

Daybreak Couplet Speed Study and Design Alternatives

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Daybreak Couplet Project, South Jordan, UT

Background

Site

This project is located on the Daybreak Parkway couplet in South Jordan, Utah. The couplet consists of two one way roads with roundabouts on each end, bisected by Kestrel Rise Road. It is managed by Rio Tinto, who is the owner and major contributor to the design and layout of the planned community. The location was designed in conjunction with another professional traffic engineering firm. The site exists in the planned community zone of South Jordan (Jordan, 2012) and is located on a trucking route (Jordan, South Jordan City Truck Routes). It is also located in an area within the planned community which has both residential and commercial traffic. The current couplet has in recent time undergone some redesign, which attempted to reduce the speed along the couplet.

Project

Rio Tinto has experienced problems in the design of the daybreak couplet, especially with 85th percentile speed within this couplet. In order to mitigate the hazards posed by speeding, it was necessary to perform speed and volume studies to gain an understanding of the effects that the recent redesign has had on the speeds. Other concerns of note were the stopping sight distance in the current striping plan, as well as the safety of pedestrians and vehicles. This is of special concern to Rio Tinto, the owner of the sight, as their regional center is located adjacent to the road. Rio Tinto has especially focused on safety, and an increase of safety on this road would benefit this goal.

TWGS Engineering Approach

The current project was undertaken by TWGS engineering in conjunction with Rio Tinto, is to determine the best approach to solve the design issues on the daybreak couplet. TWGS vision is to help the area around the Daybreak Parkway Couplet in South Jordan become a vibrant and thriving commercial area. In order to do so, TWGS has undertaken several speed studies and research into possible traffic calming alternatives. The body of this paper will report the current findings and recommendations of TWGS engineering.

Data Collection and Analysis

Speed/Volume Procedure

Speed and volume studies were completed at the four locations designated by Rio Tinto. These locations have been labeled one through four to aid in identification (Figure 1). Speed studies were conducted at the sight on the 4th, 9th, and 10th of February, 2012 (see appendix). Weather did not play a major role in altering speeds as each day for which data was collected was dry and free of ice. Speed was measured using a standard radar gun from inside of a car parked on the side of the road. Volume counts at the intersections of Kestrel Rise Road were conducted using a Jamar counter on the dates previously specified. In completing these studies the following steps were followed in accordance with standard practice (Currin, 2001):

1) Location and time of observations

- a. Time
 - i. Saturday Feb 4, 2012 3PM; Thursday Feb 9, 2012 5PM; Friday Feb 10, 2012 7AM
- b. Locations
 - i. Speed Study: Daybreak parkway couplet, 4 stations (pictured below)
 - ii. Volume Study: intersections of Daybreak parkway and Kestrel Rise Rd.

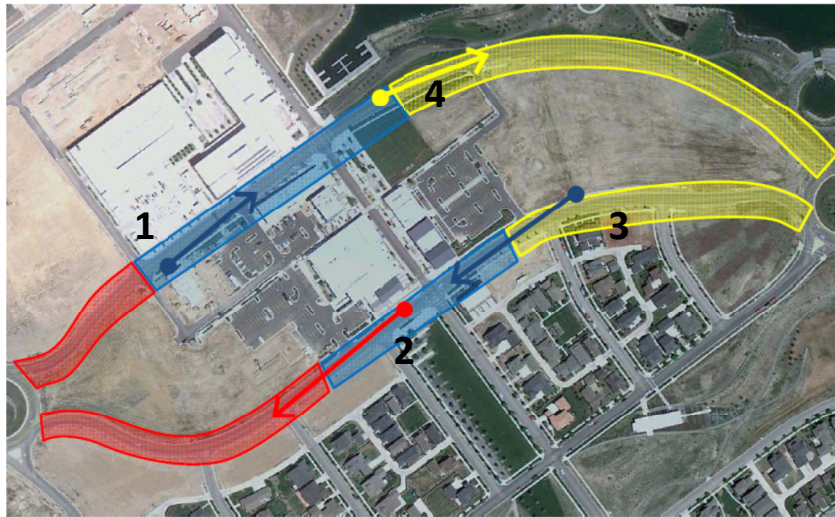


Figure 1 - Location of speed studies

2) Data Collection

- a. Speed
 - i. Speeds were collected by teams of two; one to measure speeds one to record measured speeds.
 - ii. Data was collected for 100 observations in a consistent manner
 - iii. Saturday data was collected for every car in one lane
 - iv. Weekday was collected for every third car, counted for both lanes
- b. Volume
 - i. Jamar counter was used to record vehicle movements in all directions as well as pedestrian traffic
 - ii. Recorded by one group member
 - iii. Weekend recording time was two hours, weekday recording time was one hour

3) Data Analysis

- a. The Spot Speeds, Data Analysis spreadsheet was used to complete the required data analysis
 - i. Recorded speeds were grouped according to integer speed groups and the total number of speeds recorded within each group was indicated.
 - ii. A plot of cumulative occurrence against observed speed was created for each recording event

- iii. Both mean and 85th percentile speeds were determined from plots and also confirmed with Microsoft Excel calculation tools.
- iv. Volume counts were compared with peak hour and pedestrian warrants to determine if stop lights would be warranted at intersections of Daybreak Parkway and Kestrel Rise Rd.

Analysis

Upon completion and compilation of the speed and volume data, the data was analyzed to aid in design selection. Speed data was used to determine 85th percentile speed. Volume data from the intersections was analyzed to determine level of service (LOS) and if traffic signals are warranted.

Using standard methods speed data was collected for 100 vehicles at the designated locations (Roess, Prassas, & McShane, 2011). Speed data was collected at different times throughout the week. Following data collection analysis was conducted to determine the 85th percentile speed for each location. This analysis shows that the 85th percentile speed is still higher than the desired speed of 25 mph along the couplet. Table 1 shows the average and 85th percentile speeds for all data locations, including previous data from Kennecott Land.

Table 1 - Summary of Speed Data Analysis

Location	Kennecott Data		TWGS Data	
	Average Speed (mph)	85% Speed (mph)	Average Speed (mph)	85% Speed (mph)
1	29.7	34	31	35.5
2	38.9	42	31.3	35.9
3	33.3	36	32.6	36.5
4	35.1	38	32.5	37

The next step of the analysis was to determine if any of the traffic signal warrants were met for the intersections along the couplet. Specifically, the warrants that were analyzed were the peak hour and pedestrian warrants. The volume counts were used for this analysis. It was determined that the peak hour warrant volumes were not met as there was little traffic along the minor streets. The pedestrian warrants were also not reached. However, because the counts were taken in the middle of winter this was likely to have a large impact on the number of pedestrians even though the weather was relatively warm.

From the volume counts the level of service for these intersections was determined. This was accomplished using HCS+ software. The lowest level of service that was obtained was a level of C. Level C is acceptable in this situation. Some of the variables in HCS+ were unknown so the standard values for these variables were used.

Sight distance is also an area of concern because the speeds along the couplet are higher than the design speed. The analysis of the sight distance along the couplets is being conducted during this time and is expected to be finished in the next week.

Appendix

REFERENCES

- Currin, T. R. (2001). *Introduction to Traffic Engineering; A Manual for Data Collection and Analysis*. (B. Stenquist, Ed.) Pacific Grove, California: Thomas Learning.
- Jordan, C. o. (2012, February 7). *South Jordan Official Zoning Map*. Retrieved February 2012, from <http://www.sjc.utah.gov/pdf/maps-zoning.pdf>
- Jordan, C. o. (n.d.). *South Jordan City Truck Routes*. Retrieved February 2012, from <http://www.sjc.utah.gov/police/pdf/police-traffic-TruckRoutes.pdf>
- Roess, R. P., Prassas, E. S., & McShane, W. R. (2011). *Traffic Engineering* (4th ed.). Upper saddle River, New Jersey: Pearson Higher Education, Inc.