F. Administrative Rule Matters
1. Presentations
a. Fire Department Concerns and Approval Collaboration - Erich Roden

1

Fire Service Empiricism with Type IV Construction

- Preponderance of conventional fire service texts and peer-reviewed journal articles focus on legacy timber dimensions
- Conflagration-size fires in Type IV buildings with re-occupancy in mere weeks to months
- Charring of structural members provided inherent fire resistance

2

Fire Service Anticipated Protections

Firefighters anticipate customary fire protection systems with structures over 75’ (Standpipes, sprinklers, 1-2 hour gypsum, etc.)

Current IBC requirement for building height is 85’ for CLT (without variance)

Fire Service Concerns with CLT

Firefighters are concerned with the introduction of the new term (oxymoron) “Sacrificial Layer”

New construction methods and engineering counter to fire service building construction conditioning and has created a sense of alarmism

UL fire testing showed corners and shoddy construction practices as primary concerns, particularly while under construction

Firefighters use means of egress from floor(s) below as a beachhead to launch firefighting operations. Protection of this area is the first order of priority - “save the stairs, save the building”

Ascent and Milwaukee Fire Department Collaboration

- "25 story piece of wood"
- Type IV-A
- 50% of structure is exposed wood
- 3 hour fire rating for structure and 2 hour rating for floor system
- Forest Products Labs conducted 3 hr burn test of columns

5

Ascent and Milwaukee Fire Department Collaboration, Continued

- Initial MFD Concerns based-upon research and lab testing by UL, current IBC and resulting recommendations:
  - Sealing of connections and utility chases
  - Gypcrete (gyspsum) of public hallways
  - Inspection of corners
  - Public means of egress protections
  - Sealing of building while under construction
  - Construction debris
  - Bi-directional water supply to standpipes

6

Ascent and Milwaukee Fire Department Collaboration, continued

Developers brought MFD into conversation, planning and approvals during conceptualization through variance approvals

Agreed to MFD concerns and submitted fair variances

Outcomes

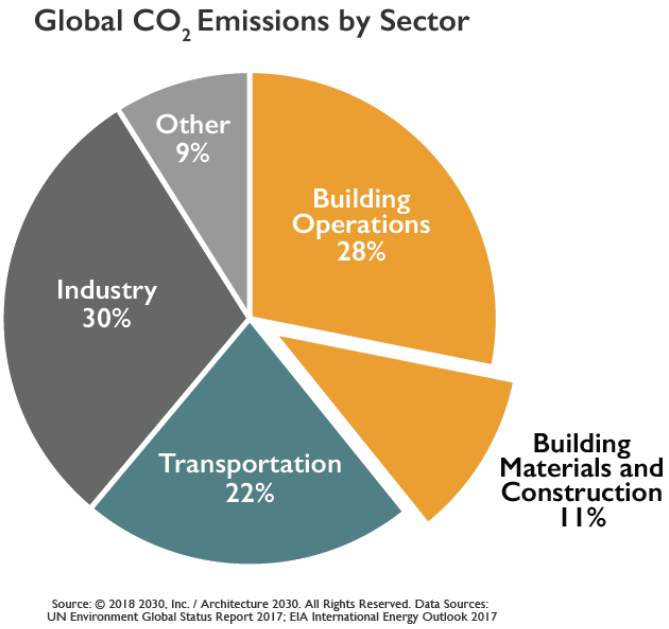
- Fire service's mission is not to stand in the way of economic and sustainable built-environment progress; however, the fire service must be brought along for the ride to plan and prepare fair contingent policy, codes and protections
- The Ascent project was a seminal breakthrough in fire department involvement in CLT projects
- The MFD has been interviewed in several news stories and built-environment journals regarding new colaborative relationships

OCTOBER 5TH, 2021

BIOPHILIC DESIGN

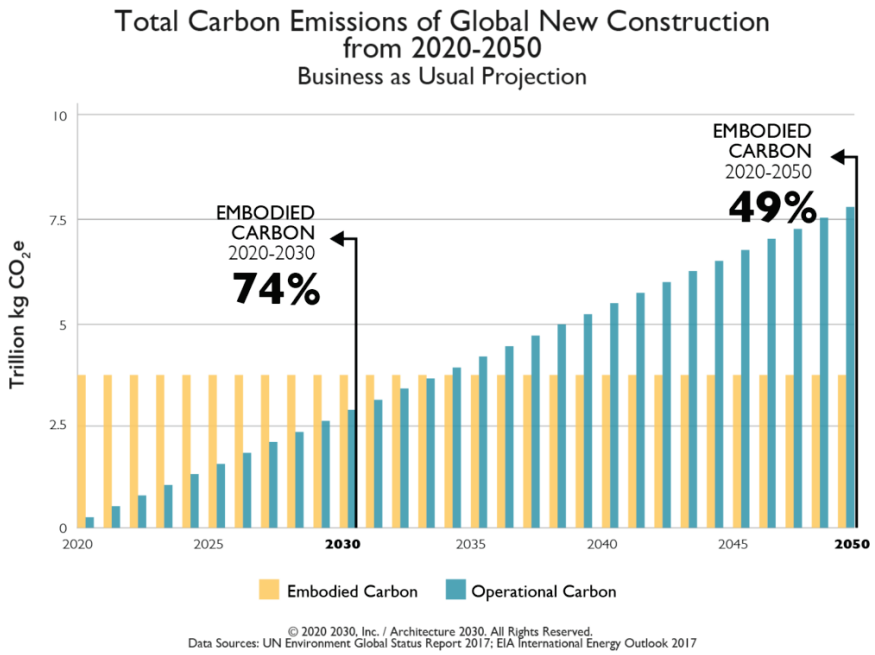
Alex Timmer, LFA,
LEED Green Associate
Assistant Professor
UWM SARUP

Cooper Carry. "HudsonAlpha Institute for Biotechnology.". https://www.coopercarry.com/projects/hudsonalpha-institute-for-biotechnology/.



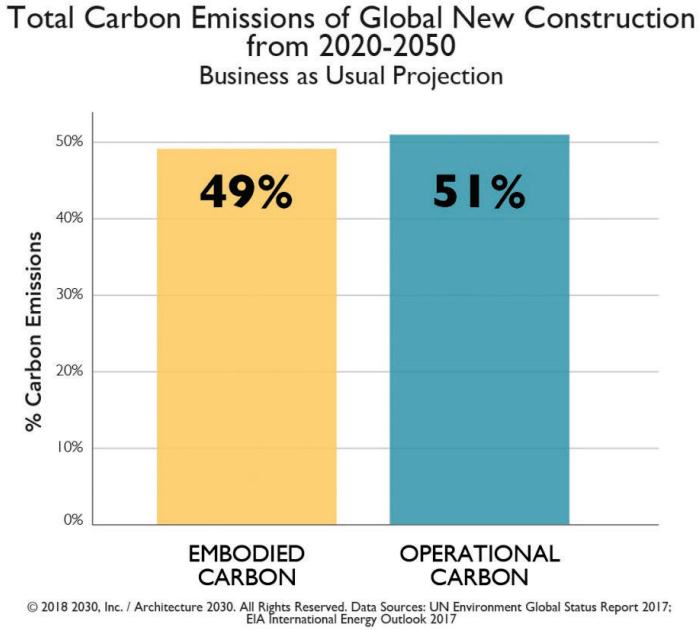
"Annually, embodied carbon is responsible for 11% of global GHG emissions and 28% of global building sector emissions."

Architecture 2030



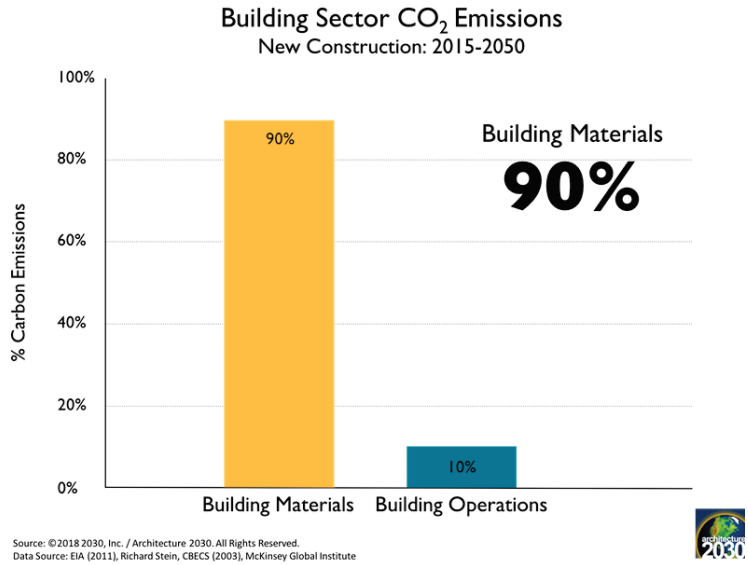
"When we look at all the new construction that is projected to take place between now and 2050, we see the critical role embodied carbon plays."

Architecture 2030



"Embodied carbon will be responsible for *almost half* of total new construction emissions between now and 2050."

Architecture 2030



"Between 2015 and 2050, building materials will account for 90 percent of CO_2 emissions."

Architecture 2030

BIOPHILIA

"Biophilia is the idea that humans have an affinity towards the natural world."
-International Well Building Institute

"Biophilia I - Qualitative | WELL Standard." https://standard.wellcertified.com/mind/biophilia-i-qualitative.

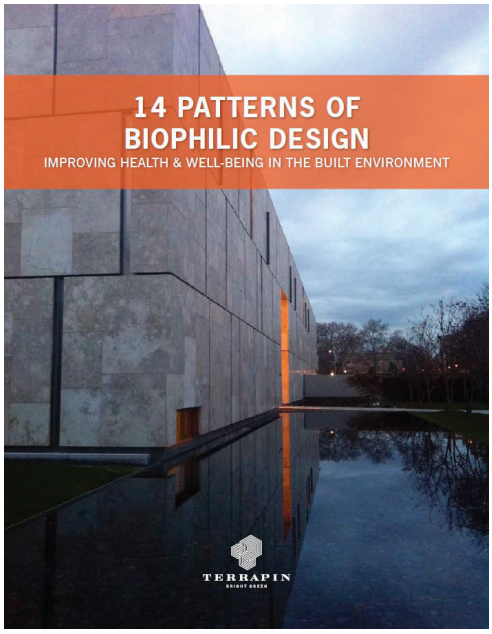
BIOPHILIC DESIGN

"Biophilic design is the practice of connecting people and nature within our built environments and communities."
-Biophilic Design Initiative, LBC

"Biophilic Design Initiative | Living-Future.Org," November 5, 2016. https://living-future.org/biophilic-design/.

LIVING BUILDING CHALLENGE℠

http://leed.usgbc.org/leed.html , https://living-future.org/lbc/ , https://www.wellcertified.com/

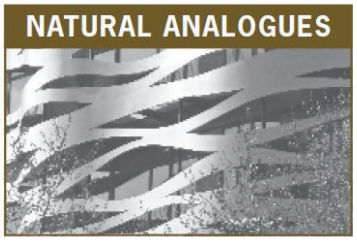


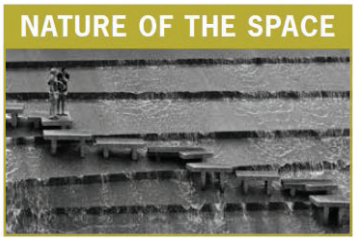
http://www.terrapinbrightgreen.com/reports/14-patterns-of-biophilic-design/

Browning, W.D., Ryan, C.O., Clancy, J.O. (2014). 14 Patterns of Biophilic Design. New York: Terrapin Bright Green llc.

2021 DSPS // MASS TIMBER TASK FORCE

PROFESSOR ALEX TIMMER





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"14 Patterns of Biophilic Design," September 12, 2014. http://www.terrapinbrightgreen.com/reports/14-patterns-of-biophilic-design/.

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1. Visual Connection with Nature
A view to elements of nature, living systems and natural processes.

2. Non-Visual Connection with Nature
Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

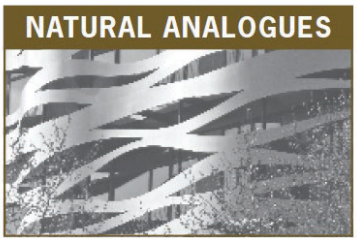
3. Non-Rhythmic Sensory Stimuli
Stochastic and ephemeral connections with nature that may be analyzed statistically but may not be predicted precisely.

4. Thermal & Airflow Variability
Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.

5. Presence of Water
A condition that enhances the experience of a place through the seeing, hearing or touching of water.

6. Dynamic & Diffuse Light
Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.

"14 Patterns of Biophilic Design," September 12, 2014. http://www.terrapinbrightgreen.com/reports/14-patterns-of-biophilic-design/.



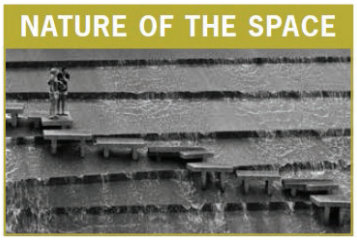
Browning, W.D., Ryan, C.O., Clancy, J.O. (2014). 14 Patterns of Biophilic Design. Page 23, New York: Terrapin Bright Green llc.

8. Biomorphic Forms & Patterns
Symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature.

9. Material Connection with Nature
Material and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.

10. Complexity & Order
Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature.

"14 Patterns of Biophilic Design," September 12, 2014. http://www.terrapinbrightgreen.com/reports/14-patterns-of-biophilic-design/.



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11. Prospect
An unimpeded view over a distance for surveillance and planning.

12. Refuge
A place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.

13. Mystery
The promise of more information achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment.

14. Risk/Peril
An identifiable threat coupled with a reliable safeguard.

"14 Patterns of Biophilic Design," September 12, 2014. http://www.terrapinbrightgreen.com/reports/14-patterns-of-biophilic-design/.

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PROFESSOR ALEX TIMMER

	14 PATTERNS	*	STRESS REDUCTION	COGNITIVE PERFORMANCE	EMOTION, MOOD & PREFERENCE
NATURE IN THE SPACE	Visual Connection with Nature	* * *	**Lowered blood pressure and heart rate** (Brown, Barton & Gladwell, 2013; van den Berg, Hartig, & Staats, 2007; Tsunetsugu & Miyazaki, 2005)	**Improved mental engagement/ attentiveness** (Biederman & Vessel, 2006)	**Positively impacted attitude and overall happiness** (Barton & Pretty, 2010)
	Non-Visual Connection with Nature	* *	**Reduced systolic blood pressure and stress hormones** (Park, Tsunetsugu, Kasetani et al., 2009; Hartig, Evans, Jamner et al., 2003; Orsega-Smith, Mowen, Payne et al., 2004; Ulrich, Simons, Losito et al., 1991)	**Positively impacted on cognitive performance** (Mehta, Zhu & Cheema, 2012; Ljungberg, Neely, & Lundström, 2004)	**Perceived improvements in mental health and tranquility** (Li, Kobayashi, Inagaki et al., 2012; Jahncke, et al., 2011; Tsunetsugu, Park, & Miyazaki, 2010; Kim, Ren, & Fielding, 2007; Stigsdotter & Grahn, 2003)
	Non-Rhythmic Sensory Stimuli	* *	**Positively impacted on heart rate, systolic blood pressure and sympathetic nervous system activity** (Li, 2009; Park et al, 2008; Kahn et al., 2008; Beauchamp, et al., 2003; Ulrich et al., 1991)	**Observed and quantified behavioral measures of attention and exploration** (Windhager et al., 2011)	
	Thermal & Airflow Variability	* *	**Positively impacted comfort, well-being and productivity** (Heerwagen, 2006; Tham & Willem, 2005; Wigö, 2005)	**Positively impacted concentration** (Hartig et al., 2003; Hartig et al., 1991; R. Kaplan & Kaplan, 1989)	**Improved perception of temporal and spatial pleasure (alliesthesia)** (Parkinson, de Dear & Candido, 2012; Zhang, Arens, Huizenga & Han, 2010; Arens, Zhang & Huizenga, 2006; Zhang, 2003; de Dear & Brager, 2002; Heschong, 1979)
	Presence of Water	* *	**Reduced stress, increased feelings of tranquility, lower heart rate and blood pressure** (Alvarsson, Wiens, & Nilsson, 2010; Pheasant, Fisher, Watts et al., 2010; Biederman & Vessel, 2006)	**Improved concentration and memory restoration** (Alvarsson et al., 2010; Biederman & Vessel, 2006) **Enhanced perception and psychological responsiveness** (Alvarsson et al., 2010; Hunter et al., 2010)	**Observed preferences and positive emotional responses** (Windhager, 2011; Barton & Pretty, 2010; White, Smith, Humphryes et al., 2010; Karmanov & Hamel, 2008; Biederman & Vessel, 2006; Heerwagen & Orians, 1993; Ruso & Atzwanger, 2003; Ulrich, 1983)
	Dynamic & Diffuse Light	* *	**Positively impacted circadian system functioning** (Figueiro, Brons, Plitnick et al., 2011; Beckett & Roden, 2009) **Increased visual comfort** (Elyezadi, 2012; Kim & Kim, 2007)		
	Connection with Natural Systems				**Enhanced positive health responses; Shifted perception of environment** (Kellert et al., 2008)

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	14 PATTERNS	*	STRESS REDUCTION	COGNITIVE PERFORMANCE	EMOTION, MOOD & PREFERENCE
NATURAL ANALOGUES	Biomorphic Forms & Patterns	*			**Observed view preference** (Vessel, 2012; Joye, 2007)
	Material Connection with Nature			**Decreased diastolic blood pressure** (Tsunetsugu, Miyazaki & Sato, 2007) **Improved creative performance** (Lichtenfeld et al., 2012)	**Improved comfort** (Tsunetsugu, Miyazaki & Sato 2007)
	Complexity & Order	* *	**Positively impacted perceptual and physiological stress responses** (Salingaros, 2012; Joye, 2007; Taylor, 2006; S. Kaplan, 1988)		**Observed view preference** (Salingaros, 2012; Hägerhäll, Laike, Taylor et al., 2008; Hägerhäll, Purcella, & Taylor, 2004; Taylor, 2006)

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	14 PATTERNS	*	STRESS REDUCTION	COGNITIVE PERFORMANCE	EMOTION, MOOD & PREFERENCE
NATURE OF THE SPACE	Prospect	* * *	**Reduced stress** (Grahn & Stigsdotter, 2010)	**Reduced boredom, irritation, fatigue** (Clearwater & Coss, 1991)	**Improved comfort and perceived safety** (Herzog & Bryce, 2007; Wang & Taylor, 2006; Petherick, 2000)
	Refuge	* * *		**Improved concentration, attention and perception of safety** (Grahn & Stigsdotter, 2010; Wang & Taylor, 2006; Wang & Taylor, 2006; Petherick, 2000; Ulrich et al., 1993)	
	Mystery	* *			**Induced strong pleasure response** (Biederman, 2011; Salimpoor, Benovoy, Larcher et al., 2011; Ikemi, 2005; Blood & Zatorre, 2001)
	Risk/Peril	*			**Resulted in strong dopamine or pleasure responses** (Kohno et al., 2013; Wang & Tsien, 2011; Zald et al., 2008)

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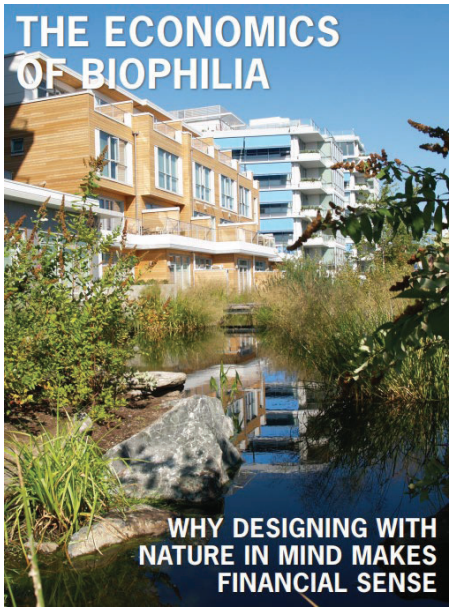


Lower Illness and Absenteeism

Higher Staff Retention

Greater Job Performance (mental stress/fatigue)

Faster Healing Rates

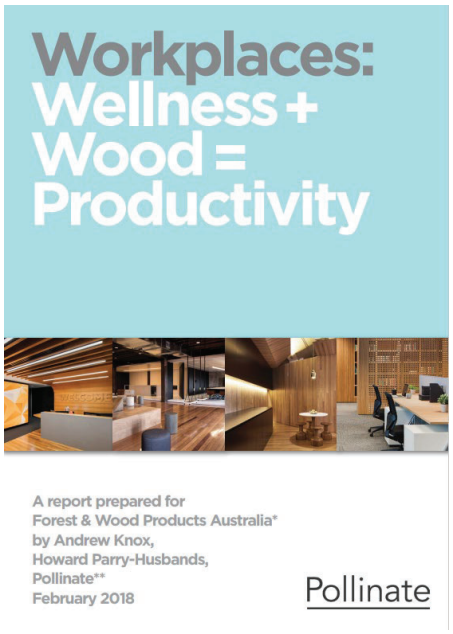
Higher Classroom Learning Rates

Higher Retail Sales

Lower Violence Statistics

http://www.terrapinbrightgreen.com/wp-content/uploads/2012/06/The-Economics-of-Biophilia_Terrapin-Bright-Green-2012.pdf

"The Economics of Biophilia," June 12, 2012. http://clients.edmullen.com/terrapin/.



Office design: productivity can be increased by 8% and rates of well-being increased by 13%

Education spaces: increased rates of learning, improved test results, concentration levels and attendance, reduced impacts of ADHD

Healthcare spaces: post-operative rates of recovery reduced by 8.5%, reduced pain medication by 22%

Retail: the presence of vegetation & landscaping has been found to increase average rental rates on retail spaces with customers indicating they were willing to pay 8-12% more for goods and services.

Homes: 7-8 % less crime attributed to areas with access to nature and can command an increase of 4-5% in property price

https://makeitwood.org/documents/doc-1624-pollinate-health-report---february-2018.pdf

WCMS, Webboy net. "Workplaces: Wellness + Wood = Productivity." Make it Wood. Make it Wood. Australia. https://makeitwood.org/healthandwellbeing/wellness-study.cfm?

1. Visual Connection with Nature
A view to elements of nature, living systems and natural processes.

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Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

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1. Visual Connection with Nature
A view to elements of nature, living systems and natural processes.

Live Oak Banking Company

Architect LS3P Associates
Civil Engineer Norris & Tunstall Engineers
General Contractor Clancy & Theys Construction Company
Structural Engineer Woods Engineering
Mechanical Engineer CBHF Engineers
Plumbing Engineer CBHF Engineers
Electrical Engineer McFadyen Engineers
Landscape Architect LACC International

https://1r4scx402tmr26fqa93wk6an-wpengine.netdna-ssl.com/wp-content/uploads/2019/08/Think-Wood-ADV-Workplace-Live-Oak-Bank.pdf

Think Wood. "Live Oak Bank Headquarters. https://www.thinkwood.com/projects/live-oak-bank-headquarters.

2. Non-Visual Connection with Nature

Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

Vashon Island High School

Architect Integrus Architecture

http://www.integrusarch.com/project/vashon-island-high-school-vashon-island-school-district/

Integrus Architecture. "Integrus Architecture – Vashon Island High School." https://www.integrusarch.com/project/vashon-island-high-school-vashon-island-school-district/.

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PROFESSOR ALEX TIMMER

2. Non-Visual Connection with Nature

Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

Vashon Island High School

Architect Integrus Architecture

https://continuingeducation.bnpmedia.com/courses/multi-aia/designing-modern-wood-schools/5/

Integrus Architecture. "Integrus Architecture – Vashon Island High School." https://www.integrusarch.com/project/vashon-island-high-school-vashon-island-school-district/.

8. Biomorphic Forms & Patterns

Symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature.

10 Grenell
LVMH Media Division

Architect Ora Ito

http://inspirationist.net/a-parametric-sculpture-with-a-biomorphic-structure/

"10 Grenelle | Ora-Ïto." https://www.ora-ito.com/studio/projects/10-grenelle-2/.

9. Material Connection with Nature

Material and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.

Butler Square

Architect Harry W. Jones

https://www.butlersquare.com/sustainability

https://www.butlersquare.com/history

WOOD AND INDOOR ENVIRONMENT

Think Wood

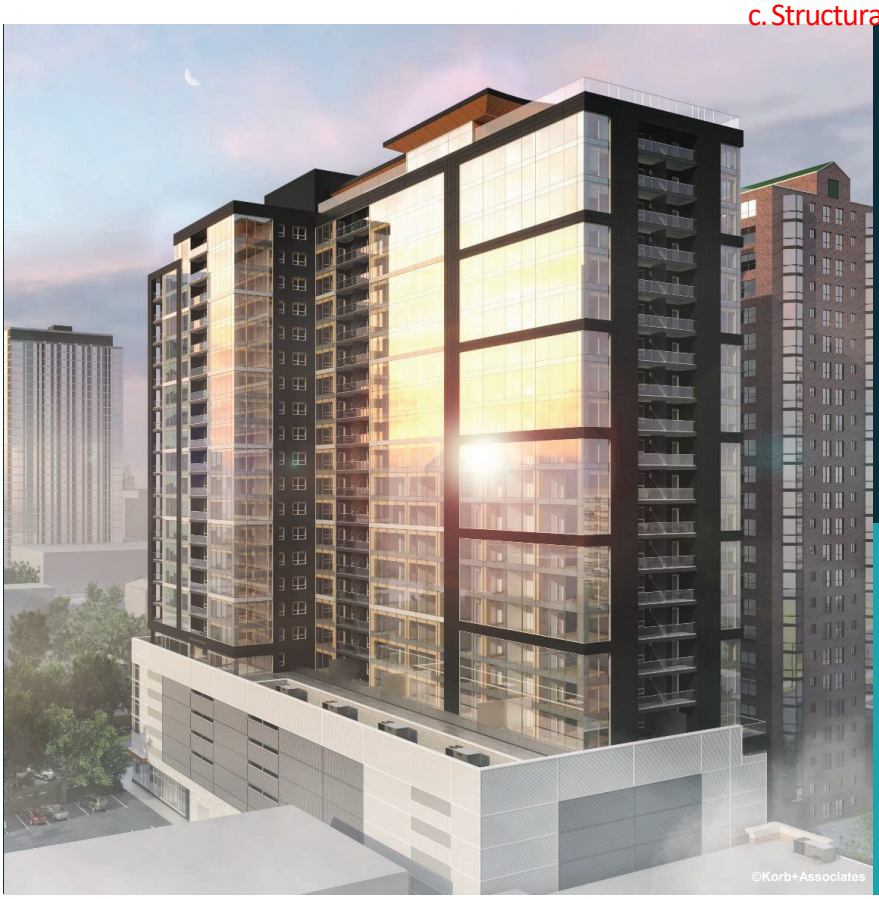
https://1r4scx402tmr26fqa93wk6an-wpengine.netdna-ssl.com/wp-content/uploads/2020/08/Think-Wood-CEU-Wood-and-Indoor-Environment.pdf

https://www.thinkwood.com/education/wood-indoor-environment

OCTOBER 5TH, 2021

BIOPHILIC DESIGN

Alex Timmer, LFA,
LEED Green Associate
Assistant Professor
UWM SARUP



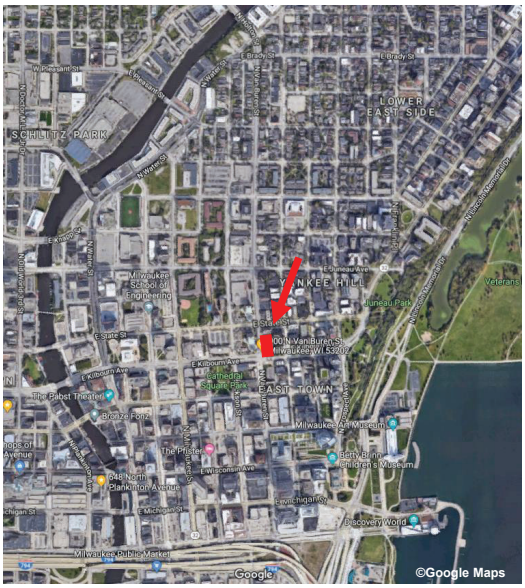
OCTOBER 05, 2021

Mass Timber Approvals

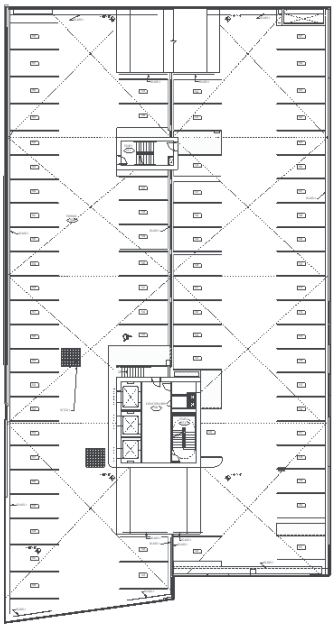
John Peronto
Senior Principal

Thornton Tomasetti

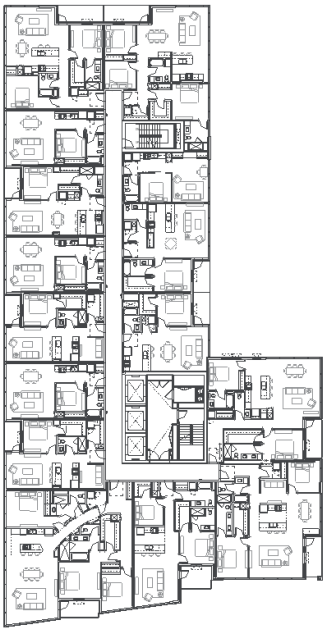
ASCENT



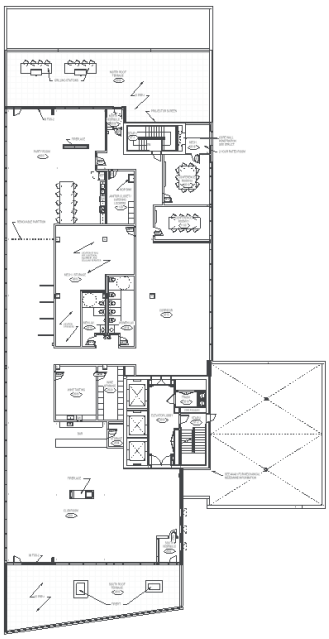
ASCENT



TYPICAL PARKING LEVEL



TYPICAL RESIDENTIAL LEVEL

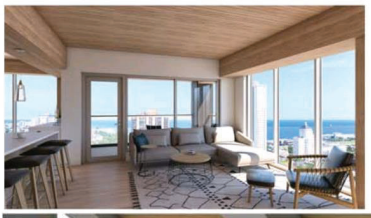


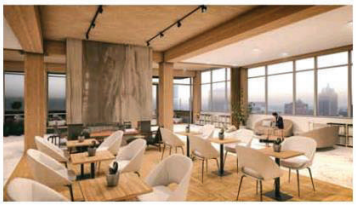
AMENITIES LEVEL (L25)

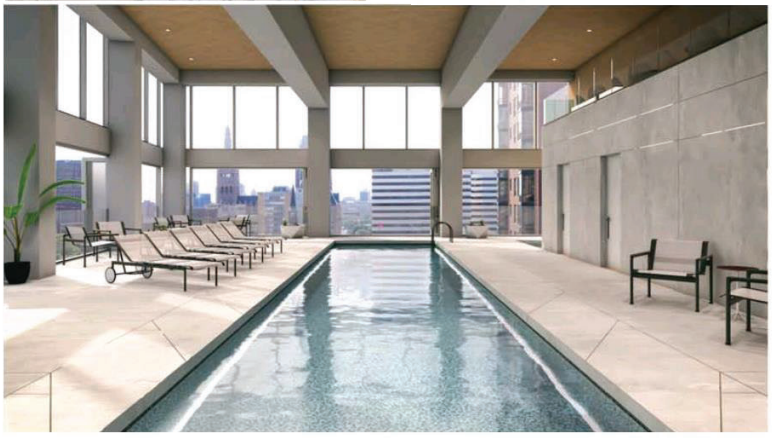
Thornton Tomasetti

Plans by ©Korb+Associates

ASCENT







Thornton Tomasetti

All Images by ©Korb+Associates

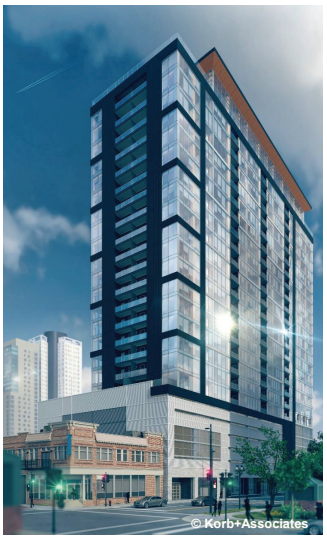
ASCENT

The challenge

Dates indicate
approved permit year

12 stories

25 stories



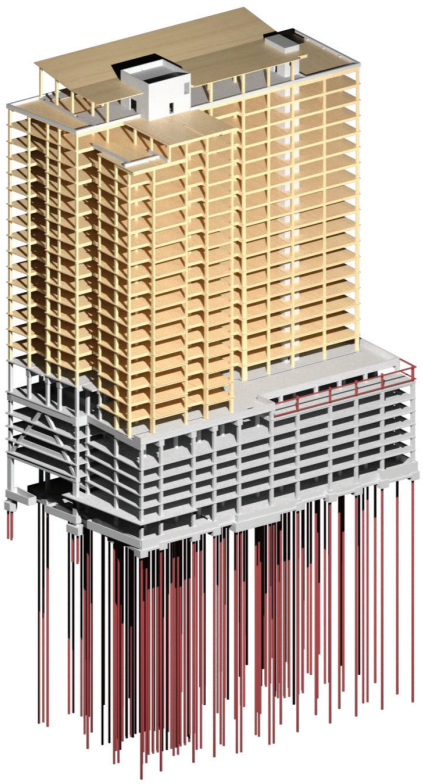
Framework (2017)
Portland, OR

Ascent (2020)
Milwaukee, WI

CODE

[A] 104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability and safety. Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons why the alternative was not *approved*.

IBC 2015

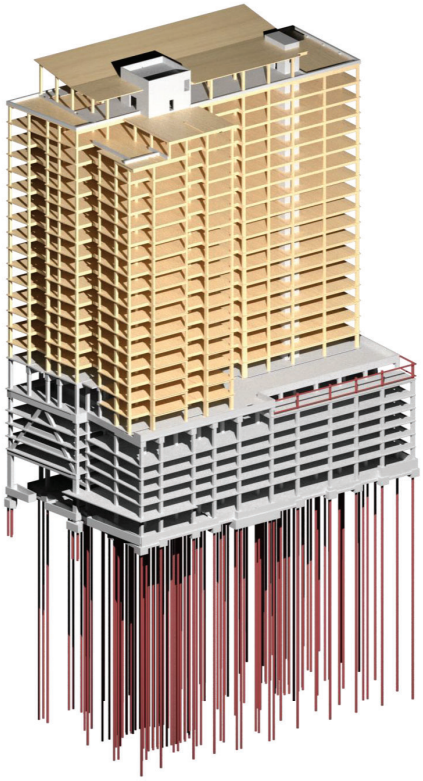


CODE

[A] 104.11.1 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

[A] 104.11.2 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved agency*. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

IBC 2015



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ASCENT

Variances

TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A	B	A	B	HT	A	B
Primary structural frame[f] (see Section 202)	3[a]	2[a]	1	0	1	0	HT	1	0
Bearing walls Exterior[e, f] Interior	3 3[a]	2 2[a]	1 1	0 0	2 1	2 0	2 1/HT	1 1	0 0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	See Section 602.4.6	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	$1\frac{1}{2}$[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	HT	1[b,c]	0

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.

c. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).

f. Not less than the fire-resistance rating as referenced in Section 704.10.

IBC 2015

Chapter SPS 361
ADMINISTRATION AND ENFORCEMENT

Subchapter I — Scope and Application

(6) Alternatives. Nothing in chs. SPS 361 to 366 is intended to prohibit or discourage the design and utilization of new building products, systems, components, or alternate practices, provided written approval from the department is obtained first.
Note: Chapter SPS 361, subch. VI contains requirements for approval of building products and alternate standards.

Subchapter VI — Product and Standard Review and Approval

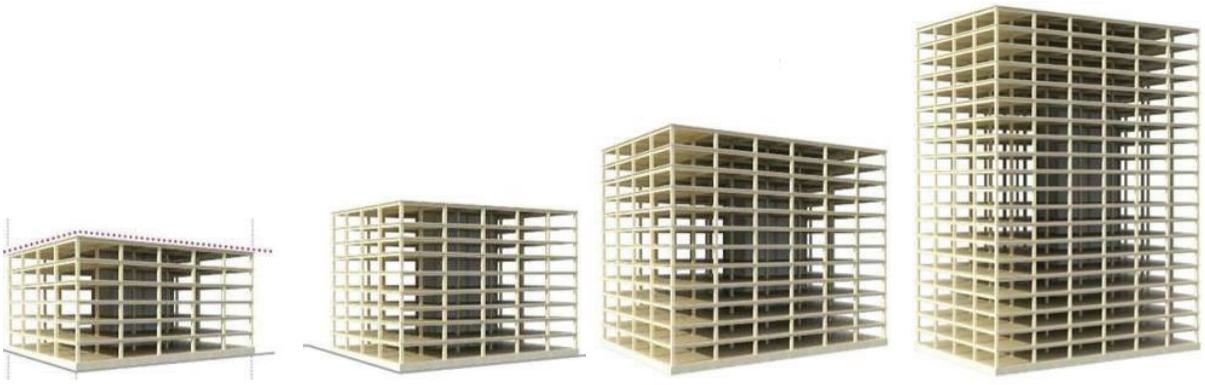
SPS 361.50 Building product approvals.
(1) Voluntary approval.
(a) Materials, equipment, and products regulated under chs. SPS 361 to 366 may receive a written approval from the department indicating code compliance.
(b)
1. Approval of materials, equipment, and products shall be based on sufficient data, tests, and other evidence that prove the material, equipment, or product is in compliance with the standards specified in chs. SPS 361 to 366.
2. Tests, compilation of data, and calculations shall be conducted by a qualified independent third party.
(2) Alternate approval.
(a) Materials, equipment, and products that meet the intent of chs. SPS 361 to 366 and which are not approved under sub. (1) shall be permitted if approved in writing by the department.
(b)
1. Approval of materials, equipment, and products shall be based on sufficient data, tests, and other evidence that prove the material, equipment, or product meets the intent of the standards specified in chs. SPS 361 to 366.
2. Tests, compilation of data, and calculations shall be conducted by a qualified independent third party.

WISCONSIN COMMERCIAL BUILDING CODE

Thornton Tomasetti

CODE

IBC 2021



- 6 Stories
- Fully Exposed

IBC 2015

TYPE IV-C

- 9 Stories
- Fully Exposed

TYPE IV-B

- 12 Stories
- Limited exposure (20% ceilings, 40% walls)

TYPE IV-A

- 18 Stories
- Fully Concealed

IBC 2021 (approved)

?

FUTURE CODES ?

Images From American Wood Council (https://awc.org/tallmasstimber)

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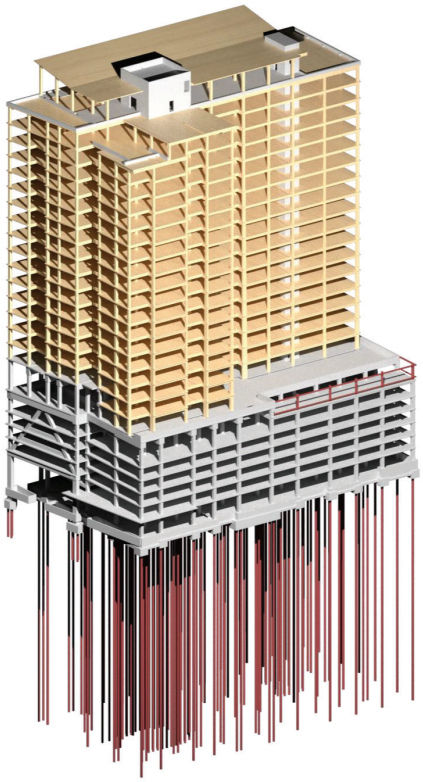
CODE

[A] 104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability and safety. Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons why the alternative was not *approved*.

IBC 2015



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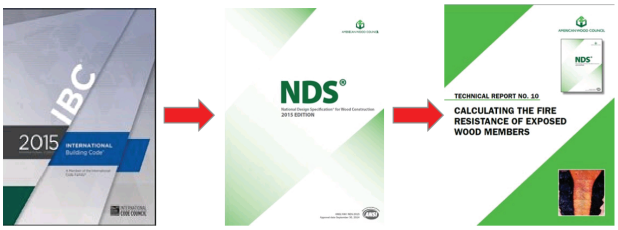
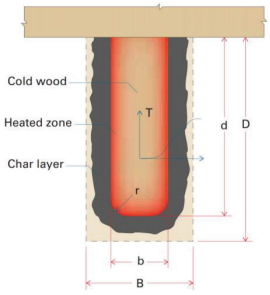
FIRE

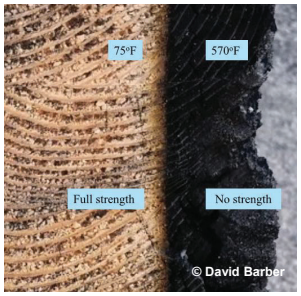
Determining Fire Ratings:

- Char
  - Calculations (Char Method)
  - Full Scale (Global) Testing
  - Element (Member) Testing
  - Connection Testing
- Product Certificates
- Concealment
- Intumescent Paint (connections only)



IBC NDS TR-10





Thornton Tomasetti

CLT

SOUTHWEST RESEARCH INSTITUTE

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION

FIRE PERFORMANCE EVALUATION OF AN UNRESTRAINED LOAD-BEARING FLOOR ASSEMBLY TESTED IN ACCORDANCE WITH ASTM E119-19, *STANDARD TEST METHODS FOR FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS*

FINAL REPORT
Consisting of 20 Pages

SwRI® Project No. 01.25700.01.002
Test Date: March 11, 2020
Report Date: April 24, 2020

Prepared for:

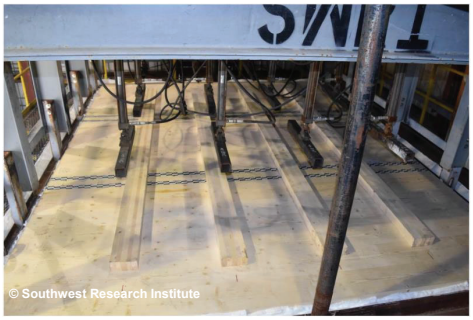
KLH US Holding Corp.
240 N. Broadway, Suite 308
Portland, OR 97227

KLH Massivholz GmbH
Gewerbestrasse 4
Teufenbach-Katsch 8842
Austria

KF Submitted by:
Steven Uribe
Digitally signed by Steven Uribe
Date: 2020.04.24 12:43:10 -05'00'
Bill Bendele
Principal Engineering Technologist
Fire Resistance Section

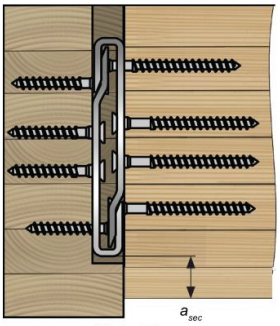
Approved by:
Karen C. Carpenter
Digitally signed by Karen C. Carpenter
Date: 2020.04.24 13:19:59 -05'00'
Karen C. Carpenter, M.S., P.E.
Assistant Director
Fire Technology Department

Benefiting government, industry and the public through innovative science and technology

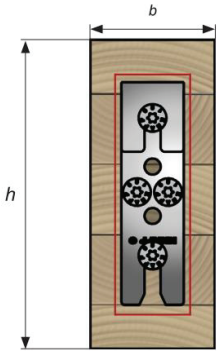


Thornton Tomasetti

CONNECTIONS



Side View



Front View
Secondary Member

Table 24.1 Suggested Cross Sections

Connector	Fire Resistance Rating					
	1 hour			2 hours		
	Min. Beam Width (b) [in]	Min. Beam Height (h) [in]	a_{sec} [in]	Min. Beam Width (b) [in]	Min. Beam Height (h) [in]	a_{sec} [in]
GIGANT 120x40	4-1/2"	9-1/2"	2"	-	-	-
	5-1/2"	7-3/4"	1-1/2"			
GIGANT 150x40	4-1/2"	9-1/2"	2"	8-3/4"	11-7/8"	2-3/4"
	5-1/2"	8-1/4"	1-1/2"			
GIGANT 180x40	4-1/2"	9-7/8"	2"	8-3/4"	11-7/8"	2-3/4"
	5-1/2"	9-3/8"	1-1/2"			

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CONNECTIONS

SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA ROAD • P.O. DRAWER 28510 • SAN ANTONIO, TEXAS, USA • (210) 684-5111 • WWW.SWRI.ORG

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION

FIRE TECHNOLOGY DEPARTMENT
WWW.FIRE.SWRI.ORG
FAX (210) 522-3377

FIRE PERFORMANCE EVALUATION OF A LOAD BEARING CLT PANEL FASTENED TO A GLULAM BEAM TO COLUMN CONNECTION TESTED IN GENERAL ACCORDANCE WITH ASTM E119-16a, *STANDARD TEST METHODS FOR FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS*

FINAL REPORT
Consisting of 29 Pages

SwRI® Project No. 01.22078.02.002
Test Date: July 27, 2016
Report Date: March 10, 2017

Prepared for:

The Framework Project, LLC
413 SW 13th Avenue, Suite #300
Portland, OR 97205

Submitted by:
Bill B. Bendele
Principal Engineering Technologist
Fire Resistance Section

Approved by:
Karen C. Carpenter, M.S., P.E.
Manager
Fire Resistance Section

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ASCENT
VARIANCES

Variance: Fire Test

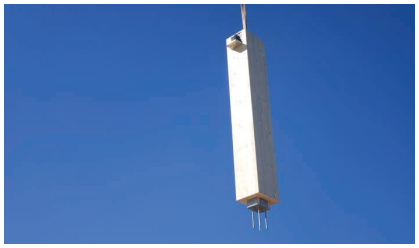
The variance requested is: Per NDS, the maximum calculated fire resistance is 2 hours. To match the fire rating provided by Type I-A construction, a 3-hour column rating is required.

The intent of the code section petitioned is: to establish parameters by which calculations and/or testing of materials can determine equivalencies.

FIRE
3 HOURS TEST

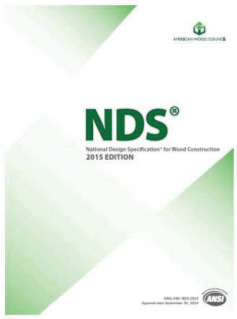
FIRE

BEAMS



COLUMNS

CLT




SOUTHWEST RESEARCH INSTITUTE

FINAL REPORT

Thornton Tomasetti

ASCENT
VARIANCES

Variance: Height & Number of Stories Limit

The variance requested is: to construct a building of Type IV construction, at 25 stories, with a height of 283’

The intent of the code section petitioned is: to provide a living environment that protects the health, safety and welfare of the building’s occupants.

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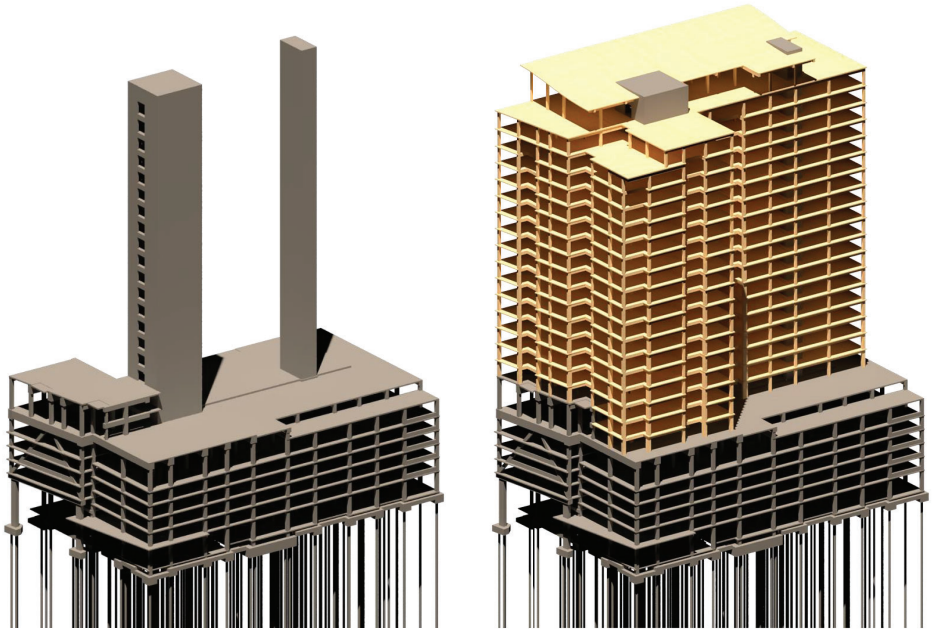
ASCENT



- Concrete cores
- Automatic sprinkler system
- Dual Water Supply to Fire Pump
- Standpipe in Each Stair
- Smoke detection
- FD Vehicle Access on Two Roads
- Electronically Supervised Valves
- Fire Command Center
- Fire Dept Communications Support
- Voice Communications
- Stair Pressurization

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ASCENT

The timeline

01 March 2018: Directive from New Land Enterprises to pursue MTF Tower

03 May 2018: Presentation to DNS Commissioner and Alderman

24 July 2018: Introduction to DNS Staff

21 October 2018: Project unveiled at CTBUH World Conference, Dubai

11 November 2018: Presentation to MFD leadership

22 July 2019: First working meeting with DNS Staff

07 November 2019: Second working meeting with DNS Staff

17 December 2019: Witnessed three hour fire test (4^{th} of 9)

13 February 2020: Variance review meeting with DNS Staff

21 February 2020: Four variance petitions filed with DNS

21 February 2020: Footings and Foundation Permit applied for

7 May 2020: Final Variance Conference

August 2020: Variances Approved

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PERMITTING

Milwaukee's 25-Story Ascent Stacks Up as Tall Timber Role Model

Fire officials accept the unprecedented use of the sustainable material in a 284-ft-tall wood and concrete frame

ENR
Engineering News-Record

Approvals took two years for Ascent, an unprecedented 284-ft-tall wood and concrete tower under way in Milwaukee since September.

Montage by Scott Hilling for ENR—rendering by Thornton Tomasetti, photo courtesy C.D. Smith

https://www.enr.com/articles/50905-milwaukees-25-story-ascent-stacks-up-as-tall-timber-role-model

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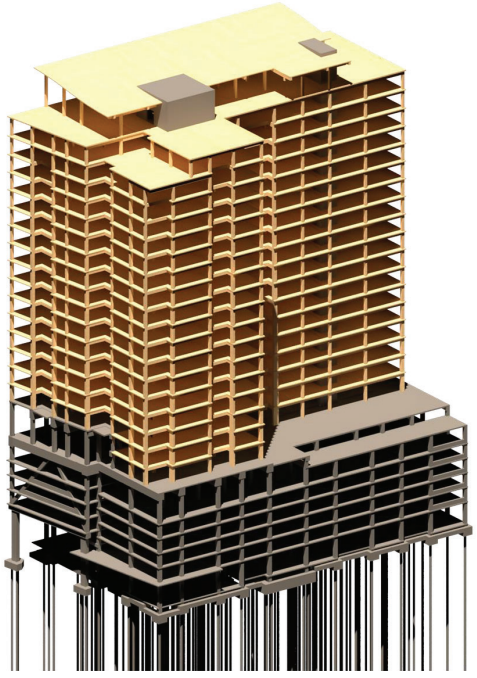
ASCENT



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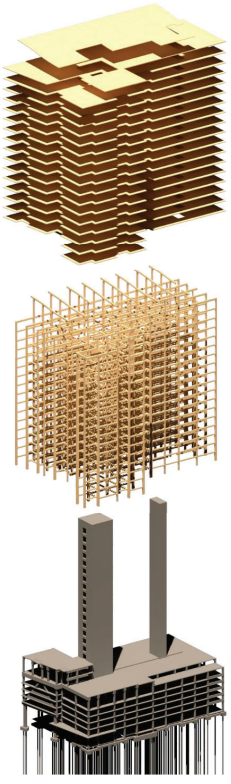


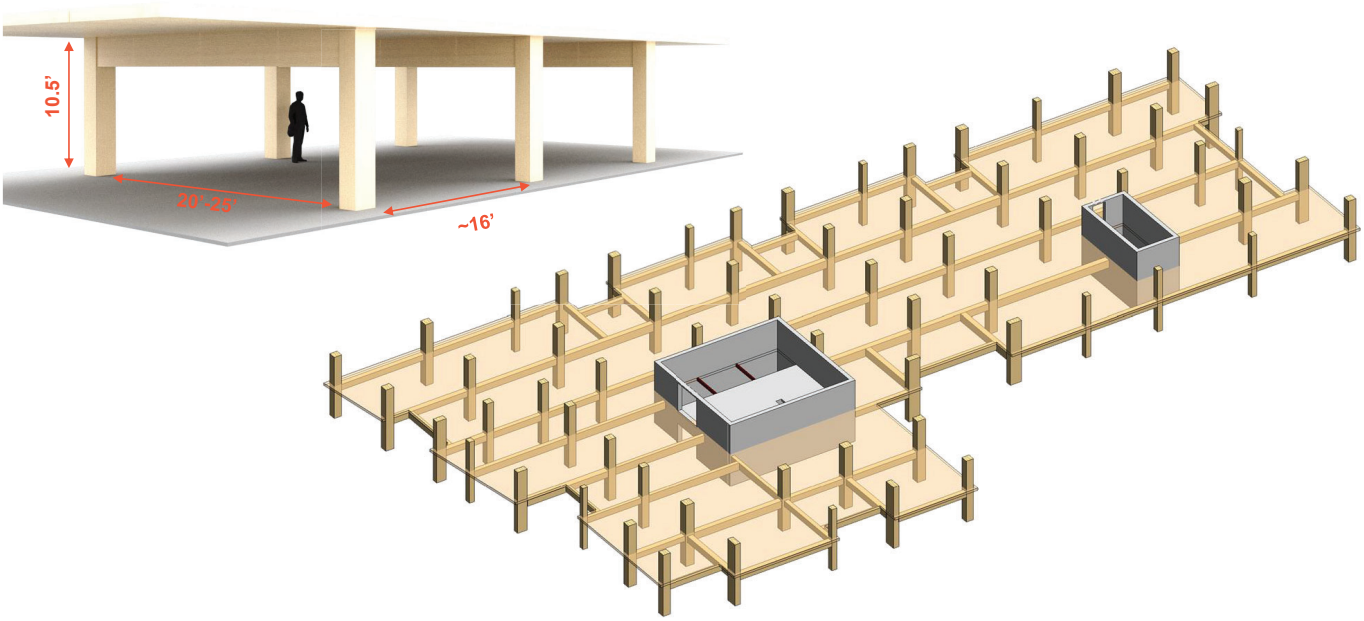
SLABS (CLT)

BEAMS + COLUMNS (GLULAM)

PODIUM (CONCRETE)

ASCENT

TYPICAL LEVEL



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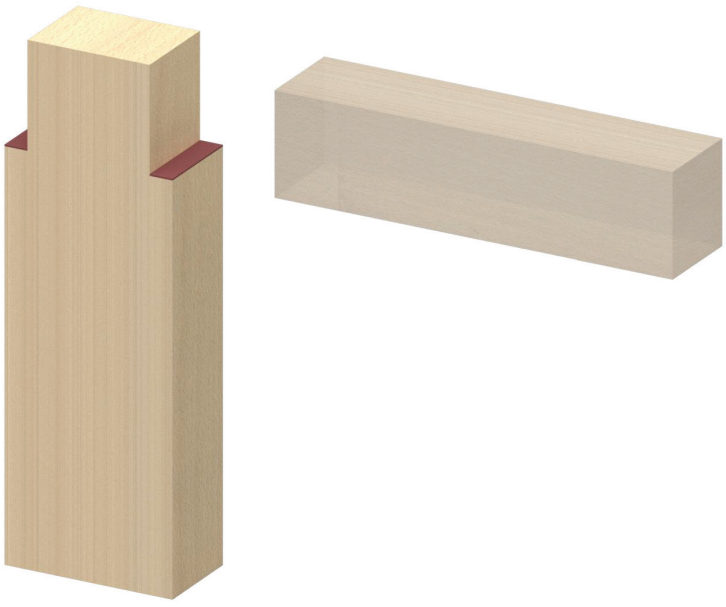
CONNECTIONS



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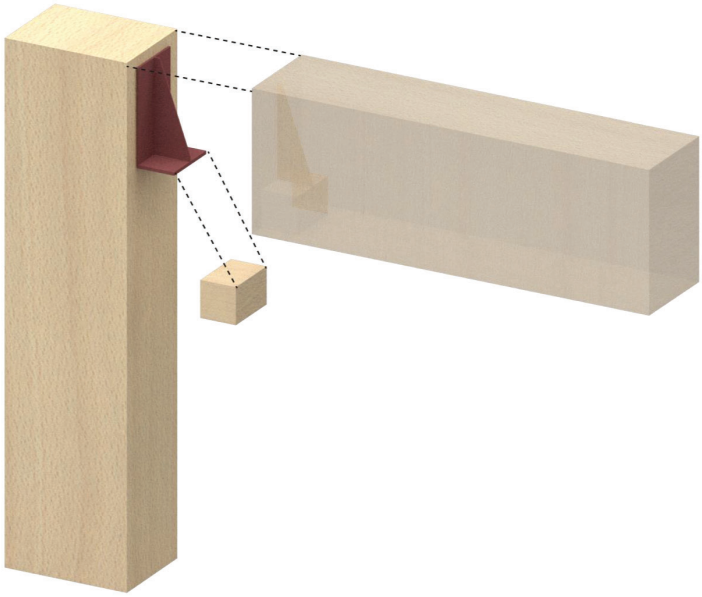
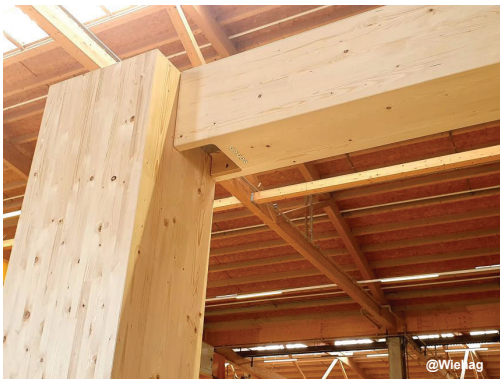
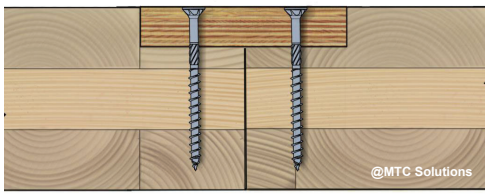
CONNECTIONS





CONNECTIONS



QUESTIONS?

Contact info

jperonto@ThorntonTomasetti.com

1

Code Path?

- 2015 IBC 104.11 Alternative materials, design and methods of construction and equipment.
- OR
- Call it what it is, a 25 story Type IV building, and use adopted code sections as a departure point. SPS 361.50(2)

No published code parameters when process started

City of Milwaukee DEPARTMENT OF NEIGHBORHOOD SERVICES

2

Code Sections Petitioned

- Section 504, Building Height and Number of Stories
- Section 602.4, Type IV Const. (concealed spaces)
- Section 722, Calculated Fire Resistance

City of Milwaukee | DEPARTMENT OF NEIGHBORHOOD SERVICES

Section 722, Calculated Fire Resistance

- Per NDS max. calculated fire resistance rating is 2hr.
- Proposed column performance equivalency of Type IA construction with 3hr column fire test and no reduction in structural capacity.

City of Milwaukee | DEPARTMENT OF NEIGHBORHOOD SERVICES

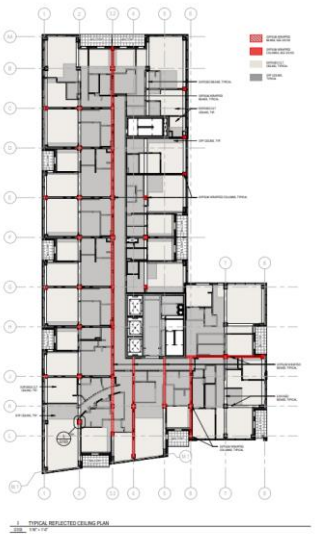
Section 504, Building Height and Stories

- Type IV construction – 85’ and 5 stories(R)
- Proposed – 283’ and 25 stories → Type IA

City of Milwaukee | DEPARTMENT OF NEIGHBORHOOD SERVICES

Comfort Factors

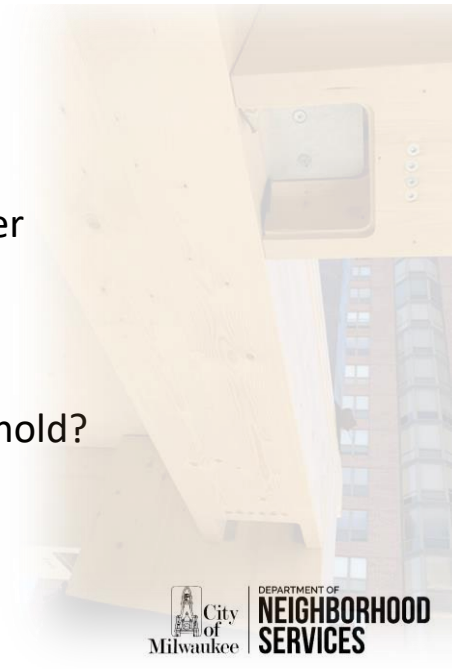
- MFD support
- Limitation of wood exposure adjacent
- to and within egress paths
- Corridor and unit separation ratings
- 420’ provisions
- Special inspections



City of Milwaukee | DEPARTMENT OF NEIGHBORHOOD SERVICES

Questions/Concerns

- Critical field execution – details matter
- Performance → Prescriptive?
- Where do we stop/What is our threshold?



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