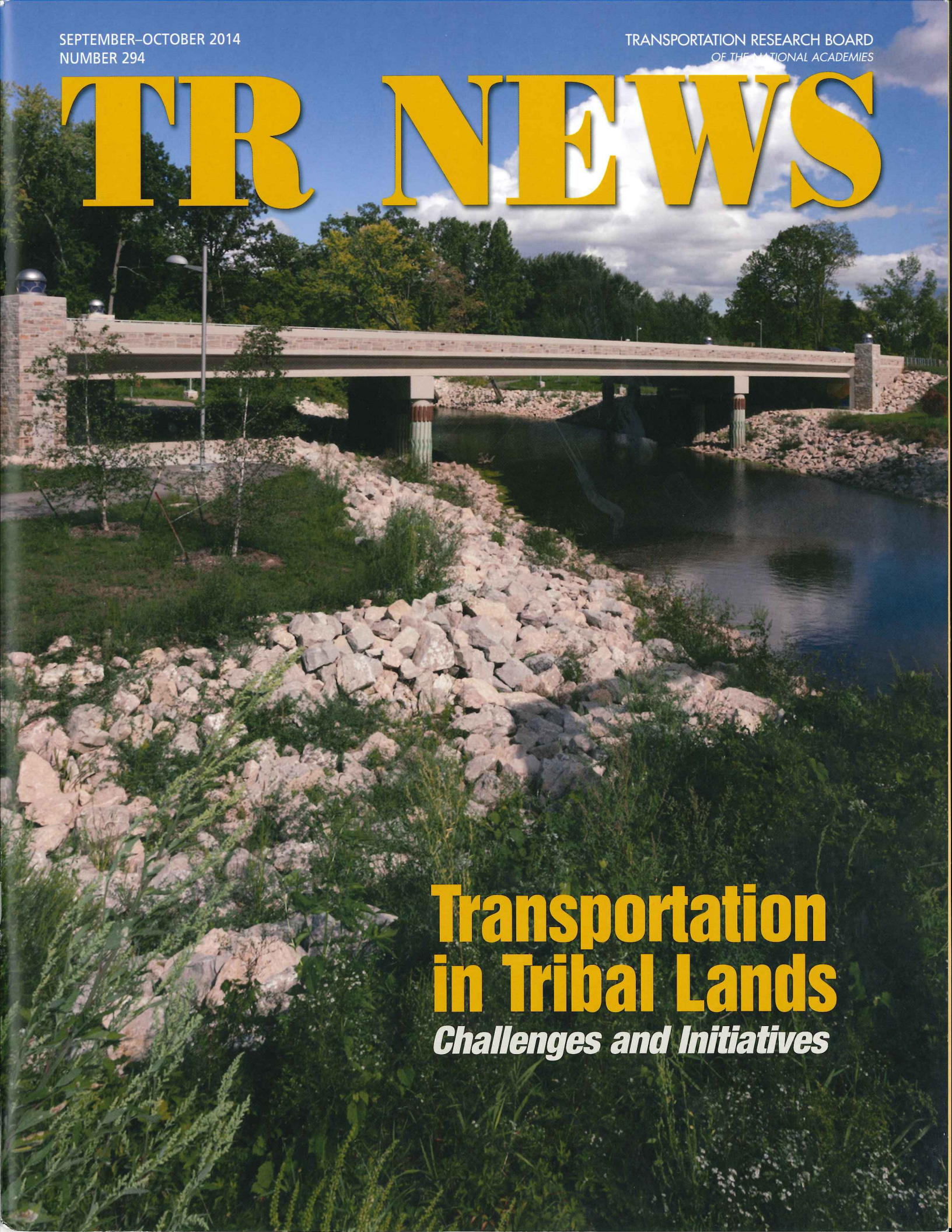


SEPTEMBER–OCTOBER 2014
NUMBER 294

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

TR NEWS



**Transportation
in Tribal Lands**
Challenges and Initiatives

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

**National Academy of Sciences
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National Research Council**

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Obtaining right-of-way through Indian Country for a transportation project is a complex process, subject to rules and regulations related to the timing, purpose, and scope of the request, and involving unique jurisdictional conflicts between tribal, state, and federal governments. The authors describe the steps for determining the authority for a right-of-way, obtaining a right-of-way, and the primary issues to address.



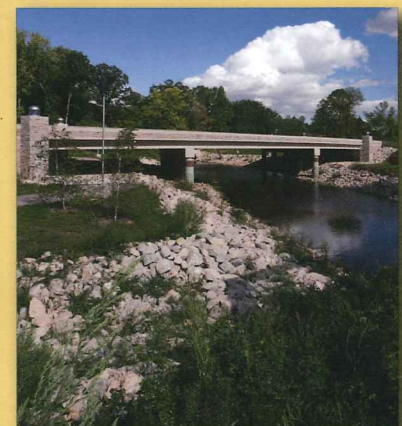
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COVER: Oneida Duck Creek Bridge in Wisconsin is an example of close collaboration between a sovereign tribe and state and federal agencies to produce a transformative, improved transportation facility with community and environmental benefits and cultural significance. (Photo: Mead & Hunt)

TR NEWS

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TR News is produced by the Transportation Research Board Publications Office

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TR News (ISSN 0738-6826) is issued bimonthly by the Transportation Research Board, National Research Council, 500 Fifth Street, NW, Washington, DC 20001. Internet address: www.TRB.org.

Editorial Correspondence: By mail to the Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, by telephone 202-334-2972, by fax 202-334-3495, or by e-mail jawan@nas.edu.

Subscriptions: North America: 1 year \$60; single issue \$12. Overseas: 1 year \$85; single issue \$12 plus shipping. Inquiries or communications concerning new subscriptions, subscription problems, or single-copy sales should be addressed to the Business Office at the address below, or telephone 202-334-3216, fax 202-334-2519. Periodicals postage paid at Washington, D.C.

Postmaster: Send changes of address to TR News, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001.

Notice: The opinions expressed in articles appearing in TR News are those of the authors and do not necessarily reflect the views of the Transportation Research Board. The Transportation Research Board and TR News do not endorse products or manufacturers. Trade and manufacturers' names appear in an article only because they are considered essential.

Printed in the United States of America.

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India's Highway Capacity Manual, and several recent research reports on such topics as smart growth and urban goods movement; new developments in the implementation of roundabouts; the use of geospatial data and mobile lidar in state department of transportation projects; active traffic management; and more.

(Left:) Traffic conditions in an urban center in India; researchers are developing a Highway Capacity Manual to address the heterogeneous mix of vehicles and the unique traveler characteristics and behaviors.



Context-Sensitive Solutions for an Oneida Nation Transportation Project

Teamwork and Community Involvement for Safety, Connectivity, Mobility, and Cultural Identity

JOHN A. RATHKE

The author is Senior Manager, Mead & Hunt, Inc., Green Bay, Wisconsin.

An Oneida Nation bridge replacement project in Wisconsin became the catalyst for the redevelopment of the community's core. The planning and design team leveraged the project to connect the community, to provide a gathering space, and to strengthen tribal identity by incorporating landscaping and artwork by local artists.

An iconic structure resulted from the interactions and coordination between the Oneida Nation staff, the Wisconsin Department of Transportation (DOT), and the design team at Mead & Hunt, Inc. The transportation project provided a stronger sense of place and improved mobility for the community and for the traveling public.

Before the project, the only safe and reliable way to travel between upper and lower Oneida was by automobile. The completion of the project has opened other opportunities for the community and the traveling public to enjoy the natural beauty of the

area. The comprehensive endeavor required the commitment to open, frequent, and honest communication by the project team.

Establishing Principles

Wisconsin DOT's core team scheduled regular meetings to maintain clear communication with agency officials. The Oneida Nation's government, like all others, operates under intricate procedures and bureaucracies. The core team therefore engaged representatives from the departments that would be essential for communicating and implementing a complex project on Oneida tribal lands, covering such concerns as land management, environmental issues, planning, cultural issues, and engineering.

Under the guidance of the Oneida Nation's general manager and chief of staff, the importance and urgency of the bridge replacement was kept front and center. In addition, Wisconsin DOT's dedication

(Above:) The Duck Creek Bridge is the result of collaboration between the Oneida Nation of Wisconsin, the Wisconsin Department of Transportation, and contractor Mead & Hunt, Inc.

The new Duck Creek Bridge, the preserved and converted old bridge, the connecting trail systems, and the green space developed in the Oneida project.

of staff time and adoption of a flexible approach to problem solving was essential in the project visioning and implementation.

Consulting engineers from Mead & Hunt were able to work directly with Oneida staff to assure clarity of communication and a shared understanding of the project goals established by the core team. The guiding principles revolved around a commitment to pedestrian safety, slower traffic speeds, and landscaping and design that appealed to the Oneida community.

Community Involvement

Community involvement in the Oneida Duck Creek Bridge project involved consistent efforts by the project team, outreach to internal departments and commissions, and the open exchange of information with the Oneida community. The project not only required the replacement of the failing bridge but also addressed the multifaceted details of a highway shift and the design of a new entrance to a residential area, as well as roundabouts, trails, landscaping, and connections to local roads. Consistent outreach and communication facilitated consensus building on these varied and complex topics. The table at the right highlights several important communication meetings during the project.

The outreach was comprehensive and included groups from the Oneida government, such as the Business Committee, the General Tribal Council (GTC), and the Land Commission, as well as representatives from the community organizations that were equally and intimately involved in the day-to-day activities affected by the bridge, such as the school board, the library, a veterans group, the housing agency, and police.



At a 2009 open-house meeting, community members viewed renderings of the proposed designs and provided feedback.



TABLE 1 Community Meetings

2006	
March	Presentation for the Veterans
November	Oneida Land Commission
2007	
January	Civic Center staff, Library Board, and Norbert Hill Center Parent Breakfast
February	Tsyuhekwa Harvest Supper, Honor the Youth Pow-Wow, Oneida Library, Oneida Police Department, School Board, Land Commission
September	Fall Festival
December	Oneida Land Commission
2008	
January	Oneida Land Commission, to finalize highway shift
2009	
February	Radisson Open House: Community Meeting
April	Site 1 Community Meeting
May	Community Development Planning Committee
May	Oneida Business Committee approves entire project plan
November	Oneida Land Commission, to finalize easements
2010	
January	Oneida Land Commission
February	Oneida Land Commission
March	Community Development Planning Committee
March	Oneida Land Commission
April	Community Development Planning Committee and General Tribal Council (GTC)
August	Business Committee Resolution of Support
November	GTC
2011	
February	GTC Outreach
April	GTC Outreach
May	GTC Outreach
June	DOT Public Meeting regarding STH-54 and Oneida Cultural Festival
November	Community Development Planning Committee

The Oneida project converted and restored the failing bridge—a local historic landmark—into a pedestrian and bicycle crossing.



Beginning with the open house meeting at the local Radisson Hotel in February 2009, the proposed design was presented via comprehensive visual displays and renderings. The detailed images of the proposed bridge, trails, lighting, railings, and landscaping garnered clear feedback, as did several community surveys; the survey at the April 2010 GTC meeting on the proposed design obtained the largest number of responses, 104. Finally, the Oneida artists responsible for creating and transmitting the image of Oneida through the community-sensitive design process participated in focus group meetings.

The early and continuous planning and coordi-

nation efforts by Oneida Nation staff provided a framework to facilitate improvements to the bridge replacement project in accordance with the guiding principles established through community involvement. Through these efforts, a simple bridge replacement project transformed a community.

Shaping the Project

The primary improvements included the following:

1. Safety measures for roadway users and the community,
2. Public spaces enhanced to provide functional and safe areas,
3. Public works to improve water quality, and
4. The integration of community-identifying features into project elements.

Early on, the Oneida Nation planning staff realized that an alignment for a temporary bridge that would route traffic around the replacement could serve as the alignment for the main highway. This insight into realignment was the genesis of the project's transformation—the proposal provided a separation allowing for green space, stormwater management features, and trails. The separation of the main highway also improved safety by moving traffic away from the community and making space for trails and highway underpasses.

Constructing the new bridge downstream also made it possible to preserve the old Duck Creek Bridge, which had provided historical context to the community and was considered an important cultural resource. Preservation of the bridge included conversion for pedestrian and bicyclist traffic and allowed the development of a completely separated trail system connecting lower and upper Oneida.

Oneida Duck Creek Bridge Project Team

Loretta Metoxen, Tribal Historian, Oneida Cultural Heritage
Jeff Witte, Community Planner, Oneida Planning
Fred Muscavitch, Director, Oneida Division of Land Management (DOLM)
Diane Wilson, Property Manager, Oneida DOLM
Mary Jo Nash, Area Manager, Real Estate, Oneida DOLM
Paul Witek, Senior Architect, Engineering
Laura Manthe, Director, Oneida Environment Resource Board (ERB)
Mike Finney, Manager, Eco-Services, Oneida Environmental Health and Safety Division (EH&SD)
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Stacie Danforth, Community Planner, Oneida Planning
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Debbie Thundercloud, General Manager, Oneida Tribe of Indians of Wisconsin
Bill Gollnick, Chief of Staff, Oneida Tribe of Indians of Wisconsin
Chad Wilson, Project Manager, Oneida ERB
Tim Skenandore, Director, Oneida Facilities
Jim Snitgen, Water Resources Supervisor, Oneida EH&SD
Tony Kuchma, Wetland Program Coordinator, Oneida EH&SD

Safety Improvements

Roundabouts

The interactive design process identified opportunities to incorporate carefully placed and expertly designed safety features. Methods were investigated to achieve speed reduction, a priority. The solution was to bookend the project corridor with roundabouts at the eastern and western intersections.

Although normally not used to reduce speed, the roundabouts provided safe intersections that marked a change in the roadway to a more residential area in between, distinct from the rural roadways leading into and coming out of the area. The roundabouts also offered a unique opportunity to incorporate community-identifying elements into the project.

After ensuring the safety and efficiency of the roundabouts design, the project team focused on adding community-identifying elements. A working session with artists advanced the concept of a roundabout representing a turtle. Achieving the vision was tricky, however, because the design had to retain safety features such as low clearance for errant vehicles.

Low-profile concrete shapes that would not become safety hazards mimicked turtle shells and were placed in a pattern in the landscaping to create the appearance of a turtle in a grassy area. The color scheme provided a natural look. The turtle is readily identified from an aerial view, but the ground view is subtle. Renderings and visuals were key in transferring the artist's intent into construction drawings.

Sidewalks and Trails

Before completion of this project, safe and reliable pedestrian and bicycle facilities between upper and lower Oneida were lacking. Children attending the elementary school in upper Oneida, for example, had no safe way to travel to the library in lower Oneida. A safe connection was mandatory.

A combination of sidewalks and trails was designed to provide direct, safe, and reliable access. Because of the limited space and the intent to minimize disturbance outside the roadway corridor, sidewalks were placed adjacent to the roadway on the western end in upper Oneida. In lower Oneida, a complete trail system was designed to accommodate bicyclists and pedestrians; the trail system is expandable, because most of it fit within the original roadway alignment. Moreover, the careful placement of the trails avoided intrusion into the many sensitive cultural and historic sites along the roadway.

To provide safe access across the highway, the trails were connected through underpasses beneath the new bridge. These underpasses are located on each side of Duck Creek and connect over the bridge with a shared-use path separated by a concrete bar-



rier to provide safe crossing for pedestrians and bicyclists across Duck Creek.

This led to the construction of a trail system on the north side of the highway to provide for future connections in the Oneida community. The combination of trails and underpasses allows safe access to the library from the north side of the highway without having to cross the highway.

Crosswalks

At each end of the corridor, crosswalks at the roundabouts were designed for pedestrian safety. Vehicles slow down when approaching and navigating a roundabout, which also offers improved visibility; this increases safety for pedestrians crossing the roadway.

The crosswalks through the roundabouts were located to maximize visibility and to take advantage of low speeds. A safety island reduces the length of pedestrian crossings. The crosswalks connect into the trail and sidewalk system, providing continuity and improving safety.

An aerial view of the Seminary Road roundabout reveals a landscaped turtle. The Turtle Clan is one of the three Oneida clans.

Designed by local artists, a mural along one side of the pedestrian underpasses depicts an Oneida creation story.





Salt-tolerant trees and prairie grasses provide a buffer to the highway. The green space connects directly to the trail system for safe pedestrian access.

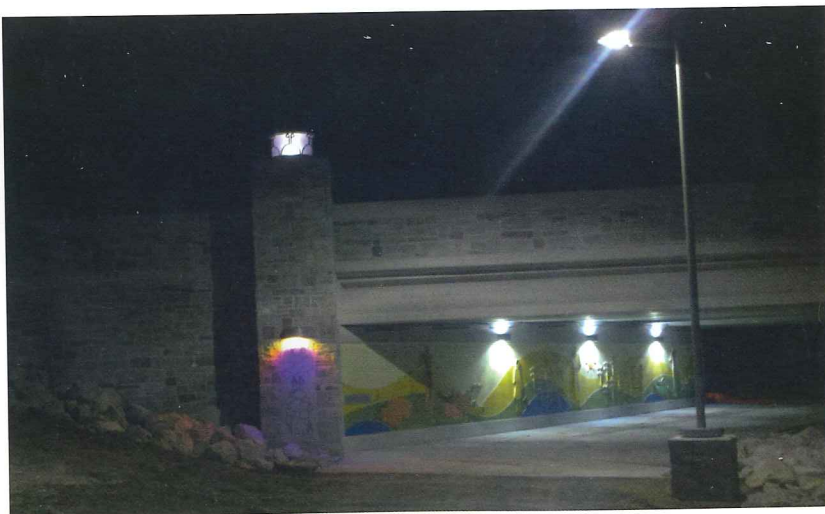
Improvements to Public Spaces

Engineers, landscape architects, and planners collaboratively selected native prairie grasses and salt-tolerant trees and shrubs for placement throughout the project. The concept was to place native species in a way that appeared random and natural. Extensive consultations helped to avoid incursion into sensitive historic and archaeological sites within the project area and nearby.

The project created a green space in front of the library as a buffer from the highway and for use as a learning area in a natural setting. The green space has direct access to the trail network, so that children can safely cross State Trunk Highway (STH) 54 under the new bridge. The green space blends into the terrain yet screens off the view of the highway from the library. The salt-tolerant trees, prairie grasses, and low shrubs enhance the visual aesthetics and provide additional screening.

The collaborative and interactive design process made use of visual tools at coordination meetings with stakeholders and the public to communicate the design objectives throughout the project develop-

Lighting along the trails and underneath the bridge improve safety and highlight the artwork incorporated into the structure.



ment. The trail network layout was coordinated carefully with Oneida Nation planners to provide logical and useful connections to public buildings and tribal neighborhoods.

Trails were extended to the project limits for future connections. The south trail eventually will connect to the community's senior center, and the north trail eventually will provide access to neighborhood sites.

Public Works Improvements

Water Management

Downstream from the project site, Duck Creek becomes a degraded waterway with generally high turbidity. The project therefore included stormwater management features to improve the water quality.

On the west side of Duck Creek, runoff from the Seminary Road intersection is diverted to vegetated swales located behind the curb and gutter in the terrace area for pretreatment before collection into the storm sewer system. The runoff then flows to a swale system that discharges via dual-split biofilters into treatment ponds, which discharge to a tributary swale of Duck Creek. On the east side, a combination of biofilters, detention basins, and vegetated swales stores and filters the runoff before it enters Duck Creek.

Intersection Safety

The realignment and widening of the roadway improved the intersection and the turning lanes. Previously, the intersections had experienced higher-than-average crash rates. The improved intersection alignment established desirable sight distances.

Eliminating the Artley Street intersection adjacent to the bridge and improving the East Service Road intersection, combined with improvements to the turn lanes, greatly increased the safety of the roadway. The Artley Street roadway became a secondary access point to the adjacent neighborhood in case of emergency. The roadway has breakaway gates and articulated blocks covered with grass to provide access that does not look like a roadway but can support emergency vehicles in the neighborhoods south of STH-54.

Lighting

Trailside and underdeck lighting enhances the safety of the area at night, particularly for the trail network. The shared-use trails were designed to fit the topography yet provide grades that meet the requirements of the Americans with Disabilities Act. The trails minimize the environmental impacts and provide a separation from traffic, but do not increase the footprint of the project.

The trail lighting was designed with intensity models to ensure that every segment had adequate light and to avoid significant areas of shadow. The light intensity model also was applied to the trails beneath the bridge so that users of the underpass trails would feel safe and comfortable. The trail lighting devices and fixtures were carefully coordinated with Oneida Nation planning staff to provide aesthetically pleasing and functional fixtures.

Community Identity

Because of the project's location in the heart of the Wisconsin Oneida Indian Reservation, project aesthetics, context-sensitive solutions, and sustainable design practices were a priority. Throughout the project development, the Mead & Hunt team coordinated extensively with Wisconsin DOT staff, Oneida Planning staff, and Oneida artists to incorporate community-identifying elements into the new bridge, the retaining walls, the roundabouts, the lighting, and the landscaping. Iroquois artwork produced key visual elements expressing stories and themes significant to the Oneida people.

The success of this project required working closely with the Oneida community and artists to reproduce drawings accurately for the engineering plans and for final incorporation into the bridge, retaining wall, and roadway structures. The process involved computerized methods—computer-assisted design and drafting (CADD) replicas were prepared from electronic scans of artists' drawings and were reviewed by the artists for accuracy. The structural designers and detailers used these CADD drawings to incorporate the artwork accurately into the bridge plans. From the CADD drawings, the bridge contractor developed the form liners, applying laser production techniques.

The project team created a focus group to work through the vision and details for the artwork. The focus group expedited decision making and served as a conduit to disseminate information to the community, to achieve community acceptance of the bridge and the project. The focus group included Oneida Nation planners and artists, members of the Mead & Hunt design team, and Wisconsin DOT staff. The group collaborated to improve multimodal transportation opportunities and to incorporate community-identifying artwork and aesthetics into the project.

Decorative Elements

With abutment wall heights of more than 8 feet, measures were necessary to discourage graffiti. The solution was to place Iroquois artwork from local Oneida artists depicting themes, stories, and history



Bridge pilaster artwork by Brenda John-Stevens depicts the Standing Stone, a central figure in Oneida tradition. The word *Oneida* derives from an Iroquoian name meaning "People of the Standing Stone."

meaningful to the Oneida Nation. The design team worked with local artists to create unique artwork for the bridge and to create an aesthetically pleasing design with which the community could identify.

The design of the front faces of the abutments called for a variety of reliefs to accentuate the artistic elements. A color key was assigned to each relief level or artistic element, adhering to the artist's intent. Pilasters in the abutment corners combine stone veneer and reinforced concrete and include lighting. The Oneida artwork in the pilasters consists of panel inserts that fit with the stone veneer and simplify the form work for the pilaster cores. Each panel depicts a selection from a traditional Iroquois story.

The pier columns replicate cattails. The Oneida culture's reverence for the earth and its creatures inspired the Oneida artists. The unusual design features of the architectural elements added to the complexity of the column detailing.

The specialized treatments were necessary to satisfy stakeholders' expectations of an aesthetically pleasing and community-identifying structure. By managing expectations and the design process, the team produced an iconic structure for the Oneida Nation that did not greatly increase construction costs.

The continual involvement with the Oneida planners, artists, and community stakeholders facilitated success. The design team shared the graphics and the cost information of the aesthetic features and struc-

A group of artists collaborated on the mural on the retaining wall depicting the progress of the seasons.



ture types, to assist the group in making fiscally responsible decisions.

A Large Canvas

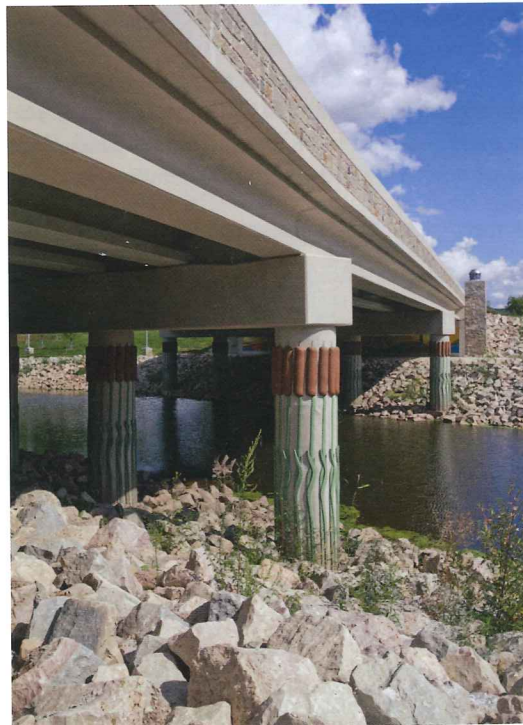
The retaining wall graphics were the result of many sessions with the artists. At first, the goal was to tell a story of the Oneida people on a large canvas. The artists submitted original ideas in highly detailed drawings and continued to explore a variety of stories, producing many detailed pieces.

Finally the decision was made to simplify and to portray the change of seasons through the position of the sun and moon and with wind patterns including symbols of each season. For example, a leaf represents fall; a snowflake, winter; and a strawberry,

summer. To add texture to the wall, rolling hills and a variety of sky patterns were added, with a setting and rising sun. The artists carefully identified the color schemes for the four seasons.

Working together to understand Oneida culture, history, and connections to the land reinforced a sense of place for the Oneida people. The design team maintained flexibility in meeting schedules and locations. Much of the abutment artwork, for example, was created in working sessions at night in an artist's home, at the kitchen table, to facilitate timely completion.

The new bridge was constructed to carry three different modes of transportation safely—pedestrians, bicycles, and motorized traffic. Trail connections extending from the bridge were designed to provide the community with safe and accessible bicycle and pedestrian travel. The outcome offers a balance between the built and natural environments.



Iconic Structure

Innovative partnerships, collaborative efforts, and team commitment resulted in a new bridge, improved safety, better neighborhood connections, a strong sense of place, and improved mobility. A simple bridge replacement project developed into an iconic structure that provided identity to a community—a transportation facility that connected the community without relying on the automobile.

This project provided a framework for effective coordination with tribal communities. Through clear and understandable graphics, the project team was able to communicate planned improvements and to facilitate understanding and acceptance. The community was able to participate significantly in the development of the project. This involvement has resulted in great pride and acceptance of a project that portrays the Oneida culture for travelers through the area for generations to come.