Ridge Team

Winter Quarter Presentation

Owners: Anja Jutraz and Josh Odelson

Sinan Mihelcic

Caroline Lewis
Justin Schwaiger
Annemarie Golz
(Apprentice)

Linette Bodilsen

Maria Selk
Fernando Castillo
University of Nevada, Reno

Earthquakes
Challenging Weather
Sloped Site

Reno
Nevada
Construction Site

Stanford!
University of Nevada
Location on the Site
Education = Building
Design: Lego Concept
Big Ideas

NEVADA

RENO UNIV.
Program Scheme

terrain configuration
+26 ft

146 ft
116 ft
30 ft
Logistics of the Building

116 ft

132 ft

north

2/18/2011 Ridge Team
2nd Floor

- Small classrooms
- Research
- Storage
- Auditorium
- Faculty office
- Toilets
- Air space/shaft
- Communications

Upper Entrance

- Lobby
- Toil.

Measurements:
- 29'6" x 11'6" x 17'6" x 58'

Dimensions:
- 58' x 121'4" x 63'4"
Section

146 ft

30 ft
Section

146 ft

30 ft

15 ft
Façade

Sunshading
Concrete cladding

Local granulate

north
East & West View
Structural Loads

Dead Load: 100 psf
Live Load: 60 psf average
Snow Load: 10 psf

**Concept 1**
Earthquake base shear: $0.1337g = 535$ kips
Wind shear: 87 kips

**Concept 2:**
Earthquake base shear: $0.27g = 1100$ kips
Wind shear: 87 kips
Structural Development

- Challenges:
  - Curved roof
  - Earthquake Country

- Solutions:
  - Curved roof truss system
  - Structural solution 1: Shear walls and viscous wall dampers
  - Structural solution 2: ConXtech
**Soil Profile**

<table>
<thead>
<tr>
<th>Depth of Excavation</th>
<th>Soil Type</th>
<th>Thickness</th>
<th>Bearing Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade at 4,580 ft. Elevation: 0 inches (0 ft.)</td>
<td>Stony Sandy Loam and Heavy Loam</td>
<td>19 inches (1.58 ft.)</td>
<td>1,500 psf.</td>
</tr>
<tr>
<td>(Assume this soil for above 4,580 ft.)</td>
<td>Sandy Clay Loam</td>
<td>10 inches (0.83 ft.)</td>
<td>1,500 psf.</td>
</tr>
<tr>
<td>19 inches (1.58 ft.)</td>
<td>Clay and Clay Loam</td>
<td>27 inches (2.25 ft.)</td>
<td>1,500 psf.</td>
</tr>
<tr>
<td>29 inches (2.42 ft.)</td>
<td>Very Gravelly Sandy Loam and Very Gravelly Loam</td>
<td>28 inches (2.33 ft.)</td>
<td>5,000 psf.</td>
</tr>
<tr>
<td>56 inches (4.67 ft.)</td>
<td>Volcanic Rock</td>
<td>Unknown</td>
<td>8,000 psf.</td>
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<tr>
<td>84 inches (7 ft.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Water Table:** 48 inches (4.0 ft.) below grade

2/18/2011

Ridge Team
Foundations

- 15 ft tall retaining wall
- 10x10 ft isolated spread footing
- 25x25” base plate
- 8#9 @16”
- 3” Clear
Shear Wall: 2nd Floor Framing

Framing:
- W18x50
- W18x35
- W16x36

Column:
- W14x90
- W14x46
Shear Wall: 3rd Floor Framing

Framing:
- W18x50
- W18x35
- W16x36

2 Story Truss

Column:
- W14x90
- W14x46
Shear Wall: 4th Floor Framing

Framing:
- W18x50
- W18x35
- W16x36

2 Story Truss Column:
- W14x68
- W14x46
Shear Wall: Roof Framing

Framing:
- W18x50
- W18x35
- W16x36
- W24x55
- 2 Story Truss

Roof Truss

Column:
- W14x68
- W14x46
Curved Roof Truss

- Top members single curvature
- Separated by 10 ft.
- Steel decking formed over curved members
- Normal roofing procedure
ConXtech: 2nd Floor Framing

Framing:
- W21x68
- W16x36
- W12x30

Column:
- HSS 16x16x5/8
- W14x46
ConXtech: 3rd Floor Framing

Framing:
- W21x68
- W16x36
- W12x30
- Queen Post Truss

Column:
- HSS 16x16x5/8
- W14x46

Ridge Team
2/18/2011
ConXtech: 4th Floor Framing

Framing:
- W21x68
- W16x36
- W12x30
- W18x35

Queen Post Truss

Column:
- HSS 16x16x5/8
- W14x46
ConXtech: Roof Framing

Framing:
- W21x68
- W16x36
- W12x30

Roof Truss
- Queen Post Truss

Column:
- HSS 16x16x5/8
- W14x46
Load Path: Queen Post Truss

- 2 Story Classroom Space
- 2 Story Auditorium Space

Dimensions:
- 24’
- 29’
# Climate Data

## Annual relative air humidity [%]

<table>
<thead>
<tr>
<th></th>
<th>Morning</th>
<th>Afternoon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Morning</td>
<td>Afternoon</td>
</tr>
<tr>
<td>Jan</td>
<td>79</td>
<td>50</td>
</tr>
<tr>
<td>lowest</td>
<td>Morning</td>
<td>Afternoon</td>
</tr>
<tr>
<td>Sep</td>
<td>61</td>
<td>19</td>
</tr>
</tbody>
</table>

![Annual Wind Rose](image1.png)  
![Annual Wind Rose (Frequency Distribution)](image2.png)
Solar Access Analysis

August

East_9_am  South_12_am  West_3_pm

January

East_9_am  South_12_am  West_3_pm
Façade Solution
Capacity of the HVAC System

<table>
<thead>
<tr>
<th>Concept</th>
<th>Area (m²)</th>
<th>Qv (m³/h)</th>
<th>Heating (W)</th>
<th>Cooling (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept 1</td>
<td>2856.304</td>
<td>14802.09</td>
<td>34965.44</td>
<td>-40620.3</td>
</tr>
<tr>
<td>Concept 2</td>
<td>2829.641</td>
<td>15818.49</td>
<td>27799.15</td>
<td>-38491.7</td>
</tr>
</tbody>
</table>

Ventilation based on ASHRAE 62.1
Geothermal Heating and Cooling

Summer:
Cooling in ceiling

Winter:
Floor heating
The Vertical Shaft

- Vertical Shaft
- 4th Floor
- 3rd Floor
- 2nd Floor
- 1st Floor
- Restrooms
- Rooms
- Water
- Ventilation
- Mechanical Room
- Domestic, Gray, Black
- Supply Air
- Heating, Cooling, Return
Duct System and Lighting Zones

3D Model of Ducts

- DF > 2%
- DF < 2%
- Ducts and Mech Room
Design: Core Concept
Big Idea
2nd Concept

(professors
students
offices)

classrooms

100 ft  115 ft

25 ft

terrain configuration
+20 ft

Ridge Team
2/18/2011
Logic of the Building
1st and 2nd Floors

1. floor

2. floor
3rd Floor

- **AUDITORIUM**
- **TOIL.**
- **ENTRANCE**
- **LOBBY**

Legend:
- **auditorium**
- **chairs office**
- **senior assist.**
- **administration**
- **faculty office**
- **toilets**
- **air space**
- **communications**

Dimensions:
- 100' x 56'
- 22' x 22'
- 98' x 62'
- 115' x 17'
- 36'
4th Floor

- Small classrooms
- Storage/seminar
- Large classrooms
- Faculty office
- Toilets
- Air space/shaft
- Communications

4. floor
5th Floor

- Seminar rooms
- Students offices
- Technics, storage
- Air space/shaft
- Communications

Floor Plan:
- Cactus roof
- Dimension: 115' x 100' x 56'

5th Floor
Façade

- Concrete cladding
- White color panels
- Sunshaders

North
Core Concept – Retaining Wall

12” Wall with #5’s at 4”O.C. EW

11’
Core Concept: Foundation Plan

3' THICK MAT FOUNDATION.

Column Sizes:
W14x109
Core Concept: 1st Floor Framing

Framing Sizes:
- W18x35
- W21x57

Column Sizes:
- W14x109

Shear Wall Above

N

Ridge Team

2/18/2011
Core Concept: 2\textsuperscript{nd} Floor Framing

<table>
<thead>
<tr>
<th>Framing Sizes</th>
<th>Column Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>W18x35</td>
<td>W14x109</td>
</tr>
<tr>
<td>W21x57</td>
<td></td>
</tr>
<tr>
<td>W24x76</td>
<td></td>
</tr>
<tr>
<td>W24x117</td>
<td></td>
</tr>
</tbody>
</table>
Core Concept: 3rd Floor Framing

Framing Sizes
- W18x35
- W21x57
- W24x76
- W40x249
- W36x135
- W24x117
- W14x68

Column Sizes

SLOPING DIAPHRAGM
DOWN

37'  29' 10\(\frac{1}{2}\)"  29' 10\(\frac{1}{2}\)"  17'
Core Concept: 4<sup>th</sup> Floor Framing

Framing Sizes
- W18x35
- W21x57
- W24x76
- W24x117

Column Sizes
- W14x68
Core Concept: Roof Framing Plan

Framing Sizes
- W18x35
- W21x57

Column Sizes
- W14x68
Structural Development

• Challenges:
  • Cantilevers (22’ and 17’)
  • Earthquake Country – Base Shear = .27% g

• Solutions:
  • Gravity Framing
    • Two story truss
    • Cable supported
  • Concrete shear walls
  • 3’ mat foundation
Structural Process

Truss Plenum

Two Story Truss

Cable Supported

Architectural Model
Two Story Truss Load Path

115’

100’

24’

33’
Two Story Truss

\[ \Delta = -0.75'' \]

\[ \Delta = -0.75'' \]
Cable Supports

115'

100'

2/18/2011

Ridge Team
Cable Supported

Diagram showing the forces and cable support system with notations such as 170 kips, 150 kips, and 315 kips.
Cable Supported Load Path

Diaphragm Force
Tension Load
Column Load
Solar Access Analysis

August

January
Façade Solution
Duct System and Lighting Zones

3D Model of Ducts

- DF > 2%
- DF < 2%
- Ducts and mech room
Construction:

Lego Concept   Core Concept
Finance: Budget

Budget in 2011 Dollars: $7,145,000

- CD “Risk Free” Investment Return: 2.05%
- Expected Inflation: 3.25%
Logistics: The Job Site

Construction Site

Pedestrian Path
Logistics: Site Access

- Interstate 80
- US 395 BUS
- McCarran Blvd
- Entrance Rd
- 17th Street
- Evans Ave
- Evans Ave
- 15th Street
Logistics: Parking

• Owners reserved us 40 parking spots for free!

25+ spaces

50+ spaces

Metered Parking

50+ spaces

Silver passes $375 per year
Constructability: Water Table

5ft high steps

55ft Elevation Delta

Water table is 4ft below lowest elevation.
Constructability: Steep Slope

Steep slope divides construction site into a “top” and “bottom” section.

~ 10° Max

Slope is manageable but access by heavy equipment should be minimized.
Constructability: Soil Stability

Very stable soil. Approximately 50ft of soil without a retaining wall for construction.
Constructability: Lego Concept

Curved Roof

- Curved steel roof structure.

Cantilevers

- On site or prefab cantilevers.
Site Logistics: Lego Shear Walls

- Mobile Crane
- Pump Truck
- Waste Management
- Telescopic Fork Lift
- Concrete Trucks
- Delivery Truck
- Mobile Crane
- Trailer + WC

Laydown

ShearWalls
Site Logistics: Lego ConXtech

ConXtech

- Trailer + WC
- Pump Truck
- Waste Management
- Telescopic Fork Lift
- Concrete Trucks
- Delivery Truck
- Mobile Crane
- Trailer + WC

2/18/2011
Ridge Team
Site Logistics: Weather

<table>
<thead>
<tr>
<th>Month</th>
<th>Inches of Snow</th>
<th>Inches of Rain</th>
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<tbody>
<tr>
<td>January</td>
<td>5.8</td>
<td>1.1</td>
</tr>
<tr>
<td>February</td>
<td>5.2</td>
<td>1.0</td>
</tr>
<tr>
<td>March</td>
<td>4.3</td>
<td>0.7</td>
</tr>
<tr>
<td>April</td>
<td>1.2</td>
<td>0.4</td>
</tr>
<tr>
<td>May</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>June</td>
<td>0</td>
<td>0.5</td>
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<td>July</td>
<td>0</td>
<td>0.3</td>
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<tr>
<td>August</td>
<td>0</td>
<td>0.3</td>
</tr>
<tr>
<td>September</td>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td>October</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>November</td>
<td>2.4</td>
<td>0.9</td>
</tr>
<tr>
<td>December</td>
<td>4.3</td>
<td>1.0</td>
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</tbody>
</table>

This suggests a start of construction date of June 1st 2015.
Schedule: Milestones

**Start Construction: June 1, 2015**

**Milestone 1:** Enclose building by Nov 1, 2015

**Milestone 2:** Provide Lab Access by Jan 1, 2016

**Milestone 3:** Finish construction by May 31, 2016

---

**2015**

|-------|------|------|------|------|------|------|------|------|------|------|------|------|

**Climate**

- No Snow, some rain.
- Some snow, some rain.

**Milestones**

- Earthwork, foundations, structure, enclosure, exterior systems.
- Building interior systems, interior construction, interior finishes.
- Faculty move in to install instructional labs and computer room.

---

**2016**

**May**

- Dedicate Building on Jun 1st, 2016
Schedule: Comparison

**Duration:**
- **46 Weeks** for Shear Walls
- **52 Weeks** for ConXtech

Milestones:
- Start
- Enclosed
- Lab Access
- Finish

Time Delta:
- 2/18/2011

Ridge Team: Enclosed - 80
Site Logistics: Early Lab Access

- Finish basement interior construction
- Adjust construction fence
- Secure all access from second floor to basement

Ground Level

- Labs
- Hard Hat Free Zone
- Labs Zone
- Construction Zone
Need to carefully plan the scheduling for both designs in order to construct the building on time.

Trusses or Cables to support the cantilever? Trusses may not require the cantilevers to have temporary support, whereas a cable system will.
Site Logistics: Core Method

- Mobile Crane
- Pump Truck
- Waste Management
- Trailer + WC
- Concrete Trucks
- Telescopic Fork Lift
- Mobile Crane
- Trailer + WC
Site Logistics: Core Methods 1 & 2

Truss System

Truss Assembly Area

Temporary Supports

Cable System
Heavy Equipment Selection

**Wacker Neuson**
Small Turn Excavator
60032 • 80032

**Excavator**

**Mobile Crane**
Max: 60m radius for 8.4 tons lift

**Concrete Pump Truck**
Max: 42.6m radius

**Liebherr**
LTM 1250-6.1

**ZhengZhou**
Boom Pump 50m
Light Equipment Selection

**Fork Lift**
- Capacity: 9,000 lbs.
- Max Height: 45 ft

*Gradall 534D9-45*

**Excavation Roller**
*Wacker RD 7H-ES*

**Skid Steer Loader**
- Capacity: 1400 lbs.

*Volvo MC60B*
The Challenges:
Target Value Design

Lego Concept    Core Concept
TVD – Setting Targets

1. RSMeans S.F. Estimate
   ~$5,000,000

2. Adjust RSMeans S.F. Estimate to our Maximum Budget
   $7,145,000

3. Consider 1 & 2 plus initial design concepts

1 2 3 → Generate Initial Estimate and Targets

4. Discuss options with team and design with a target!

5. Adjust based on feedback from mentors and owners.

4 5 6 → Improve Estimate and Targets

6. Discuss with owners, reset targets and commit to them!

(Next Step)
TVD – Estimate and Level of Detail

<table>
<thead>
<tr>
<th>Line Items from Sub-Assembly TVD</th>
<th>RS Means Unit Cost</th>
<th>Estimated Quantity</th>
<th>Estimated Cost</th>
<th>Team Chosen Target Value</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Assembly Number</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Material O&amp;G</th>
<th>Installation O&amp;G</th>
<th>Total O&amp;G</th>
<th>% of Total</th>
<th>TVD – ESTIMATED VALUE</th>
<th>% of Total</th>
<th>RSMeans SQFT Estimate</th>
<th>% of Total</th>
<th>Estimated Adjusted Value</th>
<th>% of Total</th>
<th>VALUE DELTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Shell TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
<td>$1,821,632</td>
<td>25%</td>
<td>$1,762,068</td>
<td>34%</td>
<td>$2,268,682</td>
<td>14%</td>
<td>$1,007,194</td>
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<tr>
<td>8610 Floor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11%</td>
<td>$1,082,737</td>
<td>11%</td>
<td>$803,500</td>
<td>14%</td>
<td>$1,007,194</td>
<td>14%</td>
<td>$1,000,000</td>
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<tr>
<td>8610 Floor</td>
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<td>1%</td>
<td>$76,767</td>
<td>1%</td>
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<td>$76,767</td>
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<td>$81,500</td>
<td>1%</td>
<td>$81,500</td>
</tr>
</tbody>
</table>
# TVD – Influencing Design

## Options for Discussion

### Exterior Walls

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Assembly Number</th>
<th>Description</th>
<th>Unit</th>
<th>Material O&amp;M</th>
<th>Installation O&amp;M</th>
<th>Total O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>011012162142</td>
<td>Concrete wall, reinforced, 8&quot; high, 6&quot; thick, plan finish, 300 psi</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162143</td>
<td>Concrete wall, reinforced, 8&quot; high, 4&quot; thick, aged wood beam, 200 psi</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162144</td>
<td>Concrete wall, reinforced, 8&quot; high, 18&quot; thick, plan finish</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162145</td>
<td>Concrete wall (CMU) wall, regular weight, 2&quot; x 4&quot; x 8&quot; 16&quot; 2000 cbf</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162146</td>
<td>Concrete wall (CMU) wall, regular weight, 4&quot; x 8&quot; x 16&quot; 1600 lb</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162147</td>
<td>Concrete wall (CMU) wall, split 10&quot; thick, regular weight, 4&quot; x 8&quot; x 16&quot; 1600 lb</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162148</td>
<td>Brick wall, standard, solid, double wythe, 8&quot; thick, 10&quot; solid core</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
</tr>
<tr>
<td>1</td>
<td>011012162149</td>
<td>Brick wall, standard, solid, double wythe, 8&quot; thick, 10&quot; solid core</td>
<td>S.F.</td>
<td>$2.95</td>
<td>$16.59</td>
<td>$19.54</td>
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</tbody>
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### Exterior Windows

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Assembly Number</th>
<th>Description</th>
<th>Unit</th>
<th>Material O&amp;M</th>
<th>Installation O&amp;M</th>
<th>Total O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>020020121020</td>
<td>Aluminum fixed frame, Sash-Accent Frame, 2.25&quot; x 4.5&quot;</td>
<td>S.F.</td>
<td>$17.87</td>
<td>$9.29</td>
<td>$27.16</td>
</tr>
<tr>
<td>1</td>
<td>020020121021</td>
<td>Aluminum fixed frame, Sash-Accent Frame, 12.25&quot; x 4.5&quot;</td>
<td>S.F.</td>
<td>$24.04</td>
<td>$13.71</td>
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<td>Aluminum fixed frame, Sash-Accent Frame, 2.25&quot; x 4.5&quot;</td>
<td>S.F.</td>
<td>$17.87</td>
<td>$9.29</td>
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<td>Copper fixed frame, Sash-Accent Frame, 2.25&quot; x 4.5&quot;</td>
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### Floor Systems

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<th>Assembly Number</th>
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<th>Unit</th>
<th>Material O&amp;M</th>
<th>Installation O&amp;M</th>
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<td>Concrete wall, reinforced, 8&quot; high, 6&quot; thick, plan finish, 300 psi</td>
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TVD – The Target Value Design Wall
## TVD Results: Lego Concept

### TVD Summary

#### Estimate and Target Value - Summary

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### Estimate and Target Value - Summary

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## Cost Estimate: Lego Concept

### Structure M1 (Standard): $736,000

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### Structure M2 (ConXtech): $750,000

- **F Specialty Const.**: $295,413 (5%)
- **G General Req.**: $155,149 (3%)
- **A Substructure**: $277,246 (5%)
- **B Shell**: $1,050,189 (32%)
- **C Interiors**: $827,618 (14%)
- **D Services**: $2,362,154 (40%)
- **E Equipment and Furnishings**: $74,633 (1%)

**Value Delta**: $1,000,000

### Notes:

- Ridge Team
- 2/18/2011
# Cost Estimate Core Concept

## VALUE DELTA: $1,000,000

### VALUE DELTA: $1,000,000

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<td>G3080 Water Supply</td>
<td>$18,236</td>
<td>$50,000</td>
<td>$31,764</td>
</tr>
<tr>
<td>G3080 Sanitary Sewer</td>
<td>$6,543</td>
<td>$46,000</td>
<td>$39,457</td>
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<td>G4010 Electrical Distribution</td>
<td>$20,954</td>
<td>$50,000</td>
<td>$29,046</td>
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<tr>
<td>Mobilization</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$0</td>
</tr>
</tbody>
</table>
Historic TVD: Lego and Core

Estimate exceeded the target value

Concepts Diverge
The Challenges: Being Native

Lego Concept  Core Concept
Being Native

**SOCIAL INTEGRATION**

LOCAL STUDENTS → RECYCLE (PARTICIPATE) → REUSE

**PHYSICAL INTEGRATION**

LOCAL MATERIAL
Decision Matrix
and
Team Process
## Decision Matrix

<table>
<thead>
<tr>
<th>Sustainability</th>
<th>Shear Walls</th>
<th>ConXtech</th>
<th>Truss Systems</th>
<th>Cable System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being Native</td>
<td>30</td>
<td>30</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Building Envelope in terms of Energy Consumption</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>MEP systems’s energy consumption</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>optimizing active systems</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

| Economy                                |             |          |              |              |
| Estimate’s compliance to target        | 20          | 20       | 20           | 20           |
| Structural cost                        | 15          | 15       | 5            | 10           |
| Achievement of milestones              | 18          | 27       | 18           | 18           |

| Discipline Based                       |             |          |              |              |
| Complexity Level                       | 12          | 18       | 18           | 12           |
| Clarity of Concept/Idea                | 20          | 20       | 30           | 10           |
| Clarity of Program Organization        | 15          | 15       | 10           | 10           |
| Additional Int&ext Social Space        | 15          | 15       | 5            | 5            |
| Constructability                       | 20          | 30       | 20           | 10           |

| TOTAL                                  | 231         | 256      | 212          | 157          |
Communications

- Skype
- GoToMeeting
- Teleplace

- Google Wave
- Google Docs
- Dropbox
LEED

- MATERIALS
  - Recycled
  - Local

- ENERGY USAGE
  - Geothermal
  - Sun Shades
  - Natural lighting
  - Natural ventilation during night time

- Bicycle racks
Lessons Learned

This is a Learning Experience!

Team collaboration makes everything easier

Constantly seek mentors advice in advance

Fulfilling commitment to self manage the task list is difficult
Thanks To:

Erik Kneer
Eduardo Mirana
Greg Luth

Josh Odelson
Anja Jutraz

Questions?

Renate
Mentors
Classmates

Alex Ershov
Adhamina Rodriguez
Daniel Gonzales
Henning Roedel