



MEMORANDUM

TO: Chad Hanson, MnDOT District 6

FROM: Graham Johnson, SEH
Chris Hiniker, SEH

DATE: March 30, 2012
Rev: July 3, 2012

RE: Red Wing Bridge Project
Traffic Forecast Update
SEH No. 119112

The traffic forecasts and traffic data from the “Origin-Destination and Traffic Circulation Study for the U.S. 63 Bridge Area” (ODTC Study), dated February 10, 2011, were reviewed to determine if any updates or revisions were needed. The purpose of this memorandum is to present the findings from this review.

The traffic forecasts from the ODTC Study were developed based on several factors, including traffic forecasts from the 2010 Collar County Travel Demand Model, regression analysis on historical AADT data, and review of previous forecast data from MnDOT and other agencies. Though the Collar County Travel Demand Model will be updated based on 2010 census data, the update to the model will not happen until 2014. MnDOT and the City of Red Wing were contacted, and there does not appear to be any new development or information that would substantially change the forecast assumptions from the ODTC Study. Therefore, the annual growth factor of 1.35% developed for the ODTC Study for U.S. 63 on the Red Wing Bridge is still reasonable and valid.

WisDOT conducted traffic counts on the Wisconsin side of the U.S. 63 in April and May 2012. The resulting traffic counts came in higher than what MnDOT had previously collected and adjusted to an AADT. MnDOT factored AADT in 2011 was 11,500 vehicles per day; WisDOT ADT in 2012 was over 13,000 vehicles per day. This discrepancy in demand created a need for more research into the historical ADT volumes collected on the bridge; the ADT is the 24-hour data that is not adjusted for an AADT number.

The research indicated that traffic patterns on the U.S. 63 river bridge are not consistent with the statewide annualization and daily adjustment factors applied as part of MnDOT’s standard process to calculate AADT. For example, the recorded river crossing traffic volumes ranged from 12,500 to more than 14,500 over several days of the week and months of the year. As a result, a representative average of recent traffic counts from both WisDOT and MnDOT was identified and the resulting 2012 ADT value is 13,300 vehicles per day.

The traffic forecasts from the ODTC Study were derived by using the compound annual growth rate method. However, the MnDOT Traffic and Analysis section prefers that traffic forecasts be calculated using a straight-line simple growth method. Therefore, revised forecasts for the Red Wing bridge were calculated using the straight-line simple growth method. The forecasts were derived using an ADT of 13,300 for the base year of 2012 and an annual increase of 180 vehicles per year (equivalent to 12,900 for 2010). The revised forecasts for U.S. 63 on the Red Wing bridge are 2022 AADT of 15,100, 2042 AADT of 18,700, and 2072 AADT of 24,100.

To determine the number of lanes needed for the Red Wing bridge to accommodate future traffic, the forecast AADT volumes for the bridge were compared to planning-level daily service volumes for various roadway types. The daily service volumes were derived from the 2010 Highway Capacity Manual, Exhibit 16-14, assuming a posted speed of 30 mph, a K-Factor of 0.09, and a D-Factor of 0.60. The following table shows the daily service volumes for the different roadway types.

Facility Type	Daily Service Volume		
	LOS C	LOS D	LOS E
2-lane	5,400	14,100	18,300
4-lane	10,300	28,800	34,800
6-lane	15,000	42,500	49,800

Comparing the Red Wing bridge forecasts to the daily service volumes in the above table, a 2-lane bridge would operate at a LOS E for the 2022 AADT forecast, and a 2-lane bridge would operate at a LOS F for the 2042 AADT forecast. A 2-lane bridge would operate at LOS F for the 2072 AADT forecast, while a 4-lane bridge would operate at a LOS C for the 2072 AADT forecast. It should be noted that the daily service volumes in the above table are meant for general planning purposes, and a detailed traffic operations analysis should be completed to make any final decisions on design features. For the Red Wing bridge, it is possible the Red Wing approach roadway and intersection designs will be a factor in determining the level of service and, consequently, the design features needed for the bridge. The necessary traffic operations analysis to determine the specific design features will be conducted during the upcoming feasibility assessment phase.

To provide some context as to how AADT and number of lanes are related at bridges over major rivers, a sample of MnDOT Trunk Highway bridges over major rivers in greater Minnesota was compiled, and current AADT volumes (2009 or 2010 were the latest data available) for these bridges were determined from MnDOT Traffic Volume Maps. Freeway bridges and other high-volume bridges with four or more lanes were excluded from the sample. This sampling of Minnesota Trunk Highway bridges is shown on the attached table.

Red Wing Bridge Project
Sampling of Minnesota Trunk Highway River Bridges

Route	River	City	2009/2010 ADT	Number of Lanes
TH 61	Mississippi	Hastings	36,000	2>4**
TH 2	Red	East Grand Forks	19,600	4
TH 64	St. Croix	Stillwater	17,900	2>4**
TH 41	Minnesota	Chaska	17,000	4
TH 14/61	Mississippi	LaCrescent	16,500	4
TH 8	St. Croix	Taylors Falls	14,900	4
TH 24	Mississippi	Clearwater	14,800	2
TH 27	Mississippi	Little Falls	13,900	2
TH 63	Mississippi	Red Wing	12,900	2*
TH 43	Mississippi	Winona	11,100	2*
TH 10	Mississippi	Little Falls	10,300	4
TH 14	Minnesota	New Ulm	8,300	2
TH 19	Minnesota	Morton	6,500	2
TH 243	St. Croix	Franconia	6,400	2
TH 60	Mississippi	Wabasha	5,600	2
TH 210	North Bois de Sioux	Breckenridge	5,600	2

2* -- existing 2-lane bridge under study for expansion
2>4** -- existing 2-lane bridge being replaced with 4-lane bridge