Risk Analysis and Scheduling Approaches

with Chris Evans

Woodworks | August 19, 2020

Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.

Presentation Goal:

To identify potential project risks, recommend mitigation tactics, so that mass timber projects can be implemented with financial efficiency.

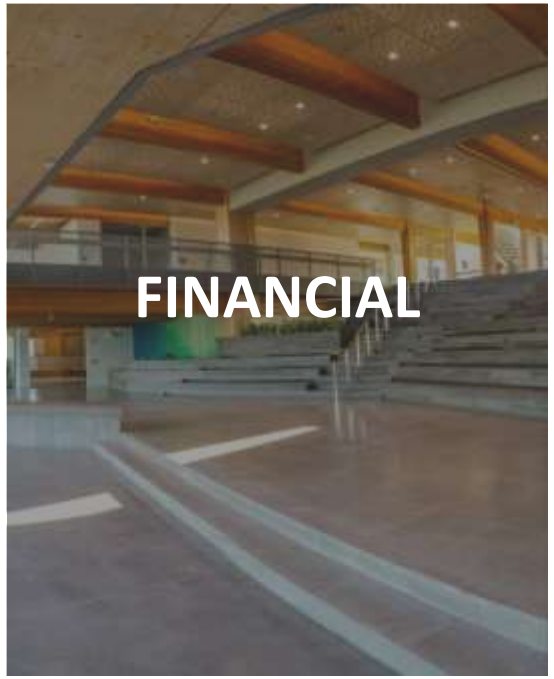
Risk and Schedule Management Learning Objectives

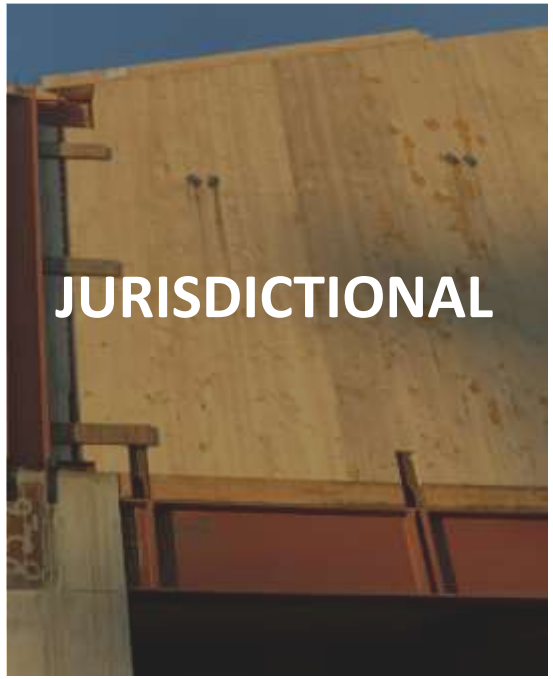
Financial Risk
- Project Delivery Method
- Purchasing: Exchange Rate
- Purchasing: Commodity Pricing
- Project Delivery Method

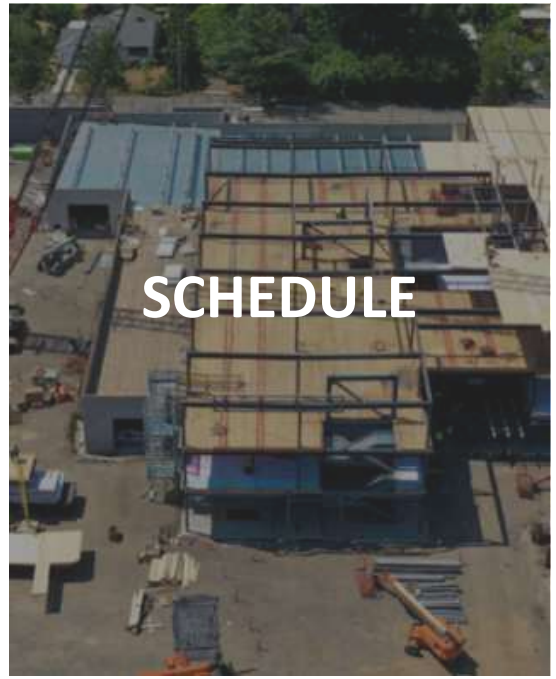
Jurisdictional Risk
- Code Path
- Code Interpretation
- Limited Tested Assemblies
- Field Inspections

Schedule
- MEPF Penetration Incorporation
- Schedule Critical Shop Drawing Dates
- Adjacent Structural Systems
- Manage RFI Process
- Factory Backlog & OPP
- Erection Sequencing Constructability

Project Risks







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FINANCIAL RISK

Project Delivery Method
Purchasing: Exchange Rate
Purchasing: Commodity Pricing

Project Delivery Method

5% Savings

Neutrality

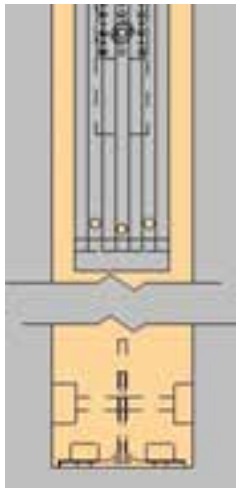
10% Premium

CMGC,
GC/CM,
CMAR,
Design-Build

Design-Bid-Build

Project Delivery Matters: Why?

Project Delivery Method: New Product Types



Detailing

Manufacturing Constraints

Fabrication Limitations

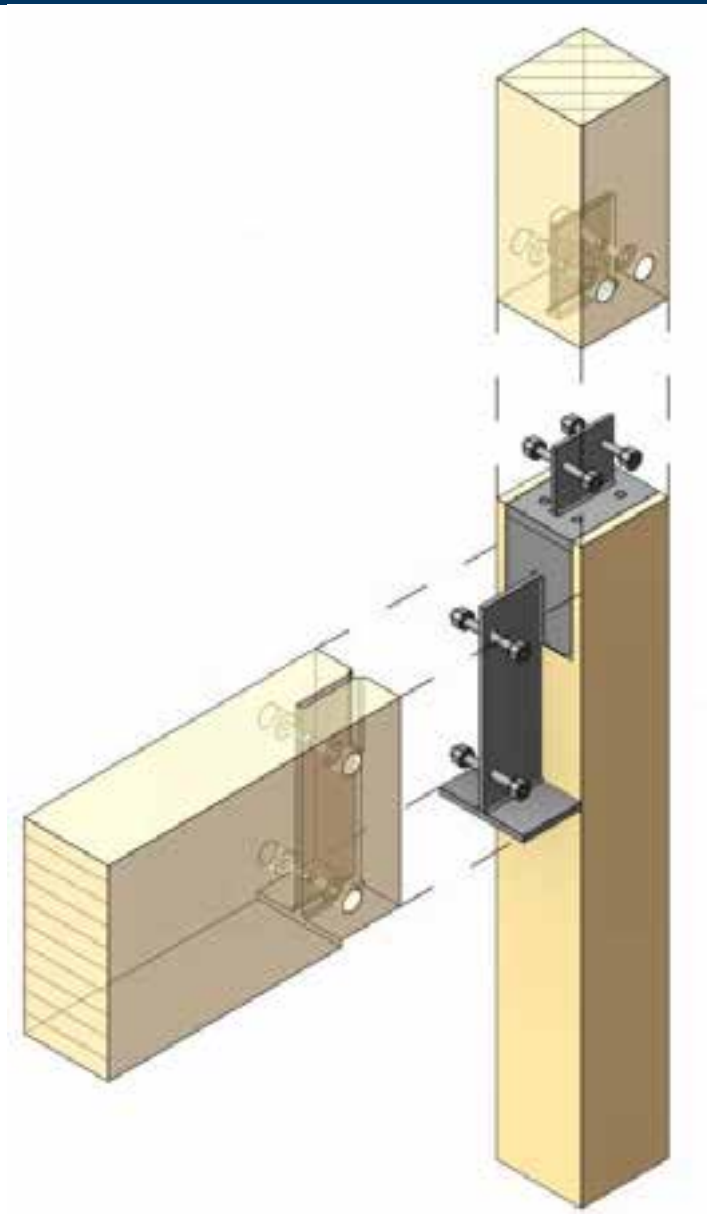
Hardware Choices

Fasteners and Proper Use

Risk: New and unfamiliar products can lead to unoptimized design => **$$$$**

Mitigation: Gain technical knowhow from industry experts => **$**

Can Details Be Fabricated?



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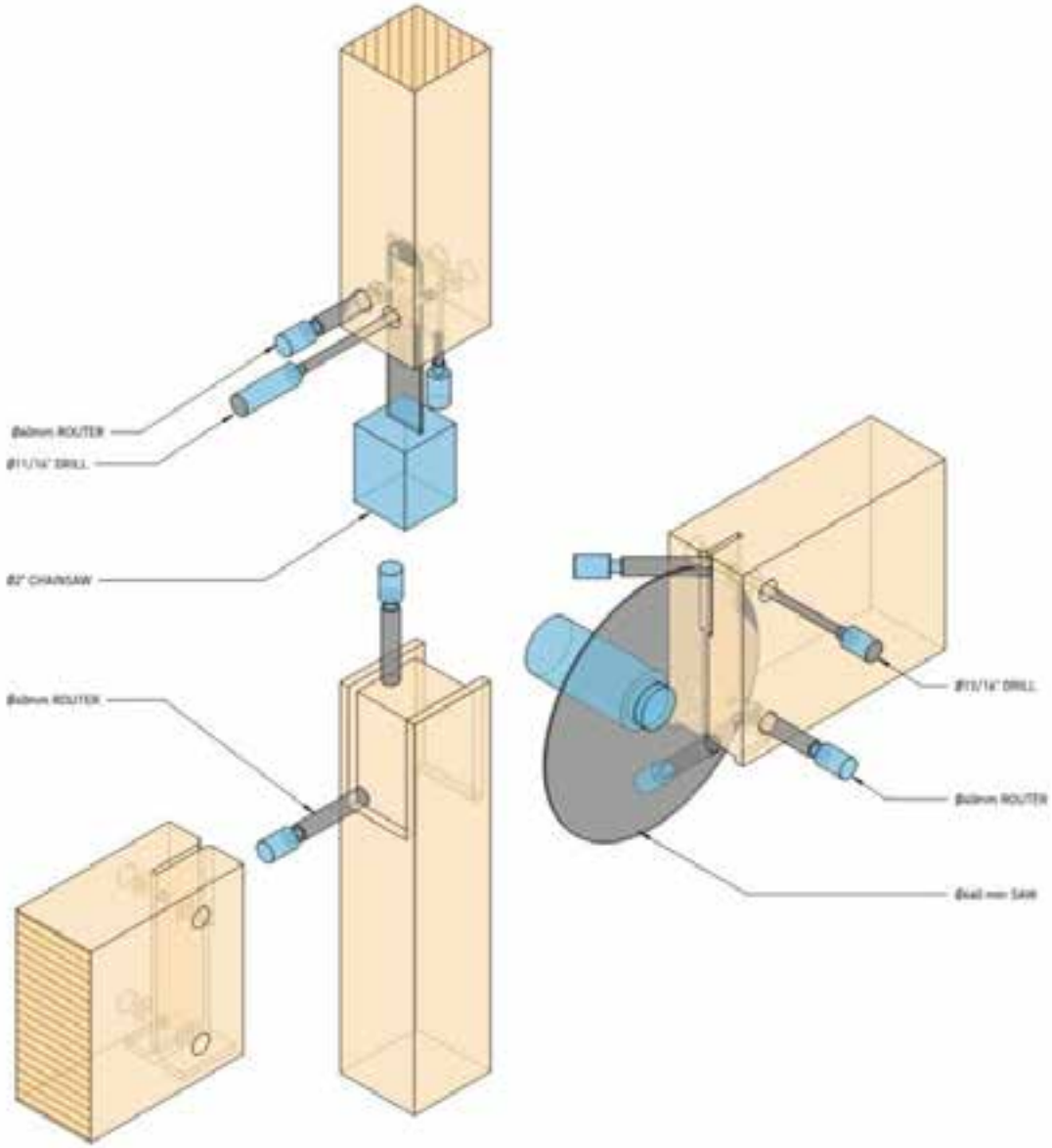
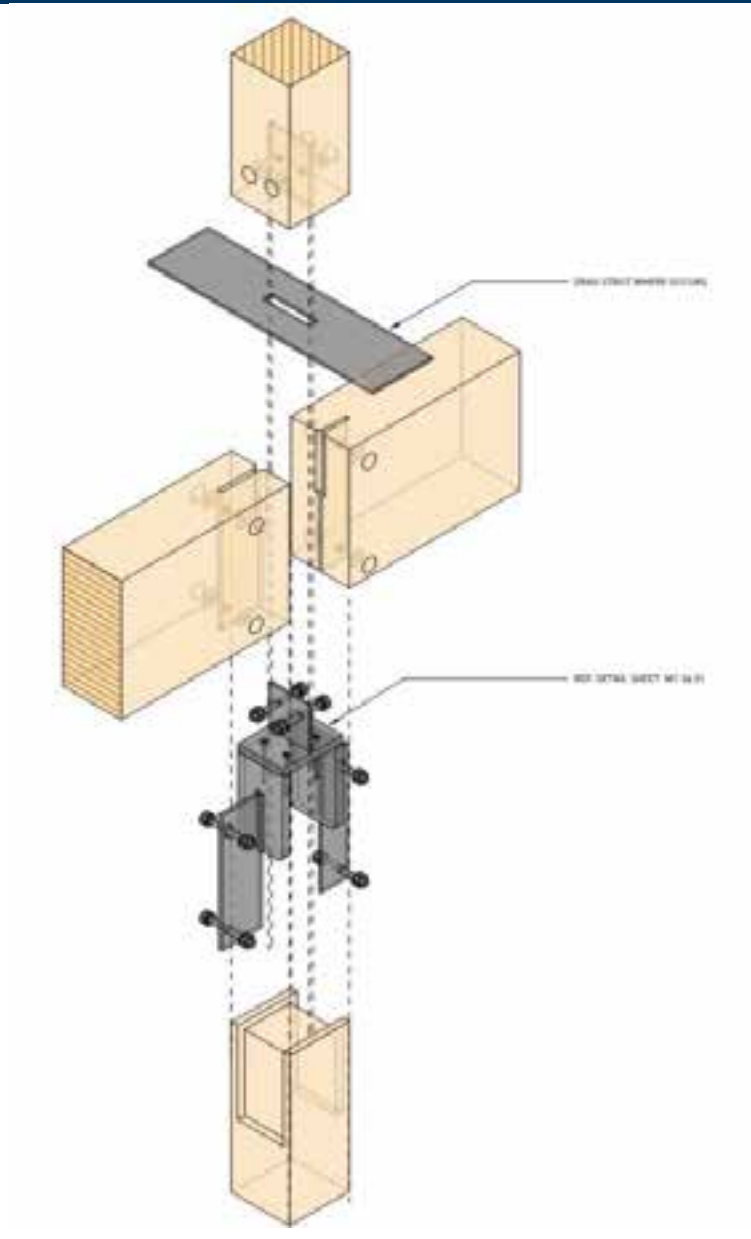


Can Details Be Installed?



Project Delivery Method

5% Savings

Neutrality

10% Premium

CMGC,
GC/CM,
CMAR,
Design-Build

Design-Bid-Build

Project Delivery Matters: Why?

Efficient Detailing and Fabrication leads to Lower Installation Costs

Risk Mitigation For Seamless Transition to Construction

Risk Mitigation Strategies:

- Avoid Design-Bid-Build
- Hire and use a CM or GC during design for paid precon => spend $ to save $$$
- Engage with a mass timber firm during precon to optimize system costs

Purchasing: Exchange Rate Effects

Bid Date: May 15th, 2020

Bid Amount: $1,000,000

Bid Amount is not locked, varies with exchange rate

Bid Leveling, Approvals, Etc.: May 15th – July 28th

LOI Date: July 28th

Purchase Price: $1,096,500

Financial Risk: $96,500 or 9.65%

Risk: Purchase of material has exchange rate risk

Mitigation: Be prepared to execute an LOI to lock in exchange rate risk at time of bid. This approach requires teaming effort with owner, contractor, architect, and engineer.

Purchasing: Commodity Index Effects

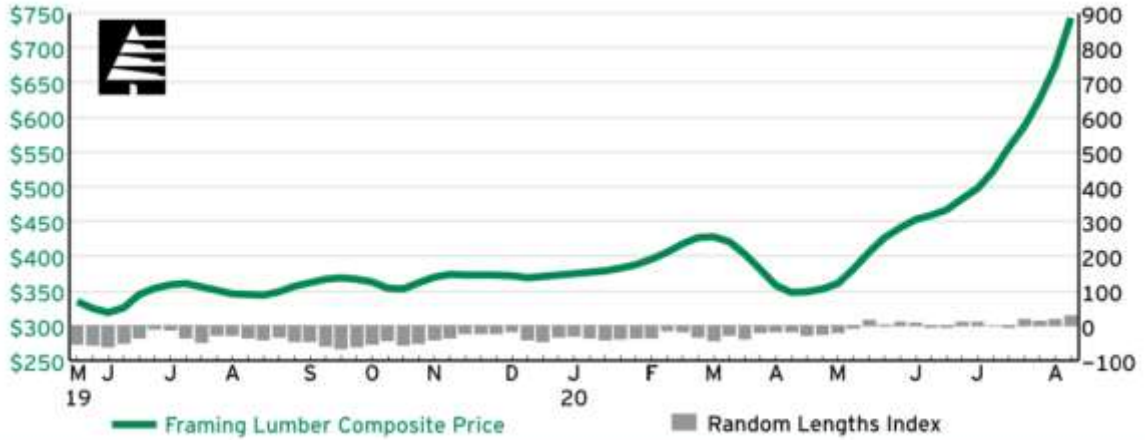
Lumber Market Indicators

	This Week	Last Week	Year Ago
Framing Lumber Composite Price[1]	**$743**	**$675**	**$344**
Key Lumber Prices			
2x4 #2&Btr KD Western S-P-F	760	678	336
2x4 Std&Btr Grn Douglas Fir (Portland)	720	680	378
2x4 #2 KD SYP (Westside)	716	640	355
2x4-8' PET KD Western S-P-F	710	660	268
1x12 #3 KD Ponderosa Pine	655	630	440
Random Lengths Index[2]	+29.0	+16.8	-41.3

1 – For a list of items included in each composite, go to www.rlpi.com and click on In Depth > Useful Data > Monthly Composite Prices.

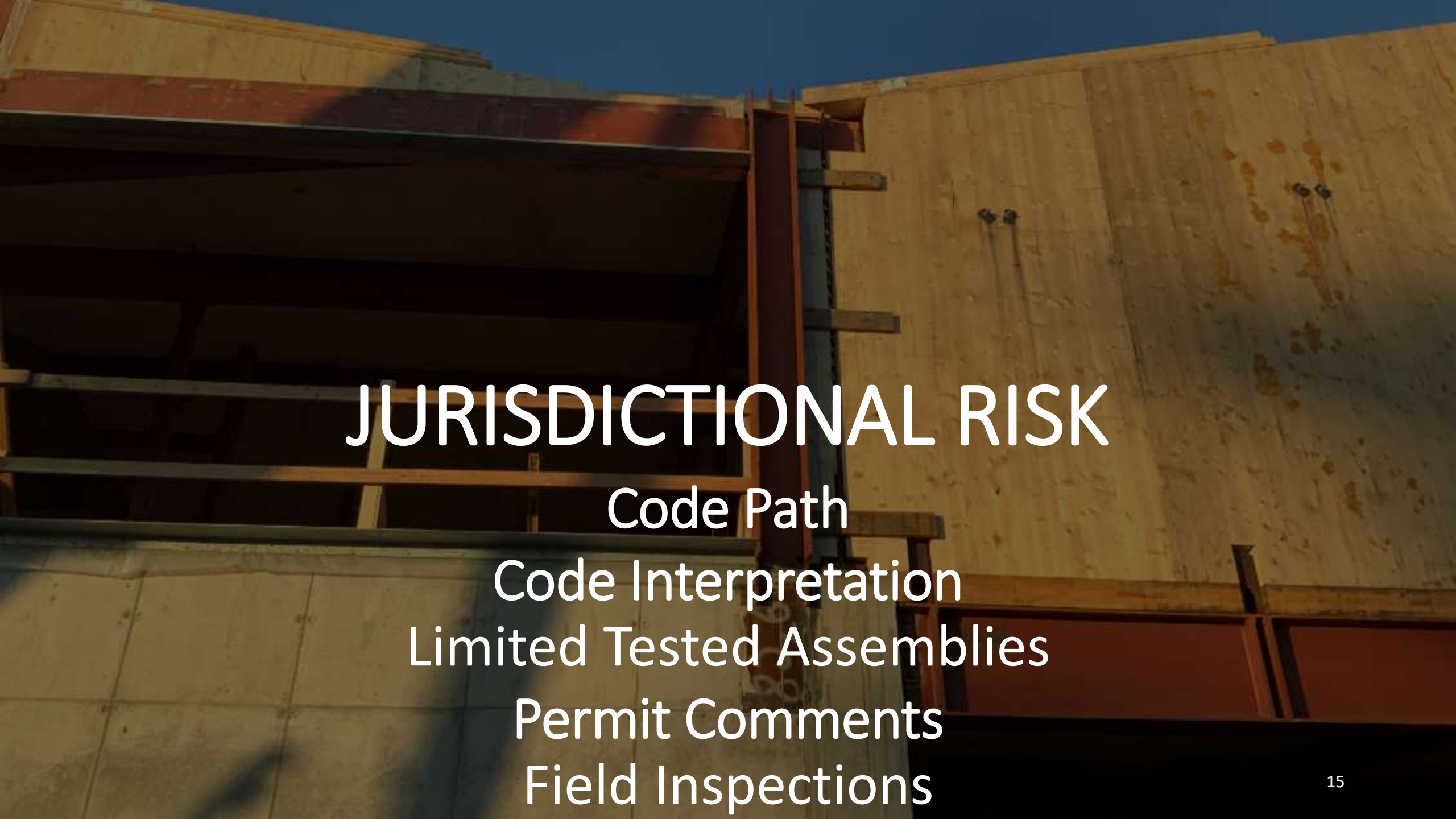
2 – The index is a numerical representation of market activity, based on a ratio of western sawmill order files to inventories. In computing the index, the data are compared with similar data averaged over the past five years.

	This Week	Last Week	Year Ago
Lumber Group Composites[1]			
Random-Length Dimension	698	636	355
Stud	712	653	314
Low-Grade Random Dimension	369	349	230
Board	731	714	666
Shop and Mldg&Btr	700	697	714
Coast Dry Random and Stud	690	624	341
Inland	721	677	446
Southern Pine	762	696	343
Western S-P-F	703	635	323
Eastern S-P-F	777	717	382
Green Douglas Fir	706	670	434



Risk: Purchase of material has commodity index risk, similar to steel and concrete

Mitigation: Be prepared to execute an LOI to avoid commodity price risk at time of bid. This approach requires teaming effort with owner, contractor, architect, and engineer.



JURISDICTIONAL RISK

Code Path

Code Interpretation

Limited Tested Assemblies

Permit Comments

Field Inspections

Which Code?

Risk: Local adoption of code influences what can and can’t be done with mass timber

Mitigation: Understand code path and required variances at inception of project

Code Interpretation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The design team for the 13th & Union project fully appreciates the city of Seattle's time and your guidance on the items above. We look forward to discussing these items on Friday. Please reach out if there are any further questions. We will follow today's meeting with documentation of the points discussed in today's meeting.

Sincerely,

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Risk:

Each jurisdiction may interpret the code slightly differently.

Mitigation:

Meet with the AHJ for pre-app conferences to discuss code interpretation for project

Document and circulate meeting minutes to ensure team is on the same page

Limited Tested Assemblies

2 HR Shafts through Non-Rated or 1 HR Floors

2 HR rated Timber to Timber Connections

Limitations of tested connections (loading in Kips)

Risks:

Tested assemblies may be required

Mitigation:

Engage consultants and system experts to determine what project details require engineering judgements or project specific testing. Can the design be modified to remove engineering judgements or project specific testing?

Incorporate Permit Comments into Shop Drawings

19	Submittals & Procurement		08-May-20	03-Dec-21	396	396		SB -
20	All Areas		08-May-20	03-Dec-21	396	396		SB -
21	Procurement		08-May-20	08-May-20	0	0		SB -
22	Fasteners		08-May-20	08-May-20	0	0		SB -
23	Swinerton VDC Coordination		08-May-20	08-May-20	0	0		SB -
24	Levels 2-3 Bldg Geometry		09-Jun-20	28-Jul-20	35	35		SB -
25	No Materials		09-Jun-20	28-Jul-20	35	35		SB -
26	Swinerton VDC Coordination		09-Jun-20	28-Jul-20	35	35		SB -
27	VDC BG2010	Swinerton--Drawing Review	09-Jun-20	29-Jun-20	15	15		SB -
28	VDC BG6060	Addendum #2 (Structure) Review Comments Back From DBI	29-Jun-20		0	0		SB -
29	VDC BG2020	Swinerton-CLT+Glulam Detailing LOD 200 Geometry Change--EOS--RFI's Submittal	30-Jun-20	07-Jul-20	5	5		SB -
30	VDC BG2030	Swinerton-CLT+Glulam Shop Drawings LOD 200 A/E EOS Review/Comments	08-Jul-20	21-Jul-20	10	10		SB -
31	VDC BG2040	Swinerton-CLT+Glulam Shop Drawings LOD 200 Corrections EOS	22-Jul-20	28-Jul-20	5	5		SB -
32	VDC BG2070	Swinerton-CLT+Glulam Shop Drawings LOD 200 A/E EOS+Glulam Submit for Record		28-Jul-20	0	0		SB -

Critical Remaining Work
Actual Work
Remaining Work
Milestone
Start Constraint

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Addendum #2 (Structure) Review Comments Back From DBI

Risk: Permit comments required to complete mass timber shop drawings

Mitigation:

Know when first round of structural comments are anticipated, place date in schedule

Ensure structural comment date is tied to critical path in schedule

Field Inspections

Risk: Approved permit does not limit field inspector interpretation of the plans.

Mitigation:

- Determine assemblies requiring engineering judgements
- Proactively plan for inspections and engage inspector prior to onsite inspections

SCHEDULE RISK

MEPF Penetration Incorporation

Schedule Critical Shop Drawing Dates

Adjacent Structural Systems

Manage RFI Process

Factory Backlog & OPP

Erection Sequencing Constructability

Early MEPF Involvement Leads to Schedule Enhancement

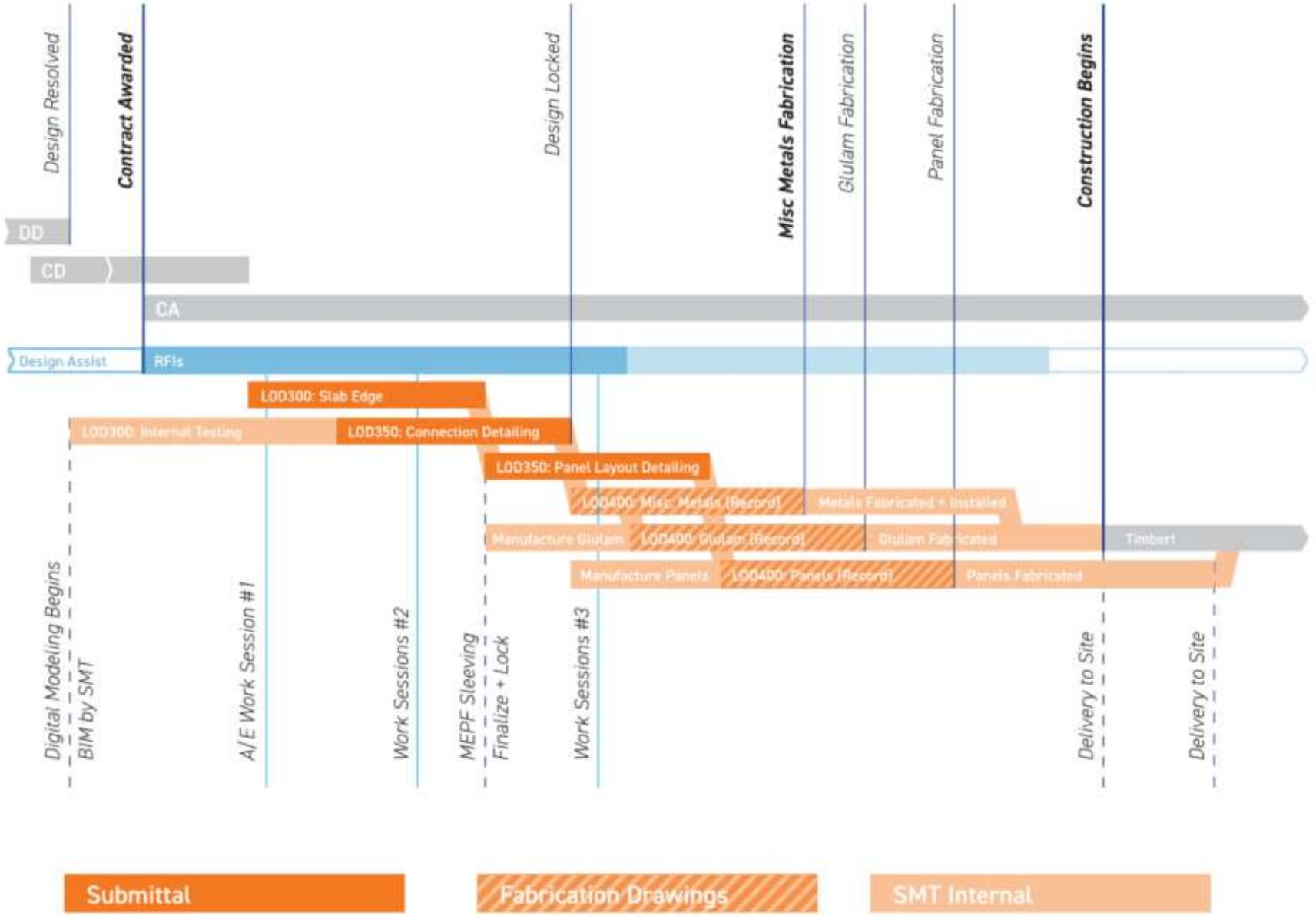
Risk: Failure to engage MEPF partners early leads to difficulty field fabricating penetrations

Mitigation:

Take advantage of CNC Technology, coordinate MEPF trades early in project design

Prefabricating MEPF openings leads to quicker field installation times and better quality

Shop Drawing Schedule



Model Adjacent Structural Systems

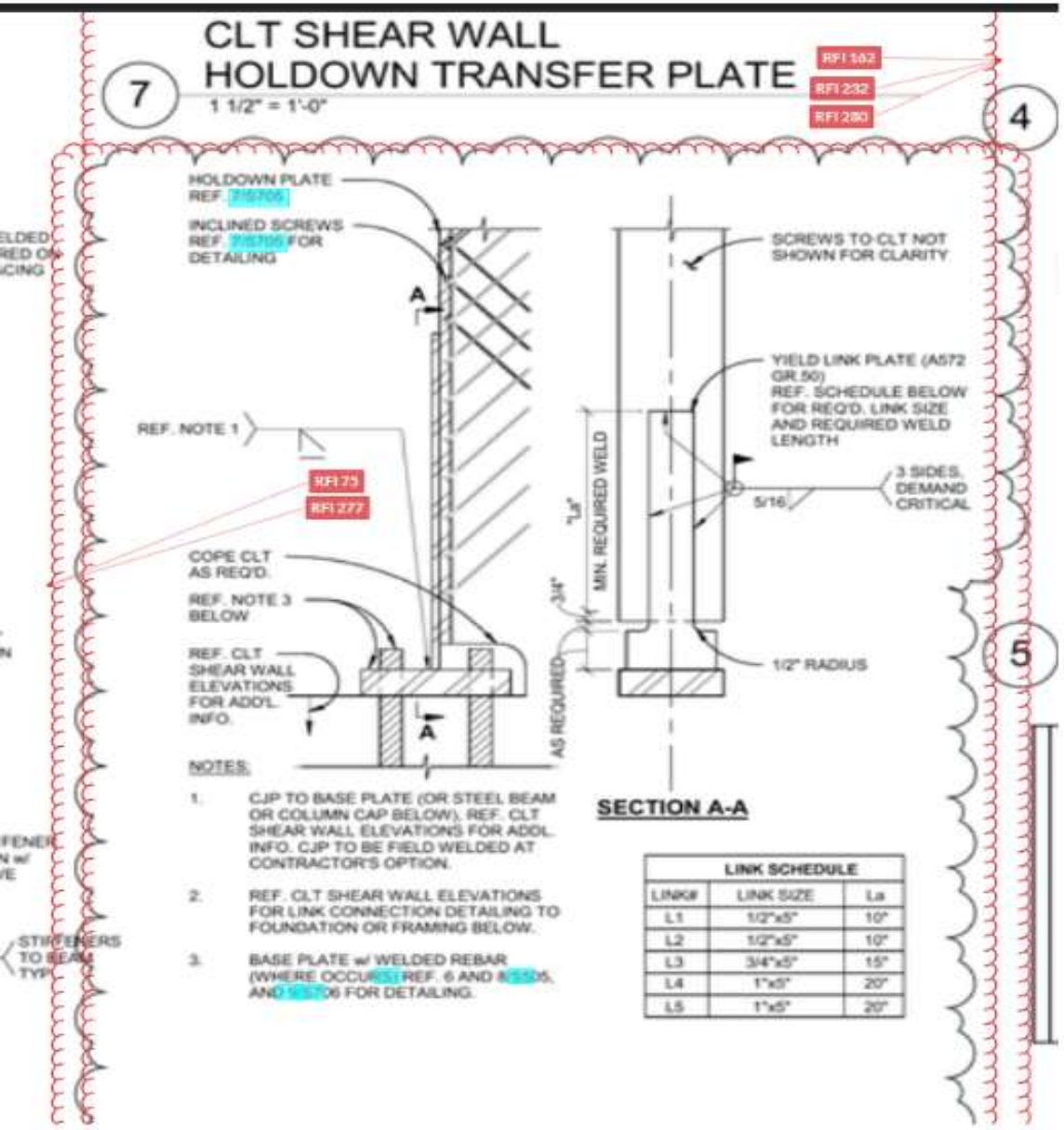
Risk: Failure model, and build off of model, for adjacent structural systems (concrete/steel)

Mitigation:

Ensure subcontractor performing steel and concrete structures build off of a model

Coordinate timber model with other structural models

RFI Submission & Response Timing



Risks:

Protracted RFI submittal and response period leads to hold ups with fabrication drawing development

Mitigation:

Teamwork and RFI meetings between AEC teams will speed up RFI period and facilitate timely execution of fabrication drawings

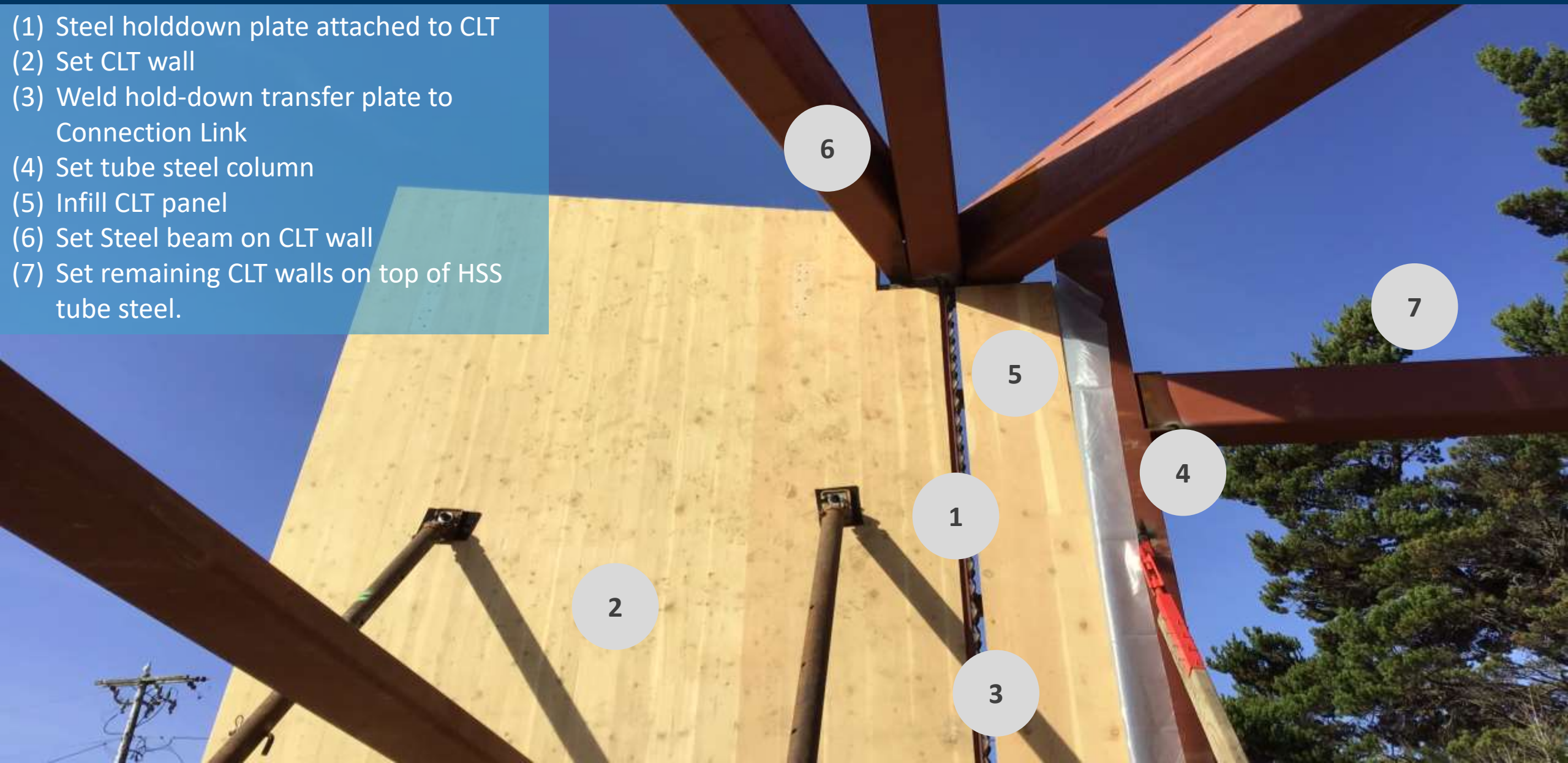
Factory Backlog and Other Peoples Projects (OPP)

Risk: If large projects ahead of you in the factory's queue get delayed then your material may become delayed

Mitigation: Understand the manufacturer's backlog and risk associated with those projects.

Erection Sequencing Constructability

(1) Steel holddown plate attached to CLT
(2) Set CLT wall
(3) Weld hold-down transfer plate to Connection Link
(4) Set tube steel column
(5) Infill CLT panel
(6) Set Steel beam on CLT wall
(7) Set remaining CLT walls on top of HSS tube steel.



The mission of Swinerton Mass Timber is to accelerate the mainstream adoption of mass timber construction by providing comprehensive engineering, procurement, and construction (EPC) services in the US commercial construction market.

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Thank you!

Chris Evans

Director

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