CEEn-2018CPST-002

Erickson Anchorage of Roof-Top Equipment

B-RAY Engineering

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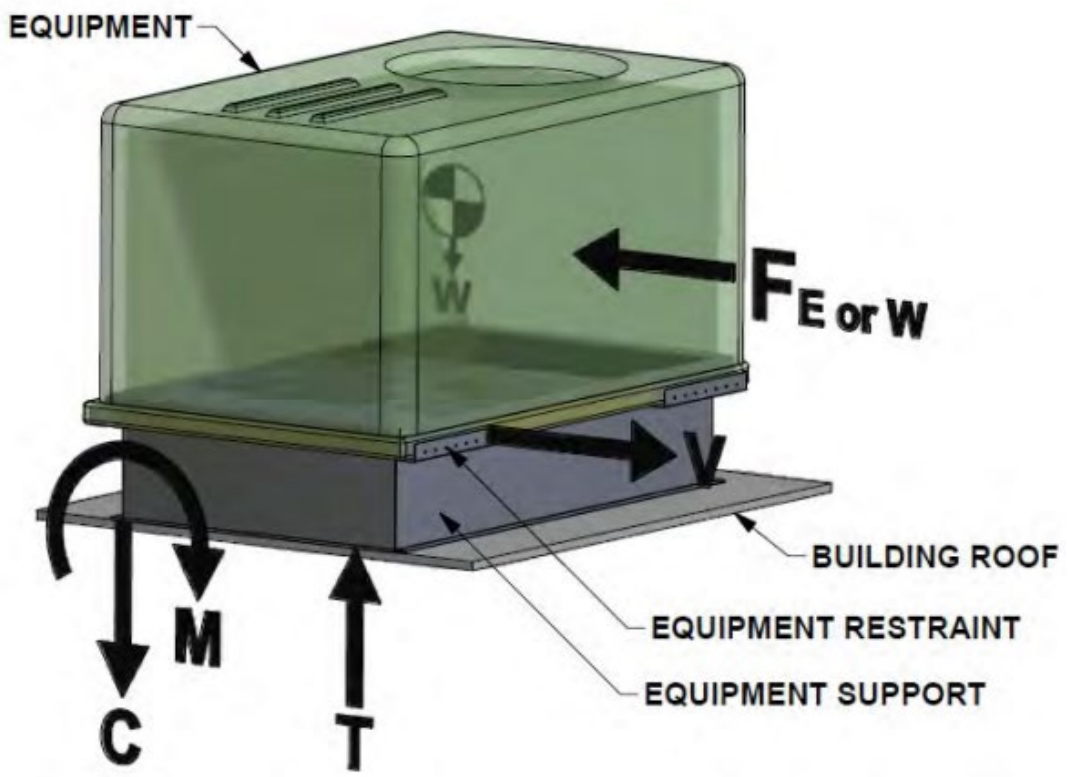
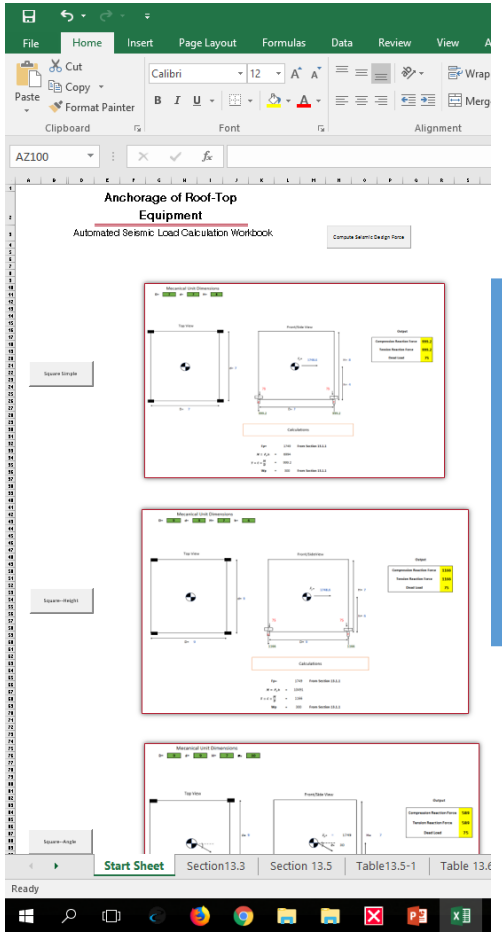
Introduction

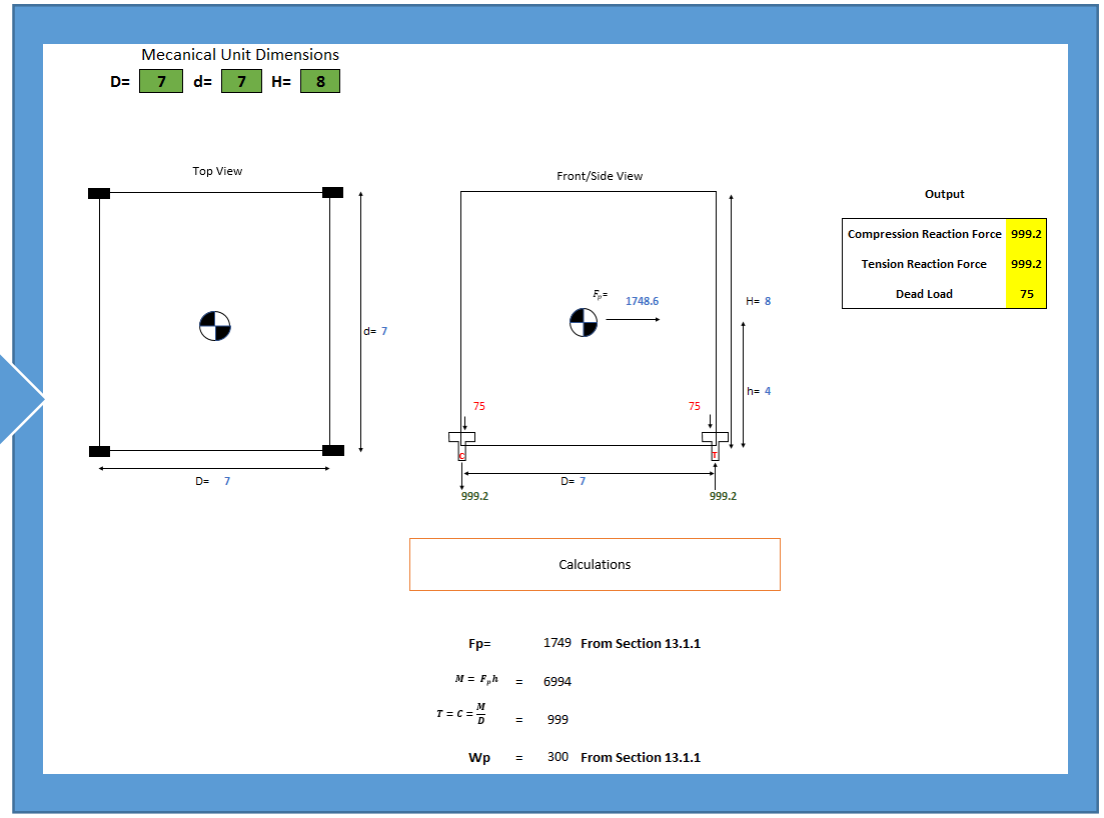
Description

Based on the ASCE 7-10 manual codes, create an automated tool to calculate lateral anchorage and wind loads of rooftop equipment



Design, Analysis and Results





Design, Analysis and Results

Do any of these conditions apply? (See Section 13.1.3)

1. The component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems and egress stairways.
2. The component conveys, supports, or otherwise contains toxic, highly toxic, or explosive substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.
3. The component is in or attached to a Risk Category IV structure, and it is needed for continued operation of the facility or its failure could impair the continued operation of the facility.
4. The component conveys, supports, or otherwise contains hazardous substances and is attached to a structure or portion thereof classified by the authority having jurisdiction as a hazardous occupancy.

(•) Yes ( ) No

Go to Vertical Cantilevered Systems

Go Back to Start Sheet

13.3 SEISMIC DEMANDS ON NONSTRUCTURAL COMPONENTS

13.3.1 Seismic Design Force

Note: Manually enter components in green. Yellow components are automated.

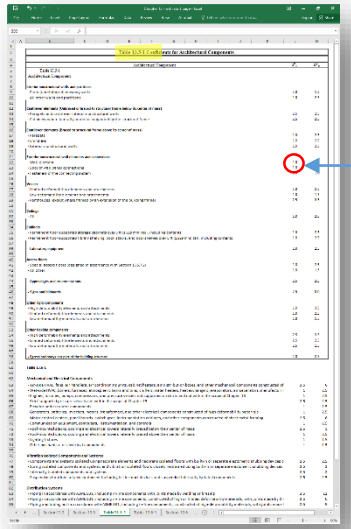
For horizontal seismic design force (Fp)

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right) \qquad (13.3-1)$$

a_p	1
S_{DS}	10
W_p	300
R_p	2.5
← I_p	1.5
z	5
h	7
F_p =	1748.57143

Select component from Table 13.5-1 and Table 13.6-1

- Limited deformability elements and attachments



If F_P is not required to be taken as greater than

$$F_p = 1.6 S_{DS} I_p W_p \qquad (13.3-2)$$

F_p = 7200 Design force from 13.3-1 required

and Fp shall not be taken as less than

$$F_p = 0.3 S_{DS} I_p W_p \qquad (13.3-3)$$

F_p = 1575 Use Design force from 13.3-1

where

F_p = seismic design force

S_{DS} = spectral acceleration, short period, as determined from Section 11.4.4

a_p = component amplification factor that varies from 1.00 to 2.50 (select appropriate value from Table 13.5-1 or 13.6-1)

I_p = component importance factor that varies from 1.00 to 1.50 (see Section 13.1.3)

W_p = component operating weight

R_P= component response modification factor that varies from 1.00 to 12 (select appropriate value from Table 13.5-1 or 13.6-1)

z = height in structure of point of attachment of component with respect to the base. For items at or below the base, z shall be taken as 0. The value of z/h need not exceed 1.0

Conclusions and Recommendations

- We created an automated spreadsheet 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, we created details to depict typical connections of rooftop equipment to the building structure.

The End