M-11 and M-37 Looking West (after)

MICHIGAN Get In…Do It Right…Get Out!

MICHIGAN REDESIGNS AND REBUILDS A BUSY COMMERCIAL INTERSECTION

Redesign and rebuild a busy commercial intersection of two major trunklines with as little disruption to local commerce and the traveling public as possible: this was the task assigned to Michigan Department of Transportation (MDOT) engineers in the winter of 2002. In fact, the mission for the reconstruction of the M-11/M-37 intersection in Grand Rapids and Kentwood quickly became "Get In…Do It Right…Get Out!"

M-11 (28th Street) and M-37 (Broadmoor Avenue) ranked among the most congested surface trunkline intersections in western Michigan. M-11 is a 12-mile long, dense retail and commercial corridor with an ADT of 37,850, swelling to 50,000 on some segments. M-37 is a major commuter and commercial corridor in eastern Kent County with an ADT of 30,150. Two regional shopping malls and an array of businesses are located adjacent to the intersection, contributing to the congestion and high incidence of turns.

"Our job was to design and build an intersection that would handle the capacity safely and more efficiently," said Art Green, Grand Rapids Transportation Services Center Development Manager with MDOT. The project is now featured as a best practice by Highways for LIFE, a Federal Highway Administration program that advances Long lasting highways using Innovative technologies and practices to accomplish Fast construction of Efficient and safe pavements and bridges.

Intersection Geometrics

Prior to reconstruction, both roadways had five lane cross-sections—four through lanes and a center turn lane—plus right turn lanes. The left turn queues were long enough to interfere with through lane traffic and block access to local land uses.

Traditionally, MDOT had designed indirect turn lanes at highly congested intersections in the State, a proposition that requires significantly wider rights-of-way. However, the traditional approach was not an option for this project. While indirect left turn lanes (essentially U-turns made after passing through

M-11 Facing West

the intersection) would have improved the intersection's traffic flow, they would have required expanding the road right-of-way to make room for a U-turn maneuver and installing a median that would restrict ingress to and egress from local businesses.

MDOT's solution entailed geometry new to the agency: build opposing dual left-turn lanes on all four intersections to reduce unacceptably long queues and maximize access to nearby properties. The team would widen the intersection to accommodate the dual left-turn lanes, right-turn lanes, and tapers; rebuild three legs with seven traffic lanes and the fourth leg with eight; upgrade traffic signals; extend a twin box culvert, and rehabilitate the intersection's approach pavement.

Major Utility Relocations

Since almost all existing underground utilities were beneath the paved surface or under the curb line, crews had to complete extensive utility investigative and relocation work before construction of the newly designed intersection could launch. The team worked with gas companies, those in charge of street lights, phone companies and other organizations to minimize all possible impacts before digging began.

The normal utility coordination process included gathering utility plans, conducting field surveys, field staking of existing utilities through the "Miss Dig" system, and holding joint site meetings with all the utility companies. However, the M-11/M-37 project demanded more.

Twelve types of utilities and ten utility companies were involved, as well as

M-11 Facing West (east approach)

M-37 North of Intersection

three governmental agencies, the Cities of Grand Rapids and Kentwood, and the Kent County Department of Public Works. Design issues to be hammered out included potential conflicts with new curbs, storm sewer pipelines, catch basins, manholes, signal poles, sheet piling and wingwalls.

Multiple on-site and office utility meetings during the design phase in 2001 helped avoid utility delays, with utility companies, municipal agencies, the design team, and MDOT construction staff partnering and planning. Teams staked proposed infrastructure, held individual site meetings with owners of gas and fiber optic lines, and used hand digging and vacuum trucks to find especially significant locations.

As a result, all relocation was accomplished prior to construction and most potential conflicts were addressed ahead of time. Remaining coordination issues were detailed in a utility coordination clause in the contract that required the contractor to coordinate and cooperate with the utility companies during construction. While the clause allowed the opportunity to request time extensions for delays caused by third party utilities, it did not allow monetary claims. MDOT also secured agreements from all affected utilities that established schedules for meeting necessary relocations, an action that further increased cooperation and helped save time.

Quadrant Staging to Save Time

Another time-saving, traffic-easing, stakeholder-centered initiative was quadrant staging, which minimized impacts on motorists and businesses in the area. According to Tom Richer, Grand Rapids TSC Assistant Delivery Engineer at MDOT, "The entire portion of the job that affected traffic was completed in only 2 ½ months."

M-37 Facing North

M-37 Facing North (after)

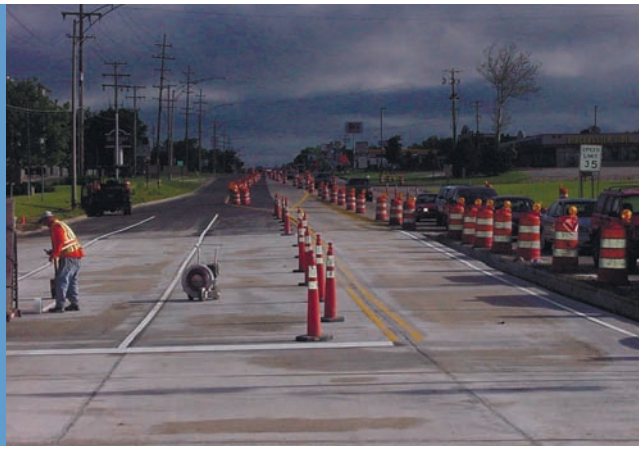
To speed the job up, and for the first time, MDOT fully reconstructed a concrete intersection while maintaining traffic flow through the project area by "staging." Each major "stage" consisted of reconstructing one quadrant of the intersection. There were six stages total: a prep work stage, four stages for the intersection reconstruction itself, and a final stage for the approach rehabilitation, cleanup and restoration. The team felt that staging worked well, especially because MDOT had established solid parameters for construction, but allowed flexibility for the contractor to expand on them for continual improvements.

Historically, in Michigan, an intersection constructed out of concrete would be closed for the pavement work. With the major roadways involved in this project, though, closure was not a viable option. Staging allowed three lanes of traffic to be maintained for each roadway—one lane of traffic in each direction, plus one left turn lane to permit turns without holding up through traffic. A regular concrete mix that did not utilize chloride or fast-set ingredients contributed to the positive outcome and ensured that the quality of the concrete was not compromised.

Due to the resounding success of the staging plan, MDOT has used the option in several other intersection projects.

Electronic File Sharing

The Michigan Department of Transportation was willing to digress from tradition in a range of practices when the innovations would save time and money. Electronic file sharing was an instance. For a number of reasons, providing electronic files to surveyors is not a standard practice. However, on this project, MDOT learned that under special circumstances, and when using



M-37 Facing North (after)

certain safeguards to insure the integrity of the survey data, this procedure can benefit certain projects.

MDOT shared files with the contractor to aid with timely verification of the proposed construction data, which helped validate field information and expedite construction layout. Because of existing driveways and small, subtle drainage patterns, detailed, accurate grading of the project was vital to prevent bumps and water ponding. The electronic data helped the surveyor interpolate in between the cross sections shown on the plans by providing real information in these areas. The speed and accuracy of finding raw data was improved. This process also enabled the surveyor to perform his own quality control checking.

Incentives for Schedule, Focus on Safety

The intersection reconstruction project was designed, let for bidding and constructed in less than 1 ½ years, including a 4 ½ month winter shutdown period. An incentive/disincentive clause fueled the "open to traffic due date" as well as a 20 hour-a-day schedule. The clause encouraged the contractor to minimize closure times and complete the project prior to the contract open date. As a result, the contractor had two teams of workers who worked 10 hour shifts, seven days a week, resulting in reduced user delay costs during the project. For this contract, the daily rate was $20,000 with a cap of $200,000 on incentives and no cap on disincentives. The contractor opened the project to traffic 12 days ahead of schedule and received the maximum incentive amount.

"We paid a lot in overtime," said Dirk Hoekstra, Superintendent for Nagel Construction, Inc., the State's contractor for this job. "But it was important to get this job done in the short amount of time allotted. And by having a good plan going in, working closely with all involved and having a great team of employees and subcontractors, we finished 12 days ahead of schedule and received the maximum incentive amount."

Despite an expedited schedule, with both daytime and nighttime work shifts, MDOT and Nagel Construction maintained focus on safety. The contractor submitted the construction safety program at the pre-construction meeting and throughout the project sustained no injury accidents on the work site, an outstanding achievement because of the high volume of traffic in the corridor.

The Grand Rapids and Kentwood police departments also played a role in elevating safety by assigning a police cruiser and officer to provide speed enforcement in the construction work zone during various work shifts. The officers also assisted with traffic control while the contractor changed temporary traffic signals between different stages of work.

Communication with Stakeholders

While Grand Rapids and Kentwood were the two largest single customers for the project (both contributed financially), the reconstruction partnered many others, including there Kent County, owners of utilities in the right of way, malls (one of which was undergoing a concurrent renovation), hotels, stores and colleges. Of equal importance were the commuters, shoppers and truckers who used the intersection daily. Local partners were consulted on major issues that would affect traffic and the team worked closely with the Chamber of Commerce to distribute alternative route brochures.

MDOT coordinated with local businesses to schedule the various "stages" of the project. The biggest impacts would occur during stages two through

five, and together the team established the best timing for these stages. Since the mid-summer months were the low-peak times for most affected retail establishments, the second stage was scheduled to start right after Memorial Day and be completed in August before "Back to School" sales.

"We spent a lot of non-construction time with our customers," recalled Richer. "It was critical to communicate with all the local businesses every time there was a change to the traffic pattern that would affect their customers."

He emphasized the importance of good communication and flexibility during a job of such magnitude and partnerships. MDOT engineers continually communicated with each other as well as the community and were able to make quick adjustments in the field to resolve issues as they arose.

Intersection of Safety, Quality and Innovation

The efficiency and safety of the intersection improved dramatically after reconstruction. A "before and after" study showed that delays for all movements have been reduced by an average of 57 percent. The study also estimated that the total number of vehicle stops was reduced by almost 24 percent and fuel consumption and vehicular emissions reduced by almost 23 percent. Comparing the number of crashes in the three years prior to reconstruction with the three years after demonstrates a reduction in total crashes at the intersection of 37 percent.

The Michigan Department of Transportation, Nagel Construction, and URS Corporation earned a National Achievement Award from the National Partnership for Highway Quality (NPHQ) in 2003 for the M-11 at M-37 project. Most importantly, customers were pleased with the outcome. For example, before construction, one business owner was particularly concerned with the impacts to his company's bottom line. Afterwards he wrote a glowing letter to the editor of the *Grand Rapids Press* commending MDOT for running such a smooth project. The Grand Rapids Chamber of Commerce also sent MDOT a letter of thanks for the manner in which the project was managed and for improvements to traffic flow.

According to Green, "We took a lot of lessons away from this project. It was a great experience that we have used as an example several times already and will continue to use again and again in the future."

"Getting In, Doing It Right, and Getting Out" helped create a new vision at MDOT, making the M-11/M-37 project a game changer that will continue to serve the traveling public in Michigan for years to come.