PROFIS Engineering: Cloud-based Anchor Design

Zach VanLemmeren

Hilti, Product Manager

AUTODESK. UNIVERSITY

About the speaker

Zach VanLemmeren

I have always had a passion for building things – from Legos, as a child, to bridges at the start of my career and now to software in my current position. This passion led me to study Civil Engineering at Carnegie Mellon University. At the beginning of my career I was part of the American Bridge Construction Management team overseeing the rehabilitation of iconic bridges throughout New York City and upstate New York. I next worked as a Superintendent for Jay Reese Contractors where I led maintenance and improvement projects focused on the railroad industry.

While working directly on the construction site was very rewarding, I wanted to do more to improve the construction industry as a whole so I went back to school and earned my MBA from the University of Southern California.

Since USC, I have been working at Hilti focusing on the structural engineering industry – first as a Trade Manager and now as the North America Product Manager for PROFIS Engineering, our revolutionary anchor design software. It is an exciting time to be in the construction industry with digitization and automation taking over the job site and I can't wait to see where it goes next and what small part I can play.

In the office

It all starts with a plan – so we’re making it easier to create one. Our designing solutions give specifiers, estimators, purchasers and general contractors the calculating, drafting and reporting tools needed to develop comprehensive plans for every project – from ground-up to interiors.

On the jobsite

Keep projects on track – whether on the jobsite or at the office. Our asset management, installation and layout solutions enable construction professionals to effectively manage their building tools, products and plans from anywhere, preventing building delays and controlling costs.

Software for the entire construction industry

Hilti provides innovative and productivity enhancing software solutions for multiple sectors:

- **Structural Engineering**
  - PROFIS Anchor
  - PROFIS Anchor Channel
  - PROFIS DF Diaphragm
  - PROFIS Rebar
  - PROFIS Engineering Suite
- **Mechanical, Electrical & Plumbing**
  - Modular Supports Plug-In
  - BIM/CAD Library
  - PROFIS Installation
- **Firestop**
  - Firestop Plug-in
  - Documentation Manager
- **Asset Management**
  - ON!Track
- **Measuring**
  - Construction Layout
  - PROFIS Detection Office
  - PROFIS Layout Office

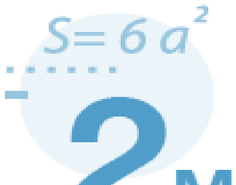
Hilti software is used by leading construction firms across the globe.

85+
COUNTRIES

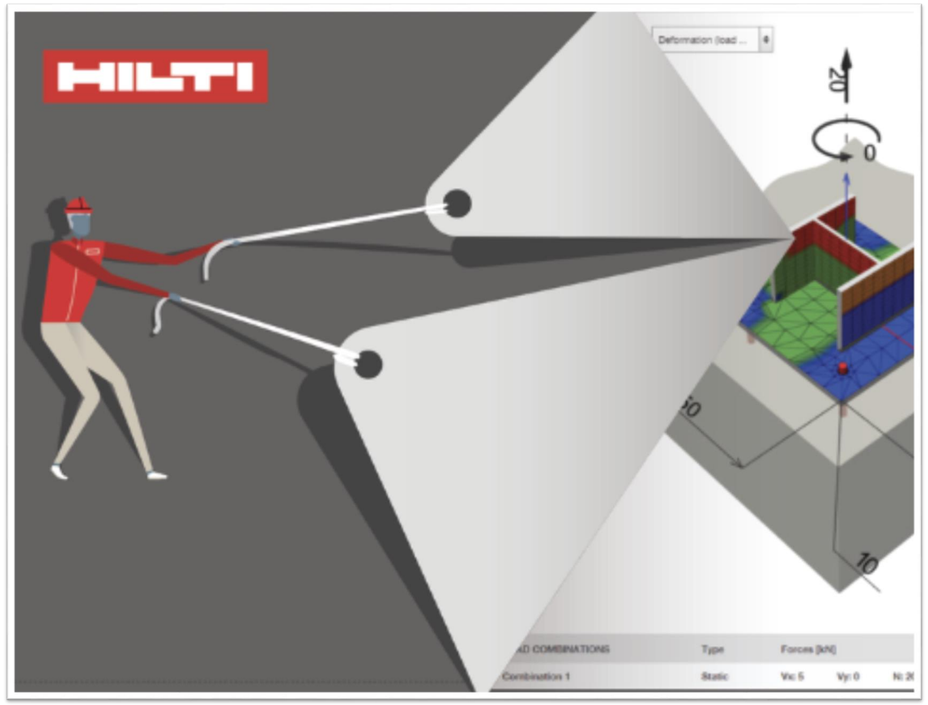
250,000+
PROFESSIONAL ENGINEERS

10+
YEARS
Construction software experience.

4X
FASTER
Reduce anchor calculation time from 20 minutes to **5 minutes** with Hilti PROFIS Engineering Suite.



2 MILLION
CALCULATIONS
Over 2 million engineering calculations are performed with Hilti software each year.



Coming soon – PROFIS Engineering Suite

The total package

Maximize your productivity with our most complete anchor design software

PROFIS Engineering Suite’s calculating, analysis, and reporting capabilities help you more easily tackle your most challenging anchoring projects – from one cloud-based tool.

Industry leading anchor design software

Biggest evolution in anchor design software

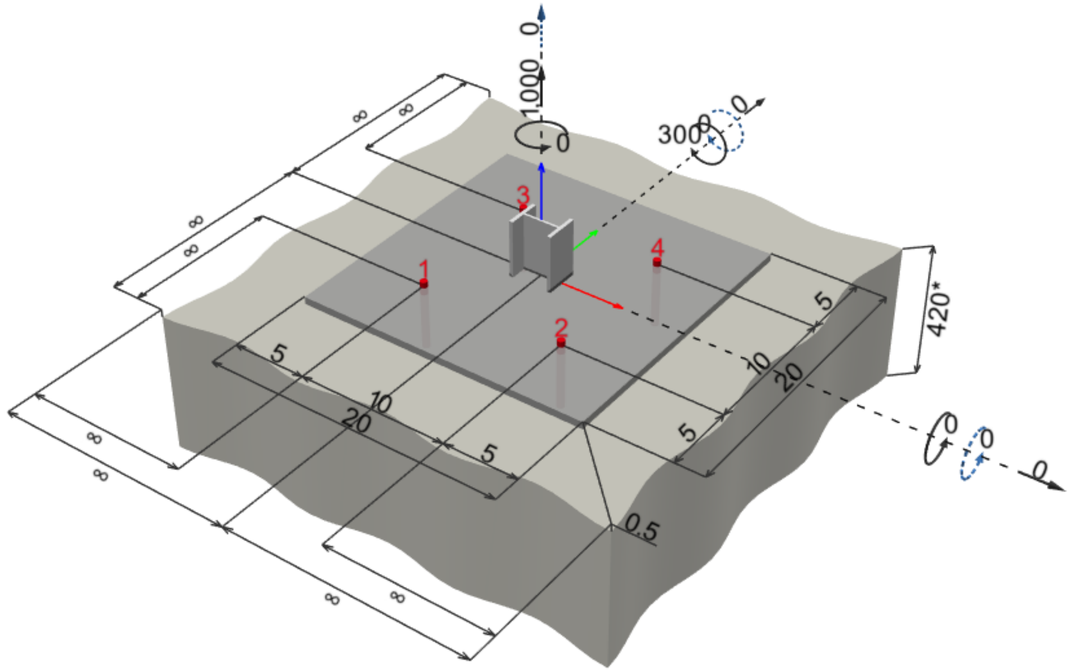
- Hilti PROFIS Engineering Suite builds upon the incredible calculating power of our PROFIS Anchor software by integrating improvements that will save you time, streamline your design process and support project team collaboration.

PROFIS Engineering Suite features increase productivity

- Cloud-enabled access and file sharing
- Multiple ACI and CSA Codes
- Detailed anchor design reports
- Post installed anchors
- Cast-in-place anchors
- Rigid base plate analysis
- Anchoring to masonry
- Anchoring to concrete over metal deck
- Load engine
  - Run multiple load combinations simultaneously
  - Import loads from Excel
- Customizable user experience and reports
- 2D and 3D BIM/CAD export

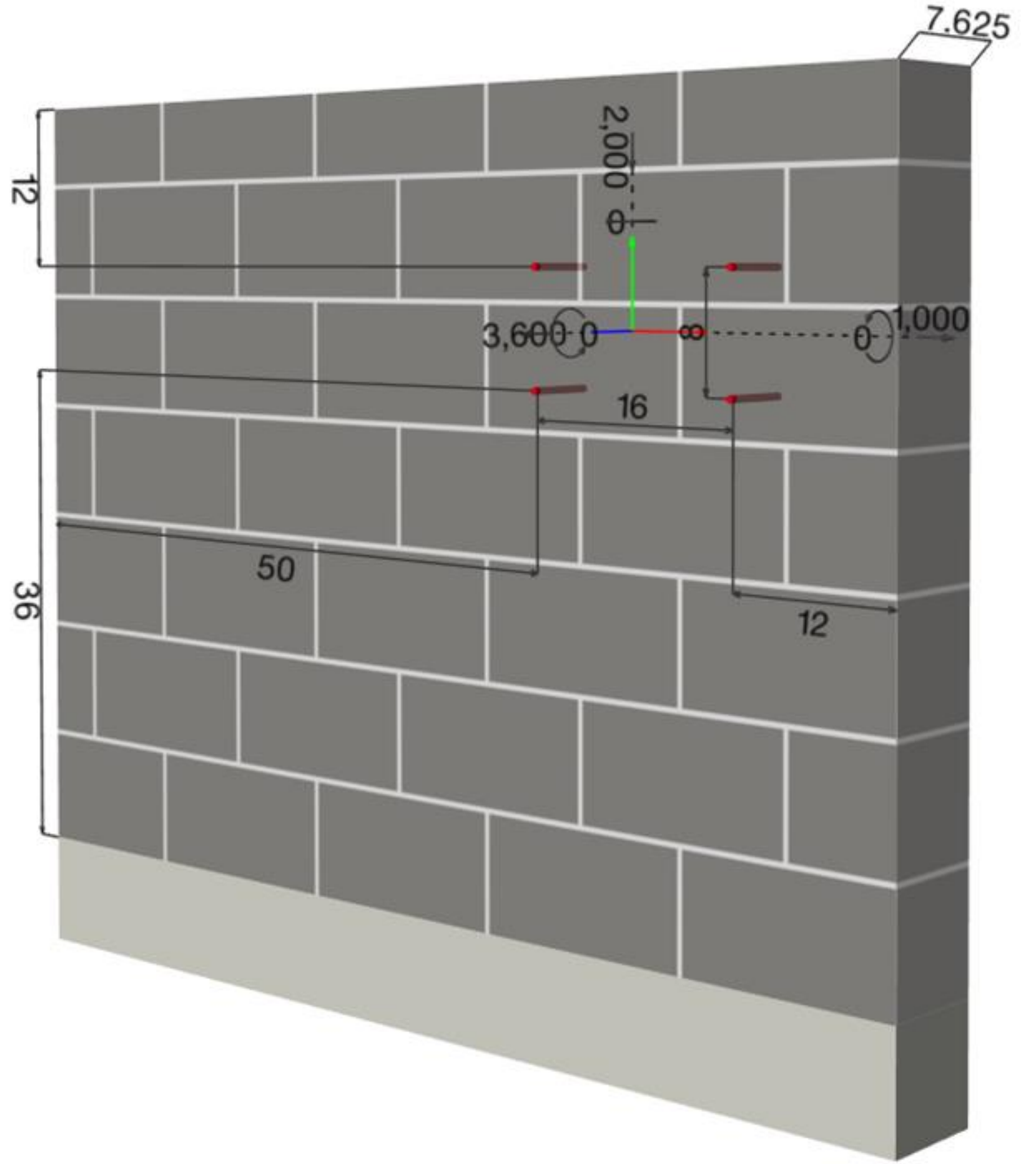
PROFIS Engineering anchoring to concrete module has been enhanced to make you more productive and personalize your user experience

- Undo button
- Favorites tab
- Customizable design parameter tabs
- Customizable design reports
- Cloud base file storage and file sharing
- Automatically updated
- Design templates



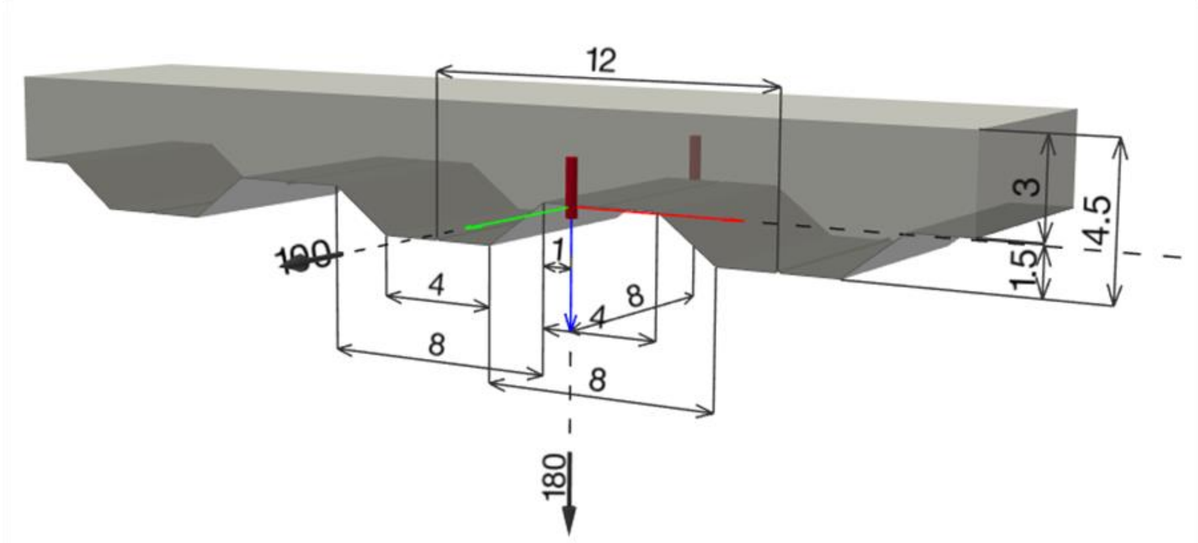
PROFIS Engineering has incorporated anchoring to masonry following the ASD deisgn method

- Brick, hollow CMU and grout-filled CMU
- Single and multi-wythe walls
- Fully interactive 3D GUI
- Anchor into face, side or top of wall
- Anchor into bed joints

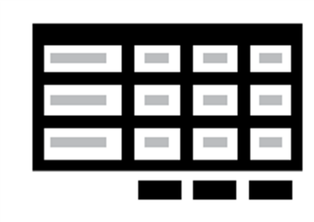


Designing anchors into concrete over metal deck has never been easier with our new module

- 3 generic deck profiles that are fully customizable
- 15+ commercial deck profiles
- Anchor can be designed in lower flute, upper flute or on the top of the concrete deck
- Anchors can be located anywhere within the flute
- Dimensions turn red when dimension is outside scope of the ESR
- Design validation checks

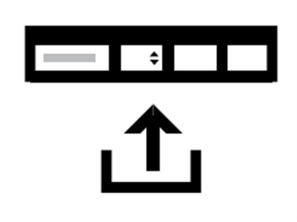


PROFIS Engineering give you the flexibility to input loads how you want



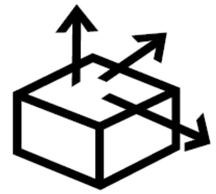
INPUT SERVICE LOADS

Choose as many load combinations as you want, input service loads and let the software determine your controlling load combination



IMPORT FACTORED LOADS

Import factored loads directly into PROFIS Engineering using the Excel interface

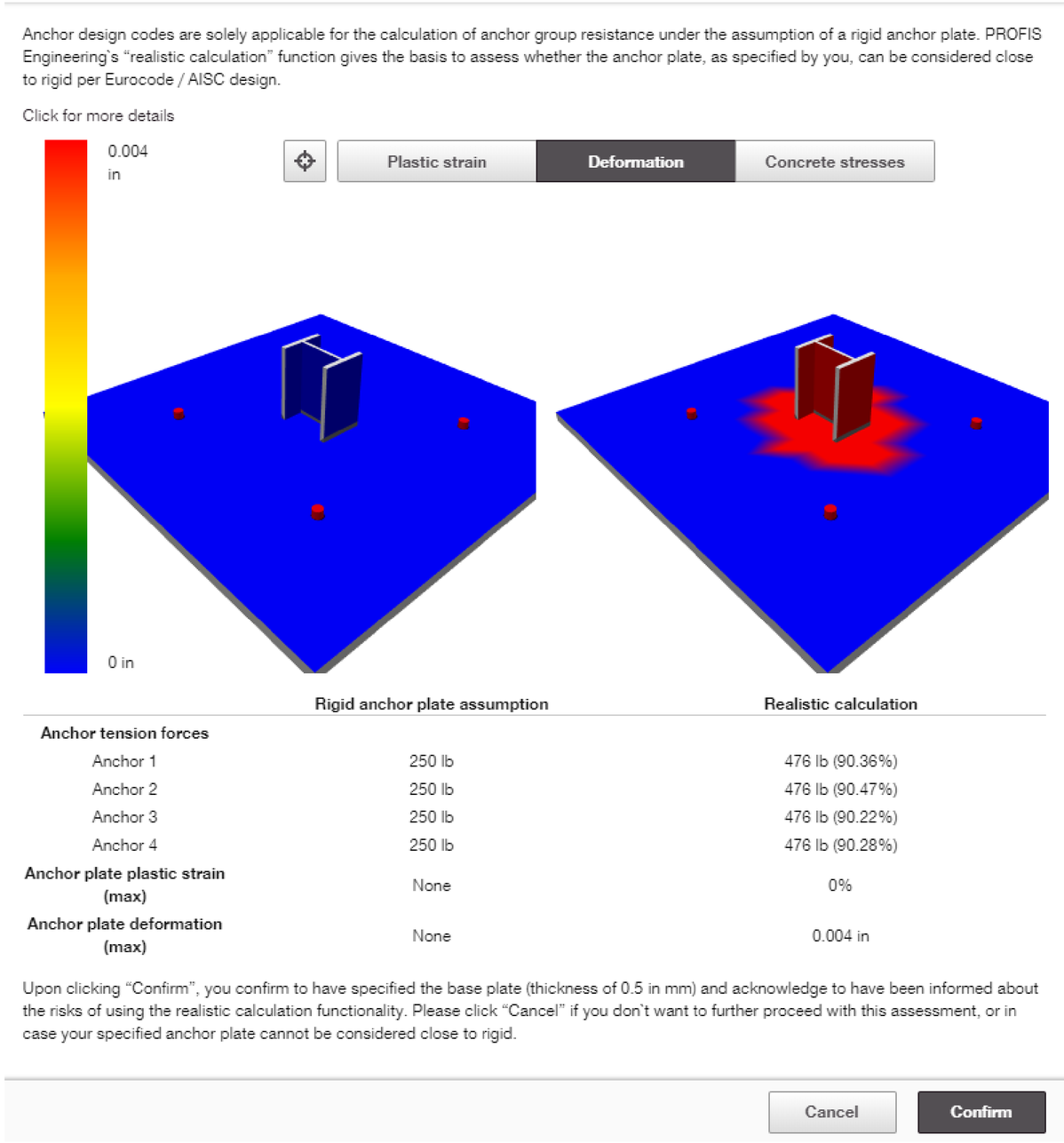


INPUT FACTORED LOADS

Enter factored loads directly into the model or into the custom factored loads field

True base plate analysis has finally been integrated into anchor design software with our AISC Design Guide 1 and FEM-based analysis modules

- AISC Design Guide 1 2nd Edition
  - Fully code-compliant
  - Determines base plate moment utilization
  - Checks if entered thickness satisfies DG1
- Component Finite Element Method
  - Compares anchor loads determined by FEM with anchor loads determined by a rigid assumption
  - User makes an engineering judgement if the base plate rigid or not



Customer Testimonial

About the speaker

Nick Heinlen, Dunaway Associates

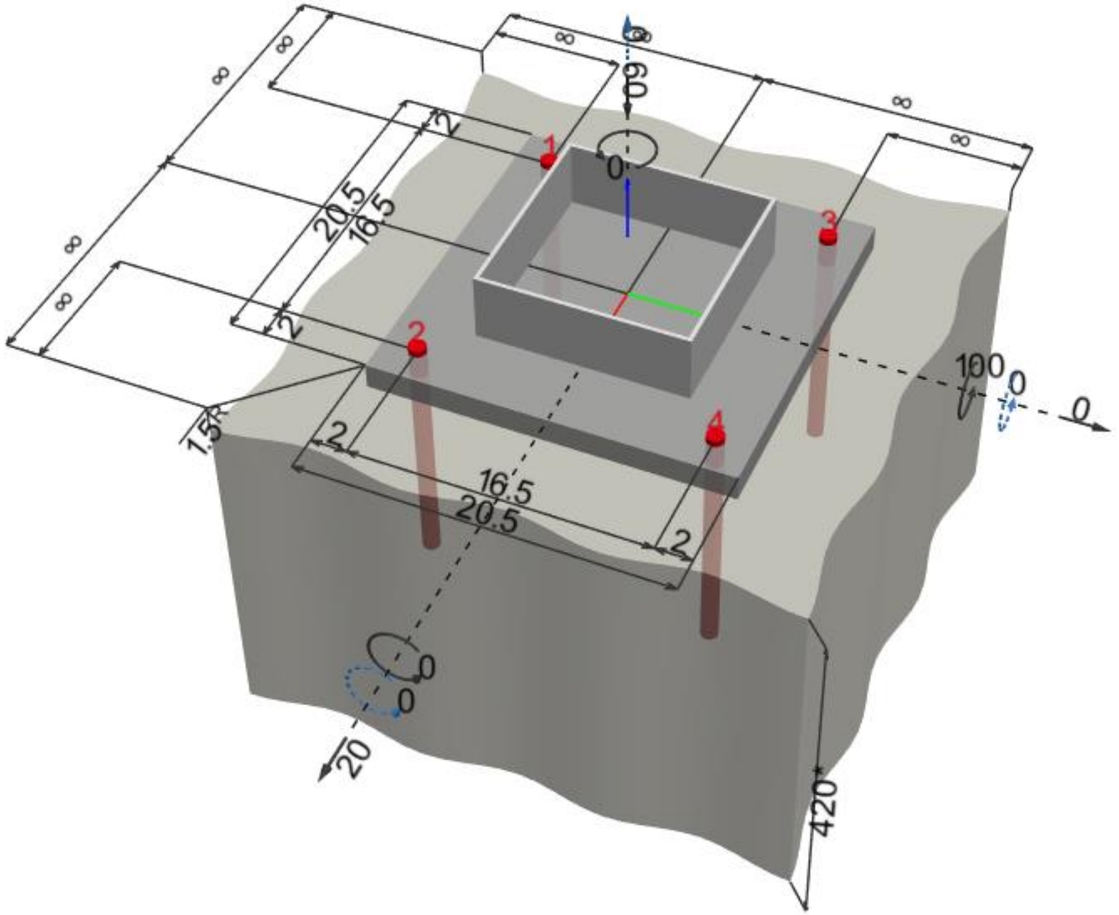
Nick Heinlen is a registered Professional Engineer in Texas and serves as Project Engineer in the structural department at Dunaway Associates. He oversees the technical design and construction administration for all projects performed within the Fort Worth structural department.

He also serves as Dunaway's BIM Manager and utilizes his past computer science experience to constantly improve internal Autodesk Revit processes and its interoperability with analysis programs.

Anchoring Design Examples

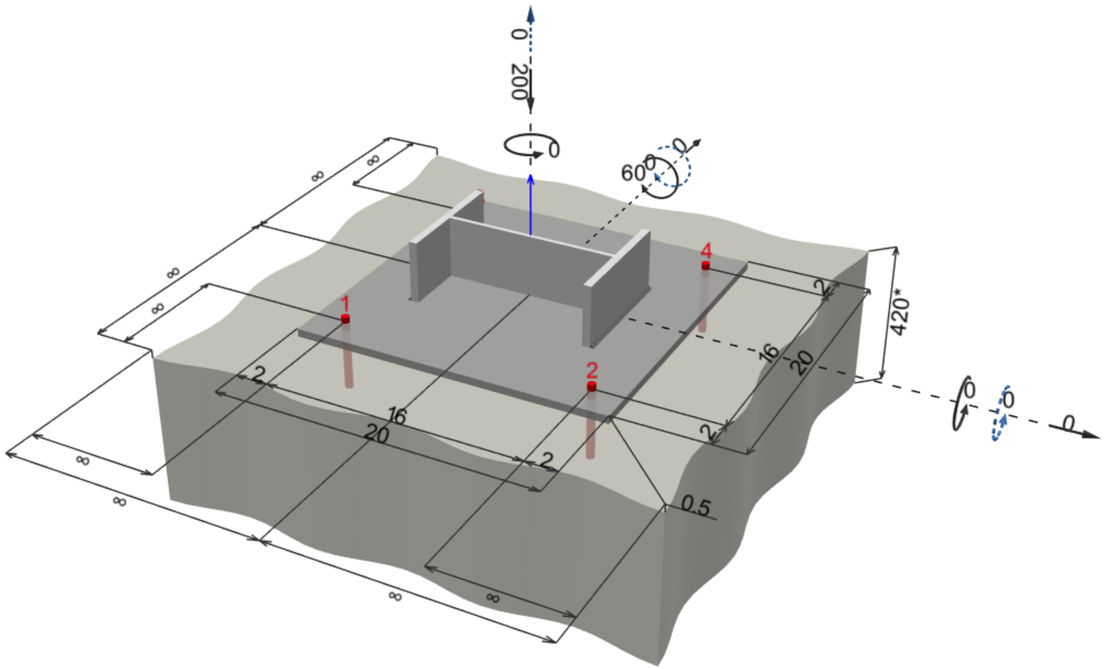
AISC Design Guide 1

- Base plate: 20.5” x 20.5” x 1.5”
- Anchor spacing: 16.5”-x, 16.5”-y
- Profile: HSS 12x12x1/4
- Concrete: 4,000 psi
- Loads
  - 60 kip compression
  - 20 kip shear
  - 100 kip-ft moment



FEM Module

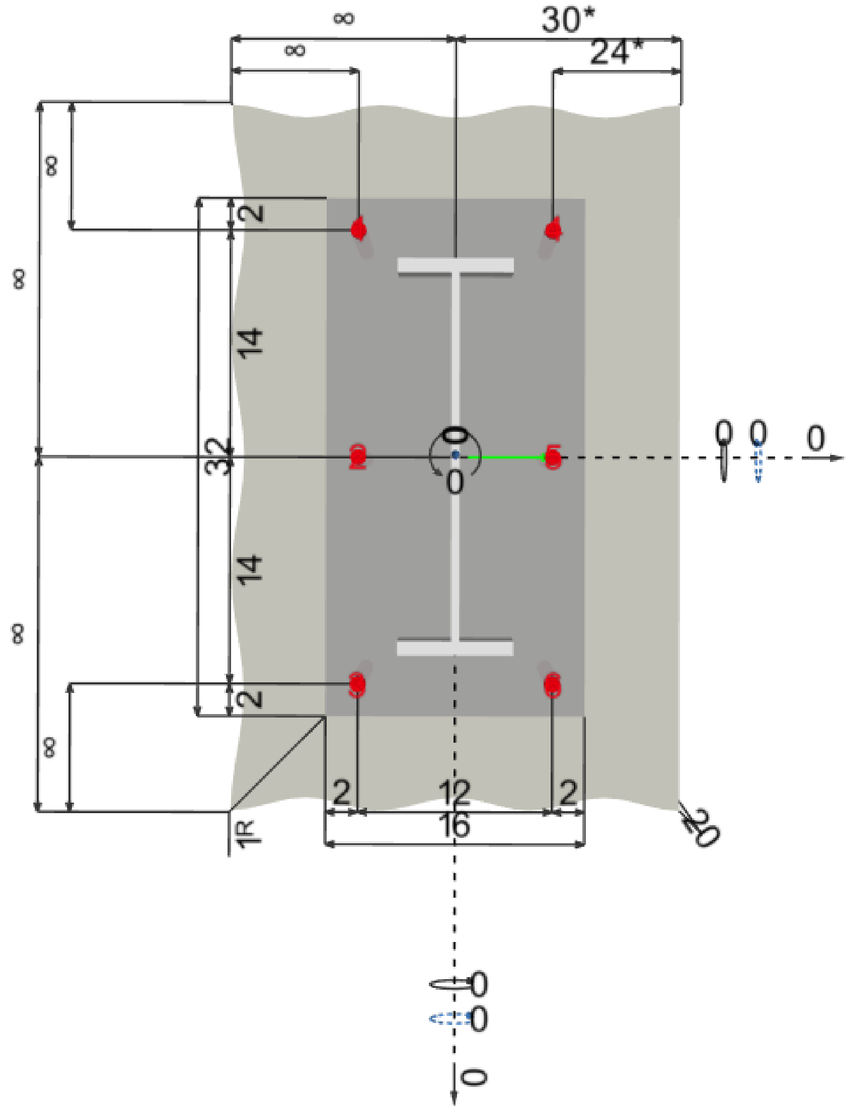
- Base plate: 20” x 20” x 0.5”
- Anchor spacing: 16”-x, 16”-y
- Profile: W 12x40
- Concrete: 3,000 psi
- Loads
  - 200 kip compression
  - 60 kip-ft moment



Anchoring to concrete 1

- Base plate: 16” x 32” x 1”
- Anchor spacing: 12”-x, 14”-y
- Profile: S24x80
- Concrete: 4,500 psi
- Loads

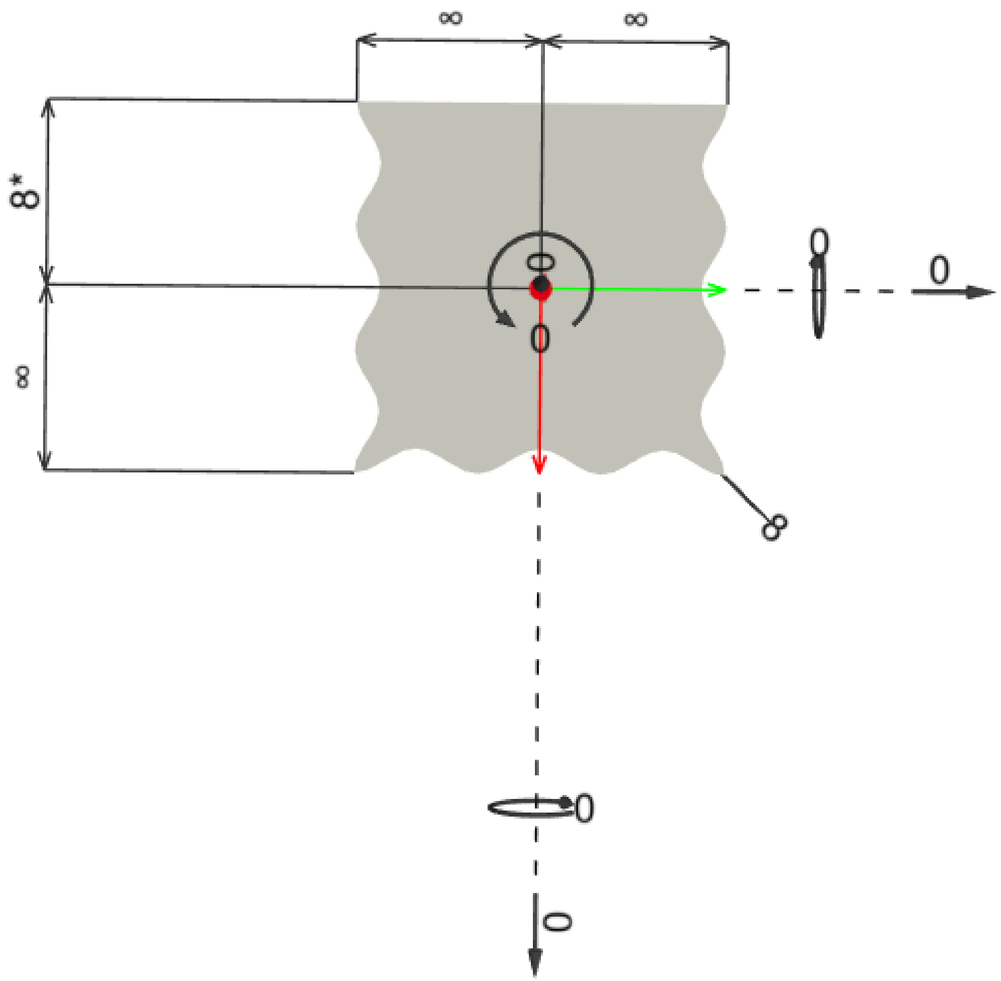
	Sustained load factor	IBC factor	V_x	V_y	N	M_x	M_y	M_T
Dead	1.0	N/A	N/A	10,800	N/A	432,000	N/A	N/A
Live	0.25	N/A	N/A	8,000	N/A	320,000	N/A	80,000



Anchoring to concrete 2

- Base plate: None
- Anchor spacing: NA
- Profile: None
- Concrete: 3,500 psi
- Loads

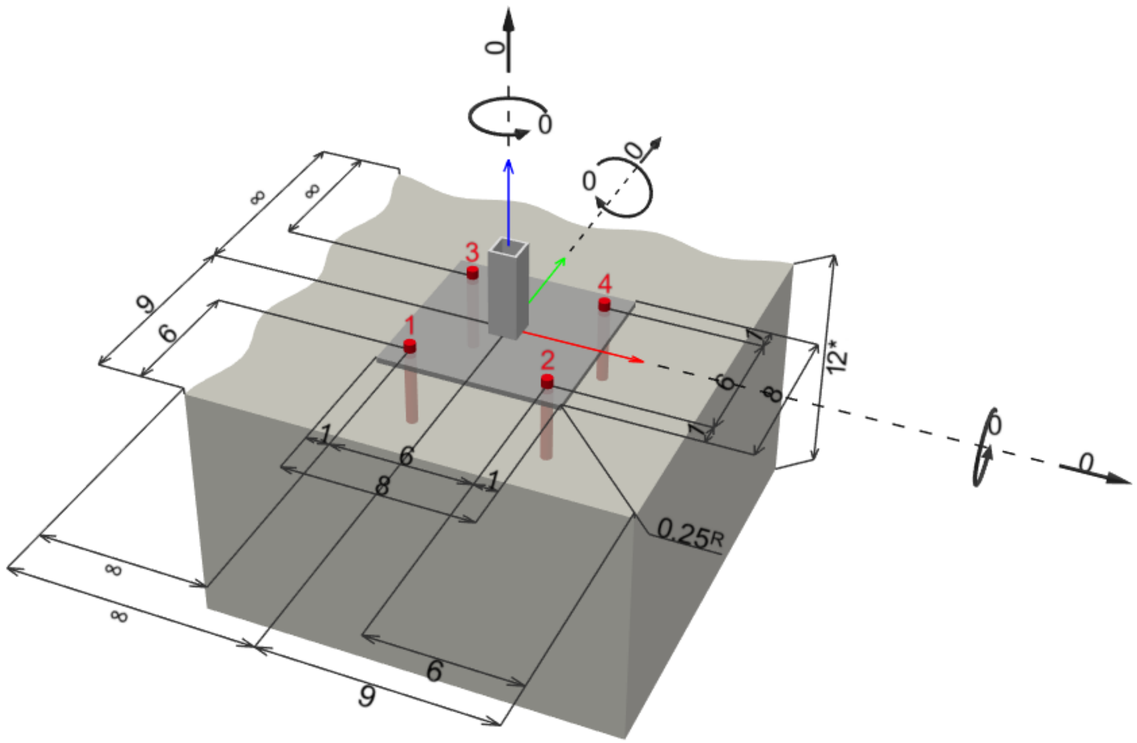
	Sustained load factor	IBC factor	V_x	V_y	N	M_x	M_y	M_T
Dead	N/A	N/A	N/A	-50	N/A	2,000	N/A	N/A
Live	N/A	0.5	N/A	-1,000	N/A	4,000	N/A	N/A
Snow	N/A	N/A	N/A	-1,500	N/A	6,000	N/A	N/A
Wind	N/A	N/A	N/A	1,000	N/a	4,000	N/A	N/A



Anchoring to concrete 3

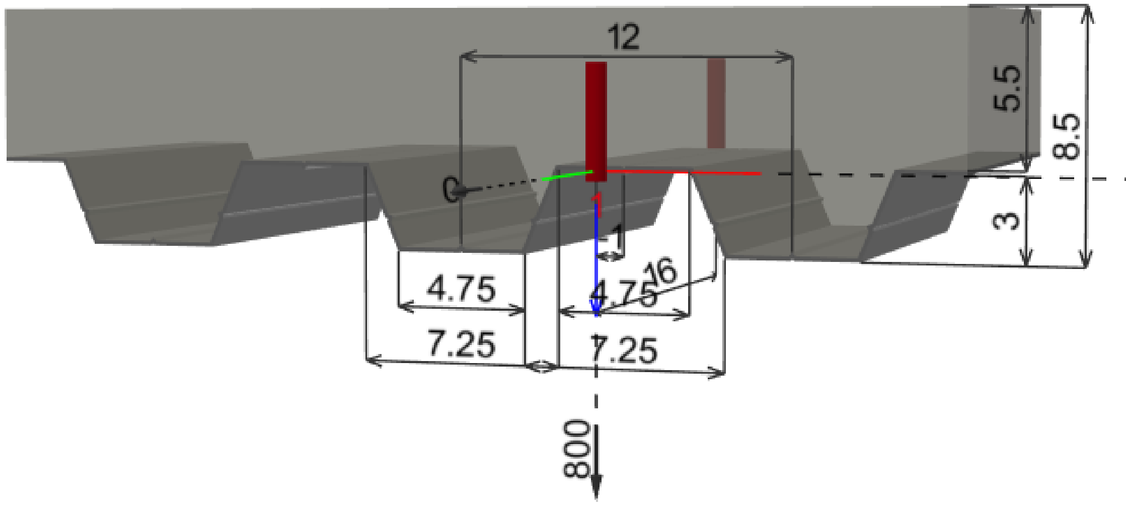
- Base plate: 8” x 8” x 0.25”
- Anchor spacing: 6” on center
- Profile: HSS 1-1/4x1-1/4x.125
- Concrete: 4,000 psi
- Loads

	Sustained load factor	IBC factor	V_x	V_y	N	M_x	M_y	M_T
Dead	N/A	N/A	N/A	N/A	N/A	N/A	12,000	N/A
Earthquake	N/A	N/A	1,000	-1,200	N/A	-3,600	-4,000	N/A



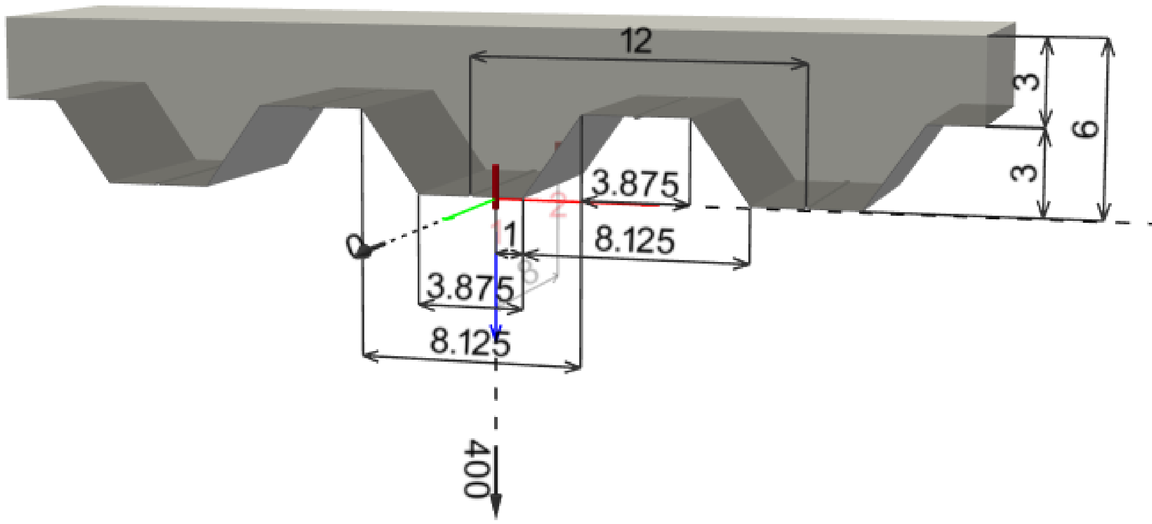
Anchoring to concrete over metal deck 1

- Location: Upper flute
- Deck type: Vulcraft 3C
- Anchor spacing: 16”
- Concrete: 3,000 psi
- Concrete cover: 5.5”
- Loads
  - 800 lbs tension
  - 1,000 lbs shear



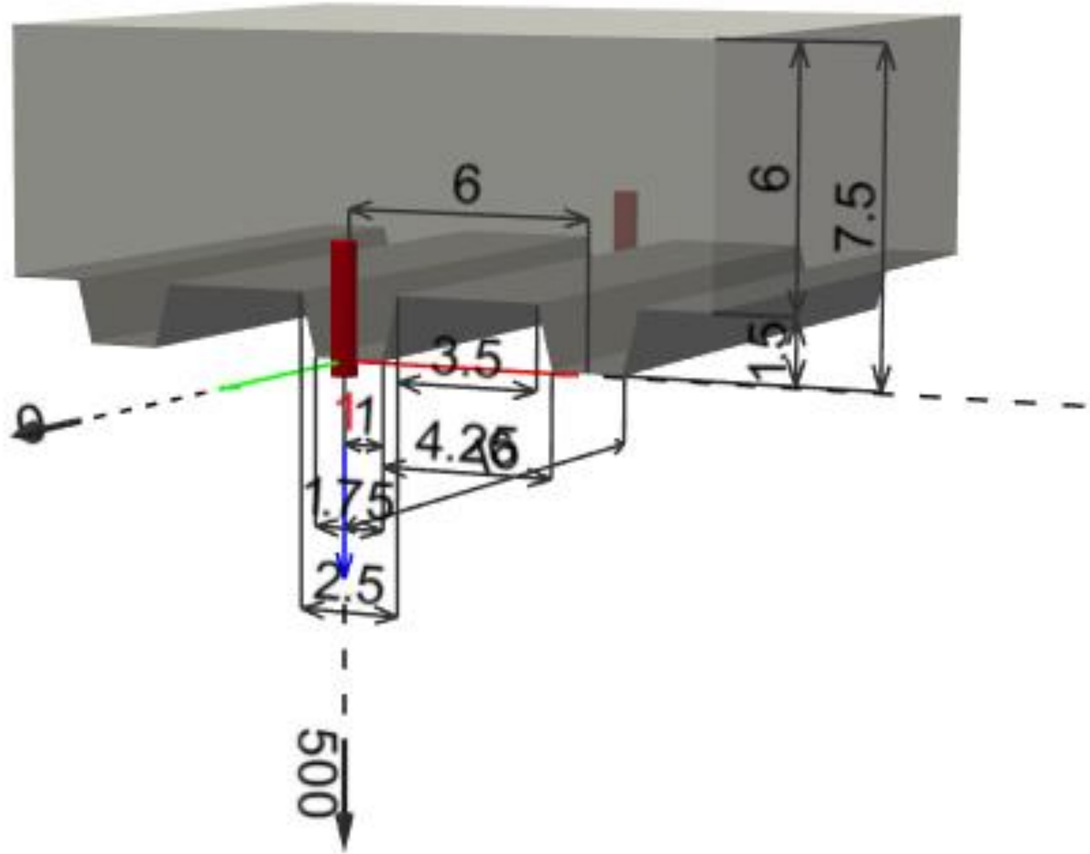
Anchoring to concrete over metal deck 2

- Location: Lower flute
- Deck type: ASC 3WH-36
- Anchor spacing: 8”
- Concrete: 3,250 psi
- Concrete cover: 3”
- Loads
  - 400 lbs tension
  - 250 lbs shear



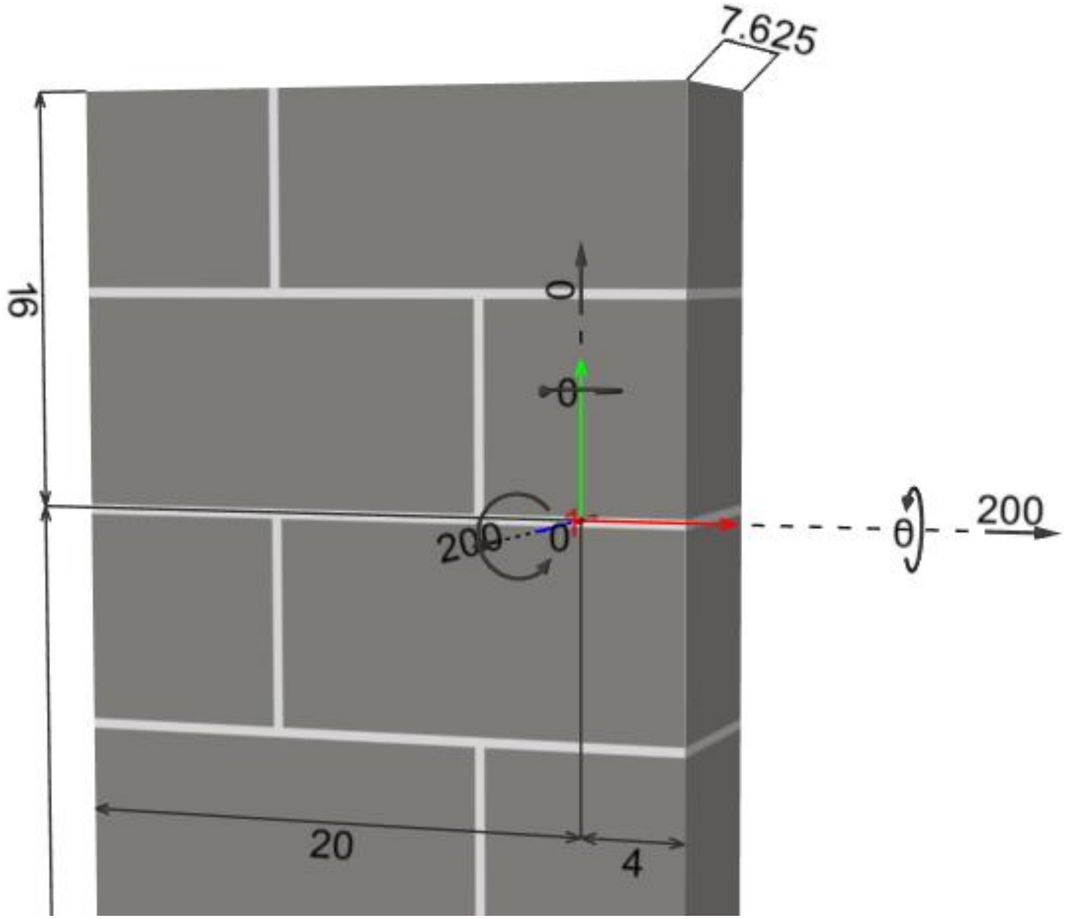
Anchoring to concrete over metal deck 3

- Location: Lower flute
- Deck type: Verco B Deck (HSB-36)
- Anchor spacing: 16”
- Concrete: 3,500 psi
- Concrete cover: 6”
- Loads
  - 500 lbs tension
  - 3000 lbs shear



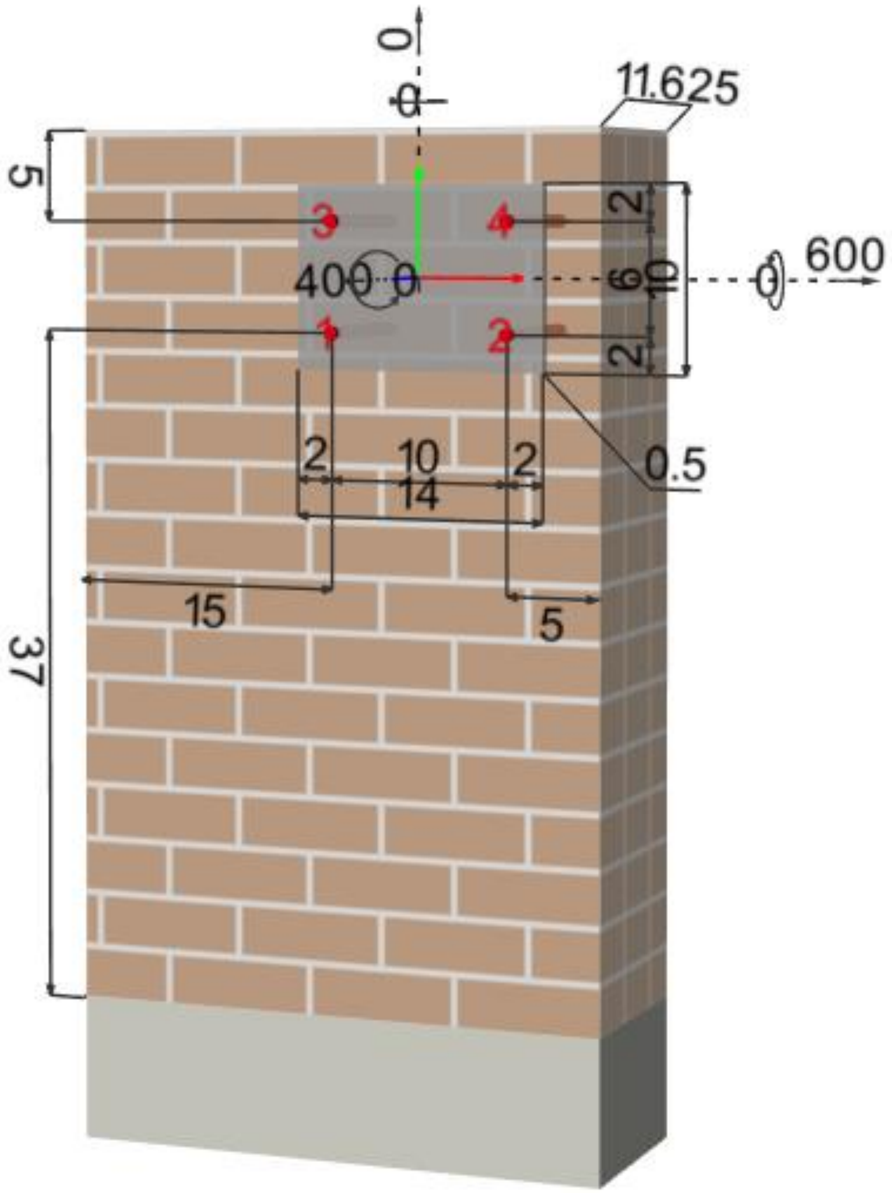
Anchoring to masonry 1

- Location: Face of wall in bed joint
- Material: Grout filled CMU
- Anchor spacing: N/A
- Plate: N/A
- Profile: N/A
- Anchor location: 16”-y, 4”-x
- Loads
  - 200 lbs tension
  - 200 lbs shear



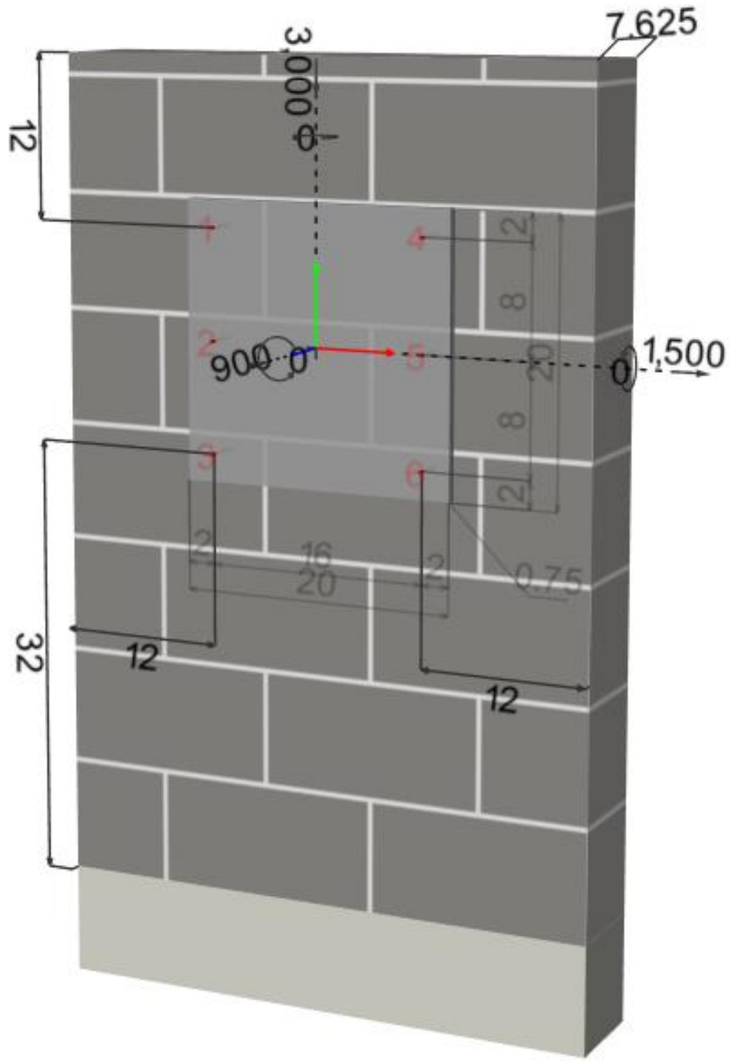
Anchoring to masonry 2

- Location: Face of wall
- Material: Multi wythe hollow CMU
- Anchor spacing: 6”-y, 10”-x
- Plate: 10” x 14” x 0.5”
- Profile: N/A
- Anchor location: 5”-y, 5”-x
- Loads
  - 400 lbs tension
  - 600 lbs shear



Anchoring to masonry 3

- Location: Face of wall
- Material: Grout filled CMU
- Anchor spacing: 8”-y, 16”-x
- Plate: 20” x 20” x 0.5”
- Profile: N/A
- Anchor location: 12”-y, 12”-x
- Loads
  - 900 lbs tension
  - 1,500 lbs shear perpendicular to edge
  - -3,000 lbs parallel to edge



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Make anything™

Thank-you!