

Estimate Travel Time on Don Valley Parkway Using Cameras and Screen Monitor

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Description

The travel time data on Don Valley Parkway (DVP) were collected on Tuesday, June 9th and Wednesday, June 10th between 6:00:00 am to 10:00:00 am. The technique was applied using cameras to monitor trucks traveling along the DVP. The procedure was following one truck from a starting intersection and recording the times when arrived at different intersections. Usually, the trip started and ended in either York Mills or Eastern. An example of the data is shown in the table below.

Northbound DVP	10-Jun-09	9:16:32 - 9:27:08
Camera Number	Exact Location	Arriving Time
65	Bridge	9:16:32
66	Bridge	9:16:58
67	End Screen	9:17:49
68	Off Ramp	9:18:47
69	CMS	9:19:30
70	Bridge	9:20:10
71	Bridge	9:20:49
73	End Screen	9:21:31
74	Bridge	9:22:02
75	End Screen	9:22:07
76	On Ramp	9:23:04
77	On Ramp	9:24:29
78	Off Ramp	9:25:05
79	CMS	9:26:15
80	York Mills	9:27:08

Table 1 – Sample Data of the Arriving Time of a Truck at Each Intersection

The exact location marked the spot where a truck passed through at that instant, the time was recorded. For example, in camera 66, arriving time was recorded when a truck passed through the bridge. To receive accurate results, arriving times must be consistently recorded when trucks passed through at the exact location.

Results

Travel time versus starting time graphs were plotted at northbound and southbound of the DVP on June 9th and 10th between 6:00:00 am to 10:00:00 am. They are shown below.

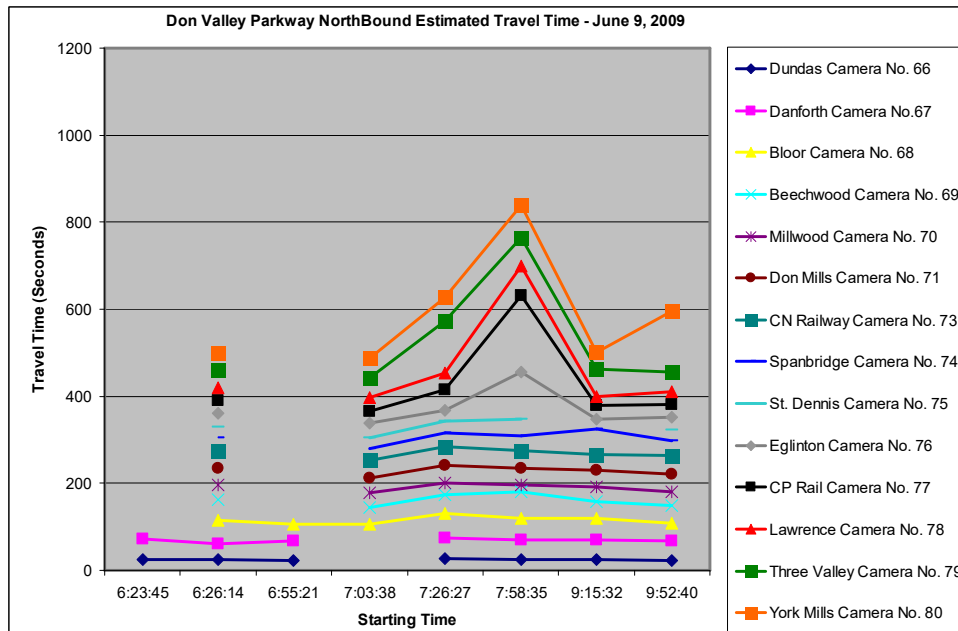


Figure 1 – Starting Time Versus Travel Time graph at DVP Northbound (June 9, 2009)

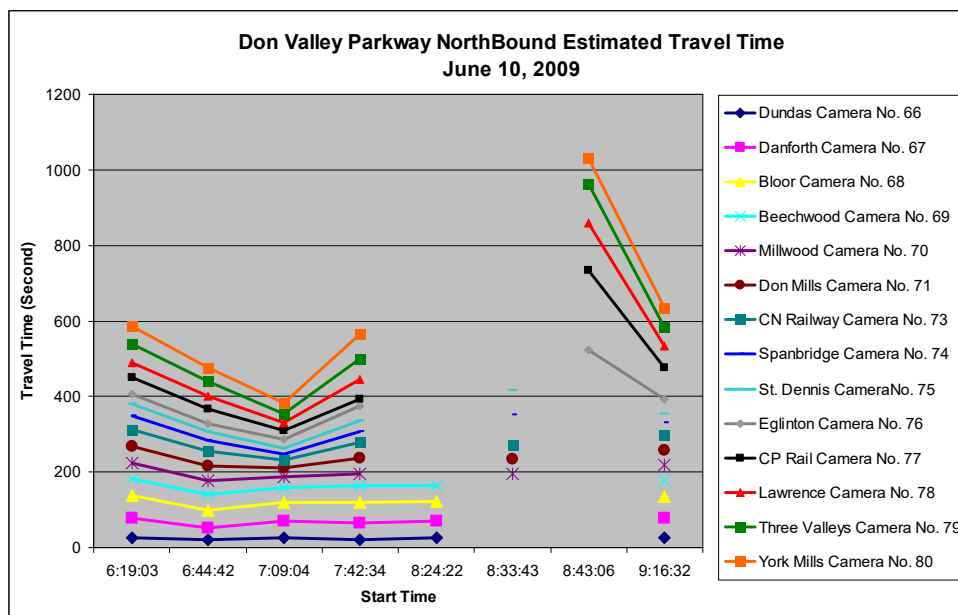


Figure 2 – Starting Time Versus Travel Time Graph at DVP Northbound (June 10, 2009)

Eight observations were made for both days at the DVP northbound with no identical starting times. On June 9th, starting time at 6:26:14 am, the travel time was about 510 seconds, and on June 10th, starting time at 6:19:03 am, the travel time was about 590 seconds. The longest travel time observed on June 9th was about 820 seconds starting at 7:58:35 am and on June 10th was

about 1020 seconds starting at 8:43:06 am. There were no factors such as incidents and rains occurred on both days which could affect the traffic.

In some observations, trucks exited at an intersection before reaching the final destination (York Mills in this case). For example, the first observation on June 9th at 6:23:45 am, the truck exited at Danforth. Thus, there are no points displayed beyond Danforth so some colour lines which represent the intersections on DVP are disconnected on the graph. This happened on other observations as well.

Overall, there are similarities and differences between these two graphs. The peak travel time period (above 600 seconds) was between 8:00:00am to 9:00:00 am on both days, but day two's peak travel time was higher than the other.

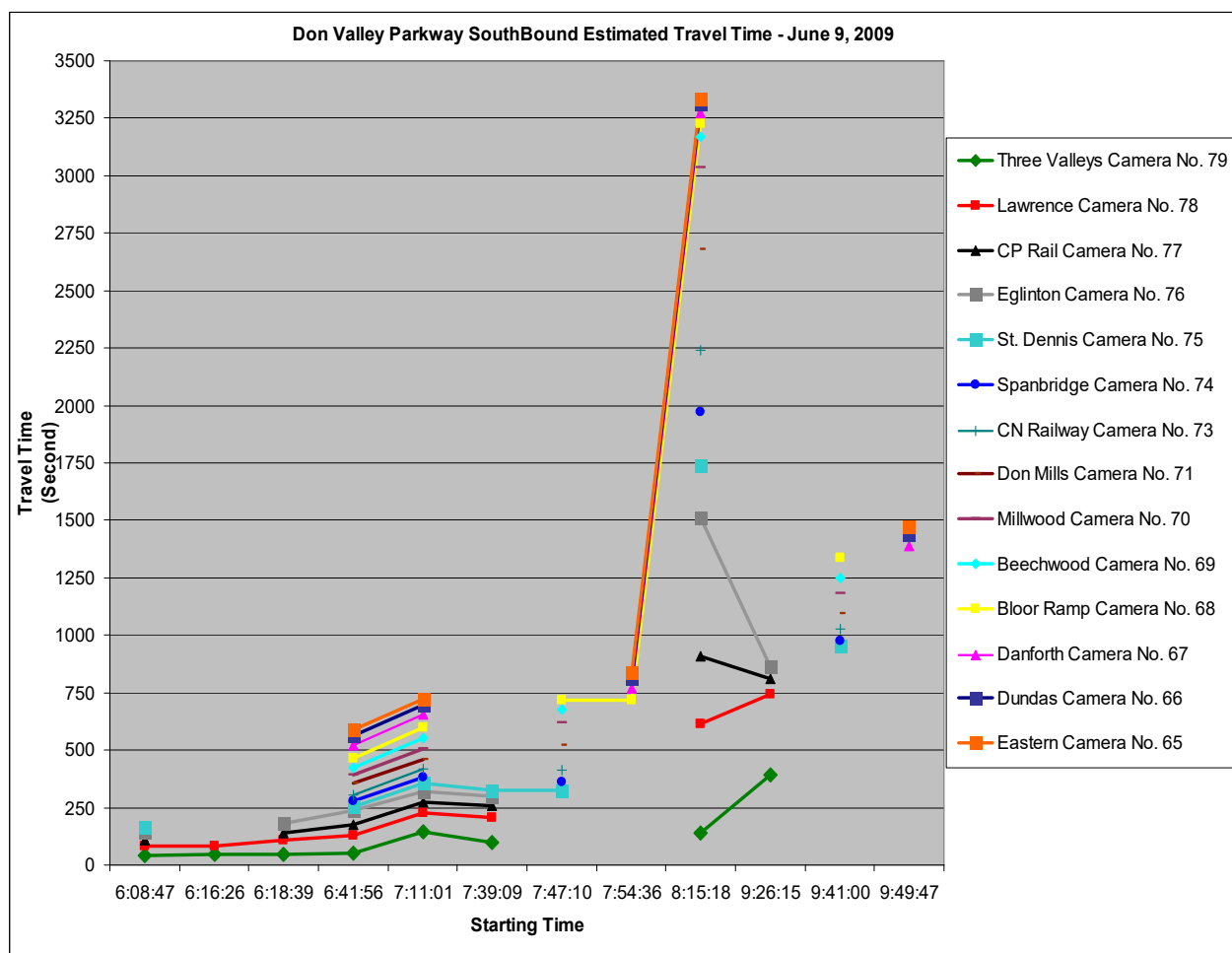


Figure 3 – Starting Time Versus Travel Time Graph at DVP SouthBound (June 9, 2009)

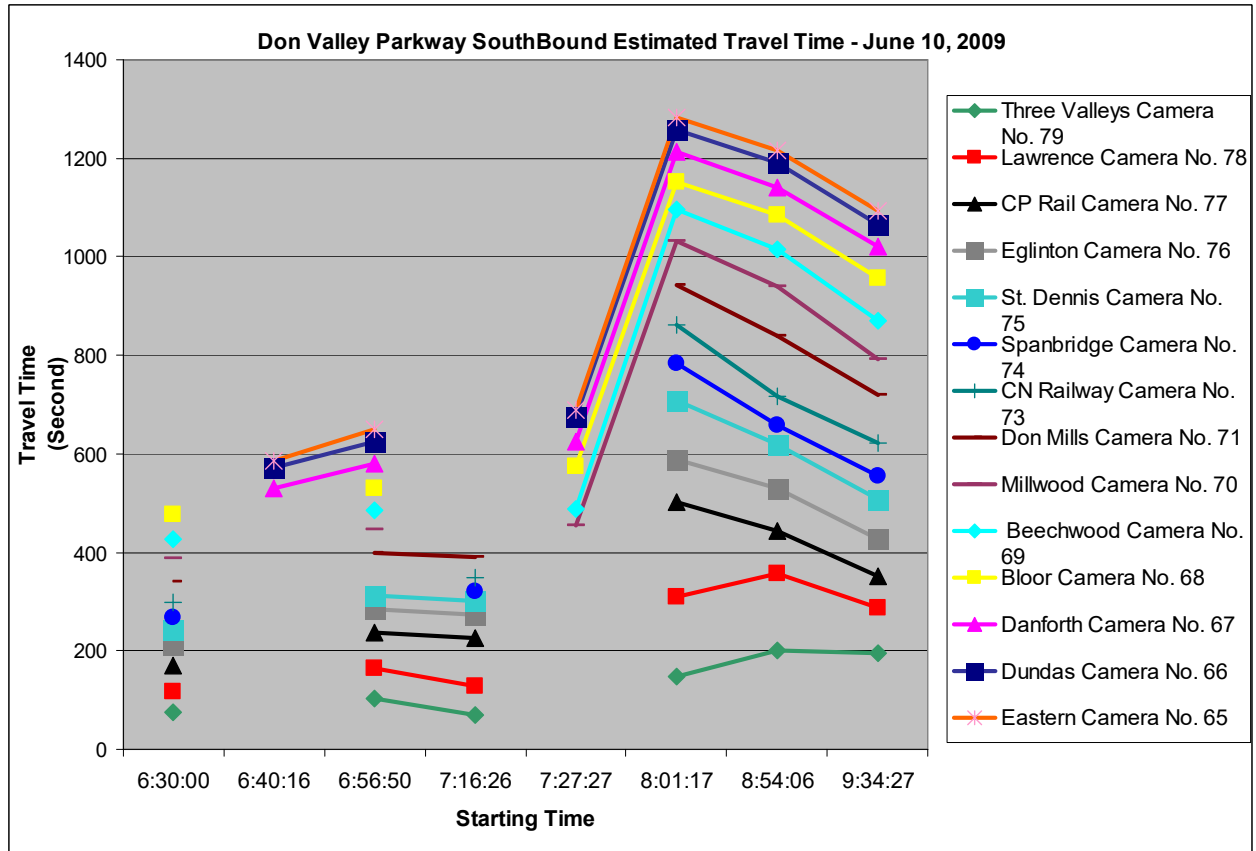


Figure 4 – Starting Time Versus Travel Time Graph at DVP SouthBound (June 10, 2009)

Notice the scale on the first day's DVP southbound graph is significantly larger. There was an accident happened on South of Millwood at starting time 8:15:18 am on the first day. One lane was blocked. It rose the travel time significantly longer to 3250 seconds. The longest travel time on June 10, 2009 was at starting time 8:01:17 am for about 1250 seconds.

On the first day of the DVP southbound, it took about 760 seconds to travel along the entire DVP southbound at starting time 7:54:36 am and about 3270 seconds at starting time 8:15:18 am. Therefore, the difference in travel time increased dramatically starting after about 20 minutes. The second day took about 700 seconds when starting at 7:27:27 am, and 30 minutes later, starting at 8:01:17 am, the travel time took about 1250 seconds to complete the entire trip.

After 9:30:00 am, the traffic slightly reduced and thus, the travel time decreased. Again, the starting times between these two graphs are not identical. Therefore, it is difficult to make accurate comparison.

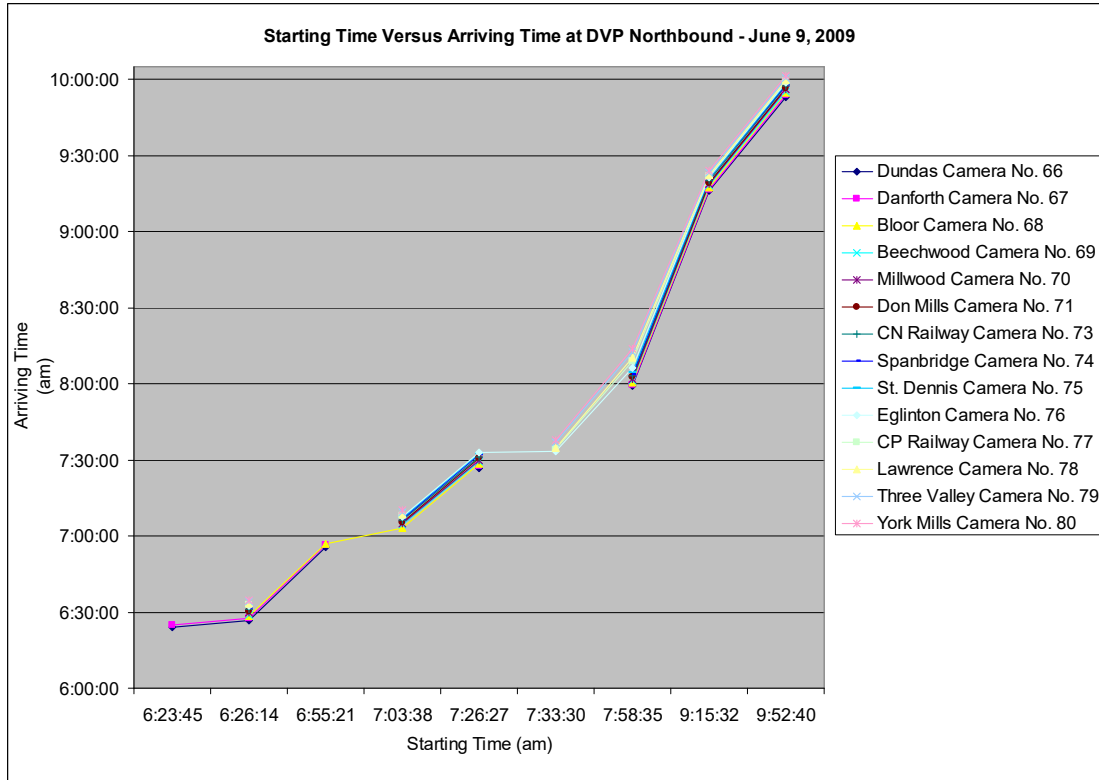


Figure 5 – Starting Time Versus Arriving Time at DVP NorthBound (June 9, 2009)

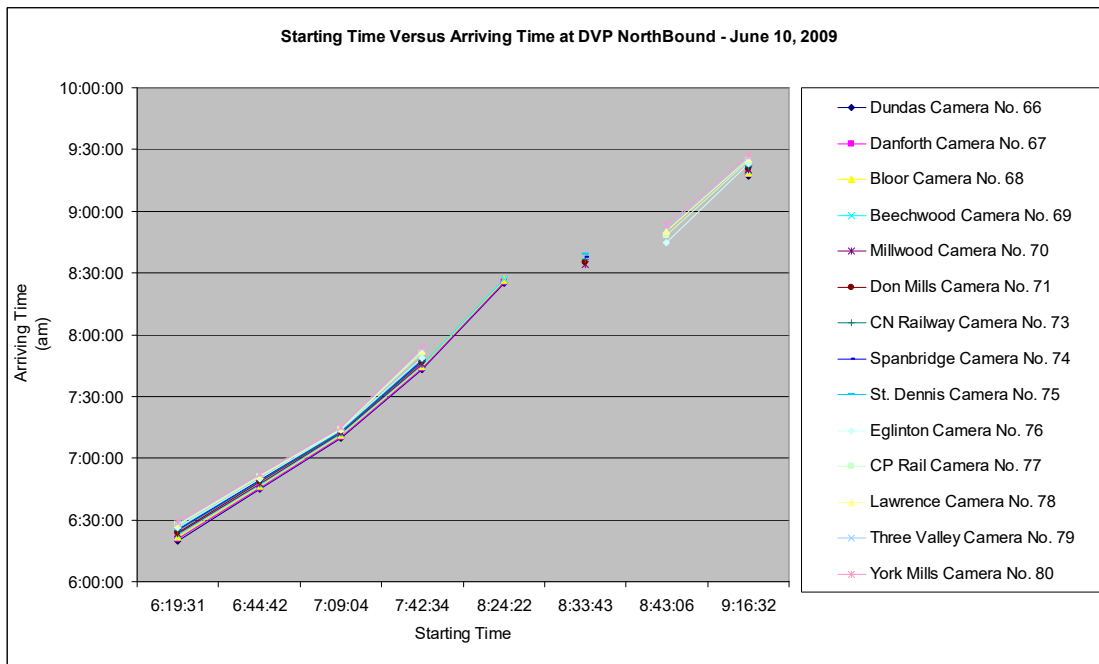


Figure 6 – Starting Time Versus Arriving Time at DVP NorthBound (June 10, 2009)

For the first graph, trucks started at 6:23:45 am, 6:55:21 am and 7:26:27 am did not complete the entire trip (Same with trucks started at 7:42:34 am, 8:24:22 am and 8:33:43 am on the second graph). On the first day, there might be a traffic delay starting at 7:58:35 am because the points on the graph are separated and leaving major gaps on top of each other. Thus, a longer time is needed to travel to the next intersection. On the second day, there are gaps between points at starting time 7:42:34 am and 8:43:06 am respectively. Those gaps indicate slowing down in traffic and increasing in travel time. Notice that not all trips are completed so some lines are disconnected.

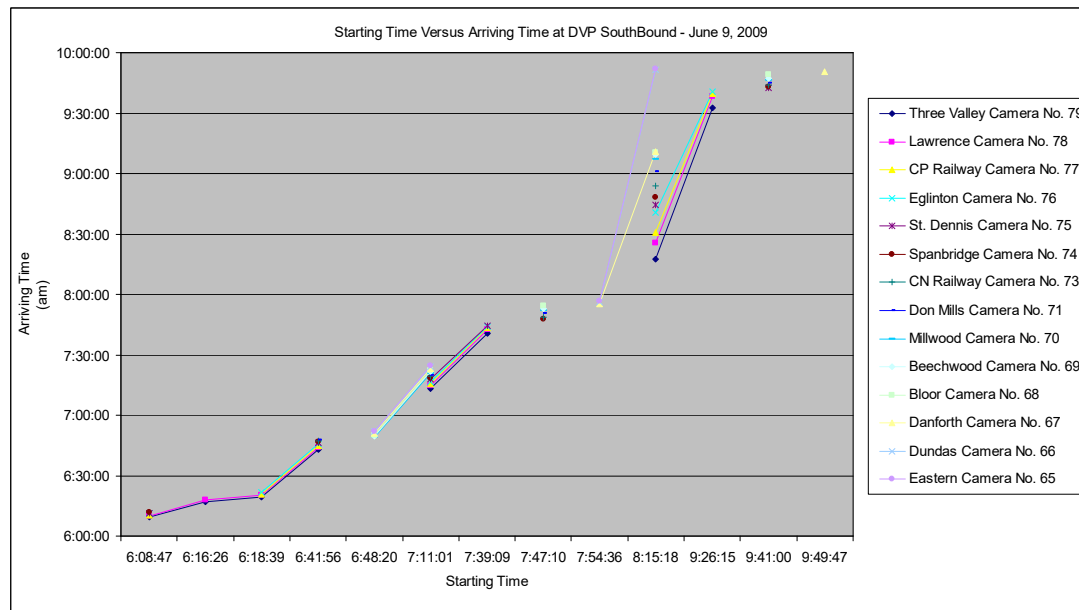


Figure 7 – Starting Time Versus Arriving Time at DVP SouthBound (June 9, 2009)

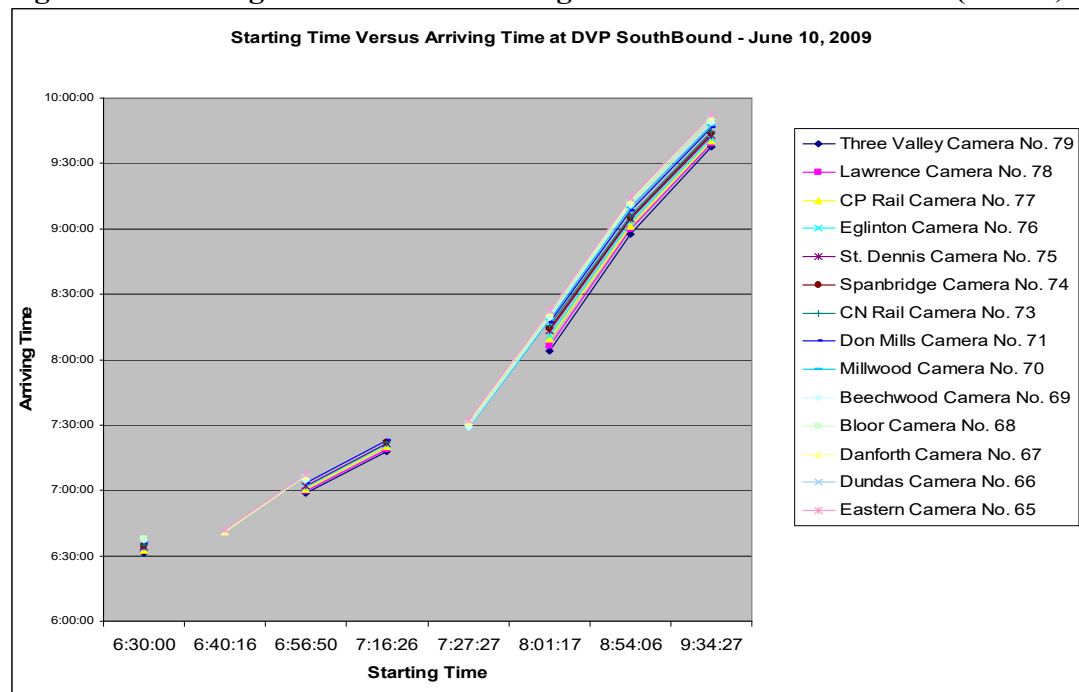


Figure 8 – Starting Time Versus Arriving Time at DVP Southbound (June 10, 2009)

Before 7:00:00 am, the time to travel along the entire southbound DVP is closely matched for both days with high travelling speed. Traffic begins to congest starting from 8:00:00 am, and longer travel times are recorded on both days. For the first day, the accident on south of Millwood caused severe delay before approaching to Millwood. This shows major gaps in between points on the first graph at the starting time, 8:15:18. However, on the second day, there were no traffic incidents or any factor that caused delay to the traffic. Therefore, all points and lines are closer together on the second day graph.

Conclusion

This experiment provides quantitative results of travel time before, during and after morning peak period on the DVP. The data are collected using cameras and screen monitors for tracking trucks and recording the arriving time when a truck passed through an intersection. Two types of graphs are plotted for analysis purpose on both days. They are starting time versus travel time graph and starting time versus arriving time graph. Both graphs provide similar information on travel time.

According to the graphs, the peak period is often between 8:00:00 to 9:00:00. However, before and after this peak period, the travel time should be normal unless accidents and constructions occur.

Further Improvement

Trucks exited before reaching the final destination caused lines to disconnect on graphs. In future experiment, if a truck is preparing to exit, select a nearing truck or vehicle for replacement to continue recording the arriving time for further intersections. This way, each intersection point is connected throughout the entire time period. Also, using identical starting times on each day will make better comparison. With the above improvements, more understandable and significant relationships and results may appear and analyze.

Reference

- CCTV Cameras along DVP