

Mid-rise Wood Frame Construction: Structural, Fire Safety, Environmental and Architectural Considerations

Kevin Cheung, Ph.D., P.E.

Chief Engineer, Western Wood Products Association, Portland Oregon USA

Fang Xu

Director, American Softwoods China Office, Shanghai CHINA

Midrise Wood Frame Construction

Wood Frame Construction - Platform framing

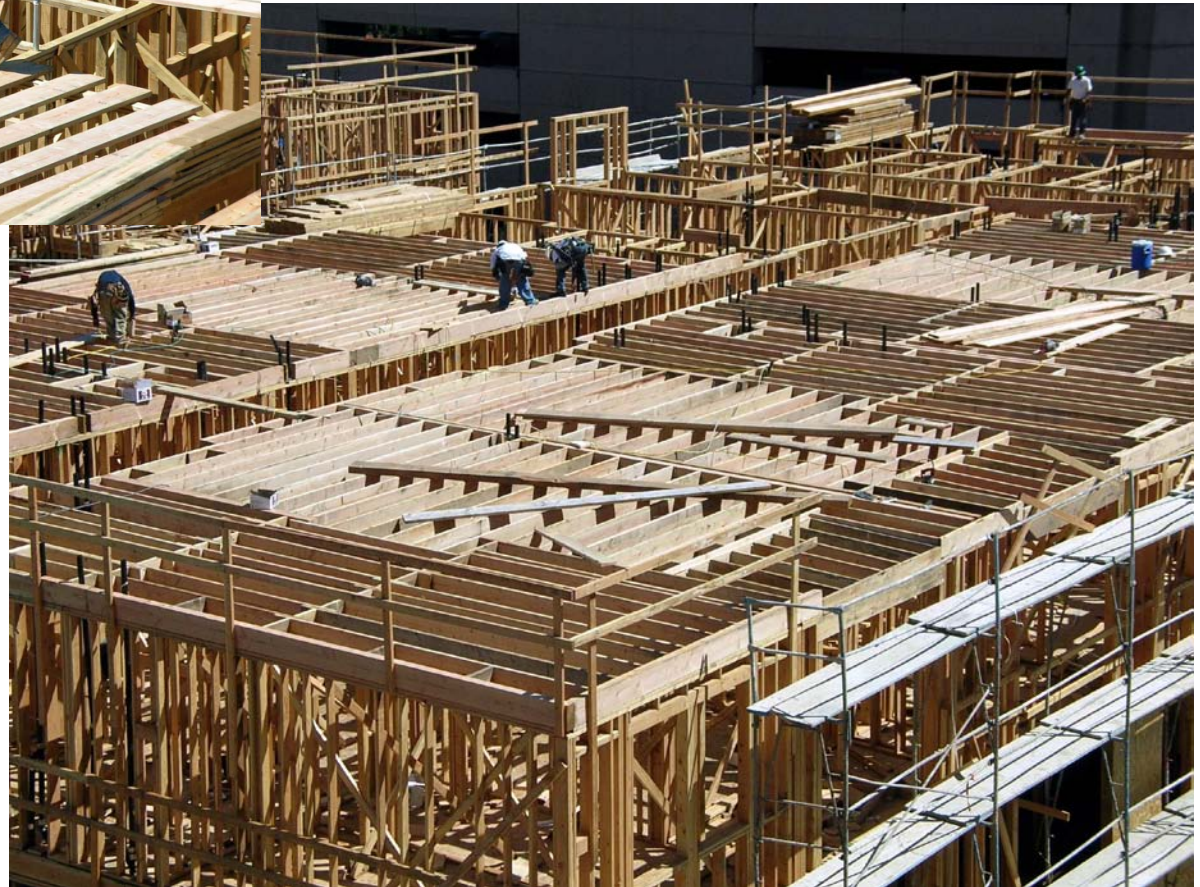
Midrise - 4 to 6 stories

Mixed Construction - Podium Construction,
such as 5+1 and 5+2

Mixed Use - residential (multi-family), retail, etc.

Design Considerations - Shrinkage, Structural,
Fire, Green, etc.

Wood frame construction





Mid-rise (Multistory) Multifamily Wood- Frame Construction



Midrise Wood Frame Construction

MATISSE Apartments in Portland Oregon, 5+1,
2 levels underground parking



Midrise Wood Frame Construction

Marselle Condos in Seattle, 160,000 SF, Type III, 5+2



5+2 in Seattle, Retirement Living



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



Midrise Wood Frame Construction

Portland, Oregon, USA (2010)

Photo: Walsh Construction



NEESWood Capstone Project (2009)

E-Defence at Miki, Japan 7.5 magnitude earthquake





TCR 15:14:13:08



TCR 15:14:13:07

Midrise Wood Frame Construction

Carbon impact factors for a range of wood products Table: Rick Bergman, USDA FS FPL

Product	Unit	Category	A	B	C	D	Alternative	E
Hardwood Lumber	One board foot	NE/NC	0.89	0.59	1.84	2.63	PVC	-4.16
Lumber	One board foot	SE	1.08	0.79	1.77	2.64	PVC	-4.12
Softwood Lumber	One 2x4 'stud'	NE/NC	1.85	1.23	6.63	6.97	Steel stud	-13.0
Lumber	One 2x4 'stud'	SE	3.90	3.32	8.42	7.01	Steel stud	-14.9
Wood Flooring	1 square foot	Solid wood	1.06	0.69	2.12	-0.13	Linoleum	-1.61
	1 square foot	Engineered	0.98	0.52	1.10	-0.22	Linoleum	-0.42
Doors	One door	Solid wood	46.5	29.4	100	228	Steel door	-311
Decking	One deck board	Treated pine	5.18	1.70	16.1	11.9	WPC	-24.5
Siding	100 square feet	WRC	37.7	5.96	77.7	20.4	Vinyl	-66.3
Poles	One 45' pole	Treated wood	454	431	1160	1380	Concrete	-2520
OSB	One 4'x 8' sheet	SE	19.0	10.7	34.7	-	n/a	-26.3
Plywood	One 4'x 8' sheet	PNW	5.72	4.13	25.5	-	n/a	-23.9
	One 4'x 8' sheet	SE	10.1	6.48	30.9	-	n/a	-27.3

Midrise Wood Frame Construction

6 stories Wood Frame (2012), Vancouver, BC, CANADA



Midrise Wood Frame Construction

3 stories, wood frame, Shanghai, China (2003)



Midrise Wood Frame Construction

4 Stories, wood frame, Tianjin, China (2012)



Shanghai, China (2012)



5+1 project in Portland, Oregon (2012)



5+1 project in Portland, Oregon (2012)



Midrise Wood Frame Construction

Fashion Walk (2008) - 5 +2

Photos: Togawa Smith Martin, Inc.



Midrise Wood Frame Construction

Casa Heiwa - 5 stories wood frame in CA (1995)
100 units/acre

Photos: Togawa Smith Martin, Inc.



Midrise Wood Frame Construction

Union Square & Elan - 6 + 1 , 130 units/acre

Photos: Togawa Smith Martin, Inc.



Midrise Wood Frame Construction

Esprit - 5+1

Photos: Togawa Smith Martin, Inc.



Midrise Wood Frame Construction

Americana - 5+1, 100 units/acre

Photos: Togawa Smith Martin, Inc.



Mid-rise Wood Frame Construction: Structural, Fire Safety, Environmental and Architectural Considerations

Kevin Cheung, Ph.D., P.E.

Chief Engineer, Western Wood Products Association, Portland Oregon USA

Fang Xu

Director, American Softwoods China Office, Shanghai CHINA