ASCE STRUCTURAL ENGINEERING CONFERENCE
Ames Iowa
WHAT DO YOU DO IF YOU HAVE MORE PROJECT THAN BUDGET?
DESIGN BUILDER SELECTION METHOD

Fixed Price ($1.1B) – Best Value
Best Value Scoring
Scope – 60%
Schedule – 20%
Maintenance of Traffic – 20%
I-15 CORE PROJECT

- 30 Miles South of Salt Lake City
- 24.7 Miles of Reconstruction
- 10 Interchanges
- 55 Bridges
- Adding 2 Lanes Each Direction
- Extending Express Lanes
- $1.75 Billion Bond to Fund Program
- $1.1 Billion Design-Build Contract
- Largest Road Construction Project in Utah History
I-15 CORE PROJECT SCOPE
I-15 CORE TEAM

- Owner: UDOT
- Contractor: Provo River Constructors
  - Fluor Corporation
  - Ames Construction
  - Wadsworth Brothers
  - Ralph L. Wadsworth
- Designer: Fluor/HDR Global Design Consultants
  - HDR (Prime)
  - Jacobs
  - Michael Baker
  - Kleinfelder
  - 15 Subconsultants
I-15 CORE SCHEDULE

- 3 year construction schedule
- 1 year design schedule
- Project Begins December 10, 2009
EXECUTION - PLAN THE WORK AND WORK THE PLAN

Staffing Plan
  Co-located Staff
  Remote Staff

Deliverable Plan
  Early Design Packages
STAFFING

- Over 30 HDR Offices
- Project Peak: 140 HDR FTEs
- Project Peak: 300 Total FTEs
- 300+ HDR Individuals to Support Final Design
- 700+ Individuals to Support Design
PHASING OF TRAFFIC – KEY TO SUCCESS
EXECUTION – **COLLABORATION WITH REMOTE STAFFING**

- **Work Performed Remotely:**
  - Structures Design
  - Geotechnical (Sub)
  - Roadway design performed centrally

Approximately 55% of Work Performed Remotely...
Majority of HDR Remote Work - Structures
  12 Temporary Bridge Widenings
  17 Permanent Bridges
  6 Box Culverts / Pedestrian Tunnels
  Retaining Wall Details

Key Staff located centrally to the project
  Design teams used in 8 offices
Structures Coordination Effort

If you are not sick of communicating, you probably are not communicating enough…

Weekly Conference Calls
Video Conferencing
Visiting Remote Offices
Remote Bridge Leads Visiting Project Office
HOW TO COMPLETE

- Early Release for Construction
  - Early Piles
  - Early Substructures
  - Early Girder
Design Completion in Under 12 Months!!!

12 Temporary Bridge Widenings
17 Permanent Bridges
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Retaining Wall Details
STRUCTURES COLLABORATION – POTENTIAL IMPROVEMENTS

Avoid the ‘Shotgun start’
Corridor Standards
Remote Offices more familiar with QC/RFC process
More Visits to Project Office by Remote Office Leads
Accelerated Bridge Construction - Benefits
- Reduced Delays for Traveling Public
- Improved Public Safety
- Improved Worker Safety
- Higher Construction Quality

History of ABC in Utah
- UDOT World Leader in ABC
- 23 Bridge Moves in UT
  Twice the Number of Moves by Other States Combined

Four Bridge Moves on I-15 CORE Alone
USE OF ABC ON I-15 CORE

- 4 bridge moves on I-15 CORE
- Other ABC techniques in use throughout

Use Contractors expertise to project advantage
USE OF ABC ON I-15 CORE

- Used Self Propelled Modular Transporters
  - Used light weight concrete for superstructures
  - Full directional control for SPMT’s

- ½ Depth Precast Concrete Deck panels
I-15 | PROVO CENTER STREET

- 120’-140’ Two Span Plate Girder
- 2 Degree Skew
208A ROLL IN CONCEPT
SITE CONSTRAINTS

- Overhead Power lines
- Tight Site
  - not large enough to build entire 2-span bridge
  - build two simple spans and roll into place
- Center Street remains open during bridge construction
SITE DURING CONSTRUCTION
DESIGN & DETAILS

- Steel Plate Girders
- Simple Span For DL
- Cont. Spans For LL
- Integral Pier Diaphragm
- Semi-Integral At Abutments
CHANGE IN SUPPORT LOCATION DECK CHECK
CHANGE IN SUPPORT LOCATION DECK CHECK

Develop long moments during roll in

$W_0 = 0.30$
$W_{total} = 1.53$

$W_0 = 0.30$

Load on steel girder while on 15.75' temp supports C full span.
No load in deck & barrier.
Assume all load in girder & I jounce comp. in deck one to barrier placement.

$V_1 = 88.8, 84.1$

$M_{max} = 3674 \text{ K-ft}$

$M_1 = 1362$
CHANGE IN SUPPORT LOCATION DECK CHECK

Load on Composite Section

As the Difference Between $M_1 + M_2$
CHANGE IN SUPPORT LOCATION DECK CHECK

Differential Moment
Impacted To Deck
And Barrier One
To Change In
Support Location

Equir. Applied Load
Due To Change In
Support Location
3D MODELING FOR ROLL IN

- Use 3D Model in LARSA
  - Longest Span (141'5 ½") was modeled with girders, framing, deck and barrier
  - Loads were induced in stages (Steel only, deck and then barrier)
  - Support displacements introduced to determine maximum loads in each element of the bridge
3D MODELING FOR ROLL IN
TEMPORARY SUPPORTS
REMOVE TEMPORARY SUPPORTS
READY TO ROLL
ROLL IN FIRST SPAN
ROLL IN SECOND SPAN
CLOSURE POUR CLEARANCES
ROLL IN SPAN 1
BOTH SPANS IN PLACE
BRIDGE COMPLETE
EXECUTION – INNOVATION AS EASY AS ABC

• Record Setting Move

How do you move a 354-foot bridge into place over night?
Come see.

The Utah Department of Transportation (UDOT), as part of its $1.725 billion design-build I-15 CORE project, is moving the 354-foot-long, two-span Sam White Lane bridge into place over Interstate 15 in one night. It will be the longest bridge moved using Self-Propelled Modular Transporters (SPMTs) in the western hemisphere.
BRIDGE MOVE

- See You tube Sam White Bridge move.