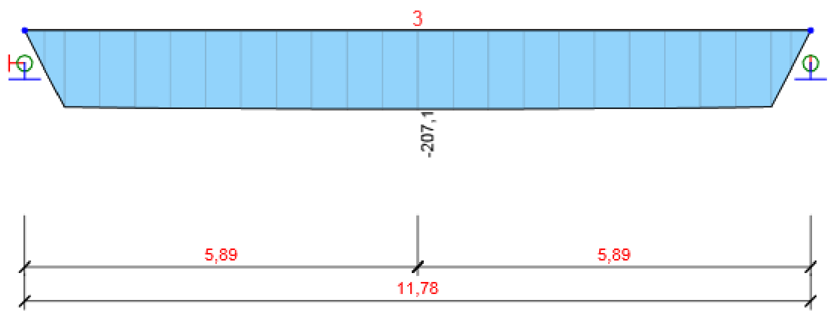


Reactions

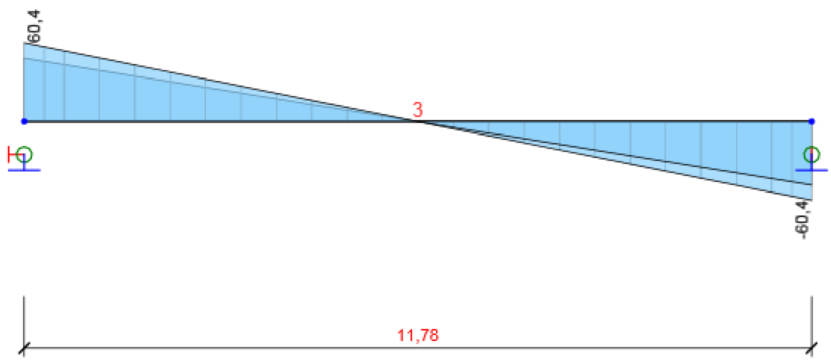
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	ULS Fundamental ST(6)(11)	0,0	0,0	74,5	0,0	0,0	0,0
1	ULS Fundamental ST(6)(5)	0,0	0,0	48,6	0,0	0,0	0,0
2	ULS Fundamental ST(6)(11)	0,0	0,0	61,6	0,0	0,0	0,0
2	ULS Fundamental ST(6)(5)	0,0	0,0	48,6	0,0	0,0	0,0
2	ULS Fundamental ST(6)(6)	0,0	0,0	74,5	0,0	0,0	0,0

Combination	Critical load effect description
ULS Fundamental ST(6)(11)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg
ULS Fundamental ST(6)(5)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
ULS Fundamental ST(6)(6)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg

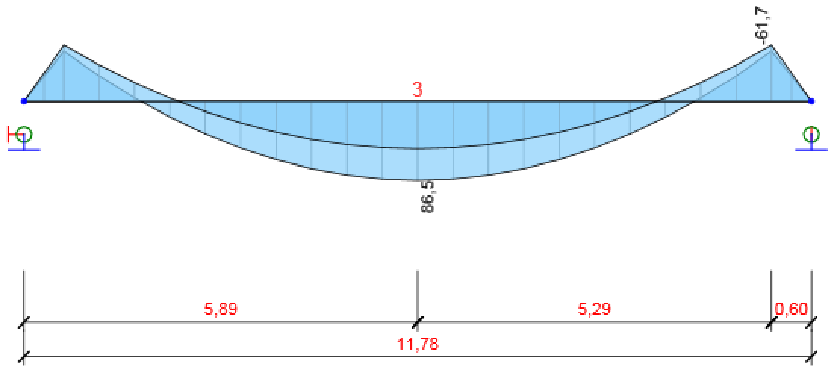
Combination SLSC ST(6)



Combination SLSC ST(6), N [kN], Centroidal forces



Combination SLSC ST(6), Vz [kN], Centroidal forces

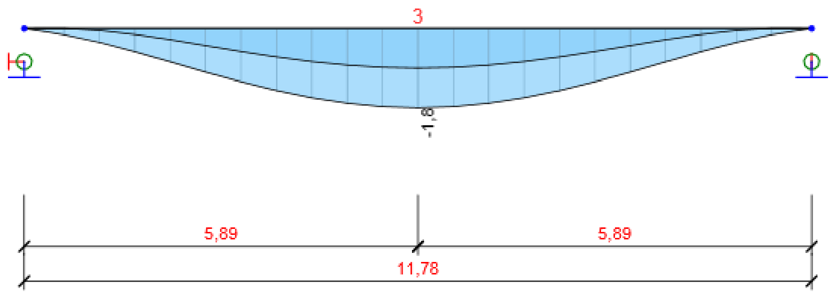


Combination SLSC ST(6), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSC ST(6)(20)	5,89	-207,1	0,0	0,0	0,0	51,8	0,0
3	SLSC ST(6)(20)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSC ST(6)(21)	11,78	0,0	0,0	-60,4	0,0	0,0	0,0
3	SLSC ST(6)(21)	0,00	0,0	0,0	60,4	0,0	0,0	0,0
3	SLSC ST(6)(20)	11,18	-201,7	0,0	-43,7	0,0	-61,7	0,0
3	SLSC ST(6)(21)	5,89	-207,1	0,0	0,0	0,0	86,5	0,0

Combination	Critical load effect description
SLSC ST(6)(20)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
SLSC ST(6)(21)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg

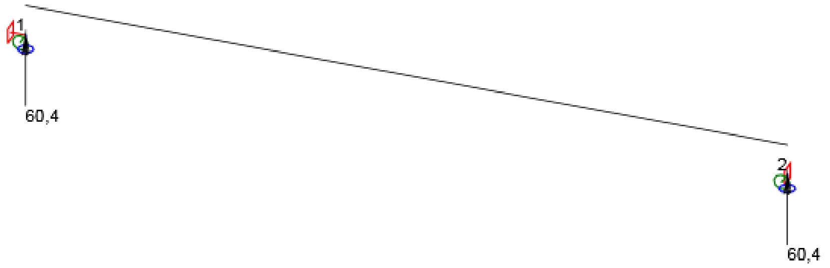


Combination SLSC ST(6), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSC ST(6)(20)	11,78	-2,2	0,0	0,0	0,0	0,0	0,0
3	SLSC ST(6)(21)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSC ST(6)(20)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	SLSC ST(6)(21)	5,89	-1,0	0,0	-1,8	0,0	0,0	0,0
3	SLSC ST(6)(20)	11,48	-2,2	0,0	0,0	0,0	0,0	0,0
3	SLSC ST(6)(21)	9,60	-1,7	0,0	-0,7	0,0	-0,4	0,0
3	SLSC ST(6)(21)	2,18	-0,3	0,0	-0,7	0,0	0,4	0,0

Combination	Critical load effect description
SLSC ST(6)(20)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
SLSC ST(6)(21)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg

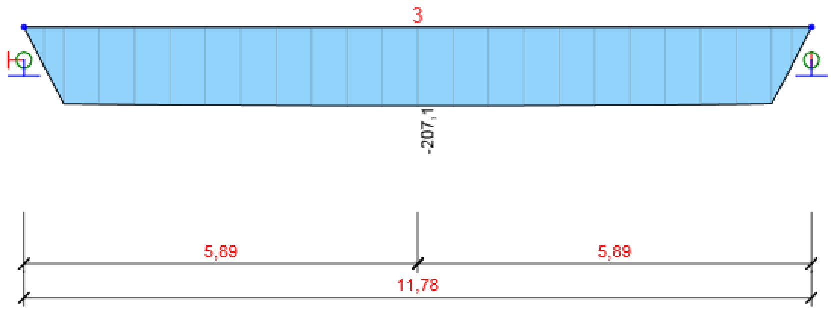


Reactions

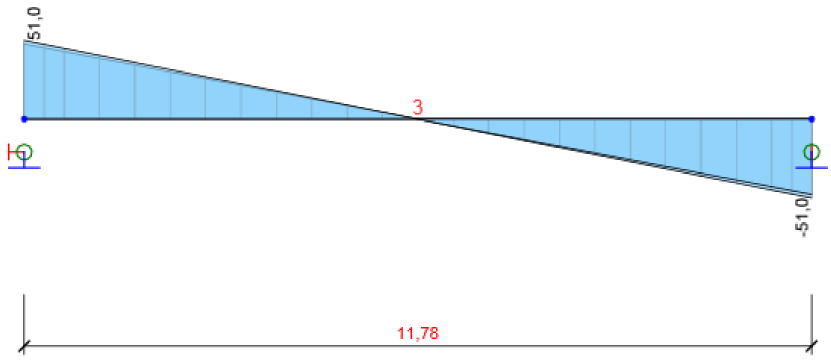
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSC ST(6)(21)	0,0	0,0	60,4	0,0	0,0	0,0
1	SLSC ST(6)(20)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSC ST(6)(21)	0,0	0,0	60,4	0,0	0,0	0,0
2	SLSC ST(6)(20)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSC ST(6)(21)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg
SLSC ST(6)(20)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)

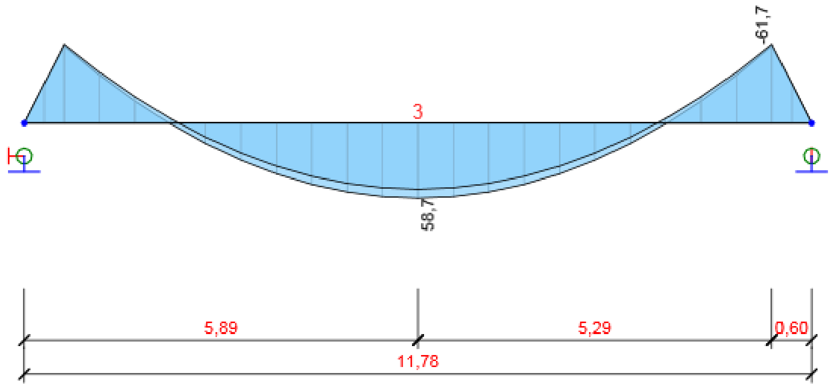
Combination SLSF ST(6)



Combination SLSF ST(6), N [kN], Centroidal forces



Combination SLSF ST(6), Vz [kN], Centroidal forces

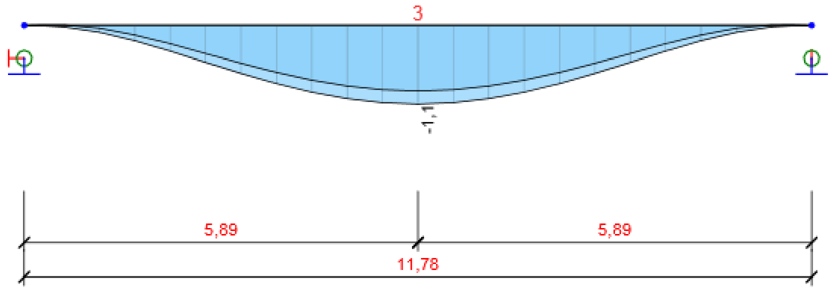


Combination SLSF ST(6), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSF ST(6)(26)	5,89	-207,1	0,0	0,0	0,0	51,8	0,0
3	SLSF ST(6)(26)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSF ST(6)(27)	11,78	0,0	0,0	-51,0	0,0	0,0	0,0
3	SLSF ST(6)(27)	0,00	0,0	0,0	51,0	0,0	0,0	0,0
3	SLSF ST(6)(26)	11,18	-201,7	0,0	-43,7	0,0	-61,7	0,0
3	SLSF ST(6)(27)	5,89	-207,1	0,0	0,0	0,0	58,7	0,0

Combination	Critical load effect description
SLSF ST(6)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
SLSF ST(6)(27)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg

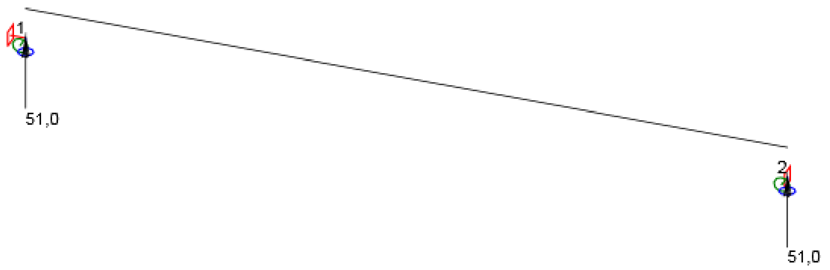


Combination SLSF ST(6), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSF ST(6)(26)	11,78	-2,2	0,0	0,0	0,0	0,0	0,0
3	SLSF ST(6)(27)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	SLSF ST(6)(26)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	SLSF ST(6)(27)	5,89	-1,1	0,0	-1,1	0,0	0,0	0,0
3	SLSF ST(6)(26)	11,48	-2,2	0,0	0,0	0,0	0,0	0,0
3	SLSF ST(6)(27)	9,07	-1,7	0,0	-0,5	0,0	-0,3	0,0
3	SLSF ST(6)(27)	2,71	-0,5	0,0	-0,5	0,0	0,3	0,0

Combination	Critical load effect description
SLSF ST(6)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
SLSF ST(6)(27)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg

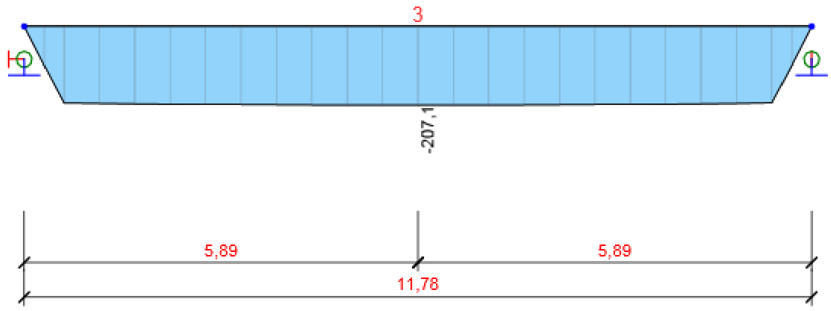


Reactions

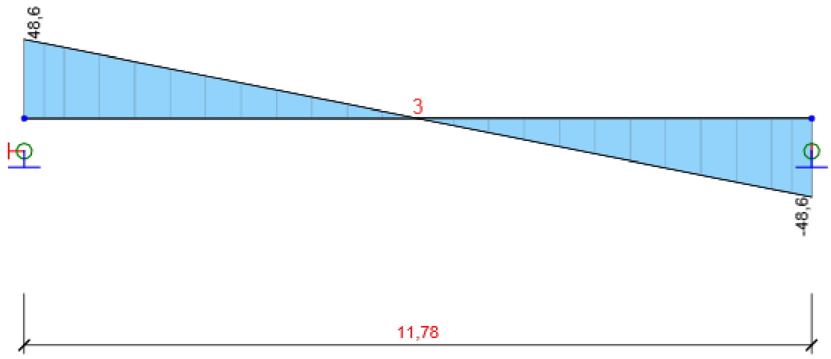
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSF ST(6)(27)	0,0	0,0	51,0	0,0	0,0	0,0
1	SLSF ST(6)(26)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSF ST(6)(27)	0,0	0,0	51,0	0,0	0,0	0,0
2	SLSF ST(6)(26)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSF ST(6)(27)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg
SLSF ST(6)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)

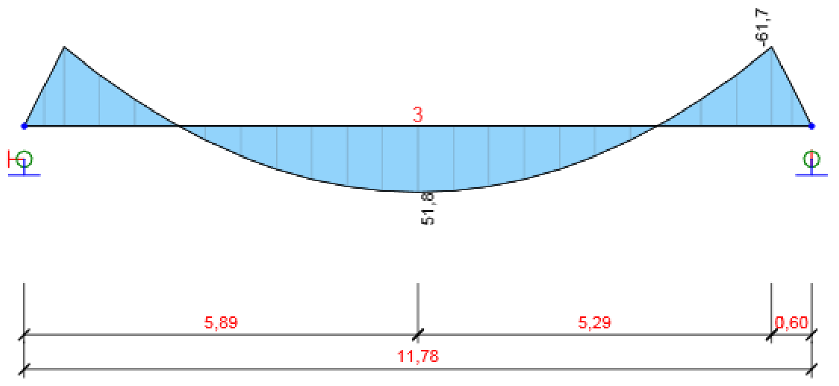
Combination SLSQ ST(6)



Combination SLSQ ST(6), N [kN], Centroidal forces



Combination SLSQ ST(6), Vz [kN], Centroidal forces

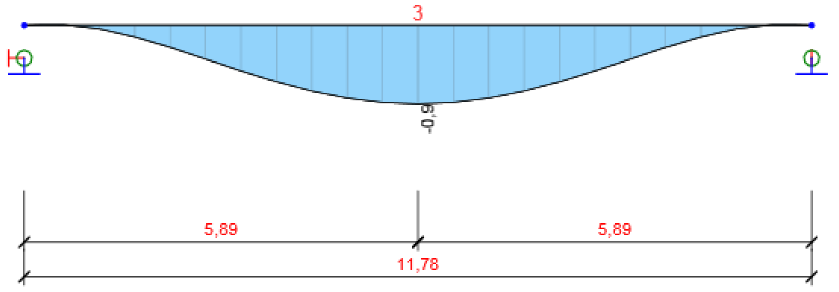


Combination SLSQ ST(6), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSQ ST(6)(32)	5,89	-207,1	0,0	0,0	0,0	51,8	0,0
3	SLSQ ST(6)(32)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSQ ST(6)(32)	11,78	0,0	0,0	-48,6	0,0	0,0	0,0
3	SLSQ ST(6)(32)	11,18	-201,7	0,0	-43,7	0,0	-61,7	0,0

Combination	Critical load effect description
SLSQ ST(6)(32)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)

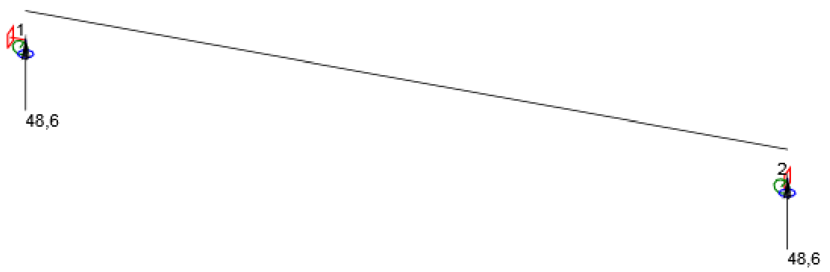


Combination SLSQ ST(6), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSQ ST(6)(32)	11,78	-2,2	0,0	0,0	0,0	0,0	0,0
3	SLSQ ST(6)(32)	0,00	0,0	0,0	0,0	0,0	0,0	0,0
3	SLSQ ST(6)(32)	5,89	-1,1	0,0	-0,9	0,0	0,0	0,0
3	SLSQ ST(6)(32)	11,48	-2,2	0,0	0,0	0,0	0,0	0,0
3	SLSQ ST(6)(32)	9,07	-1,7	0,0	-0,4	0,0	-0,2	0,0
3	SLSQ ST(6)(32)	2,71	-0,5	0,0	-0,4	0,0	0,2	0,0

Combination	Critical load effect description
SLSQ ST(6)(32)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)

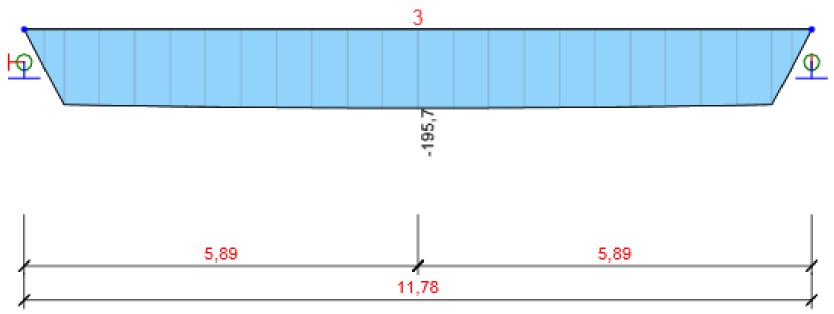


Reactions

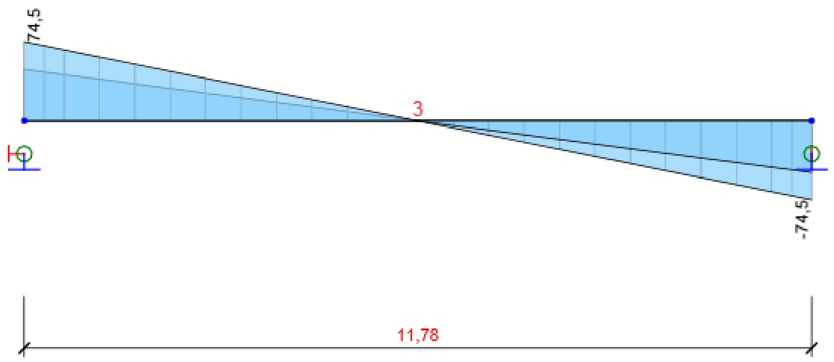
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSQ ST(6)(32)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSQ ST(6)(32)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSQ ST(6)(32)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)

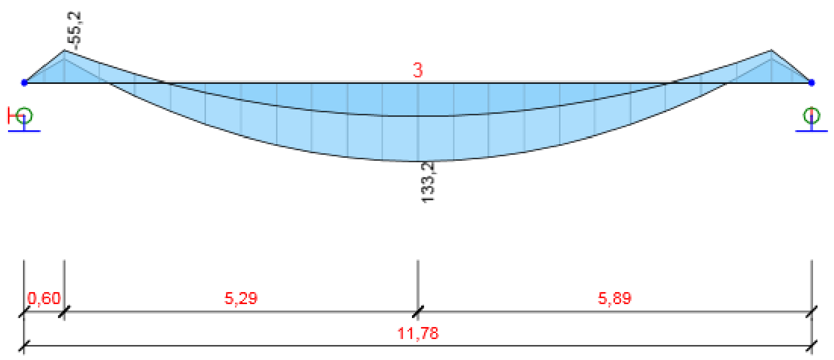
Combination ULS Fundamental ST(7)



Combination ULS Fundamental ST(7), N [kN], Centroidal forces



Combination ULS Fundamental ST(7), Vz [kN], Centroidal forces



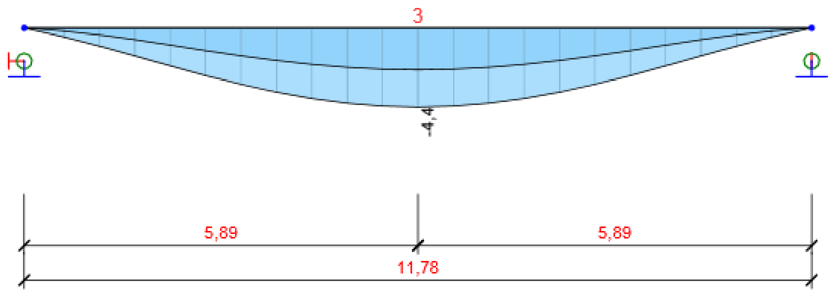
Combination ULS Fundamental ST(7), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	ULS Fundamental ST(7)(8)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	ULS Fundamental ST(7)(8)	0,00	0,0	0,0	48,6	0,0	0,0	0,0

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	ULS Fundamental ST(7)(7)	11,78	0,0	0,0	-74,5	0,0	0,0	0,0
3	ULS Fundamental ST(7)(7)	0,00	0,0	0,0	74,5	0,0	0,0	0,0
3	ULS Fundamental ST(7)(8)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0
3	ULS Fundamental ST(7)(7)	5,89	-195,7	0,0	0,0	0,0	133,2	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(8)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS Fundamental ST(7)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg + R (7) + 1,35*G (7)

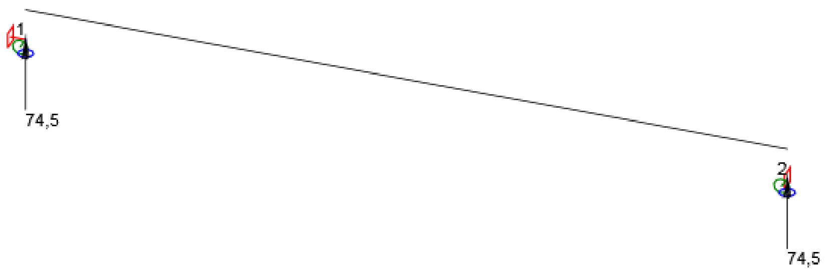


Combination ULS Fundamental ST(7), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	ULS Fundamental ST(7)(8)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	ULS Fundamental ST(7)(7)	0,00	0,4	0,0	0,0	0,0	0,8	0,0
3	ULS Fundamental ST(7)(8)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	ULS Fundamental ST(7)(7)	5,89	-2,6	0,0	-4,4	0,0	0,0	0,0
3	ULS Fundamental ST(7)(7)	10,13	-4,8	0,0	-1,5	0,0	-1,0	0,0
3	ULS Fundamental ST(7)(7)	1,65	-0,4	0,0	-1,5	0,0	1,0	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(8)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS Fundamental ST(7)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg + R (7) + 1,35*G (7)



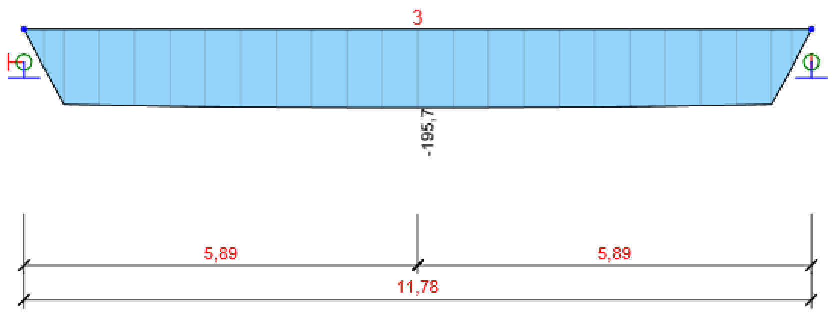
Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	ULS Fundamental ST(7)(12)	0,0	0,0	74,5	0,0	0,0	0,0
1	ULS Fundamental ST(7)(8)	0,0	0,0	48,6	0,0	0,0	0,0
2	ULS Fundamental ST(7)(12)	0,0	0,0	61,6	0,0	0,0	0,0
2	ULS Fundamental ST(7)(8)	0,0	0,0	48,6	0,0	0,0	0,0
2	ULS Fundamental ST(7)(7)	0,0	0,0	74,5	0,0	0,0	0,0

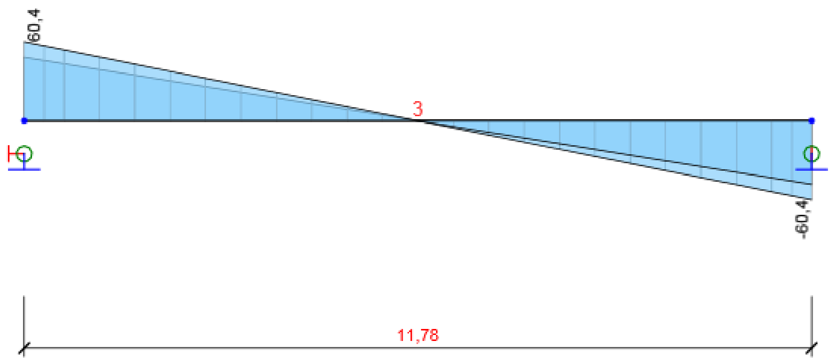
Combination	Critical load effect description

Combination	Critical load effect description
ULS Fundamental ST(7)(12)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg + R (7) + G (7)
ULS Fundamental ST(7)(8)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS Fundamental ST(7)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg + R (7) + 1,35*G (7)

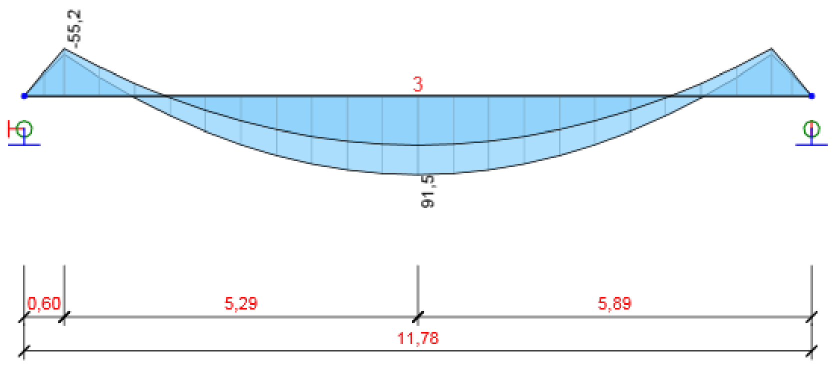
Combination SLSC ST(7)



Combination SLSC ST(7), N [kN], Centroidal forces



Combination SLSC ST(7), Vz [kN], Centroidal forces

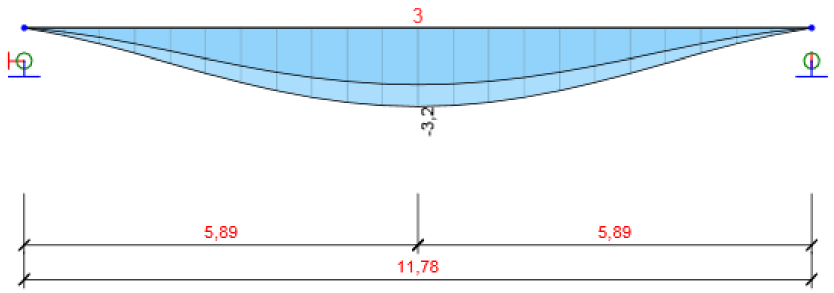


Combination SLSC ST(7), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSC ST(7)(23)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	SLSC ST(7)(23)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSC ST(7)(22)	11,78	0,0	0,0	-60,4	0,0	0,0	0,0
3	SLSC ST(7)(22)	0,00	0,0	0,0	60,4	0,0	0,0	0,0
3	SLSC ST(7)(23)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0
3	SLSC ST(7)(22)	5,89	-195,7	0,0	0,0	0,0	91,5	0,0

Combination	Critical load effect description
SLSC ST(7)(23)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSC ST(7)(22)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)

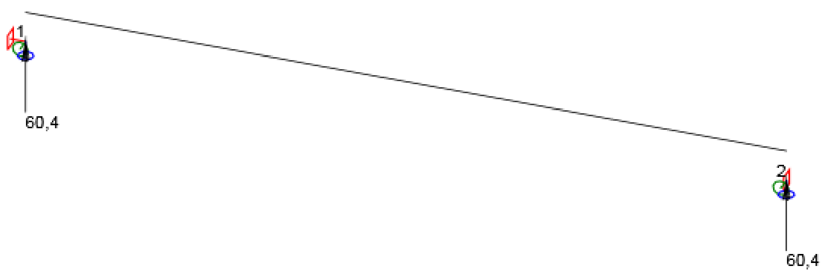


Combination SLSC ST(7), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSC ST(7)(23)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	SLSC ST(7)(22)	0,00	0,2	0,0	0,0	0,0	0,5	0,0
3	SLSC ST(7)(23)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSC ST(7)(22)	5,89	-2,8	0,0	-3,2	0,0	0,0	0,0
3	SLSC ST(7)(22)	9,60	-4,7	0,0	-1,4	0,0	-0,8	0,0
3	SLSC ST(7)(22)	2,18	-0,9	0,0	-1,4	0,0	0,8	0,0

Combination	Critical load effect description
SLSC ST(7)(23)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSC ST(7)(22)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)

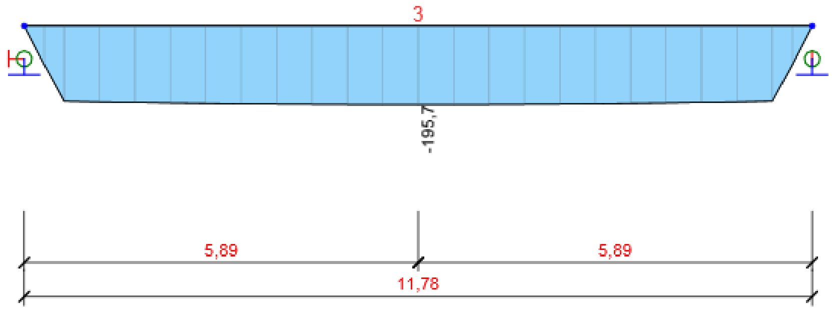


Reactions

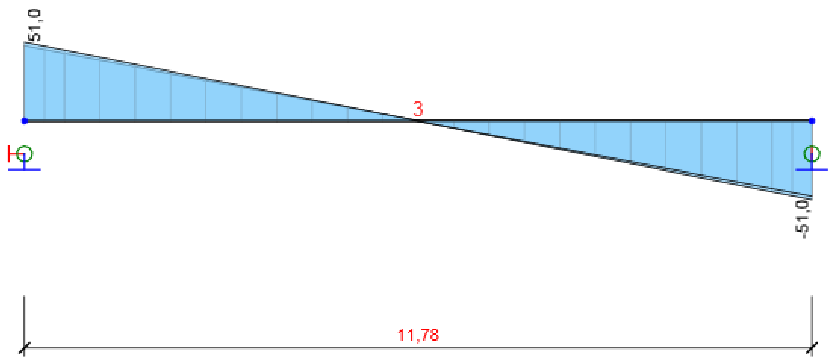
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSC ST(7)(22)	0,0	0,0	60,4	0,0	0,0	0,0
1	SLSC ST(7)(23)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSC ST(7)(22)	0,0	0,0	60,4	0,0	0,0	0,0
2	SLSC ST(7)(23)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSC ST(7)(22)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)
SLSC ST(7)(23)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

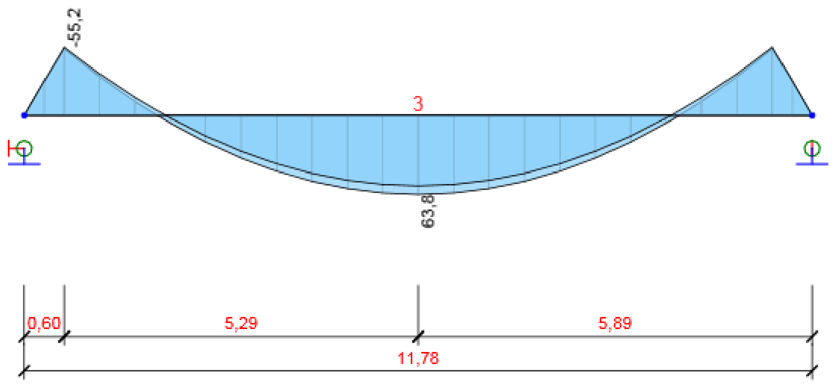
Combination SLSF ST(7)



Combination SLSF ST(7), N [kN], Centroidal forces



Combination SLSF ST(7), Vz [kN], Centroidal forces

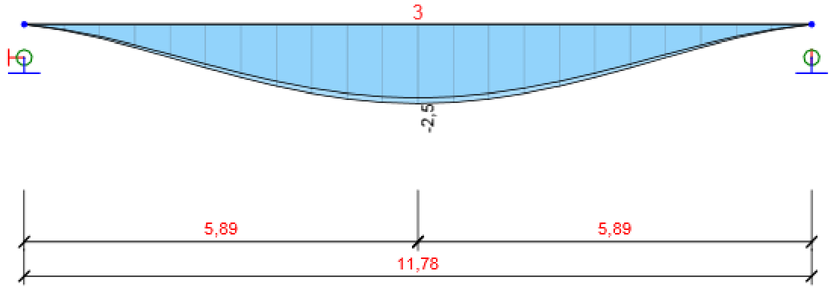


Combination SLSF ST(7), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSF ST(7)(29)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	SLSF ST(7)(29)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSF ST(7)(28)	11,78	0,0	0,0	-51,0	0,0	0,0	0,0
3	SLSF ST(7)(28)	0,00	0,0	0,0	51,0	0,0	0,0	0,0
3	SLSF ST(7)(29)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0
3	SLSF ST(7)(28)	5,89	-195,7	0,0	0,0	0,0	63,8	0,0

Combination	Critical load effect description
SLSF ST(7)(29)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSF ST(7)(28)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg + R (7) + G (7)

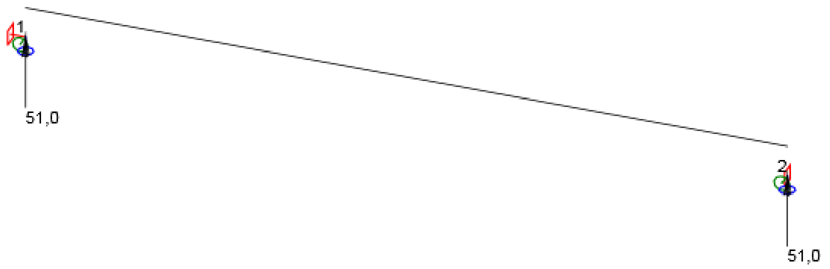


Combination SLSF ST(7), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSF ST(7)(29)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	SLSF ST(7)(28)	0,00	0,1	0,0	0,0	0,0	0,3	0,0
3	SLSF ST(7)(29)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSF ST(7)(28)	5,89	-2,9	0,0	-2,5	0,0	0,0	0,0
3	SLSF ST(7)(28)	9,60	-4,8	0,0	-1,0	0,0	-0,6	0,0
3	SLSF ST(7)(28)	2,18	-1,0	0,0	-1,0	0,0	0,6	0,0

Combination	Critical load effect description
SLSF ST(7)(29)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSF ST(7)(28)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg + R (7) + G (7)

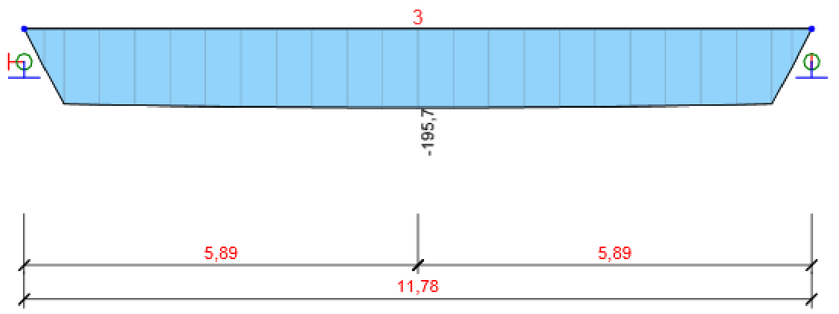


Reactions

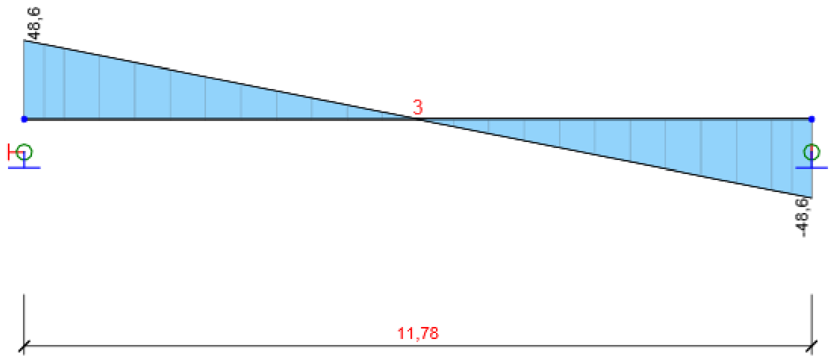
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSF ST(7)(28)	0,0	0,0	51,0	0,0	0,0	0,0
1	SLSF ST(7)(29)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSF ST(7)(28)	0,0	0,0	51,0	0,0	0,0	0,0
2	SLSF ST(7)(29)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSF ST(7)(28)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg + R (7) + G (7)
SLSF ST(7)(29)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

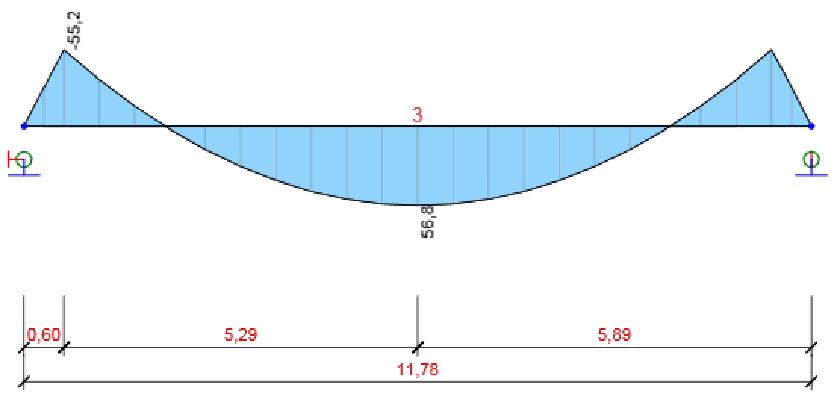
Combination SLSQ ST(7)



Combination SLSQ ST(7), N [kN], Centroidal forces



Combination SLSQ ST(7), Vz [kN], Centroidal forces

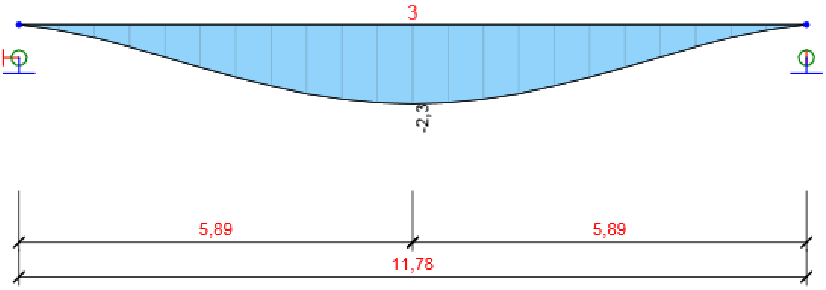


Combination SLSQ ST(7), My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSQ ST(7)(33)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	SLSQ ST(7)(33)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSQ ST(7)(33)	11,78	0,0	0,0	-48,6	0,0	0,0	0,0
3	SLSQ ST(7)(33)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0

Combination	Critical load effect description
SLSQ ST(7)(33)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

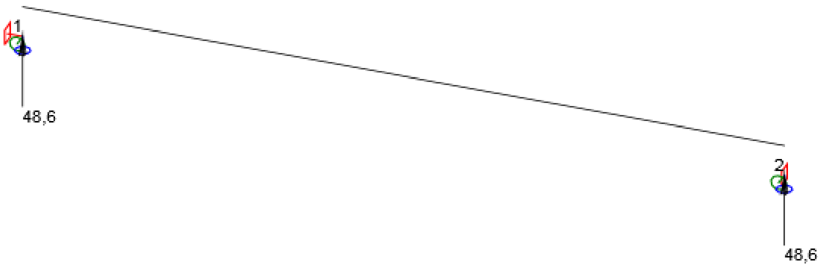


Combination SLSQ ST(7), Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSQ ST(7)(33)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	SLSQ ST(7)(33)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSQ ST(7)(33)	5,89	-2,9	0,0	-2,3	0,0	0,0	0,0
3	SLSQ ST(7)(33)	9,60	-4,8	0,0	-0,9	0,0	-0,6	0,0
3	SLSQ ST(7)(33)	2,18	-1,0	0,0	-0,9	0,0	0,6	0,0

Combination	Critical load effect description
SLSQ ST(7)(33)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

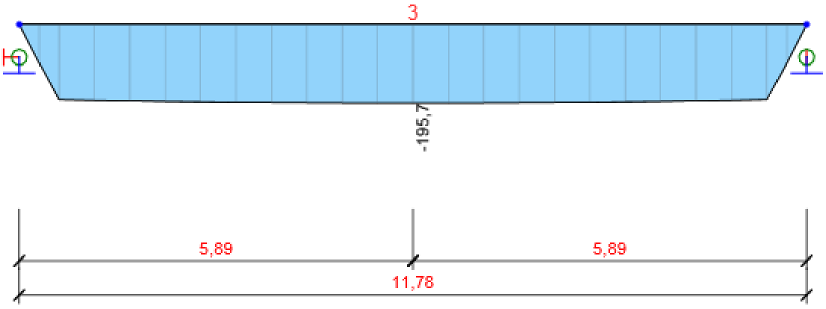


Reactions

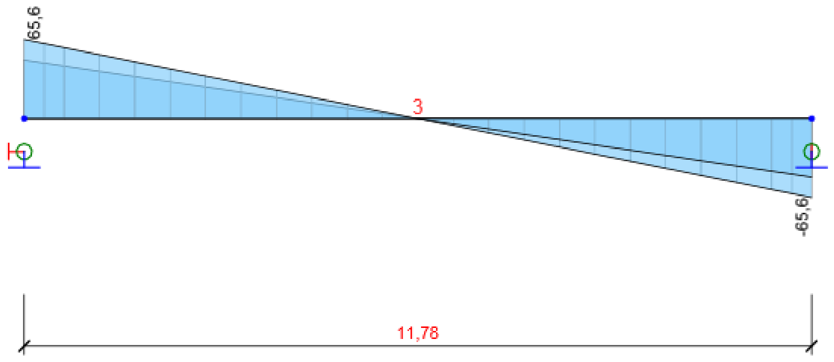
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSQ ST(7)(33)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSQ ST(7)(33)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSQ ST(7)(33)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

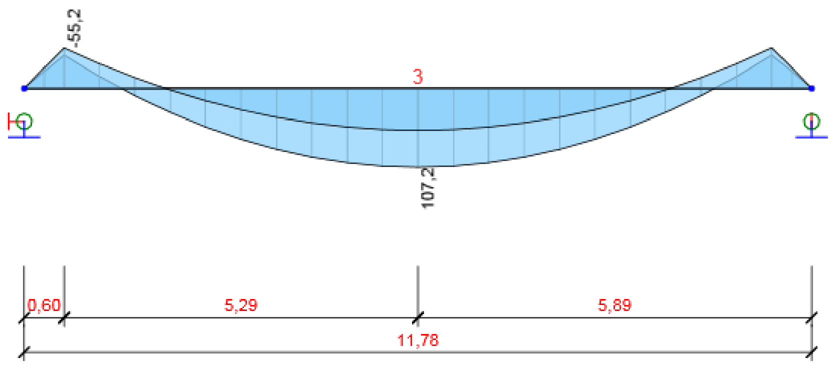
Combination ULS-W



Combination ULS-W, N [kN], Centroidal forces, Entire centroid



Combination ULS-W, Vz [kN], Centroidal forces, Entire centroid

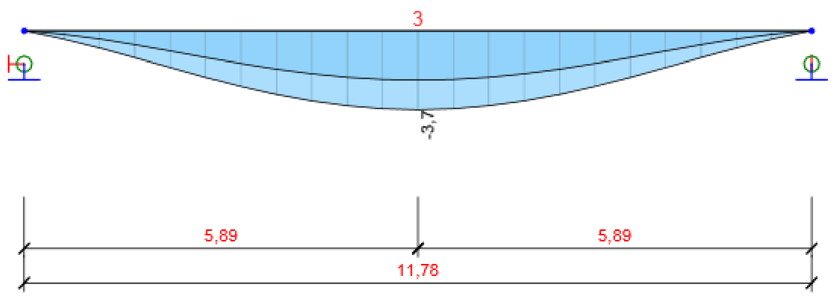


Combination ULS-W, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	ULS-W(91)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	ULS-W(91)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	ULS-W(92)	11,78	0,0	0,0	-65,6	0,0	0,0	0,0
3	ULS-W(92)	0,00	0,0	0,0	65,6	0,0	0,0	0,0
3	ULS-W(91)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0
3	ULS-W(92)	5,89	-195,7	0,0	0,0	0,0	107,2	0,0

Combination	Critical load effect description
ULS-W(91)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS-W(92)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + 1,35*G (7)

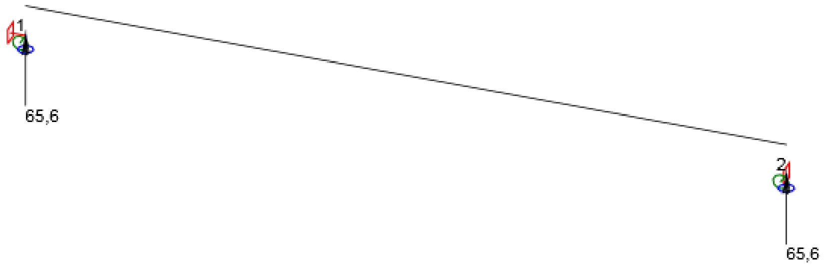


Combination ULS-W, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	ULS-W(91)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	ULS-W(92)	0,00	0,3	0,0	0,0	0,0	0,6	0,0
3	ULS-W(91)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	ULS-W(92)	5,89	-2,7	0,0	-3,7	0,0	0,0	0,0
3	ULS-W(92)	9,60	-4,6	0,0	-1,7	0,0	-0,9	0,0
3	ULS-W(92)	2,18	-0,8	0,0	-1,7	0,0	0,9	0,0

Combination	Critical load effect description
ULS-W(91)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS-W(92)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + 1,35*G (7)

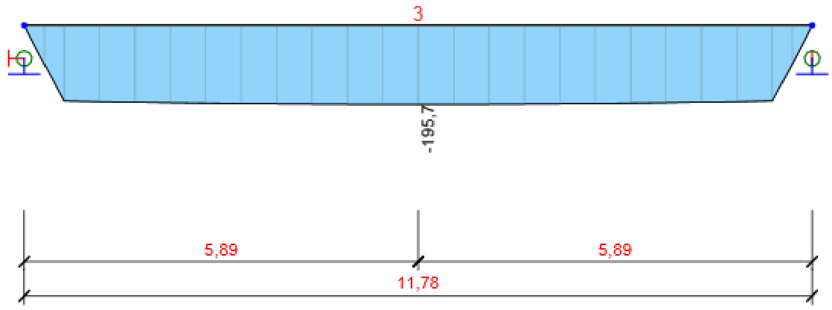


Reactions

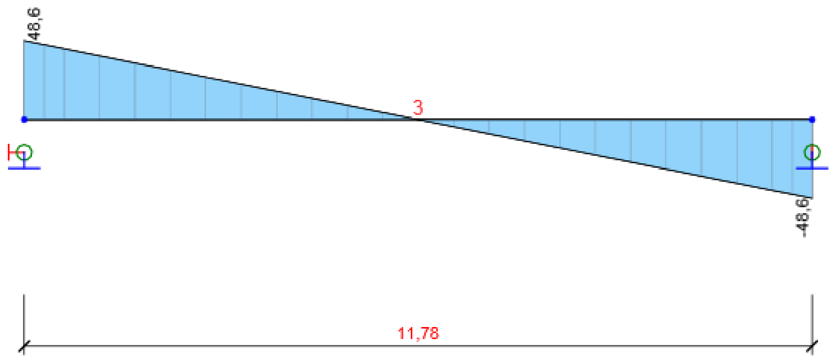
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	ULS-W(93)	0,0	0,0	65,6	0,0	0,0	0,0
1	ULS-W(91)	0,0	0,0	48,6	0,0	0,0	0,0
2	ULS-W(93)	0,0	0,0	52,7	0,0	0,0	0,0
2	ULS-W(91)	0,0	0,0	48,6	0,0	0,0	0,0
2	ULS-W(92)	0,0	0,0	65,6	0,0	0,0	0,0

Combination	Critical load effect description
ULS-W(93)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + G (5) + R (6) + 1,35*Stalno (6) + R (7) + G (7)
ULS-W(91)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS-W(92)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + 1,35*G (7)

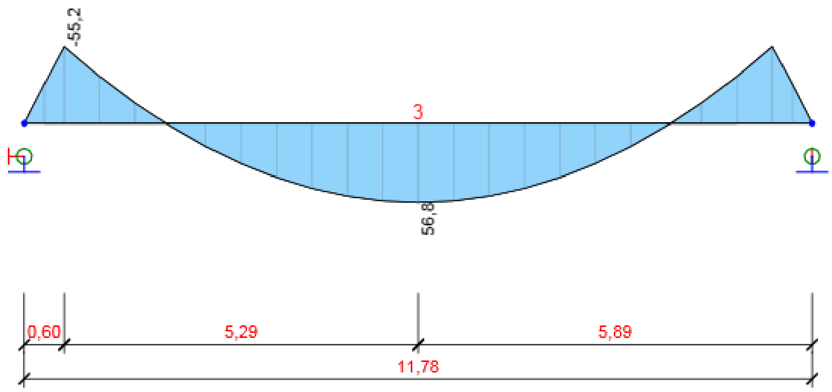
Combination SLSCh-W



Combination SLSCh-W, N [kN], Centroidal forces, Entire centroid



Combination SLSCh-W, Vz [kN], Centroidal forces, Entire centroid

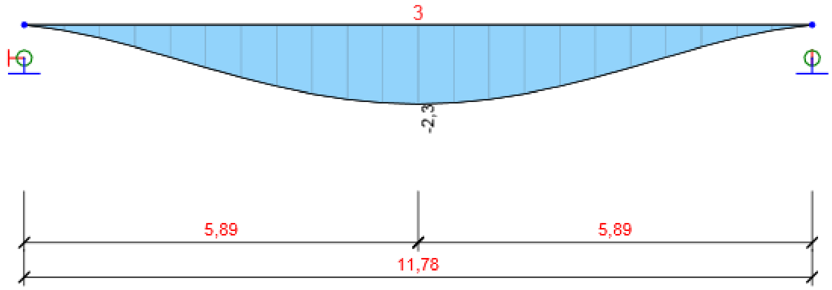


Combination SLSCh-W, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSCh-W(98)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	SLSCh-W(98)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSCh-W(98)	11,78	0,0	0,0	-48,6	0,0	0,0	0,0
3	SLSCh-W(98)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0

Combination	Critical load effect description
SLSCh-W(98)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

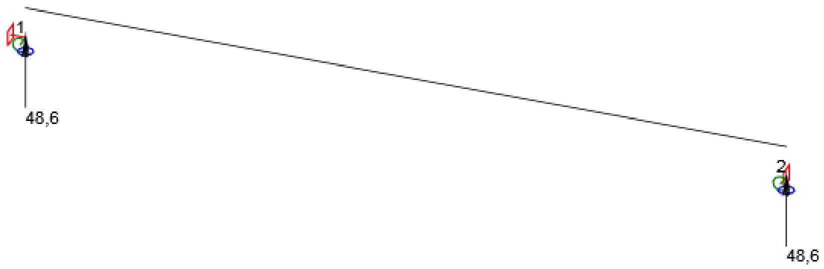


Combination SLSCh-W, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSCh-W(98)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	SLSCh-W(98)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSCh-W(98)	5,89	-2,9	0,0	-2,3	0,0	0,0	0,0
3	SLSCh-W(98)	9,60	-4,8	0,0	-0,9	0,0	-0,6	0,0
3	SLSCh-W(98)	2,18	-1,0	0,0	-0,9	0,0	0,6	0,0

Combination	Critical load effect description
SLSCh-W(98)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

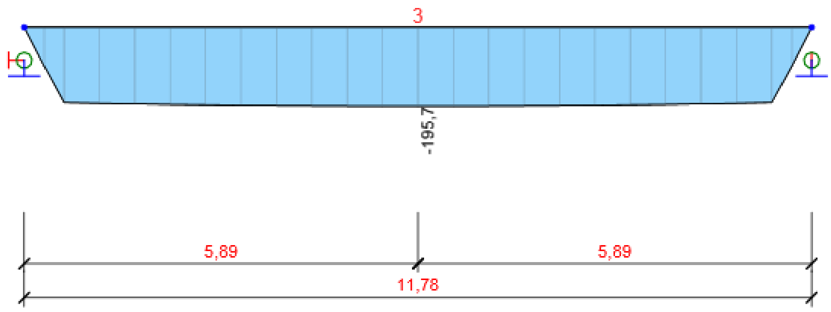


Reactions

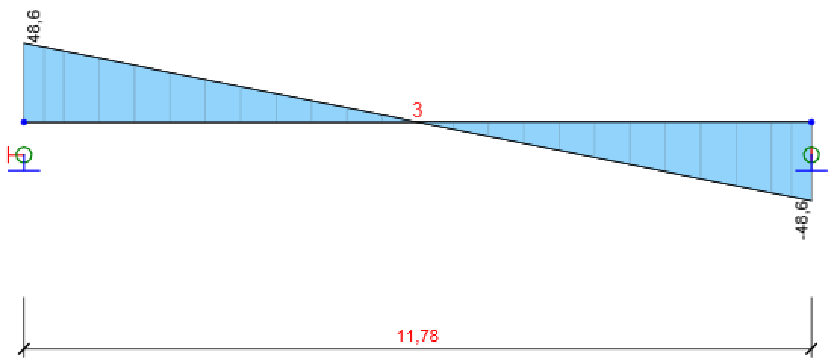
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSCh-W(98)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSCh-W(98)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSCh-W(98)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

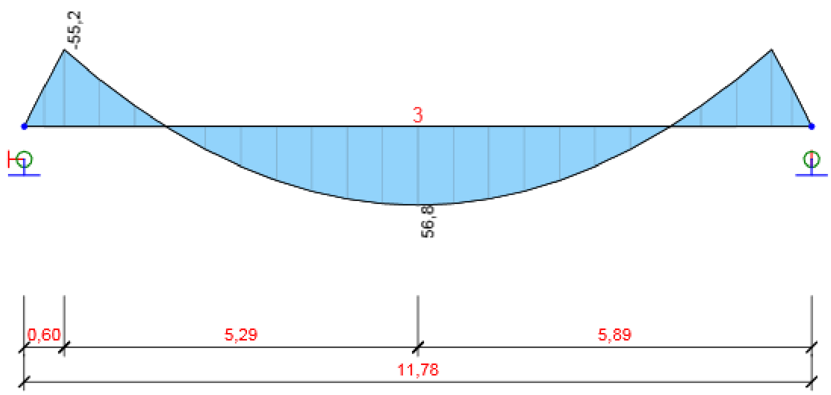
Combination SLSFr-W



Combination SLSFr-W, N [kN], Centroidal forces, Entire centroid



Combination SLSFr-W, Vz [kN], Centroidal forces, Entire centroid

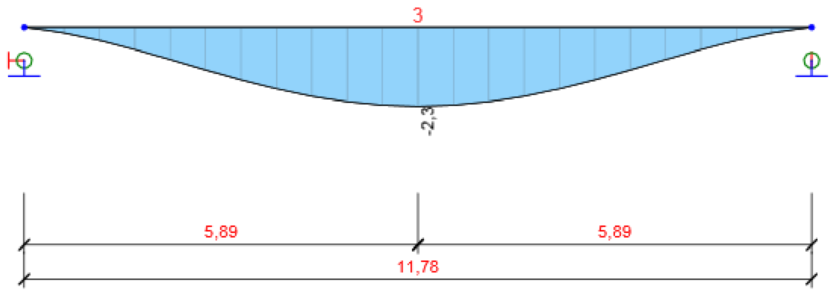


Combination SLSFr-W, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSFr-W(100)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	SLSFr-W(100)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSFr-W(100)	11,78	0,0	0,0	-48,6	0,0	0,0	0,0
3	SLSFr-W(100)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0

Combination	Critical load effect description
SLSFr-W(100)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

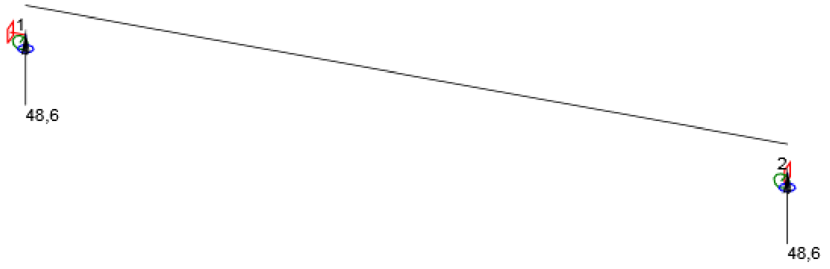


Combination SLSFr-W, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSFr-W(100)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	SLSFr-W(100)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSFr-W(100)	5,89	-2,9	0,0	-2,3	0,0	0,0	0,0
3	SLSFr-W(100)	9,60	-4,8	0,0	-0,9	0,0	-0,6	0,0
3	SLSFr-W(100)	2,18	-1,0	0,0	-0,9	0,0	0,6	0,0

Combination	Critical load effect description
SLSFr-W(100)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

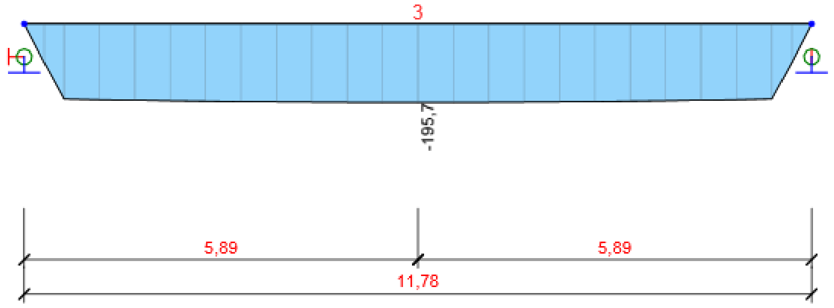


Reactions

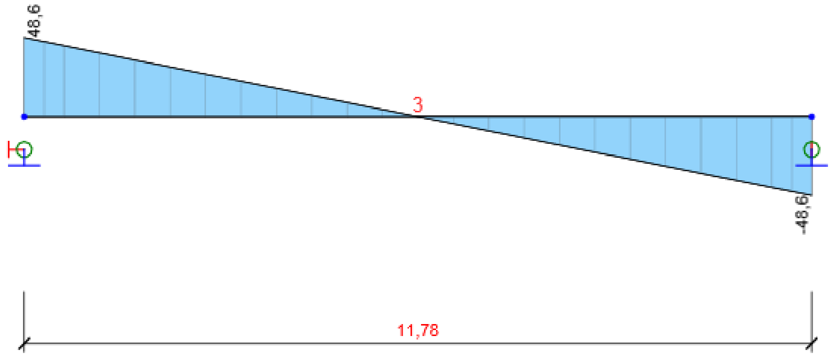
Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSFr-W(100)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSFr-W(100)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSFr-W(100)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

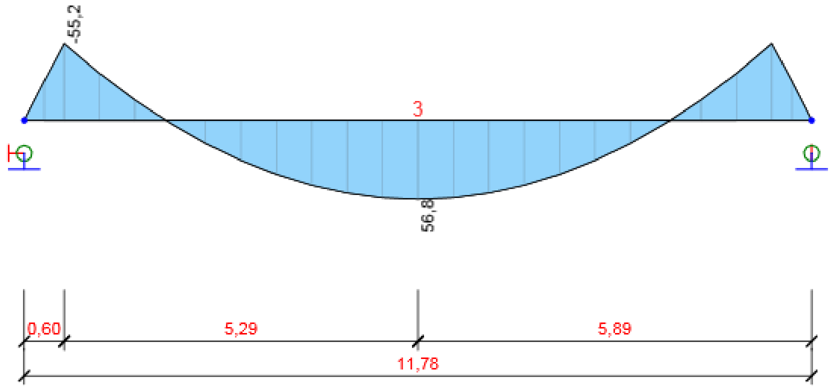
Combination SLSQa-W



Combination SLSQa-W, N [kN], Centroidal forces, Entire centroid



Combination SLSQa-W, Vz [kN], Centroidal forces, Entire centroid

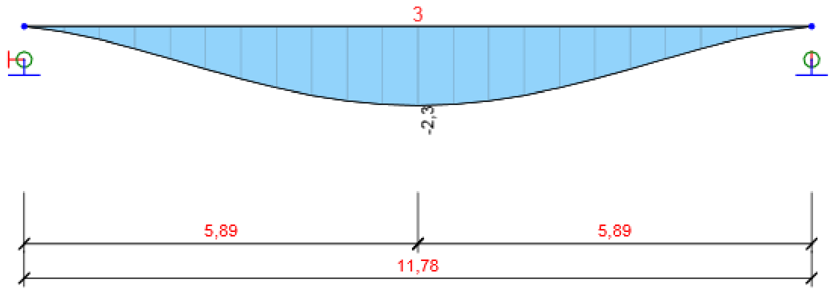


Combination SLSQa-W, My [kNm], Centroidal forces, Entire centroid

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	SLSQa-W(102)	5,89	-195,7	0,0	0,0	0,0	56,8	0,0
3	SLSQa-W(102)	0,00	0,0	0,0	48,6	0,0	0,0	0,0
3	SLSQa-W(102)	11,78	0,0	0,0	-48,6	0,0	0,0	0,0
3	SLSQa-W(102)	0,60	-187,1	0,0	43,7	0,0	-55,2	0,0

Combination	Critical load effect description
SLSQa-W(102)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

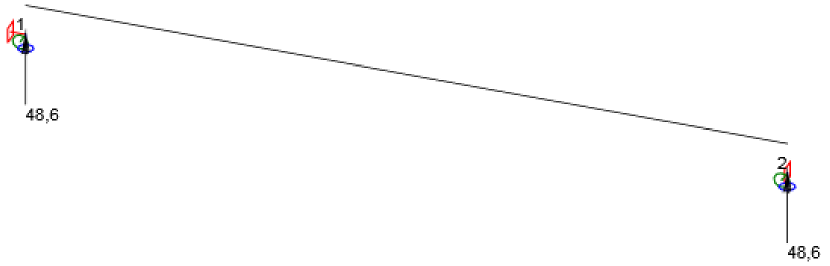


Combination SLSQa-W, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_y [mm]	u_z [mm]	fi_x [mrad]	fi_y [mrad]	fi_z [mrad]
3	SLSQa-W(102)	11,78	-5,9	0,0	0,0	0,0	-0,2	0,0
3	SLSQa-W(102)	0,00	0,1	0,0	0,0	0,0	0,2	0,0
3	SLSQa-W(102)	5,89	-2,9	0,0	-2,3	0,0	0,0	0,0
3	SLSQa-W(102)	9,60	-4,8	0,0	-0,9	0,0	-0,6	0,0
3	SLSQa-W(102)	2,18	-1,0	0,0	-0,9	0,0	0,6	0,0

Combination	Critical load effect description
SLSQa-W(102)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)



Reactions

Node	Combi	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
1	SLSQa-W(102)	0,0	0,0	48,6	0,0	0,0	0,0
2	SLSQa-W(102)	0,0	0,0	48,6	0,0	0,0	0,0

Combination	Critical load effect description
SLSQa-W(102)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

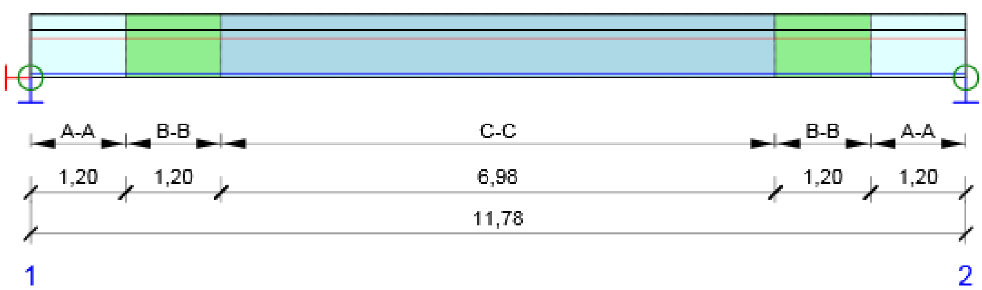
10 Concrete design

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

Note:Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time dependent analysis.

Scheme of reinforcement



Summary of checks

Construction stage	Type of check	Combination	Position	Value [%]	Check
Transfer of prestressing (5,0d)	Capacity N-M-M	ULS Fundamental ST(2)(2)	Section 5 (5,91m)	42,4	OK
Superimposed dead load (45,0d)	Capacity N-M-M	ULS Fundamental ST(6)(6)	Section 5 (5,91m)	62,7	OK
End of design working life (18250,0d)	Capacity N-M-M	ULS Fundamental ST(7)(7)	Section 5 (5,91m)	62,7	OK

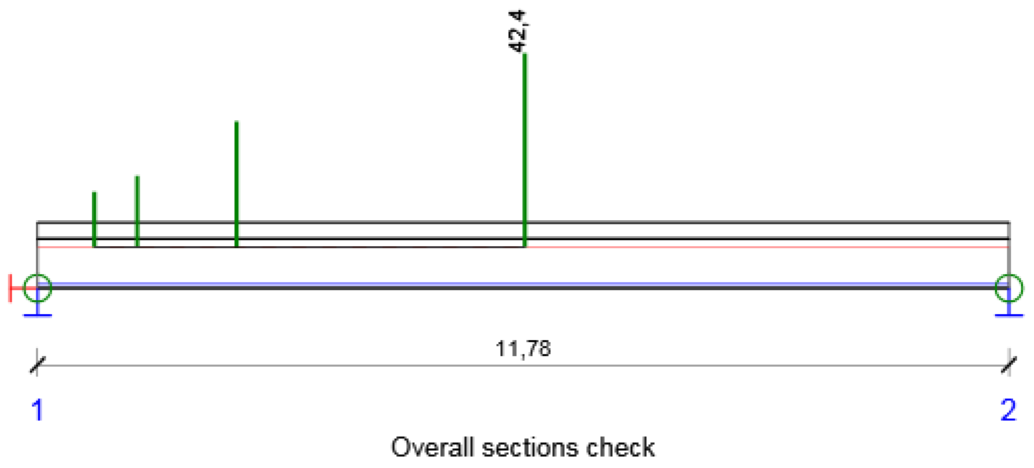
Construction stage: Transfer of prestressing (5,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Intermediate results of redistribution and reduction

Redistribution and reduction not calculated yet.



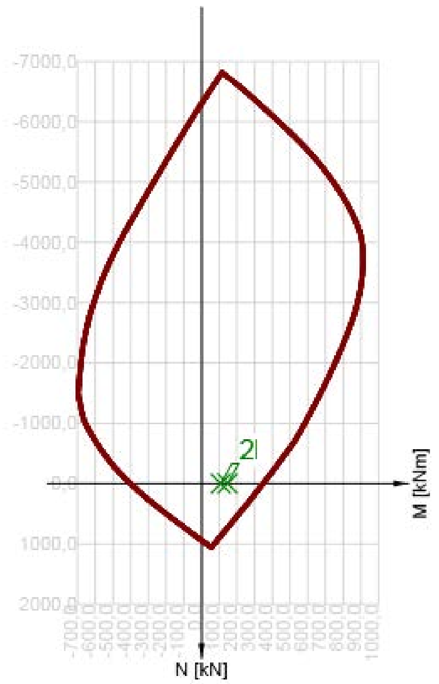
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 2 (0,69m)	A-A	Capacity N-M-M	12,2	OK
Section 3 (1,21m)	B-B	Capacity N-M-M	15,7	OK
Section 4 (2,41m)	C-C	Capacity N-M-M	27,6	OK
Section 5 (5,91m)	C-C	Capacity N-M-M	42,4	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,91m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	$M_{Ed,z}$ [kNm]	V_{Ed} [kN]	T_{Ed} [kNm]	Value [%]	Check
Capacity N-M-M	ULS Fundamental ST(2)(2)	0,0	147,2	0,0	-0,2	0,0	42,4	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	$M_{Ed,z}$ [kNm]	V_{Ed} [kN]	T_{Ed} [kNm]	Value [%]	Check
Capacity N-M-M							
ULS Fundamental ST(2)(2)	0,0	147,2	0,0	-0,2	0,0	42,4	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(2)(2)	0,0	147,2	0,0
2	ULS Fundamental ST(2)(1)	0,0	109,0	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(2)(2)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

Construction stage: Superimposed dead load (45,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

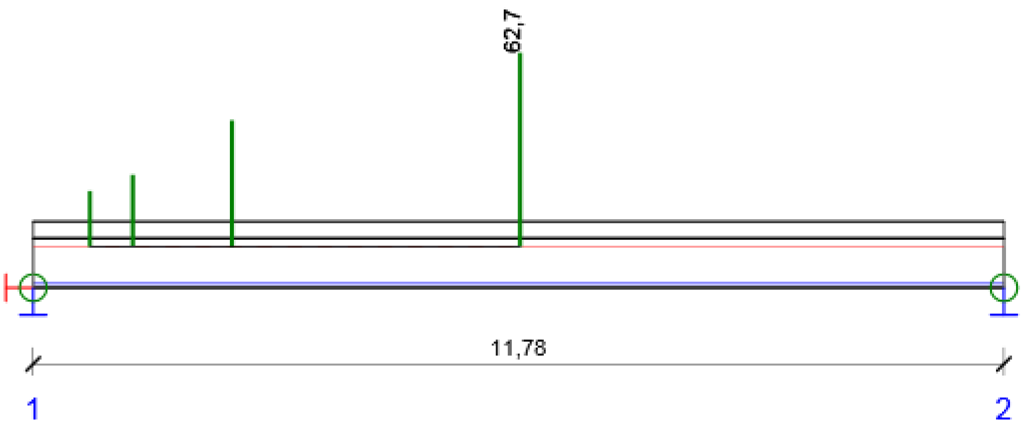
Member	Dx [m]	Combination	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	5,89	ULS Fundamental ST(6)(5)	-207,1	0,0	0,0	0,0	51,8	0,0
3	0,00	ULS Fundamental ST(6)(5)	0,0	0,0	41,0	0,0	0,0	0,0
3	11,04	ULS Fundamental ST(6)(6)	-201,9	0,0	-62,8	0,0	-37,9	0,0
3	0,00	ULS Fundamental ST(6)(6)	0,0	0,0	62,8	0,0	0,0	0,0
3	5,89	ULS Fundamental ST(6)(6)	-207,1	0,0	0,0	0,0	128,1	0,0
3	11,18	ULS Fundamental ST(6)(5)	-201,7	0,0	-41,0	0,0	-61,7	0,0

Combination	Critical load effect description
ULS Fundamental ST(6)(5)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6)
ULS Fundamental ST(6)(6)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(6)(6)

Node / Support	Original internal forces		Reduction
	Vy/z [kN]	My/z [kNm]	ΔVy/z [kN]
1 Right	0,0	0,0	0,0
	74,5	0,0	-11,6
2 Left	0,0	0,0	0,0
	-74,5	0,0	11,6



Overall sections check

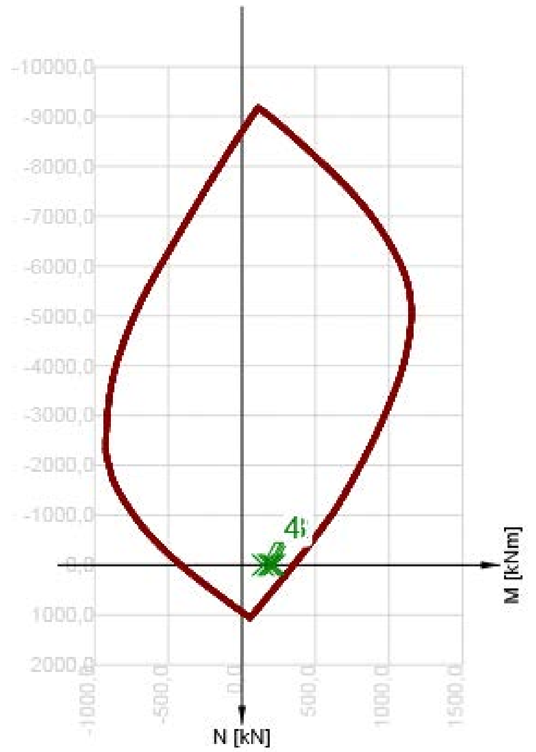
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 2 (0,69m)	A-A	Capacity N-M-M	17,9	OK
Section 3 (1,21m)	B-B	Capacity N-M-M	23,2	OK
Section 4 (2,41m)	C-C	Capacity N-M-M	40,8	OK
Section 5 (5,91m)	C-C	Capacity N-M-M	62,7	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,91m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	$M_{Ed,z}$ [kNm]	V_{Ed} [kN]	T_{Ed} [kNm]	Value [%]	Check
Capacity N-M-M	ULS Fundamental ST(6)(6)	0,0	220,0	0,0	-0,3	0,0	62,7	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	$M_{Ed,z}$ [kNm]	V_{Ed} [kN]	T_{Ed} [kNm]	Value [%]	Check
Capacity N-M-M							
ULS Fundamental ST(6)(6)	0,0	220,0	0,0	-0,3	0,0	62,7	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(6)(6)	0,0	220,0	0,0
2	ULS Fundamental ST(6)(15)	0,0	200,9	0,0
3	ULS Fundamental ST(6)(16)	0,0	181,9	0,0
4	ULS Fundamental ST(6)(5)	0,0	143,7	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(6)(6)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg

Construction stage: End of design working life (18250,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Member	Dx [m]	Combination	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	5,89	ULS Fundamental ST(7)(7)	-195,7	0,0	0,0	0,0	133,2	0,0
3	0,00	ULS Fundamental ST(7)(7)	0,0	0,0	62,8	0,0	0,0	0,0
3	11,04	ULS Fundamental ST(7)(7)	-187,5	0,0	-62,8	0,0	-31,5	0,0

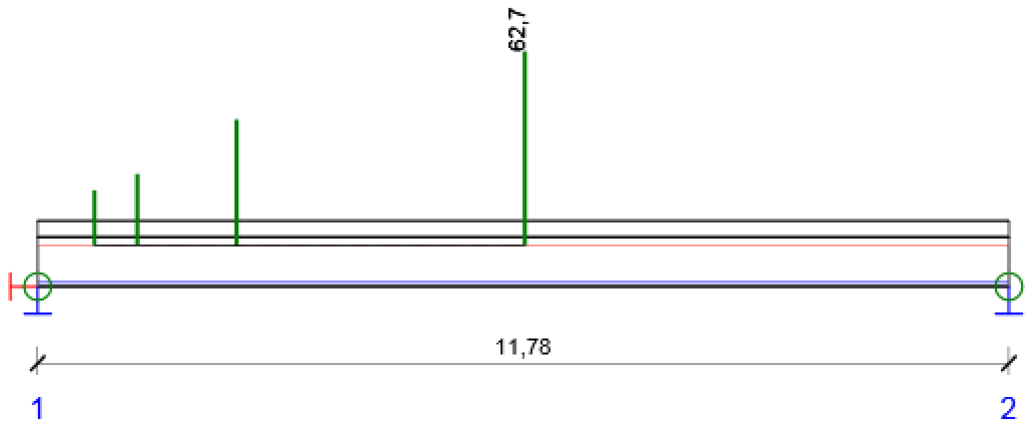
Member	Dx [m]	Combination	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
3	0,60	ULS Fundamental ST(7)(8)	-187,1	0,0	41,0	0,0	-55,2	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(8)	SW (1) + R (2) + G (2) + PRE (2) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(7)(7)

Node / Support	Original internal forces		Reduction
	Vy/z [kN]	My/z [kNm]	ΔVy/z [kN]
1 Right	0,0	0,0	0,0
	74,5	0,0	-11,6
2 Left	0,0	0,0	0,0
	-74,5	0,0	11,6



Overall sections check

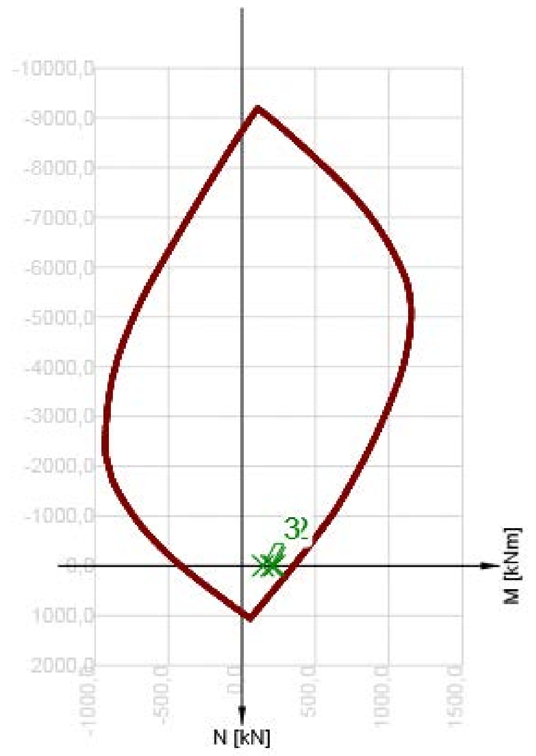
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 2 (0,69m)	A-A	Capacity N-M-M	17,9	OK
Section 3 (1,21m)	B-B	Capacity N-M-M	23,2	OK
Section 4 (2,41m)	C-C	Capacity N-M-M	40,8	OK
Section 5 (5,91m)	C-C	Capacity N-M-M	62,7	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,91m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	$M_{Ed,z}$ [kNm]	V_{Ed} [kN]	T_{Ed} [kNm]	Value [%]	Check
Capacity N-M-M	ULS Fundamental ST(7)(7)	0,0	220,0	0,0	-0,3	0,0	62,7	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	$M_{Ed,z}$ [kNm]	V_{Ed} [kN]	T_{Ed} [kNm]	Value [%]	Check
Capacity N-M-M							
ULS Fundamental ST(7)(7)	0,0	220,0	0,0	-0,3	0,0	62,7	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(7)(7)	0,0	220,0	0,0
2	ULS Fundamental ST(7)(17)	0,0	200,9	0,0
3	ULS Fundamental ST(7)(8)	0,0	143,7	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(7)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 0,75*Snijeg + R (7) + 1,35*G (7)

Design member data

Member type	Beam
Exposure class	XC1
Relative humidity	65 %
Creep coeficient	Calculated
Structural member importance	Minor
Redistribution of moments	Off
Reduction of moments	Off
Reduction of shear force	On
Limited interaction check	On

Supports definition

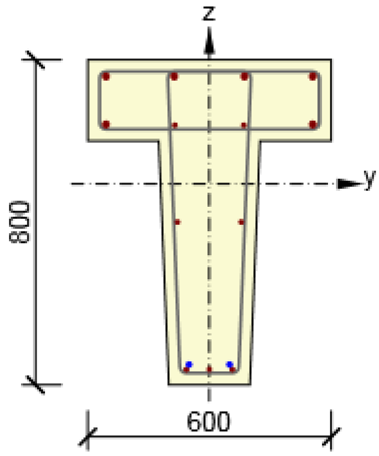
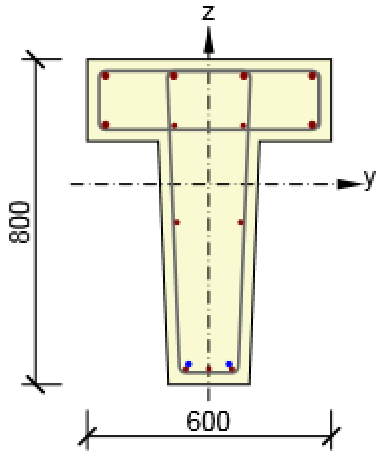
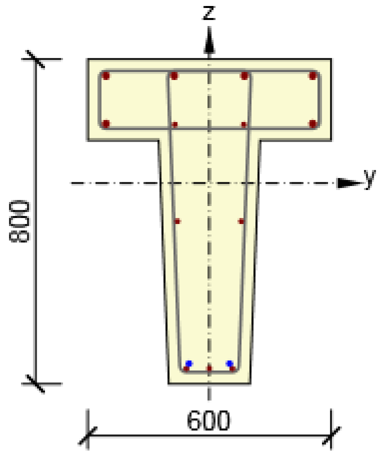
Node	Support width [mm]	Beam or slab is
1	400	Continuous over a support
4	400	Continuous over a support

Reinforcement zones

Zone	Begin [m]	End [m]	Length [m]	Reinforcement	Check
1	0,00	1,20	1,20	A-A	No
2	1,20	2,40	1,20	B-B	No
3	2,40	9,38	6,98	C-C	No
4	9,38	10,58	1,20	B-B	No
5	10,58	11,78	1,20	A-A	No

Reinforcement for position

Position	Reinforced cross-section	Reinforcement

<table>
<tr><th>Position</th><th>Reinforced cross-section</th><th>Reinforcement</th></tr>
<tr><td>Section 2 (0,69m)</td><td>
</td><td>Reinforcement:
4ø16 (804mm^2) (B 500B), z = 265 mm
2ø16 (402mm^2) (B 500B), z = 147 mm
2ø10 (157mm^2) (B 500B), z = 145 mm
2ø10 (157mm^2) (B 500B), z = -94 mm
3ø10 (236mm^2) (B 500B), z = -456 mm
Stirrups:
ø8 (B 500B) - 150 mm
ø8 (B 500B) - 150 mm
Tendons:
2*1ø12,5 (93mm^2) (Y1860S7-12.5), z = -444 mm</td></tr>
<tr><td>Section 3 (1,21m)</td><td>
</td><td>Reinforcement:
4ø16 (804mm^2) (B 500B), z = 265 mm
2ø16 (402mm^2) (B 500B), z = 147 mm
2ø10 (157mm^2) (B 500B), z = 145 mm
2ø10 (157mm^2) (B 500B), z = -94 mm
3ø10 (236mm^2) (B 500B), z = -456 mm
Stirrups:
ø8 (B 500B) - 200 mm
ø8 (B 500B) - 200 mm
Tendons:
2*1ø12,5 (93mm^2) (Y1860S7-12.5), z = -444 mm</td></tr>
<tr><td>Section 4 (2,41m),
Section 5 (5,91m)</td><td>
</td><td>Reinforcement:
4ø16 (804mm^2) (B 500B), z = 265 mm
2ø16 (402mm^2) (B 500B), z = 147 mm
2ø10 (157mm^2) (B 500B), z = 145 mm
2ø10 (157mm^2) (B 500B), z = -94 mm
3ø10 (236mm^2) (B 500B), z = -456 mm
Stirrups:
ø8 (B 500B) - 250 mm
ø8 (B 500B) - 250 mm
Tendons:
2*1ø12,5 (93mm^2) (Y1860S7-12.5), z = -444 mm</td></tr>
</table>

Material of reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 500B	500,0	540,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Code and calculation settings

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Persistent, transient		1,50-	Partial factor for concrete EC2-1-1 (3.15),(3.16)

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Accidental		1,20-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Persistent, transient		1,15-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Accidental		1,00-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ sp		1,15-	Partial factor for prestressing steel EC2-1-1 (3.15),(3.16)
5.5	k1		0,44-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k2		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k3		0,54-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k4		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k5		0,70-	Coefficient used for calculation of moment redistribution EC2-1-1
5.5	k6		0,80-	Coefficient used for calculation of moment redistribution EC2-1-1
6.2.2	Values for shear check d = h *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2	Values for shear check z = d *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2(1)	C rdc		0,18-	Coeficient Crdc / gamma_c EC2-1-1 (6.2a)
6.2.2(1)	k1		0,15-	Coefficient k1 EC2-1-1 (6.2a)
6.2.2(2)	Neglect cracking status		On	Neglect the status without flexural cracks in calculation of shear resistance. Shear resistance will always be calculated acc. to clause 6.2.2 (1) as if the cross-section was cracked bending EC2-1-1 (6.2.2(1))
6.2.3(1)	θ		21,8°	Angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1 (6.8), (6.9), (6.13), (6.14)
6.2.3(2)	θ min		21,8°	Minimal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	θ max		45,0°	Maximal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1

Clause	Name		Value	Description
6.2.3(2)	Calculate angle of concrete compression strut	Check Type	Off Long. reinf. and Strut	Calculate angle of concrete compression strut to optimize the use of selected component of truss analogy. In the case that any other component of truss analogy is not satisfactory, the value of angle from code settings will be used. EC2-1-1
6.2.3(3)	α cw	Check	Off 1,00-	Coefficient taking account of the state of the stress in the compression chord EC2-1-1 (6.9), (6.14)
6.2.3(3)	ρ w,max		On	Maximal reinforcement ratio for shear reinforcement EC2-1-1 (6.12)
6.2.5 (1)	Shear stress calculation in joints		Difference of normal forces	Shear stress in joint is calculated according to settings
	Limit is defined as numerical value		Off	Deflection will be checked against limit value defined numerically
	Numerical value of deflection limit		25mm	Deflection will be checked against limit value defined numerically.
	Limit value for deflections acc. 7.4.1 (4) as length of span /		250,00-	Calculated deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (4).
	Limit value for deflections acc. 7.4.1 (5) as length of span /		500,00-	Calculated increment of deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (5).
7.3.1(5)	wmax for reinforced members: Exposure class	X0, XC1 XC2, XC3, XC4 XD, XS	0,400mm 0,300mm 0,300mm	Recommended values of wmax for reinforced members and quasi-permanent combination EC2-1-1 7.1N
7.3.1(5)	wmax for prestressed members: Exposure class	X0, XC1 XC2, XC3, XC4	0,200mm 0,200mm	Recommended values of wmax for prestressed members and frequent combination EC2-1-1 7.1N
7.3.1(5)	Decompression for prestressed members: Exposure class	XC2, XC3, XC4 XD, XS	25mm 25mm	Recommended values of decompression for prestressed members and frequent combination EC2-1-1 7.1N
8.2(2)	s l,min	Check Distance k1(multiple) k2(increment)	On 20mm 1,00- 5mm	Minimal clear distance of longitudinal reinforcement EC2-1-1
8.3(2)	Φ m,min	Check Φs <= 16mm (increment Φs) Φs > 16mm (increment Φs)	On 3,00- 7,00-	Minimum mandrel diameter of stirrup as multiple of stirrup diameter EC2-1-1 Table 8.1N
9.2.1.1(1)	ρ l,min	Check Ratio Factor	On 0,13% 0,26-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.1N)
9.2.1.1(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.2.2(5)	ρ w,min	Check	On 0,08-	Minimal reinforcement ratio for shear reinforcement EC2-1-1 (9.5N)

Clause	Name		Value	Description
9.2.2(6)	s w,max	Check	On 0,75-	Maximal distance of stirrups EC2-1-1 (9.6N)
9.2.2(8)	s t,max	Check Check Distance Factor	On On 600mm 0,75-	Maximal transversal distance of branches of stirrups EC2-1-1 (9.8N)
9.2.3(4)	s l,max	Check	On 350mm	Maximal axial distance of longitudinal reinforcement EC2-1-1
9.5.2(1)	Φ min	Check	On 8mm	Minimal diameter of longitudinal reinforcement EC2-1-1
9.5.2(2)	ρ l,min	Check Ratio Factor	On 0,20% 0,10-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.12N)
9.5.2(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.5.2(4)	n Φ	Check	On 4	Minimal number of bars of longitudinal reinforcement EC2-1-1
9.5.3(1)	Φ w,min	Check	On 6mm	Minimal diameter of shear reinforcement EC2-1-1
9.5.3(3)	s ct,tmax	Check Distance Factor	On 400mm 20,00-	Maximal distance of stirrups EC2-1-1
	Don't exclude tendons		Off	Don't exclude tendons from calculation model of reinforced cross-section if tendons are outside of cross-section
	Neglect redistribution of moments		10,00%	Neglect redistribution of moments My, Mz, if the ratio My/Mz is less than 10%
	Limit value of exploitation		100,00%	Limit value of the exploitation of the cross-section
	Number of iteration steps		20	Number of iteration steps
	Use simplified model of cross-section		On	Use simplified calculation model of cross-section to increase the speed of checks
	Evaluation of interaction diagram		NuMuMu	Evaluation of interaction diagram
	Direction of imperfection		Resultant of moments	Type of direction for calculation of imperfections for columns
	Interpolation curve		Parabolic	Type of interpolation curve of bending moment for calculation of imperfection
	Maximum length of subzone		1,00m	The stiffness of cross-section for the calculation of deflection is considered to be constant in the subzone.

1 Project data

Project title	**SN-2 T 80**
Project number	002
Description	olucna greda t80
Author	SIRBEGOVIC Inzenjering
Date of creation	21.11.2017

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

2 Design Members

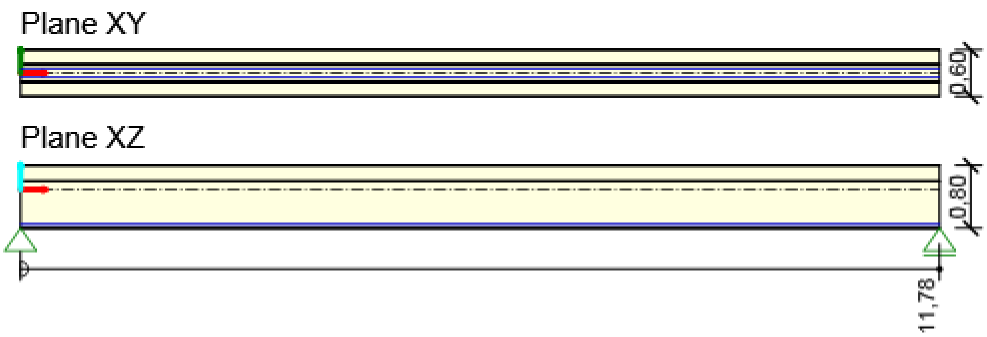
2.1 DM1

Description	Type	Members	Tendons	Valid
	Pre-tensioned	3	G1	✓

Stressing bed: SB1

Length of prestressing units	50,00 m
Stressing procedure	Pretenesioned - correction of relaxation
Calculation of relaxation	By time
Duration of keeping stress constant	300 s
Duration of short-term relaxation	57600 s
Loss due to deformation of end abutments	On
Defining of number of prestresing units	By groups
Shortening of stressing bed	1 mm
Anchorage set	2 mm
Loss due to the difference in temperature	On
Code coefficient	0,50 -
T_{max}	50 °C
T_0	20 °C
Tendon releasing	Gradual releasing

Geometry of design member



2.1.1 Prestressing

Name	Material	A_p [mm^2]	Length [m]	L_s [m]	L_{arc} [m]	R_{min} [m]	θ [°]
	Strands	σ_a [MPa]	σ_{min} [MPa]	σ_{max} [MPa]	e_{ba} [mm]	e_{aa} [mm]	L_{set} [m]
G1	Y1860S7-12.5	93	11,78	11,78	0,00	0,00	0,0
	1	1200,0	572,1	1159,0	307,7	305,7	0,00

Name	$\sigma_{ini,max}$ [MPa]	$\sigma_{p,max}$ [MPa]	Check 5.10.2.1(1)P	σ_{min} [MPa]	σ_{max} [MPa]	σ_{pm0} [MPa]	Check 5.10.3(2)P
G1	1200,0	1476,0	✓	572,1	1159,0	1394,0	✓

Explanation

Symbol	Explanation
A_p	Area of tendon
Length	Length of tendon
L_s	Sum of lengths of straight parts of tendon
L_{arc}	Sum of lengths of curved parts of tendon
R_{min}	Smallest curve radius found in specified geometry of current tendon
θ	Cumulative angular change
σ_a	Anchorage stress
σ_{min}	Minimum stress along the length of tendon after anchoring
σ_{max}	Maximum stress along the length of tendon after anchoring
e_{ba}	Theoretical tendon elongation before anchoring
e_{aa}	Theoretical tendon elongation after anchoring
L_{set}	Length affected by anchorage set
$\sigma_{ini,max}$	Maximum initial stress in tendon
$\sigma_{p,max}$	Limit value of tendon stress applied to the tendon acc. to 5.10.2.1 (1)P
Check 5.10.2.1(1)P	Check of criterion according to provision 5.10.2.1 (1)P
σ_{pm0}	Limit value of tendon stress applied to the tendon acc. to 5.10.3 (2)
Check 5.10.3(2)P	Check of criterion according to provision 5.10.3 (2)P

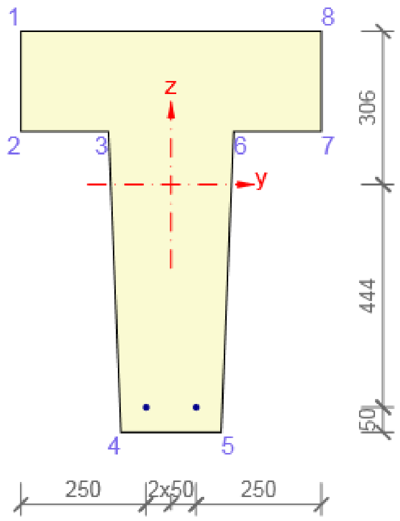
3 Tendons

3.1 Tendon: G1

Material	Number of strands	Load case	Area [mm^2]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-12.5	1	PRE (2)	93	12,5	1200,0	1476,0	✓

3.1.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
2	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	-50	-444
2	50	-444

Tendon coordinates calculated in defined distance X

X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	-50	-250	350	-444	-50	750
1,00	1,00	-50	-250	350	-444	-50	750
2,00	2,00	-50	-250	350	-444	-50	750
3,00	3,00	-50	-250	350	-444	-50	750
4,00	4,00	-50	-250	350	-444	-50	750
5,00	5,00	-50	-250	350	-444	-50	750
6,00	6,00	-50	-250	350	-444	-50	750
7,00	7,00	-50	-250	350	-444	-50	750
8,00	8,00	-50	-250	350	-444	-50	750
9,00	9,00	-50	-250	350	-444	-50	750
10,00	10,00	-50	-250	350	-444	-50	750
11,00	11,00	-50	-250	350	-444	-50	750
11,78	11,78	-50	-250	350	-444	-50	750

3.1.2 Equivalent load caused by prestressing

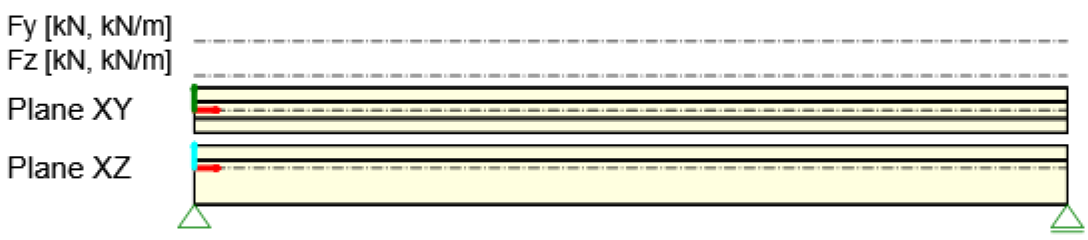
Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G1	1	0,03	21,6	0,0	0,0	0,0	-9,6	0,0
	2	0,09	21,6	0,0	0,0	0,0	-9,6	0,0
	3	0,15	21,6	0,0	0,0	0,0	-9,6	0,0
	4	0,21	21,6	0,0	0,0	0,0	-9,6	0,0
	5	0,27	21,6	0,0	0,0	0,0	-9,6	0,0
	6	0,33	21,6	0,0	0,0	0,0	-9,6	0,0
	7	0,39	21,6	0,0	0,0	0,0	-9,6	0,0
	8	0,45	21,6	0,0	0,0	0,0	-9,6	0,0
	9	0,51	21,6	0,0	0,0	0,0	-9,6	0,0

	10	0,57	16,2	0,0	0,0	0,0	-7,2	0,0
	11	0,60	5,4	0,0	0,0	0,0	-2,4	0,0
	12	11,18	-5,4	0,0	0,0	0,0	2,4	0,0
	13	11,21	-16,2	0,0	0,0	0,0	7,2	0,0
	14	11,27	-21,6	0,0	0,0	0,0	9,6	0,0
	15	11,33	-21,6	0,0	0,0	0,0	9,6	0,0
	16	11,39	-21,6	0,0	0,0	0,0	9,6	0,0
	17	11,45	-21,6	0,0	0,0	0,0	9,6	0,0
	18	11,51	-21,6	0,0	0,0	0,0	9,6	0,0
	19	11,57	-21,6	0,0	0,0	0,0	9,6	0,0
	20	11,63	-21,6	0,0	0,0	0,0	9,6	0,0
	21	11,69	-21,6	0,0	0,0	0,0	9,6	0,0
	22	11,75	-21,6	0,0	0,0	0,0	9,6	0,0

Explanation

Symbol	Explanation
Tendon name	Tendon name
Index	Index of current impulse of concentrated load
x	x - coordinate in coordinate system of Design Member
F_x	Magnitude of concentrated force in x direction
F_y	Magnitude of concentrated force in y direction
F_z	Magnitude of concentrated force in z direction
M_x	Magnitude of concentrated moment about x axis
M_y	Magnitude of concentrated moment about y axis
M_z	Magnitude of concentrated moment about z axis

Equivalent load



3.1.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check
1159,0	1394,0	✓

Input values and intermediate results

Area of tendon	93 mm^2
Length of tendon	11,78 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1159,0 MPa
Theoretical tendon elongation before anchoring	307,7 mm
Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,60 m
Transmission length - end	0,60 m
Blanketed length - begin	0,00 m
Blanketed length - end	0,00 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	12,5	1161,3	4,6	0,60	0,48	0,72

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	12,5	1161,3	4,6	0,60	0,48	0,72

Short-term losses

d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
0,60	-7,8	0,0	-1,6	1190,6	-29,3	-17,1	1144,3	-2,2	-30,4
1,00	-7,8	0,0	-1,6	1190,6	-29,3	-14,9	1146,4	-2,2	-30,4
2,00	-7,8	0,0	-1,6	1190,6	-29,3	-10,3	1151,0	-2,2	-30,4
3,00	-7,8	0,0	-1,6	1190,6	-29,3	-6,7	1154,6	-2,2	-30,4
4,00	-7,8	0,0	-1,6	1190,6	-29,3	-4,2	1157,1	-2,2	-30,4
5,00	-7,8	0,0	-1,6	1190,6	-29,3	-2,7	1158,6	-2,2	-30,4
6,00	-7,8	0,0	-1,6	1190,6	-29,3	-2,3	1159,0	-2,2	-30,4
7,00	-7,8	0,0	-1,6	1190,6	-29,3	-3,0	1158,4	-2,2	-30,4
8,00	-7,8	0,0	-1,6	1190,6	-29,3	-4,6	1156,7	-2,2	-30,4
9,00	-7,8	0,0	-1,6	1190,6	-29,3	-7,4	1153,9	-2,2	-30,4
10,00	-7,8	0,0	-1,6	1190,6	-29,3	-11,2	1150,1	-2,2	-30,4
11,00	-7,8	0,0	-1,6	1190,6	-29,3	-16,1	1145,2	-2,2	-30,4
11,18	-7,8	0,0	-1,6	1190,6	-29,3	-17,1	1144,3	-2,2	-30,4
11,78	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0

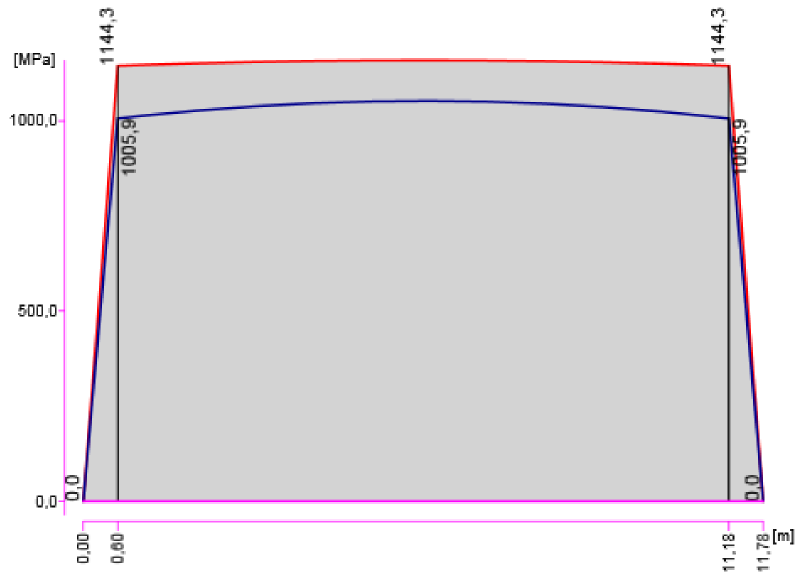
Long-term losses

d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
0,60	1144,3	138,4	1005,9	0,88
1,00	1146,4	133,8	1012,6	0,88
2,00	1151,0	123,9	1027,1	0,89
3,00	1154,6	116,3	1038,3	0,90
4,00	1157,1	110,9	1046,2	0,90
5,00	1158,6	107,8	1050,8	0,91
6,00	1159,0	106,9	1052,1	0,91
7,00	1158,4	108,2	1050,1	0,91
8,00	1156,7	111,8	1044,8	0,90
9,00	1153,9	117,7	1036,2	0,90
10,00	1150,1	125,9	1024,2	0,89
11,00	1145,2	136,3	1008,9	0,88
11,18	1144,3	138,4	1005,9	0,88

Explanation

Symbol	Explanation
l_{pt1}	0.8 lpt
l_{pt2}	1.2 lpt
$\Delta\sigma_{pw}$	Anchorage set loss
$\Delta\sigma_{pA}$	Loss due the deformation of ends abutments of the stressing bed
$\Delta\sigma_{pr}$	Relaxation loss
$\sigma_{pr,cor}$	Stress after short-term relaxation
$\Delta\sigma_{pT}$	Loss due to the difference in temperature of prestressing steel and stressing bed
$\Delta\sigma_{pe}$	Loss due to the immediate elastic concrete strain
σ_{pa}	Stress after short-term losses - stress in the prestressing steel immediately after the anchoring, or – in the case of pre-tensioned concrete – after the transfer of prestressing into the concrete.
$\Delta\sigma_{pr,occur}$	Relaxation that already took place (occurred)
$\Delta\sigma_{pr,cap}$	Remaining relaxation capacity, i.e. potential stress decrease in prestressing reinforcement due to relaxation at infinite time
$\Delta\sigma_\infty$	Loss of stress in the prestressing steel due to relaxation of prestressing steel, concrete creep and shrinkage, and due to immediate elastic concrete strain caused by permanent actions applied after transfer of prestressing.
σ_∞	Stress after long-term losses - stress in the prestressing steel due to all permanent actions including prestressing at the time close to infinity.
$\sigma_\infty/\sigma_{pa}$	The ratio of stress after long-term losses, and the stress after short -term losses.

Losses



4 List of used materials

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-12.5	1860,0	1640,0	195000,0	0,15	7850
	F_m = 173,0 kN, F_{p01} = 152,2 kN, F_r = 190,0 MPa, ρ_{1000} = 0,03, ρ_∞ = 0,06, Φ = 13 mm, Area = 93 mm2, ε_{uk} = 350,0 1e-4, A_{gt} = 350,0 1e-4, Type: Strand Surface characteristic: Plain, Relaxation class: Class2, Production: Low relaxation, Diagram type: Bilinear with an inclined top branch, Number of wires: 7				

Explanation

Symbol	Explanation
f_{pk}	Characteristic tensile strength
f_{p01k}	Characteristic 0,1% proof force
E	Modulus of elasticity of prestressing steel
F_m	Characteristic value of maximum force
F_{p01}	Characteristic 0,1% proof force
F_r	Fatigue stress range
ρ_{1000}	The value of relaxation loss (ratio), at 1000 hours after tensioning and at a mean temperature of 20°C
ρ_∞	The value of relaxation loss (ratio), at 500 000 hours after tensioning and at a mean temperature of 20°C
ε_{uk}	Characteristic strain of reinforcement or prestressing steel at maximum load
A_{gt}	Total elongation at maximum force
Type	Type of prestressing steel
Diagram type	The type of stress-strain diagram

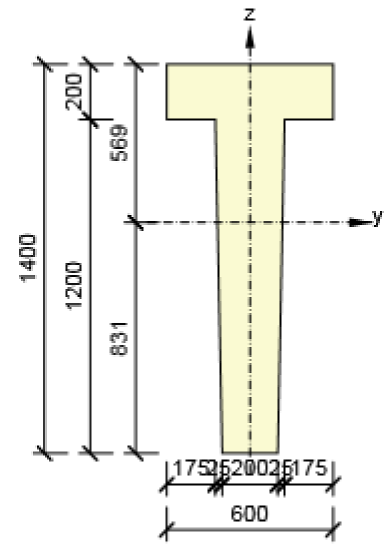
1 Project Data

Title of the project	**GN-1 T 140**
Identification of project	003
Author	SIRBEGOVIC Inženjering
Description	T-140
Date	21.11.2017
Design code	EN
Type of beam	Pre-fabricated pre-tensioned concrete beam

2 Cross-Sections

1. T Shape 1400, 600

Symbol	Value	Unit
Material	C50/60	
A	390000	[mm^2]
S_y	0	[mm^3]
S_z	0	[mm^3]
I_y	70830769231	[mm^4]
I_z	4753125000	[mm^4]
C_{gy}	0	[mm]
C_{gz}	0	[mm]
i_y	426	[mm]
i_z	110	[mm]



3 Material

Concrete

Name	f_{ck} [MPa]	f_{cm} [MPa]	f_{ctm} [MPa]	E_{cm} [MPa]	μ [-]	Unit mass [kg/m^3]
C50/60	50,0	58,0	4,1	37277,9	0,20	2500
	ε_{c2} = 20,0 1e-4,ε_{cu2} = 35,0 1e-4,ε_{c3} = 17,5 1e-4,ε_{cu3} = 35,0 1e-4, Exponent - n: 2,00,Aggregate size = 16 mm,Cement class: R (s = 0,20),Diagram type: Parabolic					

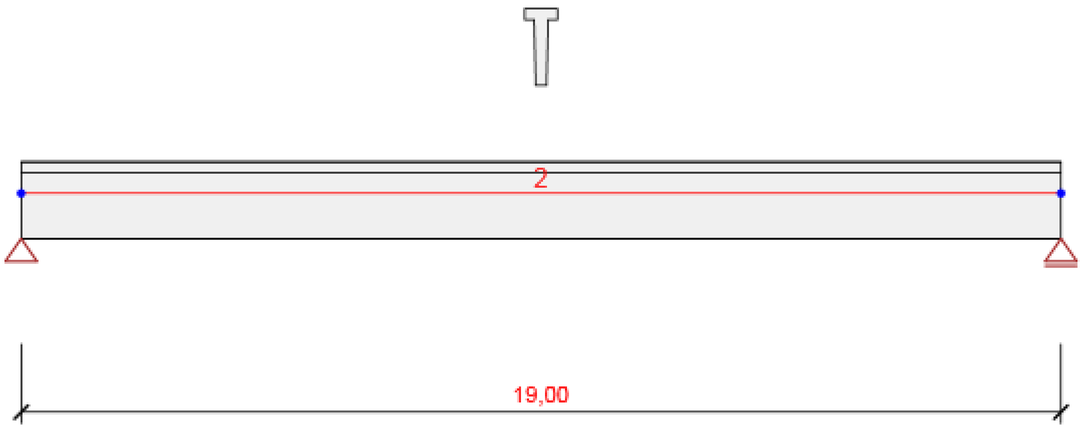
Reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 500B	500,0	540,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Prestressing steel

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-15.2	1860,0	1640,0	195000,0	0,15	7850
	F_m = 259,0 kN,F_{p01} = 227,9 kN,F_r = 190,0 MPa,ρ_{1000} = 0,03,ρ_∞ = 0,06, Φ = 15 mm,Area = 139 mm2,ε_{uk} = 350,0 1e-4,A_{gt} = 350,0 1e-4,Type: Strand Surface characteristic: Plain,Relaxation class: Class2,Production: Low relaxation, Diagram type: Bilinear with an inclined top branch,Number of wires: 7				

4 Geometry



Structural scheme

Members

Member	Length [m]	End of Member [m]	Cross-Section
2	19,00	19,00	1 - T Shape 1400, 600

Nodes

Node	X [m]	Support
1	0,00	XZ
3	19,00	Z

5 Load Cases

Name	Type	C.Stage	Load Group	Load [kN/m]
SW (1)	Permanent	1	LG1	0,0
R (2)	Permanent	2	LG1	0,0
G (2)	Permanent	2	LG1	0,0
PRE (2)	Permanent	2	LG1	0,0
R (3)	Permanent	3	LG1	0,0
G (3)	Permanent	3	LG1	0,0
R (4)	Permanent	4	LG1	0,0
G (4)	Permanent	4	LG1	0,0
R (5)	Permanent	5	LG1	0,0
G (5)	Permanent	5	LG1	0,0
R (6)	Permanent	6	LG1	0,0
G (6)	Permanent	6	LG1	0,0
R (7)	Permanent	7	LG1	0,0
G (7)	Permanent	7	LG1	0,0
Snijeg	Variable		Snijeg	0,0

Permanent load groups

Name	$\gamma_{G, sub}$ [-]	$\gamma_{G, inf}$ [-]	ξ [-]
LG1	1,35	1,00	0,85

Variable load groups

Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Snijeg	Standard	1,50	0,50	0,20	0,00

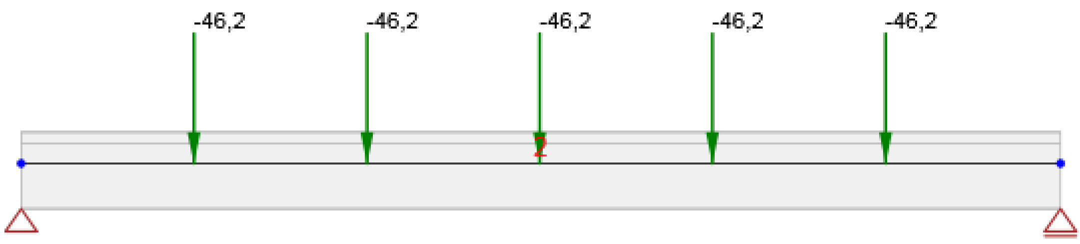
6 Loads

Load Case PRE (2)

Line Loads

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Angle [°]	Location
2	222,7	222,7	0,00	0,72	Global X	0,0	Length
2	668,0	668,0	1,50	2,22	Global X	0,0	Length
2	647,9	647,9	3,00	3,16	Global X	0,0	Length
2	682,6	682,6	3,17	3,72	Global X	0,0	Length
2	-659,2	-659,2	15,28	15,80	Global X	0,0	Length
2	-691,0	-691,0	15,80	16,00	Global X	0,0	Length
2	-646,4	-646,4	16,78	17,42	Global X	0,0	Length
2	-835,5	-835,5	17,42	17,50	Global X	0,0	Length
2	-222,7	-222,7	18,28	19,00	Global X	0,0	Length

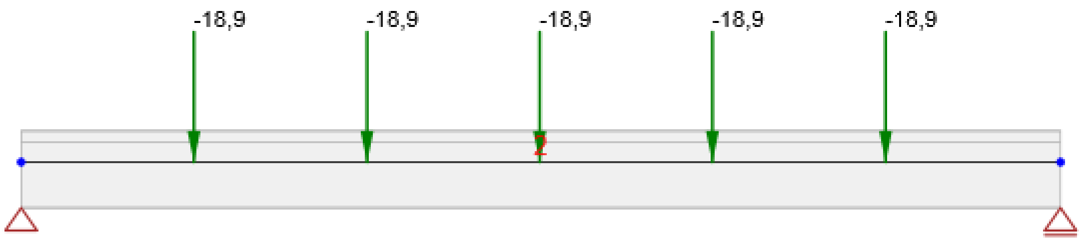
Load Case G (6)



Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
2	-46,2	3,16	X	Global Z	0,0
2	-46,2	6,32	X	Global Z	0,0
2	-46,2	9,48	X	Global Z	0,0
2	-46,2	12,64	X	Global Z	0,0
2	-46,2	15,80	X	Global Z	0,0

Load Case Snijeg



Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
2	-18,9	3,16	X	Global Z	0,0
2	-18,9	6,32	X	Global Z	0,0
2	-18,9	9,48	X	Global Z	0,0
2	-18,9	12,64	X	Global Z	0,0
2	-18,9	15,80	X	Global Z	0,0

7 Load Combinations

Name	Type	C.Stage	Evaluation
ULS Fundamental ST(2)	ULS Fundamental	2	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2)			
SLSC ST(2)	SLS Char	2	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2)			
SLSF ST(2)	SLS Freq	2	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2)			
SLSQ ST(2)	SLS Quasi	2	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2)			
ULS Fundamental ST(3)	ULS Fundamental	3	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSC ST(3)	SLS Char	3	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			

Name	Type	C.Stage	Evaluation
SLSF ST(3)	SLS Freq	3	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSQ ST(3)	SLS Quasi	3	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
ULS Fundamental ST(4)	ULS Fundamental	4	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSC ST(4)	SLS Char	4	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSF ST(4)	SLS Freq	4	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSQ ST(4)	SLS Quasi	4	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
ULS Fundamental ST(5)	ULS Fundamental	5	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSC ST(5)	SLS Char	5	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSF ST(5)	SLS Freq	5	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSQ ST(5)	SLS Quasi	5	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
ULS Fundamental ST(6)	ULS Fundamental	6	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); Snijeg			
SLSC ST(6)	SLS Char	6	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); Snijeg			
SLSF ST(6)	SLS Freq	6	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); Snijeg			
SLSQ ST(6)	SLS Quasi	6	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); Snijeg			
ULS Fundamental ST(7)	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); R (7); G (7); Snijeg			
SLSC ST(7)	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); R (7); G (7); Snijeg			
SLSF ST(7)	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); R (7); G (7); Snijeg			
SLSQ ST(7)	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); G (6); R (7); G (7); Snijeg			

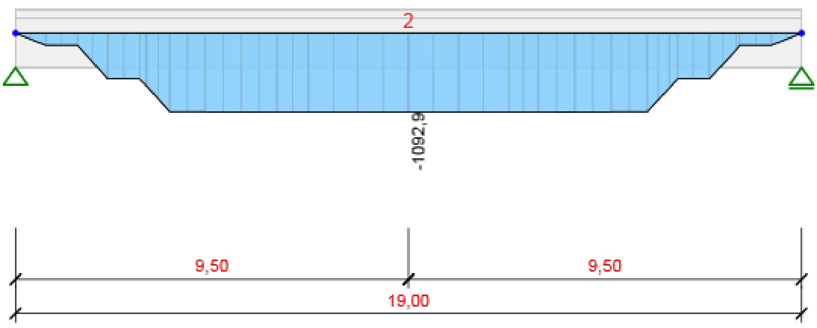
8 Construction stages

	Name	Time [d]	Beam spans [m]
1	Casting	0	
2	Transfer of prestressing	5	19,00
	Support 0,00 m: on deformed structure Support 19,00 m: on deformed structure User-specified concrete strength f_{ck} = 36,1 MPa		
3	Storage yard	5,1	2,24 - 14,53 - 2,24
	Support 2,24 m: on deformed structure Support 16,76 m: on deformed structure		
4	Transport	14	3,17 - 14,25 - 1,58
	Support 3,17 m: on deformed structure Support 17,42 m: on deformed structure		
5	Final supports	25	
6	Superimposed dead load	45	
7	End of design working life	18250	

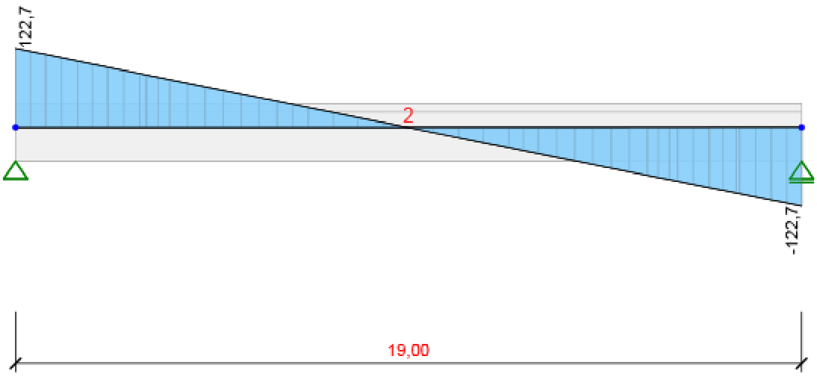
9 Results

Note: Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time depend analysis.

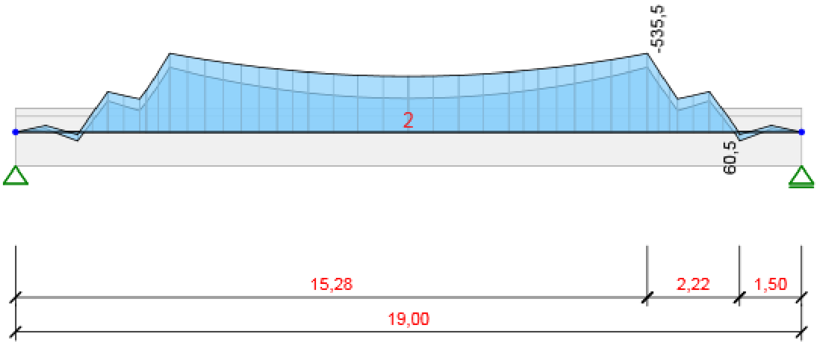
Construction Stage Transfer of prestressing
Envelopes



Transfer of prestressing, All combinations, N [kN], Centroidal forces, Entire centroid



Transfer of prestressing, All combinations, Vz [kN], Centroidal forces, Entire centroid

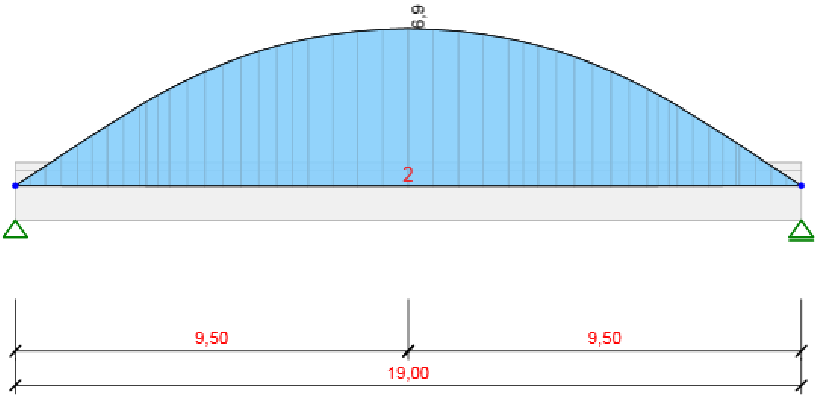


Transfer of prestressing, All combinations, My [kNm], Centroidal forces, Entire centroid

Internal forces, Global Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(2)(1)	9,50	-1092,9	0,0	-230,0
2	ULS Fundamental ST(2)(1)	19,00	0,0	-122,7	0,0
2	ULS Fundamental ST(2)(1)	0,00	0,0	122,7	0,0
2	ULS Fundamental ST(2)(2)	15,28	-1084,4	-55,2	-535,5
2	ULS Fundamental ST(2)(1)	17,50	-161,1	-103,3	60,5

Combination	Critical load effect description
ULS Fundamental ST(2)(1)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)
ULS Fundamental ST(2)(2)	SW (1) + R (2) + G (2) + PRE (2)



Transfer of prestressing, All combinations, Displacement uz [mm]

Deformations, Global Extreme,

Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
2	SLSC ST(2)(181)	19,00	-2,1	0,0	1,2
2	SLSC ST(2)(181)	0,00	-1,0	0,0	-1,2
2	SLSC ST(2)(181)	9,50	-1,6	6,9	0,0

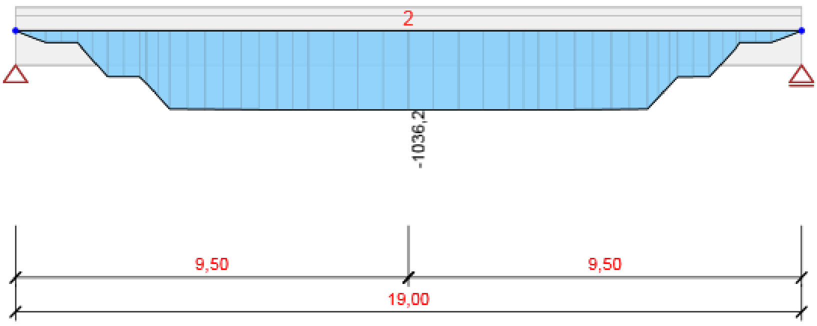
Combination	Critical load effect description
SLSC ST(2)(181)	SW (1) + R (2) + G (2) + PRE (2)

Reactions

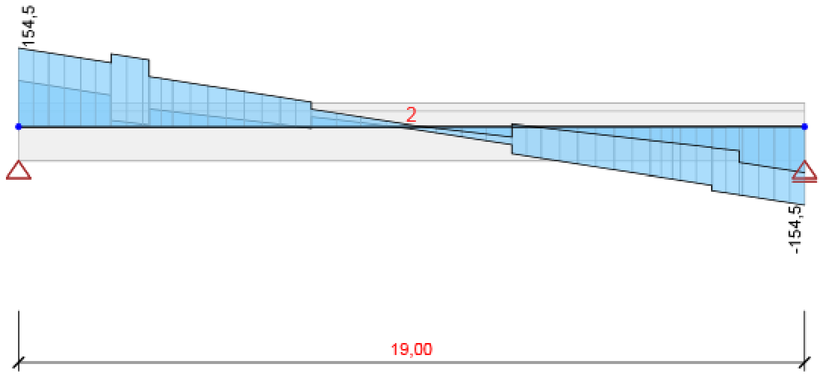
Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
10	ULS Fundamental ST(2)(1)	0,0	122,7	0,0
9	ULS Fundamental ST(2)(1)	0,0	122,7	0,0
10	ULS Fundamental ST(2)(3)	0,0	90,9	0,0

Combination	Critical load effect description
ULS Fundamental ST(2)(1)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + G (2) + PRE (2)

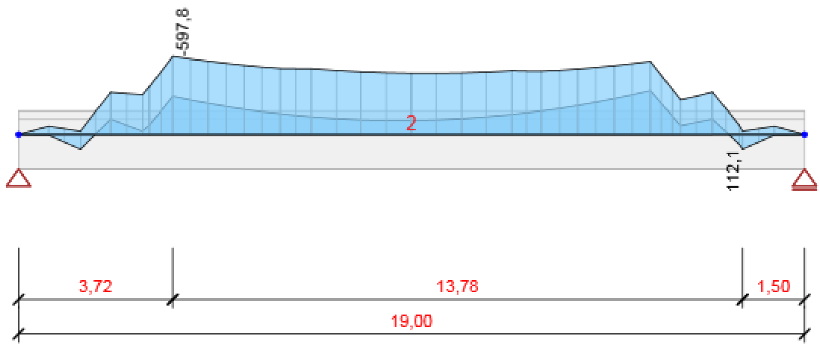
Construction Stage Final supports
Envelopes



Final supports, All combinations, N [kN], Centroidal forces, Entire centroid



Final supports, All combinations, Vz [kN], Centroidal forces, Entire centroid

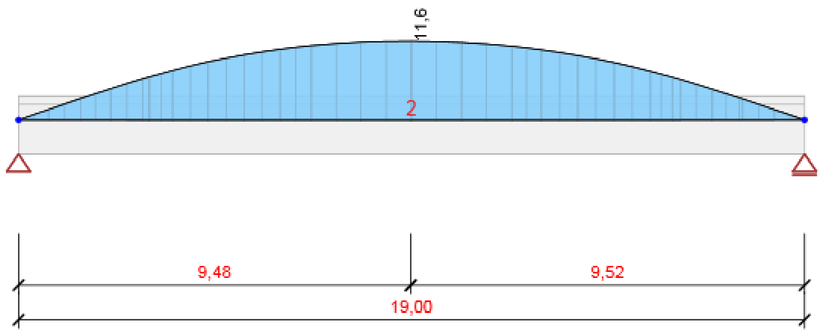


Final supports, All combinations, My [kNm], Centroidal forces, Entire centroid

Internal forces, Global Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(5)(26)	9,50	-1036,2	-3,5	-246,6
2	ULS Fundamental ST(5)(26)	0,00	0,0	90,9	0,0
2	ULS Fundamental ST(5)(37)	19,00	0,0	-154,5	0,0
2	ULS Fundamental ST(5)(37)	0,00	0,0	154,5	0,0
2	ULS Fundamental ST(5)(74)	3,72	-1019,8	50,9	-597,8
2	ULS Fundamental ST(5)(37)	17,50	-155,3	-135,1	112,1

Combination	Critical load effect description
ULS Fundamental ST(5)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(37)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(74)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5)



Final supports, All combinations, Displacement uz [mm]

Deformations, Global Extreme,

Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
2	SLSC ST(5)(184)	19,00	-2,7	0,0	2,1
2	SLSC ST(5)(184)	0,00	0,7	0,0	-2,1
2	SLSC ST(5)(184)	9,48	-1,0	11,6	0,0

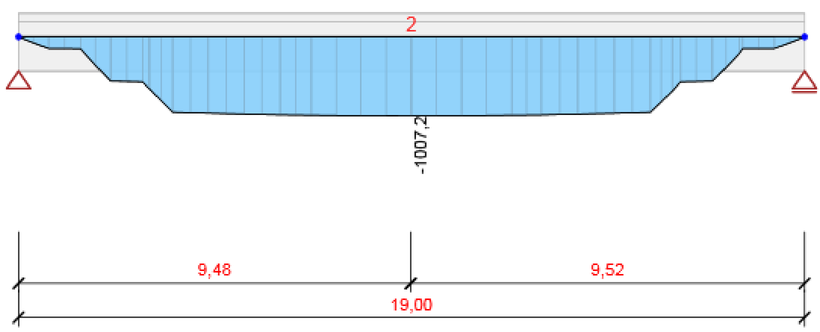
Combination	Critical load effect description
SLSC ST(5)(184)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)

Reactions

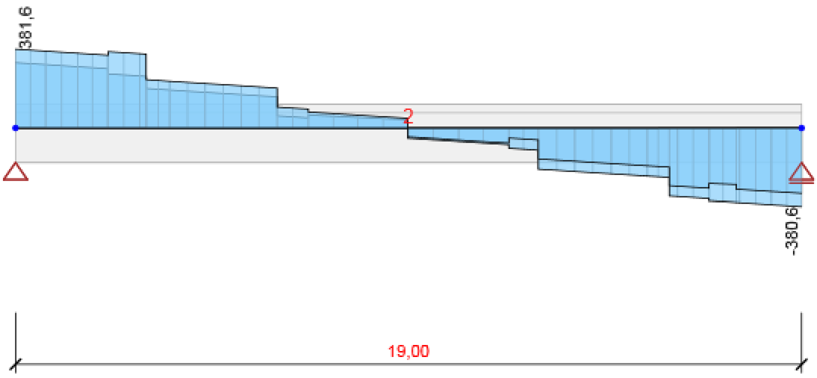
Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
1	ULS Fundamental ST(5)(100)	0,0	122,7	0,0
2	ULS Fundamental ST(5)(100)	0,0	122,7	0,0
2	ULS Fundamental ST(5)(31)	0,0	90,9	0,0

Combination	Critical load effect description
ULS Fundamental ST(5)(100)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(31)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)

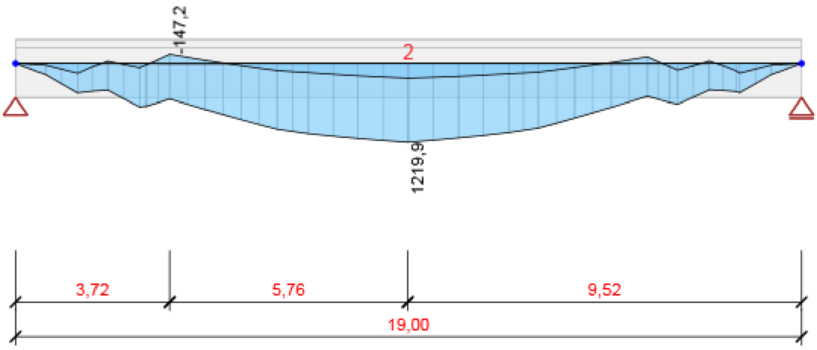
Construction Stage End of design working life
Envelopes



End of design working life, All combinations, N [kN], Centroidal forces, Entire centroid



End of design working life, All combinations, Vz [kN], Centroidal forces, Entire centroid

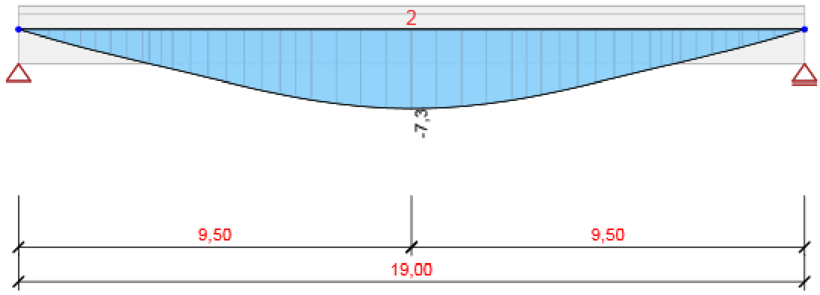


End of design working life, All combinations, My [kNm], Centroidal forces, Entire centroid

Internal forces, Global Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
2	ULS Fundamental ST(7)(56)	9,48	-1007,2	27,1	362,3
2	ULS Fundamental ST(7)(56)	19,00	0,0	-237,9	0,0
2	ULS Fundamental ST(7)(68)	19,00	0,0	-380,6	0,0
2	ULS Fundamental ST(7)(68)	0,00	0,0	381,6	0,0
2	ULS Fundamental ST(7)(83)	3,72	-958,6	120,5	-147,2
2	ULS Fundamental ST(7)(59)	9,48	-1007,2	42,5	1219,9

Combination	Critical load effect description
ULS Fundamental ST(7)(56)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)
ULS Fundamental ST(7)(68)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(83)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)
ULS Fundamental ST(7)(59)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)



End of design working life, All combinations, Displacement uz [mm]

Deformations, Global Extreme,

Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
2	SLSC ST(7)(187)	19,00	-8,3	0,0	-0,5
2	SLSC ST(7)(188)	0,00	3,3	0,0	1,1
2	SLSC ST(7)(188)	9,50	-2,3	-7,3	0,0
2	SLSC ST(7)(188)	19,00	-7,8	0,0	-1,1

Combination	Critical load effect description
SLSC ST(7)(187)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)
SLSC ST(7)(188)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + Snijeg + R (7) + G (7)

Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
2	ULS Fundamental ST(7)(98)	0,0	206,1	0,0
1	ULS Fundamental ST(7)(98)	0,0	206,6	0,0
1	ULS Fundamental ST(7)(123)	0,0	349,8	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(98)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)
ULS Fundamental ST(7)(123)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)

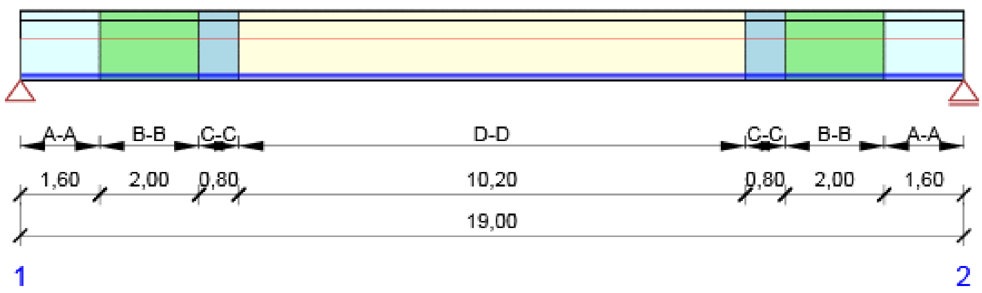
10 Concrete design

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

Note:Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time dependent analysis.

Scheme of reinforcement



Summary of checks

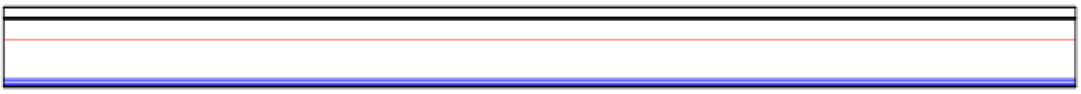
Construction stage	Type of check	Combination	Position	Value [%]	Check
Transfer of prestressing (5,0d)	Stress Limitation	SLSC ST(2)(181)	Section 1 (1,19m)	83,0	OK
Final supports (25,0d)	Stress Limitation	SLSC ST(5)(184)	Section 1 (1,19m)	80,0	OK
End of design working life (18250,0d)	Capacity N-M-M	ULS Fundamental ST(7)(59)	Section 4 (9,51m)	85,6	OK

Construction stage: Transfer of prestressing (5,0d)
Redistribution and reduction

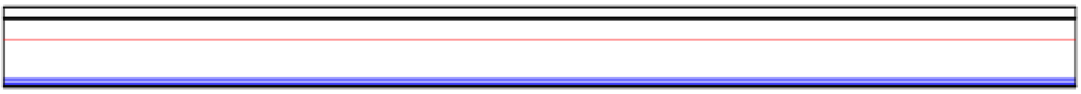
Internal forces respecting the influence of redistribution and reduction

Combination: All ULS Fund

Shear force Vz [kN]



Bending moment My [kNm]

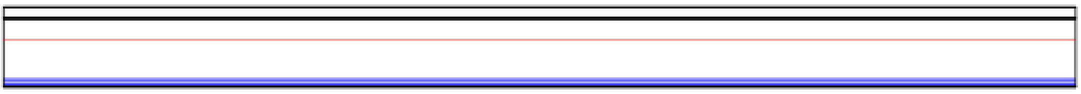


Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	ULS Fundamental ST(6)(40)	-1056,9	27,1	325,4
2	0,00	ULS Fundamental ST(5)(26)	0,0	76,9	0,0
2	0,00	ULS Fundamental ST(5)(25)	0,0	111,7	0,0
2	19,00	ULS Fundamental ST(6)(52)	0,0	-369,6	0,0
2	0,00	ULS Fundamental ST(7)(68)	0,0	370,5	0,0
2	9,48	ULS Fundamental ST(7)(59)	-1007,2	42,5	1219,9
2	3,72	ULS Fundamental ST(5)(74)	-1019,8	50,9	-597,8

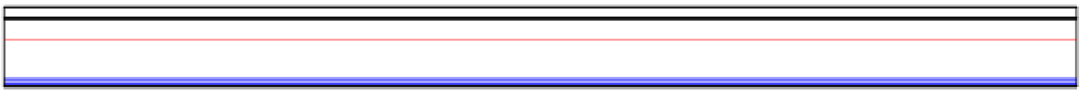
Combination	Critical load effect description
ULS Fundamental ST(6)(40)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + G (6)
ULS Fundamental ST(5)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(25)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5)
ULS Fundamental ST(6)(52)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg
ULS Fundamental ST(7)(68)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(59)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(5)(74)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5)

Combination: All SLS Freq

Shear force Vz [kN]



Bending moment My [kNm]

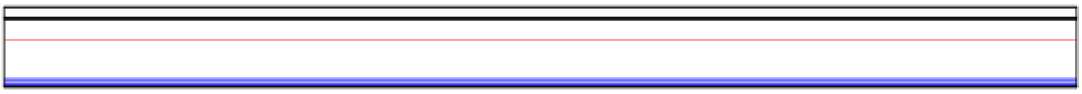


Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	SLSF ST(6)(193)	-1056,9	23,5	304,6
2	0,00	SLSF ST(5)(192)	0,0	76,9	0,0
2	17,89	SLSF ST(6)(194)	-154,5	-201,6	129,1
2	0,00	SLSF ST(7)(196)	0,0	202,1	0,0
2	9,48	SLSF ST(7)(196)	-1007,2	25,4	395,4
2	15,28	SLSF ST(5)(192)	-1022,5	-55,2	-489,3

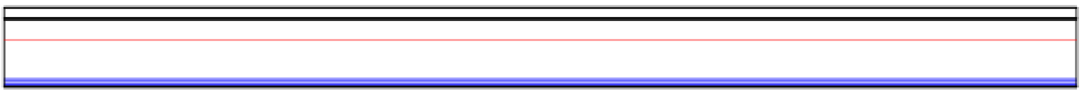
Combination	Critical load effect description
SLSF ST(6)(193)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6)
SLSF ST(5)(192)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSF ST(6)(194)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + 0,2*Snijeg
SLSF ST(7)(196)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + 0,2*Snijeg + R (7) + G (7)

Combination: All SLS Quasi

Shear force Vz [kN]

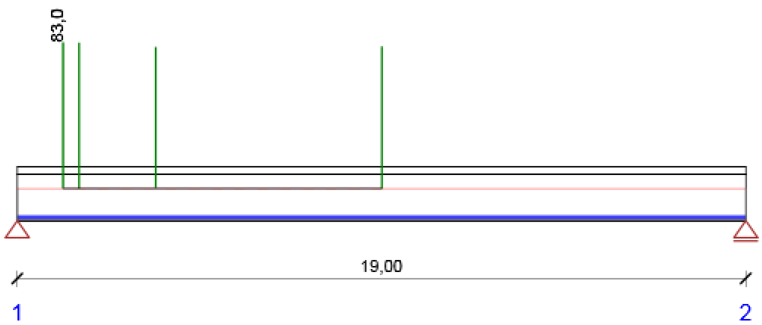


Bending moment My [kNm]



Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	SLSQ ST(6)(201)	-1056,9	23,5	304,6
2	0,00	SLSQ ST(5)(200)	0,0	76,9	0,0
2	17,89	SLSQ ST(6)(201)	-154,5	-192,2	118,7
2	0,00	SLSQ ST(7)(202)	0,0	192,6	0,0
2	9,48	SLSQ ST(7)(202)	-1007,2	23,5	341,6
2	15,28	SLSQ ST(5)(200)	-1022,5	-55,2	-489,3

Combination	Critical load effect description
SLSQ ST(6)(201)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6)
SLSQ ST(5)(200)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSQ ST(7)(202)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)



Overall sections check

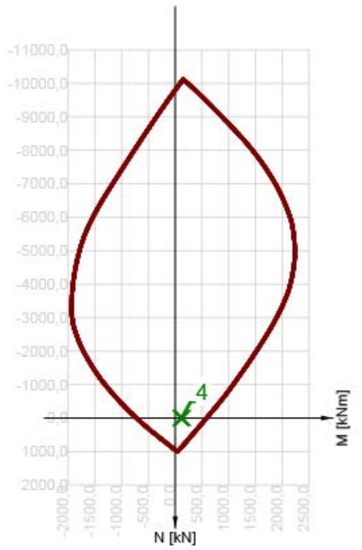
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (1,19m)	A-A	Stress Limitation	83,0	OK
Section 2 (1,61m)	B-B	Stress Limitation	82,8	OK
Section 3 (3,61m)	C-C	Stress Limitation	80,3	OK
Section 4 (9,51m)	D-D	Stress Limitation	80,6	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 1 (1,19m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(2)(181)	-160,9	-7,8	79,5	83,0	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(2)(1)	0,0	137,3	107,3	23,4	OK
Shear					
ULS Fundamental ST(2)(1)	-160,9	27,8	107,3	16,5	OK
Stress Limitation					
SLSC ST(2)(181)	-160,9	-7,8	79,5	83,0	OK
Crack Width					
SLSF ST(2)(189)	-152,8	-2,3	79,5	0,0	OK



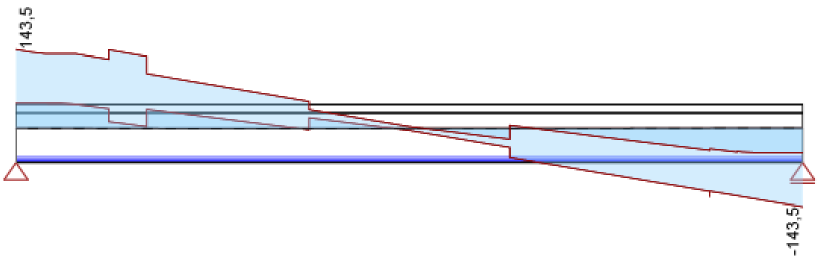
	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(2)(4)	0,0	137,3	0,0
2	ULS Fundamental ST(2)(1)	0,0	137,3	0,0
3	ULS Fundamental ST(2)(2)	0,0	101,7	0,0
4	ULS Fundamental ST(2)(3)	0,0	101,7	0,0

Construction stage: Final supports (25,0d)
Redistribution and reduction

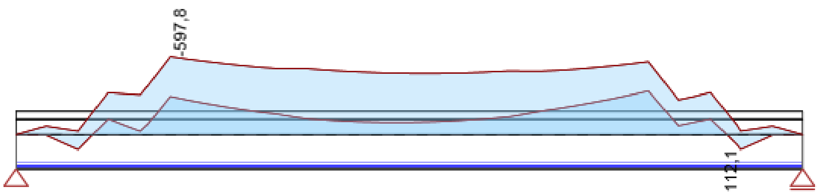
Internal forces respecting the influence of redistribution and reduction

Combination: All ULS Fund

Shear force Vz [kN]



Bending moment My [kNm]

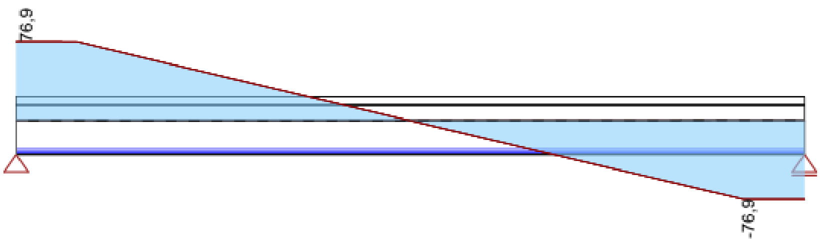


Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	ULS Fundamental ST(6)(40)	-1056,9	27,1	325,4
2	0,00	ULS Fundamental ST(5)(26)	0,0	76,9	0,0
2	0,00	ULS Fundamental ST(5)(25)	0,0	111,7	0,0
2	19,00	ULS Fundamental ST(6)(52)	0,0	-369,6	0,0
2	0,00	ULS Fundamental ST(7)(68)	0,0	370,5	0,0
2	9,48	ULS Fundamental ST(7)(59)	-1007,2	42,5	1219,9
2	3,72	ULS Fundamental ST(5)(74)	-1019,8	50,9	-597,8

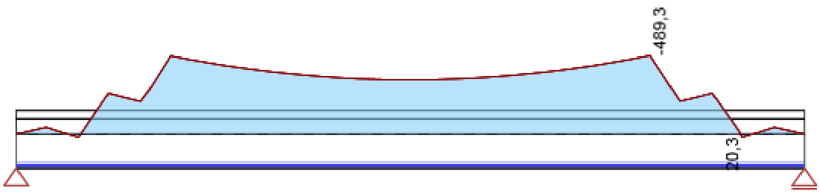
Combination	Critical load effect description
ULS Fundamental ST(6)(40)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + G (6)
ULS Fundamental ST(5)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(25)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5)
ULS Fundamental ST(6)(52)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg
ULS Fundamental ST(7)(68)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(59)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(5)(74)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5)

Combination: All SLS Freq

Shear force Vz [kN]



Bending moment My [kNm]



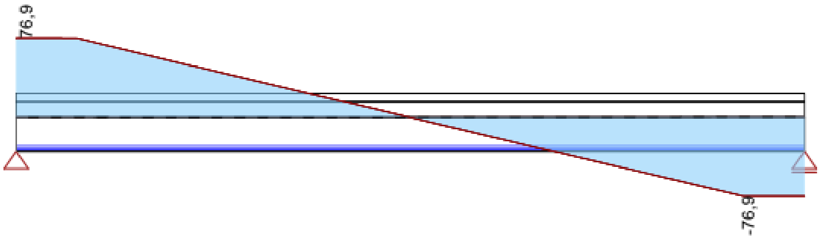
Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	SLSF ST(6)(193)	-1056,9	23,5	304,6
2	0,00	SLSF ST(5)(192)	0,0	76,9	0,0
2	17,89	SLSF ST(6)(194)	-154,5	-201,6	129,1
2	0,00	SLSF ST(7)(196)	0,0	202,1	0,0
2	9,48	SLSF ST(7)(196)	-1007,2	25,4	395,4

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	15,28	SLSF ST(5)(192)	-1022,5	-55,2	-489,3

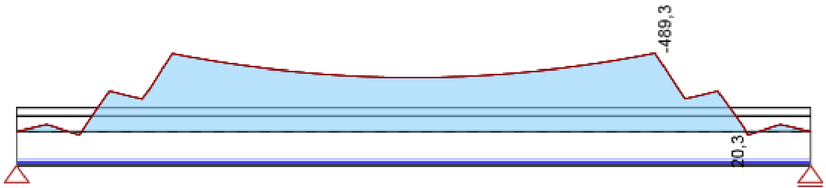
Combination	Critical load effect description
SLSF ST(6)(193)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6)
SLSF ST(5)(192)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSF ST(6)(194)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + 0,2*Snijeg
SLSF ST(7)(196)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + 0,2*Snijeg + R (7) + G (7)

Combination: All SLS Quasi

Shear force Vz [kN]

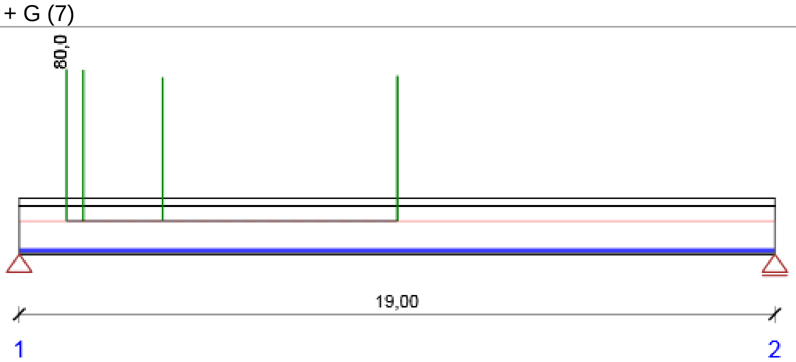


Bending moment My [kNm]



Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	SLSQ ST(6)(201)	-1056,9	23,5	304,6
2	0,00	SLSQ ST(5)(200)	0,0	76,9	0,0
2	17,89	SLSQ ST(6)(201)	-154,5	-192,2	118,7
2	0,00	SLSQ ST(7)(202)	0,0	192,6	0,0
2	9,48	SLSQ ST(7)(202)	-1007,2	23,5	341,6
2	15,28	SLSQ ST(5)(200)	-1022,5	-55,2	-489,3

Combination	Critical load effect description
SLSQ ST(6)(201)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6)
SLSQ ST(5)(200)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSQ ST(7)(202)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)



Overall sections check

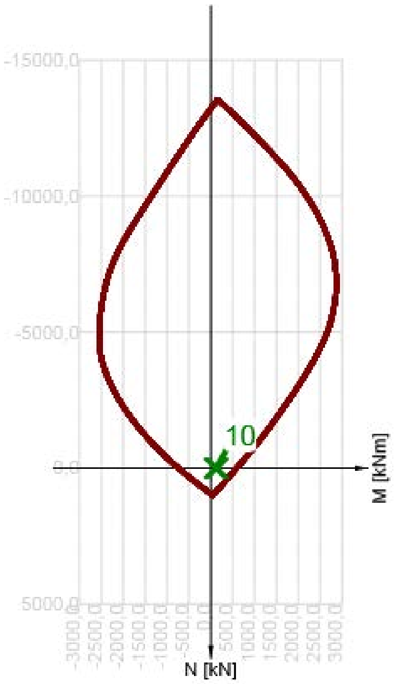
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (1,19m)	A-A	Stress Limitation	80,0	OK
Section 2 (1,61m)	B-B	Stress Limitation	79,7	OK
Section 3 (3,61m)	C-C	Stress Limitation	75,8	OK
Section 4 (9,51m)	D-D	Stress Limitation	76,6	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 1 (1,19m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(5)(184)	-155,1	-3,9	76,9	80,0	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(5)(75)	0,0	175,1	135,6	29,7	OK
Shear					
ULS Fundamental ST(5)(75)	-155,1	69,6	135,6	21,1	OK
Stress Limitation					
SLSC ST(5)(184)	-155,1	-3,9	76,9	80,0	OK
Crack Width					
SLSF ST(5)(192)	-147,4	1,4	76,9	0,0	OK



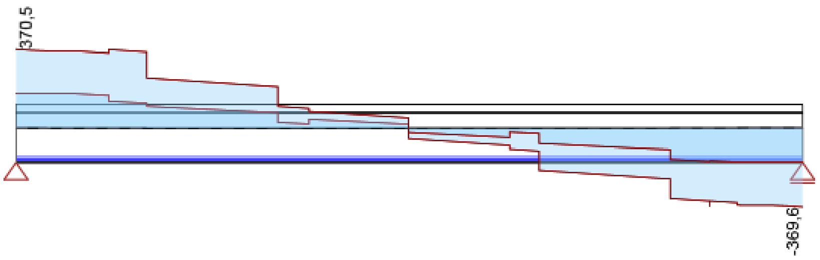
	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(5)(75)	0,0	175,1	0,0
2	ULS Fundamental ST(5)(76)	0,0	175,1	0,0
3	ULS Fundamental ST(5)(35)	0,0	139,6	0,0
4	ULS Fundamental ST(5)(32)	0,0	137,3	0,0
5	ULS Fundamental ST(5)(25)	0,0	137,3	0,0
6	ULS Fundamental ST(5)(26)	0,0	101,7	0,0
7	ULS Fundamental ST(5)(95)	0,0	101,7	0,0
8	ULS Fundamental ST(5)(94)	0,0	101,7	0,0
9	ULS Fundamental ST(5)(31)	0,0	101,7	0,0
10	ULS Fundamental ST(5)(77)	0,0	63,9	0,0

Construction stage: End of design working life (18250,0d)
Redistribution and reduction

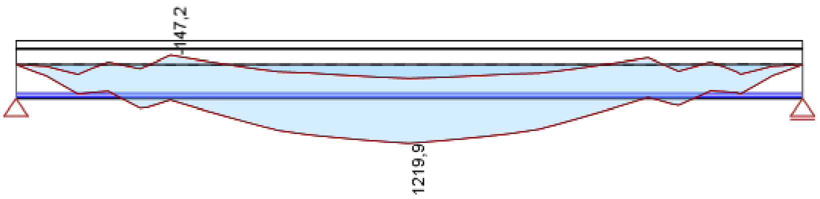
Internal forces respecting the influence of redistribution and reduction

Combination: All ULS Fund

Shear force Vz [kN]



Bending moment My [kNm]

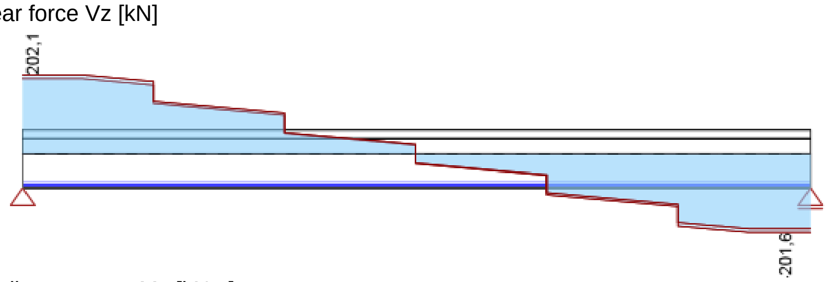


Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	ULS Fundamental ST(6)(40)	-1056,9	27,1	325,4
2	0,00	ULS Fundamental ST(5)(26)	0,0	76,9	0,0
2	0,00	ULS Fundamental ST(5)(25)	0,0	111,7	0,0
2	19,00	ULS Fundamental ST(6)(52)	0,0	-369,6	0,0
2	0,00	ULS Fundamental ST(7)(68)	0,0	370,5	0,0
2	9,48	ULS Fundamental ST(7)(59)	-1007,2	42,5	1219,9
2	3,72	ULS Fundamental ST(5)(74)	-1019,8	50,9	-597,8

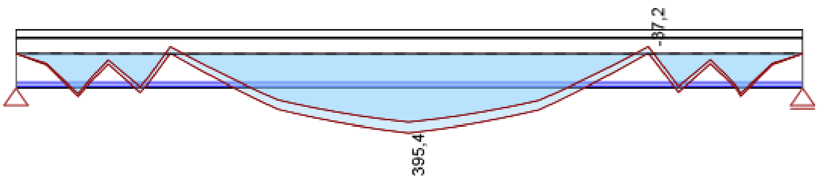
Combination	Critical load effect description
ULS Fundamental ST(6)(40)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + G (6)
ULS Fundamental ST(5)(26)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(25)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + G (5)
ULS Fundamental ST(6)(52)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg
ULS Fundamental ST(7)(68)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(59)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*G (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(5)(74)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5)

Combination: All SLS Freq

Shear force Vz [kN]



Bending moment My [kNm]



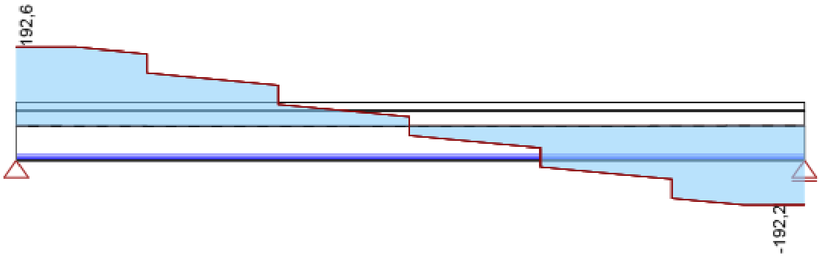
Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	SLSF ST(6)(193)	-1056,9	23,5	304,6
2	0,00	SLSF ST(5)(192)	0,0	76,9	0,0
2	17,89	SLSF ST(6)(194)	-154,5	-201,6	129,1

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	0,00	SLSF ST(7)(196)	0,0	202,1	0,0
2	9,48	SLSF ST(7)(196)	-1007,2	25,4	395,4
2	15,28	SLSF ST(5)(192)	-1022,5	-55,2	-489,3

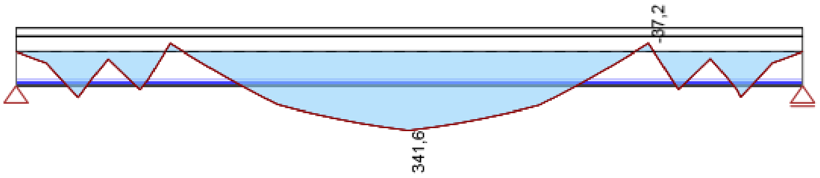
Combination	Critical load effect description
SLSF ST(6)(193)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6)
SLSF ST(5)(192)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSF ST(6)(194)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + 0,2*Snijeg
SLSF ST(7)(196)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + 0,2*Snijeg + R (7) + G (7)

Combination: All SLS Quasi

Shear force Vz [kN]

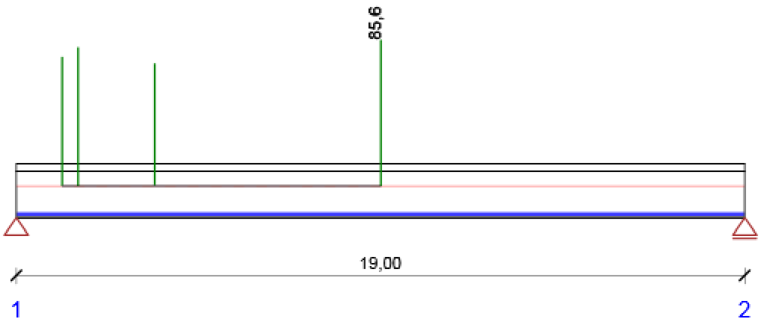


Bending moment My [kNm]



Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
2	9,48	SLSQ ST(6)(201)	-1056,9	23,5	304,6
2	0,00	SLSQ ST(5)(200)	0,0	76,9	0,0
2	17,89	SLSQ ST(6)(201)	-154,5	-192,2	118,7
2	0,00	SLSQ ST(7)(202)	0,0	192,6	0,0
2	9,48	SLSQ ST(7)(202)	-1007,2	23,5	341,6
2	15,28	SLSQ ST(5)(200)	-1022,5	-55,2	-489,3

Combination	Critical load effect description
SLSQ ST(6)(201)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6)
SLSQ ST(5)(200)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
SLSQ ST(7)(202)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + G (6) + R (7) + G (7)



Overall sections check

Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (1,19m)	A-A	Capacity N-M-M	75,5	OK

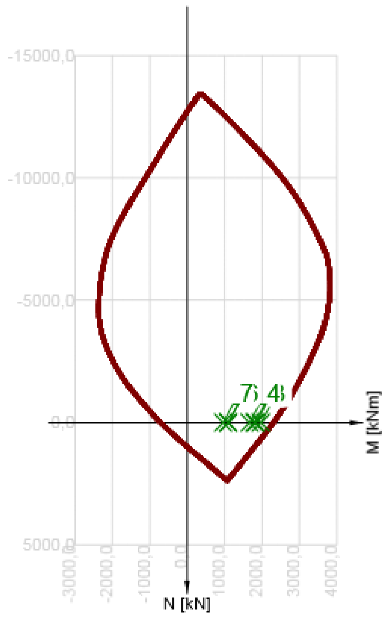
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 2 (1,61m)	B-B	Shear	81,2	OK
Section 3 (3,61m)	C-C	Stress Limitation	71,7	OK
Section 4 (9,51m)	D-D	Capacity N-M-M	85,6	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 4 (9,51m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M	ULS Fundamental ST(7)(59)	0,0	1968,9	-48,5	85,6	OK

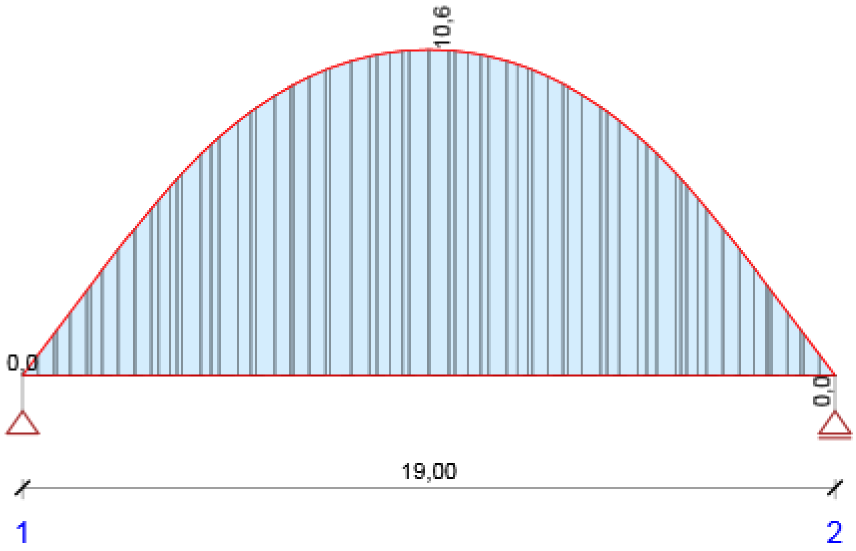
Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(7)(59)	0,0	1968,9	-48,5	85,6	OK
Shear					
ULS Fundamental ST(7)(59)	-1007,2	1218,5	-48,5	18,0	OK
Stress Limitation					
SLSC ST(7)(188)	-1007,2	609,6	-32,3	80,8	OK
Crack Width					
SLSF ST(7)(196)	-956,8	432,2	-24,8	10,2	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(7)(59)	0,0	1968,9	0,0
2	ULS Fundamental ST(7)(137)	0,0	1838,3	0,0
3	ULS Fundamental ST(7)(102)	0,0	1803,2	0,0
4	ULS Fundamental ST(7)(92)	0,0	1672,6	0,0
5	ULS Fundamental ST(7)(67)	0,0	1105,6	0,0
6	ULS Fundamental ST(7)(98)	0,0	1091,3	0,0
7	ULS Fundamental ST(7)(58)	0,0	960,7	0,0

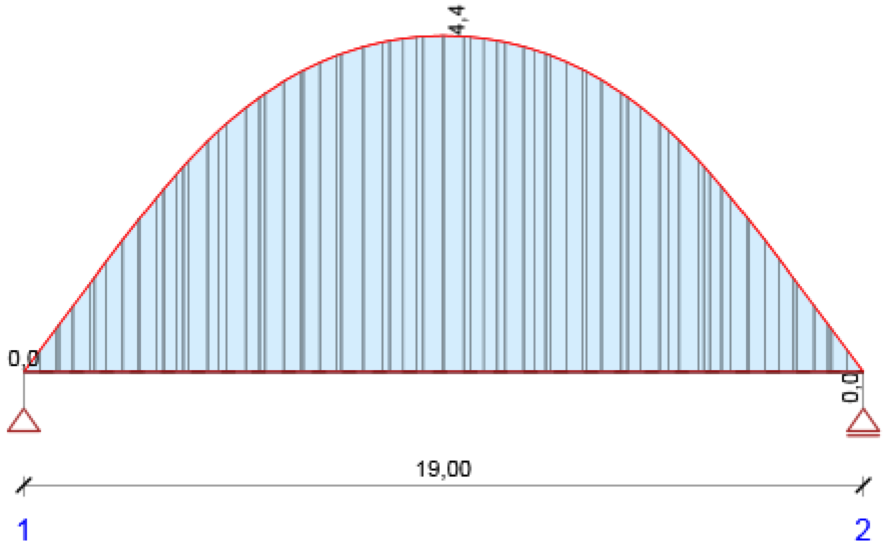
Check of deflections
Deflections: local extremes in spans

Combination: SLSC ST(2)(181), Total deflection



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,II}$ [mm]	$u_{z,lt}$ [mm]	$u_{z,lim\ (\pm)}$ [mm]
9,50	6,9	6,1	10,6	10,6	

Combination: SLSC ST(2)(181), Deflection increment



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,II}$ [mm]	$u_{z,incr}$ [mm]	$u_{z,lim\ (\pm)}$ [mm]
9,50	6,9	6,1	10,6	4,4	

Long-term losses coefficient

Design member	Load case	Long-term losses coefficient [-]
DM1	PRE (2)	0,90

Design member data

Member type	Beam
Exposure class	XC1
Relative humidity	65 %
Creep coeficient	Calculated
Structural member importance	Major
Redistribution of moments	Off
Reduction of moments	Off
Reduction of shear force	On
Limited interaction check	On

Data of beam spans

Span	Length [m]	Check acc. 7.4.1 (4)		Check acc. 7.4.1 (5)	
		Check	Deflection limits [mm]	Check	Deflection limits [mm]
1	19,00	False		False	

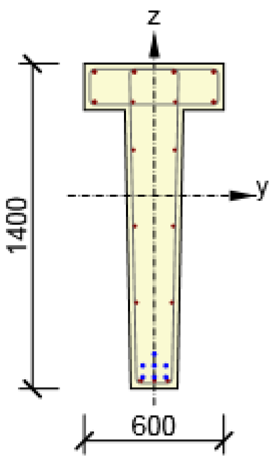
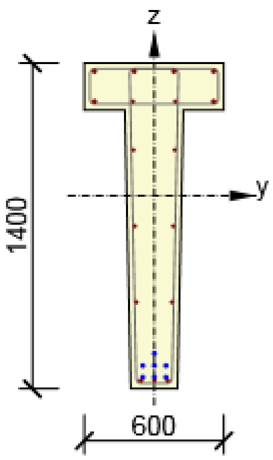
Supports definition

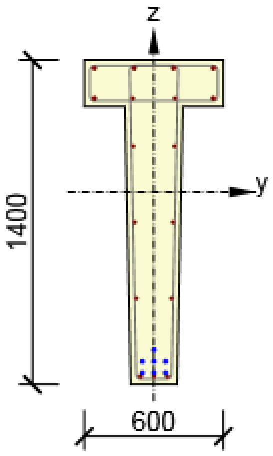
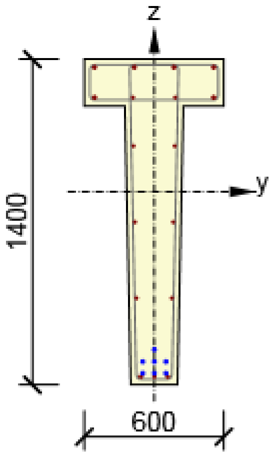
Node	Support width [mm]	Beam or slab is
1	400	Continuous over a support
3	400	Continuous over a support

Reinforcement zones

Zone	Begin [m]	End [m]	Length [m]	Reinforcement	Check
1	0,00	1,60	1,60	A-A	No
2	1,60	3,60	2,00	B-B	No
3	3,60	4,40	0,80	C-C	No
4	4,40	14,60	10,20	D-D	No
5	14,60	15,40	0,80	C-C	No
6	15,40	17,40	2,00	B-B	No
7	17,40	19,00	1,60	A-A	No

Reinforcement for position

Position	Reinforced cross-section	Reinforcement
Section 1 (1,19m)		Reinforcement: 4ø14 (616mm²) (B 500B), z = 534 mm 2ø10 (157mm²) (B 500B), z = 404 mm 2ø14 (308mm²) (B 500B), z = 404 mm 2ø10 (157mm²) (B 500B), z = 197 mm 2ø10 (157mm²) (B 500B), z = -131 mm 2ø10 (157mm²) (B 500B), z = -459 mm 3ø12 (339mm²) (B 500B), z = -795 mm Stirrups: ø8 (B 500B) - 100 mm ø8 (B 500B) - 100 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -681 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -731 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -781 mm
Section 2 (1,61m)		Reinforcement: 4ø14 (616mm²) (B 500B), z = 534 mm 2ø10 (157mm²) (B 500B), z = 404 mm 2ø14 (308mm²) (B 500B), z = 404 mm 2ø10 (157mm²) (B 500B), z = 197 mm 2ø10 (157mm²) (B 500B), z = -131 mm 2ø10 (157mm²) (B 500B), z = -459 mm 3ø12 (339mm²) (B 500B), z = -795 mm Stirrups: ø8 (B 500B) - 150 mm ø8 (B 500B) - 150 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -681 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -731 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -781 mm

Position	Reinforced cross-section	Reinforcement
Section 3 (3,61m)		Reinforcement: 4ø14 (616mm²) (B 500B), z = 534 mm 2ø10 (157mm²) (B 500B), z = 404 mm 2ø14 (308mm²) (B 500B), z = 404 mm 2ø10 (157mm²) (B 500B), z = 197 mm 2ø10 (157mm²) (B 500B), z = -131 mm 2ø10 (157mm²) (B 500B), z = -459 mm 3ø12 (339mm²) (B 500B), z = -795 mm Stirrups: ø8 (B 500B) - 200 mm ø8 (B 500B) - 200 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -681 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -731 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -781 mm
Section 4 (9,51m)		Reinforcement: 4ø14 (616mm²) (B 500B), z = 534 mm 2ø10 (157mm²) (B 500B), z = 404 mm 2ø14 (308mm²) (B 500B), z = 404 mm 2ø10 (157mm²) (B 500B), z = 197 mm 2ø10 (157mm²) (B 500B), z = -131 mm 2ø10 (157mm²) (B 500B), z = -459 mm 3ø12 (339mm²) (B 500B), z = -795 mm Stirrups: ø8 (B 500B) - 250 mm ø8 (B 500B) - 250 mm Tendons: 1ø15,2 (139mm²) (Y1860S7-15.2), Position 0, -681 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -731 mm 3*1ø15,2 (139mm²) (Y1860S7-15.2), z = -781 mm

Material of reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 500B	500,0	540,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Code and calculation settings

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Persistent, transient		1,50-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ c - Accidental		1,20-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Persistent, transient		1,15-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Accidental		1,00-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ sp		1,15-	Partial factor for prestressing steel EC2-1-1 (3.15),(3.16)
5.5	k1		0,44-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k2		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)

Clause	Name		Value	Description
5.5	k3		0,54-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k4		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k5		0,70-	Coefficient used for calculation of moment redistribution EC2-1-1
5.5	k6		0,80-	Coefficient used for calculation of moment redistribution EC2-1-1
6.2.2	Values for shear check d = h *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2	Values for shear check z = d *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2(1)	C rdc		0,18-	Coeficient Crdc / gamma_c EC2-1-1 (6.2a)
6.2.2(1)	k1		0,15-	Coefficient k1 EC2-1-1 (6.2a)
6.2.2(2)	Neglect cracking status		On	Neglect the status without flexural cracks in calculation of shear resistance. Shear resistance will always be calculated acc. to clause 6.2.2 (1) as if the cross-section was cracked bending EC2-1-1 (6.2.2(1))
6.2.3(1)	θ		35,0°	Angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1 (6.8), (6.9), (6.13), (6.14)
6.2.3(2)	θ min		21,8°	Minimal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	θ max		45,0°	Maximal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	Calculate angle of concrete compression strut	Check Type	Off Long. reinf. and Strut	Calculate angle of concrete compression strut to optimize the use of selected component of truss analogy. In the case that any other component of truss analogy is not satisfactory, the value of angle from code settings will be used. EC2-1-1
6.2.3(3)	α cw	Check	Off 1,00-	Coefficient taking account of the state of the stress in the compression chord EC2-1-1 (6.9), (6.14)
6.2.3(3)	ρ w,max		On	Maximal reinforcement ratio for shear reinforcement EC2-1-1 (6.12)
6.2.5 (1)	Shear stress calculation in joints		Difference of normal forces	Shear stress in joint is calculated according to settings
	Limit is defined as numerical value		Off	Deflection will be checked against limit value defined numerically
	Numerical value of deflection limit		25mm	Deflection will be checked against limit value defined numerically.

Clause	Name		Value	Description
	Limit value for deflections acc. 7.4.1 (4) as length of span /		250,00-	Calculated deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (4).
	Limit value for deflections acc. 7.4.1 (5) as length of span /		500,00-	Calculated increment of deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (5).
7.3.1(5)	wmax for reinforced members: Exposure class	X0, XC1 XC2, XC3, XC4 XD, XS	0,400mm 0,300mm 0,300mm	Recommended values of wmax for reinforced members and quasi-permanent combination EC2-1-1 7.1N
7.3.1(5)	wmax for prestressed members: Exposure class	X0, XC1 XC2, XC3, XC4	0,200mm 0,200mm	Recommended values of wmax for prestressed members and frequent combination EC2-1-1 7.1N
7.3.1(5)	Decompression for prestressed members: Exposure class	XC2, XC3, XC4 XD, XS	25mm 25mm	Recommended values of decompression for prestressed members and frequent combination EC2-1-1 7.1N
8.2(2)	s l,min	Check Distance k1(multiple) k2(increment)	On 20mm 1,00- 5mm	Minimal clear distance of longitudinal reinforcement EC2-1-1
8.3(2)	Φ m,min	Check Φs <= 16mm (increment Φs) Φs > 16mm (increment Φs)	On 4,00- 7,00-	Minimum mandrel diameter of stirrup as multiple of stirrup diameter EC2-1-1 Table 8.1N
9.2.1.1(1)	ρ l,min	Check Ratio Factor	On 0,13% 0,26-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.1N)
9.2.1.1(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.2.2(5)	ρ w,min	Check	On 0,08-	Minimal reinforcement ratio for shear reinforcement EC2-1-1 (9.5N)
9.2.2(6)	s w,max	Check	On 0,75-	Maximal distance of stirrups EC2-1-1 (9.6N)
9.2.2(8)	s t,max	Check Check Distance Factor	On On 600mm 0,75-	Maximal transversal distance of branches of stirrups EC2-1-1 (9.8N)
9.2.3(4)	s l,max	Check	On 350mm	Maximal axial distance of longitudinal reinforcement EC2-1-1
9.5.2(1)	Φ min	Check	On 8mm	Minimal diameter of longitudinal reinforcement EC2-1-1
9.5.2(2)	ρ l,min	Check Ratio Factor	On 0,20% 0,10-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.12N)
9.5.2(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.5.2(4)	n Φ	Check	On 4	Minimal number of bars of longitudinal reinforcement EC2-1-1

Clause	Name		Value	Description
9.5.3(1)	Φ w,min	Check	On 6mm	Minimal diameter of shear reinforcement EC2-1-1
9.5.3(3)	s ct,tmax	Check Distance Factor	On 400mm 20,00-	Maximal distance of stirrups EC2-1-1
	Don't exclude tendons		Off	Don't exclude tendons from calculation model of reinforced cross-section if tendons are outside of cross-section
	Neglect redistribution of moments		10,00%	Neglect redistribution of moments My, Mz, if the ratio My/Mz is less than 10%
	Limit value of exploitation		100,00%	Limit value of the exploitation of the cross-section
	Number of iteration steps		20	Number of iteration steps
	Use simplified model of cross-section		On	Use simplified calculation model of cross-section to increase the speed of checks
	Evaluation of interaction diagram		NuMuMu	Evaluation of interaction diagram
	Direction of imperfection		Resultant of moments	Type of direction for calculation of imperfections for columns
	Interpolation curve		Parabolic	Type of interpolation curve of bending moment for calculation of imperfection
	Maximum length of subzone		1,00m	The stiffness of cross-section for the calculation of deflection is considered to be constant in the subzone.

1 Project data

Project title	**GN-1 T 140**
Project number	003
Description	T-140
Author	SIRBEGOVIC Inženjering
Date of creation	21.11.2017

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

2 Design Members

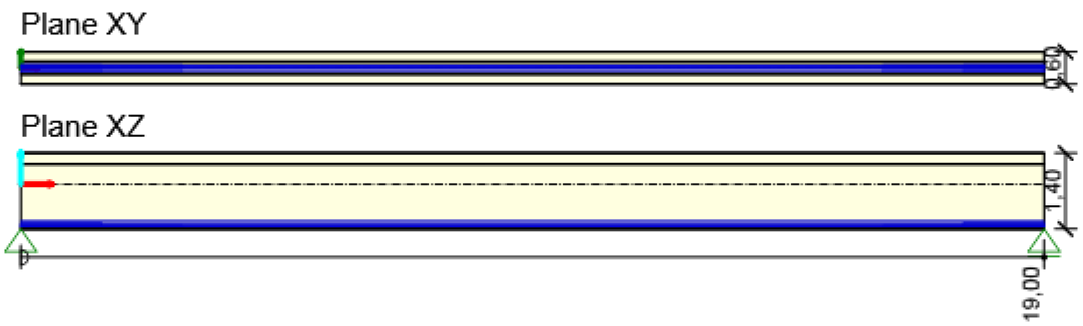
2.1 DM1

Description	Type	Members	Tendons	Valid
	Pre-tensioned	2	G1, G17, G18	✓

Stressing bed: SB1

Length of prestressing units	50,00 m
Stressing procedure	Pretenesioned - correction of relaxation
Calculation of relaxation	By time
Duration of keeping stress constant	300 s
Duration of short-term relaxation	57600 s
Loss due to deformation of end abutments	On
Defining of number of prestresing units	By groups
Shortening of stressing bed	1 mm
Anchorage set	2 mm
Loss due to the difference in temperature	On
Code coefficient	0,50 -
T_{max}	50 °C
T_0	20 °C
Tendon releasing	Gradual releasing

Geometry of design member



2.1.1 Prestressing

Name	Material	A_p [mm²]	Length [m]	L_s [m]	L_{arc} [m]	R_{min} [m]	θ [°]
	Strands	σ_a [MPa]	σ_{min} [MPa]	σ_{max} [MPa]	e_{ba} [mm]	e_{aa} [mm]	L_{set} [m]
G1	Y1860S7-15.2	139	19,00	19,00	0,00	0,00	0,0
	1	1200,0	103,3	1122,1	307,7	305,7	0,00
G17	Y1860S7-15.2	139	19,00	19,00	0,00	0,00	0,0
	1	1200,0	63,2	1138,7	307,7	305,7	0,00
G18	Y1860S7-15.2	139	19,00	19,00	0,00	0,00	0,0
	1	1200,0	577,7	1158,6	307,7	305,7	0,00

Name	$\sigma_{ini,max}$ [MPa]	$\sigma_{p,max}$ [MPa]	Check 5.10.2.1(1)P	σ_{min} [MPa]	σ_{max} [MPa]	σ_{pm0} [MPa]	Check 5.10.3(2)P
G1	1200,0	1476,0	✓	103,3	1122,1	1394,0	✓
G17	1200,0	1476,0	✓	63,2	1138,7	1394,0	✓
G18	1200,0	1476,0	✓	577,7	1158,6	1394,0	✓

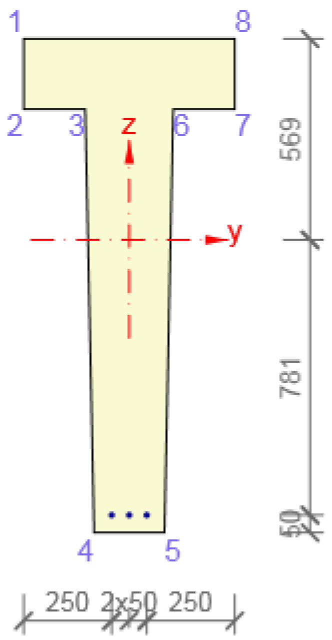
3 Tendons

3.1 Tendon: G1

Material	Number of strands	Load case	Area [mm²]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-15.2	1	PRE (2)	139	15,2	1200,0	1476,0	✓

3.1.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
3	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	-50	-781
2	0	-781
3	50	-781

Tendon coordinates calculated in defined distance X

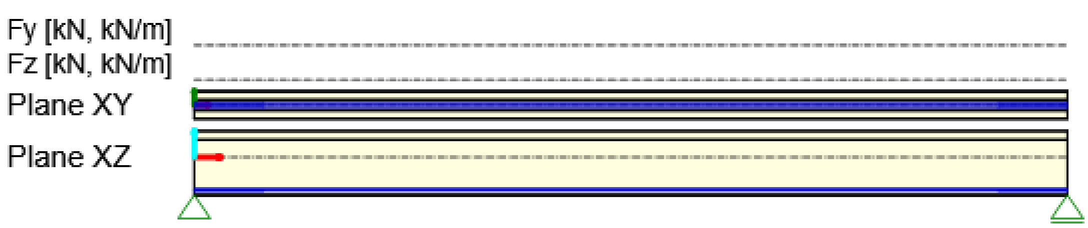
X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	-50	-250	350	-781	-50	1350
1,00	1,00	-50	-250	350	-781	-50	1350
2,00	2,00	-50	-250	350	-781	-50	1350
3,00	3,00	-50	-250	350	-781	-50	1350
4,00	4,00	-50	-250	350	-781	-50	1350
5,00	5,00	-50	-250	350	-781	-50	1350
6,00	6,00	-50	-250	350	-781	-50	1350
7,00	7,00	-50	-250	350	-781	-50	1350
8,00	8,00	-50	-250	350	-781	-50	1350
9,00	9,00	-50	-250	350	-781	-50	1350
10,00	10,00	-50	-250	350	-781	-50	1350
11,00	11,00	-50	-250	350	-781	-50	1350
12,00	12,00	-50	-250	350	-781	-50	1350
13,00	13,00	-50	-250	350	-781	-50	1350
14,00	14,00	-50	-250	350	-781	-50	1350
15,00	15,00	-50	-250	350	-781	-50	1350
16,00	16,00	-50	-250	350	-781	-50	1350
17,00	17,00	-50	-250	350	-781	-50	1350
18,00	18,00	-50	-250	350	-781	-50	1350
19,00	19,00	-50	-250	350	-781	-50	1350

3.1.2 Equivalent load caused by prestressing

Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G1	1	3,04	48,4	0,0	0,0	0,0	-37,8	0,0
	2	3,11	48,4	0,0	0,0	0,0	-37,8	0,0
	3	3,18	48,4	0,0	0,0	0,0	-37,8	0,0
	4	3,25	48,4	0,0	0,0	0,0	-37,8	0,0
	5	3,33	48,4	0,0	0,0	0,0	-37,8	0,0
	6	3,40	48,4	0,0	0,0	0,0	-37,8	0,0
	7	3,47	48,4	0,0	0,0	0,0	-37,8	0,0
	8	3,54	48,4	0,0	0,0	0,0	-37,8	0,0
	9	3,62	48,4	0,0	0,0	0,0	-37,8	0,0

	10	3,69	36,3	0,0	0,0	0,0	-28,3	0,0
	11	3,72	12,1	0,0	0,0	0,0	-9,4	0,0
	12	15,28	-12,1	0,0	0,0	0,0	9,4	0,0
	13	15,31	-36,3	0,0	0,0	0,0	28,3	0,0
	14	15,38	-48,4	0,0	0,0	0,0	37,8	0,0
	15	15,46	-48,4	0,0	0,0	0,0	37,8	0,0
	16	15,53	-48,4	0,0	0,0	0,0	37,8	0,0
	17	15,60	-48,4	0,0	0,0	0,0	37,8	0,0
	18	15,67	-48,4	0,0	0,0	0,0	37,8	0,0
	19	15,75	-48,4	0,0	0,0	0,0	37,8	0,0
	20	15,82	-48,4	0,0	0,0	0,0	37,8	0,0
	21	15,89	-48,4	0,0	0,0	0,0	37,8	0,0
	22	15,96	-48,4	0,0	0,0	0,0	37,8	0,0

Equivalent load



3.1.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	**Limit value of tendon stress $\sigma_{p,max}$** [MPa]	**Stress check**
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	**Limit value of tendon stress σ_{pm0}** [MPa]	**Stress check**
1122,1	1394,0	✓

Input values and intermediate results

Area of tendon	139 mm^2
Length of tendon	19,00 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1122,1 MPa
Theoretical tendon elongation before anchoring	307,7 mm
Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,72 m
Transmission length - end	0,72 m
Blanketed length - begin	3,00 m
Blanketed length - end	3,00 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1160,0	4,6	0,72	0,58	0,87

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1160,0	4,6	0,72	0,58	0,87

Short-term losses

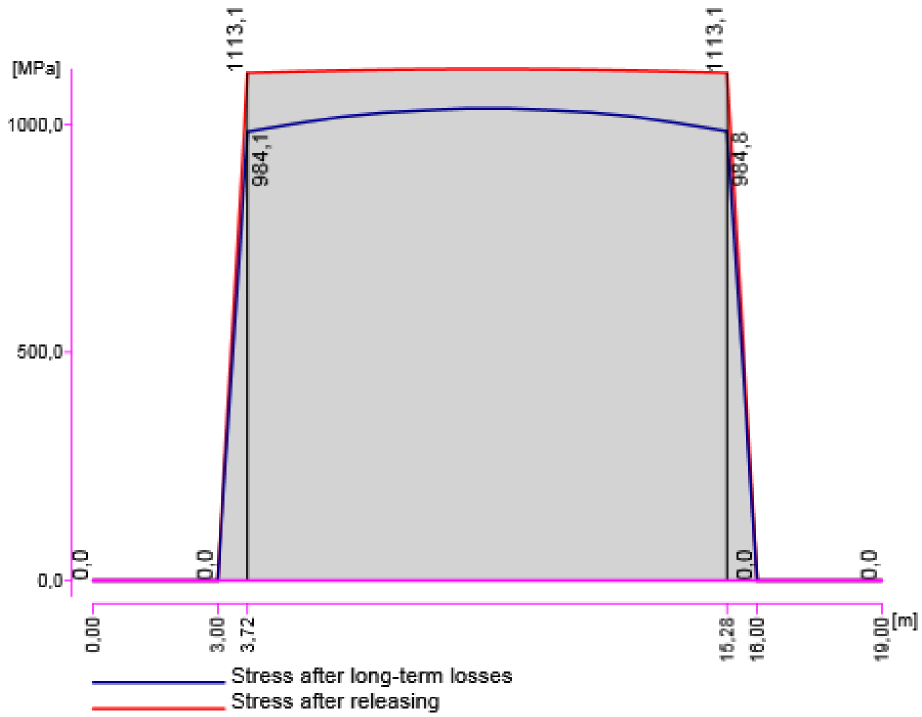
d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
1,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
2,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
3,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
3,72	-7,8	-1,3	-1,6	1189,3	-29,3	-47,0	1113,1	-2,2	-30,3
4,00	-7,8	-1,3	-1,6	1189,3	-29,3	-46,1	1113,9	-2,2	-30,3
5,00	-7,8	-1,3	-1,6	1189,3	-29,3	-43,4	1116,6	-2,2	-30,3
6,00	-7,8	-1,3	-1,6	1189,3	-29,3	-41,2	1118,8	-2,2	-30,3
7,00	-7,8	-1,3	-1,6	1189,3	-29,3	-39,6	1120,4	-2,2	-30,3

8,00	-7,8	-1,3	-1,6	1189,3	-29,3	-38,5	1121,5	-2,2	-30,3
9,00	-7,8	-1,3	-1,6	1189,3	-29,3	-38,0	1122,1	-2,2	-30,3
10,00	-7,8	-1,3	-1,6	1189,3	-29,3	-38,0	1122,1	-2,2	-30,3
11,00	-7,8	-1,3	-1,6	1189,3	-29,3	-38,5	1121,5	-2,2	-30,3
12,00	-7,8	-1,3	-1,6	1189,3	-29,3	-39,6	1120,4	-2,2	-30,3
13,00	-7,8	-1,3	-1,6	1189,3	-29,3	-41,2	1118,8	-2,2	-30,3
14,00	-7,8	-1,3	-1,6	1189,3	-29,3	-43,4	1116,6	-2,2	-30,3
15,00	-7,8	-1,3	-1,6	1189,3	-29,3	-46,1	1113,9	-2,2	-30,3
15,28	-7,8	-1,3	-1,6	1189,3	-29,3	-47,0	1113,1	-2,2	-30,3
16,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
17,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
18,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
19,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
19,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0

Long-term losses

d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
3,72	1113,1	129,0	984,1	0,88
4,00	1113,9	125,5	988,4	0,89
5,00	1116,6	113,3	1003,3	0,90
6,00	1118,8	101,8	1016,9	0,91
7,00	1120,4	94,6	1025,8	0,92
8,00	1121,5	90,4	1031,1	0,92
9,00	1122,1	87,0	1035,1	0,92
10,00	1122,1	87,0	1035,1	0,92
11,00	1121,5	90,2	1031,3	0,92
12,00	1120,4	94,2	1026,2	0,92
13,00	1118,8	101,5	1017,3	0,91
14,00	1116,6	112,8	1003,9	0,90
15,00	1113,9	124,8	989,1	0,89
15,28	1113,1	128,2	984,8	0,88

Losses

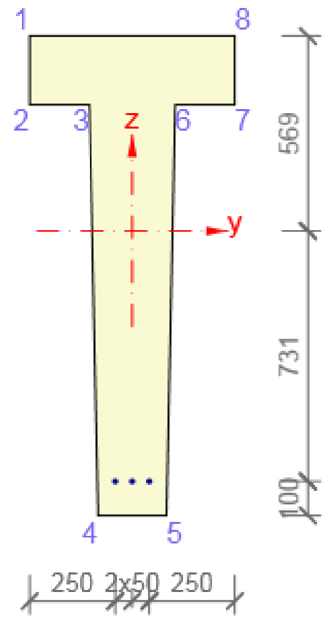


3.2 Tendon: G17

Material	Number of strands	Load case	Area [mm²]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-15.2	1	PRE (2)	139	15,2	1200,0	1476,0	✓

3.2.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
3	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	-50	-731
2	0	-731
3	50	-731

Tendon coordinates calculated in defined distance X

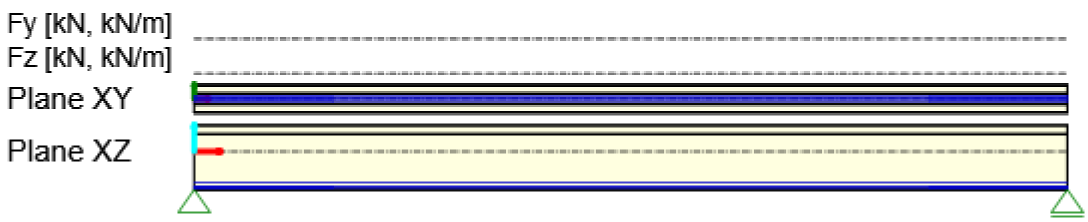
X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	-50	-250	350	-731	-100	1300
1,00	1,00	-50	-250	350	-731	-100	1300
2,00	2,00	-50	-250	350	-731	-100	1300
3,00	3,00	-50	-250	350	-731	-100	1300
4,00	4,00	-50	-250	350	-731	-100	1300
5,00	5,00	-50	-250	350	-731	-100	1300
6,00	6,00	-50	-250	350	-731	-100	1300
7,00	7,00	-50	-250	350	-731	-100	1300
8,00	8,00	-50	-250	350	-731	-100	1300
9,00	9,00	-50	-250	350	-731	-100	1300
10,00	10,00	-50	-250	350	-731	-100	1300
11,00	11,00	-50	-250	350	-731	-100	1300
12,00	12,00	-50	-250	350	-731	-100	1300
13,00	13,00	-50	-250	350	-731	-100	1300
14,00	14,00	-50	-250	350	-731	-100	1300
15,00	15,00	-50	-250	350	-731	-100	1300
16,00	16,00	-50	-250	350	-731	-100	1300
17,00	17,00	-50	-250	350	-731	-100	1300
18,00	18,00	-50	-250	350	-731	-100	1300
19,00	19,00	-50	-250	350	-731	-100	1300

3.2.2 Equivalent load caused by prestressing

Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G17	1	1,54	48,4	0,0	0,0	0,0	-35,3	0,0
	2	1,61	48,4	0,0	0,0	0,0	-35,3	0,0
	3	1,68	48,4	0,0	0,0	0,0	-35,3	0,0
	4	1,75	48,4	0,0	0,0	0,0	-35,3	0,0
	5	1,83	48,4	0,0	0,0	0,0	-35,3	0,0
	6	1,90	48,4	0,0	0,0	0,0	-35,3	0,0
	7	1,97	48,4	0,0	0,0	0,0	-35,3	0,0

	8	2,04	48,4	0,0	0,0	0,0	-35,3	0,0
	9	2,12	48,4	0,0	0,0	0,0	-35,3	0,0
	10	2,19	36,3	0,0	0,0	0,0	-26,5	0,0
	11	2,22	12,1	0,0	0,0	0,0	-8,8	0,0
	12	16,78	-12,1	0,0	0,0	0,0	8,8	0,0
	13	16,81	-36,3	0,0	0,0	0,0	26,5	0,0
	14	16,88	-48,4	0,0	0,0	0,0	35,3	0,0
	15	16,96	-48,4	0,0	0,0	0,0	35,3	0,0
	16	17,03	-48,4	0,0	0,0	0,0	35,3	0,0
	17	17,10	-48,4	0,0	0,0	0,0	35,3	0,0
	18	17,17	-48,4	0,0	0,0	0,0	35,3	0,0
	19	17,25	-48,4	0,0	0,0	0,0	35,3	0,0
	20	17,32	-48,4	0,0	0,0	0,0	35,3	0,0
	21	17,39	-48,4	0,0	0,0	0,0	35,3	0,0
	22	17,46	-48,4	0,0	0,0	0,0	35,3	0,0

Equivalent load



3.2.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check
1138,7	1394,0	✓

Input values and intermediate results

Area of tendon	139 mm^2
Length of tendon	19,00 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1138,7 MPa
Theoretical tendon elongation before anchoring	307,7 mm
Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,72 m
Transmission length - end	0,72 m
Blanketed length - begin	1,50 m
Blanketed length - end	1,50 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1160,0	4,6	0,72	0,58	0,87

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1160,0	4,6	0,72	0,58	0,87

Short-term losses

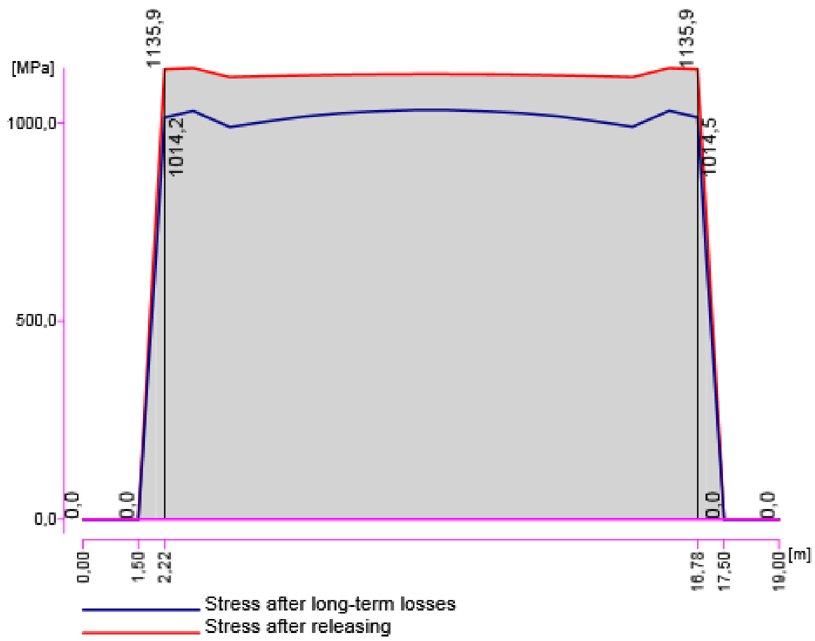
d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
1,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
1,50	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
2,00	-7,8	-1,3	-1,6	1189,3	-29,3	-17,1	783,9	-2,2	-20,9
2,22	-7,8	-1,3	-1,6	1189,3	-29,3	-24,1	1135,9	-2,2	-30,3
3,00	-7,8	-1,3	-1,6	1189,3	-29,3	-21,3	1138,7	-2,2	-30,3
4,00	-7,8	-1,3	-1,6	1189,3	-29,3	-44,1	1115,9	-2,2	-30,3
5,00	-7,8	-1,3	-1,6	1189,3	-29,3	-41,6	1118,4	-2,2	-30,3
6,00	-7,8	-1,3	-1,6	1189,3	-29,3	-39,6	1120,5	-2,2	-30,3
7,00	-7,8	-1,3	-1,6	1189,3	-29,3	-38,0	1122,0	-2,2	-30,3
8,00	-7,8	-1,3	-1,6	1189,3	-29,3	-37,0	1123,0	-2,2	-30,3

9,00	-7,8	-1,3	-1,6	1189,3	-29,3	-36,5	1123,5	-2,2	-30,3
10,00	-7,8	-1,3	-1,6	1189,3	-29,3	-36,5	1123,5	-2,2	-30,3
11,00	-7,8	-1,3	-1,6	1189,3	-29,3	-37,0	1123,0	-2,2	-30,3
12,00	-7,8	-1,3	-1,6	1189,3	-29,3	-38,0	1122,0	-2,2	-30,3
13,00	-7,8	-1,3	-1,6	1189,3	-29,3	-39,6	1120,5	-2,2	-30,3
14,00	-7,8	-1,3	-1,6	1189,3	-29,3	-41,6	1118,4	-2,2	-30,3
15,00	-7,8	-1,3	-1,6	1189,3	-29,3	-44,1	1115,9	-2,2	-30,3
16,00	-7,8	-1,3	-1,6	1189,3	-29,3	-21,3	1138,7	-2,2	-30,3
16,78	-7,8	-1,3	-1,6	1189,3	-29,3	-24,1	1135,9	-2,2	-30,3
17,00	-7,8	-1,3	-1,6	1189,3	-29,3	-17,4	783,6	-2,2	-20,9
17,50	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
18,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
19,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
19,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0

Long-term losses

d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
2,00	783,9	106,4	677,5	0,86
2,22	1135,9	121,7	1014,2	0,89
3,00	1138,7	107,9	1030,8	0,91
4,00	1115,9	126,3	989,6	0,89
5,00	1118,4	114,8	1003,6	0,90
6,00	1120,5	104,2	1016,3	0,91
7,00	1122,0	97,4	1024,6	0,91
8,00	1123,0	93,4	1029,6	0,92
9,00	1123,5	90,3	1033,3	0,92
10,00	1123,5	90,3	1033,3	0,92
11,00	1123,0	93,3	1029,7	0,92
12,00	1122,0	97,0	1024,9	0,91
13,00	1120,5	103,8	1016,6	0,91
14,00	1118,4	114,3	1004,1	0,90
15,00	1115,9	125,6	990,3	0,89
16,00	1138,7	107,3	1031,4	0,91
16,78	1135,9	121,5	1014,5	0,89
17,00	783,6	106,7	676,9	0,86

Losses

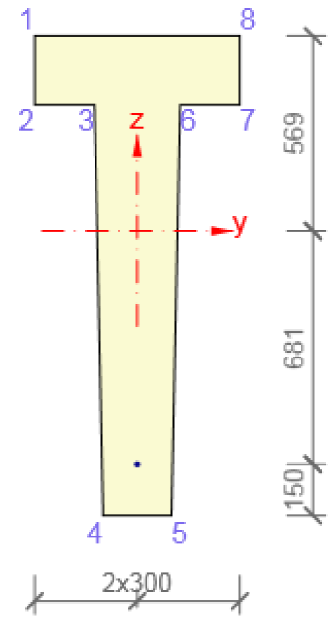


3.3 Tendon: G18

Material	Number of strands	Load case	Area [mm²]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-15.2	1	PRE (2)	139	15,2	1200,0	1476,0	✓

3.3.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
1	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	0	-681

Tendon coordinates calculated in defined distance X

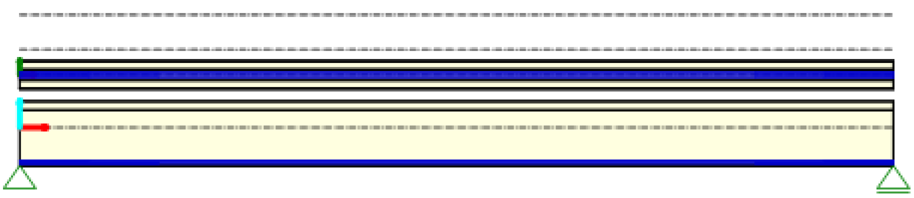
X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	0	-300	300	-681	-150	1250
1,00	1,00	0	-300	300	-681	-150	1250
2,00	2,00	0	-300	300	-681	-150	1250
3,00	3,00	0	-300	300	-681	-150	1250
4,00	4,00	0	-300	300	-681	-150	1250
5,00	5,00	0	-300	300	-681	-150	1250
6,00	6,00	0	-300	300	-681	-150	1250
7,00	7,00	0	-300	300	-681	-150	1250
8,00	8,00	0	-300	300	-681	-150	1250
9,00	9,00	0	-300	300	-681	-150	1250
10,00	10,00	0	-300	300	-681	-150	1250
11,00	11,00	0	-300	300	-681	-150	1250
12,00	12,00	0	-300	300	-681	-150	1250
13,00	13,00	0	-300	300	-681	-150	1250
14,00	14,00	0	-300	300	-681	-150	1250
15,00	15,00	0	-300	300	-681	-150	1250
16,00	16,00	0	-300	300	-681	-150	1250
17,00	17,00	0	-300	300	-681	-150	1250
18,00	18,00	0	-300	300	-681	-150	1250
19,00	19,00	0	-300	300	-681	-150	1250

3.3.2 Equivalent load caused by prestressing

Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G18	1	0,04	16,1	0,0	0,0	0,0	-11,0	0,0
	2	0,11	16,1	0,0	0,0	0,0	-11,0	0,0
	3	0,18	16,1	0,0	0,0	0,0	-11,0	0,0
	4	0,25	16,1	0,0	0,0	0,0	-11,0	0,0
	5	0,33	16,1	0,0	0,0	0,0	-11,0	0,0
	6	0,40	16,1	0,0	0,0	0,0	-11,0	0,0
	7	0,47	16,1	0,0	0,0	0,0	-11,0	0,0
	8	0,54	16,1	0,0	0,0	0,0	-11,0	0,0
	9	0,62	16,1	0,0	0,0	0,0	-11,0	0,0

	10	0,69	12,1	0,0	0,0	0,0	-8,2	0,0
	11	0,72	4,0	0,0	0,0	0,0	-2,7	0,0
	12	18,28	-4,0	0,0	0,0	0,0	2,7	0,0
	13	18,31	-12,1	0,0	0,0	0,0	8,2	0,0
	14	18,38	-16,1	0,0	0,0	0,0	11,0	0,0
	15	18,46	-16,1	0,0	0,0	0,0	11,0	0,0
	16	18,53	-16,1	0,0	0,0	0,0	11,0	0,0
	17	18,60	-16,1	0,0	0,0	0,0	11,0	0,0
	18	18,67	-16,1	0,0	0,0	0,0	11,0	0,0
	19	18,75	-16,1	0,0	0,0	0,0	11,0	0,0
	20	18,82	-16,1	0,0	0,0	0,0	11,0	0,0
	21	18,89	-16,1	0,0	0,0	0,0	11,0	0,0
	22	18,96	-16,1	0,0	0,0	0,0	11,0	0,0

Equivalent load



3.3.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check
1158,6	1394,0	✓

Input values and intermediate results

Area of tendon	139 mm^2
Length of tendon	19,00 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1158,6 MPa
Theoretical tendon elongation before anchoring	307,7 mm
Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,72 m
Transmission length - end	0,72 m
Blanketed length - begin	0,00 m
Blanketed length - end	0,00 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1160,0	4,6	0,72	0,58	0,87

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1160,0	4,6	0,72	0,58	0,87

Short-term losses

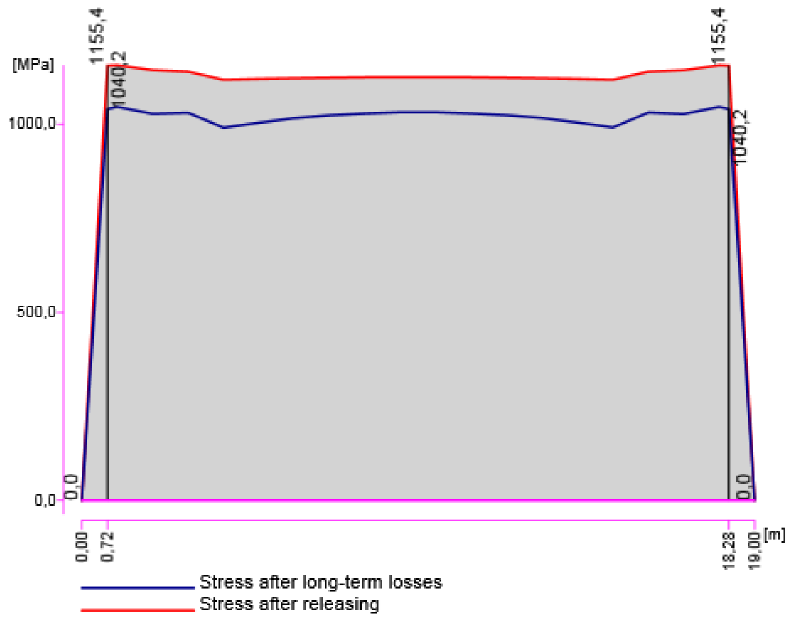
d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0
0,72	-7,8	-1,3	-1,6	1189,3	-29,3	-4,6	1155,4	-2,2	-30,3
1,00	-7,8	-1,3	-1,6	1189,3	-29,3	-3,4	1156,6	-2,2	-30,3
2,00	-7,8	-1,3	-1,6	1189,3	-29,3	-16,4	1143,6	-2,2	-30,3
3,00	-7,8	-1,3	-1,6	1189,3	-29,3	-20,5	1139,5	-2,2	-30,3
4,00	-7,8	-1,3	-1,6	1189,3	-29,3	-42,1	1117,9	-2,2	-30,3
5,00	-7,8	-1,3	-1,6	1189,3	-29,3	-39,8	1120,3	-2,2	-30,3
6,00	-7,8	-1,3	-1,6	1189,3	-29,3	-37,9	1122,1	-2,2	-30,3
7,00	-7,8	-1,3	-1,6	1189,3	-29,3	-36,5	1123,6	-2,2	-30,3
8,00	-7,8	-1,3	-1,6	1189,3	-29,3	-35,5	1124,5	-2,2	-30,3
9,00	-7,8	-1,3	-1,6	1189,3	-29,3	-35,1	1125,0	-2,2	-30,3
10,00	-7,8	-1,3	-1,6	1189,3	-29,3	-35,0	1125,0	-2,2	-30,3

11,00	-7,8	-1,3	-1,6	1189,3	-29,3	-35,5	1124,5	-2,2	-30,3
12,00	-7,8	-1,3	-1,6	1189,3	-29,3	-36,5	1123,6	-2,2	-30,3
13,00	-7,8	-1,3	-1,6	1189,3	-29,3	-37,9	1122,1	-2,2	-30,3
14,00	-7,8	-1,3	-1,6	1189,3	-29,3	-39,8	1120,3	-2,2	-30,3
15,00	-7,8	-1,3	-1,6	1189,3	-29,3	-42,1	1117,9	-2,2	-30,3
16,00	-7,8	-1,3	-1,6	1189,3	-29,3	-20,5	1139,5	-2,2	-30,3
17,00	-7,8	-1,3	-1,6	1189,3	-29,3	-16,7	1143,4	-2,2	-30,3
18,00	-7,8	-1,3	-1,6	1189,3	-29,3	-3,4	1156,6	-2,2	-30,3
18,28	-7,8	-1,3	-1,6	1189,3	-29,3	-4,6	1155,4	-2,2	-30,3
19,00	-7,8	-1,3	-1,6	1189,3	-29,3	0,0	0,0	-2,2	0,0

Long-term losses

d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
0,72	1155,4	115,2	1040,2	0,90
1,00	1156,6	110,6	1046,0	0,90
2,00	1143,6	116,4	1027,2	0,90
3,00	1139,5	109,4	1030,2	0,90
4,00	1117,9	127,0	990,9	0,89
5,00	1120,3	116,4	1003,9	0,90
6,00	1122,1	106,5	1015,7	0,91
7,00	1123,6	100,2	1023,4	0,91
8,00	1124,5	96,5	1028,0	0,91
9,00	1125,0	93,5	1031,4	0,92
10,00	1125,0	93,6	1031,4	0,92
11,00	1124,5	96,4	1028,1	0,91
12,00	1123,6	99,9	1023,7	0,91
13,00	1122,1	106,2	1016,0	0,91
14,00	1120,3	115,9	1004,3	0,90
15,00	1117,9	126,4	991,5	0,89
16,00	1139,5	108,8	1030,7	0,90
17,00	1143,4	116,8	1026,6	0,90
18,00	1156,6	110,6	1046,0	0,90
18,28	1155,4	115,3	1040,2	0,90

Losses



4 List of used materials

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m³]
Y1860S7-15.2	1860,0	1640,0	195000,0	0,15	7850
	F_m = 259,0 kN, F_{p01} = 227,9 kN, F_r = 190,0 MPa, ρ_{1000} = 0,03, ρ_∞ = 0,06, Φ = 15 mm, Area = 139 mm2, ε_{uk} = 350,0 1e-4, A_{gt} = 350,0 1e-4, Type: Strand Surface characteristic: Plain, Relaxation class: Class2, Production: Low relaxation, Diagram type: Bilinear with an inclined top branch, Number of wires: 7				

Explanation

Symbol	Explanation

f_{pk}	Characteristic tensile strength
f_{p01k}	Characteristic 0,1% proof force
E	Modulus of elasticity of prestressing steel
F_m	Characteristic value of maximum force
F_{p01}	Characteristic 0,1% proof force
F_r	Fatigue stress range
ρ_{1000}	The value of relaxation loss (ratio), at 1000 hours after tensioning and at a mean temperature of 20°C
ρ_{∞}	The value of relaxation loss (ratio), at 500 000 hours after tensioning and at a mean temperature of 20°C
ε_{uk}	Characteristic strain of reinforcement or prestressing steel at maximum load
A_{gt}	Total elongation at maximum force
Type	Type of prestressing steel
Diagram type	The type of stress-strain diagram

5 Symbols explanations

Symbols related to prestressing

Symbol	Explanation
A_p	Area of tendon
Length	Length of tendon
L_s	Sum of lengths of straight parts of tendon
L_{arc}	Sum of lengths of curved parts of tendon
R_{min}	Smallest curve radius found in specified geometry of current tendon
θ	Cumulative angular change
σ_a	Anchorage stress
σ_{min}	Minimum stress along the length of tendon after anchoring
σ_{max}	Maximum stress along the length of tendon after anchoring
e_{ba}	Theoretical tendon elongation before anchoring
e_{aa}	Theoretical tendon elongation after anchoring
L_{set}	Length affected by anchorage set
$\sigma_{ini,max}$	Maximum initial stress in tendon
$\sigma_{p,max}$	Limit value of tendon stress applied to the tendon acc. to 5.10.2.1 (1)P
Check 5.10.2.1(1)P	Check of criterion according to provision 5.10.2.1 (1)P
σ_{pm0}	Limit value of tendon stress applied to the tendon acc. to 5.10.3 (2)
Check 5.10.3(2)P	Check of criterion according to provision 5.10.3 (2)P

Symbols related to coordinates of tendon points

Symbol	Explanation
X_B	Position of the point is related to beginning of the design member
X_T	Position of the point is related to beginning of the tendon
Y, Z	Position of the point is related to reference curve, which connects nodes of structural model.
Y-, Y+, Z-, Z+	Position of the point is related to cross-section edge with extreme coordinate Y or Z of local coordinate system of the design member

Symbols related to loads equivalent to the effects of prestressing.

Symbol	Explanation
Tendon name	Tendon name
Index	Index of current impulse of concentrated load
x	x - coordinate in coordinate system of Design Member
F_x	Magnitude of concentrated force in x direction
F_y	Magnitude of concentrated force in y direction
F_z	Magnitude of concentrated force in z direction
M_x	Magnitude of concentrated moment about x axis
M_y	Magnitude of concentrated moment about y axis
M_z	Magnitude of concentrated moment about z axis

Symbols related to short-term losses

Symbol	Explanation
l_{pt1}	0.8 lpt
l_{pt2}	1.2 lpt
$\Delta\sigma_{pw}$	Anchorage set loss

$\Delta\sigma_{pA}$	Loss due the deformation of ends abutments of the stressing bed
$\Delta\sigma_{pr}$	Relaxation loss
$\sigma_{pr,cor}$	Stress after short-term relaxation
$\Delta\sigma_{pT}$	Loss due to the difference in temperature of prestressing steel and stressing bed
$\Delta\sigma_{pe}$	Loss due to the immediate elastic concrete strain
σ_{pa}	Stress after short-term losses - stress in the prestressing steel immediately after the anchoring, or – in the case of pre-tensioned concrete – after the transfer of prestressing into the concrete.
$\Delta\sigma_{pr,occur}$	Relaxation that already took place (occurred)
$\Delta\sigma_{pr,cap}$	Remaining relaxation capacity, i.e. potential stress decrease in prestressing reinforcement due to relaxation at infinite time
$\Delta\sigma_{\infty}$	Loss of stress in the prestressing steel due to relaxation of prestressing steel, concrete creep and shrinkage, and due to immediate elastic concrete strain caused by permanent actions applied after transfer of prestressing.
σ_{∞}	Stress after long-term losses - stress in the prestressing steel due to all permanent actions including prestressing at the time close to infinity.
$\sigma_{\infty}/\sigma_{pa}$	The ratio of stress after long-term losses, and the stress after short -term losses.

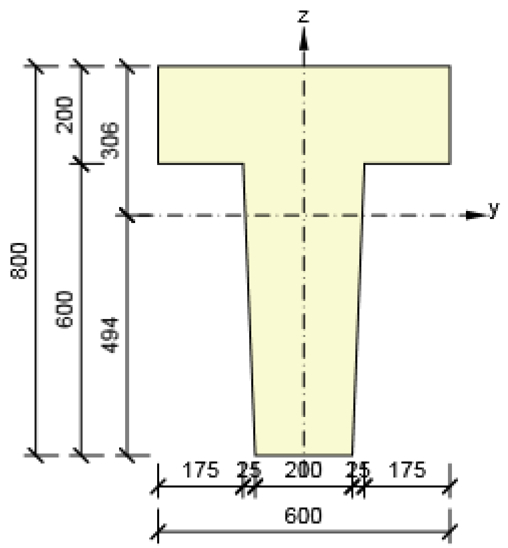
1 Project Data

Title of the project	**GN-2 T 80**
Identification of project	17/271
Author	ŠIRBEGOVIĆ inženjering
Description	tip T-80
Date	16.5.2017
Design code	EN
Type of beam	Pre-fabricated pre-tensioned concrete beam

2 Cross-Sections

2. T-80(T Shape 800, 600)

Symbol	Value	Unit
Material	C50/60	
A	255000	[mm^2]
S_y	0	[mm^3]
S_z	0	[mm^3]
I_y	14041176471	[mm^4]
I_z	4176562500	[mm^4]
C_{gy}	0	[mm]
C_{gz}	0	[mm]
i_y	235	[mm]
i_z	128	[mm]



3 Material

Concrete

Name	f_{ck} [MPa]	f_{cm} [MPa]	f_{ctm} [MPa]	E_{cm} [MPa]	μ [-]	Unit mass [kg/m^3]
C50/60	50,0	58,0	4,1	37277,9	0,20	2500
	ε_{c2} = 20,0 1e-4,ε_{cu2} = 35,0 1e-4,ε_{c3} = 17,5 1e-4,ε_{cu3} = 35,0 1e-4, Exponent - n: 2,00,Aggregate size = 16 mm,Cement class: R (s = 0,20),Diagram type: Parabolic					

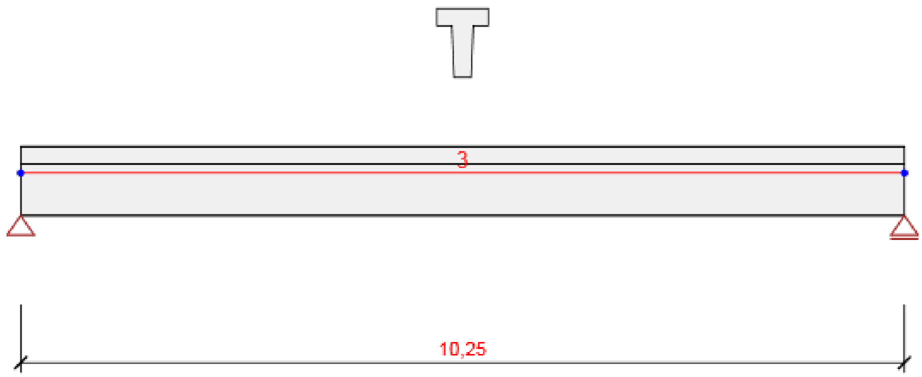
Reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 550B	550,0	594,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Prestressing steel

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m³]
Y1860S7-12.5	1860,0	1640,0	195000,0	0,15	7850
	F_m = 173,0 kN,F_{p01} = 152,2 kN,F_r = 190,0 MPa,ρ_{1000} = 0,03,ρ_∞ = 0,06, Φ = 13 mm,Area = 93 mm2,ε_{uk} = 350,0 1e-4,A_{gt} = 350,0 1e-4,Type: Strand Surface characteristic: Plain,Relaxation class: Class2,Production: Low relaxation, Diagram type: Bilinear with an inclined top branch,Number of wires: 7				

4 Geometry



Structural scheme

Members

Member	Length [m]	End of Member [m]	Cross-Section
3	10,25	10,25	2 - T-80 (T Shape 800, 600)

Nodes

Node	X [m]	Support
1	0,00	XZ
4	10,25	Z

5 Load Cases

Name	Type	C.Stage	Load Group	Load [kN/m]
SW (1)	Permanent	1	LG1	-6,3
R (2)	Permanent	2	LG1	0,0
G (2)	Permanent	2	LG1	0,0
PRE (2)	Permanent	2	LG1	0,0
R (3)	Permanent	3	LG1	0,0
G (3)	Permanent	3	LG1	0,0
R (4)	Permanent	4	LG1	0,0
G (4)	Permanent	4	LG1	0,0
R (5)	Permanent	5	LG1	0,0
G (5)	Permanent	5	LG1	0,0
R (6)	Permanent	6	LG1	0,0
Stalno (6)	Permanent	6	LG1	0,0
R (7)	Permanent	7	LG1	0,0
G (7)	Permanent	7	LG1	0,0
Snijeg	Variable		Snijeg	0,0

Permanent load groups

Name	$\gamma_{G, sub}$ [-]	$\gamma_{G, inf}$ [-]	ξ [-]
LG1	1,35	1,00	0,85

Variable load groups

Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Snijeg	Standard	1,50	0,50	0,20	0,00

Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Vjetar	Standard	1,50	0,60	0,20	0,00

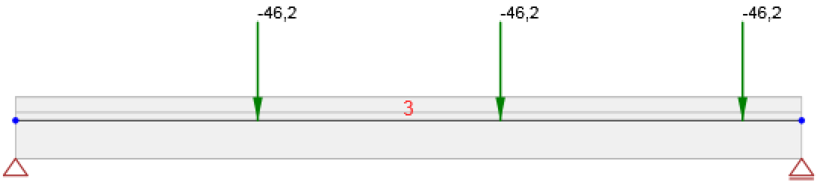
6 Loads

Load Case PRE (2)

Line Loads

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Angle [°]	Location
3	543,5	543,5	1,00	1,60	Global X	0,0	Length
3	-543,5	-543,5	8,65	9,25	Global X	0,0	Length

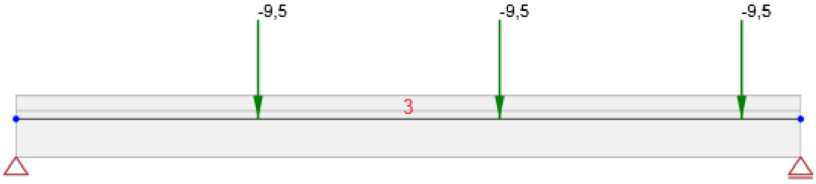
Load Case Stalno (6)



Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
3	-46,2	3,16	X	Global Z	0,0
3	-46,2	6,32	X	Global Z	0,0
3	-46,2	9,48	X	Global Z	0,0

Load Case Snijeg



Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
3	-9,5	3,16	X	Global Z	0,0
3	-9,5	6,32	X	Global Z	0,0
3	-9,5	9,48	X	Global Z	0,0

7 Load Combinations

Name	Type	C.Stage	Evaluation
ULS Fundamental ST(2)	ULS Fundamental	2	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2)			
SLSC ST(2)	SLS Char	2	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2)			
SLSF ST(2)	SLS Freq	2	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2)			
SLSQ ST(2)	SLS Quasi	2	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2)			
ULS Fundamental ST(3)	ULS Fundamental	3	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSC ST(3)	SLS Char	3	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSF ST(3)	SLS Freq	3	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSQ ST(3)	SLS Quasi	3	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
ULS Fundamental ST(4)	ULS Fundamental	4	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSC ST(4)	SLS Char	4	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSF ST(4)	SLS Freq	4	Eurocode, formula 6.15b

Name	Type	C.Stage	Evaluation
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSQ ST(4)	SLS Quasi	4	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
ULS Fundamental ST(5)	ULS Fundamental	5	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSC ST(5)	SLS Char	5	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSF ST(5)	SLS Freq	5	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSQ ST(5)	SLS Quasi	5	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
ULS Fundamental ST(6)	ULS Fundamental	6	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSC ST(6)	SLS Char	6	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSF ST(6)	SLS Freq	6	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSQ ST(6)	SLS Quasi	6	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
ULS Fundamental ST(7)	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSC ST(7)	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSF ST(7)	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSQ ST(7)	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
ULS-W	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSCh-W	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSFr-W	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSQa-W	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			

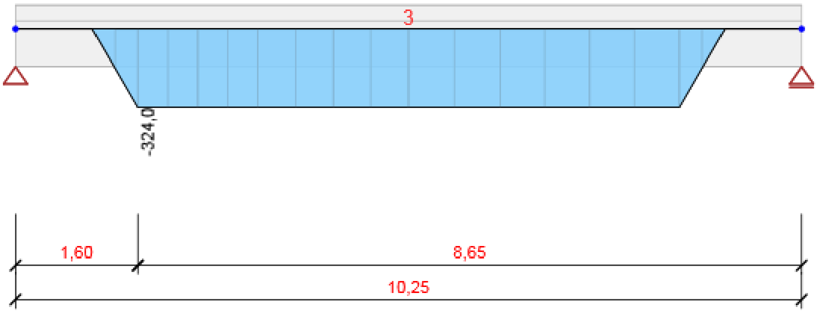
8 Construction stages

	Name	Time [d]	Beam spans [m]
1	Casting	0	
2	Transfer of prestressing	5	10,25
	Support 0,00 m: to design position Support 10,25 m: to design position User-specified concrete strength f_{ck} = 36,1 MPa		
3	Storage yard	5,1	0,57 - 9,11 - 0,57
	Support 0,57 m: to design position Support 9,68 m: to design position		
4	Transport	14	0,57 - 9,11 - 0,57
	Support 0,57 m: to design position Support 9,68 m: to design position		
5	Final supports	17	
6	Superimposed dead load	45	
7	End of design working life	18250	

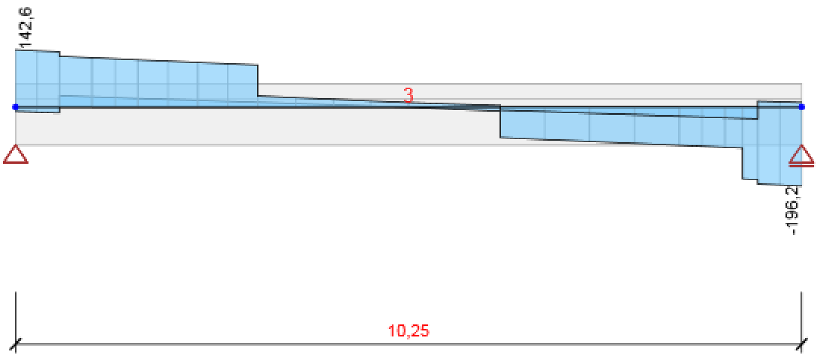
9 Results

Note: Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time depend analysis.

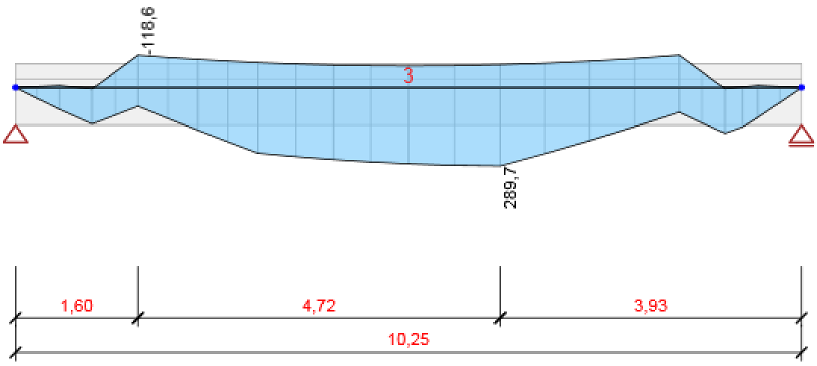
Envelopes



All combinations, N [kN], Centroidal forces



All combinations, Vz [kN], Centroidal forces



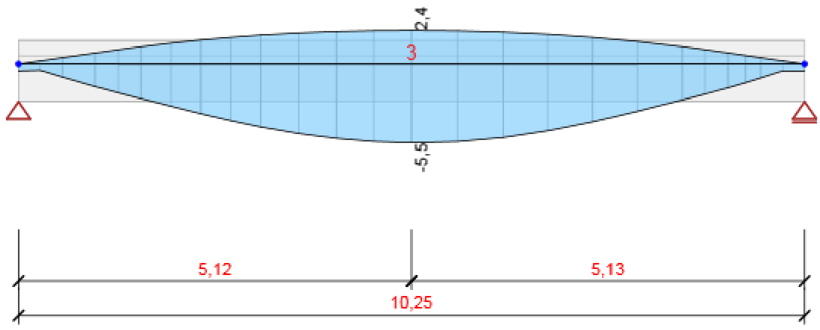
All combinations, My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
3	ULS Fundamental ST(4)(11)	1,60	-324,0	29,8	-97,0
3	ULS Fundamental ST(7)(38)	1,00	0,0	78,9	75,8
3	ULS Fundamental ST(7)(41)	10,25	0,0	-196,2	0,0
3	ULS Fundamental ST(6)(35)	0,00	0,0	142,6	0,0
3	ULS Fundamental ST(4)(16)	1,60	-324,0	22,1	-118,6
3	ULS Fundamental ST(7)(41)	6,32	-324,0	-75,2	289,7

Combination	Critical load effect description

Combination	Critical load effect description
ULS Fundamental ST(4)(11)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4)
ULS Fundamental ST(7)(38)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(41)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(6)(35)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg
ULS Fundamental ST(4)(16)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4)



All combinations, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
3	SLSC ST(7)(84)	10,25	-4,2	0,0	-1,5
3	SLSC ST(7)(85)	0,00	1,3	0,0	1,7
3	SLSC ST(7)(85)	5,12	-1,4	-5,5	0,0
3	SLSC ST(5)(81)	5,12	-0,4	2,4	0,0
3	SLSC ST(7)(85)	10,25	-4,0	0,0	-1,8

Combination	Critical load effect description
SLSC ST(7)(84)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSC ST(7)(85)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)
SLSC ST(5)(81)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)

Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
1	ULS Fundamental ST(7)(42)	0,0	85,2	0,0
1	ULS Fundamental ST(5)(21)	0,0	43,3	0,0
1	ULS Fundamental ST(5)(134)	0,0	32,1	0,0
1	ULS Fundamental ST(6)(31)	0,0	131,4	0,0
2	ULS Fundamental ST(5)(21)	0,0	43,3	0,0
2	ULS Fundamental ST(5)(134)	0,0	32,1	0,0
2	ULS Fundamental ST(7)(39)	0,0	185,0	0,0
3	ULS Fundamental ST(3)(132)	0,0	32,1	0,0
3	ULS Fundamental ST(4)(14)	0,0	43,3	0,0
3	ULS Fundamental ST(3)(7)	0,0	43,3	0,0
4	ULS Fundamental ST(3)(7)	0,0	43,3	0,0
4	ULS Fundamental ST(4)(133)	0,0	32,1	0,0
5	ULS Fundamental ST(2)(131)	0,0	32,1	0,0
5	ULS Fundamental ST(2)(3)	0,0	43,3	0,0
6	ULS Fundamental ST(2)(3)	0,0	43,3	0,0
6	ULS Fundamental ST(2)(131)	0,0	32,1	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(42)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

Combination	Critical load effect description
ULS Fundamental ST(5)(21)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(5)(134)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
ULS Fundamental ST(6)(31)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg
ULS Fundamental ST(7)(39)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(3)(132)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3)
ULS Fundamental ST(4)(14)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4)
ULS Fundamental ST(3)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3)
ULS Fundamental ST(4)(133)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4)
ULS Fundamental ST(2)(131)	1,35*SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

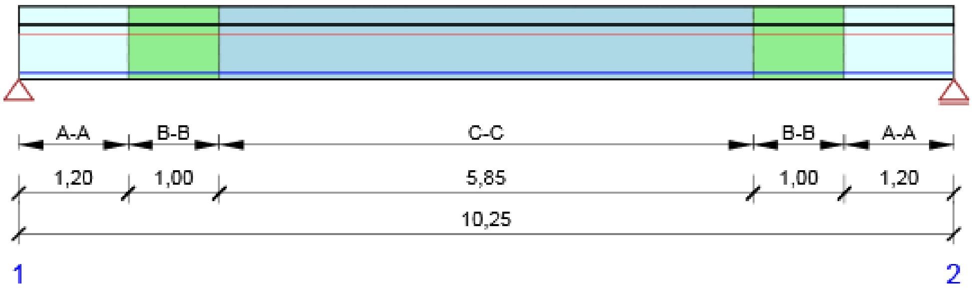
10 Concrete design

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

Note:Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time dependent analysis.

Scheme of reinforcement



Summary of checks

Construction stage	Type of check	Combination	Position	Value [%]	Check
Transfer of prestressing (5,0d)	Stress Limitation	SLSC ST(2)(78)	Section 5 (5,13m)	82,1	OK
End of design working life (18250,0d)	Stress Limitation	SLSC ST(7)(85)	Section 5 (5,13m)	90,4	OK

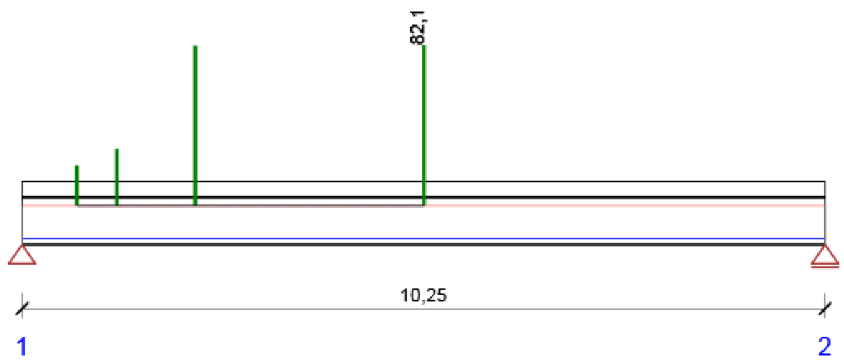
Construction stage: Transfer of prestressing (5,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Intermediate results of redistribution and reduction

Redistribution and reduction not calculated yet.



Overall sections check

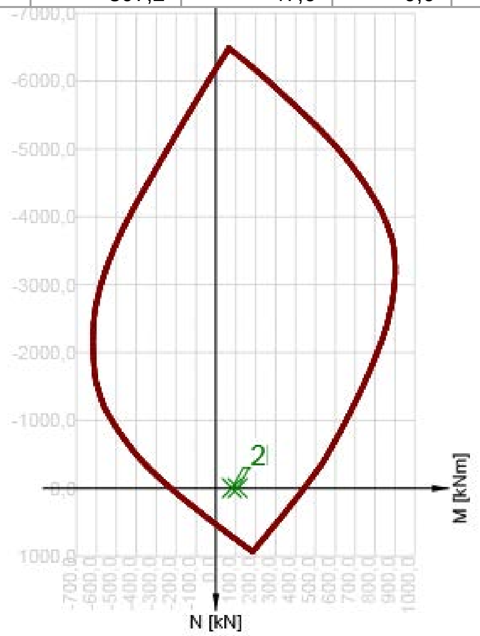
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,70m)	A-A	Capacity N-M-M	20,7	OK
Section 2 (1,21m)	B-B	Stress Limitation	28,9	OK
Section 3 (2,21m)	C-C	Stress Limitation	81,8	OK
Section 5 (5,13m)	C-C	Stress Limitation	82,1	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,13m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(2)(78)	-324,0	-54,7	0,0	82,1	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(2)(3)	-4,3	109,9	0,0	24,6	OK
Shear					
ULS Fundamental ST(2)(3)	-324,0	-25,7	0,0	0,0	OK
Stress Limitation					
SLSC ST(2)(78)	-324,0	-54,7	0,0	82,1	OK
Crack Width					
SLSF ST(2)(86)	-307,2	-47,6	0,0	0,0	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(2)(3)	-4,3	109,9	0,0
2	ULS Fundamental ST(2)(2)	-4,3	80,9	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(2)(2)	SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)
SLSC ST(2)(78)	SW (1) + R (2) + G (2) + PRE (2)

Combination	Critical load effect description
SLSF ST(2)(86)	SW (1) + R (2) + G (2) + PRE (2)

Construction stage: End of design working life (18250,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
3	8,65	ULS Fundamental ST(7)(38)	-324,0	-61,3	-2,0
3	1,00	ULS Fundamental ST(7)(38)	0,0	78,9	75,8
3	0,00	ULS Fundamental ST(7)(38)	0,0	74,0	0,0
3	10,25	ULS Fundamental ST(7)(41)	0,0	-149,9	0,0
3	0,00	ULS Fundamental ST(7)(39)	0,0	123,6	0,0
3	6,32	ULS Fundamental ST(7)(41)	-324,0	-75,2	289,7
3	1,60	ULS Fundamental ST(7)(38)	-324,0	75,2	-15,5

Combination	Critical load effect description
ULS Fundamental ST(7)(38)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(41)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(39)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(7)(41)

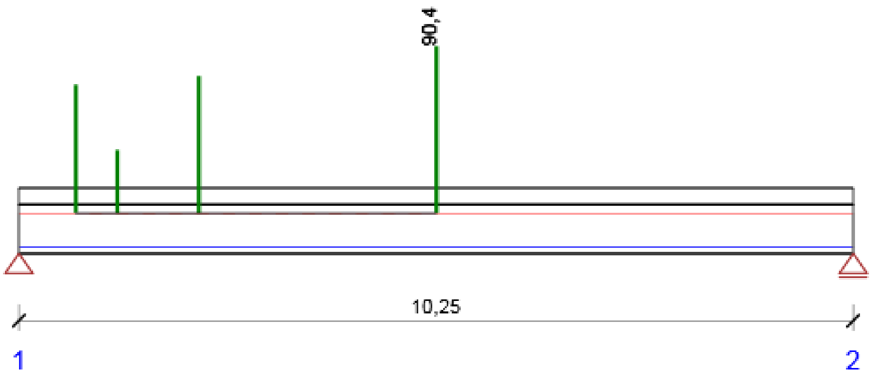
Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	142,6	0,0	-19,0
2 Left	-196,2	0,0	46,3

Combination: SLSC ST(7)(85)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	96,1	0,0	-5,8
2 Left	-135,1	0,0	33,7

Combination: SLSF ST(7)(93)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	87,4	0,0	-5,8
2 Left	-121,0	0,0	29,1



Overall sections check

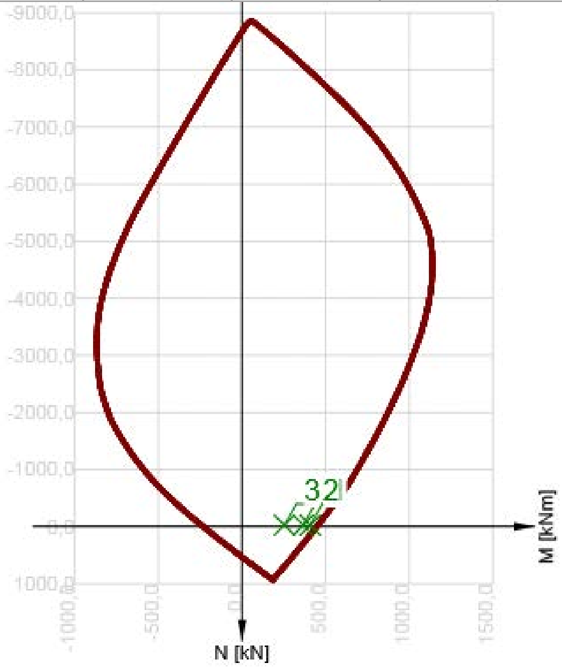
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,70m)	A-A	Capacity N-M-M	69,4	OK
Section 2 (1,21m)	B-B	Shear	34,1	OK
Section 3 (2,21m)	C-C	Stress Limitation	74,3	OK
Section 5 (5,13m)	C-C	Stress Limitation	90,4	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,13m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(7)(85)	-324,0	164,3	8,3	90,4	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(7)(41)	-26,3	408,1	11,5	89,8	OK
Shear					
ULS Fundamental ST(7)(41)	-324,0	281,8	11,5	4,6	OK
Stress Limitation					
SLSC ST(7)(85)	-324,0	164,3	8,3	90,4	OK
Crack Width					
SLSF ST(7)(93)	-308,3	141,0	7,2	69,2	OK



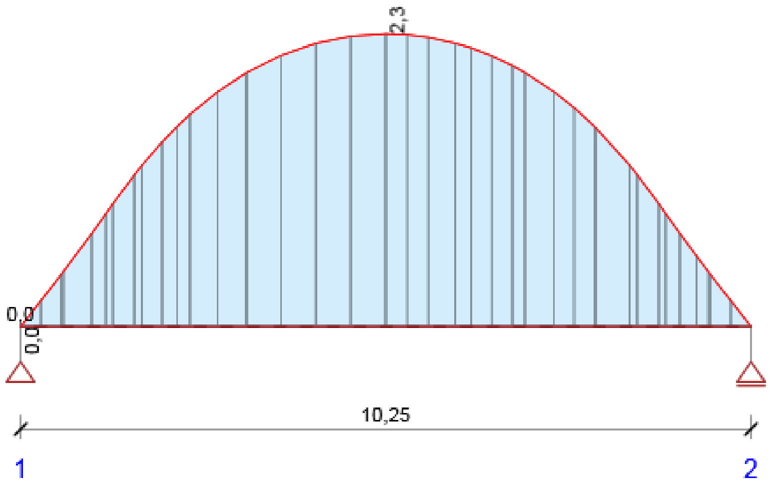
	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(7)(41)	-26,3	408,1	0,0
2	ULS Fundamental ST(7)(60)	-26,3	366,4	0,0
3	ULS Fundamental ST(7)(42)	-26,3	253,2	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(3)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3)
ULS Fundamental ST(7)(41)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
SLSC ST(7)(85)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)
SLSF ST(7)(93)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + 0,2*Snijeg + R (7) + G (7)

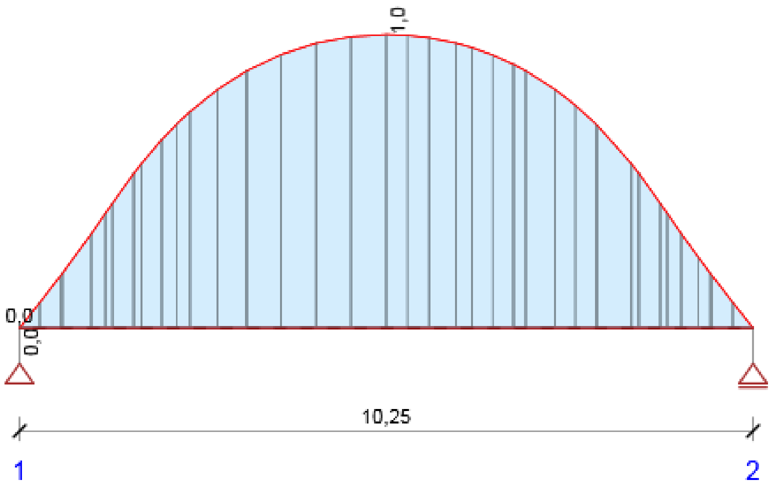
Check of deflections
Deflections: local extremes in spans

Combination: SLSC ST(2)(78), Total deflection



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,II}$ [mm]	$u_{z,lt}$ [mm]	$u_{z,lim\ (\pm)}$ [mm]
5,12	1,5	1,3	2,3	2,3	

Combination: SLSC ST(2)(78), Deflection increment



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,II}$ [mm]	$u_{z,incr}$ [mm]	$u_{z,lim\ (\pm)}$ [mm]
5,12	1,5	1,3	2,3	1,0	

Long-term losses coefficient

Design member	Load case	Long-term losses coefficient [-]
DM1	PRE (2)	0,91

Design member data

Member type	Beam
Exposure class	XC1
Relative humidity	65 %
Creep coeficient	Calculated
Structural member importance	Major
Redistribution of moments	Off
Reduction of moments	Off
Reduction of shear force	On
Limited interaction check	On

Data of beam spans

Span	Length [m]	Check acc. 7.4.1 (4)		Check acc. 7.4.1 (5)	
		Check	Deflection limits [mm]	Check	Deflection limits [mm]
1	10,25	False		False	

Supports definition

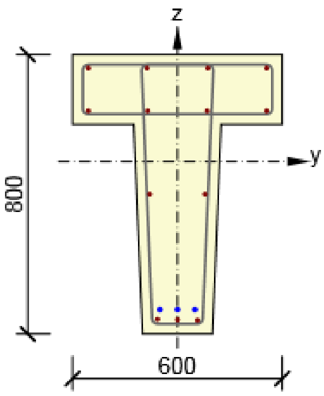
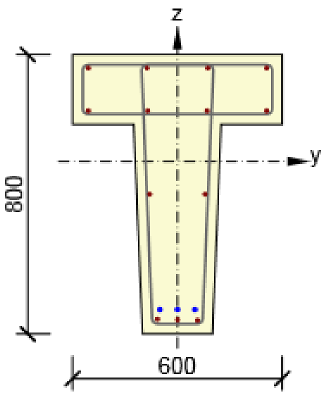
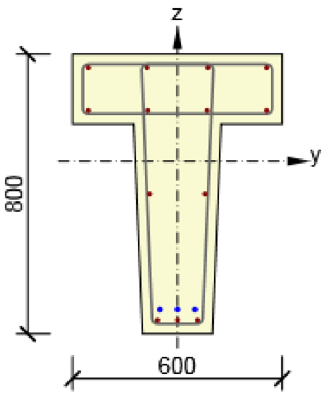
Node	Support width [mm]	Beam or slab is
1	400	Continuous over a support

Node	Support width [mm]	Beam or slab is
4	400	Continuous over a support

Reinforcement zones

Zone	Begin [m]	End [m]	Length [m]	Reinforcement	Check
1	0,00	1,20	1,20	A-A	No
2	1,20	2,20	1,00	B-B	No
3	2,20	8,05	5,85	C-C	No
4	8,05	9,05	1,00	B-B	No
5	9,05	10,25	1,20	A-A	No

Reinforcement for position

Position	Reinforced cross-section	Reinforcement
Section 1 (0,70m)		Reinforcement: 4ø10 (314mm²) (B 550B), z = 267 mm 4ø10 (314mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 1ø10 (79mm²) (B 550B), Position -57, -452 mm 1ø10 (79mm²) (B 550B), Position 0, -454 mm 1ø10 (79mm²) (B 550B), Position 57, -455 mm Stirrups: ø8 (B 550B) - 150 mm ø8 (B 550B) - 150 mm Tendons: 3*1ø12,5 (93mm²) (Y1860S7-12.5), z = -424 mm
Section 2 (1,21m)		Reinforcement: 4ø10 (314mm²) (B 550B), z = 267 mm 4ø10 (314mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 1ø10 (79mm²) (B 550B), Position -57, -452 mm 1ø10 (79mm²) (B 550B), Position 0, -454 mm 1ø10 (79mm²) (B 550B), Position 57, -455 mm Stirrups: ø8 (B 550B) - 200 mm ø8 (B 550B) - 200 mm Tendons: 3*1ø12,5 (93mm²) (Y1860S7-12.5), z = -424 mm
Section 3 (2,21m), Section 5 (5,13m)		Reinforcement: 4ø10 (314mm²) (B 550B), z = 267 mm 4ø10 (314mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 3ø10 (236mm²) (B 550B), z = -455 mm Stirrups: ø8 (B 550B) - 250 mm ø8 (B 550B) - 250 mm Tendons: 3*1ø12,5 (93mm²) (Y1860S7-12.5), z = -424 mm

Material of reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m³]
B 550B	550,0	594,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08, ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Code and calculation settings

Clause	Name		Value	Description

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Persistent, transient		1,50-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ c - Accidental		1,20-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Persistent, transient		1,15-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Accidental		1,00-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ sp		1,15-	Partial factor for prestressing steel EC2-1-1 (3.15),(3.16)
5.5	k1		0,44-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k2		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k3		0,54-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k4		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k5		0,70-	Coefficient used for calculation of moment redistribution EC2-1-1
5.5	k6		0,80-	Coefficient used for calculation of moment redistribution EC2-1-1
6.2.2	Values for shear check d = h *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2	Values for shear check z = d *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2(1)	C rdc		0,18-	Coeficient Crdc / gamma_c EC2-1-1 (6.2a)
6.2.2(1)	k1		0,15-	Coefficient k1 EC2-1-1 (6.2a)
6.2.2(2)	Neglect cracking status		On	Neglect the status without flexural cracks in calculation of shear resistance. Shear resistance will always be calculated acc. to clause 6.2.2 (1) as if the cross-section was cracked bending EC2-1-1 (6.2.2(1))
6.2.3(1)	θ		21,8°	Angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1 (6.8), (6.9), (6.13), (6.14)
6.2.3(2)	θ min		21,8°	Minimal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	θ max		45,0°	Maximal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1

Clause	Name		Value	Description
6.2.3(2)	Calculate angle of concrete compression strut	Check Type	Off Long. reinf. and Strut	Calculate angle of concrete compression strut to optimize the use of selected component of truss analogy. In the case that any other component of truss analogy is not satisfactory, the value of angle from code settings will be used. EC2-1-1
6.2.3(3)	α cw	Check	Off 1,00-	Coefficient taking account of the state of the stress in the compression chord EC2-1-1 (6.9), (6.14)
6.2.3(3)	ρ w,max		On	Maximal reinforcement ratio for shear reinforcement EC2-1-1 (6.12)
6.2.5 (1)	Shear stress calculation in joints		Difference of normal forces	Shear stress in joint is calculated according to settings
	Limit is defined as numerical value		Off	Deflection will be checked against limit value defined numerically
	Numerical value of deflection limit		25mm	Deflection will be checked against limit value defined numerically.
	Limit value for deflections acc. 7.4.1 (4) as length of span /		250,00-	Calculated deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (4).
	Limit value for deflections acc. 7.4.1 (5) as length of span /		500,00-	Calculated increment of deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (5).
7.3.1(5)	wmax for reinforced members: Exposure class	X0, XC1 XC2, XC3, XC4 XD, XS	0,400mm 0,300mm 0,300mm	Recommended values of wmax for reinforced members and quasi-permanent combination EC2-1-1 7.1N
7.3.1(5)	wmax for prestressed members: Exposure class	X0, XC1 XC2, XC3, XC4	0,200mm 0,200mm	Recommended values of wmax for prestressed members and frequent combination EC2-1-1 7.1N
7.3.1(5)	Decompression for prestressed members: Exposure class	XC2, XC3, XC4 XD, XS	25mm 25mm	Recommended values of decompression for prestressed members and frequent combination EC2-1-1 7.1N
8.2(2)	s l,min	Check Distance k1(multiple) k2(increment)	On 20mm 1,00- 5mm	Minimal clear distance of longitudinal reinforcement EC2-1-1
8.3(2)	Φ m,min	Check Φs <= 16mm (increment Φs) Φs > 16mm (increment Φs)	On 3,00- 7,00-	Minimum mandrel diameter of stirrup as multiple of stirrup diameter EC2-1-1 Table 8.1N
9.2.1.1(1)	ρ l,min	Check Ratio Factor	On 0,13% 0,26-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.1N)
9.2.1.1(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.2.2(5)	ρ w,min	Check	On 0,08-	Minimal reinforcement ratio for shear reinforcement EC2-1-1 (9.5N)

Clause	Name		Value	Description
9.2.2(6)	s w,max	Check	On 0,75-	Maximal distance of stirrups EC2-1-1 (9.6N)
9.2.2(8)	s t,max	Check Check Distance Factor	On On 600mm 0,75-	Maximal transversal distance of branches of stirrups EC2-1-1 (9.8N)
9.2.3(4)	s l,max	Check	On 350mm	Maximal axial distance of longitudinal reinforcement EC2-1-1
9.5.2(1)	Φ min	Check	On 8mm	Minimal diameter of longitudinal reinforcement EC2-1-1
9.5.2(2)	ρ l,min	Check Ratio Factor	On 0,20% 0,10-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.12N)
9.5.2(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.5.2(4)	n Φ	Check	On 4	Minimal number of bars of longitudinal reinforcement EC2-1-1
9.5.3(1)	Φ w,min	Check	On 6mm	Minimal diameter of shear reinforcement EC2-1-1
9.5.3(3)	s ct,tmax	Check Distance Factor	On 400mm 20,00-	Maximal distance of stirrups EC2-1-1
	Don't exclude tendons		Off	Don't exclude tendons from calculation model of reinforced cross-section if tendons are outside of cross-section
	Neglect redistribution of moments		10,00%	Neglect redistribution of moments My, Mz, if the ratio My/Mz is less than 10%
	Limit value of exploitation		100,00%	Limit value of the exploitation of the cross-section
	Number of iteration steps		20	Number of iteration steps
	Use simplified model of cross-section		On	Use simplified calculation model of cross-section to increase the speed of checks
	Evaluation of interaction diagram		NuMuMu	Evaluation of interaction diagram
	Direction of imperfection		Resultant of moments	Type of direction for calculation of imperfections for columns
	Interpolation curve		Parabolic	Type of interpolation curve of bending moment for calculation of imperfection
	Maximum length of subzone		1,00m	The stiffness of cross-section for the calculation of deflection is considered to be constant in the subzone.

1 Project data

Project title	**GN-2 T 80**
Project number	17/271
Description	tip T-80
Author	ŠIRBEGOVIĆ inženjering
Date of creation	16.5.2017

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

2 Design Members

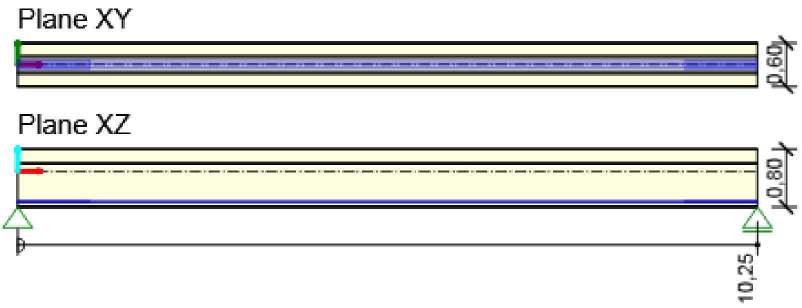
2.1 DM1

Description	Type	Members	Tendons	Valid
	Pre-tensioned	3	G1	✓

Stressing bed: SB1

Length of prestressing units	50,00 m
Stressing procedure	Pretenesioned - correction of relaxation
Calculation of relaxation	By time
Duration of keeping stress constant	300 s
Duration of short-term relaxation	57600 s
Loss due to deformation of end abutments	On
Defining of number of prestresing units	By groups
Shortening of stressing bed	1 mm
Anchorage set	2 mm
Loss due to the difference in temperature	On
Code coefficient	0,50 -
T_{max}	50 °C
T_0	20 °C
Tendon releasing	Gradual releasing

Geometry of design member



2.1.1 Prestressing

Name	Material	A_p [mm^2]	Length [m]	L_s [m]	L_{arc} [m]	R_{min} [m]	θ [°]
	Strands	σ_a [MPa]	σ_{min} [MPa]	σ_{max} [MPa]	e_{ba} [mm]	e_{aa} [mm]	L_{set} [m]
G1	Y1860S7-12.5	93	10,25	10,25	0,00	0,00	0,0
	1	1200,0	572,1	1145,9	307,7	305,7	0,00

Name	$\sigma_{ini,max}$ [MPa]	$\sigma_{p,max}$ [MPa]	Check 5.10.2.1(1)P	σ_{min} [MPa]	σ_{max} [MPa]	σ_{pm0} [MPa]	Check 5.10.3(2)P
G1	1200,0	1476,0	✓	572,1	1145,9	1394,0	✓

Explanation

Symbol	Explanation
A_p	Area of tendon
Length	Length of tendon
L_s	Sum of lengths of straight parts of tendon
L_{arc}	Sum of lengths of curved parts of tendon
R_{min}	Smallest curve radius found in specified geometry of current tendon
θ	Cumulative angular change
σ_a	Anchorage stress
σ_{min}	Minimum stress along the length of tendon after anchoring
σ_{max}	Maximum stress along the length of tendon after anchoring
e_{ba}	Theoretical tendon elongation before anchoring
e_{aa}	Theoretical tendon elongation after anchoring
L_{set}	Length affected by anchorage set
$\sigma_{ini,max}$	Maximum initial stress in tendon
$\sigma_{p,max}$	Limit value of tendon stress applied to the tendon acc. to 5.10.2.1 (1)P
Check 5.10.2.1(1)P	Check of criterion according to provision 5.10.2.1 (1)P
σ_{pm0}	Limit value of tendon stress applied to the tendon acc. to 5.10.3 (2)
Check 5.10.3(2)P	Check of criterion according to provision 5.10.3 (2)P

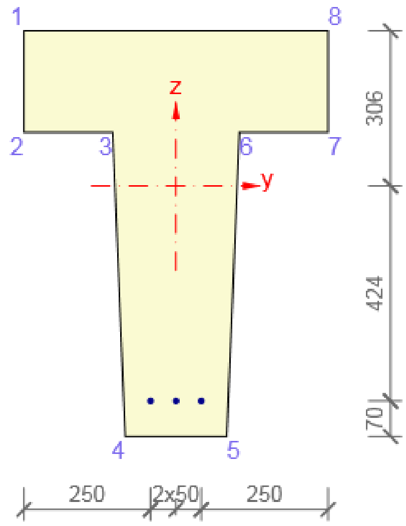
3 Tendons

3.1 Tendon: G1

Material	Number of strands	Load case	Area [mm^2]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-12.5	1	PRE (2)	93	12,5	1200,0	1476,0	✓

3.1.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
3	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	-50	-424
2	0	-424
3	50	-424

Tendon coordinates calculated in defined distance X

X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	-50	-250	350	-424	-70	730
1,00	1,00	-50	-250	350	-424	-70	730
2,00	2,00	-50	-250	350	-424	-70	730
3,00	3,00	-50	-250	350	-424	-70	730
4,00	4,00	-50	-250	350	-424	-70	730
5,00	5,00	-50	-250	350	-424	-70	730
6,00	6,00	-50	-250	350	-424	-70	730
7,00	7,00	-50	-250	350	-424	-70	730
8,00	8,00	-50	-250	350	-424	-70	730
9,00	9,00	-50	-250	350	-424	-70	730
10,00	10,00	-50	-250	350	-424	-70	730
10,25	10,25	-50	-250	350	-424	-70	730

3.1.2 Equivalent load caused by prestressing

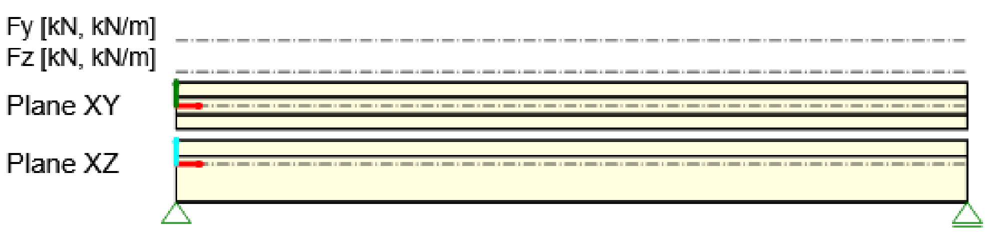
Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G1	1	1,03	32,4	0,0	0,0	0,0	-13,7	0,0
	2	1,09	32,4	0,0	0,0	0,0	-13,7	0,0
	3	1,15	32,4	0,0	0,0	0,0	-13,7	0,0
	4	1,21	32,4	0,0	0,0	0,0	-13,7	0,0
	5	1,27	32,4	0,0	0,0	0,0	-13,7	0,0
	6	1,33	32,4	0,0	0,0	0,0	-13,7	0,0
	7	1,39	32,4	0,0	0,0	0,0	-13,7	0,0
	8	1,45	32,4	0,0	0,0	0,0	-13,7	0,0
	9	1,51	32,4	0,0	0,0	0,0	-13,7	0,0
	10	1,57	24,3	0,0	0,0	0,0	-10,3	0,0

	11	1,60	8,1	0,0	0,0	0,0	-3,4	0,0
	12	8,65	-8,1	0,0	0,0	0,0	3,4	0,0
	13	8,68	-24,3	0,0	0,0	0,0	10,3	0,0
	14	8,74	-32,4	0,0	0,0	0,0	13,7	0,0
	15	8,80	-32,4	0,0	0,0	0,0	13,7	0,0
	16	8,86	-32,4	0,0	0,0	0,0	13,7	0,0
	17	8,92	-32,4	0,0	0,0	0,0	13,7	0,0
	18	8,98	-32,4	0,0	0,0	0,0	13,7	0,0
	19	9,04	-32,4	0,0	0,0	0,0	13,7	0,0
	20	9,10	-32,4	0,0	0,0	0,0	13,7	0,0
	21	9,16	-32,4	0,0	0,0	0,0	13,7	0,0
	22	9,22	-32,4	0,0	0,0	0,0	13,7	0,0

Explanation

Symbol	Explanation
Tendon name	Tendon name
Index	Index of current impulse of concentrated load
x	x - coordinate in coordinate system of Design Member
F_x	Magnitude of concentrated force in x direction
F_y	Magnitude of concentrated force in y direction
F_z	Magnitude of concentrated force in z direction
M_x	Magnitude of concentrated moment about x axis
M_y	Magnitude of concentrated moment about y axis
M_z	Magnitude of concentrated moment about z axis

Equivalent load



3.1.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check
1145,9	1394,0	✓

Input values and intermediate results

Area of tendon	93 mm^2
Length of tendon	10,25 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1145,9 MPa
Theoretical tendon elongation before anchoring	307,7 mm
Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,60 m
Transmission length - end	0,60 m
Blanketed length - begin	1,00 m
Blanketed length - end	1,00 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	12,5	1161,3	4,6	0,60	0,48	0,72

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	12,5	1161,3	4,6	0,60	0,48	0,72

Short-term losses

d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]

0,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
1,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
1,60	-7,8	0,0	-1,6	1190,6	-29,3	-21,7	1139,6	-2,2	-30,4
2,00	-7,8	0,0	-1,6	1190,6	-29,3	-20,3	1141,0	-2,2	-30,4
3,00	-7,8	0,0	-1,6	1190,6	-29,3	-17,7	1143,6	-2,2	-30,4
4,00	-7,8	0,0	-1,6	1190,6	-29,3	-16,1	1145,2	-2,2	-30,4
5,00	-7,8	0,0	-1,6	1190,6	-29,3	-15,4	1145,9	-2,2	-30,4
6,00	-7,8	0,0	-1,6	1190,6	-29,3	-15,8	1145,5	-2,2	-30,4
7,00	-7,8	0,0	-1,6	1190,6	-29,3	-17,2	1144,1	-2,2	-30,4
8,00	-7,8	0,0	-1,6	1190,6	-29,3	-19,5	1141,8	-2,2	-30,4
8,65	-7,8	0,0	-1,6	1190,6	-29,3	-21,7	1139,7	-2,2	-30,4
9,00	-7,8	0,0	-1,6	1190,6	-29,3	-6,5	480,5	-2,2	-12,7
9,25	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
10,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
10,25	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0

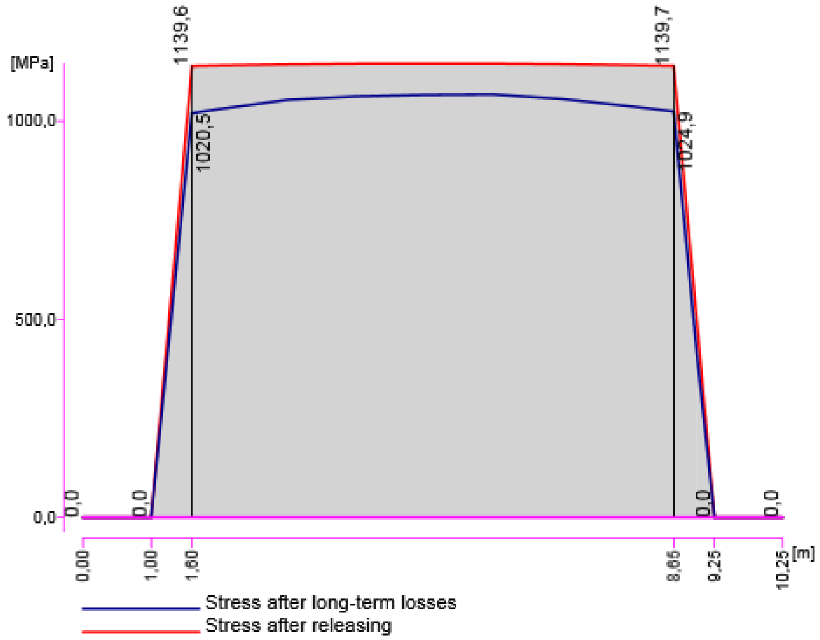
Long-term losses

d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
1,60	1139,6	119,1	1020,5	0,90
2,00	1141,0	110,3	1030,7	0,90
3,00	1143,6	89,4	1054,2	0,92
4,00	1145,2	82,4	1062,8	0,93
5,00	1145,9	79,3	1066,6	0,93
6,00	1145,5	77,6	1067,9	0,93
7,00	1144,1	87,4	1056,7	0,92
8,00	1141,8	103,5	1038,3	0,91
8,65	1139,7	114,8	1024,9	0,90
9,00	480,5	82,6	397,9	0,83

Explanation

Symbol	Explanation
l_{pt1}	0.8 lpt
l_{pt2}	1.2 lpt
$\Delta\sigma_{pw}$	Anchorage set loss
$\Delta\sigma_{pA}$	Loss due the deformation of ends abutments of the stressing bed
$\Delta\sigma_{pr}$	Relaxation loss
$\sigma_{pr,cor}$	Stress after short-term relaxation
$\Delta\sigma_{pT}$	Loss due to the difference in temperature of prestressing steel and stressing bed
$\Delta\sigma_{pe}$	Loss due to the immediate elastic concrete strain
σ_{pa}	Stress after short-term losses - stress in the prestressing steel immediately after the anchoring, or – in the case of pre-tensioned concrete – after the transfer of prestressing into the concrete.
$\Delta\sigma_{pr,occur}$	Relaxation that already took place (occurred)
$\Delta\sigma_{pr,cap}$	Remaining relaxation capacity, i.e. potential stress decrease in prestressing reinforcement due to relaxation at infinite time
$\Delta\sigma_\infty$	Loss of stress in the prestressing steel due to relaxation of prestressing steel, concrete creep and shrinkage, and due to immediate elastic concrete strain caused by permanent actions applied after transfer of prestressing.
σ_∞	Stress after long-term losses - stress in the prestressing steel due to all permanent actions including prestressing at the time close to infinity.
$\sigma_\infty/\sigma_{pa}$	The ratio of stress after long-term losses, and the stress after short -term losses.

Losses



4 List of used materials

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-12.5	1860,0	1640,0	195000,0	0,15	7850
	F_m = 173,0 kN, F_{p01} = 152,2 kN, F_r = 190,0 MPa, ρ_{1000} = 0,03, ρ_∞ = 0,06, Φ = 13 mm, Area = 93 mm2, ε_{uk} = 350,0 1e-4, A_{gt} = 350,0 1e-4, Type: Strand Surface characteristic: Plain, Relaxation class: Class2, Production: Low relaxation, Diagram type: Bilinear with an inclined top branch, Number of wires: 7				

Explanation

Symbol	Explanation
f_{pk}	Characteristic tensile strength
f_{p01k}	Characteristic 0,1% proof force
E	Modulus of elasticity of prestressing steel
F_m	Characteristic value of maximum force
F_{p01}	Characteristic 0,1% proof force
F_r	Fatigue stress range
ρ_{1000}	The value of relaxation loss (ratio), at 1000 hours after tensioning and at a mean temperature of 20°C
ρ_∞	The value of relaxation loss (ratio), at 500 000 hours after tensioning and at a mean temperature of 20°C
ε_{uk}	Characteristic strain of reinforcement or prestressing steel at maximum load
A_{gt}	Total elongation at maximum force
Type	Type of prestressing steel
Diagram type	The type of stress-strain diagram

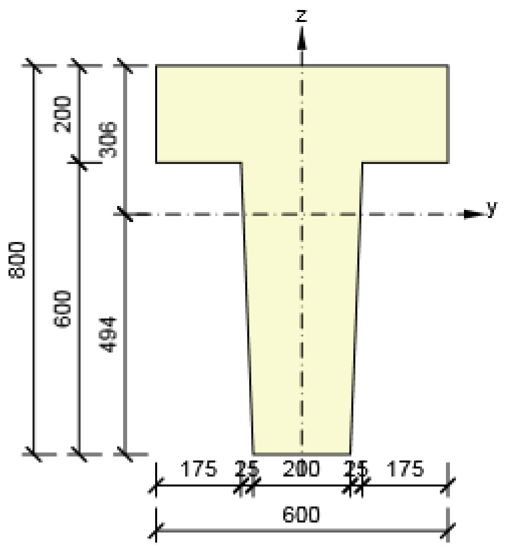
1 Project Data

Title of the project	**GN-3 T 80**
Identification of project	06
Author	ŠIRBEGOVIĆ inženjering
Description	tip T-80
Date	21.11.2017
Design code	EN
Type of beam	Pre-fabricated pre-tensioned concrete beam

2 Cross-Sections

2. T-80(T Shape 800, 600)

Symbol	Value	Unit
Material	C50/60	
A	255000	$[mm^2]$
S_y	0	$[mm^3]$
S_z	0	$[mm^3]$
I_y	14041176471	$[mm^4]$
I_z	4176562500	$[mm^4]$
C_{gy}	0	[mm]
C_{gz}	0	[mm]
i_y	235	[mm]
i_z	128	[mm]



3 Material

Concrete

Name	f_{ck} [MPa]	f_{cm} [MPa]	f_{ctm} [MPa]	E_{cm} [MPa]	μ [-]	Unit mass $[kg/m^3]$
C50/60	50,0	58,0	4,1	37277,9	0,20	2500
	ε_{c2} = 20,0 1e-4,ε_{cu2} = 35,0 1e-4,ε_{c3} = 17,5 1e-4,ε_{cu3} = 35,0 1e-4, Exponent - n: 2,00,Aggregate size = 16 mm,Cement class: R (s = 0,20),Diagram type: Parabolic					

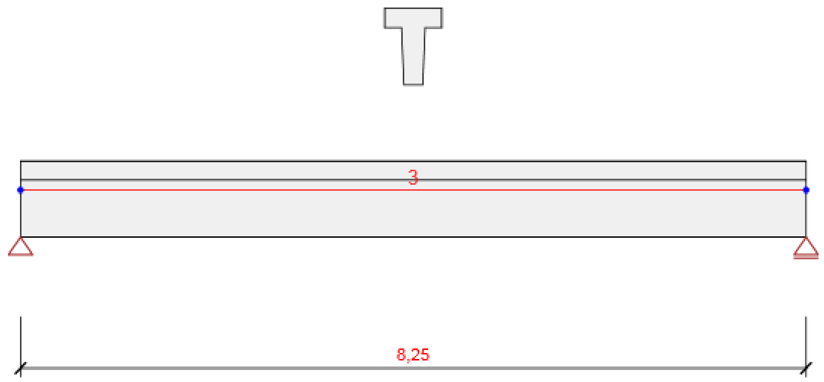
Reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass $[kg/m^3]$
B 550B	550,0	594,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Prestressing steel

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass $[kg/m^3]$
Y1860S7-12.5	1860,0	1640,0	195000,0	0,15	7850
	F_m = 173,0 kN,F_{p01} = 152,2 kN,F_r = 190,0 MPa,ρ_{1000} = 0,03,ρ_∞ = 0,06, Φ = 13 mm,Area = 93 mm2,ε_{uk} = 350,0 1e-4,A_{gt} = 350,0 1e-4,Type: Strand Surface characteristic: Plain,Relaxation class: Class2,Production: Low relaxation, Diagram type: Bilinear with an inclined top branch,Number of wires: 7				

4 Geometry



Structural scheme

Members

Member	Length [m]	End of Member [m]	Cross-Section
3	8,25	8,25	2 - T-80 (T Shape 800, 600)

Nodes

Node	X [m]	Support
1	0,00	XZ
4	8,25	Z

5 Load Cases

Name	Type	C.Stage	Load Group	Load [kN/m]
SW (1)	Permanent	1	LG1	-6,3
R (2)	Permanent	2	LG1	0,0
G (2)	Permanent	2	LG1	0,0
PRE (2)	Permanent	2	LG1	0,0
R (3)	Permanent	3	LG1	0,0
G (3)	Permanent	3	LG1	0,0
R (4)	Permanent	4	LG1	0,0
G (4)	Permanent	4	LG1	0,0
R (5)	Permanent	5	LG1	0,0
G (5)	Permanent	5	LG1	0,0
R (6)	Permanent	6	LG1	0,0
Stalno (6)	Permanent	6	LG1	0,0
R (7)	Permanent	7	LG1	0,0
G (7)	Permanent	7	LG1	0,0
Snijeg	Variable		Snijeg	0,0

Permanent load groups

Name	$\gamma_{G, sub}$ [-]	$\gamma_{G, inf}$ [-]	ξ [-]
LG1	1,35	1,00	0,85

Variable load groups

Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Snijeg	Standard	1,50	0,50	0,20	0,00
Vjetar	Standard	1,50	0,60	0,20	0,00

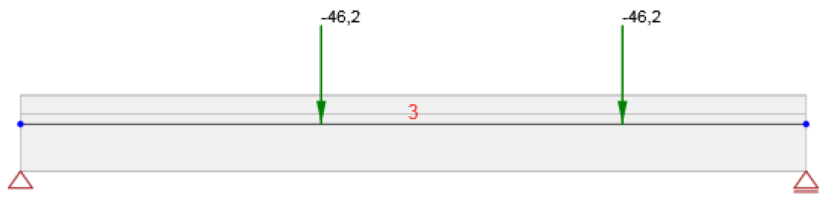
6 Loads

Load Case PRE (2)

Line Loads

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Angle [°]	Location
3	-362,3	-362,3	6,65	7,25	Global X	0,0	Length
3	362,3	362,3	1,00	1,60	Global X	0,0	Length

Load Case Stalno (6)

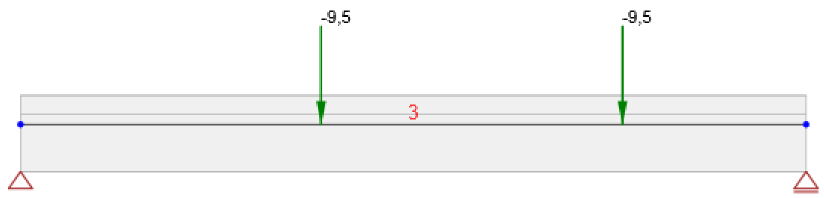


Load Case Stalno (6)

Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
3	-46,2	3,16	X	Global Z	0,0
3	-46,2	6,32	X	Global Z	0,0

Load Case Snijeg



Load Case Snijeg

Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
3	-9,5	3,16	X	Global Z	0,0
3	-9,5	6,32	X	Global Z	0,0

7 Load Combinations

Name	Type	C.Stage	Evaluation
ULS Fundamental ST(2)	ULS Fundamental	2	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2)			
SLSC ST(2)	SLS Char	2	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2)			
SLSF ST(2)	SLS Freq	2	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2)			
SLSQ ST(2)	SLS Quasi	2	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2)			
ULS Fundamental ST(3)	ULS Fundamental	3	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSC ST(3)	SLS Char	3	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSF ST(3)	SLS Freq	3	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSQ ST(3)	SLS Quasi	3	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
ULS Fundamental ST(4)	ULS Fundamental	4	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSC ST(4)	SLS Char	4	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			

Name	Type	C.Stage	Evaluation
SLSF ST(4)	SLS Freq	4	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSQ ST(4)	SLS Quasi	4	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
ULS Fundamental ST(5)	ULS Fundamental	5	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSC ST(5)	SLS Char	5	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSF ST(5)	SLS Freq	5	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSQ ST(5)	SLS Quasi	5	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
ULS Fundamental ST(6)	ULS Fundamental	6	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSC ST(6)	SLS Char	6	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSF ST(6)	SLS Freq	6	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSQ ST(6)	SLS Quasi	6	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
ULS Fundamental ST(7)	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSC ST(7)	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSF ST(7)	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSQ ST(7)	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
ULS-W	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSCh-W	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSFr-W	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSQa-W	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			

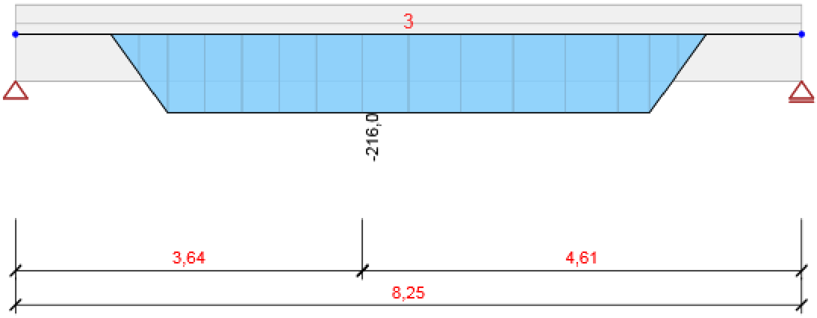
8 Construction stages

	Name	Time [d]	Beam spans [m]
1	Casting	0	
2	Transfer of prestressing	5	8,25
	Support 0,00 m: to design position Support 8,25 m: to design position User-specified concrete strength f_{ck} = 36,1 MPa		
3	Storage yard	5,1	0,46 - 7,33 - 0,46
	Support 0,46 m: to design position Support 7,79 m: to design position		
4	Transport	14	0,46 - 7,33 - 0,46
	Support 0,46 m: to design position Support 7,79 m: to design position		
5	Final supports	17	
6	Superimposed dead load	45	
7	End of design working life	18250	

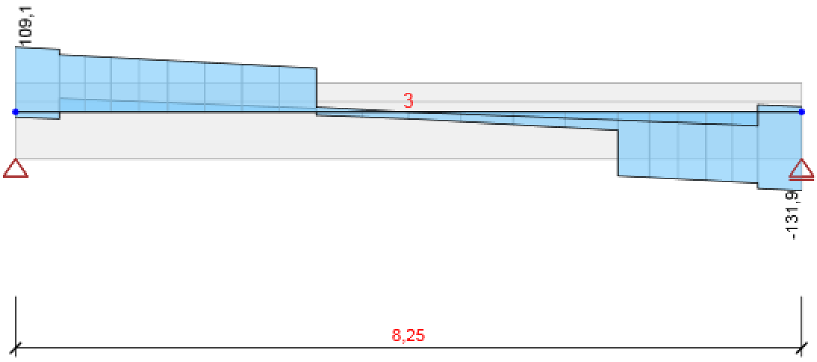
9 Results

Note: Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time depend analysis.

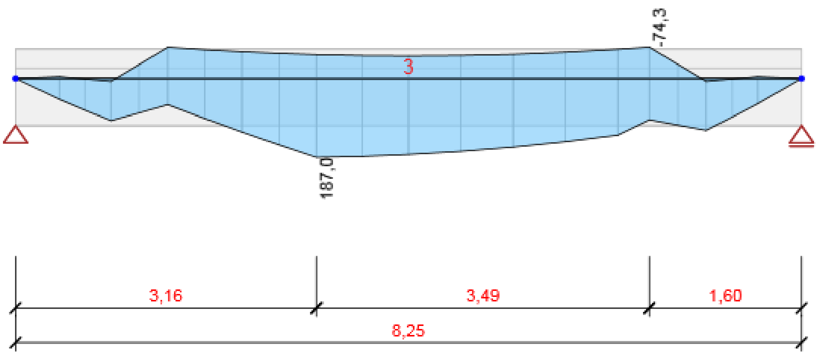
Envelopes



All combinations, N [kN], Centroidal forces



All combinations, Vz [kN], Centroidal forces



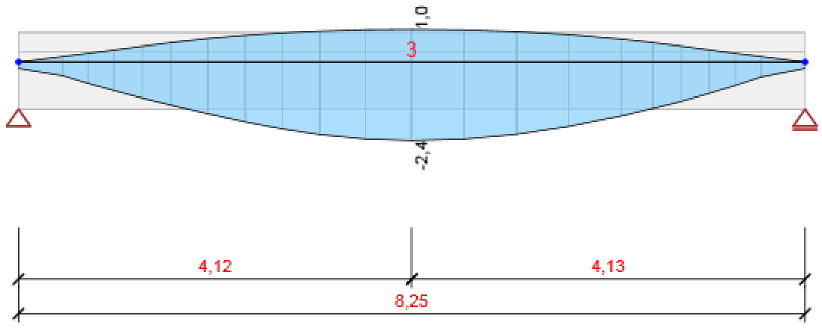
All combinations, My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
3	ULS Fundamental ST(6)(40)	3,64	-216,0	-3,9	78,1
3	ULS Fundamental ST(7)(45)	1,00	0,0	58,9	58,0
3	ULS Fundamental ST(7)(48)	8,25	0,0	-131,9	0,0
3	ULS Fundamental ST(6)(43)	0,00	0,0	109,1	0,0
3	ULS Fundamental ST(4)(33)	6,65	-216,0	-15,8	-74,3
3	ULS Fundamental ST(7)(48)	3,16	-216,0	73,3	187,0

Combination	Critical load effect description
ULS Fundamental ST(6)(40)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6)

Combination	Critical load effect description
ULS Fundamental ST(7)(45)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(48)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(6)(43)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg
ULS Fundamental ST(4)(33)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4)



All combinations, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
3	SLSC ST(7)(95)	8,25	-3,5	0,0	-0,9
3	SLSC ST(7)(94)	0,00	0,7	0,0	0,9
3	SLSC ST(7)(94)	4,12	-1,4	-2,4	0,0
3	SLSC ST(5)(91)	4,12	-0,3	1,0	0,0
3	SLSC ST(7)(94)	8,25	-3,4	0,0	-1,0

Combination	Critical load effect description
SLSC ST(7)(95)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSC ST(7)(94)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)
SLSC ST(5)(91)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)

Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
1	ULS Fundamental ST(7)(62)	0,0	65,1	0,0
1	ULS Fundamental ST(5)(36)	0,0	34,8	0,0
1	ULS Fundamental ST(5)(99)	0,0	25,8	0,0
1	ULS Fundamental ST(6)(41)	0,0	100,0	0,0
2	ULS Fundamental ST(5)(36)	0,0	34,8	0,0
2	ULS Fundamental ST(5)(99)	0,0	25,8	0,0
2	ULS Fundamental ST(7)(46)	0,0	122,9	0,0
3	ULS Fundamental ST(4)(98)	0,0	25,8	0,0
3	ULS Fundamental ST(3)(25)	0,0	34,8	0,0
4	ULS Fundamental ST(3)(25)	0,0	34,8	0,0
4	ULS Fundamental ST(3)(97)	0,0	25,8	0,0
4	ULS Fundamental ST(4)(31)	0,0	34,8	0,0
5	ULS Fundamental ST(2)(96)	0,0	25,8	0,0
5	ULS Fundamental ST(2)(23)	0,0	34,8	0,0
6	ULS Fundamental ST(2)(23)	0,0	34,8	0,0
6	ULS Fundamental ST(2)(96)	0,0	25,8	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(62)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
ULS Fundamental ST(5)(36)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5)

Combination	Critical load effect description
ULS Fundamental ST(5)(99)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
ULS Fundamental ST(6)(41)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg
ULS Fundamental ST(7)(46)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(4)(98)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4)
ULS Fundamental ST(3)(25)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3)
ULS Fundamental ST(3)(97)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3)
ULS Fundamental ST(4)(31)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4)
ULS Fundamental ST(2)(96)	1,35*SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(23)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

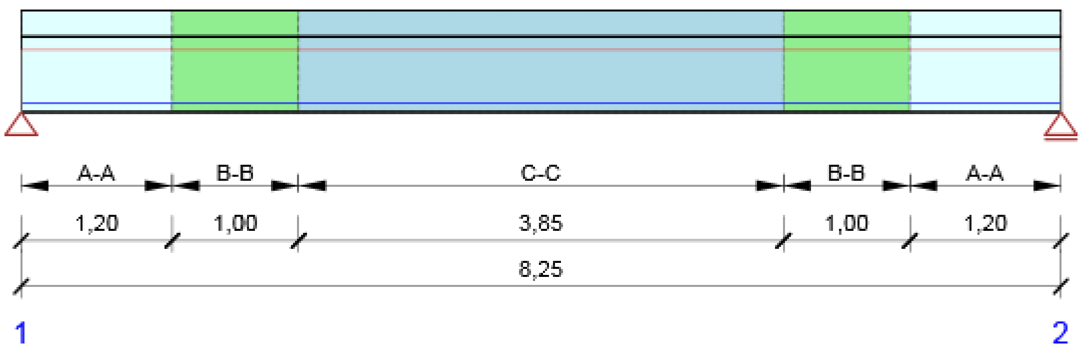
10 Concrete design

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

Note:Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time dependent analysis.

Scheme of reinforcement



Summary of checks

Construction stage	Type of check	Combination	Position	Value [%]	Check
Transfer of prestressing (5,0d)	Stress Limitation	SLSC ST(2)(88)	Section 5 (4,13m)	82,5	OK
End of design working life (18250,0d)	Stress Limitation	SLSC ST(7)(94)	Section 5 (4,13m)	75,9	OK

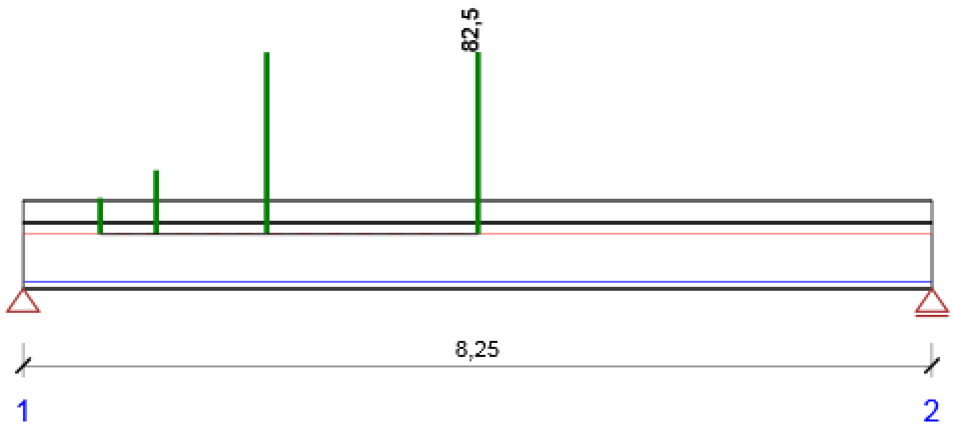
Construction stage: Transfer of prestressing (5,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Intermediate results of redistribution and reduction

Redistribution and reduction not calculated yet.



Overall sections check

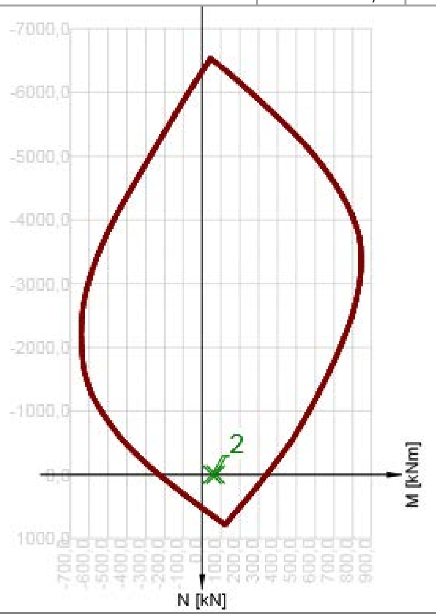
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,70m)	A-A	Capacity N-M-M	16,5	OK
Section 2 (1,21m)	B-B	Stress Limitation	29,1	OK
Section 3 (2,21m)	C-C	Stress Limitation	82,3	OK
Section 5 (4,13m)	C-C	Stress Limitation	82,5	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (4,13m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(2)(88)	-216,0	-37,9	0,0	82,5	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(2)(23)	-2,0	71,7	0,0	20,9	OK
Shear					
ULS Fundamental ST(2)(23)	-216,0	-19,0	0,0	0,0	OK
Stress Limitation					
SLSC ST(2)(88)	-216,0	-37,9	0,0	82,5	OK
Crack Width					
SLSF ST(2)(114)	-227,1	-42,6	0,0	0,0	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(2)(23)	-2,0	71,7	0,0
2	ULS Fundamental ST(2)(65)	-2,0	52,9	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(7)(2)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + 1,35*G (7)

Combination	Critical load effect description
ULS Fundamental ST(2)(23)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)
SLSC ST(2)(88)	SW (1) + R (2) + G (2) + PRE (2)
SLSF ST(2)(114)	SW (1) + R (2) + G (2) + PRE (2)

Construction stage: End of design working life (18250,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
3	6,65	ULS Fundamental ST(7)(45)	-216,0	-68,9	22,3
3	1,00	ULS Fundamental ST(7)(45)	0,0	58,9	58,0
3	0,00	ULS Fundamental ST(7)(45)	0,0	56,1	0,0
3	7,79	ULS Fundamental ST(7)(61)	0,0	-115,1	51,5
3	0,46	ULS Fundamental ST(7)(61)	0,0	92,3	41,0
3	3,16	ULS Fundamental ST(7)(48)	-216,0	73,3	187,0
3	8,25	ULS Fundamental ST(7)(46)	0,0	-115,1	0,0

Combination	Critical load effect description
ULS Fundamental ST(7)(45)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(61)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(48)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(46)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(7)(48)

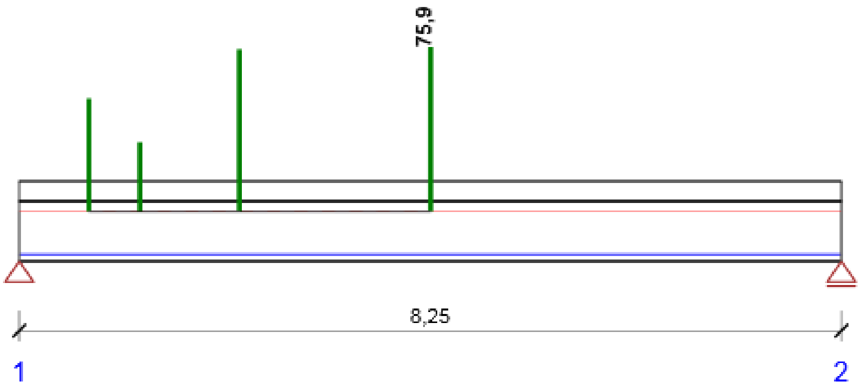
Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	109,1	0,0	-16,8
2 Left	-131,9	0,0	16,8

Combination: SLSC ST(7)(94)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	73,2	0,0	-5,8
2 Left	-89,8	0,0	5,8

Combination: SLSF ST(7)(120)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	65,1	0,0	-5,8
2 Left	-78,9	0,0	5,8



Overall sections check

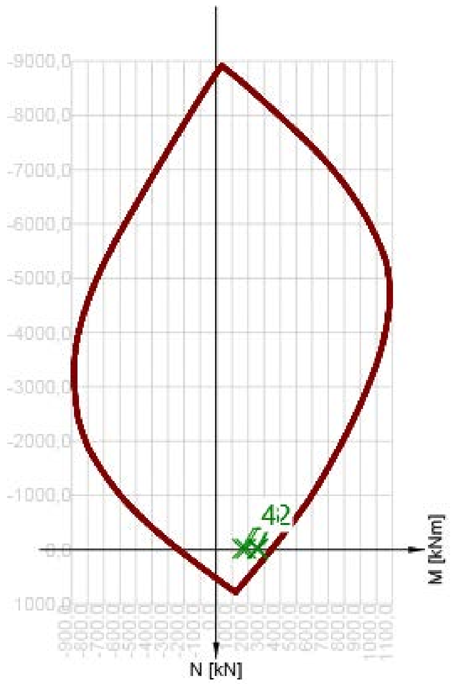
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,70m)	A-A	Capacity N-M-M	52,1	OK
Section 2 (1,21m)	B-B	Capacity N-M-M	32,0	OK
Section 3 (2,21m)	C-C	Stress Limitation	74,8	OK
Section 5 (4,13m)	C-C	Stress Limitation	75,9	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (4,13m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(7)(94)	-216,0	103,9	-8,3	75,9	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(7)(48)	-19,4	263,4	-11,5	75,1	OK
Shear					
ULS Fundamental ST(7)(48)	-216,0	180,0	-11,5	4,1	OK
Stress Limitation					
SLSC ST(7)(94)	-216,0	103,9	-8,3	75,9	OK
Crack Width					
SLSF ST(7)(120)	-205,8	84,0	-6,9	0,0	OK



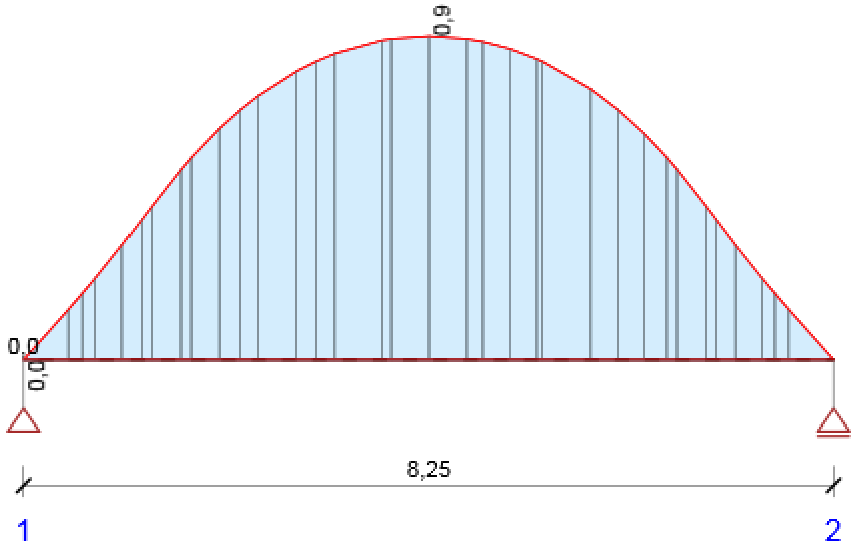
	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(7)(48)	-19,4	263,4	0,0
2	ULS Fundamental ST(7)(81)	-19,4	255,1	0,0
3	ULS Fundamental ST(7)(76)	-19,4	186,0	0,0
4	ULS Fundamental ST(7)(62)	-19,4	163,1	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(6)(7)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6)
ULS Fundamental ST(7)(48)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + 1,5*Snijeg + R (7) + 1,35*G (7)
SLSC ST(7)(94)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + Snijeg + R (7) + G (7)
SLSF ST(7)(120)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

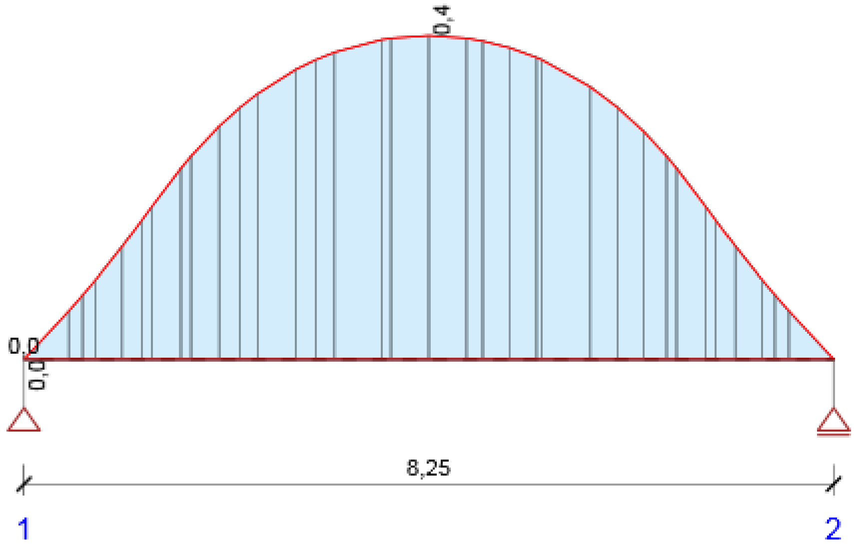
Check of deflections
Deflections: local extremes in spans

Combination: SLSC ST(2)(88), Total deflection



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,ll}$ [mm]	$u_{z,lt}$ [mm]	$u_{z,lim}$ (±) [mm]
4,12	0,6	0,5	0,9	0,9	

Combination: SLSC ST(2)(88), Deflection increment



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,ll}$ [mm]	$u_{z,incr}$ [mm]	$u_{z,lim}$ (±) [mm]
4,12	0,6	0,5	0,9	0,4	

Long-term losses coefficient

Design member	Load case	Long-term losses coefficient [-]
DM1	PRE (2)	0,91

Design member data

Member type	Beam
Exposure class	XC1
Relative humidity	65 %
Creep coeficient	Calculated
Structural member importance	Major
Redistribution of moments	Off
Reduction of moments	Off
Reduction of shear force	On
Limited interaction check	On

Data of beam spans

Span	Length [m]	Check acc. 7.4.1 (4)		Check acc. 7.4.1 (5)	
		Check	Deflection limits [mm]	Check	Deflection limits [mm]

Span	Length [m]	Check acc. 7.4.1 (4)		Check acc. 7.4.1 (5)	
		Check	Deflection limits [mm]	Check	Deflection limits [mm]
1	8,25	False		False	

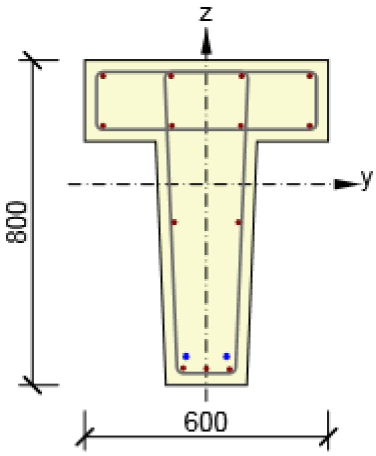
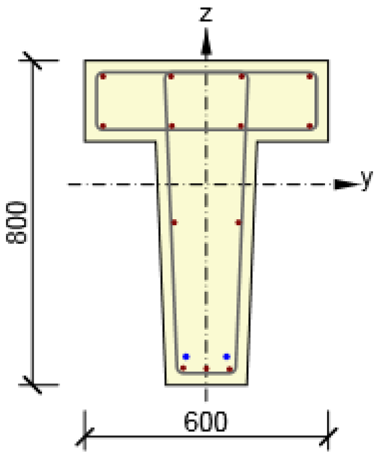
Supports definition

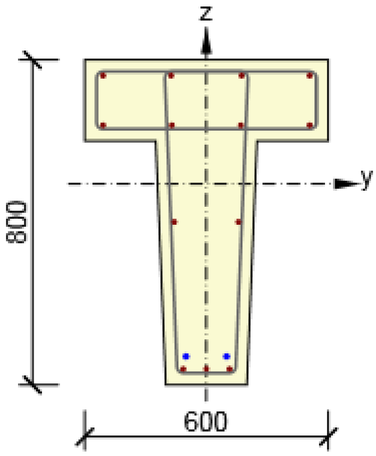
Node	Support width [mm]	Beam or slab is
1	400	Continuous over a support
4	400	Continuous over a support

Reinforcement zones

Zone	Begin [m]	End [m]	Length [m]	Reinforcement	Check
1	0,00	1,20	1,20	A-A	No
2	1,20	2,20	1,00	B-B	No
3	2,20	6,05	3,85	C-C	No
4	6,05	7,05	1,00	B-B	No
5	7,05	8,25	1,20	A-A	No

Reinforcement for position

Position	Reinforced cross-section	Reinforcement
Section 1 (0,70m)		Reinforcement: 4ø10 (314mm²) (B 550B), z = 267 mm 4ø10 (314mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 1ø10 (79mm²) (B 550B), Position -57, -452 mm 1ø10 (79mm²) (B 550B), Position 0, -454 mm 1ø10 (79mm²) (B 550B), Position 57, -455 mm Stirrups: ø8 (B 550B) - 150 mm ø8 (B 550B) - 150 mm Tendons: 2*1ø12,5 (93mm²) (Y1860S7-12.5), z = -424 mm
Section 2 (1,21m)		Reinforcement: 4ø10 (314mm²) (B 550B), z = 267 mm 4ø10 (314mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 1ø10 (79mm²) (B 550B), Position -57, -452 mm 1ø10 (79mm²) (B 550B), Position 0, -454 mm 1ø10 (79mm²) (B 550B), Position 57, -455 mm Stirrups: ø8 (B 550B) - 200 mm ø8 (B 550B) - 200 mm Tendons: 2*1ø12,5 (93mm²) (Y1860S7-12.5), z = -424 mm

Position	Reinforced cross-section	Reinforcement
Section 3 (2,21m), Section 5 (4,13m)	 	Reinforcement: 4ø10 (314mm²) (B 550B), z = 267 mm 4ø10 (314mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 3ø10 (236mm²) (B 550B), z = -455 mm Stirrups: ø8 (B 550B) - 250 mm ø8 (B 550B) - 250 mm Tendons: 2*1ø12,5 (93mm²) (Y1860S7-12.5), z = -424 mm

Material of reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 550B	550,0	594,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Code and calculation settings

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Persistent, transient		1,50-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ c - Accidental		1,20-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Persistent, transient		1,15-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Accidental		1,00-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ sp		1,15-	Partial factor for prestressing steel EC2-1-1 (3.15),(3.16)
5.5	k1		0,44-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k2		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k3		0,54-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k4		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k5		0,70-	Coefficient used for calculation of moment redistribution EC2-1-1
5.5	k6		0,80-	Coefficient used for calculation of moment redistribution EC2-1-1
6.2.2	Values for shear check d = h *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1

Clause	Name		Value	Description
6.2.2	Values for shear check z = d *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2(1)	C rdc		0,18-	Coeficient Crdc / gamma_c EC2-1-1 (6.2a)
6.2.2(1)	k1		0,15-	Coefficient k1 EC2-1-1 (6.2a)
6.2.2(2)	Neglect cracking status		On	Neglect the status without flexural cracks in calculation of shear resistance. Shear resistance will always be calculated acc. to clause 6.2.2 (1) as if the cross-section was cracked bending EC2-1-1 (6.2.2(1))
6.2.3(1)	θ		21,8°	Angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1 (6.8), (6.9), (6.13), (6.14)
6.2.3(2)	θ min		21,8°	Minimal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	θ max		45,0°	Maximal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	Calculate angle of concrete compression strut	Check Type	Off Long. reinf. and Strut	Calculate angle of concrete compression strut to optimize the use of selected component of truss analogy. In the case that any other component of truss analogy is not satisfactory, the value of angle from code settings will be used. EC2-1-1
6.2.3(3)	α cw	Check	Off 1,00-	Coefficient taking account of the state of the stress in the compression chord EC2-1-1 (6.9), (6.14)
6.2.3(3)	ρ w,max		On	Maximal reinforcement ratio for shear reinforcement EC2-1-1 (6.12)
6.2.5 (1)	Shear stress calculation in joints		Difference of normal forces	Shear stress in joint is calculated according to settings
	Limit is defined as numerical value		Off	Deflection will be checked against limit value defined numerically
	Numerical value of deflection limit		25mm	Deflection will be checked against limit value defined numerically.
	Limit value for deflections acc. 7.4.1 (4) as length of span /		250,00-	Calculated deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (4).
	Limit value for deflections acc. 7.4.1 (5) as length of span /		500,00-	Calculated increment of deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (5).
7.3.1(5)	wmax for reinforced members: Exposure class	X0, XC1 XC2, XC3, XC4 XD, XS	0,400mm 0,300mm 0,300mm	Recommended values of wmax for reinforced members and quasi-permanent combination EC2-1-1 7.1N

Clause	Name		Value	Description
7.3.1(5)	wmax for prestressed members: Exposure class	X0, XC1 XC2, XC3, XC4	0,200mm 0,200mm	Recommended values of wmax for prestressed members and frequent combination EC2-1-1 7.1N
7.3.1(5)	Decompression for prestressed members: Exposure class	XC2, XC3, XC4 XD, XS	25mm 25mm	Recommended values of decompression for prestressed members and frequent combination EC2-1-1 7.1N
8.2(2)	s l,min	Check Distance k1(multiple) k2(increment)	On 20mm 1,00- 5mm	Minimal clear distance of longitudinal reinforcement EC2-1-1
8.3(2)	Φ m,min	Check Φs <= 16mm (increment Φs) Φs > 16mm (increment Φs)	On 3,00- 7,00-	Minimum mandrel diameter of stirrup as multiple of stirrup diameter EC2-1-1 Table 8.1N
9.2.1.1(1)	ρ l,min	Check Ratio Factor	On 0,13% 0,26-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.1N)
9.2.1.1(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.2.2(5)	ρ w,min	Check	On 0,08-	Minimal reinforcement ratio for shear reinforcement EC2-1-1 (9.5N)
9.2.2(6)	s w,max	Check	On 0,75-	Maximal distance of stirrups EC2-1-1 (9.6N)
9.2.2(8)	s t,max	Check Check Distance Factor	On On 600mm 0,75-	Maximal transversal distance of branches of stirrups EC2-1-1 (9.8N)
9.2.3(4)	s l,max	Check	On 350mm	Maximal axial distance of longitudinal reinforcement EC2-1-1
9.5.2(1)	Φ min	Check	On 8mm	Minimal diameter of longitudinal reinforcement EC2-1-1
9.5.2(2)	ρ l,min	Check Ratio Factor	On 0,20% 0,10-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.12N)
9.5.2(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.5.2(4)	n Φ	Check	On 4	Minimal number of bars of longitudinal reinforcement EC2-1-1
9.5.3(1)	Φ w,min	Check	On 6mm	Minimal diameter of shear reinforcement EC2-1-1
9.5.3(3)	s ct,tmax	Check Distance Factor	On 400mm 20,00-	Maximal distance of stirrups EC2-1-1
	Don't exclude tendons		Off	Don't exclude tendons from calculation model of reinforced cross-section if tendons are outside of cross-section
	Neglect redistribution of moments		10,00%	Neglect redistribution of moments My, Mz, if the ratio My/Mz is less than 10%
	Limit value of exploitation		100,00%	Limit value of the exploitation of the cross-section
	Number of iteration steps		20	Number of iteration steps

Clause	Name		Value	Description
	Use simplified model of cross-section		On	Use simplified calculation model of cross-section to increase the speed of checks
	Evaluation of interaction diagram		NuMuMu	Evaluation of interaction diagram
	Direction of imperfection		Resultant of moments	Type of direction for calculation of imperfections for columns
	Interpolation curve		Parabolic	Type of interpolation curve of bending moment for calculation of imperfection
	Maximum length of subzone		1,00m	The stiffness of cross-section for the calculation of deflection is considered to be constant in the subzone.

1 Project data

Project title	**GN-3 T 80**
Project number	06
Description	tip T-80
Author	ŠIRBEGOVIĆ inženjering
Date of creation	21.11.2017

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

2 Design Members

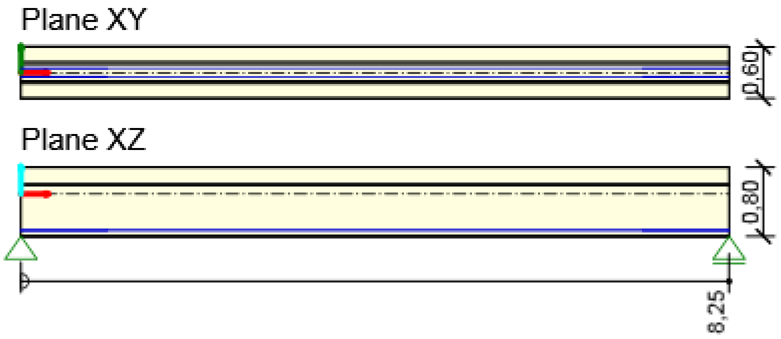
2.1 DM1

Description	Type	Members	Tendons	Valid
	Pre-tensioned	3	G1	✓

Stressing bed: SB1

Length of prestressing units	50,00 m
Stressing procedure	Pretenesioned - correction of relaxation
Calculation of relaxation	By time
Duration of keeping stress constant	300 s
Duration of short-term relaxation	57600 s
Loss due to deformation of end abutments	On
Defining of number of prestresing units	By groups
Shortening of stressing bed	1 mm
Anchorage set	2 mm
Loss due to the difference in temperature	On
Code coefficient	0,50 -
T_{max}	50 °C
T_0	20 °C
Tendon releasing	Gradual releasing

Geometry of design member



2.1.1 Prestressing

Name	Material	A_p [mm²]	Length [m]	L_s [m]	L_{arc} [m]	R_{min} [m]	θ [°]
	Strands	σ_a [MPa]	σ_{min} [MPa]	σ_{max} [MPa]	e_{ba} [mm]	e_{aa} [mm]	L_{set} [m]
G1	Y1860S7-12.5	93	8,25	8,25	0,00	0,00	0,0
	1	1200,0	575,6	1150,7	307,7	305,7	0,00

Name	$\sigma_{ini,max}$ [MPa]	$\sigma_{p,max}$ [MPa]	Check 5.10.2.1(1)P	σ_{min} [MPa]	σ_{max} [MPa]	σ_{pm0} [MPa]	Check 5.10.3(2)P
G1	1200,0	1476,0	✓	575,6	1150,7	1394,0	✓

Explanation

Symbol	Explanation
A_p	Area of tendon
Length	Length of tendon
L_s	Sum of lengths of straight parts of tendon
L_{arc}	Sum of lengths of curved parts of tendon

R_{min}	Smallest curve radius found in specified geometry of current tendon
θ	Cumulative angular change
σ_a	Anchorage stress
σ_{min}	Minimum stress along the length of tendon after anchoring
σ_{max}	Maximum stress along the length of tendon after anchoring
e_{ba}	Theoretical tendon elongation before anchoring
e_{aa}	Theoretical tendon elongation after anchoring
L_{set}	Length affected by anchorage set
$\sigma_{ini,max}$	Maximum initial stress in tendon
$\sigma_{p,max}$	Limit value of tendon stress applied to the tendon acc. to 5.10.2.1 (1)P
Check 5.10.2.1(1)P	Check of criterion according to provision 5.10.2.1 (1)P
σ_{pm0}	Limit value of tendon stress applied to the tendon acc. to 5.10.3 (2)
Check 5.10.3(2)P	Check of criterion according to provision 5.10.3 (2)P

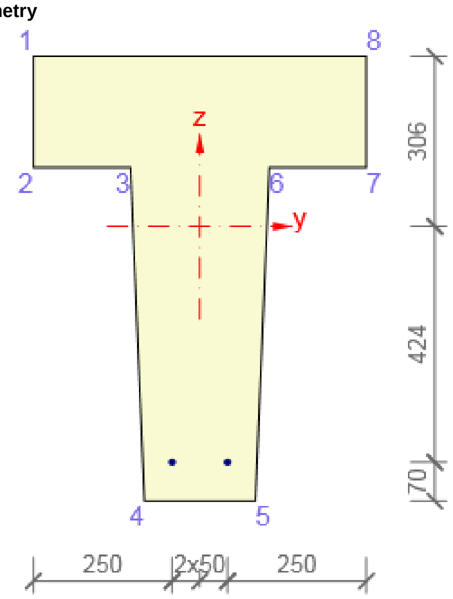
3 Tendons

3.1 Tendon: G1

Material	Number of strands	Load case	Area [mm^2]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-12.5	1	PRE (2)	93	12,5	1200,0	1476,0	✓

3.1.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
2	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	-50	-424
2	50	-424

Tendon coordinates calculated in defined distance X

X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	-50	-250	350	-424	-70	730
1,00	1,00	-50	-250	350	-424	-70	730
2,00	2,00	-50	-250	350	-424	-70	730
3,00	3,00	-50	-250	350	-424	-70	730
4,00	4,00	-50	-250	350	-424	-70	730
5,00	5,00	-50	-250	350	-424	-70	730
6,00	6,00	-50	-250	350	-424	-70	730
7,00	7,00	-50	-250	350	-424	-70	730
8,00	8,00	-50	-250	350	-424	-70	730

8,25	8,25	-50	-250	350	-424	-70	730

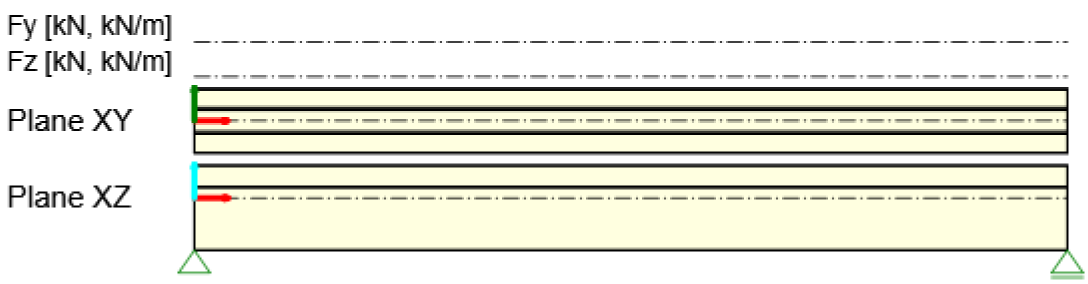
3.1.2 Equivalent load caused by prestressing

Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G1	1	1,03	21,6	0,0	0,0	0,0	-9,2	0,0
	2	1,09	21,6	0,0	0,0	0,0	-9,2	0,0
	3	1,15	21,6	0,0	0,0	0,0	-9,2	0,0
	4	1,21	21,6	0,0	0,0	0,0	-9,2	0,0
	5	1,27	21,6	0,0	0,0	0,0	-9,2	0,0
	6	1,33	21,6	0,0	0,0	0,0	-9,2	0,0
	7	1,39	21,6	0,0	0,0	0,0	-9,2	0,0
	8	1,45	21,6	0,0	0,0	0,0	-9,2	0,0
	9	1,51	21,6	0,0	0,0	0,0	-9,2	0,0
	10	1,57	16,2	0,0	0,0	0,0	-6,9	0,0
	11	1,60	5,4	0,0	0,0	0,0	-2,3	0,0
	12	6,65	-5,4	0,0	0,0	0,0	2,3	0,0
	13	6,68	-16,2	0,0	0,0	0,0	6,9	0,0
	14	6,74	-21,6	0,0	0,0	0,0	9,2	0,0
	15	6,80	-21,6	0,0	0,0	0,0	9,2	0,0
	16	6,86	-21,6	0,0	0,0	0,0	9,2	0,0
	17	6,92	-21,6	0,0	0,0	0,0	9,2	0,0
	18	6,98	-21,6	0,0	0,0	0,0	9,2	0,0
	19	7,04	-21,6	0,0	0,0	0,0	9,2	0,0
	20	7,10	-21,6	0,0	0,0	0,0	9,2	0,0
	21	7,16	-21,6	0,0	0,0	0,0	9,2	0,0
	22	7,22	-21,6	0,0	0,0	0,0	9,2	0,0

Explanation

Symbol	Explanation
Tendon name	Tendon name
Index	Index of current impulse of concentrated load
x	x - coordinate in coordinate system of Design Member
F_x	Magnitude of concentrated force in x direction
F_y	Magnitude of concentrated force in y direction
F_z	Magnitude of concentrated force in z direction
M_x	Magnitude of concentrated moment about x axis
M_y	Magnitude of concentrated moment about y axis
M_z	Magnitude of concentrated moment about z axis

Equivalent load



3.1.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check
1150,7	1394,0	✓

Input values and intermediate results

Area of tendon	93 mm^2
Length of tendon	8,25 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1150,7 MPa
Theoretical tendon elongation before anchoring	307,7 mm

Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,60 m
Transmission length - end	0,60 m
Blanketed length - begin	1,00 m
Blanketed length - end	1,00 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	12,5	1161,3	4,6	0,60	0,48	0,72

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	12,5	1161,3	4,6	0,60	0,48	0,72

Short-term losses

d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
1,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
1,60	-7,8	0,0	-1,6	1190,6	-29,3	-13,8	1147,5	-2,2	-30,4
2,00	-7,8	0,0	-1,6	1190,6	-29,3	-12,9	1148,4	-2,2	-30,4
3,00	-7,8	0,0	-1,6	1190,6	-29,3	-11,3	1150,0	-2,2	-30,4
4,00	-7,8	0,0	-1,6	1190,6	-29,3	-10,6	1150,7	-2,2	-30,4
5,00	-7,8	0,0	-1,6	1190,6	-29,3	-11,0	1150,3	-2,2	-30,4
6,00	-7,8	0,0	-1,6	1190,6	-29,3	-12,4	1148,9	-2,2	-30,4
6,65	-7,8	0,0	-1,6	1190,6	-29,3	-13,9	1147,4	-2,2	-30,4
7,00	-7,8	0,0	-1,6	1190,6	-29,3	-3,7	483,3	-2,2	-12,7
7,25	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
8,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
8,25	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0

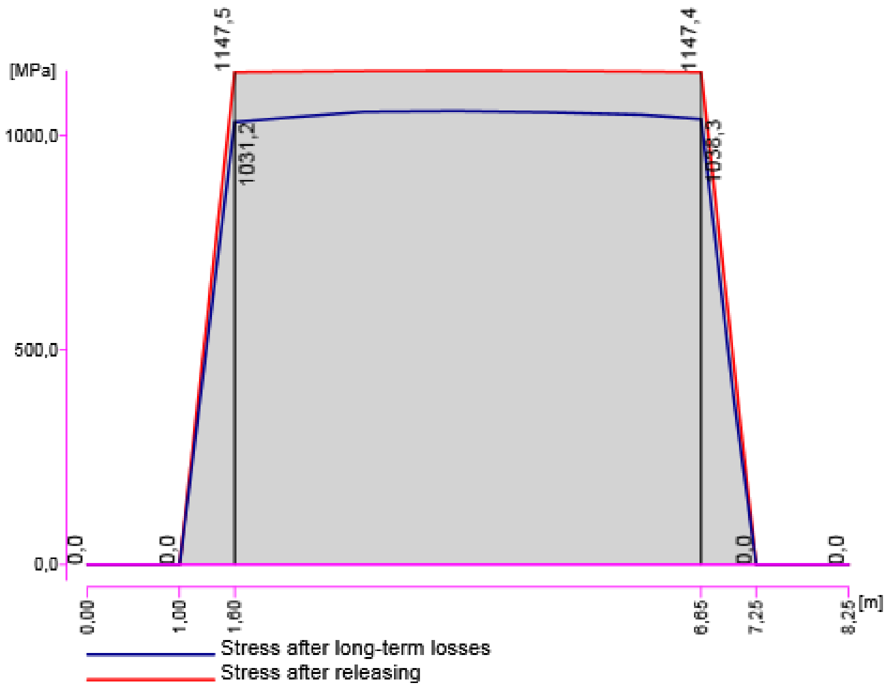
Long-term losses

d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
1,60	1147,5	116,3	1031,2	0,90
2,00	1148,4	109,7	1038,7	0,90
3,00	1150,0	94,5	1055,6	0,92
4,00	1150,7	93,3	1057,3	0,92
5,00	1150,3	96,1	1054,2	0,92
6,00	1148,9	100,5	1048,4	0,91
6,65	1147,4	109,2	1038,3	0,90
7,00	483,3	84,6	398,7	0,82

Explanation

Symbol	Explanation
l_{pt1}	0.8 lpt
l_{pt2}	1.2 lpt
$\Delta\sigma_{pw}$	Anchorage set loss
$\Delta\sigma_{pA}$	Loss due the deformation of ends abutments of the stressing bed
$\Delta\sigma_{pr}$	Relaxation loss
$\sigma_{pr,cor}$	Stress after short-term relaxation
$\Delta\sigma_{pT}$	Loss due to the difference in temperature of prestressing steel and stressing bed
$\Delta\sigma_{pe}$	Loss due to the immediate elastic concrete strain
σ_{pa}	Stress after short-term losses - stress in the prestressing steel immediately after the anchoring, or – in the case of pre-tensioned concrete – after the transfer of prestressing into the concrete.
$\Delta\sigma_{pr,occur}$	Relaxation that already took place (occurred)
$\Delta\sigma_{pr,cap}$	Remaining relaxation capacity, i.e. potential stress decrease in prestressing reinforcement due to relaxation at infinite time
$\Delta\sigma_\infty$	Loss of stress in the prestressing steel due to relaxation of prestressing steel, concrete creep and shrinkage, and due to immediate elastic concrete strain caused by permanent actions applied after transfer of prestressing.
σ_∞	Stress after long-term losses - stress in the prestressing steel due to all permanent actions including prestressing at the time close to infinity.
$\sigma_\infty/\sigma_{pa}$	The ratio of stress after long-term losses, and the stress after short -term losses.

Losses



4 List of used materials

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m³]
Y1860S7-12.5	1860,0	1640,0	195000,0	0,15	7850
	F_m = 173,0 kN, F_{p01} = 152,2 kN, F_r = 190,0 MPa, ρ_{1000} = 0,03, ρ_{∞} = 0,06, Φ = 13 mm, Area = 93 mm2, ε_{uk} = 350,0 1e-4, A_{gt} = 350,0 1e-4, Type: Strand Surface characteristic: Plain, Relaxation class: Class2, Production: Low relaxation, Diagram type: Bilinear with an inclined top branch, Number of wires: 7				

Explanation

Symbol	Explanation
f_{pk}	Characteristic tensile strength
f_{p01k}	Characteristic 0,1% proof force
E	Modulus of elasticity of prestressing steel
F_m	Characteristic value of maximum force
F_{p01}	Characteristic 0,1% proof force
F_r	Fatigue stress range
ρ_{1000}	The value of relaxation loss (ratio), at 1000 hours after tensioning and at a mean temperature of 20°C
ρ_{∞}	The value of relaxation loss (ratio), at 500 000 hours after tensioning and at a mean temperature of 20°C
ε_{uk}	Characteristic strain of reinforcement or prestressing steel at maximum load
A_{gt}	Total elongation at maximum force
Type	Type of prestressing steel
Diagram type	The type of stress-strain diagram

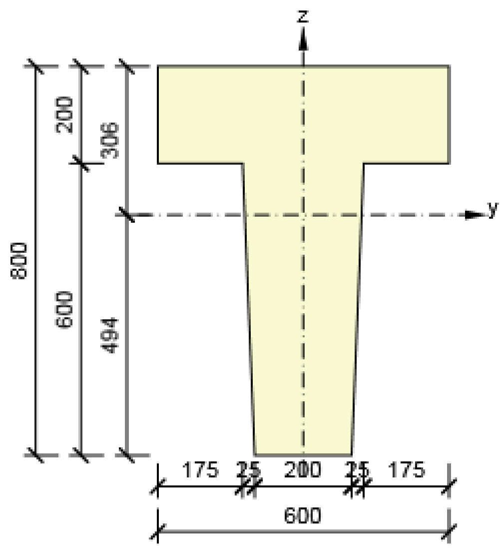
1 Project Data

Title of the project	**KG-1 T 80**
Identification of project	07
Author	SIRBEGOVIC Imzenjering
Description	T80 KRANSKA GREDA
Date	6.9.2016
Design code	EN
Type of beam	Pre-fabricated pre-tensioned concrete beam

2 Cross-Sections

2. T-80(T Shape 800, 600)

Symbol	Value	Unit
Material	C50/60	
A	255000	[mm^2]
S_y	0	[mm^3]
S_z	0	[mm^3]
I_y	14041176471	[mm^4]
I_z	4176562500	[mm^4]
C_{gy}	0	[mm]
C_{gz}	0	[mm]
i_y	235	[mm]
i_z	128	[mm]



3 Material

Concrete

Name	f_{ck} [MPa]	f_{cm} [MPa]	f_{ctm} [MPa]	E_{cm} [MPa]	μ [-]	Unit mass [kg/m^3]
C50/60	50,0	58,0	4,1	37277,9	0,20	2500
	ε_{c2} = 20,0 1e-4,ε_{cu2} = 35,0 1e-4,ε_{c3} = 17,5 1e-4,ε_{cu3} = 35,0 1e-4, Exponent - n: 2,00,Aggregate size = 16 mm,Cement class: R (s = 0,20),Diagram type: Parabolic					

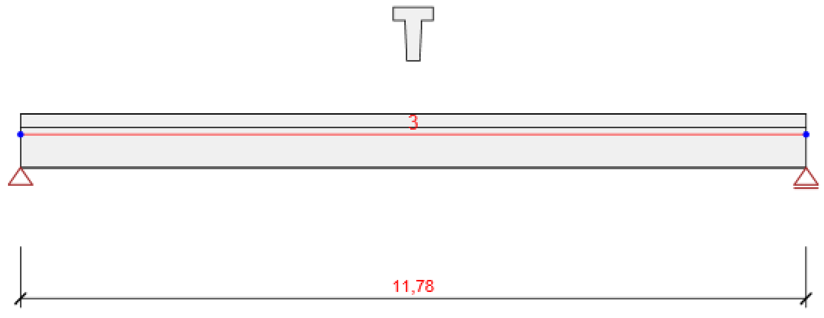
Reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 550B	550,0	594,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Prestressing steel

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-15.2	1860,0	1640,0	195000,0	0,15	7850
	F_m = 259,0 kN,F_{p01} = 227,9 kN,F_r = 190,0 MPa,ρ_{1000} = 0,03,ρ_∞ = 0,06, Φ = 15 mm,Area = 139 mm2,ε_{uk} = 350,0 1e-4,A_{gt} = 350,0 1e-4,Type: Strand Surface characteristic: Plain,Relaxation class: Class2,Production: Low relaxation, Diagram type: Bilinear with an inclined top branch,Number of wires: 7				

4 Geometry



Structural scheme

Members

Member	Length [m]	End of Member [m]	Cross-Section
3	11,78	11,78	2 - T-80 (T Shape 800, 600)

Nodes

Node	X [m]	Support
1	0,00	XZ
4	11,78	Z

5 Load Cases

Name	Type	C.Stage	Load Group	Load [kN/m]
SW (1)	Permanent	1	LG1	-6,3
R (2)	Permanent	2	LG1	0,0
G (2)	Permanent	2	LG1	0,0
PRE (2)	Permanent	2	LG1	0,0
R (3)	Permanent	3	LG1	0,0
G (3)	Permanent	3	LG1	0,0
R (4)	Permanent	4	LG1	0,0
G (4)	Permanent	4	LG1	0,0
R (5)	Permanent	5	LG1	0,0
G (5)	Permanent	5	LG1	0,0
R (6)	Permanent	6	LG1	0,0
Stalno (6)	Permanent	6	LG1	-2,0
R (7)	Permanent	7	LG1	0,0
G (7)	Permanent	7	LG1	0,0
Snijeg	Variable		Snijeg	0,0
KRAN 6,3T	Variable		Kran 6,3t	0,0

Permanent load groups

Name	$\gamma_{G, sub}$ [-]	$\gamma_{G, inf}$ [-]	ξ [-]
LG1	1,35	1,00	0,85

Variable load groups

Name	Type	γ_q [-]	Ψ_0 [-]	Ψ_1 [-]	Ψ_2 [-]
Snijeg	Standard	1,50	0,50	0,20	0,00
Vjetar	Standard	1,50	0,60	0,20	0,00
Kran 6,3t	Standard	1,50	1,00	0,90	0,50

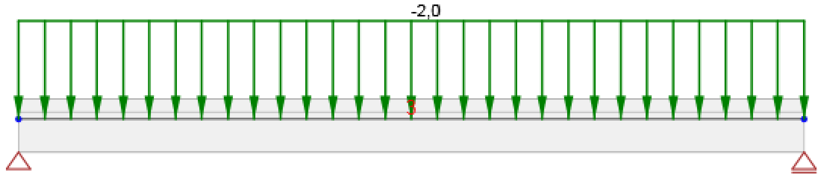
6 Loads

Load Case PRE (2)

Line Loads

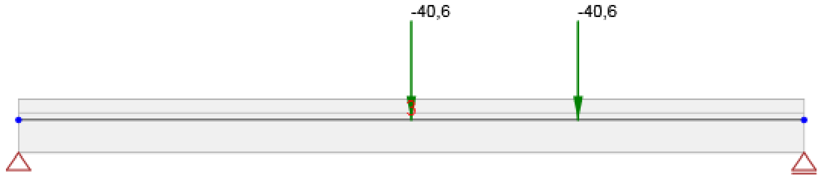
Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Angle [°]	Location
3	445,3	445,3	2,50	3,22	Global X	0,0	Length

Member	Size p1 [kN/m]	Size p2 [kN/m]	X1 [m]	X2 [m]	Direction	Angle [°]	Location
3	-445,3	-445,3	8,56	9,28	Global X	0,0	Length



Load Case Stalno (6)

Load Case KRAN 6,3T



Load Case KRAN 6,3T

Force Loads in Points

Member	Size [kN]	X [m]	Position	Direction	Angle [°]
3	-40,6	8,39	X	Global Z	0,0
3	-40,6	5,89	X	Global Z	0,0

7 Load Combinations

Name	Type	C.Stage	Evaluation
ULS Fundamental ST(2)	ULS Fundamental	2	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2)			
SLSC ST(2)	SLS Char	2	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2)			
SLSF ST(2)	SLS Freq	2	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2)			
SLSQ ST(2)	SLS Quasi	2	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2)			
ULS Fundamental ST(3)	ULS Fundamental	3	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSC ST(3)	SLS Char	3	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSF ST(3)	SLS Freq	3	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
SLSQ ST(3)	SLS Quasi	3	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3)			
ULS Fundamental ST(4)	ULS Fundamental	4	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSC ST(4)	SLS Char	4	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSF ST(4)	SLS Freq	4	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
SLSQ ST(4)	SLS Quasi	4	Eurocode, formula 6.16b

Name	Type	C.Stage	Evaluation
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4)			
ULS Fundamental ST(5)	ULS Fundamental	5	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSC ST(5)	SLS Char	5	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSF ST(5)	SLS Freq	5	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
SLSQ ST(5)	SLS Quasi	5	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5)			
ULS Fundamental ST(6)	ULS Fundamental	6	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSC ST(6)	SLS Char	6	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSF ST(6)	SLS Freq	6	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
SLSQ ST(6)	SLS Quasi	6	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); Snijeg			
ULS Fundamental ST(7)	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSC ST(7)	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSF ST(7)	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
SLSQ ST(7)	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7); Snijeg			
ULS-W	ULS Fundamental	7	Eurocode, formula 6.10
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSCh-W	SLS Char	7	Eurocode, formula 6.14b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSFr-W	SLS Freq	7	Eurocode, formula 6.15b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			
SLSQa-W	SLS Quasi	7	Eurocode, formula 6.16b
SW (1); R (2); G (2); PRE (2); R (3); G (3); R (4); G (4); R (5); G (5); R (6); Stalno (6); R (7); G (7)			

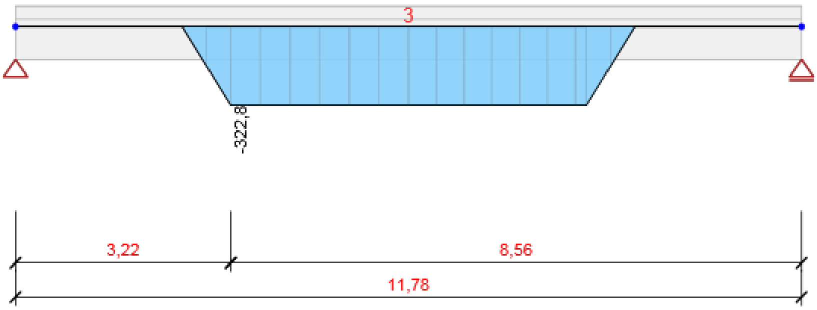
8 Construction stages

	Name	Time [d]	Beam spans [m]
1	Casting	0	
2	Transfer of prestressing	5	11,78
	Support 0,00 m: to design position Support 11,78 m: to design position User-specified concrete strength f_{ck} = 36,1 MPa		
3	Storage yard	5,1	0,65 - 10,47 - 0,65
	Support 0,65 m: to design position Support 11,13 m: to design position		
4	Transport	14	0,65 - 10,47 - 0,65
	Support 0,65 m: to design position Support 11,13 m: to design position		
5	Final supports	17	
6	Superimposed dead load	45	
7	End of design working life	18250	

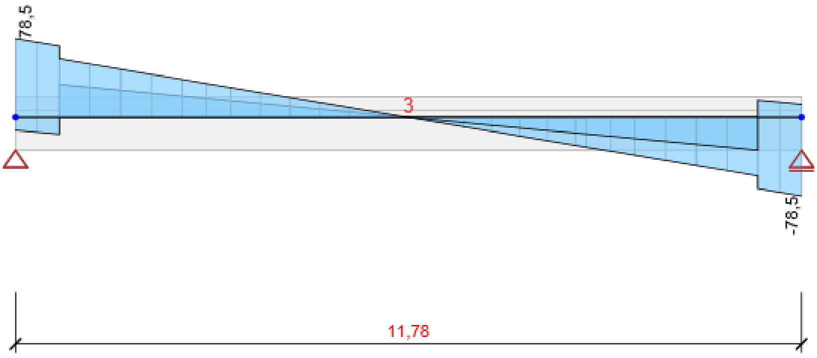
9 Results

Note: Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time depend analysis.

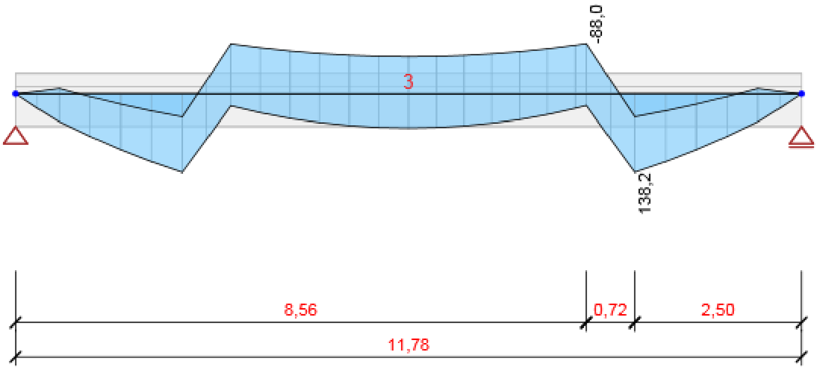
Envelopes



All combinations, N [kN], Centroidal forces



All combinations, Vz [kN], Centroidal forces

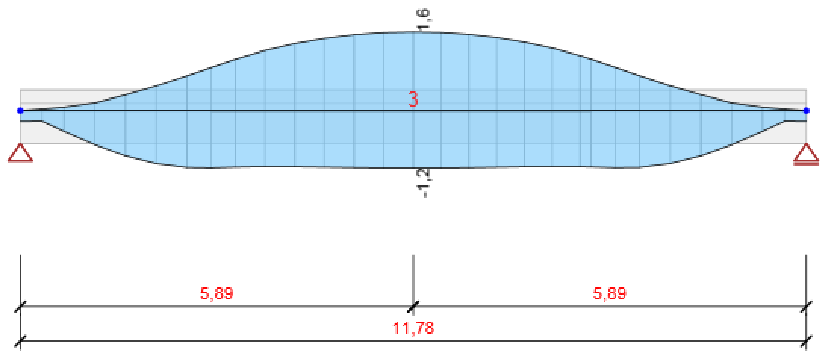


All combinations, My [kNm], Centroidal forces

Internal forces, Member Extreme, Centroidal forces, Entire centroid

Member	Combi	Position [m]	N [kN]	V_z [kN]	M_y [kNm]
3	ULS Fundamental ST(7)(38)	3,22	-322,8	29,7	20,8
3	ULS Fundamental ST(6)(28)	1,58	0,0	48,1	98,7
3	ULS Fundamental ST(6)(28)	11,78	0,0	-78,5	0,0
3	ULS Fundamental ST(7)(38)	0,00	0,0	78,5	0,0
3	ULS Fundamental ST(4)(16)	8,56	-322,8	-16,7	-88,0
3	ULS Fundamental ST(7)(38)	9,28	0,0	-37,8	138,2

Combination	Critical load effect description
ULS Fundamental ST(7)(38)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + G (7)
ULS Fundamental ST(6)(28)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6)
ULS Fundamental ST(4)(16)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4)



All combinations, Displacement uz [mm]

Deformations, Member Extreme,

Member	Combi	Position [m]	u_x [mm]	u_z [mm]	fi_y [mrad]
3	SLSC ST(7)(71)	11,78	-5,4	0,0	-0,7
3	SLSC ST(7)(71)	0,00	0,5	0,0	0,7
3	SLSC ST(7)(71)	5,89	-2,4	-1,2	0,0
3	SLSC ST(4)(68)	5,89	-0,6	1,6	0,0

Combination	Critical load effect description
SLSC ST(7)(71)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSC ST(4)(68)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4)

Reactions

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
1	ULS Fundamental ST(6)(114)	0,0	48,6	0,0
1	ULS Fundamental ST(7)(39)	0,0	65,6	0,0
1	ULS Fundamental ST(5)(113)	0,0	36,8	0,0
1	ULS Fundamental ST(5)(21)	0,0	49,7	0,0
2	ULS Fundamental ST(5)(21)	0,0	49,7	0,0
2	ULS Fundamental ST(5)(113)	0,0	36,8	0,0
2	ULS Fundamental ST(6)(31)	0,0	65,6	0,0
3	ULS Fundamental ST(3)(111)	0,0	36,8	0,0
3	ULS Fundamental ST(4)(14)	0,0	49,7	0,0
3	ULS Fundamental ST(3)(7)	0,0	49,7	0,0
4	ULS Fundamental ST(3)(7)	0,0	49,7	0,0
4	ULS Fundamental ST(4)(112)	0,0	36,8	0,0
5	ULS Fundamental ST(2)(110)	0,0	36,8	0,0
5	ULS Fundamental ST(2)(3)	0,0	49,7	0,0
6	ULS Fundamental ST(2)(3)	0,0	49,7	0,0

Node	Combi	R_x [kN]	R_z [kN]	M_y [kNm]
6	ULS Fundamental ST(2)(110)	0,0	36,8	0,0

Combination	Critical load effect description
ULS Fundamental ST(6)(114)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6)
ULS Fundamental ST(7)(39)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + 1,35*G (7)
ULS Fundamental ST(5)(113)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5)
ULS Fundamental ST(5)(21)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5)
ULS Fundamental ST(6)(31)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6)
ULS Fundamental ST(3)(111)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3)
ULS Fundamental ST(4)(14)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4)
ULS Fundamental ST(3)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3)
ULS Fundamental ST(4)(112)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4)
ULS Fundamental ST(2)(110)	1,35*SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

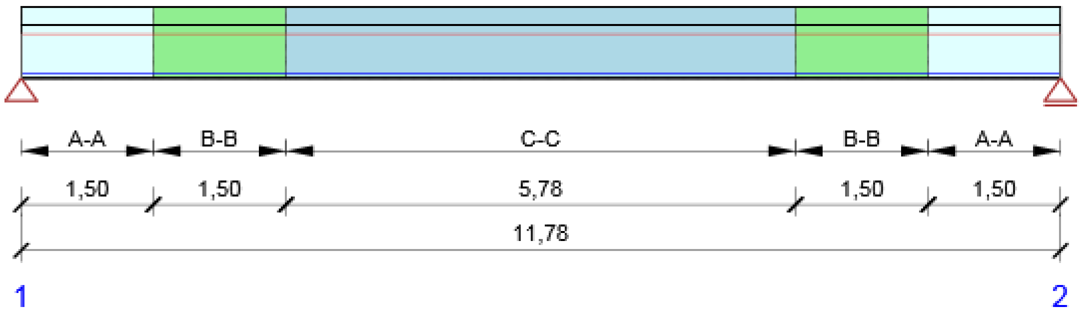
10 Concrete design

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

Note:Tangential modulus Ec acc. to article 3.1.4(2) EN 1992-1-1 is used in time dependent analysis.

Scheme of reinforcement



Summary of checks

Construction stage	Type of check	Combination	Position	Value [%]	Check
Transfer of prestressing (5,0d)	Stress Limitation	SLSC ST(2)(66)	Section 5 (5,90m)	82,4	OK
End of design working life (18250,0d)	Stress Limitation	SLSC ST(7)(71)	Section 5 (5,90m)	73,5	OK

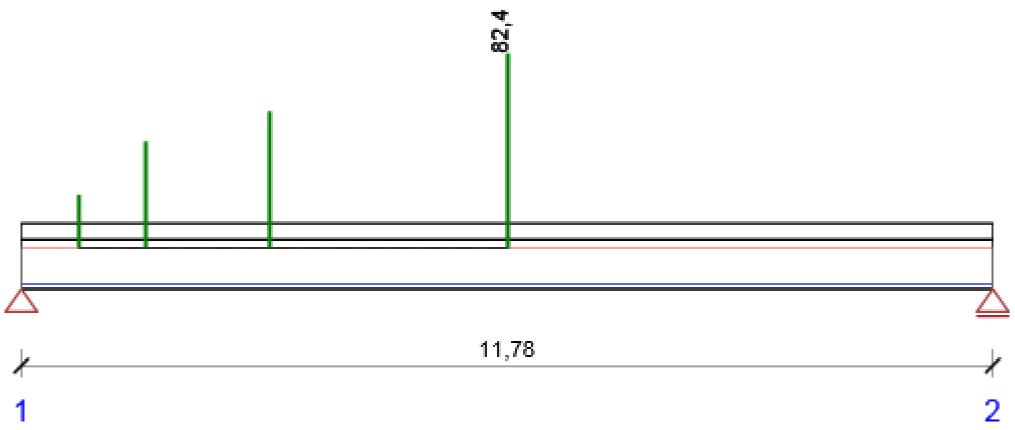
Construction stage: Transfer of prestressing (5,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Intermediate results of redistribution and reduction

Redistribution and reduction not calculated yet.



Overall sections check

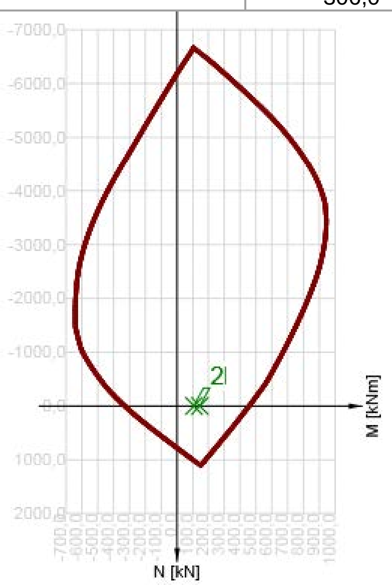
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,70m)	A-A	Capacity N-M-M	22,7	OK
Section 2 (1,51m)	B-B	Capacity N-M-M	45,3	OK
Section 3 (3,01m)	C-C	Stress Limitation	58,0	OK
Section 5 (5,90m)	C-C	Stress Limitation	82,4	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,90m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(2)(66)	-322,8	-32,9	-0,1	82,4	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(2)(3)	-3,4	145,5	-0,1	31,7	OK
Shear					
ULS Fundamental ST(2)(3)	-322,8	5,2	-0,1	0,0	OK
Stress Limitation					
SLSC ST(2)(66)	-322,8	-32,9	-0,1	82,4	OK
Crack Width					
SLSF ST(2)(72)	-306,0	-25,5	-0,1	0,0	OK



	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(2)(3)	-3,4	145,5	0,0
2	ULS Fundamental ST(2)(2)	-3,4	107,4	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(2)(2)	SW (1) + R (2) + G (2) + PRE (2)
ULS Fundamental ST(2)(3)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2)

Combination	Critical load effect description
SLSC ST(2)(66)	SW (1) + R (2) + G (2) + PRE (2)
SLSF ST(2)(72)	SW (1) + R (2) + G (2) + PRE (2)

Construction stage: End of design working life (18250,0d)
Redistribution and reduction

Internal forces respecting the influence of redistribution and reduction

Combination: All combinations

Member	Dx [m]	Combination	N [kN]	V_z [kN]	M_y [kNm]
3	3,22	ULS Fundamental ST(7)(38)	-322,8	29,7	20,8
3	10,20	ULS Fundamental ST(7)(38)	0,0	-48,1	98,7
3	0,00	ULS Fundamental ST(7)(38)	0,0	69,7	0,0
3	11,78	ULS Fundamental ST(7)(38)	0,0	-69,7	0,0
3	9,28	ULS Fundamental ST(7)(38)	0,0	-37,8	138,2
3	8,56	ULS Fundamental ST(7)(50)	-322,8	-22,0	-36,3

Combination	Critical load effect description
ULS Fundamental ST(7)(38)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + G (7)
ULS Fundamental ST(7)(50)	1,35*SW (1) + R (2) + G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + 1,35*G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + 1,35*G (7)

Intermediate results of redistribution and reduction

Combination: ULS Fundamental ST(7)(42)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	78,5	0,0	-8,8
2 Left	-78,5	0,0	8,8

Combination: ULS Fundamental ST(7)(58)

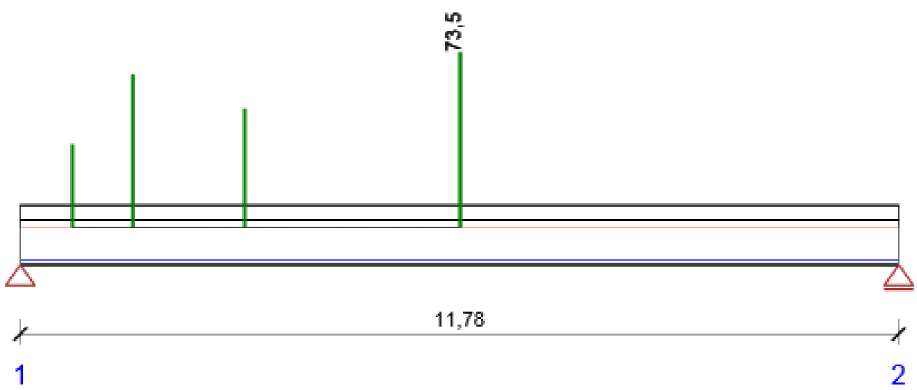
Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	65,6	0,0	-10,3
2 Left	-65,6	0,0	10,3

Combination: SLSC ST(7)(71)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	48,6	0,0	-7,6
2 Left	-48,6	0,0	7,6

Combination: SLSF ST(7)(77)

Node / Support	Original internal forces		Reduction
	Vz [kN]	My [kNm]	ΔVz [kN]
1 Right	48,6	0,0	-7,6
2 Left	-48,6	0,0	7,6



Overall sections check

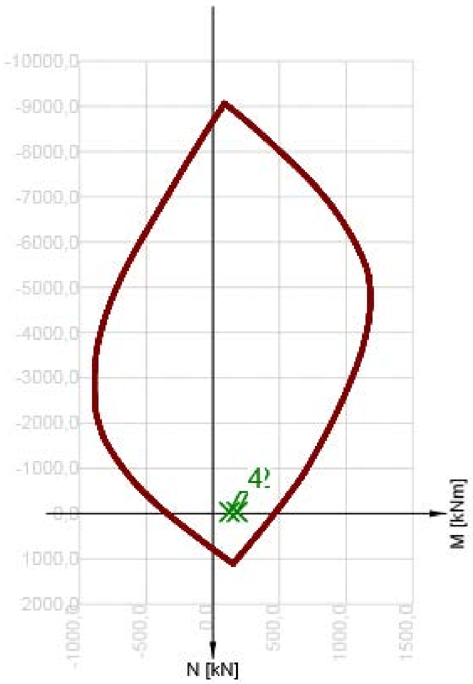
Position	Reinforcement	Governing type of check	Value [%]	Check
Section 1 (0,70m)	A-A	Capacity N-M-M	35,0	OK
Section 2 (1,51m)	B-B	Capacity N-M-M	64,2	OK
Section 3 (3,01m)	C-C	Stress Limitation	50,0	OK
Section 5 (5,90m)	C-C	Stress Limitation	73,5	OK

Limit value of the exploitation of the cross-section: 100,0 %

Section check for position: Section 5 (5,90m)

Governing type of check	Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Stress Limitation	SLSC ST(7)(71)	-322,8	1,8	-0,1	73,5	OK

Combination	N_{Ed} [kN]	$M_{Ed,y}$ [kNm]	V_{Ed} [kN]	Value [%]	Check
Capacity N-M-M					
ULS Fundamental ST(7)(42)	-36,9	186,0	-0,1	38,2	OK
Shear					
ULS Fundamental ST(7)(58)	-322,8	52,0	-0,1	0,0	OK
Stress Limitation					
SLSC ST(7)(71)	-322,8	1,8	-0,1	73,5	OK
Crack Width					
SLSF ST(7)(77)	-307,7	8,4	-0,1	0,0	OK



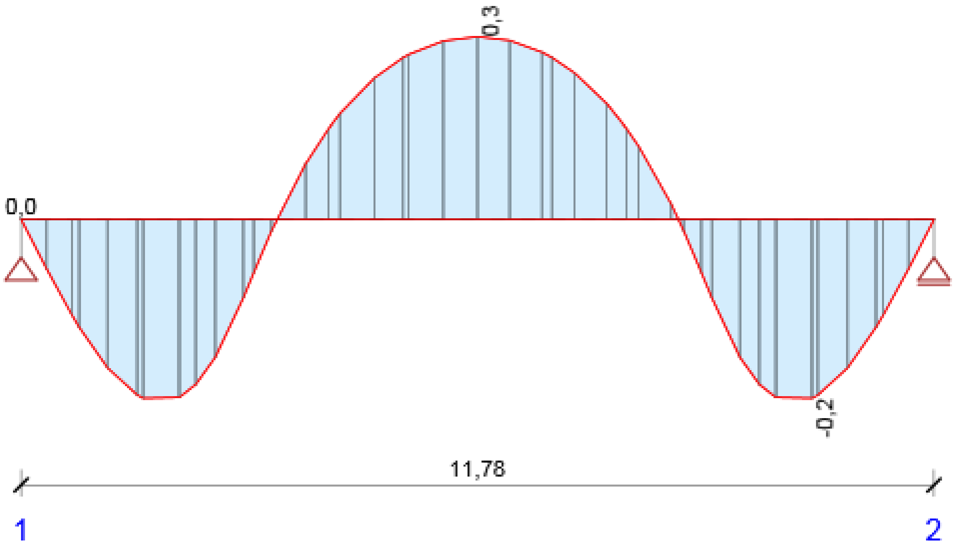
	Extreme	N [kN]	My [kNm]	Mz [kNm]
1	ULS Fundamental ST(7)(42)	-36,9	186,0	0,0
2	ULS Fundamental ST(7)(58)	-36,9	177,6	0,0
3	ULS Fundamental ST(7)(41)	-36,9	127,3	0,0
4	ULS Fundamental ST(7)(51)	-36,9	118,9	0,0

Critical combinations selected for section checks

Combination	Critical load effect description
ULS Fundamental ST(3)(7)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3)
ULS Fundamental ST(7)(42)	1,35*SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + G (3) + R (4) + 1,35*G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + 1,35*G (7)
ULS Fundamental ST(7)(58)	SW (1) + R (2) + 1,35*G (2) + PRE (2) + R (3) + 1,35*G (3) + R (4) + G (4) + R (5) + 1,35*G (5) + R (6) + 1,35*Stalno (6) + R (7) + G (7)
SLSC ST(7)(71)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)
SLSF ST(7)(77)	SW (1) + R (2) + G (2) + PRE (2) + R (3) + G (3) + R (4) + G (4) + R (5) + G (5) + R (6) + Stalno (6) + R (7) + G (7)

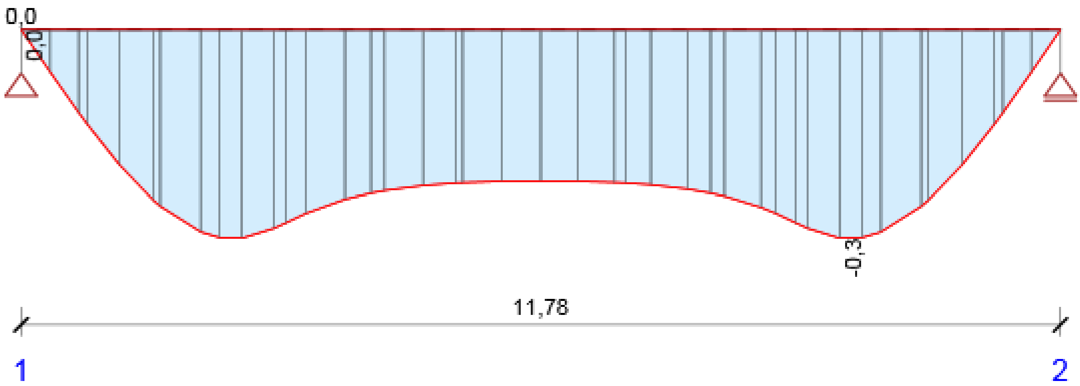
Check of deflections
Deflections: local extremes in spans

Combination: SLSC ST(2)(66), Total deflection



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,ll}$ [mm]	$u_{z,lt}$ [mm]	$u_{z,lim}$ (±) [mm]
5,89	0,5	0,5	0,3	0,3	
10,20	0,0	0,0	-0,2	-0,2	

Combination: SLSC ST(2)(66), Deflection increment



d_x [m]	$u_{z,lin}$ [mm]	$u_{z,st}$ [mm]	$u_{z,ll}$ [mm]	$u_{z,incr}$ [mm]	$u_{z,lim}$ (±) [mm]
9,28	0,2	0,1	-0,2	-0,3	

Long-term losses coefficient

Design member	Load case	Long-term losses coefficient [-]
DM1	PRE (2)	0,89

Design member data

Member type	Beam
Exposure class	XC1
Relative humidity	65 %
Creep coeficient	Calculated
Structural member importance	Minor
Redistribution of moments	Off
Reduction of moments	Off
Reduction of shear force	On
Limited interaction check	On

Data of beam spans

Span	Length	Check acc. 7.4.1 (4)	Check acc. 7.4.1 (5)

	[m]	Check	Deflection limits [mm]	Check	Deflection limits [mm]
1	11,78	False		False	

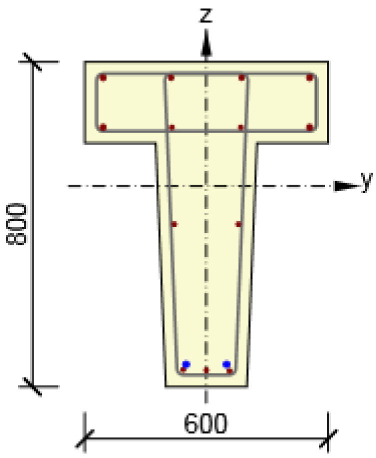
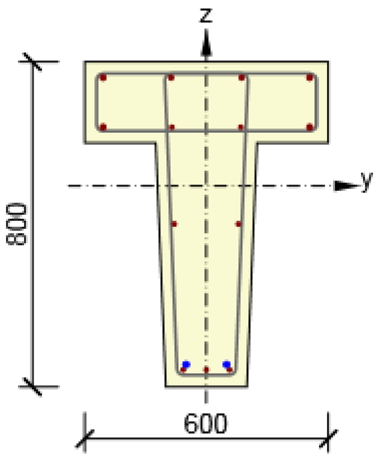
Supports definition

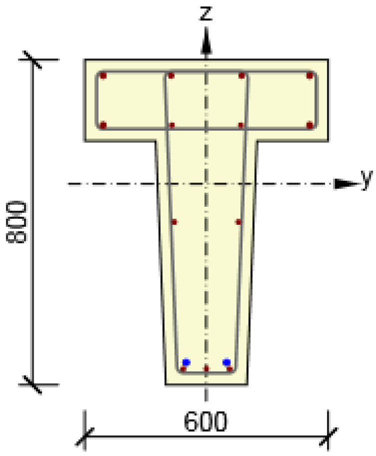
Node	Support width [mm]	Beam or slab is
1	400	Continuous over a support
4	400	Continuous over a support

Reinforcement zones

Zone	Begin [m]	End [m]	Length [m]	Reinforcement	Check
1	0,00	1,50	1,50	A-A	No
2	1,50	3,00	1,50	B-B	No
3	3,00	8,78	5,78	C-C	No
4	8,78	10,28	1,50	B-B	No
5	10,28	11,78	1,50	A-A	No

Reinforcement for position

Position	Reinforced cross-section	Reinforcement
Section 1 (0,70m)		Reinforcement: 2ø12 (226mm²) (B 550B), z = 267 mm 2ø14 (308mm²) (B 550B), z = 267 mm 2ø10 (157mm²) (B 550B), z = 145 mm 2ø14 (308mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 1ø10 (79mm²) (B 550B), Position -57, -452 mm 1ø10 (79mm²) (B 550B), Position 0, -454 mm 1ø10 (79mm²) (B 550B), Position 57, -455 mm Stirrups: ø8 (B 550B) - 150 mm ø8 (B 550B) - 150 mm Tendons: 2*1ø15,2 (139mm²) (Y1860S7-15.2), z = -439 mm
Section 2 (1,51m)		Reinforcement: 2ø12 (226mm²) (B 550B), z = 267 mm 2ø14 (308mm²) (B 550B), z = 267 mm 2ø10 (157mm²) (B 550B), z = 145 mm 2ø14 (308mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 3ø10 (236mm²) (B 550B), z = -452 mm Stirrups: ø8 (B 550B) - 200 mm ø8 (B 550B) - 200 mm Tendons: 2*1ø15,2 (139mm²) (Y1860S7-15.2), z = -439 mm

Position	Reinforced cross-section	Reinforcement
Section 3 (3,01m), Section 5 (5,90m)		Reinforcement: 2ø12 (226mm²) (B 550B), z = 267 mm 2ø14 (308mm²) (B 550B), z = 267 mm 2ø10 (157mm²) (B 550B), z = 145 mm 2ø14 (308mm²) (B 550B), z = 145 mm 2ø10 (157mm²) (B 550B), z = -94 mm 3ø10 (236mm²) (B 550B), z = -455 mm Stirrups: ø8 (B 550B) - 250 mm ø8 (B 550B) - 250 mm Tendons: 2*1ø15,2 (139mm²) (Y1860S7-15.2), z = -439 mm

Material of reinforcement

Name	f_{yk} [MPa]	f_{tk} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
B 550B	550,0	594,0	200000,0	0,20	7850
	f_{tk}/f_{yk} = 1,08,ε_{uk} = 500,0 1e-4,Type: Bars,Bar surface: Ribbed,Class: B, Fabrication: Hot rolled,Diagram type: Bilinear with horizontal top branch				

Code and calculation settings

Clause	Name		Value	Description
2.4.2.4(1)	γ c - Persistent, transient		1,50-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ c - Accidental		1,20-	Partial factor for concrete EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Persistent, transient		1,15-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ s - Accidental		1,00-	Partial factor for reinforcing EC2-1-1 (3.15),(3.16)
2.4.2.4(1)	γ sp		1,15-	Partial factor for prestressing steel EC2-1-1 (3.15),(3.16)
5.5	k1		0,44-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k2		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10a)
5.5	k3		0,54-	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k4		1.25(0.6 + 0.0014/epscu2)	Coefficient used for calculation of moment redistribution EC2-1-1 (5.10b)
5.5	k5		0,70-	Coefficient used for calculation of moment redistribution EC2-1-1
5.5	k6		0,80-	Coefficient used for calculation of moment redistribution EC2-1-1
6.2.2	Values for shear check d = h *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1

Clause	Name		Value	Description
6.2.2	Values for shear check z = d *		0,90-	The values of d (effective detpth) and z (lever arm) for shear check can by specified by the user EC2-1-1
6.2.2(1)	C rdc		0,18-	Coeficient Crdc / gamma_c EC2-1-1 (6.2a)
6.2.2(1)	k1		0,15-	Coefficient k1 EC2-1-1 (6.2a)
6.2.2(2)	Neglect cracking status		On	Neglect the status without flexural cracks in calculation of shear resistance. Shear resistance will always be calculated acc. to clause 6.2.2 (1) as if the cross-section was cracked bending EC2-1-1 (6.2.2(1))
6.2.3(1)	θ		21,8°	Angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1 (6.8), (6.9), (6.13), (6.14)
6.2.3(2)	θ min		21,8°	Minimal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	θ max		45,0°	Maximal angle between the concrete compression strut and the beam axis perpendicular to the shear force EC2-1-1
6.2.3(2)	Calculate angle of concrete compression strut	Check Type	Off Long. reinf. and Strut	Calculate angle of concrete compression strut to optimize the use of selected component of truss analogy. In the case that any other component of truss analogy is not satisfactory, the value of angle from code settings will be used. EC2-1-1
6.2.3(3)	α cw	Check	Off 1,00-	Coefficient taking account of the state of the stress in the compression chord EC2-1-1 (6.9), (6.14)
6.2.3(3)	ρ w,max		On	Maximal reinforcement ratio for shear reinforcement EC2-1-1 (6.12)
6.2.5 (1)	Shear stress calculation in joints		Difference of normal forces	Shear stress in joint is calculated according to settings
	Limit is defined as numerical value		Off	Deflection will be checked against limit value defined numerically
	Numerical value of deflection limit		25mm	Deflection will be checked against limit value defined numerically.
	Limit value for deflections acc. 7.4.1 (4) as length of span /		250,00-	Calculated deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (4).
	Limit value for deflections acc. 7.4.1 (5) as length of span /		500,00-	Calculated increment of deflection of a beam, slab or cantilever subjected to selected SLS (usually quasi-permanent) combination must not exceed vertical out-of-level to span ratio acc.7.4.1 (5).
7.3.1(5)	wmax for reinforced members: Exposure class	X0, XC1 XC2, XC3, XC4 XD, XS	0,400mm 0,300mm 0,300mm	Recommended values of wmax for reinforced members and quasi-permanent combination EC2-1-1 7.1N

Clause	Name		Value	Description
7.3.1(5)	wmax for prestressed members: Exposure class	X0, XC1 XC2, XC3, XC4	0,200mm 0,200mm	Recommended values of wmax for prestressed members and frequent combination EC2-1-1 7.1N
7.3.1(5)	Decompression for prestressed members: Exposure class	XC2, XC3, XC4 XD, XS	25mm 25mm	Recommended values of decompression for prestressed members and frequent combination EC2-1-1 7.1N
8.2(2)	s l,min	Check Distance k1(multiple) k2(increment)	On 20mm 1,00- 5mm	Minimal clear distance of longitudinal reinforcement EC2-1-1
8.3(2)	Φ m,min	Check Φs <= 16mm (increment Φs) Φs > 16mm (increment Φs)	On 3,00- 7,00-	Minimum mandrel diameter of stirrup as multiple of stirrup diameter EC2-1-1 Table 8.1N
9.2.1.1(1)	ρ l,min	Check Ratio Factor	On 0,13% 0,26-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.1N)
9.2.1.1(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.2.2(5)	ρ w,min	Check	On 0,08-	Minimal reinforcement ratio for shear reinforcement EC2-1-1 (9.5N)
9.2.2(6)	s w,max	Check	On 0,75-	Maximal distance of stirrups EC2-1-1 (9.6N)
9.2.2(8)	s t,max	Check Check Distance Factor	On On 600mm 0,75-	Maximal transversal distance of branches of stirrups EC2-1-1 (9.8N)
9.2.3(4)	s l,max	Check	On 350mm	Maximal axial distance of longitudinal reinforcement EC2-1-1
9.5.2(1)	Φ min	Check	On 8mm	Minimal diameter of longitudinal reinforcement EC2-1-1
9.5.2(2)	ρ l,min	Check Ratio Factor	On 0,20% 0,10-	Minimal reinforcement ratio for longitudinal reinforcement EC2-1-1 (9.12N)
9.5.2(3)	ρ l,max	Check	On 4,00%	Maximal reinforcement ratio for longitudinal reinforcement EC2-1-1
9.5.2(4)	n Φ	Check	On 4	Minimal number of bars of longitudinal reinforcement EC2-1-1
9.5.3(1)	Φ w,min	Check	On 6mm	Minimal diameter of shear reinforcement EC2-1-1
9.5.3(3)	s ct,tmax	Check Distance Factor	On 400mm 20,00-	Maximal distance of stirrups EC2-1-1
	Don't exclude tendons		Off	Don't exclude tendons from calculation model of reinforced cross-section if tendons are outside of cross-section
	Neglect redistribution of moments		10,00%	Neglect redistribution of moments My, Mz, if the ratio My/Mz is less than 10%
	Limit value of exploitation		100,00%	Limit value of the exploitation of the cross-section
	Number of iteration steps		20	Number of iteration steps

Clause	Name		Value	Description
	Use simplified model of cross-section		On	Use simplified calculation model of cross-section to increase the speed of checks
	Evaluation of interaction diagram		NuMuMu	Evaluation of interaction diagram
	Direction of imperfection		Resultant of moments	Type of direction for calculation of imperfections for columns
	Interpolation curve		Parabolic	Type of interpolation curve of bending moment for calculation of imperfection
	Maximum length of subzone		1,00m	The stiffness of cross-section for the calculation of deflection is considered to be constant in the subzone.

1 Project data

Project title	**KG-1 T 80**
Project number	07
Description	T80 KRANSKA GREDA
Author	SIRBEGOVIC Imzenjering
Date of creation	6.9.2016

National code

National code	EN 1992-1-1:2014-12
Design working life	50 years

2 Design Members

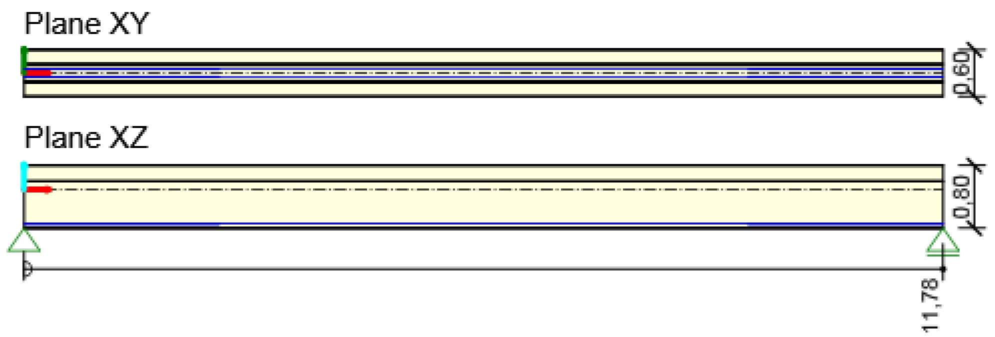
2.1 DM1

Description	Type	Members	Tendons	Valid
	Pre-tensioned	3	G1	✓

Stressing bed: SB1

Length of prestressing units	50,00 m
Stressing procedure	Pretenesioned - correction of relaxation
Calculation of relaxation	By time
Duration of keeping stress constant	300 s
Duration of short-term relaxation	57600 s
Loss due to deformation of end abutments	On
Defining of number of prestresing units	By groups
Shortening of stressing bed	1 mm
Anchorage set	2 mm
Loss due to the difference in temperature	On
Code coefficient	0,50 -
T_{max}	50 °C
T_0	20 °C
Tendon releasing	Gradual releasing

Geometry of design member



2.1.1 Prestressing

Name	Material	A_p [mm^2]	Length [m]	L_s [m]	L_{arc} [m]	R_{min} [m]	θ [°]
	Strands	σ_a [MPa]	σ_{min} [MPa]	σ_{max} [MPa]	e_{ba} [mm]	e_{aa} [mm]	L_{set} [m]
G1	Y1860S7-15.2	139	11,78	11,78	0,00	0,00	0,0
	1	1200,0	578,8	1149,2	307,7	305,7	0,00

Name	$\sigma_{ini,max}$ [MPa]	$\sigma_{p,max}$ [MPa]	Check 5.10.2.1(1)P	σ_{min} [MPa]	σ_{max} [MPa]	σ_{pm0} [MPa]	Check 5.10.3(2)P
G1	1200,0	1476,0	✓	578,8	1149,2	1394,0	✓

Explanation

Symbol	Explanation
A_p	Area of tendon
Length	Length of tendon
L_s	Sum of lengths of straight parts of tendon
L_{arc}	Sum of lengths of curved parts of tendon

R_{min}	Smallest curve radius found in specified geometry of current tendon
θ	Cumulative angular change
σ_a	Anchorage stress
σ_{min}	Minimum stress along the length of tendon after anchoring
σ_{max}	Maximum stress along the length of tendon after anchoring
e_{ba}	Theoretical tendon elongation before anchoring
e_{aa}	Theoretical tendon elongation after anchoring
L_{set}	Length affected by anchorage set
$\sigma_{ini,max}$	Maximum initial stress in tendon
$\sigma_{p,max}$	Limit value of tendon stress applied to the tendon acc. to 5.10.2.1 (1)P
Check 5.10.2.1(1)P	Check of criterion according to provision 5.10.2.1 (1)P
σ_{pm0}	Limit value of tendon stress applied to the tendon acc. to 5.10.3 (2)
Check 5.10.3(2)P	Check of criterion according to provision 5.10.3 (2)P

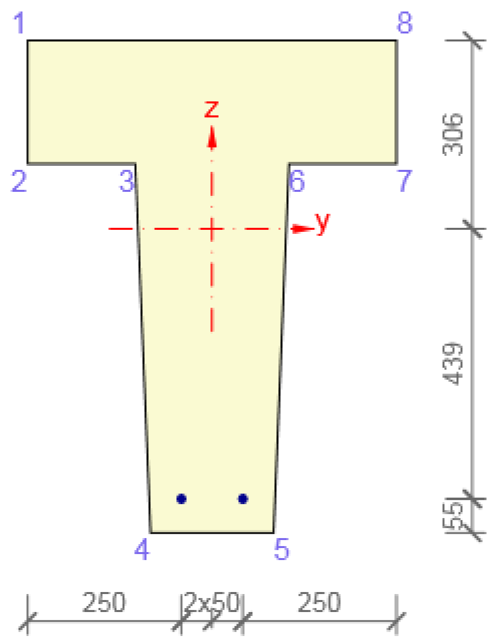
3 Tendons

3.1 Tendon: G1

Material	Number of strands	Load case	Area [mm^2]	Ø [mm]	Max. initial stress [MPa]	Limit stress [MPa]	Stress check
Y1860S7-15.2	1	PRE (2)	139	15,2	1200,0	1476,0	✓

3.1.1 Geometry

Tendon geometry



Number of tendons		[mm]		[mm]
2	Vertex 4		Vertex 5	

Index	y [mm]	z [mm]
1	-50	-439
2	50	-439

Tendon coordinates calculated in defined distance X

X_B [m]	X_T [m]	Y [mm]	Y- [mm]	Y+ [mm]	Z [mm]	Z- [mm]	Z+ [mm]
0,00	0,00	-50	-250	350	-439	-55	745
1,00	1,00	-50	-250	350	-439	-55	745
2,00	2,00	-50	-250	350	-439	-55	745
3,00	3,00	-50	-250	350	-439	-55	745
4,00	4,00	-50	-250	350	-439	-55	745

5,00	5,00	-50	-250	350	-439	-55	745
6,00	6,00	-50	-250	350	-439	-55	745
7,00	7,00	-50	-250	350	-439	-55	745
8,00	8,00	-50	-250	350	-439	-55	745
9,00	9,00	-50	-250	350	-439	-55	745
10,00	10,00	-50	-250	350	-439	-55	745
11,00	11,00	-50	-250	350	-439	-55	745
11,78	11,78	-50	-250	350	-439	-55	745

3.1.2 Equivalent load caused by prestressing

Tendon name	Index	x [m]	F_x [kN]	F_y [kN]	F_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
G1	1	2,54	32,3	0,0	0,0	0,0	-14,2	0,0
	2	2,61	32,3	0,0	0,0	0,0	-14,2	0,0
	3	2,68	32,3	0,0	0,0	0,0	-14,2	0,0
	4	2,75	32,3	0,0	0,0	0,0	-14,2	0,0
	5	2,83	32,3	0,0	0,0	0,0	-14,2	0,0
	6	2,90	32,3	0,0	0,0	0,0	-14,2	0,0
	7	2,97	32,3	0,0	0,0	0,0	-14,2	0,0
	8	3,04	32,3	0,0	0,0	0,0	-14,2	0,0
	9	3,12	32,3	0,0	0,0	0,0	-14,2	0,0
	10	3,19	24,2	0,0	0,0	0,0	-10,6	0,0
	11	3,22	8,1	0,0	0,0	0,0	-3,5	0,0
	12	8,56	-8,1	0,0	0,0	0,0	3,5	0,0
	13	8,59	-24,2	0,0	0,0	0,0	10,6	0,0
	14	8,66	-32,3	0,0	0,0	0,0	14,2	0,0
	15	8,74	-32,3	0,0	0,0	0,0	14,2	0,0
	16	8,81	-32,3	0,0	0,0	0,0	14,2	0,0
	17	8,88	-32,3	0,0	0,0	0,0	14,2	0,0
	18	8,95	-32,3	0,0	0,0	0,0	14,2	0,0
	19	9,03	-32,3	0,0	0,0	0,0	14,2	0,0
	20	9,10	-32,3	0,0	0,0	0,0	14,2	0,0
	21	9,17	-32,3	0,0	0,0	0,0	14,2	0,0
	22	9,24	-32,3	0,0	0,0	0,0	14,2	0,0

Explanation

Symbol	Explanation
Tendon name	Tendon name
Index	Index of current impulse of concentrated load
x	x - coordinate in coordinate system of Design Member
F_x	Magnitude of concentrated force in x direction
F_y	Magnitude of concentrated force in y direction
F_z	Magnitude of concentrated force in z direction
M_x	Magnitude of concentrated moment about x axis
M_y	Magnitude of concentrated moment about y axis
M_z	Magnitude of concentrated moment about z axis

Equivalent load

3.1.3 Prestressing losses

Maximum stress allowed in tendon during tensioning acc. 5.10.2.1(1)P

Maximum initial stress in tendon [MPa]	Limit value of tendon stress $\sigma_{p,max}$ [MPa]	Stress check
1200,0	1476,0	✓

Maximum stress allowed in tendon immediately after transfer acc. 5.10.3(2)

Maximum stress after transfer [MPa]	Limit value of tendon stress σ_{pm0} [MPa]	Stress check

1149,2	1394,0	✓

Input values and intermediate results

Area of tendon	139 mm^2
Length of tendon	11,78 m
Maximum stress during tensioning	1200,0 MPa
Maximum stress after transfer	1149,2 MPa
Theoretical tendon elongation before anchoring	307,7 mm
Theoretical tendon elongation after anchoring	305,7 mm
Length affected by anchorage set	0,00 m
Transmission length - begin	0,72 m
Transmission length - end	0,72 m
Blanketed length - begin	2,50 m
Blanketed length - end	2,50 m

Transmission length - begin

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1161,3	4,6	0,72	0,58	0,87

Transmission length - end

$f_{ctd(t)}$ [MPa]	η_{p1} [-]	η_1 [-]	α_1 [-]	α_2 [-]	ϕ [mm]	σ_{pm0} [MPa]	f_{bpt} [MPa]	l_{pt} [m]	l_{pt1} [m]	l_{pt2} [m]
1,4	3,20	1,00	1,00	0,19	15,2	1161,3	4,6	0,72	0,58	0,87

Short-term losses

d_x [m]	$\Delta\sigma_{pw}$ [MPa]	$\Delta\sigma_{pA}$ [MPa]	$\Delta\sigma_{pr}$ [MPa]	$\sigma_{pr,cor}$ [MPa]	$\Delta\sigma_{pT}$ [MPa]	$\Delta\sigma_{pe}$ [MPa]	σ_{pa} [MPa]	$\Delta\sigma_{pr,occur}$ [MPa]	$\Delta\sigma_{pr,cap}$ [MPa]
0,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
1,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
2,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
2,50	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
3,00	-7,8	0,0	-1,6	1190,6	-29,3	-7,1	793,8	-2,2	-21,0
3,22	-7,8	0,0	-1,6	1190,6	-29,3	-15,8	1145,6	-2,2	-30,4
4,00	-7,8	0,0	-1,6	1190,6	-29,3	-13,9	1147,4	-2,2	-30,4
5,00	-7,8	0,0	-1,6	1190,6	-29,3	-12,5	1148,8	-2,2	-30,4
6,00	-7,8	0,0	-1,6	1190,6	-29,3	-12,1	1149,2	-2,2	-30,4
7,00	-7,8	0,0	-1,6	1190,6	-29,3	-12,7	1148,6	-2,2	-30,4
8,00	-7,8	0,0	-1,6	1190,6	-29,3	-14,4	1146,9	-2,2	-30,4
8,56	-7,8	0,0	-1,6	1190,6	-29,3	-15,8	1145,5	-2,2	-30,4
9,00	-7,8	0,0	-1,6	1190,6	-29,3	1,3	449,9	-2,2	-11,7
9,28	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
10,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
11,00	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0
11,78	-7,8	0,0	-1,6	1190,6	-29,3	0,0	0,0	-2,2	0,0

Long-term losses

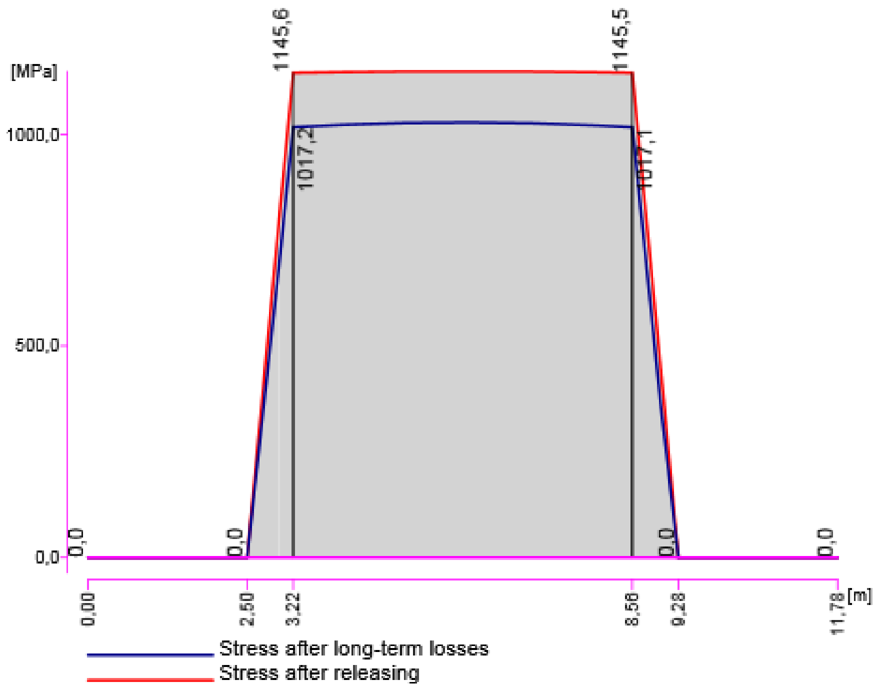
d_x [m]	σ_{pa} [MPa]	$\Delta\sigma_\infty$ [MPa]	σ_∞ [MPa]	$\sigma_\infty/\sigma_{pa}$ [-]
3,00	793,8	108,7	685,1	0,86
3,22	1145,6	128,4	1017,2	0,89
4,00	1147,4	124,5	1022,8	0,89
5,00	1148,8	121,5	1027,3	0,89
6,00	1149,2	120,7	1028,5	0,89
7,00	1148,6	122,0	1026,5	0,89
8,00	1146,9	125,5	1021,4	0,89
8,56	1145,5	128,4	1017,1	0,89
9,00	449,9	89,6	360,3	0,80

Explanation

Symbol	Explanation
l_{pt1}	0.8 lpt
l_{pt2}	1.2 lpt
$\Delta\sigma_{pw}$	Anchorage set loss
$\Delta\sigma_{pA}$	Loss due the deformation of ends abutments of the stressing bed
$\Delta\sigma_{pr}$	Relaxation loss
$\sigma_{pr,cor}$	Stress after short-term relaxation
$\Delta\sigma_{pT}$	Loss due to the difference in temperature of prestressing steel and stressing bed
$\Delta\sigma_{pe}$	Loss due to the immediate elastic concrete strain
σ_{pa}	Stress after short-term losses - stress in the prestressing steel immediately after the anchoring, or – in the case of pre-tensioned concrete – after the transfer of prestressing into the concrete.
$\Delta\sigma_{pr,occur}$	Relaxation that already took place (occurred)
$\Delta\sigma_{pr,cap}$	Remaining relaxation capacity, i.e. potential stress decrease in prestressing reinforcement due to relaxation at infinite time

$\Delta\sigma_\infty$	Loss of stress in the prestressing steel due to relaxation of prestressing steel, concrete creep and shrinkage, and due to immediate elastic concrete strain caused by permanent actions applied after transfer of prestressing.
σ_∞	Stress after long-term losses - stress in the prestressing steel due to all permanent actions including prestressing at the time close to infinity.
$\sigma_\infty/\sigma_{pa}$	The ratio of stress after long-term losses, and the stress after short -term losses.

Losses



4 List of used materials

Name	f_{pk} [MPa]	f_{p01k} [MPa]	E [MPa]	μ [-]	Unit mass [kg/m^3]
Y1860S7-15.2	1860,0	1640,0	195000,0	0,15	7850
	F_m = 259,0 kN, F_{p01} = 227,9 kN, F_r = 190,0 MPa, ρ_{1000} = 0,03, ρ_∞ = 0,06, Φ = 15 mm, Area = 139 mm2, ε_{uk} = 350,0 1e-4, A_{gt} = 350,0 1e-4, Type: Strand Surface characteristic: Plain, Relaxation class: Class2, Production: Low relaxation, Diagram type: Bilinear with an inclined top branch, Number of wires: 7				

Explanation

Symbol	Explanation
f_{pk}	Characteristic tensile strength
f_{p01k}	Characteristic 0,1% proof force
E	Modulus of elasticity of prestressing steel
F_m	Characteristic value of maximum force
F_{p01}	Characteristic 0,1% proof force
F_r	Fatigue stress range
ρ_{1000}	The value of relaxation loss (ratio), at 1000 hours after tensioning and at a mean temperature of 20°C
ρ_∞	The value of relaxation loss (ratio), at 500 000 hours after tensioning and at a mean temperature of 20°C
ε_{uk}	Characteristic strain of reinforcement or prestressing steel at maximum load
A_{gt}	Total elongation at maximum force
Type	Type of prestressing steel
Diagram type	The type of stress-strain diagram

ISKAZ PROCJENJENIH TROŠKOVA GRADNJE

Poslovne zgrada
Bruto površina 722 m2
Jedinični troškovi 5.000 kn/m2
Okvirni troškovi (građevna jama, temeljenje, zidovi, stropovi, krovovi, građevinske ugradnje, intalacije vodovoda i odvodnje, elektroinstalacije, strojarske instalacije)

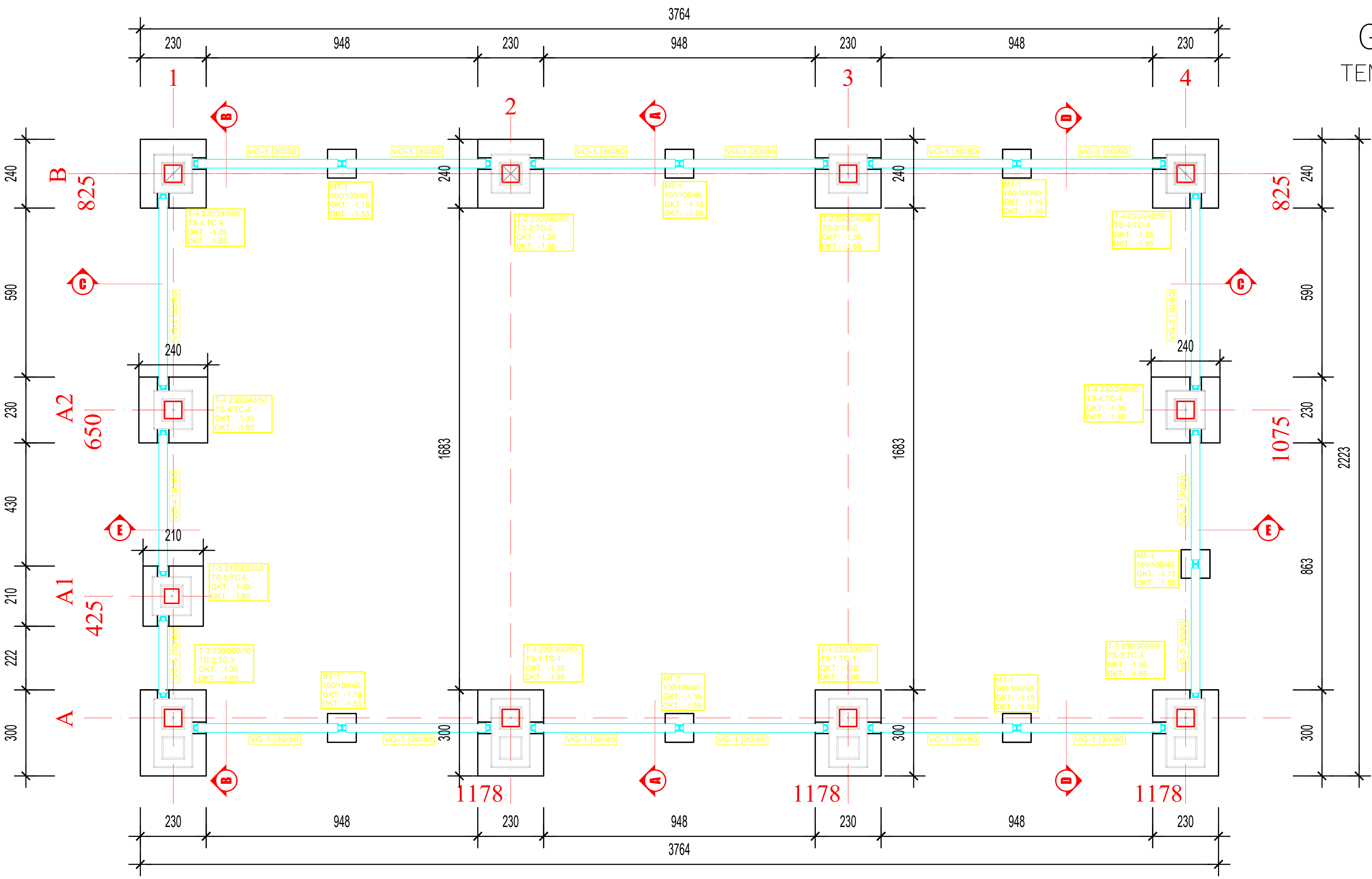
722m2 x 5000 kn/m2 = 3.610.000 kn

Novigrad, studeni 2017.

GLAVNI PROJEKT

TEMELJNA KONSTRUKCIJA

M 1:150



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PROJEKT
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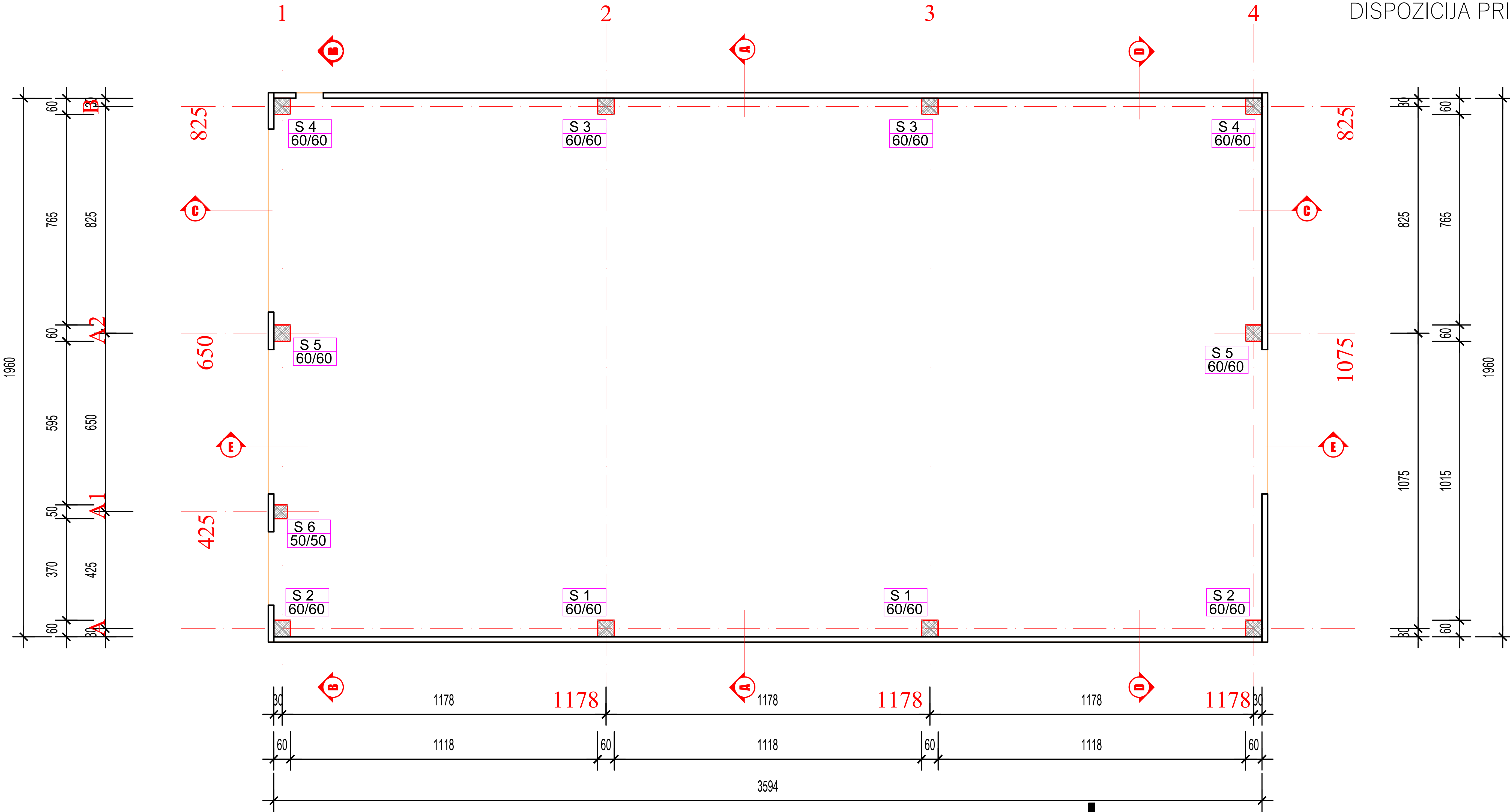
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
TLOCRT TEMELJNE KONSTRUKCIJE	1 : 150	1

GLAVNI PROJEKT

DISPOZICIJA PRIZEMLJA

M 1:150



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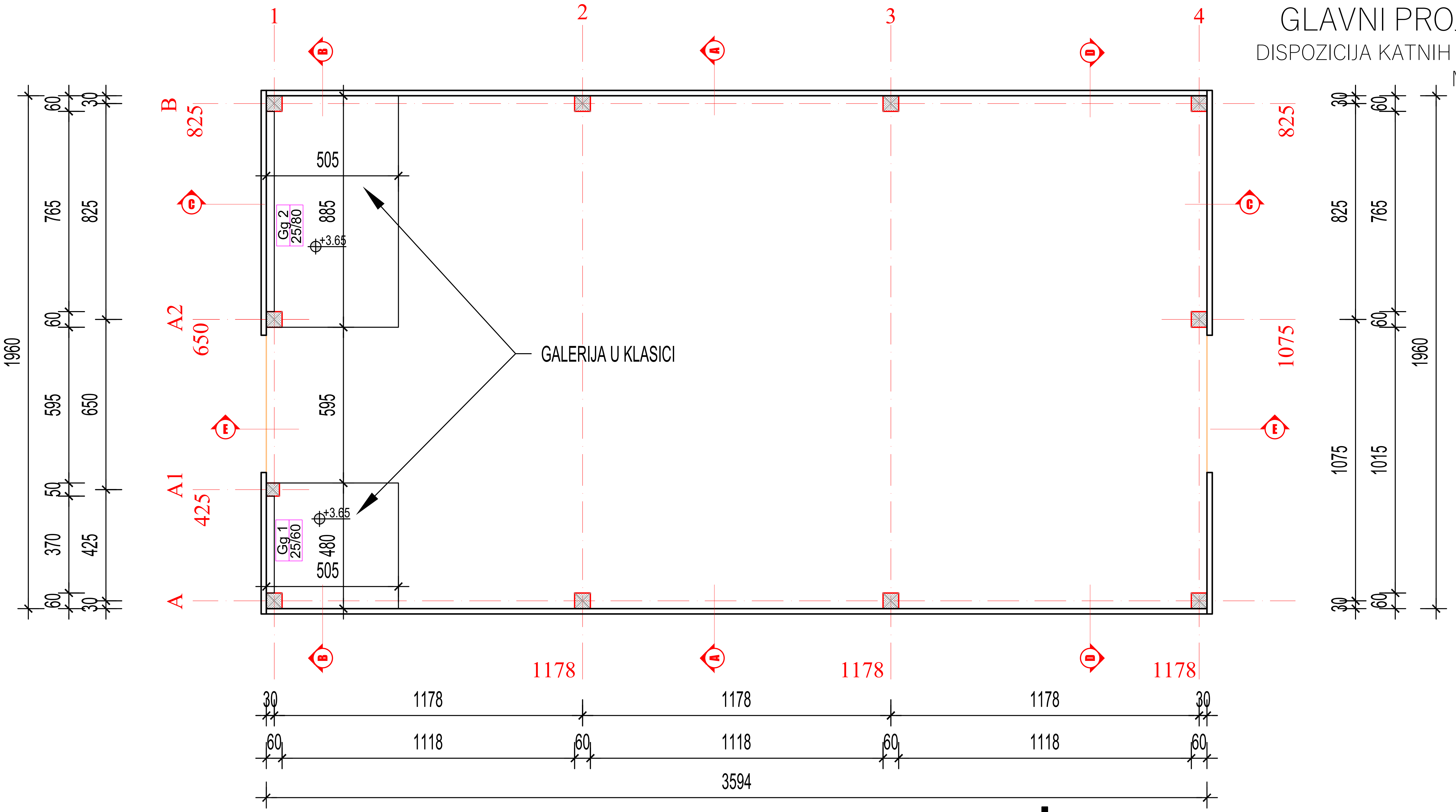
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
DISPOZICIJA PRIZEMLJA	1 : 150	2

GLAVNI PROJEKT

DISPOZICIJA KATNIH GREDA

M 1:150



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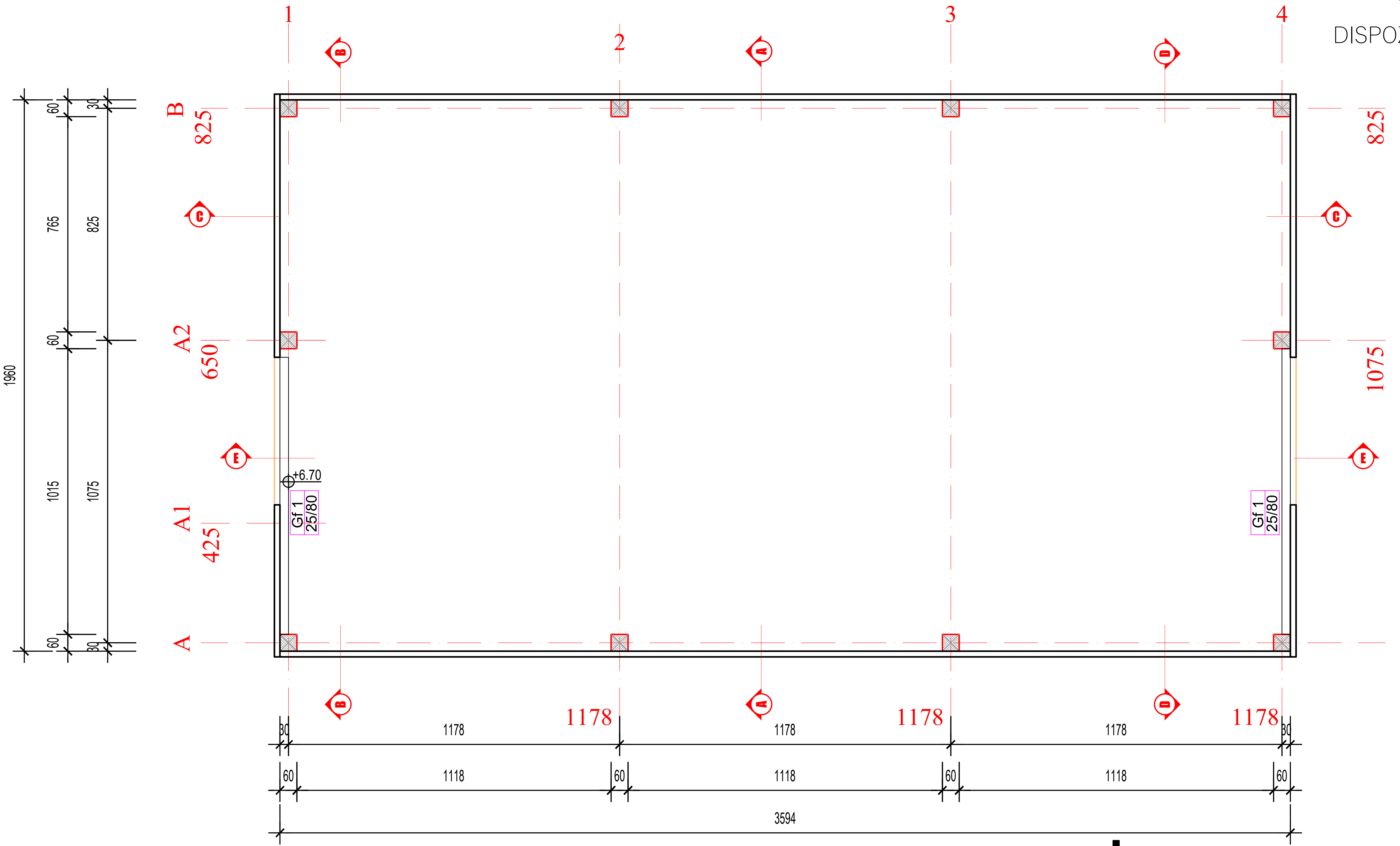
SADRŽAJ NACRTA	MJERILO	LIST
DISPOZICIJA KATNIH GREDA	1 : 150	3

GLAVNI PROJEKT

DISPOZICIJA FASADNIH GREDA

M 1:150



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BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
DISPOZICIJA FASADNIH GREDA	1 : 150	4

GLAVNI PROJEKT

DISPOZICIJA KRANSKIH GREDA

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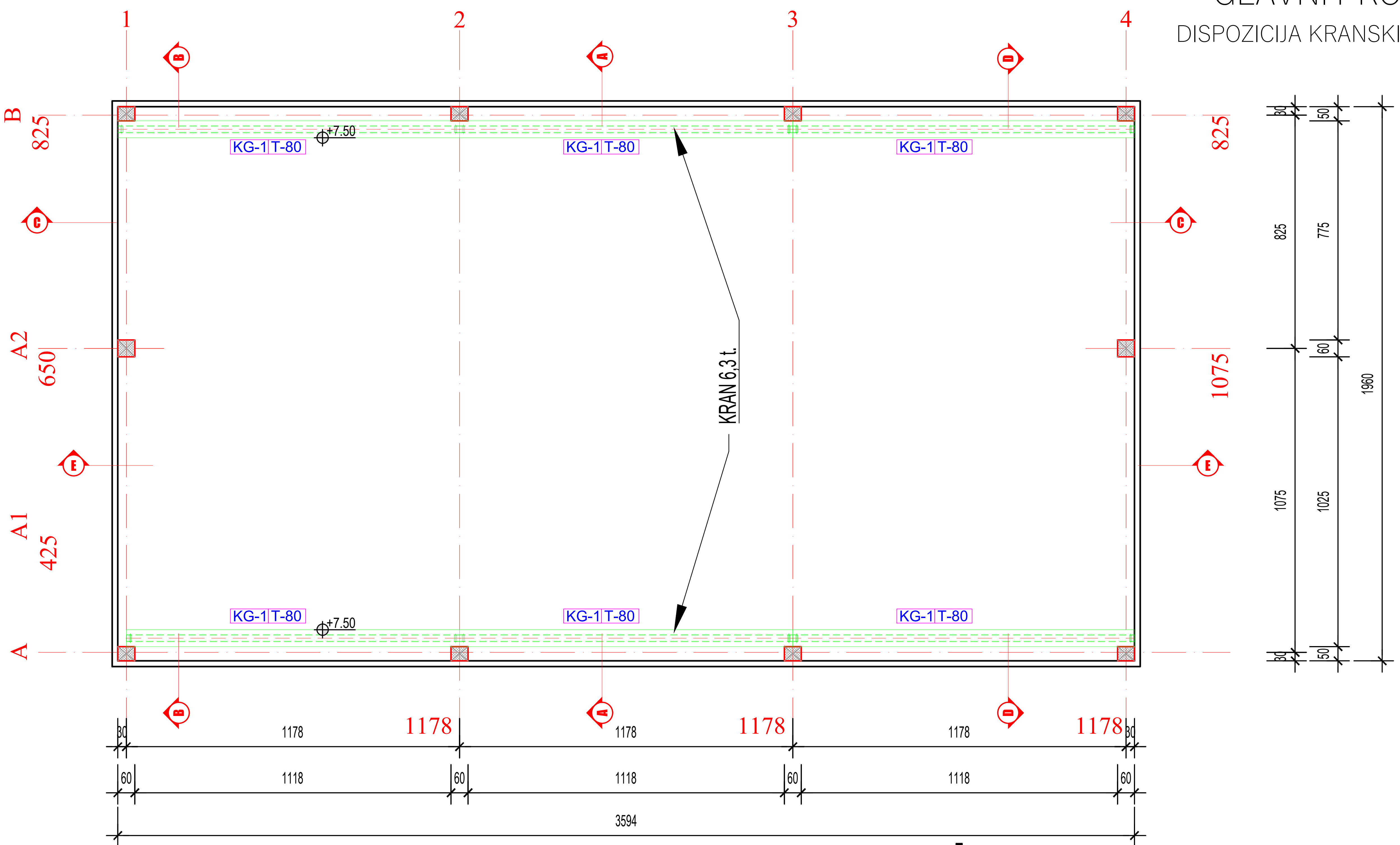

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PROJEKT	INVESTITOR
GRAĐEVINSKI PROJEKT	TERAKOP GRAĐEVINSKI OBRT, Partizanska 13, Poreč 52440, OIB: 79878419670
FAZA	GRAĐEVINA
GLAVNI PROJEKT	PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA
PROJEKTANT	LOKACIJA
IVA LAZARIĆ mag.ing.aedif.	K.Č. 1232/64, 1232/68, 1232/67, 1836/25 K.O. ŽBANDAJ

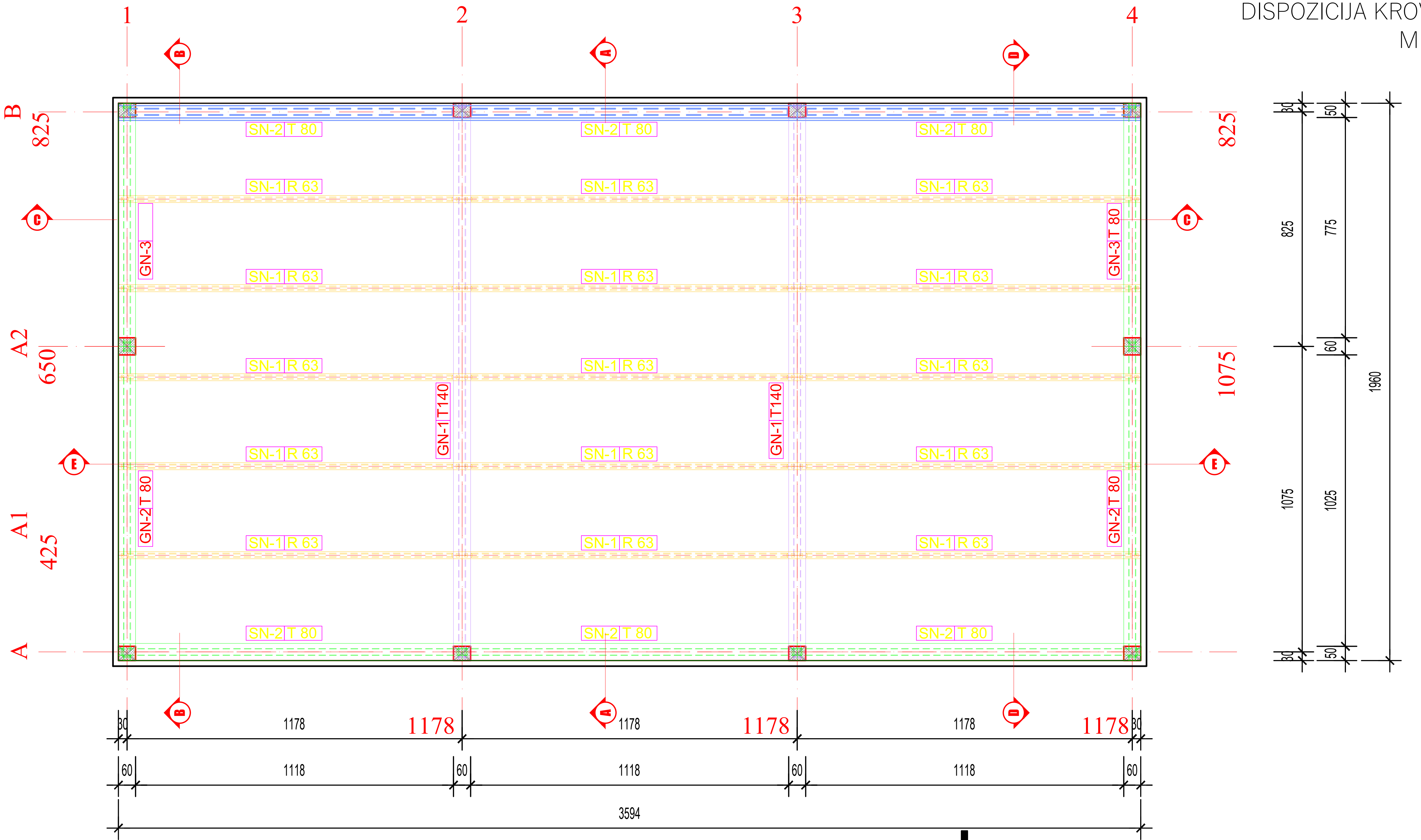
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
DISPOZICIJA KRANSKIH GREDA	1 : 150	5

GLAVNI PROJEKT

DISPOZICIJA KROVIŠTA

M 1:150



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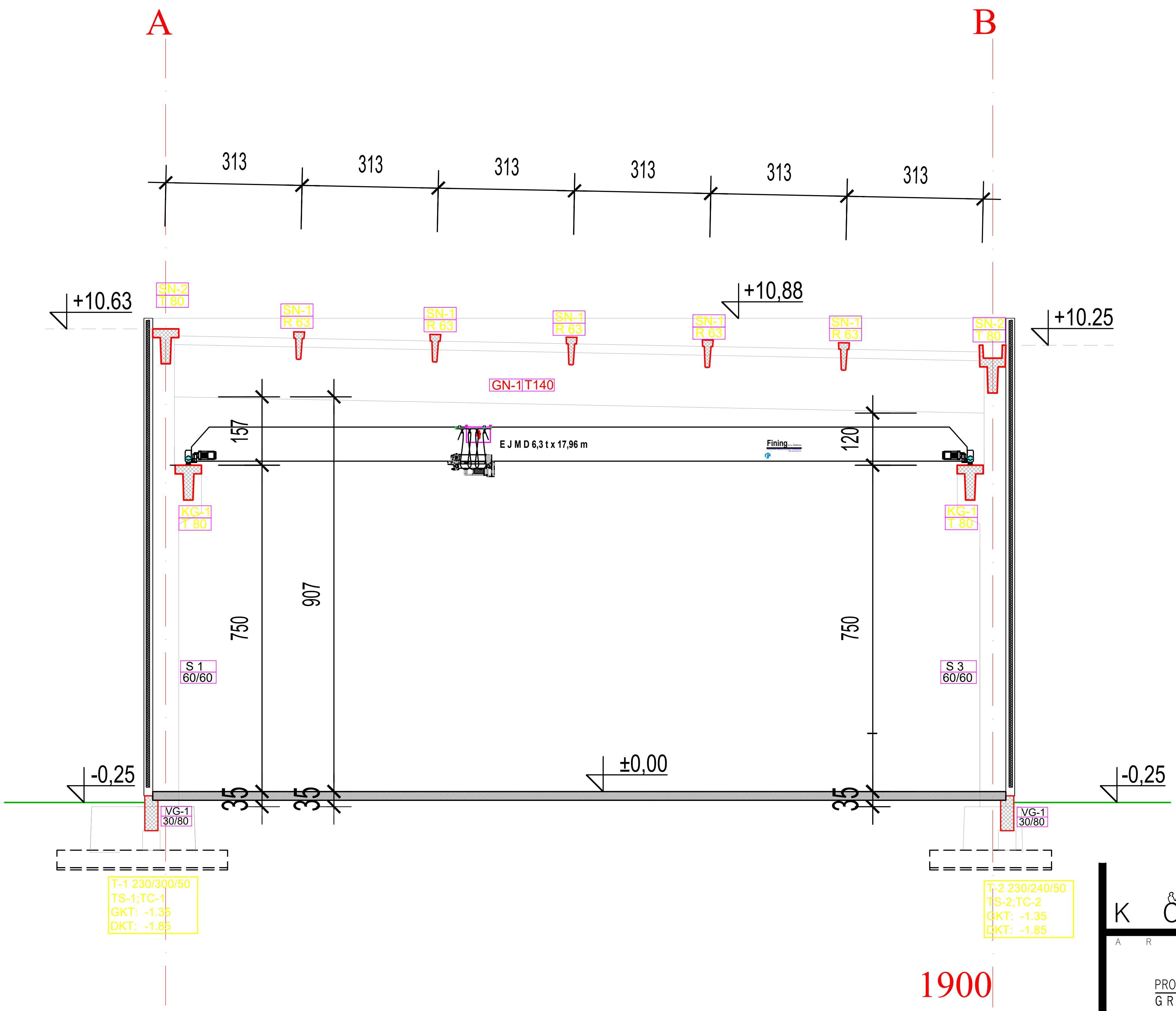
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
DISPOZICIJA KROVIŠTA	1 : 150	6

GLAVNI PROJEKT

PRESJEK A-A

M 1:100



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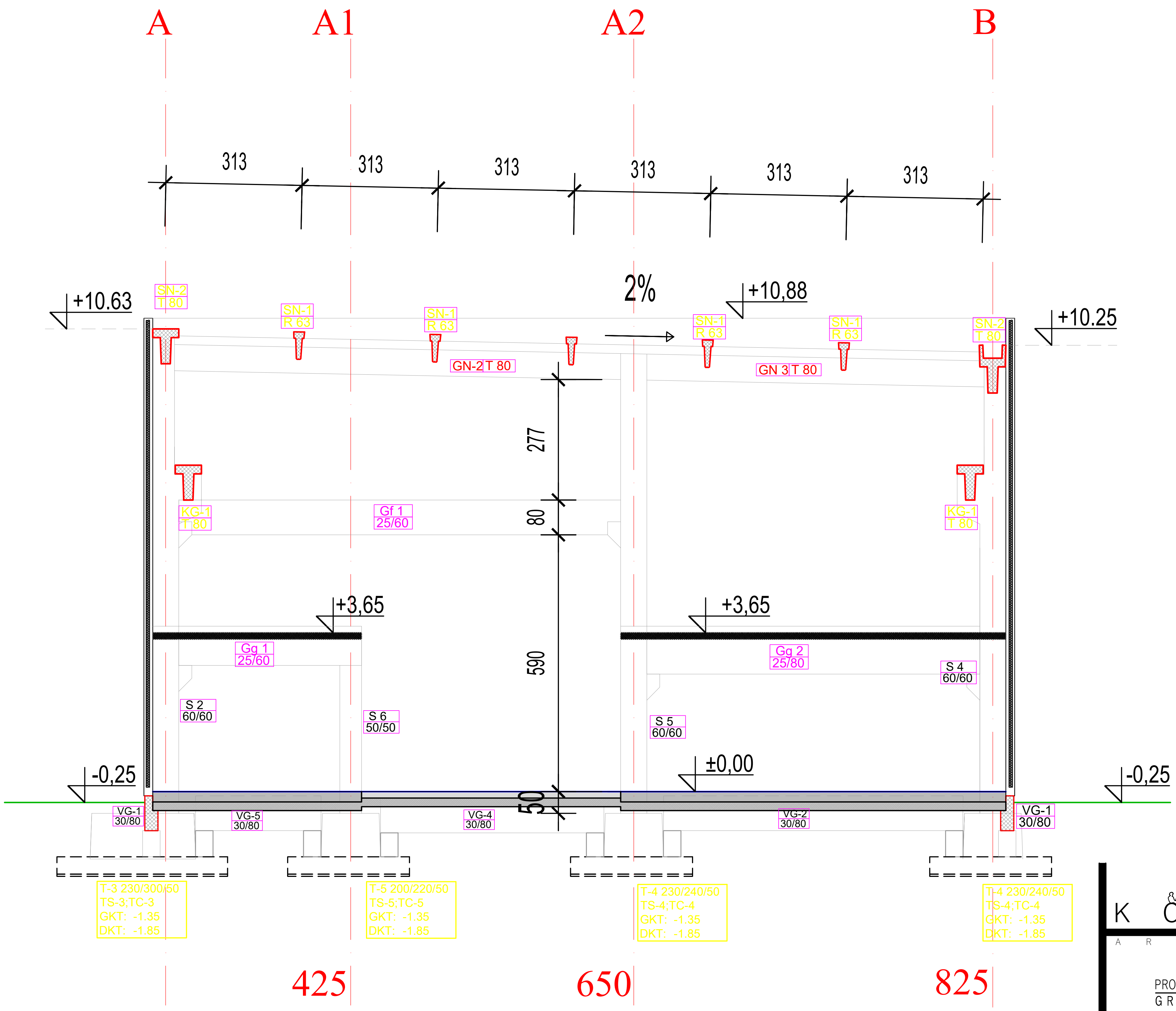
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
PRESJEK A-A	1 : 100	7

GLAVNI PROJEKT

PRESJEK B-B

M 1:100



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HR8624020061100766217
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OIB 85176229919

PROJEKT
GRAĐEVINSKI PROJEKT

FAZA
GLAVNI PROJEKT

PROJEKTANT
IVA LAZARIĆ mag.ing.aedif.

INVESTITOR
TERAKOP GRAĐEVINSKI OBRT, Partizanska 13, Poreč 52440, OIB: 79878419670

GRAĐEVINA
PROIZVODNI POGON ZA SAVIJANJE METALA, REZANJE METALA I IZRADU PREDGOTOVLJENIH ELEMENATA OD METALA

LOKACIJA
K.Č. 1232/64, 1232/68, 1232/67, 1836/25 K.O. ŽBANDAJ

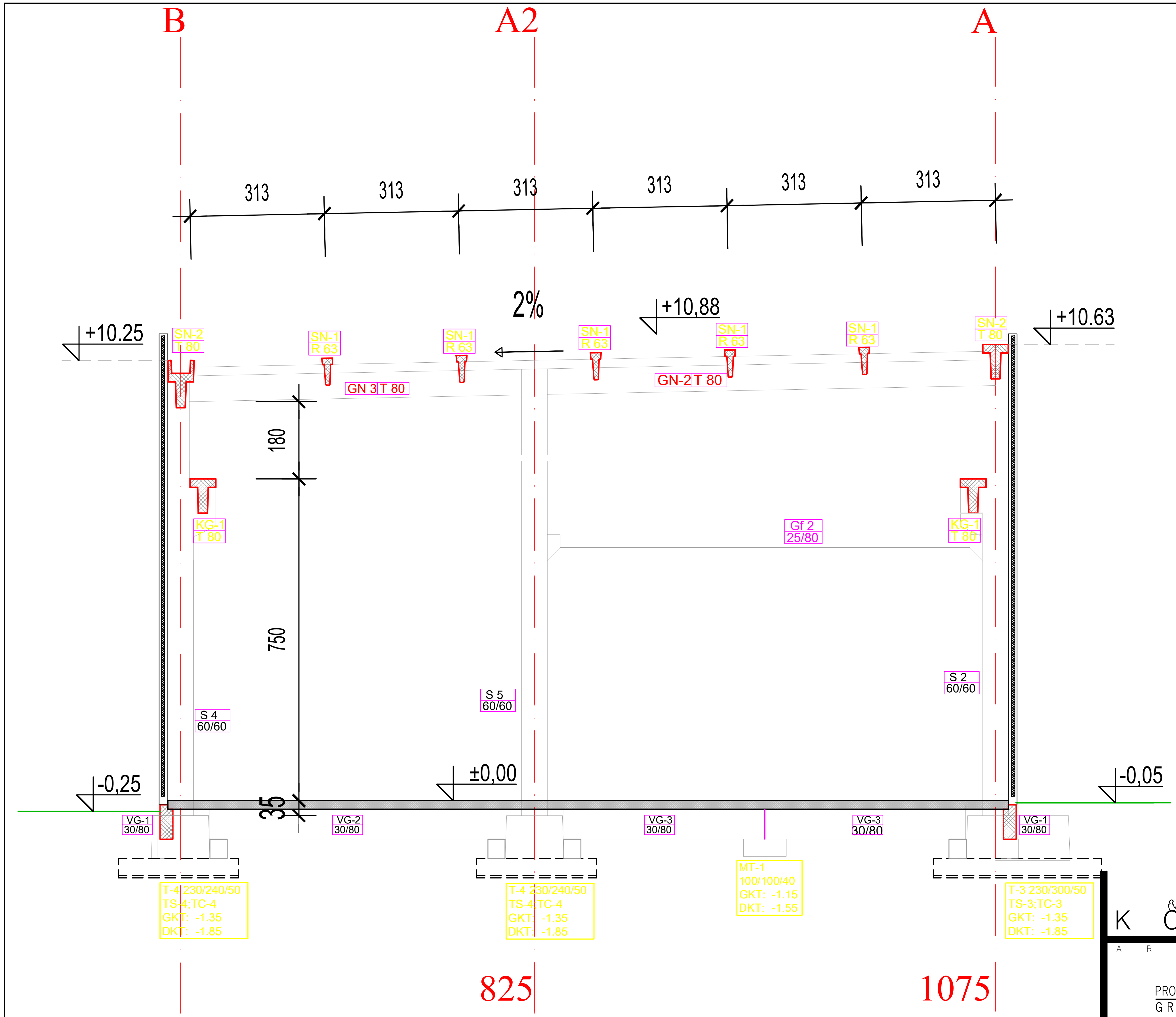
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
PRESJEK B-B	1 : 100	8

GLAVNI PROJEKT

PRESJEK D-D

M 1:100



KONZOLA ARHITEKTURA

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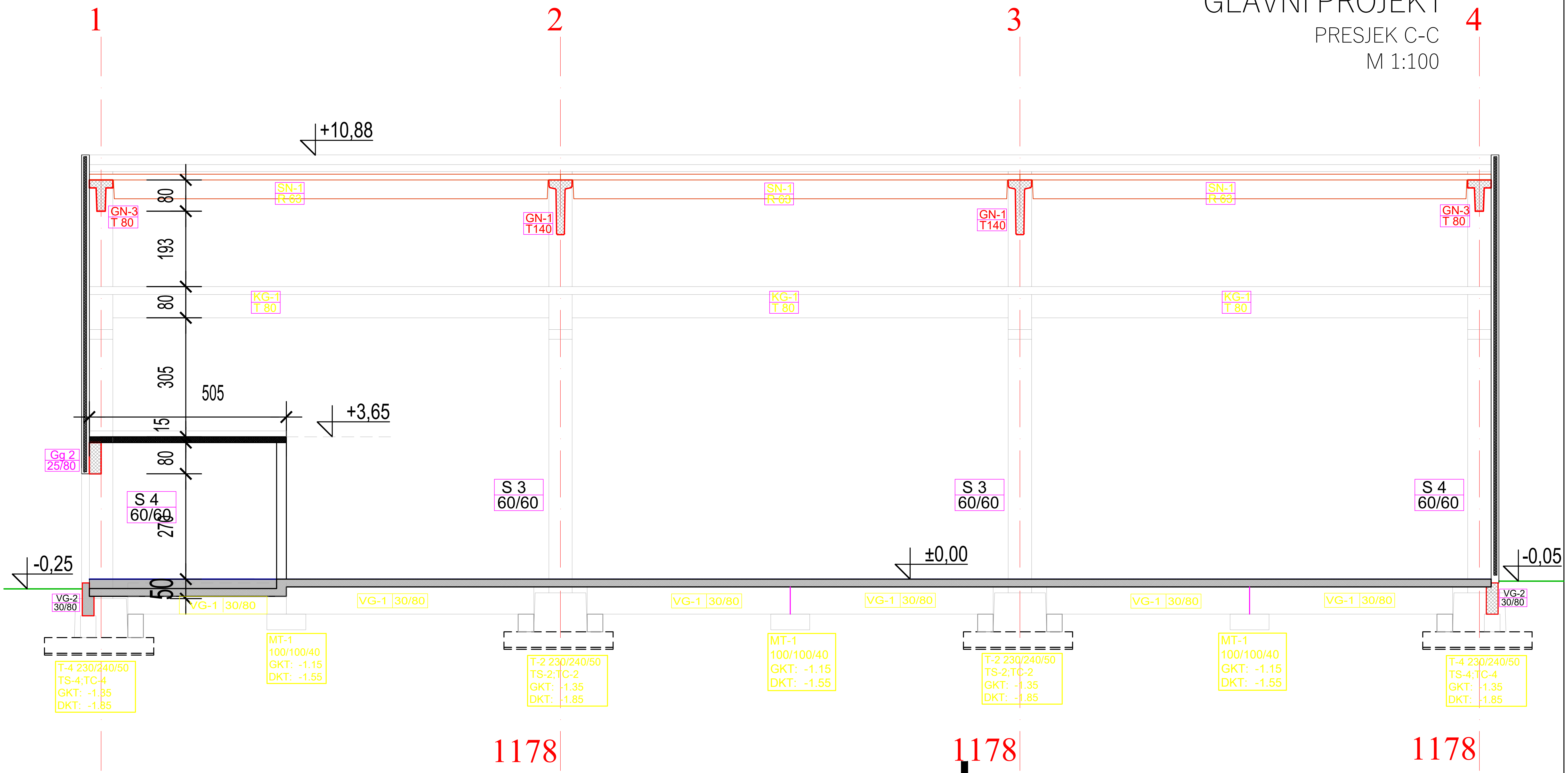
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
PRESJEK D-D	1 : 100	9

GLAVNI PROJEKT
PRESJEK C-C
M 1:100



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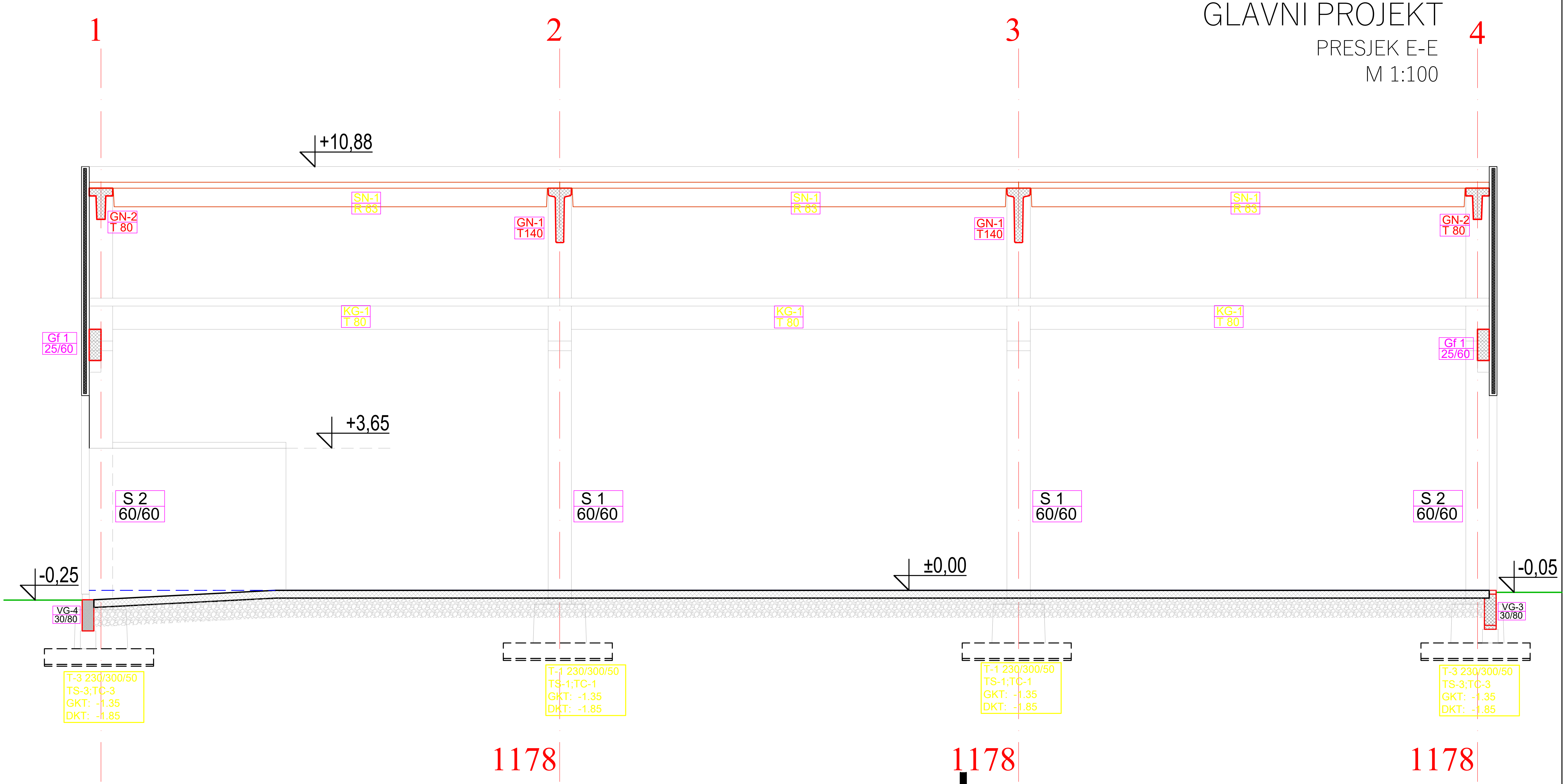
BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
PRESJEK C-C	1 : 100	10

GLAVNI PROJEKT

PRESJEK E-E

M 1:100



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BROJ PROJEKTA (BR/MJ/GD)	ZOP	DATUM
G15/2017	GP 15/2017	STUDENI 2017

SADRŽAJ NACRTA	MJERILO	LIST
PRESJEK E-E	1 : 100	11