NCHRP Leveraging Resources for Better Transportation

Waseem Dekelbab, Ph.D., P.E., PMP

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Outlines

• National Cooperative Highway Research Program (NCHRP)
• NCHRP Bridge Research Areas
• NCHRP Project 20-83 Series Long-range Strategic Issues
National Cooperative Highway Research Program

• NCHRP was created in 1962 as a means to conduct research in acute problem areas that affect highway planning, design, construction, operation, and maintenance nationwide.

• State Departments of Transportations (DOTs) leverage their funds through NCHRP to work on problems common to many states.

• Keys to NCHRP Success
  – Guided by NCHRP Panels
  – Managed by the Transportation Research Board (TRB)
  – Sponsored by AASHTO and its member departments (i.e., individual State Departments of Transportation)
  – Assisted by FHWA
NCHRP Bridge Research Areas

• Design and Specifications
• Safety and Security
• Construction
• New Materials
• Inspection
• Maintenance and Repair & Strengthening
• Testing and Instrumentation
• Asset Management and Performance Measures
## Design and Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Title</th>
<th>Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-83</td>
<td>Calibration of LRFD Concrete Bridge Design Specifications for Serviceability</td>
<td>$500K</td>
</tr>
<tr>
<td>12-84</td>
<td>Guidelines for the LRFD and Rating of Riveted, Bolted, and Welded Gusset-Plate Connections for Steel Bridges</td>
<td>$1M</td>
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<tr>
<td>12-33</td>
<td>Development of a Comprehensive Bridge Specification and Commentary-LRFD</td>
<td>$1.4M</td>
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<tr>
<td>24-34</td>
<td>Risk-Based Approach to Bridge Scour Prediction</td>
<td>$500K</td>
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## Safety and Security

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<tr>
<th>Project</th>
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<tr>
<td>12-86</td>
<td>Bridge System Safety and Redundancy</td>
<td>$500K</td>
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<tr>
<td>12-85</td>
<td>Highway Bridge Fire Hazard Assessment</td>
<td>$350K</td>
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<tr>
<td>12-72</td>
<td>Blast-Resistant Highway Bridges: Design and Detailing Guidelines</td>
<td>$950K</td>
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## Construction

<table>
<thead>
<tr>
<th>Project</th>
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<tbody>
<tr>
<td>12-79</td>
<td>Guidelines for Analysis and Construction Engineering of Curved and Skewed Steel Girder Bridges</td>
<td>$600K</td>
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<tr>
<td>12-74</td>
<td>Development of a Precast Bent Cap System for Seismic Regions</td>
<td>$600K</td>
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<tr>
<td>10-71</td>
<td>Evaluation of CIP Reinforced Joints for Full-Depth Precast Concrete Bridge Decks</td>
<td>$650K</td>
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## New Materials

<table>
<thead>
<tr>
<th>Project</th>
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<th>Funds</th>
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<tbody>
<tr>
<td>18-15</td>
<td>High-Performance/High-Strength Lightweight Concrete for Bridge Girders and Decks</td>
<td>$750K</td>
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<tr>
<td>18-12</td>
<td>Self-Consolidating Concrete for Precast, Prestressed Concrete Bridge Elements <em>Completed—Published as NCHRP Report 628</em></td>
<td>$450K</td>
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<tr>
<td>12-77</td>
<td>Structural Design with High-Strength Reinforcement</td>
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# Inspection

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<tr>
<td>12-82</td>
<td>Developing Reliability-Based Bridge Inspection Practices</td>
<td>$400K</td>
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<tr>
<td>20-07/</td>
<td>Guidelines for Implementing Quality Control and Quality Assurance for</td>
<td>$75K</td>
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<tr>
<td>Task 252</td>
<td>Bridge Inspection</td>
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<tr>
<td>10-64</td>
<td>Field Inspection of In-Service FRP Bridge Decks</td>
<td>$300K</td>
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<tr>
<td></td>
<td><em>Completed—Published as NCHRP Report 564</em></td>
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## Maintenance, and Repair & Strengthening

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<th>Project</th>
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<th>Funds</th>
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<tr>
<td>18-14</td>
<td>Evaluation and Repair Procedures for Precast/Prestressed Concrete Girders with Longitudinal Cracking in the Web</td>
<td>$300K</td>
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<tr>
<td>14-15</td>
<td>Developing a National Database System for Maintenance Actions on Highway Bridges</td>
<td>$427K</td>
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<tr>
<td>10-73</td>
<td>Guide Specification for the Design of Externally Bonded FRP Systems for Repair and Strengthening of Concrete Bridge Elements</td>
<td>$450K</td>
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# Testing and Instrumentation

<table>
<thead>
<tr>
<th>Project</th>
<th>Title</th>
<th>Funds</th>
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</thead>
</table>
| 21-07   | Development of Portable Scour Monitoring Equipment  
*Completed—Published as NCHRP Report 515* | $300K |
| 21-03   | Instrumentation for Measuring Scour at Bridge Piers and Abutments  
*Completed—Published as NCHRP Reports 396, 397A, and 397B* | $916K |
## Asset Management and Performance Measures

<table>
<thead>
<tr>
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<th>Funds</th>
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<tbody>
<tr>
<td>20-24 (37)E</td>
<td>Measuring Performance Among State DOTs -- Bridge Conditions</td>
<td>$75K</td>
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<tr>
<td>12-69</td>
<td>Multiple-Objective Optimization for Bridge Management Systems</td>
<td>$350K</td>
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<tr>
<td>Synthesis 20-05/Topic 37-07</td>
<td>Bridge Management Systems for Transportation Agency Decision-Making <em>Completed—Published as NCHRP Synthesis 397</em></td>
<td>$300K</td>
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</table>
NCHRP Project 20-83 Series
Long-range Strategic Issues

Program Goal No. 1: Anticipate the future issues so that we are better prepared to meet new and emerging challenges.
Program Goal No. 2: Explore visions of what the future should look like, so that we can help shape the future through our decision making.
Challenges Facing The Transportation Industry

Major Forces Affecting the World

- Demographics
- Economics
- Environment and Energy
- Government and Politics
- Societal Factors
- Technology

Project Development
System Operations
Planning
Transportation Agency Decisions and Actions
Maintenance
Finance
Traveler Safety and Security
Performance Measures
Passenger Travel Demand
Vehicle Operations
Freight Transportation Demand
Etc.

Performance Measures
Vehicle Operations
Freight Transportation Demand
Etc.

Challenges Facing The Transportation Industry
“The only thing we know about the future is that it will be different.”  
Peter Drucker
Objective:
Develop guidance for transportation stakeholders on emerging materials, tools, approaches, and technologies that could be used to deal with long-range (30 to 50 years) highway infrastructure maintenance, preservation, and renewal needs and ensure satisfactory system condition and performance.

Phases:
Phase I – Scenarios and Impacts
Phase II – Vision Development
Phase III – Guidance and Communication
PHASE I – Scenarios and Impacts

• Identify the factors and future trends that could influence infrastructure maintenance, preservation, and renewal

• Assess the likelihood and impact of various scenarios on future needs
Factors Influencing Transportation

• Technology and innovations (e.g., high-performance materials, construction equipment and methods, and monitoring systems)
• Environment (e.g., global warming and sustainability)
• System performance (e.g., accelerated deterioration and accountability)
• Safety and security
• Finance and budget (e.g., global economy, contracting methods, and costs)
Factors Influencing Transportation

- Human resources (e.g., education and training)
- Coordination (e.g., among transportation modes and related industries);
- Regulations and policies (e.g., environmental regulation and changing role of governmental identities)
- Demographics (e.g., population and urban/rural differences)
- Customer expectations
- Traffic (e.g., loading and volume)
PHASE II – Vision Development

• Identify and examine potential of new materials, tools, approaches, and technologies for meeting future needs for maintaining, preserving, and renewing the highway infrastructure

• Develop a vision for a future, sustainable highway infrastructure

• Discuss potential barriers to the identified materials, tools, approaches, and technologies
PHASE III – Guidance and Communication

- Develop guidance for transportation stakeholders on the use of potential materials, tools, approaches, and technologies for enhancing system maintenance, preservation, and renewal consistent with the described vision
- Develop communication packages to convey the vision, objective, and products of this research to current and future transportation stakeholders
- Identify future research efforts that are required to expand the findings of this project and to serve as a guide for further research opportunities
Research Project Products

http://www.trb.org/NCHRP/Public/NCHRP.aspx

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES