

ASSET MANAGEMENT EXCHANGES

*Georgia Department of Transportation
and NETIVEI Israel*

Synthesis Report

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Notice

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Executive Summary

The Georgia Department of Transportation (Georgia DOT) and NETIVEI Israel – National Infrastructure Company (formerly Israel National Road Company)¹ participated in a knowledge exchange agreement since it was formalized by a Memorandum of Collaboration in 2009. Transportation asset management was a topic included among the exchange activities, which took the form of webinars and technical discussions. The purpose of this report is to summarize some of the information exchanges conducted between the Georgia DOT and Israel’s National Transport Infrastructure Company (NETIVEI), with a focus on asset management, and identify recommendations regarding possible topics for future exchanges.

One of the FHWA Office of Policy’s missions is to support international technical and information exchange, working with Federal-level highway and transportation agencies across the world to learn from best practices implemented elsewhere.

Transportation asset management was identified as a topic of mutual interest, as both organizations are moving to a more strategic and systematic process of effectively operating, maintaining, upgrading, and expanding their physical assets through their life cycles. NETIVEI Israel began implementing strategic asset management practices in 2006 to make timely repairs or other corrective actions to the road network. The organization sought to develop a system that would help them identify infrastructure repair and maintenance measures that would maximize utility and benefit to public road users. In 2008, a system was set up to address these needs and implemented in the company’s work processes. With a similar goal, in 2012, Georgia DOT developed an Asset Management Implementation plan and is now in the process of executing a comprehensive Asset Management System. The goal of the Georgia system is to integrate the management of various assets into a single, comprehensive system. Prior to implementing the asset management systems, both organizations used a worst-first approach to guide infrastructure maintenance and repairs, based predominantly on visual evaluation of the road condition.

Under the knowledge exchange agreement, both Georgia DOT and NETIVEI Israel believe the sharing of asset management practices and “lessons learned” was beneficial. Since NETIVEI Israel implemented its comprehensive Asset Management System a few years prior to Georgia DOT’s initiation of a process, Georgia DOT was able to learn from the experience of NETIVEI Israel’s use of their system. This exposure helped Georgia DOT to gain valuable implementation insights and ideas as well as obtain knowledge of both expected outcomes and pitfalls to consider. On their part, NETIVEI Israel gained insight on the use of Geographic Information Systems (GIS) in asset management, safety management processes (e.g.,

¹ Based on the decision of the company’s Board of Directors and with the approval of the General Assembly of shareholders, the Israel National Roads Company Ltd. changed its name to “NETIVEI ISRAEL – National Transport Infrastructure Company Ltd.” The name change was notified in November 2012.

network monitoring, project prioritization), and the use of tradeoff analysis tools in the decision-making process.

Based on the exchange activities to date, future efforts could include the conduct of collaborative research, webinars, technical tours, and knowledge exchanges focused on 1) bringing greater integration of outcomes from various asset management modules into decision-making processes; 2) improving data used by the system; 3) developing methodologies to bring other asset management classes into risk-based planning; and 4) identifying safety management system components for incorporation into an asset management system.

1.0 Purpose

The United States Federal Highway Administration (FHWA) has promoted adoption of best practices in the practice of Asset Management by State departments of transportation (DOT). This has included sponsoring domestic initiatives such as peer exchanges, conferences, leading research efforts, and helping build State DOT capacity in this area. In the implementation of asset management, FHWA and its State DOT partners also have conducted activities aimed at learning from work done in other countries. One of the FHWA Office of Policy's missions is to support international technical and information exchange, working with Federal-level highway and transportation agencies across the world to learn from best practices implemented elsewhere. The purpose of this report is to document the information exchanges conducted between the Georgia DOT and Israel's National Infrastructure Company (NETIVEI), with a focus on asset management, and to identify recommendations regarding possible next steps for future exchanges.

In 2007, the FHWA and the Israeli National Roads Company (INRC) signed a Memorandum of Cooperation (MOC) building on a previous cooperation between the two organizations. The purpose of the MOC was to promote technology exchange and information sharing, cooperation, and collaboration in the field of road infrastructure. In addition to sharing information on topics of mutual interest, an agreement was reached to promote twinning-type cooperation with a State DOT in the United States. The twining relationship occurs when State DOTs and foreign governments partner to conduct activities such as information and technology exchanges on topics of mutual interest. In 2009, a Memorandum of Collaboration was signed by Georgia DOT and INRC. The purpose of the MOC is to strengthen core competences within Georgia DOT and NETIVEI and to provide a framework to facilitate and conduct international knowledge exchange as mutually agreed. Transportation Asset Management was identified as a mutually beneficial topic of interest to both parties. This report summarizes the asset management state of practice for both organizations, knowledge exchange activities conducted, benefits of the exchange, and potential future exchange topics and activities.

2.0 State of Practice

The American Association of State Highway and Transportation Officials' (AASHTO) Subcommittee on Asset Management defines transportation asset management as "a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively through their life cycle." Transportation agencies use management systems, engineering, and economic analysis tools to make decisions on infrastructure maintenance and replacement. The Georgia DOT and NETIVEI Israel have identified transportation asset management as a key strategy in the preservation of their highway systems, including roads, bridges, and roadside features. The following sections describe the recent asset management activities conducted by both organizations.

2.1 Georgia DOT

Georgia DOT began the move towards asset management practice in the fall of 2009. Prior to this, a “worst-first” approach had been used in infrastructure maintenance practices, which can result in a reactive or crisis-oriented dynamic. A major motivation for adopting an asset management approach in Georgia was the DOT’s strong desire to make the most efficient use of agency resources. Significant budgetary constraints and growing infrastructure investment needs highlighted the need to understand the performance impacts of funding allocations and major decision-making. Implementing asset management required quality data and information that supported all Georgia DOT data, processes, and divisions.

In the first quarter of FY 2011, a Transportation Asset Management (TAM) Task Force was established in an effort to formalize GDOT’s commitment to asset management. The group included representatives from each of the divisions critical to TAM implementation and was first charged with completing an Asset Management Self-Assessment Survey to identify areas of high concern with respect to maintenance. Key findings from the self-assessment included several areas of focus for Georgia DOT: developing a performance-based approach to resource allocation, developing life-cycle approaches to evaluating investment benefits and costs, and improving data accessibility and integration.

In an effort to institutionalize TAM as a business process in the agency, Georgia DOT has taken steps to connect asset management with overall strategic planning. In February 2010, then-Commissioner Vance C. Smith, Jr., formally announced the implementation of TAM in the Department, which was followed by communication between the Division of Organizational Performance Management (OPM) and district engineers. To take advantage of the progress in other State DOTs with respect to TAM, two members of GDOT’s leadership attended a TAM Scanning Tour, which included visits to the States of Washington, Indiana, and North Carolina.

Georgia DOT has seven main asset management tools, including:

- The Highway Maintenance Management System (HMMS) tracks the daily work of maintenance crews throughout the State, allowing the department to develop a work program for tracking costs.²
- The Pavement Condition Evaluation System (PACES) is an assessment survey that rates every mile of every road each year.
- The Pipe Inventory (PI) is a module of the HMMS and provides condition assessments of pipes.
- The Highway Performance Monitoring System (HPMS) is a sample-based road inventory system mandated by the Federal Highway Administration (FHWA).

² The HMMS currently is being redeveloped.

- The Life-Cycle Cost Analysis (LCCA) tool provides the pavement management office comparisons of the life-cycle costs for different pavement types.
- The Bridge Information Management System (BIMS) holds input data from bridge inspections and generally holds more data than the Federally required National Bridge Inventory (NBI).
- The Benefit/Cost (B/C) tool assigns scores to projects as part of a prioritization process and is used by the planning, preconstruction, and traffic operations offices.
- The Georgia Pavement Management System (GPAMS) provides forecast data for Computerized Pavement Condition Evaluation System (COPACES) each year and helps with analysis and prioritization, giving GDOT the ability to better predict current and future needs.

Georgia DOT also has additional tools that can contribute to asset management, including an inventory of signals (maintained by individual districts), an Enterprise GIS database that includes crashes, traffic counts, and other data, and a developing sign inventory, as well as some software tools that are used to meet the financial reporting requirements of Government Accounting and Standards Board (GASB) Statement 34.

Georgia DOT is in the process of implementing a comprehensive Asset Management System. The goal of the system is to integrate the management of various assets into a single system. The initial system modules or components being implemented include bridge inventory, bridge maintenance, pavement design, HMMS, sign inventory, and fleet. These initial components are expected to be active in fall 2014. Sign management and safety modules are expected to follow.

2.2 NETIVEI Israel

NETIVEI Israel began implementing strategic asset management practices in 2006 to be able to intervene when repairs or corrections were needed to the road network. The organization desired to develop a system that would allow them to repair and maintain infrastructure in a manner that brought the most utility and benefit to public road users. The INRC Asset Management System Department wished to replace an older and unused asset management system developed in the former Public Works Department, which was the organization preceding INRC and NETIVEI Israel. A team of experts was nominated to develop this newer asset management system launched in 2008.

The Road Maintenance Management System (RMMS) uses multiple indicators to model and forecast benefits to road users of various infrastructure improvements. The goals of the system are to extend the life cycle of infrastructure facilities by making investments with high benefit to cost ratios, reflect the priority for road-user safety by increasing it on the road network, incorporate objective measures and criteria when assessing road condition, and enable prediction of future infrastructure performance under varying maintenance budget and intervention scenarios. The system includes safety, bridge, and pavement management

modules. The three modules enable the development of fiscally constrained plans and feed an Integrated Planning System (IPS), which helps the company define the integrated work plan for maintenance of road infrastructure.

The Department operates three types of surveys to provide data and indicators to the RMMS: 1) condition of road surface (e.g., pavement quality, condition of shoulders, roughness, bearing capacity); 2) inventory data (e.g., guardrails, physical safety hazards on the road sides (obstacles), road geometry, etc.); and 3) structure condition data (e.g., bridges, retaining walls, culverts, sign gantries). Benefit/cost ratios are used to prioritize projects and needs. Prior to implementing the Asset Management System, the organization used a “worst-first” approach to conduct maintenance and infrastructure repairs, mostly based on visual evaluation of the road condition.

Integrating the system into the organization’s decision-making process proved to be challenging but with the commitment of management, the task has been successful. The greatest challenge was achieving acceptance for the shift from the “worst-first” approach to a more systematic and data-driven approach. Experts’ personal impressions of the road condition became less crucial to the decision-making process, where maintenance plans were concerned. While experts understood the value of a benefit/cost prioritization method, their perception was that the relationships implemented in the asset management system were not accurate. Eventually the asset management system department began developing maintenance plans which are 80 percent based on the asset management system’s identified priorities and 20 percent based on priorities dictated by the maintenance experts. This approach allowed for flexibility and compromise between objective and subjective measures.

The quality of data collected during the survey process is another challenge. Significant time and resources have been used to improve the data used by the asset management system. While data quality has improved, the organization continues to develop new strategies to collect survey data, reduce survey costs, improve data quality and develop new forecasting methods for life cycles.

3.0 Exchange Activities

The Georgia DOT and NETIVEI Israel knowledge exchange activities have been conducted via webinars, in-person visits both in Georgia and Israel, and email exchanges on technical topics. A variety of experts have been involved from both organizations. Figure 3-1 shows a timeline of exchange activities.

Figure 3-1 Georgia DOT/NETIVEI Israel Exchange Timeline



Source: All photos provided by FHWA Office of International Programs.

3.1 Asset Management

Georgia DOT and NETIVEI Israel conducted a number of activities to share asset management practices and lessons. In 2011, NETIVEI Israel shared information on its RMMS and Integrated Planning System (IPS) via two web conferences. Presentations explored the following three system components: safety, bridge, and pavement management. For the system at large as well as each component, goals were identified, flows were charted showing the process used to feed the system with data and develop maintenance plans, and data collection and outputs were discussed. This exchange was particularly timely in helping Georgia DOT collect information used to implement an integrated asset management system.

In 2012, GDOT hosted NETIVEI Israel at Georgia DOT headquarters. The purpose of the visit was primarily for Georgia DOT to share key asset management strategies and practices related to GIS applications, tradeoff analysis, and safety management. Georgia DOT shared strategies used to locate and inventory assets using GIS data. Georgia DOT also demonstrated its recently developed program-level tradeoff analysis tool. The tool provides a method to quickly and easily compare funding choices distributed across major program areas (i.e., safety, pavement, bridge, capacity, and operations). The tool is organized around Georgia DOT's agency goals, performance metrics, and targets. The tool evaluates and quantifies the relationship between funding and performance for each of the program areas. The NETIVEI Israel expert also toured the Georgia DOT Transportation Management Center and discussed safety management with the State Traffic Operations Engineer.

3.2 Other Topics

Georgia DOT and NETIVEI Israel have conducted exchanges on other topics. During a 2009 visit to Georgia DOT, the group discussed the use of recycling materials (e.g., rubber asphalt technology), green technologies and Intelligent Transportation System (ITS), and maintenance contracts administration (e.g., quality assurance and control, crisis management, etc.).

Two Georgia DOT staff visited Israel in 2010 to participate in the Highway To Innovation Transportation Symposium, discuss research and traffic operations, and identify topics of mutual interest for joint research and/or information exchange. At the international symposium in Israel, Georgia DOT presented on the scope of its use of recycled materials such as reclaimed asphalt pavement, coal fly ash, roofing shingle scrap, and reclaimed concrete material for various project applications.

4.0 Benefits of Exchange

Both organizations have benefited from the exchange activities. In particular regarding asset management topics, the exchanges provided NETIVEI Israel with new insights on the use of Geographic Information Systems (GIS), safety management processes (e.g., network monitoring, project prioritization), and use of tradeoff analysis tools in the decision-making process. NETIVEI Israel and Georgia DOT are both interested in the potential of strategies to

incorporate tradeoff analysis scenarios produced by their asset management systems into the organizations' decision-making processes.

Since NETIVEI Israel implemented a comprehensive Asset Management System a few years prior to the time that Georgia DOT began its process initiatives, Georgia GDOT was able to learn from NETIVEI Israel's implementation experiences, including expected outcomes and pitfalls to consider in the process. The exchange provided another point of view and additional information for Georgia DOT to consider during the selection and development of a comprehensive asset management system. The two organizations also shared ideas for future implementation strategies, since Georgia DOT recently developed an asset management implementation plan.

Georgia DOT's demonstration of its Asset Management Trade Tradeoff Analysis Tool also provided NETIVEI Israel insight and ideas about alternative methodologies to develop deterioration curves for data input in its asset management system. NETIVEI Israel is interested in developing deterioration curves for structures (bridges) according to Israeli standards.

The information exchange on recycled materials was beneficial to both organizations. NETIVEI Israel has been experimenting with rubber asphalt specifications similar to Georgia DOT's since the discussion in 2011. The technology was tested on a road section, but wide use of the technology has not been approved yet. NETIVEI Israel also conducted follow-up research on other recyclable materials discussed during the exchange.

5.0 Future Opportunities

GDOT and NETIVEI Israel are interested in additional knowledge exchange activities and joint research in areas of mutual interest. Based on the asset management activities conducted to date by both organizations and the challenges faced in asset management implementation, Table 5-1 show recommended topics and activities each organization has some interest in pursuing.

Table 5-1 Future Research Topics and Activities

Opportunity/Activity	Georgia DOT	NETIVEI Israel
Identify State DOT best practices to integrate an asset management system into the organization’s decision-making process.	✓	✓
Explore strategies related to safety management systems (e.g., monitoring, project prioritization).	✓	✓
Explore bringing asset classes, other than pavements and bridges, such as signing, rest areas, and lighting into risk-based planning.	✓	
Explore strategies to improve data collection for asset management system (e.g., quality of data surveys, cost effectiveness of survey collection).		✓
Develop bridge deterioration curves according to Israeli standards.		✓
Incorporating 3D visualization into the bridge management component.		✓
Conduct time series analysis of asset management system data to see the actual improvements of the road network over time.		✓
Identify strategies used in the U.S. to incorporate the Highway Safety Manual (HSM) methods into the project development process.		✓
Discuss pavement marking technologies for both agencies.	✓	✓
Development and integration of pavement markings management system in the asset management system.		✓
Conduct a study tour at Georgia DOT to explore financial and contracting processes used in project development and delivery.	✓	✓
Conduct joint technical exchange forum with NETIVEI Israel and multiple State DOTs.		✓

6.0 Conclusions

The activities conducted under the Georgia DOT and NETIVEI Israel MOC have been beneficial and useful for both organizations. While transportation asset management was one of many exchange topics, the activities conducted around the primary subjects of interest have helped the two organizations identify opportunities, methodologies, and solutions to advance their asset management practices to foster best practices in investment decision-making. Both parties see potential opportunities in future exchange activities related to asset management and other topics. These activities may include collaborative research, webinars, technical tours, and knowledge exchanges focused on integrating a comprehensive asset management system in the decision-making process and improving data used by the system.

The exchange activities provide two lessons learned for the Office of International Programs. First, the geographic separation of the two organizations required strategic planning and

targeted exchange activities. Webinars and other virtual communication methods provided an opportunity for partnering agencies to collaborate, but in-person visits, tours, and technical exchanges appeared to be significantly more productive. Second, technical exchanges required a synergy between participating parties that lead to building truly collaborative relationships. The relationship between the two organizations is still developing. Both organizations are continuously looking for ways to collaborate. Georgia DOT and NETIVEI Israel conducted activities on other topics before identifying asset management as a topic of mutual interest. Activities such as joint research will require a period of time to identify goals and agree on approaches. Participating organizations will need time to reach agreement on mutual research interests and develop a plan for participating parties to secure funding resources.

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