Federal Highway Administration
Long-Term Bridge Performance Program

LTBP Program

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LTBP Program Objectives

Collect, Document and Maintain high quality, quantitative performance data

Improve Knowledge of Bridge Performance

Tools for improved asset management
LTBP Program Approach

• Detailed inspection, periodic evaluation and monitoring utilizing sensor technology

• Representative sample of “work-horse” highway bridges

• Forensic autopsies of decommissioned bridges

• Accelerated testing
Expected Outcomes of the LTBP Program

- Better performance measures and predictive models
- Data on operational performance
- Means to quantify effectiveness of various maintenance, preservation, repair and rehabilitation strategies
- Data to support improved deterioration models and life-cycle cost analysis
- Support for development of the next generation of Bridge Management Systems
Step 1: Defining Bridge Performance

Step 2: Data to be Collected

Step 3: Data Management System

Step 4: Design the Experimental Program

Step 5: Data Collection

Step 6: Data Analysis & Modeling

Step 7: Dissemination of Findings

Program Outcome

Long-Term Bridge Performance Program

U.S. Department of Transportation
Federal Highway Administration
LTBP Pilot Program Schedule

- Pilot Program will last 2 years
- Begin Pilot Program late summer/early fall 2009
- 3 to 4 months to kick off and instrument each bridge
  - 2 weeks for visual inspection and NDE
  - 3 months for instrumentation
  - Developing instrumentation plan
  - Developing site plan for DOT approval
  - Contracting necessary field work
  - In place instrumentation of bridge
LTBP Pilot Program – Virginia Pilot Bridge

- Selected as first pilot bridge
  - Proximately to FHWA Turner-Fairbank and Headquarters
  - Accessibility to many LTBP team members
- U.S Route 15 over I-66 Haymarket, VA
- Constructed in 1979
- Continuous built-up steel girder
- CIP concrete deck
- AADT of 16,500 with 6% truck traffic
- Deck condition rating of 6 in NBI
LTBP Pilot Program – New Jersey Bridge

- I-195 over Sharon Station Rd 13 miles east Trenton, NJ
- Proximity to WIM and weather station
- Constructed in 1969
- Single-span, simple span steel girder bridge
- CIP concrete deck with SIP forms
- AADT of 24,970 with 14% truck traffic
- Deck condition rating of 6 in NBI
LTBP Pilot Program – Utah Pilot Bridge

- Selected as second pilot bridge
- I-15 over Cannery Road 1.5 miles west Perry, UT
- Proximity to weigh station
- Constructed in 1976
- Single span AASHTO beams with integral abutment
- CIP concrete deck with asphalt overlay and membrane
- AADT of 22,250 with 29% truck traffic
- Deck condition rating of 7 in NBI
LTBP Pilot Program – California Pilot Bridge

- I-5 over Lambert Road – 25 miles south of Sacramento
- Constructed in 1975
- Pre-stressed post-tensioned continuous cast-in-place Box Girder Bridge
- 2 span bridge w/ structure length of ~260ft & maximum span length of 130ft
- Twin bridge, carries two-lanes of traffic in one direction over Lambert Rd.
- AADT of 24,500 with 21% Truck Traffic
- NBI Rating of 7 for super, 5 for deck, 8 for sub
- 8° skew
Minnesota Bridge Selection Criteria

- Structure Type
  - Deck Truss
  - Horizontal Curve
  - High Skew
- Age – Older than 40 years
- AADT < 10,000
- NBI Rating, Deck and Superstructure ≤ 7
LTBP Minnesota Pilot Bridge Selection Process

- Criteria entered into NBI to generate initial shortlist
- Discussion held between FHWA and LTBP contract
- Initial Shortlist reduced to 5 bridges
  - TH 243 over St. Croix River (Deck Truss)
  - TH 123 over Kettle River (Deck Truss)
  - US 8 WB over TH 8 (Horizontal Curve)
  - I-35E SB near JCT TH5 (Horizontal Curve)
  - County Highway 48 onto I-35 SB (Horizontal Curve)
LTBP Pilot Program – Minnesota Pilot Bridge

- TH 123 over Kettle Road – Near Sandstone State Park
- Constructed in 1948
- Built-up steel deck truss bridge
- 3 span bridge w/ structure length of ~400ft & maximum span length of 200ft
- Carries two-lanes of traffic one in each direction
- AADT of 2,050 with 8% Truck Traffic
- NBI Rating of 5 for super, 6 for deck, 7 for sub
- Historic Structure
LTBP Pilot Program Field Investigation

- Deck inspected on a two-foot grid
  - Detailed Visual Inspection using ScanPrint Tablets
  - Non-Destructive Evaluation
- Complimentary Material Sampling/Testing
- Live Load Testing
- Detailed “Segmental” Visual Inspection
LTBP Pilot Program NDE

- Ground Penetrating Radar
- Half Cell Potential
- Impact Echo
- Ultrasonic Pulse Echo
- Ultrasonic Surface Wave
LTBP Pilot Program - Visual Inspection Protocols

• Quantitative Measurements
  • Minimizes subjectivity of inspector
  • Can be used to generate “rating” if desired
• Well Defined Protocols aimed at repeatability
• Using two tablet systems
  • Bridge Data System (BDS)
  • ScanPrint
LTBP Pilot Program - Segmental Inspection Method

- Structure is broken down into “Segments”
- Defect can be accurately located

[Diagram showing a bridge structure divided into segments labeled A.1 to A.6, B.1 to B.6, C.1 to C.6, D.1 to D.6, E.1 to E.6, F.1 to F.6, with diaphragms indicated.]
LTBP Pilot Program - Visual Inspection (ScanPrint)
LTBP Pilot Program - Material Testing

- Chloride Contents
- Cover Depth
- Concrete Resistivity
- Corrosion Potential and Rate
- Carbonation of concrete
- Coring of Concrete
LTBP Pilot Program - After Baseline Survey

• Data is processed and loaded into LTBP Database
• Information is used to update Finite Element Model
• Long-Term Instrumentation Plan developed from FEM and Field Investigations
• Long-Term Instrumentation put in place
• Visual Inspection repeated on regular basis
• NDE and Material Testing as needed
LTBP Program Information

- LTBP Program Website
  - http://www.tfhrc.gov/ltbp

- LTBP Program e-mail
  - ltbp@dot.gov