River Team Contract

General Rules

Rule #1: be polite, words like thanks and please will make the work easier
Rule #2: be transparent, how do you feel, what plans do you have for the next months
Rule #3: be available, its just as good to show that you are on the same step as your team members (give messages likes or comments)
Rule #4: Say AND, not BUT! (Give every idea a chance!)
Rule #5: work and decide together
Rule #6: Decisions should come from the whole group and send on owner/renate
Rule #7: 24 hours before our official meeting the agenda should be fix so we can discuss all issues between the group before our official owner meeting starts. TRY to upload the files not too late. That everyone have a early access to the files to be prepared.
Rule #8: Please mute yourself if there is anybody else talking

Technology Implementation Plan

File sharing: We will use Box. Please download the “Box Sync” extension. You will have
<table>
<thead>
<tr>
<th>Meeting Leader</th>
<th>Week #</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danny</td>
<td>2</td>
<td>January 29, 2013</td>
</tr>
<tr>
<td>Charles</td>
<td>3</td>
<td>February 5, 2013</td>
</tr>
<tr>
<td>Danielle</td>
<td>4</td>
<td>February 12, 2013</td>
</tr>
<tr>
<td>Ronnie</td>
<td>5</td>
<td>February 19, 2013</td>
</tr>
<tr>
<td>Sijie</td>
<td>6</td>
<td>February 26, 2013</td>
</tr>
<tr>
<td>Joanna</td>
<td>7</td>
<td>March 5, 2013</td>
</tr>
<tr>
<td>Mareike</td>
<td>7</td>
<td>March 8, 2013 (No Class)</td>
</tr>
<tr>
<td>Danny</td>
<td>8</td>
<td>March 11-14 (Dry Run #1)</td>
</tr>
<tr>
<td>Charles</td>
<td>8</td>
<td>March 11-14 (Dry Run #2)</td>
</tr>
</tbody>
</table>
## “I wish, I like, How to...”

<table>
<thead>
<tr>
<th>Description</th>
<th>Danny</th>
<th>Sijie</th>
<th>Danielle</th>
<th>Mareike</th>
<th>Joanna</th>
<th>Ronnie</th>
<th>Charles</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wish: More subgroup meeting</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>8</td>
</tr>
<tr>
<td>Wish: have a party!</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>7</td>
</tr>
<tr>
<td>Howto: More productive but how?</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>7</td>
</tr>
<tr>
<td>Wish: This is the only class!</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>7</td>
</tr>
<tr>
<td>Like: Owners/Profs are very present. Available</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>7</td>
</tr>
<tr>
<td>Like: Great team spirit</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>6</td>
</tr>
<tr>
<td>Wish: more construction/industry experience with IPD and etc.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>6</td>
</tr>
<tr>
<td>Wish: difference between team updates/presentation vs. discussion. Two type of meetings.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>6</td>
</tr>
<tr>
<td>Wish: to integrate technology without being distraction</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>6</td>
</tr>
<tr>
<td>Wish: More quality time</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>5</td>
</tr>
<tr>
<td>Wish: leap frog idea for movable space</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>5</td>
</tr>
<tr>
<td>Howto: make concept clear for winter presentation</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>5</td>
</tr>
<tr>
<td>Wish: general team concept understanding. what is important?</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>5</td>
</tr>
<tr>
<td>How to make all of our work shown? how to integrate our the work clearly?</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>5</td>
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<tr>
<td>Like: big idea for the project</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>4</td>
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<tr>
<td>Like: understand everyone's workload</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>4</td>
</tr>
<tr>
<td>Like: presentation feedback from the crit, lesson learned.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>4</td>
</tr>
<tr>
<td>Wish: could manage time better</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>3</td>
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<td>Wish: more group meeting time</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Wish: Less time difference</td>
<td>x</td>
<td>x</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>3</td>
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<tr>
<td>Wish/Howto: rsmeans, vico, revit model, a in bewteen method</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>3</td>
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<tr>
<td>Howto: work more efficiently with different concept</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Solution</td>
<td>Before</td>
<td>After</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>---------------</td>
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<tr>
<td>Communication</td>
<td>Gmail</td>
<td>Facebook</td>
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<tr>
<td>Collaborate</td>
<td>Document</td>
<td>Box</td>
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</tr>
<tr>
<td>Coordination</td>
<td>Calendar</td>
<td>Basecamp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Here’s what’s been happening in your projects.

**AEC River Project**

Ronnie H. commented on *What’s the BiG idea for our project?*
I have tried to elaborate on the big idea of "Connection" and what we have so far. I have tried narrow a lot of our work down to four con...

8:51pm

Feb 22

Joanna P. forwarded an email: *AEC class - possible coaching session?*

11:03pm

**Feb 21**

**AEC River Project**

Sijie Z. completed a to-do: *Both CM Discuss risk list with LCFM*

8:44pm

Sijie Z. completed a to-do: *Both CM Update site access #1 to make to feasible and verify with M...*

8:44pm
SITE INFORMATION
WEIMAR, Germany
SITE INFORMATION
WEIMAR, Germany
WEIMAR, Germany

CASTLE

ILM RIVER

SITE

CONCENTRATION OF PEDESTRIAN TRAFFIC

A

MEP

SE

CM

LCFM
SITE HAZARDS & CHALLENGES

- Floods
- Many trees
- Park protected by UNESCO
- Castle proximity
VALUES

- Economic
- Social
- Environmental

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td></td>
</tr>
<tr>
<td>Big Idea</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td></td>
</tr>
<tr>
<td>Connection with Environment</td>
<td></td>
</tr>
<tr>
<td>Collaborative Space</td>
<td></td>
</tr>
<tr>
<td>Aesthetic Value</td>
<td></td>
</tr>
<tr>
<td>Risk Factor</td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
</tr>
<tr>
<td>Constructability / Phasing</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total Value</td>
<td>26 points</td>
</tr>
<tr>
<td>Cost</td>
<td>$7.03M</td>
</tr>
<tr>
<td>Value for Cost</td>
<td>3,70</td>
</tr>
</tbody>
</table>
CHALLENGE:

SOLUTIONS:

LET WATER IN

KEEP WATER OUT
BIG IDEA

- Float
- Flower stem
- Light

inner core
VIEW FROM THE STREET
THIRD FLOOR

- MEP
- storage
- restrooms
- circulation
- lounge

- faculty lounge
- faculty offices
- administrative assistants
- senior administration office
- department chair’s office
<table>
<thead>
<tr>
<th>Erosion</th>
<th>Best = 3 Points</th>
<th>Water Lily</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Better = 2 Points</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good = 1 Point</td>
<td></td>
</tr>
<tr>
<td>Sustainability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big Idea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection with Environment</td>
<td></td>
<td></td>
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<tr>
<td>Collaborative Space</td>
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<tr>
<td>Aesthetic Value</td>
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<tr>
<td>Comfort</td>
<td></td>
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<tr>
<td>Efficiency</td>
<td></td>
<td></td>
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<tr>
<td>Constructability / Phasing</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>24 points</th>
<th>Total Value</th>
<th>Cost</th>
<th>26 points</th>
<th>$7.03M</th>
</tr>
</thead>
</table>

| 3,69      | Value for Cost | 3,70 |
THE METRICS

CARBON EMISSION

COST
LIFE CYCLE COST
RENT

VALUE FOR MONEY

O&M
RISK
REPLACEMENT
REPLACEMENT

Carbon (kgCO2e)
Water (kgH2O)
Energy (MJ)

VALUE FOR MONEY

RISK CHARGE
REPLACEMENT

THE METRICS

CARBON EMISSION

COST
LIFE CYCLE COST
RENT

VALUE FOR MONEY
FOUR innovations

Amphibious Defense System

Indoor Environment

Energy & Water

Safety & Lean
AMPHIBIOUS DEFENSE SYSTEM

Resting Position

Flood Position
## Buoyancy

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Floor Mass</td>
<td>1364000 kg</td>
<td>kg</td>
</tr>
<tr>
<td>Cladding Mass</td>
<td>26000 kg</td>
<td>kg</td>
</tr>
<tr>
<td>Foundation Mass</td>
<td>1078000 kg</td>
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<tr>
<td>Total Mass</td>
<td>2469000 kg</td>
<td>kg</td>
</tr>
<tr>
<td>Total Volume</td>
<td>12116 m³</td>
<td>m³</td>
</tr>
<tr>
<td>Density of Structure</td>
<td>204 kg/m³</td>
<td>kg/m³</td>
</tr>
<tr>
<td>Density of Water</td>
<td>1000 kg/m³</td>
<td>kg/m³</td>
</tr>
<tr>
<td><strong>AMPHIBIOUS DEFENSE SYSTEM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Volume of Replaced Fluid</strong></td>
<td>1847</td>
<td>m³</td>
</tr>
<tr>
<td><strong>Basement Footprint</strong></td>
<td>930</td>
<td>m²</td>
</tr>
<tr>
<td><strong>Depth of Replaced Fluid</strong></td>
<td>2.0</td>
<td>m</td>
</tr>
<tr>
<td>(Volume / Basement Footprint)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fraction of Body Submerged</strong></td>
<td>15.2</td>
<td>%</td>
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</tbody>
</table>

**BUOYANCY**

Flood Position

2.0 m
**FOUNDATION SYSTEM**

**Water Flow**

36.1 m³/s

**Vertical Guidepost**

HSS 18x .500 w/ 4000 psi Concrete Fill

**Foundation Block**

- 60kN
- 9 m
- 3 m
- 667 kN-m
CONSTRUCTION SEQUENCE

A
MEP
SE
CM
LCFM
CONSTRUCTION SEQUENCE

A  MEP  SE  CM  LCFM
Punching Shear Critical in Slab Design

Inner Foundation Slab

356mm

508mm

236000 kg
Entire Substructure

- Vertical Guideposts
- Interior Post-Tension Slab
- Exterior Slab
- Structural Steel Columns
- Foundation Blocks
- Reinforced Concrete Foundation Walls

Dimensions:
- 4 m
- 3.3 m
1.1 AMPHIBIOUS DEFENSE SYSTEM
1.1 AMPHIBIOUS DEFENSE SYSTEM

Carbon emission  Rent  Cost

0. BASIC BUILDING  1.1 ADS
1.1 AMPHIBIOUS DEFENSE SYSTEM

Value for money

Value

0. BASIC BUILDING

1.1 ADS
SUPERSTRUCTURE WEIGHT

CONCRETE

2463000 kg

STEEL

+162000 kg

1170000 kg

32% building weight savings
1st Floor

W24x94

W16x31
2nd Floor
2nd Floor

W24x94
W16x31
W18x46
W24X131
3rd Floor
3rd Floor

W24x94
W16x31
W18x46
W24X131
Roof
Roof

W14x22
W21x68
W18x46
W21x111
Moment Connection

Gravity Beam-Column Connection

Gravity Beam-Beam Connection

Moment Resisting Cantilever Connection
1.2 CONCRETE to STEEL

- Carbon emission
- Rent
- Cost

Diagram showing comparisons between basic building and concrete to steel transitions, indicating changes in carbon emission, rent, and cost.
1.2 CONCRETE to STEEL

Value for money

Value

0. BASIC BUILDING
1.1 ADS
1.2 CONCRETE to STEEL
1. AMPHIBIOUS defense system
INDOOR ENVIRONMENT
DYNAMIC SHADING PANELS
INDOOR ENVIRONMENT

• Render of office
INDOOR ENVIRONMENT

• Render of auditorium
2. INDOOR environment
2. INDOOR environment

- Carbon emission
- Rent
- Cost

0. BASIC BUILDING
1.1 ADS
1.2 CONCRETE -> STEEL
2. INDOOR ENVIRONMENT
2. INDOOR environment

- **Value for money**
- **Value**

---

0. BASIC BUILDING

1.1 ADS

1.2 CONCRETE -> STEEL

2. INDOOR ENVIRONMENT
ENERGY CONSUMPTION

- **MWh**
- **Jan**
- **Feb**
- **Mar**
- **Apr**
- **May**
- **Jun**
- **Jul**
- **Aug**
- **Sep**
- **Oct**
- **Nov**
- **Dec**

- **Heating**
- **Electricity**

- **Ventilation**
- **Solar shading electrics**
- **Equipment**
- **Lighting**
- **Cooling pumps**
- **Pumps**
- **Chiller**
- **DHW and Storage**
- **Space heating**
CO₂ penalty: 4.600 USD
3. ENERGY and WATER
3.1 PERSONALIZED ventilation

- Carbon emission
- Rent
- Cost

Graph showing the comparison of carbon emission, rent, and cost across different sections:

- 0. Basic Building
- 1.1 ADS
- 1.2 Concrete -> Steel
- 2. Indoor Environment
- 3.1 Personal Ventilation
3.1 PERSONALIZED ventilation

- Value for money
- Value

0. BASIC BUILDING
1.1 ADS
1.2 CONCRETE -> STEEL
2. INDOOR ENVIRONMENT
3.1 PERSONAL VENTILATION
CO₂ sale: 21.900 USD
3.2 ENERGY ROOF, PVT & COOLING

Carbon emission  Rent  Cost

0. BASIC BUILDING  1.1 ADS  1.2 CONCRETE -> STEEL  2. INDOOR ENVIRONMENT  3.1 PERSONAL VENTILATION  3.2 ENERGY ROOF, PVT & DESICCANT
3.2 ENERGY ROOF, PVT & COOLING

- **Value for money**
- **Value**
EXTRA PV AND WATER REUSE
CO$_2$ sale: 50.900 USD
Primary energy consumption
= 61.8 kWh/m$^2$ per year
3.3 EXTRA PV and WATER REUSE

- Value for money
- Value
SITE LAYOUT – WITHOUT FLOOD

- Waste/Recycling Containers
- 10 Parking lots
- Toilets
- 2-level Trailers
- Rest area
- Fence
- Silt fence
- Wheel & Concrete washout
- Material Laydown
SITE LAYOUT – WITH FLOOD

- Sand fill
- With 3m flood

HESCO Unit

- Length: 160m
- Height: 2.44 m
- 5 hour to install

Terrain data - Courtesy of River 2010
Existing road

Temporary road

Worker path

Truck path
EXTREME CONDITION CONSIDERATION

LIEBHERR  LTM 1095-5.1

Longest beam: 12m
Heaviest lift: 3.28t
Boom: 58m
Crane capacity: 4.4 t @ 35m
SITE VISUALIZATION & SAFETY TRAINING

BIM & Site Layout + Equipment Operation

Site Layout Validation + Worker Safety Training
DESIGN-FOR-SAFETY CHECKLISTS

Design for Construction Safety Toolbox
Version 2.0

Apply?
Yes
Design change!
Swing away - passageway

Swing open – exit travel

High potential fall hazard

ConXtech welded in the shop
Moved Air Handling Unit away from the roof edge.

Early ventilation and illumination.
SAFETY PLANNING – TRADITIONAL

- Fall protection planning
AUTOMATED FALL HAZARD DETECTION

Steel frame
AUTOMATED FALL HAZARD DETECTION

1st Floor Slab
AUTOMATED FALL HAZARD DETECTION

2nd Floor Slab
AUTOMATED FALL HAZARD DETECTION
### Slab Hole Checking Results

**Project Name:** River_Waterlily  
**Analyst:** Sijie Zhang  
**Date:** 5/9/2013 9:58:09 AM

<table>
<thead>
<tr>
<th>No.</th>
<th>GUID</th>
<th>Level</th>
<th>Distance to Lower Level (mm)</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Area (m²)</th>
<th>Prevention Method</th>
<th>Check</th>
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<td>600</td>
<td>600</td>
<td>0.17</td>
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<tr>
<td>2</td>
<td>11112</td>
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<td>6750</td>
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<tr>
<td>4</td>
<td>11151</td>
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<td>0</td>
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<tr>
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<td>2</td>
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<td>3496.64</td>
<td>3209.5</td>
<td>0.96</td>
<td>Guardrail System</td>
<td>FALSE</td>
</tr>
</tbody>
</table>

**Note:** Checking results + Quantity-take-off of safety protective equipment
# JOB HAZARD ANALYSIS

**Location/System:**

**Date:**

**JHA TEAM:**

**Task Description**

**TEAM LEADER:**

---

**REQUIRED PPE:**

**REQUIRED PERMITS:**

**APPROVED BY:**

**SEQUENCE OF BASIC JOB STEPS**

**POTENTIAL HAZARDS**

**RECOMMENDED ACTION OR PROCEDURE**

---

A | MEP | SE | CM | LCFM
JOB HAZARD ANALYSIS

BIM + Safety Database = Automated JHA + Estimated Workspace

<table>
<thead>
<tr>
<th>Job Hazard Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Name: River_WaterLily</td>
</tr>
<tr>
<td>Task Name: Guide Post</td>
</tr>
<tr>
<td>Activity: Frame_Guide_Protet</td>
</tr>
<tr>
<td>Job Step: Stand_Forms_Into_Place</td>
</tr>
<tr>
<td>Potential Hazard: Fall</td>
</tr>
<tr>
<td>Recommended Procedures:</td>
</tr>
<tr>
<td>(1) Use ladder or scaffold, do not use top 2 rungs of ladder</td>
</tr>
<tr>
<td>(2) Ensure area around ladder/scaffold is clear of debris and flat</td>
</tr>
</tbody>
</table>
Clash detection (BIM 360 Glue) → Classify & prioritize clashes → Send clash notice (BIM 360 Glue) → Pinpoint & resolve clashes (Revit) → Coordination meeting → Iteration
### CLASH DETECTION & COORDINATION

#### Number of Clashes

<table>
<thead>
<tr>
<th></th>
<th>Arch</th>
<th>SE - Super</th>
<th>MEP</th>
<th>SE - Base</th>
<th>SUM</th>
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</thead>
<tbody>
<tr>
<td>Arch</td>
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<td>1992</td>
<td>988</td>
<td>16</td>
<td>2996</td>
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<tr>
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<tr>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
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</tr>
</tbody>
</table>

#### MEP vs. SE – Super

- **Ducts vs. Steel beams**
- Coordination meeting (SE, MEP, CM)

#### MEP vs. SE - Base

- **Ducts vs. Foundation**
- Re-route the duct

#### MEP vs. Arch

- **Ducts vs. Furniture**
- **Ducts vs. Slabs**
- Can be handled on site
# Clash Matrix

**Before:**

<table>
<thead>
<tr>
<th>Number of Clashes</th>
<th>Arch</th>
<th>SE - Super</th>
<th>MEP</th>
<th>SE - Base</th>
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</tr>
<tr>
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<td>-</td>
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<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**After:**

<table>
<thead>
<tr>
<th>Number of Clashes</th>
<th>Arch</th>
<th>SE - Super</th>
<th>MEP</th>
<th>SE - Base</th>
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<tbody>
<tr>
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<tr>
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<td>-</td>
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<td>4</td>
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<tr>
<td>MEP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
RS Means – Square Foot Estimator

Comparison with past years’ estimates

Partial Material take-offs from Revit

Model based take-offs

Winter Pres.
TARGET VALUE COSTS

TARGET SET BASED ON:

- Owners input
- Previous projects
- First cost estimate

Total: $8.4M

A Substructure, $474,000
B Shell, $1,722,000
C Interiors, $1,634,000
D Services, $3,345,000
E Equipment & Furnishings, $202,000
F Special Construction, $47,000
G Building Sitework, $237,000
H Indirect Cost, $739,000

TARGET SET BASED ON:

• Owners input
• Previous projects
• First cost estimate
INITIAL COST VS TARGET

Total: $7.00 M

- Basic Building
- Target

Millions

A Substructure  B Shell  C Interiors  D Services  E Equipment & Furnishings  F Special Construction  G Building Sitework  H Indirect Cost
FINAL BUILDING COST vs TARGET

Total: $8.375 M

1. BASIC BUILDING
1.1 ADS
1.2 CONCRETE to STEEL
2. INDOOR ENV.
3.1 PERSONAL VENTILATION
3.2 ROOF and PVT
3.3 DESICCANT cooling
3.4 PV and WATER
FINAL COST DISTRIBUTION

A Substructure 5%
G Building Sitework 2%
F Special Construction 1%
E Equipment & Furnishings 2%
H Indirect Cost 12%
D Services 38%
C Interiors 17%
B Shell 23%

Total: $8.375M

Thousands ($)
• Computer Manager (May 1\textsuperscript{st})
• Risk of flooding during construction
• Winter
SCHEDULING APPROACH

MS Project

Comparison with past years' estimates

LBS \(\rightarrow\) Vico Office

Winter Pres.
SCHEDULE

Start 01/09/15

Finish 18/08/16

- Transplant Trees
- Flood Protection
- Earthwork
- Mobilize on Site
- Substructure
- Superstructure
- Exterior Enclosure
- Interior Wall Framing
- Services
- Interior Finishes
- Building Sitework
- Commissioning

- NTP
- Ground Freezing
- Underground Work Complete
- Building Envelope Complete
- Computer System Manager Moves In
Milestone: Computer Manager Move in date: May 1st, 2016
ConXtech system

EPIC Metal Steel deck
- Concrete - thomas-gruppe 2.6km
- Precast concrete - Betonwerk Streichardt 2.9km
- Construction equipment - zeppelin-rental 19km
Transplant Trees
Flood Protection
Earthwork
Mobilize on Site
Substructure
Superstructure
Exterior Enclosure
Interior Wall Framing
Services
Interior Finishes
Building Sitework
Commissioning

TIMELINE

Start
01/09/15

Finish
18/08/16

Qtr 4, 2015 | Qtr 1, 2016 | Qtr 2, 2016 | Qtr 3, 2016

NTP

Ground Freezing

Underground Work Complete

Building Envelope Complete

Computer System Manager Moves In

Start
01/09/15

Finish
18/08/16

Qtr 4, 2015 | Qtr 1, 2016 | Qtr 2, 2016 | Qtr 3, 2016

NTP

Ground Freezing

Underground Work Complete

Building Envelope Complete

Computer System Manager Moves In
<table>
<thead>
<tr>
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<th>SE</th>
<th>CM</th>
<th>LCFM</th>
</tr>
</thead>
</table>

4D SCHEDULE
01/09 ▶ NTP

- Transplant Trees
- Flood Protection
- Earthwork
- Install temporary utilities
- Set up site office
- Set line and grade benchmarks
- Prepare site - lay down yard and temporary utilities

01/12 ▶ Ground Freezing

- Dig trench and install utility piping
- Excavate foundation
- Pour Excavation

01/09 ▶ NTP
4. LEAN + SAFETY
4. LEAN + SAFETY

- Carbon emission
- Rent
- Cost
4. LEAN + SAFETY

- Value for money
- Value
SUSTAINABILITY ASSESSMENT

63 points =

U.S. GREEN BUILDING COUNCIL
LEED GOLD
USGBC

SNeAR®

A
MEP
SE
CM
LCFM

Economic
Procurement
Governance and Reporting
Facilities Management
Economic Effect
Climate Change
Energy

Environmental

Social
Community facilities
Form and space
Health and wellbeing
Stakeholder engagement
Health and Safety
Waste
Materials

Optimum
Worst Case
Maximize value without increasing the rent

- O&M Costs
- Replacements
- Interest Payments
- Riskcharge
WHOLE LIFE CYCLE COSTS

Basic Building

Optimized Building

$10,000,000.00
$9,000,000.00
$8,000,000.00
$7,000,000.00
$6,000,000.00
$5,000,000.00
$4,000,000.00
$3,000,000.00
$2,000,000.00
$1,000,000.00

Riskcharge
Interest Payments
O&M costs
Replacement
MINIMIZING RENT

Bar graph showing costs and savings:

- Basic Building: $1,443,534
- ADS: $1,200,000
- Concrete to Steel: $1,000,000
- Indoor Environment: $800,000
- Personalized Ventilation: $600,000
- Energy roof, PVT and Desiccant Cooling: $400,000
- Extra PV and Water: $200,000
- Optimized Buildings: $773,285

Savings: -40%
CASH FLOW OPTIMIZE BUILDING

Outcomes

Incomes

Cash Flow (cumulated)

Break Even after 22 years

$-10,000,000.00

$-8,000,000.00

$-6,000,000.00

$-4,000,000.00

$-2,000,000.00

$-1,000,000.00

$0.00

$2,000,000.00

$4,000,000.00

$6,000,000.00

$8,000,000.00

$10,000,000.00
“The one thing I will always remember is…”

“Integration does not happen by chance”
“The one thing I will always remember is…”

“how one decision impacts all other disciplines”
“The one thing I will always remember is…”

CHARLES

“Technology is only a tool; it all comes down to process”
“The one thing I will always remember is…”

Danielle

“How to work efficiently in an ever-changing environment”
“The one thing I will always remember is…”

JOANNA

“7 > 1+1+1+1+1+1+1 “
“The one thing I will always remember is…”

“communication is the key to teamwork”
“The one thing I will always remember is…”

“don’t underestimate the power of Google Docs”

DANNY
A Special Thanks To:

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Zuzanna Kołtowska

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