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Interchange Upgrade

Increased traffic around new commercial development makes clear the need for improvements to a rural interchange.



Tight Schedule

An aggressive construction schedule requires new ways of doing things.



Challenges Identified and Eliminated

MDOT keeps project on track by adjusting administrative practices to enable quick turnaround.



Plans are Made, Building Begins

After the best design is identified, construction happens very fast.



Part of the Plan

Successful collaboration reflects the adoption of key initiatives of the State's new long-range transportation plan.



Best Practices

Priority integration, innovation, administrative and operational flexibility are keys to successful partnering.

Project demonstrates value of public/private partnering

Cooperation between MDOT, Livingston County Road Commission and a group of private companies makes new interchange at US-23 and Lee Road possible

Tom Kelley is the General Manager of IDEO, an award-winning industrial design firm with a client list that includes internationally-recognized corporate giants BMW, Hewlett Packard, and McDonald's, among others. In his book *The 10 Faces of Innovation*, Kelley explains the impact innovation can have on the culture of an organization. "At IDEO we used to spend the majority of our time in the world of product-based innovation," Kelley writes, "but recently, we've grown to see innovation as a tool for transforming the entire culture of organizations." Kelley continues by explaining that great products are merely elements along the road to success for organizations; consistent and sustainable success is created by "innovation at every point of the compass, in all aspects of business."

MDOT's Office of Research and National Best Practices (ORNBP) recently examined an innovative project that involved a partnership between the public and private sectors. "This project not only yielded significant improvements to a freeway interchange," explains Calvin Roberts, Administrator of the ORNBP, "it also provided a glimpse into MDOT's emerging culture of innovation."

Expanding on Roberts' comment, State Transportation Director Kirk T. Steudle said, "One of the best outcomes of this project has been our highly successful public and private partnership. This partnership required developers, the state, local road agencies,

and local government to think outside the box in order to produce innovative design, financing, and project implementation."

Interchange Upgrade Needed

If you take Exit 58 off of US-23 just south of I-96 in Southeast Michigan and head west, you will drive through the only double roundabout in North America. This innovative application of traffic-managing geometry was constructed as part of an interchange upgrade that uses three roundabouts to handle complex and heavy traffic patterns created by a combination of new commercial development and steadily increasing residential development in the area. Lee Road, a two-lane county road, crosses US-23, a four-lane divided expressway, at Exit 58. US-23 runs north and south. Two frontage

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Kirk T. Steudle, P.E.,
MDOT Director

roads, Fieldcrest Drive on the east side of US-23 and Whitmore Lake Road on the west, add to the complexity of traffic management in this area. The interchange improvements became necessary when a group of three Detroit-area firms proposed a 600,000-square-foot upscale shopping center just off US-23, northeast of the intersection of Fieldcrest Drive and Lee Road. The firms included Quadrants Inc, a developer that owns the property and the shopping center; Redico, a real estate investment and property management company that manages the center; and Lormax Stern, a real estate firm that leases space to retailers at the center.

Tight Schedule, Innovative Approach

A traffic impact study, which projected a 3% annual traffic increase from 2005 to 2010, and a 1.5% annual increase from 2011 to 2030, made obvious the need for an upgrade to the existing US-23/Lee Road interchange. Bill Clark, President of Quadrants and the main point of contact on the development team, immediately met with officials from Green Oak Township, the Livingston County Board of Commissioners, the Livingston County Road Commission (LCRC), and the Michigan Department of Transportation (MDOT) to discuss options for a new interchange. Initial discussions revealed a number of administrative and logistical problems that could delay the development and thereby compromise its early economic viability. The \$100 million shopping center would be anchored by JCPenney, and would include popular national retailers like Old Navy, Dick's Sporting Goods, and Barnes & Noble. An on-time opening and smooth traffic flow were crucial for its early success. "It became clear right away that doing things through traditional administrative and funding channels would take too long," Clark explained. "We decided it would be best for everyone if the development team paid for the infrastructure improvements."

MDOT Eliminates Potential Hurdles

The prospect of a private group spending \$5 million or more to upgrade a portion of the public road system was attractive to MDOT. However, three hurdles stood between the good idea and the action necessary to make the idea a reality. The first hurdle involved the scope of the project and the amount of money being invested by a private developer. MDOT had worked with private companies to complete public projects before, but never at the level being proposed in this case. To verify the legality of the arrangement, MDOT consulted with the State Attorney General's office. The office confirmed that the plan was legal, but suggested formally notifying the Michigan Legislature to ensure that the various transportation stakeholders across the state understood the situation. MDOT did so with a letter.

The second hurdle was a result of the aggressive construction schedule created by the developers' fast track approach to project

delivery. While this project did not use a true fast-track approach, it did not follow the traditional development practice that MDOT is accustomed to. Traditional practice would have required that both sides of the interchange be designed before MDOT issued a permit to begin construction. On this project, MDOT granted separate permits for the east and west sides, which enabled east side construction to begin before the design for the west side was complete. "We allowed the project to be broken into two parts," explained Steve Bower, Manager of MDOT's Brighton Transportation Service Center. "The east side was completed under one permit, the west side under another."

Allowing construction of the interchange to take place in two phases created a level of risk that made MDOT and LCRC uncomfortable. The risk, which created a third hurdle for the project, had to do with the possibility of the development team not being able to complete both phases of the project. "We had an excellent working relationship with the development team, and we personally had no doubt that the east and west sides would be completed," explained Bower. "But because this was part of the public road system, we had to take legal steps to ensure financial viability from start to finish." To clear this final hurdle, Quadrants bonded the project to cover the cost of the second half (the west side), before beginning construction on the east.

"Our goal was to open the interchange on a specific date," Clark explained. "To do so the entire team got together and determined what each of us had to do, so that collectively we could reach the goal. I was extremely impressed with how MDOT handled our requests; they demonstrated a great deal of agility and responsiveness, individually and as an organization."

Assembling a Team and Making Plans

As soon as MDOT, LCRC, and the development team agreed on the initial plan, details began to take shape. Quadrants hired Parsons Corporation, one of the largest engineering and construction companies in the world, to design the new interchange. When it became clear that roundabouts would likely be included in the design, Quadrants hired roundabout expert Mark T. Johnson of MTJ Engineering to conduct roundabout capacity analyses and horizontal designs. Quadrants also hired Barry Crown, a world-renowned roundabout engineer from the United Kingdom, to oversee Johnson's work. The flow of information during the design process was impressive. Parsons, MTJ, and Barry Crown collaborated extensively on all aspects of the roundabout design, and everything was reviewed and approved by MDOT and LCRC before it was finalized. "That was a great team," Clark commented, "it took a little extra coordination, but the results were excellent." Bower echoed Clark's comment, "As intense as the schedule was, I think we all enjoyed the challenge and were satisfied with the results."

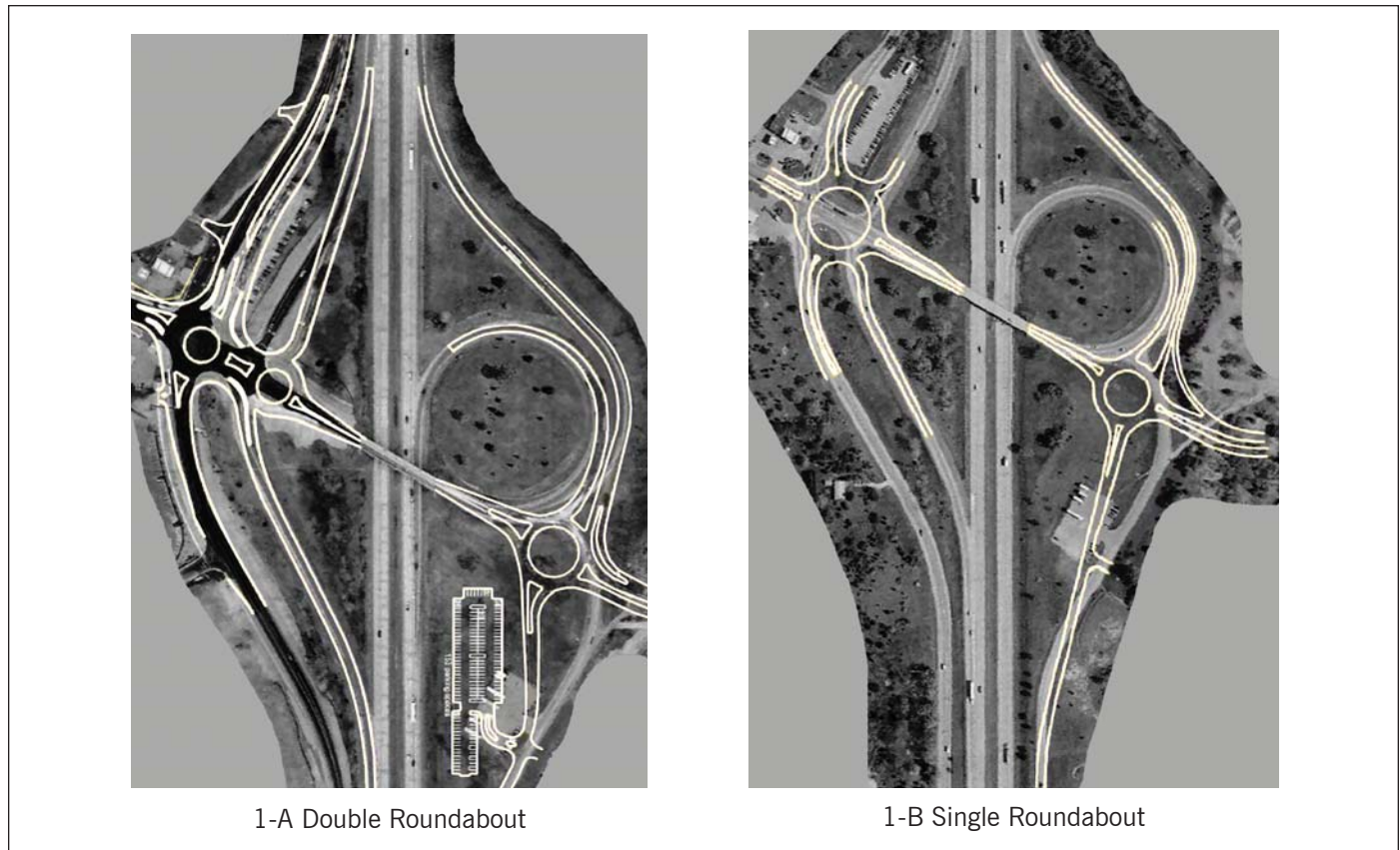


Figure 1. Final two designs for the interchange at US-23 and Lee Road.

Roundabouts Less Expensive than Other Design Options

Among the several design options considered, the top four included a single point urban interchange (SPUI), and three variations of a diamond interchange with roundabouts. MDOT, LCRC, and the development team ultimately chose between two designs that incorporated roundabouts (see Figure 1). “The SPUI would have provided a few more years of service,” Bower commented, “but it was three to four times more expensive than the other options.” The big expense with the SPUI would have been a new bridge over US-23 to accommodate the traffic backups created by signalized intersections on both sides. Unlike signalized intersections, roundabouts keep traffic moving steadily. All of the design options that included roundabouts used the existing bridge.

“This is an excellent example of the inherent value and utility of roundabouts,” Mark Johnson of MTJ pointed out. “We were able to increase traffic capacity through the intersections while working within the limitations of the existing infrastructure.” Although the bridge is sufficient as is today, traffic and growth projections show a need to widen it in about 10 years. The development team will not be responsible for any aspect of a future bridge-widening project.

Double Roundabout Safer Than Single

The preferred design of the new interchange, estimated to cost just over \$5 million, included a partial diamond with a

single roundabout on the east side and a double roundabout on the west (see Figure 1, 1-A). A single larger roundabout (see Figure 1, 1-B) would have met the operational needs of the interchange, but it was determined that the double roundabout was safer. “In the final analysis, the double roundabout proved to be significantly safer,” Johnson explained, “it not only lowers the speed of circulating traffic, but also eliminates potential conflict points between vehicles.”

The final design used as much of the existing roadway geometry as possible, and also combined two Park and Ride lots into one larger lot between Fieldcrest Drive and US-23. The changes to the Park and Ride lots became necessary when approaches to the roundabouts on both sides of the freeway disrupted existing lots. After consulting with MDOT, the development team decided to combine the lots, and incorporate geometric improvements to the entrance to discourage long-term truck parking. “The improved Park and Ride lot was a nice addition,” Bower said. “Quadrants did a nice job of maintaining the existing Park and Ride capacity.”

Construction in Less Than One Year

Construction on the new interchange began in the fall of 2005. LCRC and Orchard, Hiltz, and McCliment (OHM), both under contract with Quadrants, provided construction engineering services on site. Less than a year later, the shopping center was operational and traffic was moving smoothly through the new interchange.

No pedestrian access is provided through the new interchange. The existing bridge over US-23 is not wide enough to accommodate foot traffic and the proximity of the interchange to the shopping centers and other areas where people walk made pedestrian traffic unlikely. "We'll consider adding pedestrian access when we upgrade the bridge," Bower said, "but for now, it was not possible because of the existing bridge width."

Maintenance Agreements in the Works

A formal maintenance agreement for the new interchange is being negotiated between MDOT and LCRC. Maintenance is currently being done through a simple understanding between the two organizations. MDOT is responsible for signs and pavement markings on the US-23 ramps and all route markers in the interchange. LCRC is responsible for lighting and the rest of the signs and pavement markings. Maintenance through the first winter was handled by both.

Cooperation Reflects MDOT's Changing Culture

The improvements at US-23 and Lee Road increased traffic capacity and smoothed the flow of traffic through the intersection of several roadways. In completing the project, the process of establishing relationships between public and private entities led to new funding mechanisms for improving public roads. "As an organization, we had to make changes," Bower said, "The project helped us identify areas where we could improve our internal processes." These improvements and the willingness to accommodate the needs of a private developer, reflect a changing corporate culture at MDOT.

Transportation Plan – Now Through 2030

Innovation is a common thread through the new MI (pronounced "My") Transportation Plan, which is a policy document that presents goals, objectives, strategies, and policy recommendations to set the direction for decisions and investments on the state transportation system through 2030. The final version of the plan is scheduled to be released in May 2007. It includes four goal areas that will help focus and drive the operation of MDOT for the next 25 years. The interchange upgrade at US-23 and Lee Road touches all four goal areas: *stewardship, safety and security, system improvement, and efficient and effective operations.*

Stewardship

The stewardship goal area focuses on preserving transportation system investments, protecting the environment, and utilizing public resources in a responsible manner. By accommodating the US-23/Lee Road development team's aggressive schedule, MDOT demonstrated excellent stewardship.

Safety and Security

The purpose of the safety and security goal area is to improve transportation safety and ensure the security of the transportation system. A study conducted by the Insurance Institute for Highway Safety examined 24 intersections in eight states where roundabouts replaced stop signs or traffic signals. The study found:

39% fewer vehicular crashes overall

76% fewer crashes involving injuries.

90% fewer crashes resulting in death or incapacitating injury

By approving the use of roundabouts in the design of the new interchange, MDOT demonstrated a commitment to safety.

System Improvement

The system improvement goal area is intended to modernize and enhance the transportation system to improve mobility and accessibility. The new interchange is a dramatic improvement over the previous one. It incorporates the first-ever double roundabout in North America, and with a capacity of approximately 8000 vehicles per hour, it should remain operationally effective for 20 years or more.

Efficient and Effective Operations

The purpose of the operations goal area is to improve the efficiency and effectiveness of the transportation system and transportation services, and expand MDOT's collaboration with partners. From start to finish, the department demonstrated a commitment to operational effectiveness and a willingness to establish and nurture healthy relationships with partners. "The entire project went very smoothly," Clark commented, "I was impressed with MDOT's efficiency and effectiveness at all levels."

Best Practices Identified

Andre Clover, Administrative Engineer, MDOT Office of Research and National Best Practices, studied the administrative details of the project to identify key items to consider when developing partnerships between public and private entities. Summing up his observations, Clover said, "20th century financing strategies for public investment in highways are a mismatch for the 21st century missions in transportation. Meeting 21st century requirements involves effective integration of priorities across levels of government, use of innovation, expediting administrative processes, and placing an emphasis on operations."

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