

MODULAR PREFAB

BUILDING INNOVATIONS

SPUR Emerging Building Types— June 5th, 2019

Dean Lewis, PE SE - Associate



DCI ENGINEERS

Licensed in all 50 States with projects in Canada, Central & South America, China, and Japan

San Francisco

Los Angeles

Irvine

San Diego

Seattle

Spokane

Portland

Denver

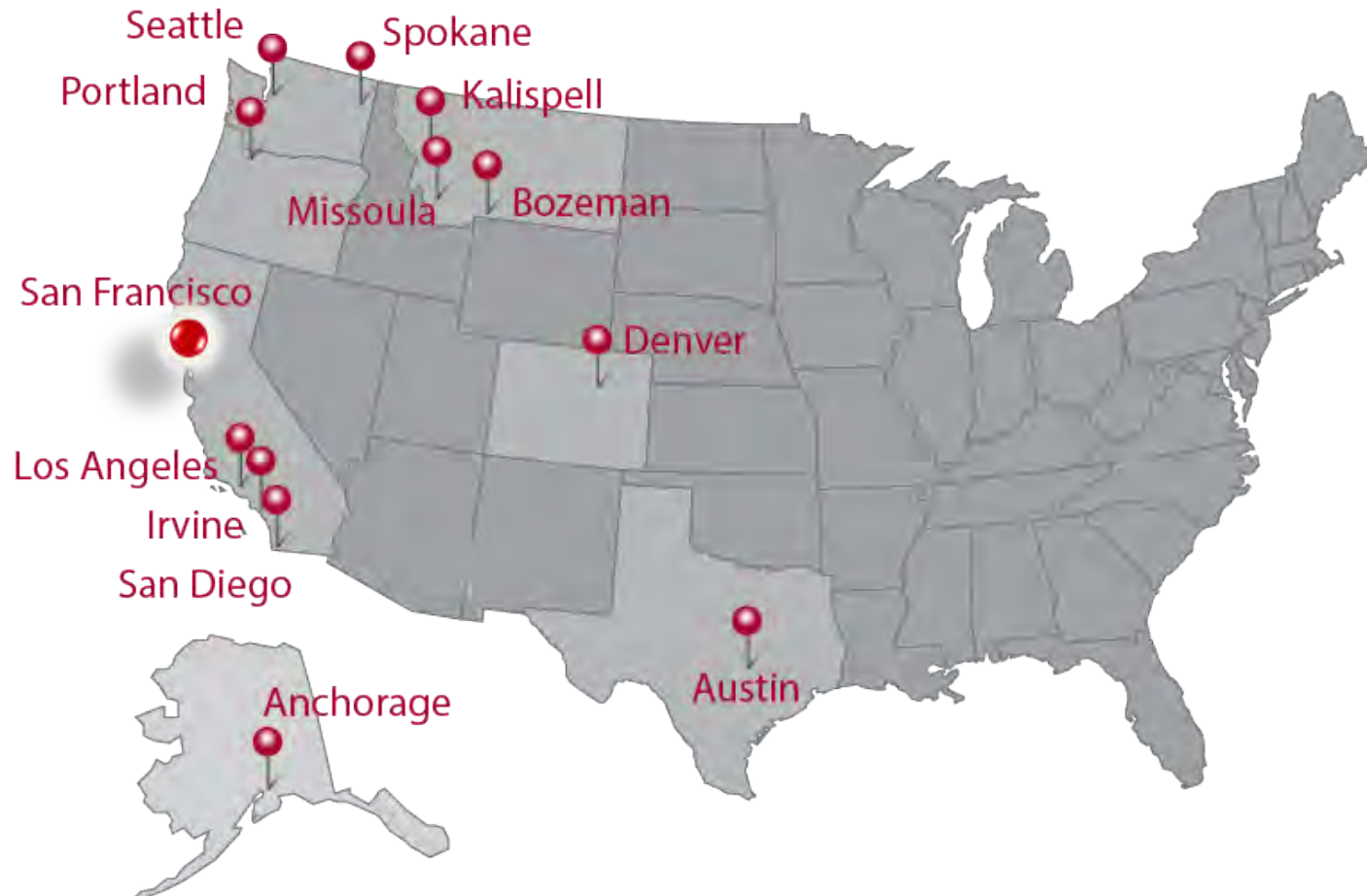
Austin

Anchorage

Kalispell

Bozeman

Missoula



MODULAR & PREFAB



PREFAB WALLS & FLOORS

- Panelized, flat pack, cassettes

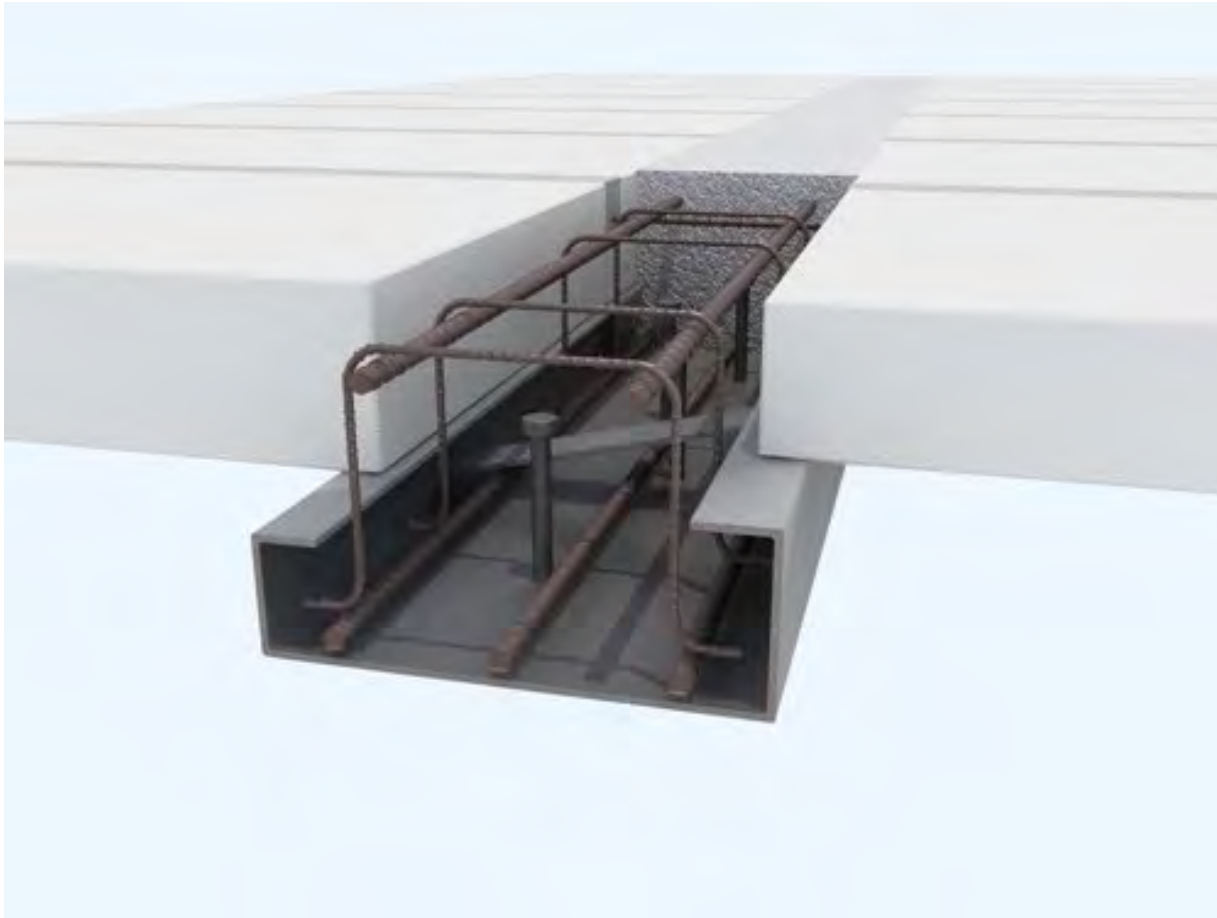


PREFAB WALLS & FLOORS

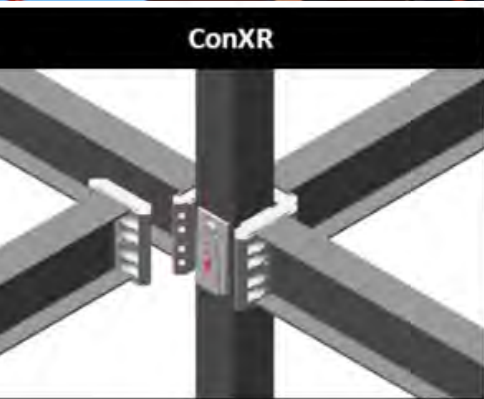


PREFAB-DIVERSAKORE

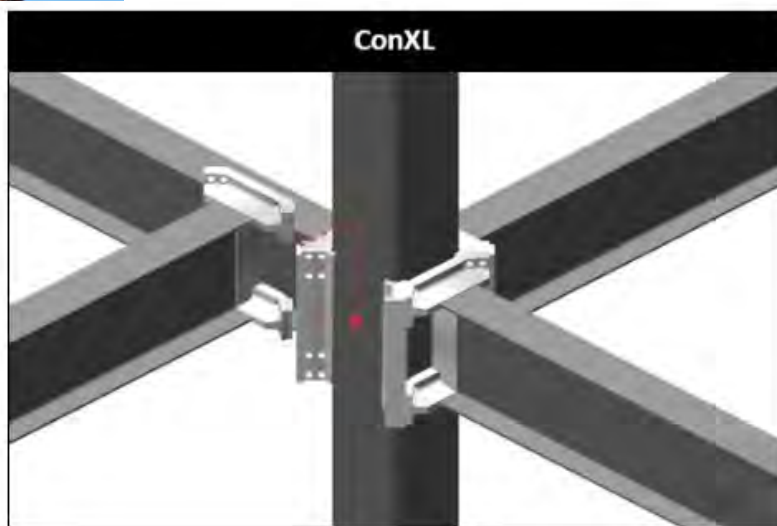
- Long span composite metal deck



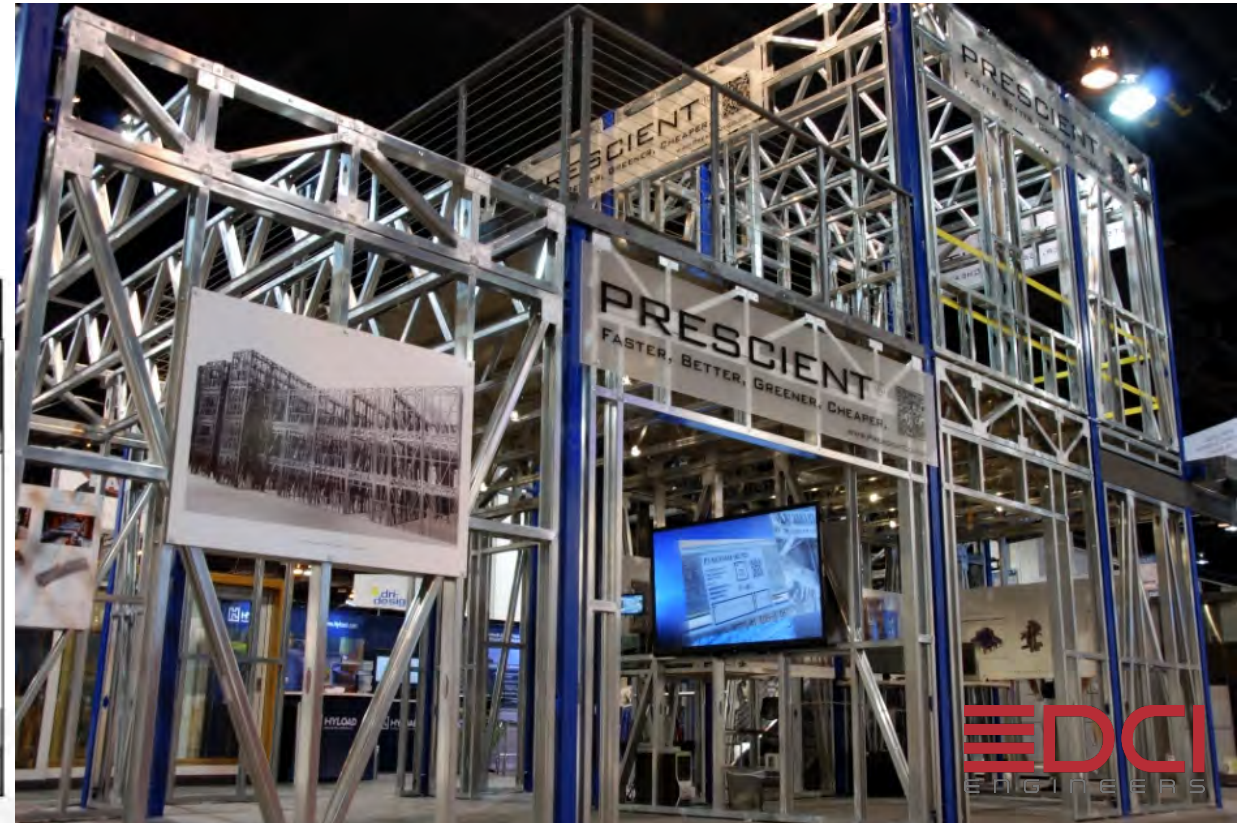
PREFAB-PROPRIETARY SYSTEMS



ConXR



ConXL



PREFAB-KIT-OF-PARTS

SUSTAINABLE LIVING INNOVATION SYSTEM (SLI)

W
COLLINS
O
R
M
A
N

EDCI
ENGINEERS

PREFAB-KIT-OF-PARTS

- Integrated MEP Systems
- Long span floor system



WOLLINS
WERMANN

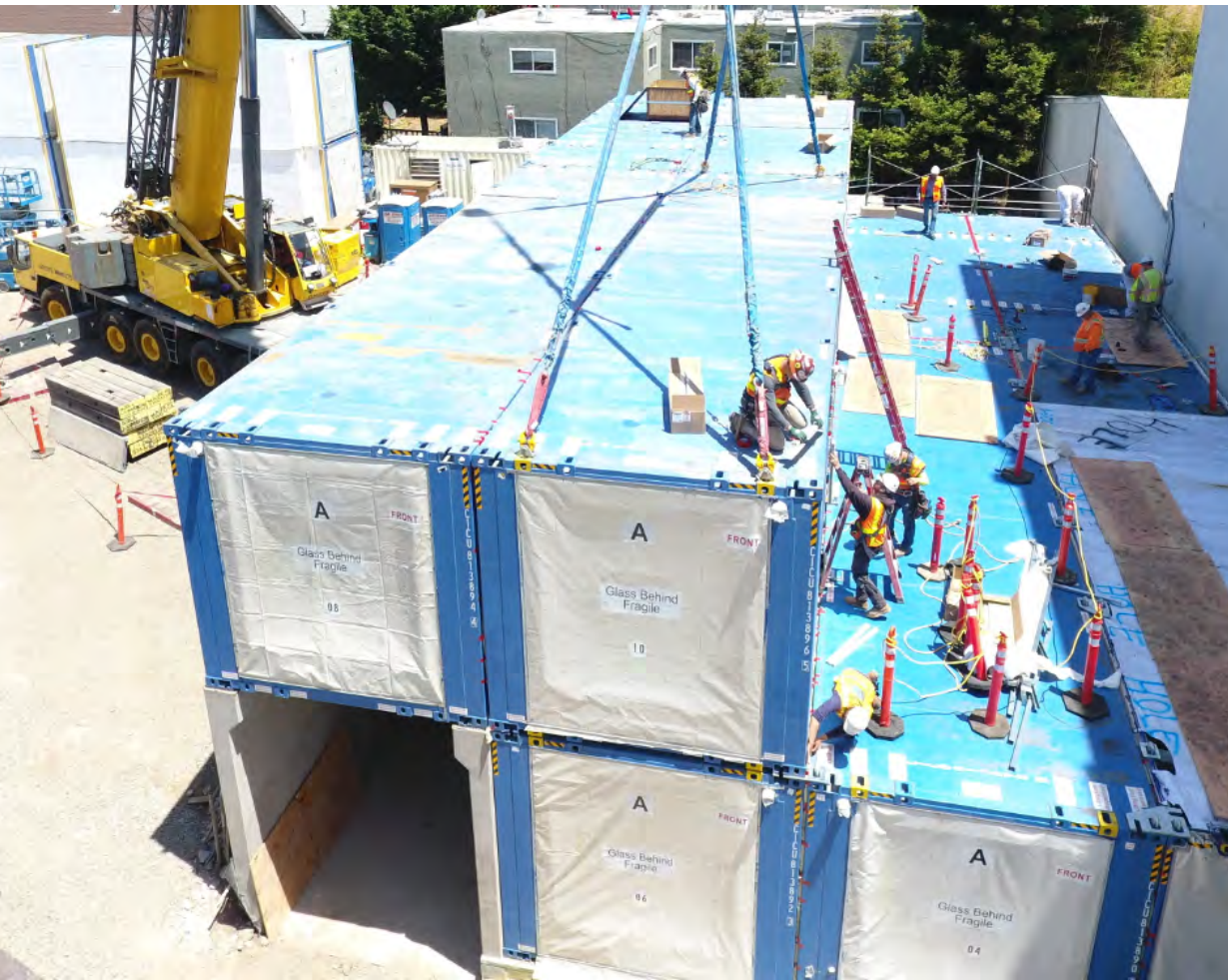
EDCI
ENGINEERS

DCI Engineers

DCI Engineers

MODULAR-STEEL

- Steel modules or shipping containers



MODULAR-WOOD

- Volumetric Prefab
- Fully integrated units



DCI MODULAR PROJECTS



Wood Modular Client : Pyatok



Wood Modular Client : David Baker Architects



Wood Modular Client : Schematic Workshop



Wood Modular Client : Lowney Architecture



Wood Modular Client : DLR GROUP



Wood Modular Client : Hamilton Urban Partners



Wood Modular Client : Driscoll Architects



Steel Container Modular Client : Panoramic Interests

MODULAR & PREFAB



WHAT IS MASS TIMBER

TIMBER PROJECTS LOOK LIKE



MASS TIMBER



MASS TIMBER PROJECTS

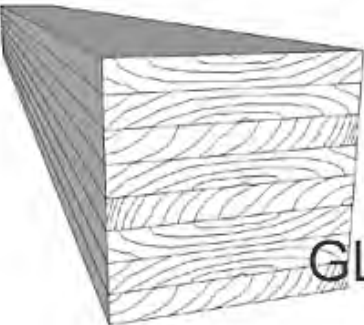


DCI ENGINEERS

MASS TIMBER



TYPES OF MASS TIMBER



GLT

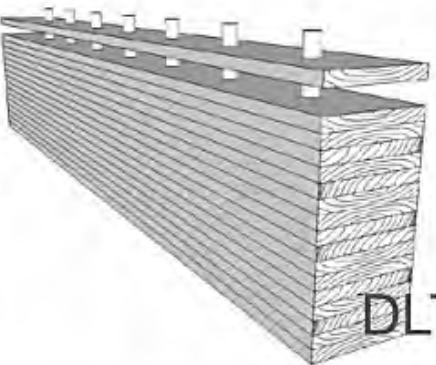


SCL

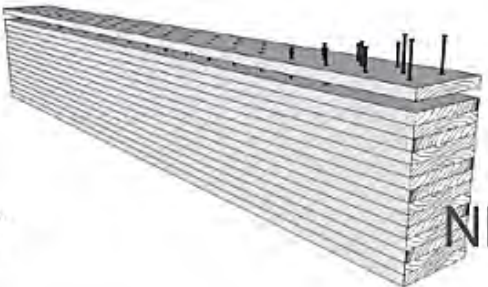


CLT

GLUED



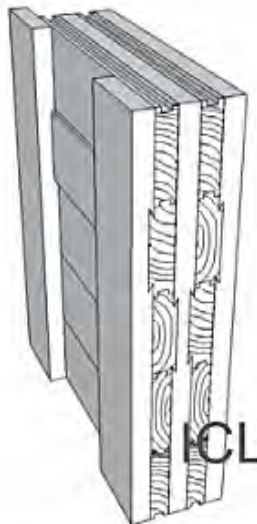
DLT



NLT



CNLT



FJCLT

NON-GLUED

TYPES OF MASS TIMBER

Products Which Span in **ONE** Direction

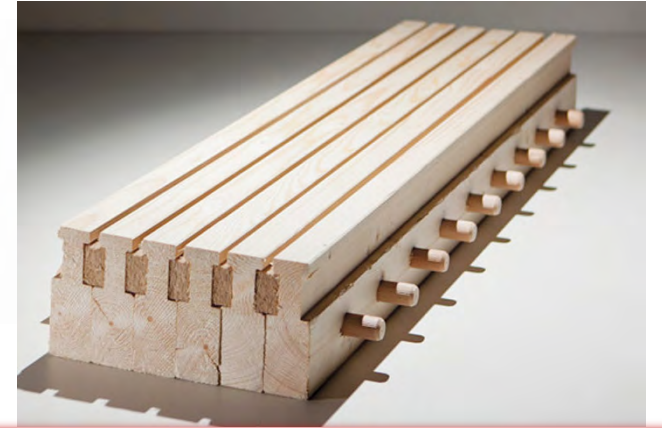
GLT (Glue Laminated Timber)



NLT (Nail Laminated Timber)



DLT (Dowel Laminated Timber)



Products Which Span in **TWO** Directions

CLT (Cross Laminated Timber)



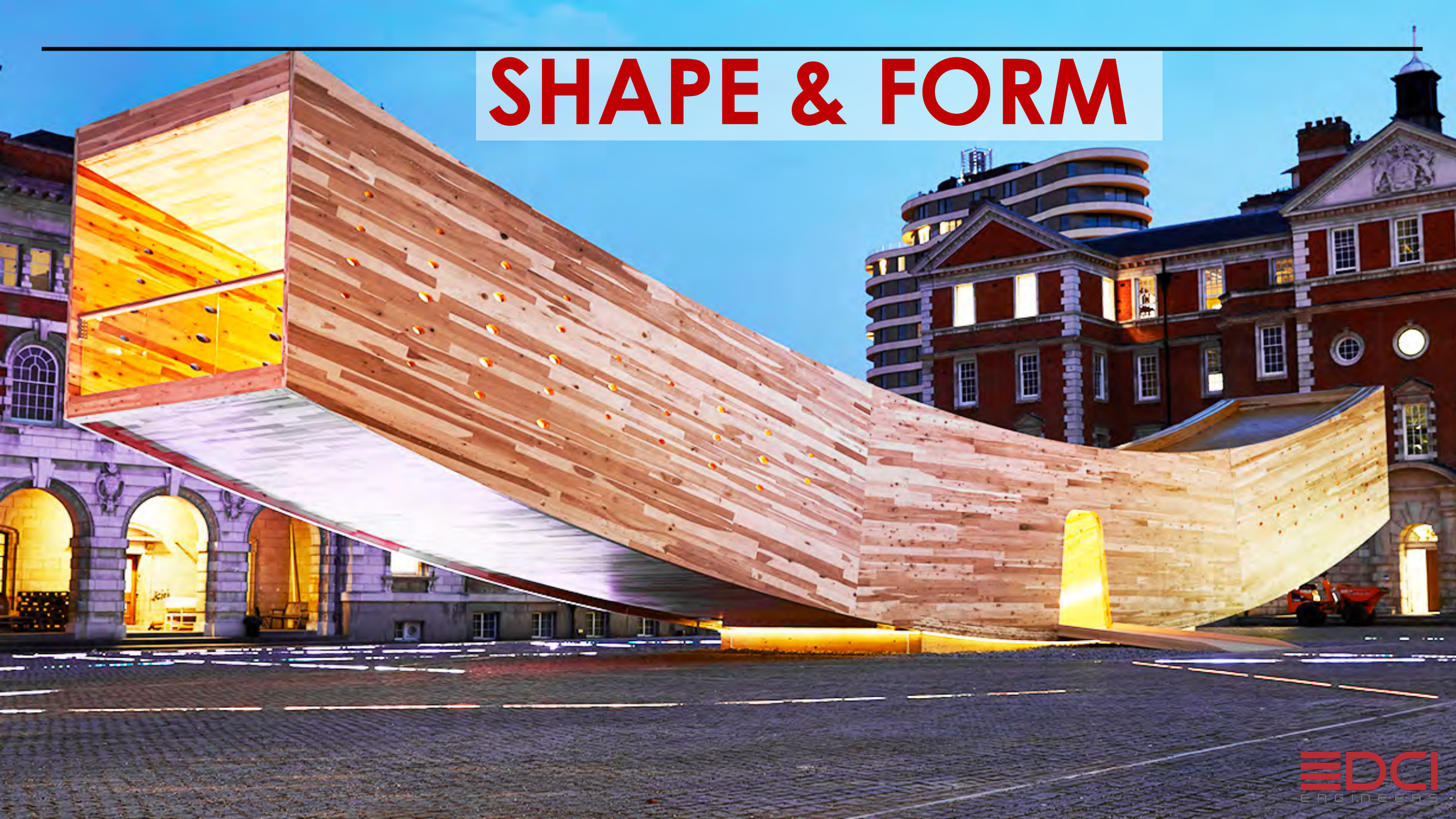
MPP (Mass Plywood Panel)



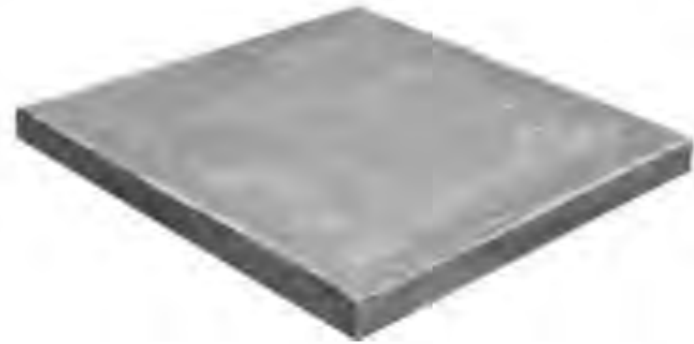
CLT & MPP DUAL SPAN CAPACITY



SHAPE & FORM



WEIGHT SAVINGS



DESCRIPTION

5 PLY CLT PANEL

CONCRETE SLAB

THICKNESS

6.66"

6.66"

WEIGHT

17 PSF

84 PSF

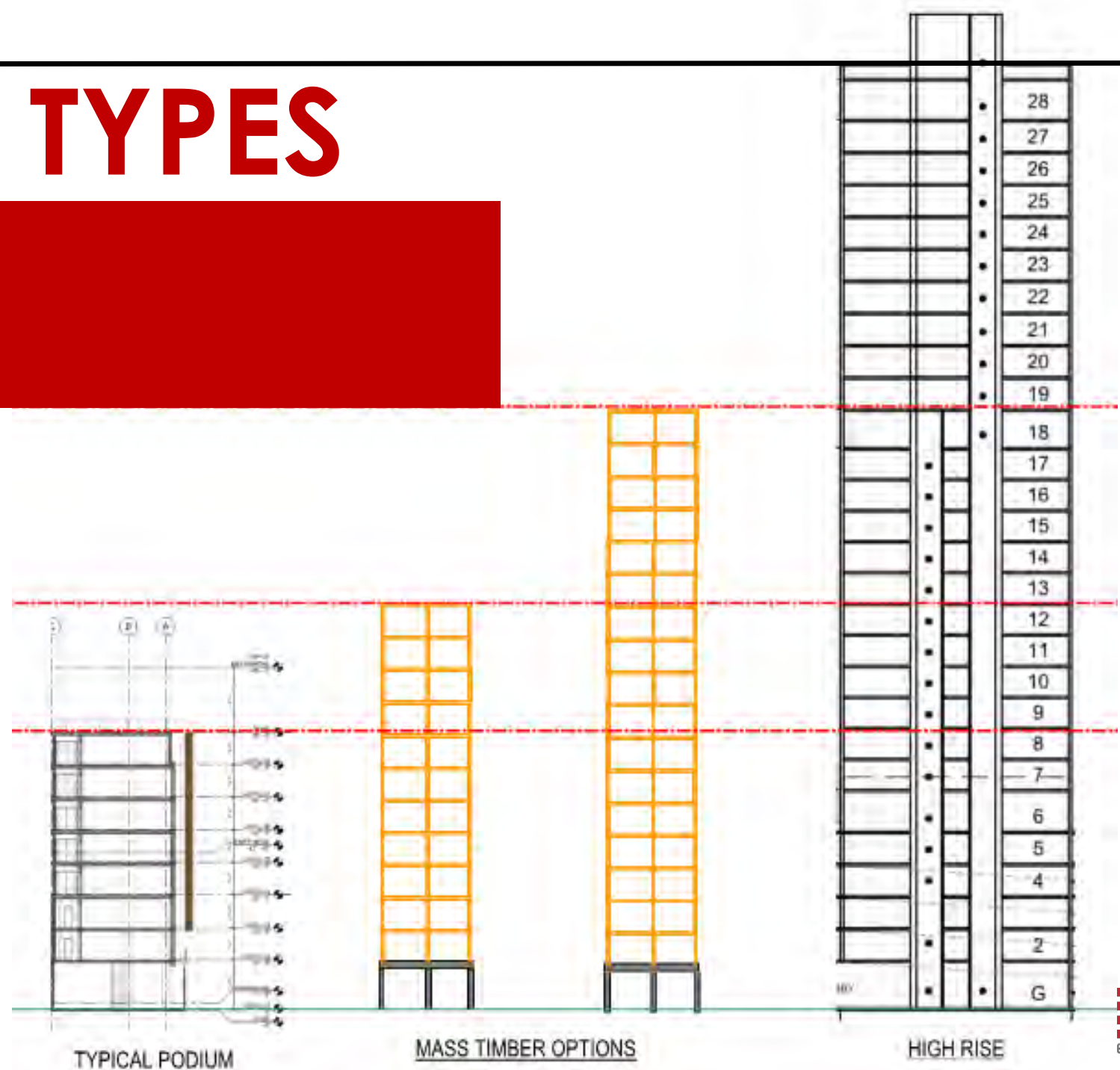
CNC = ACCURACY (1/8")



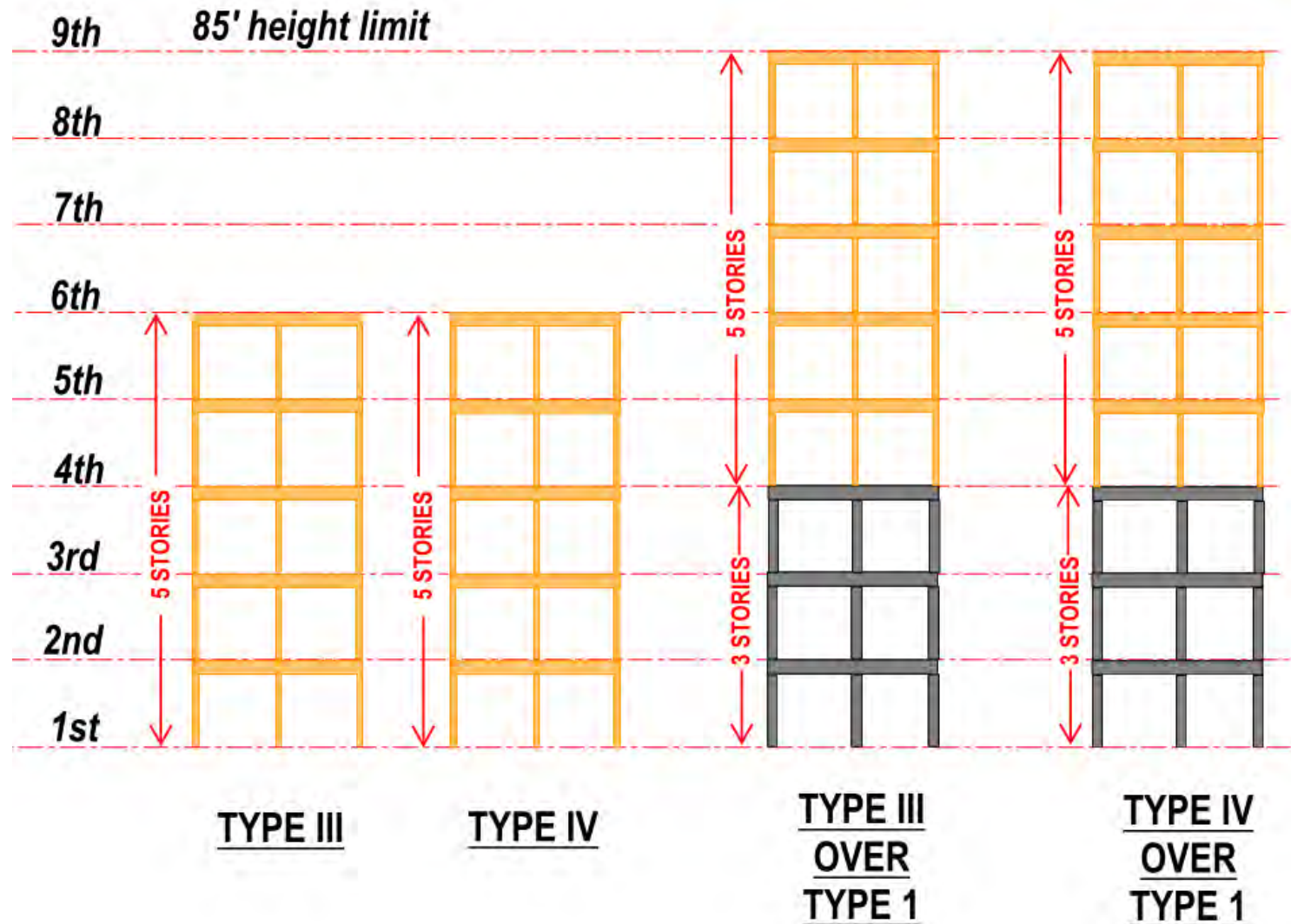
PROJECT TYPES

MANY OPTIONS

5 TO 20+ STORIES



PROJECT TYPES



**OPTIONS CURRENTLY
AVAILABLE IN 2016 CBC**

WHAT'S NEXT



FIRE TESTING

Full scale state of the art tests



FIRE TESTING



FIRE TESTING



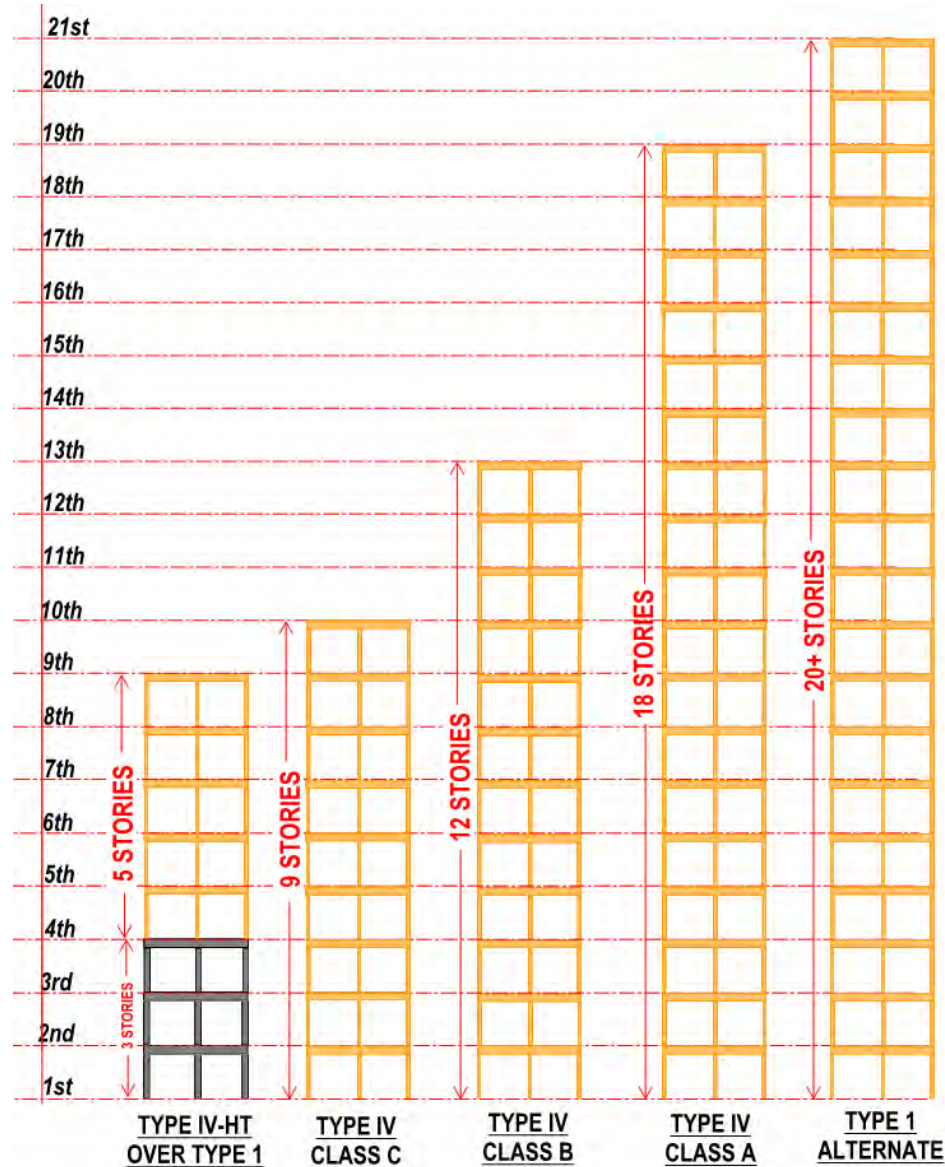
FIRE TESTING



3+ HOUR FIRE TESTING



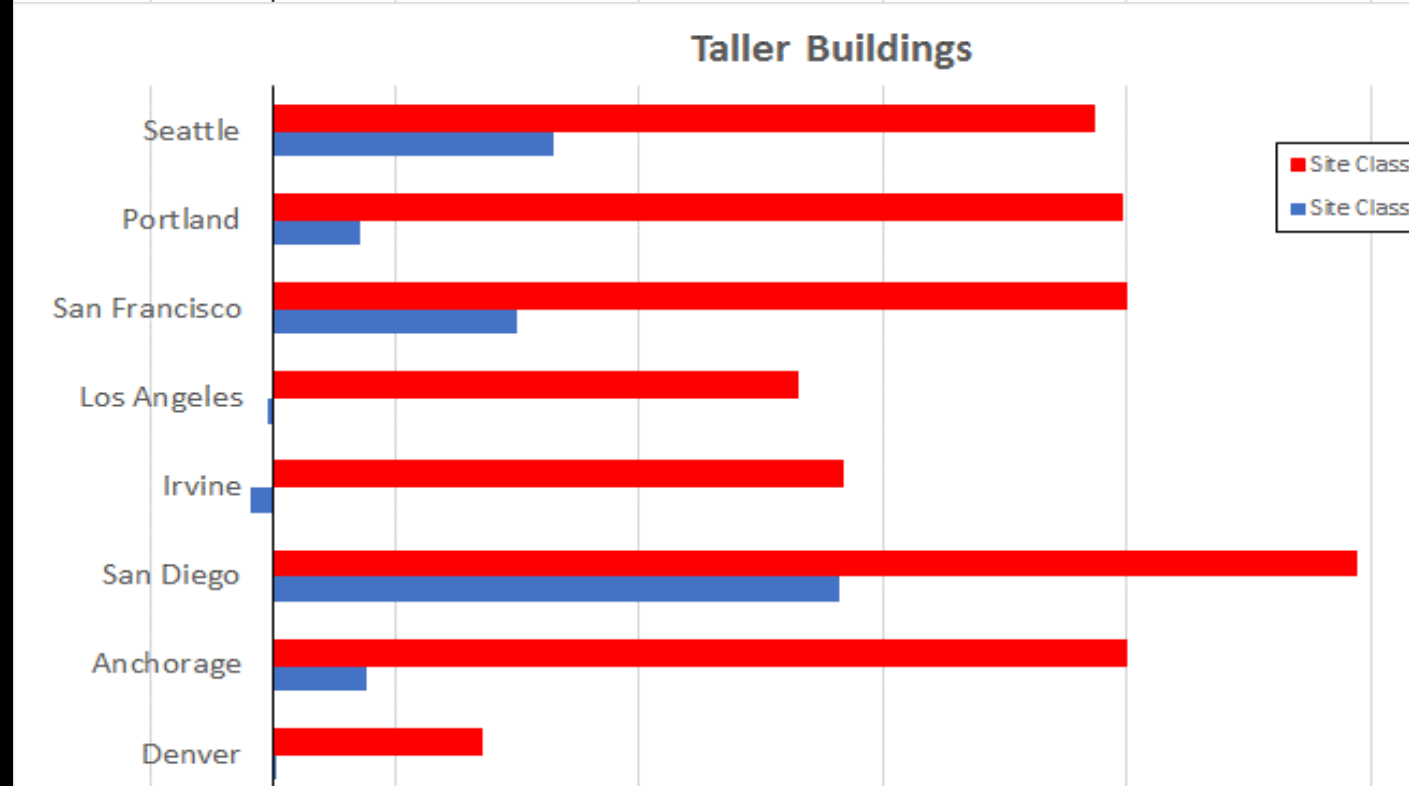
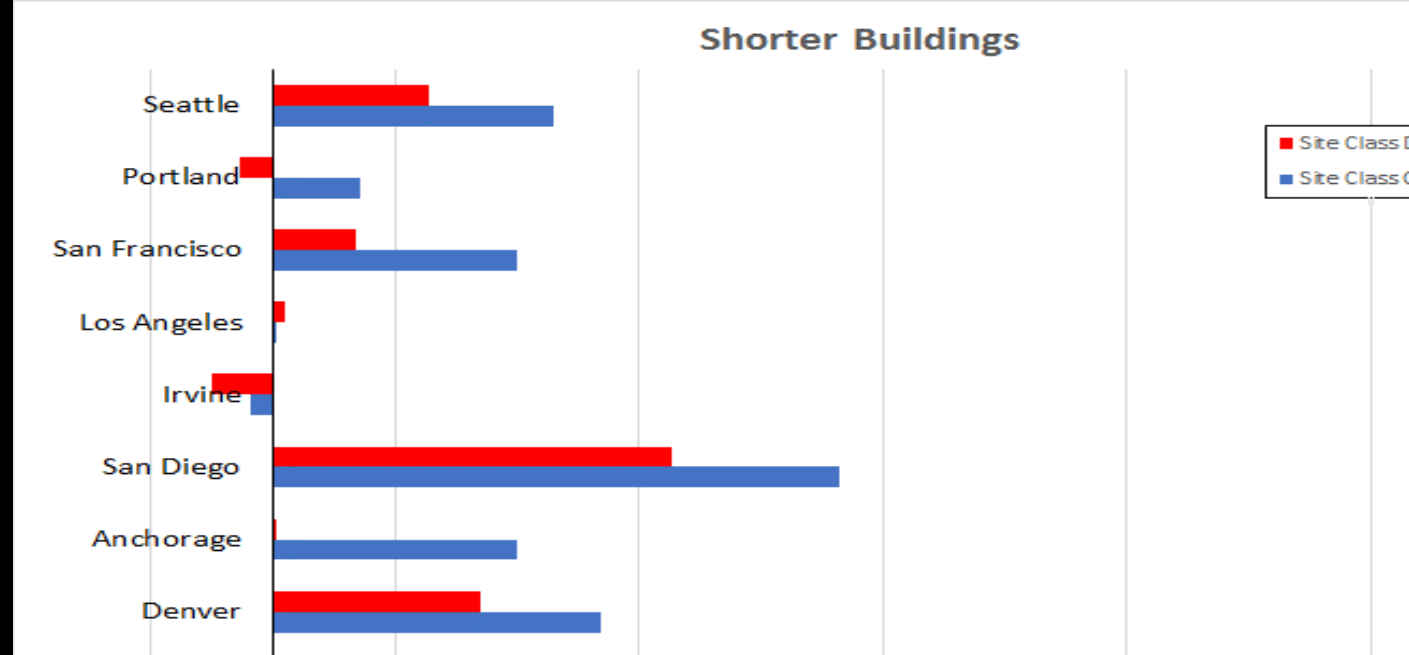
PROJECT TYPES



UPCOMING OPTIONS
IN 2021 IBC ->2022CBC ->2023 SFBC

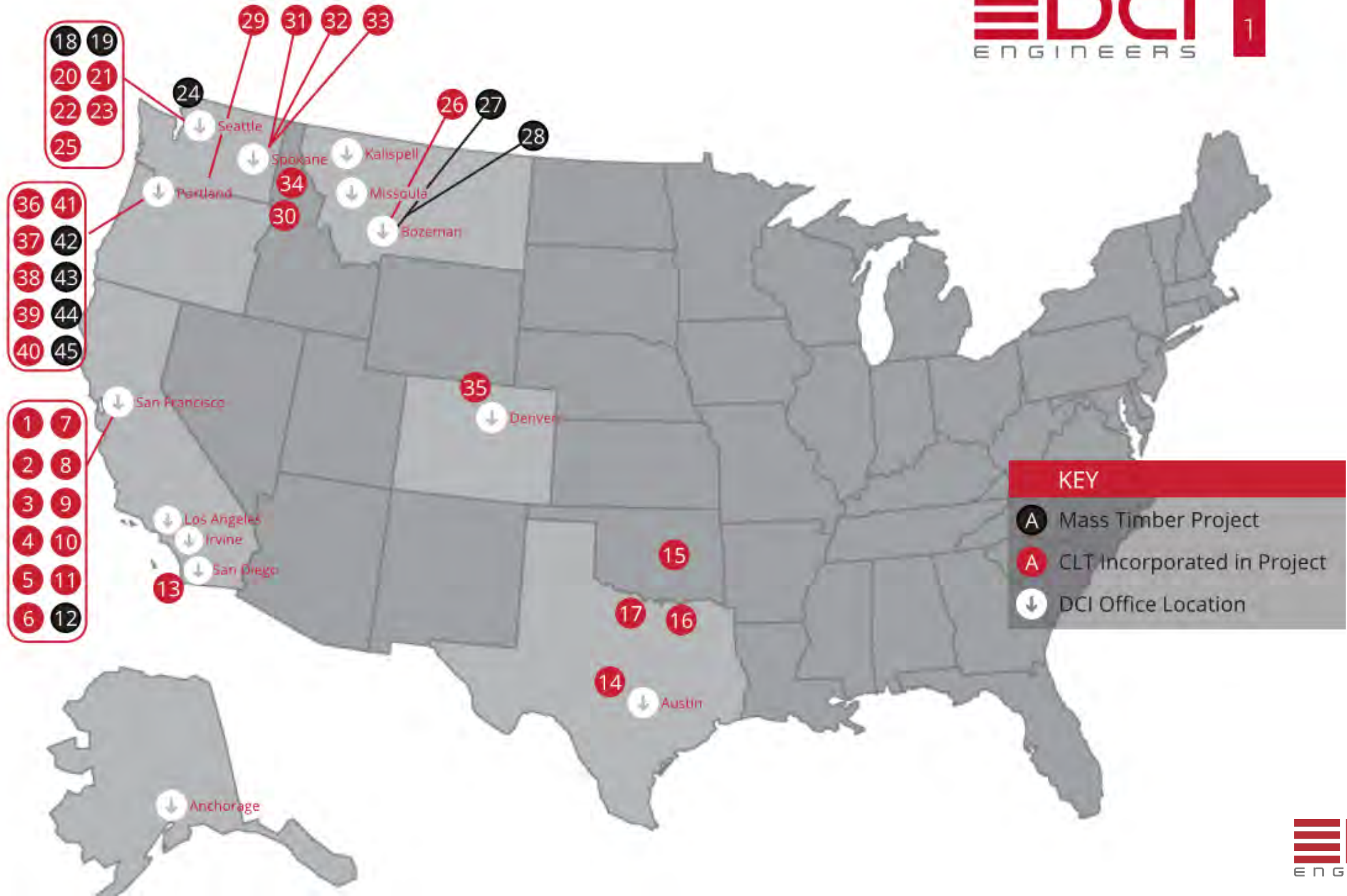
CODE CHANGES

- Increase for 2019 CBC
- Shorter buildings refer to buildings with a period less than 0.6 seconds. Taller buildings refer to buildings with a period between 0.6 seconds and 3.0 seconds.
- The load increases do not include the eliminated 18% reduction that may be applicable for some taller structures (applicable to modal analysis method).
- The charts show the maximum potential load increases. The actual load increases will depend on the location, site soil condition, building height, and analysis methods. For a given project, DCI engineers can help to determine the load increase and its impact to design.



DCI MASS TIMBER

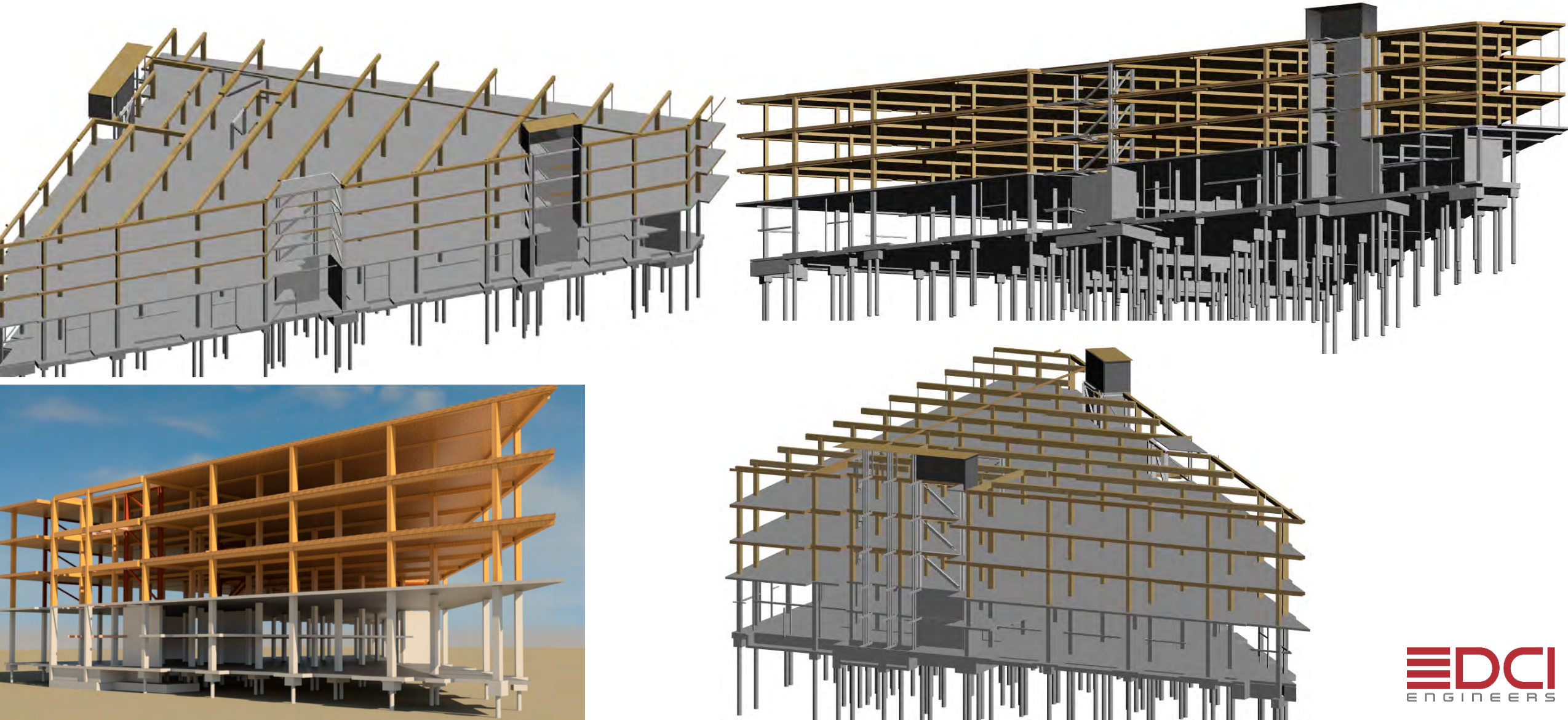




Mass Timber in San Francisco



Mass Timber in San Francisco



Mass Timber Projects In Design and Constructed in the US (March 2019)

550+ PROJECTS NATION WIDE



Stage
■ Construction Started / Built
■ In Design

| Stage | Mass Timber | # of Projects |
|------------------------------|----------------------|---------------|
| Construction Started / Built | CLT | 97 |
| | NLT | 7 |
| | DLT | 5 |
| | Heavy Timber Decking | 49 |
| | Post & Beam | 40 |
| | Total | 198 |
| In Design | CLT | 171 |
| | NLT | 21 |
| | DLT | 3 |
| | Heavy Timber Decking | 38 |
| | Post & Beam | 114 |
| | Total | 347 |
| Grand Total | | 545 |

| State | Stage | | State | Stage | |
|-------|------------------------------|----|-------|------------------------------|----|
| AL | Construction Started / Built | 2 | MS | In Design | 1 |
| | In Design | 8 | MT | Construction Started / Built | 6 |
| AR | Construction Started / Built | 3 | | In Design | 4 |
| | In Design | 3 | NC | Construction Started / Built | 10 |
| AZ | In Design | 1 | | In Design | 24 |
| CA | Construction Started / Built | 31 | ND | In Design | 1 |
| | In Design | 45 | NE | Construction Started / Built | 1 |
| CO | Construction Started / Built | 9 | | In Design | 1 |
| | In Design | 8 | NH | In Design | 1 |
| CT | Construction Started / Built | 3 | NJ | Construction Started / Built | 1 |
| | In Design | 6 | | In Design | 2 |
| DC | Construction Started / Built | 2 | NM | Construction Started / Built | 1 |
| | In Design | 3 | NY | Construction Started / Built | 5 |
| DE | In Design | 2 | | In Design | 11 |
| FL | Construction Started / Built | 16 | OH | Construction Started / Built | 1 |
| | In Design | 12 | | In Design | 3 |
| GA | Construction Started / Built | 1 | OK | Construction Started / Built | 1 |
| | In Design | 13 | | In Design | 1 |
| HI | In Design | 2 | OR | Construction Started / Built | 17 |
| IA | In Design | 1 | | In Design | 22 |
| ID | Construction Started / Built | 1 | PA | Construction Started / Built | 2 |
| | In Design | 2 | | In Design | 2 |
| IL | Construction Started / Built | 4 | RI | Construction Started / Built | 2 |
| | In Design | 11 | SC | Construction Started / Built | 6 |
| IN | Construction Started / Built | 1 | | In Design | 6 |
| KS | In Design | 2 | TN | Construction Started / Built | 3 |
| KY | Construction Started / Built | 1 | | In Design | 3 |
| | In Design | 2 | TX | Construction Started / Built | 13 |
| LA | In Design | 1 | | In Design | 30 |
| MA | Construction Started / Built | 16 | UT | Construction Started / Built | 1 |
| | In Design | 21 | | In Design | 1 |
| MD | Construction Started / Built | 1 | VA | Construction Started / Built | 2 |
| | In Design | 7 | | In Design | 10 |
| ME | Construction Started / Built | 1 | VT | Construction Started / Built | 1 |
| | In Design | 13 | | In Design | 7 |
| MI | Construction Started / Built | 1 | WA | Construction Started / Built | 22 |
| | In Design | 4 | | In Design | 28 |
| MN | Construction Started / Built | 1 | WI | Construction Started / Built | 3 |
| | In Design | 3 | | In Design | 13 |
| MO | Construction Started / Built | 4 | WV | Construction Started / Built | 2 |
| | In Design | 5 | WY | In Design | 1 |

**Considering mass timber for a project?
 Ask us anything.**

For free project support, contact:
help@woodworks.org

Questions?

- Dean Lewis
- (415) 638-8916
- DLewis@dc-engineers.com



Thank you for your time!