

CEEn-2018CPST-002

Erickson Anchorage of Roof-Top Equipment

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Description

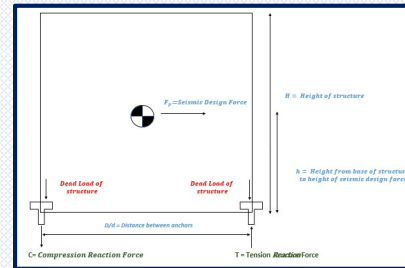
The goal of this project was to create an automated tool based on the ASCE 7-10 manual codes in which engineers could calculate gravity loads and lateral anchorage of any generic rooftop equipment by entering the dimensions of the mechanical unit. And provide a visual of the roof framing and screw details of what is being attached.

Approach

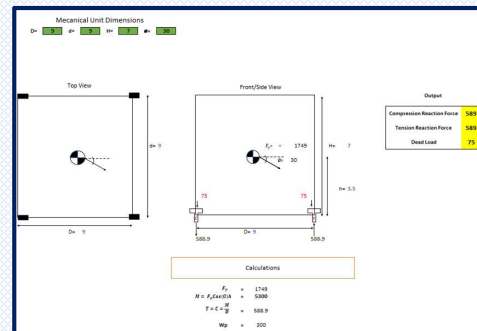
We were tasked with creating an automated spreadsheet to help employees at Erickson Structural in Vancouver, WA perform structural analysis of rooftop equipment more quickly. Our sponsor wanted us to ensure that the workbook was as user friendly as possible and include all the necessary information so the working engineers would have to reference the building code manuals as little as possible. To complete this project, B-Ray Engineering first had to gather information from ASCE 7-10 building code, such as tables, equations, and exceptions, etc. We inserted automated features such as command buttons and combo boxes to give the workbook a more interactive feel. The Start Page gives the user the option to choose variable height, shape of the unit, direction of lateral seismic load, and location of the unit's center of gravity.

Project Results

Automated Seismic Load Calculation Examples:



Representation of forces and dimensions on the structure



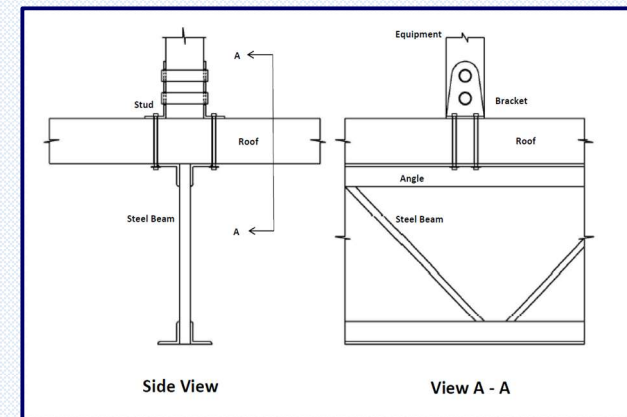
For Square Shapes Only - Customize the angle of force F_p



For Rectangular Shapes Only - Customize the height and angle of Force F_p

Summary of Tasks Completed

- An automated spreadsheet was developed to calculate gravity and lateral anchorage loads of rooftop equipment (including solar panels, mechanical units, etc.)
- The spreadsheet was automated to accommodate several different scenarios such as varying sizes of equipment and different seismic loading requirements.
- Using AutoCAD, the team created details to depict typical connections of rooftop equipment to the building structure.



AutoCAD Details