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News

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Bethel Valley Rd and SR 95 Intersection Traffic Analysis

December 2010 - In the last few years the intersections of Bethel Valley Rd and State Route (SR) 95 (west portal) and Bethel Valley Rd and Scarboro Rd. (east entrance to the campus) have experienced substantial increases in traffic volumes in all the approaches. This has resulted in increasing delays and, more importantly, in the degradation of safety at these intersections. The intersection presents hazardous driving conditions for travelers leaving the main campus (i.e., afternoon westbound traffic on Bethel Valley Rd) and traveling southbound towards Lenoir City and I-40. The intersection does not have a signal so there are few gaps in the traffic traveling south from the City of Oak Ridge (main road), resulting in an increased potential for collision risk for ORN staff making a left turn. Although ORNL is keenly interested in reducing the traffic problems, any geometric improvements to the intersection will require approval from the Tennessee Department of Transportation (TDOT) and any signalization must meet certain "warrants" which are based on traffic volumes and accident rates.

In an effort to address the safety concerns, the Facility and Operations asked the Center for Transportation Analysis (CTA) traffic engineers to (1) study potential solutions and (2) arrange a meeting with stakeholders to discuss next steps. Dr. Oscar Franzese developed and evaluated four alternatives aimed at reducing delays and improving the safety of travelers at this intersection. The proposed alternatives included two different types of traffic signals (pre-timed and semi-actuated controllers) and a change in the geometry of the intersection, specifically the construction of a roundabout. The "do-nothing" alternative (i.e., current condition) was also analyzed in the study. CTA used state-of-the-practice traffic simulation models (CORSIM and VISSIM) to analyze and

evaluate these alternatives, generating many different measures of effectiveness (MOEs), including delay per vehicle per turning movement, fuel consumption due to engine idling, emissions of different pollutants, and other MOEs. The traffic simulation models were fed with data collected by CTA using video cameras that allowed the determination of traffic volumes per turning movements during the morning (6AM-9AM) and afternoon (3PM-6PM) peak hours (see Figure 1).

Results of the Traffic Study were presented on October 7, 2010 to representatives of the Tennessee Department of Transportation (TDOT) (Assistant Deputy Commissioner Ralph Comer); the City of Oak Ridge (Kathryn Baldwin, Community Development Director and Steve Byrd, City Engineer); and the Knoxville Transportation Planning Organization (Jeff Welch and Mike Conger). ORNL was represented by Jimmy Stone Courtney Manrod, Dell Morgan, Diane Davidson, Oscar Franzese and Bill Knee.

Figure 1 – Traffic Data Collection Camera (Afternoon Peak Hour)

The results of the simulation models indicated that the Roundabout alternative performed better that the other two proposed alternatives (i.e., different type of traffic signal controllers) and it was far superior to the current situation. For example, Table 1 shows the delay per vehicle (in seconds) for each one of the approaches to the Bethel Valley Rd and SR 95 intersection that the simulation model predicted for each one of the alternatives with the traffic counts that were collected in September 2010.

Table 1 – Approach Delay (Seconds/Vehicle) for the Afternoon Peak Hour

	WB Approach		SB Approach	NB Approach
	All Veh	Left Turners	All Veh	All Veh
Current	145	213	12	10
Pre-Timed Cont	39	52	28	21
Semi-Act Cont	31	38	23	20
Roundabout	27	N/A	6	8

Crash data for S.R. 95 has been received from TDOT Region 1 which shows that six crashes occurred between 2007 to 2009, with one being an injury crash. The crash rate is 3.15 times the state average and 1.07 times the critical rate.

ORNL planners and engineers continue to work with the state and regional officials to advance a solution which meets TDOT requirements as well as to identify future funding sources for improvements. The next meeting to discuss the path forward will be held February 7, 2011.

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