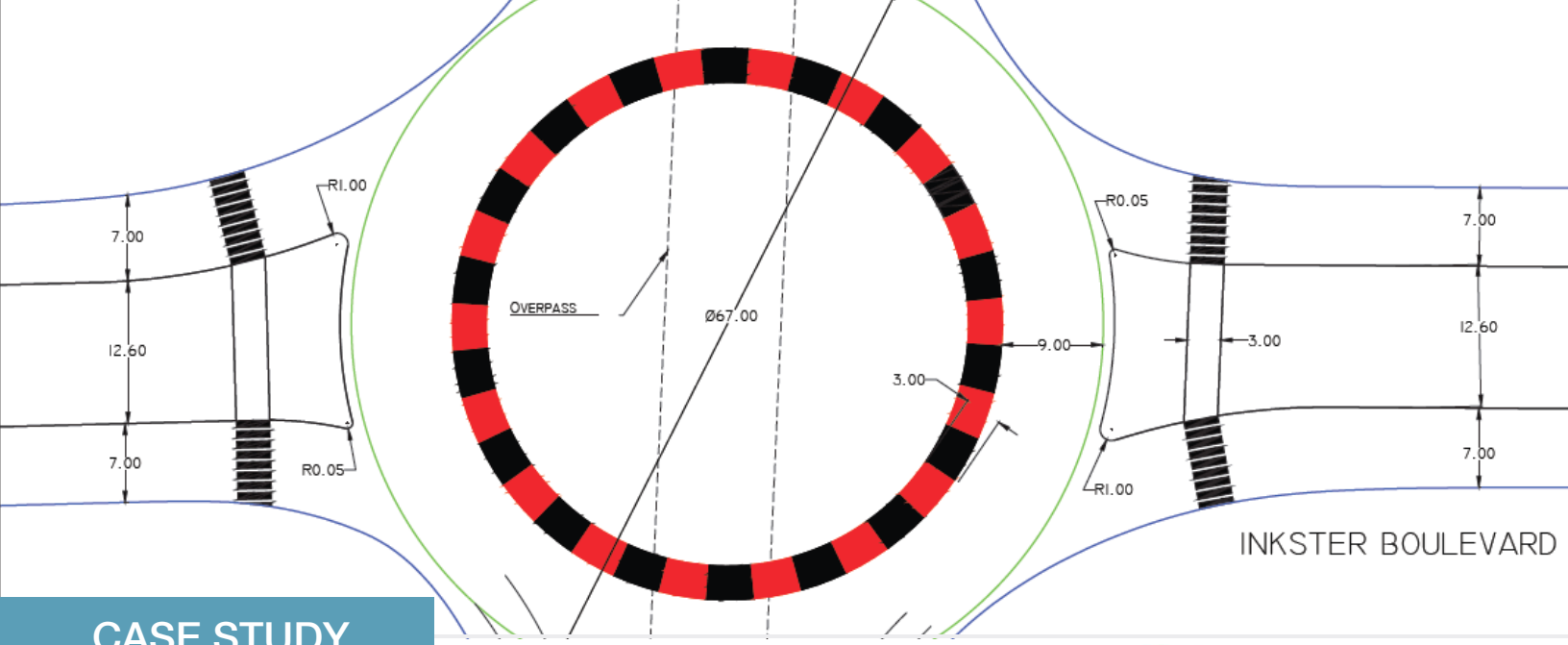


CASE STUDY

TORUS

Planning for Winnipeg's Future

TORUS to the Rescue for a Busy Intersection

By Chris Johns, Transoft Solutions

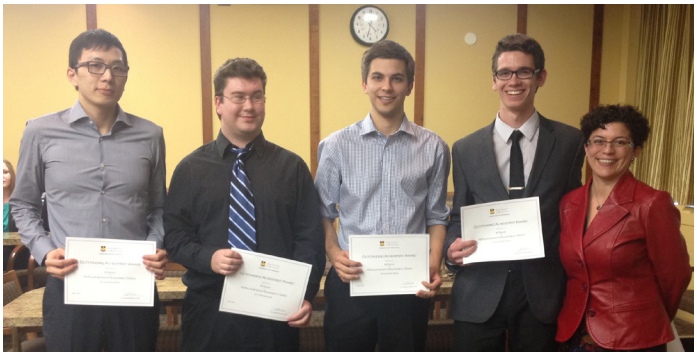
Like any other North American city, Winnipeg, Manitoba has traffic jams. Winnipeg doesn't have an overwhelming traffic problem but it does have its bottlenecks from time to time. As the local joke goes, there are times on Portage Avenue when commuters are tempted to carry their cars to work. Winnipeg even boasts a "Confusion Corner" where three major streets meet and then go in different directions. With a recent preliminary design Request for Proposal, the City of Winnipeg was considering a change in the driving landscape.

Along with the city, MMM Group and a class of students in the Civil Engineering Department at the University of Manitoba thought it might be ready for a change as well. The City of Winnipeg issued an RFP for a heavily travelled intersection, McPhillips Street and Inkster Boulevard in the Northwest part of the city. MMM Group offered to work with the students with the intention of seeing what kind of new ideas the students could bring to the table. The project was to do a realistic design exercise going through all the steps that a real engineering firm would follow in developing a functional planning study.

The Civil Engineering students at the U of M are required to take one of the Capstone Engineering Design courses (MECH 4860 (25.486), CIVL 4590, BIOE 4580 & ECE 4600) in the course of their program. Each year, the City of Winnipeg creates a list of projects and the engineering firms in the city all participate in mentoring teams of fourth year students. David Patman of the MMM Group says the firms are happy to help.

"Generally MMM and other design firms are contacted before the start of the course and informed of the projects that will be assigned in the Capstone course and asked if we want to participate," said Patman, a Project Manager with MMM Group. "In past years, generally each firm in Winnipeg helps out one team, but this year, MMM was asked to assist two teams."

One team consisting of Lei Yang, Kent Midford, Lucas Wazney and Morgan Glasgow won two awards based on their roundabout designs including the University of Manitoba ITE (Institute of Transportation Engineers) Student Chapter award for team professionalism and development, as well as the Gary Shewchuk Award for Outstanding Design Achievement.



Members of the winning team receive their awards with Dr. Jeanette Montufar (right).

Powered by the trusted AutoTURN engine, TORUS uses the patent pending Vehicle Envelope Method of design to generate roundabout geometry with vehicle swept paths. This innovative approach allows for real-time, interactive designing and

“The notifications let us know when radii were too small for our design vehicle and allowed us to correct problems before they snowballed into larger issues.”

Team Member Morgan Glasgow

dynamically updates any changes made to the entire roundabout layout. Engineers with all levels of roundabout design experience find TORUS invaluable for projects throughout the feasibility, preliminary, and planning stages. Population growth is expected to rise in the northwest quadrant of Winnipeg and as part of their overall transportation plan and The City wanted to learn if a multi-lane roundabout would increase the level of service, reduce congestion, improve safety and accommodate significant growth in this area. McPhillips Street and Inkster Boulevard are both important links in the City’s Regional Street Network. This intersection section sees on average 60,000 vehicles per day during the weekday.

“The reason the City requested the students look into this particular intersection was to be proactive to identify any issues with the performance of this signalized intersection when the NW quadrant of our City eventually reaches full development,” says Scott Suderman, a streets planning engineer at the City of Winnipeg. “This was more of a long term planning exercise. The City of Winnipeg typically would look at alternatives, such as roundabouts or roadway widening, to traditional treatments first when evaluating ways to manage transportation facilities.”

Dr. Jeannette Montufar is the professor who teaches the Capstone Design course in the Civil Engineering department at the University of Manitoba. The Capstone course is a requirement of the program and the engineering firms in Winnipeg work with the University to advance the profession. The MMM Group uses TORUS, the roundabout design software from Transoft Solutions and thought it would help the students in their designs.

“Because of all the people involved, I’m more of a facilitator of the projects and all the mentors and sponsors,” said Dr. Montufar. “In this case, MMM Group suggested the use of TORUS. I thought we could give it a try and that’s how it started.”

The students were given all the specifications for a multi-lane roundabout from the RFP from the City of Winnipeg in late in 2012. Both to complete their course and to comply with the RFP guidelines, they were required 1) to review existing intersection and road segment collision data to determine existing issues, 2) perform a capacity review of the existing signalized intersection using micro traffic simulation software and 3) perform micro traffic simulations of a multi-lane roundabout using existing traffic volumes. The final geometric design also had to meet the 1999 TAC Geometric Design Guide and NCHRP Report 672 guidelines.

The time-saving features of TORUS include re-calculating all the design elements whenever a change is made to one aspect of the design. Future engineers like the U of M students appreciated the functionality of never having to start from scratch again. “TORUS is much easier than doing manual calculations,” says design team member Lei Yang. “You only need to choose the design standard and set the design limit. It saved me a lot of time, so I can spend the most time on reviewing the design standards.”

Another member of the team, Morgan Glasgow agreed with the assessment of the software.

“I thought TORUS was very easy to use for anyone with CAD experience,” said Glasgow. “The ability to analyze the swept paths of trucks and buses proved very useful, as our design vehicle was a WB-20 truck. We also checked the compatibility of the buses in Winnipeg Transit’s fleet. Using TORUS made making changes to our design very easy. The notifications let us know when radii were too small for our design vehicle and allowed us to correct problems before they snowballed into larger issues,” he continued.

The student design team had lots of complex variables to account for in the roundabout at the busy intersection. There are no other roundabouts in the City of Winnipeg, so getting motorists used to a new traffic feature was also a challenge.

“The most difficult aspect of the location was the traffic flows during the AM and PM peaks,” said Glasgow. “At McPhillips and Inkster, a tremendous amount of traffic is through traffic along McPhillips, which is not ideal for a roundabout. During our kickoff meeting, the City of Winnipeg stated to have no more than two lanes in the roundabout, as two lanes would already present a big enough challenge for the public.”

The team’s final design consisted of a two lane roundabout with an inscribed diameter of 67 meters. The two lanes were a combined nine meters wide and there was a three meter-wide truck apron around the center. As mentioned earlier, it was necessary to find a way to reduce the amount of through traffic entering the roundabout from McPhillips.

“Our options were to divert traffic along other streets, or design an overpass or tunnel to bypass the intersection,” said Glasgow. “We designed an overpass rather than a tunnel due to the horizontal clearance necessary and the cost of accommodating the utilities under the current intersection. As McPhillips has three lanes in each direction and only two were used for the roundabout, the logistics worked out well.”

Transoft Solutions has an established client relationship with MMM Group. When David Patman asked if Transoft could deliver copies of the software to the students, it was an easy decision. “The mandate to put the best tools in the hands of young engineers comes from our president and co-founder Milton Carrasco,” said Irma De Leon, Account Manager at Transoft Solutions. “We’re empowered to offer licenses for TORUS for educational purposes as a way of ‘paying it forward’. We were happy to join MMM Group and the University of Manitoba to make the students’ final Capstone project a success,” she continued. ■

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