"Get In, Get Out, Stay Out!

FHWA Accelerated Bridge Construction Program

By
Gary Jakovich, P.E.
Senior Bridge Engineer, FHWA

Virginia Concrete Conference
Richmond, VA

March 6-7, 2007

Federal Highway Administration VISION AND MISSION

- **VISION**: Improving Transportation for a Strong America
- **MISSION**: Enhancing Mobility through Innovation, Leadership and Public Service

Presentation Outline

- Mobility - Forces Driving Change
- Accelerated Bridge Construction – What is it?
- Innovation in Equipment and Methods
- Bridge Prefabrication Examples
- SAFTEA-LU Bridge Programs
- Current FHWA ABC Initiatives
- Contacts

MOBILITY CHALLENGES

- CONGESTION
- SAFETY
- ENVIRONMENTAL IMPACTS

CONGESTION IMPACTS THE ECONOMY

- Congestion robs our nation of productivity and quality of life
- 3.5 billion hours/year time delay
- 5.7 billion gallons of wasted gas/year
- $67.5 billion in 75 urban areas

TTI 2003 Urban Mobility Report (2001 data)

MORE CHALLENGES AHEAD

- 1 Million more trucks on road by 2016
- Globalization of manufacturing increases demands on our transportation Intermodal networks
- More drivers on highways
- Urban Sprawl Continues

Necessity for Infrastructure Renewal

- Aging infrastructure
  - 50th Anniversary of the Interstate System
  - Average bridge age is 42 yrs (50 yr life)
  - Average bridge deck life is 20-25 yrs

⇒ One Third of US Bridges need Rehabilitation or Replacement

Response to the Need

- $4.5 B/yr. - SAFETEA-LU's Bridge Replacement/Rehabilitation
- $4.5 B/yr. - States and Locals matching
- Can't be Business as Usual
- Get In and Get Out Quickly
- Our livelihood depends on transportation

Impact of Work Zones

- 6,400 work zones (2003)
- 6,157 lane miles closed
- 20% capacity reduction
- Safety Issues

Solution for the Future ….. Accelerated Bridge Construction

- A process to encourage the use of innovative technologies and techniques to accelerate the construction of major highway projects with extended service lives for the purpose of reducing user delay and community disruption.

What Constitutes ABC?

- Fast Track Contracting Process
  - Close Coordination between Owner, Designer, Constructor
  - Incentives, Disincentives
- Prefabricated Bridge Elements and Systems
  - Innovative Equipment and Methods

The Goal

- Reduce on-site construction time, traffic impact, and environmental impact

Innovative Methods and Equipment

NO JOB TOO BIG!

623' Segment of 820' Span

- Confederation Bridge
- Coleman Bridge

Pier Shaft & Base –5000 tons

18+ million pounds (500-560')

Pivoting

Meylan Pedestrian Bridge, France

- Minimizes work near traffic and power lines, at high elevations, or over water.

Launching – 12 Hours per 130 Meter Span, 12,000 M Tons Total

Horizontal Skidding with strand jacks – 3300 M Ton

TOTAL BRIDGE MOVEMENT SYSTEMS
Star Performer – Incredible Machines

Self-Propelled Modular Transporters - SPMT

Span Placement with SPMT

Span Placement with SPMT

Moving with SPMTs

Prefabrication

- **Advantages**
- **Challenges**

Advantages

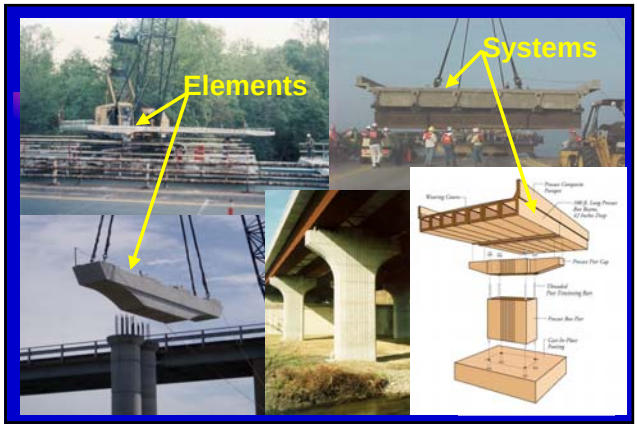
- Reduces on-site construction time
  - Minimizes traffic disruptions
  - Improves work zone safety
- Minimizes environmental impact
- Drives innovation and improves constructibility
- Increases product quality and
- lowers life-cycle-costs

Challenges

- Requires a greater degree of planning and coordination
- More options to consider
  - Evaluation of economics
    - User Costs
    - Contractor's Equipment and Staffing
- Transportation, Site accessibility, Lifting Capability

What Bridge Elements or Systems Can Be Prefabricated?

- **Decks**
- **Bent caps**
- **Columns**
- **Footings**
- **Parapets**
- **Total superstructure systems**
- **Total substructure systems**
- **Total prefabricated bridges**



Turkey Run Deck Replacement

Turkey Run Panel

SUPERSTRUCTURE SYSTEMS
Poutre Dalle System - Inverted Tee

Standardization of Precast Segmental Overpasses Alpine Motorways

France

Standardization of Precast Segmental Overpasses Alpine Motorways

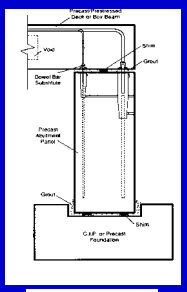
France

Segmental Voided Slabs

Virginia's Superstructure Replacement of I-95 James River Bridge

Prefabricated Superstructure Span

Precast Abutment



NMB SPLICE SLEEVE SYSTEM

Precast Bent Cap

Pile Cap Awaiting Lower Stem Segment

Half the Anchor Bars are Coupled at the Top of the Pile Cap and Half Extend Upward and are coupled at a Higher Point in the Pier

The First Segment is Threaded over the Extended Bars Anchored in the Pile Cap Through 3" Galvanized Ducts

- Footing is Recessed
- Set on Shims
- This Segment Controls Plumbing
- Grout is Pumped into Recess

Hammerhead Segments Ready for Shipping

Constructing New Precast Piers

- Typical Erecting Time Per Pier is One Shift
- Post Tensioning Time is One Shift
- Grouting and Misc. is One Shift

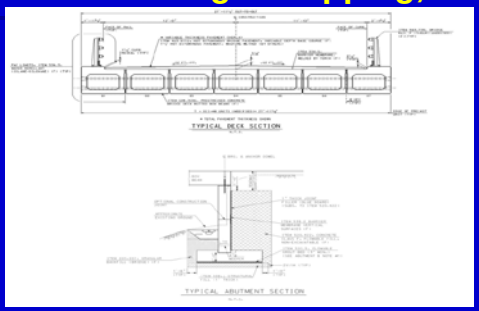
Aesthetic Rehabilitation

Restoration of Historic Monroe Street Bridge
Using Prefabricated Rail Sections, Deck Slabs, and Historic Pavilions

Straight Rail Sections for Promenade
Self Consolidation Concrete Used

Total Prefabricated Bridges

Mill St. Bridge in Epping, NH



Precast Footing

Precast Abutment Walls

Precast Box Beams

Port of Longview

- Length 123 feet pavement seat to pavement seat
- Cost of project $6.9 million
- Project length was 2400 feet and completed in 200 days

Freight Mobility Grade Separation

Prefabricated - Styrofoam Block Approach Fill, Tip-up Concrete Walls, and Prestressed Concrete Girders

Tip-up Walls, A Prestressed Girder Span, and Styrofoam Fill Approaches

SAFETEA-LU Bridge Programs

- Highway Bridge Program ($21.6 B)
- Innovative Bridge Research and Deployment (IBRD) - $52.4 M (of which $16.5 M for HPC)
- Highway for Life - $75 M ($15M for 06, $20M for each of 07-09)
- $16.4 M HPS
- Long-Term Bridge Performance ($31 M)

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

FHWA ABC Initiatives

- Decision-Making Framework (Published)
- SPMT "How To" Manual (being Finalized)
- Connection Details Catalog (in Progress)
- Specifications (2007)
- Database, Project Costs info (Ongoing)
- Marketing Plan and Demo Projects
- Workshops, Conferences, Showcases

SUMMARY

- Increasing Use of PBES World-wide
- Technology Exists Now
- Equipment Readily Available
- Incentives/Disincentives Work
- "Weekend Bridges" Are Here Today
- Lower First Cost is Possible
- Better, Faster, Safer Bridges thru PBES

FHWA Website Resources

- PBES bridges and contact information - http://www.fhwa.dot.gov/bridge/prefab/
- Accelerated Construction Technology Transfer (ACTT) Workshop information - http://www.fhwa.dot.gov/construction/accelerated/
- Highways For Life – www.fhwa.dot.gov/hfl

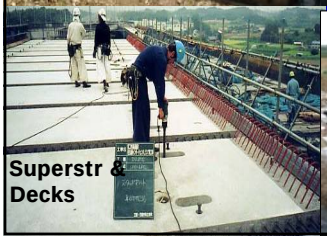
FHWA Contacts

Benjamin Tang: Ph. (202)-366-4592
E-mail:Benjamin.Tang@dot.gov

Vasant Mistry: Ph. (202)-366-4599
E-mail:Vasant.Mistry@dot.gov

Raj Ailaney: Ph. (410)-962-2542
E-mail:Raj.Ailaney@dot.gov

Gary Jakovich: Ph. (202)-366-4596
E-mail:Gary.Jakovich@dot.gov



The future is here!:

Better Bridges Built Faster

Thank You