SPHERES OF INFLUENCE

People and Plants Cohabitate in Amazon's Seattle Spheres

Facade Tectonics FORUM SEATTLE

SPEAKERS

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NBBJ

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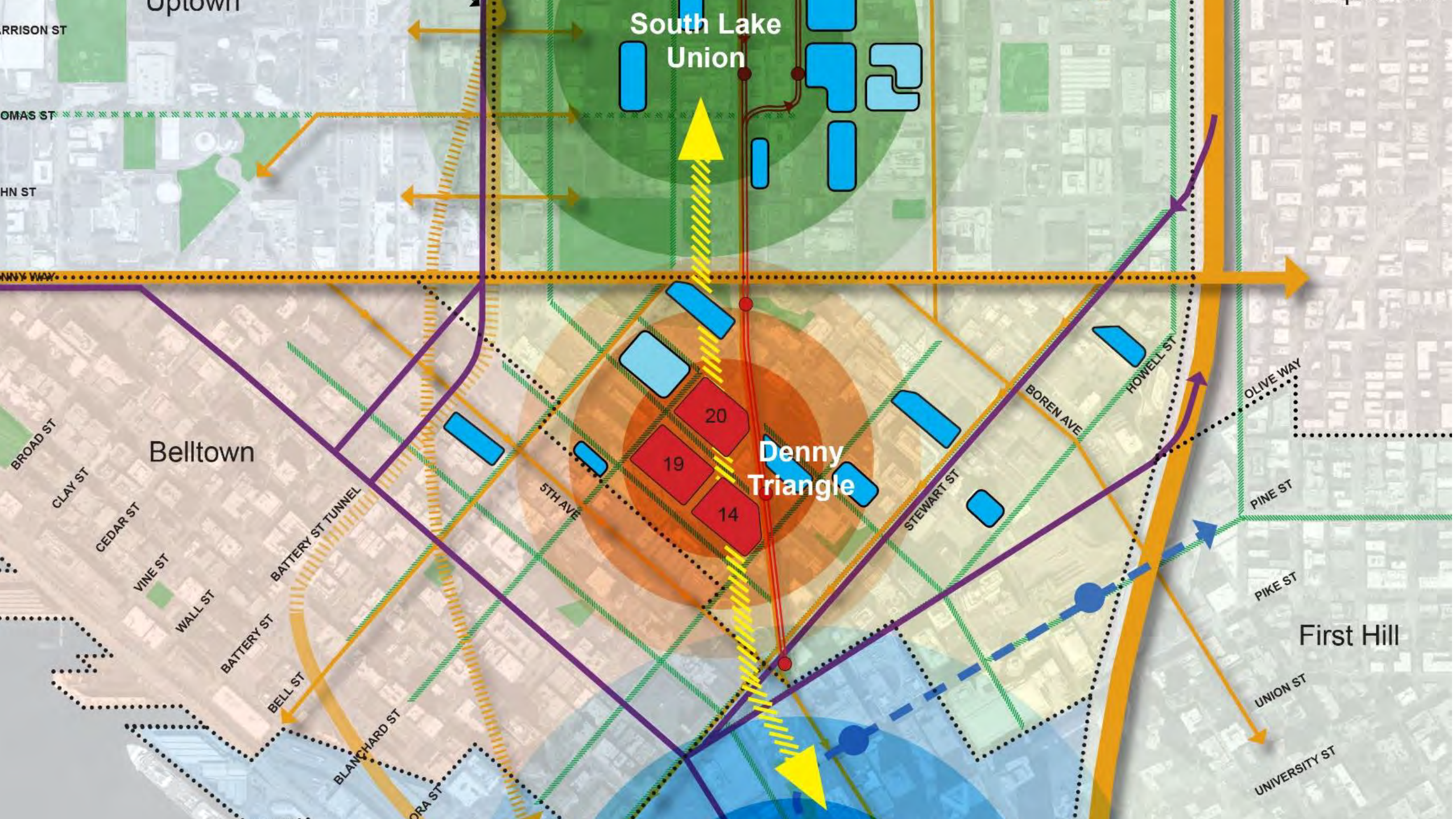
Senior Associate
WSP

Christopher Meek, AIA, IES
Professor of Architecture
University of Washington

wsp nbbj

Facade Tectonics

July 2019


Uptown
South Lake Union
Belltown
Denny Triangle
First Hill
20
19
14
ARRISON ST
OMAS ST
HN ST
NNY WAY
BROAD ST
CLAY ST
CEDAR ST
VINE ST
WALL ST
BATTERY ST
BATTERY ST TUNNEL
BELL ST
BLANCHARD ST
5TH AVE
STEWART ST
BOREN AVE
HOWELL ST
OLIVE WAY
PINE ST
PIKE ST
UNION ST
UNIVERSITY ST

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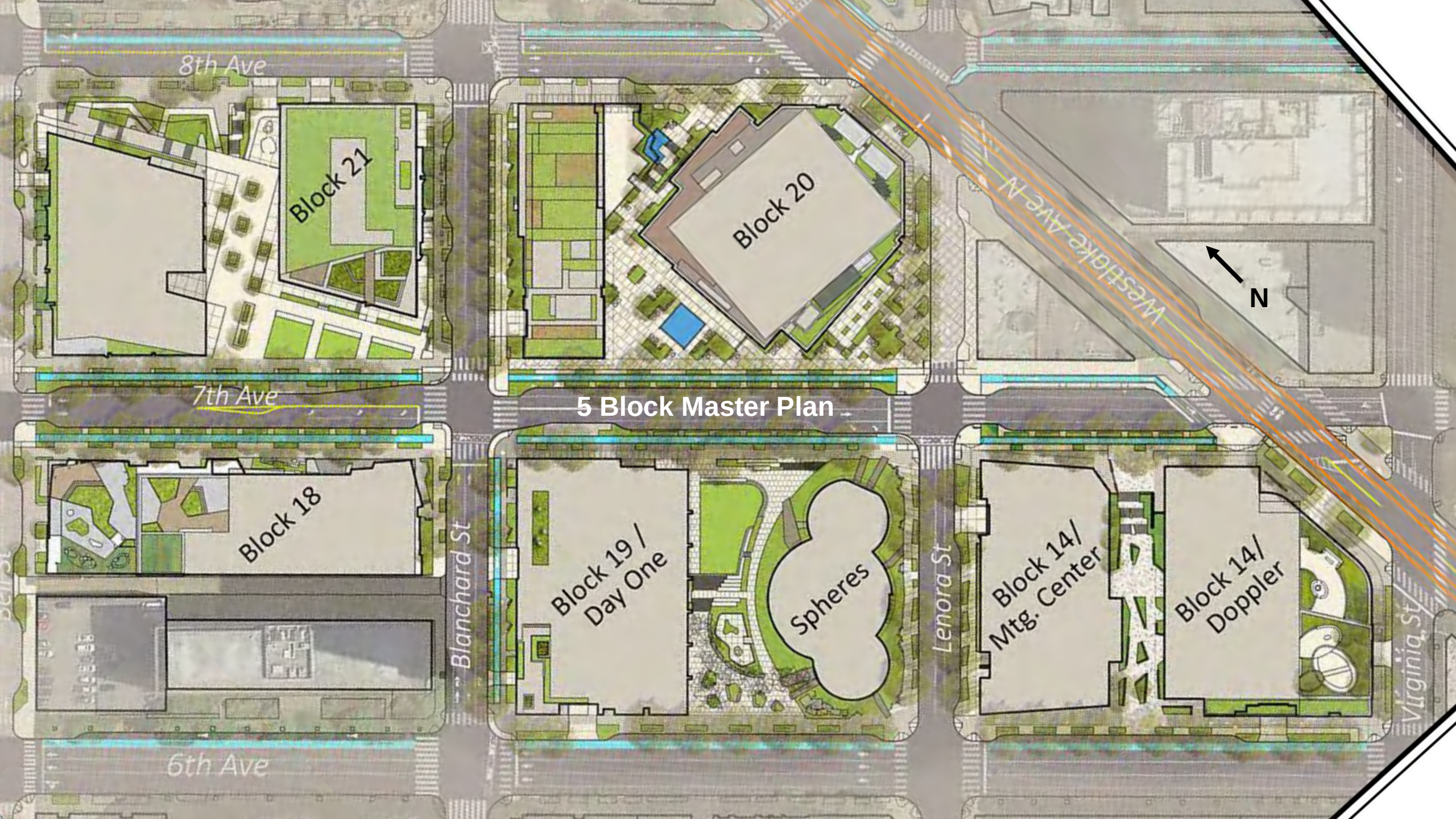
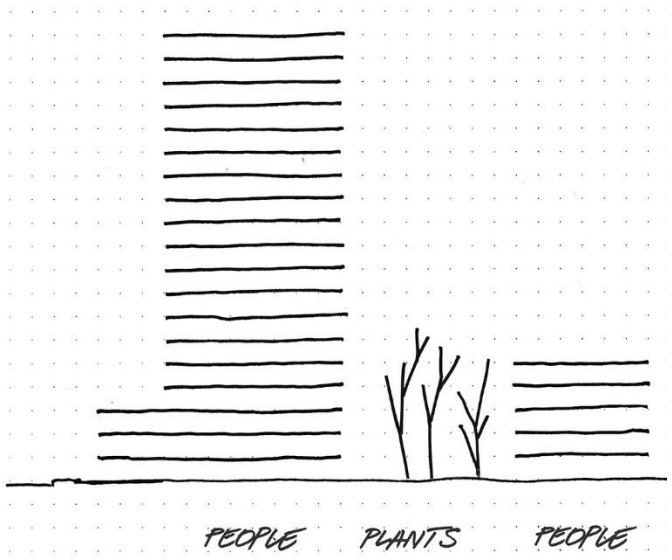
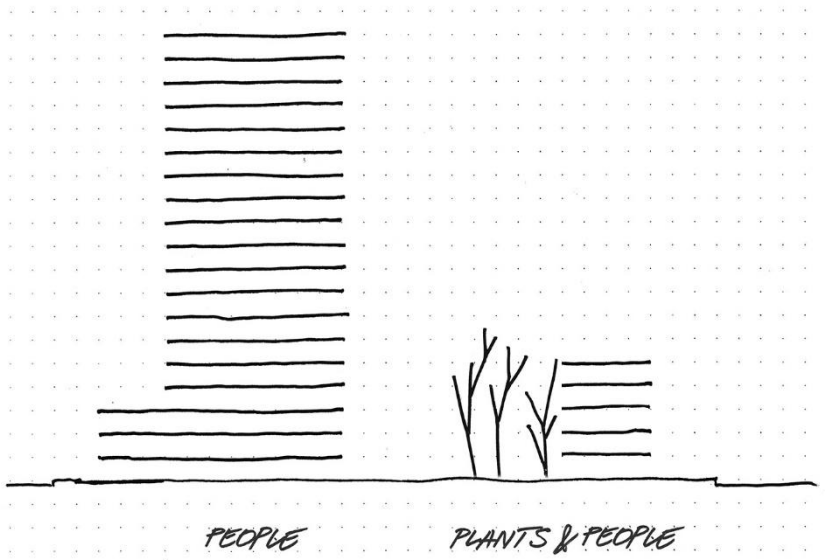
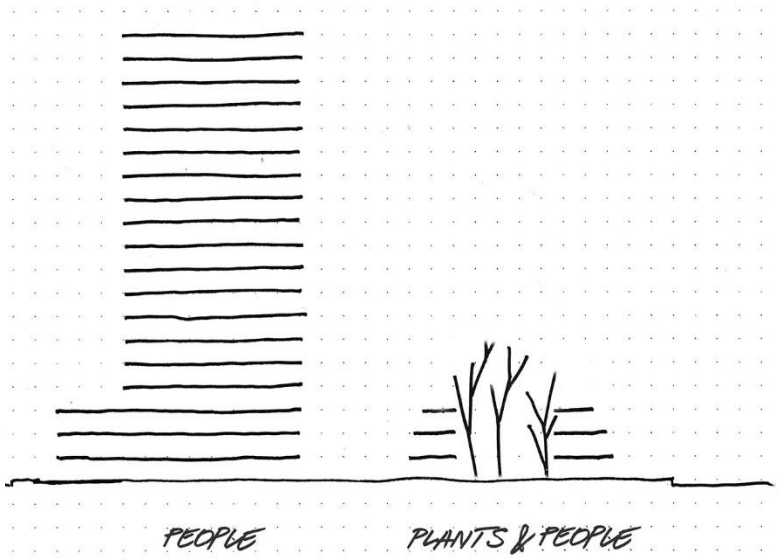
July 2019


8th Ave
7th Ave
6th Ave
Block 21
Block 20
Block 18
Block 19 / Day One
Spheres
Block 14/ Mtg. Center
Block 14/ Doppler
Blanchard St
Lenora St
Virginia St
Westlake Ave N
N
5 Block Master Plan


PEOPLE
PLANTS
PEOPLE


PEOPLE
PLANTS & PEOPLE


PEOPLE
PLANTS & PEOPLE

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So, what makes it
so complicated?

What a plant needs / What a human needs

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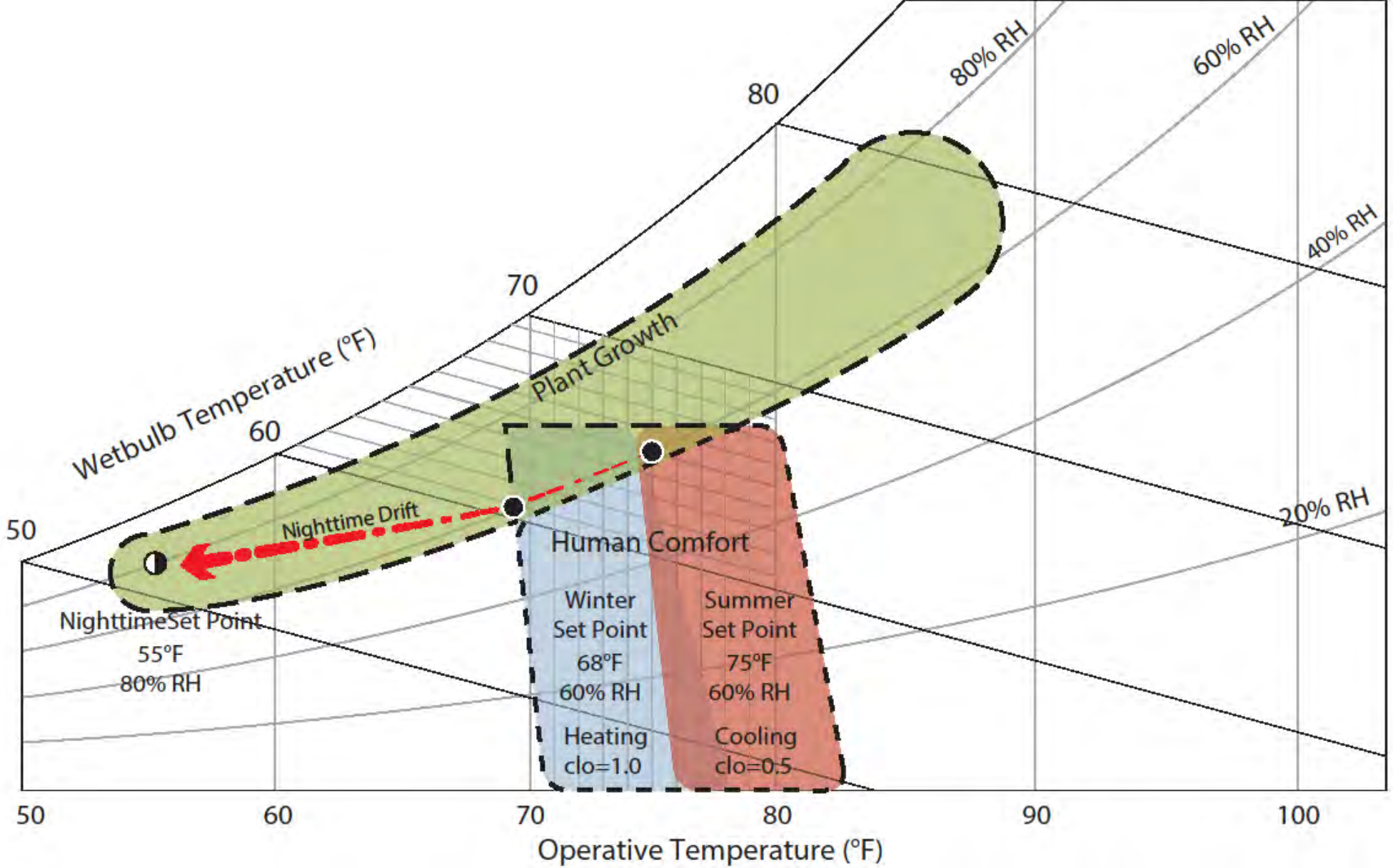
80% RH
60% RH
40% RH
20% RH
80
70
60
50
Wetbulb Temperature (°F)
Plant Growth
Nighttime Drift
Human Comfort
Winter
Set Point
68°F
60% RH
Heating
clo=1.0
Summer
Set Point
75°F
60% RH
Cooling
clo=0.5
NighttimeSet Point
55°F
80% RH
50
60
70
80
90
100
Operative Temperature (°F)

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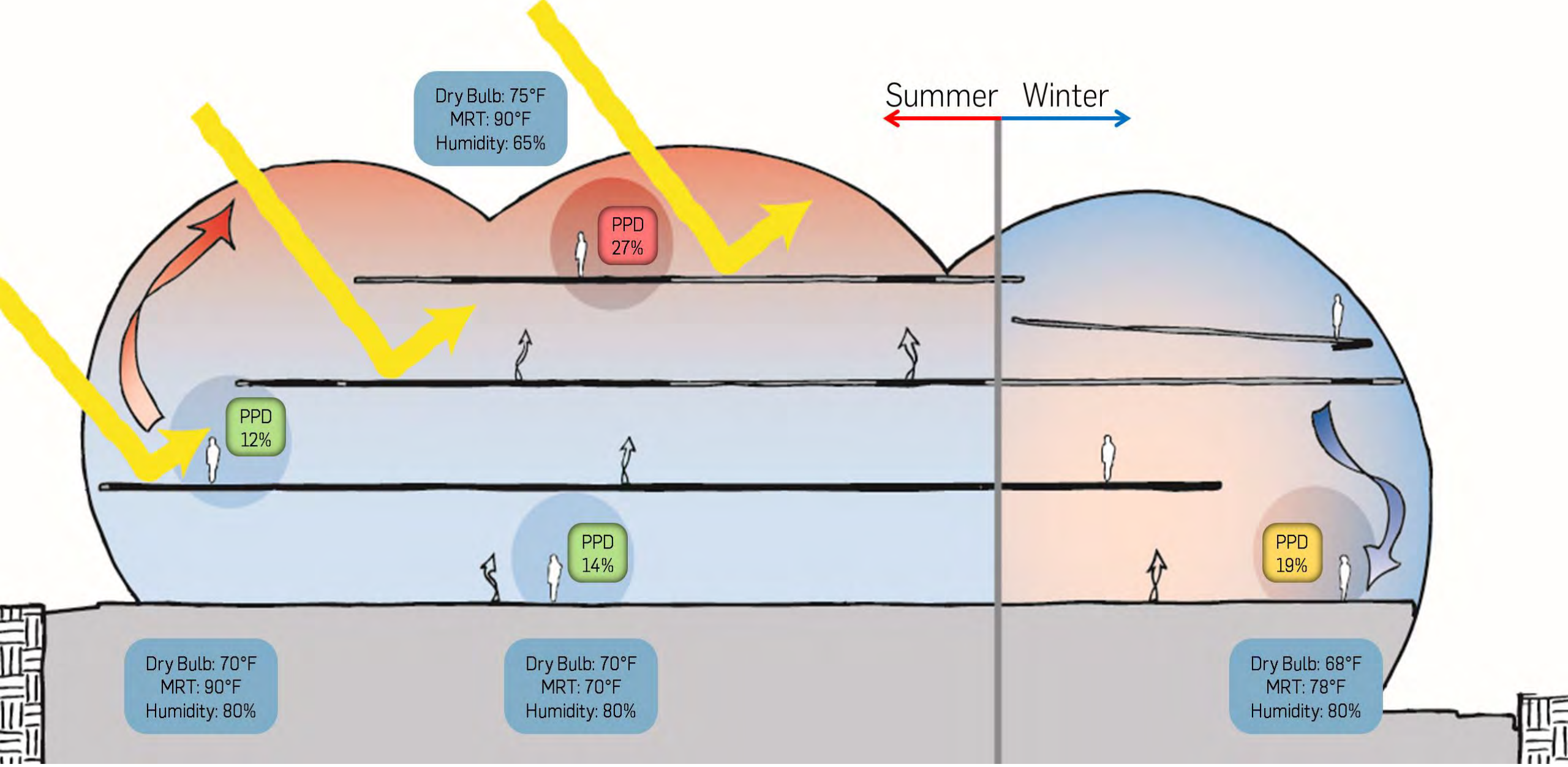
Summer
Winter
Dry Bulb: 75°F
MRT: 90°F
Humidity: 65%
PPD
27%
PPD
12%
PPD
14%
PPD
19%
Dry Bulb: 70°F
MRT: 90°F
Humidity: 80%
Dry Bulb: 70°F
MRT: 70°F
Humidity: 80%
Dry Bulb: 68°F
MRT: 78°F
Humidity: 80%

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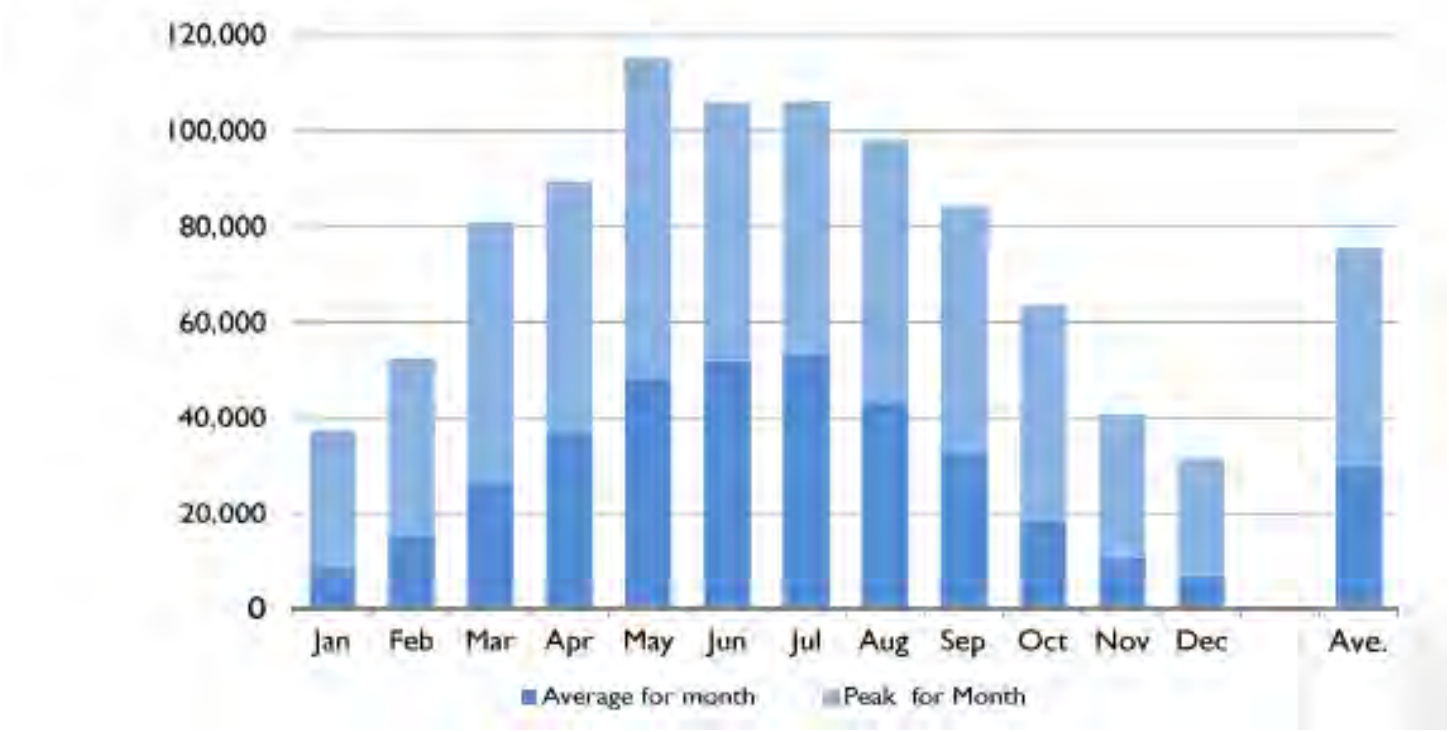
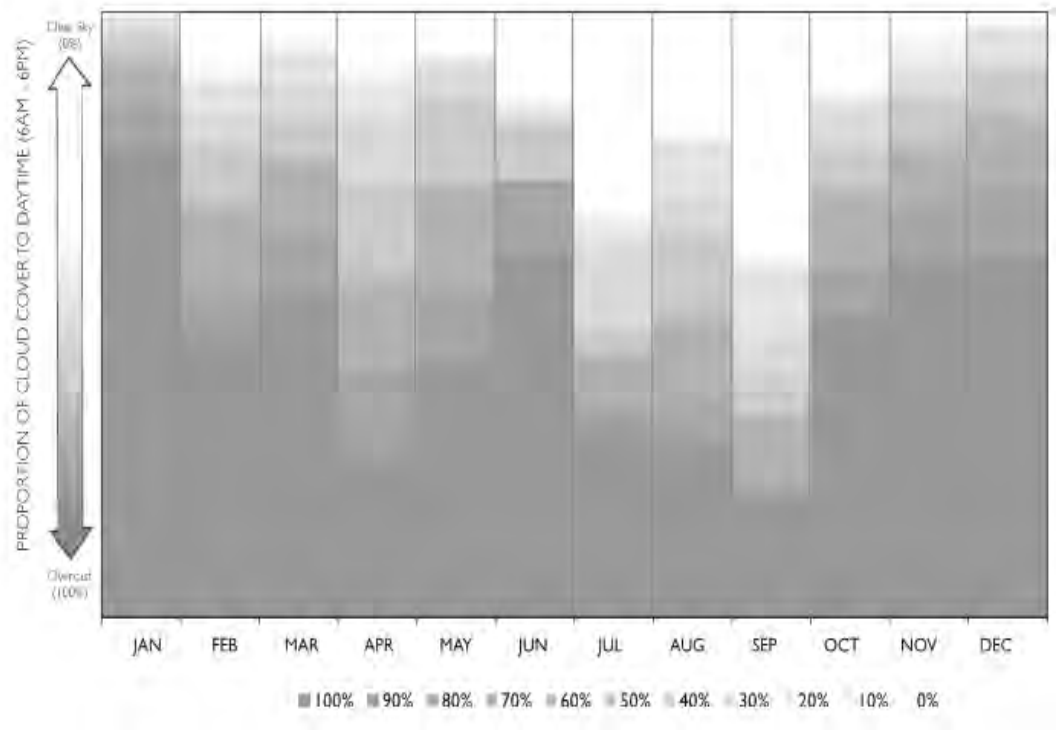
Facade Tectonics

July 2019

DAYLIGHT LEVELS (lux) IN SEATTLE BY MONTH



CLOUD COVER - DAYTIME ONLY (6am - 6pm)



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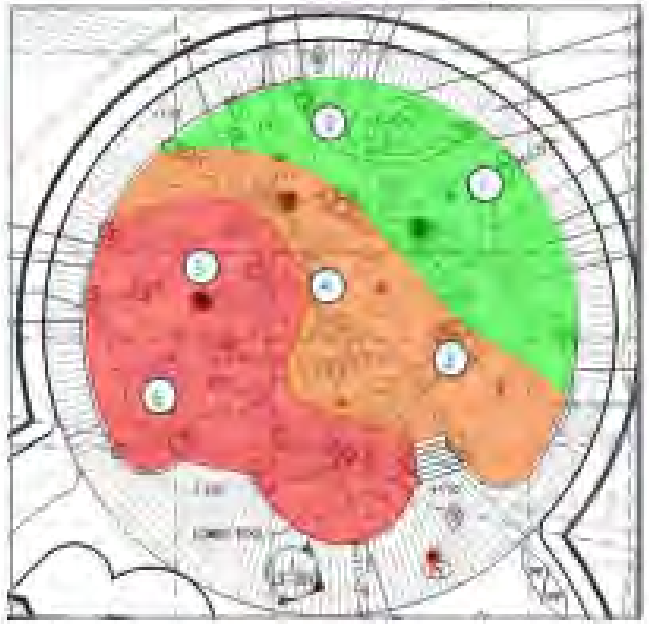
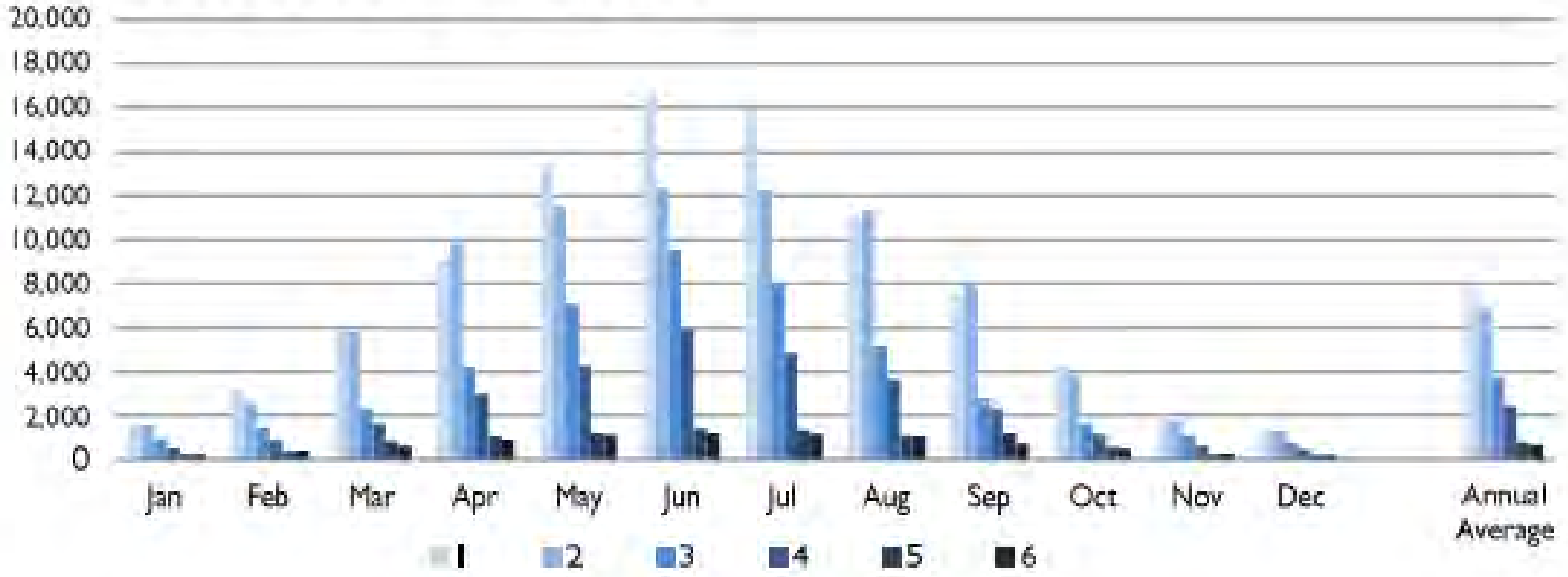
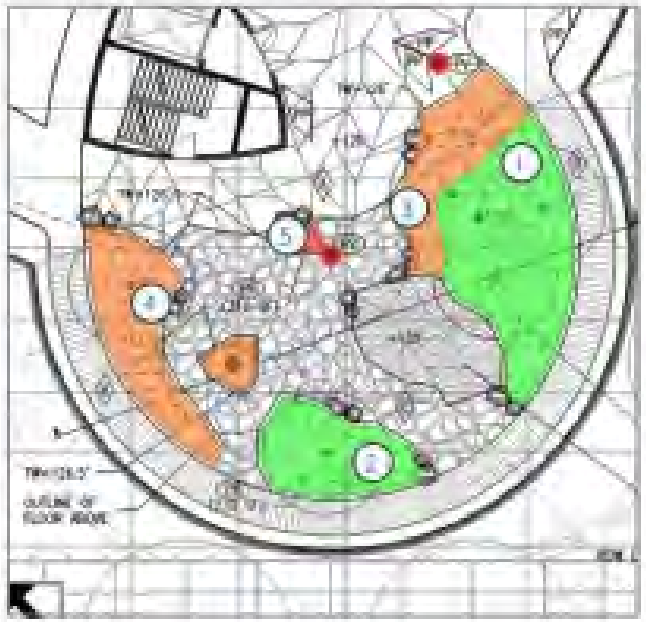
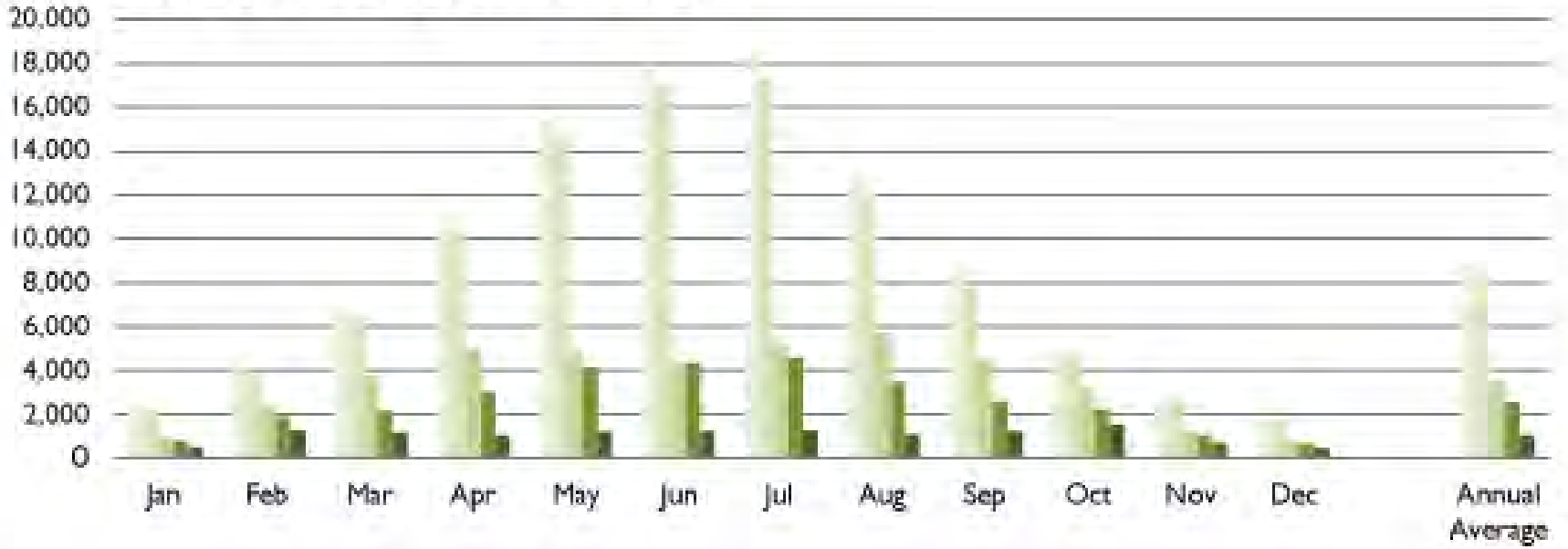


LIGHT LEVELS IN NORTH SPHERE

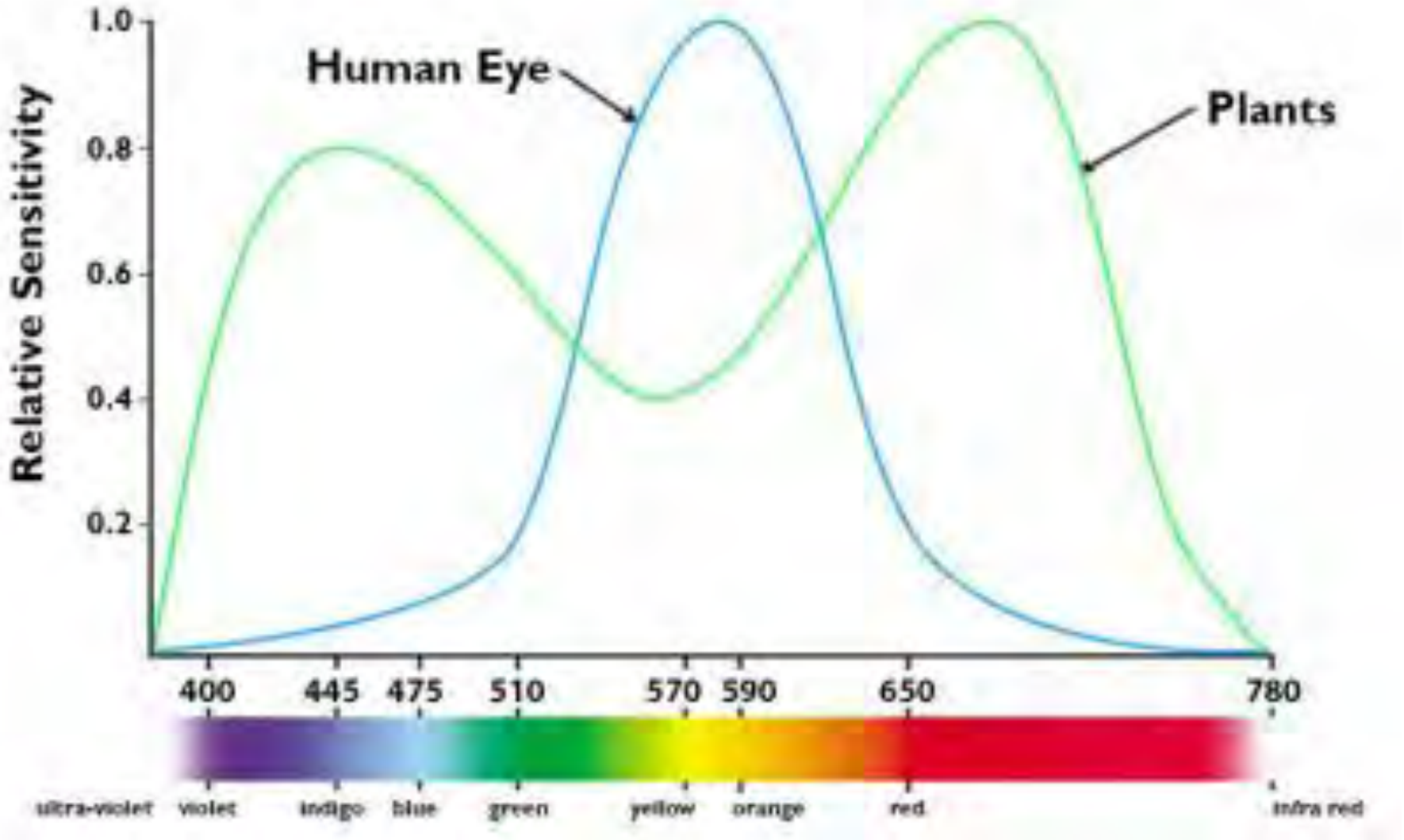


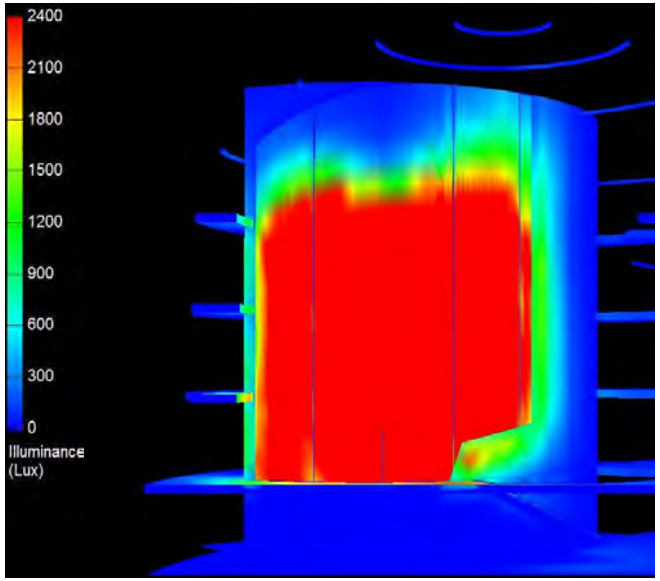


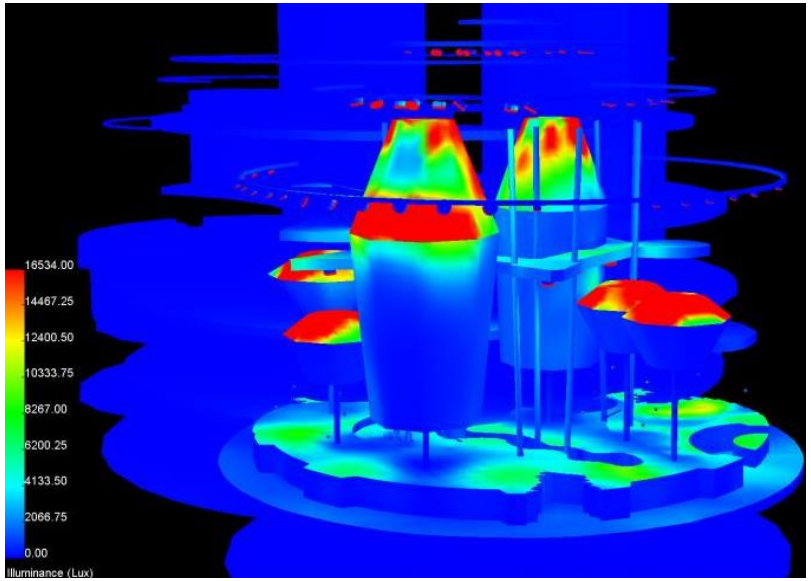
LIGHT LEVELS IN SOUTH SPHERE

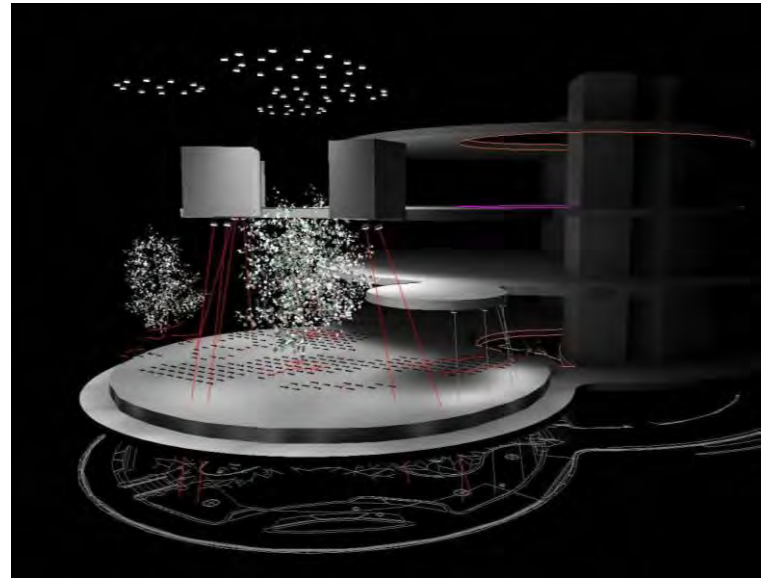


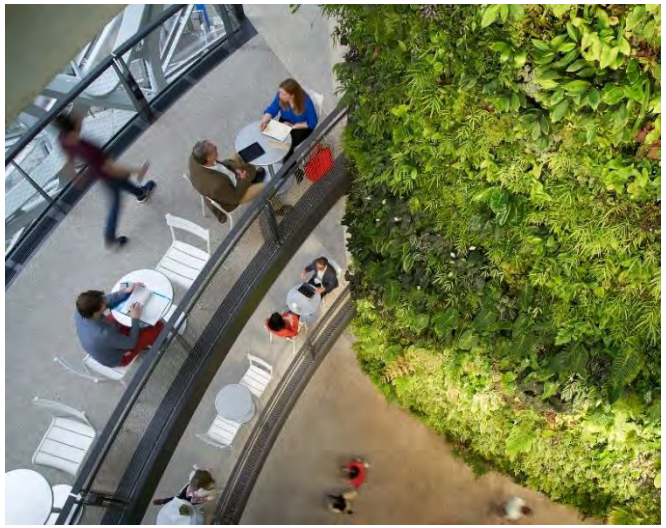
RELATIVE SENSITIVITY TO VISIBLE SPECTRUM - HUMANS vs. PLANTS

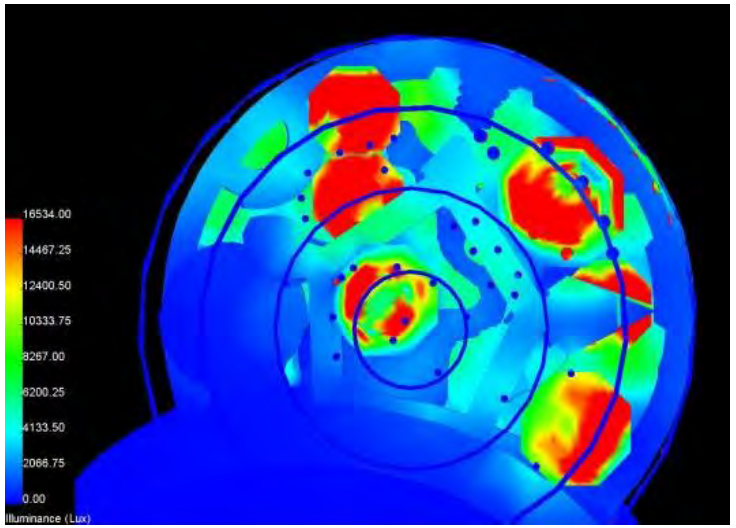


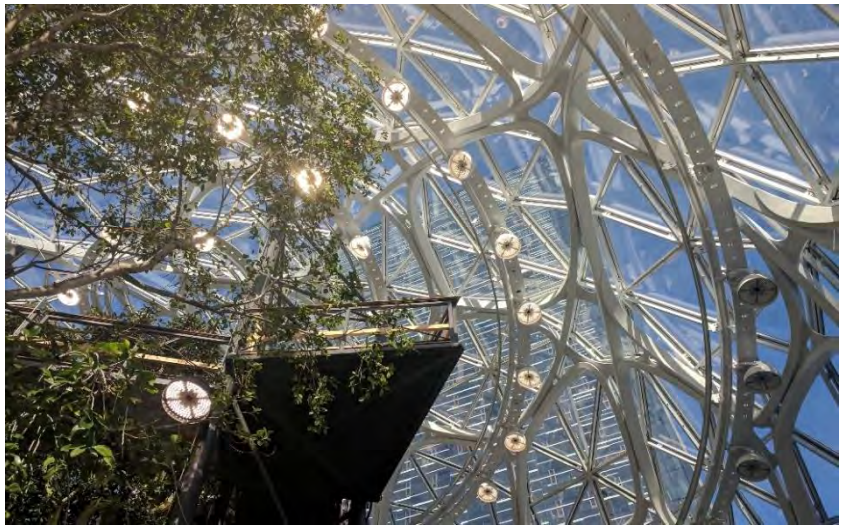












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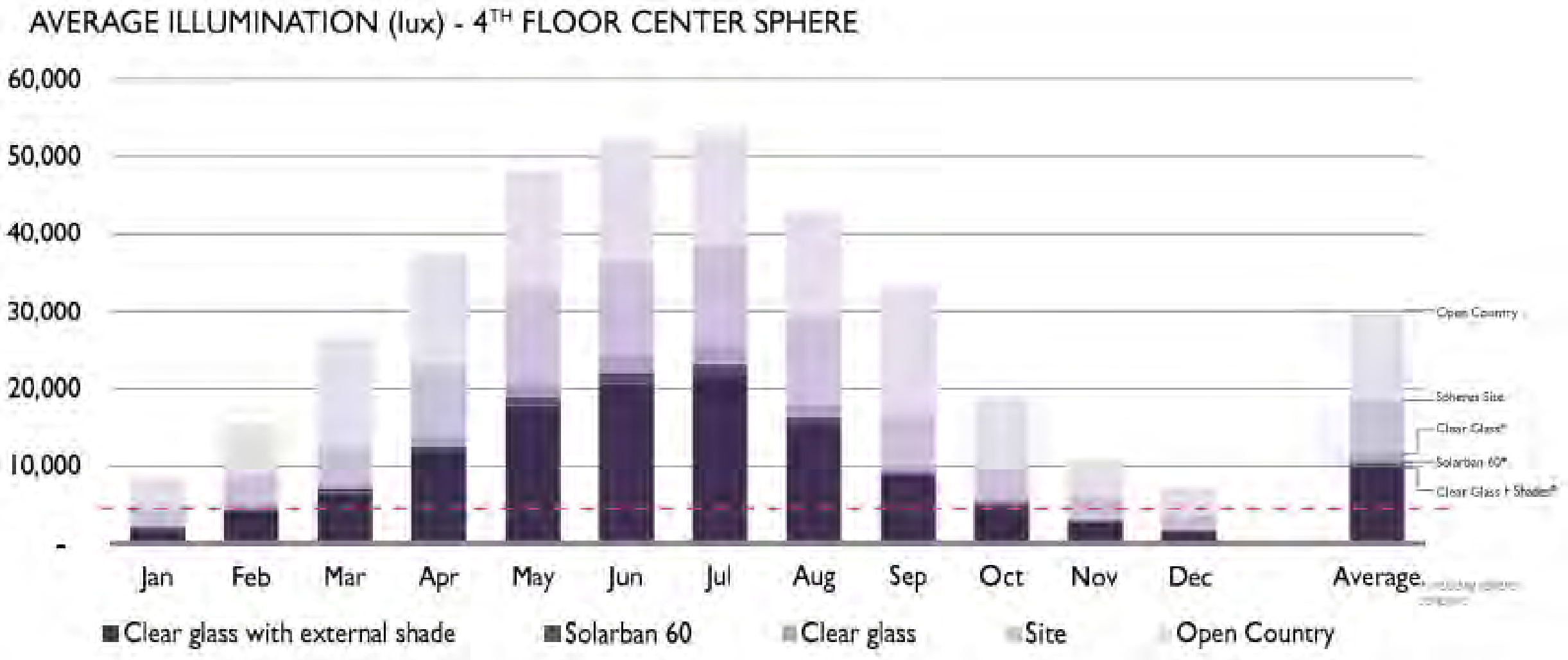
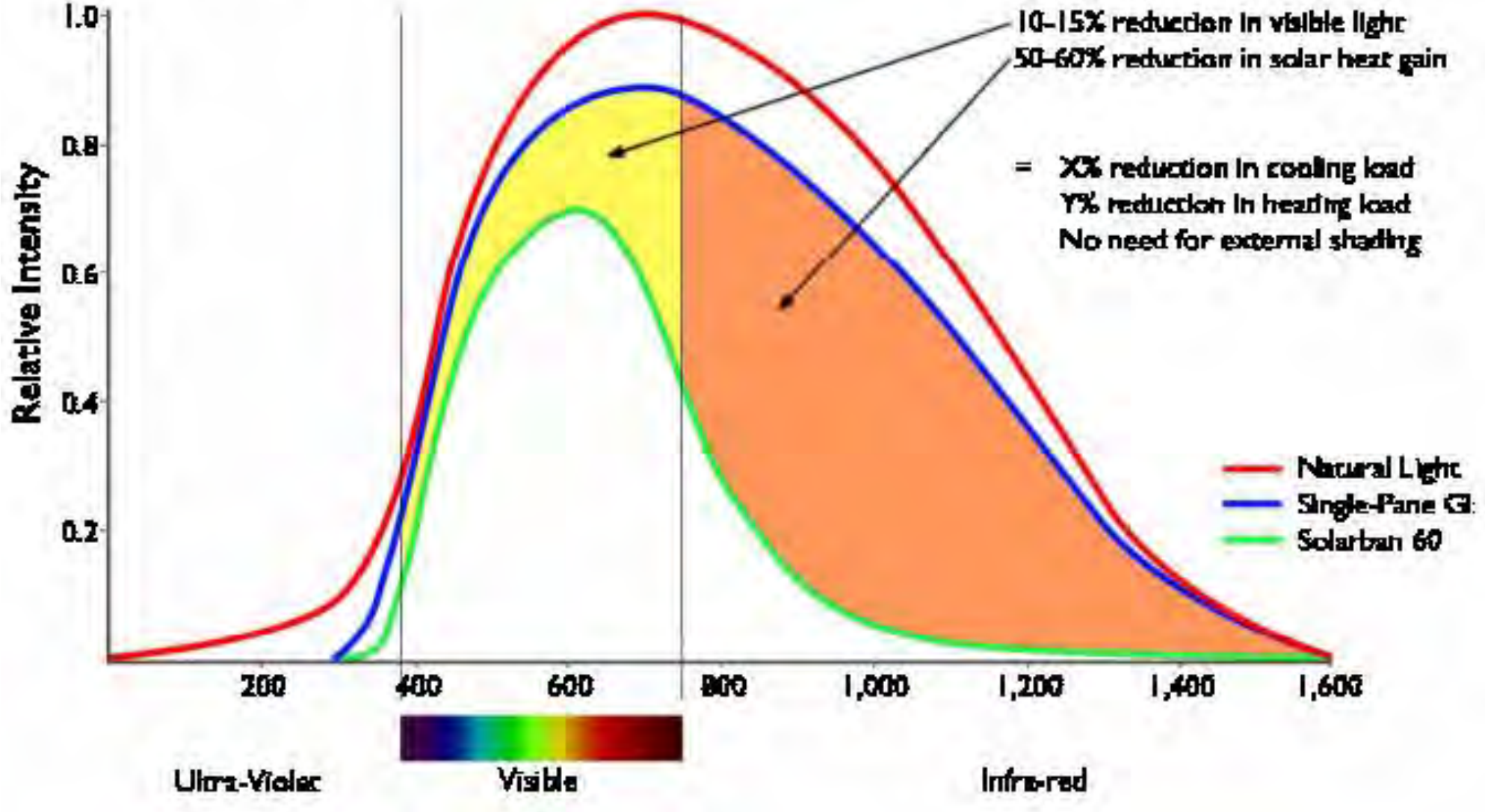
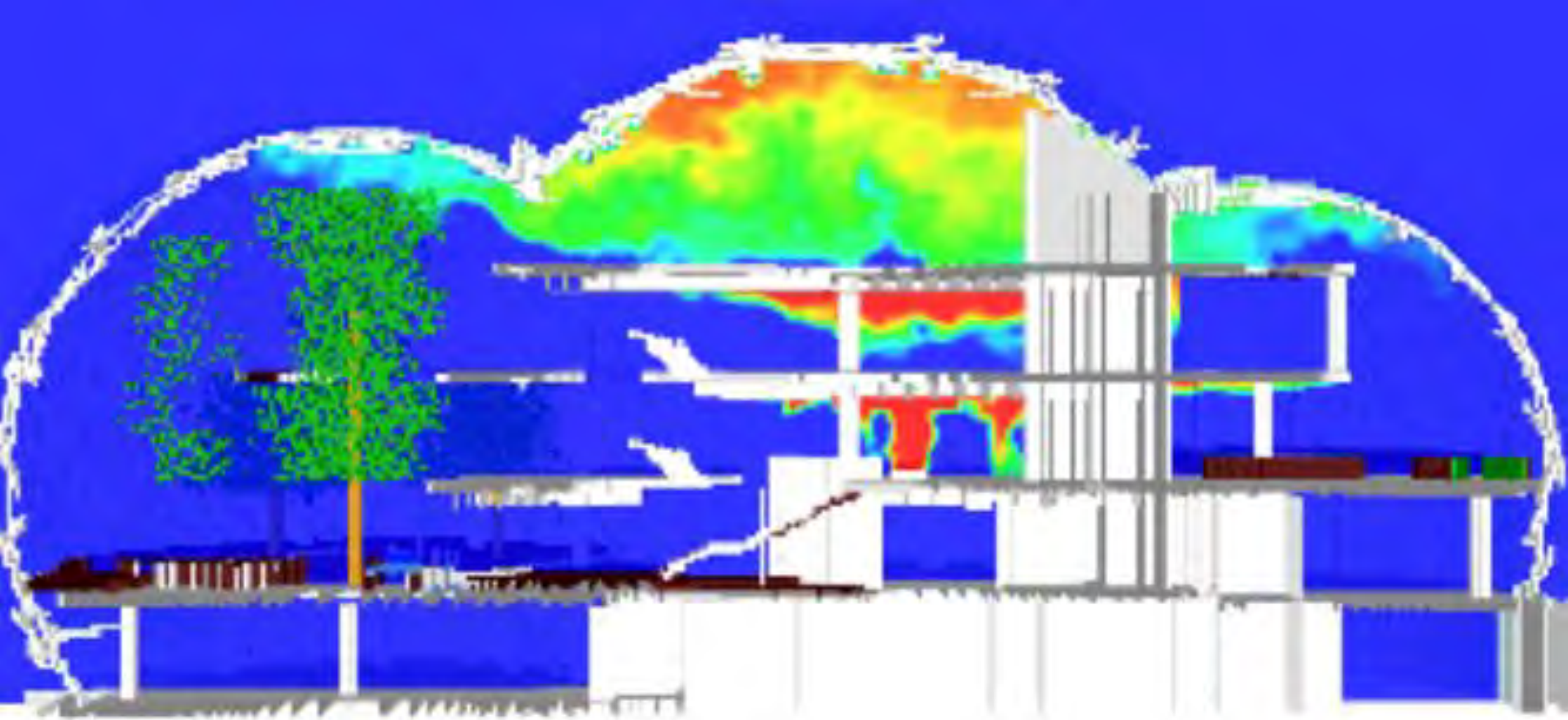
Facade Tectonics
July 2019


AVERAGE ILLUMINATION (lux) - 4TH FLOOR CENTER SPHERE
60,000
50,000
40,000
30,000
20,000
10,000
-
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Average
Open Country
Clear glass with external shade
Solarban 60
Clear glass
Site
Open Country

GLASS FILTERS THE LIGHT





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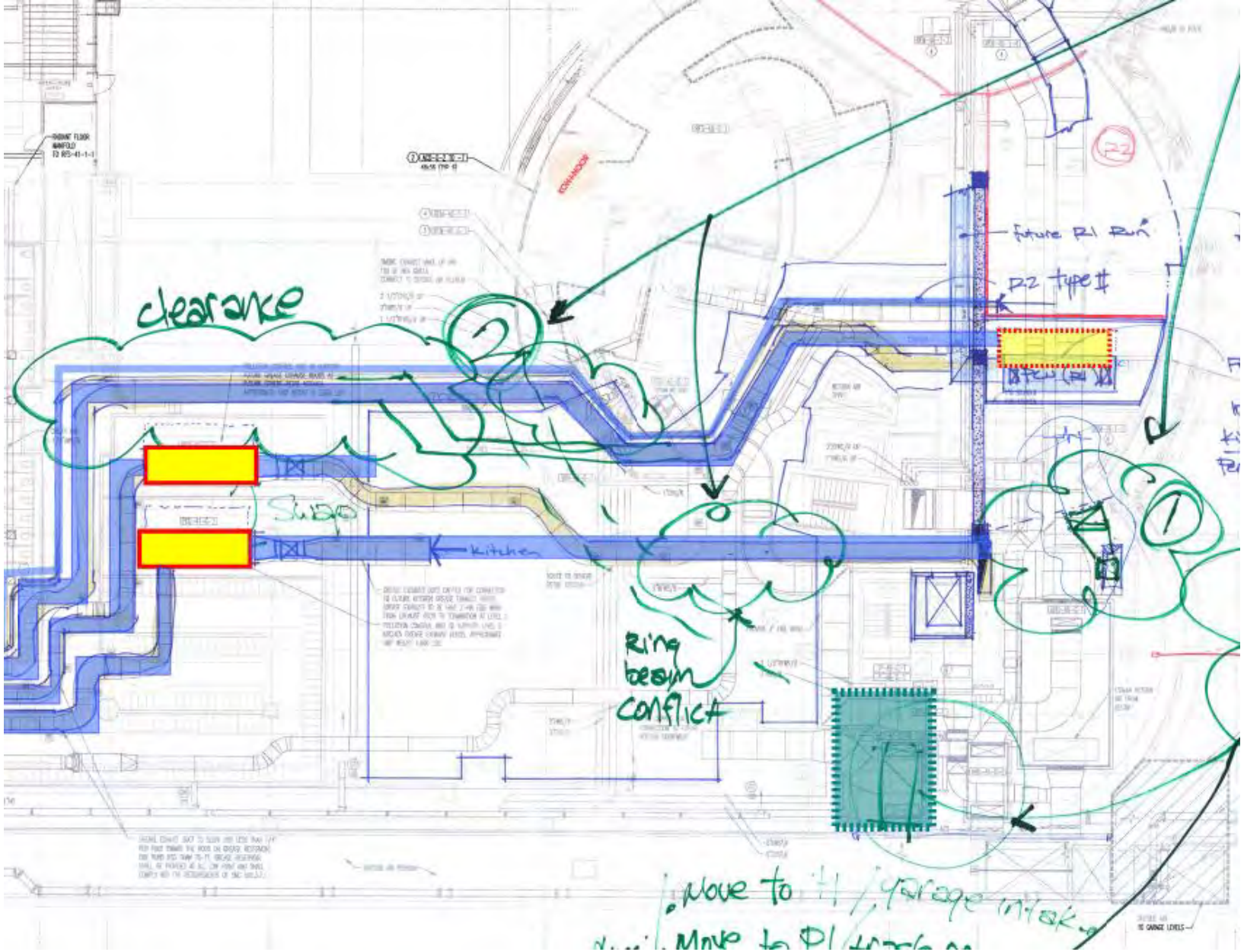
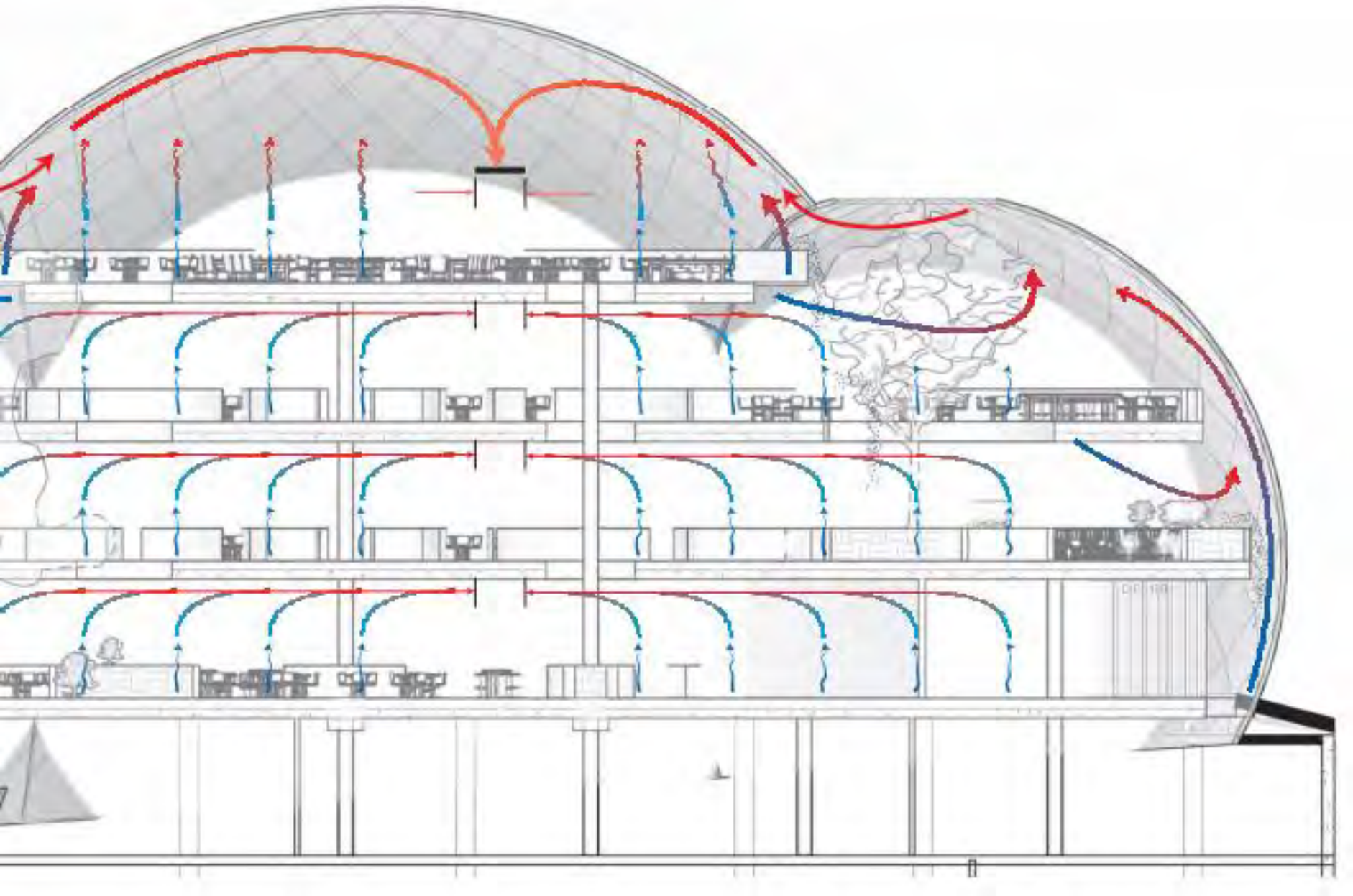
Facade Tectonics

July 2019


clearance
Slabs
Kitchen
Ring beam conflict
future R1 Run
P2 type #
move to



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Facade Tectonics

July 2019

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Facade Tectonics

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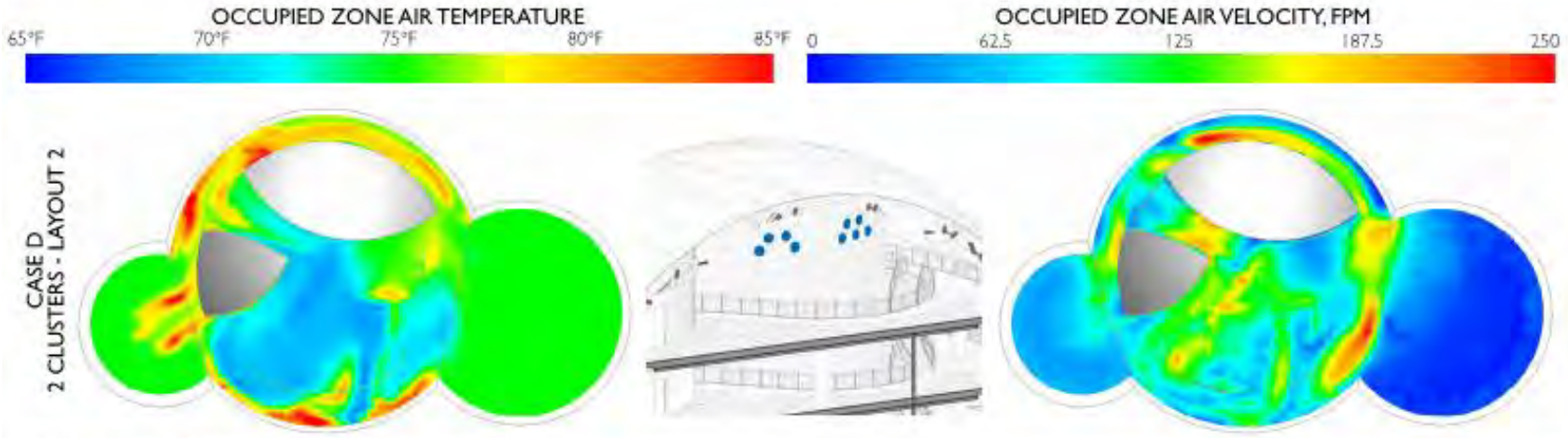
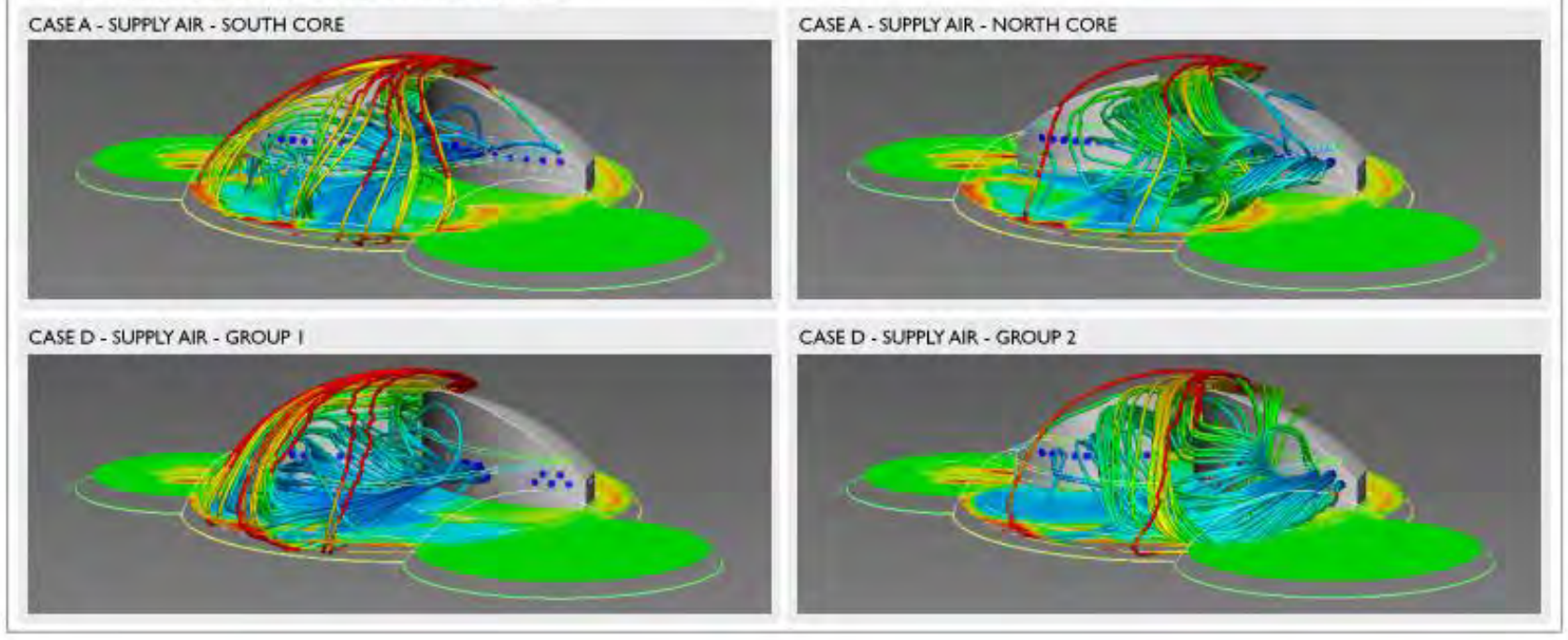
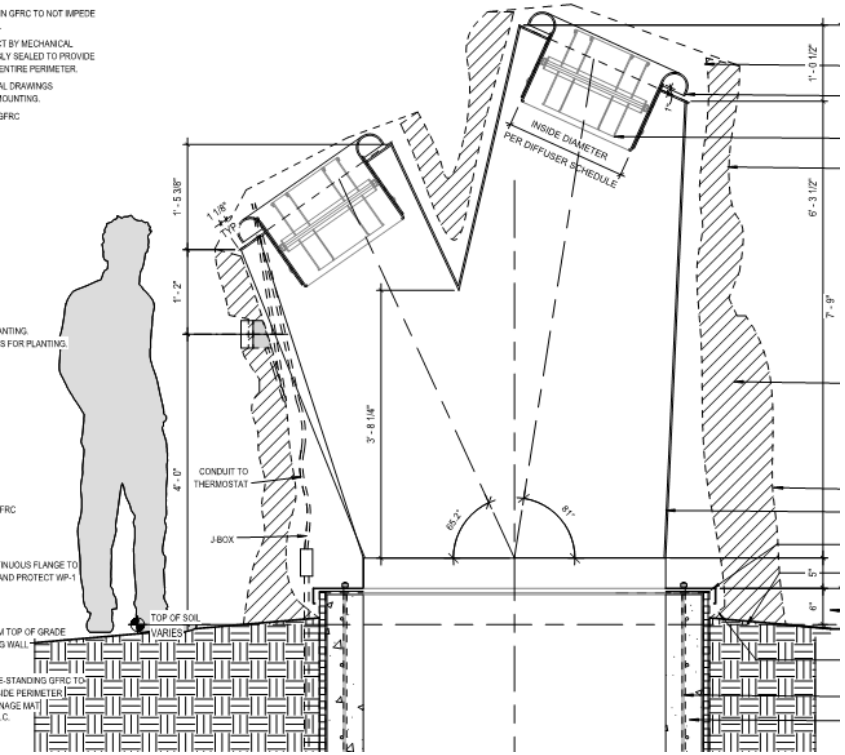
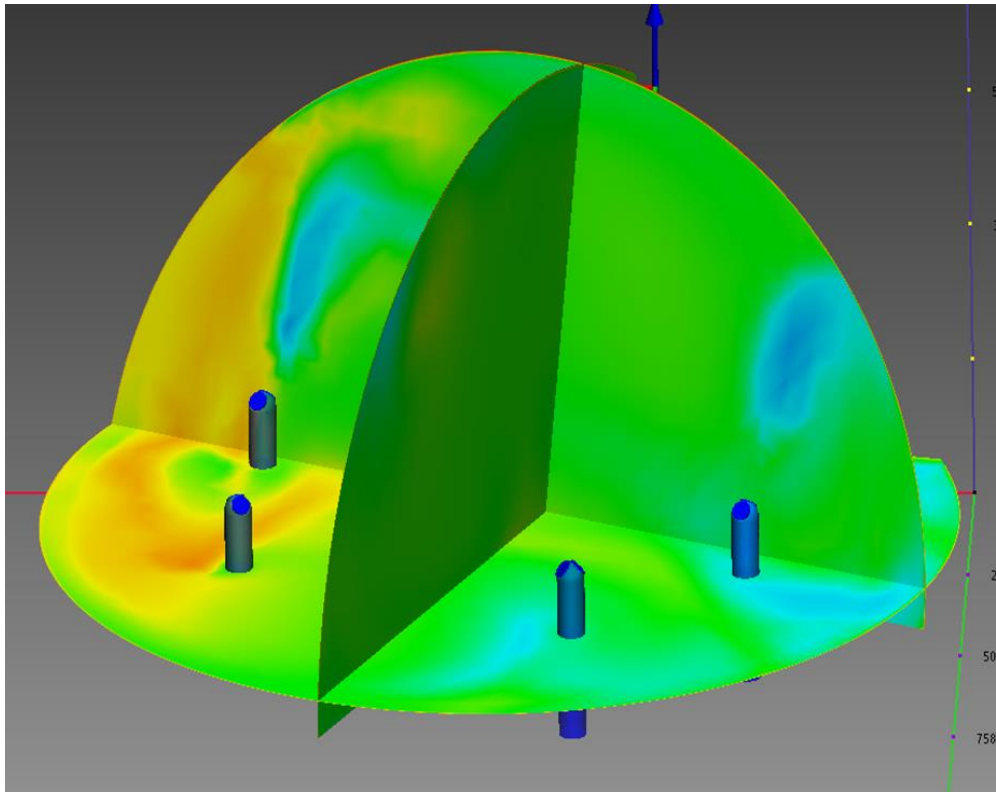


AIR FLOW PATHS

Shades in the following images reflect temperatures based on the same scale as above.







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Facade Tectonics

July 2019

Monuments

Glazing
Double-laminated low-iron glass admits a broad spectrum of light for horticultural needs while mitigating solar gain.

Artificial Lighting
Lights are dimmed or shut off when daylight levels are sufficient for plants.

Temperature
For human comfort, daytime temperatures are set between 68°F and 75°F.

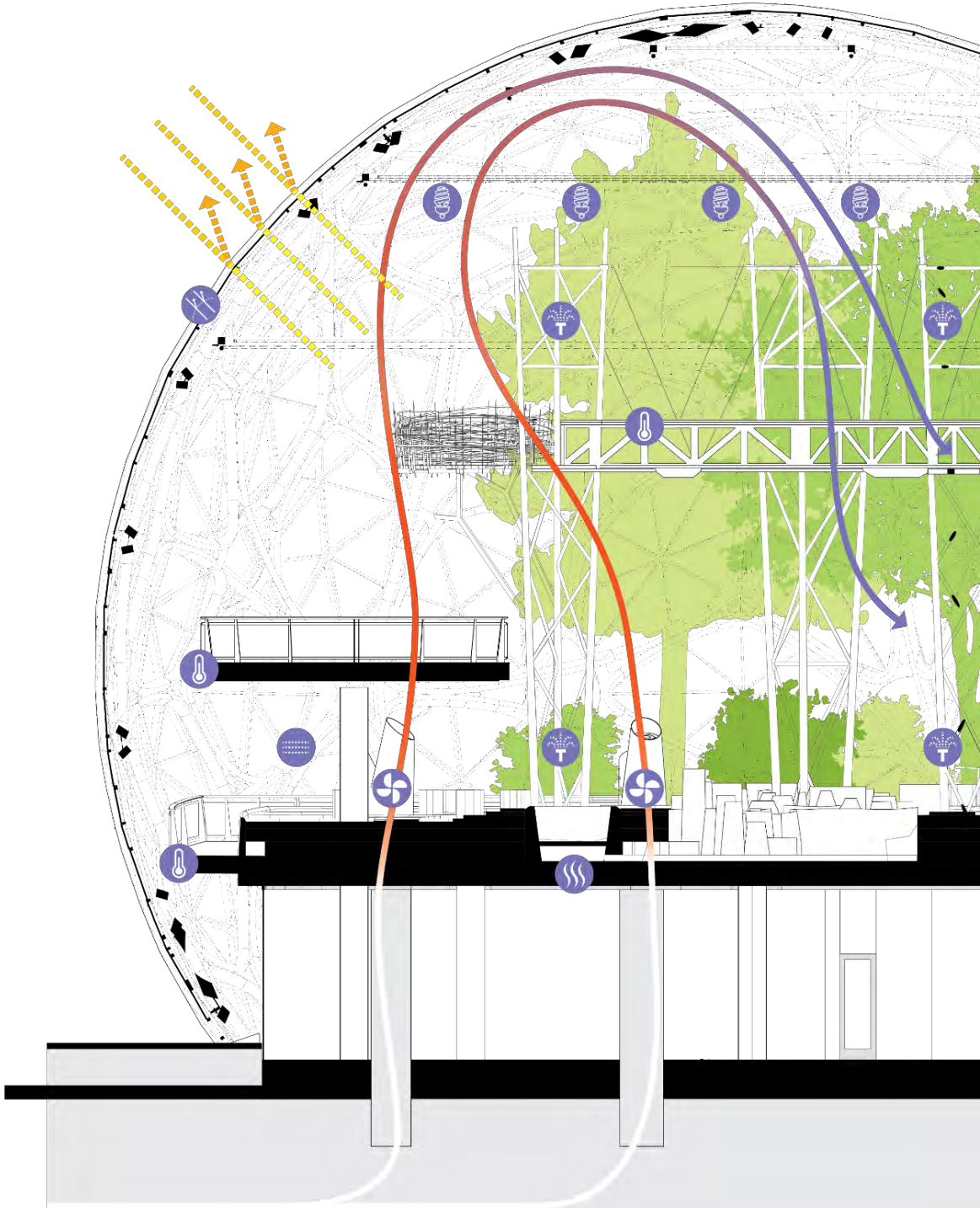
Radiant Heating
Energy-efficient, in-floor heating benefits plants by limiting the amount of warm, dry air forced around the building.

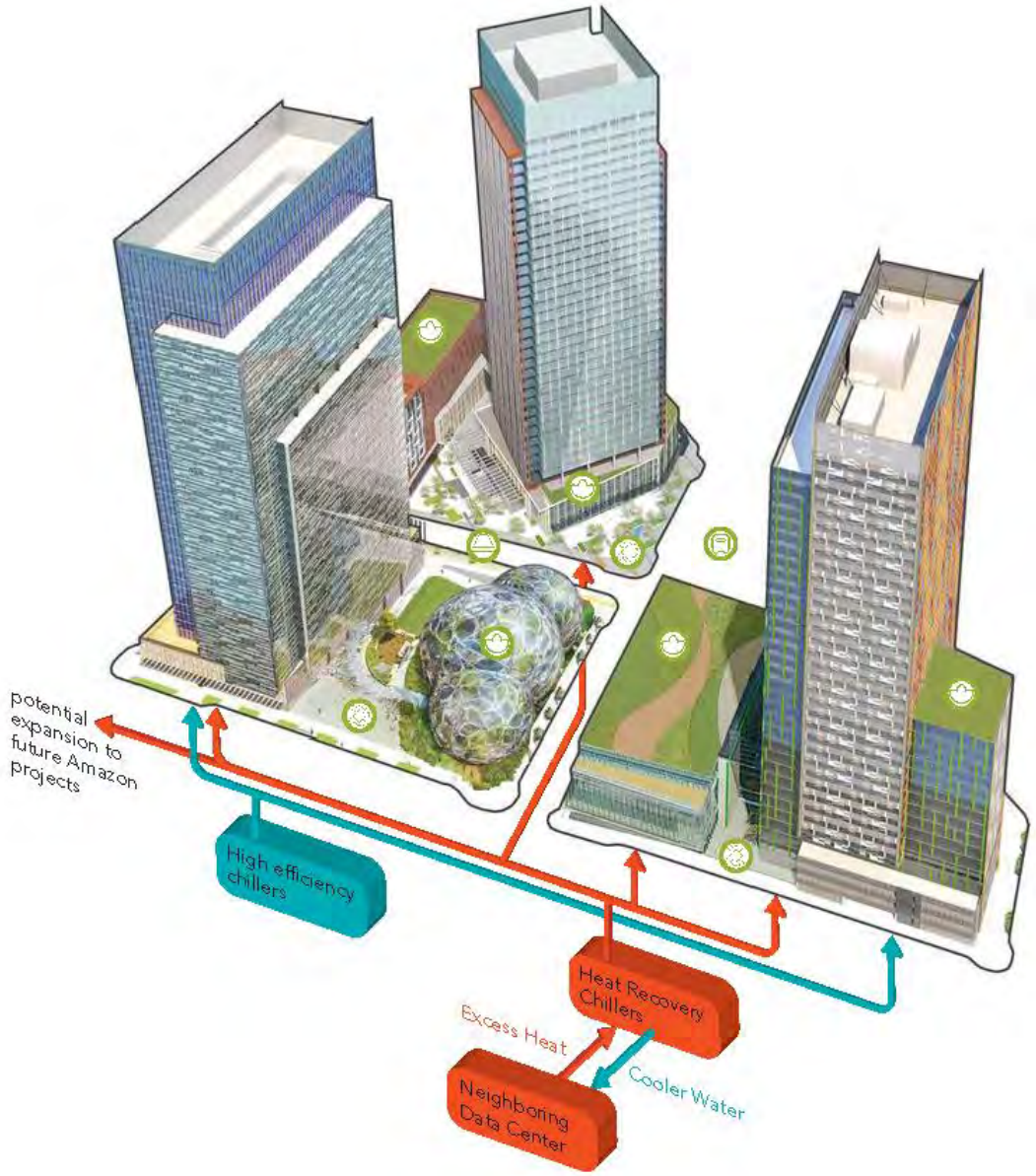
Fertigation
Water-soluble nutrients are supplied simultaneously with irrigation.

High Pressure Fog System
Fog provides necessary humidity to green walls without impacting human comfort.

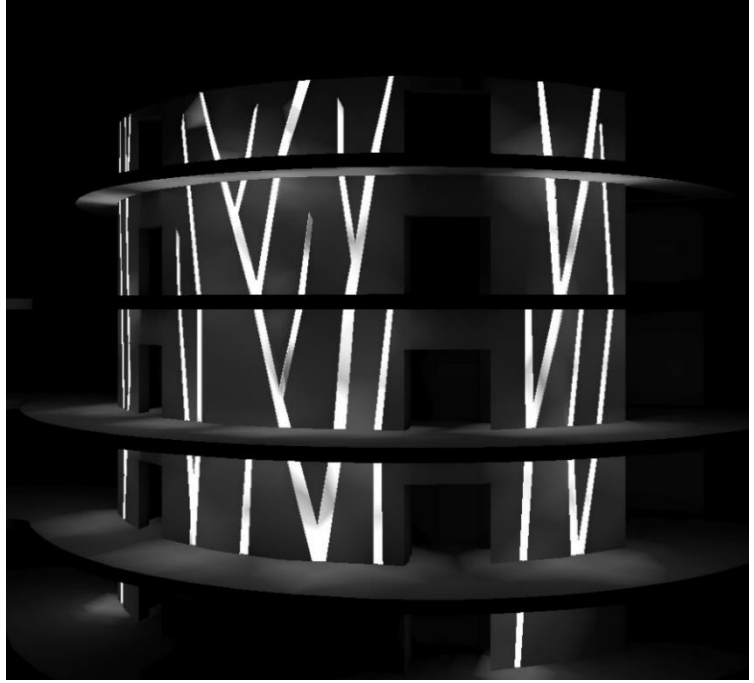
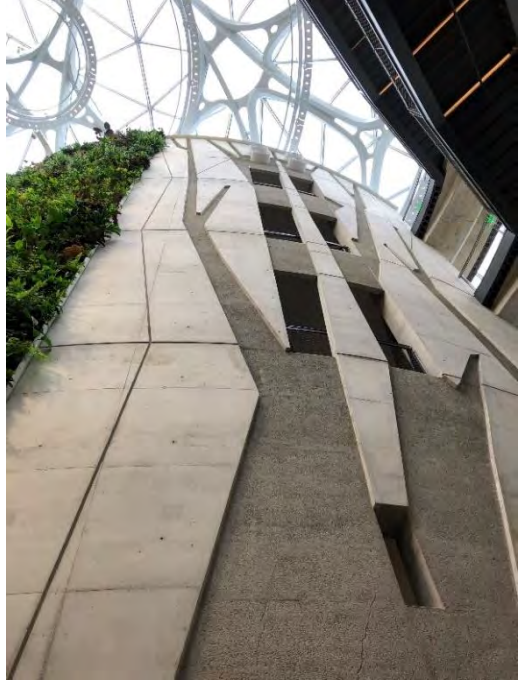
HVAC System
Warm air rises through vents to the top of the Spheres, while cool air descends to make occupied spaces comfortable during the day. Under appropriate conditions, the HVAC system is capable of providing 100% outdoor air.

Human Comfort

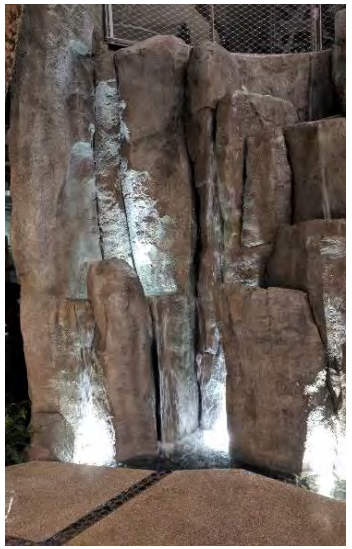



potential expansion to future Amazon projects
High efficiency chillers
Heat Recovery Chillers
Excess Heat
Cooler Water
Neighboring Data Center


Neighboring Data Center



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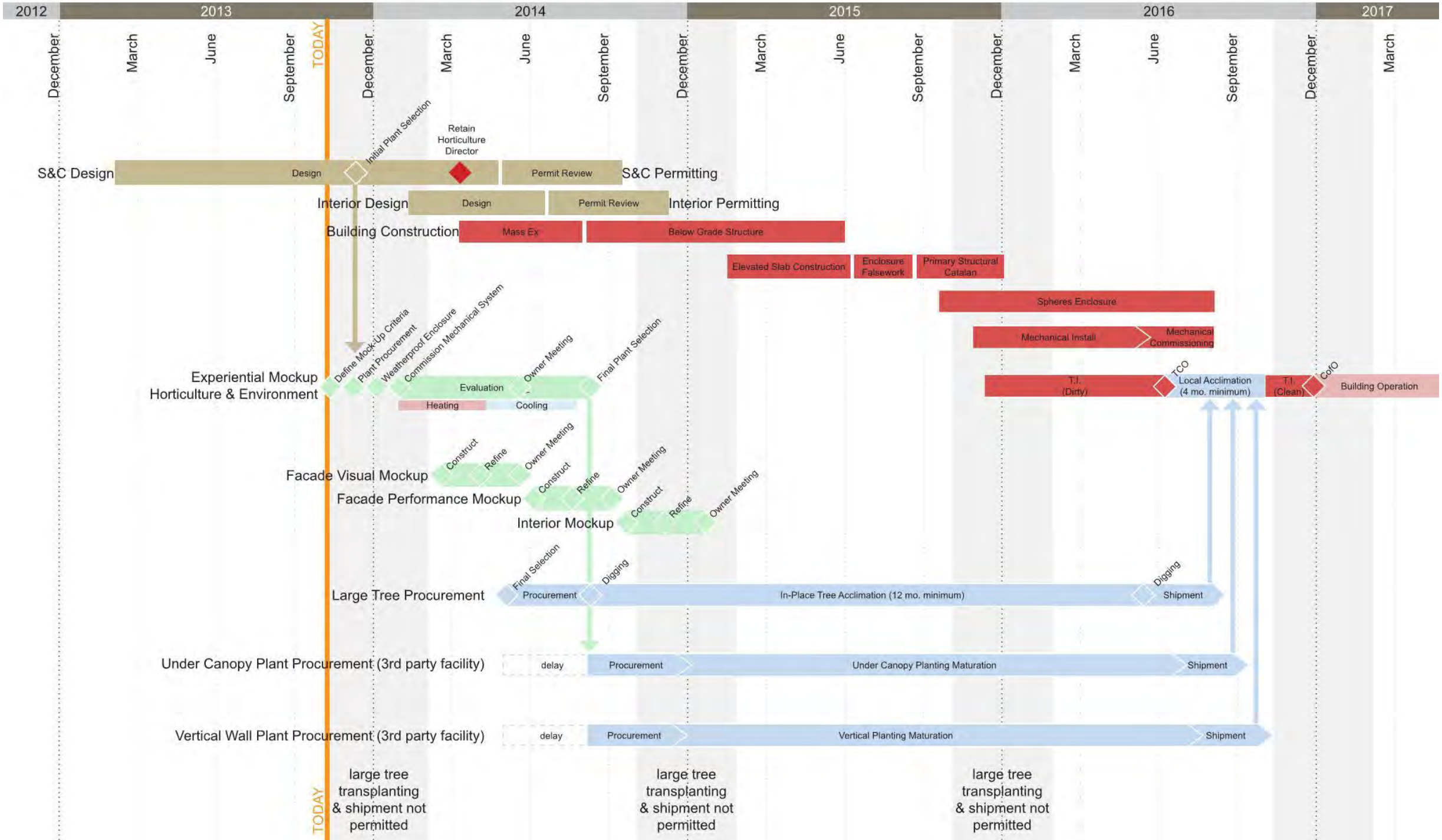
Facade Tectonics

July 2019


2012
2013
2014
2015
2016
2017
December
March
June
September
TODAY
December
March
June
September
December
March
June
September
December
March
June
September
December
March
S&C Design
Design
Initial Plant Selection
Retain Horticulture Director
Permit Review
S&C Permitting
Interior Design
Design
Permit Review
Interior Permitting
Building Construction
Mass Ex
Below Grade Structure
Elevated Slab Construction
Enclosure Falsework
Primary Structural Catalan
Spheres Enclosure
Mechanical Install
Mechanical Commissioning
Experiential Mockup
Horticulture & Environment
Define Mock-Up Criteria
Plant Procurement
Weatherproof Enclosure
Commission Mechanical System
Evaluation
Owner Meeting
Final Plant Selection
Heating
Cooling
T.I. (Dirty)
TCO
Local Acclimation (4 mo. minimum)
T.I. (Clean)
CofO
Building Operation
Facade Visual Mockup
Construct
Refine
Owner Meeting
Facade Performance Mockup
Construct
Refine
Owner Meeting
Interior Mockup
Construct
Refine
Owner Meeting
Large Tree Procurement
Final Selection
Digging
Procurement
In-Place Tree Acclimation (12 mo. minimum)
Digging
Shipment
Under Canopy Plant Procurement (3rd party facility)
delay
Procurement
Under Canopy Planting Maturation
Shipment
Vertical Wall Plant Procurement (3rd party facility)
delay
Procurement
Vertical Planting Maturation
Shipment
TODAY
large tree transplanting & shipment not permitted
large tree transplanting & shipment not permitted
large tree transplanting & shipment not permitted

SITE Selection

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Facade Tectonics

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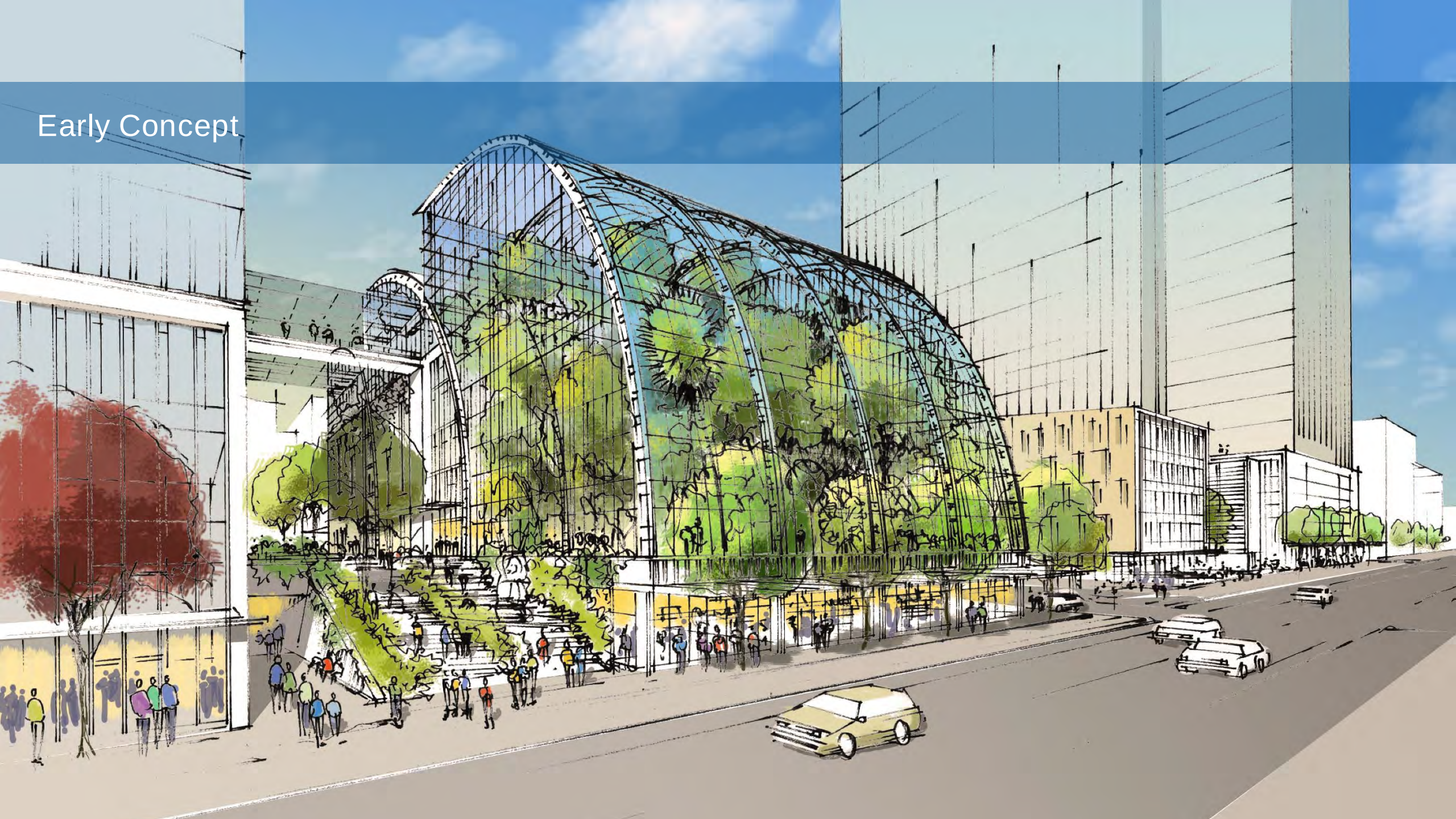
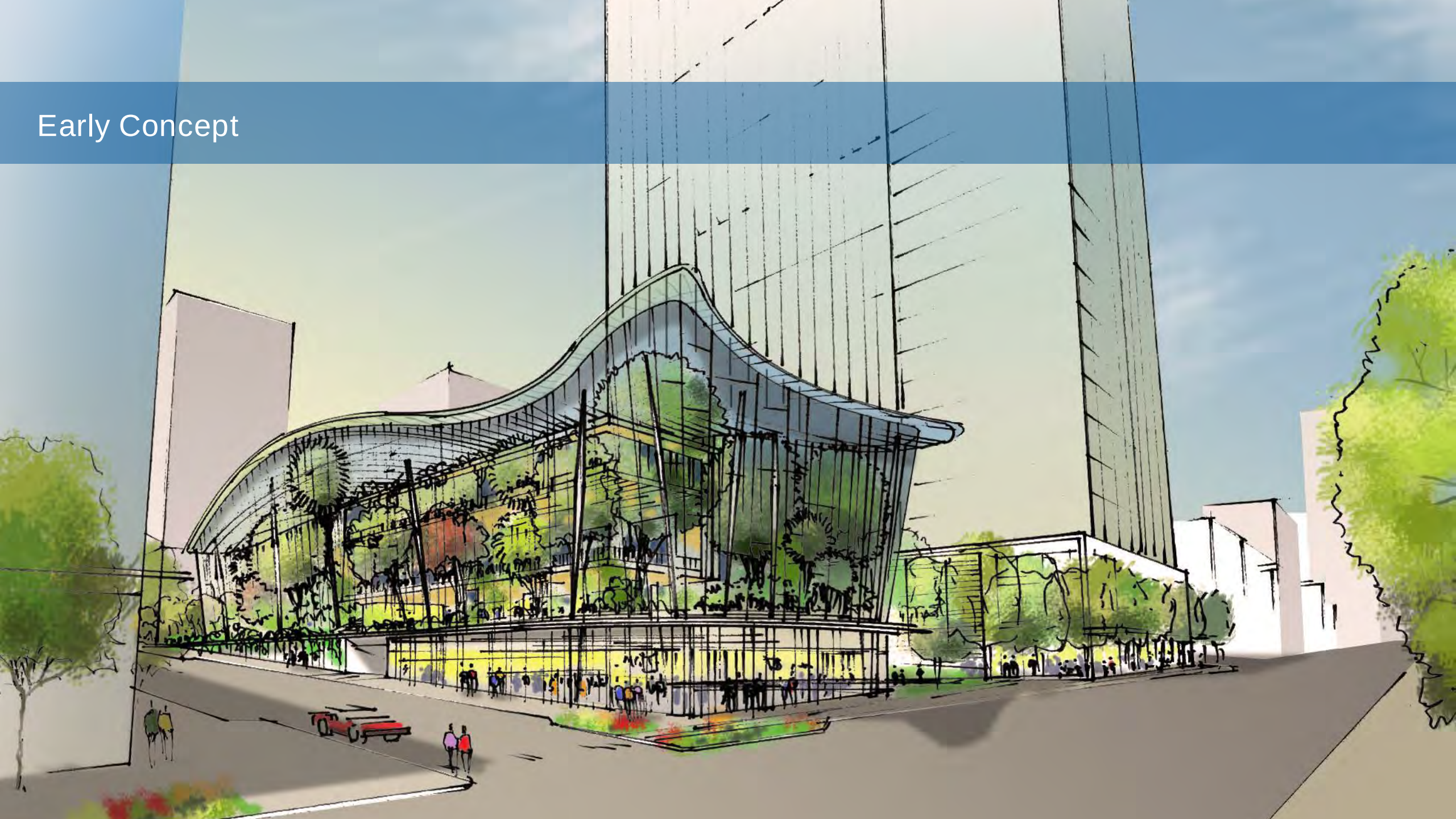
Early Concept

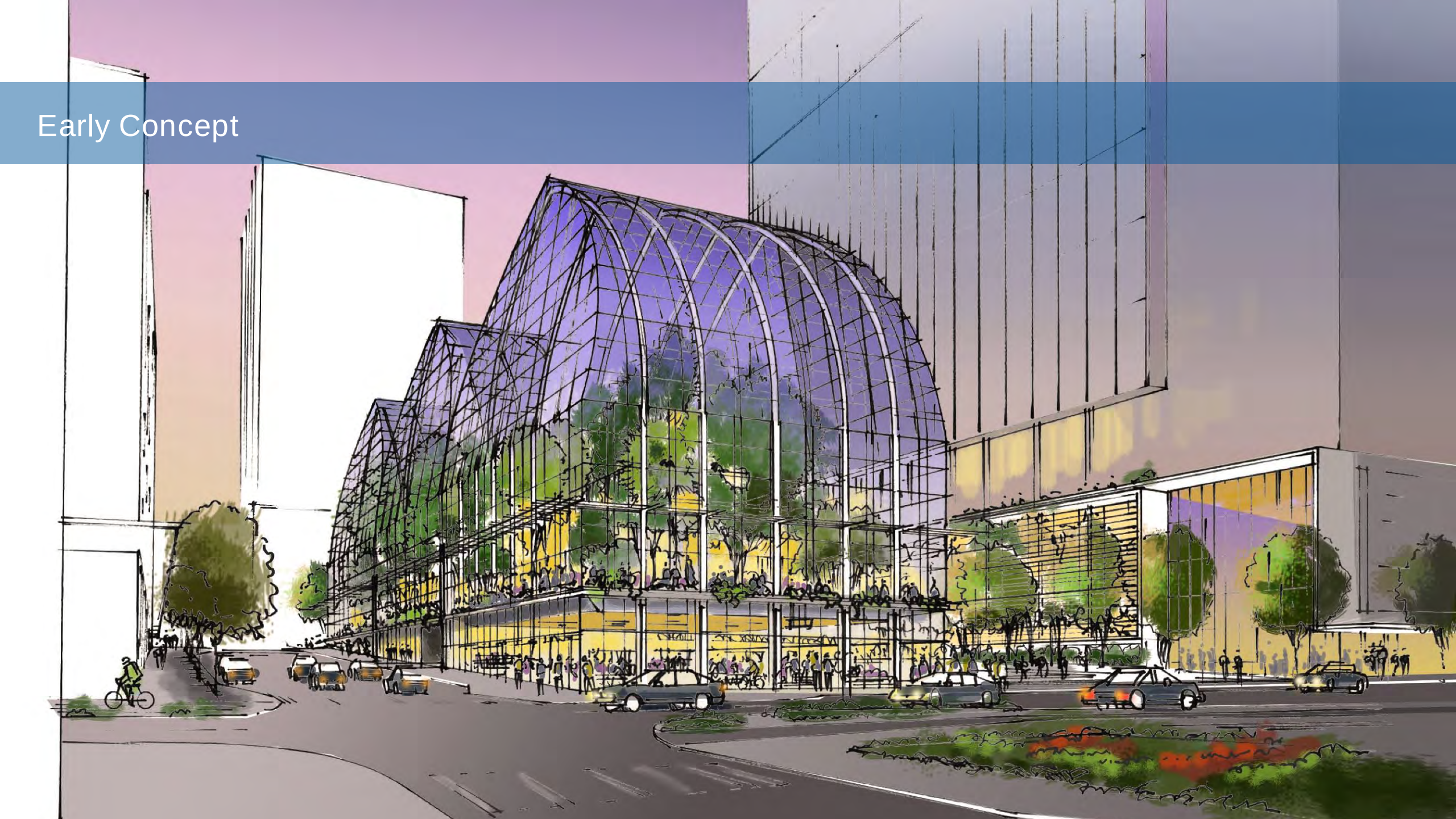
Early Concept



Early Concept



Early Concept

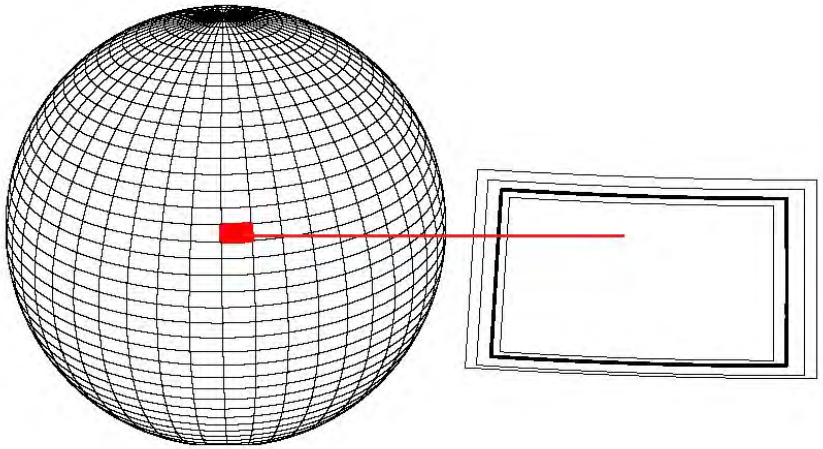


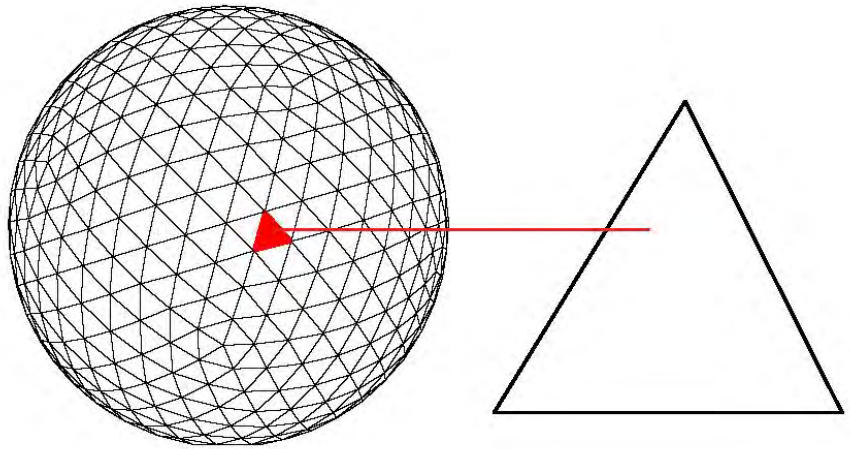
Early Concept

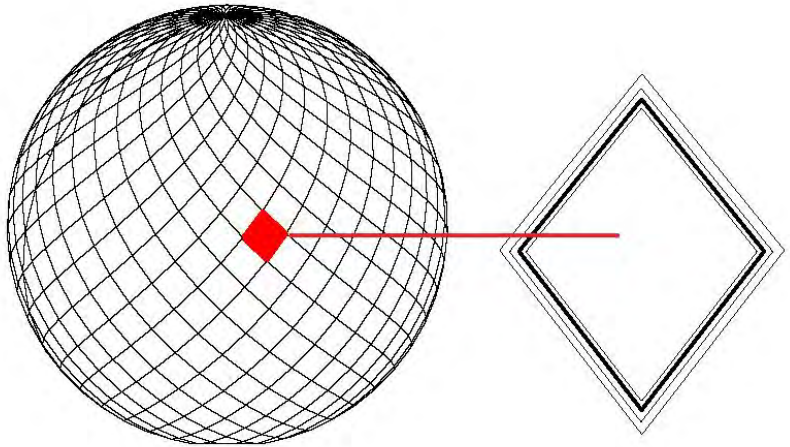
Enid A. Haupt Conservatory - Bronx, New York - 1902

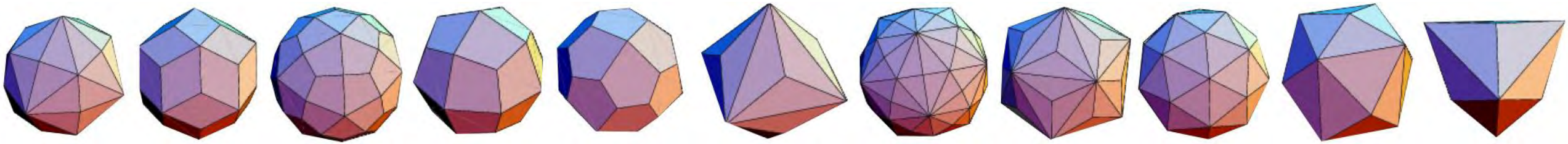
Montreal Biosphere - Montreal, Quebec - 1967

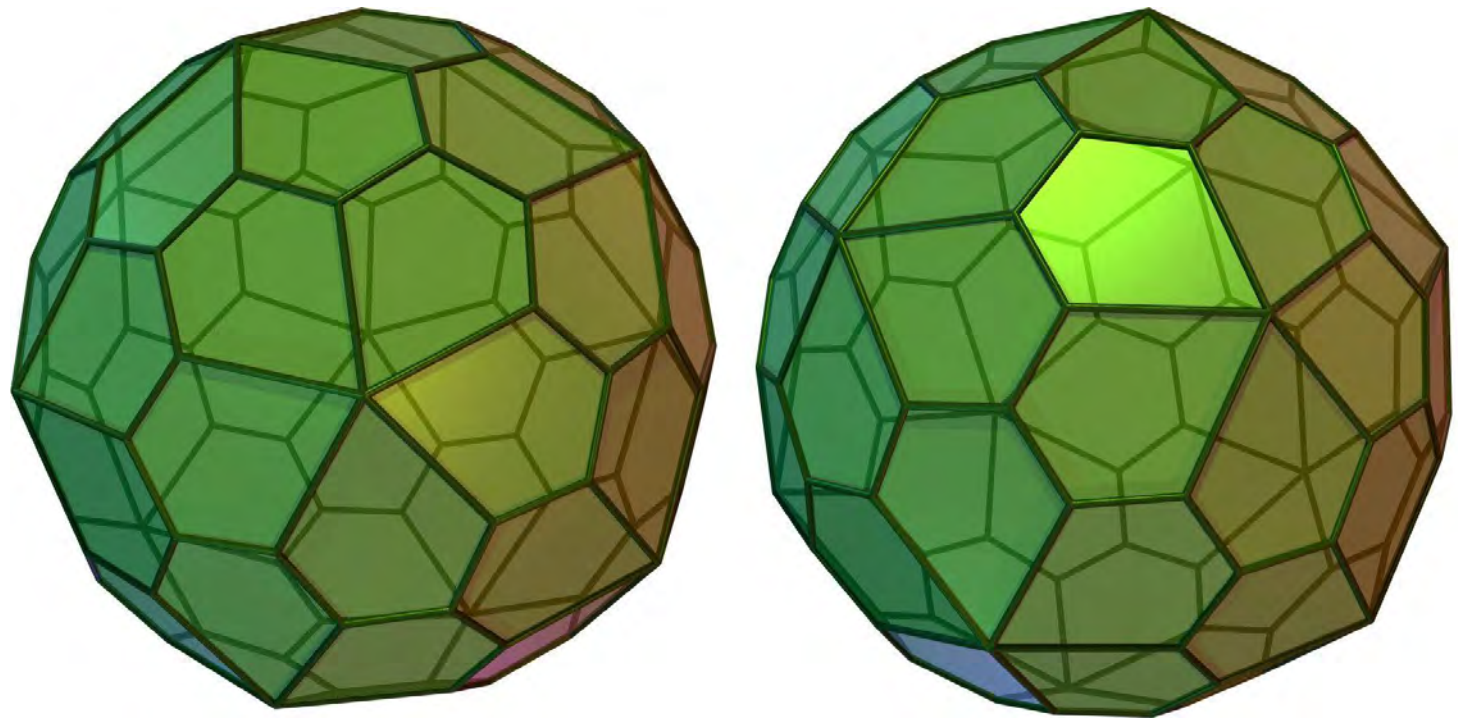
Swiss Re Headquarters - London, England - 2004

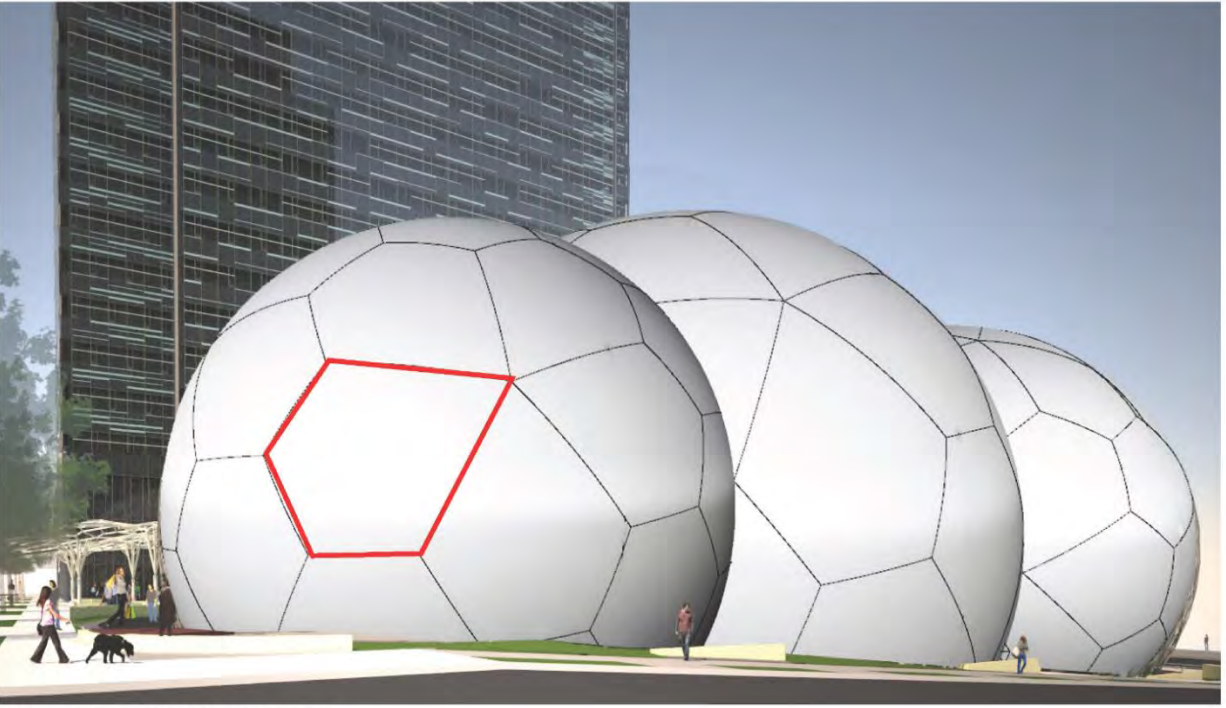






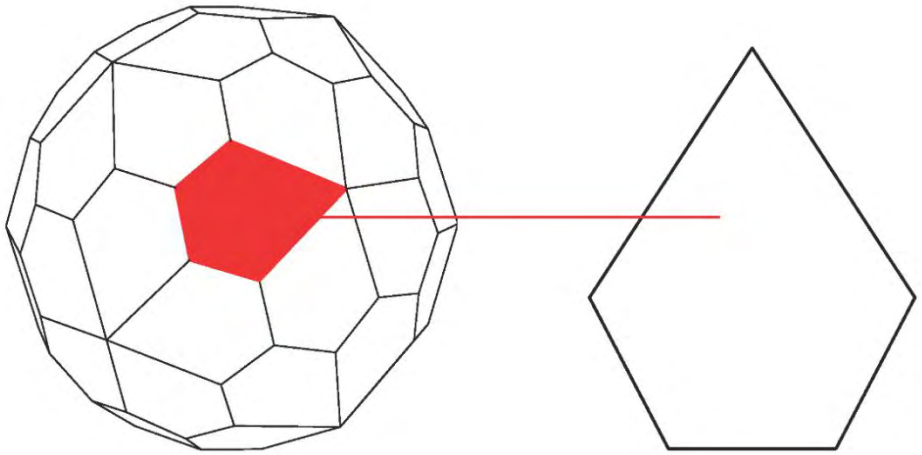


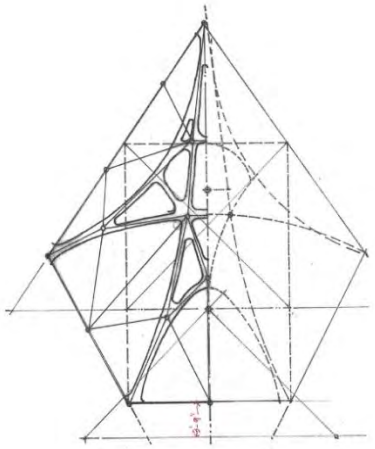


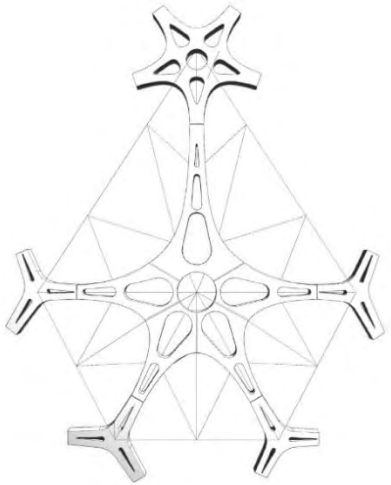


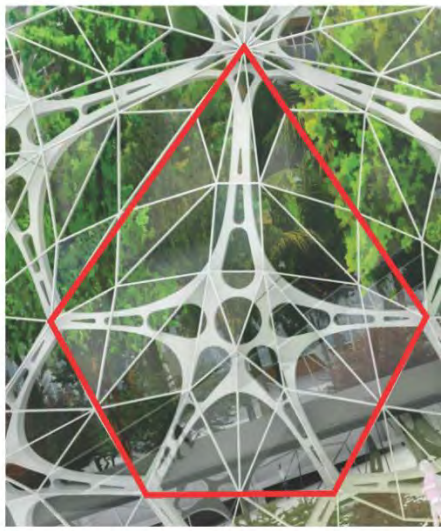
Conjoined Catalan Spheres

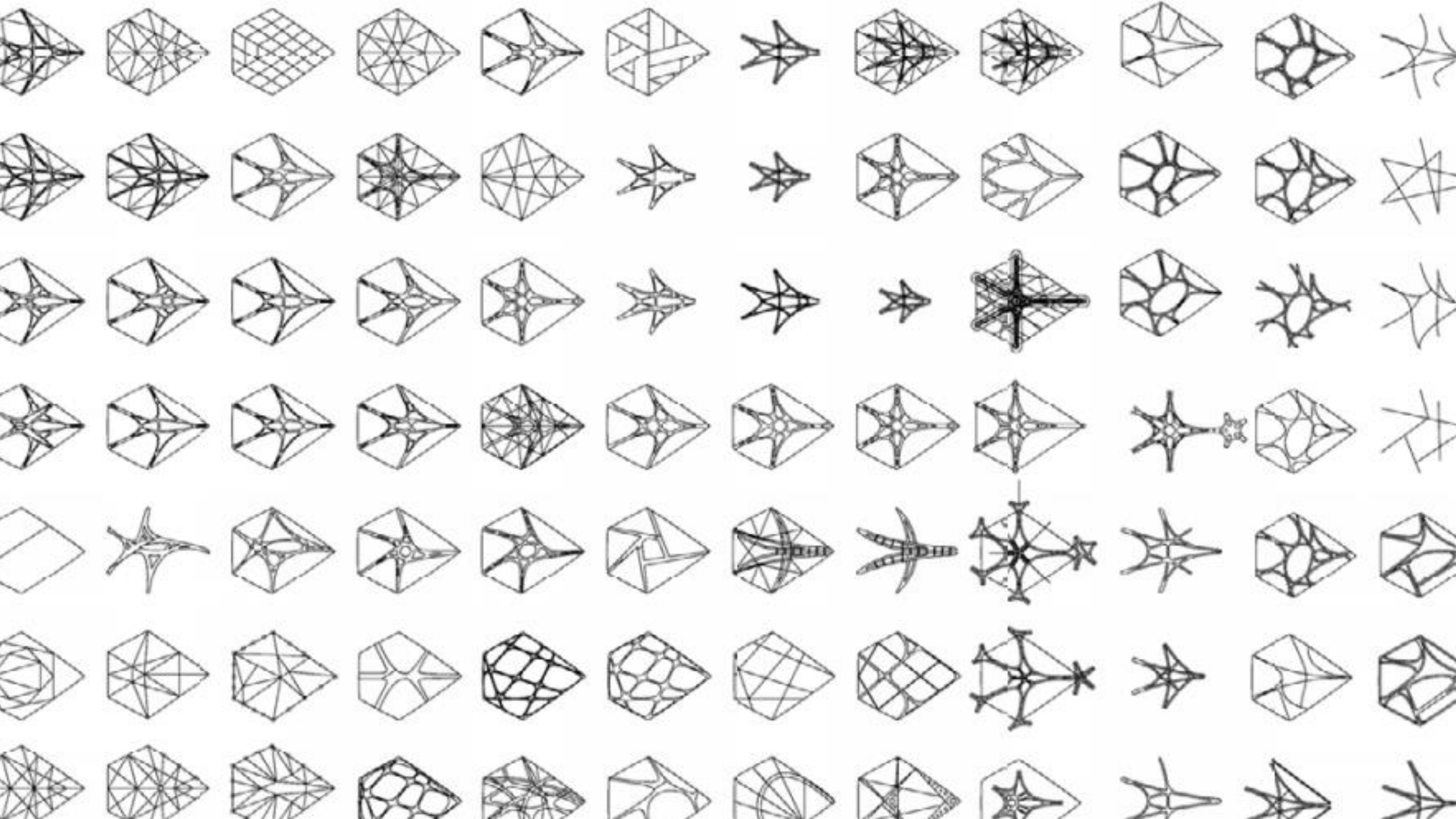
Structural Steel Catalan Module

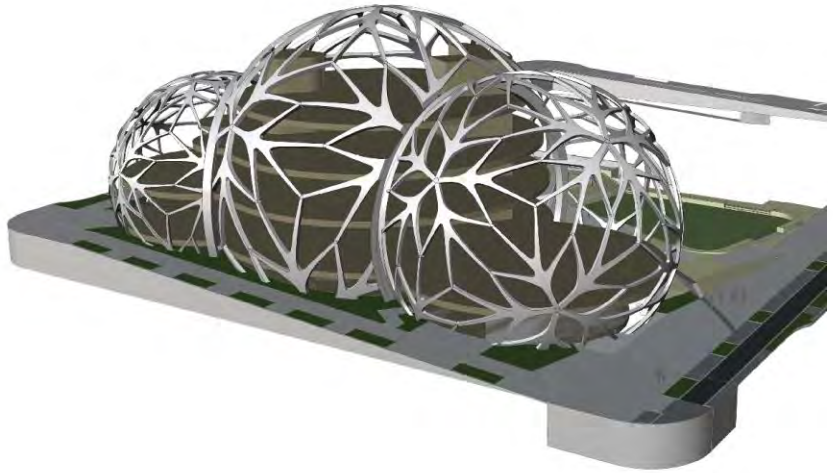
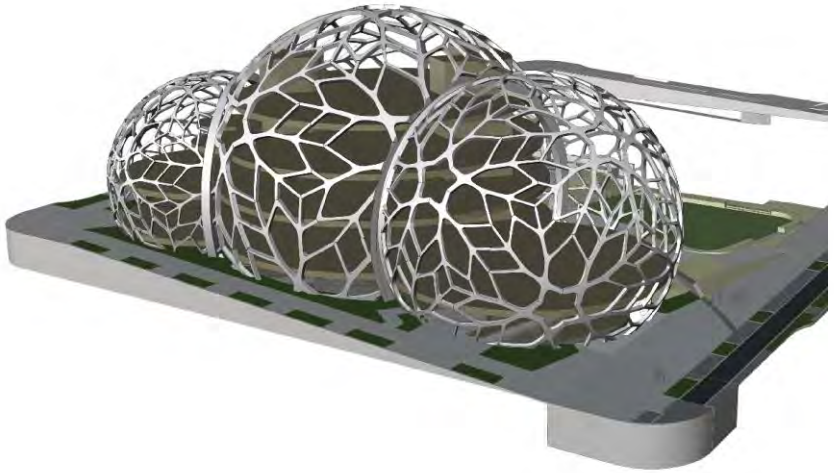
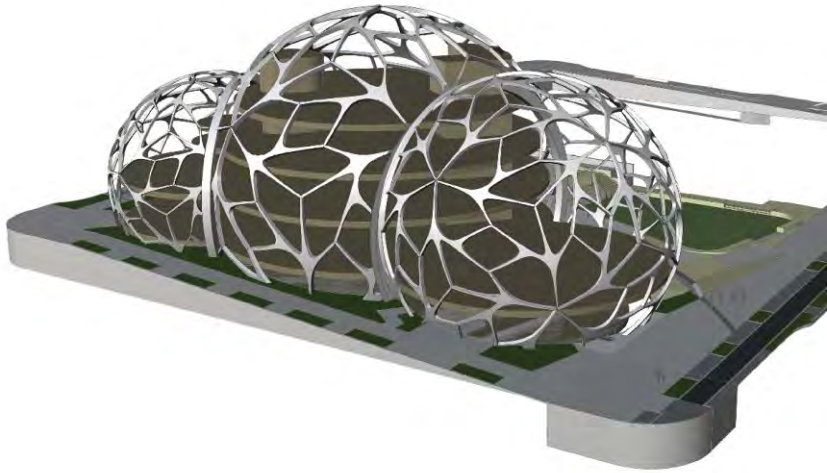
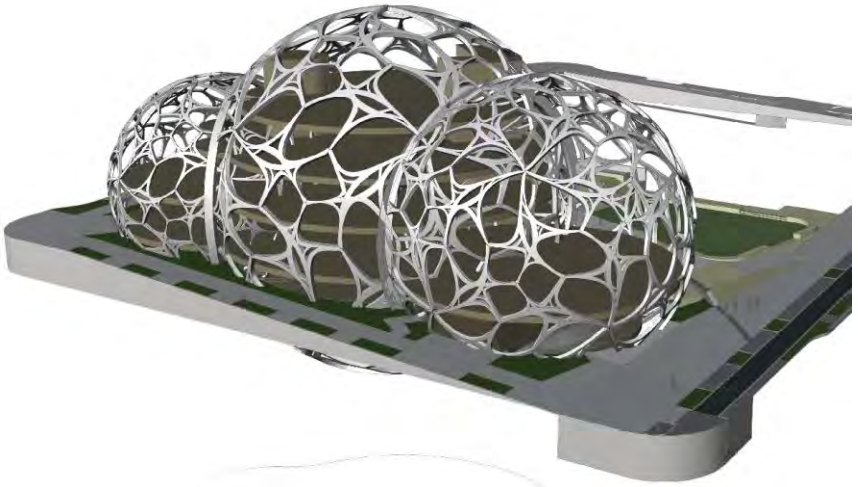
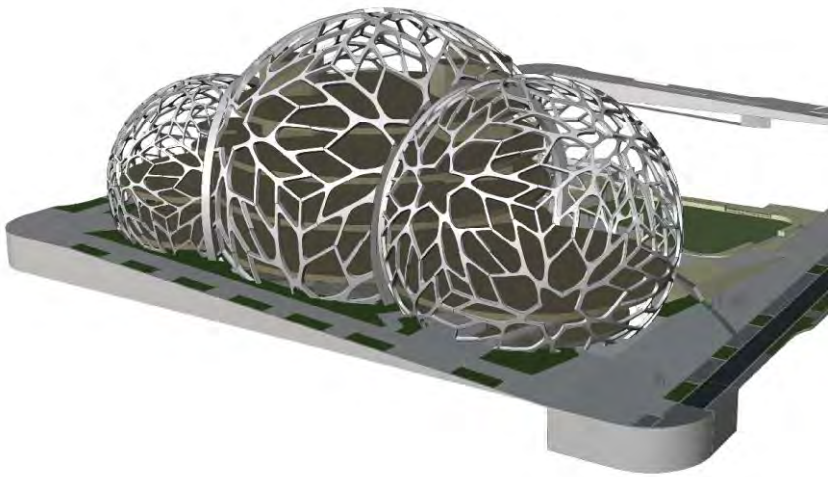
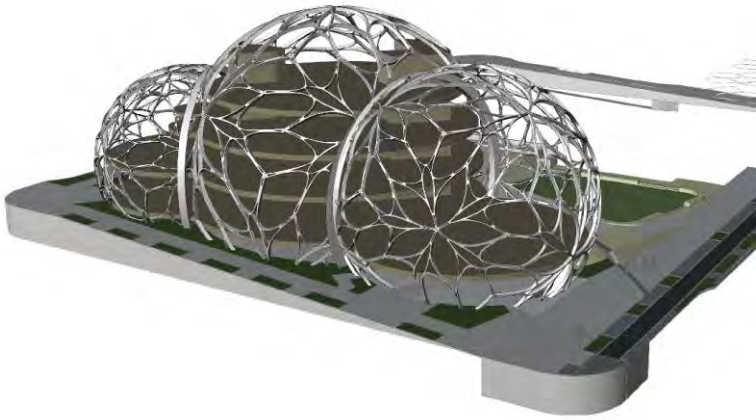


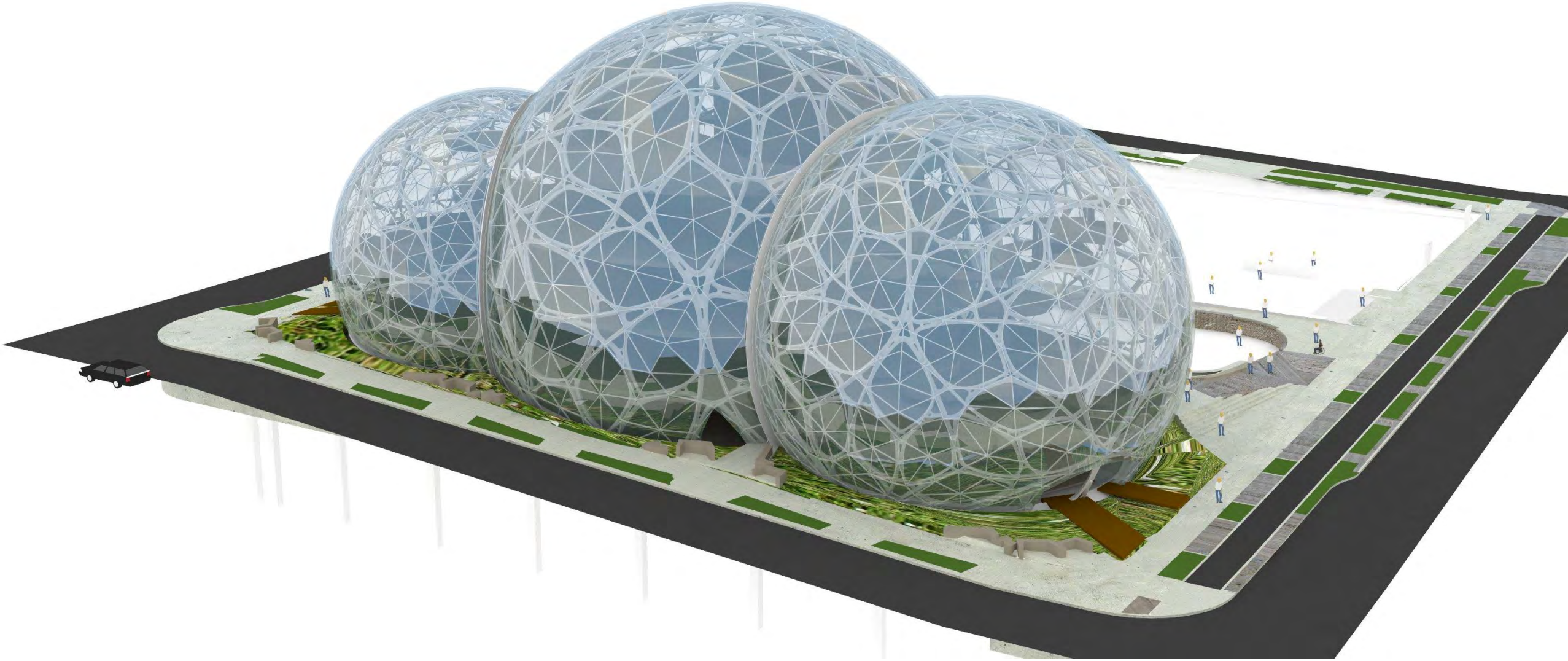




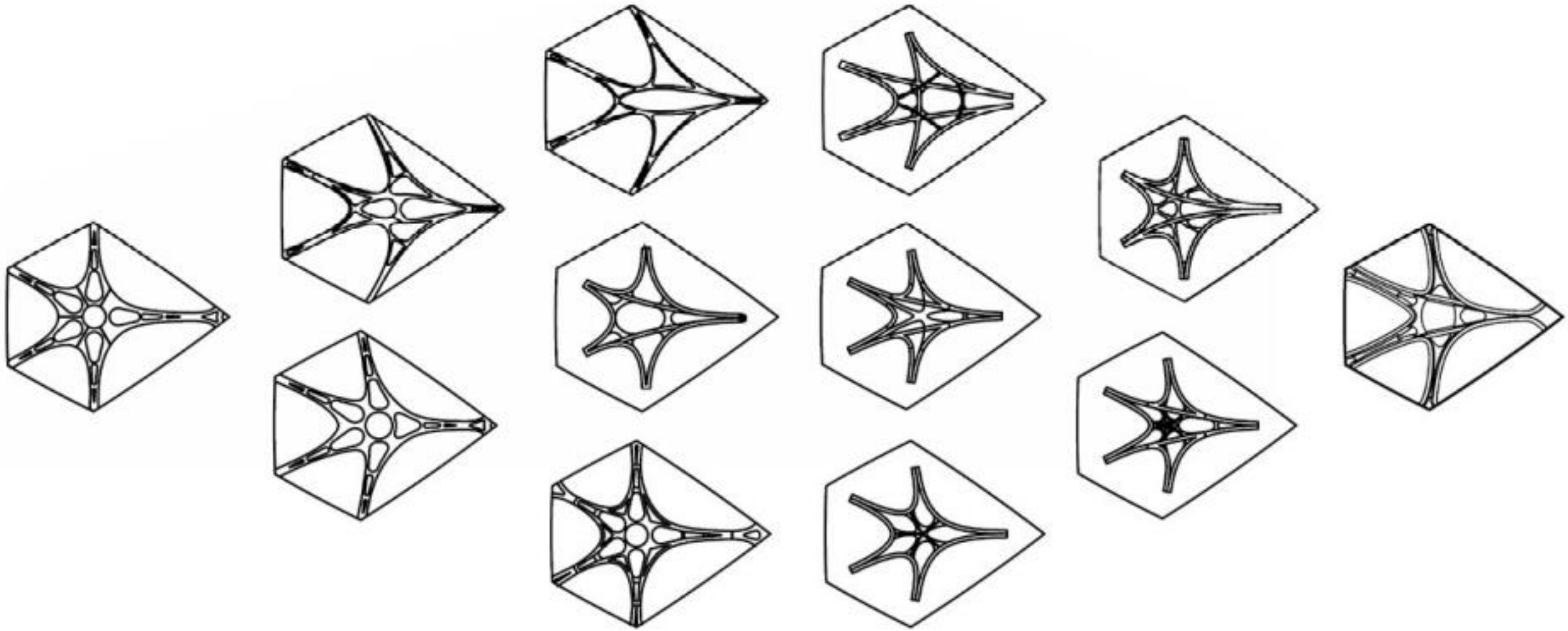


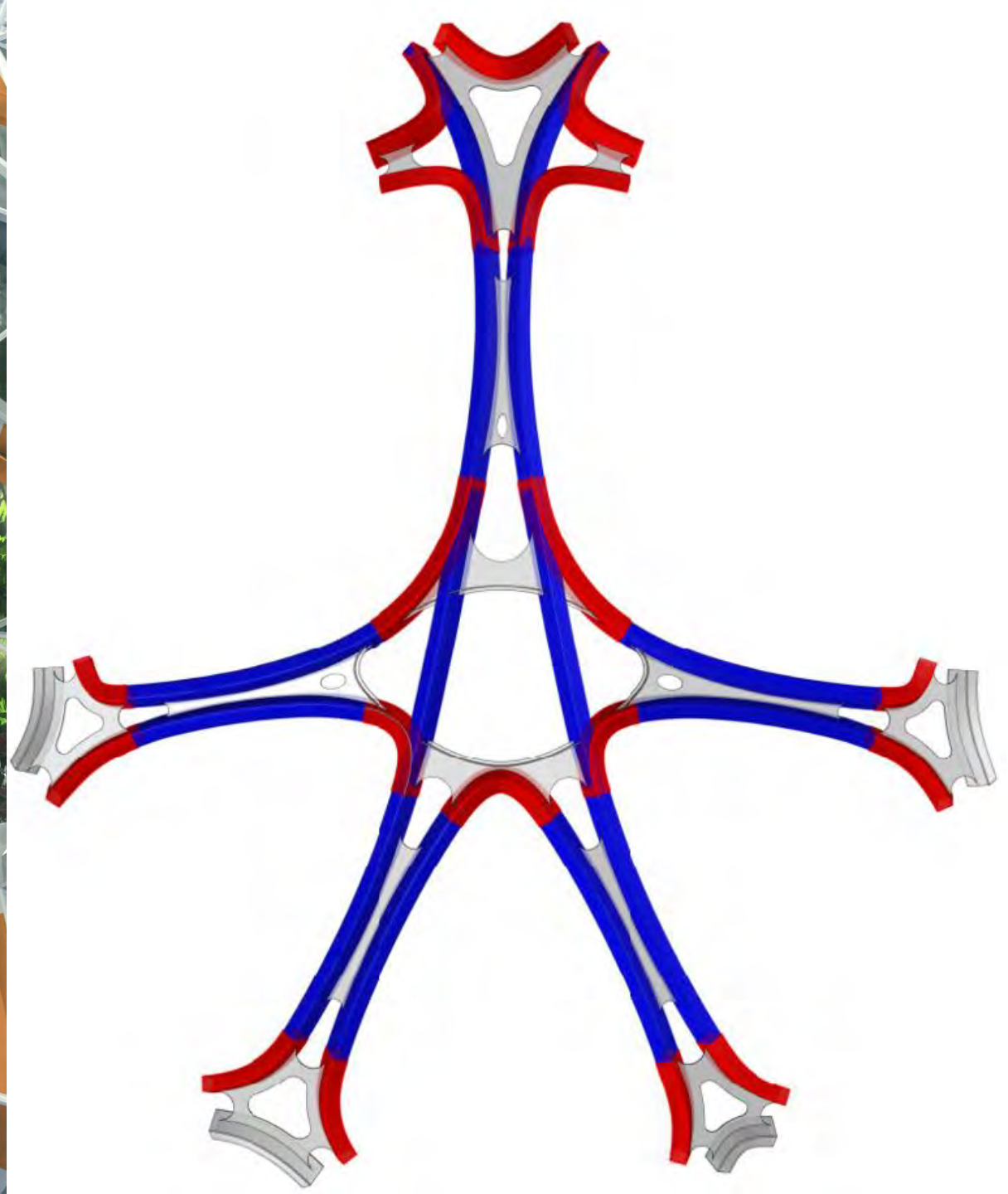


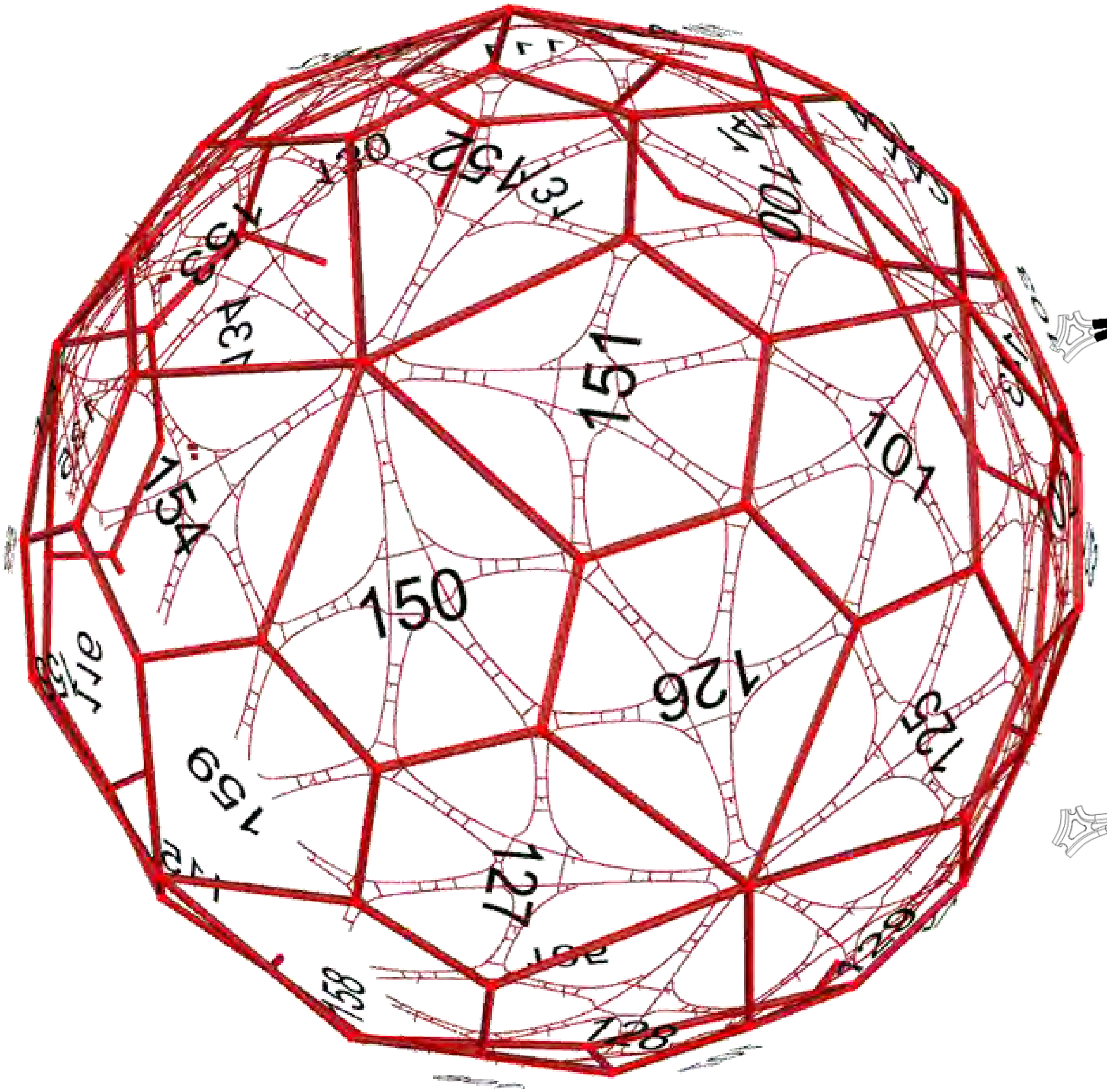










SaffronSpice
ONE WAY



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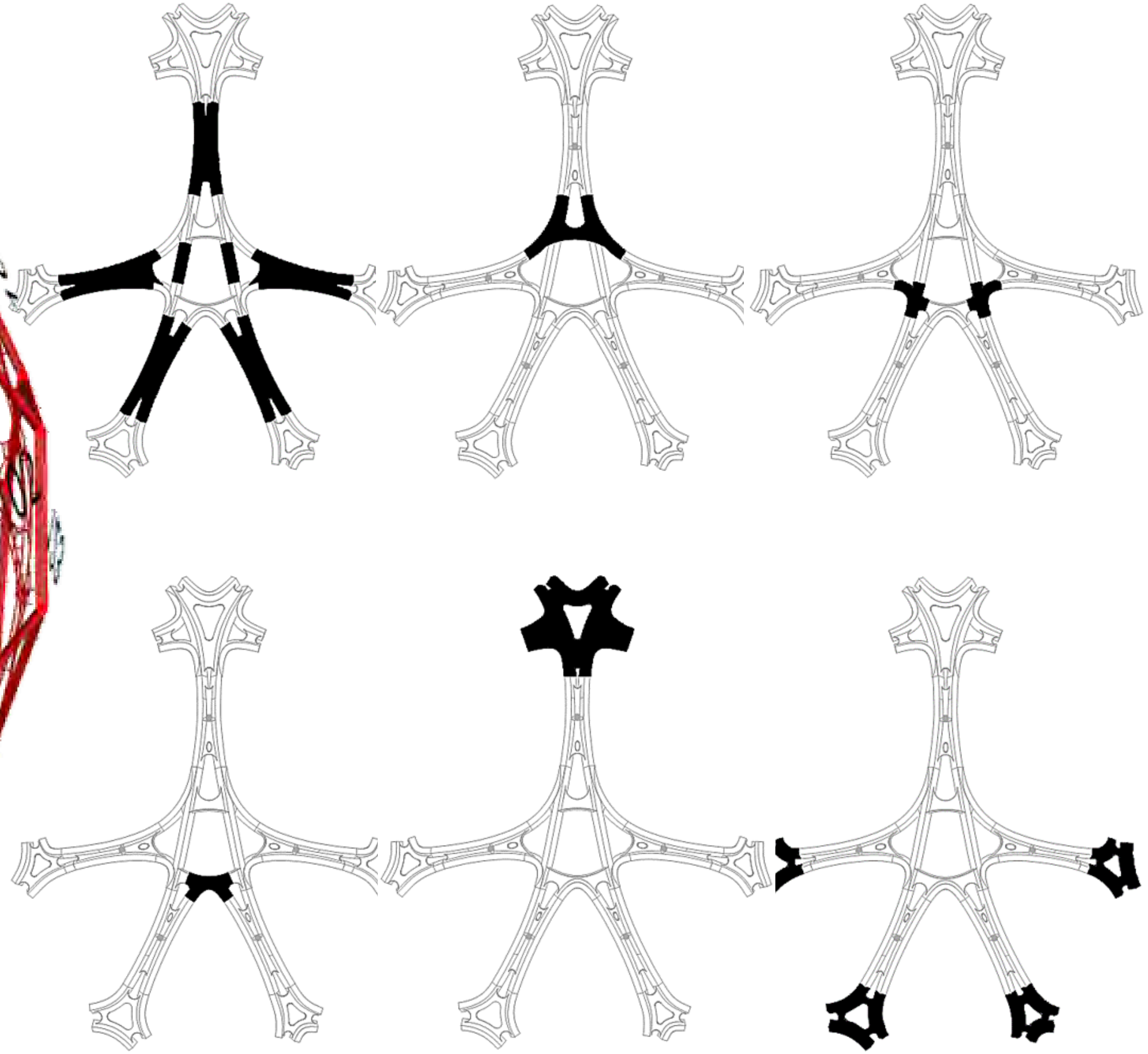
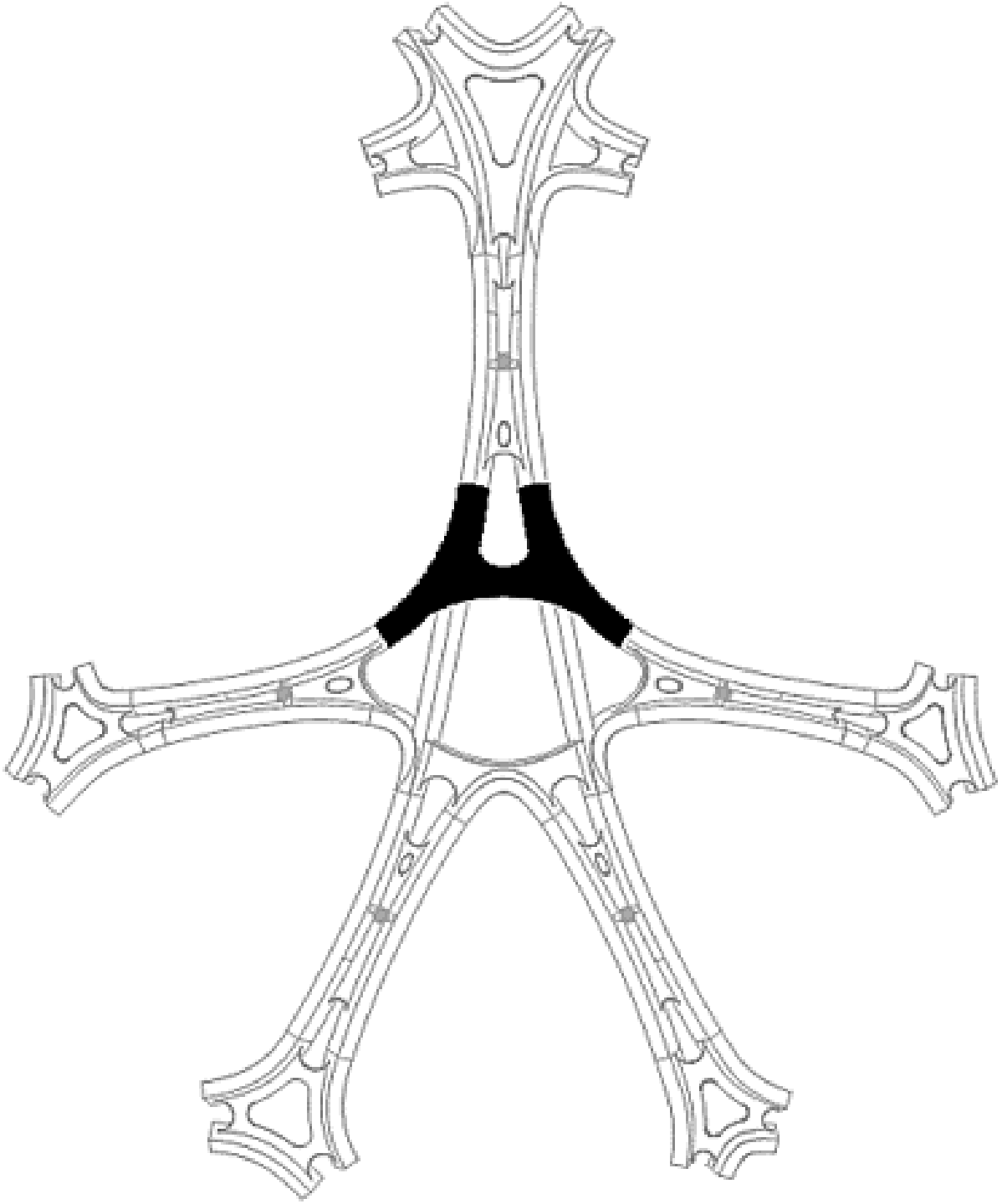
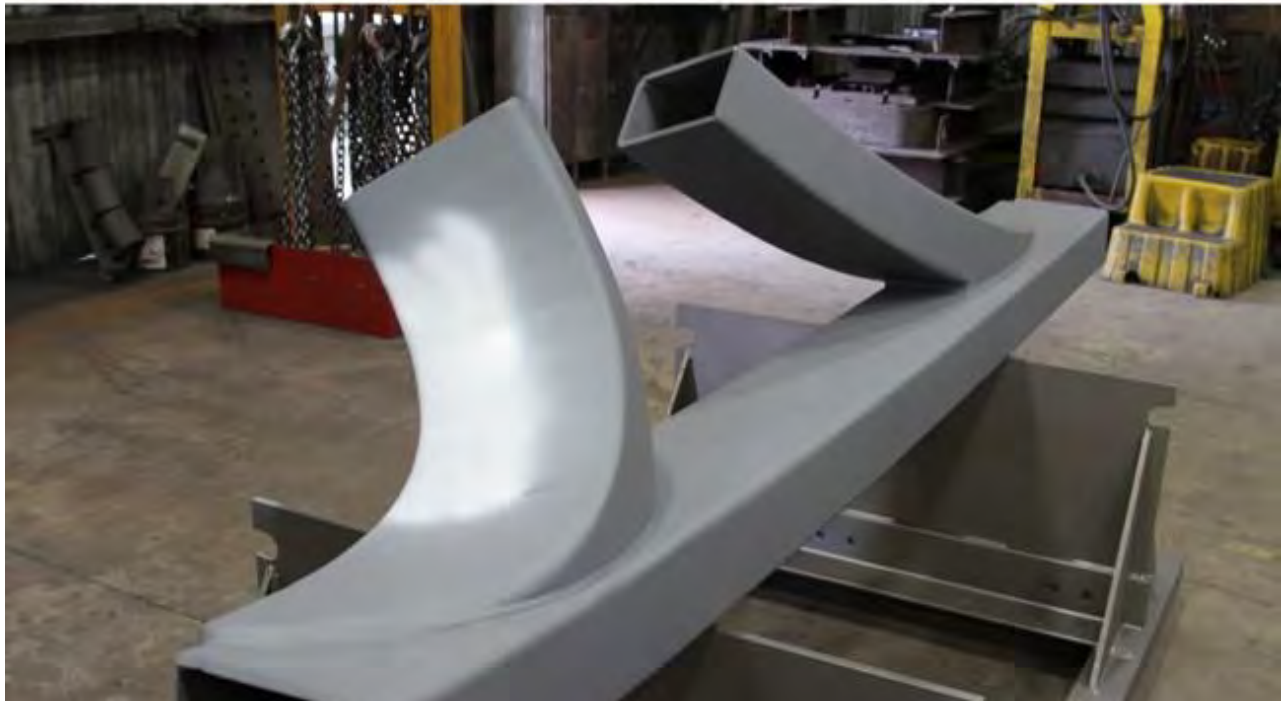
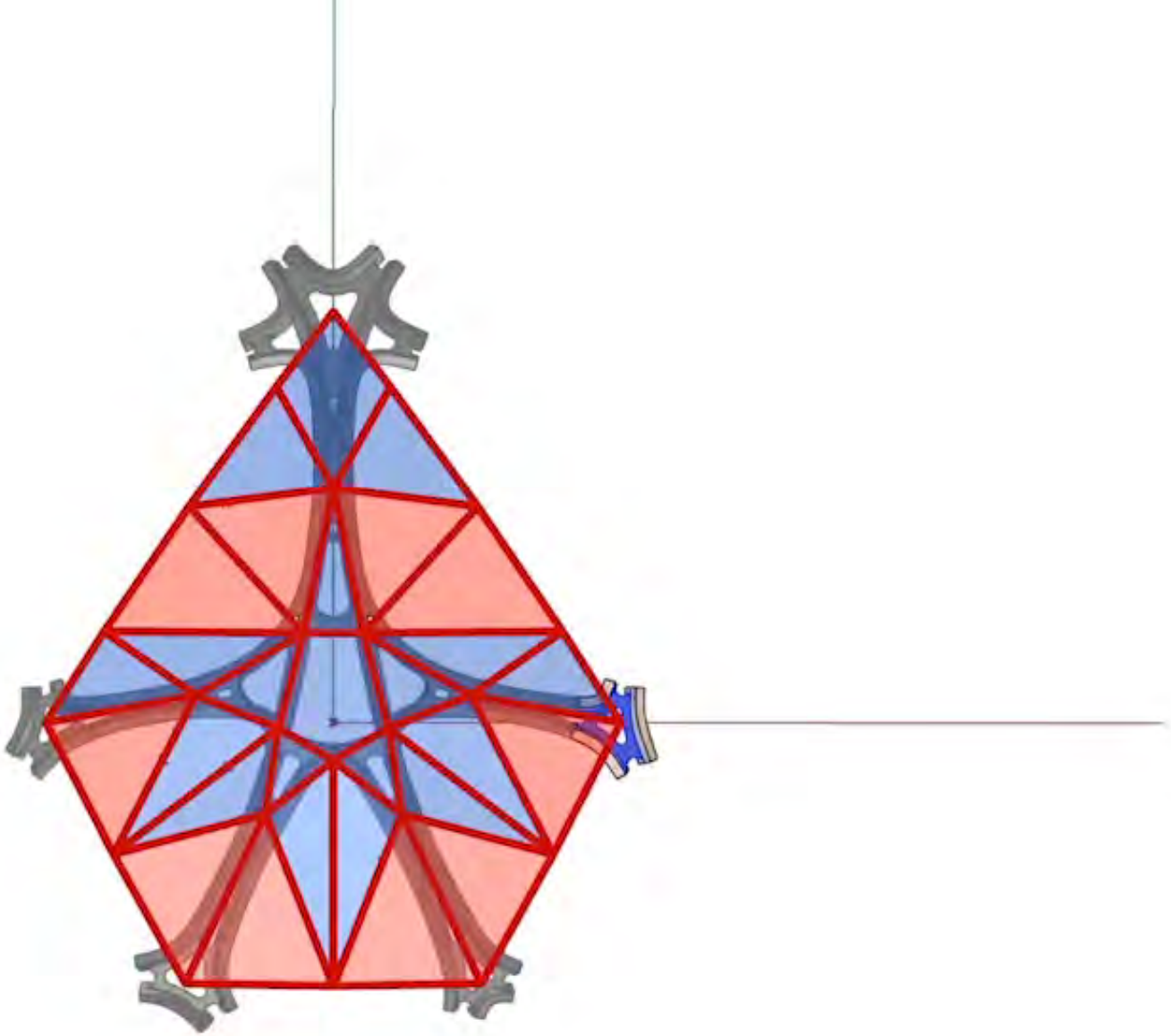
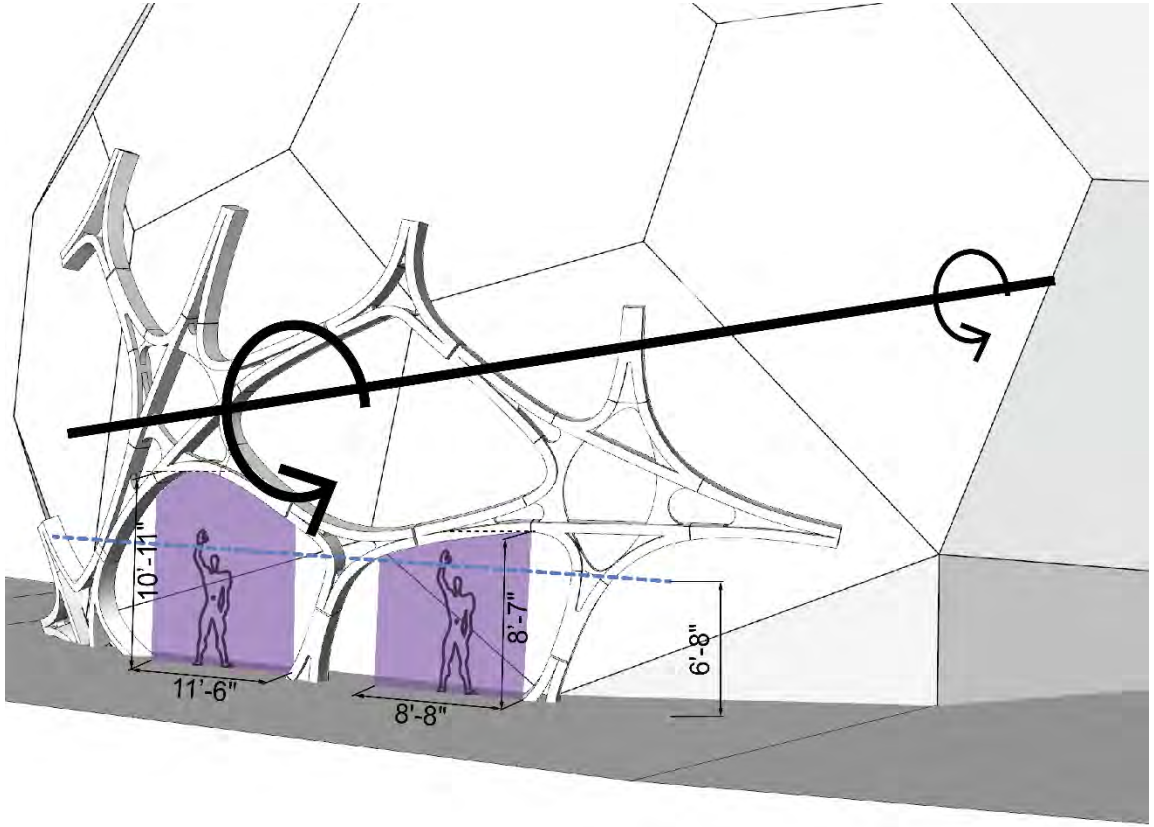


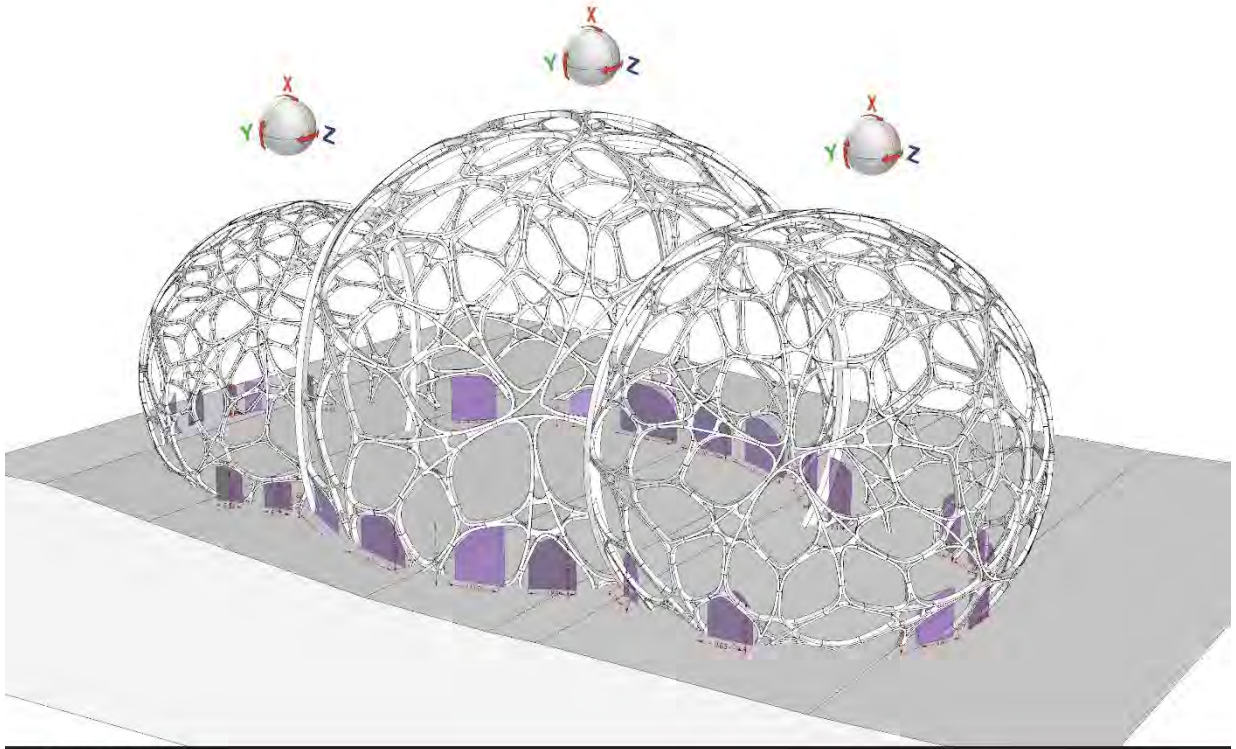





KCP

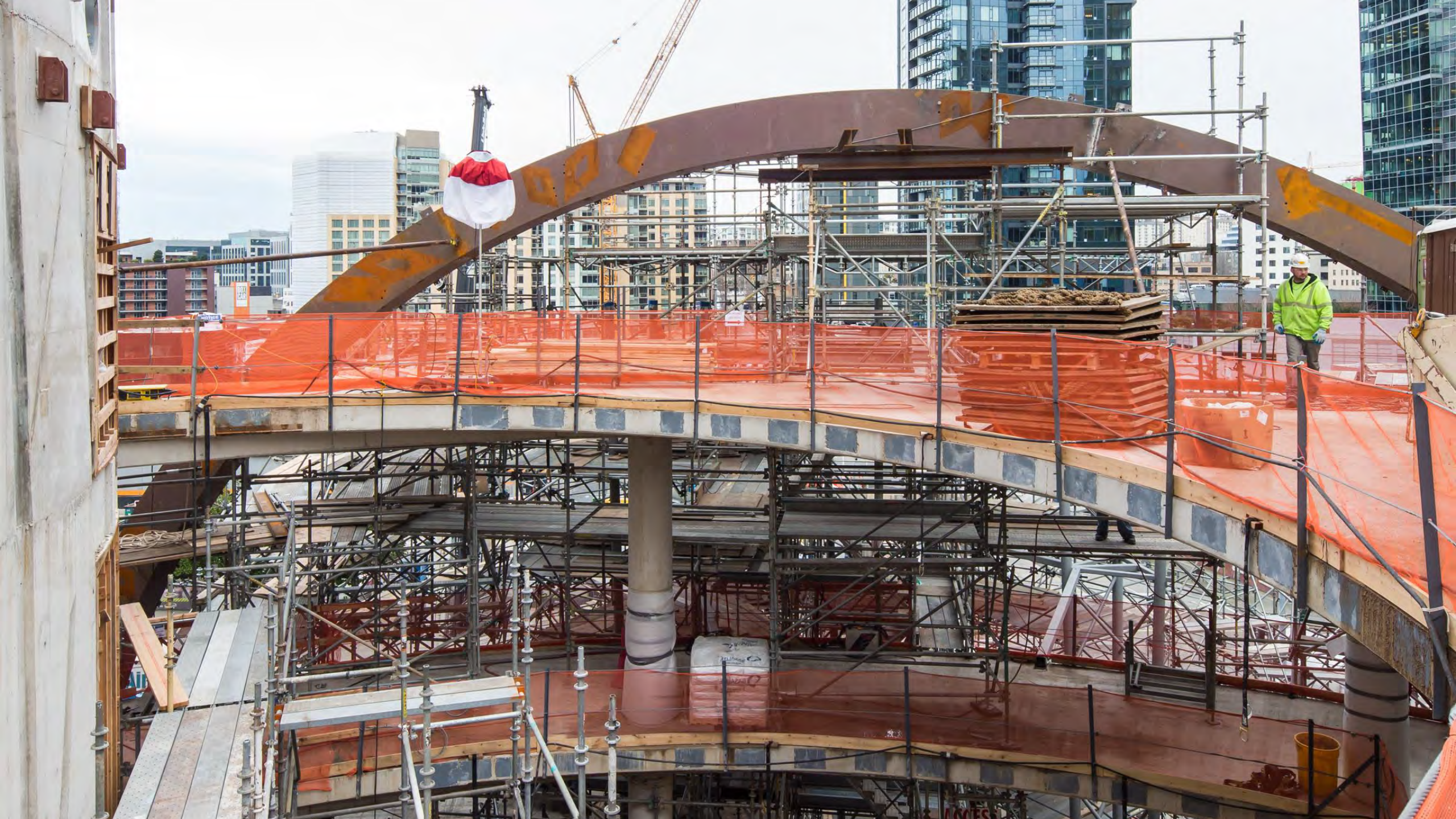




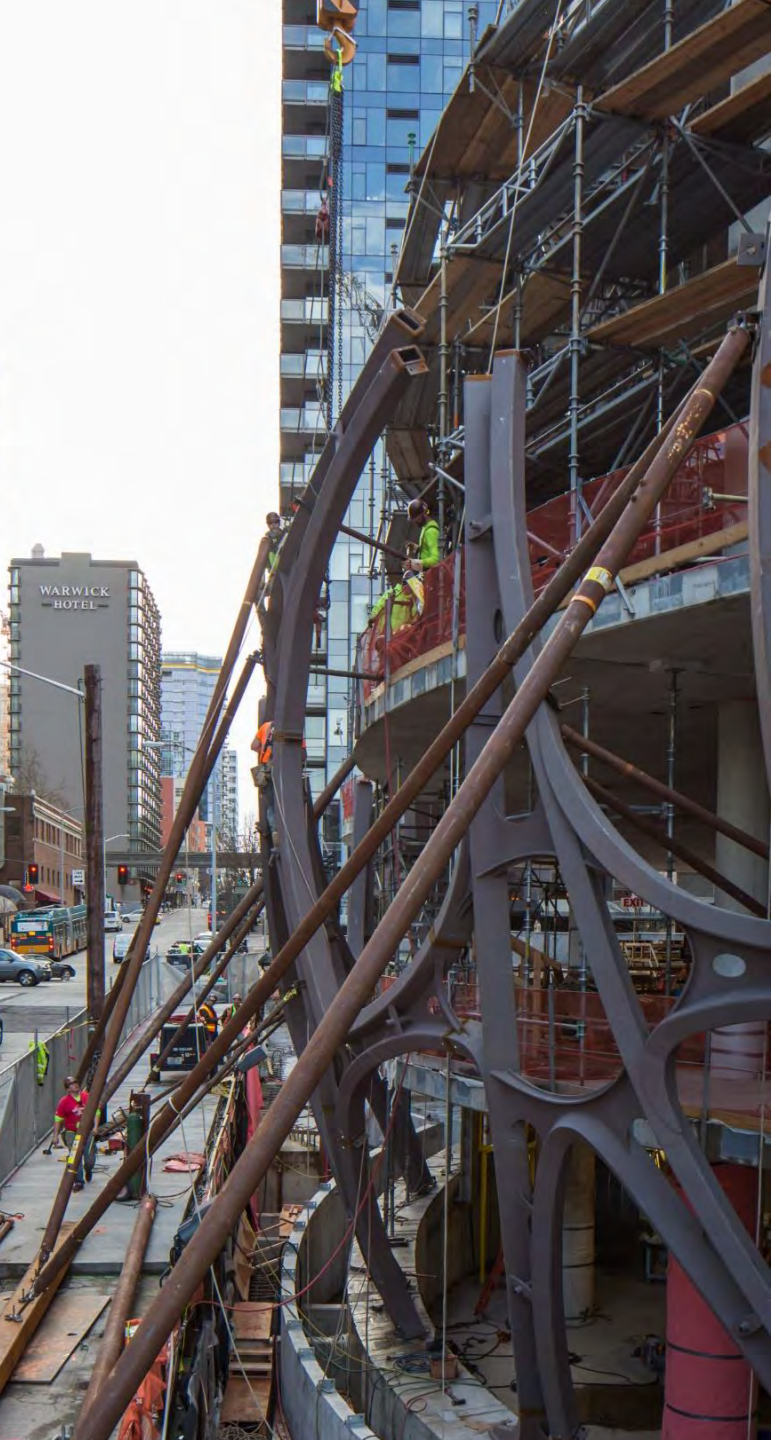


Amazon Rufus 2.0


SOAPY WA



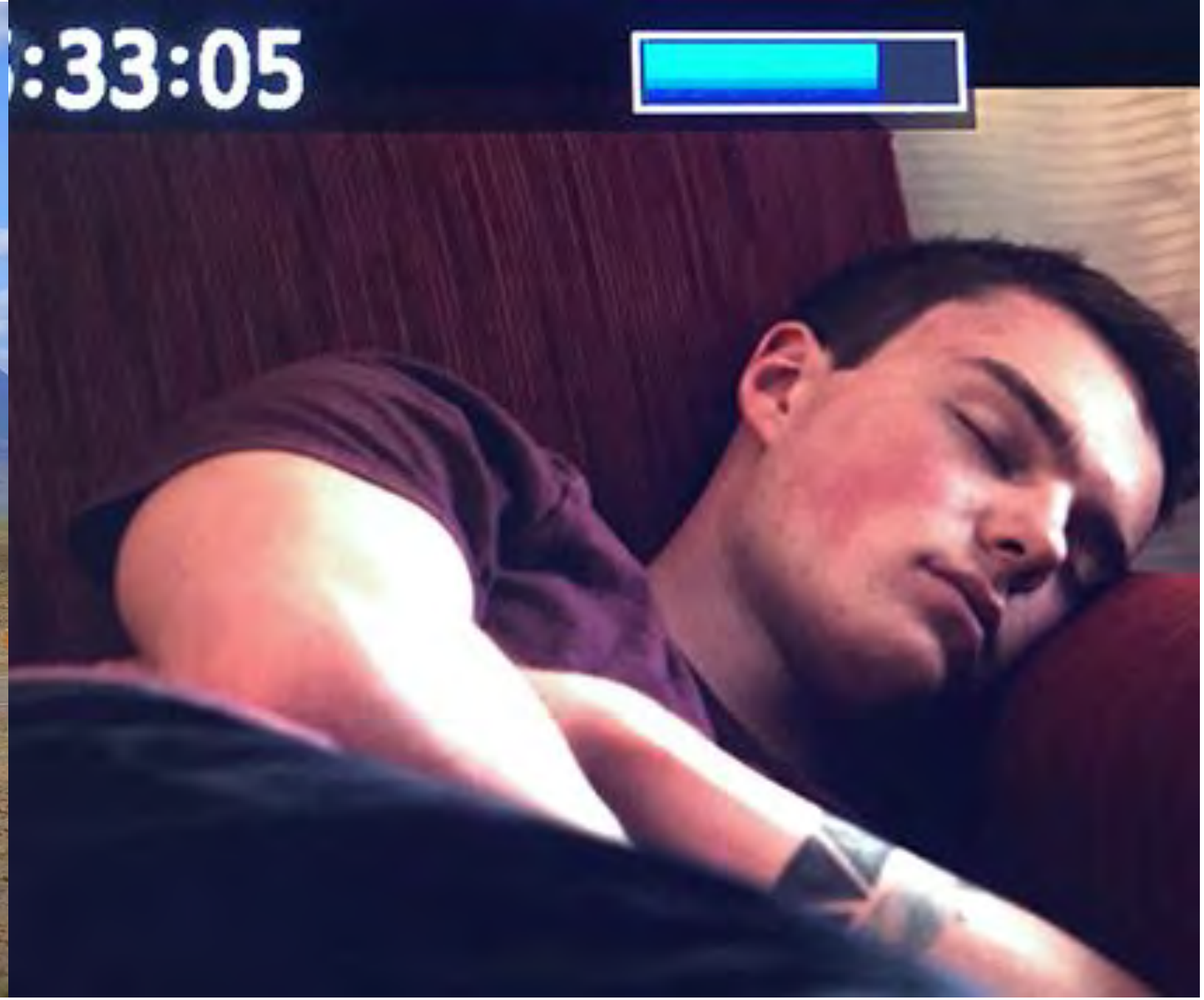

ACCESS
Towing by Burien
Sellen
RUFUS 2.0 BLOCK
2101 7th Avenue


WARWICK
HOTEL

wsp nbbj

Facade Tectonics

July 2019



wsp nbbj

Facade Tectonics

July 2019

wsp nbbj

Facade Tectonics

July 2019


EXIT

wsp nbbj

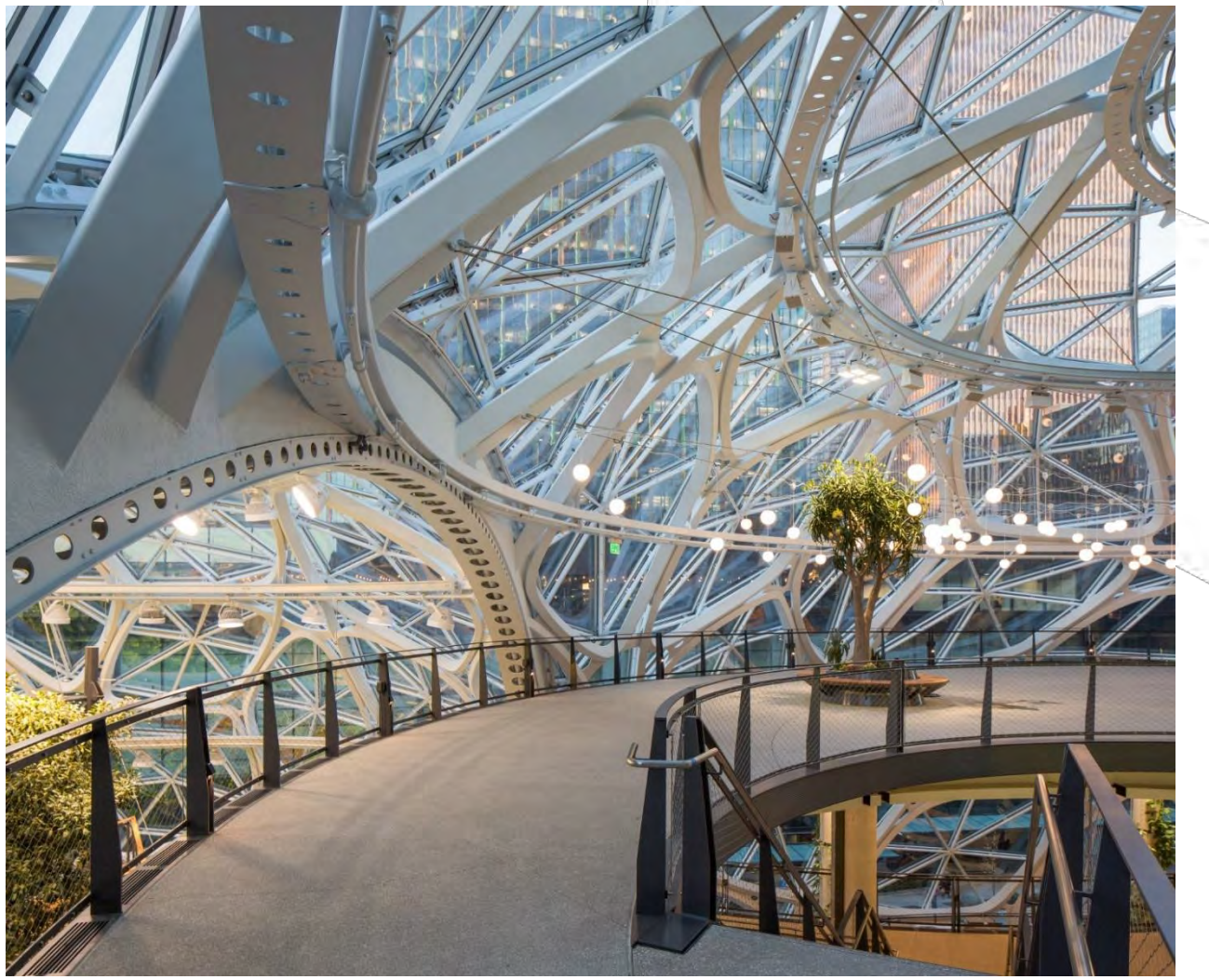
Facade Tectonics
July 2019

Take Away Thoughts

1. Innovation is not efficient; creativity takes time
2. Seek (and accept) knowledge from outside your discipline
3. Test virtually, but also literally
4. Mock-up everything new
5. A + B + C + D

A+B+C+D (Always Be Connecting the Dots). It's not about creating newness, but making sense of what you have, maybe in fragments and different places, but can be shaped in new and interesting ways.

- Richard Branson



SPHERES OF INFLUENCE

People and Plants Cohabitate in Amazon's Seattle Spheres

Facade Tectonics FORUM SEATTLE

SPEAKERS

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Senior Associate
NBBJ

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Senior Associate
WSP

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