



# Twin Tunnels Environmental Assessment

## Existing Traffic Conditions

I-70 in the vicinity of the Twin Tunnels is well described in the I-70 Mountain Corridor PEIS, 2010, as follows:

“The I-70 Mountain Corridor is linked in the national interstate highway system and is part of the only east-west interstate crossing Colorado. The corridor provides for the movement of people, goods, and services across the state and is a major corridor for access to many of Colorado’s recreation and tourism destinations. Existing transportation congestion on the Corridor is degrading the accessibility of mountain travel for Colorado residents, tourists, and businesses. The population of Corridor communities is projected to more than double by 2035. Additionally, there are a high percentage of second homes in the Corridor. While the Denver metropolitan area is not within the Corridor, Denver residents are frequent users of the Corridor, and the Denver metropolitan area population is projected to experience extensive growth.

With the combined growth in Corridor users, travel demand in the Corridor is projected to continue increasing over the next 25 years and beyond. Tourism and recreation travel are the primary sources of weekend congestion in the Corridor. Ski slopes, trails, campsites, and resorts are drawing people to the corridor for recreational trips.”

### Seasonal Patterns

It is fortunate that CDOT maintains an automatic traffic recorder (ATR) station at the Twin Tunnels. Volumes in both directions are counted on an hourly basis throughout the year. In addition, vehicles are classified into 13 separate categories based on vehicle length.

**Figure 1** shows average daily traffic volumes on a monthly basis at the Twin Tunnels. These monthly volumes established that the summer season (June

through August) generates the highest average daily volumes. This is a result of the recreational opportunities that the mountains of central Colorado provide. The second highest season (January through March) is a result of the winter activities (primarily skiing) that are provided by mountain resorts.

### Daily Patterns

I-70 is used for different purposes on weekdays (work, shopping, medical, and social trips) and weekends (recreation). As a result, **Figure 2** (summer) and **Figure 3** (winter) show that volumes during both seasons are highest on Friday through Sunday. Volumes on these figures show westbound and eastbound volumes as well as total traffic. Westbound traffic is highest on Fridays and Saturdays are slightly less as people drive to the mountain for recreational activities. All these vehicles add to Sunday day visitors in returning to the Denver metropolitan area on Sundays in order to return to work on Monday morning. Thus, Sundays have the highest eastbound volumes of the week. Significant eastbound congestion on most Sundays during these two peak seasons is the natural result.

### Truck Travel

**Figure 4** illustrates the percentage of large/heavy vehicles (single and multi-unit trucks and large recreational vehicles) on Sunday afternoons during summer, winter and the off-season. The annual average percentage of trucks in the vicinity of the Twin Tunnels is measured by CDOT at approximately 10%. Thus, Sundays are noticeably less than this average: winter is the lowest (2% to 3%), summer is next (3% to 4%) and the off-season (5% to 6% is highest). Commercial trucks would be expected to be lower on weekends when compared to work days. In addition, the long standing congestion problems on I-70 during Sundays afternoons are well known and businesses would avoid travelling during this period for economic reasons whenever possible. These factors more than offset the increase in recreational vehicles on weekends.

### Selection of Design Days

Peak winter and summer days were compared for 2009, 2010, and the first eight months of 2011. **Figure 5** shows total daily volume patterns since 2009 and **Figure 6** shows just the eastbound daily volumes. These figures show that peak volume days occurred during all three years during both the summer and winter seasons. **Table 1** compiles the highest 20 days for eastbound traffic over this most recent three year period. **Table 2** provides a comparison of the top 10 summer days with the top 10 winter days. The top 12 days occurred during the summer while two winter day made the highest days. August 7, 2011 (the third highest) day was

chosen to represent the summer peak for ongoing traffic operations analyses. August 7<sup>th</sup> is representative of the top three through seven days.

January 31, 2010 is the second highest winter day during these three years and was chosen as the winter design day. This day was utilized in early 2010 as the basis for traffic modeling during the Reversible Lane study. These volumes have been input into both the DynusT and VISSIM traffic models and have been utilized in the EA study as representative of peak conditions.

### **Sunday Congestion**

In addition to the ATR located at the Twin Tunnels, CDOT measures speeds and travel times along the I-70 Mountain Corridor to inform motorists of the projected time to reach certain destinations using the variable message signs along the corridor. Combining the volume and speed data provides a more complete picture of the congestion experienced on Sundays. **Figure 7** shows the eastbound hourly volumes from 7:00am through 8:00 pm for the summer design day. The graph illustrates that the maximum volume through the Twin Tunnels occurs during the 11:00am hour at approximately 3,250 vehicles per hour (vph). From noon to 4:00pm, the volumes fall back slightly to approximately 3,200 vph. From 5:00pm to 8:00pm, the volumes are still high, at approximately 3,000 vph. This graph leads to the conclusion that the eastbound capacity of the Twin Tunnels is approximately 3,200 vph. A second conclusion is that congestion (volumes more than 3,000 vph) occurs from 11:00am to at least the 5:00 hour.

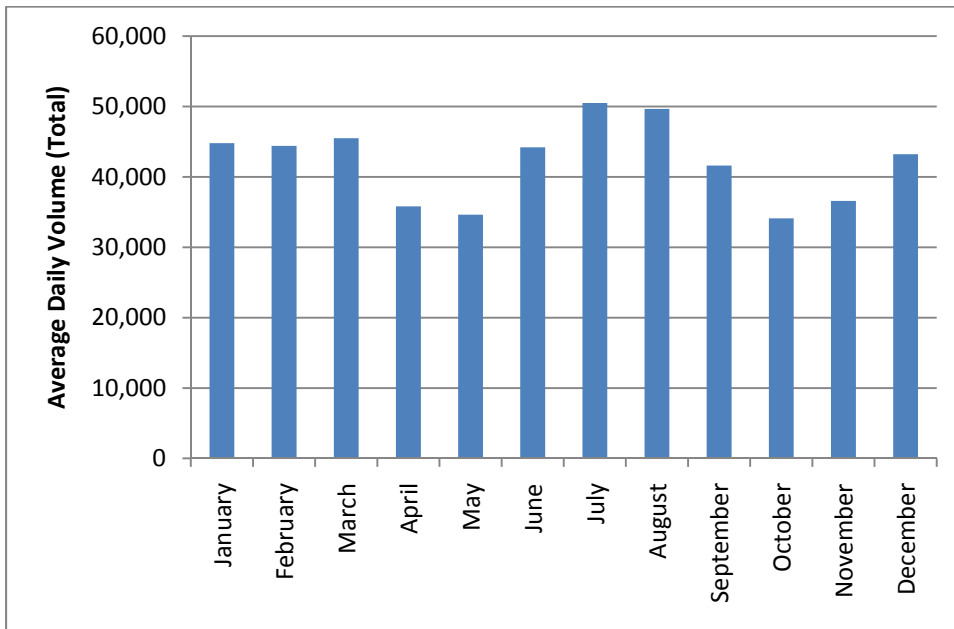
**Figure 8** shows the hourly pattern of eastbound traffic during the winter design day. The same pattern of congestion as with summer volumes is apparent. The throughput of the eastbound tunnel increases to as much as 3,400 vph. Due to the temporal nature of ski traffic, volumes above 3,000 vph occur later in the day (starting at noon) and last later (to the 6:00 hour). Thus, there is the same number of hours above 3,000 vph as during the summer.

**Figure 9** illustrates the patterns of congestion west of the Twin Tunnels on the two design days. This figure shows average travel speeds through various segments of the corridor east of the Eisenhower Johnson Memorial Tunnel (EJMT). There is a pattern of speeds decreasing over time through upstream segments. The segment from Empire Junction to Idaho Springs first experiences a decrease in speeds around 11:00am. Within an hour, the speeds have fallen to the 30 mph range – signifying congested speeds. The Georgetown to Empire Junction begins to experience a marked decrease in speeds at approximately 12:00pm. Bakerville to Georgetown begins to experience slower speeds around 1:00pm in the summer and 3:00pm in the winter. Later in the day, I-70 slowly recovers from this congestion and there is the reverse pattern of increasing speeds between Bakerville and the Twin Tunnels.

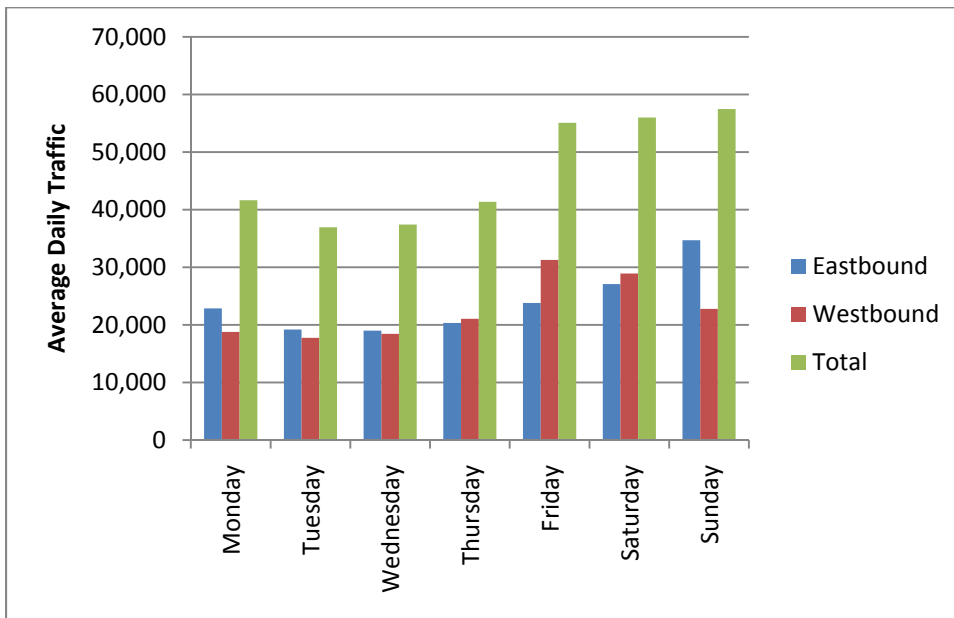
The two segments between EJMT and Bakerville have separate patterns of lower speeds. On the summer design day, EJMT records show that the Johnson Tunnel (eastbound) experienced backups from east of this tunnel that required it to be closed to traffic twice for a total of 10 minutes between 1:08 pm and 5:01pm. On the winter design day, EJMT records show that the tunnel was close eight times between 1:00pm and 6:00pm for a total of 102 minutes. This created the consistently low speeds for the segment just east of the EJMT.

**Figure 10** shows the current speed profile for eastbound traffic on the two peak Sundays at two locations east of the Twin Tunnels (west and east of the Hidden Valley interchange). The red (slower speed line) was measured just west of the interchange in the vicinity of the sharper right-hand curve, and lower speed is the result of cars slowing down to negotiate this curve. The purple line (east of the interchange) shows that vehicles are back at a free flow speed (at or above 60 mph). The conclusion is that there is currently no congestion downstream of the Twin Tunnels on peak Sunday afternoons. The Twin Tunnels are the existing bottleneck and congestion occurs upstream. Any slower speed downstream of the Tunnels is primarily due to existing curve geometry.

**Figure 1. Average Daily Traffic Volumes by Month (January 2009 – September 2011)**



**Figure 2. Summer Daily Traffic Patterns (June – September)**



**Figure 3. Winter Daily Traffic Patterns (December – March)**

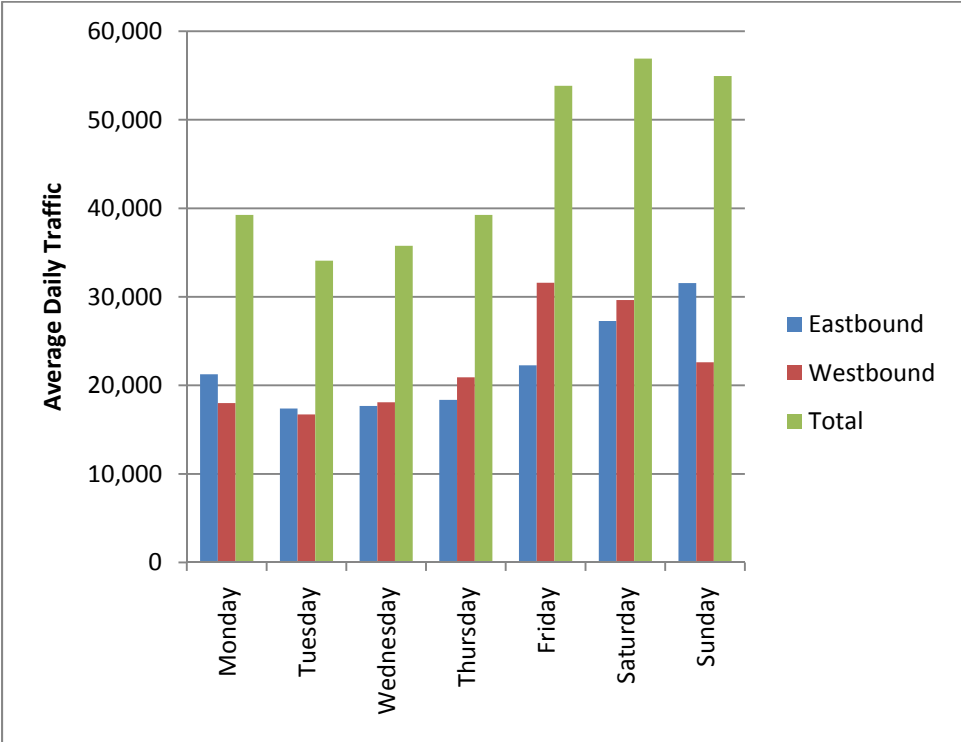
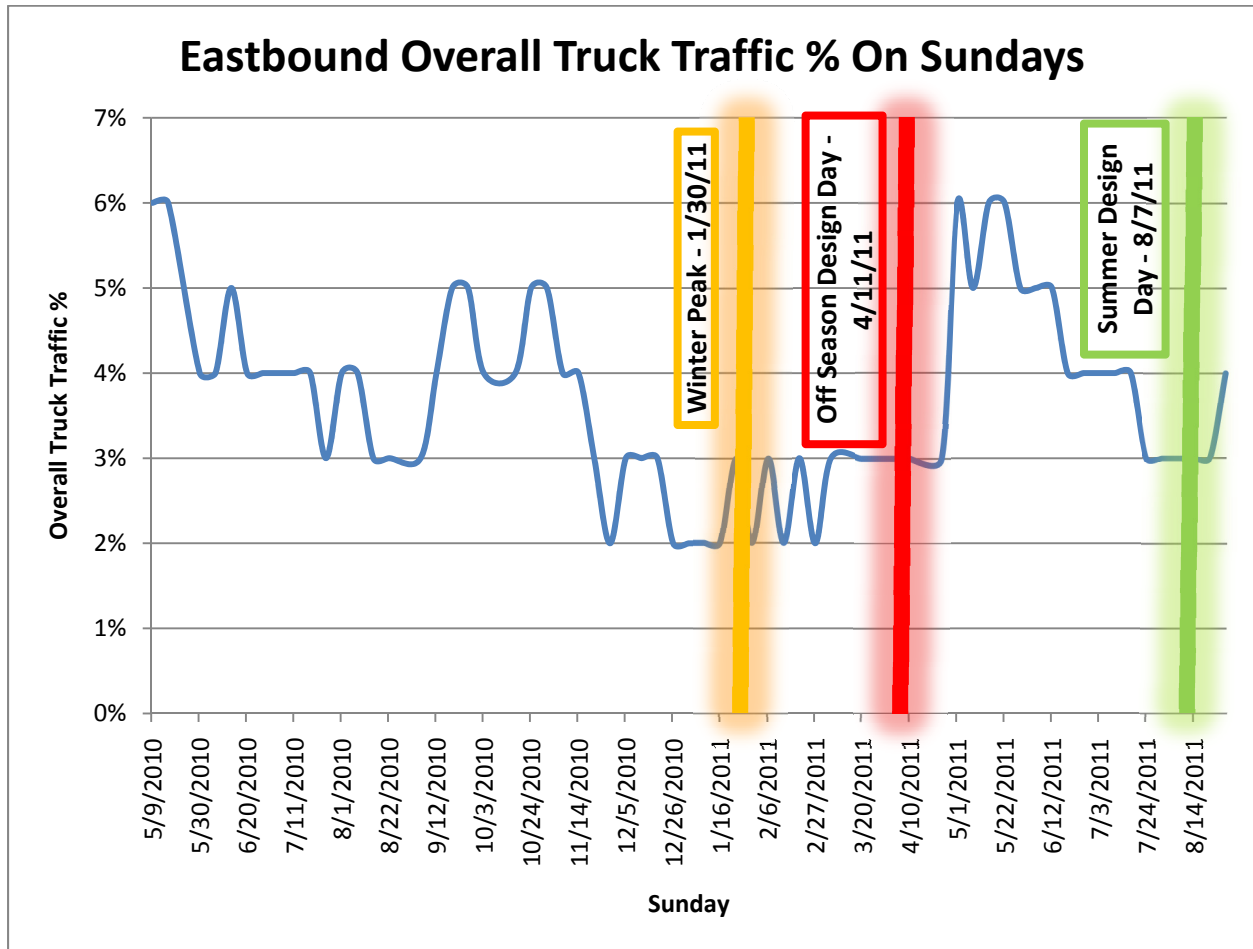


Figure 4. Heavy Vehicle Percentage



**Figure 5.**

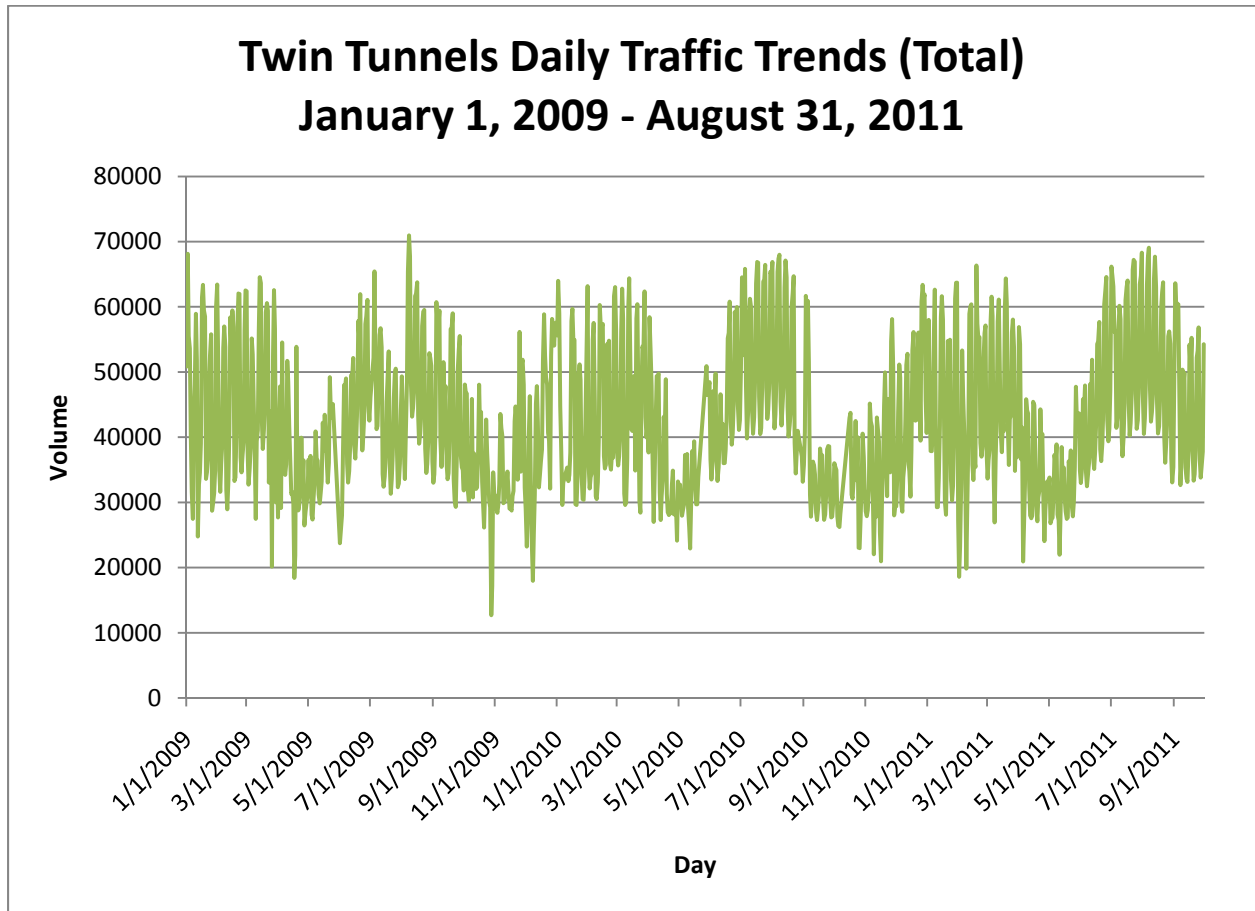
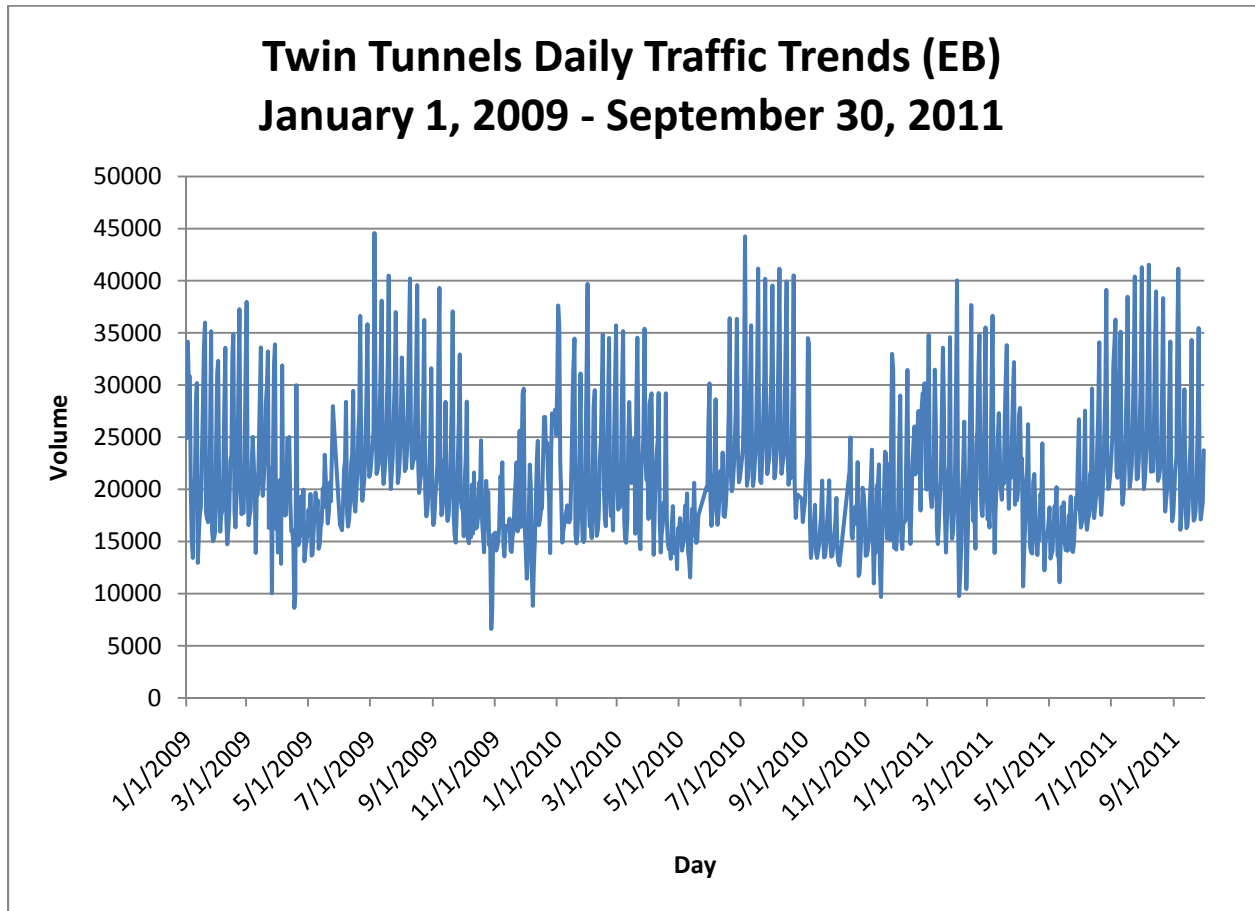




Figure 6.



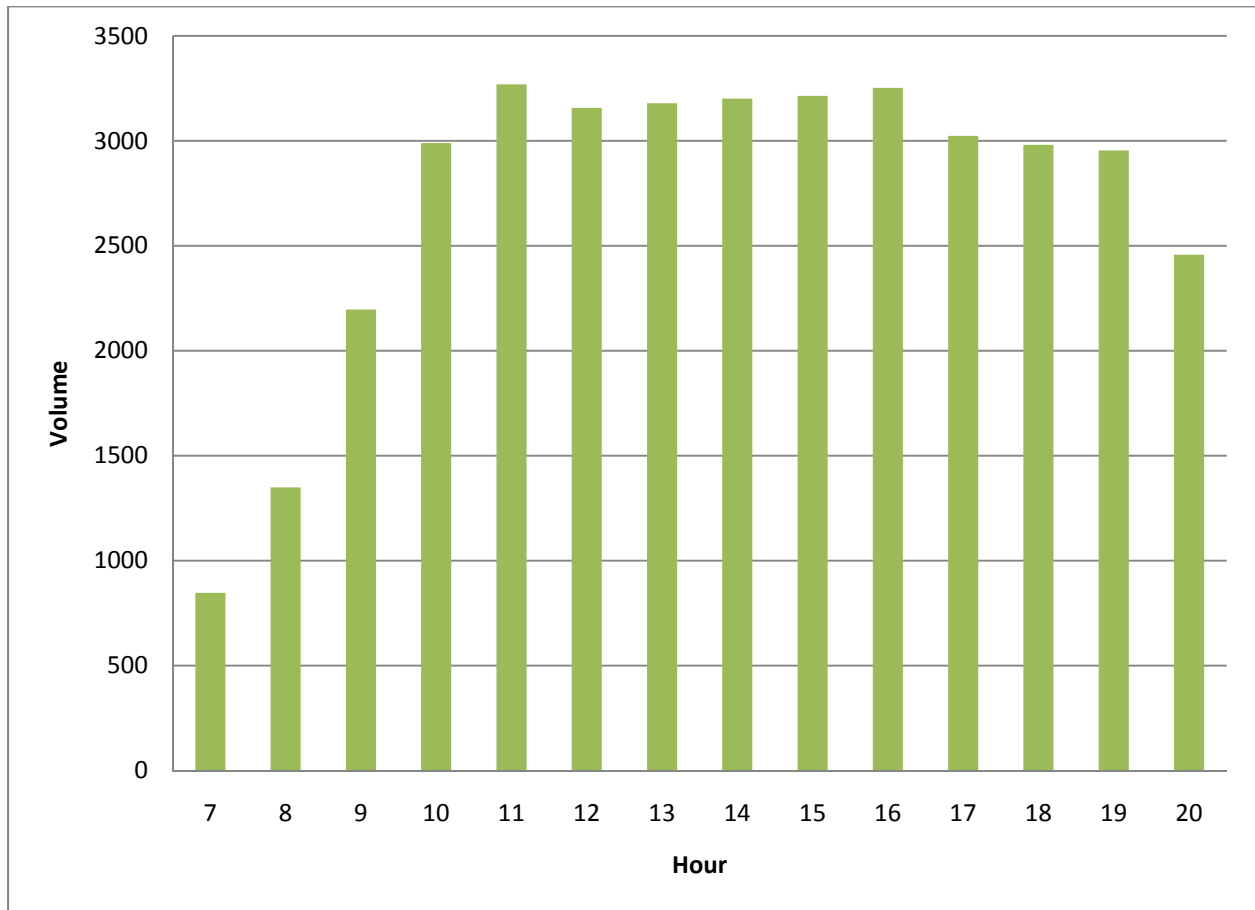
**Table 1. Top Eastbound I-70 Daily Traffic Volumes (1/2009 – 9/2011)**

Rank	Date	Day	Daily Volume
1	7/5/2009	Sun	44,570
2	7/5/2010	Mon	44,249
3	8/7/2011	Sun	41,531
4	7/31/2011	Sun	41,284
5	7/18/2010	Sun	41,168
6	9/5/2011	Mon	41,165
7	8/8/2010	Sun	41,149
8	8/22/2010	Sun	40,509
9	7/19/2009	Sun	40,483
10	7/24/2011	Sun	40,406
11	8/9/2009	Sun	40,216
12	7/25/2010	Sun	40,187
13	1/30/2011	Sun	40,038
14	8/15/2010	Sun	39,927
15	1/31/2010	Sun	39,700
16	8/16/2009	Sun	39,571
17	8/1/2010	Sun	39,544
18	9/7/2009	Mon	39,317
19	6/26/2011	Sun	39,128
20	8/14/2011	Sun	38,967

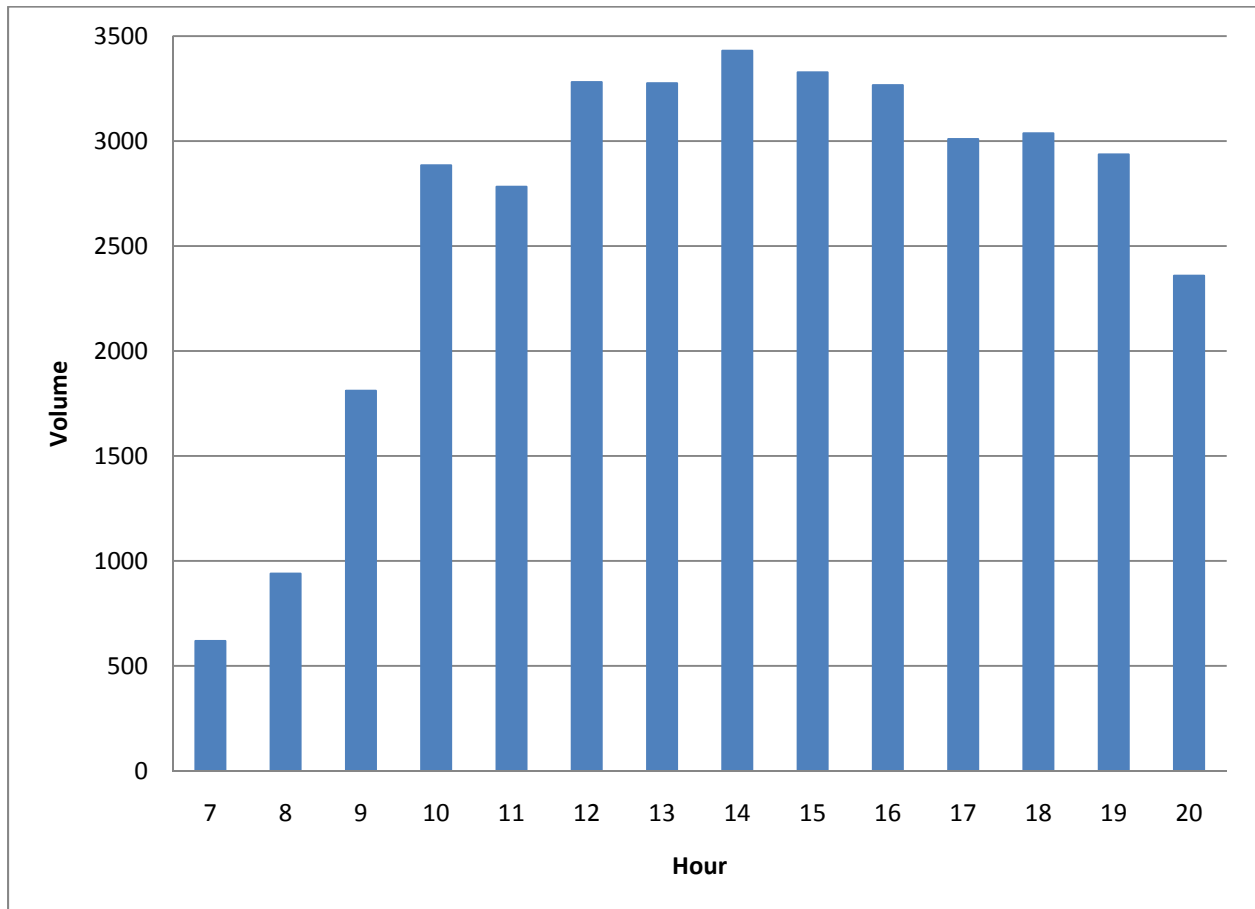
**Table 2. Highest Seasonal Eastbound I-70 Daily Traffic Volumes (1/2009 – 9/2011)**

Highest Summer Days (2009 - 2011)				Highest Winter Days (2009 - 2011)			
Rank	Date	Day	Daily Volume	Rank	Date	Day	Daily Volume
1	7/5/2009	Sun	44,570	1	1/30/2011	Sun	40,038
2	7/5/2010	Mon	44,249	2	1/31/2010	Sun	39,700
3	8/7/2011	Sun	41,531	3	3/1/2009	Sun	37,979
4	7/31/2011	Sun	41,284	4	2/13/2011	Sun	37,665
5	7/18/2010	Sun	41,168	5	1/2/2010	Sat	37,627
6	9/5/2011	Mon	41,165	6	2/22/2009	Sun	37,262
7	8/8/2010	Sun	41,149	7	3/6/2011	Sun	36,634
8	8/22/2010	Sun	40,509	8	1/19/2009	Mon	35,986
9	7/19/2009	Sun	40,483	9	2/28/2010	Sun	35,714
10	7/24/2011	Sun	40,406	10	1/3/2010	Sun	35,690
Top 10 Average			41,651	Top 10 Average			37,430
Top 5 Average			42,560	Top 5 Average			38,602

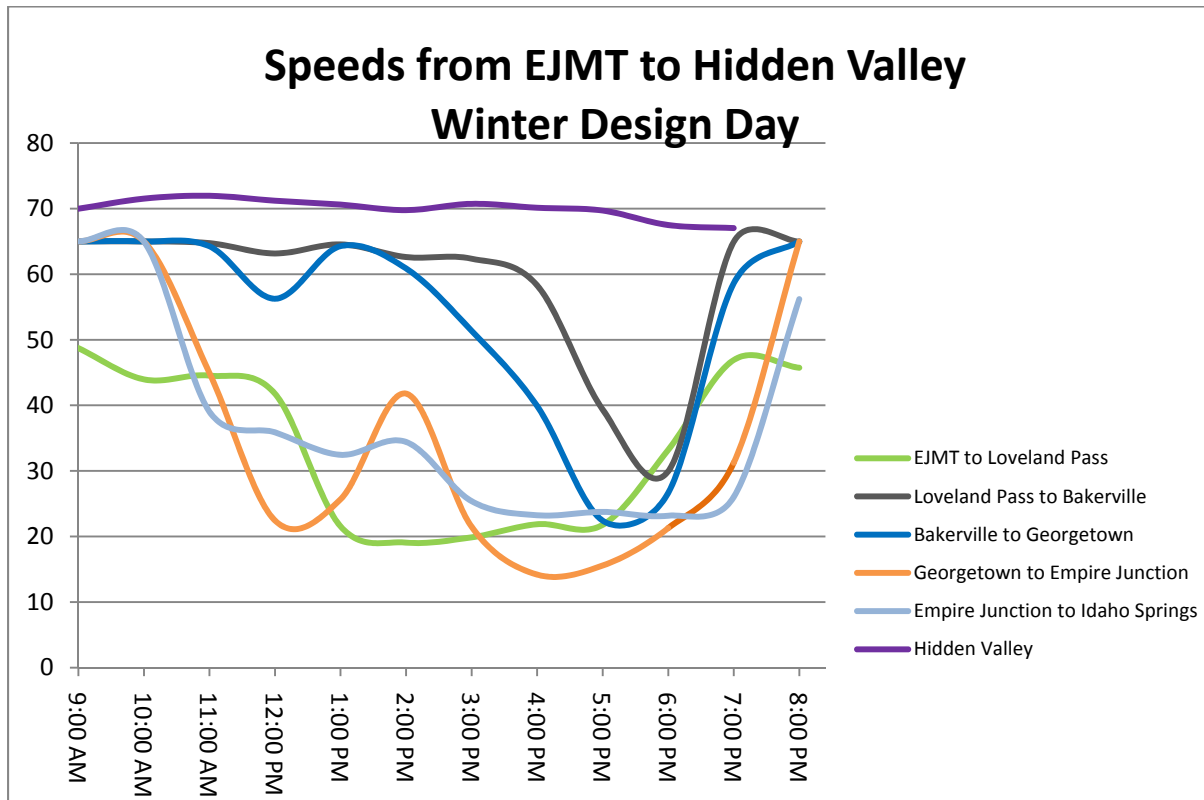
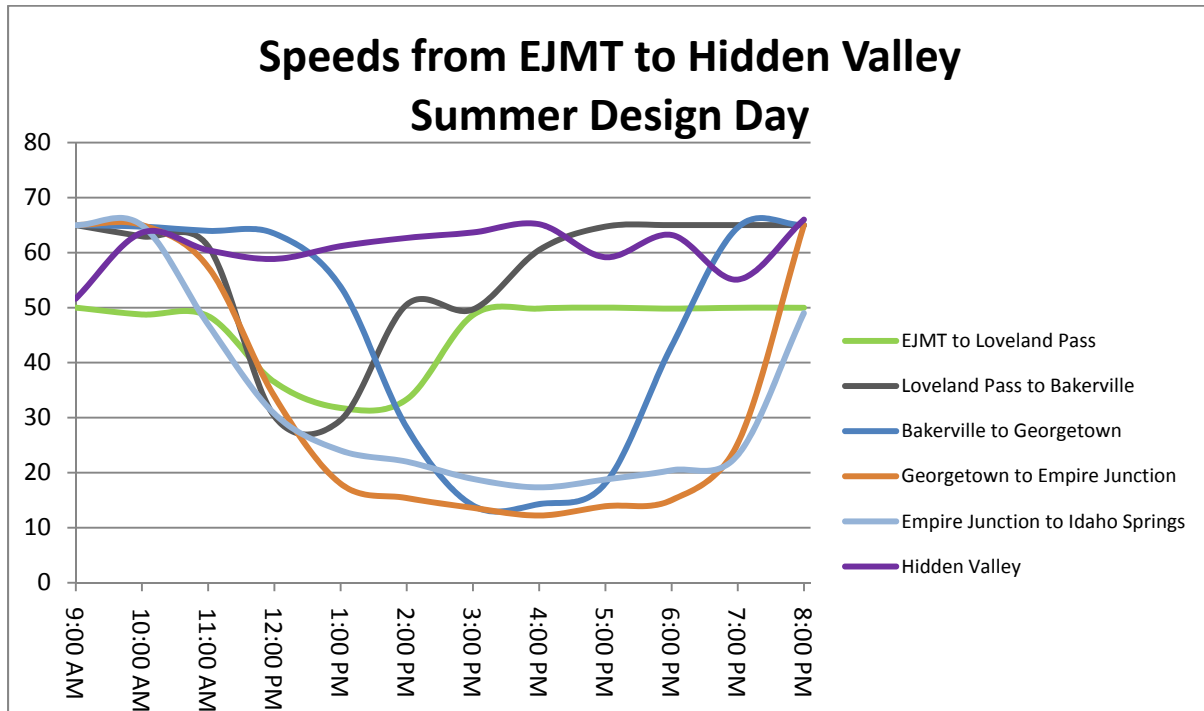
**Figure 7. Summer Design Day Eastbound I-70 Twin Tunnels Hourly Volumes**



**Figure 8. Winter Design Day Eastbound I-70 Twin Tunnels Hourly Volumes**



**Figure 9. I-70 Travel Speed Trends on Design Days**



**Figure 10. Average Speeds east of the Twin Tunnels**

