National Institute of Building Sciences

Provider Number: G168

CASL - Earthquake Proof Structural Column

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Learning Objectives

At the end of the this course, participants will be able to:

1. Understand earthquake structural forces

2. Understand innovative structural design

3. Learn an organic system

4. Know what the CASL is

Course Description

The CASL will outline an innovative and practical construction of a seismic structural device for prevention of loss of life in earthquake building collapse.

The course will show the various material, geometric, and organic natural forms from which the CASL has been created.

Various creative inspiration and background will be presented which will lead to the finished aesthetic and structural product of the resulting form.

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

CASL – Columnic Actuated Spring Loader

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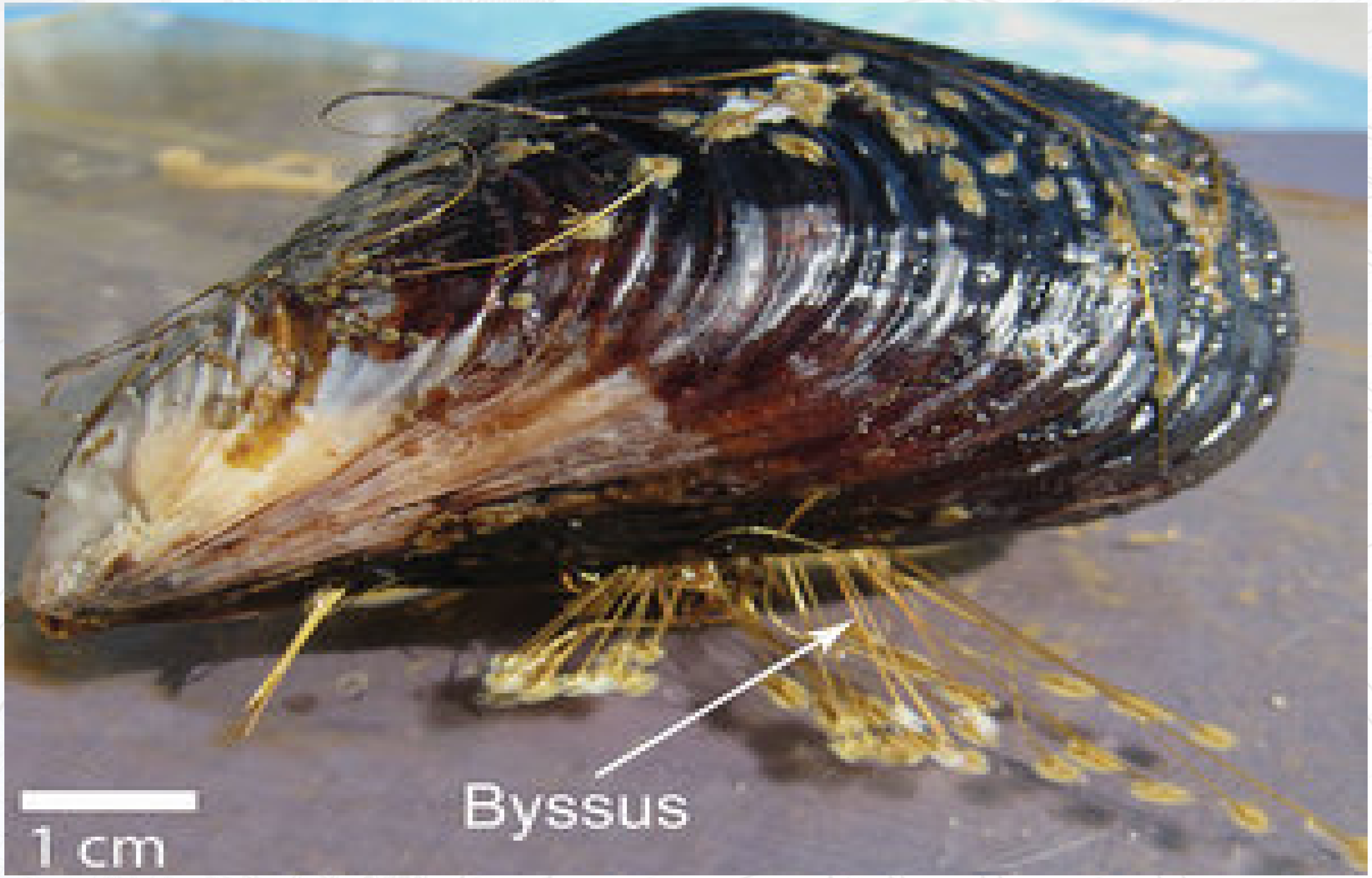
20,000 Leagues Under The Sea

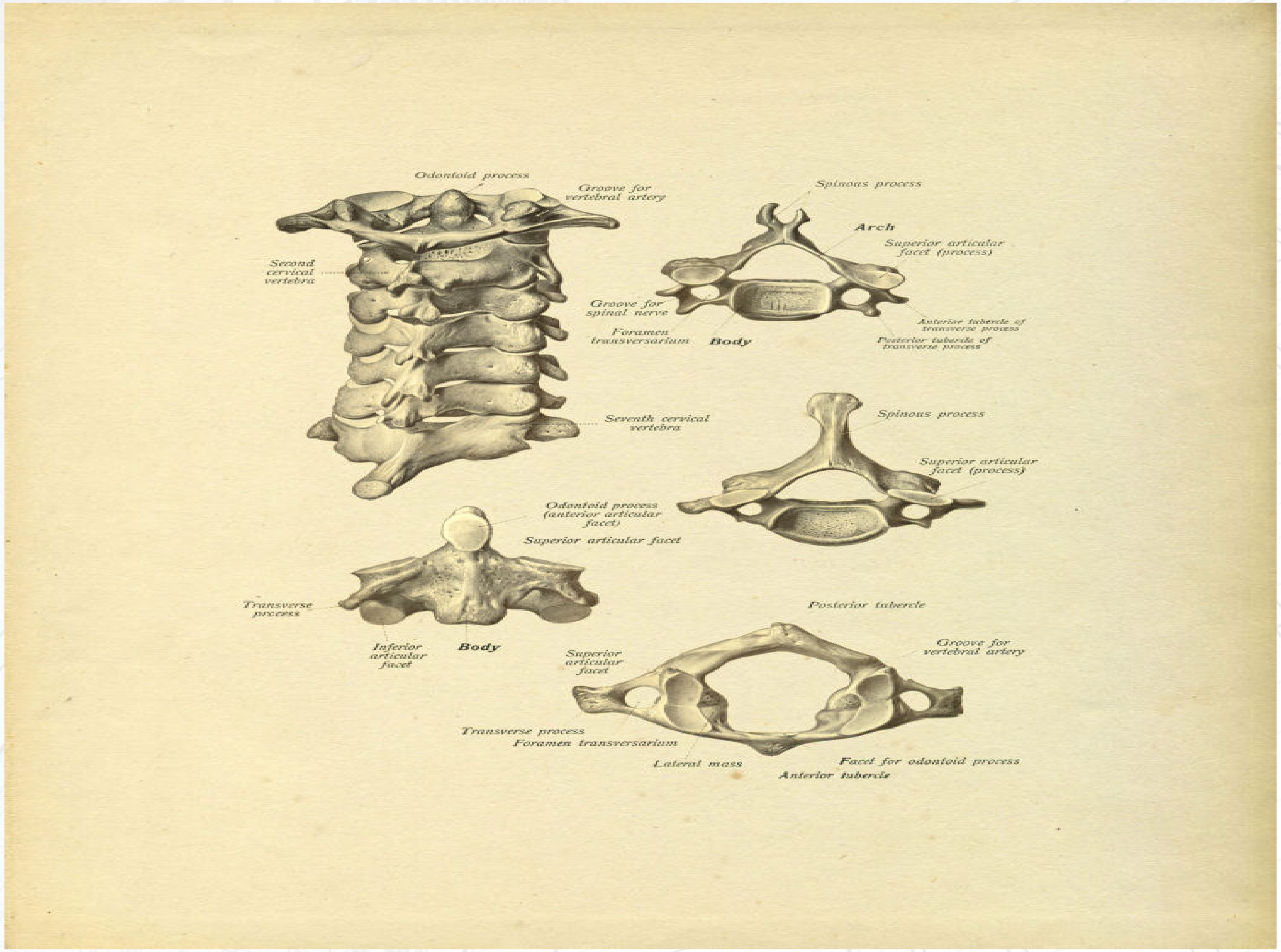
Bivalve Mussel & Byssus Threads



Lobster Appendage

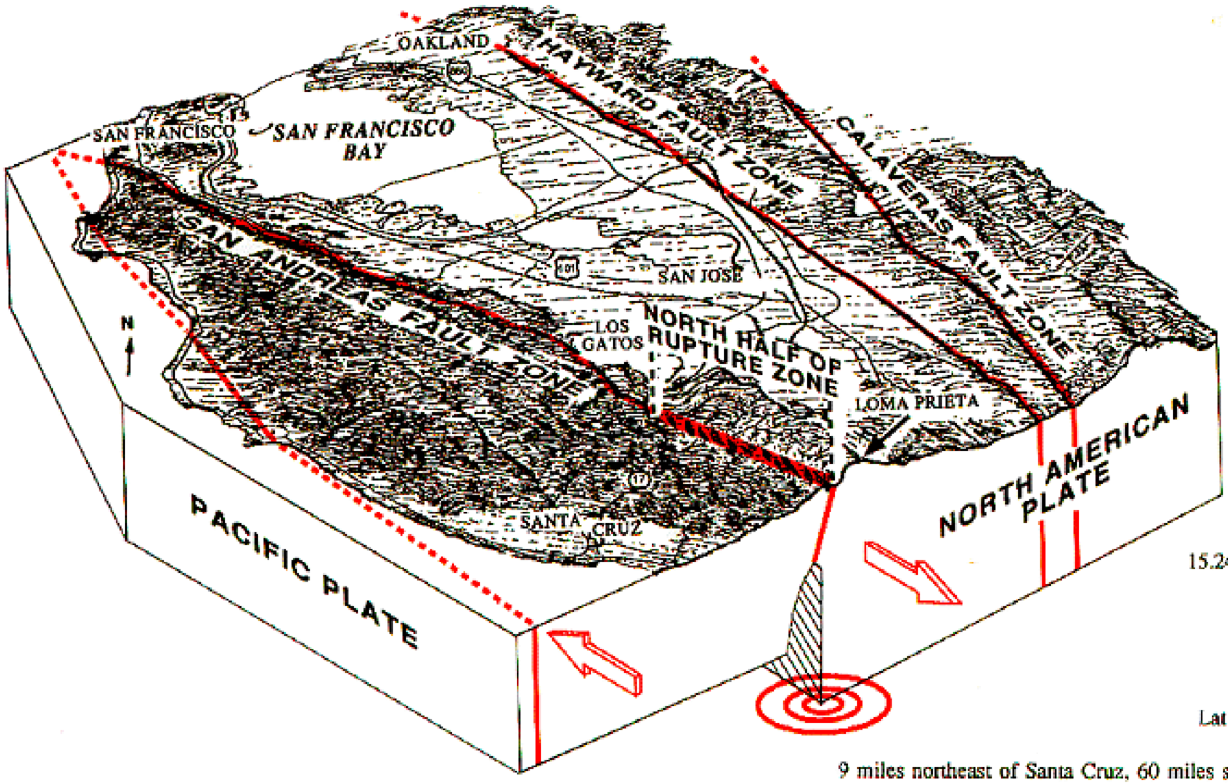
Slinky

Human Spine



Odontoid process
Groove for vertebral artery
Second cervical vertebra
Seventh cervical vertebra
Spinous process
Arch
Superior articular facet (process)
Groove for spinal nerve
Foramen transversarium
Body
Anterior tubercle of transverse process
Posterior tubercle of transverse process
Spinous process
Superior articular facet (process)
Odontoid process (anterior articular facet)
Superior articular facet
Transverse process
Inferior articular facet
Body
Posterior tubercle
Groove for vertebral artery
Superior articular facet
Transverse process
Foramen transversarium
Lateral mass
Facet for odontoid process
Anterior tubercle

Tectonics



EARTHQUAKE ORIGIN

Time
October 17, 1989
15.24 seconds after 5:04 p.m. (PDT)

Magnitude
7.1

Location
Lat. 37.036° N., long. 121.883° W.
Depth 11.5 miles
9 miles northeast of Santa Cruz, 60 miles south-southeast of San Francisco

6.7 Magnitude Earthquake Damage

San Francisco

Residential Damage

Freeway Collapse

1989 Loma Prieta Earthquake Structural Failure

San Francisco

Column – Beam Connection

Typical Steel Column - Beam

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Japan - Steel Cables

Raft Footing Spring Isolators

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CASL Description

The CASL is an earthquake proof structural column for buildings. The CASL or Columnic Actuated Spring Loader promotes the safety of the inhabitants of buildings and promotes the non – destruction of the buildings themselves.

Vertical rods and diagonal bracing anchor springs situated along the length of the vertical axis of the column. Beams bear on wooden slip plates which act to pass the vertical forces of the beam to the steel springs. Wooden supports held in place by diagonal steel bracing support the springs on 2 vertical rods.

The base is made from steel and comprises an abstract shape of the bivalve mollusk. Strategically placed byssus thread steel cables reach upward from the horizontal rod. Each cable has an attachment CAM which can be used to anchor on a wall, ceiling, or horizontal surface.

Wooden arms at the base horizontal rod hold the steel cables in place before the steel rods bend vertical at each side of the base to the top of the column.

The wooden plates are installed on the column so as to not need any structural modification, drilling, cutting, bolting, or screwing to the beam. Beams or intermediate structural supports can be placed at any wooden slip plate along the length of the CASL. The wooden slip plates once loaded by the weight of the wood or steel beam slide vertically down the 3 vertical rods. Two of the rods which are spring loaded bear on secondary fixed in place wood plates which absorb the vertical energy transferring this to the bracing and the rest of the structure.

The spring mechanism and slip plate acts to absorb horizontal and vertical movement from the beam during an earthquake. Loads are transferred from the top and intermediate wooden plate locations to the steel base of the column. Once the base receives the load the load is transferred to the floor.

The CASL has higher ductility and would perform better than less ductile systems in an earthquake. The building codes characterize different lateral force resisting systems by their ability to yield, deform, and absorb energy under load. The ductility factor or “R” factor, is critical in determining design loads and in understanding the response a structure may go through during ground shaking.

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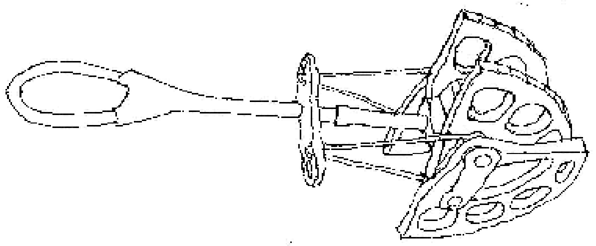
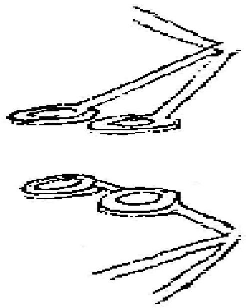
Steel Spring

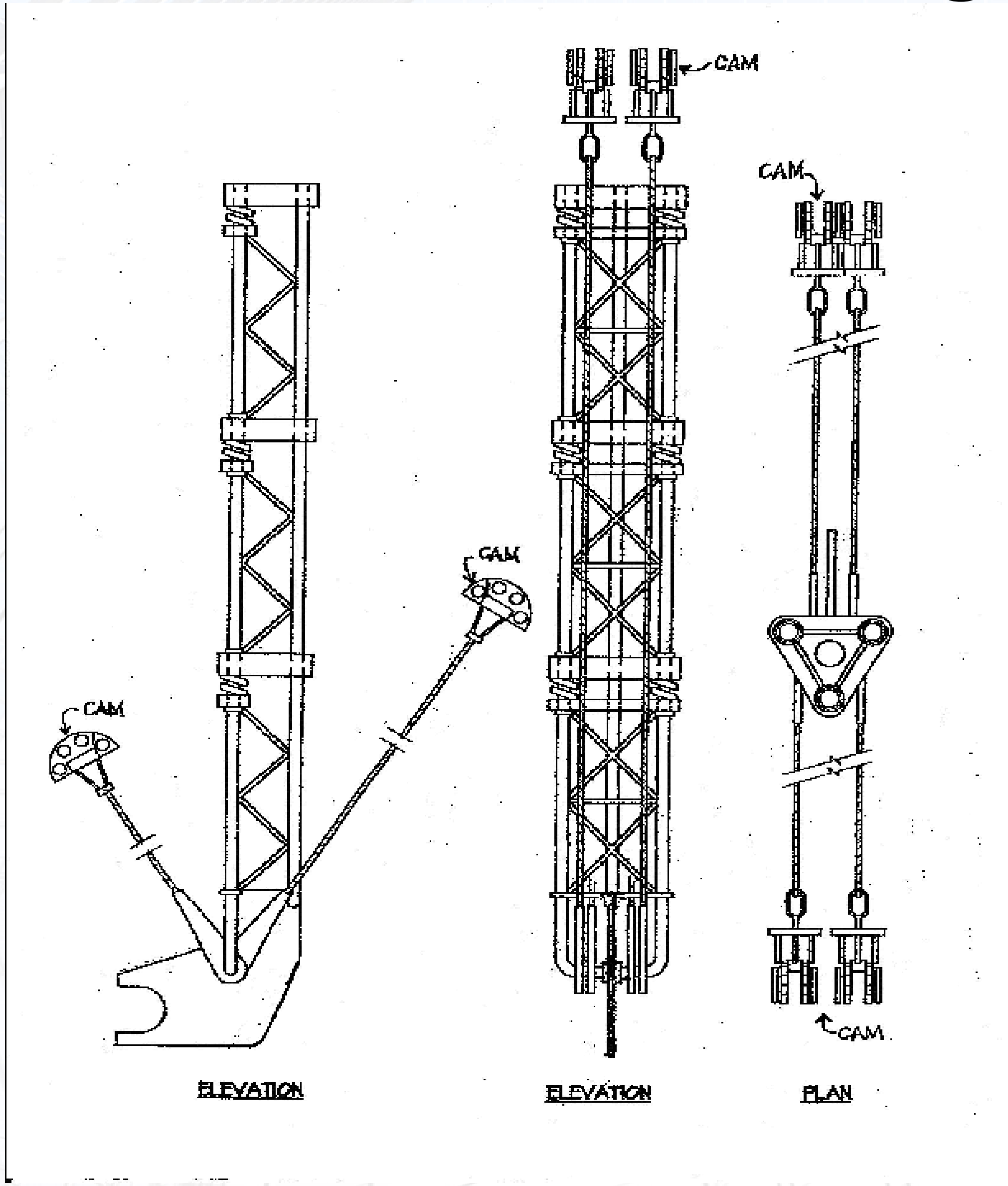
CAM



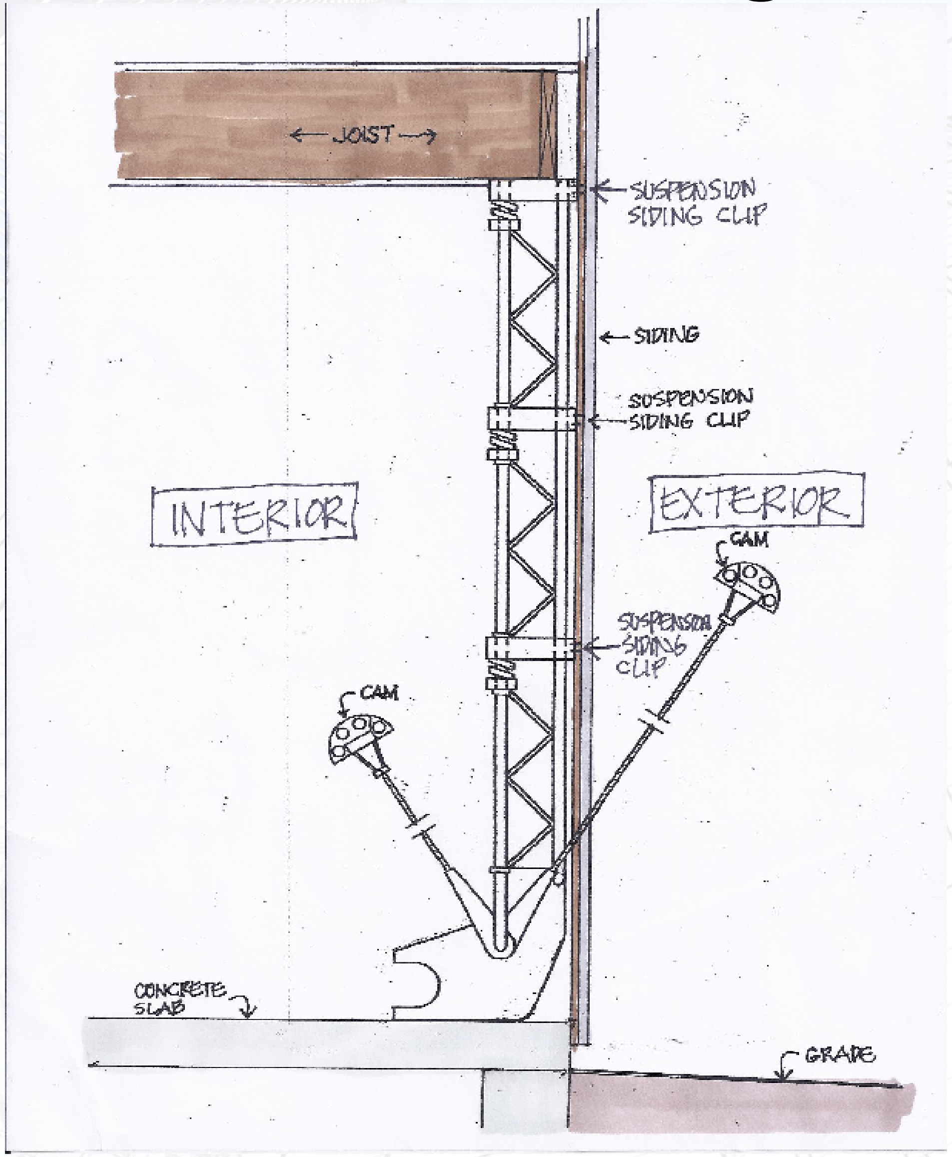
Flange – Diagonal Webbing Support



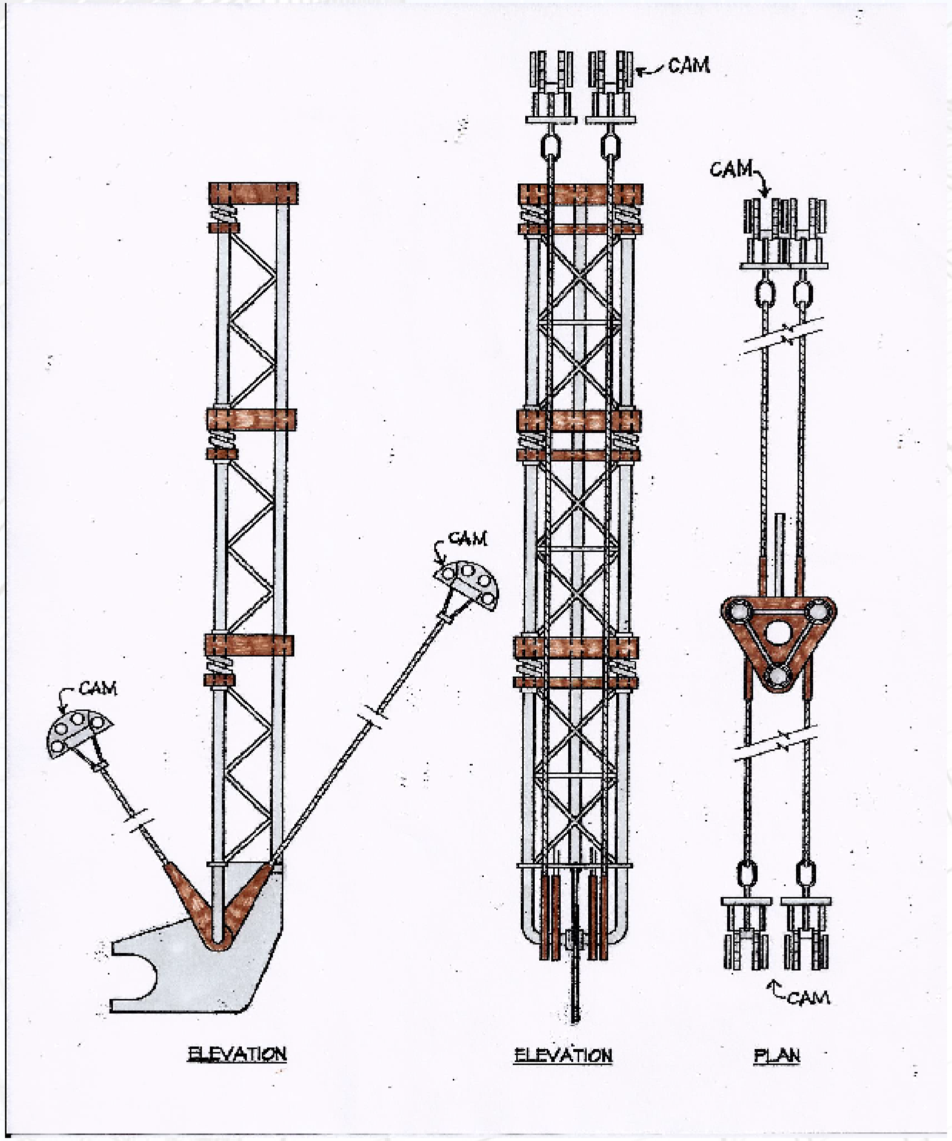
CASL - Patent Pending



Construction Integration



CASL Rendered



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This concludes The American Institute of Architects Continuing Education Systems Course

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artificial – construct

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