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

Mid-Continent Transportation Research Symposium

Ames, Iowa

August 22, 2003

IOWA STATE UNIVERSITY

CTRE
Center for Transportation Research and Education

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

August 22, 2003

Future Strategic Highway Research Program NCHRP 20-58(1): Renewal

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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

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- 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

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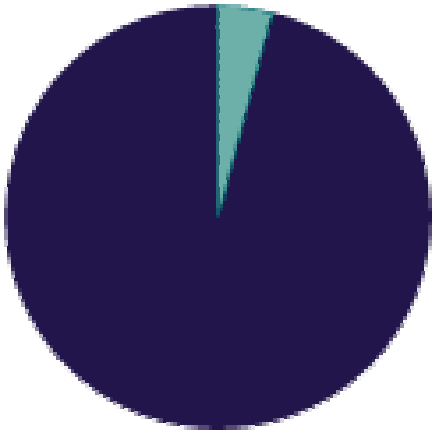
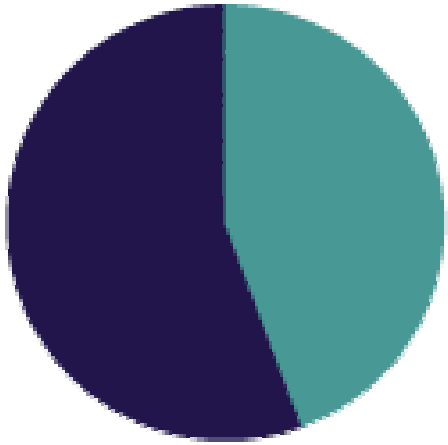
NHS: 161,188 miles (4.1%)



Total highway miles: 3,951,098

NHS VMT: 1.2 trillion (44.3%)



Total VMT: 2.8 trillion

Source: *Our Nation's Highways 2000,* FHWA

Renewal Project Team

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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

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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

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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

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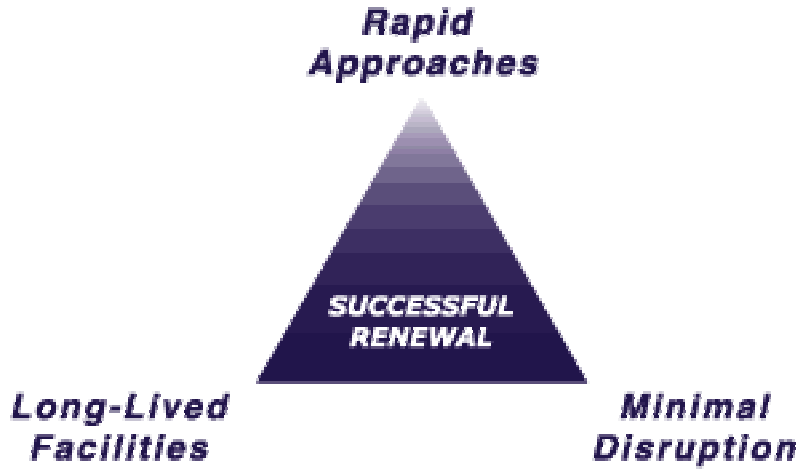

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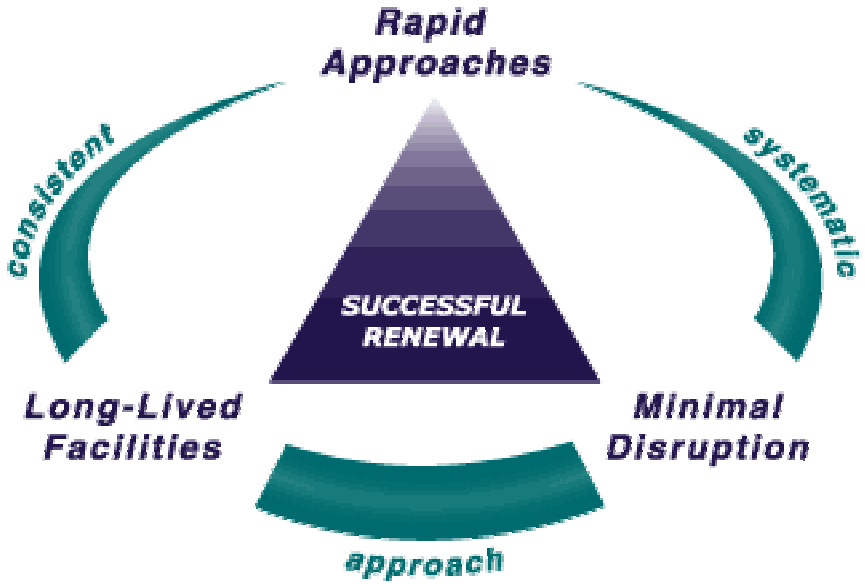

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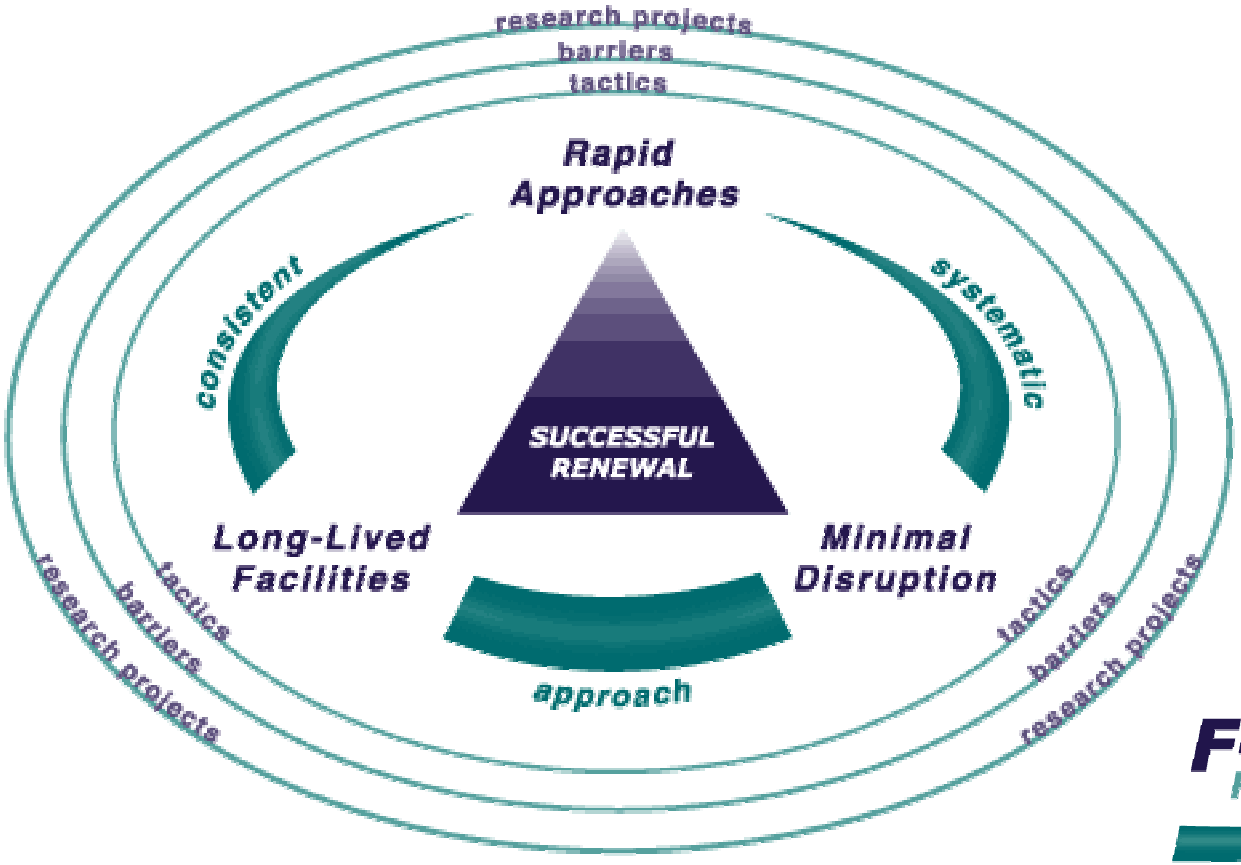

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Relationship Between Projects and Research Objectives

Strategic Objectives	Tactics	Barriers	Research Projects
•Rapid Approaches	•Minimize Field Fabrication Effort	•Traditional techniques for bridge and pavement construction are built on site.	•Modular Bridge Systems •Modular Pavements •Innovative Construction Technology

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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

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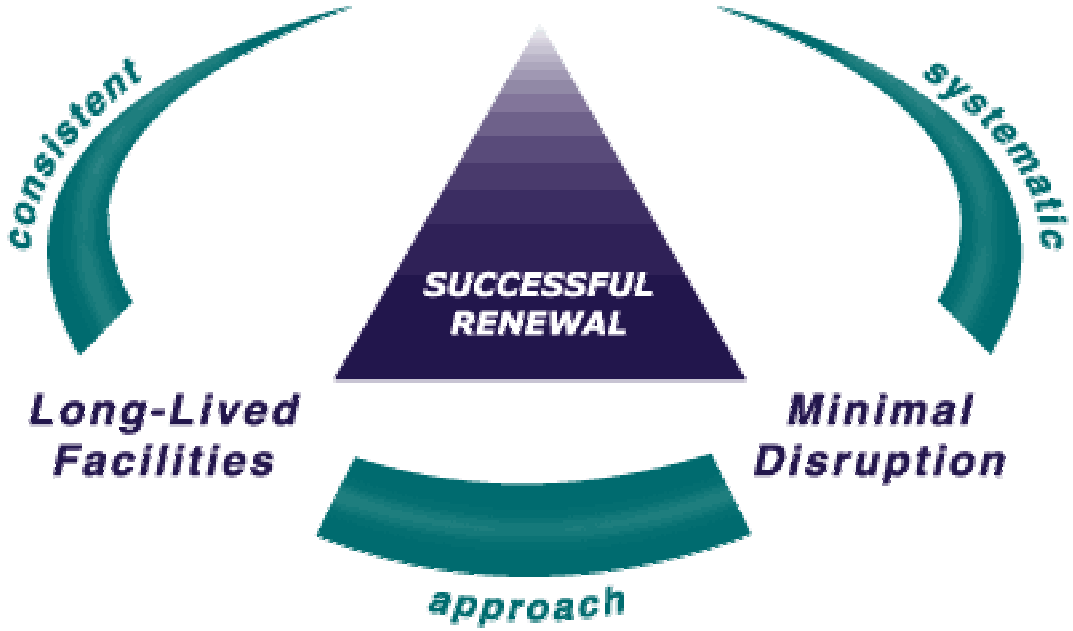
Rapid Approaches



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Supporting Projects

Rapid Approaches

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

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Supporting Projects

Rapid Approaches

Minimize Field Fabrication Effort

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

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Supporting Projects

Perform Faster Construction, Inspection, and Monitoring

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

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Supporting Projects

Rapid Approaches

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

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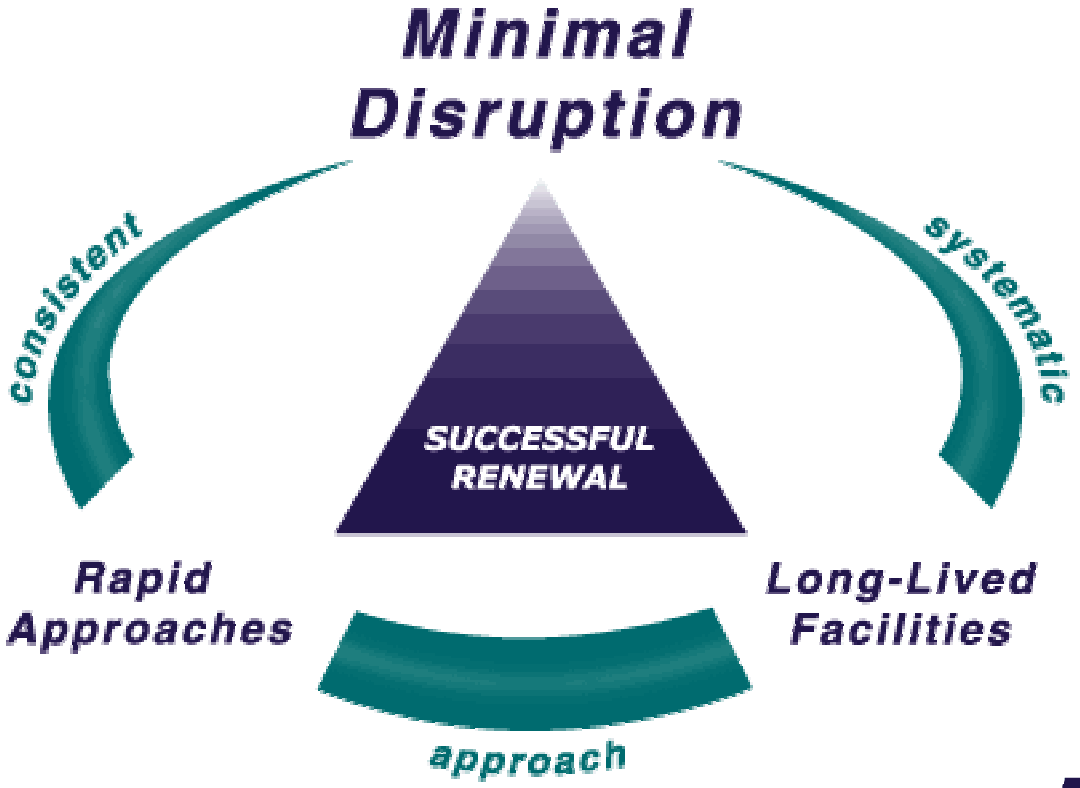

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Supporting Projects

Minimal Disruption

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

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Supporting Projects

Minimal Disruption

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

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Supporting Projects

Minimal Disruption

Improve Traffic Flow in Work Zones

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

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Supporting Projects

Long-Lived Facilities

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

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Supporting Projects

Long-Lived Facilities

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

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Supporting Projects

Long-Lived Facilities

Preserve Facility Life

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

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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

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This Program of Research Will Make a Difference

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