IDEA StatiCa®

Calculate yesterday's estimates

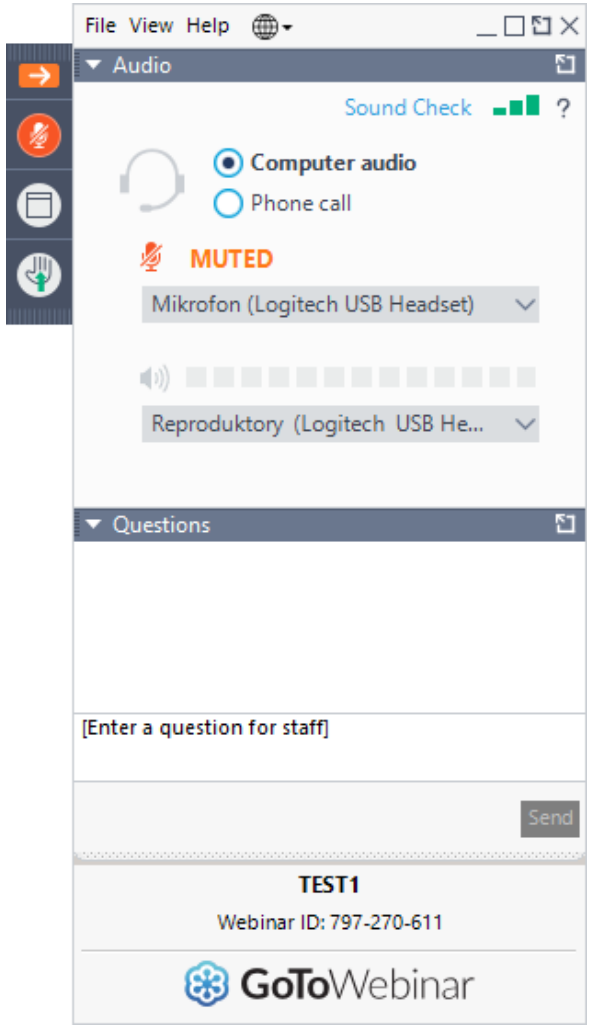
ANCHOR REINFORCEMENT IN BASE PLATE DESIGN

Control Panel

When you first join a session, the Control Panel appears on the right side of your screen. Use the Control Panel to manage your session. To free up space on your desktop, you can collapse the Control Panel and use the Grab Tab to continue to manage your session.

- **Grab Tab**: From the Grab Tab, you can hide the Control Panel, mute yourself (if you have been unmuted by the organizer), view the webinar in full screen and raise your hand.
- **Audio Pane**: Use the Audio pane to switch between Telephone and Mic & Speakers.
- **Questions Pane**: Ask questions for the staff.

QUESTIONS HANDOUT



IDEA StatiCa®

AGENDA

Intro to IDEA StatiCa

Version 25 Highlights

Complete base plate workflow demo

Next steps: how to download a trial?

Texas roadshow

Q&A

Ps. Download it now!

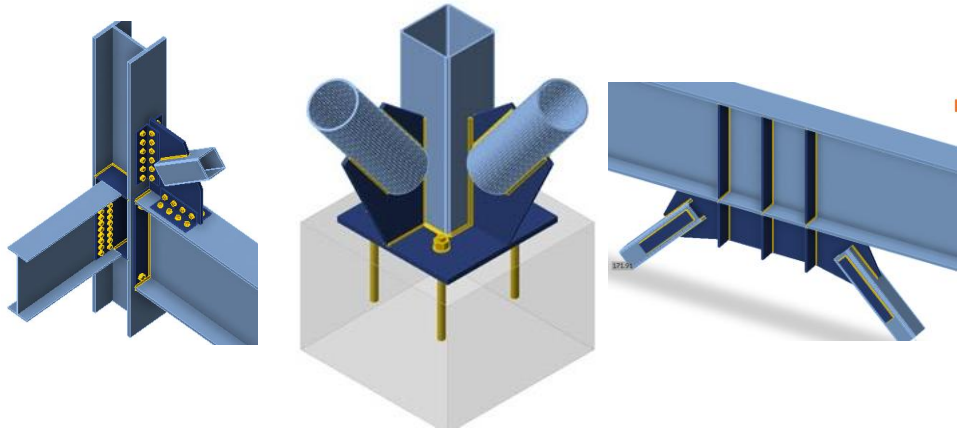
IDEA StatiCa®

IDEA StatiCa®

Calculate yesterday's estimates

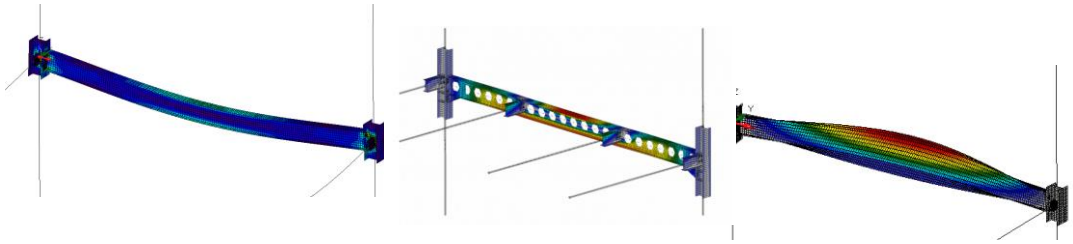
Connection

Steel



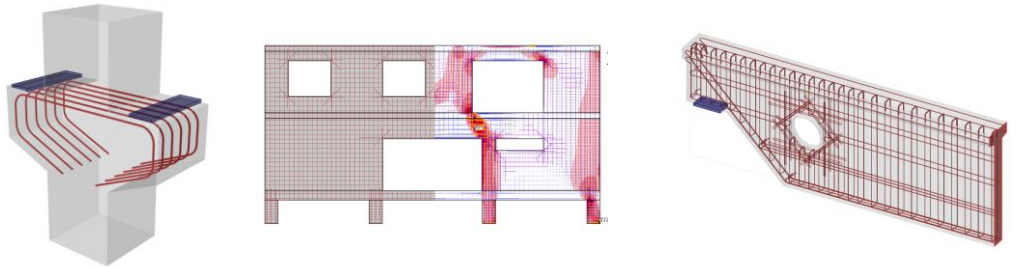
Member

Steel



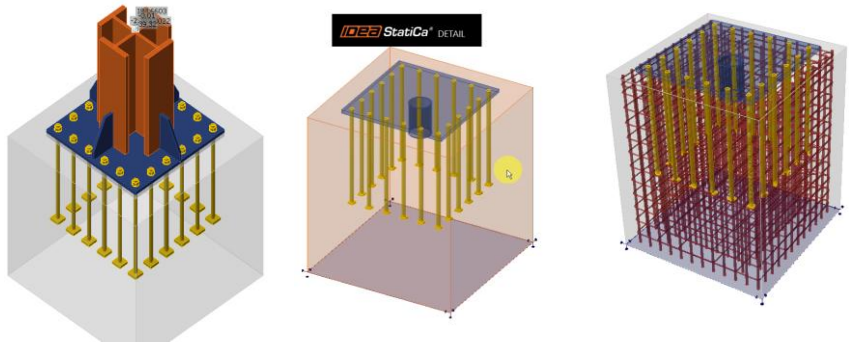
Detail

Concrete



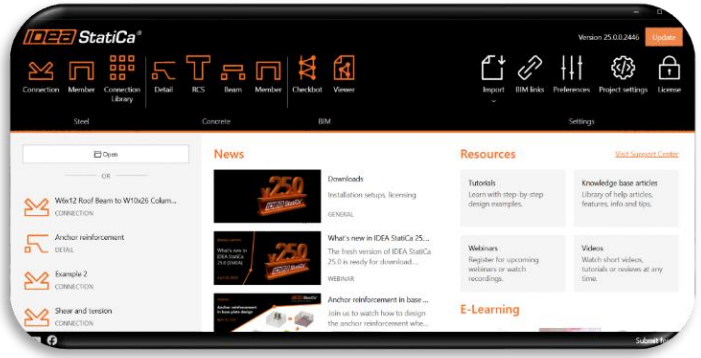
Connection + Detail

Steel + Concrete

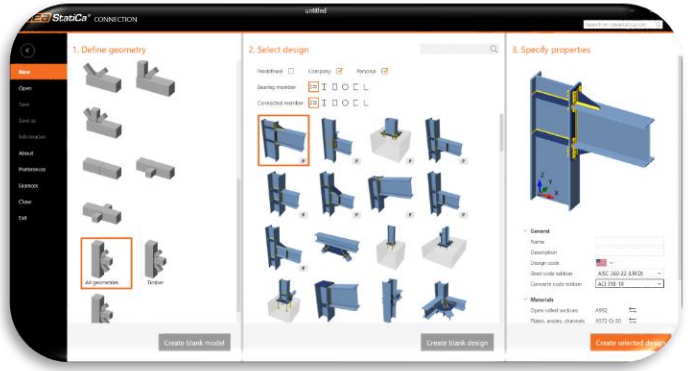


V25 HIGHLIGHTS STEEL

Refreshed look

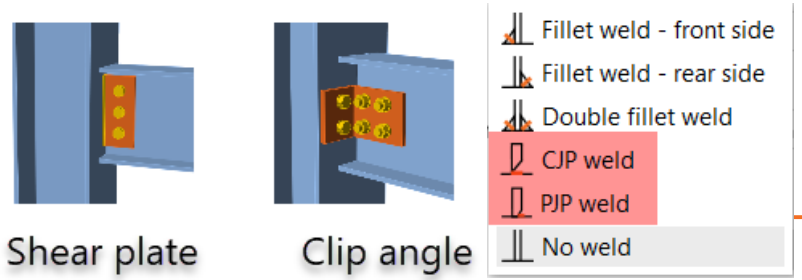


Open connections from your database



Slotted holes – plate selection

US naming convention



ACI 318-19 – Anchor design

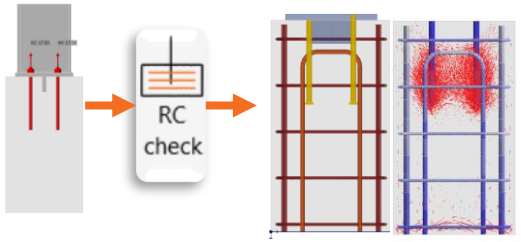
Save custom materials and cross section in MPRL

Full release notes

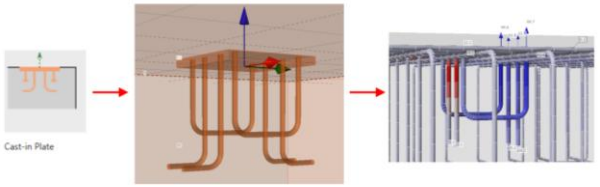
IDEA StatiCa®

V25 HIGHLIGHTS DETAIL

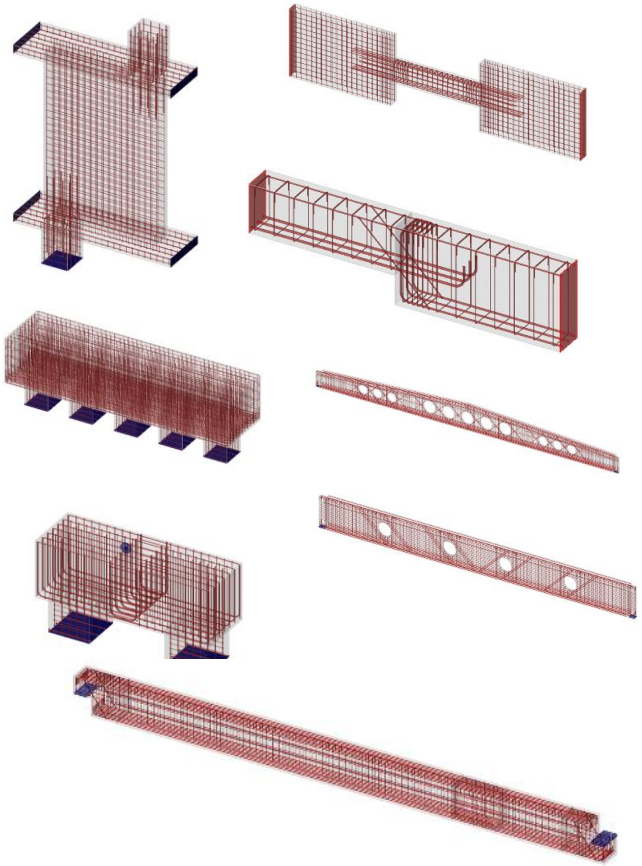
Connection and Detail app integration



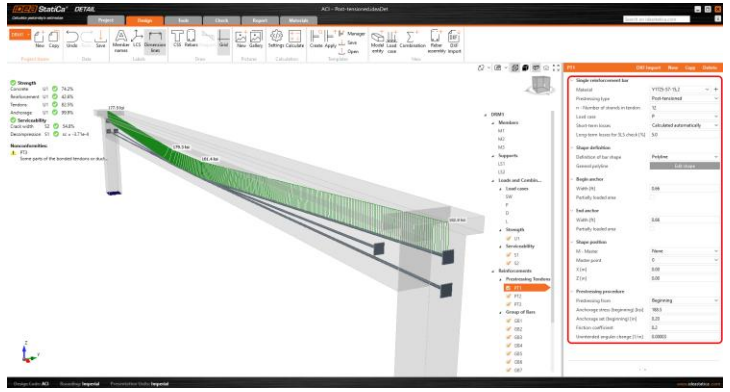
Embed plates



New templates in Detail for ACI



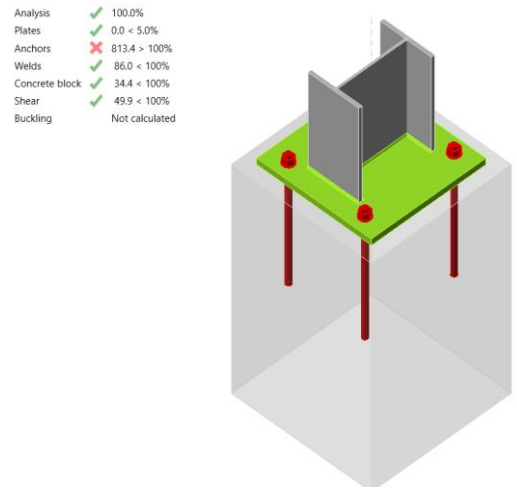
Prestressing tendons in beams



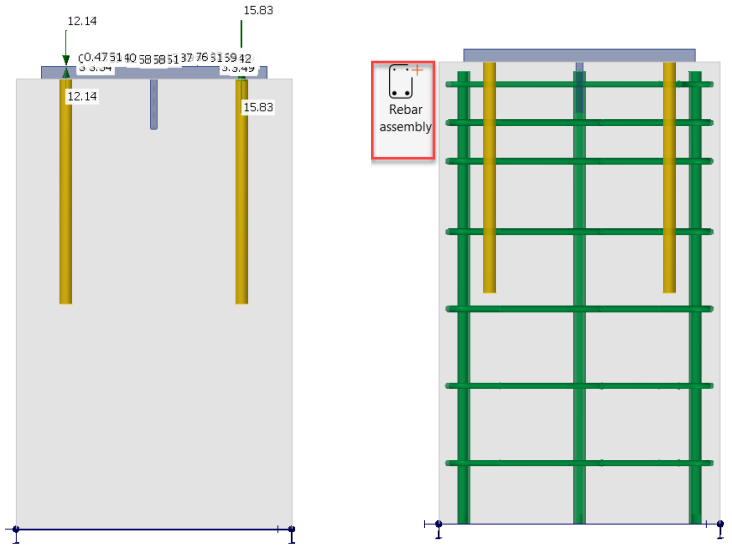
IDEA StatiCa®

COMPLETE BASE PLATE WORKFLOW

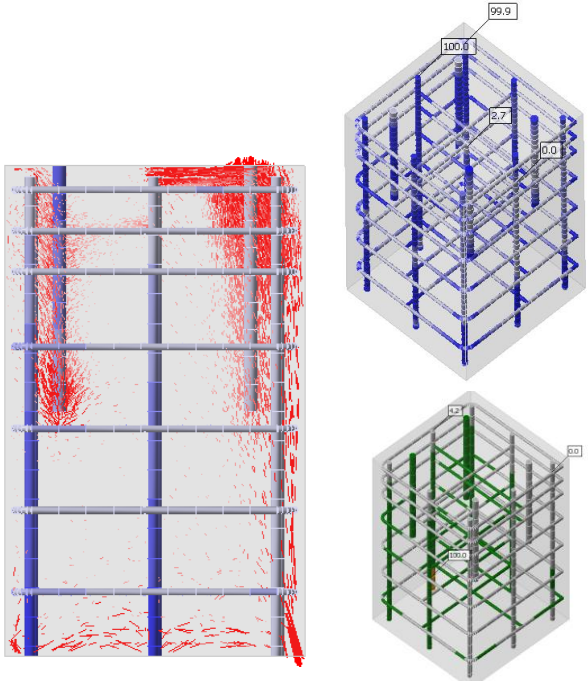
Three simple steps:



1. Model and **design** the **base plate** in Connection app



2. Export the model to Detail app and **model reinforcement**



2. Review **results** and optimize

ANCHOR REINFORCEMENT

What is the current solution?

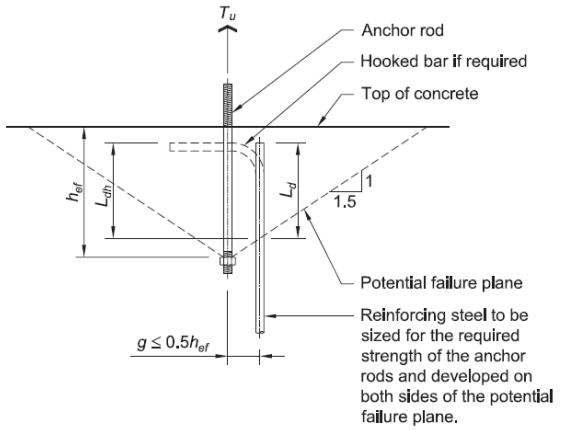


Fig. 4-11. The use of steel reinforcement for restraining tension concrete breakout.

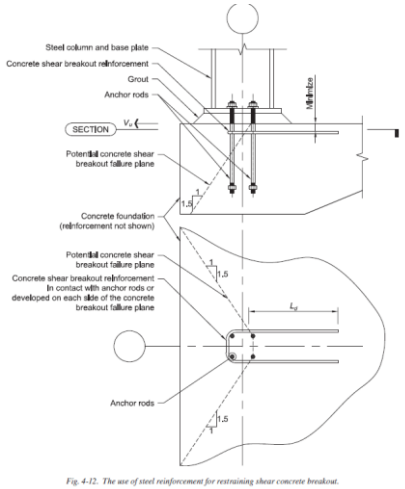
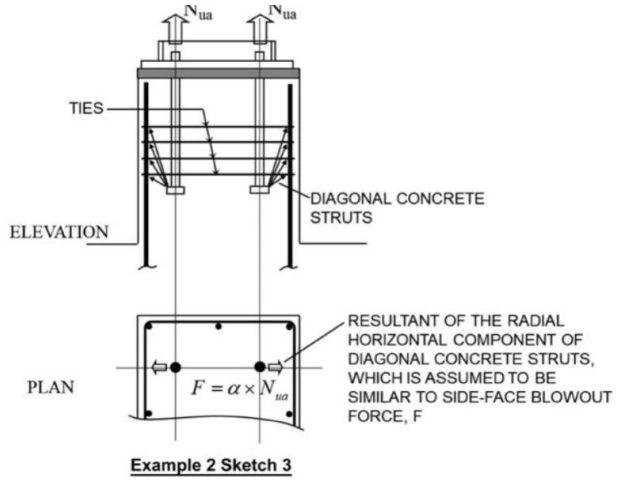


Fig. 4-12. The use of steel reinforcement for restraining shear concrete breakout.



Example 2 Sketch 3

Anchor reinforcement is permitted in ACI 318 instead of concrete breakout strength

Design guidelines in:

ACI 318, Section 17.5.2.1

AISC Design Guide 1, 3rd ed.

Use of Strut-and-Tie Methodologies in Anchorage Design

(ASCE, 2013)

EXAMPLE – LIVE DEMO

Base plate and pedestal design

- Col=W12X40
- Pedestal section = 22x22in H= 36in
- Minimum area of reinforcement 0.5% Ag= 484in^2*0.005=2.42in^2
- Vertical reinforcement=6#6

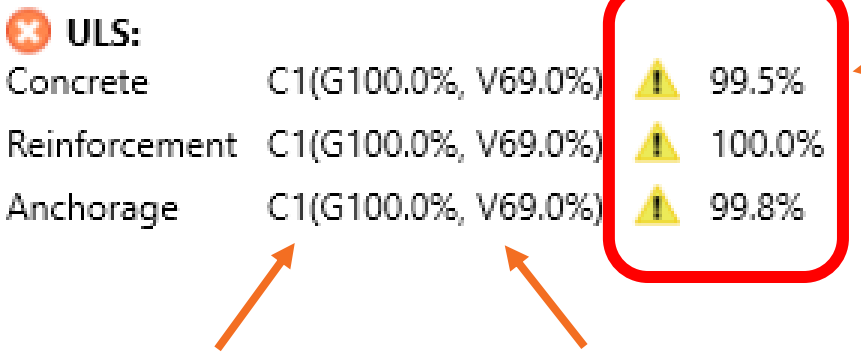
Load combinations:

- C+M+V=-25kips,62k-ft,15k
- T+V=50kips,20kips

IDEA StatiCa®

SUMMARY RESULTS

STOP AT LIMIT STRAIN



Utilization in % mark

Notes.: Reinforcement 100 % => The criteria have been reached on the rebars

Applied 100 % of permanent loads (G = *permanent*)

Applied 69 % of variable loads (V = *variable*)

Stop criteria have been reached.
The calculation stopped prior 100 % load transfer

RESULTS

Summary

- Shows the compression stresses on the concrete (red), tension stress in the steel (blue)

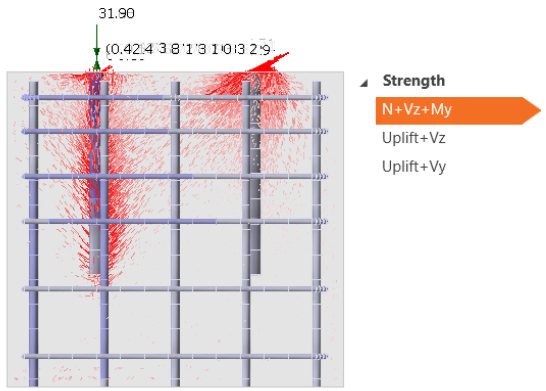
Strength

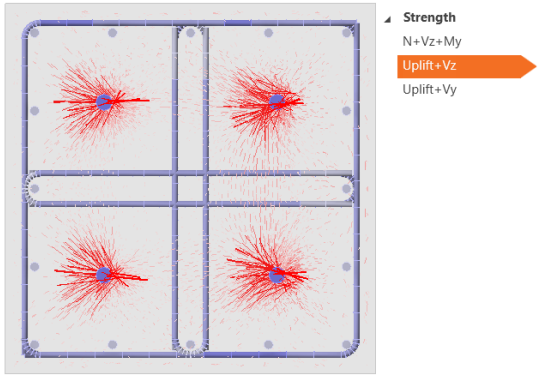
- Compressive stress in the concrete, utilization ratio stress vs available strength fc*0.75
- Stress in the steel, utilization ratio: stress vs available strength fy*0.75

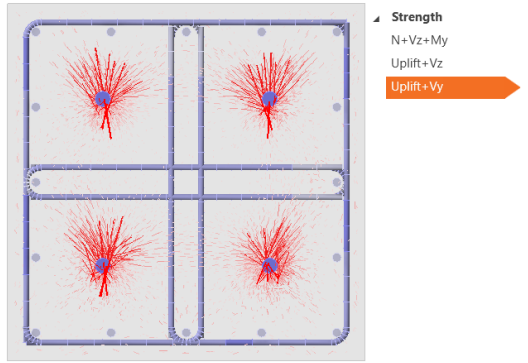
Anchorage

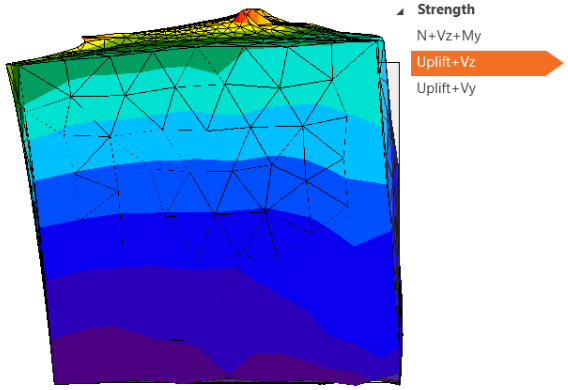
- Bond stress in the rebar

STRESS FLOW



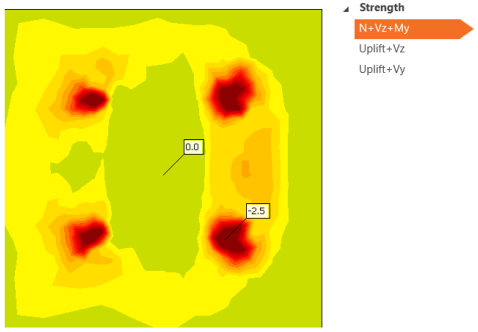




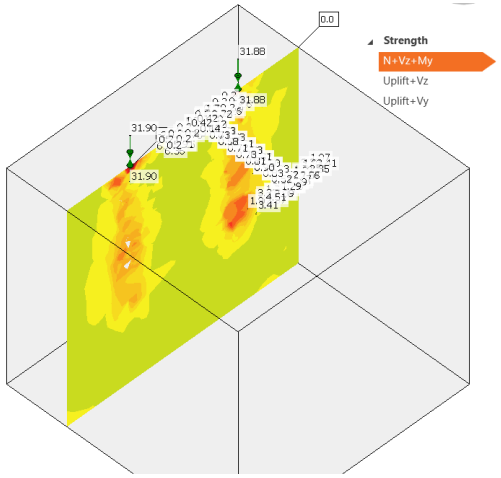


Deformed shape

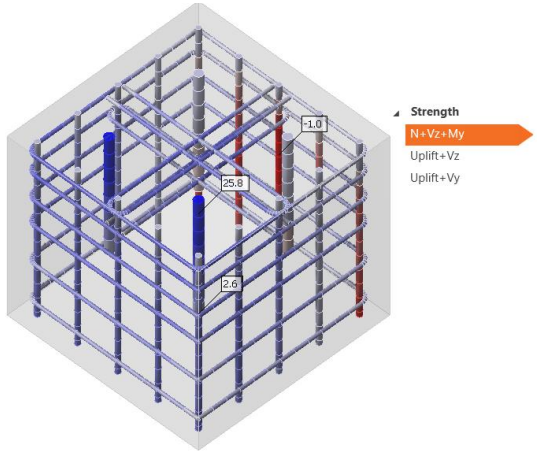
STRENGTH



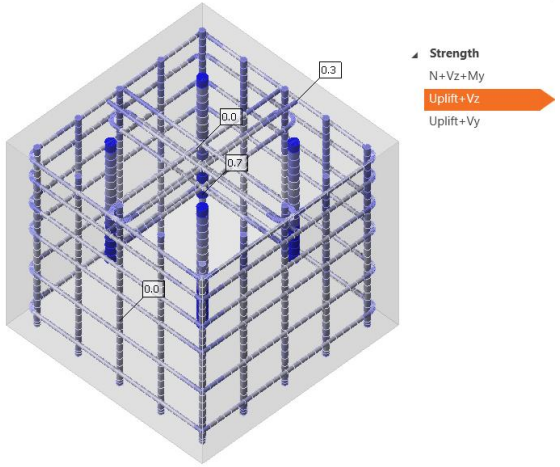
Concrete compressive stress



Sections results



Reinforcement stress

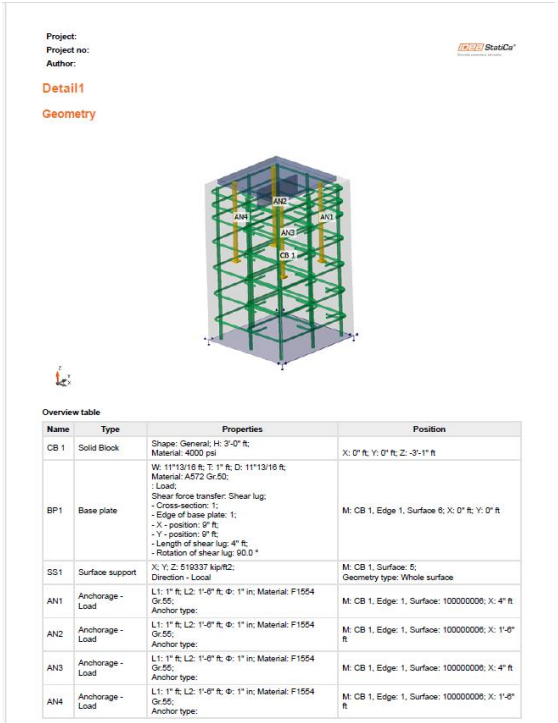


Bond stress

IDEA StatiCa®

REPORT

3D Views
Model properties



Project:
Project no:
Author:

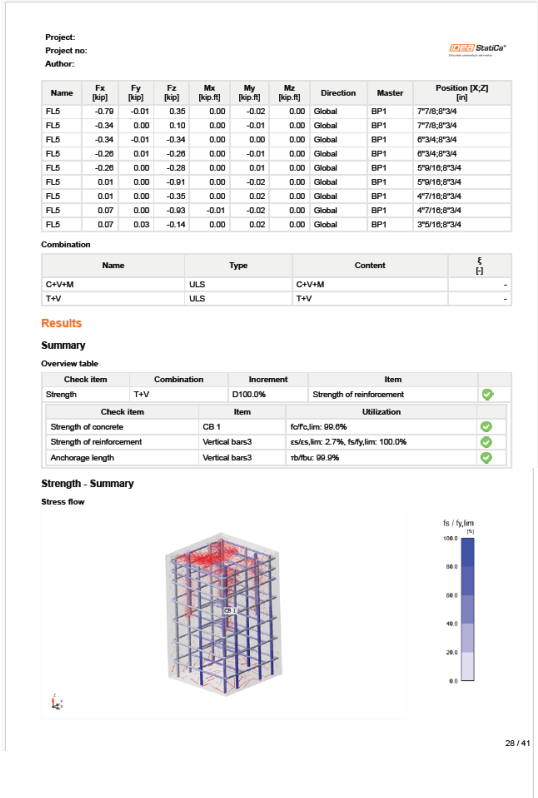
Detail1

Geometry

Overview table

Name	Type	Properties	Position
CB 1	Solid Block	Shape: General; H: 3'-0" ft; Material: 4000 psi	X: 0" ft; Y: 0" ft; Z: -3'-1" ft
BP1	Base plate	W: 11"13/16 ft; T: 1" ft; D: 11"13/16 ft; Material: A572 Gr.50; : Load; Shear force transfer: Shear lug; - Cross-section: 1; - Edge of base plate: 1; - X - position: 9" ft; - Y - position: 9" ft; - Length of shear lug: 4" ft; - Rotation of shear lug: 90.0 °	M: CB 1, Edge 1, Surface 6; X: 0" ft; Y: 0" ft
SS1	Surface support	X; Y; Z; 519337 kip/ft2; Direction - Local	M: CB 1, Surface: 5; Geometry type: Whole surface
AN1	Anchorage - Load	L1: 1" ft; L2: 1'-6" ft; Φ: 1" in; Material: F1554 Gr.55; Anchor type:	M: CB 1, Edge: 1, Surface: 100000006; X: 4" ft
AN2	Anchorage - Load	L1: 1" ft; L2: 1'-6" ft; Φ: 1" in; Material: F1554 Gr.55; Anchor type:	M: CB 1, Edge: 1, Surface: 100000006; X: 1'-6" ft
AN3	Anchorage - Load	L1: 1" ft; L2: 1'-6" ft; Φ: 1" in; Material: F1554 Gr.55; Anchor type:	M: CB 1, Edge: 1, Surface: 100000006; X: 4" ft
AN4	Anchorage - Load	L1: 1" ft; L2: 1'-6" ft; Φ: 1" in; Material: F1554 Gr.55; Anchor type:	M: CB 1, Edge: 1, Surface: 100000006; X: 1'-6" ft

Applied loads
Results summary



Project:
Project no:
Author:

Name	Fx [kip]	Fy [kip]	Fz [kip]	Mx [kip.ft]	My [kip.ft]	Mz [kip.ft]	Direction	Master	Position [X,Z] [in]
FL5	-0.79	-0.01	0.35	0.00	-0.02	0.00	Global	BP1	7"7/8;8"3/4
FL5	-0.34	0.00	0.10	0.00	-0.01	0.00	Global	BP1	7"7/8;8"3/4
FL5	-0.34	-0.01	-0.34	0.00	0.00	0.00	Global	BP1	6"3/4;8"3/4
FL5	-0.26	0.01	-0.26	0.00	-0.01	0.00	Global	BP1	6"3/4;8"3/4
FL5	-0.26	0.00	-0.28	0.00	0.01	0.00	Global	BP1	5"9/16;8"3/4
FL5	0.01	0.00	-0.91	0.00	-0.02	0.00	Global	BP1	5"9/16;8"3/4
FL5	0.01	0.00	-0.35	0.00	0.02	0.00	Global	BP1	4"7/16;8"3/4
FL5	0.07	0.00	-0.93	-0.01	-0.02	0.00	Global	BP1	4"7/16;8"3/4
FL5	0.07	0.03	-0.14	0.00	0.02	0.00	Global	BP1	3"5/16;8"3/4

Combination

Name	Type	Content	ξ [-]
C+V+M	ULS	C+V+M	-
T+V	ULS	T+V	-

Results

Summary

Overview table

Check item	Combination	Increment	Item	
Strength	T+V	D100.0%	Strength of reinforcement	✓

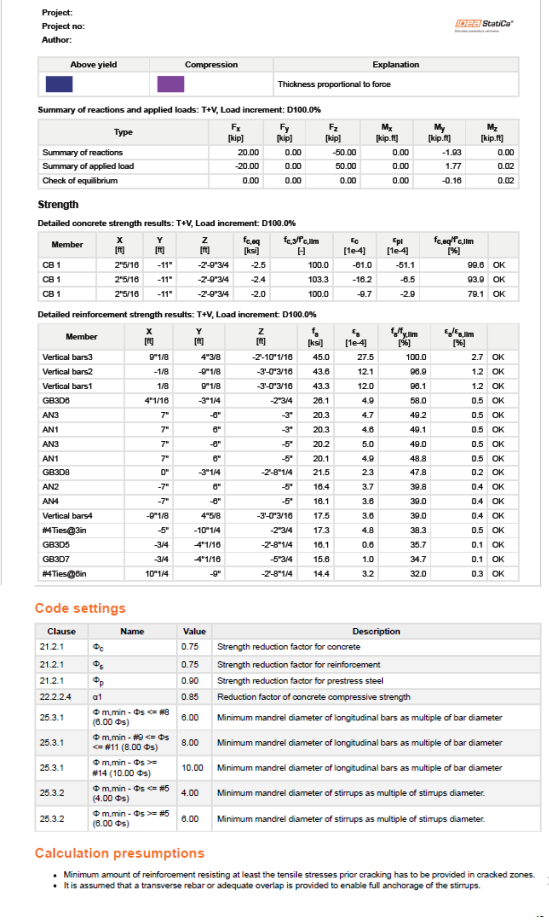
Check item	Item	Utilization	
Strength of concrete	CB 1	fc/f'c,lim: 99.6%	✓
Strength of reinforcement	Vertical bars3	εs/εs,lim: 2.7%, fs/fy,lim: 100.0%	✓
Anchorage length	Vertical bars3	τb/fbu: 99.9%	✓

Strength - Summary

Stress flow

29 / 41

Reinforcement stress by groups



Project:
Project no:
Author:

Above yield	Compression	Explanation
		Thickness proportional to force

Summary of reactions and applied loads: T+V, Load increment: D100.0%

Type	F_x [kip]	F_y [kip]	F_z [kip]	M_x [kip.ft]	M_y [kip.ft]	M_z [kip.ft]
Summary of reactions	20.00	0.00	-50.00	0.00	-1.93	0.00
Summary of applied load	-20.00	0.00	50.00	0.00	1.77	0.02
Check of equilibrium	0.00	0.00	0.00	0.00	-0.16	0.02

Strength

Detailed concrete strength results: T+V, Load increment: D100.0%

Member	X [ft]	Y [ft]	Z [ft]	$\varepsilon_{c,eq}$ [ksi]	$\varepsilon_{c,eq}/\varepsilon_{c,lim}$ [-]	ε_c [1e-4]	ε_{pl} [1e-4]	$\varepsilon_{c,eq}/\varepsilon_{c,lim}$ [%]	
CB 1	2"5/16	-11"	-2'-9"3/4	-2.5	100.0	-61.0	-51.1	99.6	OK
CB 1	2"5/16	-11"	-2'-9"3/4	-2.4	103.3	-16.2	-8.5	93.9	OK
CB 1	2"5/16	-11"	-2'-9"3/4	-2.0	100.0	-9.7	-2.9	79.1	OK

Detailed reinforcement strength results: T+V, Load increment: D100.0%

Member	X [ft]	Y [ft]	Z [ft]	f_s [ksi]	ε_s [1e-4]	$f_s/f_{s,lim}$ [%]	$\varepsilon_s/\varepsilon_{s,lim}$ [%]	
Vertical bars3	9"1/8	4"3/8	-2'-10"1/16	45.0	27.5	100.0	2.7	OK
Vertical bars2	-1/8	-9"1/8	-3'-0"3/16	43.6	12.1	96.9	1.2	OK
Vertical bars1	1/8	9"1/8	-3'-0"3/16	43.3	12.0	96.1	1.2	OK
GB3D6	4"1/16	-3"1/4	-2"3/4	26.1	4.9	58.0	0.5	OK
AN3	7"	-6"	-3"	20.3	4.7	49.2	0.5	OK
AN1	7"	6"	-3"	20.3	4.6	49.1	0.5	OK
AN3	7"	-6"	-5"	20.2	5.0	49.0	0.5	OK
AN1	7"	6"	-5"	20.1	4.9	48.8	0.5	OK
GB3D8	0"	-3"1/4	-2'-8"1/4	21.5	2.3	47.8	0.2	OK
AN2	-7"	6"	-5"	16.4	3.7	39.8	0.4	OK
AN4	-7"	-6"	-5"	16.1	3.6	39.0	0.4	OK
Vertical bars4	-9"1/8	4"5/8	-3'-0"3/16	17.5	3.6	39.0	0.4	OK
#4Ties@3in	-5"	-10"1/4	-2"3/4	17.3	4.8	38.3	0.5	OK
GB3D5	-3/4	-4"1/16	-2'-8"1/4	16.1	0.6	35.7	0.1	OK
GB3D7	-3/4	-4"1/16	-5"3/4	15.6	1.0	34.7	0.1	OK
#4Ties@6in	10"1/4	-9"	-2'-8"1/4	14.4	3.2	32.0	0.3	OK

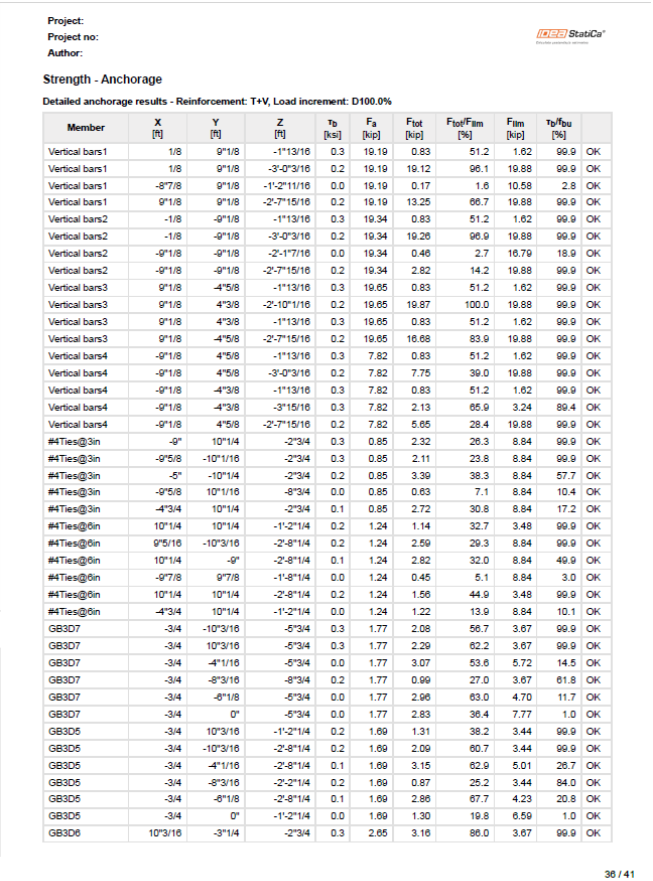
Code settings

Clause	Name	Value	Description
21.2.1	Φ_c	0.75	Strength reduction factor for concrete
21.2.1	Φ_s	0.75	Strength reduction factor for reinforcement
21.2.1	Φ_p	0.90	Strength reduction factor for prestress steel
22.2.2.4	α1	0.85	Reduction factor of concrete compressive strength
25.3.1	Φ m,min - Φs <= #8 (6.00 Φs)	6.00	Minimum mandrel diameter of longitudinal bars as multiple of bar diameter
25.3.1	Φ m,min - #9 <= Φs <= #11 (8.00 Φs)	8.00	Minimum mandrel diameter of longitudinal bars as multiple of bar diameter
25.3.1	Φ m,min - Φs >= #14 (10.00 Φs)	10.00	Minimum mandrel diameter of longitudinal bars as multiple of bar diameter
25.3.2	Φ m,min - Φs <= #5 (4.00 Φs)	4.00	Minimum mandrel diameter of stirrups as multiple of stirrups diameter.
25.3.2	Φ m,min - Φs >= #5 (6.00 Φs)	6.00	Minimum mandrel diameter of stirrups as multiple of stirrups diameter.

Calculation presumptions

- Minimum amount of reinforcement resisting at least the tensile stresses prior cracking has to be provided in cracked zones.
- It is assumed that a transverse rebar or adequate overlap is provided to enable full anchorage of the stirrups.

Bond stress by groups



Project:
Project no:
Author:

Strength - Anchorage

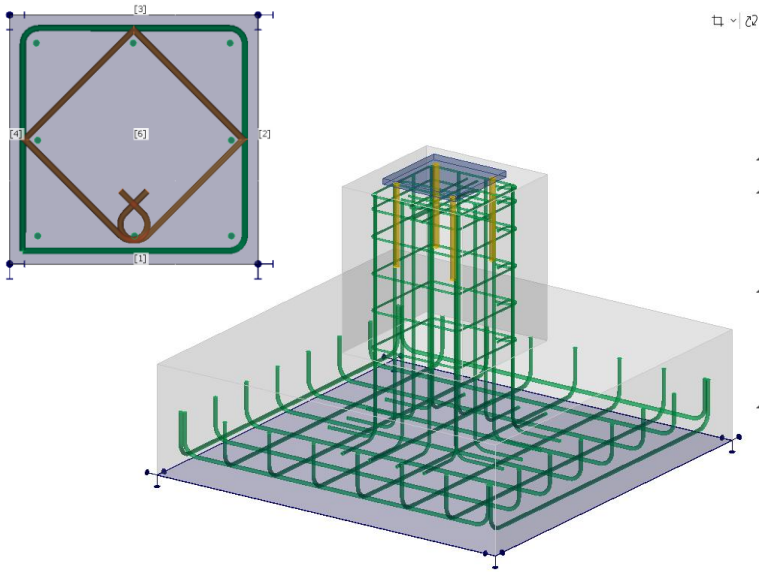
Detailed anchorage results - Reinforcement: T+V, Load increment: D100.0%

Member	X [ft]	Y [ft]	Z [ft]	τ_b [ksi]	F_a [kip]	F_{tot} [kip]	F_{tot}/F_{lim} [%]	F_{lim} [kip]	τ_b/f_{bu} [%]	
Vertical bars1	1/8	9"1/8	-1"13/16	0.3	19.19	0.83	51.2	1.62	99.9	OK
Vertical bars1	1/8	9"1/8	-3'-0"3/16	0.2	19.19	19.12	96.1	19.88	99.9	OK
Vertical bars1	-8"7/8	9"1/8	-1'-2"11/16	0.0	19.19	0.17	1.6	10.58	2.8	OK
Vertical bars1	9"1/8	9"1/8	-2'-7"15/16	0.2	19.19	13.25	66.7	19.88	99.9	OK
Vertical bars2	-1/8	-9"1/8	-1"13/16	0.3	19.34	0.83	51.2	1.62	99.9	OK
Vertical bars2	-1/8	-9"1/8	-3'-0"3/16	0.2	19.34	19.26	96.9	19.88	99.9	OK
Vertical bars2	-9"1/8	-9"1/8	-2'-1"7/16	0.0	19.34	0.46	2.7	16.79	18.9	OK
Vertical bars2	-9"1/8	-9"1/8	-2'-7"15/16	0.2	19.34	2.82	14.2	19.88	99.9	OK
Vertical bars3	9"1/8	-4"5/8	-1"13/16	0.3	19.65	0.83	51.2	1.62	99.9	OK
Vertical bars3	9"1/8	4"3/8	-2'-10"1/16	0.2	19.65	19.87	100.0	19.88	99.9	OK
Vertical bars3	9"1/8	4"3/8	-1"13/16	0.3	19.65	0.83	51.2	1.62	99.9	OK
Vertical bars3	9"1/8	-4"5/8	-2'-7"15/16	0.2	19.65	16.68	83.9	19.88	99.9	OK
Vertical bars4	-9"1/8	4"5/8	-1"13/16	0.3	7.82	0.83	51.2	1.62	99.9	OK
Vertical bars4	-9"1/8	4"5/8	-3'-0"3/16	0.2	7.82	7.75	39.0	19.88	99.9	OK
Vertical bars4	-9"1/8	-4"3/8	-1"13/16	0.3	7.82	0.83	51.2	1.62	99.9	OK
Vertical bars4	-9"1/8	-4"3/8	-3"15/16	0.3	7.82	2.13	65.9	3.24	89.4	OK
Vertical bars4	-9"1/8	4"5/8	-2'-7"15/16	0.2	7.82	5.65	28.4	19.88	99.9	OK
#4Ties@3in	-9"	10"1/4	-2"3/4	0.3	0.85	2.32	26.3	8.84	99.9	OK
#4Ties@3in	-9"5/8	-10"1/16	-2"3/4	0.3	0.85	2.11	23.8	8.84	99.9	OK
#4Ties@3in	-5"	-10"1/4	-2"3/4	0.2	0.85	3.39	38.3	8.84	57.7	OK
#4Ties@3in	-9"5/8	10"1/16	-8"3/4	0.0	0.85	0.63	7.1	8.84	10.4	OK
#4Ties@3in	-4"3/4	10"1/4	-2"3/4	0.1	0.85	2.72	30.8	8.84	17.2	OK
#4Ties@6in	10"1/4	10"1/4	-1'-2"1/4	0.2	1.24	1.14	32.7	3.48	99.9	OK
#4Ties@6in	9"5/16	-10"3/16	-2'-8"1/4	0.2	1.24	2.59	29.3	8.84	99.9	OK
#4Ties@6in	10"1/4	-9"	-2'-8"1/4	0.1	1.24	2.82	32.0	8.84	49.9	OK
#4Ties@6in	-9"7/8	9"7/8	-1'-8"1/4	0.0	1.24	0.45	5.1	8.84	3.0	OK
#4Ties@6in	10"1/4	10"1/4	-2'-8"1/4	0.2	1.24	1.56	44.9	3.48	99.9	OK
#4Ties@6in	-4"3/4	10"1/4	-1'-2"1/4	0.0	1.24	1.22	13.9	8.84	10.1	OK
GB3D7	-3/4	-10"3/16	-5"3/4	0.3	1.77	2.08	56.7	3.67	99.9	OK
GB3D7	-3/4	10"3/16	-5"3/4	0.3	1.77	2.29	62.2	3.67	99.9	OK
GB3D7	-3/4	-4"1/16	-5"3/4	0.0	1.77	3.07	53.6	5.72	14.5	OK
GB3D7	-3/4	-8"3/16	-8"3/4	0.2	1.77	0.99	27.0	3.67	61.8	OK
GB3D7	-3/4	-6"1/8	-5"3/4	0.0	1.77	2.96	63.0	4.70	11.7	OK
GB3D7	-3/4	0"	-5"3/4	0.0	1.77	2.83	36.4	7.77	1.0	OK
GB3D5	-3/4	10"3/16	-1'-2"1/4	0.2	1.69	1.31	38.2	3.44	99.9	OK
GB3D5	-3/4	-10"3/16	-2'-8"1/4	0.2	1.69	2.09	60.7	3.44	99.9	OK
GB3D5	-3/4	-4"1/16	-2'-8"1/4	0.1	1.69	3.15	62.9	5.01	26.7	OK
GB3D5	-3/4	-8"3/16	-2'-2"1/4	0.2	1.69	0.87	25.2	3.44	84.0	OK
GB3D5	-3/4	-6"1/8	-2'-8"1/4	0.1	1.69	2.86	67.7	4.23	20.8	OK
GB3D5	-3/4	0"	-1'-2"1/4	0.0	1.69	1.30	19.8	6.59	1.0	OK
GB3D6	10"3/16	-3"1/4	-2"3/4	0.3	2.65	3.16	86.0	3.67	99.9	OK

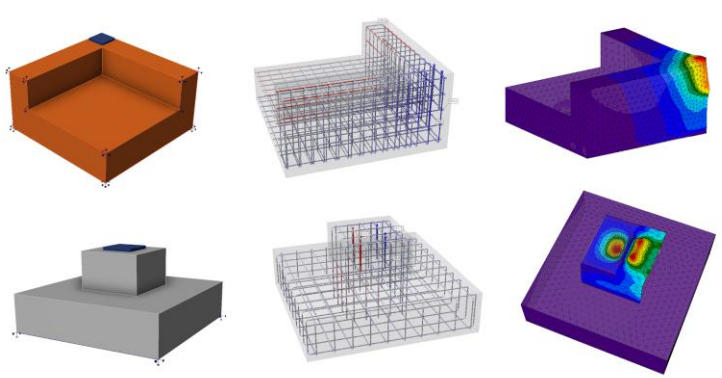
36 / 41

IDEA StatiCa®

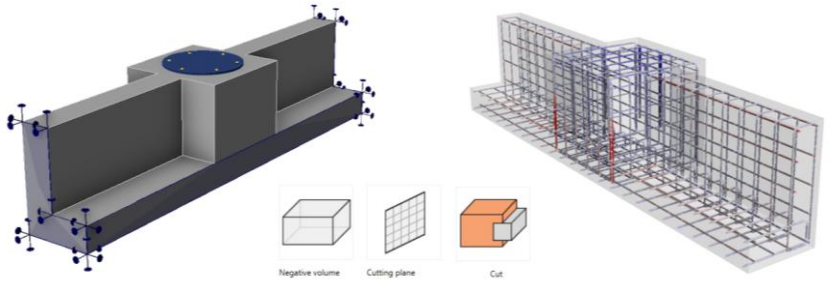
OTHER CASES



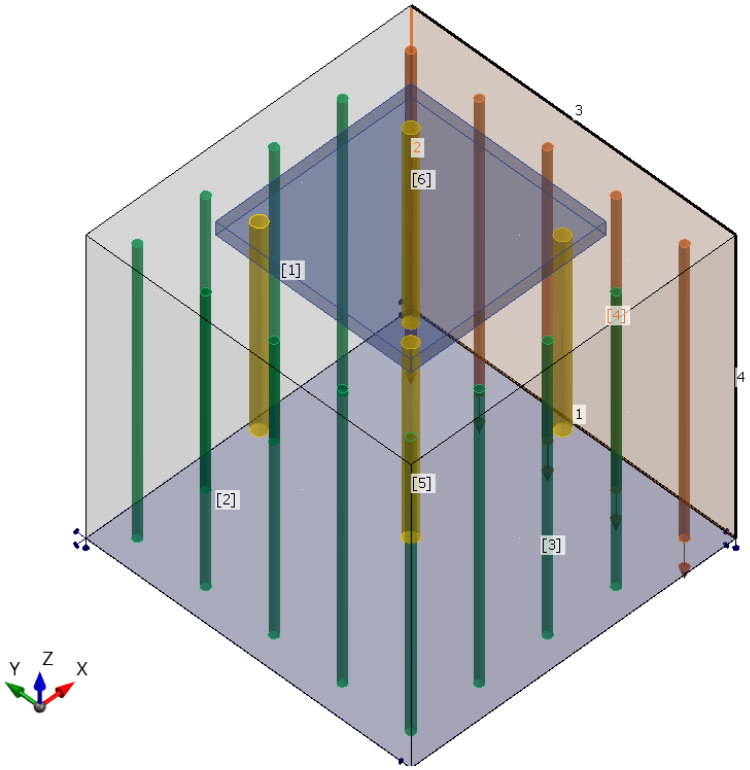
Base plate on pedestal and isolated foundation



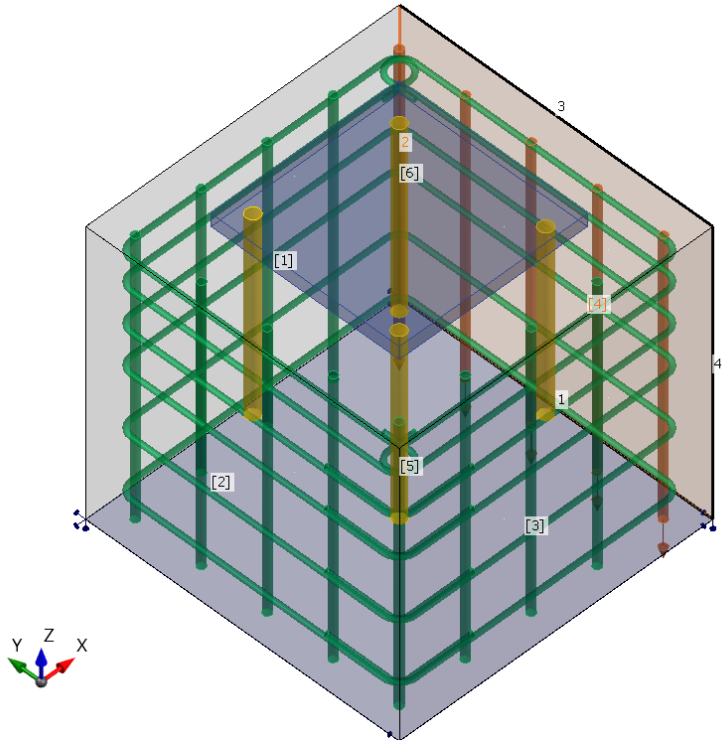
Base plate – Corner locations
Base plate - Pedestals



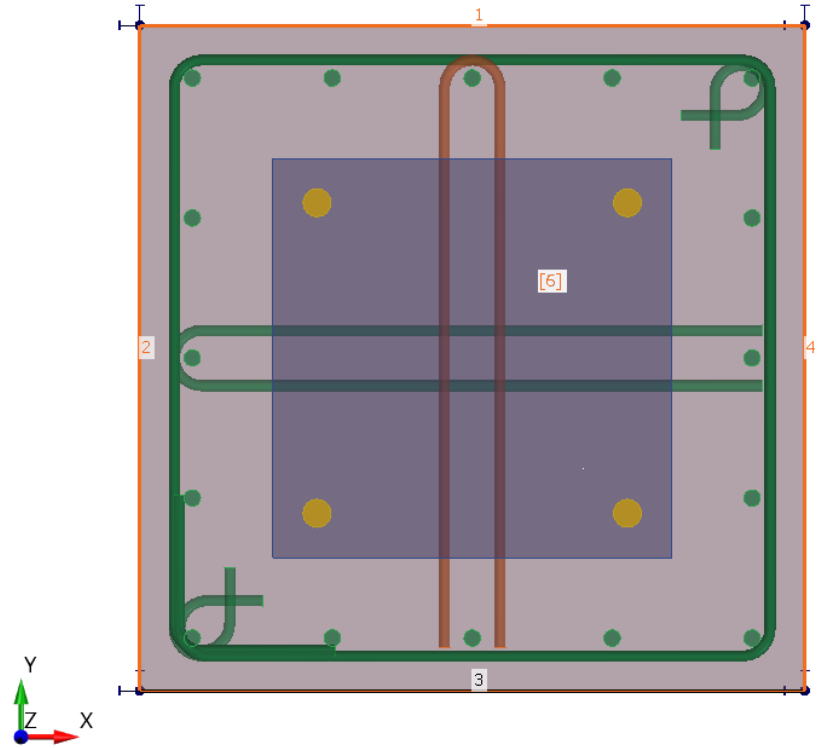
Base plate on strip foundation



Vertical reinforcement



Stirrups

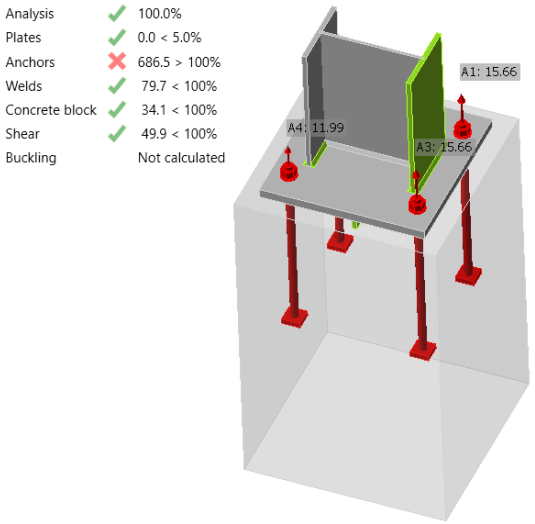


Hairpin rebar

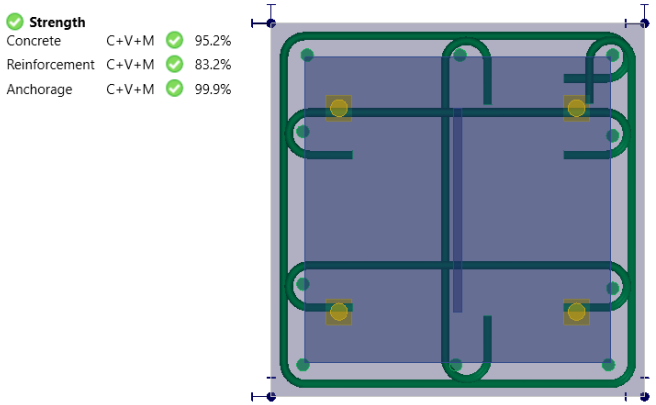
IDEA StatiCa®

SUMMARY:

Connection app: Base plate and anchors code check



Detail App: Reinforced concrete checks



- ✓ All-in-one solution: Smooth integration
- ✓ Avoid manual inputs
- ✓ Design for the actual reactions
- ✓ Design all possible geometry base plates and foundations

NEXT STEPS: TRY THIS WORKFLOW!

- ✓ Sample projects
- ✓ Blog post
- ✓ Tutorials
- ✓ Theoretical background

https://campaign.ideastatica.com/detail-access-request

IDEA StatiCa®

2025 TEXAS ROADSHOW

https://www.ideastatica.com/texas-roadshow-may-2025

Houston – May 7

3-6 pm

Fort Worth – May 13

3-6 pm

Dallas – May 14

3-6 pm

IDEA StatiCa®

IDEA StatiCa®

Calculate yesterday's estimates

Q&A