The New Jersey Turnpike Authority (NJTA) owns and operates the New Jersey Turnpike and the Garden State Parkway and is dedicated to the safe, efficient movement of people, goods and information on one of the nation’s largest and busiest toll-road systems. NJTA is responsible for the inspection and structural integrity of 1,000 routine and complex bridge structures, as well as other infrastructure such as sign-support structures, culvert structures and antenna towers.

In the past these two major roadways operated as independent entities and managed distinct bridge inspection programs for their respective inventories. NJTA’s bridge inspection program has been designed to meet the needs of a variety of critical stakeholders, including the Engineering and Maintenance Departments for planning maintenance repairs and capital program improvements, and the New Jersey Department of Transportation (NJDOT) and the Federal Highway Administration (FHWA) for compliance with National Bridge Inspection Standards (NBIS).

Numerous consultants are engaged by NJTA to perform bridge inspections each year. Organizing and maintaining all of this information into paper and computer formats for the various stakeholders has proven to be a difficult challenge. NJTA recently embarked on a program to address these challenges and standardize the inspection report format for both roadways. The standardization is being accomplished by implementing a new integrated field- and office-based computer system that is capable of handling the wide variety of structure types, and user and output needs, which will provide a greatly enhanced inspection and management process.

**Yesterday and today**

The New Jersey Turnpike was opened to traffic in 1951 and today covers 148 miles. It is one of the most densely traveled roads in the nation, with a 2007 total traffic volume of 250 million vehicles. The turnpike serves as a primary link for both commercial and noncommercial traffic through the Northeast. The first toll section of the Garden State Parkway was opened to traffic.
in 1954 and today covers 173 miles from the New York line at Montvale to Cape May. The 2007 total traffic volume on the parkway was 450 million vehicles.

The combined bridge inventory consists of 1,000 bridges with a total deck area of over 20 million sq ft. Following construction of the turnpike mainline, NJTA began to perform condition and maintenance inspections of the facilities with the assistance of the authority’s general consulting engineer, HNTB Corp. The results were documented in letter form with highlights of deficiencies, which were few and minor in nature. Starting in 1961, with the facility about 10 years old and growing evidence of more pronounced and frequent deficiencies caused by wear and tear, formal bridge inspection reports were prepared in a simplified checklist format for the structures grouped in each maintenance district. Since no federal requirements or standards were in force at this time, the inspections were undertaken by NJTA strictly on its own initiative for safety assurance and scheduling of bridge maintenance activities.

Today, NJTA’s bridges are not only inspected on a biennial basis to comply with NBIS, but they also are inspected at a cursory level every year to address emergent structural deficiencies in a timely and cost-effective manner. The inspection report deliverables consist of NBIS reports of the routine bridges grouped by district/area, individual detailed reports of the major bridges and specialized reports covering FCMS and other unique elements.

The New Jersey Turnpike varies from two two-lane roadways to up to six three-lane roadways by Newark Airport, with dual-dual roadways for 32 miles through the busiest zone. The Garden State Parkway varies from a four-lane land service highway at the southern terminus to multiple-lane roadways farther north.

A united front

In July 2003, the two toll-road authorities were consolidated under NJTA in an initiative to improve conditions for New Jersey’s motoring public. Since the consolidation, NJTA has been maintaining numerous bridge-related databases for the turnpike and parkway inventories. The turnpike bridge inspection database started 20 years ago as a paper-based compilation of NJTA’s traditional individual checklist forms, then evolved about 10 years ago into an Access database and is now being transformed again into an integrated inspection and database system designed by Inspecttech of Pittsburgh. NJTA’s post-consolidation effort also has involved the task of merging the distinctive inspection report for-
The heart of the turnpike bridge inspection report is the eight-page checklist, which covers all bridge elements and commonly observed deficiencies that are considered worthy of notation and repair.

mats for both roadways. In 2007, the individual parkway bridge inspection reports were reformatted to follow the district style for the turnpike’s routine bridge inspection reports.

The standardized inspection reports are comprehensive and typically include an executive summary of structural conditions and priority considerations, discussion of bridge deficiencies on an element-by-element and repair category basis, conclusions and recommendations for priority repairs, tabulated deficiency summaries by repair category, photos of highlighted deficiencies and an individual checklist for each bridge. Recommended repairs are categorized as follows: Category A – Emergency, Category B – Contract, Category C – Deck Repair, Category D – Maintenance and Category E – Monitor.

The heart of the turnpike bridge inspection report is the eight-page individual checklist, which is used by the inspectors for each structure in the field. The checklist covers all bridge elements and commonly observed deficiencies that are considered worthy of notation and repair.

The checklist has been refined and expanded throughout the years to fully describe the findings of a biennial NBIS inspection, including sections on approach features, above-deck elements and fixtures, substructure elements, superstructure units and attachments, bearings, right-of-way and utilities, FCM elements, fatigue-sensitive details and underwater foundations. The checklist is electronically linked to deficiency summary tables, which are grouped according to their repair categories. The deficiency summary tables are populated with the recorded deficiencies and locations and serve as an important tool for NJTA to prioritize maintenance repairs and capital improvements on its structures.

In an effort to organize and consolidate the assorted databases, NJTA embarked on a pilot project with inspecttech in early 2007 to standardize the inspection report format for both roadways by utilizing their integrated field and web-based BridgeInspector Collector Software System. The main goal of the pilot program was to verify that the software could be efficiently configured and utilized per NJTA’s custom specifications on a select group of I-95 extension bridges on the turnpike approaching the George Washington Bridge. LS Engineering Associates Corp. (LSEA) was assigned to coordinate the pilot program in conjunction with its NBIS bridge inspection assignment.

The software system is designed for the efficient entry, retrieval, analysis and management of data. A strong advantage of this particular software is its flexibility to be easily customized. The software was tailored to include the checklist form and linked deficiency summary tables, and also created a photograph section, which allows the inspector to upload and pick photographs, place them in a particular order and write detailed descriptions for inclusion in the report.

NJTA’s pilot program demonstrated that the software is a user-friendly system that can be quickly learned and applied by both bridge inspection consultants and NJTA staff. The database is completely Internet-enabled and installed on laptop computers for use in the field while disconnected. When the laptop is brought back to the office, it can be connected to the network and all information is synchronized with the online edition. When the laptop synchronizes, it also receives the latest program updates and data changes on the server for the next time it is taken to the field. Bridge inspection staff can continue, review or QA/QC the inspection report from any of their computers. Once completed, the inspection report can be electronically submitted by the project manager to NJTA for approval.

A major advantage to NJTA in the new software is the allowance of simultaneous data and photo input and review by multiple users, both laptop- and web-based, capabilities unattainable with the prior database. Access to the program is controlled through usernames and passwords. This enables access for NJTA bridge inspection staff at any time and for consultants engaged in active assignments.

The overall inspection process flow is as follows:

• Inspections can be started in the field utilizing laptop or tablet computers;
• Reports can be uploaded to the server module;
• Reports are accessible for editing via the web interface from any In-
ternet-connected computer; and
• When the report is done the in-
spectors can still print out the
same paper reports and submit
data electronically.

Moving forward

Based on the promising results of
the pilot program, NJTA moved for-
ward with the full utilization of the
software for the 2008 NBIS inspec-
tions of turnpike and parkway bridg-
es. Over 400 bridges have now been
entered into the system, generating
several thousand pages of individu-
al and summary reports. The web-
based interface is proving extremely
valuable, allowing for an integrated
team-based approach between prime
consultants and their subconsul-
tants. Users in different offices can
simultaneously review and enter in-
formation on inspection reports, in-
creasing productivity and usability.
The ability to handle the hundreds of
photos entered per assignment and
then link them to individual mainte-
nance needs and bridge elements is
a feature that has proven especially
popular with users.

For 2008 the software was inte-
grated into NJDOT’s Pontis program
to facilitate the seamless transfer of
NBIS and other data between NJTA,
NJDOT and FHWA. Additional mod-
ules also are being considered for
deployment in 2009, such as adding
a new bridge management module
to permit the generation of detailed
bridge repair prioritization reports
and the system-wide retrieval of pho-
tos, files, inventory and inspection
data on the entire inventory. This
“one-stop location” approach will
enable multiple users to access and
manage current bridge inspection
data from NJTA’s inventory.

These and future upgrades will
significantly improve quality-control
measures, provide centralized access
for various users and yield long-term
cost savings to the bridge inspection
program.

The New Jersey Turnpike Author-
ity views its task very seriously in
helping to safeguard the lives of mil-
ions of users and the large public
infrastructure investment, and will
continue to diligently apply the best
practices to inspecting and managing
its structure inventory.

The new structure management
system will allow NJTA to easily ac-
cess all structure information in one
place in a variety of formats, includ-
ing interactive maps.

Laird is with the New Jersey Turnpike Authority in
Woodbridge. Paul is with Engineering Associates
Corp. in Montville, N.J.

Go ‘No Dig’ to rehab your
failing culverts — for better
flow and easier install!

The Snap-Tite® HDPE patented joint and installation
system allows rehabilitation without removal of
deteriorated pipe, while delivering better flow and a
watertight seal at all
joints. Most jobs
can be completed
with light duty
equipment, and
install is easy
without excavation
and road closures. Rehab with Snap-Tite® is faster.
Safer. And, more economical.

Make the Connection!
For more information visit
www.culvert-rehab.com
or call us at
1-800-CULVERT

Circle 777