

Going Around the Neighborhood – A Roundabout Case Study in Texas

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ABSTRACT. A neighborhood traffic management study was conducted in a suburban Dallas community in an attempt to reduce cut-through traffic. Traffic calming measures were originally evaluated as part of the study; however, a closer analysis of the existing conditions in the field revealed that improvements to an intersection adjacent to the neighborhood could potentially solve the problem. This arterial-collector intersection experienced long delays and excessive queue lengths under all-way stop control during the peak periods, leading to a considerable amount of cut-through traffic on the study neighborhood roadways. Possible improvements to this intersection (additional lanes / signalization / roundabout) were evaluated by Lee Engineering and the City of Southlake before proceeding with the first roundabout in the community. A single-lane urban roundabout constructed within the existing right-of-way was predicted to increase mobility at the intersection and reduce cut-through traffic in the neighborhood. Traffic data collected before and after the installation of the roundabout indicated a reduction in delay, a reduction in queue lengths, and an increase in entering traffic volumes. Additionally, the roundabout eliminated complaints of cut-through traffic through the neighborhood.

INTRODUCTION

Southlake, Texas, is a city of 25,000 people located northwest of the Dallas-Fort Worth International Airport. City of Southlake staff had been receiving complaints from residents of the Timarron subdivision of cut-through and speeding traffic within their neighborhood. In the Fall of 2002, Lee Engineering was asked to evaluate the existing conditions and identify possible improvements in the area.

Study Area

The portion of the Timarron subdivision in question is located near the southeastern limits of the City of Southlake and is bordered by Continental Boulevard to the north, Brumlow Avenue to the East, and White Chapel Boulevard to the west. Brief descriptions of the roadways included as part of the study area are provided below and identified in **Figure 1**:

Continental Boulevard - Continental Boulevard (8,900 ADT) is a two-lane undivided roadway located north of the Timarron subdivision with a posted speed limit of 30 mph. Continental Boulevard extends east-west across the City of Southlake approximately one mile south of and parallel to the major east-west arterial in Southlake, Southlake Boulevard (FM 1709), which carries approximately 45,000 vehicles daily.

Carroll Avenue / Brumlow Avenue - Carroll Avenue / Brumlow Avenue extends north-south across the City of Southlake. Carroll Avenue (6,300 ADT) is a four-lane divided roadway section immediately north of Continental Boulevard. Brumlow Avenue (10,700 ADT) is a two-lane undivided roadway south of Continental Boulevard. The posted speed limit on both roadways is 30 mph.

Byron Nelson Parkway - Byron Nelson Parkway (4,600 ADT) is a four-lane divided roadway located between Southlake Boulevard (FM 1709) and Continental Boulevard. South of Continental Boulevard and through the Timarron subdivision, Byron Nelson Parkway is a two-lane undivided roadway with a cross section width of 36 feet. Byron Nelson Parkway serves as a residential collector street within the subdivision and has a posted speed of 30 mph. While Byron Nelson Parkway does not provide a direct connection between Continental Boulevard and Brumlow Avenue, Brumlow Avenue can be reached by using Byron Nelson Parkway and other residential streets within the Timarron subdivision.

An elementary school (Old Union Elementary School) is located to the northwest of the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection. As a result, a school zone (20 mph) is in effect on Continental Boulevard within the study area during the school beginning and release times.

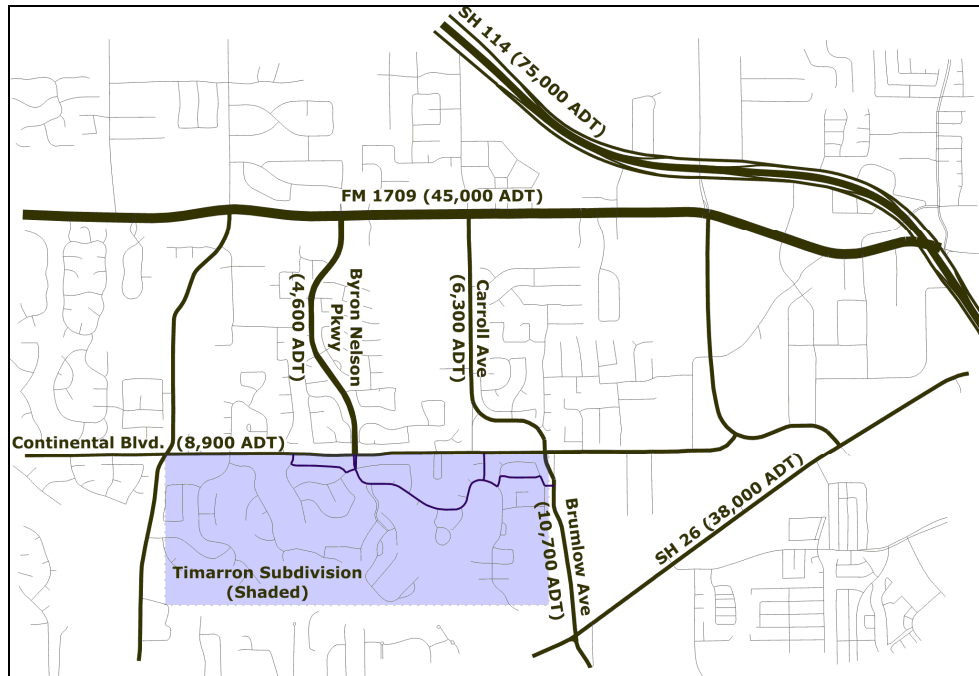


Figure 1: Timarron Subdivision and Area Roadways

Data Collection

The initial task of the study involved identifying areas of concern within and near the study area, which was accomplished through several meetings with representatives of the Timarron subdivision and City of Southlake staff. The two primary concerns were the use of the residential streets within the Timarron neighborhood as a cut-through movement between Continental Boulevard and Brumlow Avenue, and a perceived speeding problem on the residential streets within the neighborhood.

Based on these meetings and the issues brought forth by the residents and City staff, the following traffic data was collected as part of the neighborhood traffic management study:

- Peak hour turning movement counts
- Daily traffic volume counts
- Origin-destination (license plate-based) data for vehicles entering/exiting the neighborhood
- Vehicular speeds (collected by the City)

The results of the peak hour turning movement counts (collected in the Fall of 2002) and the 24-hour volumes in the study area (collected by the City in the Spring of 2002) are provided in **Figure 2**.

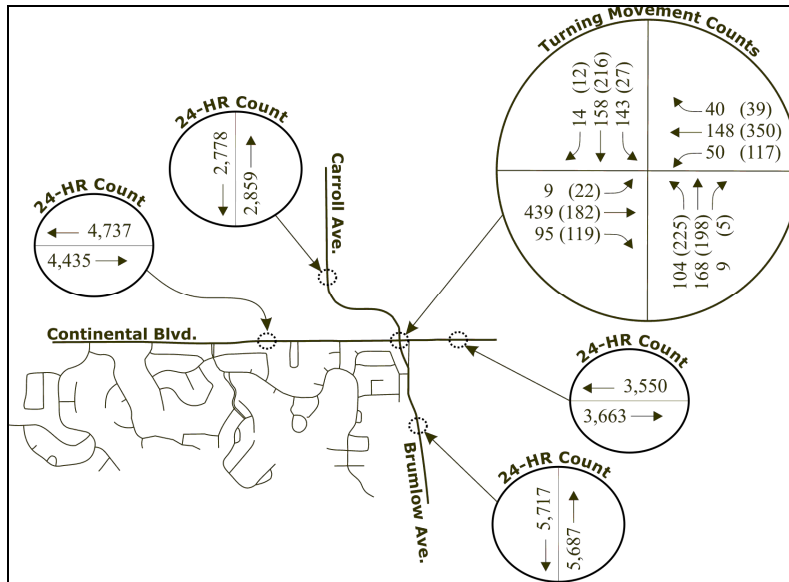


Figure 2: Study Area Traffic Volumes (2002)

ANALYSES AND FINDINGS

Cut-Through Analysis

For the purposes of this study, cut-through traffic was defined as traffic that uses the residential streets within the Timarron subdivision rather than the arterial street system intended for through traffic as identified in the City of Southlake Thoroughfare Plan. The initial portion of this analysis was concerned with identifying the amount of traffic using streets within the Timarron subdivision as a cut-through maneuver between Continental Boulevard and Brumlow Avenue. While all traffic performing the cut-through maneuver would be required to use Warwick Way to access Brumlow Avenue, three possible access locations on Continental Boulevard were identified - Strathmore Drive, Byron Nelson Parkway, and Champions Way. The location of these access points and the possible routes for each of these cut-through movements are provided in Figure 3.

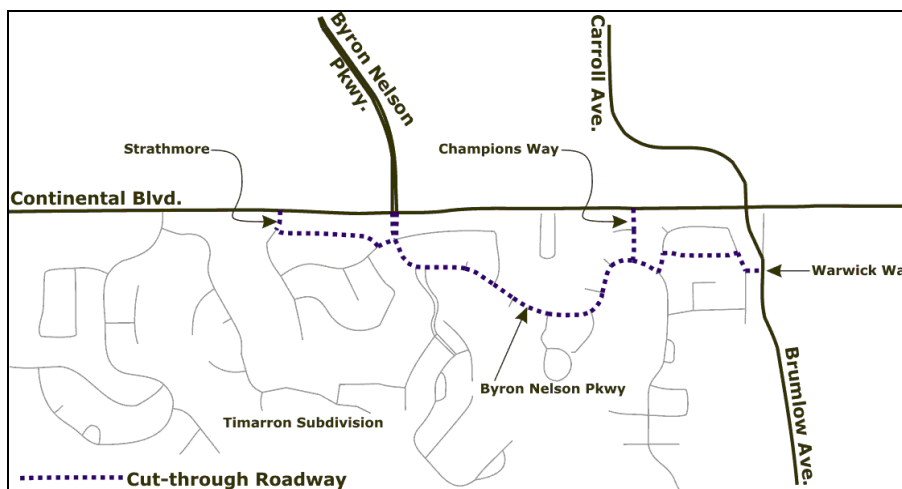


Figure 3: Neighborhood Cut-Through Routes

To determine the amount of cut-through traffic within the Timarron subdivision, a license plate number based origin and destination study was conducted during the AM and PM peak hours. A summary of the amount of vehicles that entered and exited at each access location during the AM and PM peak hours is provided in **Table 1**. The peak hours indicated in this table were based on the peak hours identified by the turning movement counts at the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection.

Table 1. Peak Hour Traffic Volumes for Timarron Access Locations

	Strathmore Dr		Byron Nelson Pkwy		Champions Way		Warwick Way	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
AM Peak Hour (7:30 - 8:30)	38	19	122	123	52	41	46	222
PM Peak Hour (4:45 - 5:45)	26	22	110	113	32	27	72	71

At most of the access points, traffic volumes entering the Timarron subdivision were similar to the traffic volumes exiting the subdivision. One of the possible explanations for the similar entering and exiting volumes and the overall traffic characteristics for the access locations is the presence of the elementary school north of Continental Boulevard. While a number of school buses were identified in the data collection, during the AM peak period, the presence of car pools picking up multiple children in the neighborhood could impact the traffic characteristics.

The traffic volume data in Table 1 indicates that the split between entering and exiting traffic is different than expected, when compared to typical directional splits for residential neighborhoods. During the AM peak hour, a higher percentage of vehicles entered the subdivision than anticipated. The difference in the entering / exiting split for this traffic may be caused by of cut-through movements.

The AM peak hour traffic patterns (high entering volumes at Continental Boulevard access locations / high exiting volumes at Warwick Way) could also be an indication of the presence of cut-through traffic in the Timarron subdivision. Using the license plate data collected at the four access locations to the Timarron subdivision, vehicles which performed the following maneuvers during the AM or PM peak hours were identified:

- Entering the Timarron subdivision at one of the three access locations on Continental Boulevard and exiting the subdivision at Warwick Way; or
- Entering the Timarron subdivision at Warwick Way and exiting the subdivision by one of the three access locations on Continental Boulevard.

Vehicles which completed these movements within the same 15-minute time period of entering the Timarron subdivision were identified as being cut-through trips. The number of vehicles classified as cut-through trips (via Warwick Way) during the AM and PM peak hours are shown in **Table 2**.

Table 2. Cut-Through Results

FROM	TO Warwick Way		FROM Warwick Way		TO
	AM	PM	AM	PM	
Strathmore Drive	14	0	0	1	Strathmore Drive
Byron Nelson Parkway	38	2	1	6	Byron Nelson Parkway
Champions Way	29	1	2	0	Champions Way
Total	81	3	3	7	Total

Based on the data presented in Tables 1 and 2, the streets within the Timarron subdivision were being used for cut-through maneuvers, primarily during the AM peak hour. Of the traffic exiting at Warwick Way during the AM peak hour, a total of 81 vehicles were identified as being cut-through traffic, which is approximately 38 percent of the traffic entering the subdivision from Continental Boulevard and approximately 36 percent of the traffic exiting at Warwick Way. The results indicated that each of the three entrances to the Timarron subdivision from Continental Boulevard were being used to cut-through the neighborhood during the AM peak hour.

An evaluation of traffic and roadway conditions in the study area identified several reasons why cut-through traffic was occurring during the AM peak hour. The primary reason traffic used the streets of the Timarron subdivision as a cut-through maneuver was attributed to the congestion created by the all-way stop-controlled intersection of Continental Boulevard at Carroll Avenue / Brumlow Avenue. Capacity analysis results at this intersection during the AM and PM peak hours are summarized in **Table 3**. These results were obtained by using the Highway Capacity Software program. The original lane configurations for this intersection are provided in **Figure 4**.

Table 3. Existing Conditions Capacity Analysis Results (Fall 2002)

Continental Boulevard at Carroll Avenue / Brumlow Avenue (AWSC)					
	Intersection	NB	SB	EB	WB
AM	53.8 (F) ¹	15.9 (C)	17.3 (C)	117.3 (F)	16.6 (C)
PM	35.6 (E)	21.6 (C)	23.2 (C)	40.3 (E)	50.0 (E)

¹ Delay in seconds/vehicle (Level of Service)

From the results shown above, this intersection operated at poor levels of service during both the AM and PM peak hours. The AM peak hour analysis estimated that eastbound motorists experienced delays of just under two (2) minutes at this intersection. Additionally, a maximum queue of 41 vehicles was observed in the eastbound direction during data collection for the AM peak hour. This queue extended to the east of Champions Way, which is approximately 1,300 feet west of the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection.

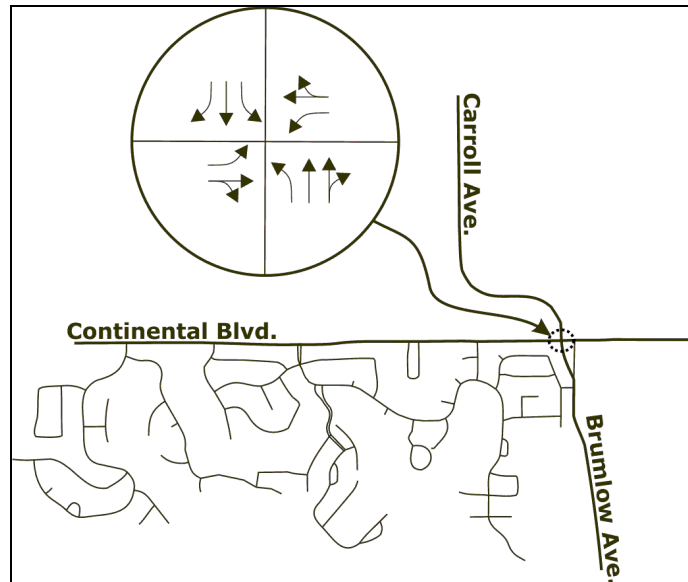


Figure 4: Original Intersection Lane Configuration

In addition to the poor operation of the all-way stop-controlled intersection on Continental Boulevard along Carroll Avenue / Brumlow Avenue and the resulting queues, the presence of the school zone on Continental Boulevard also slowed traffic flows in the area. When the school zone is activated, the speed limit on Continental Boulevard is reduced from 30 to 20 mph. During the AM peak hour, the school zone is in effect from 7:30 - 8:30 AM.

The following factors were identified as the primary causes of cut-through traffic within the Timarron subdivision:

- Congestion created by the all-way stop-controlled intersection at Continental Boulevard and Carroll Avenue / Brumlow Avenue;
- Eastbound queue lengths on Continental Boulevard at Carroll Avenue / Brumlow Avenue; and
- Reduction in speed caused by the school zone on Continental Boulevard.

To estimate the amount of time saved by cutting through the Timarron subdivision, multiple travel time runs from the Continental Boulevard at Byron Nelson Parkway intersection to the Brumlow Avenue at Warwick Way intersection were performed during free flow conditions (i.e., low traffic volume conditions). Performing the travel time runs at this time allowed a baseline travel time to be calculated, since very little delay was experienced on Continental Boulevard (no eastbound queues were present for any of these travel time runs) or on the streets within the Timarron subdivision.

The average travel time from the Continental Boulevard and Byron Nelson Parkway intersection to the Brumlow Avenue and Warwick Way intersection using only Continental Boulevard and Brumlow Avenue was approximately two minutes and fifteen seconds (2:15). Between these same two points (the Continental Boulevard and Byron Nelson Parkway intersection and the Brumlow Avenue and Warwick Way intersection) and using the streets in the Timarron subdivision as a cut-through route resulted in an average travel time of two minutes and forty-

five seconds (2:45). Therefore, under typical free flow conditions, the cut-through route resulted in travel times approximately thirty (30) seconds longer than the adjacent arterial routes.

During the AM peak, the Fall 2002 capacity analysis results for the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection indicated an average delay of approximately two (2) minutes for eastbound traffic at this intersection. Adding this delay to the free flow travel time runs performed when no eastbound queues were present results in an estimated travel time run during the AM peak hour of approximately four minutes and fifteen seconds (4:15) using Continental Boulevard and Brumlow Avenue. Therefore, by cutting through the streets of the Timarron subdivision, an estimated time savings of approximately a minute and a half (1:30) could be gained during the AM peak hour.

Speed Analysis

The City of Southlake provided spot speed data at several locations in the study area. The locations and results of the speed studies are shown in **Table 4**.

Table 4. Speed Study Results

Direction / Location	Posted Speed Limit (mph)	Average Speed (mph)	85th Percentile Speed (mph)
EB Continental - Highland Oaks	30	36	40
WB Continental - E of Byron Nelson	30	34	37
EB Byron Nelson - Fairwood	30	30	34
WB Byron Nelson - Fairwood	30	28	33
EB Waltham	30	27	31
WB Waltham	30	26	30

As shown in Table 4, the 85th percentile speed on Continental Boulevard and Byron Nelson Parkway were higher than the posted speed limit of 30 mph. Possible reasons for the operating speeds on Continental Boulevard being higher than the posted speed include the roadway serving more of a mobility than access function, the prevalence of high through traffic volumes, and the wide ROW provided on both sides of the roadway. Along Byron Nelson Parkway, the wide (36') two-lane undivided roadway in combination with the prohibition of on-street parking may lead to higher than desired speeds.

On Continental Boulevard, these results indicate a possible problem with speed limit compliance or an inappropriate speed limit. The operating speeds on Byron Nelson Parkway appear to be more of a compliance issue than an unrealistic posted speed limit. Based on these results, a lower speed limit (25 mph) on this section of Byron Nelson Parkway would likely result in a large majority of motorists exceeding the speed limit, while a higher speed limit (35 mph) would set the posted speed at a speed greater than desired on a residential roadway.

EVALUATION OF POSSIBLE IMPROVEMENTS

Based on the findings from the previous section, several alternatives for improving traffic conditions on Continental Boulevard and the roads within the Timarron subdivision were evaluated. The type of improvements identified were originally separated into three categories: intersection improvements, roadway improvements, and traffic calming. Since the traffic congestion at the intersection of Continental Boulevard at Carroll Avenue / Brumlow Avenue was identified as the primary cause of the cut-through traffic in the Timarron subdivision, the intersection improvements were the main focus of the recommendations. Lee Engineering and City staff believed that improvements to this intersection would improve the operation and help reduce the cut-through traffic through the Timarron subdivision.

Eastbound right turn lane on Continental Boulevard

The first improvement evaluated was the addition of an eastbound right turn lane on Continental Boulevard at this intersection. If the addition of the right turn lane provided less delay for eastbound right turns, it was anticipated that this would improve the operation of the intersection and reduce the number of cut-through movements through the Timarron subdivision. **Table 5** summarizes the capacity analysis results from Highway Capacity Software with the addition of an eastbound right turn lane.

Table 5. Predicted Unsignalized Intersection Capacity Analysis Results (Fall 2002)

Continental Boulevard at Carroll Avenue / Brumlow Avenue (AWSC)					
With Eastbound Right Turn Lane Added					
	Intersection	NB	SB	EB	WB
AM	30.6 (D) ¹	15.7 (C)	17.1 (C)	60.0 (F)	16.5 (C)
PM	25.9 (D)	19.0 (C)	20.0 (C)	18.4 (C)	38.0 (E)

¹ Delay in seconds/vehicle (Level of Service)

Comparing these results to the original existing condition results (Table 3), the addition of an eastbound right turn lane was predicted to improve the operation of the intersection. Under the improved intersection conditions, LOS D operations are predicted to occur during both the morning and evening peak hours. This represented an improvement over the AM (LOS F) and PM (LOS E) peak hours in the original analyses. While LOS F remains for the eastbound movement during the AM peak hour, the predicted delay is cut in half. During the PM peak hour, the LOS improves from LOS E to LOS C for the eastbound approach.

However, the results provided in Table 5 may have underestimated the actual delay in the field. Limitations of the all-way stop analysis procedure in the *Highway Capacity Manual* allow only two travel lanes per leg. With the addition of a right turn lane on the eastbound leg of this intersection, there would be three lanes on this leg. To perform an analysis at this intersection with the addition of an eastbound right turn lane, the eastbound right turn volumes were removed from the approach. This would be a valid assumption only if the right turn lane were long enough to remove all right turn traffic from the eastbound through queue. Therefore, the results

in Table 5 represented a best-case estimate of traffic conditions at this intersection with the addition of an eastbound right turn lane. It is predicted that with an eastbound right turn lane in place, the maximum queue would be reduced, as well as some of the cut-through traffic in the Timarron subdivision. However, in order to be effective, an eastbound right turn lane of considerable length would have been required to reduce the observed peak hour queues. A right turn lane of sufficient length was deemed impractical.

Traffic Signal

The installation of a traffic signal was also evaluated at the Continental Boulevard and Brumlow Avenue / Carroll Avenue intersection. **Table 6** presents the results of this analysis using Highway Capacity Software.

Table 6. Predicted Signalized Intersection Capacity Analysis Results (Fall 2002)

Continental Boulevard at Carroll Avenue / Brumlow Avenue (Signal)					
	Intersection	NB	SB	EB	WB
AM	21.8 (C) ¹	20.7 (C)	20.3 (C)	27.9 (C)	12.7 (B)
PM	19.0 (B)	15.6 (B)	23.3 (C)	21.5 (C)	17.6 (B)

¹ Delay in seconds/vehicle (Level of Service)

As a fully actuated signalized intersection, the overall intersection and the individual movements were predicted to operate at acceptable levels of service and operate more efficiently than under the existing all-way stop-controlled intersection (Table 3) during peak hours. The installation of a signal at this intersection would also result in a better overall intersection level of service than construction of an eastbound right turn lane (Table 5).

Roundabout

As an alternative to both an all-way stop-controlled (AWSC) and signalized intersection, the installation of a modern roundabout was also evaluated. For this analysis, the all-way stop-controlled intersection of Continental Boulevard at Carroll Avenue / Brumlow Avenue was analyzed as an urban single-lane roundabout. Capacity analyses were performed using the *Highway Capacity Manual* methodology as implemented in the HCS software package. Capacity analysis results for roundabouts in HCS provide approaching capacity and volume-to-capacity ratios for an intersection. Typically, the volume-to-capacity ratio of any roundabout leg is recommended not to exceed 0.85. The predicted roundabout capacity analysis results are provided in **Table 7**.

Table 7. Predicted Roundabout Capacity Analysis Results (Fall 2002)

Continental Boulevard at Carroll Avenue / Brumlow Avenue (Roundabout)					
		NB	SB	EB	WB
AM	Capacity	652	857	791	890
	V/C Ratio	0.48	0.47	0.74	0.32
PM	Capacity	905	600	820	769
	V/C Ratio	0.50	0.48	0.50	0.73

The HCM methodology used in the roundabout analysis is based on the gap acceptance of motorists. Previous research studies have indicated a range of critical gap values and follow-up time to use when analyzing the approximate capacity of a roundabout. For this analysis, the lower-bound values of critical gap and follow-up time were used to produce conservative results. As shown in Table 7, as a roundabout, this intersection had significant amount of extra capacity available on three of the approaches during both the AM and PM peak hours. A small amount of capacity was predicted to be available for the major approaches to the intersection during the AM (eastbound) and PM (westbound) peak hours.

RECOMMENDED INTERSECTION IMPROVEMENTS

All of the possible intersection improvements evaluated for the Continental Boulevard at Carroll Avenue / Brumlow Avenue intersection (addition of eastbound right turn lane, signal installation, construction of a roundabout) improved the operation of the intersection to acceptable levels compared to the original all-way stop-controlled intersection. Since construction of an eastbound right turn lane was not anticipated to be as beneficial to the intersection and peak hour operation as the other two improvements, further evaluation of the signal and modern roundabout installations were necessary.

Closer delay comparisons between a traffic signal and roundabout indicated similar peak hour delays and shorter off-peak delays for the modern roundabout. The peak hour delay results were similar only because the original intersection lane configuration had 10 entering lanes compared to the 4 lanes entering the proposed modern roundabout. Off-peak delays are lower under roundabout control because motorists only have to slow down and yield to traffic at a modern roundabout rather than stopping if facing a red indication at a traffic signal. When no conflicting traffic is present motorists at a modern roundabout can proceed through the intersection without delay. Because no additional ROW was required for the construction of the roundabout, the cost of roundabout construction at this particular location was similar to the cost of a traffic signal. Additionally, the City was hesitant to install a traffic signal, as this would have been the first City operated and maintained traffic signal within Southlake and would have been out of character with the surrounding area. All existing traffic signals in the City are on State routes and owned and maintained by the Texas Department of Transportation. Given the better efficiency and appearance of the modern roundabout compared to a signal installation, the City of Southlake chose to move forward with roundabout construction in the Summer of 2004.

MODERN ROUNDABOUT IMPLEMENTATION RESULTS

As a means of documenting the benefits of the modern roundabout installation, before and after traffic data was collected at the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection. The before data was collected in May 2004, while school was in session and before construction of the modern roundabout began in June 2004. The intersection began functioning as a roundabout in July 2004. The after data was collected in May 2005, which allowed motorists time to grow accustomed to the operation of the roundabout. The traffic data collected in the field included:

- Peak hour turning movement volumes (before condition only);
- 24-hour traffic volumes; and
- Stopped vehicles by approach.

The before traffic data was collected on Tuesday, May 11, 2004. Figure 4 shows the lane configurations at the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection as an all-way stop-controlled intersection when the before data was collected. **Figure 5** shows the AM and PM peak hour and 24-hour traffic volumes which were collected as part of the before data collection.

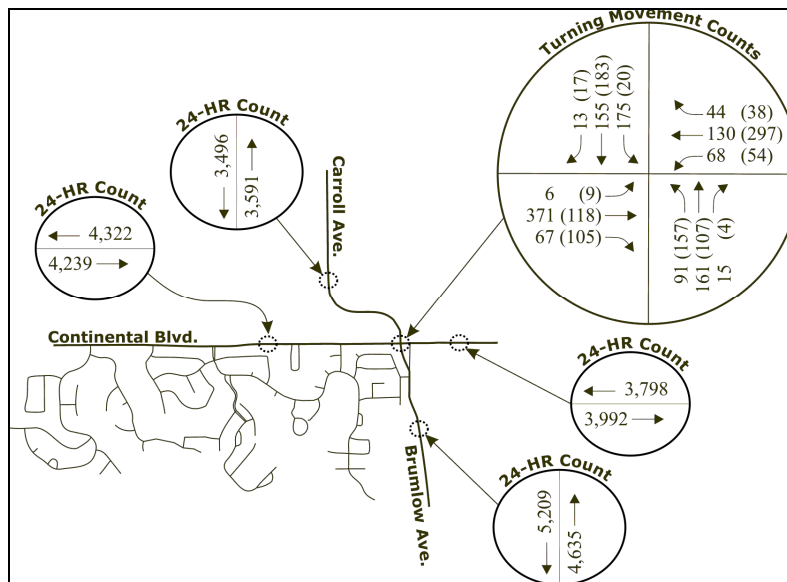


Figure 5: Before Study Traffic Volumes (May 2004)

The number of stopped vehicles on each approach was recorded in fifteen (15) second intervals during the AM and PM peak hours to estimate stopped delay. The number of stopped vehicles was also used in determining the average and maximum queues. The results from the stopped vehicle counts for the before conditions are summarized in **Table 8**.

Table 8. Before Stopped Delay and Queue Analysis Field Results (May 2004)

Continental Boulevard at Carroll Avenue / Brumlow Avenue (AWSC)					
	AM				
	Intersection	NB	SB	EB	WB
Stopped Delay (sec/veh)	123.7	12.5	14.3	317.0	13.2
Average Queue (veh)	---	0.8	1.4	41.3	0.8
Maximum Queue (veh)	---	6	8	64	5
	PM				
	Intersection	NB	SB	EB	WB
Stopped Delay (sec/veh)	56.9	18.5	23.5	29.6	118.4
Average Queue (veh)	---	1.4	1.4	1.9	12.8
Maximum Queue (veh)	---	8	8	8	41

The data in Table 8 help further explain the desire for motorists to avoid the Continental Boulevard and Carroll Avenue / Brumlow Avenue intersection and to cut-through the Timarron subdivision. Since lengthy delays (5+ minutes) were experienced by eastbound motorists during the AM peak, cutting through the Timarron subdivision was estimated to save two and a half minutes. These results also indicate that the observed maximum eastbound queue increased from 41 vehicles in Fall 2002 to 64 under the before conditions in May 2004. During the PM peak period, the peak westbound travel direction also experienced excessive delays and queues.

The after traffic data was collected on Tuesday, May 10, 2005, which was approximately eight months after completion of the roundabout. Since turning movement counts at a roundabout are difficult to collect in the field, the number of vehicles approaching each leg of the roundabout was collected. These values, along with the approach volumes in the before condition, are presented in **Figure 6**.

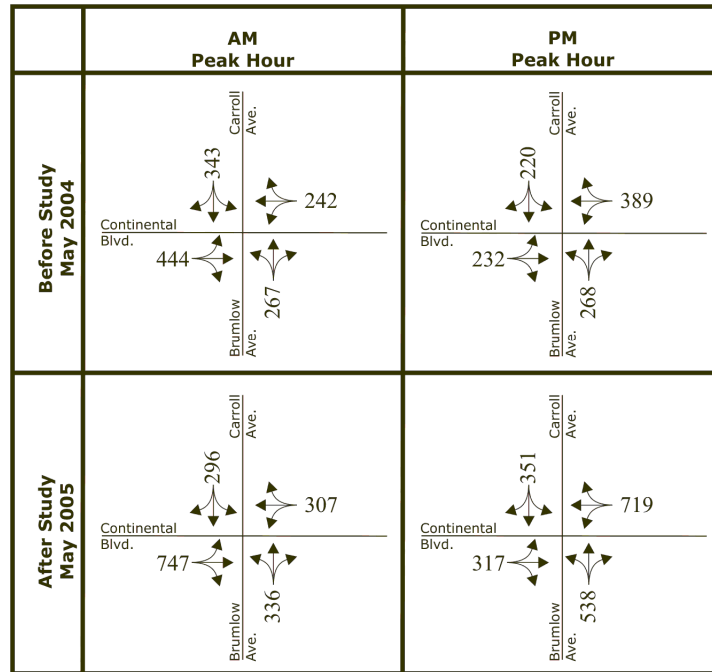


Figure 6: Before and After Study Traffic Volumes

Under roundabout operation at this intersection, it was difficult to define a stopped vehicle in the after condition, since most of the vehicles were moving on the approaches to the roundabout. There was seldom a stopped queue on the approaches during data collection in the field. For consistency and to represent a conservative estimate of the number of stopped vehicles, a vehicle in a slow moving queue was considered a stopped vehicle for data collection purposes. A fifteen (15) second interval was also used for the after data collection. The results for the after stopped vehicle counts are summarized in **Table 9**.

Table 9. After Stopped Delay and Queue Analysis Field Results (May 2005)

Continental Boulevard at Carroll Avenue / Brumlow Avenue (Roundabout)					
	AM				
	Intersection	NB	SB	EB	WB
Stopped Delay (sec/veh)	14.4	24.0	4.4	15.7	11.1
Average Queue (veh)	---	2.2	0.4	3.3	0.9
Maximum Queue (veh)	---	12	4	15	5
	PM				
	Intersection	NB	SB	EB	WB
Stopped Delay (sec/veh)	13.9	17.8	12.4	11.1	13.0
Average Queue (veh)	---	2.7	1.2	1.0	2.6
Maximum Queue (veh)	---	12	7	4	10

Table 10 contains a comparison of the before and after data, and provides a summary of the various operational improvements resulting from the installation of this modern roundabout.

Table 10. Operational Improvements at the Southlake Roundabout

TOTAL INTERSECTION						
	AM Peak Hour			PM Peak Hour		
	Before	After	% Change	Before	After	% Change
Entering Volume (veh/hr)	1296	1686	+ 30%	1109	1925	+ 74%
Delay (sec/veh)	123.7	14.4	- 88%	56.9	13.9	- 76%
MAJOR MOVEMENT						
	AM Peak - Eastbound			PM Peak - Westbound		
	Before	After	% Change	Before	After	% Change
Approach Delay (sec/veh)	317.0	15.7	- 95%	118.4	13.0	- 89%
Maximum Queue (veh)	64	15	- 77%	41	10	- 76%
Average Queue (veh)	41	3	- 92%	13	3	- 80%

This study presents the significant operational improvements realized through the implementation of a modern roundabout in lieu of a traditional all-way stop-controlled or signalized intersection. Based on observations of exiting volumes at Warwick Way and the significant reduction in resident complaints, cut-through traffic in the Timarron neighborhood southwest of the Continental Boulevard and Carroll Avenue/Brumlow Avenue intersection is no longer an issue due to the reduced queues and delays resulting from roundabout control.

CONCLUSIONS

This study began as a neighborhood traffic management study focused on reducing residential cut-through and speeding complaints within a subdivision. Traffic calming devices were evaluated and considered as part of the initial study effort. During the project, the identified problem intersection outside of the neighborhood was analyzed and improved, ultimately eliminating the need for traffic calming improvements within the neighborhood.

At this location, a modern roundabout has proven to be a dramatic improvement to the operation of this intersection. Local residents have been happy with the intersection improvements and have complimented engineering personnel at the intersection; in addition, cut-through complaints have ceased. The City of Southlake's second modern roundabout is currently in the design stage with two additional roundabouts possible in the next few years.

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