CONNECTIONS
CONNECTIONS
Our Team

Alicja ARCH
Poland

Michal ARCH
Poland

Jimena SE
Costa Rica

Kate SE
United States

Adam MEP
United States

Jue CM
China

Eeshan CM
India
Our Client

Elias

Karolina

Nick

Mikki
Team Project Values

- ZERO ACCIDENT CONSTRUCTION
- SUSTAINABILITY
- ADAPTIVENESS & FLEXIBILITY
Team Process

ZOOM

SLACK

ASANA
L3
Collaboration meeting

L2
Information, location and questions answered

L1
Task completed announcement
TRANSPARENCY IS:

“The clear and concise exchange of information. It is awareness, responsiveness and mutual respect rooted in trust and honesty.”
Transparency
Where we were
WHAT: Building a Culture of Trust
Tracking Transparency

Winter Presentation

Before Fishbowl

Final Updates

Back @ Stanford

Positive  Neutral  Negative  Travel
Site Context
Adaptability: Climate Change

Average Monthly Temperature

Dry Bulb Temperature (°F)

JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
Climatic Conditions

- Comfort Zone
- Natural Ventilation
- Internal Heat Gain
Future Climatic Conditions

- Comfort Zone
- Natural Ventilation
- Internal Heat Gain
Slope
CONNECTIONS
MAX GIVEN FOOTPRINT

15% REDUCTION
DAYLIGHTING ANALYSIS
DAYLIGHTING RESULT
DAYLIGHTING RESULT
Data Analysis for Sustainability - WIND

Average Wind Speed

- Present
- 2035
- 2065
- 2090
Data Analysis for Sustainability
Natural Ventilation
HAZARD!

Lateral Loads

• Seismic will govern!
SOUTH ELEVATION
WEST ELEVATION
Façade: Lateral System

1 32 ft 2 32 ft 3 32 ft

16 ft

4 32 ft 5

10 ft

12 ft

12 ft

14 ft
GUSSSET PLATE CONNECTION

SCALE: 1" = 1' - 0"

3/4" DIA. BOLT, TYP.
4 PER SIDE

1" MIN, TYP.

3/16" TYP.

LVL BEAM

1/2" THICK PREFAB
GUSSET PLATE

8" SQUARE BRB, TYP.

WORKLINE, TYP.

BEAM DEPTH.
PER SCHEDULE
SE – Bracing: Putting up a Facade

Mode 5
Period: 0.154 sec
Bracing: Putting up a Facade

Mode 6
Period: 0.118 sec
Structure Member Prefabrication
LEVEL 0
Living Machine Experience

- Design
- Impacts on Water
Water Analysis: Tidal Systems
Water
Water Analysis: Living Machine
Water
LIVING MACHINE
Water
ELEVATOR

BRIDGES

STAIRS
People: Floor Plans

INSTRUCTIONAL LABS, AUDITORIUM
MECHANICAL ROOM, RESTROOMS, SERVER ROOM, STORAGE, TECHNICAL SUPPORT
CAFE
People: Floor Plans

- LARGE CLASSROOMS, AUDITORIUM (L2)
- MECHANICAL ROOM, RESTROOMS, STORAGE
People: Floor Plans

- Small Classrooms, Seminar Rooms, Student Offices
- Mechanical Room, Restrooms, Storage
People: Floor Plans

- Faculty Offices
- Dept Head Office, Administrative Assistants, Senior Offices
- Mechanical Room, Restrooms, Storage
VR: LIGHT
VR DAYLIGHTING
Hybrid Steel + Timber

- Factory labor instead of field labor
- Lighter elements
- On site welding
- Smaller elements
- Truss possibility
- High cost of not linear elements
- Zero Accident Con...
  19.4%
- Sustainability/Net...
  40.6%
- Low carbon footprint (timber)
- Recycled steel
- Fuel for transportation and cranes
Typical Floor Plan

LEGEND

10" x 24" LVL TIMBER BEAM

W24X62 STEEL BEAM

2’ DEEP STEEL TRUSS BEAM

TYPICAL FLOOR PLAN
SCALE: 1" = 1' - 0"

C

A

S

M

C

Typical Floor Plan

LEGEND

10" x 24" LVL TIMBER BEAM

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TYPICAL FLOOR PLAN
SCALE: 1" = 1' - 0"

C

A

S

M

C
Adaptability: Columns

- 4 internal columns
- Symmetrical
Adaptability: Foundations

Foundation depth: 6’
Water level: 13’
Architectural Stair Prefabrication & Installation

Total Stair Size: 15’ x 24’

Prefabricate in 3 sections: 15’ x 8’
Prefabrication – Fire Stairs

- Prefabricated Fire Stairs on Steel Structure
- Fire Proofed Drywalls for Stair Case Walls
- Faster Construction
- Will be used as working stairs
TVD Impacts on Design Decision

Cost Comparison of Window Sizes

- 5' x 11': $350,000.00
- 5' x 8': $240,000.00
Collaborative Decision Between Arch, CM and MEP

<table>
<thead>
<tr>
<th>Glass Panel Size</th>
<th>Cost</th>
<th>Duration (Day)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' x 4'</td>
<td>$ 900k</td>
<td>32</td>
<td>Glass is installed in the frame</td>
</tr>
<tr>
<td>5' x 5'</td>
<td>$ 730k</td>
<td>58</td>
<td>Glass must be field installed</td>
</tr>
<tr>
<td>6' x 6'</td>
<td>$ 660k</td>
<td>87</td>
<td>Glass must be field installed</td>
</tr>
</tbody>
</table>
LEVEL 1
Acoustical Optimization
Façade: Cantilever support
Double Cantilevers

- **Double Cantilever**
- ‘Double Diamond’ Shape
- Lateral System
CABLE GUSSET PLATE CONNECTION

SCALE: 1" = 1' - 0"

CL

2" DIA. STEEL CABLE

3/16" 3/16" TYP.

PIN CONNECTION W/ 1/2" DIA THRU BOLT

(4) 1/2" THROUGH BOLTS.

GUSSET PLATE SLOTTED THROUGH TIMBER BEAM

CORNER COLUMN, PER SCHEDULE.

SLAB DEPTH, PER SCHEDULE.

BEAM DEPTH, PER SCHEDULE.
Sequencing Cantilever
Mechanical Systems
L0

ELECTRICAL
MECHANICAL
SUPPLY
RETURN
EXHAUST
Cross Paths
Two Seismic Masses: 5th Façade

Seismic masses
Atrium
Bridges

- One connected side
- One roller side
Bridges
• Tie two “halves” together at the roof
• Maximum displacement: 0.392 in
• Further exploration for bridge connection
Safety: Fall Protection

• Create safe environment on stairs and atrium
  • Temp Railing system
  • Tie Offs and Points
Safety: Action Plan – Earthquake & Hazard Mitigation

- Earthquake a major hazard
- Evacuation area provided for Earthquakes, Fire, etc off-site

How stupid can they be?

Neither of them are wearing goggles.

Take the right preventive measures for the right activity. Not just for the sake of safety regulations.
Safety: Software Solutions

Better knowledge of Sub-contractor practices, better overall site H & S

SiteWise is a prequalification system that grades a contractor's health & safety capability and publishes that grade in a database that can be viewed by main contractor's and principal organisations. This allows for better contractor selection and an easier tendering process for everyone involved.
LEVEL 2
Crane Selection

Capacity: 50t
Radius: 131 ft.
Max Height: 157 ft.
Other Equipment Selection

California Net Electricity Generation
thousand MWh

- Petroleum-Fired
- Coal-Fired
- Hydroelectric
- Natural Gas-Fired
- Nuclear
- Nonhydroelectric Renewables
- Non-Fossil Renewables

Payload Capacity:
Zero emissions & $9000

Lift Equipment Capacity:
4000 kg
Height: 43 ft.

Hanson 6m3 RMC Truck

Forklift Capacity: 1000 lb
Site Layout – Substructure Phase
Crane Radius

Radius = 80 ft
Erosion & Sediment Control
Logistics – Supply Chain

10 Miles

San Francisco Bay

25 Miles

Timber Supplier

Steel Supplier

Concrete Supplier

Glass/Window/Door Supplier
Labor Union

• San Francisco Building Trades Council

• Win & Win situation:

<table>
<thead>
<tr>
<th>Employer</th>
<th>Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>More Skilled Labors</td>
<td>Professional Education</td>
</tr>
<tr>
<td>Safer Jobsite</td>
<td>Safer Jobsite</td>
</tr>
<tr>
<td>Higher Productivity</td>
<td>Higher Wage</td>
</tr>
<tr>
<td>Stable Labor Source</td>
<td>Stable Employment</td>
</tr>
</tbody>
</table>

• Anticipate 25% higher labor wage than national average
CM – 5D Model
TVD: Cost Distribution

- Services: 33%
- Shell: 30.67%
- Interior: 10%
- Substructure: 2%
- General conditions: 5%
- Building sitework: 2%
- Special construction: 11%
- Equipment and furnishing: 7%
TVD: Dashboard

[Graph showing cost breakdown with categories such as substructure, shell, interior, services, equipment and furnishing, special construction, building site work, and general conditions.]

[Bar chart indicating total savings of $10,826,856.00, with the actual savings at $9,020,835.72 and the target savings at $1,806,020.28.]
TVD: Cost Evolution
Sustainable Target Value

<table>
<thead>
<tr>
<th>Impact</th>
<th>Target</th>
<th>Project</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (kgCO2e)</td>
<td>3,714,897</td>
<td>2,913,714</td>
<td>78%</td>
</tr>
<tr>
<td>Energy (MJ)</td>
<td>120,509,807</td>
<td>50,130,479</td>
<td>42%</td>
</tr>
<tr>
<td>Water (kgH2O)</td>
<td>73,347,945</td>
<td>65,652,420</td>
<td>90%</td>
</tr>
<tr>
<td>Ozone (kgCFC11e)</td>
<td>-</td>
<td>2.47E-01</td>
<td>-</td>
</tr>
</tbody>
</table>
Energy Analysis Summary
Sustainability

- Carbon
- Reuse
- Waste
- Performance
- Native
- Biomimicry
- Leap Frog
- Health
- Water
- Air Quality
- Space Efficiency
- Integration
“DO NOT JUMP TO CONCLUSIONS”

“NEVER STOP ASKING”

“TRUST & HONESTY”

“THE MORE INPUT YOU PROVIDE, THE MORE OUTPUT YOU RECEIVE”

“CONTRIBUTE POSITIVELY TO OTHER DISCIPLINES”
“ALWAYS VIEW IT FROM SOMEONE ELSE’S PERSPECTIVE BEFORE YOUR OWN”

“CHECK UR TIMEZONE”

“ALL CRITIQUES ARE WORTHY CRITIQUES”

“THINK BEFORE YOU SAY NO”
THANK YOU TO ALL OF OUR FAMILIES, FRIENDS, OWNERS, MENTORS, SUPPORTERS & DR. RENATE FRUCHTER FOR MAKING THIS EXPERIENCE POSSIBLE!
THANK YOU!