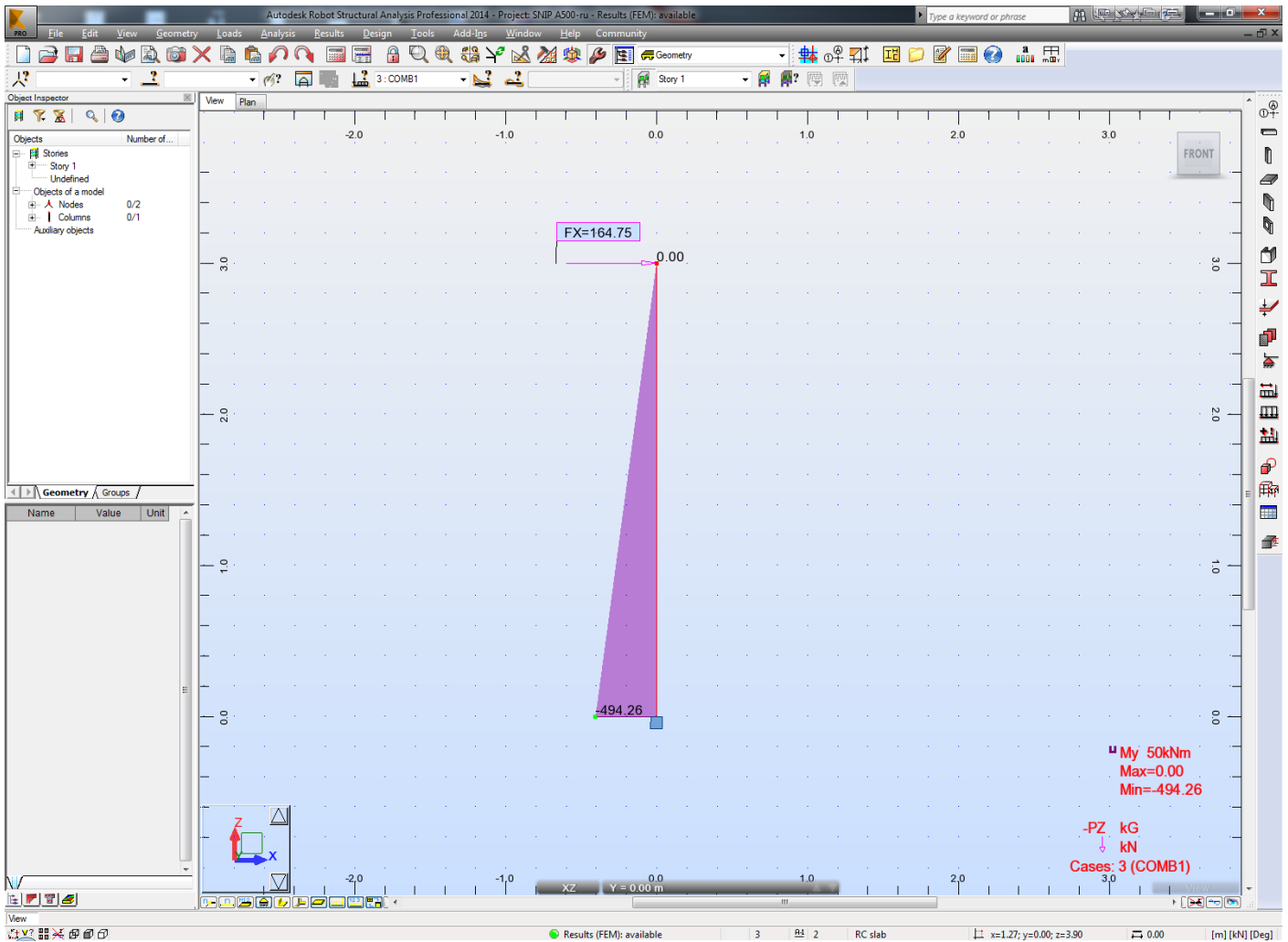


AUTODESK ROBOT STRUCTURAL ANALYSIS – COLUMN REQUIRED REINFORCEMENT DESIGN

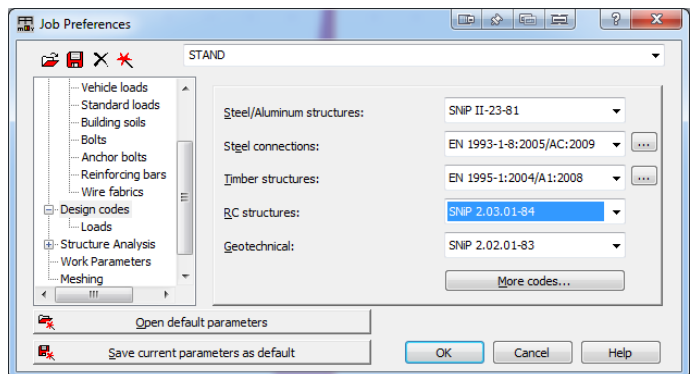
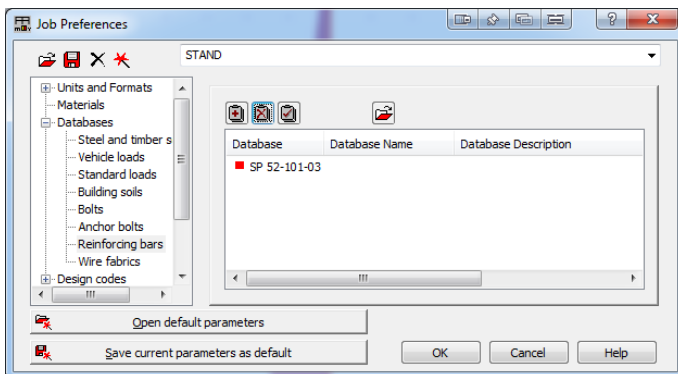
REINFORCING BAR STRENGTH PROBLEM with RUSSIAN SP-52-101-03 REBAR DATABASE

Model content: Simple column with fixed support and lateral load at tip point.

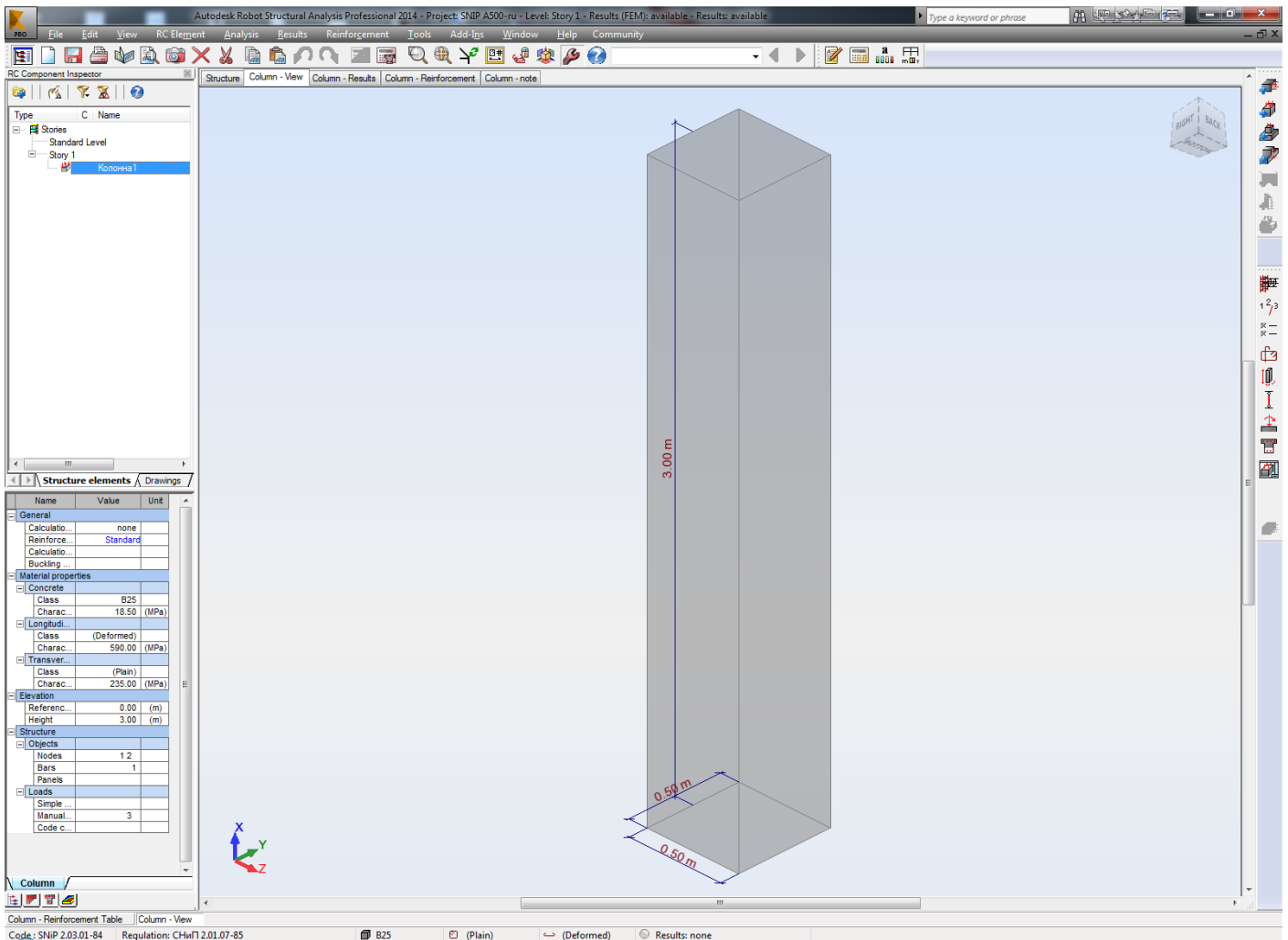


Rebar database selected as: SP52-101-03

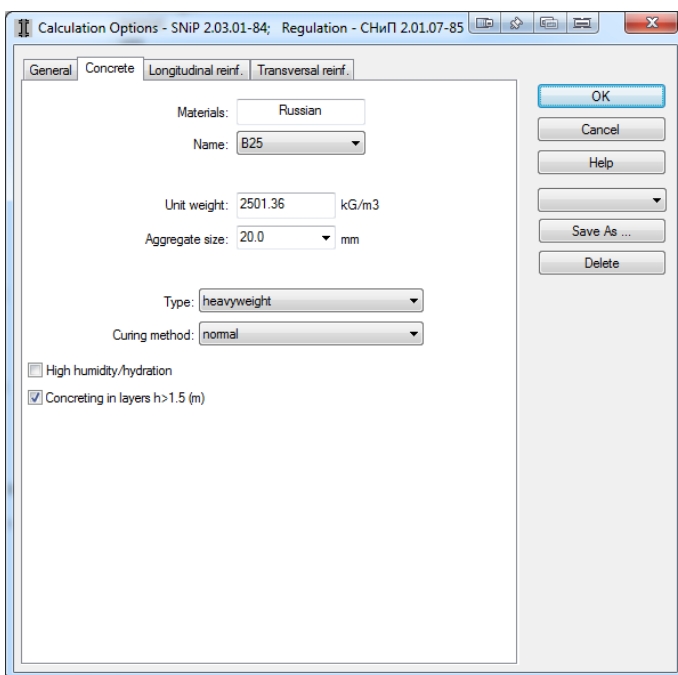
Design code selected as: Snip 2.03.01-84



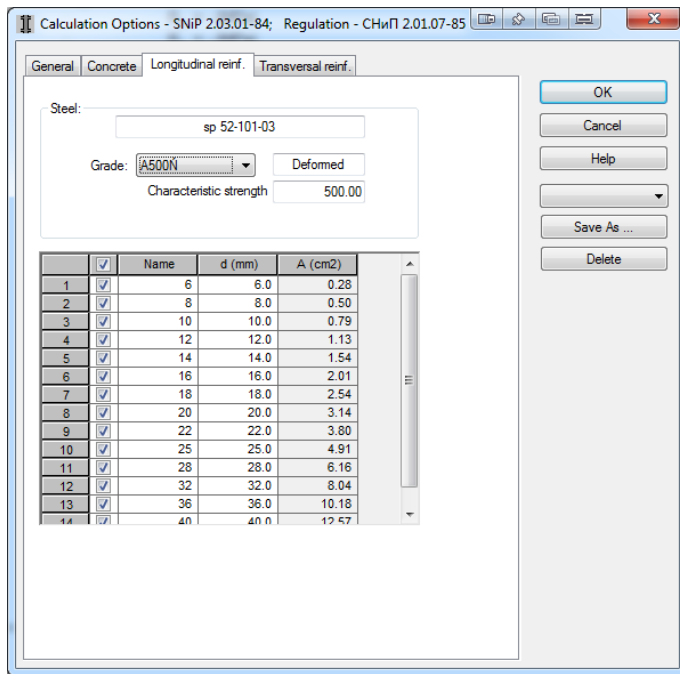
Switching to the Required Reinforcement module



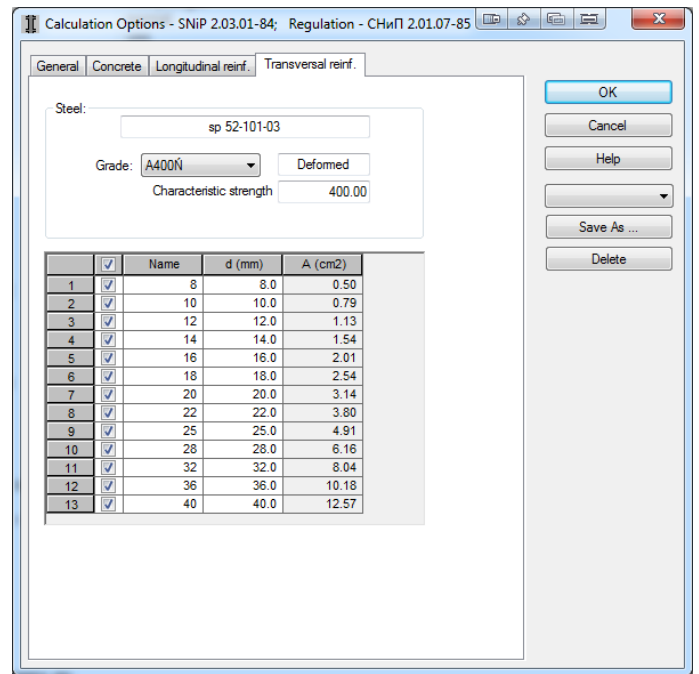
Concrete selected as standard Russian B25



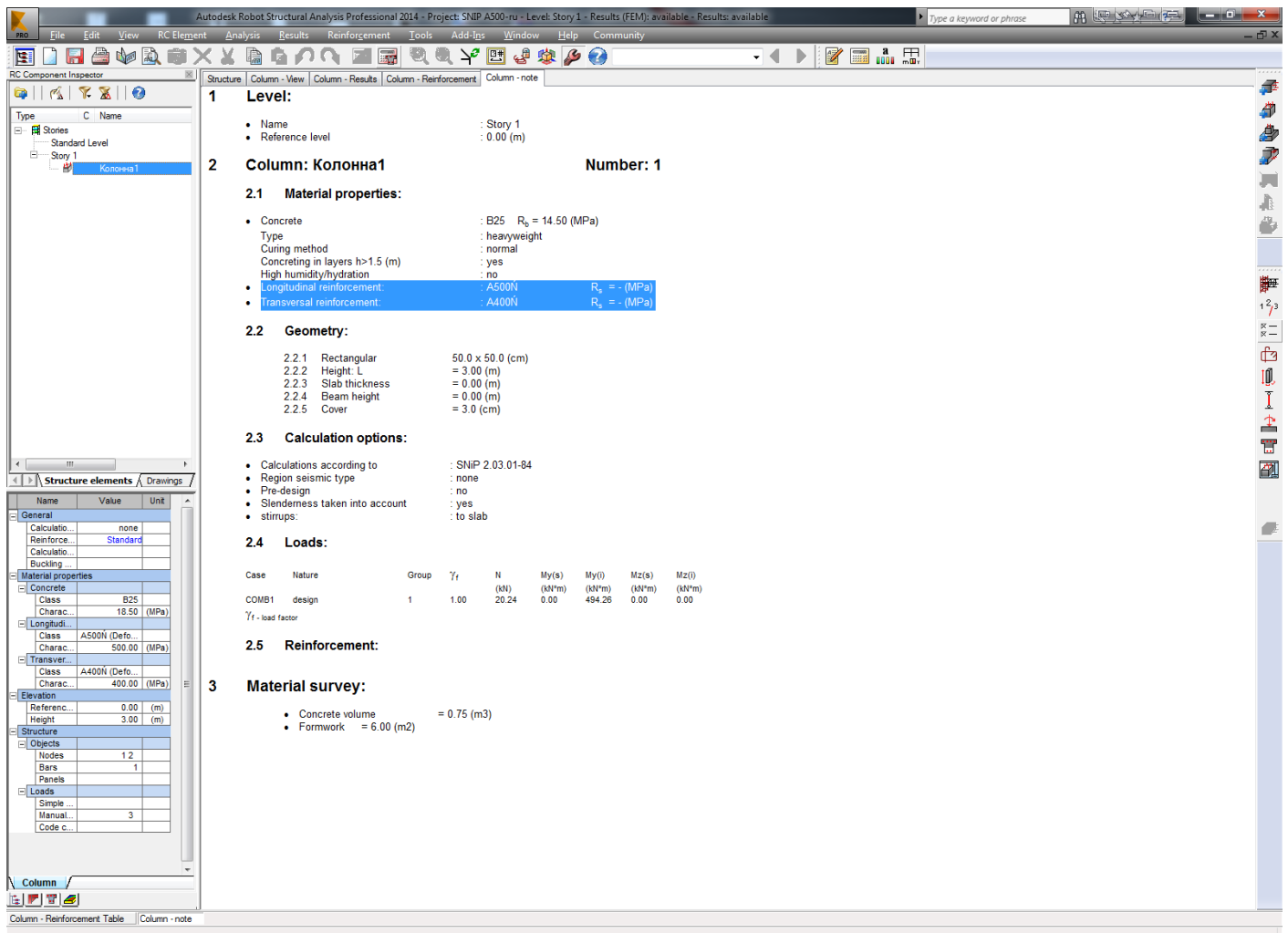
Reinforcement Grade for longitudinal bars: A500



Reinforcement Grade for longitudinal bars: A400



Before calculations



After calculations; A500 design strength is reported as 225MPa and column is designed per this value.

However it should be ~445 MPa

1 Level:

- Name : Story 1
- Reference level : 0.00 (m)

2 Column: Колонна1 Number: 1

2.1 Material properties:

- Concrete : B25 $R_b = 14.50$ (MPa)
- Type : heavyweight
- Curing method : normal
- Concreting in layers $h > 1.5$ (m) : yes
- High humidity/hydration : no
- Longitudinal reinforcement : A500N $R_{sk} = 225.00$ (MPa)
- Transversal reinforcement : A400N $R_{sk} = 360.00$ (MPa)

2.2 Geometry:

- 2.2.1 Rectangular : 50.0 x 50.0 (cm)
- 2.2.2 Height: L : = 3.00 (m)
- 2.2.3 Slab thickness : = 0.00 (m)
- 2.2.4 Beam height : = 0.00 (m)
- 2.2.5 Cover : = 5.0 (cm)

2.3 Calculation options:

- Calculations according to : SNIP 2.03.01-84
- Region seismic type : none
- Pre-design : no
- Slenderness taken into account : yes
- stirrups : to slab

2.4 Loads:

Case	Nature	Group	γ_f	N (kN)	My(s) (kNm)	My(l) (kNm)	Mz(s) (kNm)	Mz(l) (kNm)
COMB1	design	1	1.00	20.24	0.00	494.26	0.00	0.00

γ_f - load factor

2.5 Calculation results:

2.5.1 ULS Analysis

Design combination: COMB1 (B)

Internal forces:

$N_{sd} = 20.24$ (kN) $M_{sdy} = 494.26$ (kN*m) $M_{sdz} = 0.00$ (kN*m)

Design forces: Lower node

$N_{sd} = 20.24$ (kN) $N_{sd}^{etotz} = 494.26$ (kN*m) $N_{sd}^{etoty} = 0.34$ (kN*m)

2.5.1.1 Eccentricity:

Eccentricity:	Static	Initial	Total	ez (My/N) (cm)	ey (Mz/N) (cm)
Static	ea:	1.7 (cm)	2442.3 (cm)	0.0 (cm)	1.7 (cm)
Initial	e0:	1.7 (cm)	2442.3 (cm)	1.7 (cm)	1.7 (cm)
Total	etot:	1.7 (cm)	2442.3 (cm)	1.7 (cm)	1.7 (cm)

2.5.1.2 Detailed analysis-Direction Y:

2.5.1.2.1 Critical force (38)

Other grades design strengths are also taken incorrectly; fixed to 225 MPa such as:

1 Level:

- Name : Story 1
- Reference level : 0.00 (m)

2 Column: Колонна1 Number: 1

2.1 Material properties:

- Concrete : B25 $R_b = 14.50$ (MPa)
- Type : heavyweight
- Curing method : normal
- Concreting in layers $h > 1.5$ (m) : yes
- High humidity/hydration : no
- Longitudinal reinforcement : A800 $R_{sk} = 225.00$ (MPa)
- Transversal reinforcement : A81000 $R_{sk} = 225.00$ (MPa)

2.2 Geometry:

- 2.2.1 Rectangular : 50.0 x 50.0 (cm)
- 2.2.2 Height: L : = 3.00 (m)
- 2.2.3 Slab thickness : = 0.00 (m)
- 2.2.4 Beam height : = 0.00 (m)
- 2.2.5 Cover : = 5.0 (cm)

2.3 Calculation options:

- Calculations according to : SNIP 2.03.01-84
- Region seismic type : none
- Pre-design : no
- Slenderness taken into account : yes
- stirrups : to slab

2.4 Loads:

Case	Nature	Group	γ_f	N (kN)	My(s) (kNm)	My(l) (kNm)	Mz(s) (kNm)	Mz(l) (kNm)
COMB1	design	1	1.00	20.24	0.00	494.26	0.00	0.00

γ_f - load factor

2.5 Calculation results:

2.5.1 ULS Analysis

Design combination: COMB1 (B)

Internal forces:

$N_{sd} = 20.24$ (kN) $M_{sdy} = 494.26$ (kN*m) $M_{sdz} = 0.00$ (kN*m)

Design forces: Lower node

$N_{sd} = 20.24$ (kN) $N_{sd}^{etotz} = 494.26$ (kN*m) $N_{sd}^{etoty} = 0.34$ (kN*m)

2.5.1.1 Eccentricity:

Eccentricity:	Static	Initial	Total	ez (My/N) (cm)	ey (Mz/N) (cm)
Static	ea:	1.7 (cm)	2442.3 (cm)	0.0 (cm)	1.7 (cm)
Initial	e0:	1.7 (cm)	2442.3 (cm)	1.7 (cm)	1.7 (cm)
Total	etot:	1.7 (cm)	2442.3 (cm)	1.7 (cm)	1.7 (cm)

2.5.1.2 Detailed analysis-Direction Y:

2.5.1.2.1 Critical force (38)

1 Level:

- Name : Story 1
- Reference level : 0.00 (m)

2 Column: Колонна1 Number: 1

2.1 Material properties:

- Concrete : B25 $R_b = 14.50$ (MPa)
- Type : heavyweight
- Curing method : normal
- Concreting in layers $h > 1.5$ (m) : yes
- High humidity/hydration : no
- Longitudinal reinforcement : A8500N $R_{sk} = 225.00$ (MPa)
- Transversal reinforcement : A8600 $R_{sk} = 225.00$ (MPa)

2.2 Geometry:

- 2.2.1 Rectangular : 50.0 x 50.0 (cm)
- 2.2.2 Height: L : = 3.00 (m)
- 2.2.3 Slab thickness : = 0.00 (m)
- 2.2.4 Beam height : = 0.00 (m)
- 2.2.5 Cover : = 5.0 (cm)

2.3 Calculation options:

- Calculations according to : SNIP 2.03.01-84
- Region seismic type : none
- Pre-design : no
- Slenderness taken into account : yes
- stirrups : to slab

2.4 Loads:

Case	Nature	Group	γ_f	N (kN)	My(s) (kNm)	My(l) (kNm)	Mz(s) (kNm)	Mz(l) (kNm)
COMB1	design	1	1.00	20.24	0.00	494.26	0.00	0.00

γ_f - load factor

2.5 Calculation results:

2.5.1 ULS Analysis

Design combination: COMB1 (B)

Internal forces:

$N_{sd} = 20.24$ (kN) $M_{sdy} = 494.26$ (kN*m) $M_{sdz} = 0.00$ (kN*m)

Design forces: Lower node

$N_{sd} = 20.24$ (kN) $N_{sd}^{etotz} = 494.26$ (kN*m) $N_{sd}^{etoty} = 0.34$ (kN*m)

2.5.1.1 Eccentricity:

Eccentricity:	Static	Initial	Total	ez (My/N) (cm)	ey (Mz/N) (cm)
Static	ea:	1.7 (cm)	2442.3 (cm)	0.0 (cm)	1.7 (cm)
Initial	e0:	1.7 (cm)	2442.3 (cm)	1.7 (cm)	1.7 (cm)
Total	etot:	1.7 (cm)	2442.3 (cm)	1.7 (cm)	1.7 (cm)

2.5.1.2 Detailed analysis-Direction Y:

2.5.1.2.1 Critical force (38)