Future Strategic Highway Research Program (F-SHRP): Background and Status Report

Mid-Continent Transportation Research Symposium

Ames, Iowa

August 22, 2003
Background

- Study for a Future Strategic Highway Research Program requested by Congress in TEA-21
- In 2001, proposed program was published in TRB Special Report 260, *Strategic Highway Research*:
  - Four Strategic Focus Areas
  - Centrally Managed Contract Research Program
  - Trust Fund Takedown of $75 Million/Yr for 6 Years
Schedule

• December 2001:
  – AASHTO passed resolution supporting F-SHRP and authorizing use of NCHRP funds to develop detailed research plans; FHWA matched NCHRP funds
  – Technical Panel Nominations Requested

• January 2002: Technical Panels Formed

• March 1, 2002: Oversight Panel Kickoff Meeting
Schedule, cont’d.

- March-May 2002: Technical Panel Kickoff Meetings with Researchers
- February-March 2003: Research Contracts End
- April 2003: Researchers Submit Final Reports on Research Plans
- May 2003: Oversight Panel accepts Research Plans
  - 700+ pages; 26 topics; 106 projects
  - Average project size of $3.6 million
Legislative Status

- October 2003: New Legislation Due
- Formally supported by:
  
  AAA    ARTBA    GHSA
  AASHTO ASCE    ITE
  ACEC    CUTC    NACE
Interim Planning Work

• Guided by Oversight Panel and 4 Technical Panels, with 128 stakeholders (half from State DOTs)
• AASHTO F-SHRP Oversight Panel supports administration of program by National Research Council
• Integrated plan to be developed this summer
• Next steps depend on reauthorization
Strategic Focus Areas

• **Highway Renewal:** “Like fixing a car while the engine is running.”

• **Highway Safety:** “I’m a good driver; it’s the rest of the folks I worry about.”

• **Highway Reliability:** “Planning travel around your life instead of your life around travel.”

• **Balanced Capacity:** “Roads you can’t imagine living without.”
Dissemination

- 4-page color brochure—June
- 30-50 page summary—August
- 700+ pages of full research plans
- All will be posted on the web by end of summer
- 2004 TRB Annual Meeting sessions
Future Strategic Highway Research Program
NCHRP 20-58(1): Renewal
Mid-Continent Transportation Research Symposium
Ames, Iowa
Problem
- Large portions of system require renewal
- Must be carried out while in use
- Public demands minimal disruption

Objective
Develop systematic approach to consistently perform highway renewal that is rapid, long-lived, and causes minimum disruption
• From 1990 to 2000 (all roads and streets)
  – VMT increased 28.9%
  – Lane miles increased 2.1%

• By 2020
  – VMT will increase by 50%
  – truck volume will double to 16 billion tons
  – US population will grow 20%

• 150,000 bridges are deficient or obsolete (of 600,000 total)

• 3,200 miles of reconstruction/year = 50 years to complete the cycle on NHS
NHS: 161,188 miles (4.1%) NHS VMT: 1.2 trillion (44.3%)

Total highway miles: 3,951,098 Total VMT: 2.8 trillion

Source: Our Nation’s Highways 2000, FHWA
Renewal Project Team

Iowa State University
Stephen Andrle
Tom Cackler, P.E.

TDC Partners, Ltd.
Theodore Ferragut, P.E.

Purdue University
Rebecca McDaniel
Technical Panel Expertise

Chair: Mary Lou Ralls, Texas DOT
Tim Hess, NCHRP staff
• Advanced Technologies – 1
• Bridge and Structures – 3
• Construction Management – 6
• Local Government – 2
• Materials and Pavements – 4
• Research – 3
• Maintenance – 3
• Traffic and Safety – 4
• Utilities – 2
Traditional Project Delivery Process is Not Adequate for Rapid Renewal

- Project based
- Linear
- Late customer input
- Long delivery time
- Incremental financing
- Lacking multi-disciplined leadership
- Multi-year traffic impacts rarely considered
Characteristics of Renewal Delivery Process

- Corridor and Network Based
- Integrated Processes
- Systems Based
- Can be Consistently Repeated
- Goal Driven:
  - Rapid Processes
  - Minimize disruption on project & network
  - Long-lived facilities
F-SHRP RENEWAL PROVIDING OUTSTANDING CUSTOMER SERVICE

Rapid Approaches

SUCCESSFUL RENEWAL

Long-Lived Facilities

Minimal Disruption
F-SHRP RENEWAL PROVIDING OUTSTANDING CUSTOMER SERVICE

Rapid Approaches

SUCCESSFUL RENEWAL

Consistent

Systematic

Long-Lived Facilities

Minimal Disruption
## Relationship Between Projects and Research Objectives

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<td>• Minimize Field Fabrication Effort</td>
<td>• Traditional techniques for bridge and pavement construction are built on site.</td>
<td>• Modular Bridge Systems</td>
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<td>• Modular Pavements</td>
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- Modular Bridge Systems
- Modular Pavements
- Innovative Construction Technology
F-SHRP Renewal Tactics

**Rapid Approaches**
- Perform Faster In-Situ Construction
- Minimize Field Fabrication Effort
- Perform Faster Construction Inspection and Monitoring
- Facilitate Innovative and Equitable Contracting Environment

**Minimal Disruption**
- Plan Improvements to Mitigate Disruption
- Improve Customer Relationships
- Improve Traffic Flow in Work Zone

**Long-Lived Facilities**
- Design and Construct Low-Maintenance Facilities
- Monitor In-service Performance
- Preserve Facility Life
Supporting Projects

Perform Faster In-Situ Construction

- Utilities Location Technologies
- Geotechnical solutions for soil improvement and rapid embankment construction
- High-performance materials in bridge applications
- Rapid rehabilitation of specialty structures
- Micropiles for renewal of bridge foundations
- Needs assessment, plan for intelligent project delivery system
- Recycled aggregates
- Reducing worker fatigue
Supporting Projects

Minimize Field Fabrication Effort

- Modular bridge systems
- Bridge designs that take advantage of innovative construction technologies
- Modular pavement technology
Supporting Projects

Perform Faster Construction, Inspection, and Monitoring

- High-speed, nondestructive testing for design evaluation and construction inspection
Supporting Projects

Facilitate Innovative and Equitable Contracting Environment

- Performance-based specifications
- Alternate contracting strategies
- Incentive-based specifications
- Performance-based warranties
- Risk Manual for renewal contracts
- Innovative management of large, complex projects
F-SHRP RENEWAL

PROVIDING OUTSTANDING CUSTOMER SERVICE

Minimal Disruption

SUCCESSFUL RENEWAL

Rapid Approaches

Long-Lived Facilities

consistent

systematic

approach
Supporting Projects

**Plan Improvements to Mitigate Disruption**

- Strategic corridor and network level approaches to minimize disruption
- Integrating “Mix of Fixes” into corridor development
- Strategic approaches for financing large renewal projects
Supporting Projects

**Improve Customer Relationships**
- Improving public involvement in renewal strategy
- Improving business relationships and emergency response during renewal
- Utilities-DOT mitigation strategies
- Railroad-DOT mitigation strategies
- Context-sensitive construction operations
Supporting Projects

**Improve Traffic Flow in Work Zones**

- Design, installation, and maintenance of work zones for high consistency, visibility, and safety
F-SHRP RENEWAL

PROVIDING OUTSTANDING CUSTOMER SERVICE

Long-Lived Facilities

SUCCESSFUL RENEWAL

- Consistent
- Systematic

Minimal Disruption

Rapid Approaches

approach
Supporting Projects

Design and Construct Low-Maintenance Facilities

- Durable bridge subsystems
- Design for desired bridge performance
- Composite pavement systems
- Stabilization of the pavement working platform
- Using existing pavement in place and achieving long life
Supporting Projects

Monitor In-Service Performance

- Nondestructive evaluation methodology for unknown bridge foundations
- Rapid renewal inputs to bridge management and inspection systems
- Monitoring and design for improved maintenance and security
Supporting Projects

Preserve Facility Life

- Preservation approaches for high traffic roadways
- Bridge repair/strengthening systems
- Techniques for retrofitting bridges with non-redundant structural members
Keys to Success

- Ability to finance
- Contracts, specifications facilitate goals
- Systems, products support goals
- Public policy and institutional changes
- Commitment to organizational change
  - Integrated development processes
  - Institutionalized renewal goals
F-SHRP

This Program of Research Will Make a Difference