Synthesis Report of the FHWA and the MOLIT Knowledge Exchange Since 1995

U.S. Department of Transportation
Federal Highway Administration

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16. Abstract

Since 1995, a Science and Technology Implementing Arrangement between the United States Department of Transportation's (USDOT) Federal Highway Administration (FHWA) and the Republic of Korea's Ministry of Land, Infrastructure and Transport (MOLIT) has made cooperation between these two governmental agencies a priority. The arrangement has led to annual United States – Korea Roads Workshops, technical expert exchanges, and greater collaboration between the two countries.

The purpose of this synthesis report is to create an official record of the exchanges between the United States DOT's FHWA and the Republic of Korea's MOLIT. The report provides a summary of the highway transportation technical interactions between the United States and the Republic of Korea, including workshops, site visits, and personnel exchanges along with a description of the benefits derived from them. Through the documentation review and discussion with the program participants, the team also documented challenges faced by the collaboration, and offered recommendations to surmount those challenges to ensure the program continues to flourish.

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EXECUTIVE SUMMARY

Since 1995, a Science and Technology Implementing Arrangement between the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA) and the Republic of Korea's Ministry of Land, Infrastructure and Transport (MOLIT), previously the Ministry of Construction and Transportation (MOCT), has made cooperation between these two governmental agencies a priority. The arrangement has led to annual United States – Korea Roads Workshops and exchanges of technical experts between the two organizations.

These formal interactions have led to better highway transportation systems, stronger ties, informal exchanges, and greater collaboration between transportation professionals in both countries.

The purpose of this synthesis report is to create an official record of the exchanges between the FHWA and the MOLIT. The report provides a summary of the interactions between the two agencies, including workshops, site visits, and personnel exchanges, along with a description of the benefits derived from them. This report also describes the challenges associated with the collaboration efforts and makes recommendations to surmount these challenges.

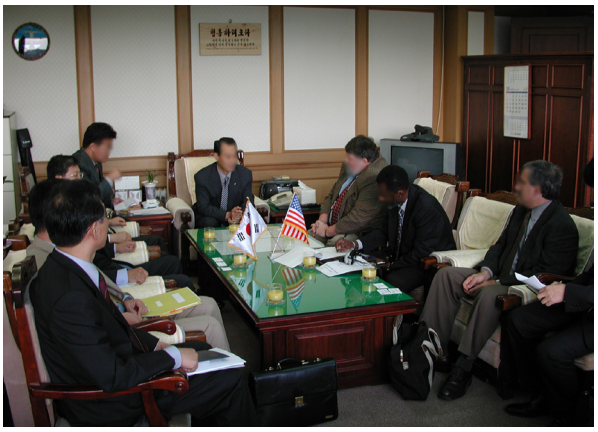
Over the last 20 years, the FHWA and the MOLIT collaborated on 17 workshops, held conversations about more than 200 topics, and participated in more than 30 site visits. These exchanges of technical knowledge provide significant benefits for all participants. The workshops create an environment where transportation professionals are able to discuss technical challenges and brainstorm solutions. The FHWA-MOLIT employee exchange program allows for a deeper knowledge exchange as professionals are immersed into the technical environment of the transportation system in another nation, providing benefits to both the sending and hosting organizations. Both workshops and employee exchanges allow new perspectives, ideas, and solutions to come forward for the benefit of both nations.

CHAPTER 1. INTRODUCTION

Background

In June 1995, the United States Department of Transportation (USDOT) signed the Science and Technology Implementing Agreement with the Republic of Korea's Ministry of Construction and Transportation (MOCT) concerning cooperation in science and technology. This agreement formalized relations and focused cooperative activities on an exchange of technical experts and fostered participation in the annual United States-Korea Roads Workshop. Since 1997, the United States and the Republic of Korea have engaged in an exchange of transportation strategies and technical knowledge through annual workshops and personnel exchanges. The USDOT Federal Highway Administration (FHWA) and the Republic of Korea Ministry of Land, Infrastructure and Transport (MOLIT), formerly MOCT, have been alternating hosting responsibilities. Over the past 20 years, the two countries have shared valuable knowledge via 17 collaborative workshops and the participation of 18 personnel in extended learning exchanges.

As per its charter, the MOLIT "is in charge of future-oriented territorial development [and] safe and convenient infrastructure and transport development,"[1] while the FHWA's mission is to "enable and empower the strengthening world-class highway system that promotes safety, mobility, and economic growth, while enhancing the quality of life of all Americans."[2]



Source: FHWA

Figure 1. In 2002, Attendees of the 5th Workshop Visit the Korean Exchange Corporation.

As such, the purpose of each of the two agencies is to work to maintain the safety and efficiency of the transportation systems in their respective countries. By committing to collaboration, the two organizations create an environment where best practices and innovative ideas can be exchanged with the goal of advancing their shared organizational purposes and visions.

In 2012, the USDOT and the MOLIT signed a memorandum of cooperation titled "On Cooperation in the Field of Intelligent Transport Systems." The memorandum reiterated the two agencies' commitment to identifying research, development, and technology areas that could benefit from joint information exchanges.

1 Ministry of Land, Infrastructure, and Transport, History. Available at: http://www.molit.go.kr/upload/cyberJccr/pdf_file/2015_English_Brochure(MOLIT).pdf

2 Federal Highway Administration, About, last modified: September 17, 2012. Available at: https://www.fhwa.dot.gov/about/

The United States and the Republic of Korea committed to continuing to share information on ongoing research and development projects, estimated technology benefits, research evaluations, and results of field demonstrations. In addition, they work together to coordinate technological interoperability, when possible. The result of this collaborative relationship, bolstered by exchange programs and workshops, has built upon a transportation culture that promotes knowledge and information sharing. The United States and the Republic of Korea have established a relationship that enhances cooperation in the fields of both transportation science as well as transportation technology.

SYNTHESIS REPORT OVERVIEW

As a result of this long-standing collaborative partnership, the FHWA has accumulated more than 20 years of materials from the annual workshops and peer exchanges, including agendas, presentations, attendee lists, meeting minutes, workshop summary reports, and personnel exchange trip reports. The FHWA determined it would be beneficial to "take stock" or look back and formally document the program's history and accomplishments in the form of a synthesis report. This synthesis report serves as an official record of the exchanges between the FHWA and the MOLIT. By documenting activities, identifying benefits and challenges, and recommending improvements, the report will serve as a tool for enhancing the effectiveness of future workshops and professional exchanges and ensuring the continued longevity of this collaborative interaction between the United States and the Republic of Korea.

Source: FHWA

Figure 2. 2001 Workshop Presentation and Discussion.

The research team used the following approach to developing this synthesis report.

- **A comprehensive resource review.** The FHWA provided all relevant and available materials from the program. The study team examined the resources from the exchanges, including agendas, presentations, attendee lists, meeting minutes, and reports. This provided the team with an overall history of the cooperative effort and offered insight into the activities held throughout this partnership. It also helped the team prepare for subsequent discussions with program participants.

- **Discussions with program participants**. Following the resource review, the study team scheduled and conducted discussions with eight of the FHWA and MOLIT participants. Some examples of items discussed were the program participant's role in the exchanges or workshops; the benefits of the workshops, site visits, or personnel exchanges; the knowledge the participant acquired and how it impacts their current work; and evidence of continued communication after the workshop, site visit, or personnel exchange. The goal for these discussions was to document the participant's perceived benefits, challenges, lessons learned, and the impact the workshops, site visits, and personnel exchanges had on their professional careers.
- **Assembling the information.** Using the information gathered from the literature review and the program participant discussions, the study team began to draw out the program's history, common themes, benefits, and challenges for inclusion in this synthesis report. The report leans heavily on historical information in order to identify strategic interests for each party involved, both today and in the future. The report also documents connections made throughout the years and proposes ways in which the program's activities could be enhanced moving forward.

CHAPTER 2. SUMMARY OF ACTIVITIES

The FHWA and the MOLIT have participated in numerous activities since the 1995 agreement that formalized this collaborative relationship. The following sections provide an overview of the workshops, site visits, and personnel exchanges.

More than **220 representatives** from the USDOT and its counterpart, MOLIT, attended **17 workshops** over the past **20 years.**

Over a dozen personnel participated in extended exchanges.

Workshops

Nearly every year for the past 20 years, the FHWA and the MOLIT hosted multi-day workshops in which technical experts from both agencies presented on best practices and shared the latest technological innovations. Through these workshops, the participants from the United States and the Republic of Korea shared technical knowledge that helps to ensure our transportation infrastructure is safe, efficient, well maintained, and supports a sustainable environment.

To date, the FHWA and the MOLIT have held 17 workshops. Table 1 summarizes when and where each workshop occurred.

Table 1 - Workshop History

Workshop	Date	Location
1st U.S. – Korea Roads Workshop	January 27–31, 1997	Republic of Korea
2nd U.S. – Korea Roads Workshop	May 11–14, 1998	United States
3rd U.S. – Korea Roads Workshop	August 7–10, 2000	Republic of Korea
4th U.S. – Korea Roads Workshop	August 27–29, 2001	United States
5th U.S. – Korea Roads Workshop	October 7–9, 2002	Republic of Korea
6th U.S. – Korea Roads Workshop	August 18–19 & 21, 2003	United States
7th U.S. – Korea Roads Workshop	July 21–22, 2005	United States
8th U.S. – Korea Roads Workshop	August 19–26, 2006	Republic of Korea
9th U.S. – Korea Roads Workshop	June 26–28, 2007	United States
10th U.S. – Korea Roads Workshop	September 2–5, 2008	Republic of Korea
11th U.S. – Korea Roads Workshop	April 7–9, 2010	United States
12th U.S. – Korea Roads Workshop	June 2–3, 2011	United States
13th U.S. – Korea Roads Workshop	July 1–20, 2012	Republic of Korea
14th U.S. – Korea Roads Workshop	July 23–24, 2013	United States
15th U.S. – Korea Roads Workshop	June 9, 2015	United States
16th U.S. – Korea Roads Workshop	September 5–9, 2016	Republic of Korea
17th U.S. – Korea Roads Workshop	November 1–2, 2017	United States

"Learning and sharing globally will lead to integration of best practices in assuring safety to the traveling public and good stewardship of public funds."

Myint Lwin
Former FHWA Director of Bridge Technology

Across all of these workshops, attendees presented on 206 topics. These presentations can be broadly grouped into the following topic areas.

- Programmatic and/or Policy
- Transportation Planning
- Funding/Financing
- Data Analysis, Tools, and Methods
- Infrastructure Design
- Traffic Operations and Safety
- Construction and Materials
- Bridge and Highway Maintenance
- Asset Management
- Information Technology Services
- Sustainability/Resilience
- Transportation Standards

During the 2016 workshop, a formal written work plan was signed by the FHWA's Associate Administrator for Planning, Environment and Realty, Gloria Shepherd, and the MOLIT's Assistant Minister for Roads, Jung-Ryeol Kim, to promote future transportation technology exchanges between the Republic of Korea and the United States. The document describes the desire of both agencies to continue discussing transportation topics, including: performance management, intelligent transportation systems and connected vehicles, and climate change, among other topics.

Site Visits

During most workshops, attendees participated in technical site visits, which gave participants first-hand examples of the technologies described within the presentations and workshop discussions. Workshop attendees consistently identified the site visits as the highlight of the annual workshops. During the site visits, participants had opportunities to view demonstrations, new technologies, and prototypes before the technology became widely available. Transportation professionals from the FHWA and the MOLIT also received hands-on experience with the latest technology within their own countries. Participants report that the in-person experience spurred valuable discussions related to best practices and innovative solutions. Through this program, the participants had the opportunity to explore 35 sites. A selection of these site visits are described below.

- The 2nd annual workshop was hosted by the United States in 1998. During this workshop, participants toured the Turner-Fairbank Highway Research Center in McLean, Virginia. The tour and following interactions focused on hydraulics and structural research. Attendees were also given the opportunity to interact with the Human Factors Field Research Vehicle. During the same workshop, participants also toured the Maryland Department of Transportation's State Operations Center and participated in a site visit to the George Washington Memorial Parkway in Virginia.
- In 2003, the 6th Annual United States-Korea Roads Workshop touched both the east and west coasts. The east coast portion of the workshop featured a site visit to the Woodrow Wilson Bridge, which spans the Potomac River between Maryland and Virginia. The participants also traveled to the west coast and took a tour of the Tacoma Narrows Bridge project and of the Washington State Department of Transportation's materials laboratory.

Source: FHWA

Figure 3. The 2002 5th Workshop Attendees on a Technical Site Visit in Seoul, Korea.

- The MOLIT attendees returned to Washington, D.C., in 2005 for the 7th workshop. During their site visit, they were able to see the progress made on the Woodrow Wilson Bridge replacement project since the previous workshop. They also toured the Virginia State Highway Administration's traffic management center (TMC).
- In 2006, organizers for the 8th workshop arranged technical site visits to the Seo-Hae, In-Cheon, and Gwang-An bridges. Visiting transportation professionals from the FHWA learned how the MOLIT constructs, monitors, and manages their bridges.
- The U.S. delegation hosted the 9th Annual United States-Korea Roads Workshop in San Francisco, California, in 2007. During this workshop, participants attended a technical field trip to the Bay Bridges. San Francisco Bay contains a variety of bridges with impressive engineering and design, including

the Golden Gate Bridge, the San Francisco-Oakland Bay Bridge, the Richmond-San Rafael Bridge, the Hayward-San Mateo Bridge, and the Dumbarton Bridge.

- During the 11th workshop in Newport Beach, California, participants visited the District 12 TMC and the 91 Express Lanes in Anaheim, California.
- The 13th workshop in 2012 featured technical field visits to the impressive Yi Sub-Sin Suspension Bridge and the Jeokgeum-Yeongnam Bridge. These bridges connect islands in southern Korea and were built with the hope of attracting tourism to grow the communities. The team also visited the Korean Expressway Corporation (KEC), formerly known as the Korean Highway Corporation (KHC), traffic information center, and a modern expressway rest area.
- Participants at the 16th workshop, hosted in the Republic of Korea, toured the island's transportation facilities. In addition, workshop attendees visited the KEC's Traffic Information Center in Seoul and engaged in a discussion with the KEC research staff and leadership at the KEC research institute. Also in Seoul, the group witnessed a demonstration at the Gyeongbu expressway smart highway test bed.
- In 2017, attendees of the 17th workshop in Washington, D.C., participated in site visits focusing on geohazards in Arlington, Virginia. They saw examples of a rock fall stabilization site on George Washington Memorial Parkway, foundation erosion on a bridge on Spout Run Drive, and a concrete crib wall for slope stabilization on the George Washington Memorial Parkway.

During the 2016 workshop in Seoul, Korea, the team visited a number of geohazard event sites. At the first site on the Korean Expressway, the team observed rockfall and landslide stabilization measures that consisted of several components. The stabilization components included a rock fence, high capacity tensioned anchors with reinforced concrete cross, rockfall netting, and enhanced drainage. KEC's design and construction of the high capacity anchoring system that consisted of post tensioned anchors and reinforced concrete crosses (Figure 4) is generally not used in the United States. KEC indicated the design of the reinforced concrete cross for the anchoring system provided several advantages compared to the traditional reinforced concrete block used in the United States. These include: 1) lighter weight compared to the block, 2) easier to handle during construction, and 3) lower material and construction costs. This option will be further investigated for use in the United States.

Source: FHWA

Figure 4. Khalid Mohamed Examining Rockfall and Landslide Stabilization Measures in Seoul, Korea during the 16th Workshop in 2016.

"Transportation challenges are similar around the world. This program provides a great opportunity to learn how our colleagues in the Republic of Korea are using innovative transportation methods and solutions that we can also apply to improve the life of our infrastructure."

Randy Iwasaki
Chief Deputy Director at CalTrans

Personnel Exchanges

Exchanging technical experts is one of the cooperative activities that the FHWA and the MOLIT engage in under the *Science and Technology Implementing Agreement*. Each exchange involves a technical expert from either the MOLIT or the FHWA traveling to the partnering country and working with the partnering agency. These personnel exchanges foster relationships, promote interactions, and create an awareness of international technological advances through extended immersion in the respective country's transportation agencies.

Since this partnership began, more than a dozen personnel exchanges have taken place. Throughout the program, 17 exchange engineers have been sent to the United States from the Republic of Korea, and one has been sent to the Republic of Korea from the United States. The exchanges have primarily involved MOLIT representatives working in the United States and lasted between 6 and 18 months. These exchanges bring in experts with new and fresh perspectives, enabling both parties to grow their knowledge base by sharing experiences and brainstorming solutions. The exchange engineers have participated in safety conferences and workshops, and have assisted with research studies, proposal reviews, problem solving, and data analysis.

The FHWA and the MOLIT exchanged technical experts within the areas of infrastructure inspection and management, bridge engineering, roadway design, traffic operations and safety, construction engineering, and steel prefabricated construction and systems. The study team spoke with three of the exchange program participants in order to gain insight into what they learned and their overall experience in the program. The following paragraphs provide an overview of the experiences of these three exchange program participants—one who traveled to the Republic of Korea and two who traveled to the United States.

Lessons Learned in Bridge Management | Dr. Seung-Kyoung Lee was a permanent FHWA staff member with the Infrastructure Inspection and Management team in the Office of Infrastructure Research & Development. He traveled to the Republic of Korea for a 6-month personnel exchange with the MOLIT in 2005. The FHWA benefited from this exchange by obtaining information on construction engineering and steel prefabricated construction and systems—areas where the MOLIT has extensive expertise. While in the Republic of Korea, Dr. Lee conducted a tour of major bridges to learn how the KEC copes with durability problems in their transportation infrastructure. Doing so helped him identify knowledge gaps within both the FHWA and the MOLIT related to bridge

"Various aspects of a country, such as its culture, the mind-set of the people, its natural environment, and economic situation are reflected in the roads of that country."

Jiwon Oh
Visiting Research Engineer from
the Republic of Korea in 2010

management. While in the Republic of Korea, Dr. Lee also provided expert advice and assistance to the KEC based upon his technical knowledge of corrosion engineering.

Bringing Home a Benchmark | Mr. Chansu Reem has worked for the KEC for 26 years and was selected to participate in the employee exchange program. His background includes expertise in pavements, bridges, and roads. During his residency at the Eastern Federal Lands Highway Division office, he learned about the FHWA's transportation practices and used that knowledge to help benchmark and evaluate the MOLIT's own programs. These items included standard design criteria, preliminary design methods, transportation manuals and guidance, and the design and engineering software and computer systems.

Benefiting Hosting Office | Mr. Reem also assisted the Eastern Federal Lands Highway Division office by reviewing State departments of transportation (DOT) proposals' for new or modified project designs related to interstate to interstate, interstate to freeway, and interstate interchange roadwork. Mr. Reem has an extensive background in operations and traffic engineering and a deep understanding of the American Association of State Highway and Transportation Officials (AASHTO) Green Book's geometric design recommendations. While at the office, Mr. Reem reviewed a project proposal featuring two close interchanges and noticed that an interchange ramp was not of sufficient length. He flagged this as a significant concern and the State adjusted its plans based on his comments and feedback.

Moving Toward Connected and Autonomous Vehicle Interoperability | Mr. Joonsoo Shin is an active participant in the exchange program as of 2018. Before he was selected by the KEC and the MOLIT as an exchange candidate, he spent four years working on the Smart Highway project in the Republic of Korea. The Smart Highway system involves a convergence of advanced IT, vehicle, and road technologies to create a convenient and safe intelligent highway. While in the United States, Mr. Shin supports the connected vehicle pilot studies and works with the FHWA to share their automation policies with the MOLIT. Mr. Shin coordinates activities between the two agencies that support the development of global connected and autonomous vehicle interoperability standards. Mr. Shin is also focused on comparing the FHWA's and the MOLIT's ITS data to identify more efficient and effective uses of big data by both transportation agencies.

Learning to Think Outside of the Box | In his post exchange report, Mr. Jiwon Oh summarized his visit to the United States as a research exchange engineer in 2010 as an opportunity to learn to think in different ways. He felt he had been a "frog in a well," which is a Korean proverb for a person who cannot think outside of the box.

During his 18-month stay, he describes his time in the United States as a learning experience that gave him knowledge about the general highway system in the United States, enabling him to compare it to the system in the Republic of Korea. Recognizing and understanding the differences between the two gave him information that he could use to help advance the highway system in his home county.

Emphasis on Stakeholder Communication | Mr. Chang Suck Yoo has been an active participant in the exchange program since 2017. He has 26 years of experience with a broad array of highway projects. Mr. Yoo has expertise in planning, design, construction, contracts, funding, operations, traffic control management, and other aspects of highway transportation. Since arriving at FHWA, he spent 6 months working with the major project team in the Office of Infrastructure, then 6 months handling pavement management in the Eastern Federal Lands Highways Division. During 2018, he has been working in the Office of Safety on projects focused on reducing roadway departure crashes. Mr. Yoo believes one of the most important lessons he has learned during his time at the FHWA is the importance of stakeholder involvement and collaboration. Collaboration is one of the FHWA's core values, and he is working with Office of Safety project managers to reach out, connect, and communicate with a variety of stakeholders.

Source: Getty Images

CHAPTER 3. PROGRAM BENEFITS

During the workshops, site visits, and personnel exchanges, participants shared their country's best practices and state-of-the-art technology on a broad range of transportation-related topics and developed lasting international relationships. According to the FHWA and the MOLIT participants, the greatest benefits of these events included:

- **The ability to benchmark the respective agencies' transportation practices and technologies.** Through the workshops, the agencies were able to benchmark advances in every aspect of transportation engineering and infrastructure and collect ideas for how to improve transportation practices in their home countries.
- **Face-to-face collaboration.** The face-to-face collaboration enabled participants to discuss technical hurdles, describe complex issues, and convey field-tested solutions to roadway and infrastructure challenges.
- **In-person technical assistance**. The post-workshop site visits allowed both the FHWA participants and the MOLIT participants to observe each country's state-of-the-art practices firsthand and ask technical questions that would be difficult to communicate remotely.

Source: FHWA

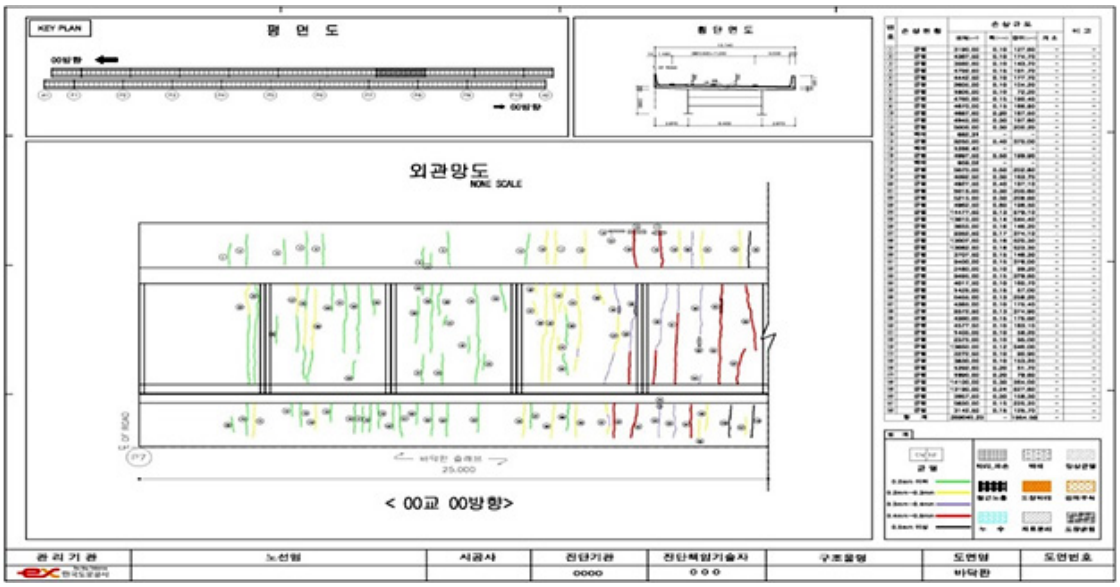
Figure 5. Site Visit During the 4th Workshop in 2001.

- **Hands-on learning through site visits.** These in-the-field knowledge exchanges are not possible remotely and therefore provide valuable insight that can only be gained through hands-on experience.
- **Exchange engineer emersion**. Engineers from other countries approach problems differently. The exchange program enables transportation professionals from both countries to brainstorm new solutions for tackling problems together. Full emersion ensures exchange engineers are integrated into the hosting agency, enabling their unique perspectives and innovative ideas to have the most impact.

Specific Examples of Knowledge Exchanges

In addition to the broad benefits described above, the program participants provided several note-worthy examples of knowledge acquired during the workshops, site visits, and personnel exchanges.

- During his residency in the Office of Safety, Mr. Chang Suck Yoo learned about the FHWA's Proven Safety Countermeasures—roundabouts and high friction pavement treatments in particular. The MOLIT plans to use this information to broaden and improve the use of these countermeasures in the Republic of Korea.
- During his time as an exchange engineer in the United States, Mr. Chansu Reem shared the MOLIT's approach to geohazard resilience with the FHWA geotechnical office. The guide was examined by FHWA hydraulic engineers and, although the engineers found the process did not merge well with the process in the United States, it was helpful to learn how MOLIT was attempting to expand the capacity of its drainage facilities for highways.
- During the 2006 workshop hosted by the Republic of Korea, the FHWA participants provided technical assistance to help address the MOLIT's concrete durability problems. During the same workshop, the FHWA learned about the MOLIT's structural health monitoring (SHM) research and digitized maintenance practices, including its effort to keep maintenance records in digitized formats on a real-time basis. Since the FHWA had recently launched a long-term bridge maintenance program, the MOLIT's SHM experiences were particularly valuable.
- During the 2015 workshop, the attendees from the United States learned about the MOLIT's automated inspection technology, which is used on the Republic of Korea's expressway structures. The automated bridge inspection system provides safe and convenient working conditions, makes inspections faster and more efficient, ensures objectivity and reliability, and builds an integrated scientific database. The system uses a remote control system called the Ubiquitous Bridge Inspection Robot System (UBRIOS), which generates an inspection report (see Figure 6). This remote monitoring was later adopted in the United States. It was also beneficial to the U.S. engineers to learn about the MOLIT's segmented bridge construction method.
- As an exchange engineer visiting from the Republic of Korea, Mr. Chansu Reem provided valuable reviews and feedback for Interstate access proposals submitted by State departments of transportation (DOT). His assistance and participation in the reviews helped ensure safer and better operating interstate access designs.
- During the 2016 workshop, Mr. Robert Kafalenos and Mr. Khalid Mohamed visited geohazard site locations in Seoul, Korea, and learned about the MOLIT's approach to bridge structures, slopes, and heavy rainfall issues. Witnessing the MOLIT's solutions reconfirmed the approach that the FHWA engineers use on similar issues.
- During a site visit, the MOLIT participants learned about the U.S. load and resistance factor design (LRFD) technology. The agency is now seeking to implement the LRFD technology within the Republic of Korea.



Source: FHWA

Figure 6. Inspection Report by UBRIOS.

- During a visit to the Republic of Korea, the FHWA personnel observed the MOLIT's next generation of transportation management centers and how the agency handles the growing congestion challenge in its capital city of Seoul.
- Through hosting Mr. Reem, the FHWA learned that some construction projects that can take as much as 10 years to complete in the United States often only take 7 years in the Republic of Korea, leading the FHWA exchange participant to comment that lessons can be learned from the MOLIT's construction timelines.
- During Mr. Joonsoo Shin's residency in the United States in 2018, he shared with the FHWA insights into the MOLIT's radar-based incident detection system.
- While in the Republic of Korea, Dr. Seung-Kyoung Lee learned how the MOLIT manages its bridge network, and he identified gaps in the FHWA's bridge management knowledge that could be filled by exchanging additional information.
- Dr. Lee documented and brought back information on the MOLIT's landslide monitoring system as well as the agency's Smart Road and Smart Highway practices. He believes the United States benefits from learning about their processes.

CHAPTER 4. LESSONS LEARNED AND RECOMMENDED IMPROVEMENTS

Participants of the FHWA-MOLIT knowledge exchange program identified some challenges faced by the program and the lessons they learned along the way. This section summarizes that feedback and recommended steps for improving the program's processes and communications to ensure the program continues to flourish.

Challenge #1: United States personnel visits to the Republic of Korea.

Historically, the FHWA sends fewer attendees to the Republic of Korea for the workshops than the MOLIT sends to the United States. This is largely due to a lack of Federal funding.

Recommendation #1:

Garnering FHWA leadership buy-in is the most reliable method to solicit the funding required to send additional FHWA staff to the workshops hosted in the Republic of Korea. Sending an adequate number of FHWA staff maximizes collaboration and ensures U.S. experts from a wide range of transportation disciplines from both the Federal and State level are able to attend.

Challenge #2: Lack of State and local participation.

State and local agency staff are often not involved in the exchanges and workshops. Therefore, integrating information gleaned from these exchanges at these levels of government is difficult. If practitioners do not adopt the ideas exchanged during workshops then the lessons learned may be lost or forgotten.

Recommendation #2:

Increase the number of State and local agency staff invited to participate in future workshops. Engage State and local agencies as hosts for the MOLIT exchange engineers. Expand the opportunities for State and local staff to interact with MOLIT counterparts, even if these opportunities do not include travel. For example, use virtual meetings to enable MOLIT participants to share their knowledge with a wider audience.

Challenge #3: Disseminating exchanged knowledge.

The knowledge shared during the workshops and exchanges is not easily accessible by practitioners. Many State and local practitioners are unaware of the MOLIT's best practices and state-of-the-art technology.

Recommendation #3:

After each knowledge exchange, record and archive information so that it is available to practitioners at all levels. Participants from both countries currently develop post-workshop and

exchange reports. While these reports are helpful, they could be more thorough, more actionable, made available online, and complemented with other outreach and educational strategies, such as webinars, to ensure ideas are disseminated and implemented nationwide. Further, for each workshop, assign an attendee as a champion responsible for ensuring new ideas are not only noticed and remembered, but also promoted and implemented.

Challenge #4: Exchange staffs' potential is not fully realized.

Exchange engineers who visit the United States from the Republic of Korea are full of largely untapped potential. Often, they only shadow the FHWA engineers at the USDOT Headquarters and the Eastern Federal Lands Highways Division. They are not exposed to State or local transportation agencies. Further, they are often not given an opportunity to fully integrate their knowledge into U.S. transportation projects.

Recommendation #4:

Integrate exchange staff visiting the United States from the Republic of Korea into State and local agencies whenever feasible. Assign the exchange engineer a specific activity or project, enabling them to contribute, integrate their knowledge, and produce a deliverable. Assigning a project to an exchange engineer will spur collaboration, communication, and learning, and will enable both parties to get more out of the exchange experience.

Challenge #5: Getting the most out of the workshops.

During the workshops hosted by the FHWA, the U.S. participants and speakers often only attend their own presentation session before returning to their office and regularly scheduled day. Interactions are limited and not sustained during these workshops. This approach stymies the potential for collaboration and limits opportunities to build relationships that are the basis for consistent information sharing and growth.

Source: FHWA

Figure 7. Technical Discussion During a Workshop.

Recommendation #5:

To ensure the information exchanged during the workshops is turned into productive and actionable projects, participants from both countries should be encouraged to attend the full duration of the workshops, actively participate in all sessions and activities, and maintain periodic contact with an assigned attendee at the conclusion of the event. For each workshop, outline specific objectives, document accomplishments and recommendations, and include an implementation plan in the workshop report.

Challenge #6: Inconsistent points of contact.

The MOLIT representatives who are involved in planning the workshops and exchanges change positions frequently. Due to these frequent turnovers, it is challenging for the FHWA transportation officials to build significant, long-lasting relationships with the MOLIT transportation officials.

Recommendation #6:

Assign an FHWA and MOLIT employee to every topic discussed during the workshops. These individuals will be responsible for determining and following through with action steps to document and implement the gained knowledge. This will increase the number of responsible points of contact within the FHWA and the MOLIT, building relationships, and encourage continued communication post-workshop.

Challenge #7: On-boarding exchange engineers.

It can take up to a year for the visiting research scholars to obtain a USDOT badge and be given access to the building and systems. In addition, throughout their tenure, anytime a research scholar rotates into a new office, they must turn in their computer and be issued a new computer. This creates delays and stress.

Recommendation #7:

Identify an individual responsible for obtaining security clearances for all exchange engineers across all international exchange programs. By placing this responsibility on a single individual rather than a hosting office, it ensures the individual learns from previous experience and can apply it to future situations. Begin working with the exchange engineer at least one year in advance of their arrival to secure the necessary permissions. Arrange monthly check-ins to ensure progress on both sides continues to move forward.

Challenge #8: Language barriers.

The MOLIT exchange engineers' verbal communication skills are mostly understandable; however, they often struggled with writing assignments. This barrier can impact the types of projects the exchange engineer can support.

Recommendation #8:

The FHWA host offices work around the language barrier by the exchange engineer verbally presenting his findings and the project manager writing the report.

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CHAPTER 5. CONCLUSION

The 1995 *Science and Technology Implementing Agreement*—and the resulting knowledge exchange program between the United States' FHWA and the Republic of Korea's MOLIT—created a collaborative, symbiotic environment, benefiting both countries. The project team found that the program's workshops, site visits, and personnel exchanges allowed the FHWA to benchmark its transportation practices and technology, collaborate face-to-face with industry experts, provide and receive in-person technical assistance, and witness state-of-the-art technology firsthand through site visits. While the program has been effective, it can be improved by expanding State and local agency participation, increasing and maintaining post-workshop communication between participants, documenting and disseminating the learned knowledge nationwide, and empowering exchange engineers to realize their full potential. Making these adjustments will ensure this program, and the benefits derived from it, continue to flourish.

Source: Getty Images

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