

**SAN SOUCI 5850 DAHLIA RETAIL SHOP
DAHLIA STREET & 58TH PLACE
COMMERCE CITY, COLORADO**

TRAFFIC IMPACT STUDY

PREPARED FOR

**SAN SOUCI ENTERPRISES
433 S BALSAM ST, STE 103
LAKEWOOD, CO 80226**

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OA PROJECT No. 016-1205

1.0 INTRODUCTION AND OBJECTIVE

This report documents the results of traffic impact analyses conducted for the proposed San Souci dispensary located on the northeast quadrant of Dahlia Street & 58th Avenue in Commerce City, Colorado. A map showing the general location of the proposed development is illustrated in **Figure 1**.

This traffic study was conducted to identify the expected trips that would be generated by the proposed development and to determine the effects of site traffic on the surrounding roadway network. Specific recommendations are included at the end of this report to help mitigate the traffic impacts.

2.0 DATA COLLECTION

The data collection effort included acquiring peak-hour turning movement counts, average daily traffic (ADT) counts, and documentation of current roadway geometrics and traffic control.

Intersection turning movement counts were conducted on Tuesday, June 28, 2016 at the following intersections:

- Vasquez Boulevard & 60th Avenue
- Dahlia Street & 58th Place
- Eudora Street & 58th Avenue
- Eudora Street & 56th Avenue

Study intersections were determined through coordination with the City of Commerce City. The count was conducted during the AM and PM peak periods of traffic flow (7:00am – 9:00am and 4:00pm – 6:00pm, respectively).

In addition, 24-hour average daily traffic (ADT) volumes were counted along Dahlia Street between 58th Place and 60th Avenue and along Eudora Street between 58th Avenue and 56th Avenue.

Count data collected for this study can be found in **Appendix A**. Note that existing volumes reflect the year 2016.

3.0 EXISTING CONDITIONS

Existing traffic conditions were evaluated to identify any existing deficiencies and to provide a baseline for comparison purposes.

3.1 Network Characteristics

There are eight major roadways within the study area: I-270, Vasquez Boulevard, Dahlia Street, Eudora Street, 60th Avenue, 58th Place, 58th Avenue, and 56th Avenue. Founders Parkway is also State Highway 86 (SH 86). Current network characteristics are summarized in **Table 1** below. Data for each roadway was acquired from aerial photography and the CDOT Online Transportation Information System (OTIS).

FIGURE 1

Vicinity Map

Dahlia Retail Shop
Commerce City, CO

LEGEND

 Study Intersection

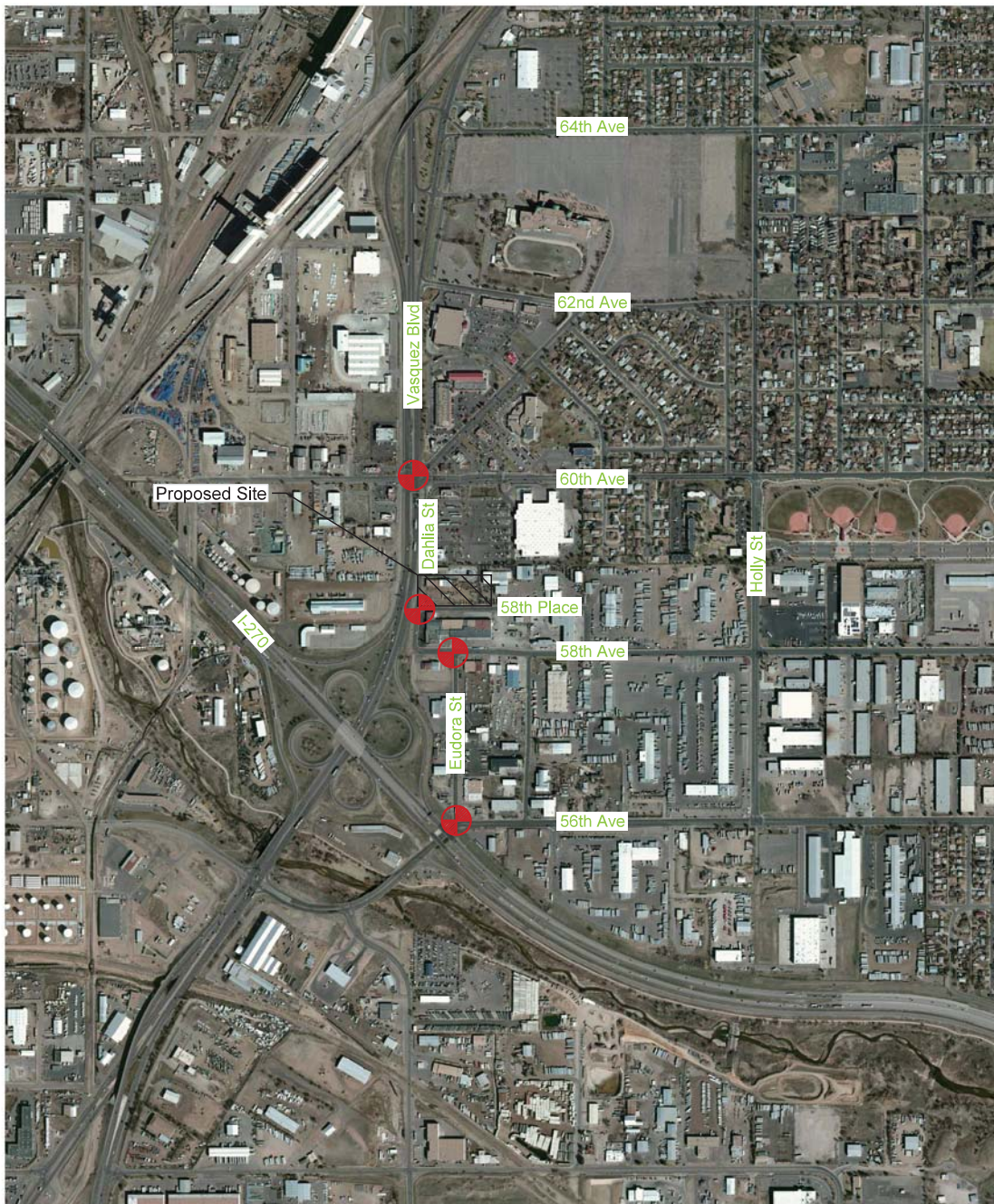


TABLE 1: EXISTING NETWORK SUMMARY

Roadway	Section	Median Type	Posted Speed	Functional Classification
I-270	4-Lane	Divided	55 mph	Interstate ¹
Vasquez Boulevard	6-Lane	Divided	45 mph	Principal Arterial (NR-C) ¹
Dahlia Street	2-Lane	n/a	25 mph	Collector ²
Eudora Street	2-Lane	n/a	25 mph	Local ²
60 th Avenue	3-Lane	TWLTL	35 mph	Collector ²
58 th Place	2-Lane	n/a	25 mph	Local ²
58 th Avenue	2-Lane	n/a	35 mph	Collector ²
56 th Avenue	4-Lane	n/a	35 mph	Collector ²

¹From CDOT OTIS²Assumed based on roadway characteristics

Existing lane configurations and traffic control for the study network are illustrated in **Figure 3**.

3.2 Existing Capacity Analysis

Capacity analyses were performed for the existing study intersections utilizing the existing lane configurations and traffic control. Analyses were conducted using Synchro, Version 9.1 which is based on the Highway Capacity Manual 2010 delay methodologies. For simplicity, the amount of control delay is equated to a grade or Level of Service (LOS) based on thresholds of driver acceptance. The amount of delay is assigned a letter grade A through F, LOS A representing little or no delay and LOS F representing very high delay. **Table 2** shows the delays associated with each LOS grade for signalized and unsignalized intersections, respectively.

TABLE 2: INTERSECTION LOS CRITERIA

Level-of-Service	Average Control Delay (seconds)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50
Highway Capacity Manual (HCM 2010)		

Results of the analyses indicate that the signalized intersection of Vasquez Boulevard & 60th Avenue operates at LOS D or better in both peak hours. Note that this is a six-leg intersection and was analyzed using HCM 2000 methodology. Most individual movements at this intersection operate at LOS D or better during both peak hours with the exception of the southbound left-turning movement which operates at LOS E in the PM peak hour.

The 95th percentile queue lengths for northbound thru movements are approximately 460 feet in the AM peak hour, which extends through the storage and taper length of the left-turn lanes. The 95th percentile queue length for the southbound left-turning movement is approximately 220 feet which is the storage length of the southbound left-turn lanes.

All movements at unsignalized intersections operate at LOS D or better in both peak hours. The 95th percentile queue lengths are no more than three vehicles in both peak hours. The intersection of Dahlia Street & 58th Place is a three-way stop controlled intersection with the west leg as a free movement from Vasquez Boulevard. The Highway Capacity Manual does not provide methodology for intersections with this configuration. For the purposes of this and subsequent analyses, this intersection was analyzed as a two-way stop controlled intersection with the east and west legs analyzed as the major legs.

The Existing Conditions capacity analysis summary is illustrated in **Figure 4**. Detailed results may be found in **Appendix B**.

4.0 FUTURE BACKGROUND ANALYSIS

Current traffic volumes and projected roadway ADT volumes were used as a basis for peak hour volume projections. The year 2040 was chosen to represent the long-term horizon year which corresponds to the Denver Regional Council of Governments (DRCOG) 2040 Fiscally Constrained Regional Transportation Plan.

4.1 2040 Background Volumes

Future ADT projections for the horizon year of 2040 were provided by DRCOG. Existing and projected volumes were used to develop an annual growth rate for surrounding roadways. Peak hour volumes at the intersection of Vasquez Boulevard & 60th Avenue were generated based on techniques described in NCHRP 255, 'HIGHWAY TRAFFIC DATA FOR URBANIZED AREA PROJECT PLANNING AND DESIGN', Chapter 8 and probable traffic patterns given the facility and area characteristics. This process is largely dependent on peak hour "K" and directional distribution "d" factors which indicate portion and direction of ADT flow for a given peak hour.

The resulting volumes represent an approximate one percent annual growth rate at Vasquez Boulevard & 60th Avenue. This one percent annual growth rate was also applied to Eudora Street & 56th Avenue. Based on conversations with DRCOG, a growth factor of 2.0 was applied to volumes along Eudora Street and Dahlia Street. The resulting annual growth rate is approximately three percent.

The 2040 Background peak hour volumes are shown in **Figure 5**.

4.2 2040 Background Capacity Analysis

Results of the capacity analysis show that the signalized intersection of Vasquez Boulevard & 60th Avenue is expected to operate at LOS D and LOS E in the AM and PM peak hours, respectively. Most individual turning movements are expected to operate at LOS D or better in both peak hours with the exception to the following movements:

- Southbound thru (LOS E, AM)
- Eastbound left/thru (LOS E, PM)
- Westbound left (LOS F, PM)
- Northbound left/thru (LOS E, PM)
- Southbound left (LOS F, PM)
- Southwest movements (LOS F, PM)

The 95th percentile queue length for southbound thru movements are expected to be approximately 675 feet in the AM peak hour. The 95th percentile northbound thru queue is expected to be approximately 725 feet in the PM peak hour. The southbound left-turning queue is expected to reach approximately 330 feet in the PM peak hour. At this queue, vehicles are expected to exceed the existing storage length of the southbound left-turn lanes by approximately 110 feet.

All movements at unsignalized intersections are expected to operate at LOS D or better in both peak hours with the exception of the southbound movements at Eudora Street & 56th Avenue, which are expected to operate at LOS E in both peak hours. The 95th percentile queue length for this movement is expected to be no more than four vehicles in either peak hour. The northbound movement at Dahlia Street & 58th Place is expected to operate at LOS F in the PM peak hour with a 95th percentile queue length of approximately seven vehicles.

The 2040 Background Conditions capacity analysis summary is illustrated in **Figure 6**. Detailed results may be found in **Appendix C**.

6.0 PLUS SITE CONDITIONS

The Existing and 2040 Background traffic volumes were combined with the proposed site trips to develop 2017 plus Site and 2040 plus Site volumes for capacity analysis purposes. The growth between existing volumes and the year 2017 was determined to be negligible; therefore, existing volumes were used to develop 2017 plus Site volumes.

Two site access points are shown in the site plan and were included in the Plus Site scenarios. One access is shown on Dahlia Street approximately 250 feet east of 58th Place and one is shown on 58th Place 100 feet north of Dahlia Street.

The 2017 plus Site peak hour volumes are shown in **Figure 10**. The 2040 plus Site peak hour volumes is shown in **Figure 11**.

6.1 2017 plus Site Conditions Capacity Analysis

Results of the capacity analysis show that the signalized intersection of Vasquez Boulevard & 60th Avenue is expected to operate at LOS D or better in both peak hours. Most individual turning movements are expected to operate at LOS D or better in both peak hours with the exception of the southbound left-turning movement which is expected to operate at LOS E in the PM peak hour. The 95th percentile queue length for southbound thru movements are expected to be approximately 500 feet in the AM peak hour. The 95th percentile northbound thru queue is expected to be approximately 470 feet in the PM peak hour. The southbound left-turning queue is expected to reach approximately 230 feet in the PM peak hour. This queue is expected to exceed the southbound turn-lane storage by approximately 10 feet. There is approximately 10 feet additional queue length for northbound and southbound movements from the Existing Conditions.

All movements at unsignalized intersections are expected to operate at LOS D or better in both peak hours with the exception of the southbound movements at Eudora Street & 56th Avenue, which are expected to operate at LOS E in both peak hours. The 95th percentile queue length for this movement is expected to no more than four vehicles in either peak hour.

The 2017 plus Site capacity analysis summary is shown in **Figure 12**. Detailed results can be found in **Appendix E**.

6.2 2040 plus Site Conditions Capacity Analysis

Results of the capacity analysis show that the signalized intersection of Vasquez Boulevard & 60th Avenue is expected to operate at LOS D and LOS E in the AM and PM peak hours, respectively. Most individual turning movements are expected to operate at LOS D or better in both peak hours with the exception to the following movements:

- Southbound thru (LOS E, AM)
- Eastbound left/thru (LOS E, PM)
- Westbound left (LOS F, PM)
- Northbound left/thru (LOS E, PM)
- Southbound left (LOS F, PM)
- Southwest movements (LOS F, PM)

The 95th percentile queue length for southbound thru movements are expected to be approximately 675 feet in the AM peak hour. The 95th percentile northbound thru queue is expected to be approximately 735 feet in the PM peak hour. This is an increase of approximately 10 feet from 2040 Background conditions. The southbound left-turning queue is expected to reach approximately 350 feet in the PM peak hour. This is an increase of approximately 20 feet from 2040 Background conditions. At this queue, vehicles are expected to exceed the left-turn storage length by approximately 130 feet.

All movements at unsignalized intersections are expected to operate at LOS D or better in both peak hours with the exception of the southbound movements at Eudora Street & 56th Avenue, which are expected to operate at LOS E and LOS F in the AM and PM peak hour, respectively. The 95th percentile queue length for this movement is expected to reach approximately nine vehicles in the PM peak hour.

In addition, the northbound movement at Dahlia Street & 58th Place is expected to operate at LOS F in the PM peak hour with a 95th percentile queue length of approximately nine vehicles. The southbound movement at this intersection are expected to operate at LOS E in the PM peak hour with a queue length of approximately three vehicles. This queue is not expected to extend past the site drive.

The 2040 plus Site capacity analysis summary is illustrated in **Figure 13**. Detailed results can be found in **Appendix F**.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study is to provide an assessment of the traffic volume projections and impacts on the roadway network before and after the construction of the proposed Dahlia Street Retail Shop. The site is proposed to consist of a marijuana dispensary, medical office space, and general light industrial space. Two site drives are proposed; one along 58th Place approximately 250 feet east of Dahlia Street and one along Dahlia Street approximately 100 feet north of 58th Place. The site is expected to generate approximately 1,221 daily trips.

In general, all traffic operations perform at acceptable levels of service in existing conditions as well as 2017 plus Site conditions. Most queue lengths are expected to be stored within existing storage lengths in these conditions with the exception of the southbound left-turning movement at Vasquez Boulevard & 60th Avenue which begins to exceed the storage length in existing conditions.

In 2040 Background and 2040 plus Site conditions, several movements are expected to operate at LOS E and LOS F throughout the network. The queue length for the southbound left-turning movement at Vasquez Boulevard & 60th Avenue is expected to exceed the existing storage length. Additional storage length for this movement is recommended. A table summary of the LOS and delay for all movements throughout the network can be seen in **Appendix G**. This table shows only the southbound movements at Eudora Street & 56th Avenue and at Dahlia Street & 58th Place as having significant increases in delay.

There is a northbound add lane from an I-270 off-ramp to Vasquez Boulevard located approximately 275 feet south of Dahlia Street & 58th Place. This add lane is dropped as a free thru-left movement at Dahlia Street & 58th Place. The northbound and southbound movements at Dahlia Street & 58th Place are expected to operate at poor LOS and delay in future conditions. This poor LOS and delay can be attributed to the free eastbound thru-left movement from Vasquez Boulevard. Closing the free movement from Vasquez Boulevard and making the northbound and southbound legs the major legs at Dahlia Street & 58th Place is expected to improve LOS at this intersection. Based on coordination with CDOT, a closure at this intersection is not planned in the future.

In addition, the intersection of Vasquez Boulevard & 60th Avenue is a six-leg intersection with one leg (Dahlia Street) that only accepts entering traffic. Due to the unique nature of this intersection, and considering there is a signalized intersection just west of Vasquez Boulevard on 60th Avenue, there are no recommendations to improve the existing approaches at Vasquez Boulevard & 60th Avenue. Because of the expected poor LOS in future conditions, the City and CDOT should program a study to look at design alternatives for this intersection and the Vasquez Boulevard corridor.

Level of Service and Delay Summary

Intersection	Turning Movement	Existing LOS	Existing Delay, s	2017 plus Site LOS	2017 plus Site Delay, s	2040 Background LOS	2040 Background Delay, s	2040 plus Site LOS	2040 plus Site Delay, s
Vasquez Boulevard & 60th Avenue	EBL	C (C)	29.6 (31.3)	C (C)	29.6 (30.9)	C (E)	28.6 (55.7)	C (D)	28.6 (54.9)
	EBT	C (D)	33.6 (36.2)	C (D)	33.6 (35.8)	C (E)	34.8 (64.6)	C (E)	34.8 (65.2)
	EBR	C (C)	31.1 (32.0)	C (C)	31.1 (31.5)	C (D)	31.0 (46.6)	C (D)	31.0 (46.5)
	WBL	C (C)	27.1 (32.1)	C (C)	27.1 (32.2)	C (F)	30.8 (107.8)	C (F)	31.0 (116.5)
	WBT	C (C)	30.3 (33.6)	C (C)	30.3 (33.1)	C (D)	31.5 (53.3)	C (D)	31.4 (53.0)
	WBR	C (C)	29.1 (31.2)	C (C)	29.1 (30.7)	C (D)	29.9 (47.2)	C (D)	29.8 (47.1)
	NBL	D (D)	40.9 (44.4)	D (D)	41.0 (41.7)	D (E)	51.5 (59.7)	D (E)	51.5 (60.2)
	NBTR	C (D)	23.7 (41.9)	C (D)	23.8 (48.0)	C (E)	25.7 (72.9)	C (E)	25.9 (73.9)
	SBL	D (E)	36.7 (71.5)	D (E)	37.0 (72.3)	D (F)	37.1 (99.7)	D (F)	37.2 (109.0)
	SBTR	C (C)	34.7 (20.2)	C (C)	34.6 (21.0)	E (C)	69.0 (24.2)	E (C)	69.5 (24.0)
	SW	D (D)	36.1 (47.5)	D (D)	36.3 (51.5)	D (F)	50.2 (90.5)	D (F)	50.8 (110.9)
Dahlia Street & 58th Place*	NBT	B (D)	12.4 (25.5)	B (D)	12.5 (32.3)	B (F)	14.7 (53.8)	B (F)	14.8 (84.1)
	SBT	C (C)	15.8 (17.7)	C (C)	16.2 (21.5)	C (D)	23.6 (26.7)	C (E)	24.5 (42.5)
Eudora Street & 58th Avenue	WB	A (A)	7.5 (7.4)	A (A)	7.5 (7.5)	A (A)	7.7 (7.5)	A (A)	7.7 (7.6)
	NB	A (B)	9.3 (10.3)	A (B)	9.3 (10.7)	B (B)	10.1 (11.2)	B (B)	10.2 (12)
Eudora Street & 56th Avenue	EB	B (B)	10.1 (10.6)	B (B)	10.1 (10.6)	B (B)	11.3 (12.1)	B (B)	11.3 (12.3)
	SB	C (C)	21.7 (21.4)	C (E)	21.9 (43.4)	E (E)	48.1 (49.4)	E (F)	48.5 (194)
Dahlia Street & 60th Avenue	NB	A (B)	9.4 (11.9)	A (B)	9.4 (12.2)	A (B)	9.7 (13.9)	A (B)	9.7 (14.4)
Site Drive 1 & 58th Place	EB	-	-	A (A)	7.3 (7.3)	-	-	A (A)	7.3 (7.3)
	SB	-	-	A (A)	8.9 (9)	-	-	A (A)	9.1 (9.2)
Dahlia Street & Site Drive 2	WB	-	-	B (B)	10.4 (12.8)	-	-	B (B)	10.9 (14.4)
	SB	-	-	A (A)	7.6 (8.4)	-	-	A (A)	7.8 (8.8)

Values are displayed per peak hour AM (PM)

*No LOS was displayed for westbound movements as the HCM does not have methodology for the existing configuration at this intersection