

Projekt: Einkaufszentrum - Aufstockung [Fläche = 3.000m²]

Land: Serbien

Leistungsumfang: Gesamte Tragwerksplanung:

- Koordination mit Architekten, HLK-Planung
- Statische Berechnung
- Anschlussnachweise
- Tragwerkszeichnungen

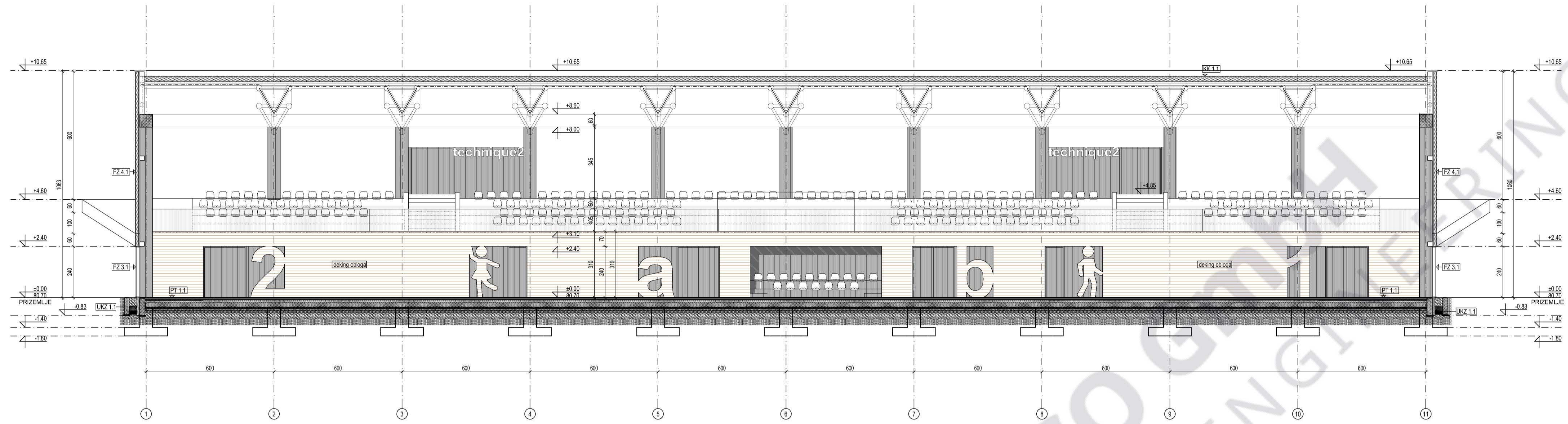


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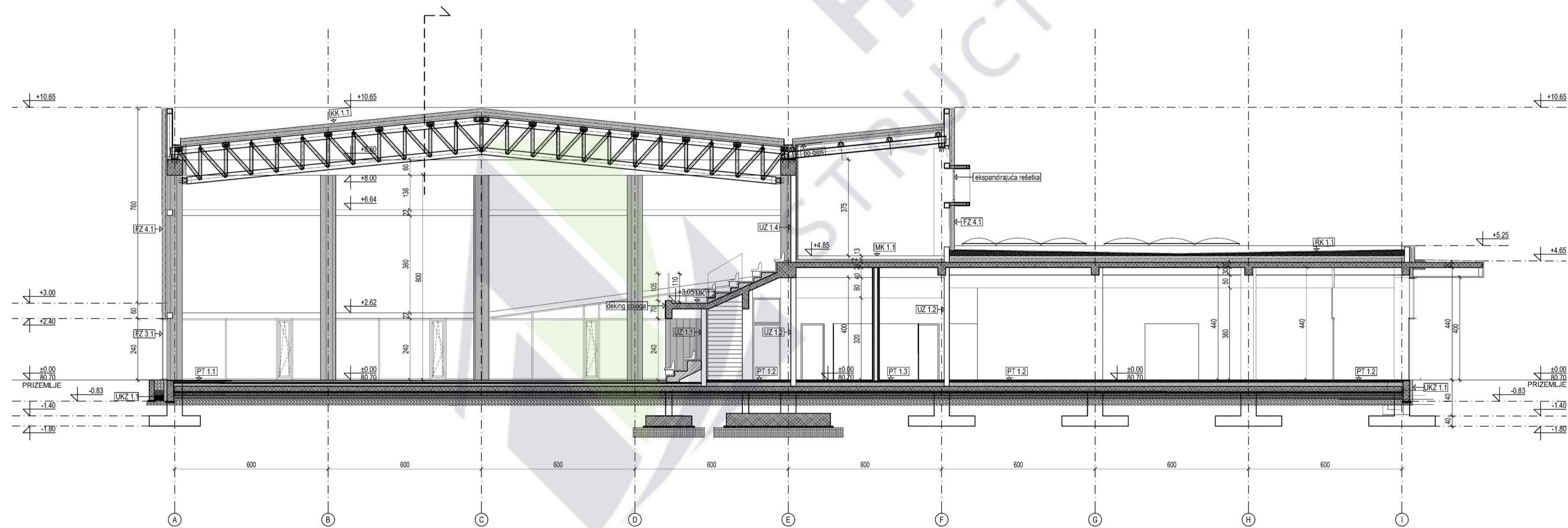




PRESEK 1-1 / SECTION 1-1



PRESEK 2-2 / SECTION 2-2



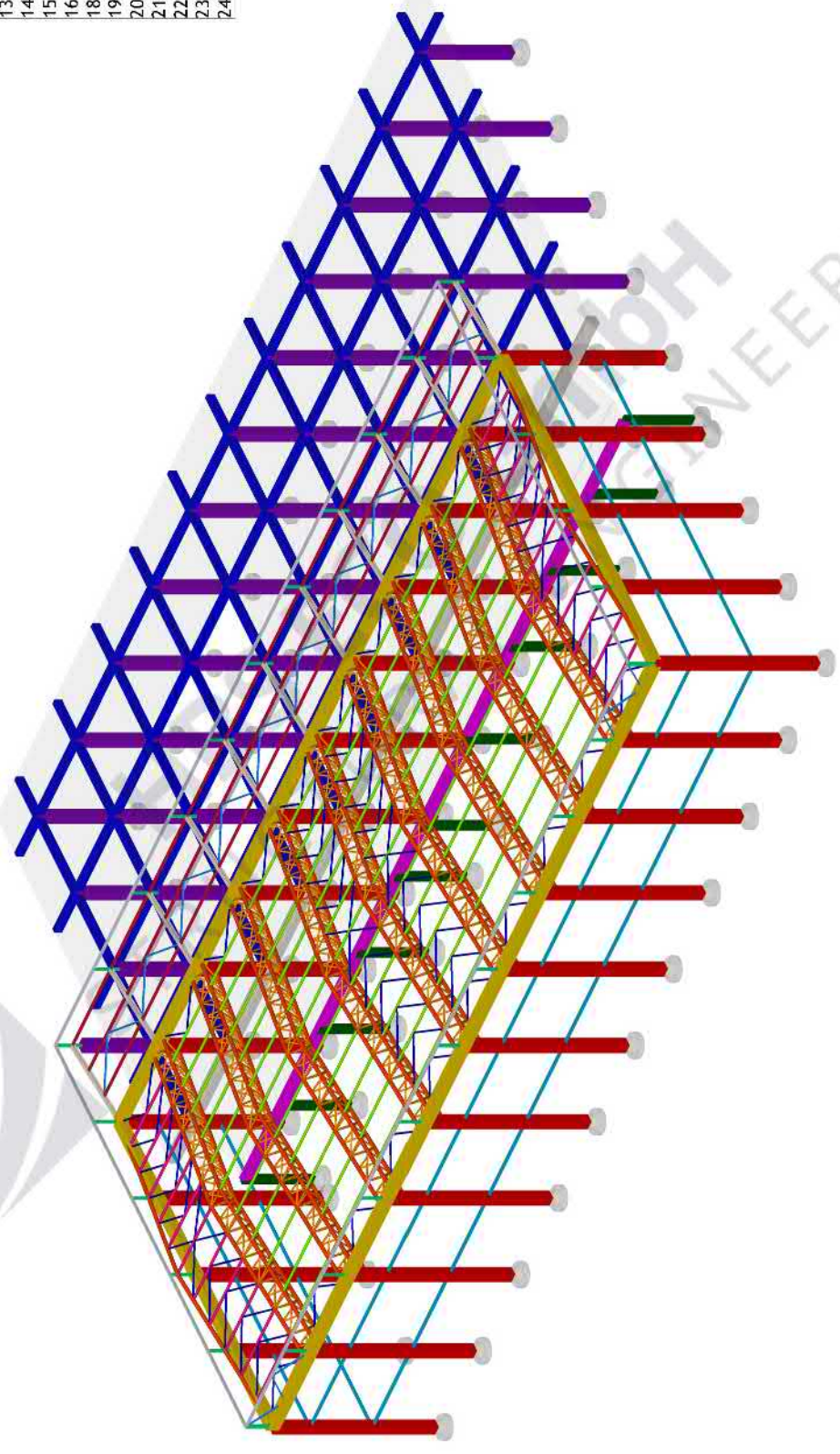
Statische Berechnung



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Greda

- 1. b/d=60/60
- 2. b/d=30/50
- 3. b/d=60/60
- 4. b/d=25/60
- 5. b/d=25/70
- 10. b/d=60/60
- 11. b/d=60/60
- 12. HOP □ 200x100x6
- 13. D= 244.5x8
- 14. D= 168.3x4
- 15. D= 114.3x4
- 16. HOP □ 140x140x6
- 18. HOP □ 140x140x6
- 19. IP81 240
- 20. HOP □ 160x100x5
- 21. HOP □ 90x90x4
- 22. D=108x4
- 23. HOP □ 140x140x6
- 24. D=177.8x5

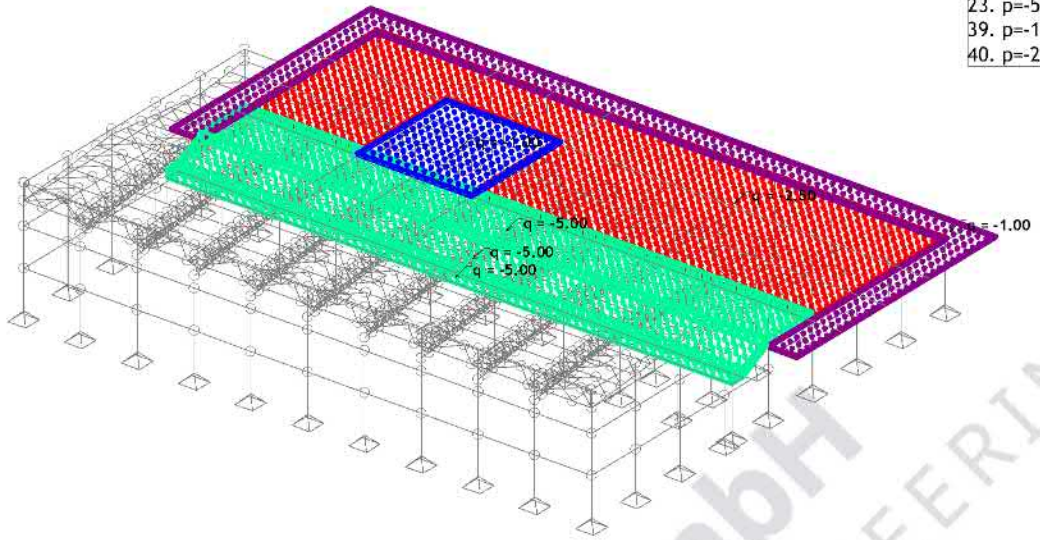


Setovi numeričkih podataka
Greda (1-5,10-16,18-24)

Opt. 3: p

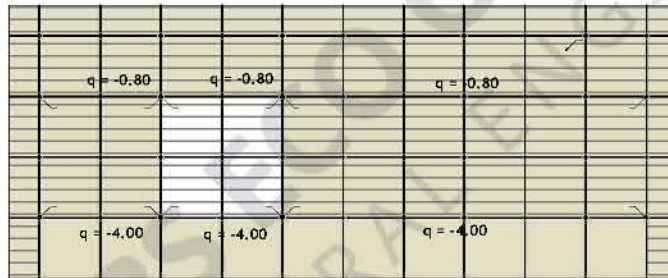
Površinsko opterećenje

2.	$p = -1.00 \text{ kN/m}^2$	
23.	$p = -5.00 \text{ kN/m}^2$	
39.	$p = -1.00 \text{ kN/m}^2$	
40.	$p = -2.50 \text{ kN/m}^2$	

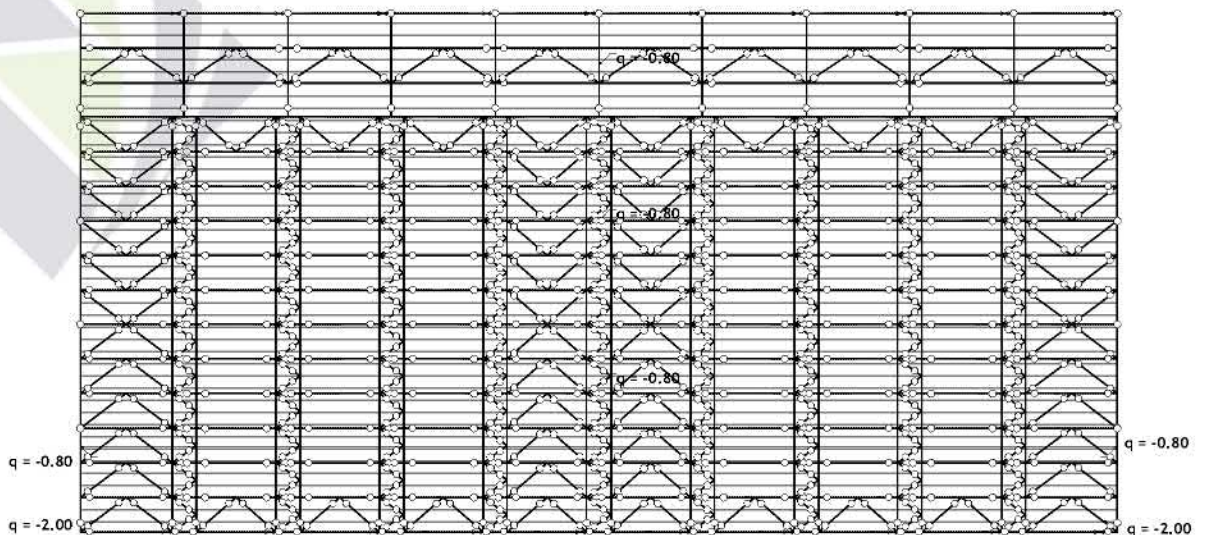


Setovi numeričkih podataka
Površinsko opterećenje (2,23,39,40)

Opt. 4: Sneg

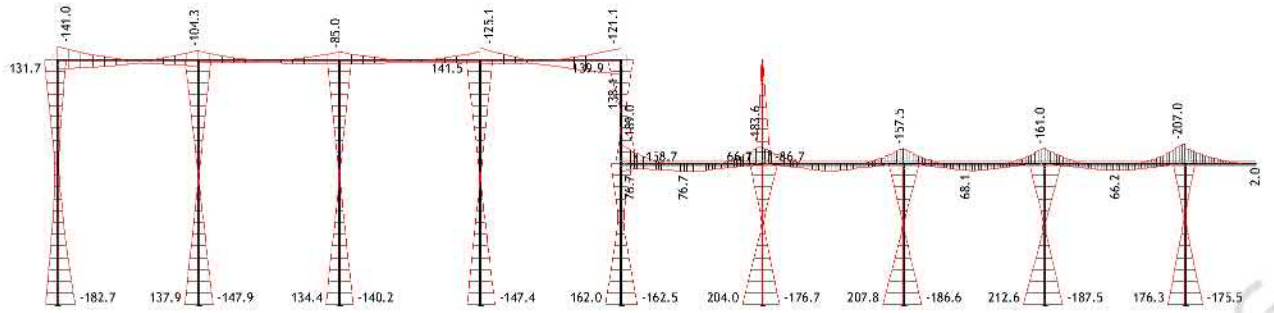


Nivo: Kota Krova Kantine [4.50 m]
Opt. 4: Sneg

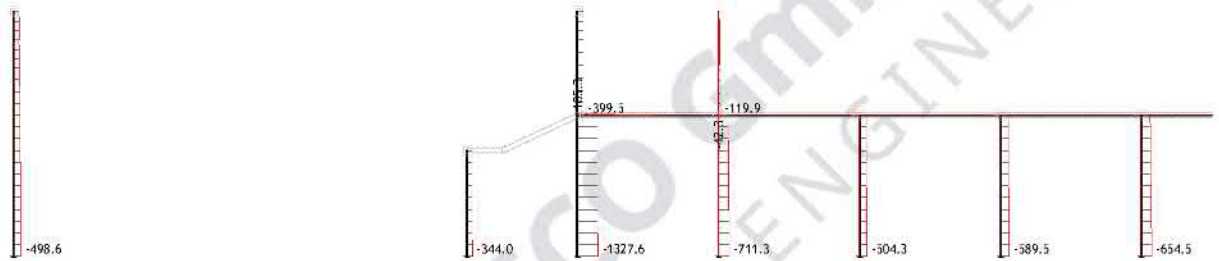


Pogled: krov 1+krov 2+mali krov

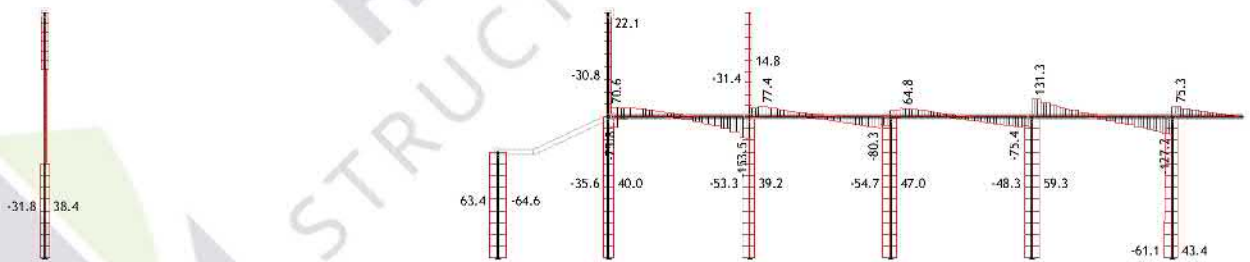
Opt. 427: [Anv] 17-424



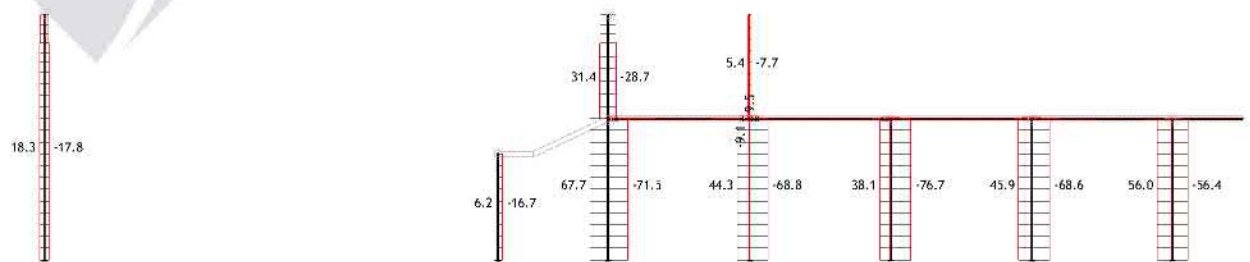
Ram: V_1 - Grupa: AB Konstrukcija
 Uticaji u gredi: max M3= 212.6 / min M3= -207.0 kNm
 Opt. 427: [Anv] 17-424



Ram: V_3 - Grupa: AB Konstrukcija
 Uticaji u gredi: max N1= 1102.8 / min N1= -1327.6 kN
 Opt. 427: [Anv] 17-424

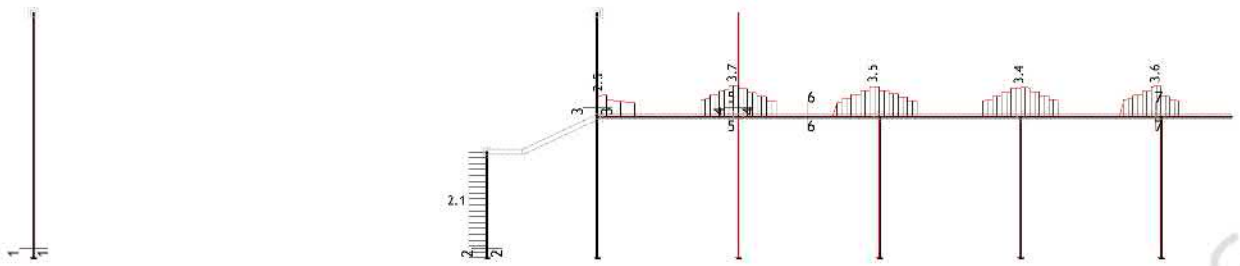


Ram: V_3 - Grupa: AB Konstrukcija
 Uticaji u gredi: max T2= 131.3 / min T2= -153.5 kN
 Opt. 427: [Anv] 17-424



Ram: V_3 - Grupa: AB Konstrukcija
 Uticaji u gredi: max T3= 67.7 / min T3= -76.7 kN

Merodavno opterećenje: Kompletna šema
EC 2 (EN 1992-1-1:2004), C 30, B500

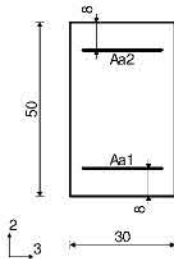


Ram: V_10 - Grupa: AB Konstrukcija
Armatura u gredama: max Aa,uz = 3.7 cm²

Greda 13354-9568

EC 2 (EN 1992-1-1:2004)
 $\alpha_{cc} = 0.85$
C 30 ($\gamma_C = 1.50$, $\gamma_S = 1.15$) [SP]
B500

Kompletna šema opterećenja



Aa1 = 5.58 cm²
Aa2 = 0.00 cm²
Aa3 = 0.00 cm²
Aa4 = 0.00 cm²
Aa,uz = 0.00 cm²/m (m=2)

$\Delta e2 = 5.2 \cdot e0 + 43.0 \cdot e1 = 48.2$ cm
 $\Delta M2 = 155.19$ kNm
 $\Delta e3 = 5.2 \cdot e0 + 41.4 \cdot e1 = 46.6$ cm
 $\Delta M3 = 149.88$ kNm

Merodavna kombinacija za torziju:
1.35xI+1.35xII+1.05xIII+1.50xV
M1u = 0.14 kNm

Merodavna kombinacija za smicanje:
1.00xI+1.00xII+0.90xVI+1.50xIX
T2u = -31.60 kN
T3u = 8.82 kN
M1u = 0.02 kNm

Vrd,max,2 = 1365.96 kN
Vrd,max,3 = 1365.96 kN
 $eb/ea = -3.500/6.006$ ‰

Aa1 = 9.56 cm²
Aa2 = 9.56 cm²
Aa3 = 6.40 cm²
Aa4 = 6.40 cm²
Aa,uz = 0.00 cm²/m (m=2)

Presek 5-5 x = 21.40m

Merodavna kombinacija za savijanje:
1.00xI+1.00xII+0.60xIII-1.00xXVI
N1u = 12.74 kN
M2u = 0.00 kNm
M3u = -130.96 kNm

Merodavna kombinacija za torziju:
1.35xI+1.35xII+1.05xIII+1.50xV
+0.90xVIII
M1u = 0.08 kNm

Merodavna kombinacija za smicanje:
1.35xI+1.35xII+1.50xIII+0.90xVI
+0.90xX
T2u = -101.65 kN
T3u = 0.79 kN
M1u = -0.04 kNm

Vrd,max,2 = 508.94 kN
Vrd,max,3 = 525.10 kN
 $eb/ea = -3.500/14.732$ ‰

Aa1 = 0.84 cm²
Aa2 = 7.96 cm²
Aa3 = 0.00 cm²
Aa4 = 0.00 cm²
Aa,uz = 3.09 cm²/m (m=2)

Presek 7-7 x = 3.20m

Merodavna kombinacija za savijanje:
1.35xI+1.35xII+1.05xIII+1.50xV+0.90xX
N1u = -9.90 kN
M2u = 0.00 kNm
M3u = -186.34 kNm

Merodavna kombinacija za torziju:
1.00xI+1.00xII+0.60xIII+1.00xXVI
M1u = 0.19 kNm

Merodavna kombinacija za smicanje:
1.35xI+1.35xII+1.05xIII+1.50xV+0.90xX
T2u = -116.23 kN
T3u = -3.86 kN
M1u = 0.16 kNm

Vrd,max,2 = 508.94 kN

Vrd,max,3 = 525.10 kN

$eb/ea = -3.500/8.433$ ‰

Aa1 = 0.00 cm²
Aa2 = 11.50 cm²
Aa3 = 0.00 cm²
Aa4 = 0.00 cm²
Aa,uz = 3.55 cm²/m (m=2)

Presek 6-6 x = 18.00m

Merodavna kombinacija za savijanje:
1.35xI+1.35xII+1.50xIV+0.90xVI
+0.90xIX
N1u = -1.87 kN
M2u = 0.00 kNm
M3u = 96.33 kNm

Merodavna kombinacija za smicanje:
1.00xI+1.00xII-1.00xXVI
T2u = -12.82 kN
T3u = -0.78 kN
M1u = -0.00 kNm

Vrd,max,2 = 510.78 kN

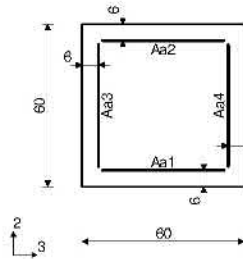
Vrd,max,3 = 527.00 kN

$eb/ea = -3.500/21.264$ ‰

Greda 5399-3718

EC 2 (EN 1992-1-1:2004)
 $\alpha_{cc} = 0.85$
C 30 ($\gamma_C = 1.50$, $\gamma_S = 1.15$) [SP]
B500

Kompletna šema opterećenja



li,2 = 20.80 m ($\lambda_2 = 120.09$)
li,3 = 20.80 m ($\lambda_3 = 120.09$)
Nepomerljiva konstrukcija

Presek 1-1 x = 10.15m

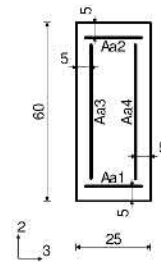
Merodavna kombinacija za savijanje:
1.35xI+1.35xII+1.50xV+0.90xVIII
N1u = -321.95 kN
M2u = -119.58 kNm
M3u = -159.12 kNm

Uvećanje momenta savijanja usled izvijanja

Greda 8199-7238

EC 2 (EN 1992-1-1:2004)
 $\alpha_{cc} = 0.85$
C 30 ($\gamma_C = 1.50$, $\gamma_S = 1.15$) [SP]
B500

Kompletna šema opterećenja



li,2 = 8.10 m ($\lambda_2 = 112.24$)
li,3 = 8.10 m ($\lambda_3 = 46.77$)
Nepomerljiva konstrukcija

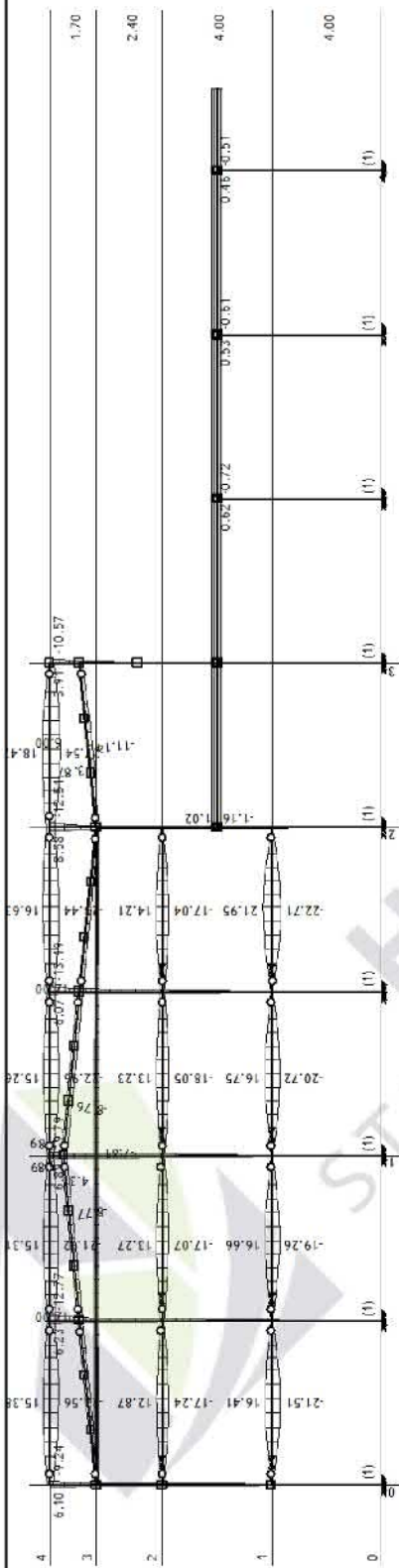
Presek 2-2 x = 4.25m

Merodavna kombinacija za savijanje:
1.35xI+1.35xII+1.05xIII+1.50xVI
+0.90xX
N1u = -343.84 kN
M2u = 14.99 kNm
M3u = -182.21 kNm

Uvećanje momenta savijanja usled izvijanja
 $\Delta e2 = 2.0 \cdot e0 + 16.8 \cdot e1 = 18.8$ cm
 $\Delta M2 = 64.57$ kNm
 $\Delta e3 = 2.0 \cdot e0 + 0.0 \cdot e1 = 2.0$ cm
 $\Delta M3 = 6.96$ kNm

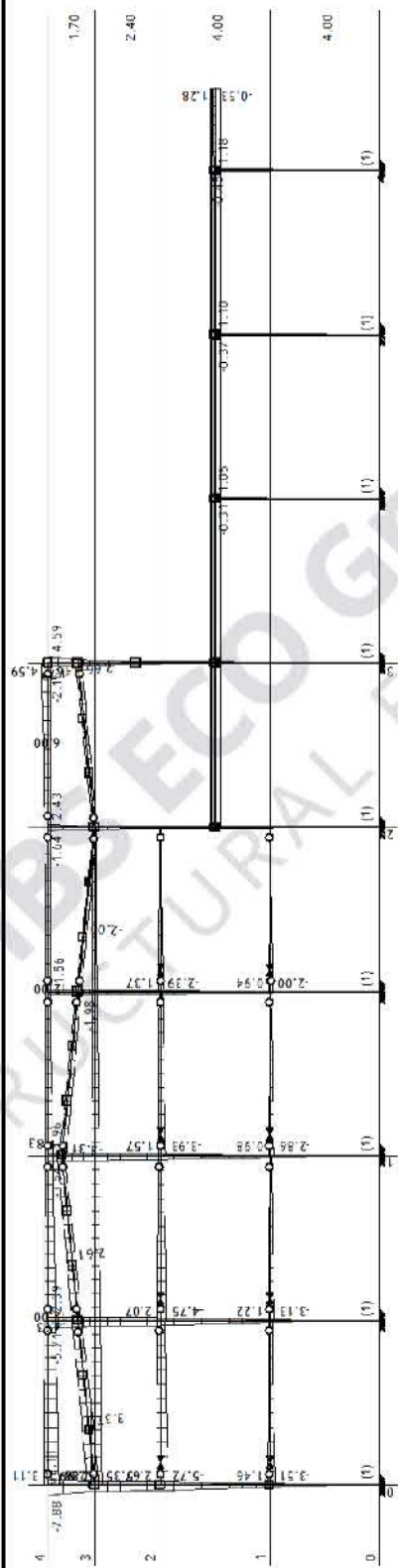
Merodavna kombinacija za torziju:
1.00xI+1.00xII+0.60xIII-1.00xXVI
M1u = -0.01 kNm

Opt. 271: [SLS] 195-269



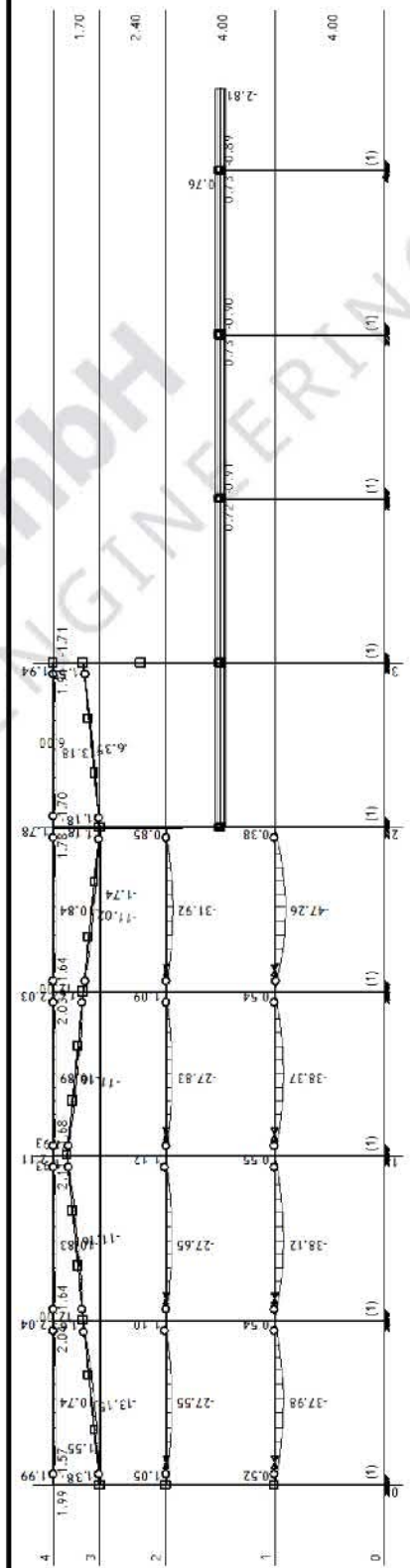
Ram: V_1
Uticaji u gredi: max $X_p = 21.95$ / min $X_p = -27.5...$

Opt. 271: [SLS] 195-269



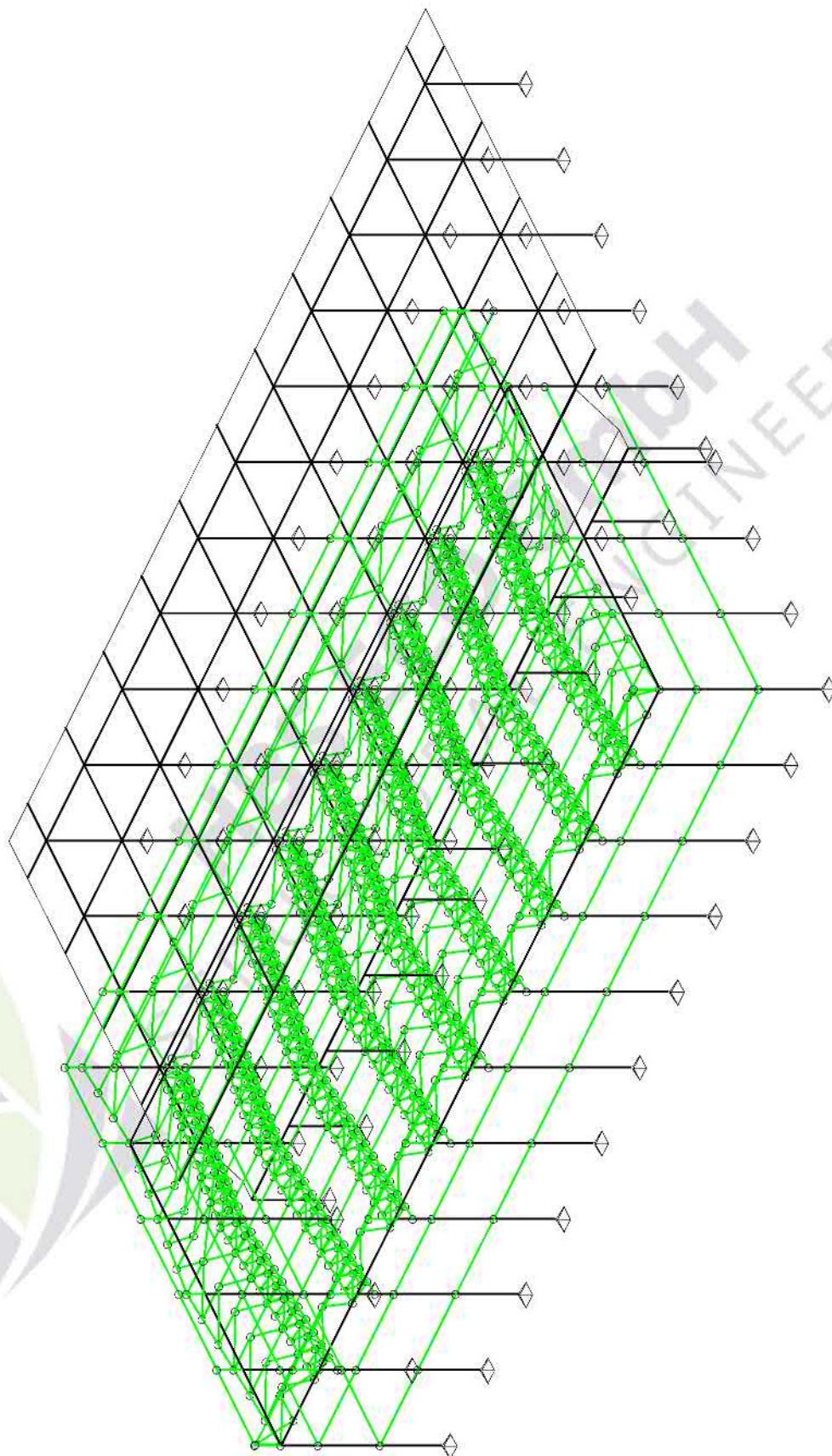
Ram: V_1
Uticaji u gredi: max $Y_p = 4.59$ / min $Y_p = -7.88 m...$

Opt. 271: [SLS] 195-269



Ram: V_1
Uticaji u gredi: max $Z_p = 2.11$ / min $Z_p = -47.26 ...$

Dimenzionisanje (čelik)



Tragwerkszeichnungen

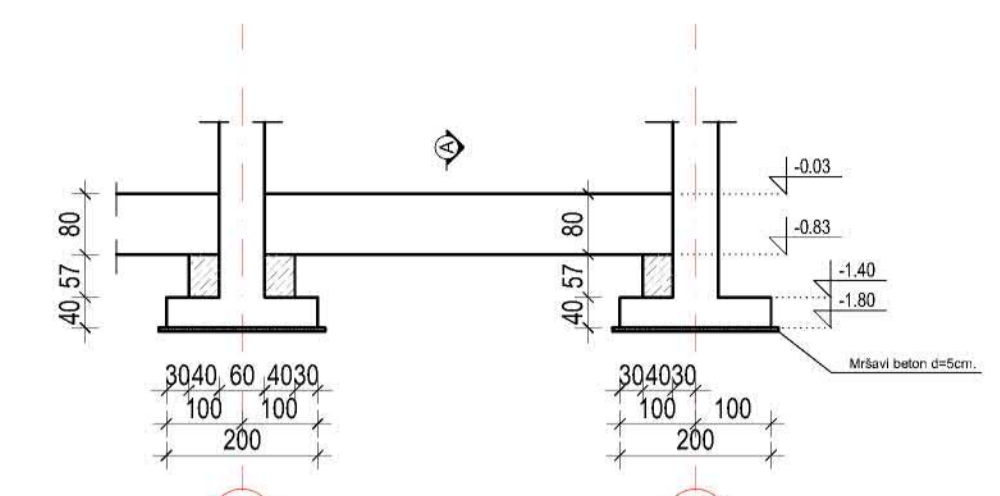
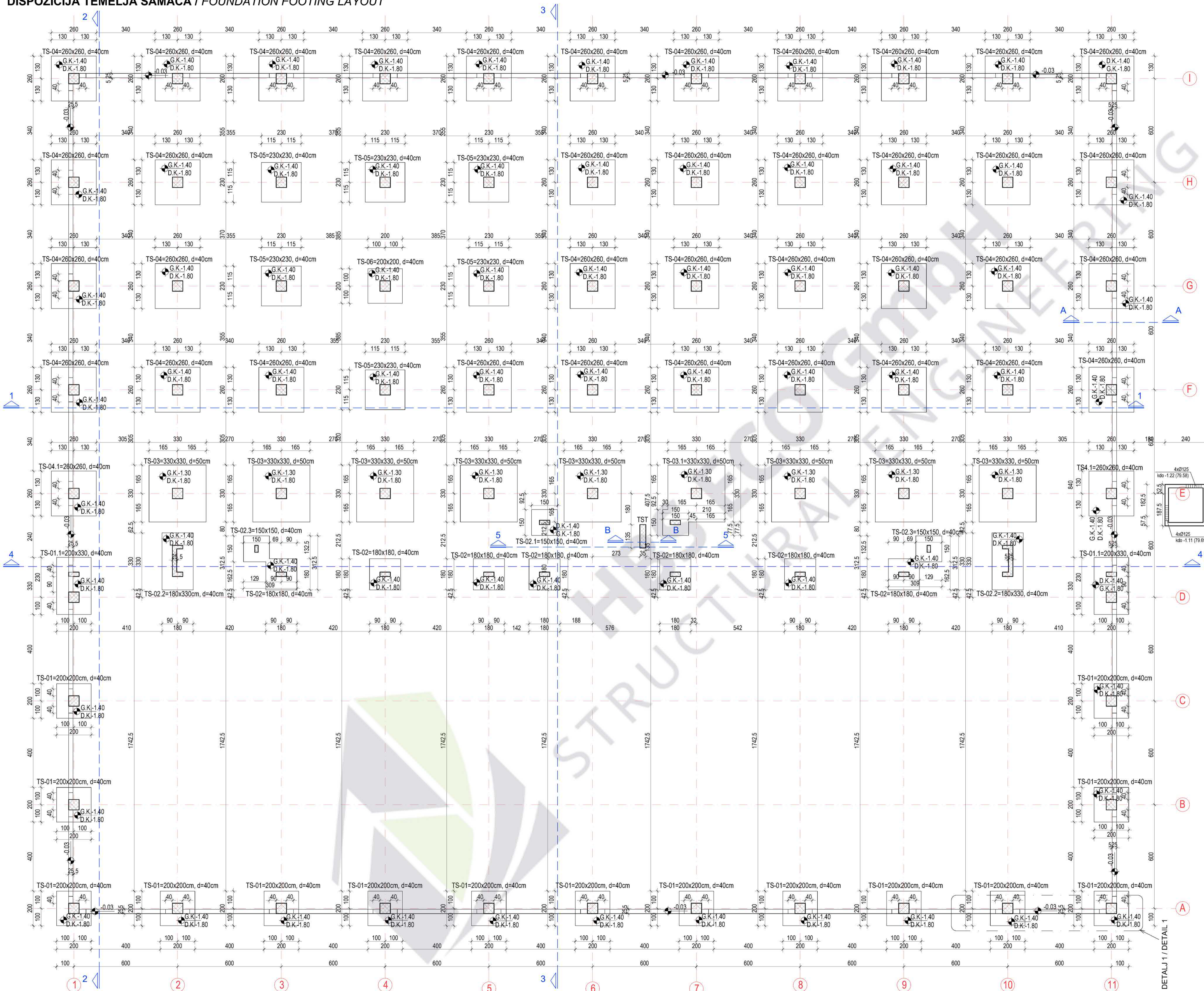


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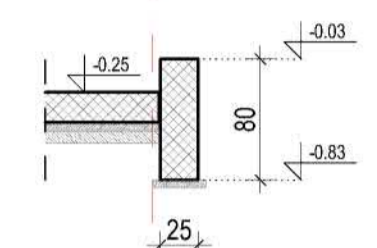
DISPOZICIJA TEMELJA SAMACA / FOUNDATION FOOTING LAYOUT

DETALJ 1 / DETAIL 1

R 1:100



Presek A-A
R = 1 : 50



Presek B-B
R = 1 : 50

NOTE:
Under foundation footing, existing soil should be compacted to Ms=25MPa.

NOTE:
Anchor position for foundation beams, which are erected from foundation footings are shown on drawings: 32.134
2020U023-PZ-G01.B0038-032-PA
2020U023-PZ-G01.B0038-034-PA

NAPOMENA:
Ispod temelja samac nabiti postojeće tlo na Ms=25MPa.

NAPOMENA:
Položaj ankera za temeljne grede, koji izlaze iz temeljne stope, prikazani su na planovima armature temeljnih greda - crteži broj 32.134.
2020U023-PZ-G01.B0038-032-PA
2020U023-PZ-G01.B0038-034-PA

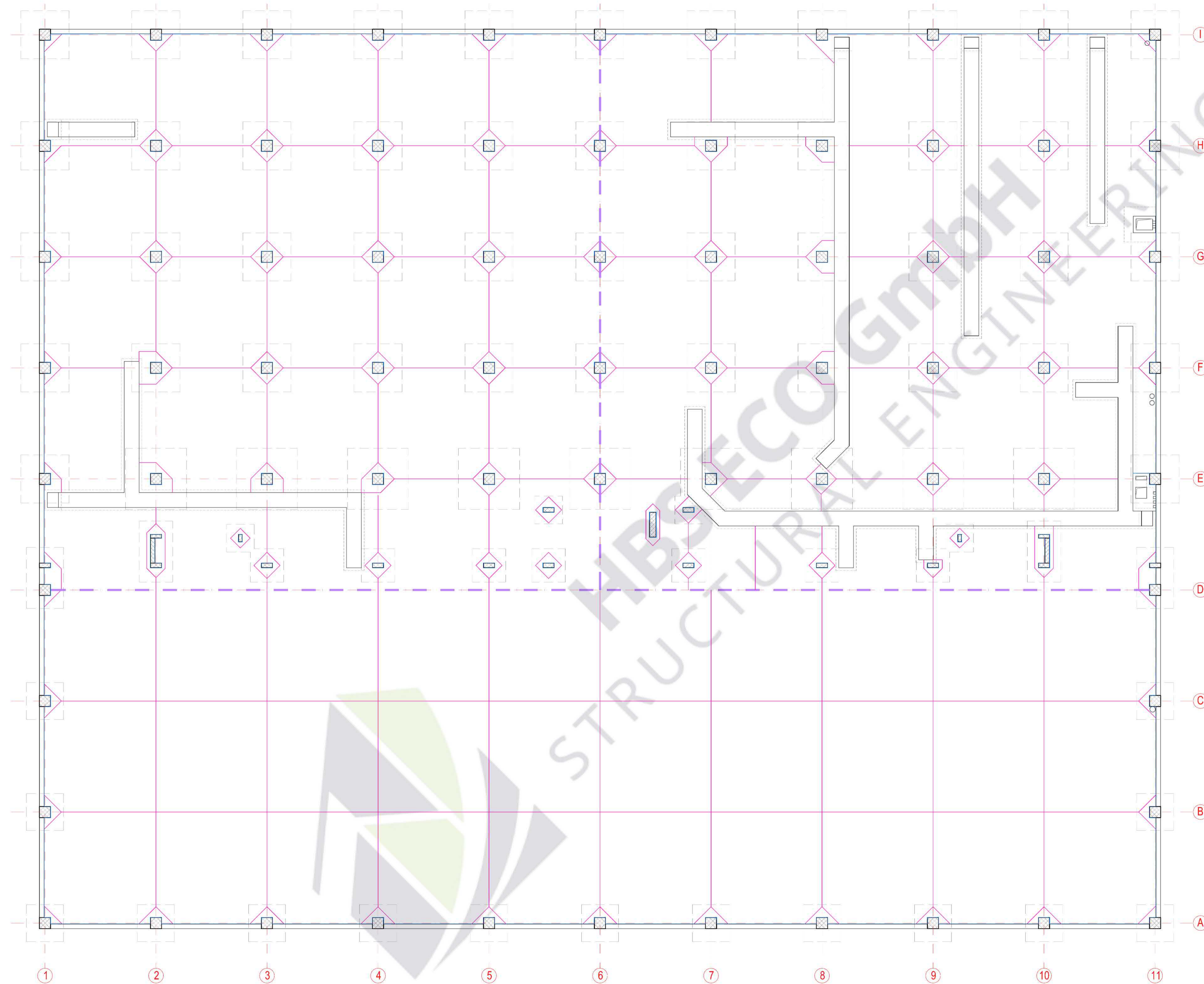
- OPŠTE NAPOMENE:**
1. Pre odobrenja radova sive mere provjeriti na licu mesta.
 2. Neusaglasnosti i odstupanja u crtežima i/ili tekstualnim priložima projekta, obavezno razriješiti sa autorom i odgovornim projektantom.
 3. Izmene u delu projekta za vreme gradnje, vršiti samo uz saglasnost autora i odgovornog projektanta.
 4. Ne dozvoljavaju se izmene na gradilištu za vreme izvođenja radova, bez saglasnosti autora, odgovornog projektanta i tehničkog nadzora.
 5. Odgovornost za izmene snosi lice koje je te izmene odobrio.
 6. Ne premeravati crteže, koje u projektu su merodavne.
 7. Sve instalacione otvore obavezno provjeriti u projektima instalacija.

- GENERAL NOTE:**
1. All measurements will be checked prior to commencement of works on site.
 2. Inconsistencies in either drawings and/or textual appendices will have to be resolved with both an Author and a Professional Engineer (PE).
 3. Variations, which may emerge in the design during the construction, are only to be made if the prior approval by both the Author and a Professional Engineer (PE) has been obtained.
 4. No variations will take place in the course of work performance on site unless prior approval by an Author, PE or a Technical Supervisor has been given.
 5. Responsibility will be assumed by a person who authorised variations in the first place.
 6. Drawings will not be checked for accuracy as design levels are correct.
 7. All voids to be checked in the designs of instalations.

- C 25/30 (MB30) - stubovi, temeljne stope, temeljne grede, grede na +8.60, podna ploča na -0.25, ograda stepeništa na tribinama, ploče, grede, stepeništa / columns, foundations, foundation beams, beams at +8.60, floor slab -0.25, stair railing on the grandstands slabs, beams, stairs
- C 16/20 (MB20) - mrvavi beton-tribine / lean concrete-grandstands

DETALJ 1 / DETAIL 1

**PLAN DILATACIJA PODNE PLOČE /
JOINT PLAN OF THE GROUND FLOOR**



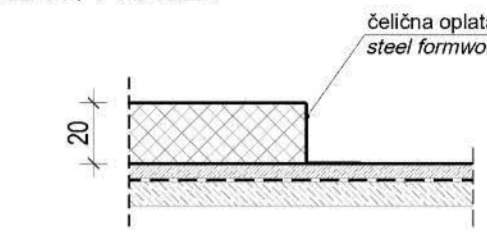
LEGENDA / LEGEND :

- RADNA DILATACIJA / DAILY JOINT
- SEKUNDARNA DILATACIJA / CUT JOINT
- DETALJ SPOJA SA VERTIKALNIM ELEMNTIMA /
DETAIL OF THE SPLICE WITH VERTICAL ELEMENTS

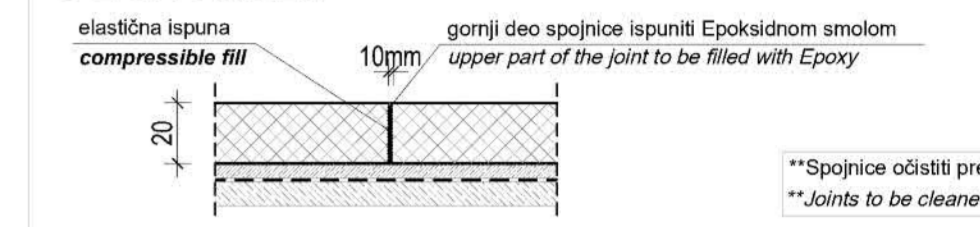
**DETALJ RADNE DILATACIJE SA DEMONTAŽNOM ČELIČNOM OPLATOM R 1:25
DETAIL OF DAILY JOINTS WITH STEEL FORMWORK**

POLJE / FIELD: oko 1000m²

FAZA I / PHASE I



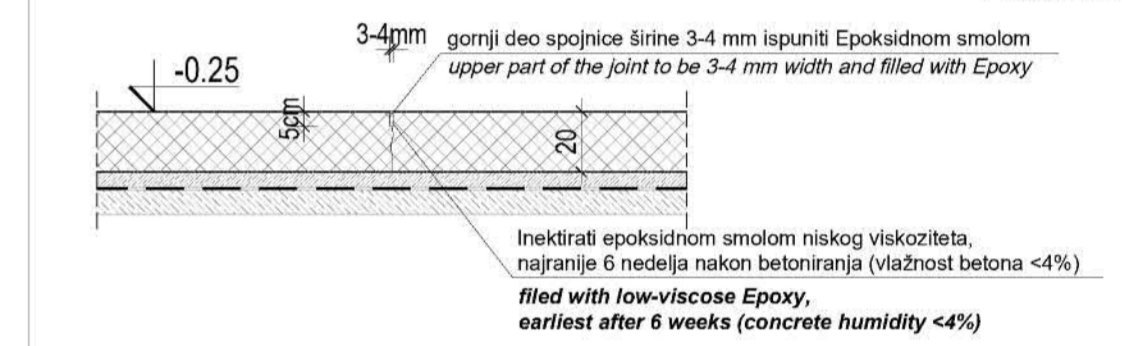
FAZA II / PHASE II



**Spojnice očistiti pre zapunjavanja
**Joints to be cleaned before the sealant application

**SEKUNDARNE DILATACIJE R 1:25
CUT JOINTS**

POLJE / FIELD: 6m x 6m



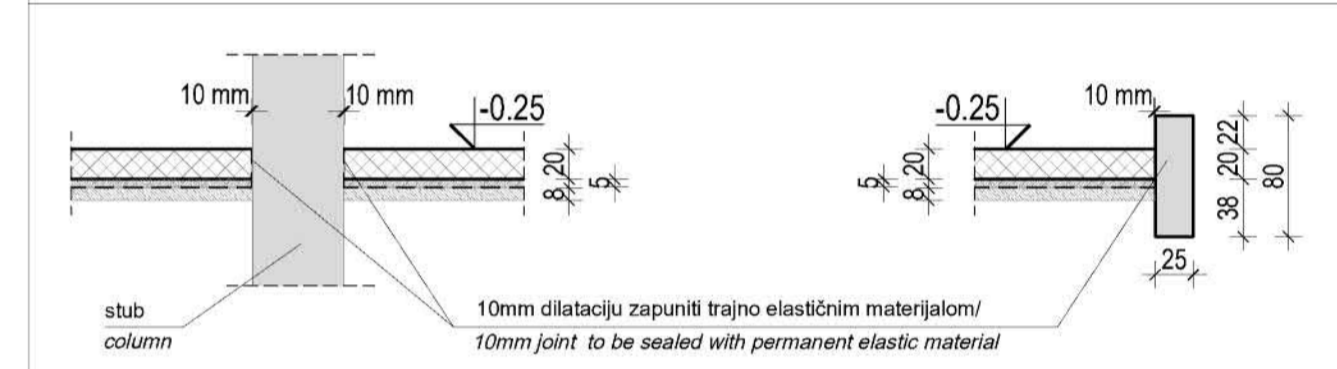
Injektirati epoksidnom smolom niskog viskozitetu, najranije 6 nedelja nakon betoniranja (vlažnost betona <4%)
filled with low-viscosity Epoxy, earliest after 6 weeks (concrete humidity <4%)

**Sekundarne dilatacije iseci 24 sata nakon betoniranja
**Cut joints cut within 24 hours after concreting

**Spojnice očistiti pre zapunjavanja
**Joints to be cleaned before the sealant application

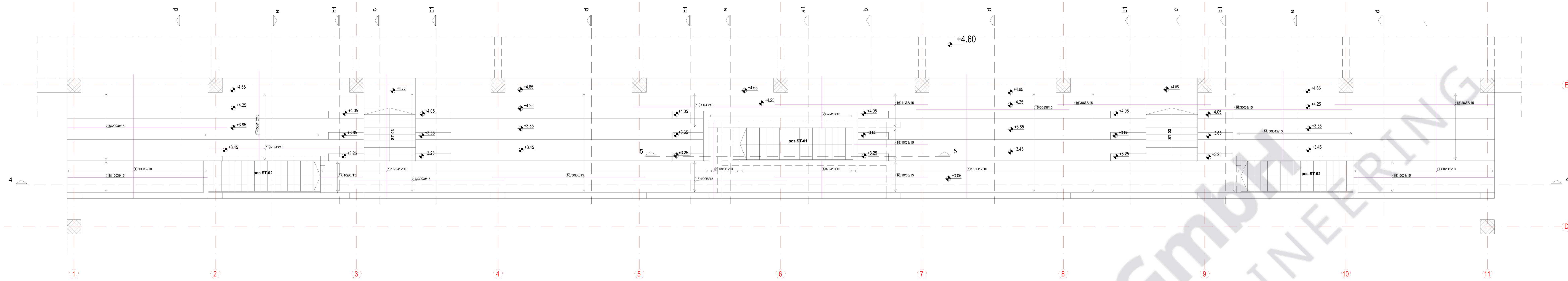
**Širina spojnica je 3-4mm, dubina 50mm / Thickness of cut 3-4mm, depth 50mm

**DETALJ SPOJA SA VERTIKALNIM ELEMNTIMA R 1:50
DETAIL OF THE SPLICE WITH VERTICAL ELEMENTS**

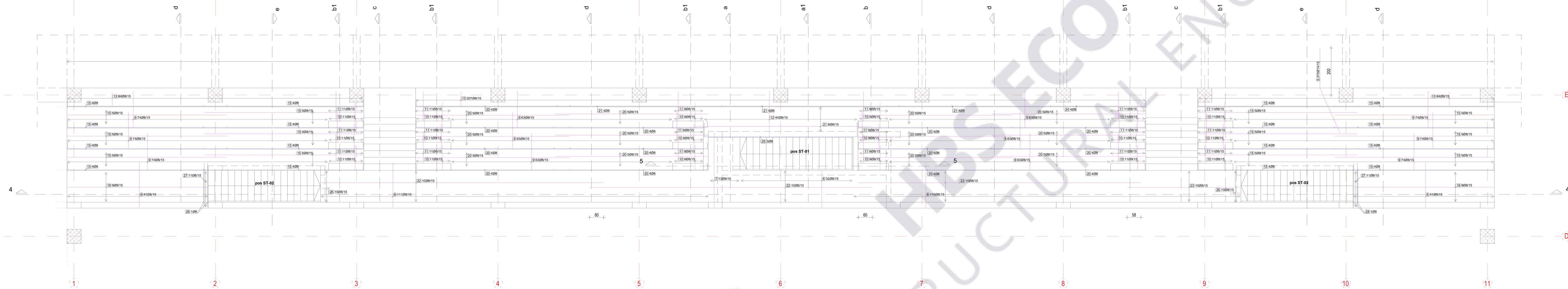


- OPŠTE NAPOMENE:**
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 - Izmene u delu projekta za vreme građenja, vršiti samo uz saglasnost autora i odgovornog projektanta.
 - Ne dozvoljavaju se izmene na gradilištu za vreme izvođenja radova, bez saglasnosti autora, odgovornog projektanta i tehničkog nadzora.
 - Odgovornost za izmene snosi lice koje je te izmene odobrilo.
 - Ne premeravati crteže, kote u projektu su merodavne.
 - Sve instalacione otvore obavezno proveriti u projektima instalacija.
 - Postaviti sistem za uzemljenje pre izvođenja hidroizolacije.
- GENERAL NOTE:**
- All measurements will be checked prior to commencement of works on site.
 - Inconsistencies in either drawings and/or textual appendices will have to be resolved with both an Author and a Professional Engineer (PE).
 - Variations, which may emerge in the design during the construction, are only to be made if the prior approval by both the Author and a Professional Engineer (PE) has been obtained.
 - No variations will take place in the course of work performance on site unless prior approval by an Author, PE or a Technical Supervisor has been given.
 - Responsibility will be assumed by a person who authorised variations in the first place.
 - Drawings will not be checked for accuracy as design levels are correct.
 - All voids to be checked in the designs of installations.
 - Grounding system to be installed before the hydro insulation.

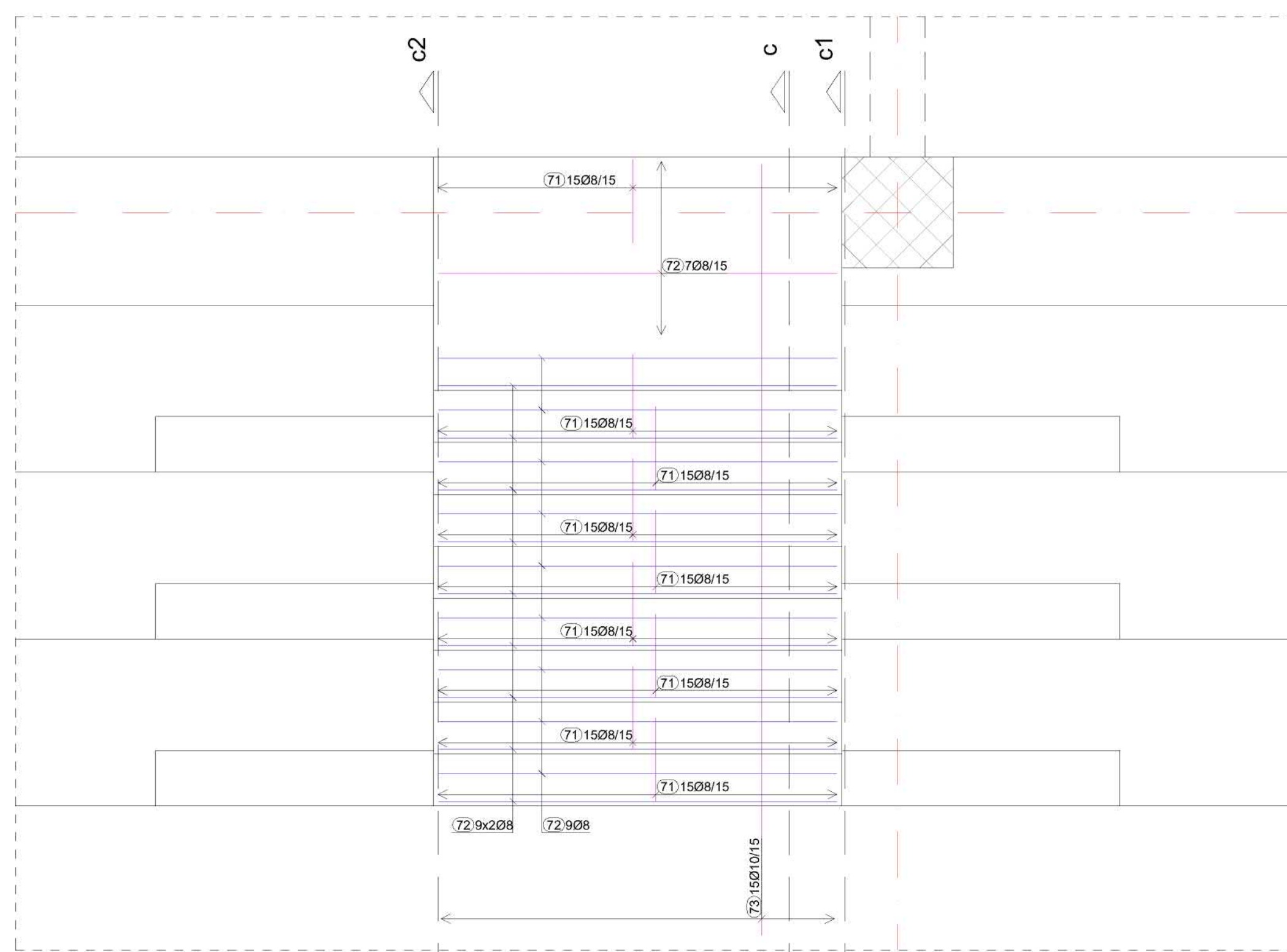
OSNOVA TRIBINE / GRANDSTAND LAYOUT
- Donja zona / Bottom zone -



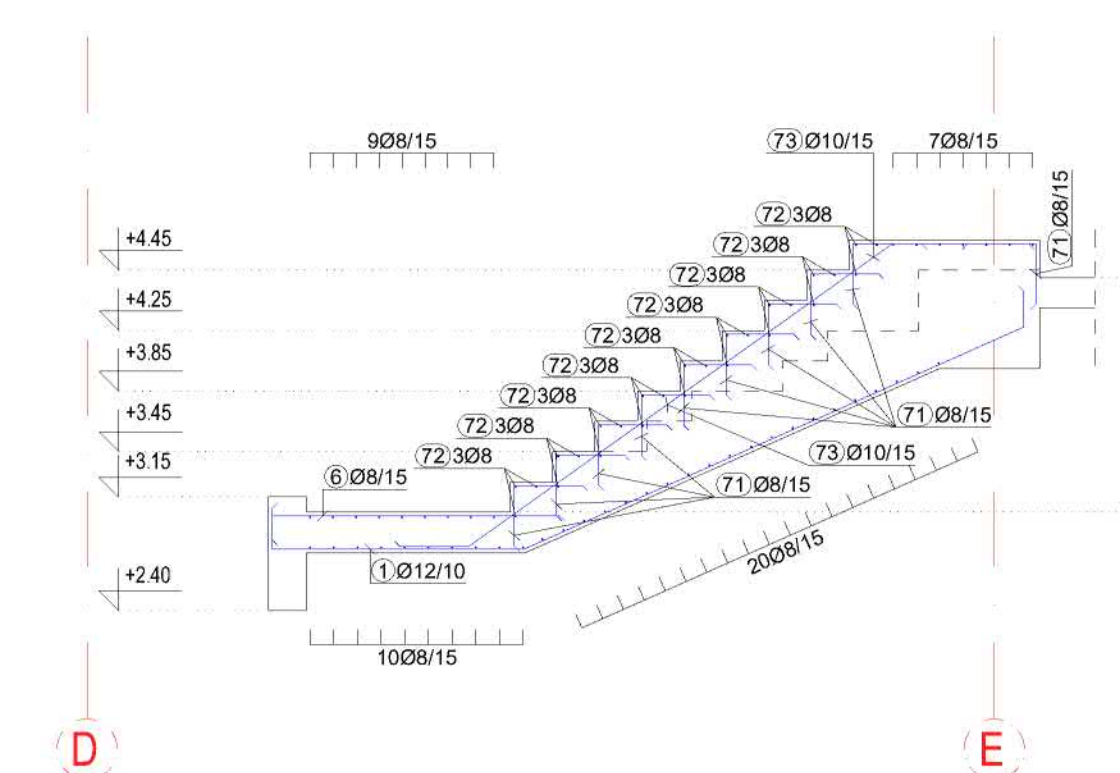
OSNOVA TRIBINE / GRANDSTAND LAYOUT
- Gornja zona / Top zone -



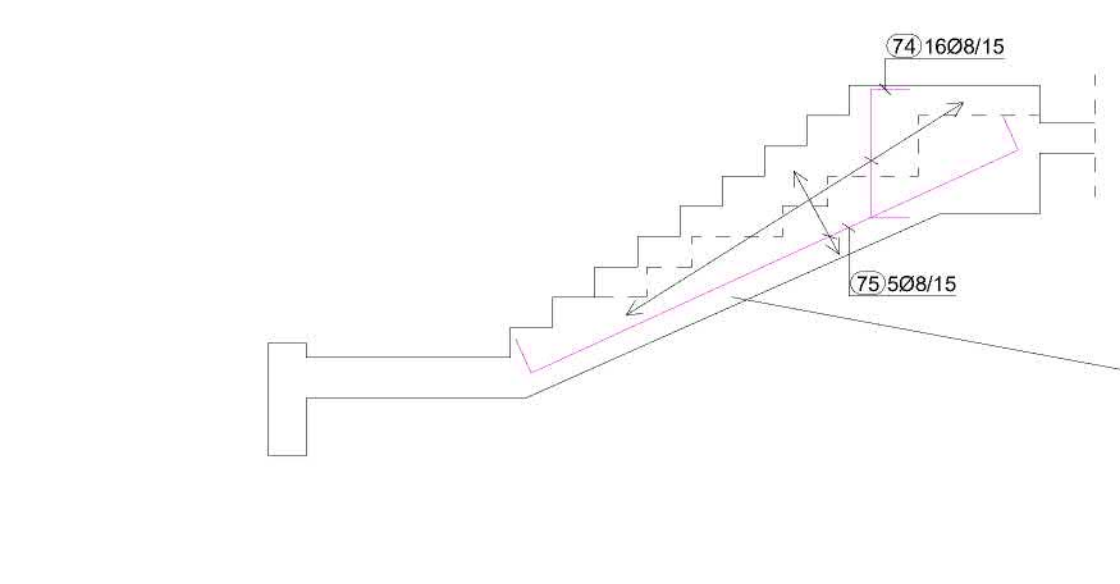
pos ST-03 / pos ST-03
R = 1:25



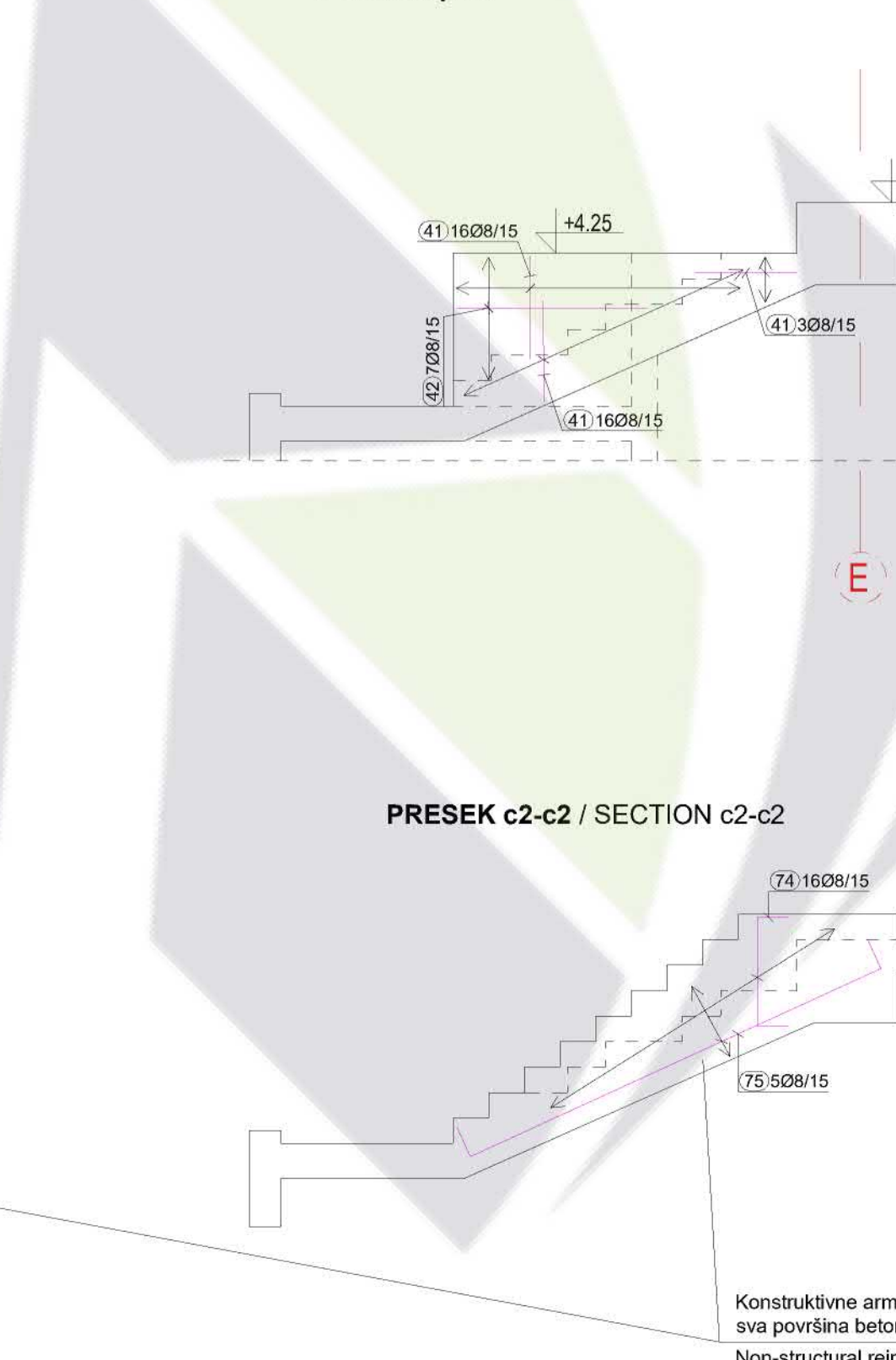
PRESEK c-c / SECTION c-c



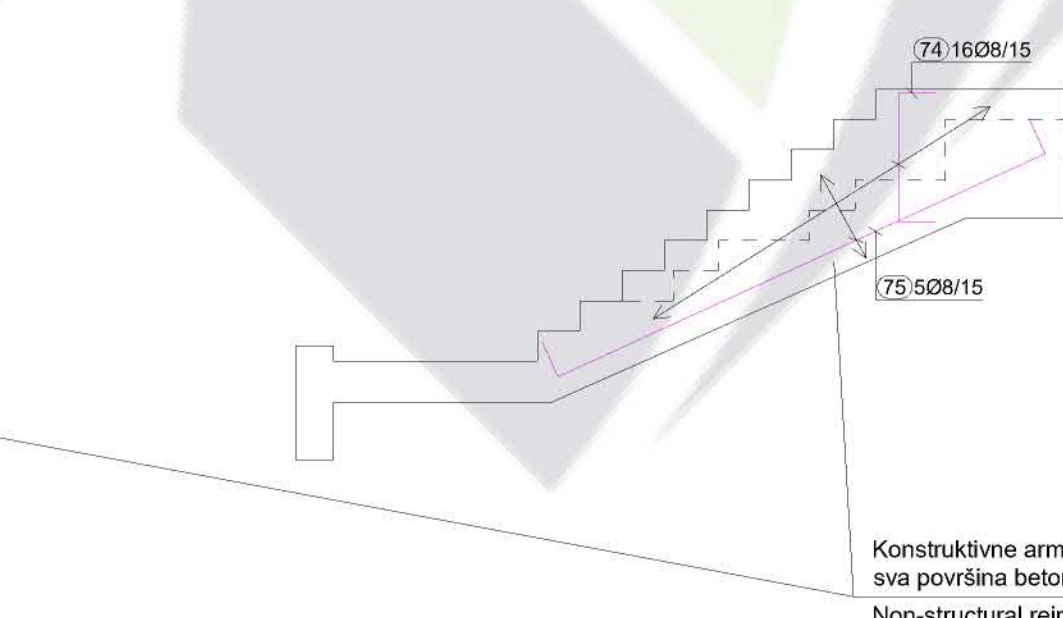
PRESEK c1-c1 / SECTION c1-c1



pos PZ1 (parapetni zid) / pos PZ1 (parapet wall)
n=2 kom.pcs.

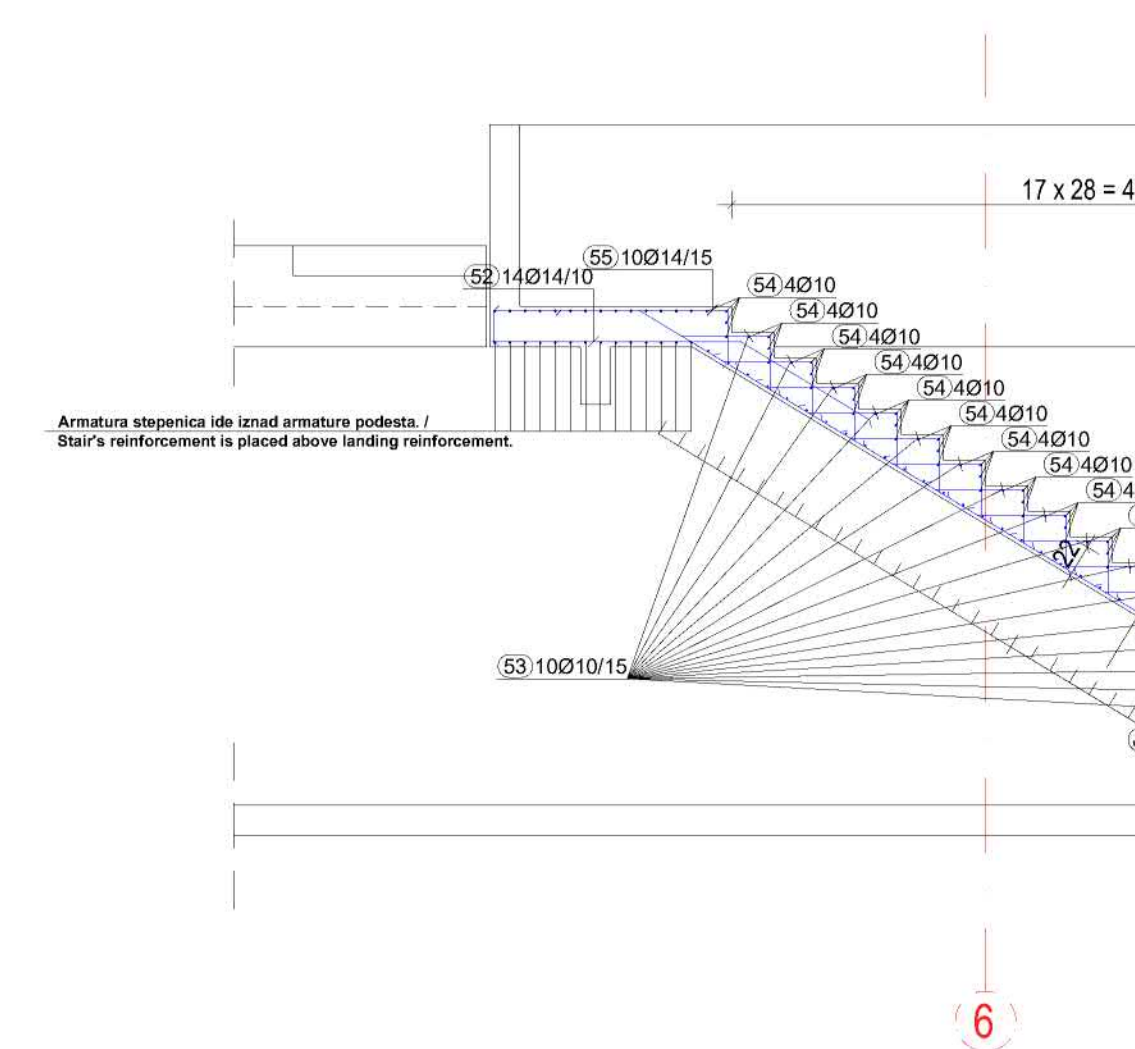


PRESEK c2-c2 / SECTION c2-c2

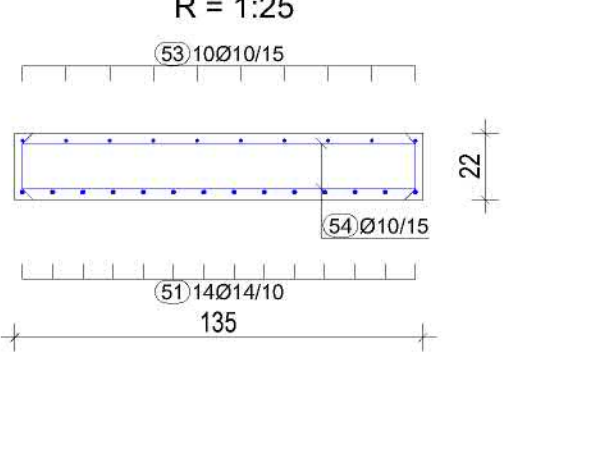


Karakteristika armature šipke po 54 i 55 prilagođeni na lice mesta, tako da se pokriva
sve površine betona šipke u u koraku sa vazduhom, odnosno površine šipke je vidljiva.
Non-structural reinforcement bars po 54 i 55 adjust on site, with the intent to cover all the
concrete surface that is in direct contact with air, that is to cover all the surfaces that are visible.

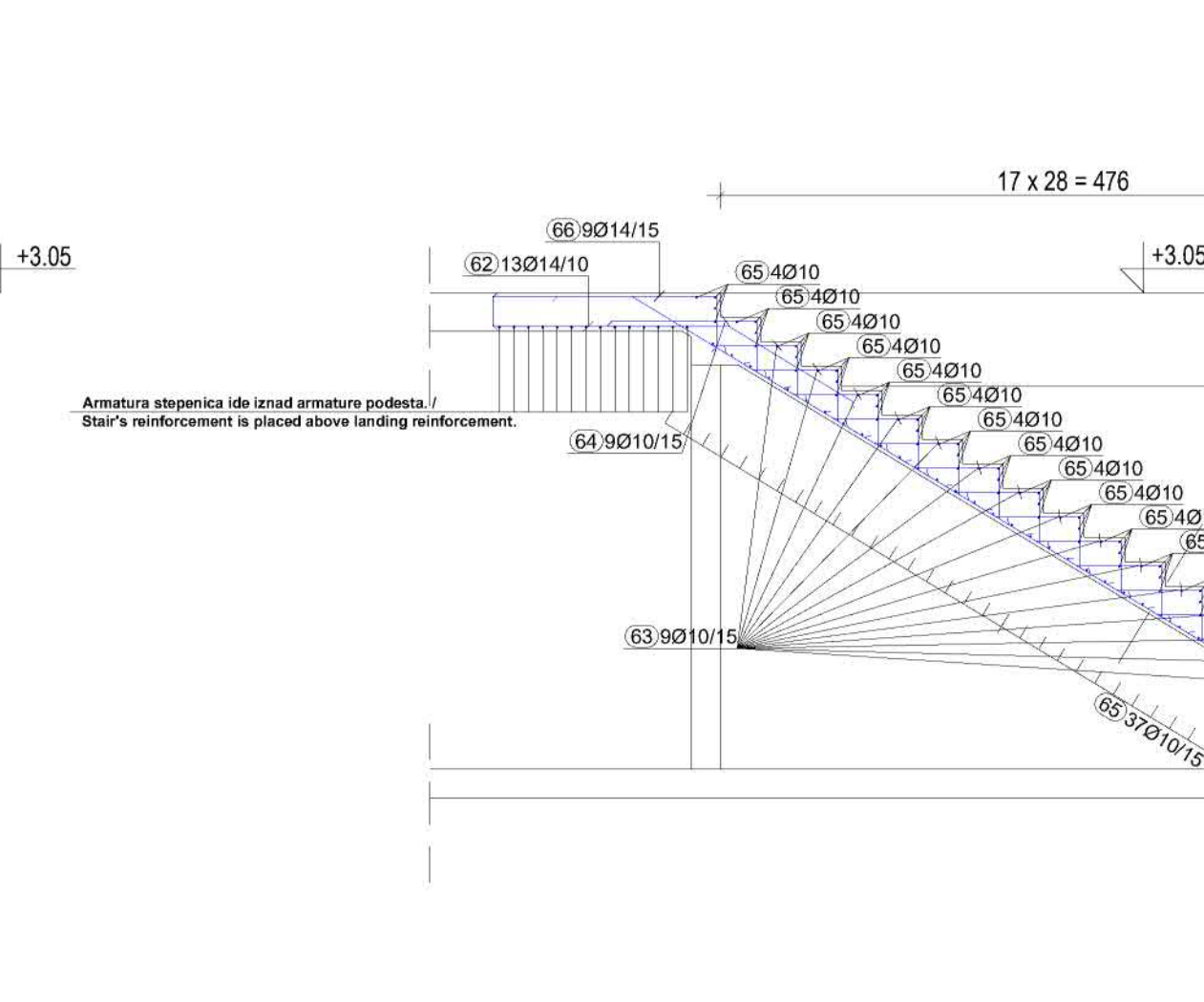
pos ST-01
n = 1 kom.



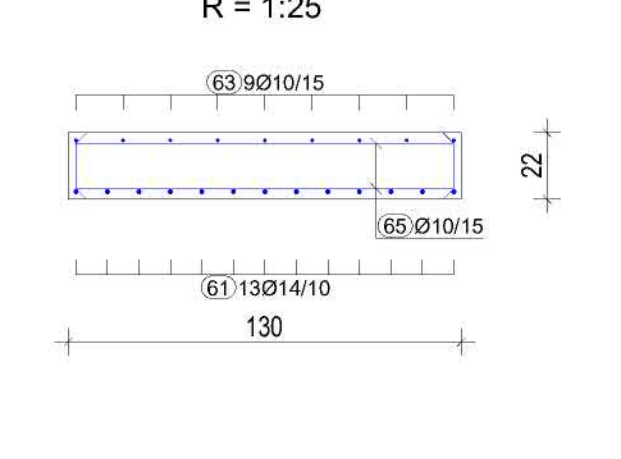
PRESEK I-I / SECTION I-I
R = 1:25



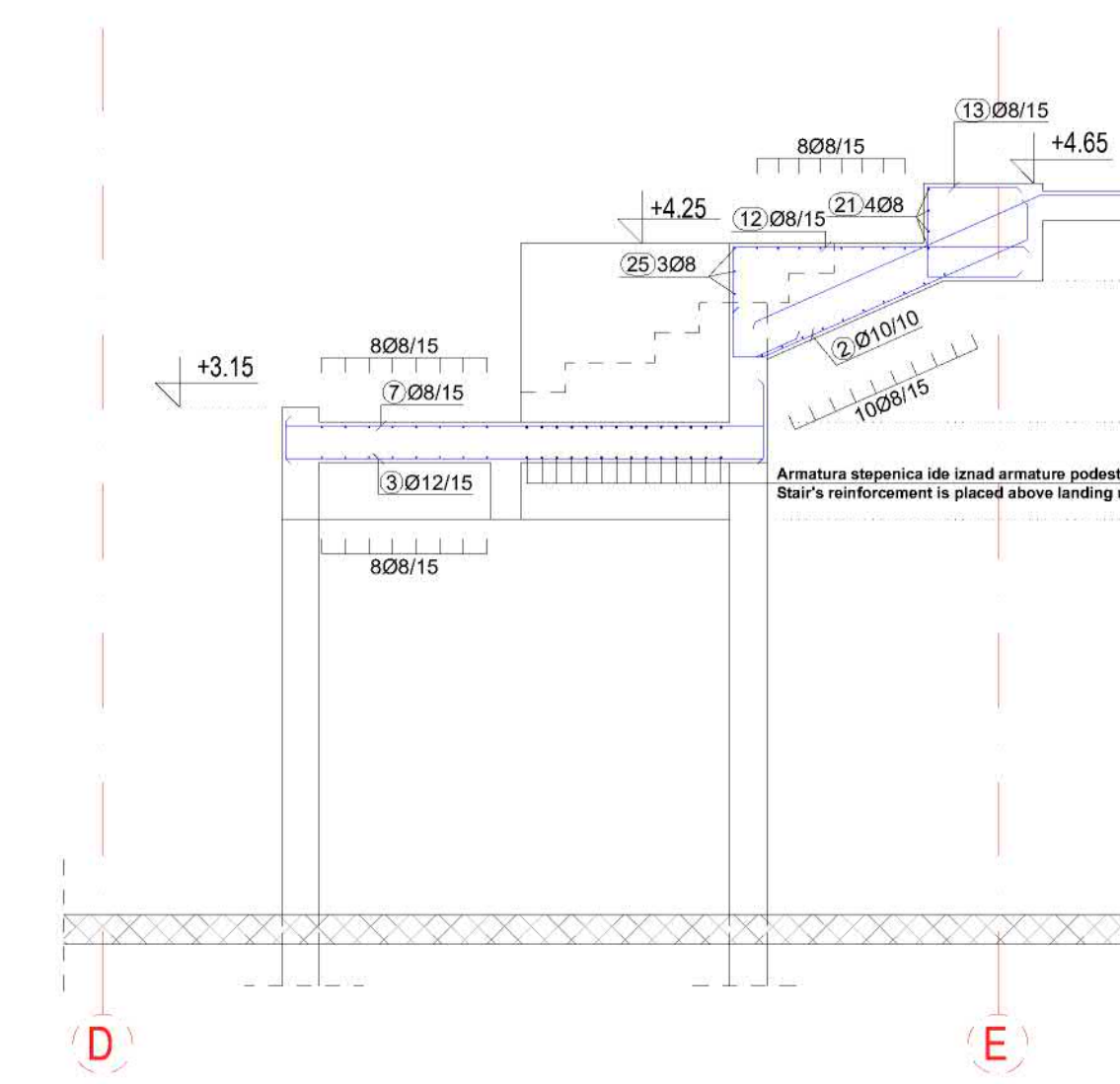
pos ST-02
n = 2 kom.



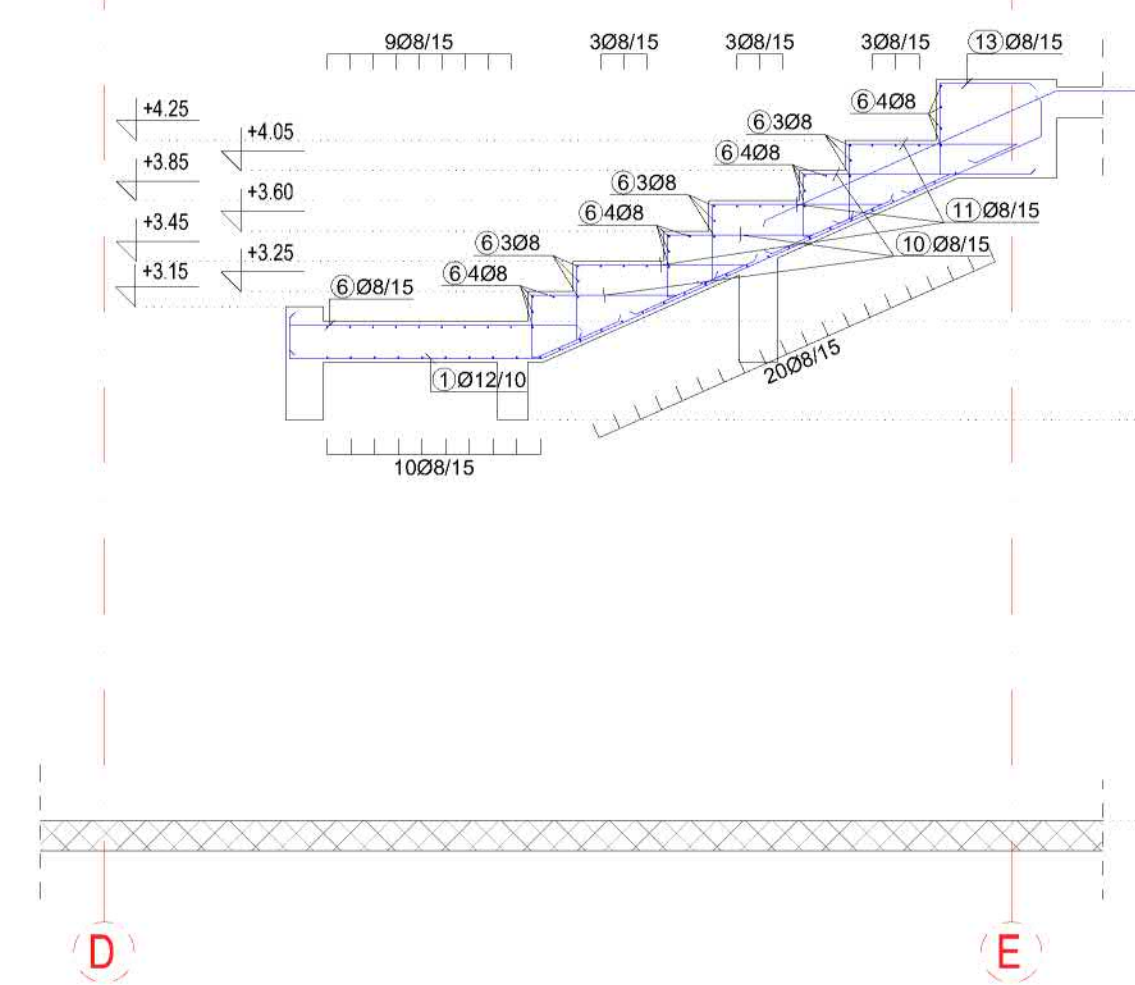
PRESEK H-H / SECTION H-H
R = 1:25



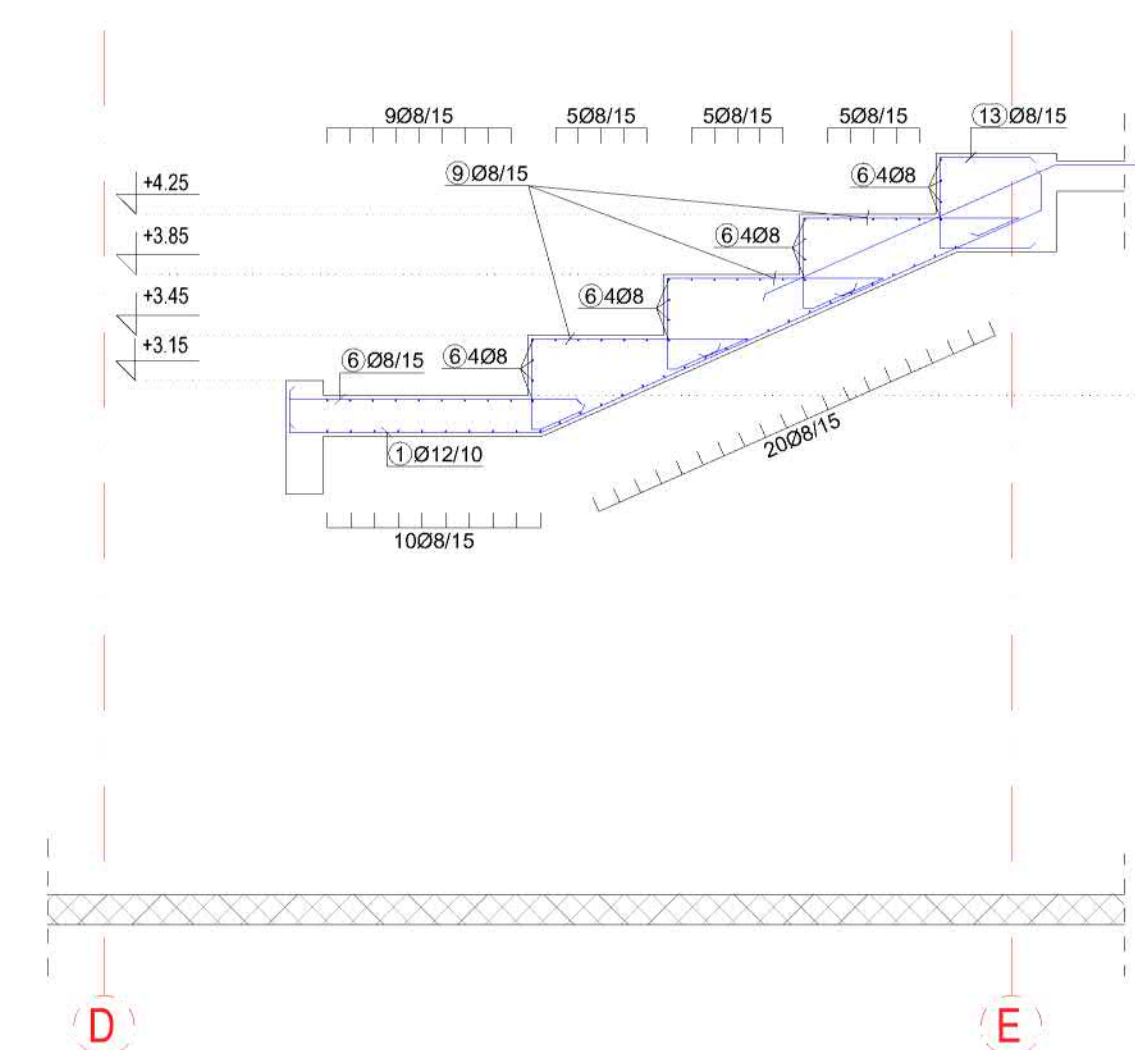
PRESEK a-a / SECTION a-a



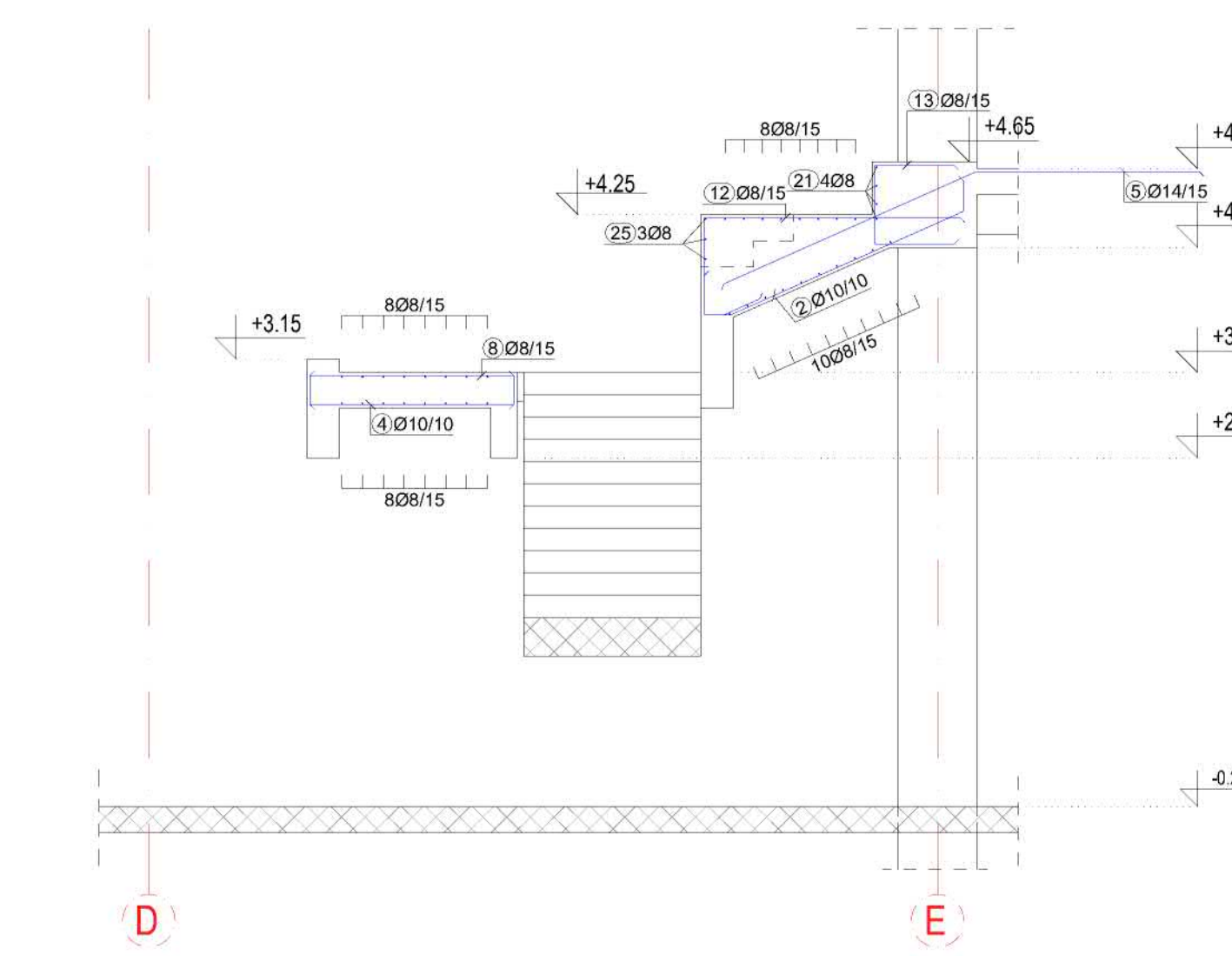
PRESEK b-b / SECTION b-b



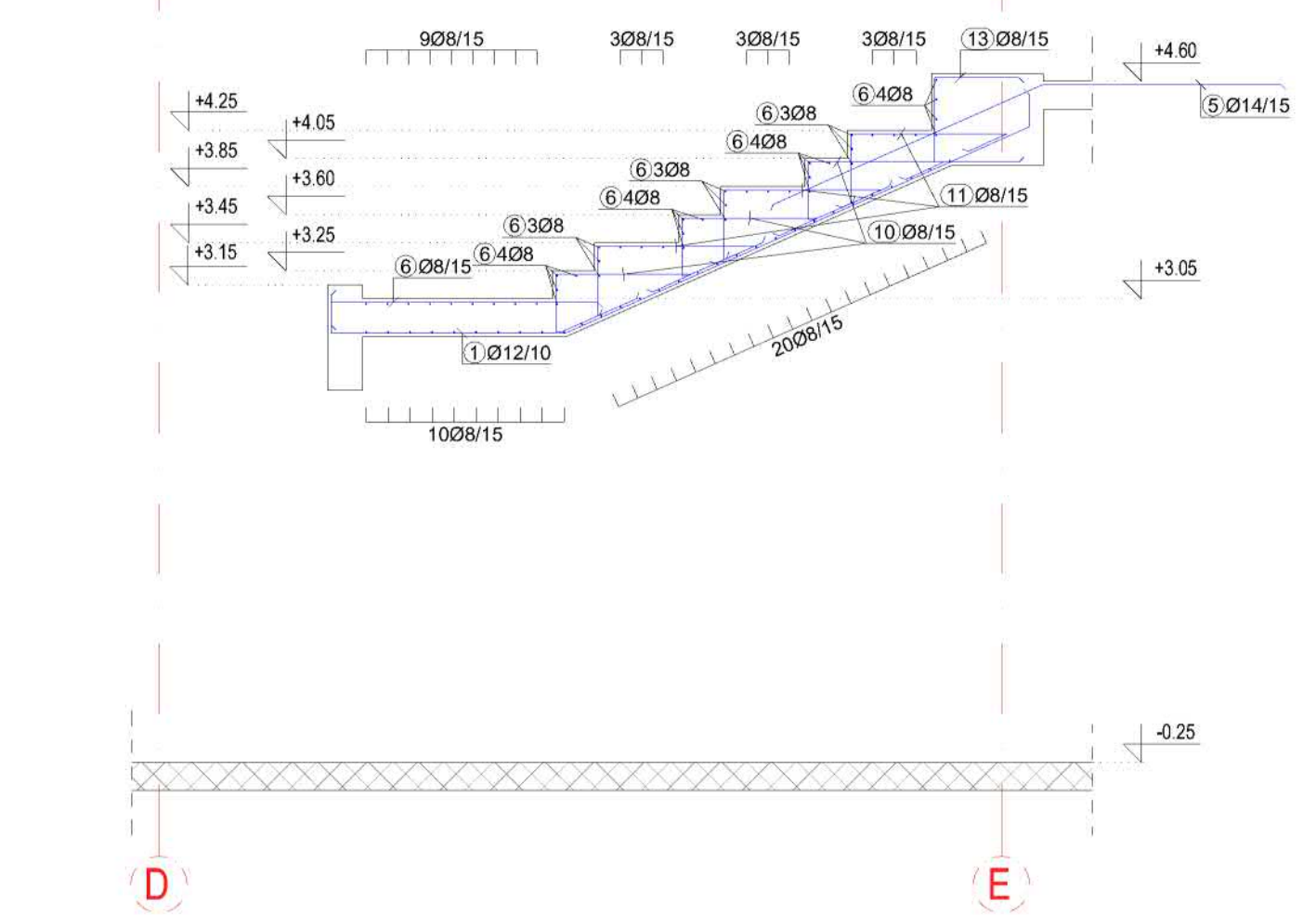
PRESEK d-d / SECTION d-d



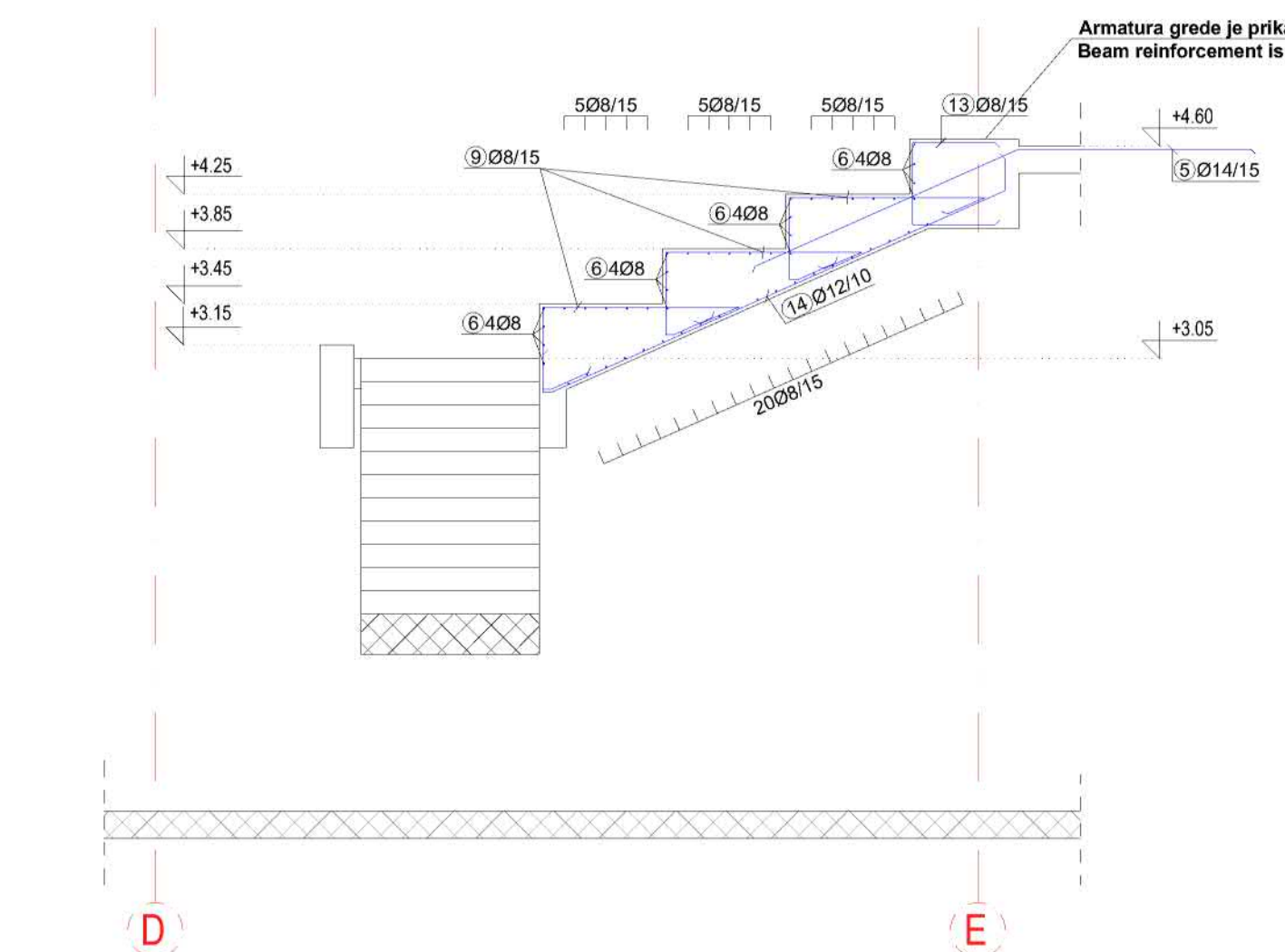
PRESEK a1-a1 / SECTION a1-a1



PRESEK b1-b1 / SECTION b1-b1



PRESEK e-e / SECTION e-e



OPŠTE NAPOMENE

1. Pre izvođenja radova sve mere proveriti na licu mesta.
2. Nausaglašenosti i odstupanja u očitima ili tekstuimh priložima projekta, obavezno razrešiti sa autorim i odgovornim projektantom.
3. Izmena u odelu projekta za vreme gradnje, vrši samo uz saglasnost autora i odgovornog projektanta.
4. Ne dozvoljavati se izmena na gradilištu za vreme izvođenja radova, bez saglasnosti autora, odgovornog projektanta i nadležnog nadzora.
5. Odgovornost za armirani detalj nosi klijent ili izvođač radova.
6. Ne premeravati crteže, koje u projektu su menodane.
7. Sve instalacione detore obavezno proveriti u projektnim instalacijama.

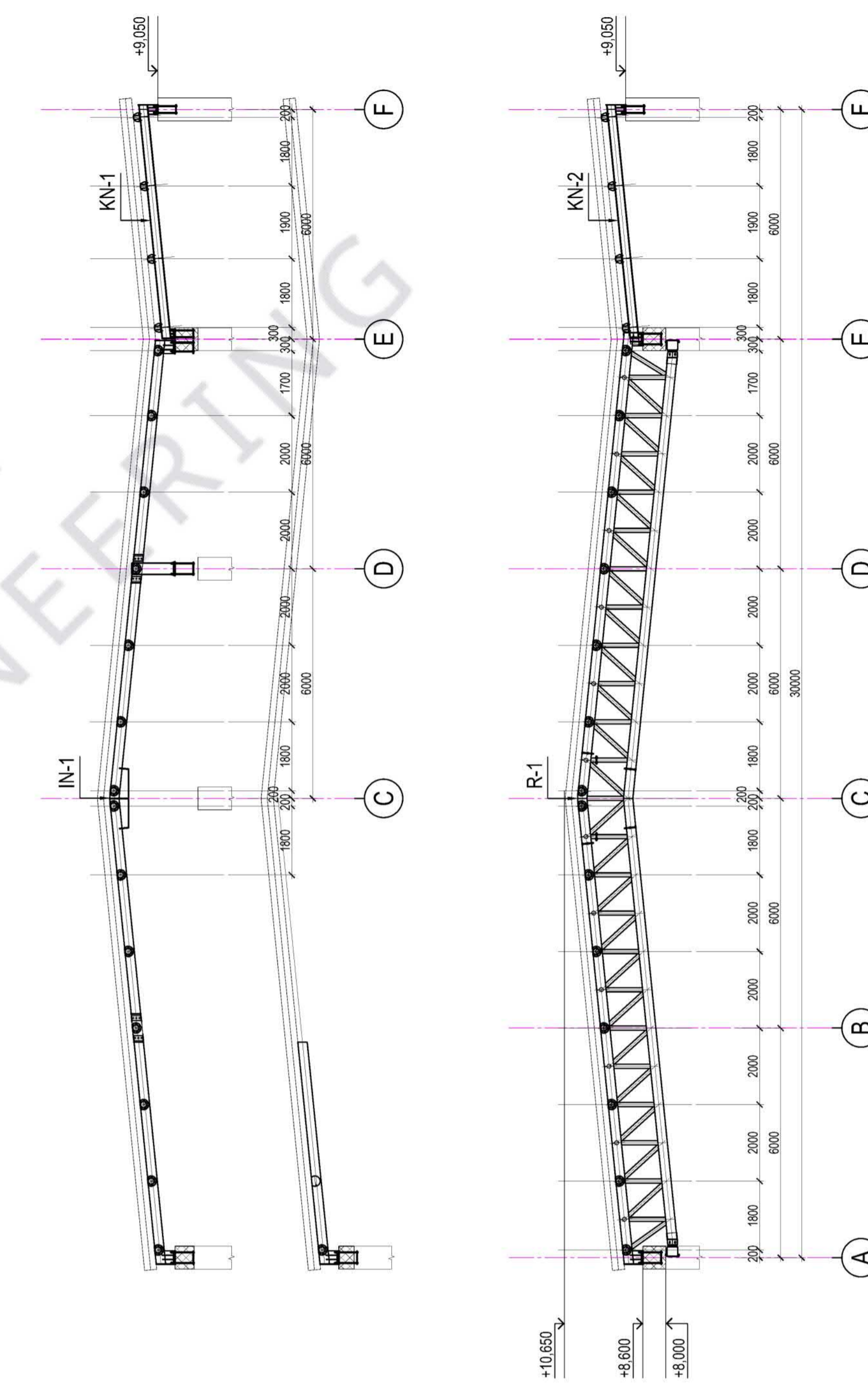
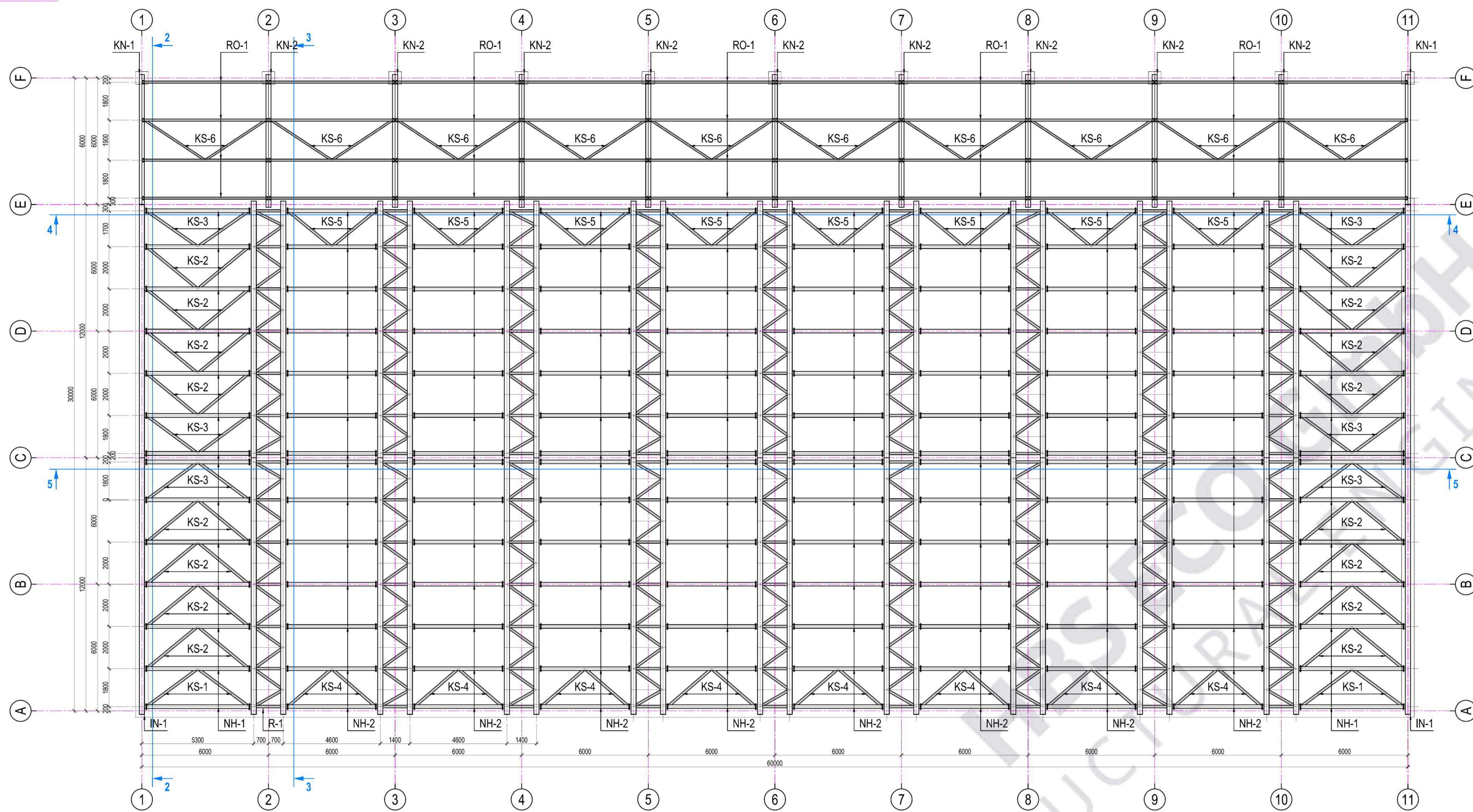
GENERAL NOTE

1. All measurements will be checked prior to commencement of works on site.
2. Inconformities in other drawings and/or textual appendices will have to be resolved with both an Author and a Professional Engineer (PE).
3. Variations, which may emerge in the design during the construction, are only to be made if the prior approval by both the Author and a Professional Engineer (PE) has been obtained.
4. No variations will be allowed in the course of work performed on site without approval by an Author, PE or a Technical Supervisor has been given.
5. Responsibility will be assumed by a person who authorized variations in the first place.
6. Drawings will not be checked for accuracy as design levels are correct.
7. All notes to be checked in the designs of installations.

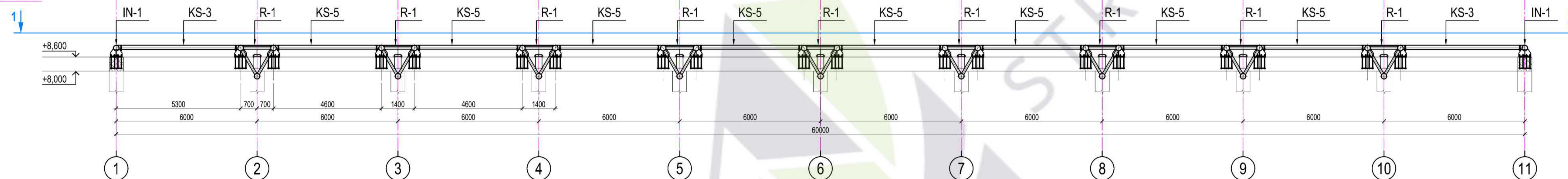
NAPOMENE:
- Površine betona ugraditi do 2mm zite.
- Sve konstrukcije šipke 50mm prilagođeni odeli
betona, tako da pokriva sve površine šipke u
koraku sa vazduhom, odnosno koja je vidljiva.
Mesta betona je postavljena na licu u odelu na
ostali konstrukcija - C30/37.

NOTES:
- Concrete surface needs to have polished finish.
- All non-structural reinforcement bars 50mm
adjust on site in accordance to formwork, with the
intent to cover all the concrete surface that is in
direct contact with air that is to cover all the
surfaces that are visible.
- Concrete class for grandstand is higher than the
rest of the building - C30/37.

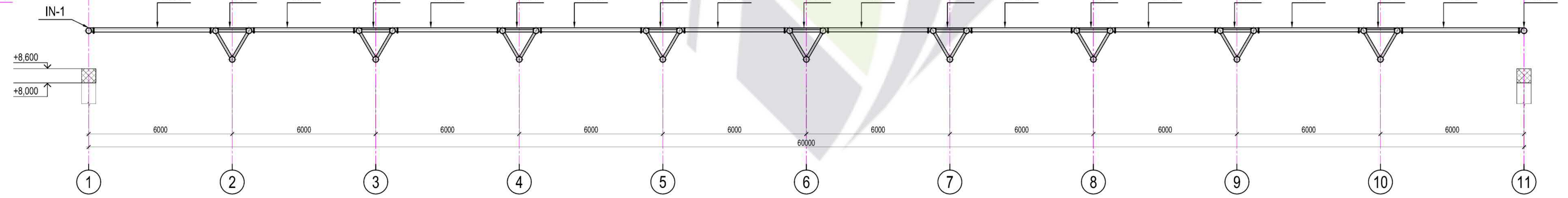
ZASTITNI SLOJEVI
CONCRETE COVER
beton - 20mm zite
B 5005 armatura +120mm
C 3037 armatura +120mm



Presek / Section 4-4



Presek / Section 5-5



NAPOMENE / REMARKS

- Osnovni materijal za sve elemente čelične konstr. je S235JRG2.
Basic material for all elements of the steel construction is S235JRG2.
- Svi šavovi su "C" kvaliteta.
All welds are of "C" quality.
- Svi ugonski šavovi koji nisu označeni debljine su 0,71 min, ali ne manje od 3 mm.
All fillet welds which are not marked area of thickness 0,71 min, but are not smaller than 3mm, except for the hollow profiles where they are same as the wall of the profile.
- Svi kontakti čeličnih elemenata, osim veza sa zavrtanjima, zavareni su.
All contacts of steel elements, other than embroidery with screws, connect odgovarajućim ugaponim ili suboenim šavovima!
with appropriate fillet or butt weld!
- Sve šuplje profile zatvoreni 5mm debljinom pločom.
All hollow profiles closed with 5mm steel plate.
- Osnovni materijal za ankerke je S.8.
Basic material for all anchors is S.8.
- Visinske kote preuzete iz projekta arhitekture ili armirano-betonske konstrukcije.
Elevation dim. are taken from the architectural design or concrete structure design.
- SVE DIMENZIJE PROVERITI NA LICU MESTAJ!
ALL DIMENSIONS NEED TO BE CHECKED ON THE SPOT!

OZNAKA ELEMENTA / ELEMENT MARK	OBLIK / SHAPE	PRESEK / SECTION
R-1		1-Ø 244.5x8 2-Ø 108x4 3-# 10 4-# 10
IN-1		1-Ø 244.5x8
NH-1		1-Ø 177.8x5
NH-2		1-Ø 168.3x4
KS-1; KS-2; KS-3; KS-4; KS-5		1-Ø 114.3x4
KN-1		1-IPB1 240 (hea)
RO-1		1-□ 160x100x5
KS-6		1-□ 90x90x4

