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MILE HIGH VIEW

A COLORADO PERSPECTIVE ON MASS TIMBER
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COURTESY OF DENVER INFILL, KEN SCHROEPPEL

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DESCRIPTION

Mass timber is gaining momentum nationwide and the mountains of Colorado are no exception. Sustainable materials like cross-laminated timber (CLT) and glue-laminated timber are being used to bring a modern wood aesthetic to a variety of project types, including offices, multi-family/mixed-use, commercial, and more. This session will explore several mass timber projects in Colorado including Denver's first CLT building, Platte Fifteen, a five-story mixed-use development that includes retail and office space, and The Loading Dock, a two-story, 60,000-square-foot office building in Boulder. Presented by the principal architect on these projects, topics will include why mass timber was used, unique design and detailing considerations, and interaction with building officials related to fire and life safety.

LEARNING OBJECTIVES

1. Highlight the recent use of mass timber products in commercial projects in Colorado.
2. Consider the unique design criteria associated with mass timber office buildings, including layout and code compliance.
3. Review detailing techniques for CLT structures that result in cost-effective solutions that meet code requirements for fire and life safety, structural performance, and acoustics.
4. Discuss approaches to designer/building official interaction needed to realize successful mass timber commercial projects.







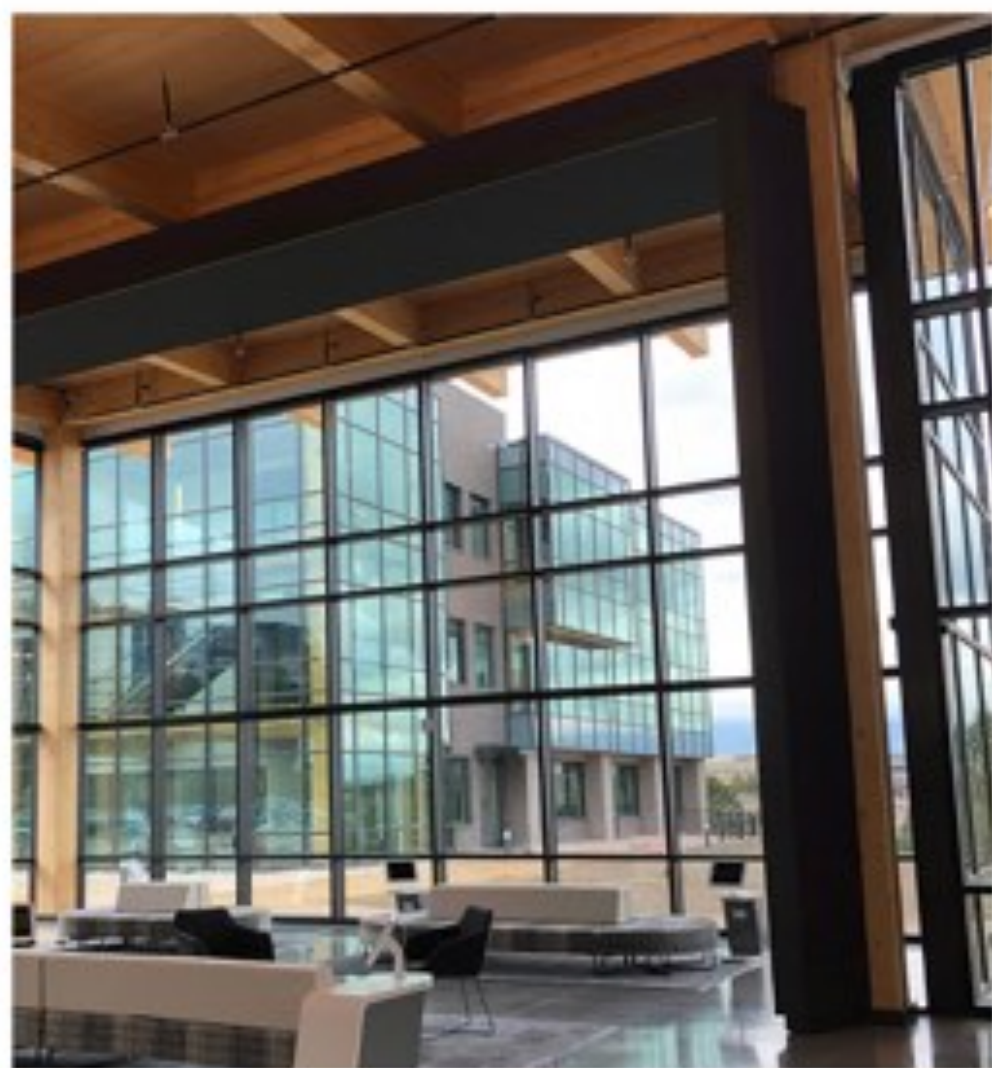
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RK | informa

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00 CASE STUDY | TABLE OF CONTENTS

01 | ZONING & CODE

02 | WHY MASS TIMBER?

03 | SITE ANALYSIS & DESIGN

04 | MASS TIMBER DESIGN

05 | SUPPLIER SELECTION

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07 | CONSTRUCTION

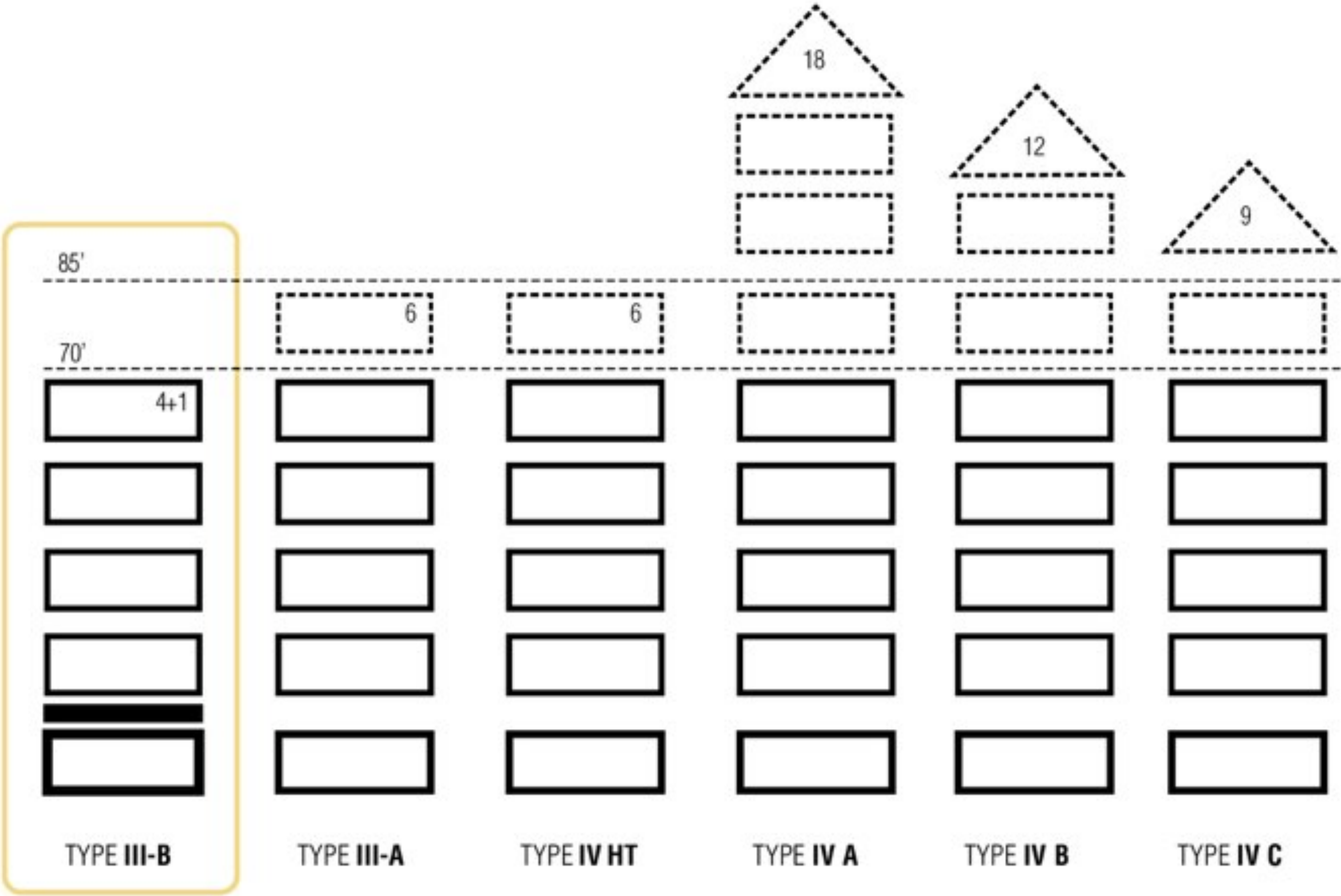
08 | COMPLETION

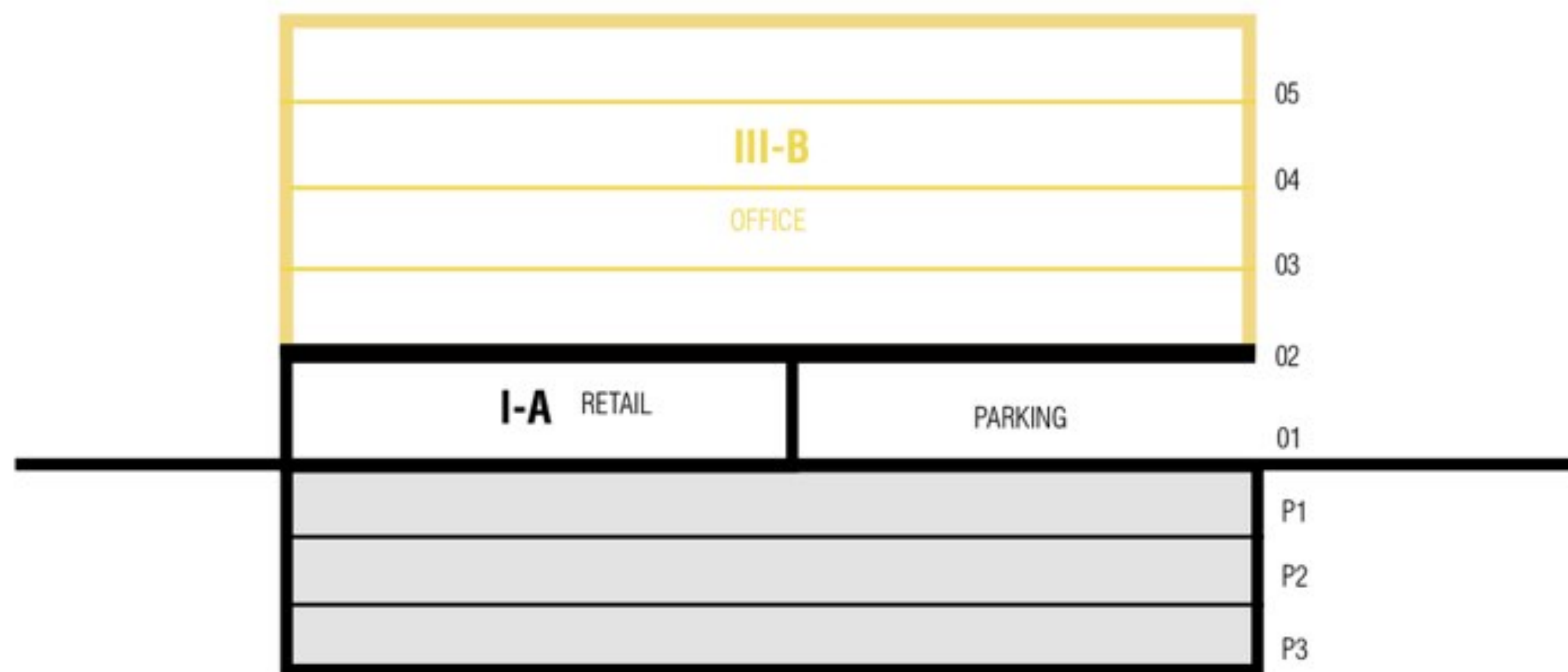


ZONING & CODE

CHAPTER 01

01 **ZONING/CODE** | TYPE OF CONSTRUCTION







18 STORIES
BUILDING HEIGHT 270'
ALLOWABLE BUILDING AREA 972,000 SF
AVERAGE AREA PER STORY 54,000SF

TYPE IV-A



12 STORIES
BUILDING HEIGHT 180 FT
ALLOWABLE BUILDING AREA 648,000 SF
AVERAGE AREA PER STORY 54,000SF

TYPE IV-B



9 STORIES
BUILDING HEIGHT 85'
ALLOWABLE BUILDING AREA 405,000 SF
AVERAGE AREA PER STORY 45,000 SF

TYPE IV-C

IBC 2021

WHY MASS TIMBER?

CHAPTER 02



SUSTAINABILITY



AESTHETIC
AUTHENTIC



DESIGN FLEXIBILITY
SYSTEM | HYBRID | FUTURE



DIMENSIONAL STABILITY



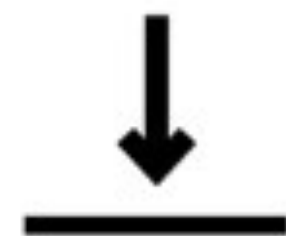
PREDICTABLE FIRE
PERFORMANCE
TESTING | 2021 IBC



PREFABRICATION
CNC | EFFICIENT | QUALITY



WASTE REDUCTION
+ MATERIAL OPTIMIZATION
FINISH MATERIALS



FAST INSTALLATION



LIGHTER / SEISMIC



THERMAL + ACOUSTICS





02 WHY MASS TIMBER | LESS FINISH MATERIAL





02 **WHY MASS TIMBER** | PREFABRICATION
CNC | EFFICIENT | QUALITY

02 **WHY MASS TIMBER** | DESIGN FLEXIBILITY
SYSTEM | HYBRID | FUTURE



02 **WHY MASS TIMBER** | DESIGN FLEXIBILITY
SYSTEM | HYBRID | FUTURE



02 **WHY MASS TIMBER** | DESIGN FLEXIBILITY
SYSTEM | HYBRID | FUTURE



02 WHY MASS TIMBER | FAST INSTALLATION







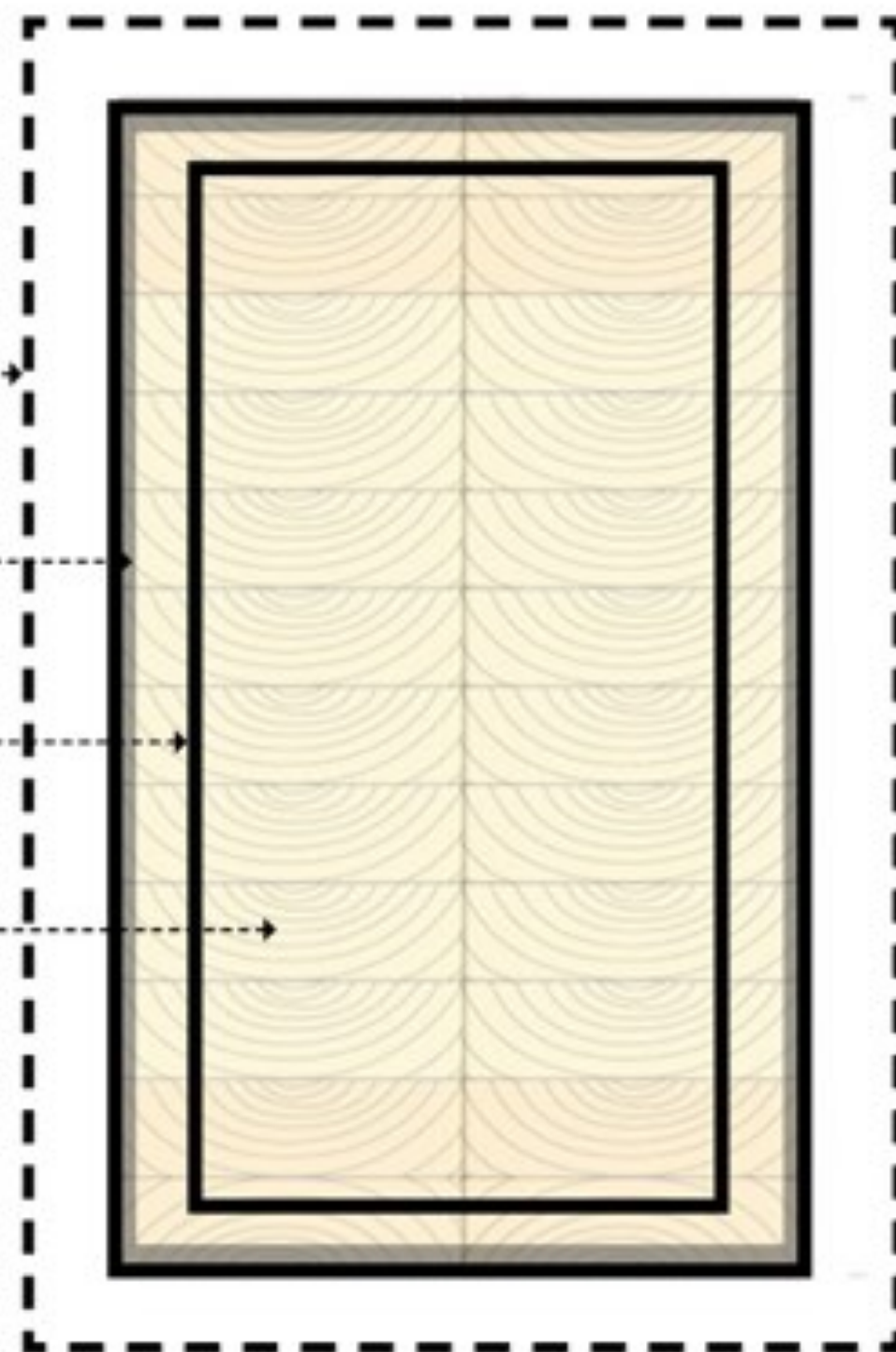
02 **WHY MASS TIMBER** | FIRE PERFORMANCE
TESTING | 2021 IBC

01 | ORIGINAL GLULAM SECTION

02 | CHAR LAYER

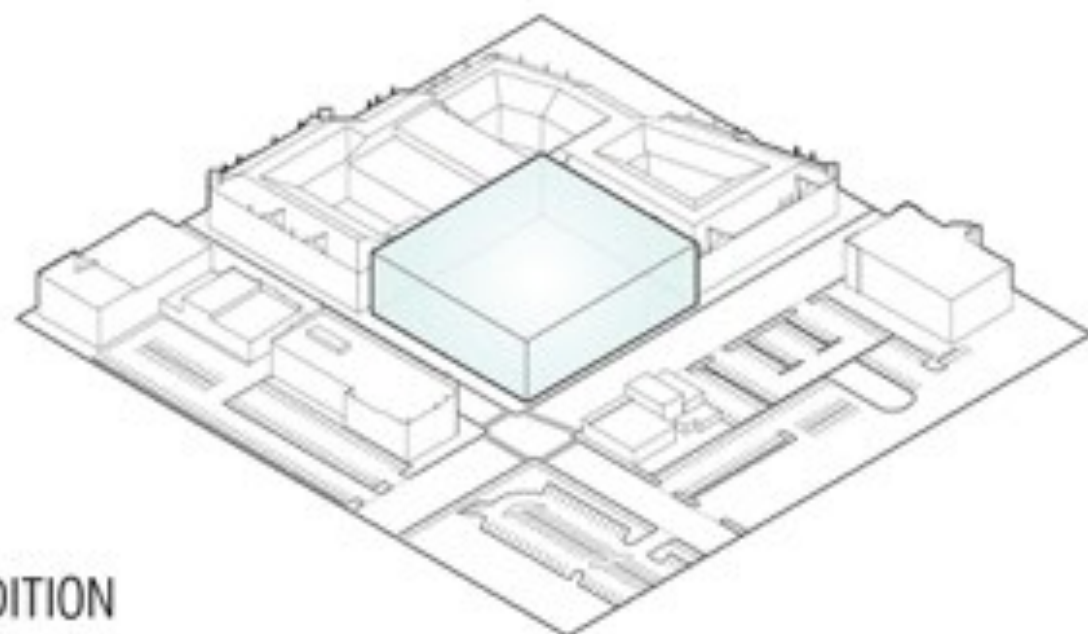
03 | ASSUMED ZERO STRENGTH LAYER

04 | RESIDUAL LOAD CARRYING SECTION

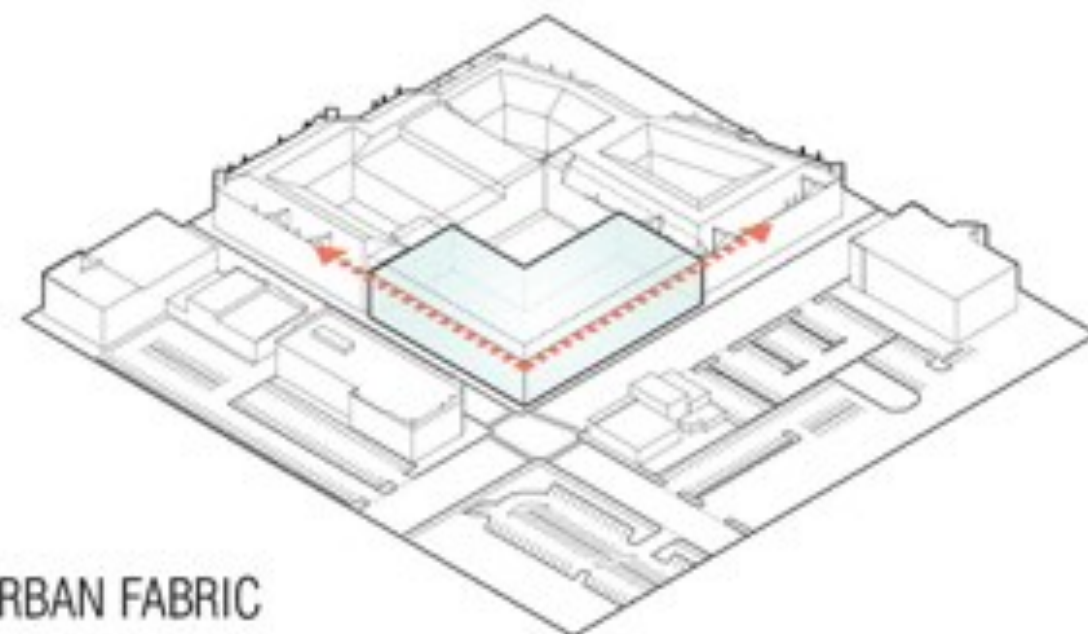


SITE ANALYSIS & DESIGN

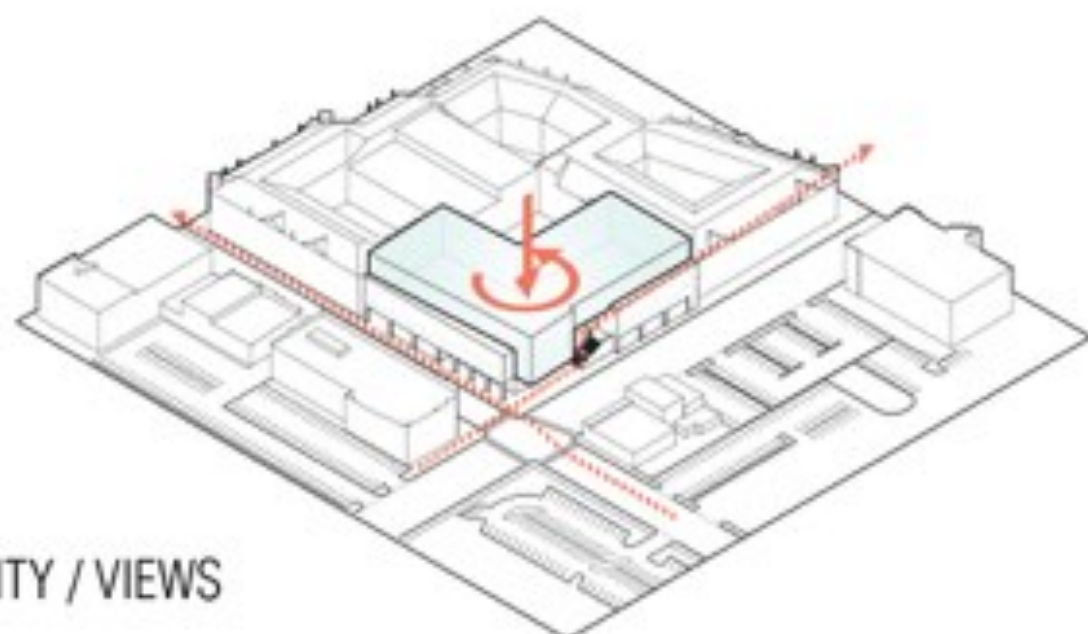
CHAPTER 03



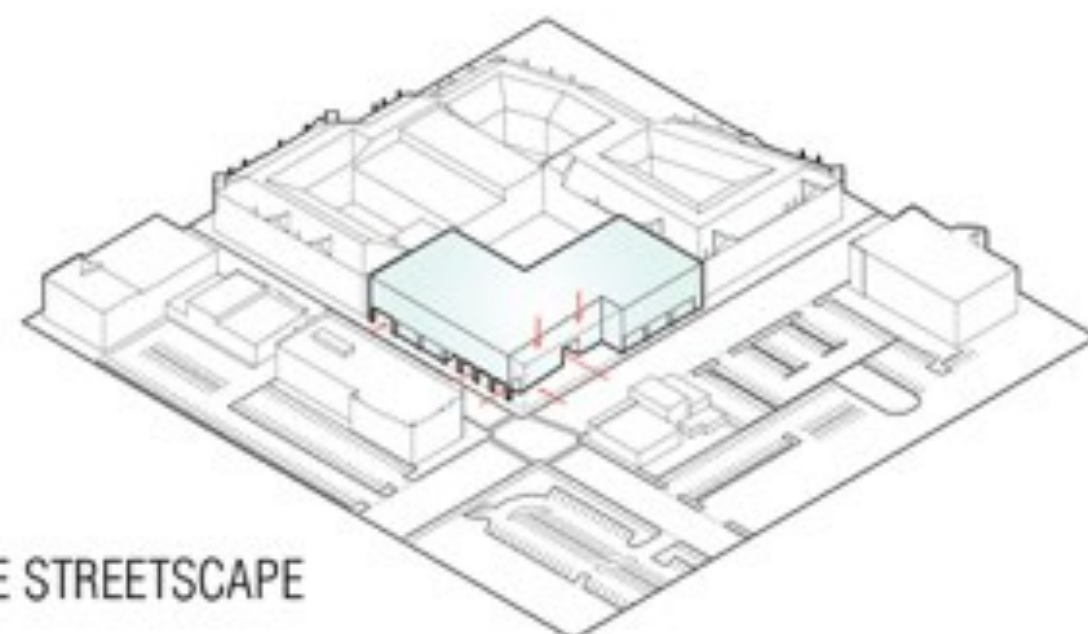
01 | BASE CONDITION



02 | EXISTING URBAN FABRIC

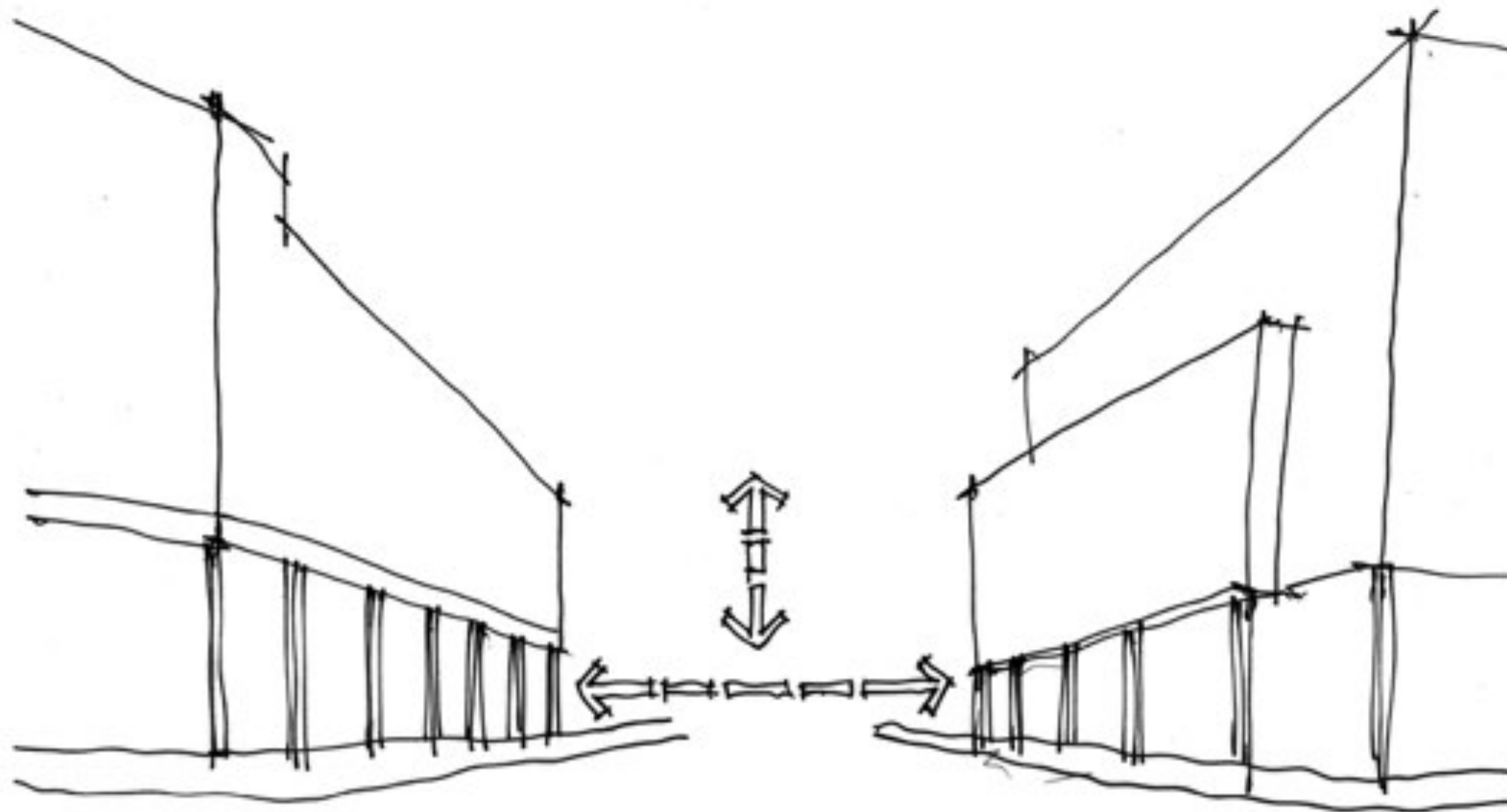


03 | OPEN TO CITY / VIEWS



04 | PERMEABLE STREETSCAPE





RESPECT

CIVIC NOD

STATEMENT BUILDING

UNIQUE DETAILING

REFLECT

SCALABILITY

ENGAGE THE STREET

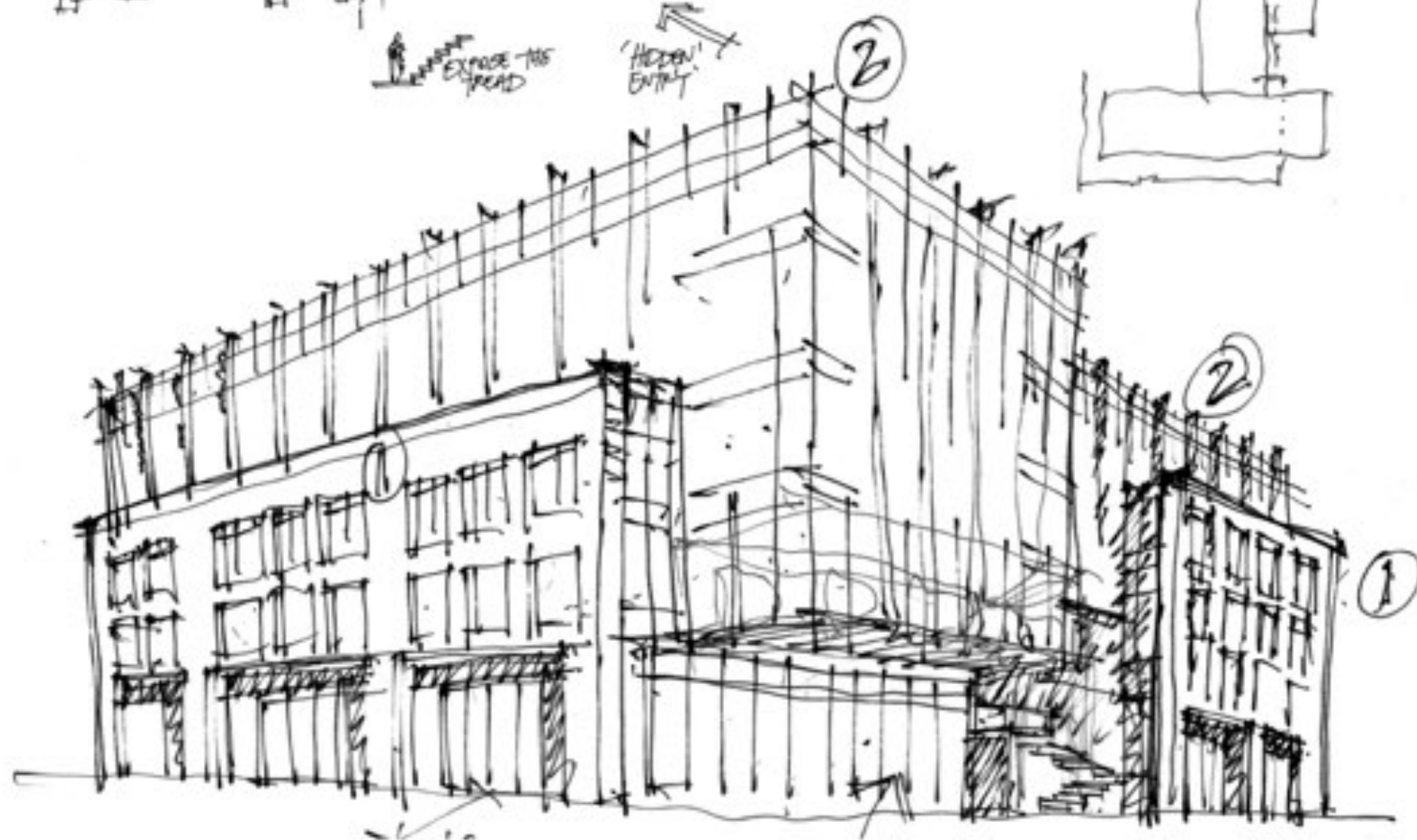
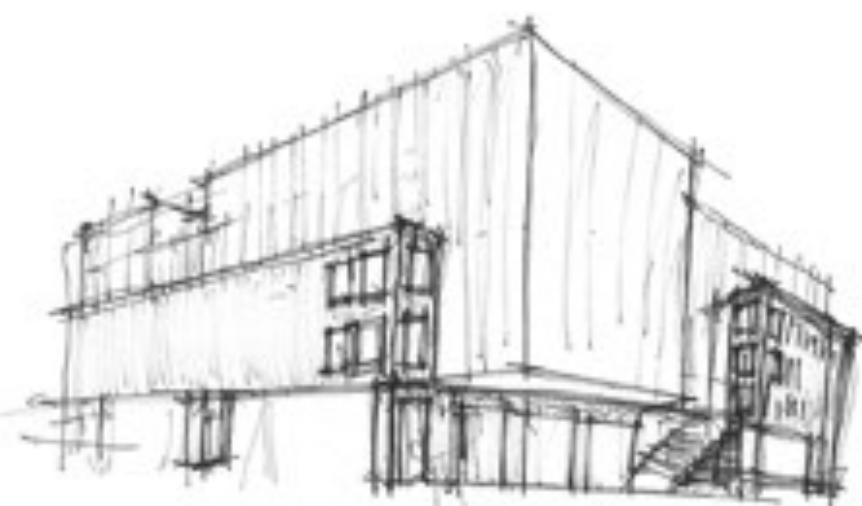
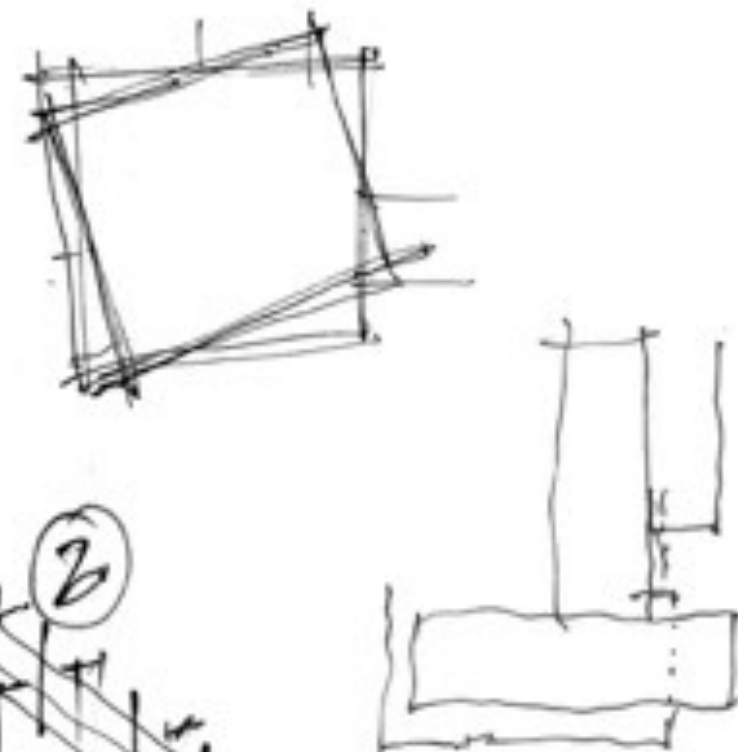
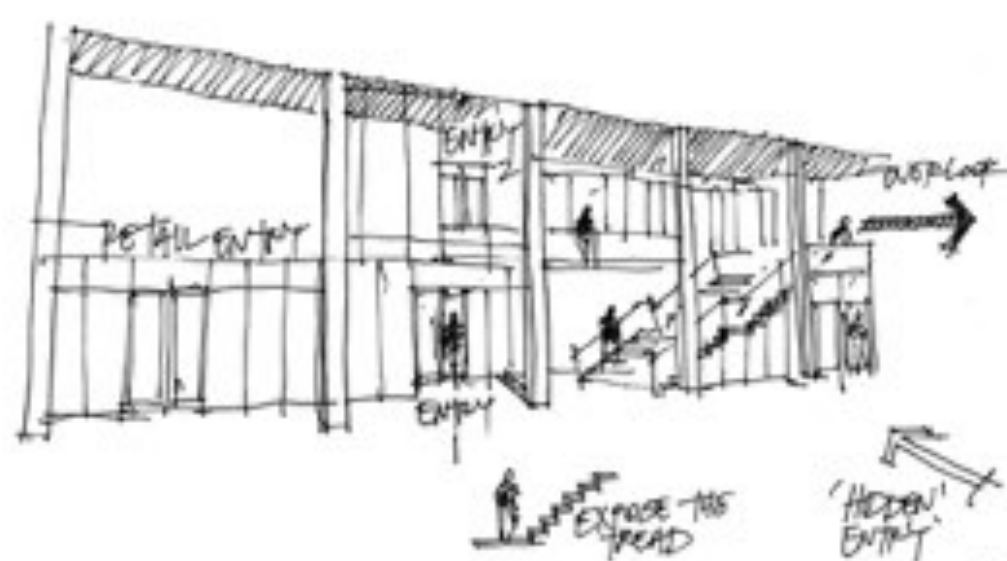
OLD -> NEW

BALANCE

INDOOR / OUTDOOR

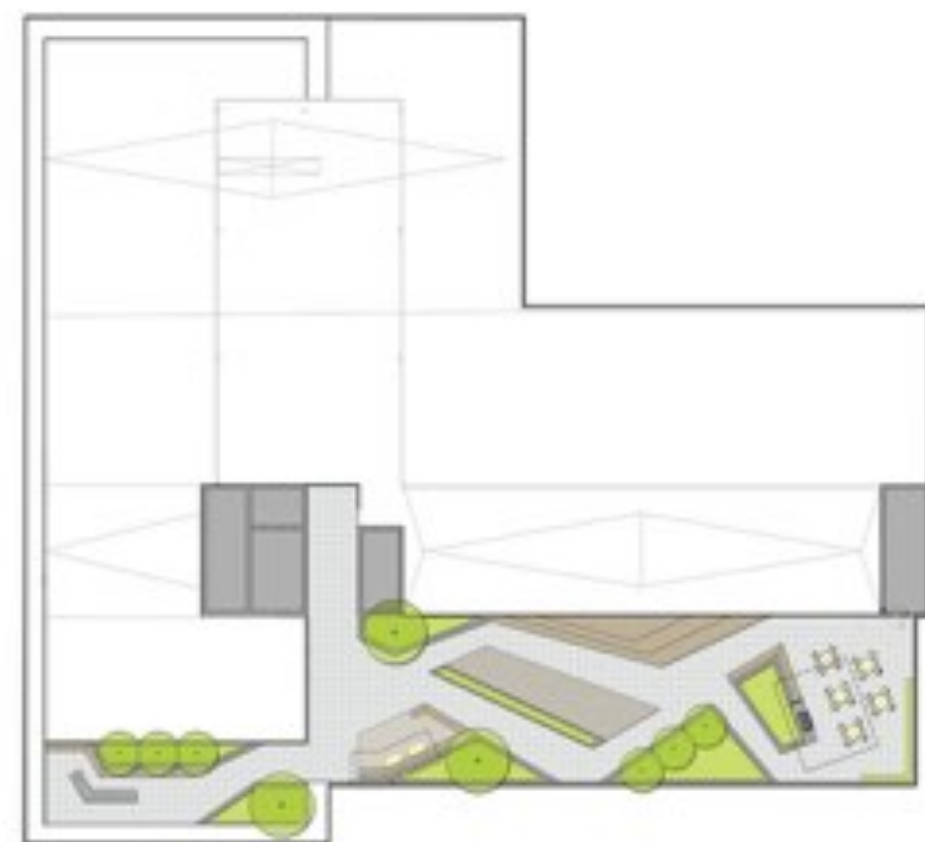
WHAT IS **PLATTE STREET** MISSING?

TRANSPARENCY





LEVEL 01 FLOOR PLAN



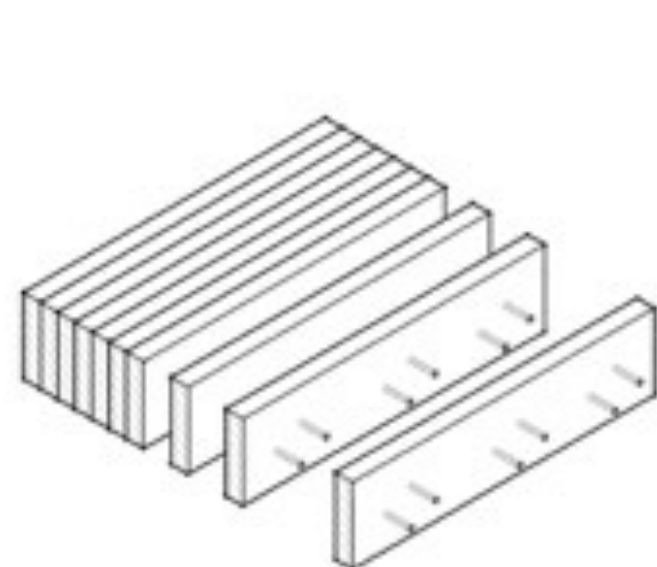
ROOF PLAN





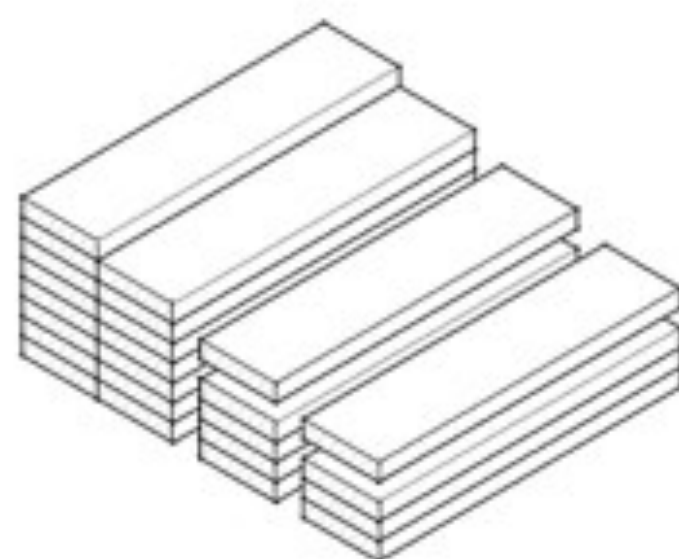
MASS TIMBER DESIGN

CHAPTER 04



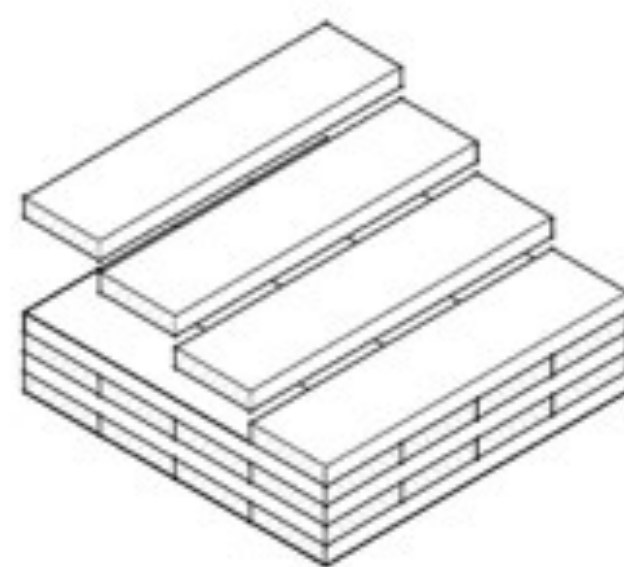
NLT

NAIL-LAMINATED TIMBER



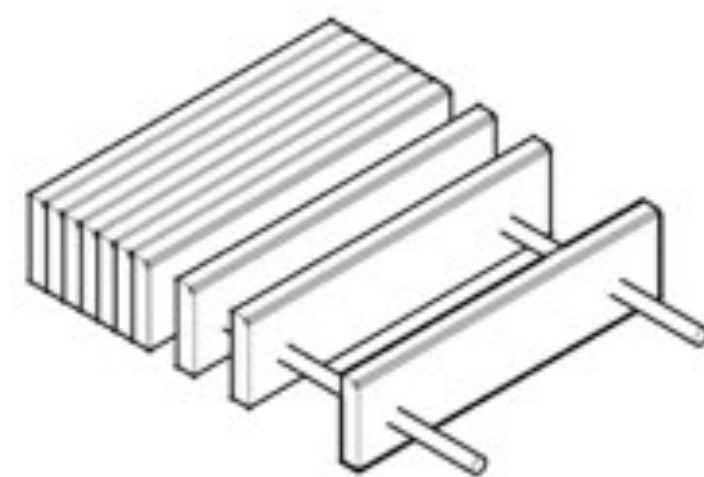
GLULAM

GLUE-LAMINATED TIMBER



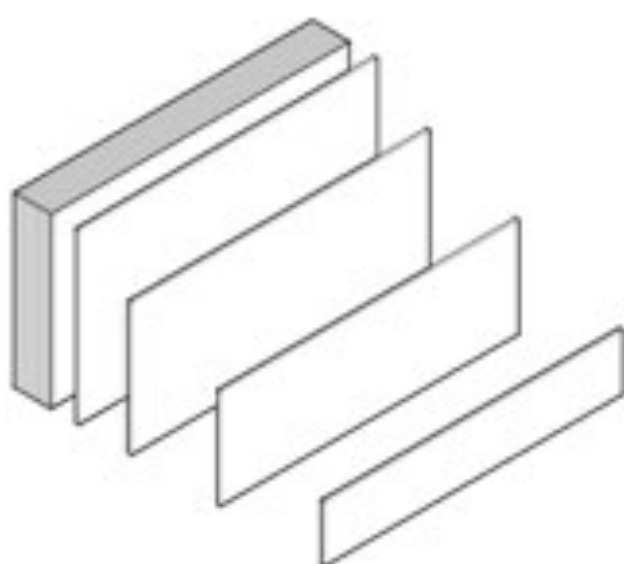
CLT

CROSS-LAMINATED TIMBER



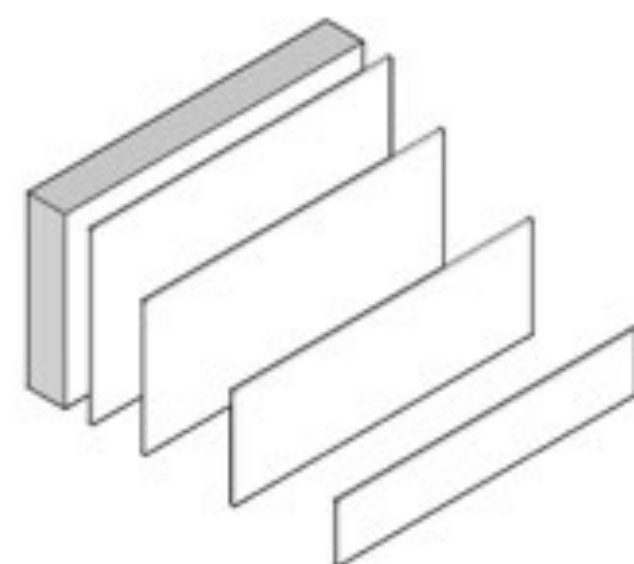
DLT

DOWEL-LAMINATED TIMBER



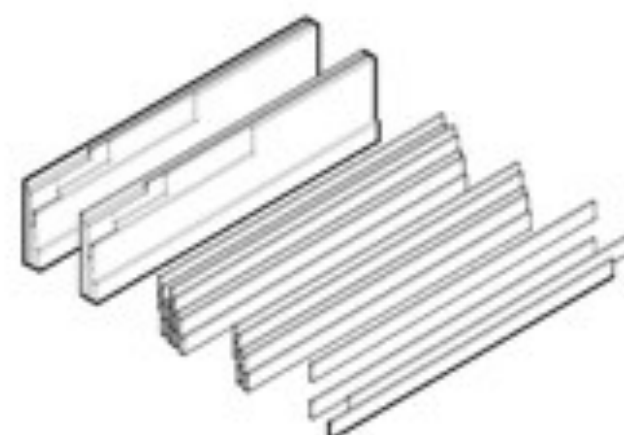
LVL

LAMINATED VENEER LUMBER



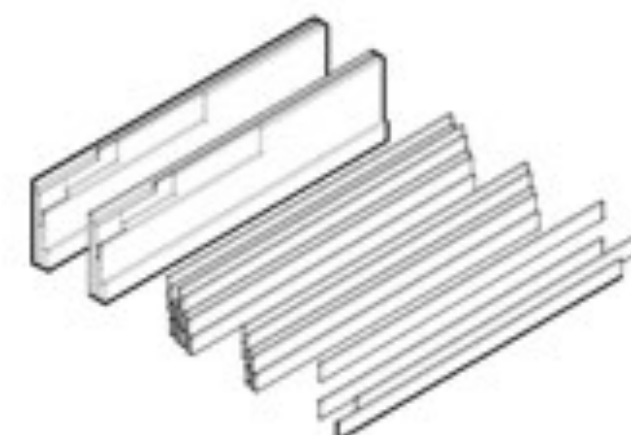
MPP

MASS PLYWOOD PANEL



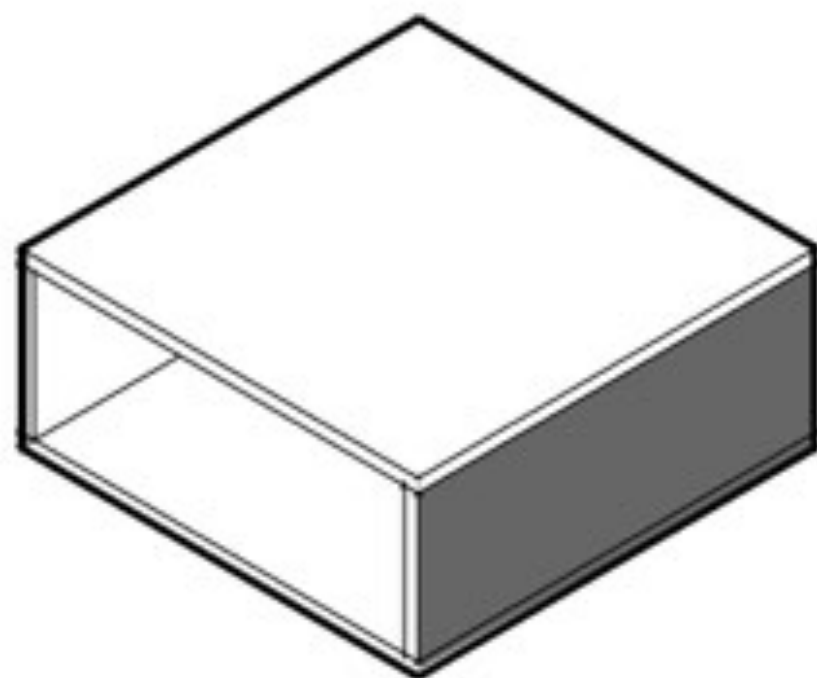
PSL

PARALLEL STRAND LUMBER



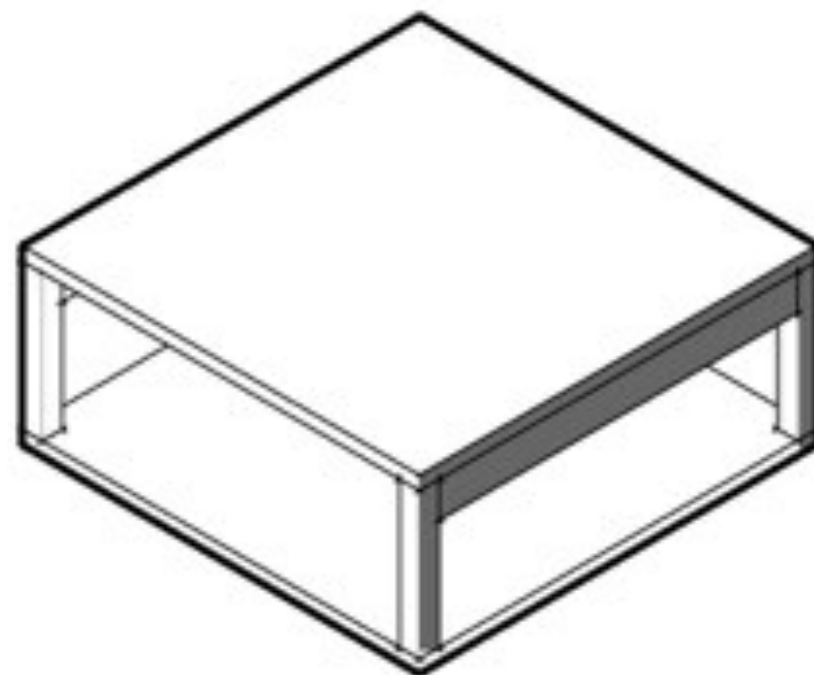
LSL

LAMINATED STRAND LUMBER



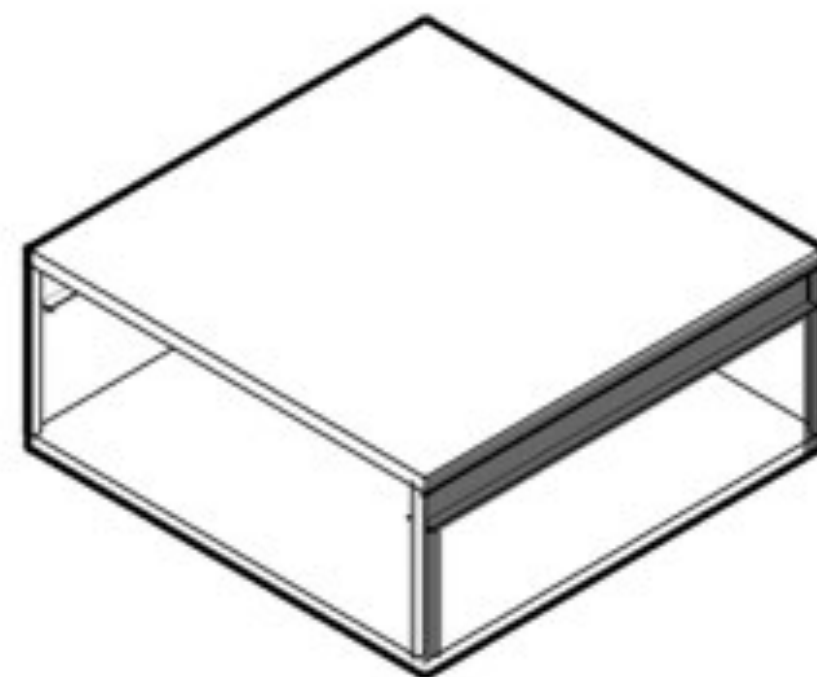
PANELIZED SYSTEM

MASS TIMBER PANELS FOR ALL PRIMARY
STRUCT. ELEMENTS



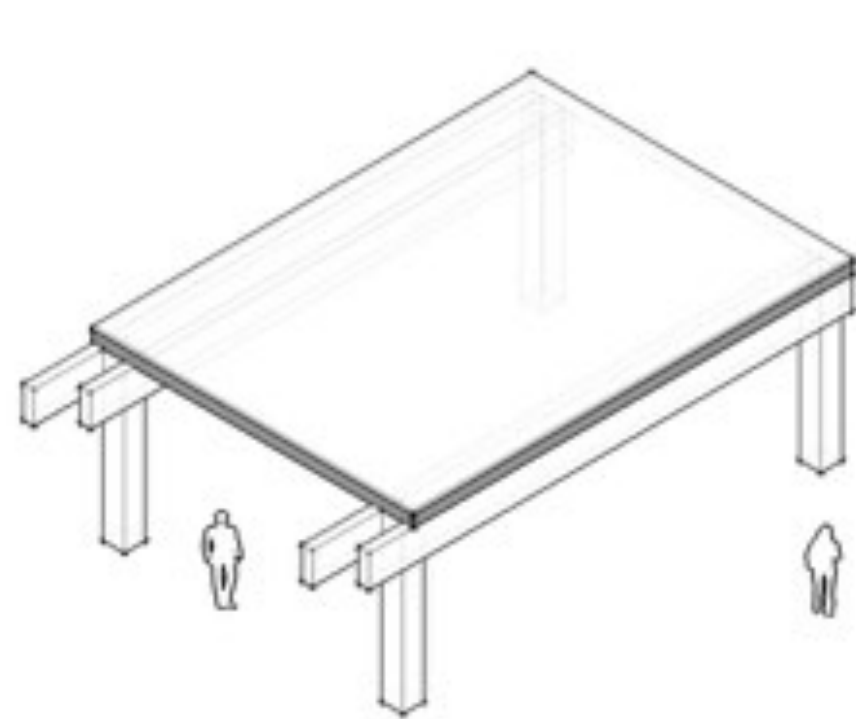
TIMBER HYBRID

MASS TIMBER FLOOR PANEL SLABS W/
A PRIMARY STRUCTURE OF GLULAM
COLUMNS AND BEAMS

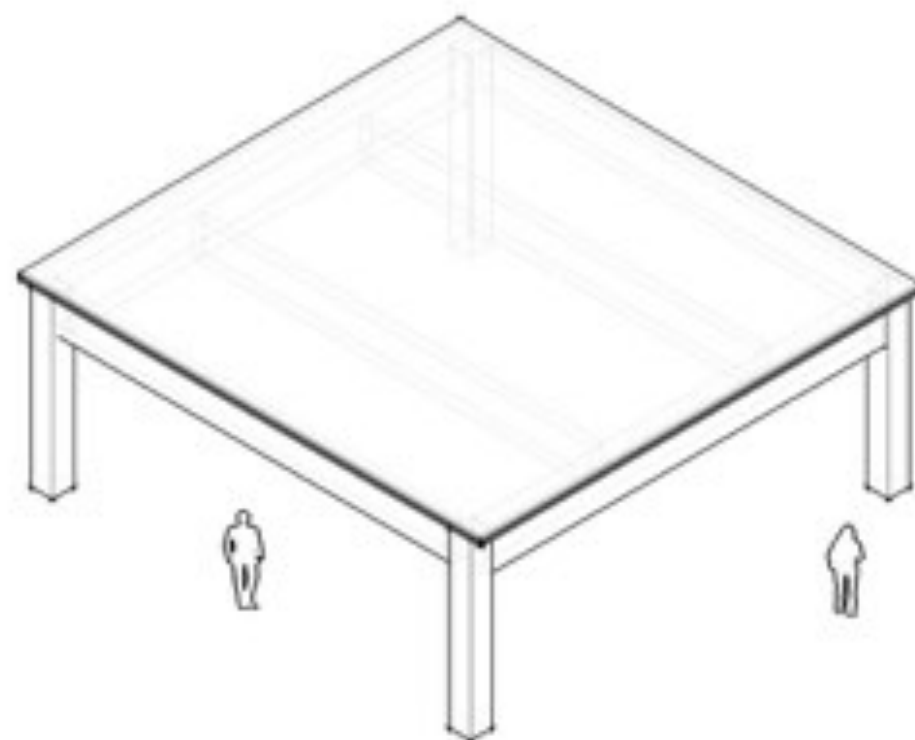


HYBRID SYSTEM

MASS TIMBER FLOOR SLABS
SUPPORTED BY STEEL OR
CONCRETE



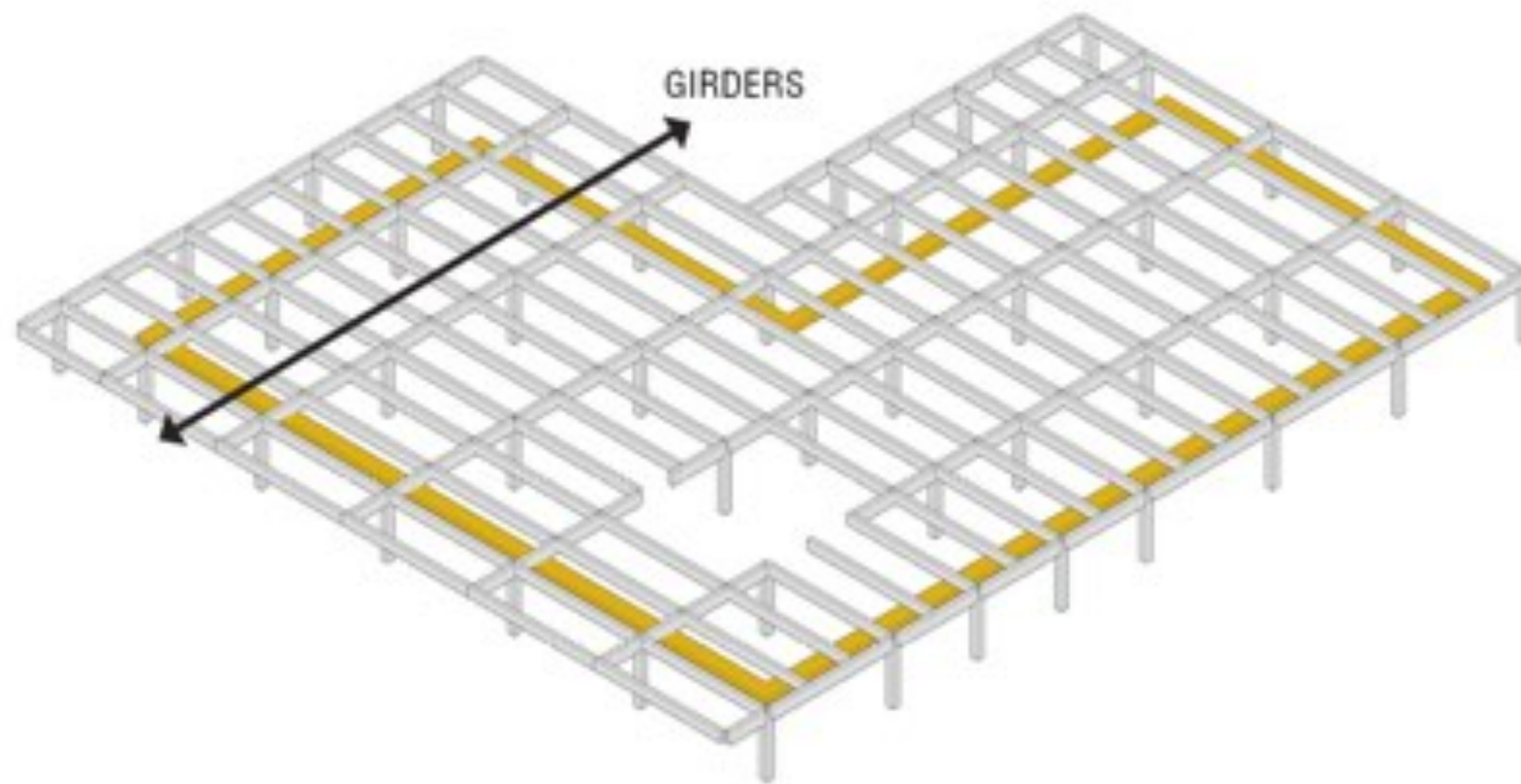
25' X 30' | 7LAM



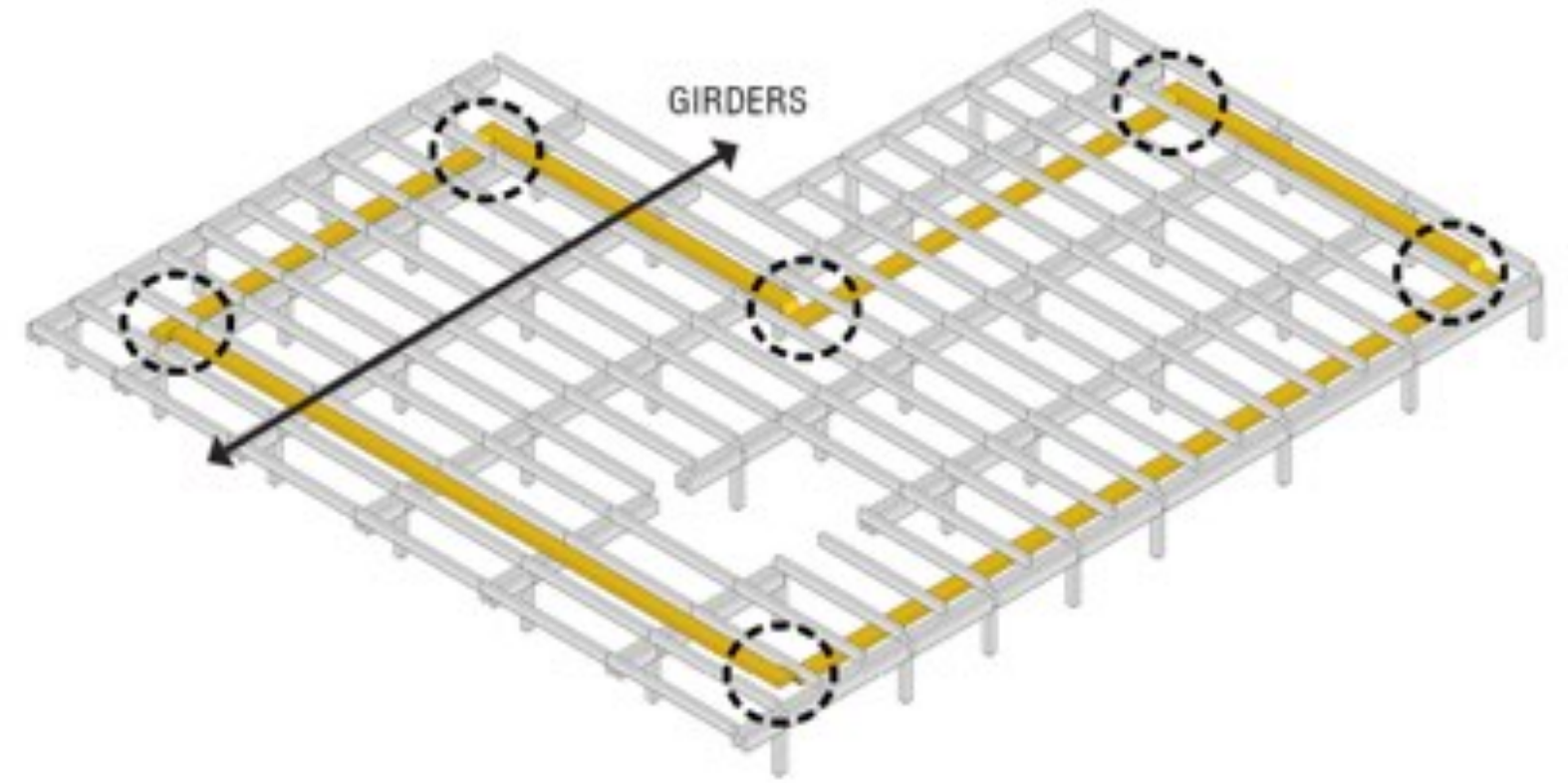
30' x 30' | 3-5LAM



30' x 40' | 3-5LAM



01 | SINGLE GIRDER



02 | DOUBLE GIRDER STACK

SUPPLIER SELECTION

CHAPTER 05



LOCATION



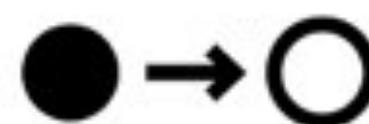
COORDINATION



MODULE LIMITS
BAY DESIGN TO FAB LIMITS



AESTHETIC / MATERIAL

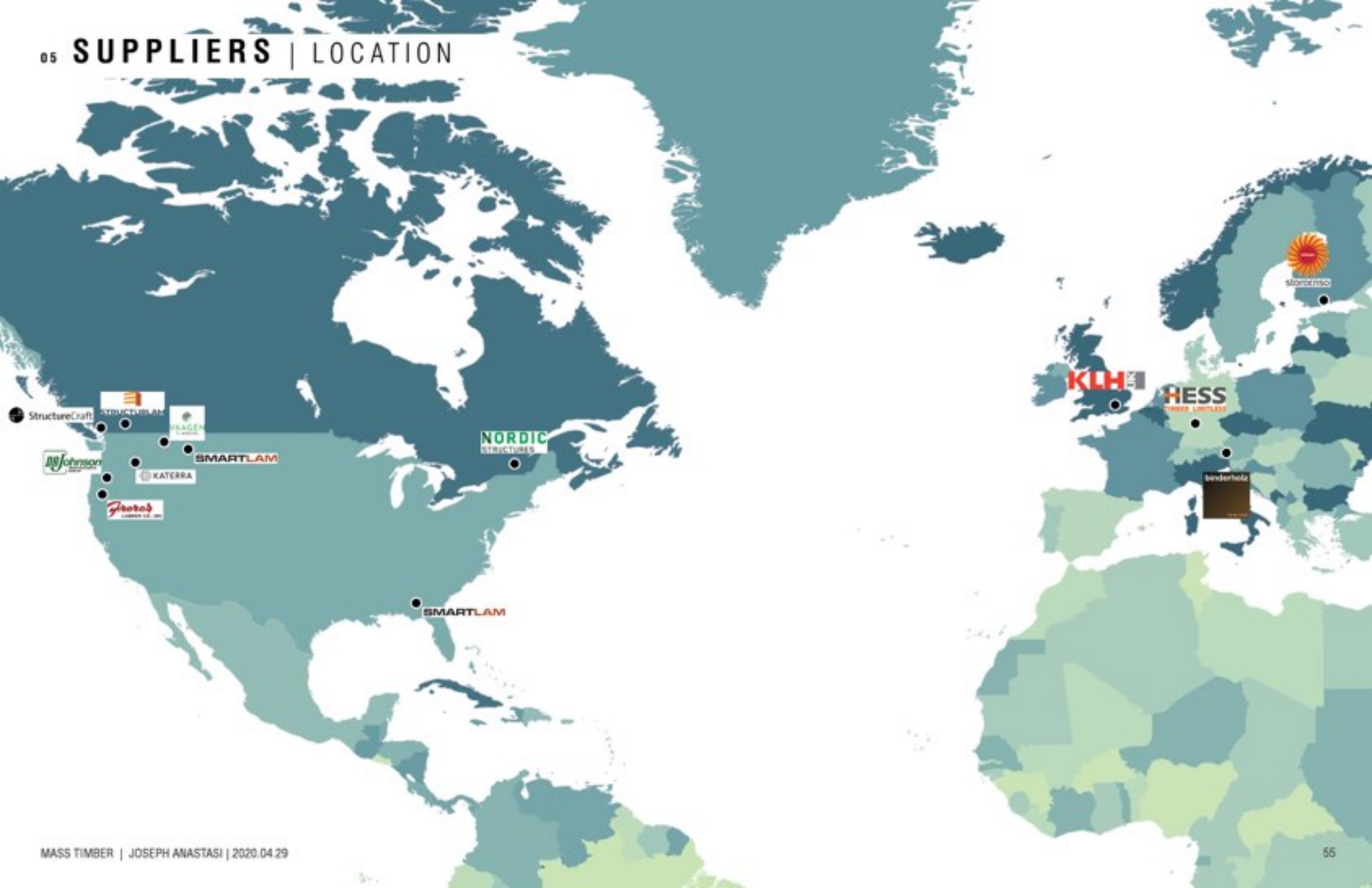


EXPERTISE
MGFR TO INSTALL



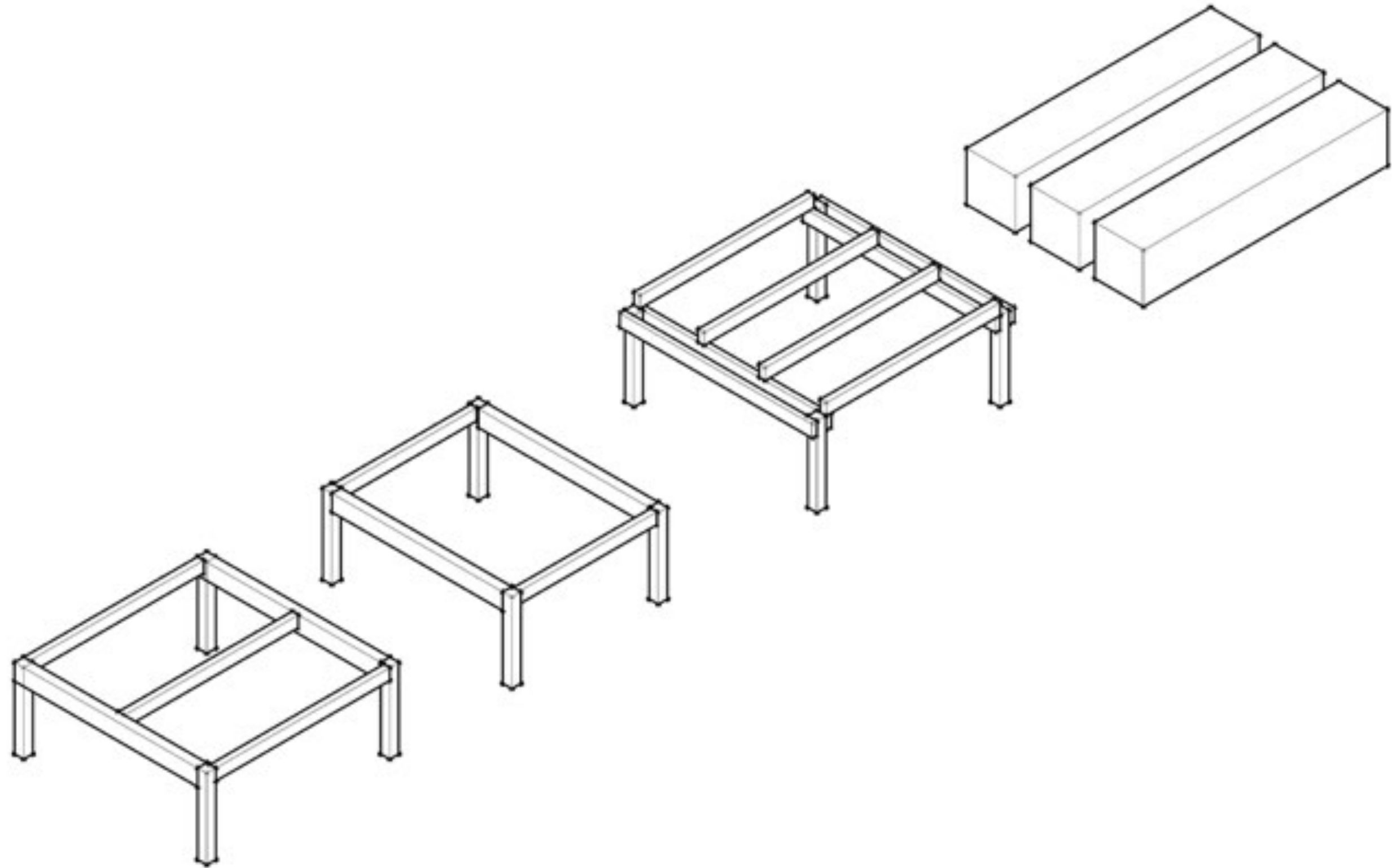
COST
"APPLES TO APPLES"

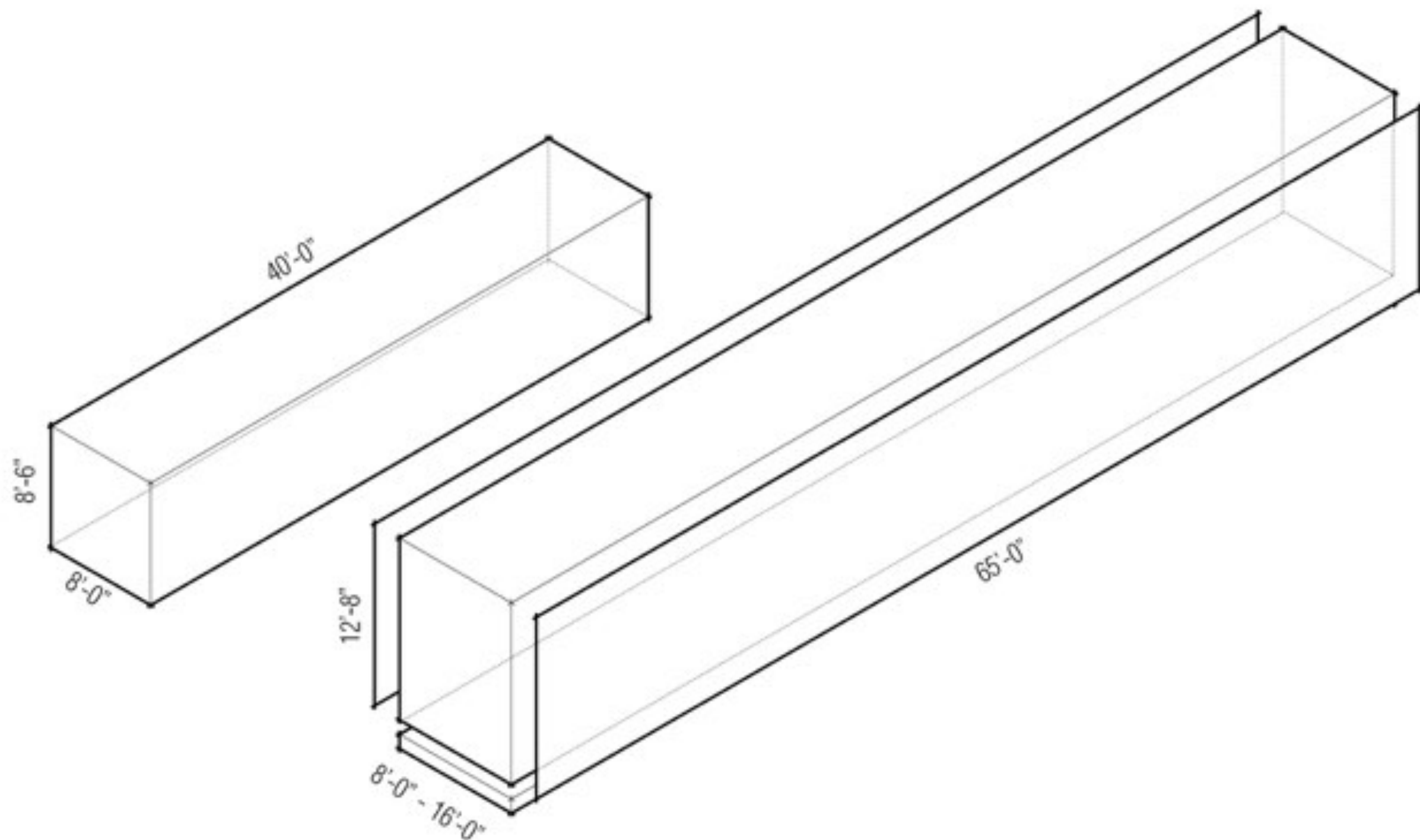
05 SUPPLIERS | LOCATION





05 **SUPPLIERS** | MODULE COORDINATION
BAY DESIGN TO FAB LIMITS





SHIPPING CONTAINER

TRUCK SHIPPING

05 **SUPPLIERS** | SOURCE TO INSTALL
SOURCES | CONNECTIONS



01 | SOURCE



02 | PROCESS



03 | SCOPE



04 | INSTALL



01 | PINE



02 | BLACK SPRUCE



03 | DOUGLAS-FIR



04 | SPRUCE / SPF

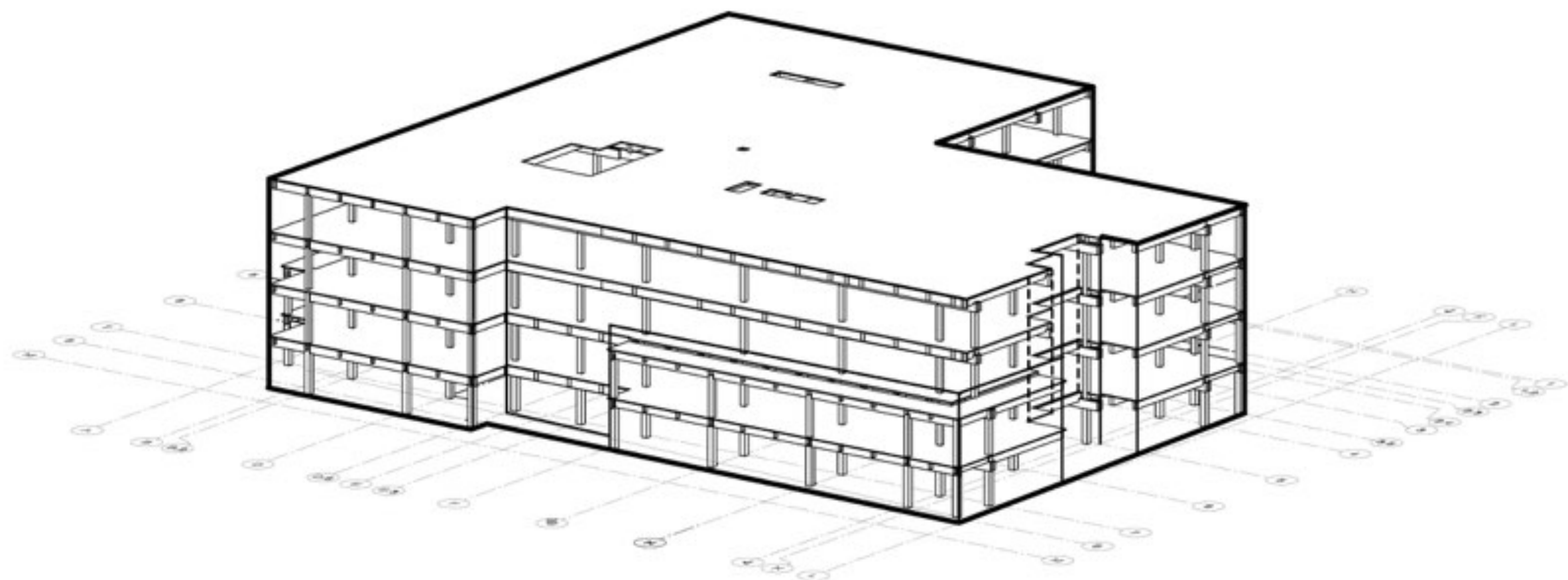


ORIGINAL



75% TINTED SEALER

05 **SUPPLIERS** | COST
"APPLES TO APPLES"



DESIGN & COORDINATION

CHAPTER 06



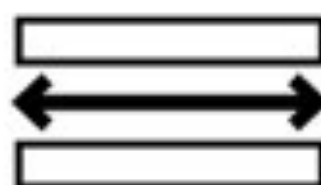
DESIGN SCHEDULE



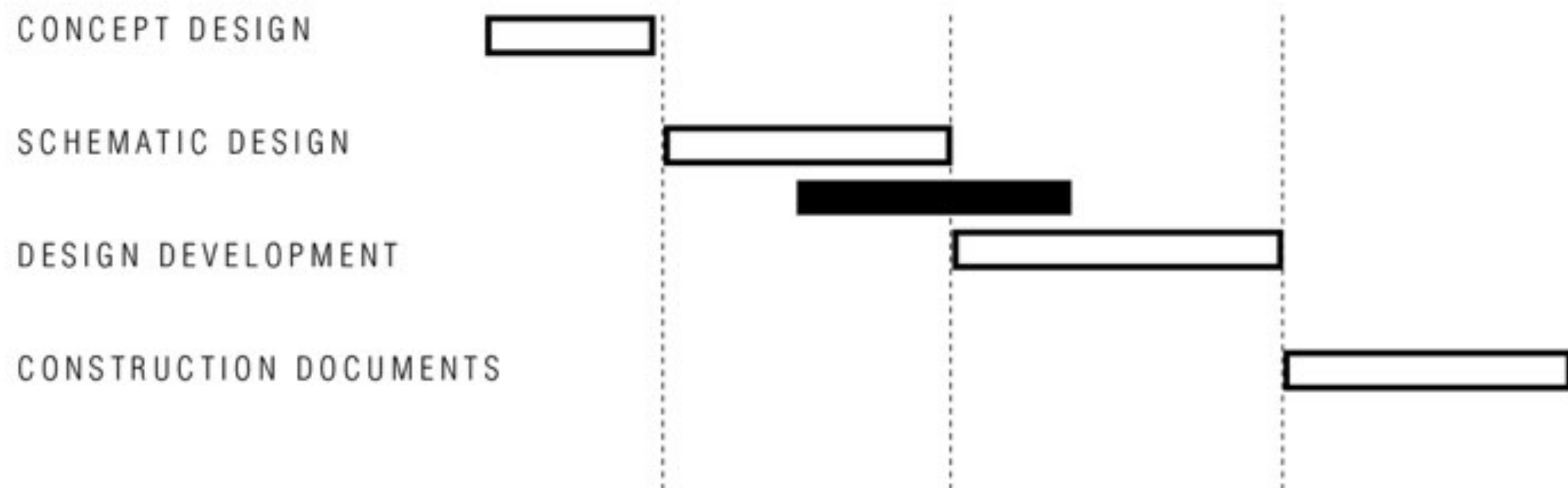
COST ANALYSIS

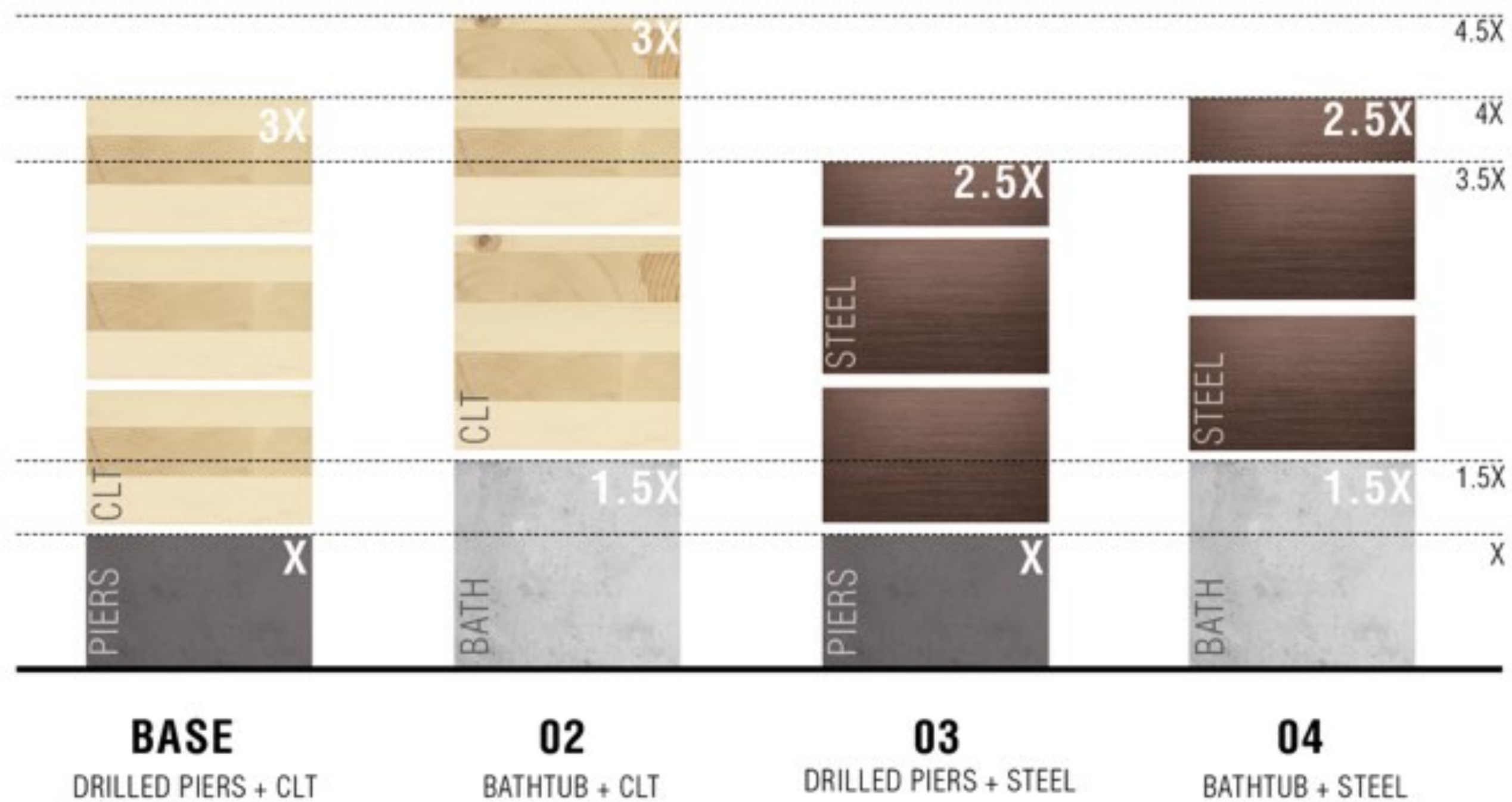


CONNECTIONS/ TRANSITIONS

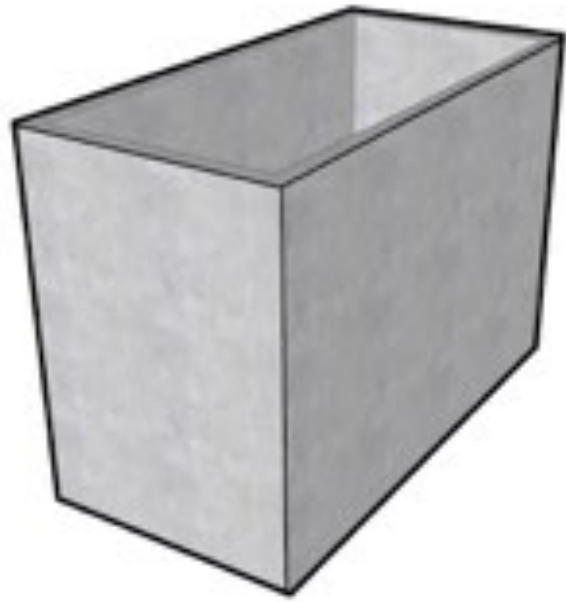


DATA/POWER

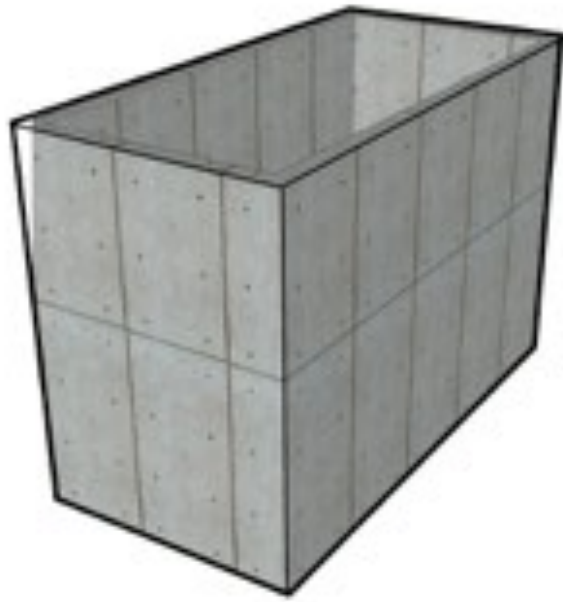




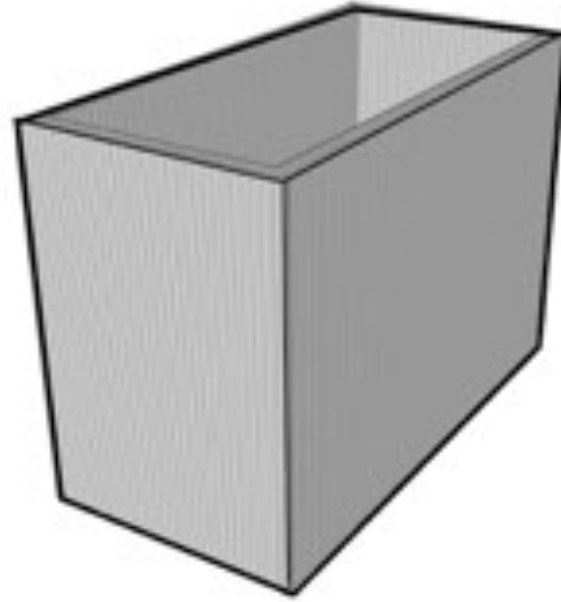
06 **COORDINATION** | CORE TYPES / TRANSITIONS
SCHEDULE | TOLERANCES



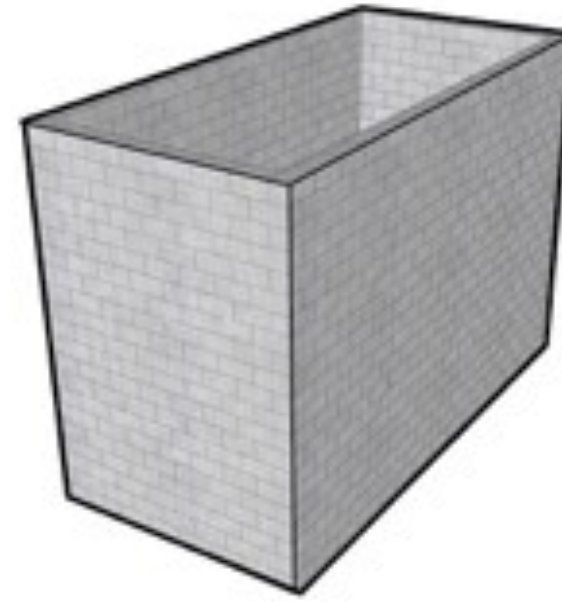
01 | PRECAST CONCRETE



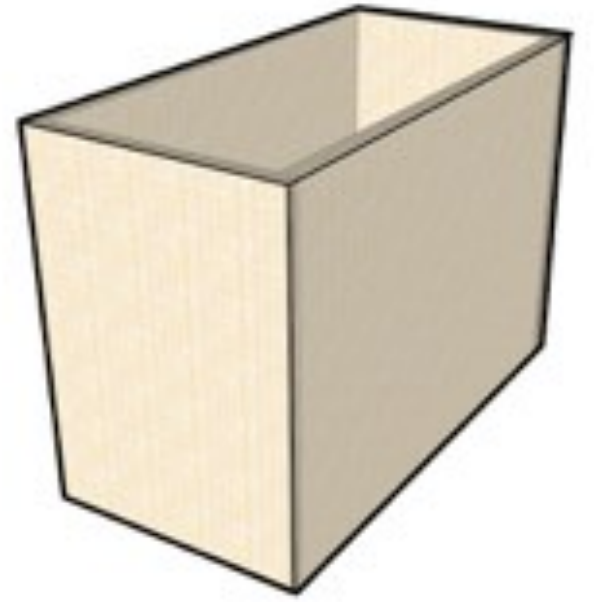
02 | CIP CONCRETE



03 | REDICOR DECKING



04 | CMU

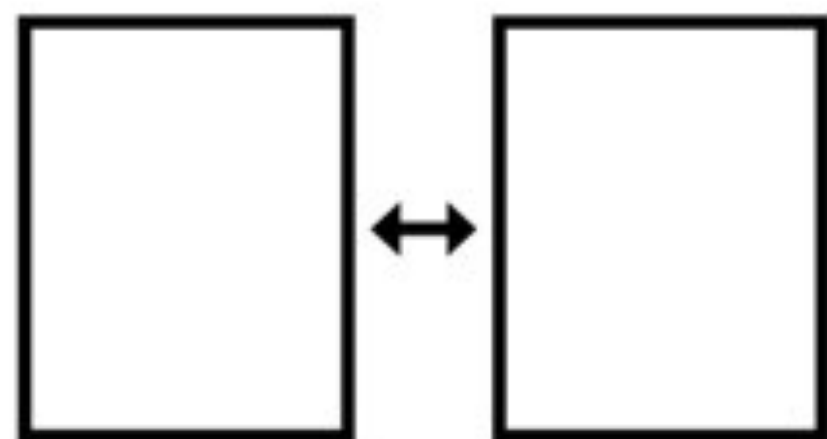


05 | CLT

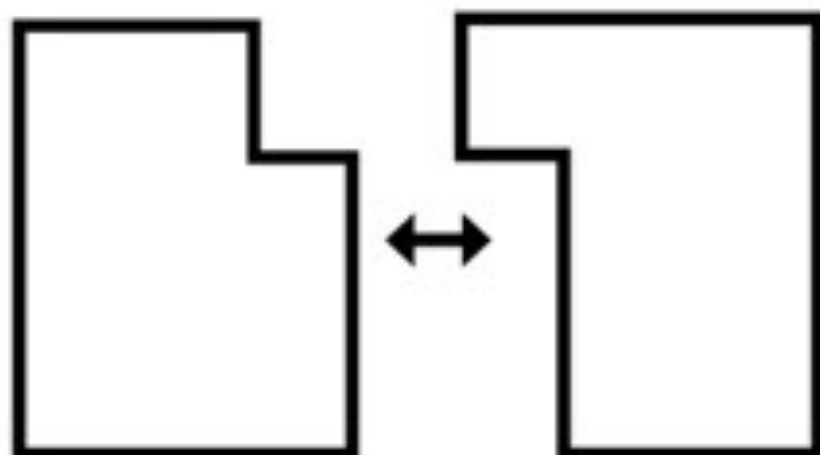




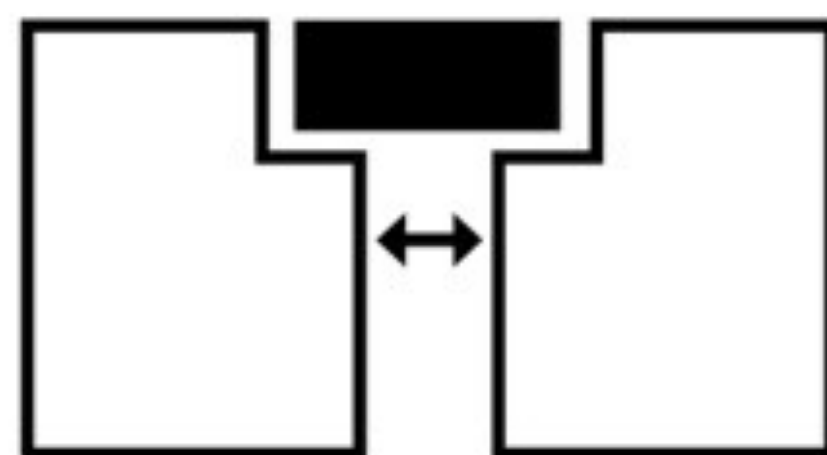




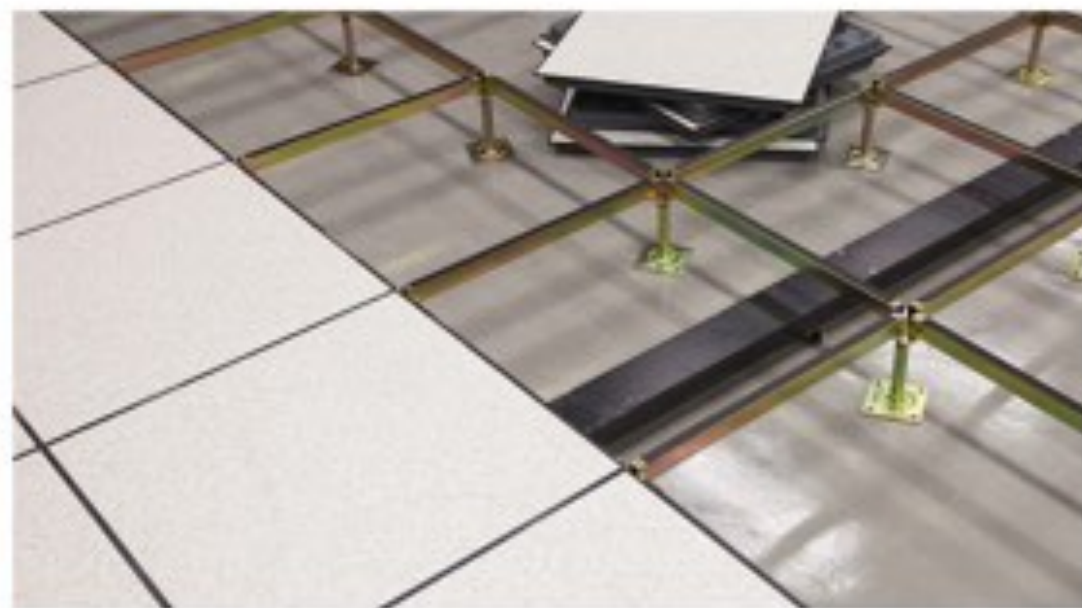
01 | BUTT JOINT



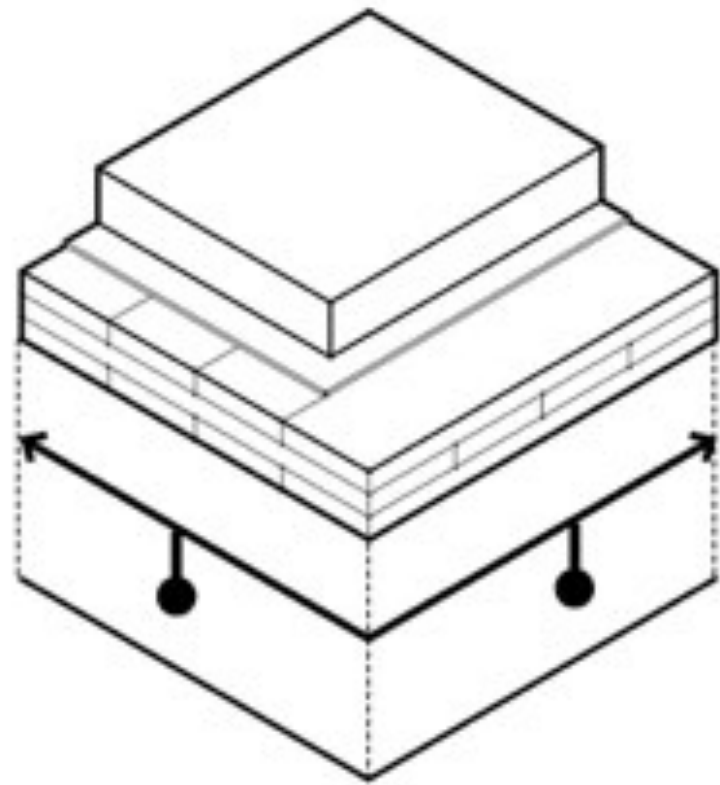
02 | HALF LAPPED JOINT



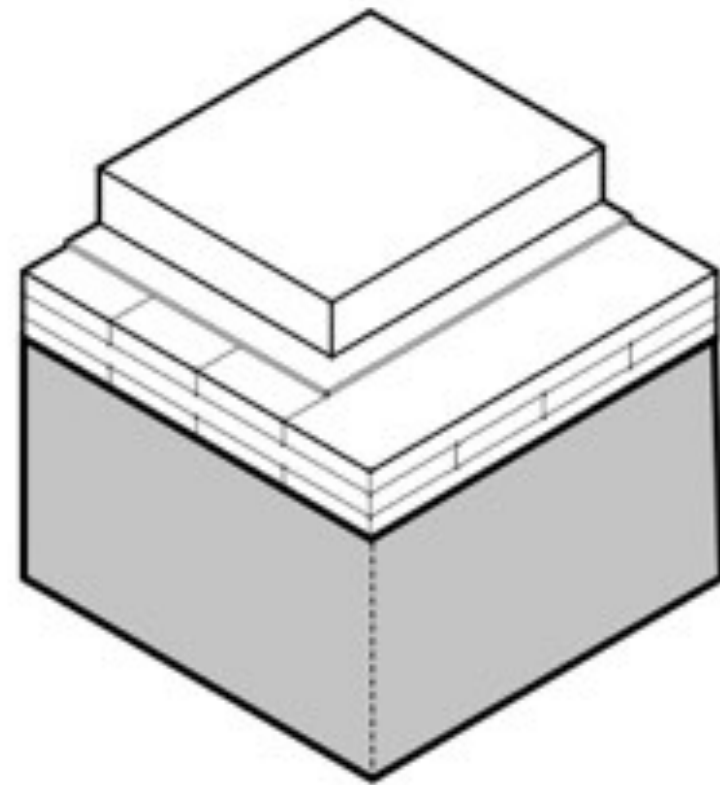
03 | SINGLE SPLINE JOINT



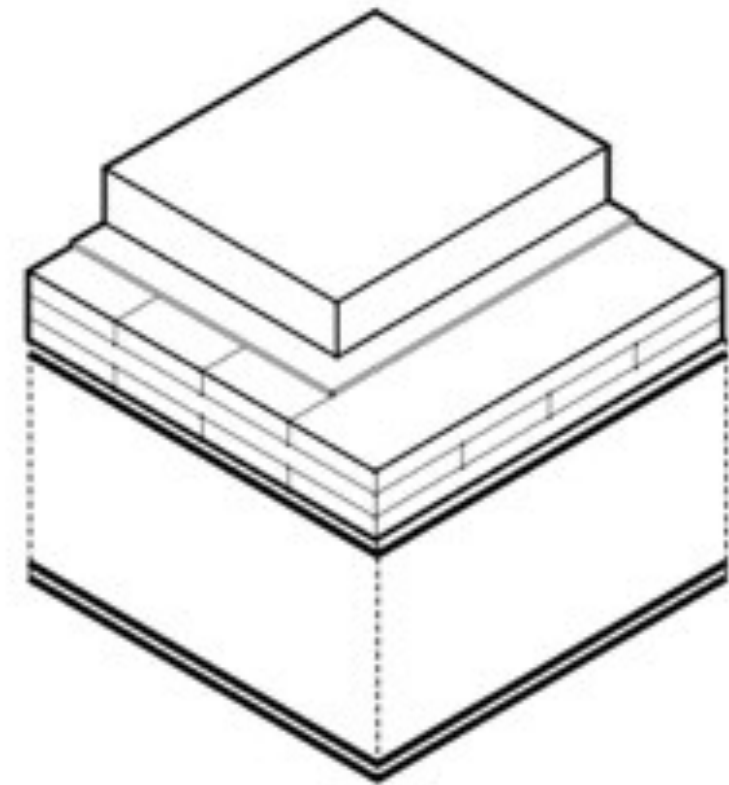




OPTION 01 SPRINKLERS



OPTION 02 NONCOMB. INSULATION



OPTION 03 5/8" TYPE X GYPSUM BD.



CONSTRUCTION

CHAPTER 07



SCHEDULE



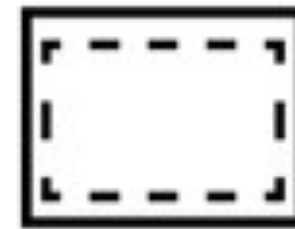
SITE SAFETY



LESS WASTE



QUIETER



ZERO LOT LINE BENEFITS



CLEAN SITE













COMPLETION

CHAPTER 08











MASS TIMBER | SUMMARY



INTEGRATED DESIGN
DIGITAL MODEL COORDINATION



PREFAB BENEFITS



TOLERANCE / LIMITS



PROVIDER COMFORT



AESTHETIC / MATERIAL



COST / PRECONSTRUCTION



DUE-DILIGENCE



LOCAL JURISDICTION



QUESTIONS?

This Concludes the American Institute of Architects Continuing Education Systems Course

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