Review of Traffic Data at the Y Intersection in Jackson, Wyoming

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Norman Marshall
President

Executive Summary

I have been a transportation planner for over 30 years, specializing in transportation planning, traffic demand modeling and analysis of traffic data. My CV is attached as Exhibit A.

The Responsible Growth Coalition retained me to analyze existing traffic data surrounding the "Y" intersection in Jackson Wyoming.

The Jackson region is preparing to study alternative roadway configurations to address congestion at the "Y" intersection (where WY 22 meets US 89/191). I will be reviewing this process as it proceeds. In an initial step, I have analyzed available traffic count data. On the basis of this review and my years of experience, I make the following conclusions:

1. Traffic volumes were generally flat between 2008 and 2014 with a very small uptick in 2015.
2. Most of the highest traffic hours are in the summer months.
3. Most of the highest hours during the day are in the afternoon peak period, especially 5-6 p.m.
4. It appears that at the "Y", the peak hour increases in the summer months is mostly an increase in traffic between WY 22 and US 89/191 to the north.
5. The proposed Tribal Trails Connector could divert only a small amount of the "Y" traffic even if every vehicle traveling between WY 22 and US 89/191 to the south used it – about 15 percent of current traffic in both directions.

Future traffic forecasts should be established carefully. There is a high level of uncertainty. Therefore, I recommend that at least two different traffic growth scenarios be analyzed. One of these would include a growth rate similar to that observed over the past 10 years. A second scenario would include lower traffic growth going forward – perhaps about half as much.

Engineering design has often been done for a worst-case scenario. A bias towards over-design makes sense for critical structures such as bridges where failure would be catastrophic. For intersections and congestion, a more nuanced approach makes more sense. The congestion risk of possible under-design should be compared to the potential over-design risks including spending unnecessary money and creating unnecessary impacts.

A range of alternatives should be considered for the Y intersection – initially a combination of improved traffic signaling and an additional turn lane from US 89 north to WY 22 west. For the signalization improvement, I recommend Adaptive Signal Control Technologies[1].

A roundabout also should be evaluated as a long-term alternative.

[1] https://www.fhwa.dot.gov/innovation/everydaycounts/edc-1/asct.cfm

6.

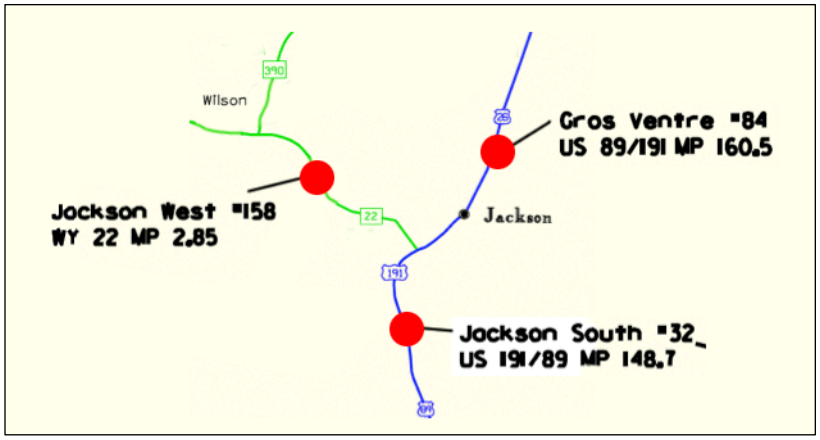
Automatic Traffic Recorder Data

The best traffic data for understanding daily, seasonal, and year-to-year variation are automatic traffic recorders (ATRs). As shown in Figure 1, the Wyoming Department of Transportation (WYDOT) has ATRs located along all of the major routes into and out of Jackson. Three ATRs are most pertinent to the evaluation of the "Y" intersection:

- Jackson West #158 WY 22
- Jackson South #32 US 89/191
- Gros Ventre #84 US 89/191

The Gros Ventre ATR began operating in the fall of 2011. The others have been operating for many years.

Figure 1: Locations of Automatic Traffic Recorders Near Jackson



ATRs are designed to operate 24 hours a day, and 365 days a year. Although there can be gaps in the data, there is the potential for 8760 hours of day per year. Some hours, including overnight hours, have little traffic, and are of little interest to traffic planners. On the other hand, it is not cost effective to build larger roadways just to serve the highest traffic hour of the year. As a middle ground, it is customary to choose a "design hour" that represents a relatively high traffic volume, but a level that also recurs fairly frequently. Some jurisdictions use the 30th highest hour of the year, but others use the 100th or 200th highest hour of the year Compared to choosing the 30th highest hour, using the 100th or 200th hour can save a lot of money and reduce impacts. I would recommend using the 100th hour here.

Figures 2, 3 and 4 show the trends in traffic volumes for 30th, 100th and 200th highest hour of the year. Trends at the Jackson West and Jackson South counters are shown for the period 2008-2015. The Gros Ventre ATR began operating in the fall of 2011; therefore, trends at that location are shown only for the period 2012-2015.

Figure 2: Design Hour Traffic Volume at the Jackson West ATR on WY 22

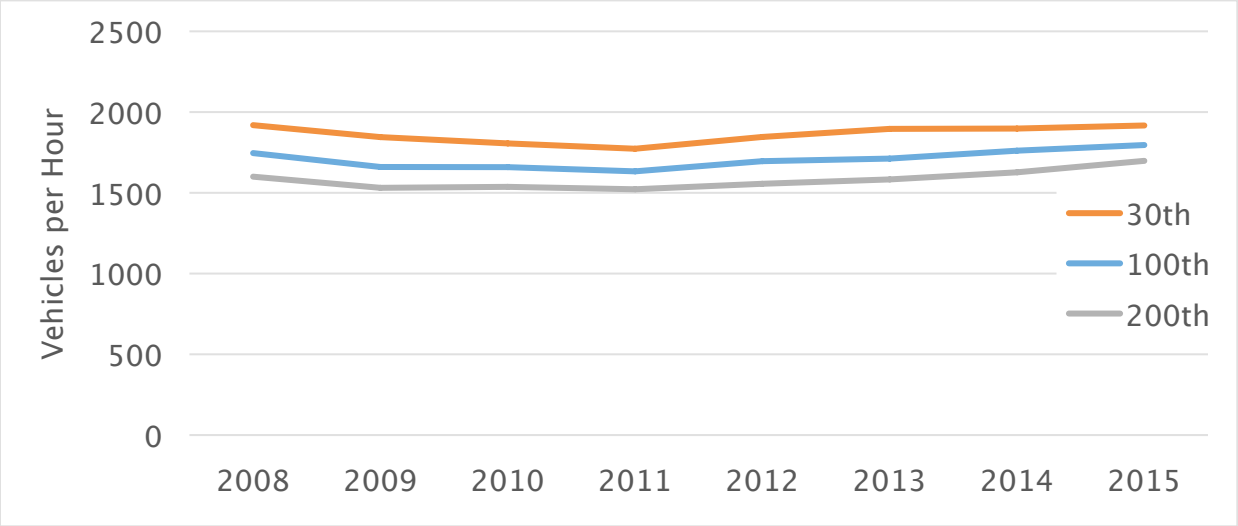


Figure 3: Design Hour Traffic Volume at the Jackson South ATR on US 89/191

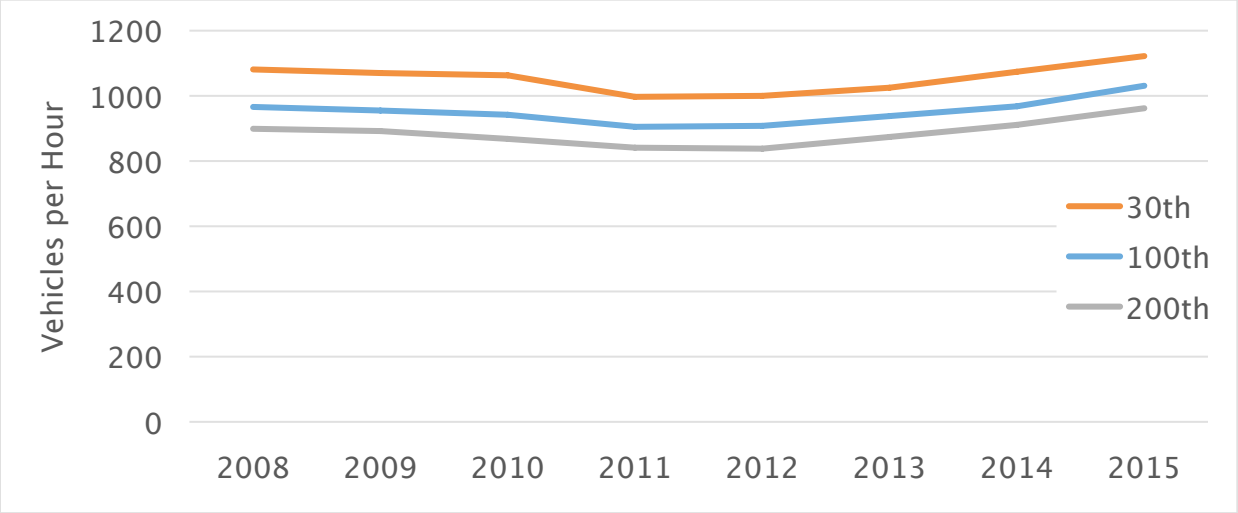
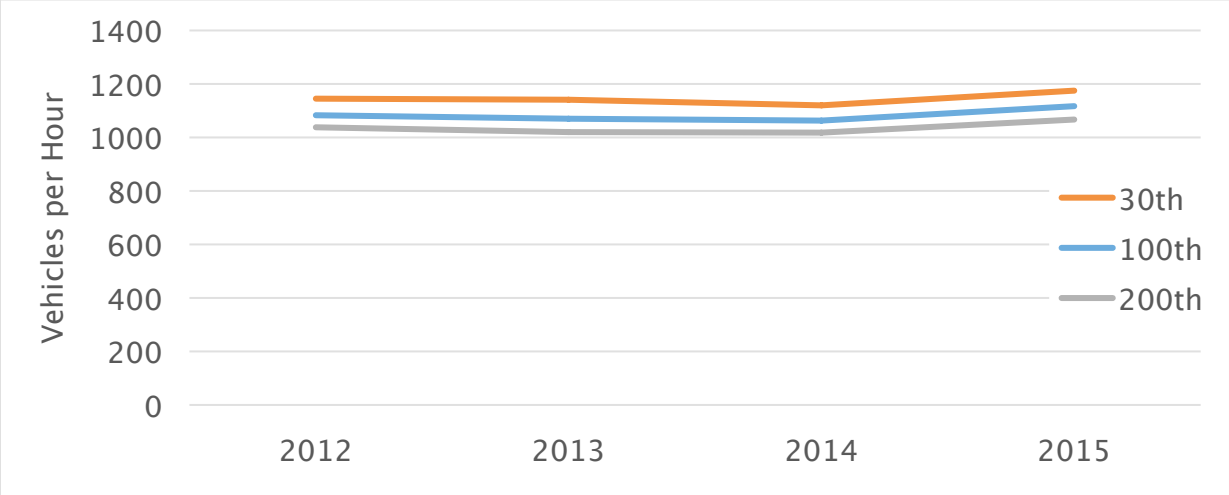


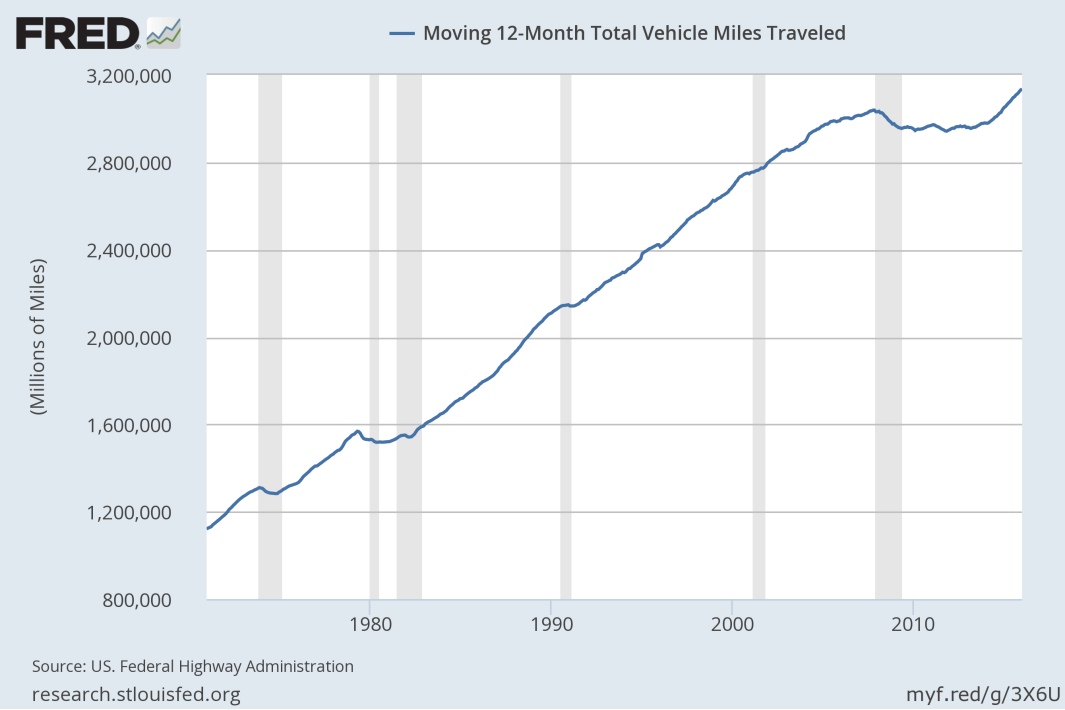
Figure 4: Design Hour Traffic Volume at the Gros Ventre ATR on US 89/191



As shown in Figures 2, 3 and 4, there has been a small increase in design hour over the past several years, but most of that increase made up for decreased traffic over the period 2008-2011. Looking at the entire period from 2008-2015, there has been little increase in design hour traffic volumes.

These trends mirror experience in the U.S. as shown in Figure 5. After decades of mostly steady growth in vehicle miles traveled (VMT), it peaked in 2008 at a level that has not been reached again until 2015.

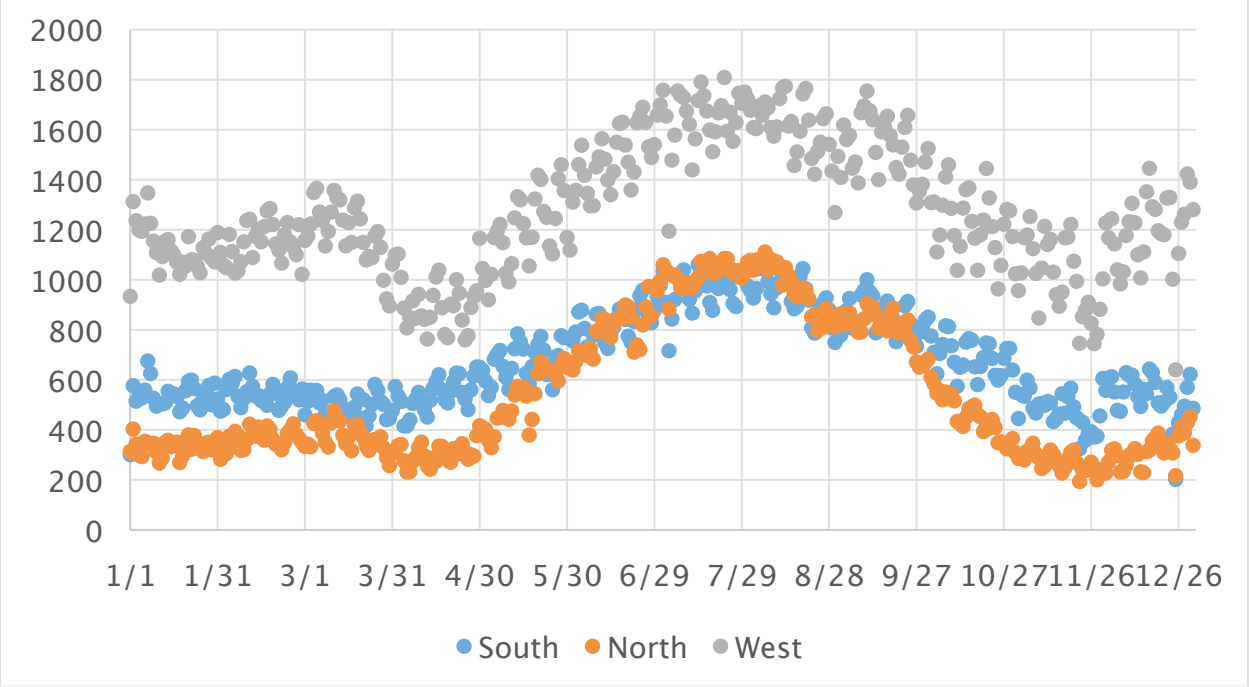
Figure 5: Annual Vehicle Miles Traveled (VMT) in the United States



The recent increases in VMT are clearly related to a combination of the economic recovery and low gas prices. There are two schools of thought about the future. One school thinks that the type of traffic growth seen before 2005 will return. The second, to which I subscribe, thinks that far less traffic should be anticipated. There was evidence of a moderating trend beginning around the year 2000. Younger adults are driving much less than previous generations and likely will continue to do so. As the baby boomers continue to age, they will certainly drive less. Many researchers think that the combination of these two trends will prevent any significant growth in VMT.

Most of the highest hours observed at the Jackson-area ATRs are in the summertime months. The most common time for the highest hours is 5-6 p.m. Figure 6 illustrates how 5-6 p.m. traffic volumes vary throughout the year, based on the averages for each day.

Figure 6: Average Counts 5-6 pm. throughout the Year (average of available 2008-2015 data)



There is considerable day-to-day variation apparent in Figure 5, but the summer months have consistently higher traffic volumes at all three locations. On a percentage basis, the largest summer increases are for the north counter on US 89/191. Throughout most of the year, it has the lowest traffic volume of any of the three locations, but rises slightly above the level for the south counter on US 89/191 in mid-summer.

Manual Turning Movement Counts

The ATRs provide the most comprehensive data, but we still rely on people counting cars for detailed traffic data at intersections. The "Y" intersection has been counted twice in recent years:

- Wednesday July 17, 2013
  - 7:00 – 9:00 a.m.
  - 11:00 a.m. – 1:00 p.m.
  - 3:30 – 5:30 p.m.
- Tuesday September 29, 2015
  - 7:00 – 9:00 a.m.
  - 11:00 a.m. – 1:00 p.m.
  - 3:00 – 6:00 p.m.

Totals were tabulated for 15-minute periods within the longer count periods. The one-hour peak traffic volumes were 4:30 – 5:30 p.m. on both days. Based on the ATR data presented above, we would expect the July traffic volume would be greater than the September traffic volume, even though the September count was in a higher traffic year – 2015 vs. 2013. As shown in Figure 7, the data confirms this expectation; the

traffic volume counted in July 2013 was slightly higher than the traffic volume counted in September 2015. It is important that traffic count data at the Y be collected on a regular basis. For the counts to be most comparable, it would be useful to do the counts at the same time of the year, and at the time of the year that is considered

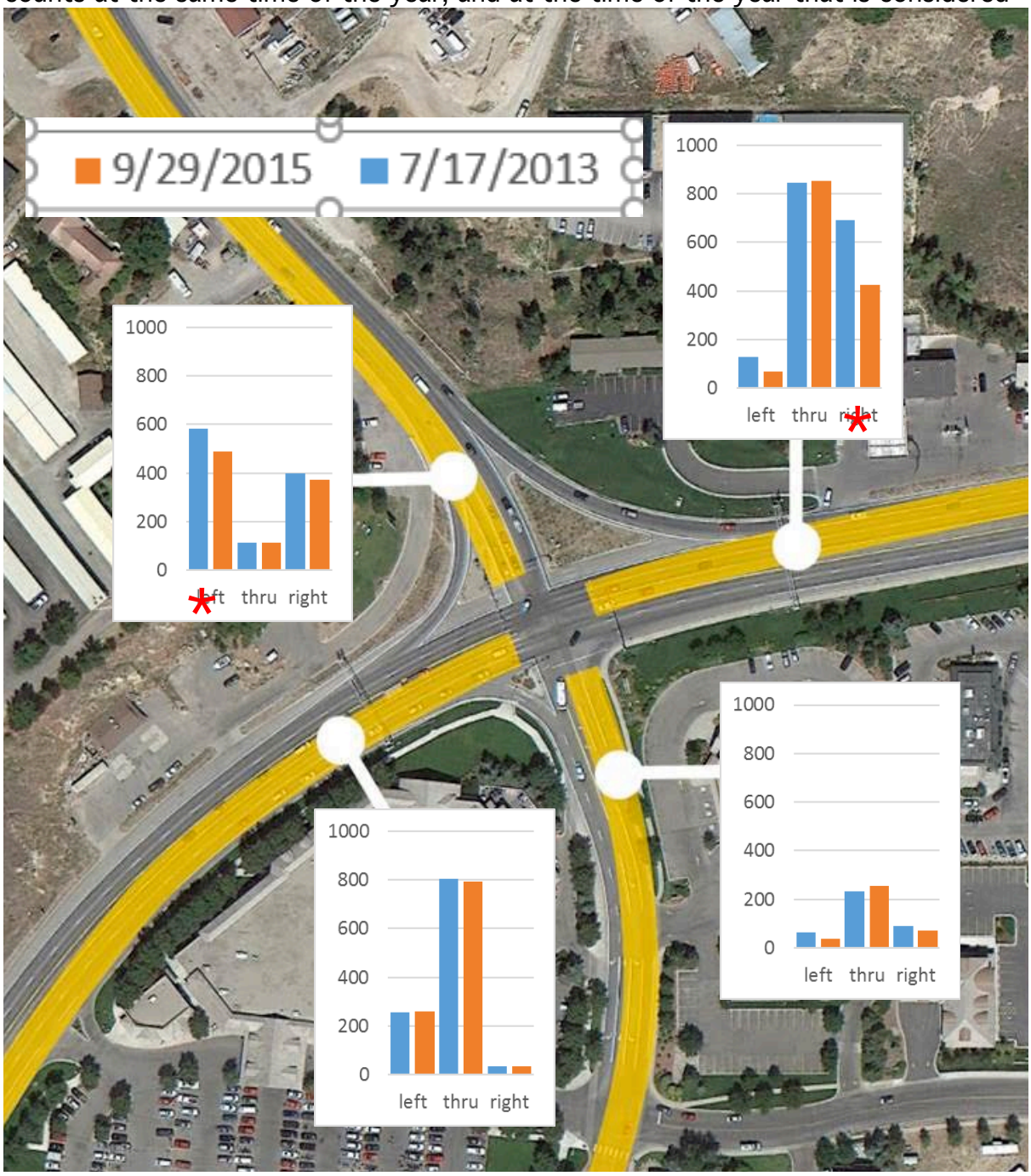


Figure 7 shows the peak hour traffic volume for each of the 12 different movements through the "Y" intersection. Most of the difference between the summer and fall counts is that the traffic is higher for 2 of the 12 movements (marked with an "*"). These movements represent travel between WY 22 and US 89/191 to the north. The counts for the other traffic movements are very similar in July and September.

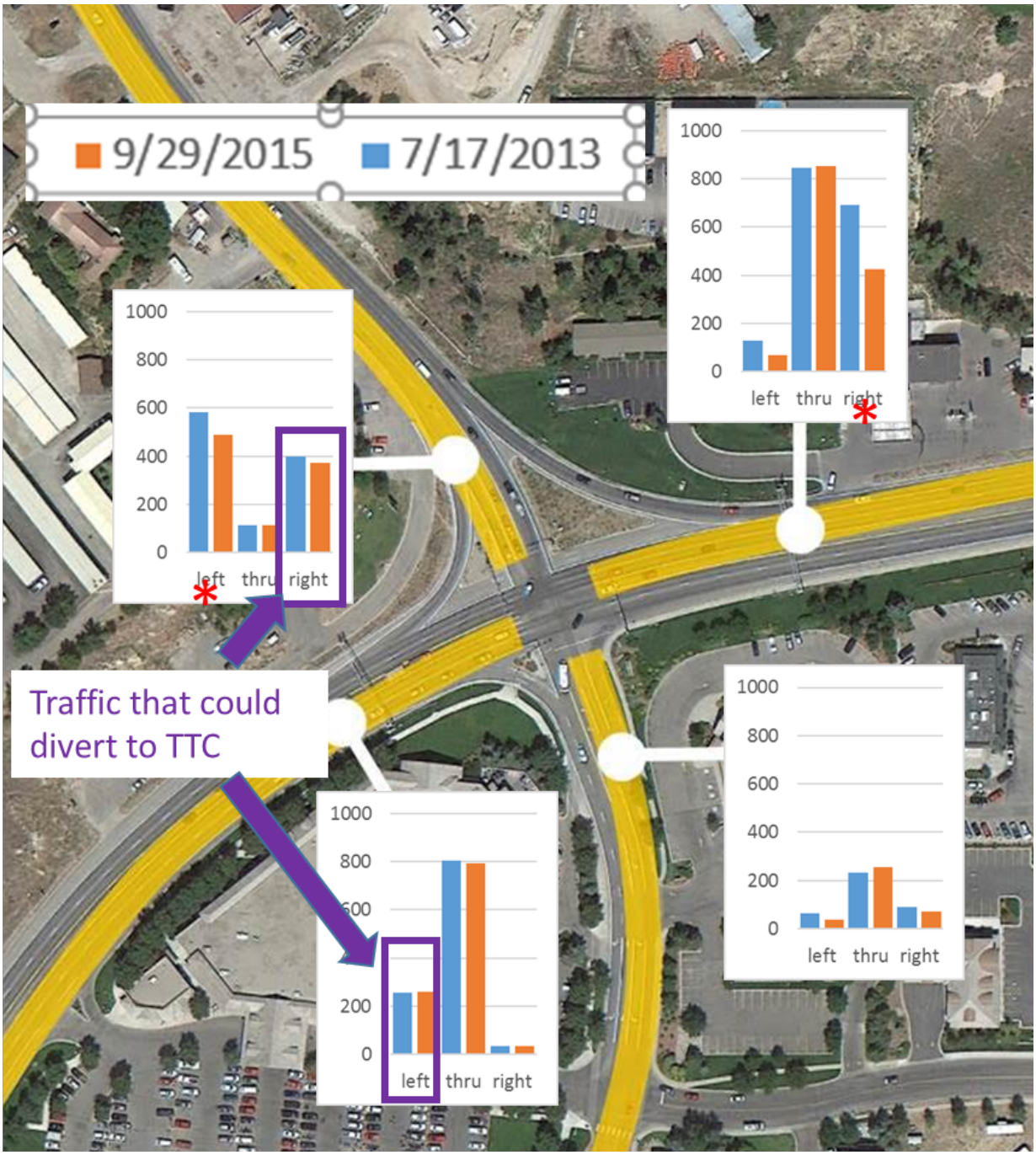
Traffic Analysis for the Alternative Y Designs

The traffic analysis for alternative Y designs will establish future estimated traffic volumes for the Y intersection. If design is done in the context of a high design hour such as the 30th highest hour of the year, the distribution of traffic will look more like the July count in Figure 7 because the 30th highest hour occurs in the summer. Therefore, it would include the higher traffic flows between WY 22 and US 89/191. If design is done for the 100th or 200th highest hour, the distribution of traffic probably will look more like the September count because the 100th and 200th hours likely occur outside of the summer months.

In either the summer or the fall counts, the amount of traffic that could possibly divert to the proposed Tribal Trails Connector is small – only about 15 percent of total intersection traffic.[2] (See Figure 8.)

[2] License plate survey data collected in the summer of 2009 indicated that 27 percent of WY 22 traffic also uses US 89/191 to or from the south. (Felsbur Holt & Ullevig, "South Park Sub Area and High School Road Corridor Transportation Analysis, June 23, 2010). Only about half of the Y traffic uses WY 22. Therefore, 27 percent of WY 22 traffic represents 14 percent of total Y traffic which is consistent with the 15 percent observed the traffic count data presented in Figure 8.

Figure 8: Peak Traffic at the Y: 4:30 – 5:30 p.m. – Potential Diversion to Tribal Trails Connector



The only traffic movements that could divert to the Tribal Trails Connector are highlighted in purple in Figure 8: Route 89/191 northbound to WY 22, and WY 22 to US 89/191 southbound. However, diversion to the Tribal Trails Connector would be much smaller than the 15 percent possible because 1) many visitors that could use the Tribal Trails Connector would stay on the numbered routes either because they did not

see the signage or just were more comfortable keeping to the main road, and 2) local people who know of it may consider it a slower route.

It is likely that a regional travel demand model will be used, at least in part, to establish future growth in traffic volumes. Regional travel demand models are a great tool, but are incapable of forecasting big picture trends including future energy prices, future driving behavior, and future vacation behavior. There is strong evidence that millennials will drive much less than their parents, and that traffic growth has slowed permanently. Therefore, I suggest that traffic analysis be done for at least two different traffic growth scenarios. One of these would include a growth rate similar to that observed over the past 10 years. A second scenario would include lower traffic growth going forward – perhaps about half as much. Engineering design has often been done for a worst-case scenario. A bias towards over-design makes sense for critical structures such as bridges where failure would be catastrophic. For intersections and congestion, a more nuanced approach makes more sense. The congestion risk of possible under-design should be compared to the potential over-design risks including spending unnecessary money and creating unnecessary impacts.

A full range of alternatives should be considered for the Y intersection – including additional lanes, and both traffic signal and roundabout alternatives. If a signalization is used, Adaptive Signal Control Technologies[3] are recommended. Given the traffic counts illustrated in Figures 7 and 8, it appears that a second left turn lane from WY 22 to US 89/191 northbound would add a significant amount of capacity, especially for summer peak conditions.

[3] https://www.fhwa.dot.gov/innovation/everydaycounts/edc-1/asct.cfm

Resume

NORMAN L. MARSHALL, PRESIDENT

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

California Air Resources Board – Led team including the University of California in $250k project that reviewed the ability of the new generation of regional activity-based models and land use models to accurately account for greenhouse gas emissions from alternative scenarios including more compact walkable land use and roadway pricing. This work included hands-on testing of the most complex travel demand models in use in the U.S. today.

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)—developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Envision Central Texas Vision (5-countyregion)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for “choice” riders). Analyzed set land

use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Chittenden County (2060 Land use and Transportation Vision Burlington Vermont region) – leading extensive public visioning project as part of MPO's long-range transportation plan update.

Municipal Planning

Flagstaff Metropolitan Planning Organization – Implemented walk, transit and bike models within regional travel demand model. The bike model includes skimming bike networks including on-road and off-road bicycle facilities with a bike level of service established for each segment.

City of Portland, Maine – Implemented model improvements that better account for non-motorized trips and interactions between land use and transportation, and applied the enhanced model to two subarea studies.

City of Honolulu – Kaka'ako Transit Oriented Development (TOD) – applied regional travel demand model in estimating impacts of proposed TOD including estimating internal trip capture.

City of Grand Rapids – Michigan Street Corridor – developed peak period subarea model including non-motorized trips based on urban form. Model is being used to develop traffic volumes for several alternatives that are being additional analyzed using the City's Synchro model

City of Omaha - Modified regional travel demand model to properly account for non-motorized trips, transit trips and shorter auto trips that would result from more compact mixed-use development. Scenarios with different roadway, transit, and land use alternatives were modeled.

City of Dublin (Columbus region) – Modified regional travel demand model to properly account for non-motorized trips and shorter auto trips that would result from more compact mixed-use development. The model was applied in analyses for a new downtown to be constructed in the Bridge Street corridor on both sides of an historic village center.

City of Burlington (Vermont) Transportation Plan – Led team that developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Roadway Corridor Planning

Managed Toll Lanes in the Chicago region (Reason Foundation) – Developed advanced model of the Chicago area that calculates variable tolls by link for seven weekday time periods. The model was used to analyze a comprehensive set of new toll roads and managed toll lanes added to existing freeways.

Hudson River Crossing Study (Capital District Transportation Committee and NYSDOT) – Analyzing long term capacity needs for Hudson River bridges which a special focus on the I-90 Patroon Island Bridge where a microsimulation VISSIM model was developed and applied.

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions and making recommendations for future practice.

PUBLICATIONS AND PRESENTATIONS (partial list)

Comparison of Regional Congestion Metrics with Static and Dynamic Assignment Models, submitted for presentation at the 2016 Annual Meeting of the Transportation Research Board.

A Statistical Model of Regional Traffic Congestion in the United States, submitted for presentation at the 2016 Annual Meeting of the Transportation Research Board.

Understanding the Transportation Models and Asking the Right Questions. Lead presenter on national Webinar put on by the Surface Policy Planning Partnership (STTP) and the Center for Neighborhood Technologies (CNT) with partial funding by the Federal Transit Administration, 2007.

Sketch Transit Modeling Based on 2000 Census Data with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, "Transit Management, Maintenance, Technology and Planning", p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, "Travel Demand 2005", p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation's Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers
Member, American Planning Association
Leader Modeling Reform Task Force, Congress for the New Urbanism