

Unique Use of Roundabout Under a Highway Structure

Presented by: Josh Straka, P.E., Strand Associates, Inc.®

The U.S. Highway 18/151 (Verona Road) project reconstructed one of the busiest corridors and interchanges in Madison, Wisconsin, and includes an unprecedented approach to roundabout installation. Completed in 2016, Stage 1 of 2 cost approximately \$100 million, which included construction of 3 new major structures all within less than 1 mile: a single-point interchange (SPUI), a jug-handle-style intersection, and a roundabout directly underneath Verona Road.



CRITICAL ISSUES

Address safety and operations at the existing signalized intersection of Verona Road and Summit Road. The two biggest challenges of this intersection included:

- **Traffic Congestion:** During rush hours, average delays at the Summit Road intersection prior to construction corresponded to a level-of-service (LOS) F, with queues greater than 1500 feet
- **Travel Safety:** Crash rates were nearly five times greater than the statewide average for an urban interstate roadway and up to 70 percent greater than the statewide average for an urban roadway.

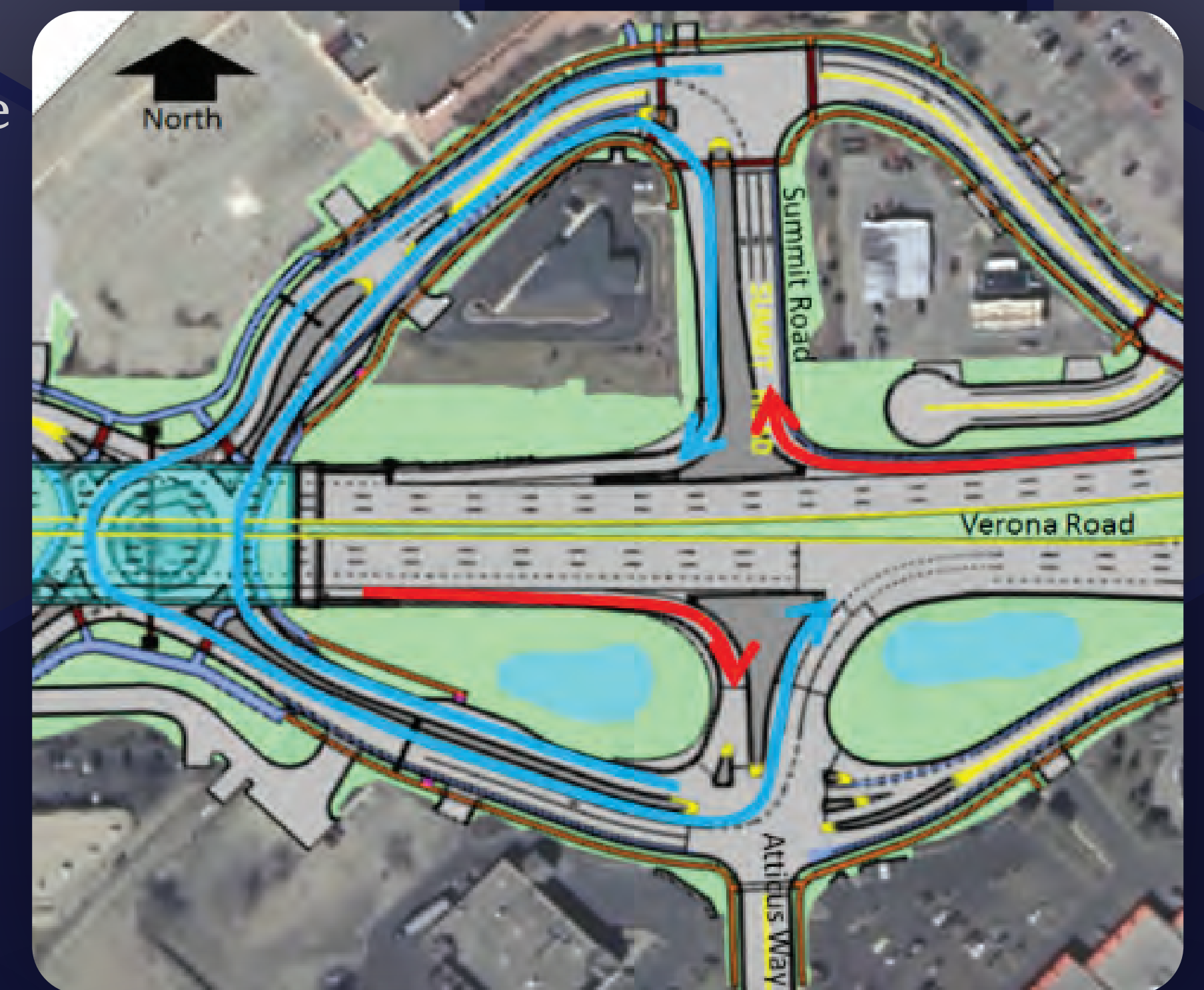
METHODOLOGY

Selecting the appropriate solution for the Verona Road/Summit Road intersection required extensive review of **eight different intersection design alternatives** which aimed to improve the operations at the intersection while also improving safety. Ultimately a jug-handle intersection with a **grade-separated roundabout** was selected for the following benefits:

- Ability to connect 4 local roads with minimal realignment
- Significantly reduced right of way/real estate impacts
- Improved safety by eliminating at grade crossings
- Improved congestion by eliminating the signal at Summit Road

CONSTRUCTION

A straddle bent-style steel bridge was designed to span the roundabout and provide desirable sight lines within the roundabout for both vehicles and pedestrians. The straddle bent structures use a pier column in the central island of the roundabout and pier columns on either side of the roundabout, well outside the bridge footprint. The pier in the center of the roundabout was placed to avoid all sight lines. The piers placed outside the roundabout also provide an open feel beneath the structure that benefits vehicles and pedestrians.



FINDINGS AND RESULTS

Traffic & Environmental Impacts: By redirecting movements through the roundabout, operations on Verona Road immediately improved from LOS F to LOS A and more than 250,000 hours of traveler delay will be eliminated annually. This reduction in delays also reduced gas consumption and emissions, thus improving air quality for local residents.

Safety Improvement: The roundabout option reduced the traffic speeds and eliminated the conflict points of the traditionally signalized intersection. Because of the reduced congestion, traffic speeds, and number of conflict points, the Verona Road jug-handle and roundabout are expected to provide more than \$26.7 million in crash savings in the first 30 years.

Pedestrian Traffic: The jug-handle and roundabout design incorporated multi-modal accommodations allowing neighborhood residents to travel underneath Verona Road to access commercial properties and neighborhoods on the other side, which otherwise would not have been possible.