



LSC TRANSPORTATION CONSULTANTS, INC.
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Paint Brush Hills Filing 14 Traffic Impact Analysis (LSC #184630) July 16, 2018

Traffic Engineer's Statement

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

A blue ink signature of the developer, written over a horizontal line.

7/16/18
Date



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July 16, 2018

Mr. Jeff Mark
The Landhuis Company
212 North Wahsatch Avenue, Suite 301
Colorado Springs, CO 80903

RE: Paint Brush Hills Filing 14
El Paso County, Colorado
Traffic Impact Analysis
LSC #184630

Dear Mr. Mark:

In response to your request, LSC Transportation Consultants, Inc. has prepared this traffic impact analysis for the proposed Paint Brush Hills Filing 14 residential development in El Paso County, Colorado. As shown in Figure 1, the site is located north-northwest of the Londonderry Drive/Rockingham Drive intersection in unincorporated El Paso County.

REPORT CONTENTS

This report is being prepared as part of a submittal to El Paso County. It identifies the traffic impacts of this development. The report contains the following:

- Existing street conditions.
- Projections of short-term (2023) and long-term (2040) baseline/background traffic volumes.
- The projected average weekday and peak-hour vehicle-trips to be generated by the site.
- The assignment of the site's projected traffic volumes to the key area streets and intersections for the short and long term and the resulting total traffic volumes for the short and long term.
- The resulting traffic impacts including level of service analysis at key intersections and average daily traffic volumes on key street sections in the vicinity of the site.
- Recommended classification for all subdivision streets.
- Recommended lane configuration for the site access points to Londonderry Drive.

PREVIOUS TRAFFIC IMPACT STUDIES

LSC has completed the following traffic studies for Paint Brush Hills (previously Falcon Hills):

- **Falcon Hills Traffic Impact Study** - April 8, 2004: This study included analysis of all of the vacant areas west of Meridian Road and north of Stapleton Drive. Since completion of that report, Falcon Middle School has been completed on the parcel shown as “Falcon High School” in the 2004 report. An elementary school will be constructed in this area; however, it will be placed just north of Falcon Middle School rather than northwest of the north Londonderry Drive/Towner intersection. The key tables and figures from that report have been attached for reference.
- **Paint Brush Hills Filing 13A** - May 14, 2014: The 17 single-family homes in Filing 13A located south of Londonderry Drive and east of Towner Avenue have all been constructed since completion of this report.
- **Paint Brush Hills Filing 13B** - March 26, 2014: This report assumed lots for 21 single-family homes to be located north of Londonderry Drive and west of Towner Avenue. This is the same number of units as assumed for this area in the 2004 overall study. Some of the lots in this filing are currently under construction but none are currently occupied.
- **Scenic View at Paint Brush Hills** - April 7, 2014: This report assumed lots for 90 single-family homes northeast of the intersection of Stapleton Drive and Towner Avenue. Since completion of that report all of the homes have been built in the Scenic View development.
- **Paint Brush Hills Filings 13C-13F** - September 25, 2014: This report was superseded by the Paint Brush Hills Filings 13C and 13 D report described below.
- **Paint Brush Hills Filings 13C and 13D** - January 9, 2017: This report assumed lots for 232 single-family homes west of Towner Avenue between the north and south portions of Londonderry Drive. Some of the lots within these filings are currently under construction but none are currently occupied.
- **D-49 Elementary School** - May 30, 2017: This report analyzed an elementary school to be located southeast of the north intersection of Londonderry Drive and Towner Avenue. At buildout the school will support up to 900 students.

Table 1 contains a summary of the land uses assumed for the areas west of Meridian Road and north of Stapleton Drive in the 2004 report and the latest traffic impact study completed by LSC in the area (D-49 Elementary School). Figure 2 shows the site plan and traffic analysis zones (TAZ) assumed in the 2004 study.

LAND USE AND ACCESS

Figure 3 shows the currently existing, approved, and currently proposed developments in the areas west of Meridian Road and north of Stapleton Drive. The currently proposed Paint Brush Hills Filing 14 is located in the northwest corner of the development. There are existing single-

family homes north, west and south of the site. The currently vacant area east of the site is planned to contain lots for single-family homes to be platted in future Paint Brush Hills filings.

Filing 14 is planned to contain 224 single-family homes. In the short term, access is proposed via an extension of Keating Drive north of Rockingham Drive. Once the currently vacant parcel to the east is developed the site will have access through that filing to an intersection with Londonderry Drive aligning with Devoncove Drive.

The Paint Brush Hills Filing 14 area was included as part of TAZ 11 in the 2004 overall TIA. As shown in Table 1 the currently proposed plan for this filing includes about 113 more lots in this area than was assumed in the 2004 overall TIA. Including other changes to the residential land uses within Paint Brush Hills made since completion of the 2004 report, the total number of dwelling units within the entire study area represents an increase of 14 dwelling units.

Changes have also been made to the commercial and educational land uses within the Paint Brush Hills development. The 2004 study included 8.8 acres on the north end of Towner Avenue to be zoned "PBC". These parcels were assumed to be developed as a "shopping center" with 85,000 square feet of floor space. A 2.2-acre portion of this area is now included in the D-49 elementary school site and it is now thought that the remaining six-acre PBC site will most likely be developed with a lower intensity land use such as a church with a daycare. The 2004 study assumed a high school with about 700 students and an elementary school with 500 students. Since completion of that study, Falcon Middle School has been constructed on the high school site. The middle school current enrollment is about 900 students. The approved elementary school is also planned to serve up to 900 students. Although this represents an increase in the number of students served, a majority of the traffic generated by the schools will likely be internal to the Paint Brush Hills development.

ROADWAY AND TRAFFIC CONDITIONS

Area Roadways

The area roadways in the site's vicinity are shown on Figures 1 and 4 and are described below.

- **Londonderry Drive** is a two-lane Urban Residential Collector that currently extends west from Eastonville Road to Towner Avenue and then loops to the south to intersect Towner Avenue again about one-half mile to the south.
- **Meridian Road** extends north from South Blaney Road to County Line Road. Meridian Road is shown as a four-lane Minor Arterial south of Rex Road and north of Stapleton Drive and a two-lane Minor Arterial north of Rex Road on the *El Paso County Major Transportation Corridors Plan (MTCP)* and *El Paso County Corridor Preservation Plan (CPP)*. Meridian has been upgraded to four lanes between Stapleton and Indian Paint Trail with a PPRTA project.

- **Stapleton Drive** is classified as a four-lane Urban Principal Arterial on the El Paso County MTCP. However, Stapleton Drive in the vicinity of the site is a two-lane roadway. Stapleton Drive extends east from just west of Towner Drive across US Highway 24 to Curtis Road. Longer-term plans show Stapleton extended west to connect with Briargate.
- **Towner Avenue** is a 40-foot-wide Urban Residential Collector street (within Paint Brush Hills) that extends south from Londonderry Drive to just south of Woodmen Hills Drive. The posted speed limit of 35 miles per hour.

TRIP GENERATION

The site-generated vehicle-trips were estimated using the nationally published trip generation rates from *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). Table 2 shows the trip generation estimates for the site.

Filing 14 is expected to generate about 2,115 vehicle-trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 41 vehicles would enter and 124 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 140 vehicles would enter and 82 vehicles would exit the site.

BACKGROUND TRAFFIC

Background traffic is the traffic estimated to be on the area streets and roadways without consideration of the proposed development. Figure 5 shows the projected background traffic volumes for the short term (2023). These background traffic volumes were based on estimates of traffic projected to be generated (or currently generated) by Paint Brush Hills Filing 4 through Filing 13D, Scenic View at Paint Brush Hills, Falcon Middle School, and the recently approved D49 elementary school. The traffic volumes for the developments not yet built out were taken from their respective traffic studies completed by LSC. The short-term scenario assumes Stapleton Drive not yet extended west from its current terminus.

Figure 6 shows the projected 2040 background traffic volumes. These volumes assume buildout of the Paint Brush Hills development. The 2040 background traffic volumes also assume Stapleton Drive has been extended west.

DIRECTIONAL DISTRIBUTION

The directional distribution of the site-generated traffic volumes on the area roadways is an important factor in determining the site's traffic impacts. Figure 6 shows the short-term and long-term external directional distribution estimates for the site-generated traffic volumes. The estimates have been based on the following factors: the site's location with respect to the nearby employment, commercial, schools, and activity centers and the balance of the Falcon and Colorado Springs metropolitan area; the site's proposed land use; the site's proposed access

points; and the phasing of the existing and future roadway system serving the site. The long-term distribution takes into account the extension of Stapleton west to Briargate Parkway.

SITE-GENERATED TRAFFIC

Figures 7 and 8 show the projected short-term and long-term site-generated traffic volumes, respectively. The site-generated traffic volumes were calculated by applying the directional distribution percentages (from Figure 6) to the trip generation estimates from Table 2.

TOTAL TRAFFIC

Figure 9 shows the projected short-term total traffic volumes. The short-term total traffic volumes are the sum of the short-term background traffic volumes (from Figure 4) plus the short-term site-generated traffic volumes from Figure 7.

Figure 10 shows the projected 2040 total traffic volumes. The 2040 total traffic volumes are the sum of the 2040 background traffic volumes (from Figure 5) plus the long-term site-generated traffic volumes from Figure 8.

PROJECTED LEVELS OF SERVICE

Level of service (LOS) is a quantitative measure of the level of delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A represents control delay of less than 10 seconds for unsignalized and signalized intersections. LOS F represents control delay of more than 50 seconds for unsignalized intersections and more than 80 seconds for signalized intersections. Table 3 shows the level of service delay ranges.

Table 3			
Intersection Levels of Service Delay Ranges			
Level of Service	Signalized Intersections		Unsignalized Intersections
	Average Control Delay (seconds per vehicle)	V/C⁽¹⁾	Average Control Delay (seconds per vehicle)⁽²⁾
A	10.0 sec or less	less than 0.60	10.0 sec or less
B	10.1-20.0 sec	0.60-0.69	10.1-15.0 sec
C	20.1-35.0 sec	0.70-0.79	15.1-25.0 sec
D	35.1-55.0 sec	0.80-0.89	25.1-35.0 sec
E	55.1-80.0 sec	0.90-0.99	35.1-50.0 sec
F	80.1 sec or more	1.00 and greater	50.1 sec or more
(1) Source: <i>Transportation Research Circular 212</i>			
(2) For unsignalized intersections if V/C ratio is greater than 1.0 the level of service is LOS F regardless of the projected average control delay per vehicle.			

The intersections of Rockingham Drive/Londonderry Drive and Devoncove Drive/Londonderry Drive were analyzed to determine the projected levels of service for the background and total traffic volumes based on the unsignalized method of analysis procedures from the *Highway Capacity Manual, 6th Edition* by the Transportation Research Board. Figures 4, 5, 9, and 10 show the level of service analysis results. The level of service reports are attached.

The intersections of Rockingham Drive/Londonderry Drive and Devoncove Drive/Londonderry Drive are projected to operate at LOS B or better for all movements based on the projected short-term and 2040 total traffic volumes as two-way stop-sign controlled intersections.

STREET CLASSIFICATIONS

Figure 11 shows the recommended internal street classifications based on the projected buildout traffic volumes for Filing 14.

CONCLUSIONS AND RECOMMENDATIONS

Trip Generation

- Filing 14 is expected to generate about 2,115 vehicle-trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak hour about 41 vehicles would enter and 124 vehicles would exit the site. During the afternoon peak hour about 140 vehicles would enter and 82 vehicles would exit the site.

Level of Service

- The intersections of Rockingham Drive/Londonderry Drive and Devoncove Drive/Londonderry Drive are projected to operate at LOS B or better for all movements based on the projected short-term and 2040 total traffic volumes as two-way stop-sign-controlled intersections.

Intersection Lane Configurations

- Based on the criteria contained in the *El Paso County Engineering Criteria Manual (ECM)* and the projected short-term total traffic volumes, a northbound left-turn lane would be required on Londonderry Drive approaching Rockingham Drive. Londonderry Drive is currently 40 feet wide in the vicinity of this intersection and could be restriped to provide a northbound left-turn lane.
- Based on the criteria contain in the ECM and the projected short-term total traffic volumes, a southbound right-turn deceleration lane would be required on Londonderry Drive approaching Rockingham Drive based on the projected right-turn volume. However, at this particular location, the westbound through volume is low and is projected to remain low at

buildout. Although the ECM does not have a provision for waiving the need for a right-turn deceleration lane when the through traffic is below a certain level, the State of Colorado Highway Access code provides a waiver to right-turn lane requirements when the 20th year predicted volume in the travel lane is below 150 vehicles per hour. As the southbound traffic volume is projected to be only 87 vehicles per hour, LSC recommends that the requirement for a right-turn deceleration lane be waived. The County may require the submittal of a deviation request form.

Proposed Subdivision Street Classifications

- As shown in Figure 11 all proposed subdivision streets will be classified as Urban Local Low Volume or Urban Local streets.

County Road Impact Fee

- The applicant will be required to participate in the County Road Impact Fee Program. Assuming this development joins the ten-mil PID, the building permit fee portion is \$923 per single-family dwelling unit. The net fee for the proposed 224 lots in Filing 14 would be \$206,752.

* * * * *

Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E., PTOE
Principal

JCH:KDF:bjwb

Enclosures: Tables 1-2
Figures 1-11
Key tables and figures from Falcon Hills Traffic Impact Study dated April 8, 2004
Level of Service Reports

Table 1
Paintbrush Hills
Land Use Comparison

Falcon Hills Traffic Impact Analysis April 8, 2004 Scenario 2				D-49 Elementary School Traffic Impact Analysis May 30, 2017				Existing, Approved, Currently Proposed or Future					Change			
													From 2004		From 2017	
Traffic Analysis Zone	Land Use	Quantity	Unit	Filing Name	Land Use	Quantity	Unit	Filing Name	Status	Land Use	Quantity	Unit	Quantity	Unit	Quantity	Unit
1	Single-Family Detached Housing	194	DU ⁽¹⁾	Paintbrush Hills Fil 4	Single-Family Detached Housing	164	DU	Paintbrush Hills Fil 4	Built Out	Single-Family Detached Housing	164	DU	1	DU	0	DU
				Paintbrush Hills Fil 5	Single-Family Detached Housing	31	DU	Paintbrush Hills Fil 5	Built Out	Single-Family Detached Housing	31	DU		DU	0	DU
2	Single-Family Detached Housing	303	DU	Paintbrush Hills Fil 6	Single-Family Detached Housing	48	DU	Paintbrush Hills Fil 6	Built Out	Single-Family Detached Housing	48	DU	-2	DU	0	DU
	Single-Family Detached Housing		DU	Paintbrush Hills Fil 7	Single-Family Detached Housing	57	DU	Paintbrush Hills Fil 7	Built Out	Single-Family Detached Housing	57	DU		DU	0	DU
	Single-Family Detached Housing		DU	Paintbrush Hills Fil 8	Single-Family Detached Housing	108	DU	Paintbrush Hills Fil 8	Built Out	Single-Family Detached Housing	108	DU		DU	0	DU
	Single-Family Detached Housing		DU	Paintbrush Hills Fil 9	Single-Family Detached Housing	88	DU	Paintbrush Hills Fil 9	Built Out	Single-Family Detached Housing	88	DU		DU	0	DU
3	High School	706	Students	Falcon Middle School	Middle School	900	Students	Falcon Middle School	Built Out	Middle School	900	Students	- - -		- - -	
4	Single-Family Detached Housing	41	DU	Paintbrush Hills Fil 10 (East)	Single-Family Detached Housing	41	DU	Paintbrush Hills Fil 10 (East)	Built Out	Single-Family Detached Housing	41	DU	0	DU	0	DU
5	Single-Family Detached Housing	181	DU	Paintbrush Hills Fil 10 (West)	Single-Family Detached Housing	49	DU	Paintbrush Hills Fil 10 (West)	Built Out	Single-Family Detached Housing	49	DU	-5	DU	0	DU
			DU	Paintbrush Hills Fil 11	Single-Family Detached Housing	81	DU	Paintbrush Hills Fil 11	Built Out	Single-Family Detached Housing	81	DU		DU	0	DU
			DU	Paintbrush Hills Fil 12	Single-Family Detached Housing	46	DU	Paintbrush Hills Fil 12	Built Out	Single-Family Detached Housing	46	DU		DU	0	DU
6	Apartments	180	DU	Scenic View at Paintbrush Hills	Single-Family Detached Housing	89	DU	Scenic View at Paintbrush Hills	Built Out	Single-Family Detached Housing	89	DU	-91	DU	0	DU
7	Single-Family Detached Housing	13	DU	- - -	- - -	- - -		- - -	- - -	- - -	- - -	-13	DU			DU
8	Shopping Center (8.2 acres)	82	KSF ⁽²⁾	D-49 Elementary School	Elementary School	900	Students	D-49 Elementary School	Approved	Elementary School	900	Students	- - -		- - -	
				Future	Church with Day Care	6	Acres	Future	Future	Church with Day Care	6	Acres	- - -		- - -	
	Single-Family Detached Housing	33	DU	Paintbrush Hills Fil 13A	Single-Family Detached Housing	17	DU	Paintbrush Hills Fil 13A	Built Out	Single-Family Detached Housing	17	DU	-16	DU	0	DU
9	Single-Family Detached Housing	133	DU	Paintbrush Hills Fil 13B	Single-Family Detached Housing	21	DU	Paintbrush Hills Fil 13B	Under Construction	Single-Family Detached Housing	21	DU	23	DU	0	DU
			DU	Paintbrush Hills Fil 13C	Single-Family Detached Housing	135	DU	Paintbrush Hills Fil 13C	Under Construction	Single-Family Detached Housing	135	DU		DU	0	DU
10	Single-Family Detached Housing	102	DU	Paintbrush Hills Fil 13D	Single-Family Detached Housing	97	DU	Paintbrush Hills Fil 13D	Under Construction	Single-Family Detached Housing	97	DU	-5	DU	0	DU
11	Single-Family Detached Housing	167	DU	Paintbrush Hills Future Filing West	Single-Family Detached Housing	181	DU	Paintbrush Hills Fil 14	Proposed	Single-Family Detached Housing	224	DU	113	DU	99	DU
			DU					Paintbrush Hills Future Filing West	Future	Single-Family Detached Housing	56	DU		DU		DU
12	Single-Family Detached Housing	93	DU	Paintbrush Hills Future Filing East	Single-Family Detached Housing	102	DU	Paintbrush Hills Future Filing East	Future	Single-Family Detached Housing	102	DU	9	DU	0	DU
	Elementary School	500	Students										- - -		- - -	
Total																
Single-Family Detached Housing		1,260	DU	Single-Family Detached Housing		1,355	DU	Single-Family Detached Housing		1,454	DU	194	DU	99	DU	
Apartments		180	DU	Apartments		0	DU	Apartments		0	DU	-180	DU	0	DU	
Total Residential		1,440	DU	Total Residential		1,355	DU	Total Residential		1,454	DU	14	DU	99	DU	
Shopping Center		82	KSF	Shopping Center		0	KSF	Shopping Center		0	KSF		KSF	0	KSF	
Church With Day Care		0	KSF	Church With Day Care		35	KSF	Church With Day Care		35	KSF	-47	KSF	0	KSF	
School		1,206	Students	School		1,800	Students	School		1,800	Students	594	Students	0	Students	

Notes:
(1) DU = dwelling unit
(2) KSF = thousand square feet of floor area

Source: LSC Transportation Consultants, Inc.

Table 2
Trip Generation Estimate
Paintbrush Hills Filing 14

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates ⁽¹⁾						Total Trips Generated			
			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour	
				In	Out	In	Out		In	Out	In	Out
210	Single-Family Detached Housing	224 DU ⁽²⁾	9.44	0.19	0.56	0.62	0.37	2,115	41	124	140	82
<p>Notes:</p> <p>(1) Source: "<i>Trip Generation, 10th Edition, 2017</i>" by the Institute of Transportation Engineers (ITE)</p> <p>(2) DU = dwelling unit</p> <p>Source: LSC Transportation Consultants, Inc.</p>												

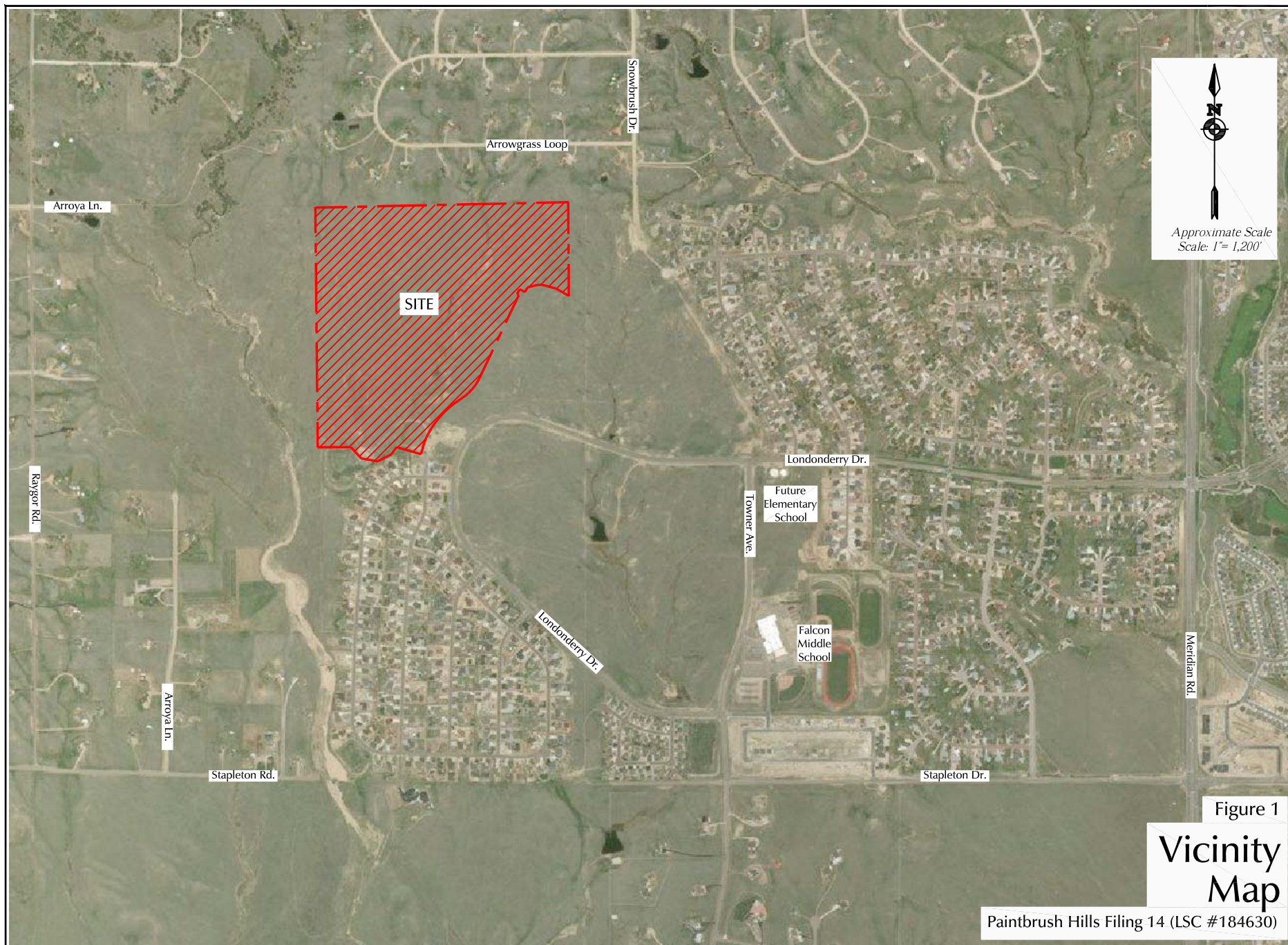
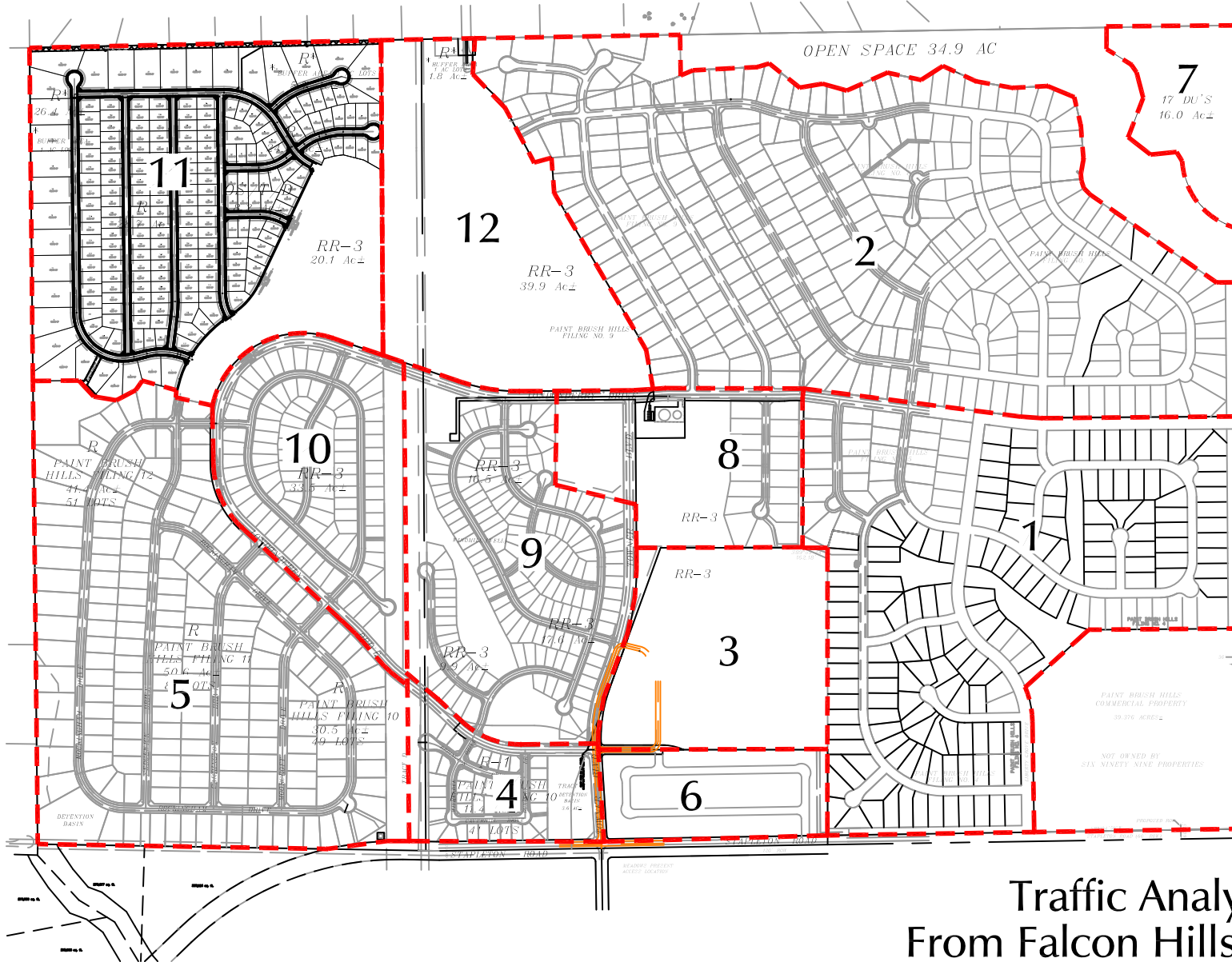


Figure 1

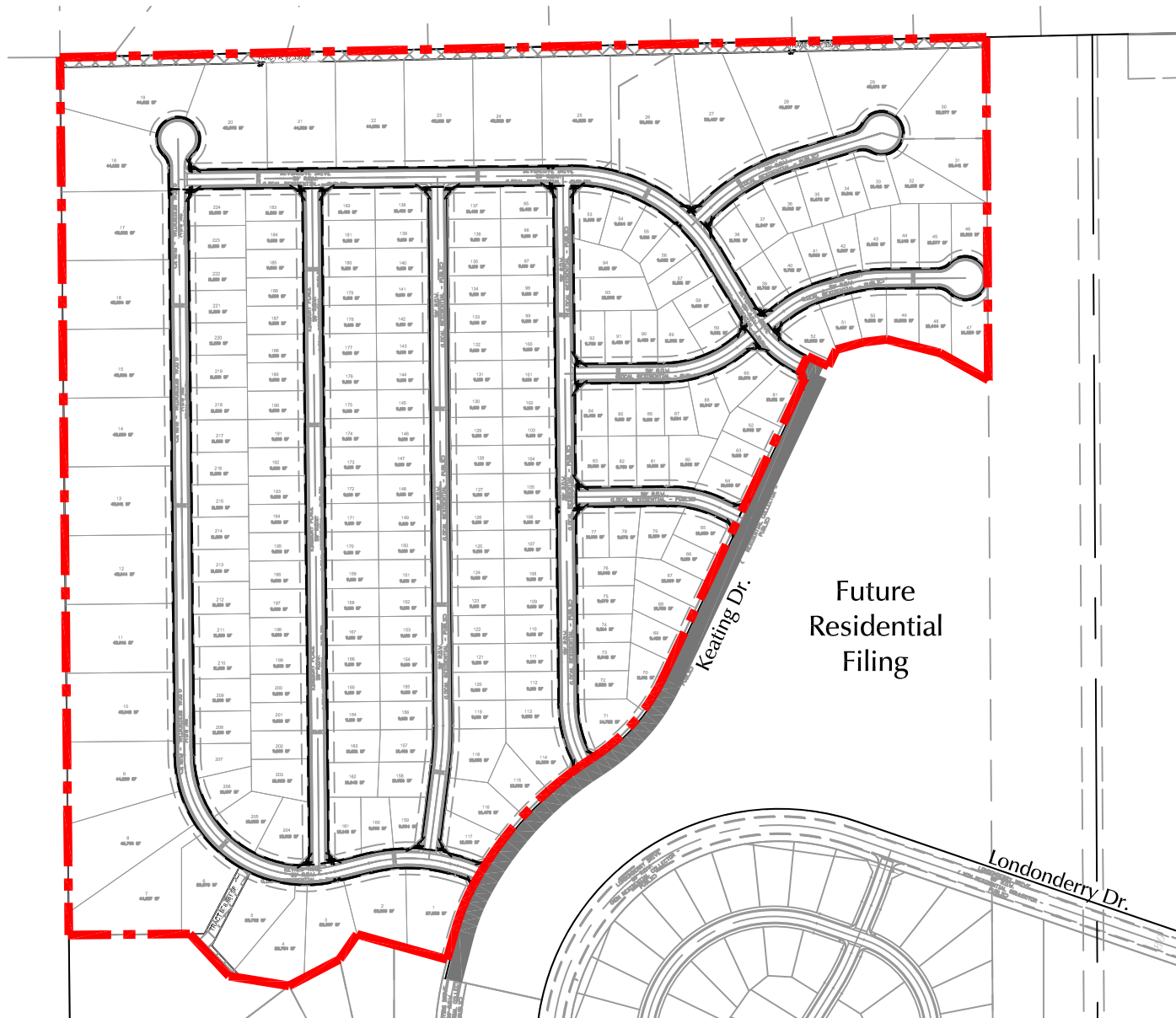
Vicinity Map


Paintbrush Hills Filing 14 (LSC #184630)



Approximate Scale
Scale: 1"= 1,000'

Figure 2
**Traffic Analysis Zones
From Falcon Hills TIA 2004**
Paintbrush Hills Filing 14 (LSC #184630)




 Approximate Scale
 Scale: 1" = 400'

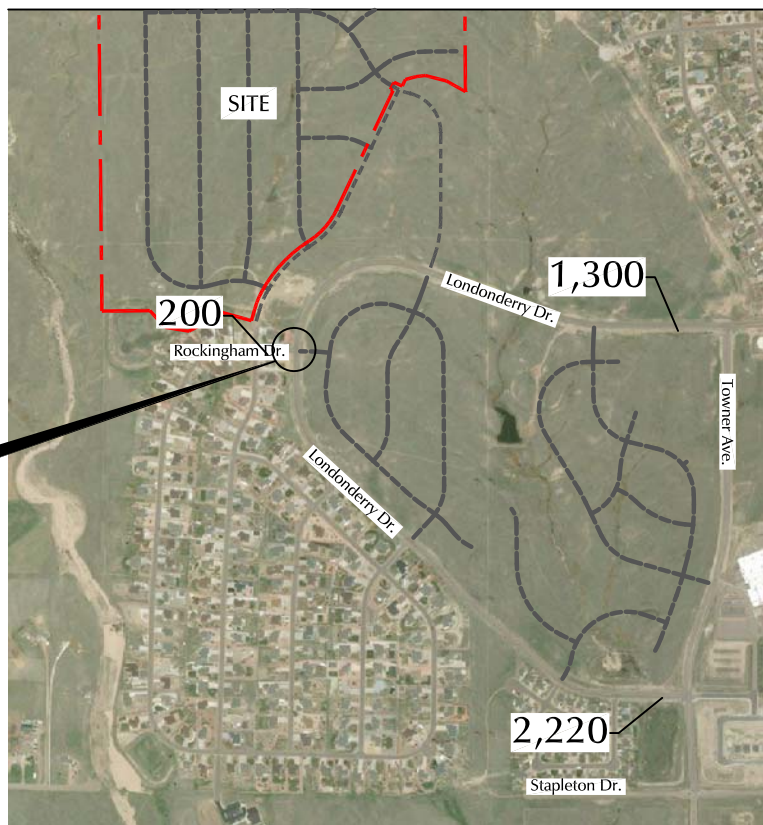
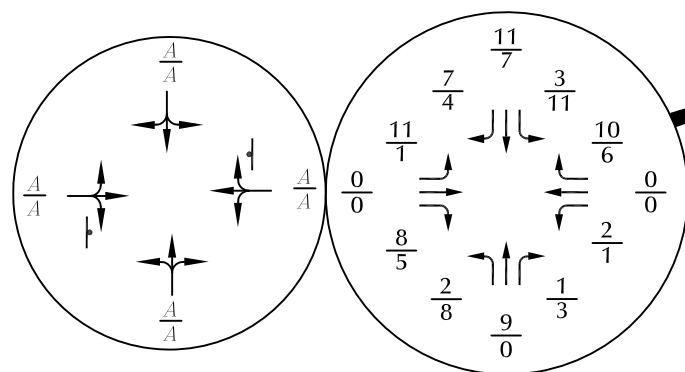
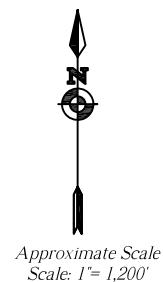
Future
 Residential
 Filing

Keating Dr.

Londonderry Dr.

Figure 3
**Site
 Plan**

Paintbrush Hills Filing 14 (LSC #184630)



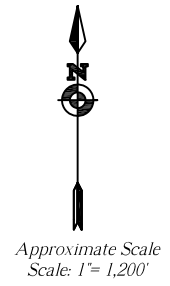
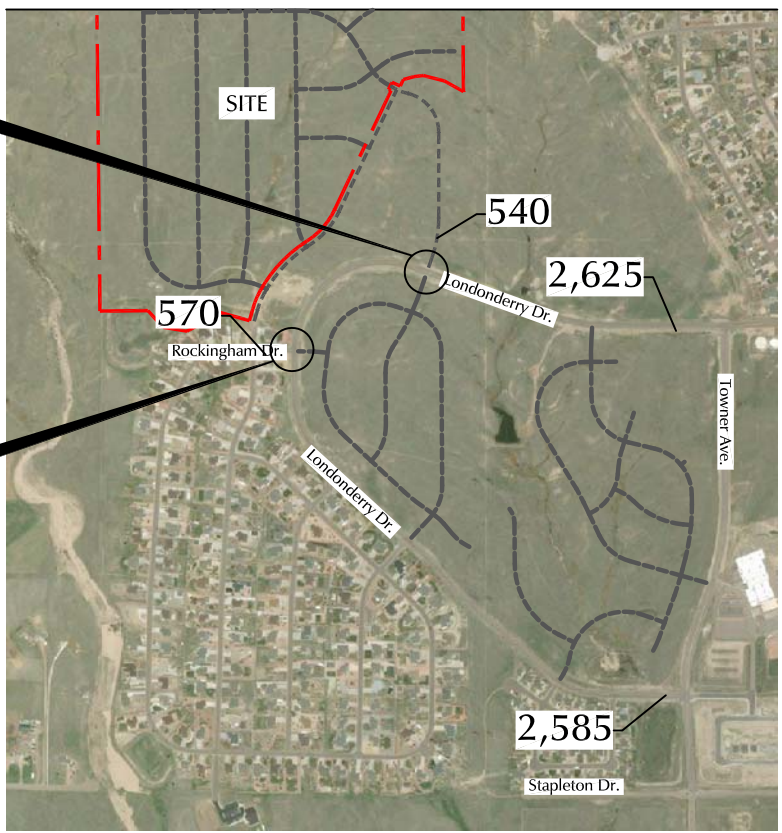
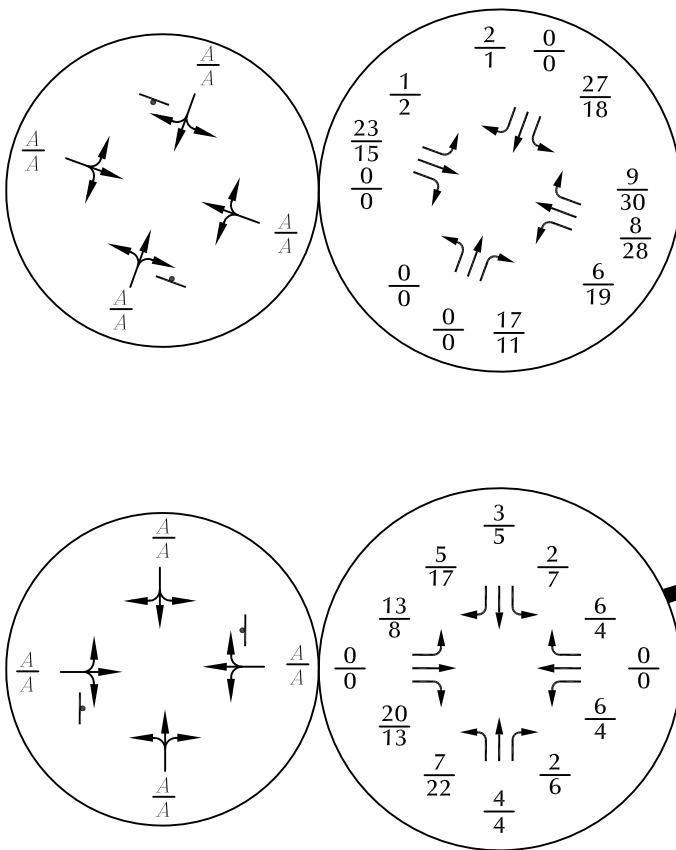
LEGEND:

- \mid = Stop Sign
- $\frac{XX}{XX}$ = $\frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$
- $\frac{A}{B}$ = $\frac{\text{AM Individual Movement Peak-Hour Level of Service}}{\text{PM Individual Movement Peak-Hour Level of Service}}$
- X,XXX= Annual Average Daily Traffic (vehicles per day)

Figure 4

Short-Term Background Traffic, Lane Geometry, Traffic Control and Level of Service

Paintbrush Hills Filing 14 (LSC #184630)



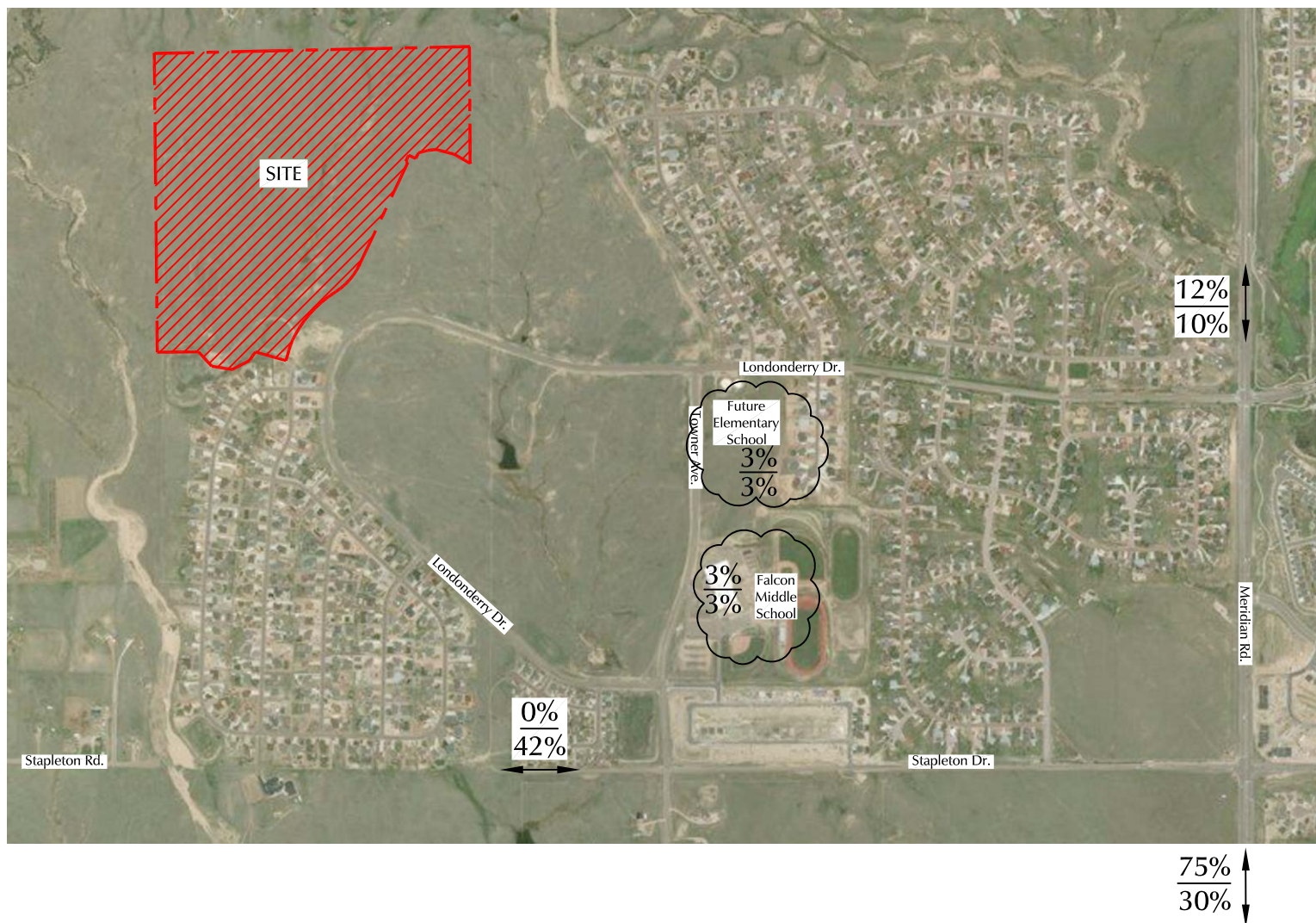
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- $\frac{A}{B}$ = $\frac{\text{AM Individual Movement Peak-Hour Level of Service}}{\text{PM Individual Movement Peak-Hour Level of Service}}$
- X,XXX= Annual Average Daily Traffic (vehicles per day)

Figure 5

Year 2040 Background Traffic, Lane Geometry, Traffic Control and Level of Service

Paintbrush Hills Filing 14 (LSC #184630)



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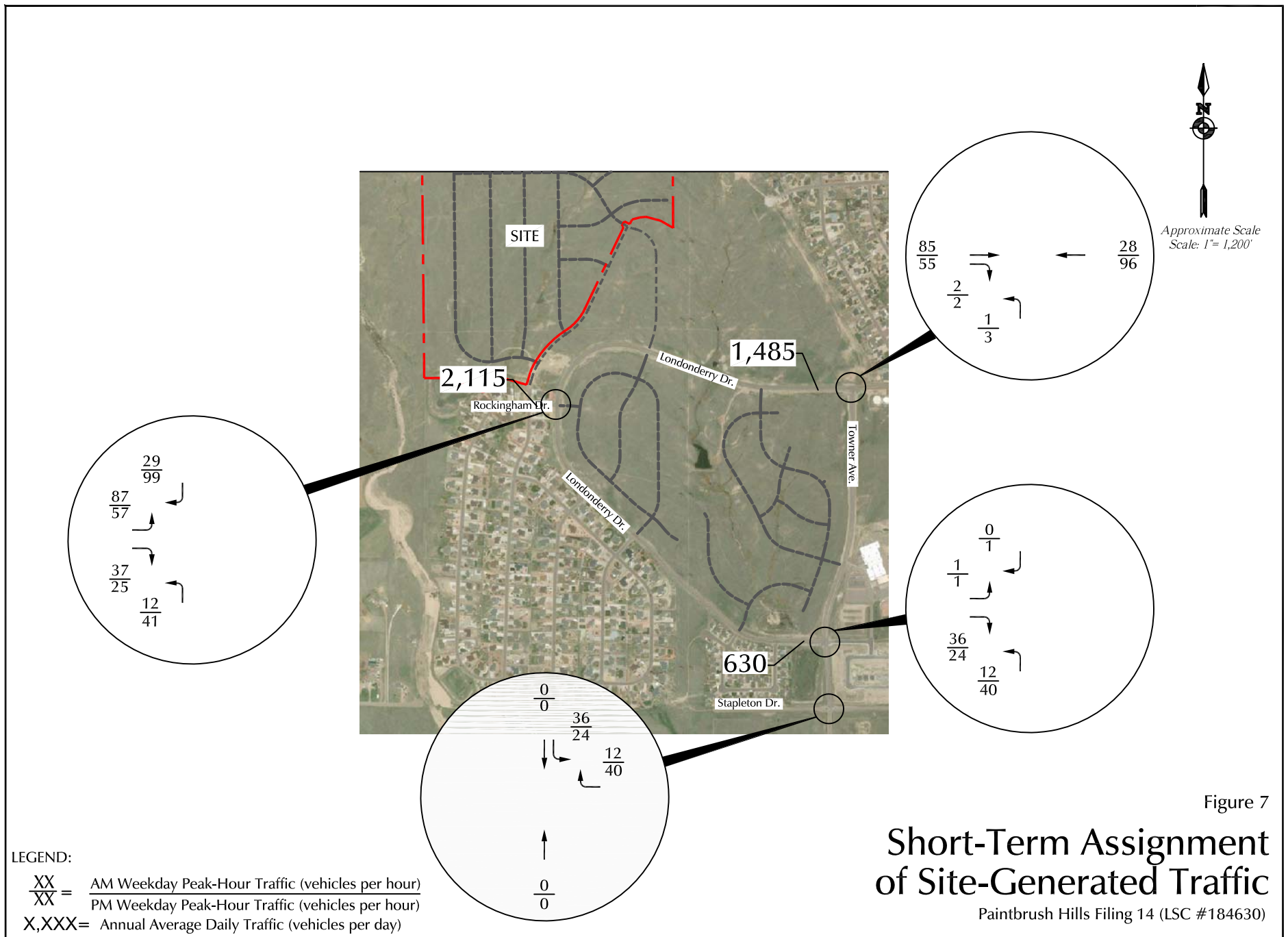
$\frac{XX\%}{XX\%}$

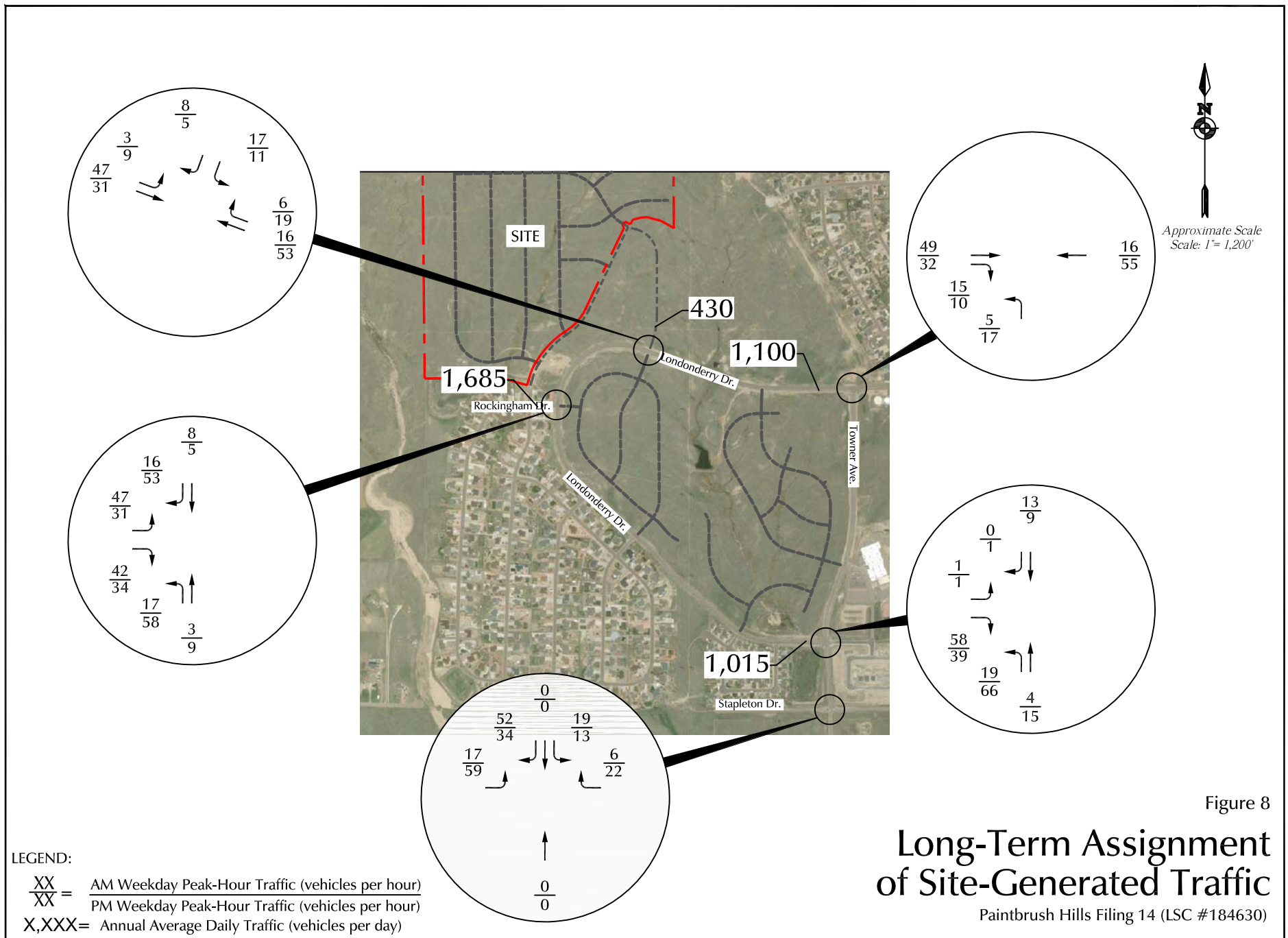
$= \frac{\text{Short-Term Percent Directional Distribution}}{\text{Long-Term Percent Directional Distribution}}$

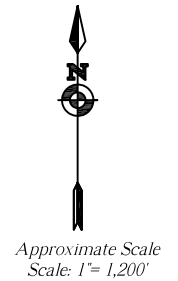
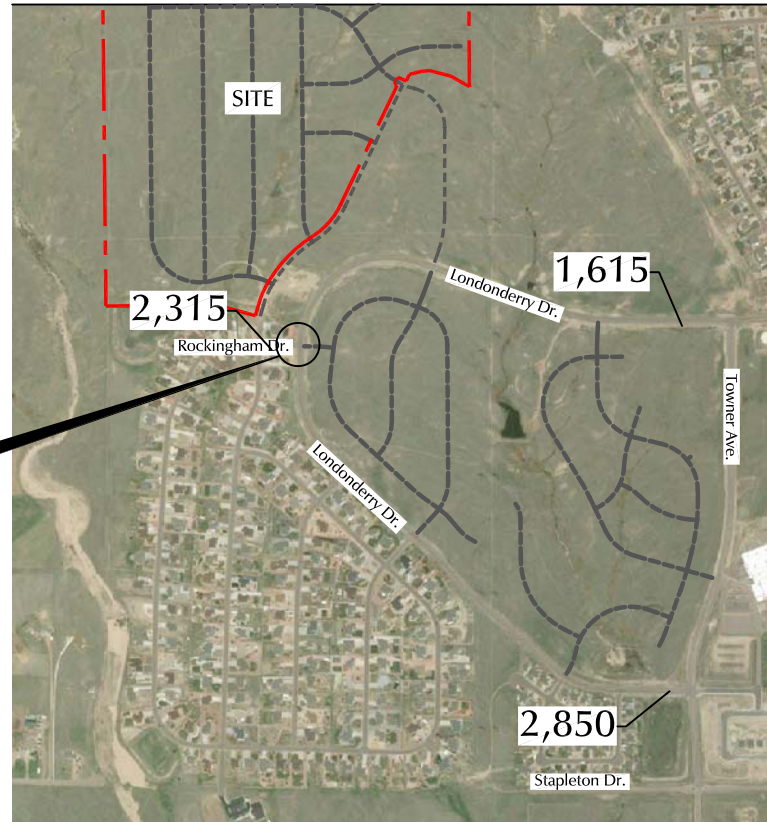
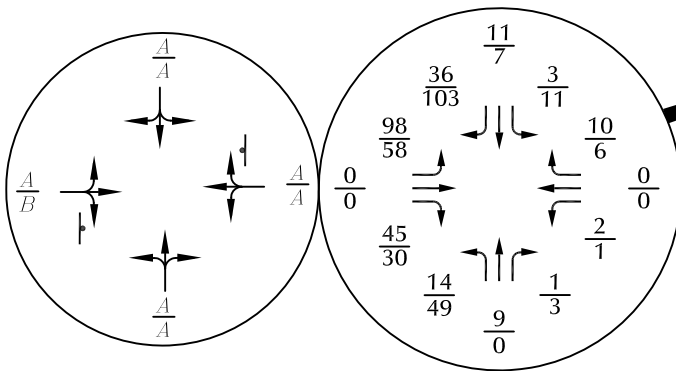
Directional Distribution of Site-Generated Traffic

Paintbrush Hills Filing 14 (LSC #184630)

Figure 6







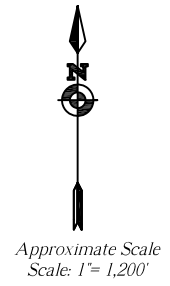
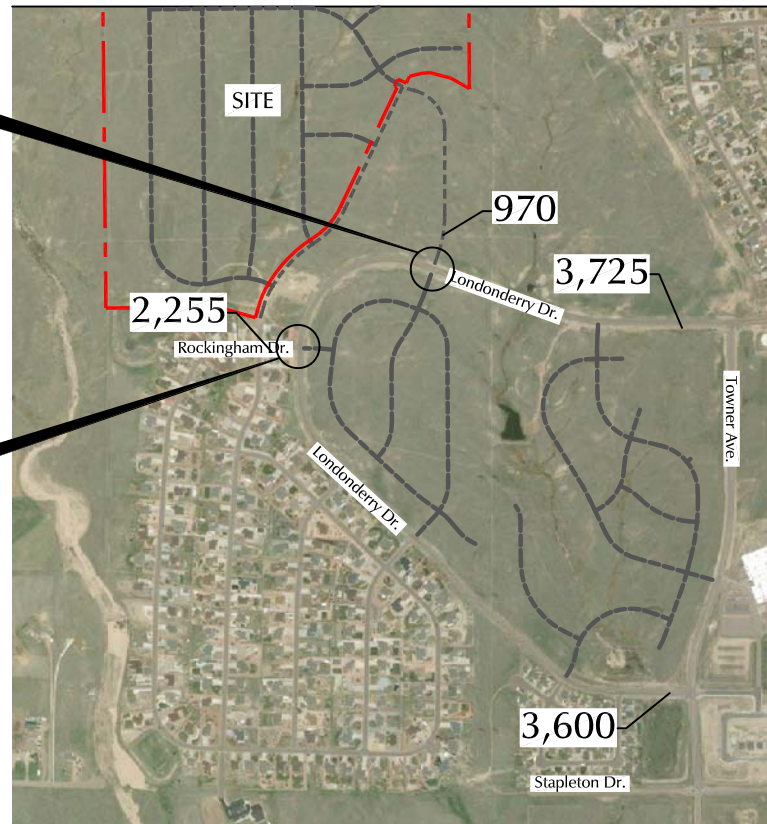
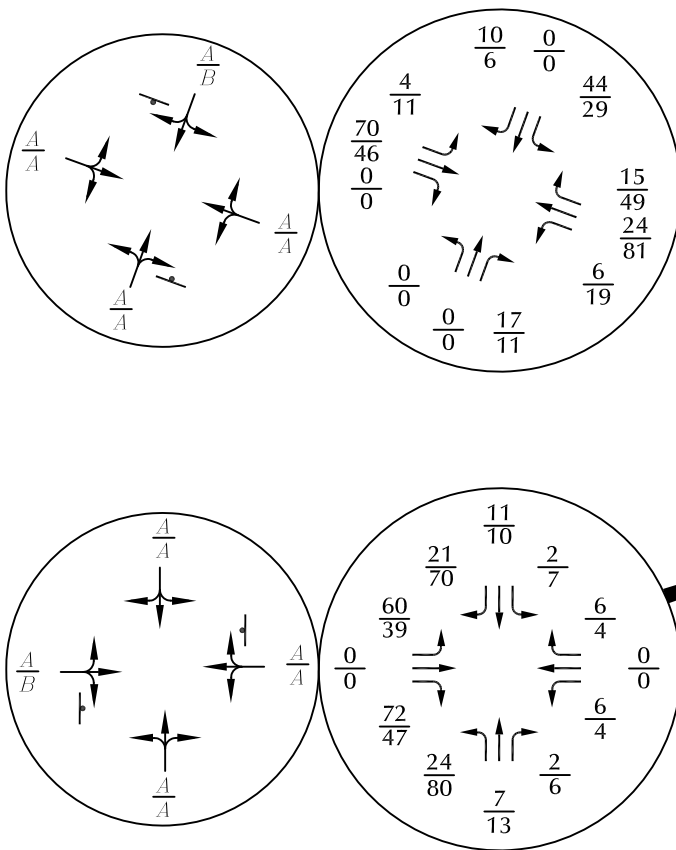
LEGEND:

- \perp = Stop Sign
 $\frac{XX}{XX}$ = $\frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$
 $\frac{A}{B}$ = $\frac{\text{AM Individual Movement Peak-Hour Level of Service}}{\text{PM Individual Movement Peak-Hour Level of Service}}$
 X,XXX= Annual Average Daily Traffic (vehicles per day)

Figure 9

Short-Term Total Traffic, Lane Geometry, Traffic Control and Level of Service

Paintbrush Hills Filing 14 (LSC #184630)



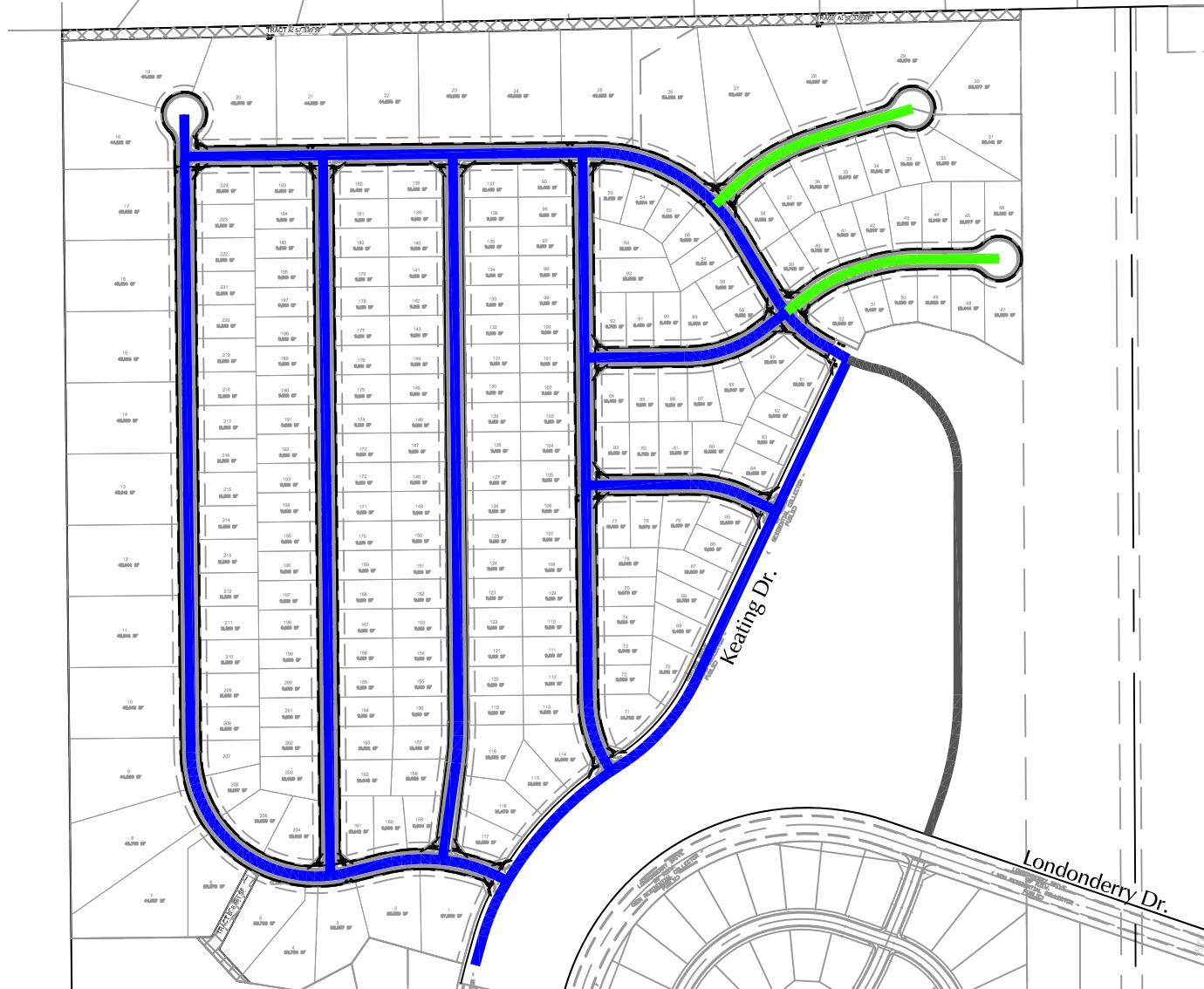
LEGEND:

- \perp = Stop Sign
- $\frac{XX}{XX}$ = $\frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$
- $\frac{A}{B}$ = $\frac{\text{AM Individual Movement Peak-Hour Level of Service}}{\text{PM Individual Movement Peak-Hour Level of Service}}$
- X,XXX= Annual Average Daily Traffic (vehicles per day)

2040 Total Traffic, Lane Geometry, Traffic Control and Level of Service

Paintbrush Hills Filing 14 (LSC #184630)

Figure 10



Approximate Scale
Scale: 1" = 400'

LEGEND:

- Urban Residential Collector
- Urban Local
- Urban Local (Low Volume)

Figure 11
Recommended
Street Classifications
Paintbrush Hills Filing 14 (LSC #184630)





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April 8, 2004

Mr. Harold Fong
Manager, Falcon Hills
Six Ninety Nine LA, LLC
545 East Pikes Peak, Suite 207
Colorado Springs, CO 80903

RE: Falcon Hills
Updated March 2004
LSC #036080

Dear Mr. Fong:

In response to your request, we have prepared this updated traffic impact analysis report for Falcon Hills. A previous traffic study was prepared for Falcon Hills entitled *Traffic Impact Report For Falcon Hills* dated May 3, 2000 by URS Corporation. Falcon Hills is located west of Meridian Road and north of Stapleton Road in El Paso County, Colorado. The site location and vicinity are shown in Figure 1. The purpose of this report is to present an updated study based on the current land use plan, including the specific separate traffic impacts for each of the various landowners within Falcon Hills as well as for the area as a whole, and to identify the short- and long-term transportation system improvements adjacent to Falcon Hills.

This report contains an analysis of the traffic estimated to be generated by each of the existing and future proposed development parcels within Falcon Hills, estimates of the projected site-generated traffic volumes on the existing and future adjacent roadway system, and the impacts of additional traffic on the area roadways and intersections by ownership land use type. The report also identifies recommendations for auxiliary turn lanes, traffic signals, and other roadway system improvements for the short and long term.

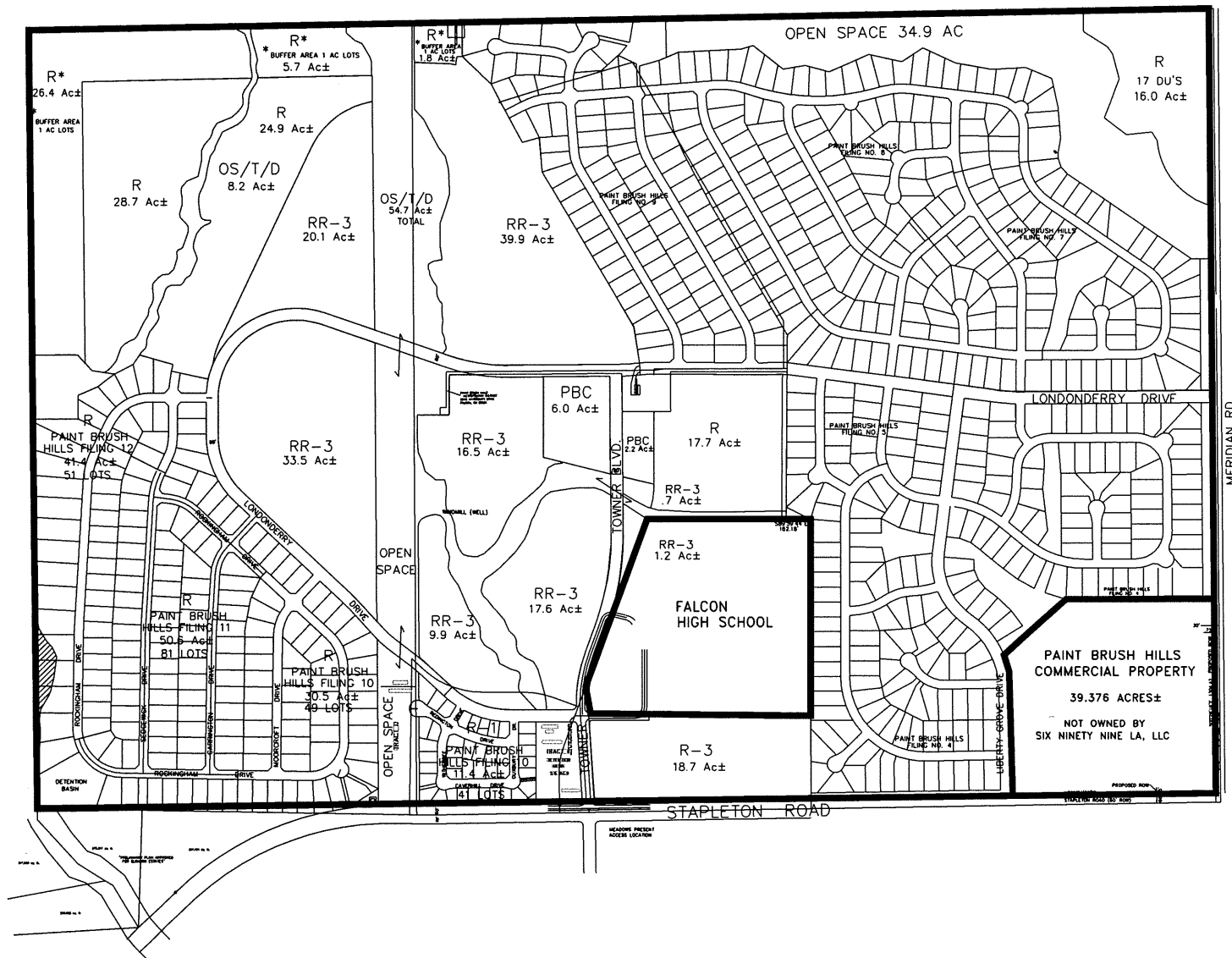
LAND USE PLAN AND OWNERSHIP

Falcon Hills is located west of Meridian Road and north of Stapleton Road. Aside from existing developed individual lots, of which there were about 497 in August 2003, there are three major owners of developing and undeveloped land within Falcon Hills. These owners are **Six Ninety Nine LA, LLC; School District 49; and Roger Barrack/Scott Smith**. These three owners will each contribute to a portion of the total traffic impacts of future development within Falcon Hills. Thus, the idea is that each would contribute to an equitable portion of the total cost of street improvements necessitated by the traffic generated.

Table 1
Trip Generation Estimate
Falcon Hills Update

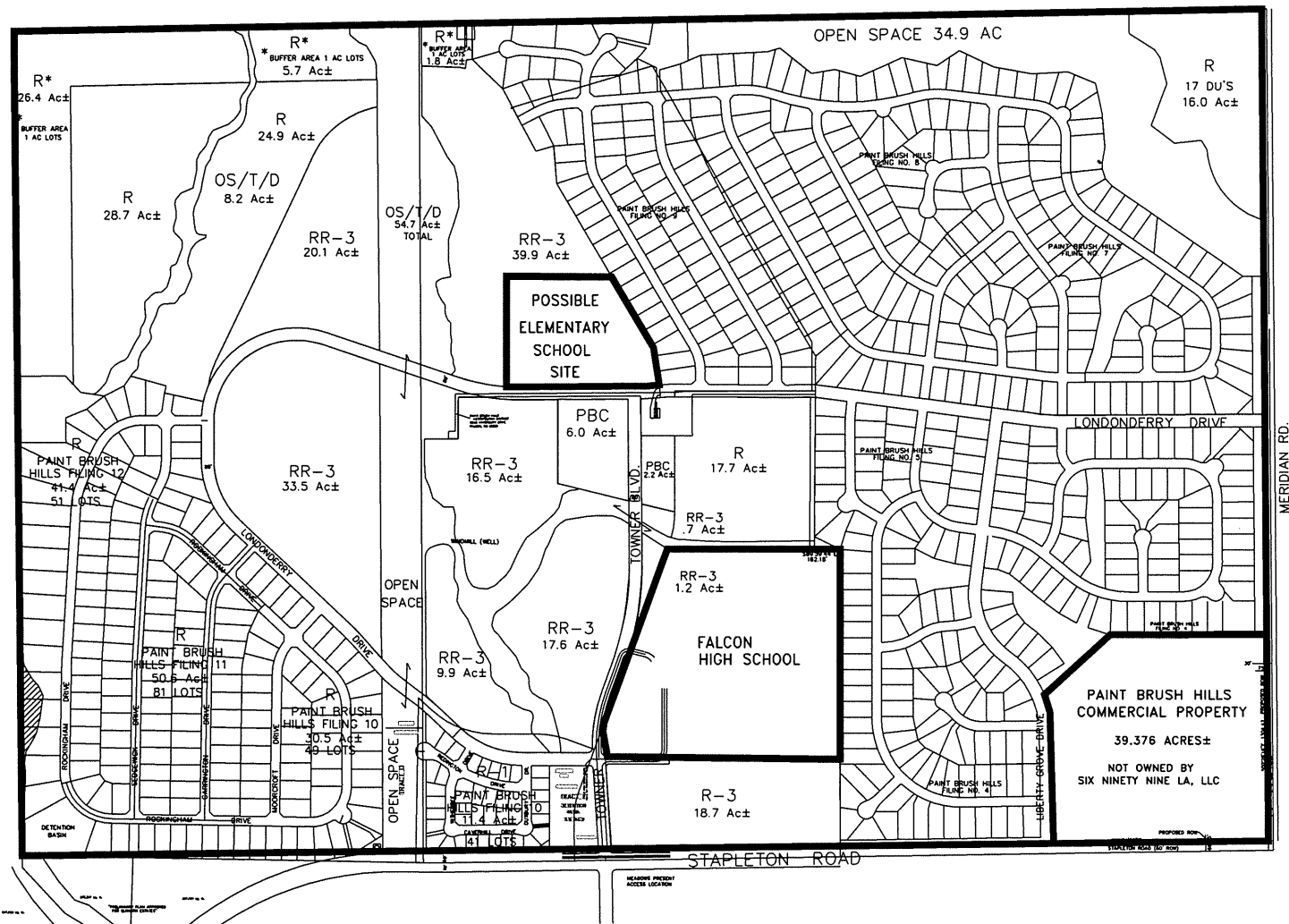
Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates ⁽¹⁾					Total Trips Generated					Percent Internal Trips	Total External Trips Generated					New Trips Generated	
			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Percent Pass-by Trips ⁽²⁾	Average New Weekday Traffic
				In	Out	In	Out		In	Out	In	Out			In	Out	In	Out		
SCENARIO 1																				
Six Ninety Nine LA, LLC Land Uses																				
Residential Uses																				
210	Single-Family Detached Housing	1290 DU ⁽³⁾	9.57	0.19	0.56	0.65	0.36	12,345	242	726	834	469	10%	11,111	218	653	750	422	0%	11,111
220	Apartment	180 DU	6.74	0.08	0.43	0.43	0.21	1,213	15	78	78	38	10%	1,092	13	70	70	34	0%	1,092
Total Six Ninety Nine Residential								13,558	257	803	912	507		12,203	231	723	820	457		12,203
Neighborhood Commercial Uses																				
820	Shopping Center	82 KSF ⁽⁴⁾	73.17	1.06	0.68	3.22	3.49	6,000	87	55	264	286	6%	5,640	81	52	249	269	34%	3,722
Total Six Ninety Nine Properties								19,558	343	859	1,176	794		17,843	312	775	1,069	726		15,925
School District 49 Land Uses																				
530	High School	706 Students	1.79	0.32	0.14	0.06	0.09	1,264	227	97	42	64	25%	948	170	73	32	48	0%	948
Southeast Corner Land Uses (Not Owned By Six Ninety Nine LA, LLC)																				
820	Shopping Center	360 KSF	43.15	0.58	0.37	1.95	2.11	15,534	209	134	702	760	6%	14,602	197	126	660	715	34%	9,637
TOTAL SCENARIO 1								36,356	780	1,090	1,920	1,618		33,392	679	974	1,761	1,488		26,510
SCENARIO 2																				
Six Ninety Nine LA, LLC																				
Residential Uses																				
210	Single-Family Detached Housing	1260 DU	9.57	0.19	0.56	0.65	0.36	12,058	236	709	814	458	13%	10,491	206	617	709	399	0%	10,491
220	Apartment	180 DU	6.74	0.08	0.43	0.43	0.21	1,213	15	78	78	38	13%	1,055	13	68	68	33	0%	1,055
Total Six Ninety Nine Residential								13,271	251	787	892	496		11,546	218	684	776	432		11,546
Neighborhood Commercial Uses																				
820	Shopping Center	82 KSF	73.17	1.06	0.68	3.22	3.49	6,000	87	55	264	286	6%	5,640	81	52	249	269	34%	3,722
Total Six Ninety Nine Properties								19,271	338	842	1,157	783		17,186	300	736	1,025	701		15,268
School District 49 Land Uses																				
530	High School	706 Students	1.79	0.32	0.14	0.06	0.09	1,264	227	97	42	64	25%	948	170	73	32	48	0%	948
520	Elementary School	500 Students	1.02	0.17	0.12	0.00	0.01	510	86	59	1	5	67%	168	28	20	0	2	0%	168
Total School District 49								1774	313	157	43	69		1116	199	93	32	49		1116
Southeast Corner Land Uses (Not Owned By Six Ninety Nine LA, LLC)																				
820	Shopping Center	360 KSF	43.15	0.58	0.37	1.95	2.11	15,534	209	134	702	760	6%	14,602	197	126	660	715	34%	9,637
TOTAL SCENARIO 2								36,579	860	1,133	1,901	1,612		32,904	695	955	1,717	1,465		26,022

Notes:
(1) Source: "Trip Generation," Institute of Transportation Engineers, 6th ed., 1997.
(2) Source: "Trip Generation Handbook An ITE Recommended Practice" Institute of Transportation Engineers, October 1998.
(3) DU = dwelling unit
(4) KSF = thousand square feet of floor area



Site Plan - Scenario One
Without Elementary School Site
Falcon Hills Update

Figure 2
LSC # 036080



Site Plan - Scenario Two
With Elementary School Site
Falcon Hills Update





Figure 3
LSC # 036080

Level of Service Reports







HCM 6th TWSC
23: Londonderry Dr & Rockingham Dr

Short-Term Total Traffic
AM Peak Hour

Intersection												
Int Delay, s/veh	4.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	0	8	2	0	10	2	9	1	3	11	7
Future Vol, veh/h	11	0	8	2	0	10	2	9	1	3	11	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	9	2	0	11	2	10	1	3	12	8
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	42	37	16	42	41	11	20	0	0	11	0	0
Stage 1	22	22	-	15	15	-	-	-	-	-	-	-
Stage 2	20	15	-	27	26	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	961	855	1063	961	851	1070	1596	-	-	1608	-	-
Stage 1	996	877	-	1005	883	-	-	-	-	-	-	-
Stage 2	999	883	-	990	874	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	949	852	1063	951	848	1070	1596	-	-	1608	-	-
Mov Cap-2 Maneuver	949	852	-	951	848	-	-	-	-	-	-	-
Stage 1	995	875	-	1004	882	-	-	-	-	-	-	-
Stage 2	988	882	-	980	872	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	8.7			8.5			1.2			1		
HCM LOS	A			A								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1596	-	-	994	1048	1608	-	-				
HCM Lane V/C Ratio	0.001	-	-	0.021	0.012	0.002	-	-				
HCM Control Delay (s)	7.3	0	-	8.7	8.5	7.2	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-				

HCM 6th TWSC
23: Londonderry Dr & Rockingham Dr

Short-Term Background Traffic
PM Peak Hour

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	5	1	0	6	8	0	3	11	7	4
Future Vol, veh/h	1	0	5	1	0	6	8	0	3	11	7	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	5	1	0	7	9	0	3	12	8	4
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	57	55	10	57	56	2	12	0	0	3	0	0
Stage 1	34	34	-	20	20	-	-	-	-	-	-	-
Stage 2	23	21	-	37	36	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	940	836	1071	940	835	1082	1607	-	-	1619	-	-
Stage 1	982	867	-	999	879	-	-	-	-	-	-	-
Stage 2	995	878	-	978	865	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	925	825	1071	926	824	1082	1607	-	-	1619	-	-
Mov Cap-2 Maneuver	925	825	-	926	824	-	-	-	-	-	-	-
Stage 1	976	861	-	993	874	-	-	-	-	-	-	-
Stage 2	983	873	-	966	859	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	8.5			8.4			5.3			3.6		
HCM LOS	A			A								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1607	-	-	1044	1057	1619	-	-				
HCM Lane V/C Ratio	0.005	-	-	0.006	0.007	0.007	-	-				
HCM Control Delay (s)	7.3	0	-	8.5	8.4	7.2	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-				

HCM 6th TWSC
23: Londonderry Dr & Rockingham Dr





Short-Term Total Traffic
AM Peak Hour

Intersection												
Int Delay, s/veh	7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	98	0	45	2	0	10	14	9	1	3	11	36
Future Vol, veh/h	98	0	45	2	0	10	14	9	1	3	11	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	107	0	49	2	0	11	15	10	1	3	12	39
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	84	79	32	103	98	11	51	0	0	11	0	0
Stage 1	38	38	-	41	41	-	-	-	-	-	-	-
Stage 2	46	41	-	62	57	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	903	811	1042	877	792	1070	1555	-	-	1608	-	-
Stage 1	977	863	-	974	861	-	-	-	-	-	-	-
Stage 2	968	861	-	949	847	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	886	801	1042	828	782	1070	1555	-	-	1608	-	-
Mov Cap-2 Maneuver	886	801	-	828	782	-	-	-	-	-	-	-
Stage 1	967	861	-	964	852	-	-	-	-	-	-	-
Stage 2	949	852	-	903	845	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	9.6		8.6		4.3		0.4					
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1555	-	-	930	1020	1608	-	-				
HCM Lane V/C Ratio	0.01	-	-	0.167	0.013	0.002	-	-				
HCM Control Delay (s)	7.3	0	-	9.6	8.6	7.2	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.6	0	0	-	-				

HCM 6th TWSC
23: Londonderry Dr & Rockingham Dr

Short-Term Total Traffic
PM Peak Hour

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	58	0	30	1	0	6	49	0	3	11	7	103
Future Vol, veh/h	58	0	30	1	0	6	49	0	3	11	7	103
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	0	33	1	0	7	53	0	3	12	8	112
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	199	197	64	213	252	2	120	0	0	3	0	0
Stage 1	88	88	-	108	108	-	-	-	-	-	-	-
Stage 2	111	109	-	105	144	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	760	699	1000	744	651	1082	1468	-	-	1619	-	-
Stage 1	920	822	-	897	806	-	-	-	-	-	-	-
Stage 2	894	805	-	901	778	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	730	668	1000	696	622	1082	1468	-	-	1619	-	-
Mov Cap-2 Maneuver	730	668	-	696	622	-	-	-	-	-	-	-
Stage 1	887	815	-	865	777	-	-	-	-	-	-	-
Stage 2	857	776	-	865	772	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	10.1		8.6		7.1		0.7					
HCM LOS	B		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1468	-	-	804	1003	1619	-	-				
HCM Lane V/C Ratio	0.036	-	-	0.119	0.008	0.007	-	-				
HCM Control Delay (s)	7.5	0	-	10.1	8.6	7.2	0	-				
HCM Lane LOS	A	A	-	B	A	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0	0	-	-				

Intersection												
Int Delay, s/veh	4.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	23	0	6	8	9	0	0	17	27	0	2
Future Vol, veh/h	1	23	0	6	8	9	0	0	17	27	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	25	0	7	9	10	0	0	18	29	0	2
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	25	0	0	56	60	25	64	55	14
Stage 1	-	-	-	-	-	-	27	27	-	28	28	-
Stage 2	-	-	-	-	-	-	29	33	-	36	27	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1597	-	-	1589	-	-	941	831	1051	930	836	1066
Stage 1	-	-	-	-	-	-	990	873	-	989	872	-
Stage 2	-	-	-	-	-	-	988	868	-	980	873	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1597	-	-	1589	-	-	935	827	1051	910	832	1066
Mov Cap-2 Maneuver	-	-	-	-	-	-	935	827	-	910	832	-
Stage 1	-	-	-	-	-	-	989	872	-	988	869	-
Stage 2	-	-	-	-	-	-	982	865	-	962	872	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			1.9			8.5			9.1		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	1051	1597	-	-	1589	-	-	919				
HCM Lane V/C Ratio	0.018	0.001	-	-	0.004	-	-	0.034				
HCM Control Delay (s)	8.5	7.3	0	-	7.3	0	-	9.1				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1				





Intersection												
Int Delay, s/veh	6.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	13	0	20	6	0	6	7	4	2	2	3	5
Future Vol, veh/h	13	0	20	6	0	6	7	4	2	2	3	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	0	22	7	0	7	8	4	2	2	3	5
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	35	32	6	42	33	5	8	0	0	6	0	0
Stage 1	10	10	-	21	21	-	-	-	-	-	-	-
Stage 2	25	22	-	21	12	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	971	861	1077	961	860	1078	1612	-	-	1615	-	-
Stage 1	1011	887	-	998	878	-	-	-	-	-	-	-
Stage 2	993	877	-	998	886	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	960	856	1077	937	855	1078	1612	-	-	1615	-	-
Mov Cap-2 Maneuver	960	856	-	937	855	-	-	-	-	-	-	-
Stage 1	1006	886	-	993	874	-	-	-	-	-	-	-
Stage 2	982	873	-	977	885	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	8.6		8.6			3.9			1.4			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1612	-	-	1028	1003	1615	-	-				
HCM Lane V/C Ratio	0.005	-	-	0.035	0.013	0.001	-	-				
HCM Control Delay (s)	7.2	0	-	8.6	8.6	7.2	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-				

Intersection												
Int Delay, s/veh	3.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	15	0	19	28	30	0	0	11	18	0	1
Future Vol, veh/h	2	15	0	19	28	30	0	0	11	18	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	16	0	21	30	33	0	0	12	20	0	1
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	63	0	0	16	0	0	109	125	16	115	109	47
Stage 1	-	-	-	-	-	-	20	20	-	89	89	-
Stage 2	-	-	-	-	-	-	89	105	-	26	20	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1540	-	-	1602	-	-	870	765	1063	862	781	1022
Stage 1	-	-	-	-	-	-	999	879	-	918	821	-
Stage 2	-	-	-	-	-	-	918	808	-	992	879	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1540	-	-	1602	-	-	860	754	1063	842	769	1022
Mov Cap-2 Maneuver	-	-	-	-	-	-	860	754	-	842	769	-
Stage 1	-	-	-	-	-	-	998	878	-	917	810	-
Stage 2	-	-	-	-	-	-	904	797	-	980	878	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			1.8			8.4			9.3		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	1063	1540	-	-	1602	-	-	850				
HCM Lane V/C Ratio	0.011	0.001	-	-	0.013	-	-	0.024				
HCM Control Delay (s)	8.4	7.3	0	-	7.3	0	-	9.3				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1				

Intersection												
Int Delay, s/veh	5.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	0	13	4	0	4	22	4	6	7	5	17
Future Vol, veh/h	8	0	13	4	0	4	22	4	6	7	5	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	0	14	4	0	4	24	4	7	8	5	18
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	88	89	14	93	95	8	23	0	0	11	0	0
Stage 1	30	30	-	56	56	-	-	-	-	-	-	-
Stage 2	58	59	-	37	39	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	897	801	1066	891	795	1074	1592	-	-	1608	-	-
Stage 1	987	870	-	956	848	-	-	-	-	-	-	-
Stage 2	954	846	-	978	862	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	880	785	1066	866	779	1074	1592	-	-	1608	-	-
Mov Cap-2 Maneuver	880	785	-	866	779	-	-	-	-	-	-	-
Stage 1	972	866	-	942	835	-	-	-	-	-	-	-
Stage 2	936	833	-	960	858	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	8.7		8.8			5			1.7			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1592	-	-	987	959	1608	-	-				
HCM Lane V/C Ratio	0.015	-	-	0.023	0.009	0.005	-	-				
HCM Control Delay (s)	7.3	0	-	8.7	8.8	7.2	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-				





HCM 6th TWSC
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2040 Total Traffic
AM Peak Hour

Intersection												
Int Delay, s/veh	3.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	70	0	6	24	15	0	0	17	44	0	10
Future Vol, veh/h	4	70	0	6	24	15	0	0	17	44	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	76	0	7	26	16	0	0	18	48	0	11
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	42	0	0	76	0	0	138	140	76	141	132	34
Stage 1	-	-	-	-	-	-	84	84	-	48	48	-
Stage 2	-	-	-	-	-	-	54	56	-	93	84	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1567	-	-	1523	-	-	833	751	985	829	759	1039
Stage 1	-	-	-	-	-	-	924	825	-	965	855	-
Stage 2	-	-	-	-	-	-	958	848	-	914	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1567	-	-	1523	-	-	820	745	985	808	753	1039
Mov Cap-2 Maneuver	-	-	-	-	-	-	820	745	-	808	753	-
Stage 1	-	-	-	-	-	-	921	823	-	962	851	-
Stage 2	-	-	-	-	-	-	943	844	-	894	823	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			1			8.7			9.6		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	985	1567	-	-	1523	-	-	843				
HCM Lane V/C Ratio	0.019	0.003	-	-	0.004	-	-	0.07				
HCM Control Delay (s)	8.7	7.3	0	-	7.4	0	-	9.6				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2				





HCM 6th TWSC
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2040 Total Traffic
AM Peak Hour

Intersection												
Int Delay, s/veh	7.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	0	72	6	0	6	24	7	2	2	11	21
Future Vol, veh/h	60	0	72	6	0	6	24	7	2	2	11	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	65	0	78	7	0	7	26	8	2	2	12	23
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	93	90	24	128	100	9	35	0	0	10	0	0
Stage 1	28	28	-	61	61	-	-	-	-	-	-	-
Stage 2	65	62	-	67	39	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	891	800	1052	845	790	1073	1576	-	-	1610	-	-
Stage 1	989	872	-	950	844	-	-	-	-	-	-	-
Stage 2	946	843	-	943	862	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	873	786	1052	771	776	1073	1576	-	-	1610	-	-
Mov Cap-2 Maneuver	873	786	-	771	776	-	-	-	-	-	-	-
Stage 1	972	871	-	934	830	-	-	-	-	-	-	-
Stage 2	924	829	-	872	861	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	9.4		9.1			5.3			0.4			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1576	-	-	962	897	1610	-	-				
HCM Lane V/C Ratio	0.017	-	-	0.149	0.015	0.001	-	-				
HCM Control Delay (s)	7.3	0	-	9.4	9.1	7.2	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0	0	-	-				

HCM 6th TWSC
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2040 Total Traffic
PM Peak Hour

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	46	0	19	81	49	0	0	11	29	0	6
Future Vol, veh/h	11	46	0	19	81	49	0	0	11	29	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	50	0	21	88	53	0	0	12	32	0	7
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	141	0	0	50	0	0	234	257	50	237	231	115
Stage 1	-	-	-	-	-	-	74	74	-	157	157	-
Stage 2	-	-	-	-	-	-	160	183	-	80	74	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1442	-	-	1557	-	-	721	647	1018	717	669	937
Stage 1	-	-	-	-	-	-	935	833	-	845	768	-
Stage 2	-	-	-	-	-	-	842	748	-	929	833	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1442	-	-	1557	-	-	703	631	1018	695	653	937
Mov Cap-2 Maneuver	-	-	-	-	-	-	703	631	-	695	653	-
Stage 1	-	-	-	-	-	-	927	826	-	837	756	-
Stage 2	-	-	-	-	-	-	824	737	-	910	826	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.5			0.9			8.6			10.2		
HCM LOS							A			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	1018	1442	-	-	1557	-	-	727				
HCM Lane V/C Ratio	0.012	0.008	-	-	0.013	-	-	0.052				
HCM Control Delay (s)	8.6	7.5	0	-	7.3	0	-	10.2				
HCM Lane LOS	A	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2				

HCM 6th TWSC
23: Londonderry Dr & Rockingham Dr

2040 Total Traffic
PM Peak Hour

Intersection												
Int Delay, s/veh	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	39	0	47	4	0	4	80	13	6	7	10	70
Future Vol, veh/h	39	0	47	4	0	4	80	13	6	7	10	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	0	51	4	0	4	87	14	7	8	11	76

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	259	260	49	283	295	18	87	0	0	21	0	0
Stage 1	65	65	-	192	192	-	-	-	-	-	-	-
Stage 2	194	195	-	91	103	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	694	645	1020	669	616	1061	1509	-	-	1595	-	-
Stage 1	946	841	-	810	742	-	-	-	-	-	-	-
Stage 2	808	739	-	916	810	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	658	604	1020	605	577	1061	1509	-	-	1595	-	-
Mov Cap-2 Maneuver	658	604	-	605	577	-	-	-	-	-	-	-
Stage 1	891	837	-	763	699	-	-	-	-	-	-	-
Stage 2	758	696	-	866	806	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10		9.7		6.1		0.6	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1509	-	-	816	771	1595	-
HCM Lane V/C Ratio	0.058	-	-	0.115	0.011	0.005	-
HCM Control Delay (s)	7.5	0	-	10	9.7	7.3	0
HCM Lane LOS	A	A	-	B	A	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0	0	-