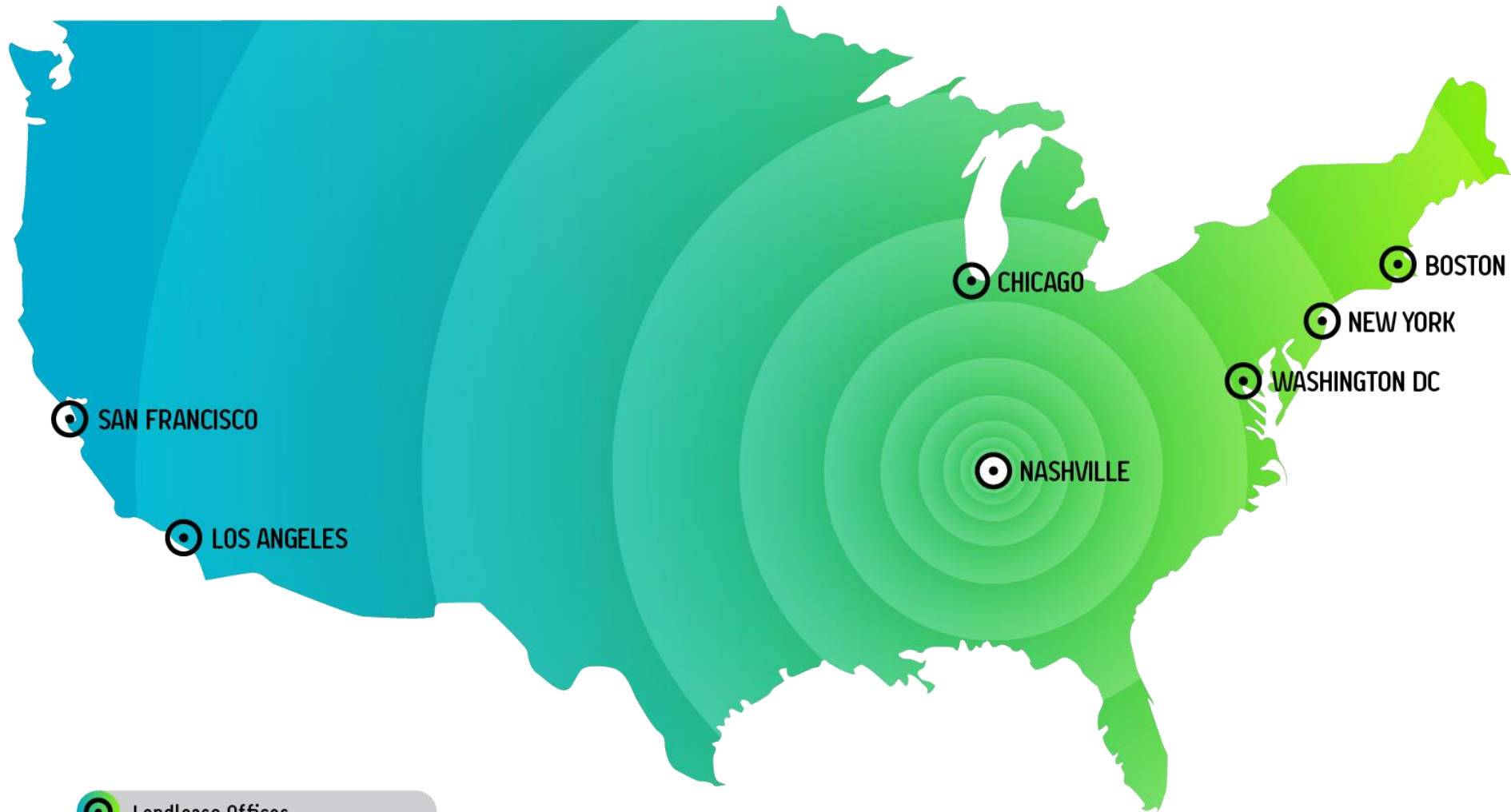


# Mass Timber – Resilience and Relevance

Jeff Morrow –  
Environmental and Energy Study Institute –  
Washington  
October 23, 2018

**lendlease**





-  Lendlease Offices
-  Timber & Innovations Group



# Lendlease CLT Projects Around the World



## Forte' – Melbourne







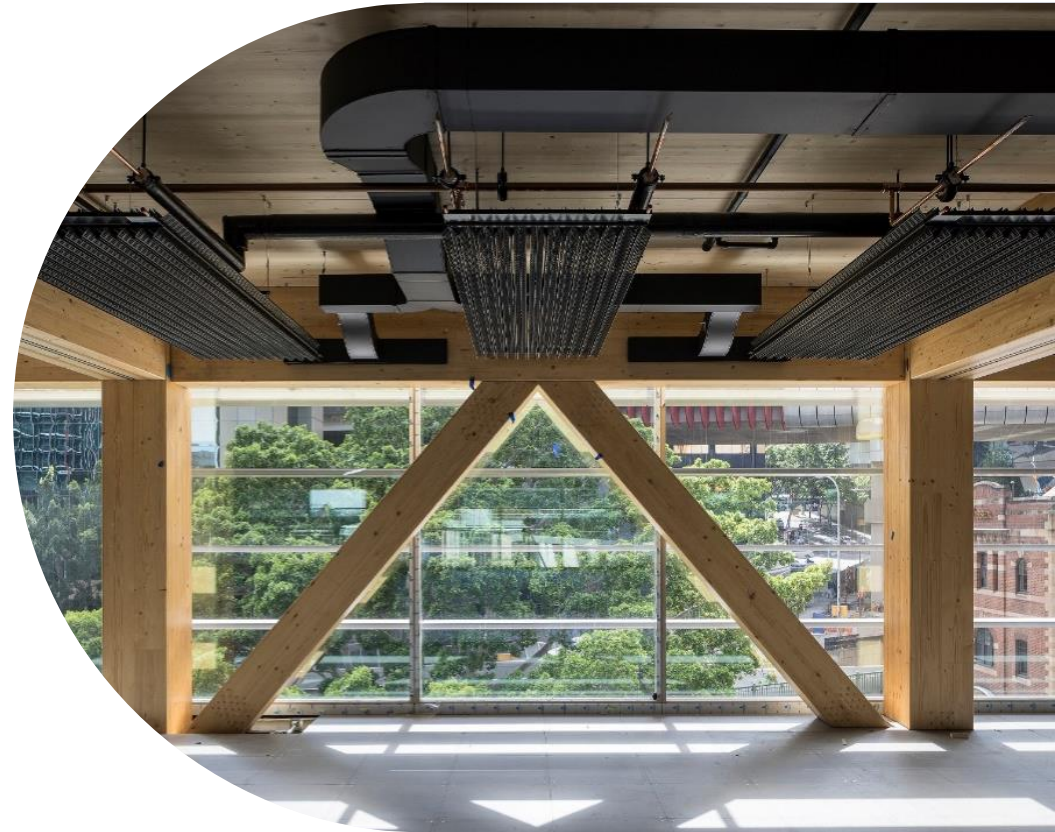


## Library at the Dock – Melbourne





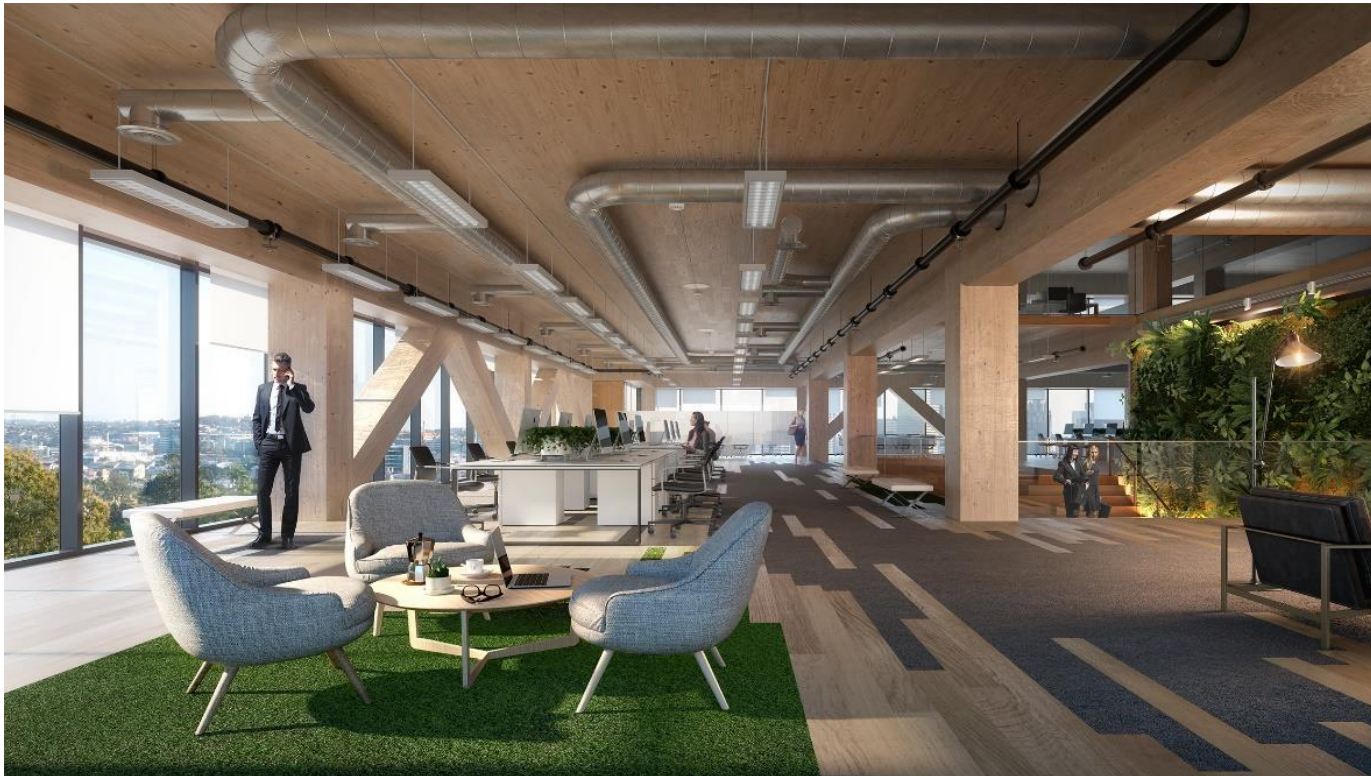
## International House – Sydney





## 25 King – Brisbane

- 10 Stories (9 office, 1 retail)
- November 2018 Completion



















# **THE TIMBERYARD UK**

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**(Develop to Rent)**

[www.homesbylendlease.co.uk/deptford](http://www.homesbylendlease.co.uk/deptford)



## Google HQ – UK

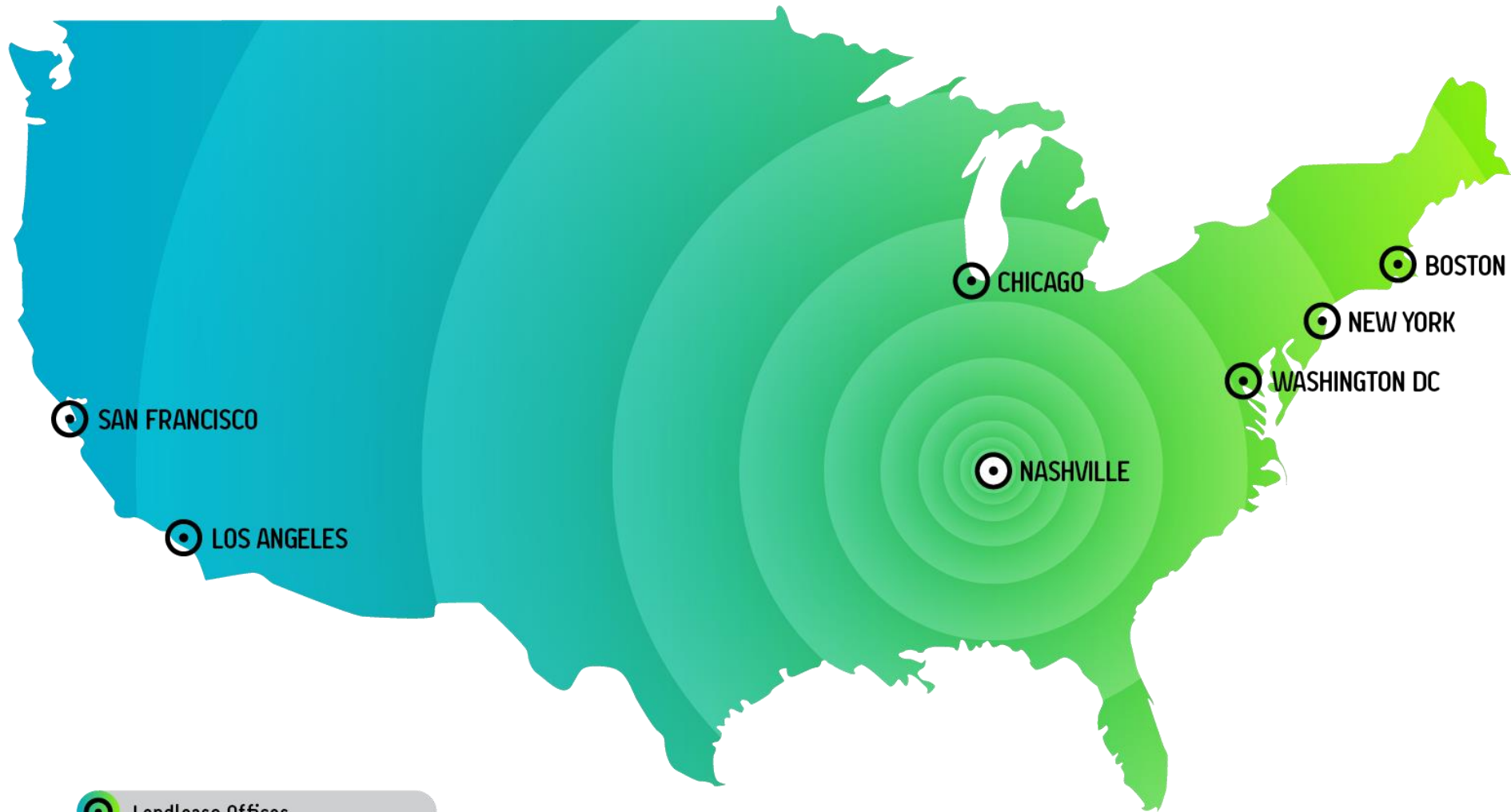
- 11 Floors Above Ground
- 2 story Basement



- 870,000 sq. ft. Gross Exterior Area (GEA)
- 651,000 sq. ft. Net Interior Area (NIA)

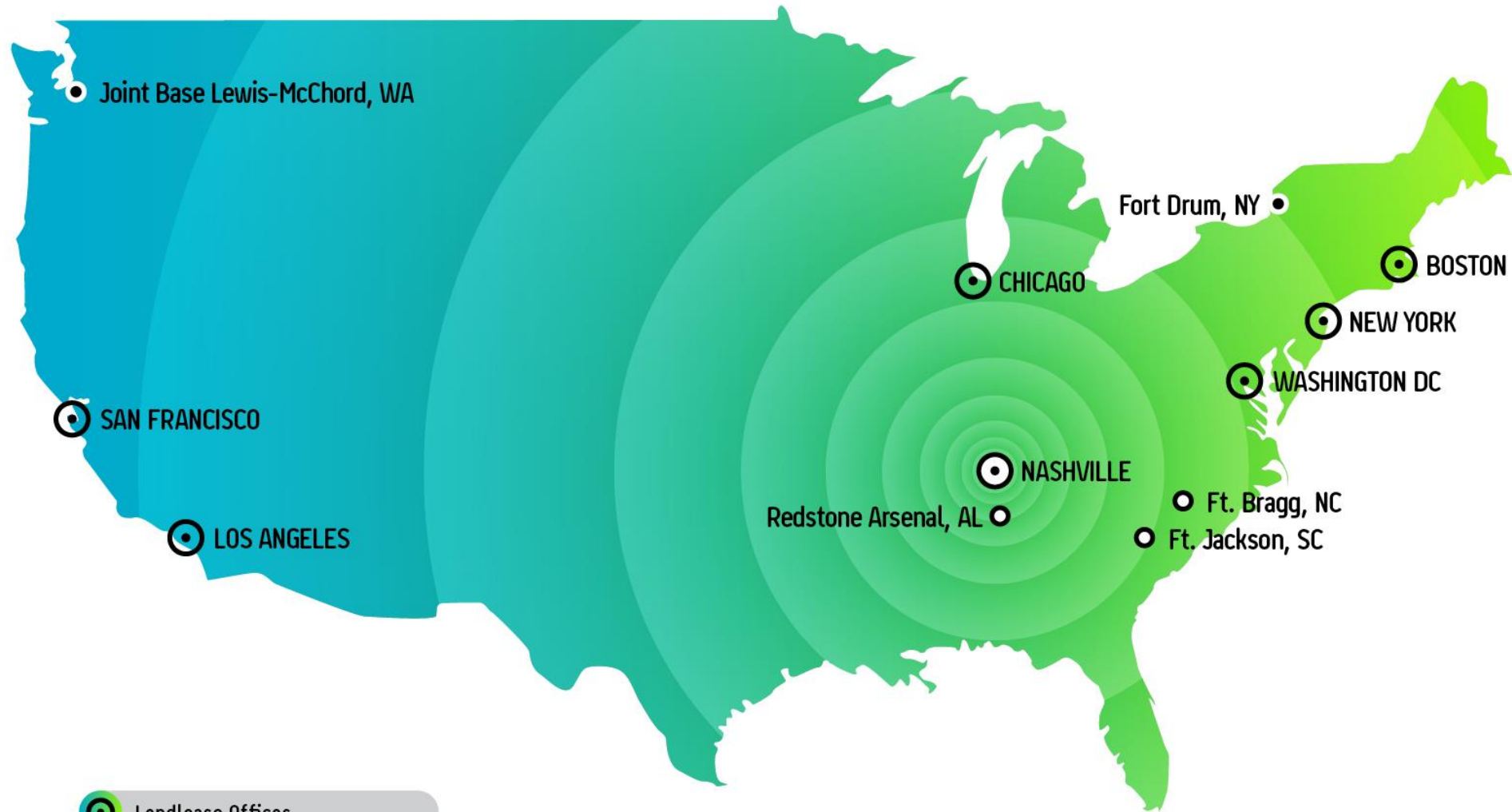
# LL in the Americas








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-  Lendlease Offices
-  Timber & Innovations Group
-  PAL CLT projects









# Future Army CLT Hotels

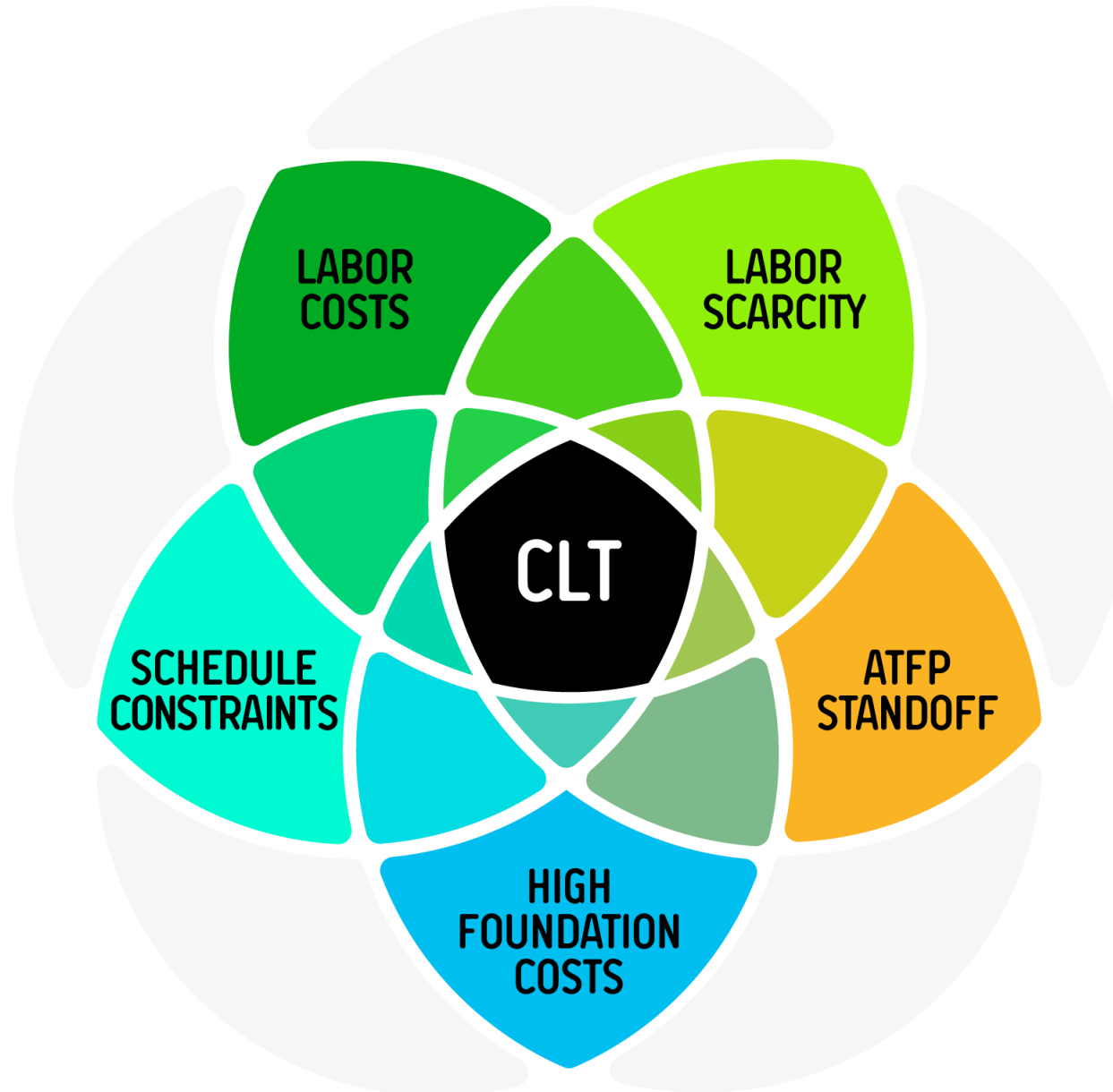
Location	# of floors	Room Count	Construction Start
Ft. Drum, NY	4 Story	99 rooms	Fall 2017 <i>(completed)</i>
Joint Base Lewis-McChord, WA	5 Story	123 rooms	October 2018
Ft. Jackson, SC	2 – 5 Story Buildings	328 rooms	Spring 2019
Ft. Bragg, NC	2 – 6 Story Buildings	488 rooms	Spring 2020





## The Sweet Spot

CLT should be strongly considered when a project experiences 3 of these 5 conditions.













# Benefits

## The Case for CLT / Modular Construction

PAL PORTFOLIO	TYPICAL NEW PAL HOTEL (ACTUAL*)	REDSTONE ARSENAL (ACTUAL)	DIFFERENCE
Gross SF	54,891	62,688	+14%
Average # of Employees	18 (Peak 26)	10 (Peak 11)	-43%
Structural Duration (Days)	123	78	-37%
Structural Man Hours	14,735	8,203	-44%
Structural Production Rate/Day (SF)	460 SF/day	803 SF/day	+75%
Overall Schedule	15 months	12 months	-20%



\* PAL New Build Hotel Historical Average





## Cross Laminated Timber in the US

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Positively disrupting  
traditional construction  
of mid rise structures







What's Next



DIGGING & RIGGING INC.

OVERSIZE LOAD

62 62





















## Tall Wood



Courtesy of LEVER Architecture

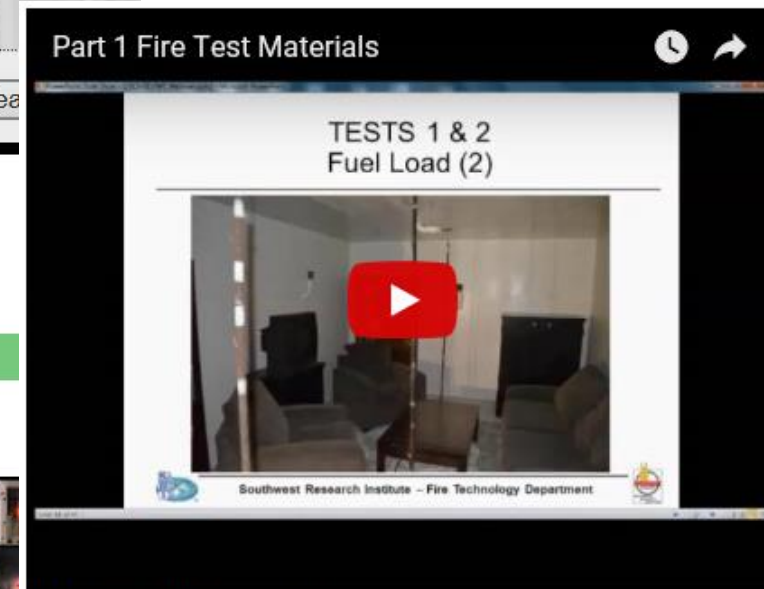
### Mass Timber Fire Testing

#### ATF Fire Tests

A team of fire experts from the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) working alongside scientists from the U.S. Forest Products Laboratory put identically furnished, multistory, one-bedroom apartments constructed of exposed, partially exposed, and unexposed (protected) five-ply cross-laminated timber (CLT) through a series of rigorously monitored tests. The purpose of the tests is to provide data that will help inform any recommendations the ICC Ad Hoc Committee on Tall Wood Buildings (TWB) propose for the 2021 *International Building Code*. A series of five tests were conducted. Each test was designed to replicate real world conditions across fire scenarios. Identical, furnished, one bedroom apartments were constructed in a multistory building. The door between the living and sleeping areas was left open in both apartments. [A three minute video capturing the highlights of each test is in this playlist.](#)



Full-Scale Fire Tests of a Two-Story Cross-Laminated Timber Structure



Part 1 - Fire Test Materials – 01:24 minutes



Part 2 - Fire Test – 03:08 minutes

Test Types	Testing Agencies
Fire Resistive Component Testing – E119 Fire	FP Innovations / NRC / Southwest Research Institute/ Independent Labs
Full Tested Assemblies – E119 Fire	Underwriters Laboratory
Full Scale Encased Compartment Comparison Testing	NRC – CNRC
System Fire Resistance Testing – US Demonstration Project	ATF & FPL
Penetration Testing	FP Innovations
Full-scale Mass Timber Shaft Demonstration Fire	NRC- CNRC / FP Innovations
Flame Spread Testing – ASTM E84	FP Innovations / Independent Labs



Type of Construction	Height	# of Stories	Exposed Mass Timber	Sprinklers	Primary Frame FRR	Floor FRR	Stair Tower	Concealed Spaces
IV-HT <i>(Existing)</i>	85'	4-6	Fully Exposed	Yes	NR	HT	Mass Timber	Not Permitted
IV– C <i>Proposed</i>	85'	4-9	Fully Exposed	Yes	2 hours	2 hours	Mass Timber	Permitted
IV-B <i>Proposed</i>	180'	6-12	Partially Exposed	Yes	2 hours	2 hours	Mass Timber	Permitted
IV-A <i>Proposed</i>	270'	9-18	Fully Protected	Yes	3 hours	2 hours	Noncombustible	Permitted

## For Detailed Information

[www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/](http://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/)

[www.builtallbuildsafe.com](http://www.builtallbuildsafe.com)







# Questions?

**Jeff Morrow**

Lendlease

[Jeff.Morrow@lendlease.com](mailto:Jeff.Morrow@lendlease.com)