

Riverbank University at Sacramento

Architect: George Elvin

Engineer: Jeannette Gaehwiler

CM: Burcu Akinci

Presentation Outline

- Alternatives from conceptual development
- Discipline solutions
 - » Architect
 - » Engineer
 - » CM
- Team dynamics and lessons learned



Alternatives from the Conceptual
Stage

SITE

- Sacramento
- Riverbank
- Existing footprint

Qualities

- Organizational clarity
- Integration with environment
- Quality of indoor light

Organizational Clarity

- Distinct functional “bars”
- Transverse circulation bar

Integration with Environment

- Entrance courtyards
- River connection

Quality of Indoor Light

- Central 'volume of light'
- Window variation

Quality Through Collaboration

- Architectural quality
- Structural Integrity
- Value - cost and schedule

Organizational Clarity

- Auditorium volume
- Clear circulation
- Functional division

Integration with Environment

- Entrance Courtyards
- Balconies

Quality of Indoor Light

- Different functions, light and windows
- Saw-tooth, skylight and barrel vault
- Heat reduction

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Structural Engineer:
Jeannette Gachwiler

Beginning the Exploration Journey

■ Initial considerations:

- » material
- » lateral system
- » column locations

■ Revisiting the concepts

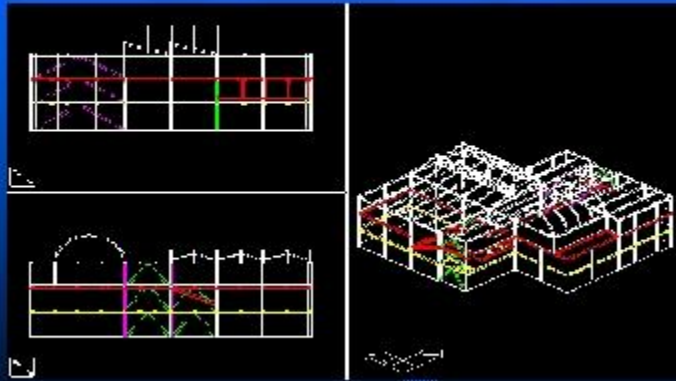
- » Perimeter SMRF
- » Reinforced Concrete Shear Walls
- » Shear Link Frame & SMRF

The Exploration Continues

- **Lateral System - New concepts**
 - » Eccentric vs. Concentric Braced Frames
- **Floor to Floor Height**
 - » costs
 - » framing members
- **Mechanical System**

Lesson: There is no such thing as an ideal solution!

Structural System



The Final Solution

■ Special architectural features

» barrel roof, saw-tooth roof trusses, open atrium core

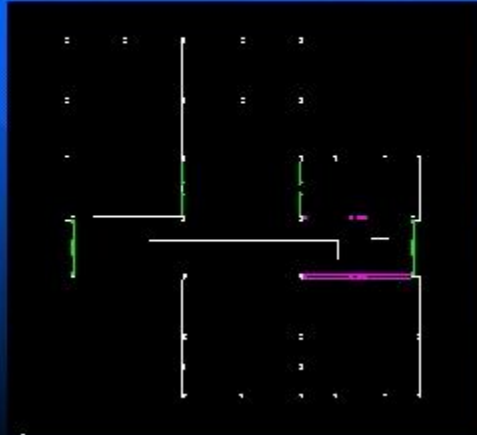
■ Lateral System: Eccentric Braced Frames

» constraints supersede structural optimization as design criteria

» costs: short vs. long term

» interaction with architecture

Plan View



The Final Solution

■ Floor System

- » 2" 18 ga. metal deck with 3 1/4" light weight conc.
- » composite
- » minimize floor beams

■ Mechanical System

- » Central Plant System (Air handler, Governair chiller and cooling tower, Boiler)
- » Hot water and S/R duct through shaft to mech. Room
- » Mount VAV's with coil between beams

Foundation Design

■ Assumptions:

- » First floor is above flood plain
- » Soil bearing pressure = 2500 psf
- » Spread footing foundation

■ Footings

- » 7 ft. square @ exterior columns
- » 12 ft. square @ braced frame columns
- » 18" grade beams tie in isolated footings

Foundation Proposal

- Potential need for piers at exterior
- 2 18" dia. piers at footings near river

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CM: Bureu Akinci

CM Considerations

- **Budget and schedule constraints**
- **Constructability**
- **Site restrictions**
 - » Congestion, Access and access to the site
 - » Flooding
- **Supplier and subcontractor availability**
 - » 47 steel fabricators within 10 miles
 - » 40 sheet metal subs within 10 miles
 - » 68 roofing subs within 10 miles

Exploration/Decisions

■ Material type of exterior closure

- Walls
 - Precast Concrete Panels
 - CMU
 - Stucco
- Windows
 - Regular glass windows
 - Glazed curtainwalls

Exploration/Decisions

■ Meeting the May milestone

- Provide computer rooms in May
- Provide a temporary facility at the site
- Pay for liquidated damages

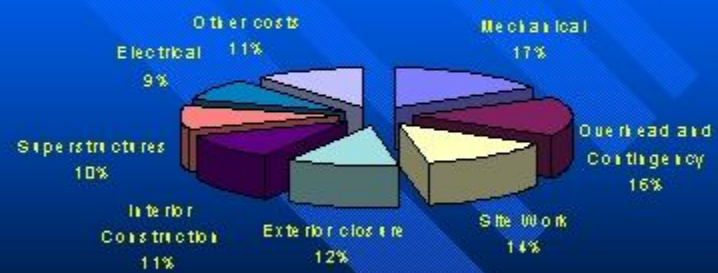
■ Crane choice

- Tower Crane
- Mobile Crane

Facility Cost is 81% of the budget



Cost Breakdown



Schedule

- Project is complete on September 14, 2012

- Milestones:

- ◊ Dec. 30, Structural steel and slabs are complete
- ◊ March 2, Exterior closure is complete
- ◊ June 21, Interior framing/MEP complete

- Risk:

- » Roof work is during winter months

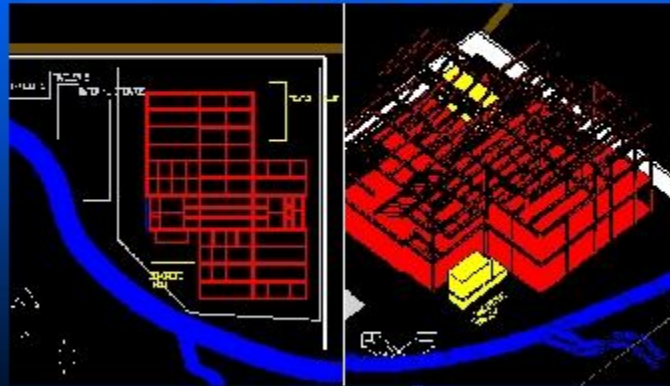
October 24, 2011
Steel Erection Starts



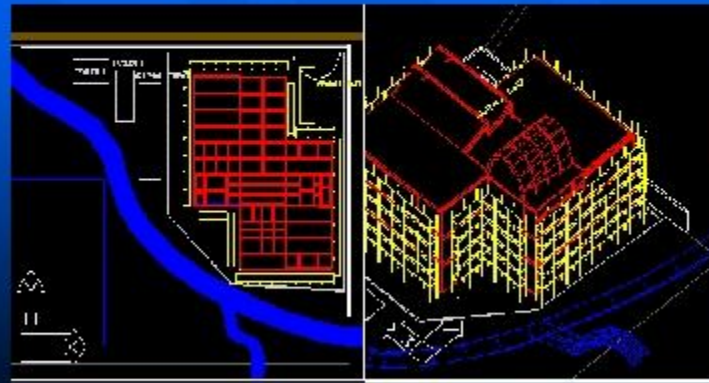
November 1, 2011
Steel erection continues



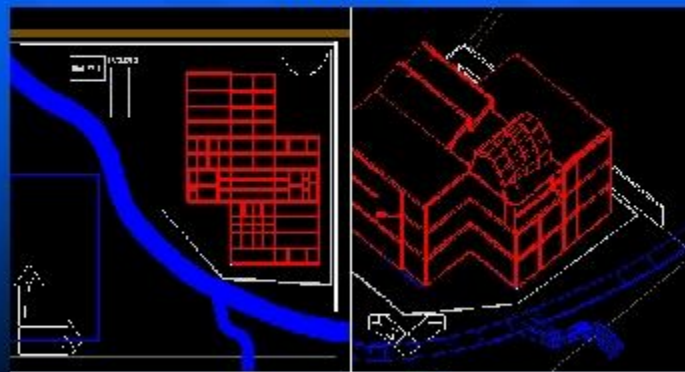
December 12, 2011
Install Metal deck on the roof
Pour Slab on Grade



January 2, 2012
Exterior Framing Starts with CMU walls



July 15, 2012
Interior Finishes
Site Work



Collaborative Issues

- Selecting structural system with respect to cost and constructability
- Integrating lateral system with architectural layout
- Choice of a mechanical system and the location of the mechanical room.
- Choosing material for exterior closure

Team Dynamics

- Trust and working relationship
- Negotiation based on principles
- Challenges from a real life situation
 - Understanding the value of collaboration across all disciplines

Mentors

Thank you!!!