

To: Brianna Medema, PE  
City of Aurora

From: Brian Horan, PE

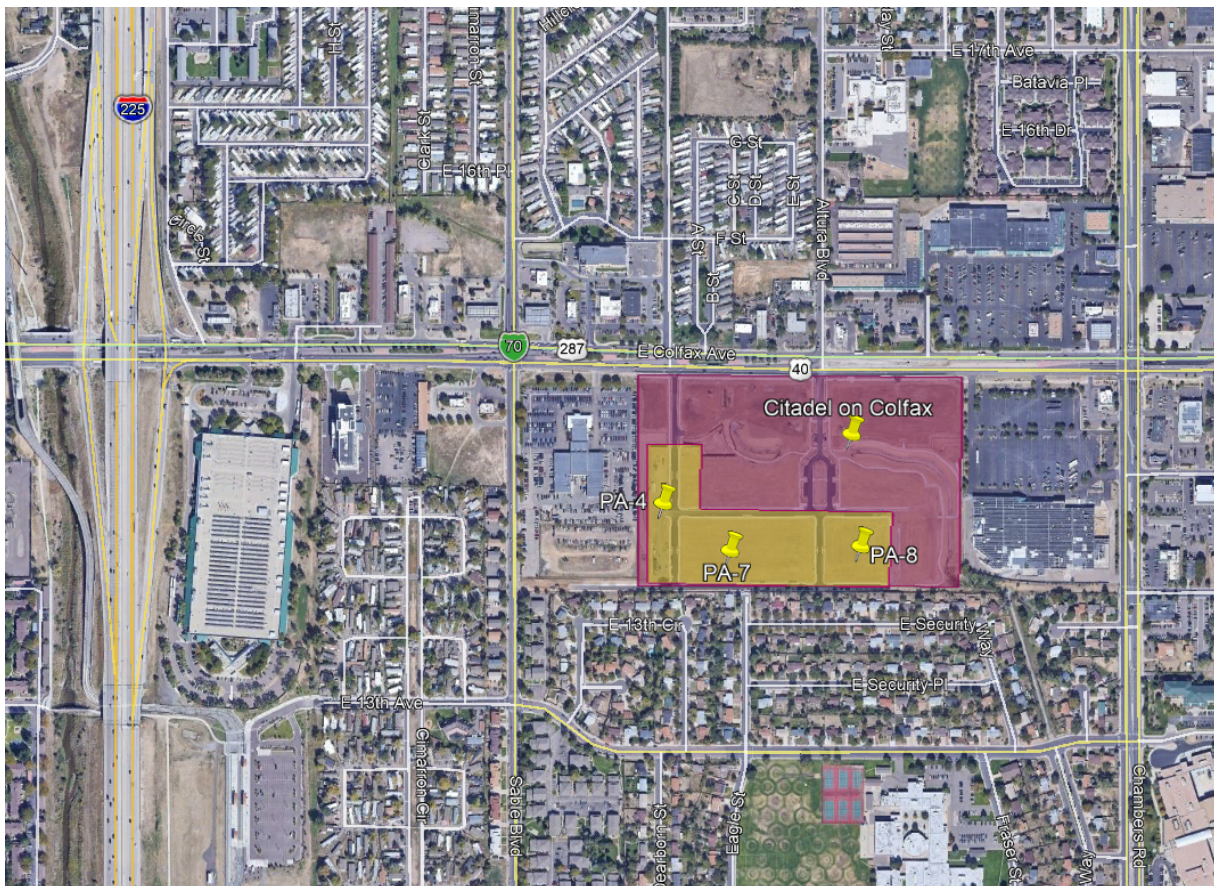
Date: February 15, 2021

**Re: Townhomes at Citadel  
Traffic Conformance**



## INTRODUCTION

This memorandum provides the results of a traffic conformance analysis performed in support of an approximately 11 Acre site in the City of Aurora, Colorado. Specifically, the site is identified as Planning Area 4, 7, and 8 of the larger Citadel on Colfax mixed-used development. The Citadel on Colfax development is located east of Sable Boulevard, south of Colfax Avenue and west of Chambers Road and is currently undeveloped. The site location is shown on Figure 1.



**Figure 1 – Site Location**

The subject site is part of the larger Citadel on Colfax mixed-use development (Citadel) which was supported by a Traffic Impact Study (TIS) completed by LSC Transportation Consultants dated December 19, 2017. The TIS analyzed Citadel with the following mix of uses:



- 3,000 square feet (SF) of fast food with restaurant with drive-thru
- 10,000 SF of high turnover sit-down restaurant
- 110 room hotel
- 30,000 SF fitness center
- 47,800 SF retail
- 156 townhome units
- 61 apartment units

Excerpts from the Citadel on Colfax TIS are included as Attachment I.

The Applicant proposes to develop Planning Area 4, 7, and 8 with 142 townhome units. A full-sized copy of the site plan is provided as Attachment II. The following memorandum has been prepared for the City of Aurora as requested. The purpose is to evaluate the traffic generated by the currently proposed townhome use in comparison to the previously studied assumptions as well as to the overall Citadel development and the associated roadway improvements.

### CITADEL TIS TRIP GENERATION AND RECOMMENDATIONS

As mentioned previously, the Citadel TIS is dated December 19, 2017 and contemplates a mix of residential and commercial uses. The TIS analyzed the project in one build out phase to be complete in 2021. The site is laid out with commercial uses oriented to the frontage along Colfax Avenue and residential and mixed-use transitioning to the residential neighborhoods to the south. **As shown in Attachment I, general land use categories are provided for the planning areas and the specific uses, as described above, are not specifically identified.**

The subject site is proposed to occupy Planning Areas 4, 7 and 8 and is annotated within Attachment I. The approved TIS forecasted trip generation estimates for the above development program based on rates/equations published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9<sup>th</sup> Edition and industry standard methodologies for pass-by and internal capture reductions.

The approved TIS concluded that in order to accommodate the 2021 and 2037 forecasted volumes a number of roadway improvements would need to be provided. These improvements were shown on the provided site plan included in the approved TIS and included herein as Attachment I. It is assumed that those proposed improvements will be provided per the recommendations of the TIS.

### PROPOSED DEVELOPMENT AND TRIP GENERATION COMPARISON

As shown in the Attachment I excerpt, the subject site occupies Planning Areas 4, 7, and 8 of the larger Citadel on Colfax development. The Applicant proposes to develop these Planning Area with 142 townhome units. The subject site was contemplated for 156 townhome units in the approved TIS. A trip generation analysis of the proposed use is provided on Table 1. As shown on Table 1 the proposed use is forecasted to generate 63 weekday AM peak hour, 73 weekday PM peak hour, and 825 average daily trips at buildout.

As shown on Attachment II, the site is provided access via N. Altura Blvd., N. Eagle St. and E. 14<sup>th</sup> Dr. which are all private drives connecting to the local network. Each townhome “block” consists of approximately 21 townhomes and is served by a private drive. Consistent with “Techniques in the Traffic Calming Toolbox”, High Visibility Crosswalk Markings are provided at each intersection, narrow roadways and on-street parking provide ample “friction” between blocks, and left turns will be restricted at key intersections as annotated in Attachment II to maintain circulation and safety.

As stated previously, specific land uses and development programs were not provided in the approved TIS. A review of planning documents related to the history of the Citadel project shows that Planning

Areas 4, 7, and 8 were designated for the entirety of the townhome development. The approved TIS contemplated 156 townhome units. The proposed unit count is 142 units representing fewer anticipated trips than the approved TIS. The comparison is provided in Table 1. The proposed townhome use is in conformance with and would have no adverse effect on the conclusions or recommendations of the approved Citadel on Colfax TIS.

## CONCLUSIONS

The conclusions of this comparative analysis are as follows:

1. The subject site was part of the Citadel on Colfax mixed use development in the City of Aurora, Colorado.
2. According to the approved traffic impact study (Citadel TIS) prepared by LSC Transportation Consultants dated December 19, 2017, the TIS analyzed Citadel on Colfax with the following mix of uses:
  - 3,000 square feet (SF) of fast food with restaurant with drive-thru
  - 10,000 SF of high turnover sit-down restaurant
  - 110 room hotel
  - 30,000 SF fitness center
  - 47,800 SF retail
  - 156 townhome units
  - 61 apartment units

The approved Citadel TIS identified road improvements to mitigate impacts associated with the overall proposed development which were provided for on the approved Citadel on Colfax Site Plan.

3. The Applicant proposes to develop Planning Areas 4, 7, and 8 with a total of 142 townhome units. The approved Citadel TIS contemplated 156 townhomes.
4. The proposed use would generate 63 weekday AM peak hour, 73 weekday PM peak hour, and 825 average daily trips at full build out.
5. This represents a decrease in trips from the approved use of 6 weekday AM peak hour (or 8.7%), 8 weekday PM peak hour (or 9.9%), and 81 average daily trips (or 8.9%).
6. Based on the trip generation analysis contained herein, the proposed townhome development would not significantly impact the conclusions of the approved Citadel TIS. The traffic impacts associated with the proposed use would be adequately accommodated by the constructed/proposed road network without the need for additional improvements.

We trust that the information contained herein satisfy the request of the City of Aurora. If you have any questions or need further information, please contact Brian Horan at [BrianHoran@gallowayus.com](mailto:BrianHoran@gallowayus.com) or 303-770-8884.

Table 1  
Citadel Townhomes  
Trip Generation Comparison

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<u>APPROVED <sup>(1)</sup></u> Apartments	230	156	DU	12	57	69	54	27	81	906
<u>PROPOSED <sup>(1)</sup></u> Apartments	230	142	DU	11	52	63	49	24	73	825
Difference (Proposed minus Approved)				-1	-5	-6	-5	-3	-8	-81

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 9th Edition consistent with the approved TIS



**Attachment I**  
**Citadel on Colfax Traffic Impact Study**  
**LSC dated December 19, 2017 excerpts**

**TRAFFIC SIGNAL WARRANT ANALYSIS**

The projected traffic volumes in Figure 8a (Year 2021 Total Traffic) were reviewed to determine if a peak-hour or four-hour traffic signal warrant will likely be met at the E. Colfax Avenue/Altura Boulevard/Site Access intersection at site buildout around 2021. Figures 10 and 11 show the estimated 2021 total traffic volumes for the two highest volume morning hours and the two highest afternoon hours plotted on a four-hour and peak-hour warrant chart. Only half of the northbound right-turn volume was used per City of Aurora guidelines. Both Figures 10 and 11 suggest a traffic signal will be warranted by site buildout.

**CONCLUSIONS AND RECOMMENDATIONS****Trip Generation**

1. The site is projected to generate about 6,031 net external vehicle-trips on the average weekday, with about half entering and half exiting during a 24-hour period. During the morning peak-hour, about 283 vehicles would enter and about 307 vehicles would exit the site. During the afternoon peak-hour, about 344 vehicles would enter and about 284 vehicles would exit.
2. Some of these trips are expected to be pass-by trips which do not add traffic to the overall roadway network. Detailed information on pass-by trip assumptions are included in Table 2. Ten percent of residential trips are expected to be internal to the site.

**Projected Levels of Service**

3. All of the signalized intersections analyzed are expected to operate at overall LOS "D" or better during both morning and afternoon peak-hours through 2037 with the recommended improvements/mitigation.

**Conclusions**

4. The eastbound left-turn movement and the southbound approach at the E. Colfax Avenue/Eagle Street intersection will operate at LOS "E" or "F" in the future if the north leg remains full movement. During peak times drivers can shift west to the signalized E. Colfax Avenue/N. Sable Boulevard intersection.
5. The impact of the Citadel on Colfax development can be accommodated by the existing and proposed roadway network with implementation of the following recommendations.

**Recommendations**

6. A continuous eastbound right-turn lane should be constructed along the site frontage of E. Colfax Avenue. The 2037 mitigated scenario shows this lane being converted to a shared through/right lane from N. Sable Boulevard to N. Chambers Road to improve operations. The mitigated scenario also shows the E. Colfax Avenue/N. Chambers Road intersection being improved so each approach has dual left-turn lanes, three through lanes, and a dedicated right-turn lane by 2037.



7. A westbound left-turn lane should be constructed on E. Colfax Avenue approaching the full movement site access aligning with Altura Boulevard. An appropriate length for the 35 mph posted speed limit is a 315-foot left-turn lane (190 feet for deceleration and 125 feet for vehicle storage) plus a 120-foot transition taper. These dimensions can be accommodated within the existing raised center median with no shifting of through lanes on E. Colfax Avenue.
8. The intersection of E. Colfax Avenue and Altura Boulevard/Site Access should be signalized once traffic signal warrants are met. This will likely occur prior to site buildout.
9. A right-in/right-out porkchop-style island should be provided on the western right-in/right-out site access if the north side of this intersection will remain full movement. This porkchop island will not be needed if the center median is closed off so that both sides of E. Colfax Avenue are right-in/right-out.
10. The approaches of both right-in/right-out access points to E. Colfax Avenue and the site access approach to N. Sable Boulevard should be stop-sign controlled.
11. A southbound left-turn lane is recommended to be striped on N. Sable Boulevard approaching the site access intersection. On-street parking may need to be removed on the east side of N. Sable Boulevard to accommodate this turn lane.

\* \* \* \* \*

We trust our findings will assist you in gaining approval of the proposed Citadel on Colfax development. Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By

Christopher S. McGranahan, PE, PTOE  
Principal



CSM/wc

12-19-17

Enclosures: Tables 1 and 2  
Figures 1 - 11  
Traffic Count Reports  
Level of Service Definitions  
Level of Service Reports

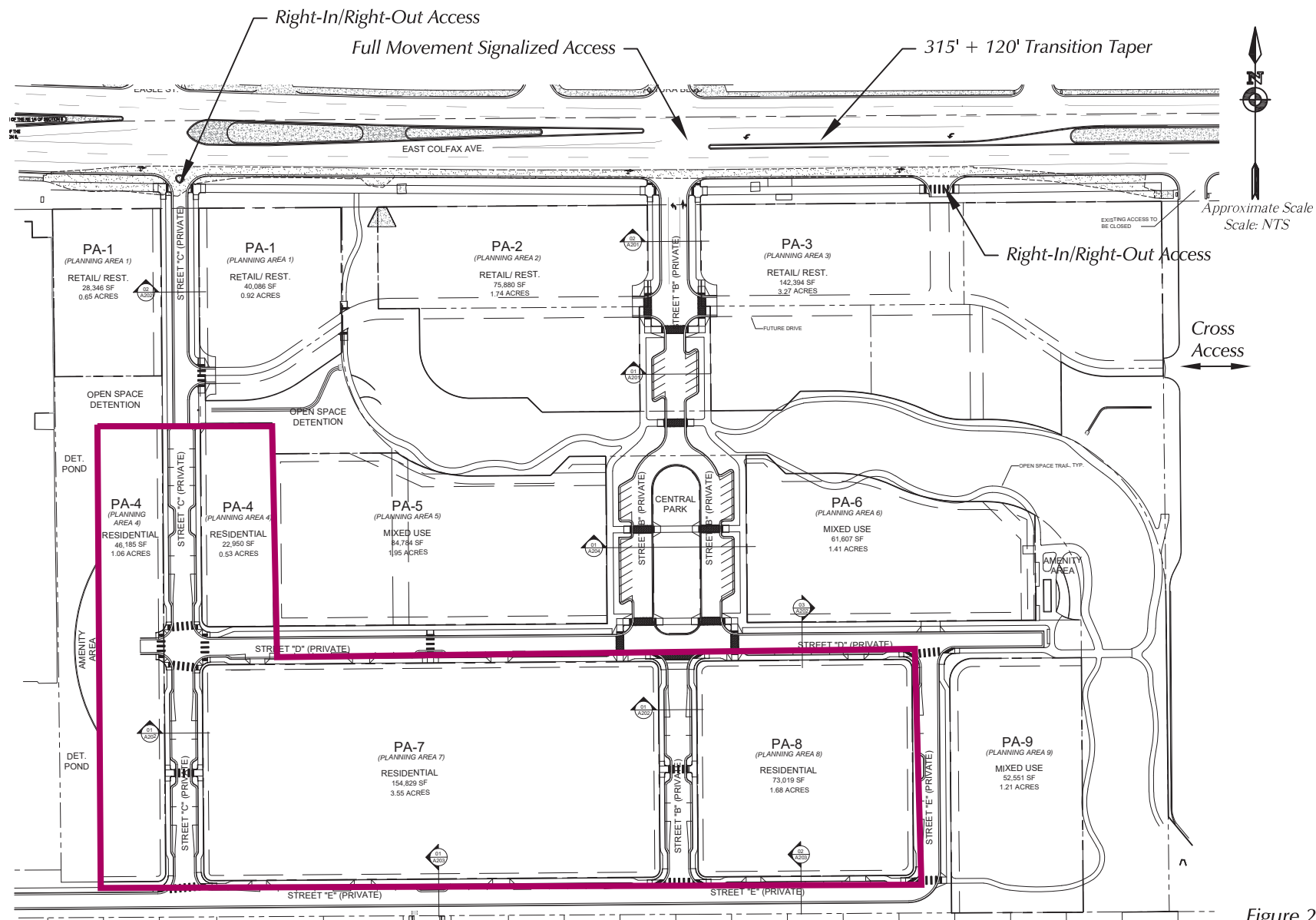
**Table 2**  
**ESTIMATED TRAFFIC GENERATION**  
**Citadel on Colfax**  
**Aurora, CO**  
**LSC #161200; December, 2017**

Trip Generating Category	Quantity		Trip Generation Rates <sup>(1)</sup>				Vehicle - Trips Generated					
			Average Weekday	AM Peak Hour		PM Peak Hour		Average Weekday	AM Peak Hour		PM Peak - Hour	
				In	Out	In	Out		In	Out	In	Out
Fast-Food Restaurant with Drive-Through <sup>(2)</sup>	3.00	KSF <sup>(3)</sup>	496.12	23.164	22.256	16.978	15.672	1,488	69	67	51	47
High-Turnover Sit-Down Restaurant <sup>(4)</sup>	10.00	KSF	127.15	5.946	4.865	5.910	3.940	1,272	59	49	59	39
Hotel <sup>(5)</sup>	110.00	Rooms	8.92	0.389	0.281	0.343	0.357	981	43	31	38	39
Fitness Center <sup>(6)</sup>	30.00	KSF	32.93	0.705	0.705	2.012	1.518	988	21	21	60	46
Retail <sup>(7)</sup>	47.80	KSF	44.32	1.518	1.192	1.192	1.518	2,118	73	57	57	73
Townhomes <sup>(8)</sup>	156	DU <sup>(9)</sup>	5.81	0.075	0.365	0.348	0.172	906	12	57	54	27
Apartments <sup>(10)</sup>	61	DU	6.65	0.102	0.408	0.403	0.217	406	6	25	25	13
<b>Total</b>								<b>8,159</b>	<b>283</b>	<b>307</b>	<b>344</b>	<b>284</b>
<b>Pass-By Trips <sup>(11)</sup></b>												
Fast-Food Restaurant (49%)								729	33	33	24	24
Sit-Down Restaurant (43%)								547	23	23	21	21
Retail (34%)								720	22	22	22	22
<b>Pass-By Trips =</b>								<b>1,996</b>	<b>78</b>	<b>78</b>	<b>67</b>	<b>67</b>
<b>Internal Trips <sup>(12)</sup></b>												
Townhomes (10%)								91	1	6	5	3
Apartments (10%)								41	1	2	2	1
<b>Internal Trips =</b>								<b>132</b>	<b>2</b>	<b>8</b>	<b>7</b>	<b>4</b>
<b>Net External Trips =</b>								<b>6,031</b>	<b>203</b>	<b>221</b>	<b>270</b>	<b>213</b>

**Notes:**

- (1) Source: *Trip Generation*, Institute of Transportation Engineers, 9th Edition, 2012.
- (2) ITE Land Use No. 934 - Fast-Food Restaurant with Drive-Through
- (3) KSF = 1,000 square feet
- (4) ITE Land Use No. 932 - High Turnover Sit-Down Restaurant
- (5) ITE Land Use No. 310 - Hotel
- (6) ITE Land Use No. 492 - Health/Fitness Club
- (7) ITE Land Use No. 826 - Specialty Retail Center - no AM rates are available, so the PM rates were reversed
- (8) ITE Land Use No. 230 - Townhomes
- (9) DU = Dwelling Unit
- (10) ITE Land Use No. 220 - Apartments
- (11) Pass-by trip percentages are based on the *Trip Generation Handbook* with 34% assumed for retail uses, 43% for sit-down restaurants and 49% for fast-food restaurants with drive-through services.
- (12) Ten percent of residential trips are assumed to be internal to the site.





To Full Movement  
to Sable Boulevard

Figure 2

## Site Plan

Citadel on Colfax (LSC #161200)

## **Attachment II**

### **Site Plan**



