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Memorandum

To: Tom Reiff, Project Manager
Public Works Department

From: Brian Horan, PE

Date: December 5, 2022

Re: **The Meadows – Filing 20
Traffic Conformance**



INTRODUCTION

This memorandum provides the results of a traffic conformance analysis performed in support of the development of Lot 2A-1A, Lot 1A-2, and Lot 1B-1 of The Meadows Filing 20 in Castle Rock, Colorado. The proposed site development is located east of Bilberry Street, west of Ambrosia Street, south of Meadows Boulevard, and north of Meadows Parkway. The lots are currently vacant. The site location is shown on Figure 1.



Figure 1 – Site Location



The subject site was previously studied with a mixed use as part of a larger proposed development, The Meadows Town Center (Filing 20) which was supported by an Arterial Street Access Plan Addendum (Access Plan) completed by Felsburg Holt & Ullevig (FHU) dated March 2018 and provided by Public Works Department (Staff). The full planning area for Filing 20 is shown on Figure 2.



Figure 2 – Filing 20

The Access Plan analyzed the Filing 20 planning area with the following uses (Table 1 of Access Plan):

- 1,018 Single Family Units
- 320 Townhome Units
- 444 Apartment Units
- 83 KSF Office Use
- 47.5 KSF Retail Use
- 5 KSF Bank Use
- 13 KSF Drug Store Use
- 717 Students Charter School

Excerpts from the Access Plan are included as Attachment I.

The Applicant, Garrett Companies, proposes to develop Lot 2A-1A, Lot 1A-2, and Lot 1B-1 of Filing 20 of The Meadows with a mix of townhome, apartment, and commercial uses. Specifically, the Applicant is proposing the following mix of uses:

- 41 Townhome Units
- 44 Apartment Units
- 6.3 KSF Commercial/Retail Use

A full-sized copy of the site plan is provided as Attachment II. The following memorandum has been prepared for Public Works as requested. The purpose is to evaluate the traffic generated by the currently proposed use in comparison to the approved land use support by the approved Access Plan.

ARTERIAL STREET ACCESS PLAN ADDENDUM TRIP GENERATION AND RECOMMENDATIONS

As mentioned previously, the Access Plan is dated March 2018 and contemplates a variety of uses for the subject site, Filing 20 of The Meadows. The Access Plan forecasted trip generation estimates for the above development program based on rates/equations published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition and industry standard methodologies for internal capture reductions.

The Access Plan concluded that in order to accommodate the projected volumes a number of roadway improvements would need to be provided. Suggested intersection geometries were provided for all affected intersections and access points included in the Access Plan as intersections 7, 8, 18, & 19, and included herein as Attachment I.

As determined by virtual field reconnaissance, the existing nearby unsignalized intersections have been constructed consistent with recommendations of the Access Plan. Intersection 19 has been signalized as recommended. Intersection 8 was identified for future signalization and improvements when warrants are met.

PROPOSED DEVELOPMENT AND TRIP GENERATION COMPARISON

As shown in the Attachment I excerpt, the Access Plan contemplates a mix of uses for the parcels of Filing 20 of The Meadows development. The proposed development would encompass 41 townhome units of the previously studied 320 townhome units, 44 apartment units of the previously studied 444 apartment units, and 6.3 KSF of the previously studied 47.5 KSF retail use.

Table 1 forecasts the trip generation for the proposed Meadows Townhome development using the ITE *Trip Generation Manual*, 11th Ed. As can be seen in the table, the proposed use is forecasted to generate 54 weekday AM peak hour trips, 55 weekday PM peak hour trips, and 514 average daily trips.

To conduct a more direct trip generation comparison between the forecasted Meadows development trips and the forecasted Filing 20 trips, the Filing 20 trip generation table originally made using the ITE *Trip Generation Manual* 9th Ed was updated to the 11th edition and is included in Table 1. This changed the forecasted number of daily trips from 21,834 to 21,017. Since 2018, many of the proposed Filing 20 developments have been constructed. The City of Castle Rock has provided a list of what has been developed as of 10/19/2022. The original list is included in Attachment II, while the condensed trip generation for developed land uses is shown in Table 1. It can be concluded that of the 21,017 daily trips forecasted to be generated upon completion of the Filing 20 development, 17,148 daily trips are currently being generated by what has been developed to date.

Once the Meadow Townhomes have been developed as a part of Filing 20, there will be a remainder of 581 weekday AM peak hour trips, 529 PM peak hour trips, and 3,355 average daily trips for the remainder of the undeveloped Filing 20 developments. The proposed residential and commercial use is in conformance with and would have no adverse effect on the conclusions or recommendations of the Access Plan.

Table 1
Meadows Townhomes - Castle Rock, CO
Site Trip Generation

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<i>Proposed: (1)</i>										
Townhomes	220	41	DU	9	27	36	24	14	38	338
Apartments	221	23	DU	2	7	9	5	4	9	104
Apartments w/ Ground-Floor Commercial	230	21	DU	2	7	9	6	2	8	72
Meadow Townhomes Total Proposed				13	41	54	35	20	55	514
<i>Total Approved - 2017: (1)(2)</i>										
Single-Family	210	1,018	DU	185	528	713	603	354	957	8,532
Multifamily Housing (Low-Rise)	220	320	DU	29	93	122	99	59	158	2,127
Multifamily Housing (Mid-Rise)	221	444	DU	42	142	184	106	68	174	2,071
Charter School (K-12)	538	717	Students	325	288	613	213	214	427	1,928
General Office Building	710	83	KSF	126	17	143	24	118	142	987
Shopping Plaza (40-150K)	821	47.5	KSF	51	31	82	121	126	247	3,207
Pharmacy/Drugstore with Drive-Through	881	13	KSF	25	24	49	66	67	133	1,364
Walk-in-Bank	911	5	KSF	59	54	113	67	65	132	1,452
Subtotal				842	1,177	2,019	1,299	1,071	2,370	21,668
<i>Internal Capture (2)</i>				(26)	(36)	(61)	(39)	(33)	(72)	(651)
Filling 20 Total Approved				816	1,141	1,958	1,260	1,038	2,298	21,017
<i>Built to Date (10/19/22)</i>										
Single-Family	210	926	DU	147	418	565	507	298	805	7,820
Multifamily Housing (Low-Rise)	220	64	DU	10	33	43	30	18	48	486
Multifamily Housing (Mid-Rise)	221	555	DU	53	180	233	132	85	217	2,601
Rock Climbing Gym	434		KSF	20	7	13	13	10	23	253
Charter School (K-12)	538	350	Students	119	105	224	44	45	89	941
General Office Building	710	29.3	KSF	51	7	58	10	50	60	399
Shopping Plaza (40-150K)	821	30	KSF	32	20	52	76	80	156	2,026
Pharmacy/Drugstore with Drive-Through	881	13	KSF	25	24	49	66	67	133	1,364
Walk-in-Bank	911	3.8	KSF	45	41	86	51	49	100	1,100
Recreation Center			Town Provided Trip Gen	29	12	41	56	81	137	689
Subtotal				531	847	1,364	985	783	1,768	17,679
<i>Internal Capture (2)</i>				(16)	(26)	(41)	(30)	(24)	(54)	(531)
Filling 20 Developed to Date				515	821	1,323	955	759	1,714	17,148
Undeveloped - Proposed				288	279	581	270	259	529	3,355

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition

(2) Arterial Street Access Plan Addendum Filing 20 (Town Center) in the Meadows by FHU dated March 2018

CONCLUSIONS

The conclusions of this comparative analysis are as follows:

1. The subject site was previously contemplated under a mixed use for The Meadows development in Castle Rock, CO.
2. According to the Arterial Street Access Plan Addendum (Access Plan) prepared by Felsburg Holt & Ullevig dated March 2018, the Access Plan analyzed Filing 20 with the following uses:
 - 1,018 Single Family Units
 - 320 Multi-Family Units
 - 444 Apartment Units
 - 83 KSF Office Use
 - 47.5 KSF Retail Use
 - 5 KSF Bank Use
 - 13 KSF Drug Store Use
 - 717 Student Charter School
3. The Applicant, Garret Companies, proposes to develop Lot 2A-1A, Lot 1A-2, and Lot 1B-1 of Filing 20 with a mix of residential and commercial uses. The Access Plan contemplated the subject site with a mix of residential, office, and commercial use. The proposed use is consistent with the assumptions of the approved Access Plan.
4. A comparison of trip generation between the undeveloped parcels uses and proposed uses suggests that the proposed use would leave a balance of trips for the remaining undeveloped parcels of 581 weekday AM peak hour, 529 weekday PM peak hour, and 3,355 average daily trips.
5. Based on the trip generation comparison contained herein, the proposed residential and commercial development would not negatively impact the conclusions of the Access Plan. 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 Castle Rock, CO. If you have any questions or need further information, please contact Brian Horan at BrianHoran@gallowayus.com or 303-770-8884.

Attachment I

Arterial Street Access Plan Addendum – Filing 17, Filing 18 & Filing 20 (Town Center)

Felsburg Holt & Ullevig dated March 2018 excerpts

ARTERIAL STREET ACCESS PLAN ADDENDUM

**Filing 17, Filing 18 &
Filing 20 (Town Center)
in The Meadows**

Prepared for:

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FHU Reference No. 117256-01

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I. INTRODUCTION

Castle Rock Development Company has been working with home and commercial builders on the construction of new land parcels in The Meadows subdivision of Castle Rock, Colorado, for many years. Residential homes, medical facilities, commercial and office space, and parks and open spaces continue to be built as The Meadows progresses toward its eventual buildout of the entire subdivision.

As The Meadows grows, it is necessary to understand the traffic impacts of these new projects, specifically along the main access routes near the core of the commercial development. To that end, this report is an addendum to the *Arterial Street Access Plan (Access Plan)* for Filings 17, 18 and 20 that was completed and approved by the Town of Castle Rock in June 2004.

Since 2004, intersection locations, turning movements, and access restrictions have been constructed as were recommended in the *Access Plan*. As such, this 2017 report assesses and confirms the recommendations from 2004 and provides input for new or revised geometric and traffic control improvements based on known uses and densities and on projections of future development uses.

This report includes information on:

- Existing land use, traffic control, and roadway data
- Available access routes and intersection characteristics
- Projected land uses and resulting traffic volume forecasts
- Recommended intersection geometry, auxiliary lanes, and traffic control
- Comparison of 2004 recommendations to 2017 recommendations

The analyses and recommendations of this report focus on Filings 17, 18 and 20 (also referred to as the Town Center). The physical land boundary of these filings is depicted on **Figure 1**. Access, traffic control and geometric improvements are focused along the arterial street system adjacent to these filings, being:

- Two segments of Meadows Boulevard – from North Meadows Drive to the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive intersection (one segment between Filings 18 and 20 and the other segment between Filings 17 and 20)

Note: For the purposes of this report, the segment of Meadows Boulevard between Filings 18 and 20 is referred to as West Meadows Boulevard and the segment between Filings 17 and 20 is referred to as North Meadows Boulevard.

- Meadows Parkway from the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive intersection to the Filing 17 access on the west side of Plum Creek (Lombard Street); this intersection currently provides parking lot access for the East Plum Creek Trail but will ultimately serve as the entry for the Filing 17 COI areas on the north and south sides of Meadows Parkway
- Prairie Hawk Drive from the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive intersection to Morningbird Lane (being constructed)

This report provides the Town of Castle Rock and Castle Rock Development Company with information and recommendations that will satisfy the vehicle capacity demands of The Meadows through construction of the final land areas.

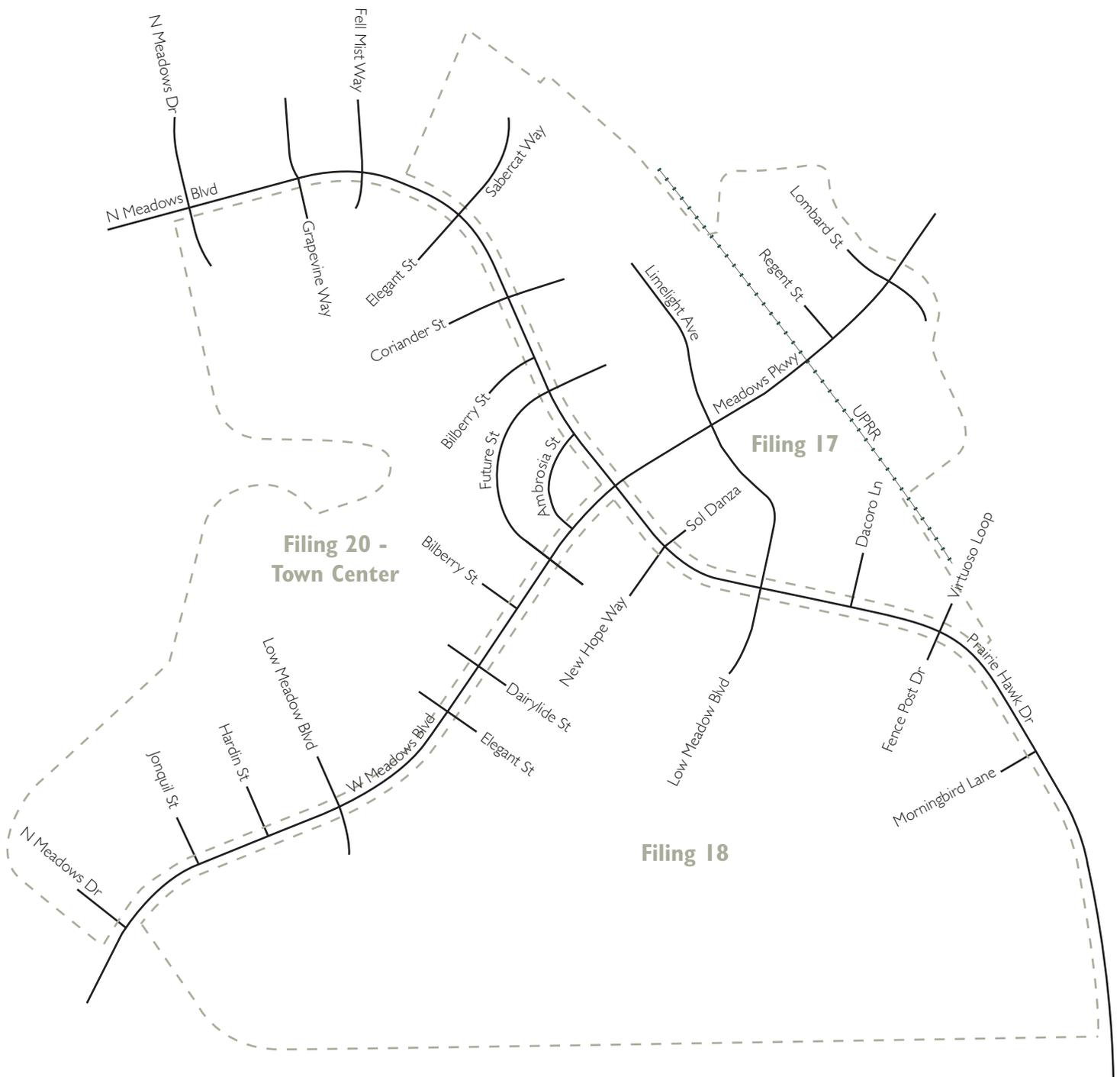


Figure 1
Filings 17, 18, and 20 Boundaries



II. EXISTING CONDITIONS COMPARISON

Since the completion of the *Access Plan* in 2004, significant development has occurred, and roadway projects have been constructed that provide a more complete street system in Filings 17, 18 and 20. Following is information on how the built environment of these filings has progressed since 2004.

II.A. Developed Environment

Residential homes, retail establishments, office space, a hospital, a charter school, medical office buildings (MOB's), an assisted care facility, and other uses have been constructed since the completion of the *Access Plan* in 2004. These land uses are throughout Filings 17, 18 and 20, but somewhat concentrated as:

- Retail, office, hospital, and MOB's in Filing 17
- Residential homes, charter school, and assisted living facility in Filing 18
- Retail, office, and residential homes (both single-family and multi-family) in Filing 20

These land uses follow what was envisioned by Castle Rock Development Company in 2004 in most cases but have been refined over the years based on economic market trends.

II.B. Access Routes

In 2004, most of the arterial street network in The Meadows had been constructed to a four-lane cross-section except in a few cases. West Meadows Boulevard between the Meadows Parkway/Meadows Boulevard/Prairie Hawk Drive intersection and Coachline Road was only a two-lane facility as was Prairie Hawk Drive to the south of Fire Station 154.

Additions to the street network provide new opportunities for residents, as well as patrons of its commercial areas, for vehicular movements to/from The Meadows and internally between the varying land uses.

None of the commercial land uses of Filing 17 existed in 2004, and, as such, none of the internal street network was in place. Only the AMC movie theater was being contemplated at that time, but Limelight Avenue or other streets had yet to be constructed.

Only the New Hope Presbyterian Church and Fire Station 154 had been built in Filing 18 in 2004. None of the internal street network for the residential homes or charter school existed, and the Town Center was totally void of any development or constructed street network.

II.C. Traffic Control

Traffic signals were in operation at only the Meadows Parkway/Meadows Boulevard/Prairie Hawk Drive intersection and at the North Meadows Boulevard/North Meadows Drive intersection in 2004. All other intersection movements were controlled by stop signs. Today, three other traffic signals have been added within the study area: 1) & 2) North Meadows Boulevard at Fell Mist Way and Elegant Street/Sabercat Way, and 3) Meadows Parkway/Limelight Avenue.

III. FUTURE CONDITIONS

The following subsections summarize the land uses, trip generation estimates, and trip distribution characteristics for Filings 17, 18 and 20, as well as describe the used to develop trip generation estimates for the *Access Plan* in 2004 and for those used in this current report.

III.A. *Developing and Future Land Uses*

Figure 2 provides a representation of the developing and future construction projects. Areas of this figure that are not defined are existing, completed projects. The information of **Figure 2** is provided to summarize the development context of Filings 17, 18 and 20; that is, what parcels are undergoing construction now or will be constructed in the future. Filing 17 will include new commercial and office uses, Filing 18 will have additional residential dwelling units, and Filing 20, the Town Center, will be a mix of residential and commercial uses.

As found in Section III.C, the analyses for this addendum are based on known and assumed land uses in these filings, not simply ones that are under construction or are anticipated in the future.

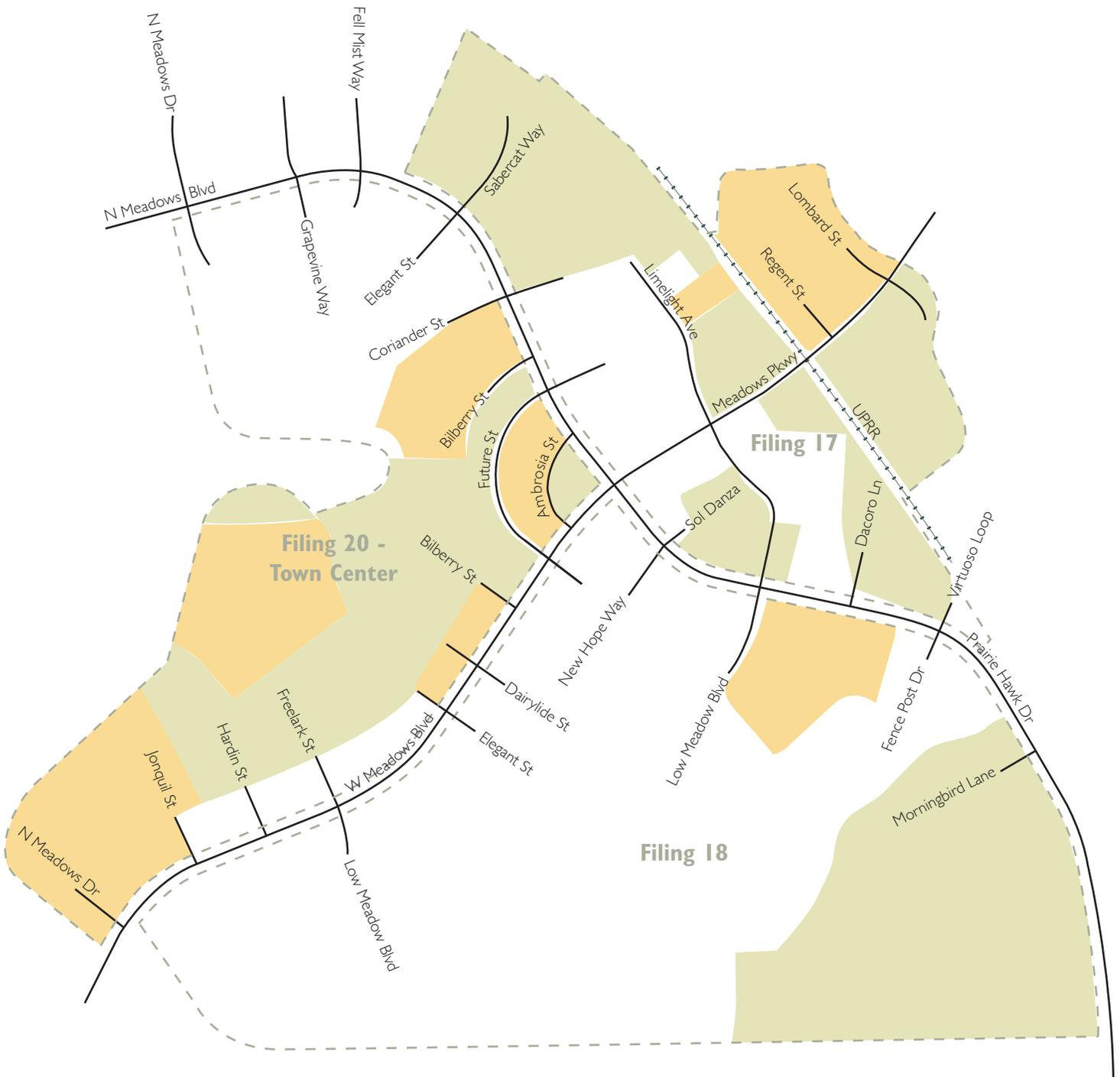
III.B. *Trip Generation Methodologies*

As can be imagined, land use and density information for Filings 17, 18 and 20 are more defined now than they were in 2004. For example, the land areas in Filing 17 were zoned as Commercial/Office/Industrial (COI) in 2004 and without more exact information, trip generation estimates were developed with a 1/3, 1/3, 1/3 split of these three land use types. Now these land areas are partially constructed and better assumptions of individual uses can be made.

Related to resultant trip generation estimates, an important factor to understand is that trip generation rates in 2004 for single-family homes were based on empirical trip generation data that was collected for homes in specific sections of The Meadows and in Founders Village. That investigation found that vehicle-trip rates on a daily and peak hour basis were less than what the Institute of Transportation Engineers' (ITE) publication *Trip Generation* would predict. The current study uses the standard ITE rates, resulting in a more conservative approach, one that should provide the Town with a level of confidence that the recommendations of this report are sufficient to meet the travel demands of The Meadows residents and commercial patrons as it continues to develop.

In 2004, an internal capture allowance of 25 percent was used to reflect the interaction of the varying residential, retail and office uses in Filing 20, the Town Center. The 25 percent allowance was based on information contained in ITE's *Trip Generation Handbook* and on conversations with Town of Castle Rock staff. Current analyses indicate that a 25 percent internal capture cannot be justified given the current mix of dwelling units and retail and office space (see next section). As such, a more conservative estimate of vehicle-trips for Filing 20 was used for the analyses.

The information above strives to convey that the methodologies of predicting vehicle-trips and resultant recommendations in 2004 and 2017 are different; ones that provide some slight variations to the recommendations of the 2004 *Access Plan*. These variations do not result in whole-scale changes to the access recommendations along the arterial street system.



Legend

- Developing Parcels
- Undeveloped Parcels

Figure 2
Developing and Future land Uses

III.C. Trip Generation Estimates and Trip Comparison

Trip Generation

Vehicle-trip estimates for Filings 17, 18 and 20 were prepared using information contained in *Trip Generation*, 9th Edition (2012), or information developed in previous traffic studies for non-typical land uses like the charter schools (see **Table 1** on pages 7 & 8).

Table 1 also shows the internal capture allowances used for each filing. The internal capture percentage for the Town Center used the *National Cooperative Highway Research Program 684* methodology to estimate the AM and PM peak hour reductions since the Town Center will have a good mix of land use types that allow this procedure to be used. Evaluation results indicate that an internal capture of 3 percent and 11 percent can be expected for the AM and PM peak hours, respectively (see **Appendix A**).

For Filings 17 and 18, the land use mix is not significant enough to use this procedure; that is, Filing 17 lacks a residential component, while Filing 18 lacks retail and office components. Regardless, it is projected that there will be some interaction between the differing land uses within these filings that will result in some internal capture, but not necessarily for each land use.

For example, in Filing 17, some internal capture will occur in the land area where the AMC movie theater is; interaction among restaurants, the theater, bank or convenience store will occur. Residents visiting the movie theater could have dinner at one of the restaurants before or after a movie. Frequenting the bank's ATM could occur before meals or before purchases at the convenience store. Businesses of varying types in this area of Filing 17 are very conducive to completing shared trips to support the internal capture concept.

There will also likely be interaction among the hospital, the MOBs, and the Arapahoe Community College (ACC) campus along Limelight Avenue. ACC may provide dental or medical programs that could support internships at one of the MOB's or at the hospital, or a hospital employee could take a class at ACC in the evening, for example; trips between land uses that do not require leaving and returning to the immediate area.

But not every parcel in Filing 17 will have an internal capture interaction. It is not expected that the COI parcel on the south side of Meadows Parkway adjacent to Plum Creek will have much interaction among the several office buildings in this land area.

Relative to Filing 18, there will be some internal capture between the residential dwelling units and the Aspen View Charter School. Some families may live within walking distance of the school or, even if they drive their children to school, they may return home and not proceed onto The Meadows arterial street system. Also, some vehicle-trips will have routes to/from the south through the Red Hawk development and to other areas of Castle Rock via Wolfensberger Road, which also do not use The Meadows arterial street system. Each condition contributes to some level of internal capture.

Considering this information, an allocation for internal capture has been used – 10 percent for the interaction between lands uses in Filings 17 and 18 have been applied to the trip generation estimates contained in **Table 1**.

Table 1 also includes information at the end of each filing summary that compares trip generation data for Filings 17, 18 and 20 between what was estimated in 2004 and what is predicted now. A summary of the numerical difference is also included. Following **Table 1** is a brief description of these differences and what is likely causing them.

Table 1. Trip Generation for Filings 17, 18 and 20

Land Use	Unit	Size	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Filing 17									
Retail	KSF	150	6,618	318	344	662	206	262	468
Office	KSF	237	2,748	353	48	401	64	312	376
Light Industrial	KSF	84.4	529	69	9	78	10	72	82
Hospital			4,953	246	78	324	115	272	387
Medical-Dental Office	KSF	110.5	4,088	209	55	264	92	237	329
Hotel	Rooms	130	1,062	71	50	121	40	38	78
ACC Campus	KSF	108	2,969	239	84	323	159	115	274
Mini-Warehouse	KSF	97.3	244	8	6	14	13	13	26
Restaurant	KSF	10	1,271	59	49	108	59	40	99
Car Wash	Bays	4	432	16	16	32	16	16	32
Bank	KSF	3.3	978	46	34	80	80	80	160
Convenience Store	KSF	3	2,537	62	61	123	76	77	153
Movie Theater	KSF	43.4	3,510	0	0	0	188	85	273
Day Care	KSF	18.7	1,385	121	107	228	108	122	230
<i>2017 Subtotal</i>			33,324	1,816	941	2,757	1,227	1,741	2,968
<i>Internal Capture – 10% For Certain Parcel Interaction</i>			-2,430	-120	-72	-192	-101	-115	-216
TOTAL External Trips to/from Filing 17			30,895	1,696	869	2,565	1,126	1,626	2,752
Filing 17 TOTAL - 2004			34,064	1,286	366	1,652	1,332	2,149	3,481
Difference (2017 vs. 2004)			-3,169	+410	+503	+913	-206	-523	-729

Table 1. Trip Generation for Filings 17, 18 and 20 (Continued)

Land Use	Unit	Size	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Filing 18									
Single-Family	DU	1,176	11,978	228	683	911	749	440	1,190
Church	KSF	28	255	10	6	16	9	5	15
Charter School	Students	790 ¹	2,200	401	337	736	234	308	542
Assisted Living	Units	219	616	25	14	39	30	33	63
<i>Subtotal</i>			15,050	663	1,040	1,702	1,023	787	1,809
<i>Internal Capture – 10% Between Residential & Charter School</i>			-1,418	-63	-102	-165	-99	-75	-173
TOTAL External Trips to/from Filing 18			13,632	600	938	1,537	924	712	1,636
Filing 18 TOTAL – 2004			17,995	399	903	1,302	1,078	594	1,672
Difference (2017 vs. 2004)			-4,363	+201	+35	+235	-154	+118	-36
Filing 20 – Town Center									
Single-Family	DU	1,018	10,318	195	585	781	645	378	1,023
Townhomes	DU	320	2,084	29	140	169	131	65	196
Apartments	DU	444	2,938	46	180	226	183	97	280
Office	KSF	83	915	114	16	129	21	103	124
Retail	KSF	47.5	2,183	105	113	218	88	112	200
Bank	KSF	5	741	34	26	60	61	61	122
Drug Store	KSF	13	1,250	23	21	45	64	64	128
Charter School	Students	717 ¹	2,005	364	305	668	212	280	492
<i>Subtotal</i>			22,433	910	1,388	2,298	1,405	1,159	2,564
<i>Internal Capture 3% AM; 11% PM</i>			-60	-28	-38	-66	-154	-183	-282
TOTAL Filing 20			22,373	882	1,350	2,232	1,251	1,031	2,282
Filing 20 TOTAL – 2004			22,530	441	1,237	1,678	1,344	923	2,267
Difference (2017 vs. 2004)			-157	+441	+113	+554	-93	+108	+15

¹ Student size represents 95 percent of the maximum population to reflect average daily attendance.

Trip Generation Comparison

The following information summarizes how the current trip generation estimates compare to what was projected in 2004. Of note, the trip generation summary in the 2004 *Access Plan* included an internal capture allowance for Filing 20 (the Town Center) which was discussed on Page 6 but also included estimates of vehicle-trips between entire filings since one of the objectives of the 2004 *Access Plan* was to understand how many vehicle-trips were entering and leaving the entire Meadows subdivision (different from internal capture within a filing). As such, the comparison of vehicle-trips in **Table 1** is between the 2017 projected vehicle-trips (minus any internal capture) and the estimates from the 2004 *Access Plan* (without any trip reductions for Filings 17 and 18, and for Filing 20 minus the 25 percent internal capture). This approach provides a better apples-to-apples comparison.

- *Filing 17* – Trip generation estimates in 2017 are less on a daily basis. AM peak hour trips are higher, while trips during the PM peak hour are lower. Partial reasoning is that some of the land uses are now known versus assumptions that were made in 2004.
- *Filing 18* – Daily vehicle-trips for Filing 18 are also lower, but slightly higher during the AM peak hour. Inbound and outbound trips in the PM peak hour are mixed, but the PM peak hour total is slightly lower. While the number of residential dwelling units is smaller than in 2004, the Aspen View Charter School has a higher trip generation, being essentially twice the projections for a public elementary school. Charter schools do not have bus service and, therefore, many students arrive by passenger car from anywhere in Castle Rock or outside Town limits.
- *Filing 20 (Town Center)* – Trip generation projections for Filing 20 are slightly lower over the course of an entire day but are higher during the AM peak hour. Reasoning is that a significant internal capture percentage was allowed in 2004 (25 percent), which cannot be justified now due to current ITE methodologies. Additionally, while the number of residential dwelling units is less, the upcoming charter school in this filing has a higher trip generation than a typical public elementary school as also noted for Filing 18.

Vehicle-Trips – Undeveloped Parcels

As noted in Section III.A, certain parcels in Filings 17, 18 and 20 are currently undeveloped and are not contributing vehicle traffic to the surrounding street network at this time. **Table 2** uses information from **Table 1** to estimate the amount of traffic that could be added to the local street network as the undeveloped parcels are constructed.

As shown in **Table 2**, over 34,500 additional vehicle-trips per day are projected to be added to the surrounding arterial street network as Filings 17, 18 and 20 develop. These new trips are part of the expected number of vehicle-trips for the entire build-out of these filings.

Additionally, no internal capture is included in **Table 2**. If it is the Town's desire to compare projected vehicle-trips in Filings 17, 18 and 20 to the information contained in this table, individual traffic studies likely will not address internal capture for a larger area outside their immediate parcel. As such, a better apples-to-apples comparison will occur if internal capture allowances are not included in these comparisons.

Table 2. Trip Generation for Undeveloped Parcels

Land Use	Unit	Size	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Filing 17									
Retail	KSF	108	4,712	226	245	471	142	181	322
Office	KSF	205	2,397	309	42	351	56	272	328
Light Industrial	KSF	84.4	529	69	9	78	10	72	82
Medical-Dental Office	KSF	100	3,874	189	50	239	82	210	291
Hotel	Rooms	130	1,062	71	50	121	40	38	78
ACC Campus	KSF	108	2,969	239	84	323	159	115	274
Restaurant	KSF	10	1,271	59	49	108	59	40	99
Car Wash	Bays	4	432	16	16	32	16	16	32
Bank	KSF	3.3	489	23	17	40	40	40	80
Convenience Store	KSF	3	2,537	62	61	123	76	77	153
Filing 17 Totals			20,272	1,263	623	1,886	679	975	1,590
Filing 18									
Single-Family	DU	209	2,069	39	117	156	129	75	204
Filing 18 Totals			2,069	39	117	156	129	75	204
Filing 20									
Single-Family	DU	376	4,462	86	257	343	280	164	444
Multi-Family	DU	310	1,997	27	134	161	125	62	187
Apartments	DU	204	1,380	21	83	104	85	45	130
Office	SF	72	794	99	13	112	18	89	107
Retail	SF	37	1,674	80	87	167	67	85	152
Bank	SF	5	741	34	26	60	61	61	122
Drug Store	SF	13	1,250	23	21	45	64	64	128
Filing 20 Totals			12,279	371	621	992	701	569	1,270
TOTAL New Trips for Undeveloped Parcels			34,620	1,673	1,361	3,034	1,509	1,619	3,064

Referring to **Table 1**, current daily vehicle-trip projections are less than what was approved for these filings in 2004 since there is now a better understanding of expected land use types and densities. As such, any trip generation comparisons that are made should reflect the approved densities, a level of vehicle-trips that is higher than an additional 34,620 vehicles per day (vpd).

III.D. Trip Distribution

Distribution of vehicles along the arterial street system defines how the projected vehicle-trips are assigned to individual left turn, right turn or through movements at the study area intersections. To develop the trip distribution relationship, the Denver Regional Council of Governments’ (DRCOG) travel demand model was reviewed—both the base model and the one that was modified for the recent *Castle Rock Transportation Plan*.

The distribution of vehicles to/from Filings 17, 18 and 20 can vary slightly given their location within The Meadows. For example, Filing 17 trips will likely have a higher distribution toward the east along Meadows Parkway because it is closer to US 85 and I-25 than the other filings. Filing 18 will have a slightly higher distribution toward the south along Red Hawk Drive, while Filing 20, the Town Center, will have a higher distribution of traffic to/from the north along North Meadows Drive.

Considering these factors and the distribution assessments of the DRCOG traffic demand model, the following distribution of vehicle-trips for Filings 17, 18 and 20 were used for the *Access Plan* addendum.

Table 3. Trip Distribution Projections

Filing	To/From the North	To/From the East	To/From the West	To/From the South		TOTAL
	N. Meadows Drive	Meadows Parkway	Meadows Boulevard	Prairie Hawk Drive	Red Hawk Drive	
Filing 17	20%	55%	5%	15%	5%	100%
Filing 18	20%	45%	10%		10%	100%
Filing 20	25%	45%	10%		5%	100%

Distribution of vehicle-trips is somewhat different from what was estimated in 2004. As noted, the DRCOG travel demand models were used to make these assessments. A better understanding of developed and undeveloped land areas, and advancements in travel model accuracy, provide differing results than the travel model estimates from 13 years ago. The estimates of **Table 3** have been discussed with Town staff and are deemed acceptable for this addendum.

III.E. Projected Traffic Volumes

The projected traffic volumes of **Table 1** and the trip distribution estimates of **Table 3** were used as defining information to estimate vehicle movements to/from each intersection along Meadows Parkway, Meadows Boulevard, and Prairie Hawk Drive. The software program Vistro™ was used to organize distribution pathways and trip assignments for individual land areas in Filings 17, 18 and 20. Traffic volume data at the 25 intersections along these roadways are represented on **Figure 3** and **Figure 4**.

Legend

xx(xx) AM(PM) Peak Hour Traffic Volumes

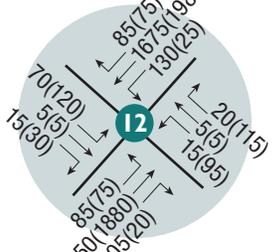
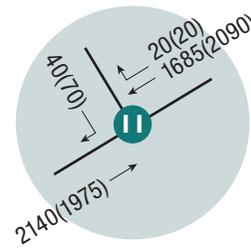
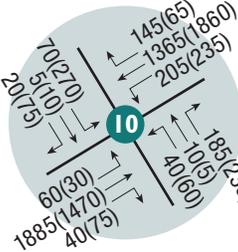
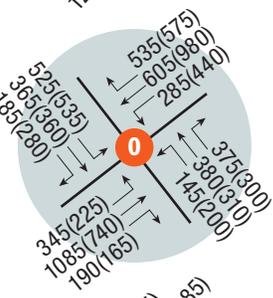
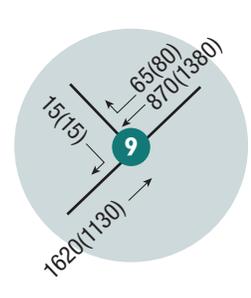
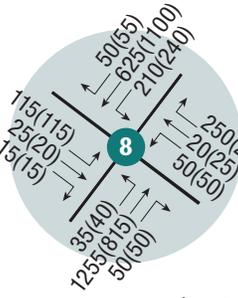
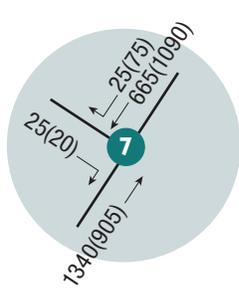
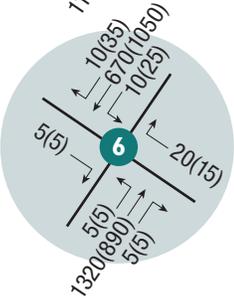
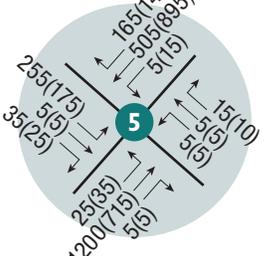
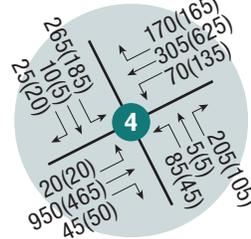
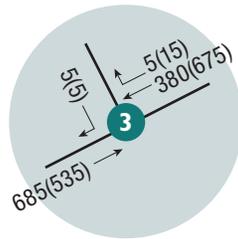
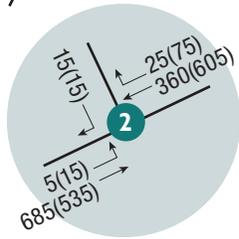
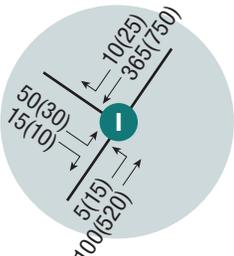
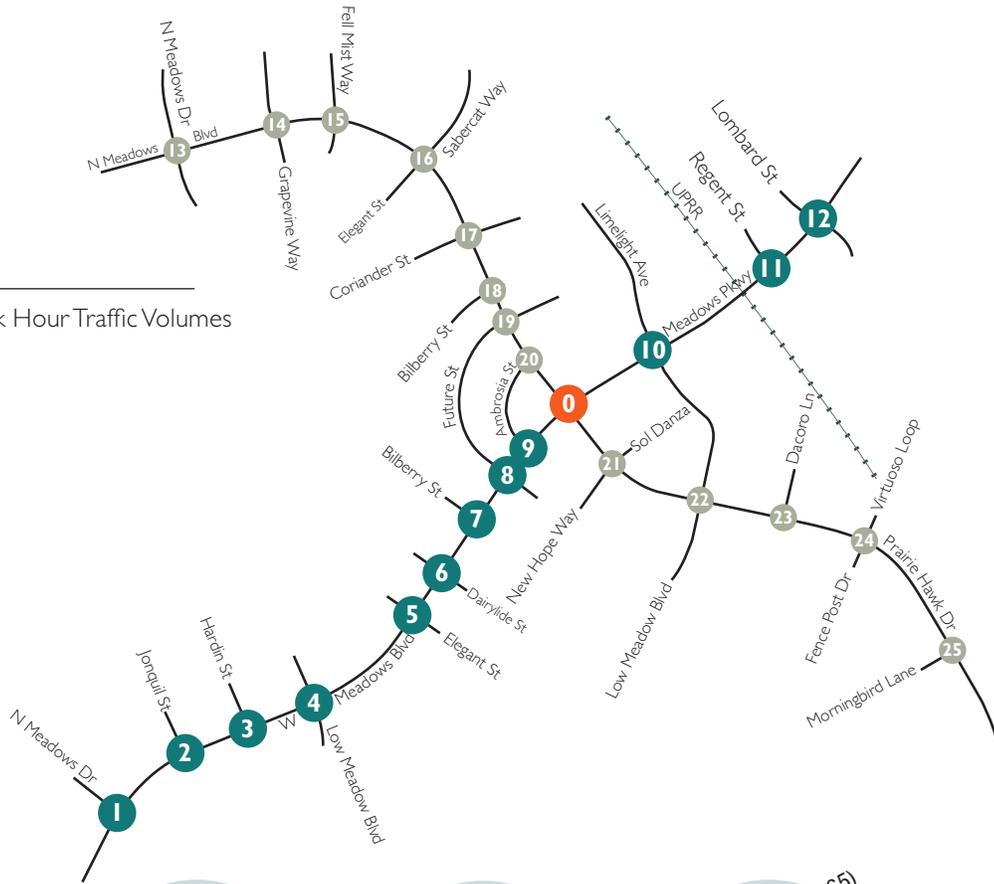


Figure 3

**Projected Traffic Volumes
Meadows Boulevard/Meadows Parkway Intersections**



Legend

xx(xx) AM(PM) Peak Hour Traffic Volumes



Figure 4
Projected Traffic Volumes
Meadows Boulevard/Prairie Hawk Drive Intersections



Having several access points for vehicle movements to/from Filings 17, 18 and 20 offers many routes for motorists to choose from when traveling to/from a destination. As such, traffic volumes are distributed over many intersection movements. **Figure 3** and **Figure 4** show that not one movement to/from these filings is excessive. Many movements are fewer than 25 vehicles per hour (vph) and few reach 200 vph. The highest levels of projected vehicle turning movements are:

- *Intersections 4 & 5* – Southbound left turn movements onto West Meadows Boulevard related to the proximity of the upcoming Apex Charter School. Based on empirical data collected by Felsburg Holt & Ullevig, charter schools generate twice as many daily and peak hour vehicle-trips as a traditional public elementary school of the same size.
- *Intersection 4* – Northbound right turn from Low Meadow Boulevard onto eastbound West Meadows Boulevard during the AM peak hour. Possibly related to movements from Aspen View Charter School.
- *Intersection 8* – Westbound left turn movement onto Red Hawk Drive; likely related to Red Hawk Drive being a cut-through route for residents of the Red Hawk subdivision.
- *Intersection 10* – Westbound left turn and northbound right turn to/from the commercial area along Limelight Avenue.
- *Intersection 16* – Northbound right turn and westbound left turn for movements to/from North Meadows Boulevard and Sabercat Way.

III.F. Intersection Geometry

An assessment has been made relative to the projected intersection laneage requirements for the build-out of The Meadows when compared to existing intersection geometry. In summary, intersection laneage that currently exists is mostly deemed appropriate for the project traffic volumes. Only one pair of modifications is necessary to satisfy operational conditions if the traffic volume projections of this report are met:

- *Meadows Parkway/Meadows Boulevard/Prairie Hawk Drive Intersection* – 2nd left turn lanes should be added to the westbound and northbound approaches; these can be added via pavement restriping. Castle Rock Development Company constructed these intersections to accommodate this lane geometry.
- *Meadows Parkway/Limelight Avenue Intersection* – The existing lane striping on the southbound approach should be changed from separate left, through and right turn lanes to two left turn lanes and a shared through/right lane.

Additionally, only the Morningbird Lane access along Prairie Hawk Drive is not completed, but it is being constructed as part of the Prairie Hawk Drive widening currently underway. This intersection will serve only residential dwelling units in Filing 18 and the planned intersection laneage is deemed appropriate for this access.

As part of the analyses for this addendum, and related to intersection geometry, an assessment has been made about whether some intersections may warrant the installation of an auxiliary lane that does not exist or if one that does exist should be modified to add more vehicle storage length. These modifications are not related to traffic operations but are specifically related to meeting the Town of Castle Rock access requirements. The summary of that information is in Section IV.C, Auxiliary Lane Modifications. **Figure 5** and **Figure 6** represent the intersection lane geometry along the arterial street system in Filings 17, 18 and 20 to satisfy the operational needs for the build-out of these filings.

Legend

-  Lane Geometry
-  New or Modified Laneage
- X/X** AM/PM Peak Hour Signalized Intersection Level of Service
- x/x** AM/PM Peak Hour Unsignalized Intersection Level of Service
-  Stop Sign
-  Traffic Signal

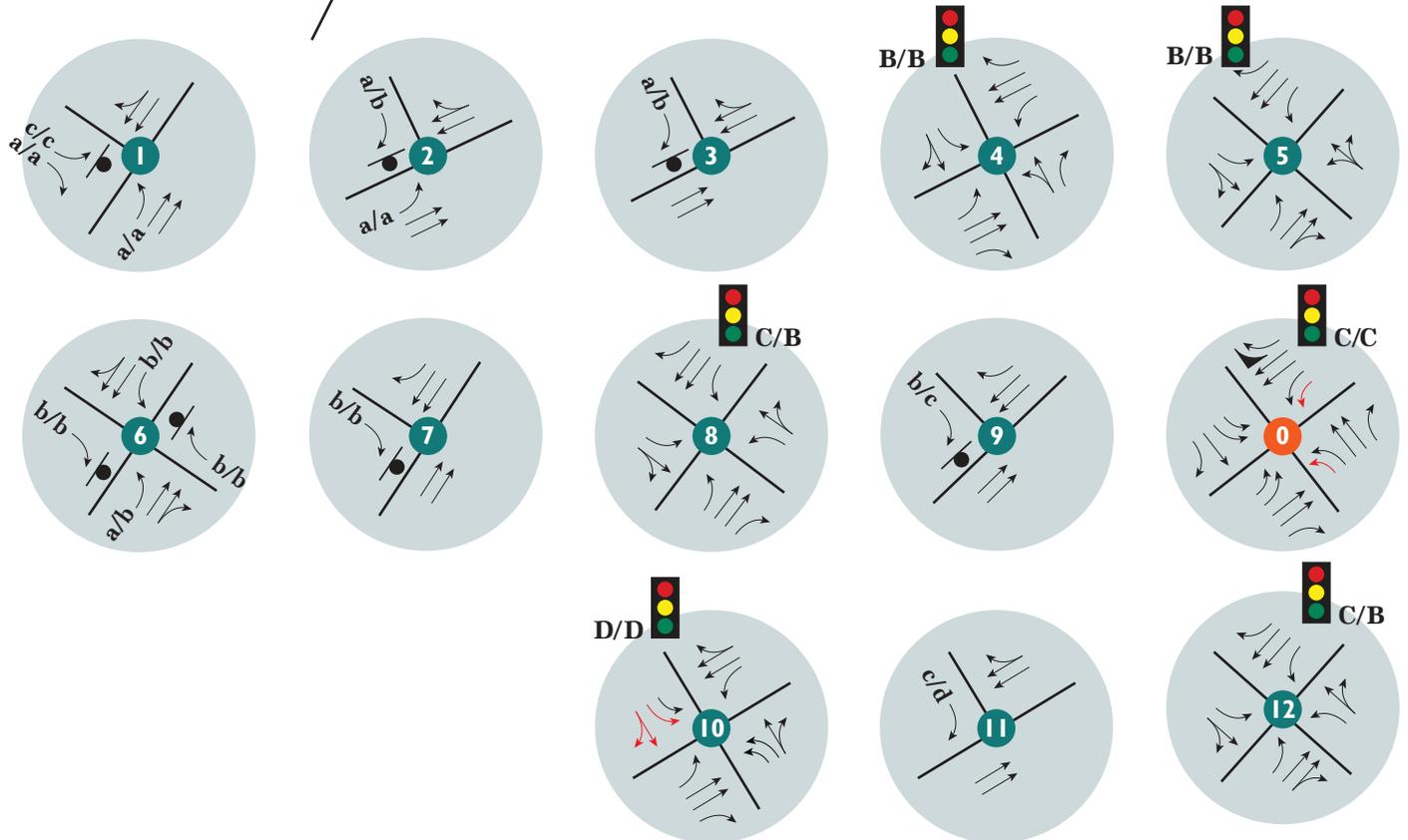
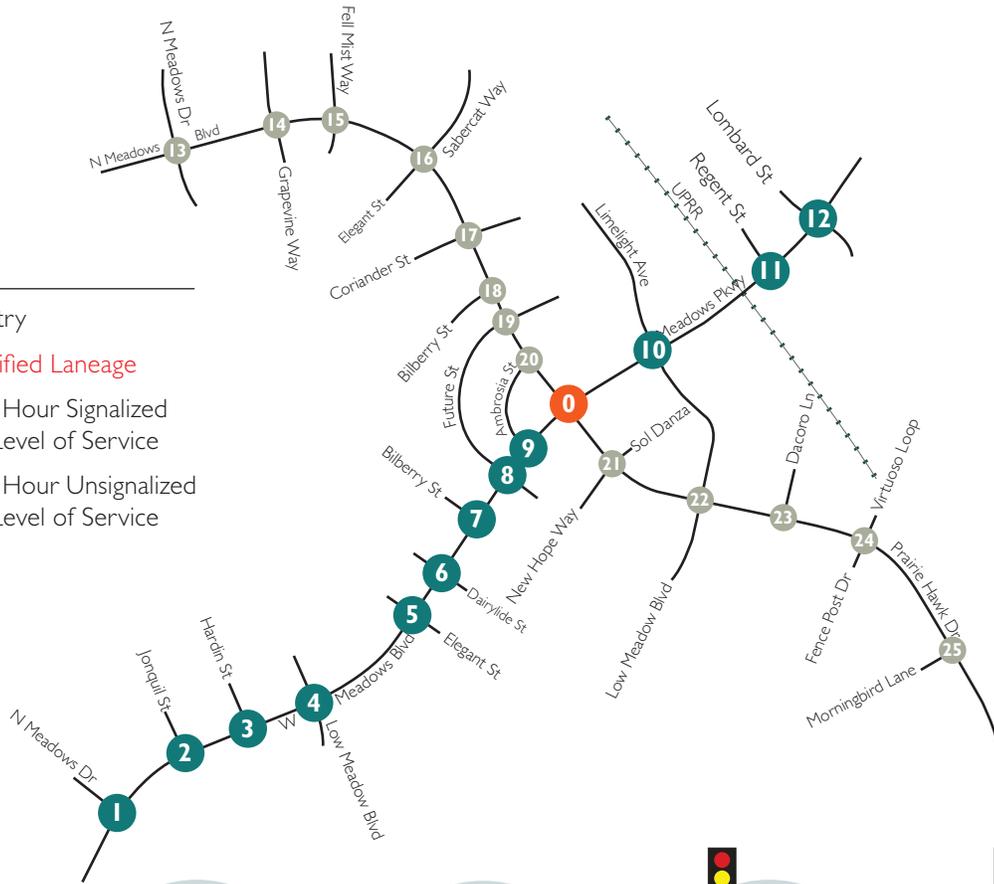


Figure 5
 Intersection Geometry, Traffic Control, and Levels of Service
 Meadows Boulevard/Meadows Parkway Intersections



Legend

- Lane Geometry
- New or Modified Laneage
- X/X** AM/PM Peak Hour Signalized Intersection Level of Service
- x/x** AM/PM Peak Hour Unsignalized Intersection Level of Service
- Stop Sign
- Traffic Signal

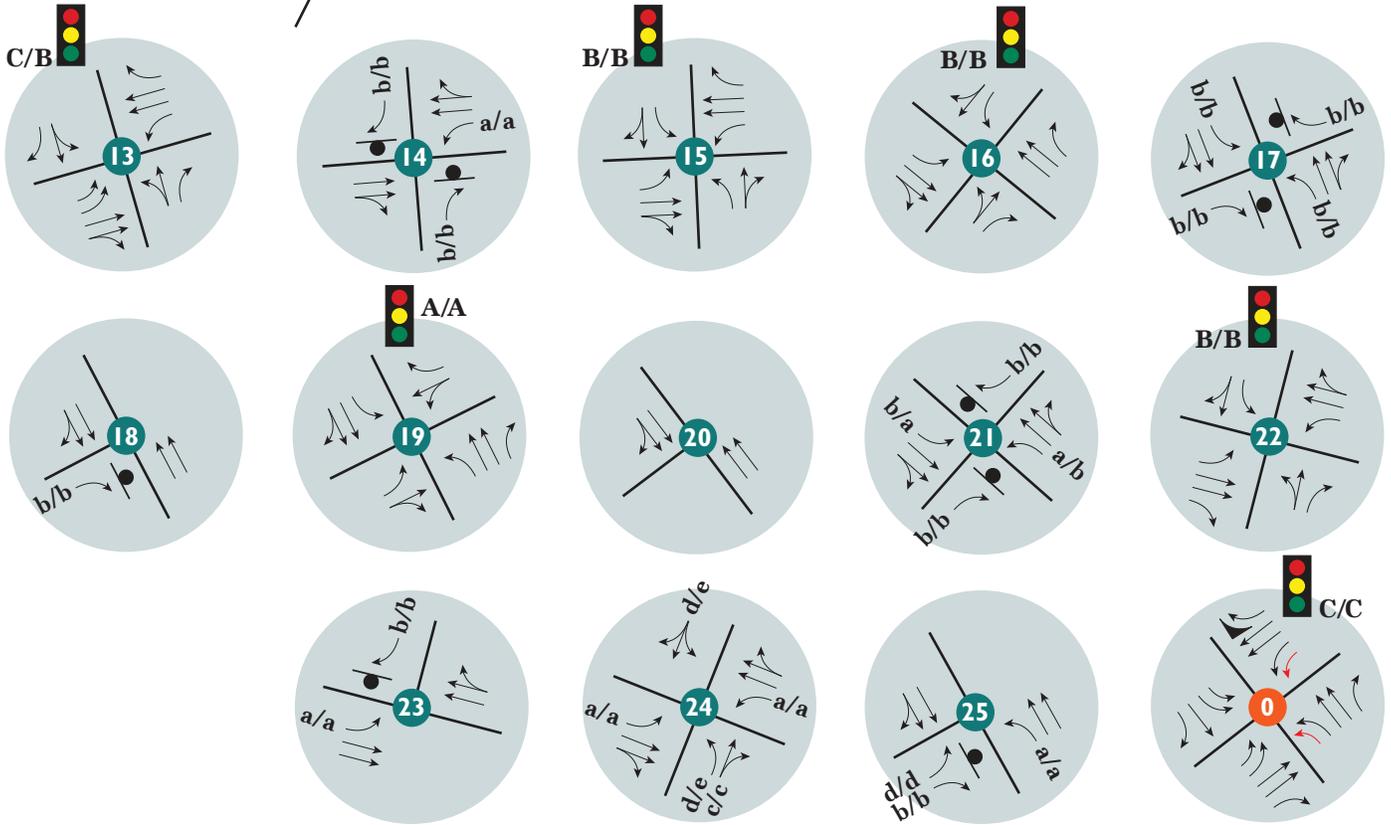
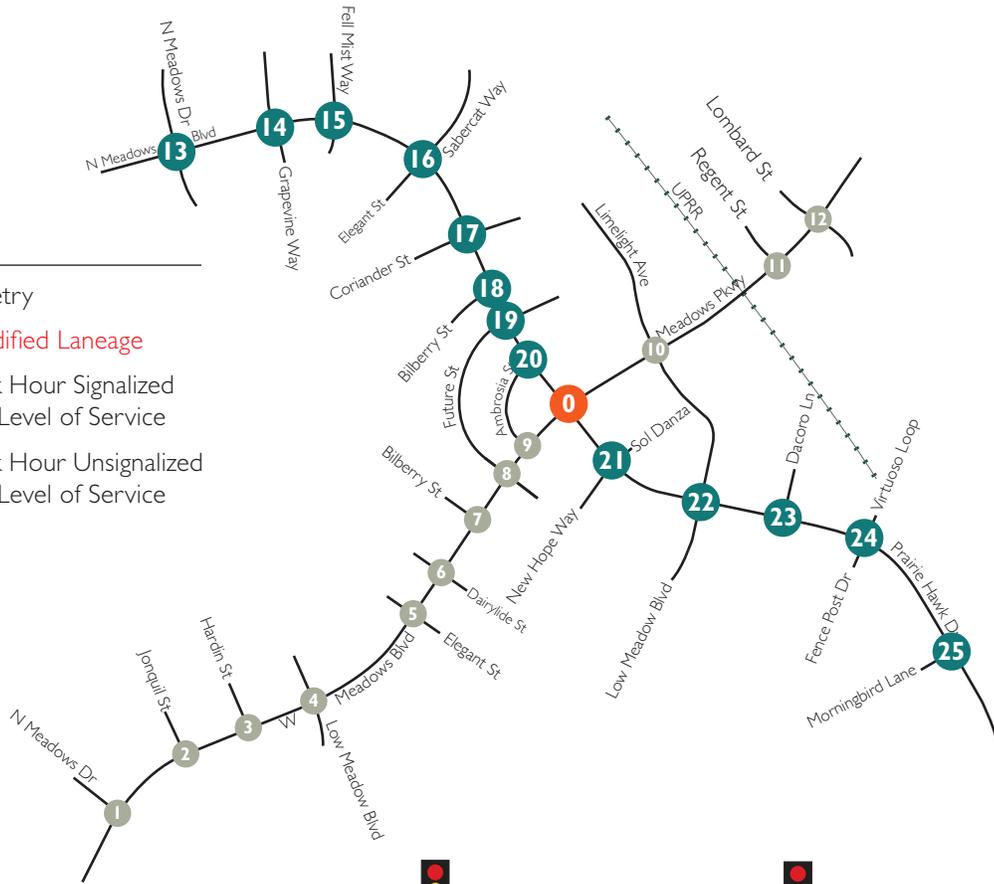


Figure 6
 Intersection Geometry, Traffic Control, and Levels of Service
 Meadows Boulevard/Prairie Hawk Drive Intersections



III.G. Traffic Signalization/Traffic Control

Understanding traffic control at each intersection along the arterial street system is important to the future functionality and operational capacity of these intersections. Along the developed roadway network are intersections that allow all vehicle movements, ones that restrict some movements, and one that allows only inbound right turns (into Filing 20).

For those intersections with restricted movements, traffic control is accomplished by stop signs. For intersections that allow all movements, an assessment was conducted to determine which ones may require the installation of a traffic signal by the build-out of these filings. Recognizing that three locations along North Meadows Boulevard are already signalized (North Meadows Drive, Fell Mist Way, and Elegant Street/Sabercat Way), as is the Meadows Parkway/Limelight Avenue intersection, there are a total of nine other full-movement intersections that have the potential for the installation of a traffic signal.

Each of the nine intersections was evaluated to determine whether it may meet the traffic-volume based traffic signal warrant criteria of the *Manual on Uniform Traffic Control Devices* (MUTCD). Because traffic volumes at these intersections are not yet sufficient to conduct a complete analysis of the MUTCD volume-based criterion, only the projected peak hour volumes were used in this evaluation. While Warrant 3, Peak Hour is not the correct warrant to use for normal public street intersections, it is the best guide available for making judgments on future conditions. A right turn volume reduction allowance for side street movements was used based on MUTCD criteria and on approach laneage.

A graph showing whether these nine intersections meet the criteria of Warrant 3, using the highest peak hour of side street traffic volume at each location, can be found on **Figure 7**. This evaluation finds that six of the nine intersections are very likely to meet the MUTCD criterion by build-out of Filings 17, 18 and 20 (see **Table 4**).

Table 4. Intersections with Traffic Signal Potential

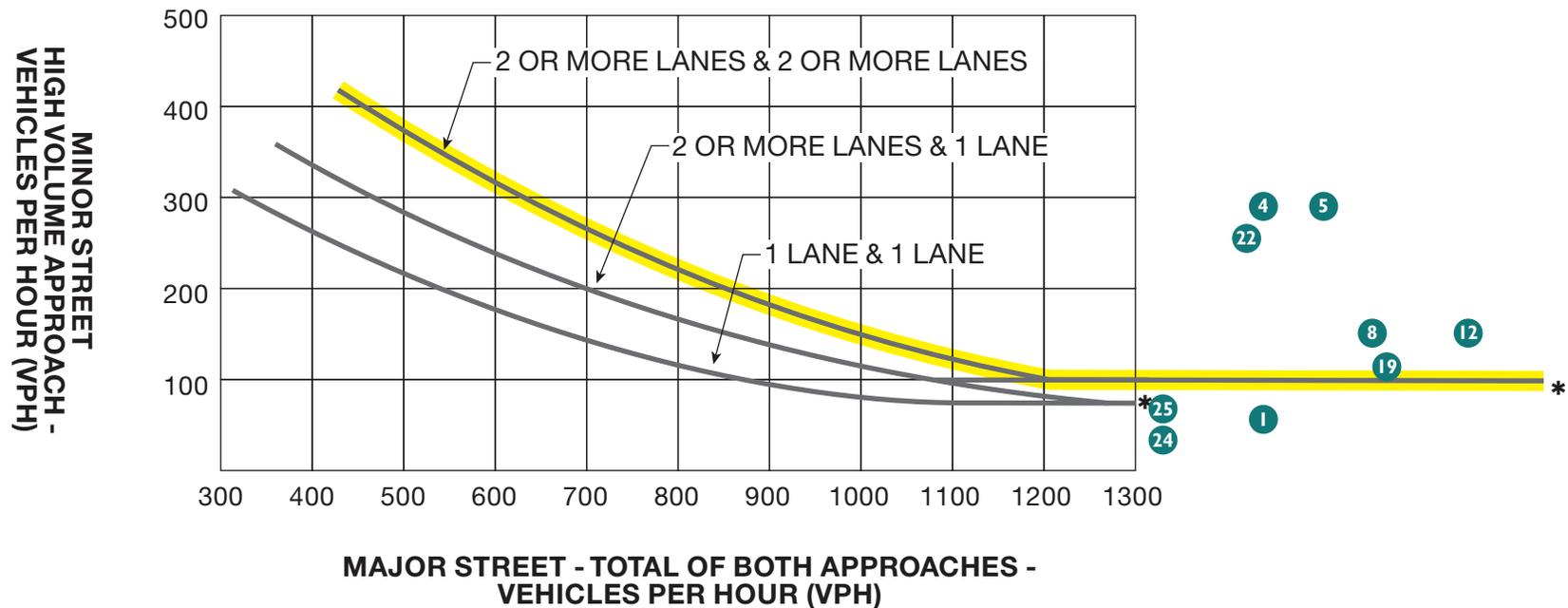
Int. No.	Location	Int. No.	Location
4	West Meadows Boulevard/ Low Meadow Boulevard	12	Meadows Parkway/Lombard Street
5	West Meadows Boulevard/ Elegant Street	19	North Meadows Boulevard/ Future Street
8	West Meadows Boulevard/Future Street/Red Hawk Drive	22	Prairie Hawk Drive/Limelight Avenue/Low Meadow Boulevard

Keep in mind that this information is only a guide on the relative potential for signalization; each of the MUTCD warrants should be evaluated when considering installing a traffic signal at any location in The Meadows.

III.H. Intersection Operations

Analyses were conducted to determine how well each intersection in this study will operate once the projected traffic volumes materialize and when considering the traffic control and access restrictions noted previously. The results of this analysis are a Level of Service (LOS) assessment, one that provides a letter designation from LOS A to LOS F, with LOS A representing free-flow conditions and LOS F being a condition with high vehicle delay and excessive congestion.

- 1 -W. Meadows Blvd./N. Meadows Dr. (AM-1475/60)
- 4 -W. Meadows Blvd./Low Meadow Blvd. (AM-1475/295)
- 5 -W. Meadows Blvd./Elegant St. (AM-1820/285)
- 8 -W. Meadows Blvd./Future St./Red Hawk Dr. (PM- 2010/150)
- 12 -Meadows Parkway/Lombard St. (PM-4015/150)
- 19 -N. Meadows Blvd./Future St. (PM- 2190/115)
- 22 -Prarie Hawk Dr./Limelight Ave./Low Meadow Blvd. (AM-1440/255)
- 24 -Prarie Hawk Dr./Virtuoso Loop/Fence Post Dr. (AM-1350/45)
- 25 -Prarie Hawk Dr./Morningbird Lane (AM- 1320/75)



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Figure 7
Peak Hour Volume Warrant
(Above 40mph on Major Street)



When considering the information contained in **Table 4**, these six intersections were evaluated with traffic signal control along with the existing signalized intersections. All other intersections were evaluated with stop-sign control. Level of service results are provided for an entire intersection when signalized; at stop-controlled intersections, LOS is provided for those movements that must yield to opposing traffic to complete their respective maneuver. Following is a summary of the LOS analyses.

Signalized Intersections

Levels of service for the existing and future signalized intersections along Meadows Boulevard, Meadows Parkway, and Prairie Hawk Drive corridors are projected to operate at LOS D or better during both the AM and PM peak hours. Only the Meadows Parkway intersections at Meadows Boulevard/Prairie Hawk Drive and Limelight Avenue are projected to experience LOS D conditions, however. Other locations are projected to operate at LOS A, B, or C.

Stop-Controlled Intersections

Given the restricted nature of some intersections, most intersection movements will operate very well (LOS A or B) with only a few operating in the LOS C to D range. Two movements are projected to operate at LOS E during the PM peak hour—the left turn movement onto Prairie Hawk Drive from Fence Post Drive, and the shared left/through/right approach from Virtuoso Loop onto Prairie Hawk Drive. This intersection is not expected to meet MUTCD volume-based criterion for signalization and their projected traffic volume levels equate to a very low frequency during the PM peak hour. When a new traffic signal is installed at the Limelight Avenue/Low Meadow Boulevard intersection, it will create gaps in the vehicle travel stream that will assist motorists in making movements onto or across Prairie Hawk Drive. No access changes are recommended.

Figure 5 and **Figure 6** show the LOS results for each intersection movement. **Appendix B** includes the analysis worksheets for each evaluated intersection.

III.I. Progression Analyses

Analyses were conducted to understand how well vehicles can travel along these arterial street corridors, i.e., from one end to the other without excessive stops. Large flows of traffic along West Meadows Boulevard/Meadows Parkway and North Meadows Boulevard/ Prairie Hawk Drive meet at the Meadows Parkway/Meadows Boulevard/Prairie Hawk Drive intersection. As such, this intersection operates as a natural break point for vehicle progression.

There is a high outflow of vehicles from The Meadows during the morning when motorists are heading to work and other activities with a corresponding high inbound flow of vehicles during the evening. While movements on North Meadows Boulevard and on Prairie Hawk Drive are somewhat similar during these peak hours, there is a primarily eastbound flow of motorists on Meadows Boulevard/Meadows Parkway in the morning with an opposite westbound flow during the evening peak period.

Additionally, traffic signals that are farther away from the Meadows Parkway/Meadows Boulevard/Prairie Hawk Drive intersection do not require as much vehicle progression time since overall intersection traffic volumes decrease to the north, south and west of this intersection. As such, a shorter cycle length can be used so that motorists on the intersecting streets do not wait for a green indication unnecessarily.

Therefore, the progression analyses were conducted with a 120 second traffic signal cycle length for the two Future Street intersections along North and West Meadows Boulevards, and from the Meadows Parkway/Meadows Boulevard/Prairie Hawk intersection eastward. 90-second cycle lengths were used for the remaining traffic signals. While this approach provides good levels of service at the intersections as noted previously in this report, vehicle progression is only optimal beginning one traffic signal to the north and west of the Meadows Parkway/Meadows Boulevard/Prairie Hawk Drive intersection and eastward towards US 85.

Considering these influences, vehicle progression characteristics include:

West Meadows Boulevard/Meadows Parkway

- The morning progression bandwidth in the eastbound direction on West Meadows Boulevard/Meadows Parkway works well beginning at Future Street. There will be a natural progression break at Future Street related to the shorter cycle lengths for the Low Meadow Boulevard and Elegant Street intersections.
- Westbound flows are disrupted in the morning at the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive intersection due to the level of southbound traffic along North Meadows Boulevard. A progression break will occur at the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive intersection.
- The evening bandwidths on West Meadows Boulevard/Meadows Parkway can be somewhat continuous with both directions working relatively well. Progression breaks will occur at Red Hawk Drive.

North Meadows Boulevard/Prairie Hawk Drive

- Vehicle progression works well to the north of Future Street. The southbound left turn movement from North Meadows Boulevard onto eastbound Meadows Parkway in the morning can be accommodated well via a secondary bandwidth created on Meadows Parkway.
- Progression through the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive and Limelight Avenue intersections can occur, but it is influenced by vehicle demands and traffic flow at the Meadows Boulevard/Meadows Parkway/Prairie Hawk Drive intersection.

The information contained above is only an initial evaluation of vehicle progression along the Meadows Parkway, Meadows Boulevard and Prairie Hawk Drive corridors. Other traffic signal cycle lengths or intersection phasing patterns could be used to optimize vehicle progression. Analyses of vehicle progression will be required as The Meadows continues to develop and as traffic volumes increase and new traffic signals are added.

IV. ACCESS MANAGEMENT PLAN

This section summarizes recommendations related to access revisions along Meadows Parkway, Meadows Boulevard, and Prairie Hawk Drive for the complete development of Filings 17, 18 and 20. Information in this section summarizes the locations of existing access and their relative spacing, their access type, traffic control recommendations, and any auxiliary lane changes that are deemed necessary to meet the projected vehicle capacity demands and to provide good operations.

IV.A. Existing Access Type and Spacing

Access Type

A total of 25 intersections of varying movement allowances exist along Meadows Parkway, Meadows Boulevard, and Prairie Hawk Drive adjacent to Filings 17, 18 and 20. Of these 25 access points, 13 allow all movements for which four are currently operated by traffic signals. Of the remaining locations, five are termed $\frac{3}{4}$ movement accesses, where left turns or crossing movements are not permitted from the side streets, while five are right-in/right-out (RIRO) intersections that permit only right turn movements to/from the intersecting streets. One intersection is a combination of $\frac{3}{4}$ and RIRO movements, being the Grapevine Way/Castle Rock Middle School access where it is a $\frac{3}{4}$ movement access for Grapevine Way, but only a RIRO access for movements to/from the Castle Rock Middle School. Additionally, the Ambrosia Street intersection along North Meadows Boulevard allows only inbound right turn movements (RI). **Figure 8** shows the permitted movements at the public street intersections along the arterial street system.

Access Spacing

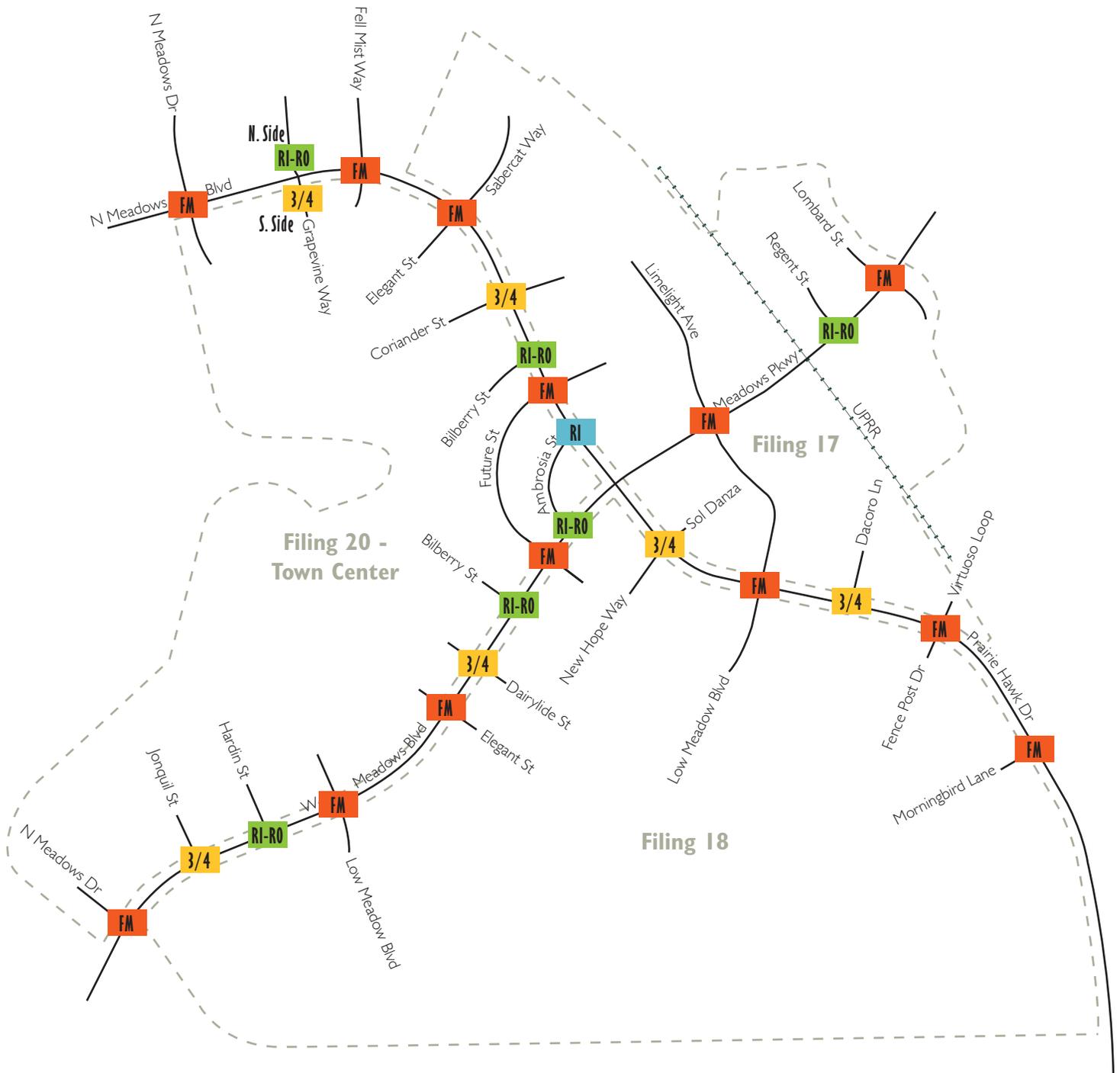
The spacing of access points along Meadows Parkway, Meadows Boulevard, and Prairie Hawk Drive can be relevant related to the dimensions of auxiliary lanes along the arterial street system. Currently, access spacing appears to be sufficient for movements to/from the adjoining residential and commercial parcels of Filings 17, 18 and 20. **Figure 9** represents the spacing of each of the 25 access points to each other.

IV.B. Traffic Control

As noted previously, intersections that have restricted movements of some level are controlled by stop signs and will always have this type of control. For those locations that allow all vehicle movements (13 total), four are already signalized. Of the remaining nine, six have the potential for being signalized as Filings 17, 18 and 20 move toward complete build-out:

- Intersection 4 – Meadows Boulevard/Low Meadow Boulevard
- Intersection 5 – Meadows Boulevard/Elegant Street
- Intersection 8 – Meadows Boulevard/Future Street/Red Hawk Drive
- Intersection 12 – Meadows Parkway/Lombard Street
- Intersection 19 – North Meadows Boulevard/Future Street
- Intersection 22 – Prairie Hawk Drive/Limelight Avenue/Low Meadow Boulevard

These six intersections were also identified in the 2004 *Access Plan* as requiring signalization. Of the remaining three intersections, these locations are not expected to meet any of the traffic-volume based warrants of the MUTCD to install a traffic signal.



Legend

- FM Full Movement Intersection
- RI-RO 3/4 Movement Intersection
- 3/4 Right-In/Right-Out Intersection
- RI Right-In Only

Figure 8
Existing Access Types



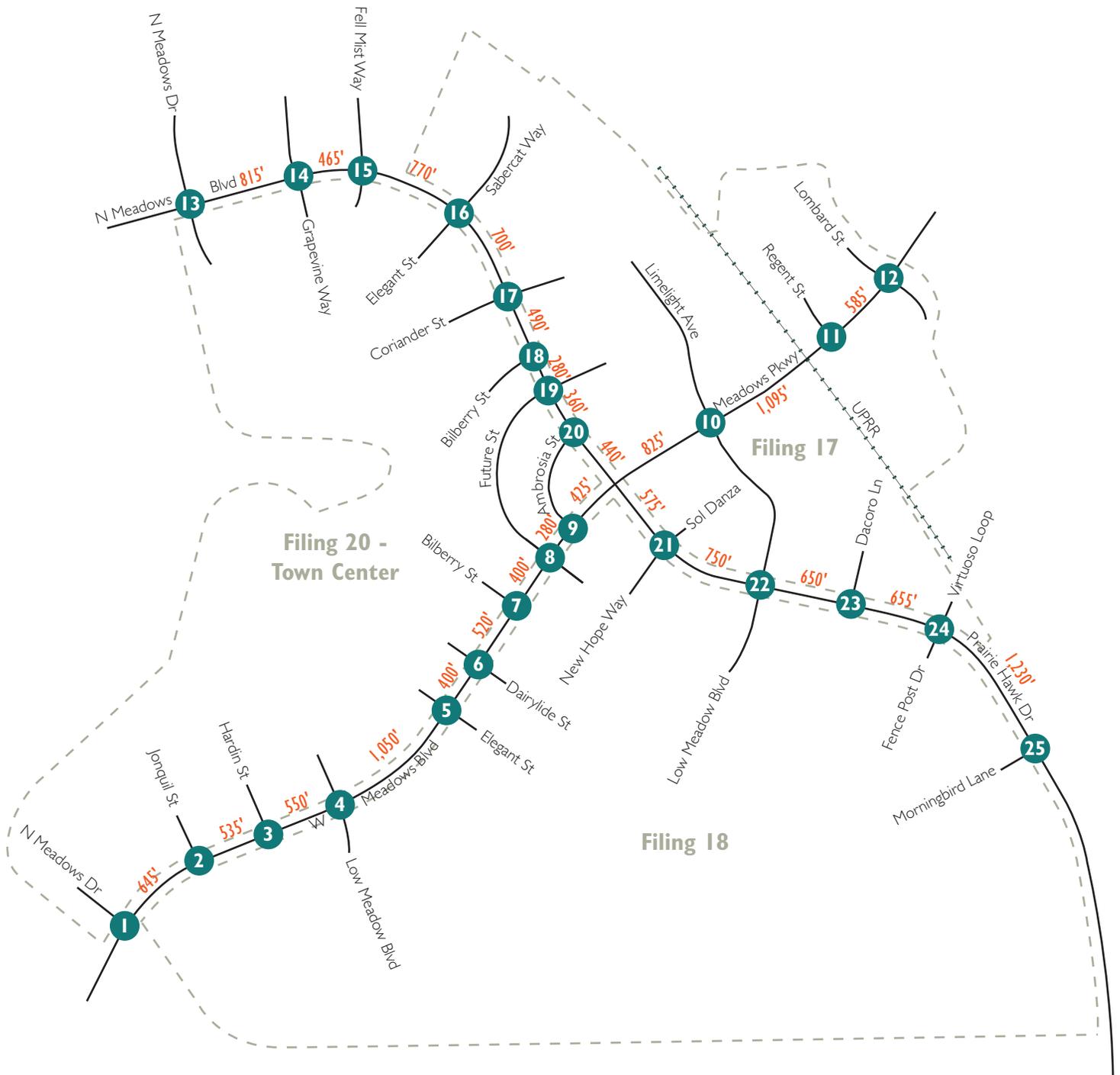


Figure 9
Existing Access Spacing



IV.C. Auxiliary Lane Modifications

The Town of Castle Rock includes information in their *Transportation Design Criteria Manual* (the *Manual*) that summarizes the dimensional requirements for when left turn or right turn deceleration lanes are installed. It also states that the need for deceleration lanes shall be determined through an analysis contained in the traffic study. As such, an assessment was made to determine if new auxiliary lanes should be added at intersections along the arterial street system that currently do not have them. That assessment was based on the level of traffic volumes projected for each auxiliary lane and the results of the *Manual* criterion.

Right Turn Deceleration Lanes

For these auxiliary lanes, operational analyses will typically find that right turn movements will operate well with or without an exclusive right turn lane. As such, engineering judgment must be used to determine the true operational value of a right turn lane.

To make this judgment, the level of right turn movements must be considered. For the purposes of this assessment, a value of two right turn movements per minute is judged to be the criterion for installing a right turn lane (one every 30 seconds on average). Because right turn vehicles typically do not stop before completing their maneuver, only to slow down to an acceptable speed, the impact to motorists behind them is limited.

If considered an acceptable procedure, right turn deceleration lanes are not needed for movements with less than 120 right turn vehicles per hour. Keep in mind that the traffic volume projections contained in this report are for the two highest hours of vehicle traffic for a typical weekday. As such, there is less of a need for a right turn lane during other hours of a weekday and on weekends when there are fewer right turn movements.

The Town of Castle Rock and Castle Rock Development Company have installed right turn deceleration lanes on intersection approaches based on information contained in the original *Access Plan*. As such, when considering the criterion proposed above, only one new right turn deceleration lane is required—in the southbound direction at the Prairie Hawk Drive/Limelight Avenue/Low Meadow Boulevard intersection. This deceleration lane is currently being constructed as part of the Prairie Hawk Drive widening project. As such, no other right turn lane installations are needed.

Left Turn Deceleration Lanes

An assessment was conducted to understand whether any modifications to the length of existing left turn lanes should be made given current knowledge on projected traffic volumes. **Table 5** summarizes each of the existing (or future) left turn lanes, and it recommends a few changes to the left turn lane dimensions along Meadows Parkway or Meadows Boulevard based on information contained in the *Manual*, if necessary. Left turn lane dimensions on Prairie Hawk Drive are deemed sufficient for the projected traffic volumes.

Table 5. Left Turn Deceleration Lane Modifications

Intersection	Direction	Highest Peak Hour Volume	Required Vehicle Storage	Existing Vehicle Storage	Recommendation
1 – W. Meadows Boulevard/ N. Meadows Drive	EB M.B. onto NB N.M.D.	15 (PM)	25'	120'	No Change
	SB N.M.D. onto EB M.B.	50 (AM)	50'	Design Plans = 150'	Develop When Constructed
2 – W. Meadows Boulevard/ Jonquil St.	EB M.B. onto NB Jonquil	15 (PM)	25'	100'	No Change
4 – W. Meadows Boulevard/Low Meadow Drive	EB M.B. onto NB L.M.	20 (AM/PM)	25'	100'	No Change
	WB M.B. onto SB L.M.	135 (PM)	135'	150'	
	SB L.M. onto EB M.B.	265 (AM)	265'	Striped= 75'	Re-Stripe Toward Celestial Avenue When Apex Charter School Opens
	NB L.M. onto WB M.B.	90 (AM)	100'	100'	No Change
5 – W. Meadows Boulevard/ Elegant Street	EB M.B. onto NB Elegant	35 (PM)	50'	100'	No Change
	WB M.B. onto SB Elegant	15 (PM)	25'	100'	
	SB Elegant onto EB M.B.	255 (AM)	255'	Striped= 75'	Re-Stripe Toward Celestial Avenue When Apex Charter School Opens
6 – W. Meadows Boulevard/ Dairylyde St.	EB M.B. onto NB Dairylyde	5 (AM/PM)	25'	100'	No Change
	WB M.B. onto SB Dairylyde	25 (PM)	25'	100'	
8 – W. Meadows Boulevard/Future St./Red Hawk Dr.	EB M.B. onto NB Future	40 (PM)	50'	100'	No Change
	WB M.B. onto SB R.H.	240 (PM)	240'	125'	Increase WB Left Turn Lane by 115'
	SB Future onto EB M.B.	115 (AM/PM)	115'	Design Plans = 85'	Increase by 30' When Constructed
	NB R.H. onto WB M.B.	50 (PM)	100'	100'	No Change

Table 5. Left Turn Deceleration Lane Modifications (Continued)

Intersection	Direction	Highest Peak Hour Volume	Required Vehicle Storage	Existing Vehicle Storage	Recommendation
10 – Meadows Parkway/Limelight Avenue	EB M.P. onto NB Limelight	60 (AM)	50'	200'	No Change
	WB M.P. onto SB Limelight	235 (PM)	235'	270'	
	NB Limelight onto WB M.P.	60 (PM)	50'	125' (Each of 2 Lanes)	
	SB Limelight onto EB M.P.	270 (PM)	270'	200'	Revise Striping on SB Limelight from Left/Through/Right Lanes to Two Left Turn Lanes and a Shared Through/Right Lane
12 – Meadows Parkway/Lombard Street	EB M.P. onto NB Lombard	85 (AM)	100'	165'	No Change
	WB M.P. onto SB Lombard	130 (AM)	130'	215'	
	NB Lombard onto WB M.P.	95 (PM)	100'		Develop When Constructed
	SB Lombard onto EB M.P.	120 (PM)	120'	Design Plans = 150'	
13 – N. Meadows Boulevard/ N. Meadows Drive	EB M.B. onto NB M.D.	465 (AM)	465'	345' (Each of 2 Lanes)	No Change
	WB M.B. onto SB M.D.	5 (AM/PM)	25'	115'	
	NB M.D. onto WB M.B.	205 (PM)	205'	>200'	
	SB M.D. onto EB M.B.	345 (SB)	345'	210'	Increase by 135' Via Striping Revisions when Needed
14 – N. Meadows Boulevard/ Grapevine Way	WB M.B. onto SB Grapevine	15 (PM)	25'	130'	No Change

Table 5. Left Turn Deceleration Lane Modifications (Continued)

Intersection	Direction	Highest Peak Hour Volume	Required Vehicle Storage	Existing Vehicle Storage	Recommendation
15 –N. Meadows Boulevard/Fell Mist Way	EB M.B. into C.R. Middle School	Not an Access Plan Issue			No Change
	WB M.B. onto Fell Mist	20 (PM)	25'	135'	
	NB Fell Mist onto WB M.B.	10 (AM)	25'	70'	
16 –N. Meadows Boulevard/Elegant Street/Sabercat Way	EB M.B. onto NB Sabercat	125 (AM)	125'	130'	No Change
	NB Elegant onto WB M.B.	35 (AM)	50'	75'	
	SB Sabercat onto EB M.B.	325 (PM)	325'	250'	Increase by 75' Via Striping Revisions when Needed
17 – N. Meadows Boulevard/ Coriander Street	NB M.B. onto Coriander	95 (PM)	100'	150'	No Change
	SB M.B. onto Coriander	20 (AM)	25'	150'	
19 – N. Meadows Boulevard/ Future Street	NB M.B. onto Future	55 (AM)	50'	215'	No Change
	SB M.B. onto Future	15 (AM)	25'	150'	
	EB Future onto NB M.B.	45 (PM)	50'	85'	
	WB Future onto SB M.B.	50 (PM)	50'	75'	
21 – Prairie Hawk Drive/New Hope Way/Sol Danza	NB P.H. onto N.H.	5 (AM/PM)	25'	90'	No Change
	SB P.H. onto S, D,	55 (AM)	50'	190'	

Table 5. Left Turn Deceleration Lane Modifications (Continued)

Intersection	Direction	Highest Peak Hour Volume	Required Vehicle Storage	Existing Vehicle Storage	Recommendation
22 – Prairie Hawk Drive/Limelight Avenue/Low Meadow Boulevard	NB P.H. onto L.M.	90 (PM)	100'	100'	No Change
	SB P.H. onto Limelight	65 (AM)	100'	100'	
	EB L.M. onto P.H.	205 (AM)	205'	>205'	
	WB Limelight onto P.H.	75 (PM)	100'	100'	
23 – Prairie Hawk Drive/Dacoro Lane	SB P.H. onto Dacoro	100 (AM)	100'	125'	No Change
24 – Prairie Hawk Drive/Virtuoso Loop/Fence Post Drive	NB P.H. onto F.P.	15 (PM)	25'	100'	No Change
	SB P.H. onto Virtuoso	5 (AM/PM)	25'	100'	
25 – Prairie Hawk Drive/Morningbird Lane	NB P.H. onto Morningbird	20 (PM)	25'	100'	No Change

V. SUMMARY

An analysis of trip generation, access locations, intersection geometry, operational conditions, and auxiliary lane requirements has been conducted for the projected future conditions when build-out of Filings 17, 18 and 20 of The Meadows subdivision is completed. The results of these analyses are contained in this report and the salient findings include:

- Trip generation for the build-out of these filings is somewhat similar to what was predicted in 2004 within certain parameters. Vehicle-trips on a daily basis are estimated to be lower given the overall reduction in density. Peak hour trips are projected to be higher during the AM peak hour and relatively equal or somewhat lower during the PM peak hour.
- The analyses have concluded that the existing access locations along Meadows Boulevard, Meadows Parkway, and Prairie Hawk Drive can continue to have the same type of access movements as what was proposed in the 2004 *Access Plan* (see **Figure 8**). Full-movement intersections and ones with vehicle movement restrictions should remain as currently constructed. A few auxiliary lane modifications are necessary, however, to meet the projected vehicle demands for certain movements (see **Table 5**).
- Six additional intersections are expected to require traffic signalization by build-out of Filings 17, 18 and 20 to satisfy the projected vehicle demand. These intersections were also identified in 2004 as needing traffic signalization.
 - West Meadows Boulevard/Low Meadows Boulevard
 - West Meadows Boulevard/Elegant Street
 - West Meadows Boulevard/Future Street/Red Hawk Drive
 - Meadows Parkway/Lombard Street
 - North Meadows Boulevard/Future Street
 - Prairie Hawk Drive/Limelight Avenue/Low Meadows Boulevard
- Intersection levels of service (LOS) are projected to operate well, with LOS D or better expected for each intersection controlled by a traffic signal. Stop-sign controlled intersections are also projected to operate well with only a few movements operating below LOS D (Fence Post/Virtuoso Loop along Prairie Hawk Drive) and only during the PM peak hour (see **Figure 5** and **Figure 6**). All other hours of a typical weekday or on a weekend are projected to operate better. Traffic signalization or access restrictions are not recommended at these two intersections.

The projected traffic volumes, trip distribution, and resultant recommendations are based on the entire build-out of Filings 17, 18 and 20. Keep in mind that any recommendations contained in this addendum may not be needed for some time. It will be necessary for the Town of Castle Rock to monitor the intersections along The Meadows arterial street system to determine if and when infrastructure improvements should occur. Also, land use assumptions for undeveloped parcels may change as development in The Meadows continues and as economic trends dictate.

APPENDIX A NCHRP INTERNAL CAPTURE WORKSHEETS

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Meadows Arterial Access Plan Update	Organization:	Felsburg Holt & Ullevig
Project Location:	Meadows-Castle Rock, CO	Performed By:	RRF
Scenario Description:	AM Peak Hour	Date:	October 2017
Analysis Year:	2017	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office		83,000	SF	130	114	16
Retail		65,000	SF	323	162	161
Restaurant				0		
Cinema/Entertainment				0		
Residential		1,782	DU	1,176	270	906
Hotel				0		
All Other Land Uses ²				0		
				1,629	546	1,083

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	0	0
Retail	5		0	0	5	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	9	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,629	546	1,083
Internal Capture Percentage	3%	5%	2%
External Vehicle-Trips ⁵	1,577	520	1,057
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	7%	25%
Retail	8%	6%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Meadows Arterial Access Plan Update	Organization:	Felsburg Holt & Ullevig
Project Location:	Meadows-Castle Rock, CO	Performed By:	RRF
Scenario Description:	PM Peak Hour	Date:	October 2017
Analysis Year:	2017	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office		83,000	SF	124	21	103
Retail		65,000	SF	450	213	237
Restaurant				0		
Cinema/Entertainment				0		
Residential		1,782	DU	1,500	960	540
Hotel				0		
All Other Land Uses ²				0		
				2,074	1,194	880

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		17	0	0	2	0
Retail	5		0	0	62	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	12	21	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	2,074	1,194	880
Internal Capture Percentage	11%	10%	14%
External Vehicle-Trips ⁵	1,836	1,075	761
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	81%	18%
Retail	18%	28%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	7%	6%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX B LEVEL OF SERVICE ANALYSIS WORKSHEETS

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	↘
Traffic Vol, veh/h	5	1100	365	10	50	15
Future Vol, veh/h	5	1100	365	10	50	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	1196	397	11	54	16

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	408	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	1147	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1147	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0	0	21.4
HCM LOS			C

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1147	-	-	-	235	803
HCM Lane V/C Ratio	0.005	-	-	-	0.231	0.02
HCM Control Delay (s)	8.2	-	-	-	24.9	9.6
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0	-	-	-	0.9	0.1

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑			↗
Traffic Vol, veh/h	5	685	360	25	0	15
Future Vol, veh/h	5	685	360	25	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	745	391	27	0	16

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	418	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	6.94
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	3.32
Pot Cap-1 Maneuver	1138	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1138	-	797
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1138	-	-	-	797
HCM Lane V/C Ratio	0.005	-	-	-	0.02
HCM Control Delay (s)	8.2	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection

Int Delay, s/veh 0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↑
Traffic Vol, veh/h	0	685	380	5	0	5
Future Vol, veh/h	0	685	380	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	745	413	5	0	5

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	-	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt

	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	797
HCM Lane V/C Ratio	-	-	-	0.007
HCM Control Delay (s)	-	-	-	9.5
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0

Queues
48: Elegant

AM Peak Hour
01/10/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕	↗		↕		↖	↗	
Traffic Volume (vph)	25	1200	5	5	505	165	5	5	15	255	5	35
Future Volume (vph)	25	1200	5	5	505	165	5	5	15	255	5	35
Satd. Flow (prot)	1770	3536	0	1770	3539	1583	0	1691	0	1770	1615	0
Flt Permitted	0.421			0.148				0.922		0.587		
Satd. Flow (perm)	784	3536	0	276	3539	1583	0	1575	0	1093	1615	0
Satd. Flow (RTOR)						179		16			38	
Lane Group Flow (vph)	27	1309	0	5	549	179	0	26	0	277	43	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2			6		6	8			4		
Total Split (s)	12.0	34.0		12.0	34.0	34.0	27.0	27.0		17.0	44.0	
Total Lost Time (s)	4.0	5.5		4.0	5.5	5.5		5.5		5.0	4.5	
Act Effct Green (s)	63.2	60.3		61.9	58.0	58.0		6.4		17.2	17.7	
Actuated g/C Ratio	0.70	0.67		0.69	0.64	0.64		0.07		0.19	0.20	
v/c Ratio	0.04	0.55		0.02	0.24	0.17		0.20		0.93	0.12	
Control Delay	4.3	7.2		6.2	9.2	2.5		27.1		70.9	10.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	4.3	7.2		6.2	9.2	2.5		27.1		70.9	10.4	
LOS	A	A		A	A	A		C		E	B	
Approach Delay		7.2			7.6			27.1			62.7	
Approach LOS		A			A			C			E	
Queue Length 50th (ft)	2	76		1	39	0		6		-190	3	
Queue Length 95th (ft)	m7	214		5	134	33		30		#215	26	
Internal Link Dist (ft)		950			321			181			163	
Turn Bay Length (ft)	100			100		115				75		
Base Capacity (vph)	639	2369		325	2282	1084		388		299	730	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.04	0.55		0.02	0.24	0.17		0.07		0.93	0.06	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 31 (34%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 14.9

Intersection LOS: B

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

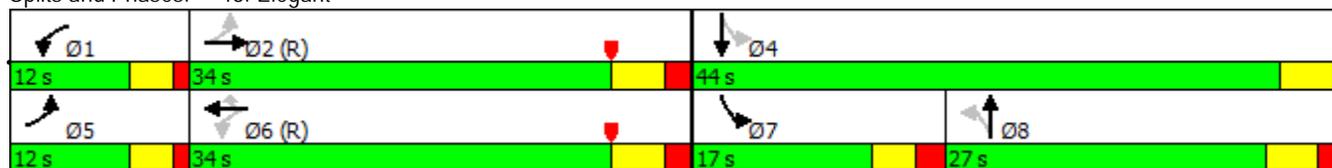
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 48: Elegant



Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕				↗			↗
Traffic Vol, veh/h	5	1320	5	10	670	10	0	0	5	0	0	20
Future Vol, veh/h	5	1320	5	10	670	10	0	0	5	0	0	20
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									
Storage Length	100	-	-	100	-	-	-	-	0	-	-	0
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	5	1435	5	11	728	11	0	0	5	0	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	739	0	0	1440	0	0	-	-	720	-	-	370
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	863	-	-	467	-	-	0	0	370	0	0	627
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	863	-	-	467	-	-	-	-	370	-	-	627
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			14.9			10.9		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	370	863	-	-	467	-	-	627
HCM Lane V/C Ratio	0.015	0.006	-	-	0.023	-	-	0.035
HCM Control Delay (s)	14.9	9.2	-	-	12.9	-	-	10.9
HCM Lane LOS	B	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0	0	-	-	0.1	-	-	0.1

Intersection

Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Traffic Vol, veh/h	0	1340	665	25	0	25
Future Vol, veh/h	0	1340	665	25	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	115	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1457	723	27	0	27

Major/Minor

	Major1	Major2	Minor2	
Conflicting Flow All	-	0	-	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0
Stage 1	0	-	-	0
Stage 2	0	-	-	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	636
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt

	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	636
HCM Lane V/C Ratio	-	-	-	0.043
HCM Control Delay (s)	-	-	-	10.9
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Traffic Vol, veh/h	0	1620	870	65	0	15
Future Vol, veh/h	0	1620	870	65	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	100	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1761	946	71	0	16

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	-	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt

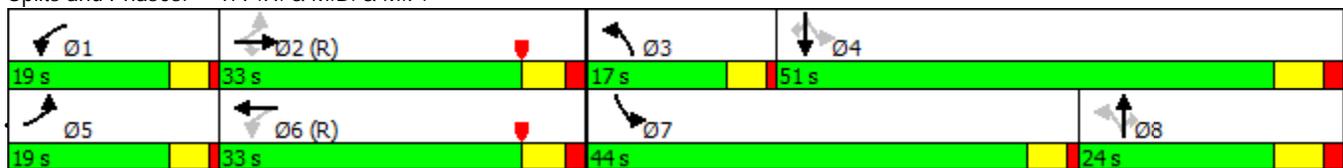
	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	538
HCM Lane V/C Ratio	-	-	-	0.03
HCM Control Delay (s)	-	-	-	11.9
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	1085	190	285	605	535	145	380	375	525	365	185
Future Volume (vph)	345	1085	190	285	605	535	145	380	375	525	365	185
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.269			0.098			0.518			0.291		
Satd. Flow (perm)	972	3539	1583	354	3539	1583	1872	3539	1583	1052	3539	1583
Satd. Flow (RTOR)			155			353			280			201
Lane Group Flow (vph)	375	1179	207	310	658	582	158	413	408	571	397	201
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		Free	8		8	4		4
Total Split (s)	19.0	33.0	33.0	19.0	33.0		17.0	24.0	24.0	44.0	51.0	51.0
Total Lost Time (s)	4.5	6.0	6.0	4.5	6.0		4.5	6.5	6.5	4.5	6.5	6.5
Act Effct Green (s)	56.0	42.0	42.0	54.0	41.0	120.0	32.8	22.1	22.1	51.5	36.2	36.2
Actuated g/C Ratio	0.47	0.35	0.35	0.45	0.34	1.00	0.27	0.18	0.18	0.43	0.30	0.30
v/c Ratio	0.53	0.95	0.32	0.68	0.54	0.37	0.25	0.63	0.79	0.63	0.37	0.33
Control Delay	21.1	46.6	10.9	46.2	61.7	0.5	21.7	49.1	25.4	21.4	28.3	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	1.3	0.0	0.0
Total Delay	21.1	46.6	10.9	46.2	61.7	0.5	21.7	49.1	28.8	22.7	28.3	4.0
LOS	C	D	B	D	E	A	C	D	C	C	C	A
Approach Delay		37.0			35.6			36.2			21.4	
Approach LOS		D			D			D			C	
Queue Length 50th (ft)	57	246	7	127	287	0	37	157	95	126	129	28
Queue Length 95th (ft)	118	#792	m72	179	#351	0	47	196	206	74	140	37
Internal Link Dist (ft)		369			730			462			371	
Turn Bay Length (ft)	155		110	230		150	180		100	290		155
Base Capacity (vph)	767	1238	654	539	1209	1583	733	667	525	1235	1328	719
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	56	435	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.95	0.32	0.58	0.54	0.37	0.22	0.62	0.87	0.71	0.30	0.28

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 33.1
 Intersection LOS: C
 Intersection Capacity Utilization 82.4%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: P.H. & M.B. & M.P.



Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↑
Traffic Vol, veh/h	0	2140	1685	20	0	40
Future Vol, veh/h	0	2140	1685	20	0	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Stop
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2326	1832	22	0	43

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	-	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

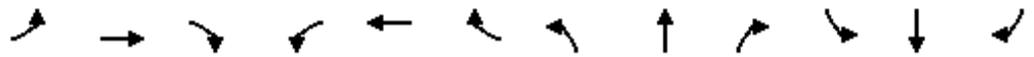
	EB	WB	SB
HCM Control Delay, s	0	0	20.5
HCM LOS			C

Minor Lane/Major Mvmt

	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	275
HCM Lane V/C Ratio	-	-	0.158
HCM Control Delay (s)	-	-	20.5
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	0.6

Meadows Parkway/Lombard
8: Office Access/Filing 17 & M.P.

AM Peak Hour
12/01/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Traffic Volume (vph)	85	1950	105	130	1675	85	15	5	20	70	5	15
Future Volume (vph)	85	1950	105	130	1675	85	15	5	20	70	5	15
Satd. Flow (prot)	1770	3511	0	1770	3539	1583	1770	1635	0	1770	1650	0
Flt Permitted	0.068			0.049			0.784			0.417		
Satd. Flow (perm)	127	3511	0	91	3539	1583	1460	1635	0	777	1650	0
Satd. Flow (RTOR)		8				95		22			16	
Lane Group Flow (vph)	92	2234	0	141	1821	92	16	27	0	76	21	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		
Total Split (s)	12.0	73.0		12.0	73.0	73.0	12.0	21.0		14.0	23.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Act Effect Green (s)	89.4	81.5		96.6	85.2	85.2	10.6	6.4		14.8	10.8	
Actuated g/C Ratio	0.74	0.68		0.80	0.71	0.71	0.09	0.05		0.12	0.09	
v/c Ratio	0.46	0.94		0.60	0.73	0.08	0.11	0.25		0.46	0.13	
Control Delay	16.3	32.3		24.8	25.9	5.6	43.5	30.1		53.7	27.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	16.3	32.3		24.8	25.9	5.6	43.5	30.1		53.7	27.8	
LOS	B	C		C	C	A	D	C		D	C	
Approach Delay		31.7			24.9			35.1			48.1	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	14	-996		54	686	13	11	4		52	3	
Queue Length 95th (ft)	m18	m#1032		101	817	m44	31	34		97	30	
Internal Link Dist (ft)		200			1007			565			580	
Turn Bay Length (ft)	165			215		215	100			100		
Base Capacity (vph)	213	2386		236	2511	1150	161	243		179	271	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.43	0.94		0.60	0.73	0.08	0.10	0.11		0.42	0.08	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 29.0
 Intersection LOS: C
 Intersection Capacity Utilization 86.2%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Office Access/Filing 17 & M.P.



Queues
35: N. Meadows

AM Peak Hour
01/22/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	200	5	210	110	120	5	465	250	465	585	30
Future Volume (vph)	5	200	5	210	110	120	5	465	250	465	585	30
Satd. Flow (prot)	0	1861	1583	0	1803	1583	1770	3539	1583	3433	3539	1583
Flt Permitted		0.999			0.968		0.410			0.287		
Satd. Flow (perm)	0	1861	1583	0	1803	1583	764	3539	1583	1037	3539	1583
Satd. Flow (RTOR)			200			200			272			145
Lane Group Flow (vph)	0	222	5	0	348	130	5	505	272	505	636	33
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8			4	6		6	2		2
Total Split (s)	22.0	22.0	22.0	28.0	28.0	28.0	9.0	23.0	23.0	17.0	31.0	31.0
Total Lost Time (s)		5.5	5.5		5.5	5.5	4.0	6.0	6.0	4.0	6.0	6.0
Act Effct Green (s)		14.5	14.5		20.6	20.6	28.8	21.5	21.5	39.8	36.0	36.0
Actuated g/C Ratio		0.16	0.16		0.23	0.23	0.32	0.24	0.24	0.44	0.40	0.40
v/c Ratio		0.74	0.01		0.84	0.25	0.02	0.60	0.47	0.64	0.45	0.05
Control Delay		50.9	0.0		52.1	2.0	32.2	54.2	23.4	21.6	22.8	0.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		50.9	0.0		52.1	2.0	32.2	54.2	23.4	21.6	22.8	0.1
LOS		D	A		D	A	C	D	C	C	C	A
Approach Delay		49.8			38.5			43.3			21.6	
Approach LOS		D			D			D			C	
Queue Length 50th (ft)		119	0		184	0	2	161	67	100	140	0
Queue Length 95th (ft)		194	0		#314	10	m6	216	123	141	226	0
Internal Link Dist (ft)		298			352			730			568	
Turn Bay Length (ft)			75			160	115		115	345		115
Base Capacity (vph)		341	453		450	545	303	844	584	807	1416	720
Starvation Cap Reductn		0	0		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.65	0.01		0.77	0.24	0.02	0.60	0.47	0.63	0.45	0.05

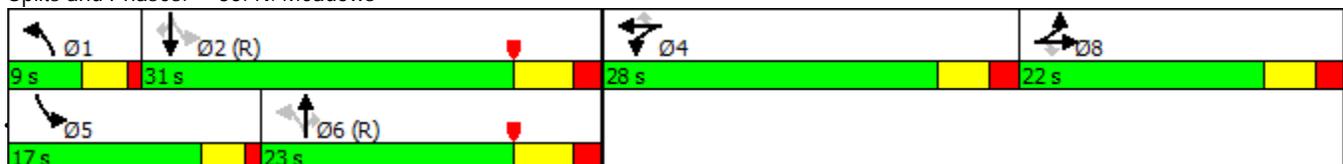
Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 8 (9%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 33.4
 Intersection LOS: C
 Intersection Capacity Utilization 71.8%
 ICU Level of Service C
 Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 35: N. Meadows



Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↗	↕			↕	
Traffic Vol, veh/h	0	0	15	0	0	5	5	715	15	0	795	5
Future Vol, veh/h	0	0	15	0	0	5	5	715	15	0	795	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									
Storage Length	-	-	0	-	-	0	130	-	-	-	-	-
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	0	0	16	0	0	5	5	777	16	0	864	5

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	435	-	-	397	870	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	569	0	0	602	770	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	569	-	-	602	770	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.5		11		0.1		0	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	770	-	-	569	602	-
HCM Lane V/C Ratio	0.007	-	-	0.029	0.009	-
HCM Control Delay (s)	9.7	-	-	11.5	11	-
HCM Lane LOS	A	-	-	B	B	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	-

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↗	↕		↗	↕	
Traffic Vol, veh/h	0	0	50	0	0	5	30	1120	30	20	950	5
Future Vol, veh/h	0	0	50	0	0	5	30	1120	30	20	950	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									
Storage Length	-	-	0	-	-	0	150	-	-	150	-	-
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	0	0	54	0	0	5	33	1217	33	22	1033	5

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	519	-	-	625	1038	0	0	1250	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	0	502	0	0	428	665	-	-	553	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	-	502	-	-	428	665	-	-	553	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	13		13.5		0.3		0.2	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	665	-	-	502	428	553	-	-
HCM Lane V/C Ratio	0.049	-	-	0.108	0.013	0.039	-	-
HCM Control Delay (s)	10.7	-	-	13	13.5	11.8	-	-
HCM Lane LOS	B	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0	0.1	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	70	0	1180	980	15
Future Vol, veh/h	0	70	0	1180	980	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	76	0	1283	1065	16

Major/Minor	Minor2	Major1	Major2		
Conflicting Flow All	-	541	-	0	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-
Pot Cap-1 Maneuver	0	485	0	-	-
Stage 1	0	-	0	-	-
Stage 2	0	-	0	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	485	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 485	-	-
HCM Lane V/C Ratio	- 0.157	-	-
HCM Control Delay (s)	- 13.8	-	-
HCM Lane LOS	- B	-	-
HCM 95th %tile Q(veh)	- 0.6	-	-

N. Meadows Blvd./Future
18: Future

AM Peak Hour
12/01/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	10	60	15	10	5	55	1140	65	15	1015	25
Future Volume (vph)	35	10	60	15	10	5	55	1140	65	15	1015	25
Satd. Flow (prot)	1770	1624	0	0	1809	1583	1770	3539	1583	1770	3525	0
Flt Permitted	0.740				0.729		0.225			0.213		
Satd. Flow (perm)	1378	1624	0	0	1358	1583	419	3539	1583	397	3525	0
Satd. Flow (RTOR)		65				64			71		4	
Lane Group Flow (vph)	38	76	0	0	27	5	60	1239	71	16	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4	6		6	2		
Total Split (s)	26.0	26.0		26.0	26.0	26.0	12.0	82.0	82.0	12.0	82.0	
Total Lost Time (s)	4.5	4.5			4.5	4.5	4.0	6.0	6.0	4.0	6.0	
Act Effct Green (s)	8.8	8.8			8.8	8.8	103.4	99.9	99.9	101.0	95.7	
Actuated g/C Ratio	0.07	0.07			0.07	0.07	0.86	0.83	0.83	0.84	0.80	
v/c Ratio	0.38	0.42			0.27	0.03	0.14	0.42	0.05	0.04	0.40	
Control Delay	62.6	23.2			58.2	0.4	2.0	3.4	1.2	1.9	5.5	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.6	23.2			58.2	0.4	2.0	3.4	1.2	1.9	5.5	
LOS	E	C			E	A	A	A	A	A	A	
Approach Delay		36.3			49.2			3.3			5.4	
Approach LOS		D			D			A			A	
Queue Length 50th (ft)	29	8			20	0	1	30	0	1	141	
Queue Length 95th (ft)	64	56			50	0	m16	140	m6	5	206	
Internal Link Dist (ft)		212			159			306			203	
Turn Bay Length (ft)	85					75	213			150		
Base Capacity (vph)	246	344			243	336	453	2947	1330	431	2811	
Starvation Cap Reductn	0	0			0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0			0	0	0	0	0	0	0	
Storage Cap Reductn	0	0			0	0	0	0	0	0	0	
Reduced v/c Ratio	0.15	0.22			0.11	0.01	0.13	0.42	0.05	0.04	0.40	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 81 (68%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 6.2
 Intersection LOS: A
 Intersection Capacity Utilization 56.4%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 18: Future



Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↗	↕		↗	↕	
Traffic Vol, veh/h	0	0	5	0	0	50	5	850	10	55	770	15
Future Vol, veh/h	0	0	5	0	0	50	5	850	10	55	770	15
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									
Storage Length	-	-	0	-	-	0	90	-	-	190	-	-
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	0	0	5	0	0	54	5	924	11	60	837	16

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	427	-	-	467	853	0	0	935	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	0	576	0	0	542	782	-	-	728	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	576	-	-	542	782	-	-	728	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.3		12.4		0.1		0.7	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	782	-	-	576	542	728	-	-
HCM Lane V/C Ratio	0.007	-	-	0.009	0.1	0.082	-	-
HCM Control Delay (s)	9.6	-	-	11.3	12.4	10.4	-	-
HCM Lane LOS	A	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.3	-	-

Prairie Hawk/Limelight/Low Meadow
63: Low Meadow/Limelight

AM Peak Hour
12/01/2017

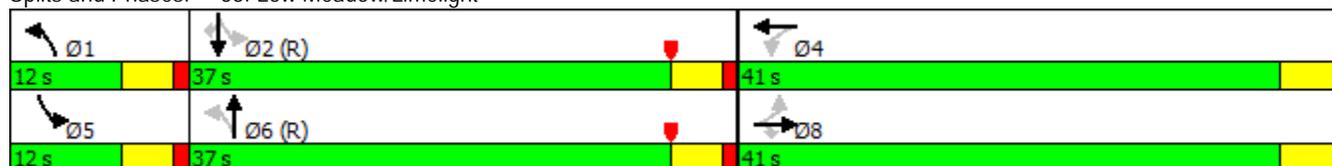


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕		↖	↕	↗
Traffic Volume (vph)	160	45	100	50	40	50	75	655	35	65	620	720
Future Volume (vph)	160	45	100	50	40	50	75	655	35	65	620	720
Satd. Flow (prot)	0	1792	1583	1770	1706	0	1770	3511	0	1770	3539	1583
Flt Permitted		0.709		0.463			0.351			0.318		
Satd. Flow (perm)	0	1321	1583	862	1706	0	654	3511	0	592	3539	1583
Satd. Flow (RTOR)			109		54			7				783
Lane Group Flow (vph)	0	223	109	54	97	0	82	750	0	71	674	783
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4			6			2		2
Total Split (s)	41.0	41.0	41.0	41.0	41.0		12.0	37.0		12.0	37.0	37.0
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		20.9	20.9	20.9	20.9		56.7	50.7		56.3	50.5	50.5
Actuated g/C Ratio		0.23	0.23	0.23	0.23		0.63	0.56		0.63	0.56	0.56
v/c Ratio		0.73	0.24	0.27	0.22		0.16	0.38		0.15	0.34	0.64
Control Delay		44.9	6.2	29.2	13.7		7.7	13.6		7.8	13.4	4.1
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		44.9	6.2	29.2	13.7		7.7	13.6		7.8	13.4	4.1
LOS		D	A	C	B		A	B		A	B	A
Approach Delay		32.2			19.2			13.0			8.4	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)		118	0	25	19		14	121		12	106	0
Queue Length 95th (ft)		172	35	51	51		40	212		36	190	70
Internal Link Dist (ft)		237			257			574			663	
Turn Bay Length (ft)			140	90			100			100		160
Base Capacity (vph)		535	706	349	723		512	1980		475	1985	1231
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.42	0.15	0.15	0.13		0.16	0.38		0.15	0.34	0.64

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 88 (98%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 13.1
 Intersection Capacity Utilization 65.2%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 63: Low Meadow/Limelight



Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕		↖	↕
Traffic Vol, veh/h	0	70	690	25	100	670
Future Vol, veh/h	0	70	690	25	100	670
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	76	750	27	109	728

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	-	389	0	0	777
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22
Pot Cap-1 Maneuver	0	610	-	-	835
Stage 1	0	-	-	-	-
Stage 2	0	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	-	610	-	-	835
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	610	835
HCM Lane V/C Ratio	-	-	0.125	0.13
HCM Control Delay (s)	-	-	11.7	10
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.4

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↕		↖	↗		↖	↗	
Traffic Vol, veh/h	30	5	10	15	5	5	5	680	15	5	655	10
Future Vol, veh/h	30	5	10	15	5	5	5	680	15	5	655	10
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									
Storage Length	0	-	-	-	-	-	100	-	-	100	-	-
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	33	5	11	16	5	5	5	739	16	5	712	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1111	1494	361	1128	1492	378	723	0	0	755	0	0
Stage 1	728	728	-	758	758	-	-	-	-	-	-	-
Stage 2	383	766	-	370	734	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	164	122	636	159	122	620	875	-	-	851	-	-
Stage 1	381	427	-	365	413	-	-	-	-	-	-	-
Stage 2	611	410	-	622	424	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	156	121	636	150	121	620	875	-	-	851	-	-
Mov Cap-2 Maneuver	156	121	-	150	121	-	-	-	-	-	-	-
Stage 1	379	424	-	363	411	-	-	-	-	-	-	-
Stage 2	594	408	-	600	422	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	29.3		30.7		0.1		0.1	
HCM LOS	D		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	875	-	-	156	263	167	851	-	-
HCM Lane V/C Ratio	0.006	-	-	0.209	0.062	0.163	0.006	-	-
HCM Control Delay (s)	9.1	-	-	34.1	19.6	30.7	9.3	-	-
HCM Lane LOS	A	-	-	D	C	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.2	0.6	0	-	-

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	15	5	635	655	25
Future Vol, veh/h	65	15	5	635	655	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	16	5	690	712	27

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1082	370	739	0	-	0
Stage 1	726	-	-	-	-	-
Stage 2	356	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	212	627	863	-	-	-
Stage 1	440	-	-	-	-	-
Stage 2	680	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	211	627	863	-	-	-
Mov Cap-2 Maneuver	211	-	-	-	-	-
Stage 1	440	-	-	-	-	-
Stage 2	676	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.7	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	863	-	211	627	-	-
HCM Lane V/C Ratio	0.006	-	0.335	0.026	-	-
HCM Control Delay (s)	9.2	-	30.4	10.9	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0	-	1.4	0.1	-	-

Intersection

Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗↗	↗↖		↖	↗
Traffic Vol, veh/h	15	750	385	25	30	10
Future Vol, veh/h	15	750	385	25	30	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	815	418	27	33	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	446	0	-	0	872
Stage 1	-	-	-	-	432
Stage 2	-	-	-	-	440
Critical Hdwy	4.14	-	-	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	2.22	-	-	-	3.52
Pot Cap-1 Maneuver	1111	-	-	-	290
Stage 1	-	-	-	-	622
Stage 2	-	-	-	-	616
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1111	-	-	-	286
Mov Cap-2 Maneuver	-	-	-	-	286
Stage 1	-	-	-	-	622
Stage 2	-	-	-	-	607

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	16.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1111	-	-	-	286	780
HCM Lane V/C Ratio	0.015	-	-	-	0.114	0.014
HCM Control Delay (s)	8.3	-	-	-	19.2	9.7
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	535	605	75	0	15
Future Vol, veh/h	15	535	605	75	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	582	658	82	0	16

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	739	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	6.94
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	3.32
Pot Cap-1 Maneuver	863	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	863	-	627
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	863	-	-	-	627
HCM Lane V/C Ratio	0.019	-	-	-	0.026
HCM Control Delay (s)	9.3	-	-	-	10.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection

Int Delay, s/veh 0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↑
Traffic Vol, veh/h	0	535	675	15	0	5
Future Vol, veh/h	0	535	675	15	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	582	734	16	0	5

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	-	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

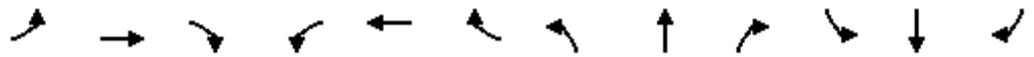
	EB	WB	SB
HCM Control Delay, s	0	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt

	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	623
HCM Lane V/C Ratio	-	-	-	0.009
HCM Control Delay (s)	-	-	-	10.8
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0

W/ Meadows Blvd./Low Meadow
51: Low Meadow/Freelark

PM Peak Hour
02/08/2018

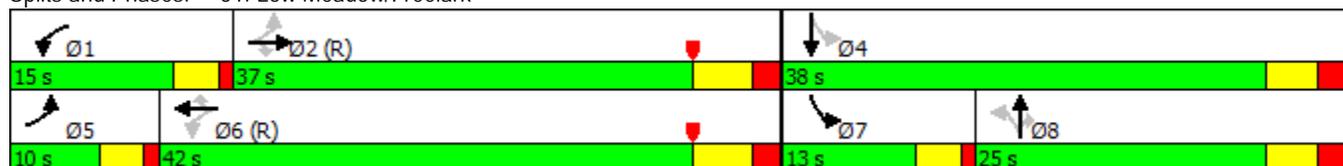


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑	↗	↙	↑↑	↗		↑	↗	↙	↗	
Traffic Volume (vph)	20	465	50	135	625	165	45	5	105	185	5	20
Future Volume (vph)	20	465	50	135	625	165	45	5	105	185	5	20
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	0	1783	1583	1770	1635	0
Flt Permitted	0.393			0.412				0.726		0.477		
Satd. Flow (perm)	732	3539	1583	767	3539	1583	0	1352	1583	889	1635	0
Satd. Flow (RTOR)			176			167			182		22	
Lane Group Flow (vph)	22	505	54	147	679	179	0	54	114	201	27	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Total Split (s)	10.0	37.0	37.0	15.0	42.0	42.0	25.0	25.0	25.0	13.0	38.0	
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.5	5.5	4.0	5.5	
Act Effect Green (s)	54.4	46.4	46.4	60.6	54.6	54.6		8.9	8.9	21.2	19.7	
Actuated g/C Ratio	0.60	0.52	0.52	0.67	0.61	0.61		0.10	0.10	0.24	0.22	
v/c Ratio	0.04	0.28	0.06	0.24	0.32	0.17		0.41	0.36	0.68	0.07	
Control Delay	6.9	14.4	0.1	2.5	3.2	0.5		46.2	4.2	40.4	12.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	6.9	14.4	0.1	2.5	3.2	0.5		46.2	4.2	40.4	12.4	
LOS	A	B	A	A	A	A		D	A	D	B	
Approach Delay		12.8			2.7			17.7			37.1	
Approach LOS		B			A			B			D	
Queue Length 50th (ft)	4	85	0	5	16	0		29	0	96	2	
Queue Length 95th (ft)	13	138	0	9	23	0		64	11	151	21	
Internal Link Dist (ft)		465			950			307			239	
Turn Bay Length (ft)	100		100	150		100			115	75		
Base Capacity (vph)	515	1824	901	640	2147	1026		292	485	297	604	
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.04	0.28	0.06	0.23	0.32	0.17		0.18	0.24	0.68	0.04	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 64 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 10.8
 Intersection LOS: B
 Intersection Capacity Utilization 51.3%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 51: Low Meadow/Freelark



Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕				↖			↖
Traffic Vol, veh/h	5	890	5	25	1050	35	0	0	15	0	0	5
Future Vol, veh/h	5	890	5	25	1050	35	0	0	15	0	0	5
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									
Storage Length	100	-	-	100	-	-	-	-	0	-	-	0
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	5	967	5	27	1141	38	0	0	16	0	0	5

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	1179	0	0	973	0	0	-	-	486	-	-	590
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	588	-	-	704	-	-	0	0	527	0	0	451
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	588	-	-	704	-	-	-	-	527	-	-	451
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0.1		0.2		12		13.1	
HCM LOS					B		B	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	527	588	-	-	704	-	-	451
HCM Lane V/C Ratio	0.031	0.009	-	-	0.039	-	-	0.012
HCM Control Delay (s)	12	11.2	-	-	10.3	-	-	13.1
HCM Lane LOS	B	B	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

Intersection

Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Traffic Vol, veh/h	0	905	1090	75	0	20
Future Vol, veh/h	0	905	1090	75	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	115	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	984	1185	82	0	22

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	592
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	449
Stage 1	0	-	-	-	-
Stage 2	0	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	449
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt

	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	449
HCM Lane V/C Ratio	-	-	-	0.048
HCM Control Delay (s)	-	-	-	13.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.2

W. Meadows Blvd./Red Hawk
40: Red Hask/Future

PM Peak Hour
02/08/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	815	50	240	1100	55	50	25	200	115	20	15
Future Volume (vph)	40	815	50	240	1100	55	50	25	200	115	20	15
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1615	0	1770	1745	0
Flt Permitted	0.189			0.239			0.732			0.288		
Satd. Flow (perm)	352	3539	1583	445	3539	1583	1364	1615	0	536	1745	0
Satd. Flow (RTOR)			177			141		217			16	
Lane Group Flow (vph)	43	886	54	261	1196	60	54	244	0	125	38	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		
Total Split (s)	16.0	55.0	55.0	23.0	62.0	62.0	12.0	25.0		17.0	30.0	
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.5	5.5		4.5	5.5	
Act Effct Green (s)	74.8	66.4	66.4	85.0	74.5	74.5	19.3	9.4		24.3	15.1	
Actuated g/C Ratio	0.62	0.55	0.55	0.71	0.62	0.62	0.16	0.08		0.20	0.13	
v/c Ratio	0.15	0.45	0.06	0.57	0.54	0.06	0.21	0.75		0.55	0.16	
Control Delay	8.5	18.6	0.1	17.9	9.0	0.1	37.6	24.2		48.7	31.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.5	18.6	0.1	17.9	9.0	0.1	37.6	24.2		48.7	31.3	
LOS	A	B	A	B	A	A	D	C		D	C	
Approach Delay		17.2			10.2			26.6			44.6	
Approach LOS		B			B			C			D	
Queue Length 50th (ft)	9	197	0	45	136	0	34	20		83	16	
Queue Length 95th (ft)	25	335	0	148	175	m1	63	100		126	46	
Internal Link Dist (ft)		316			208			329			163	
Turn Bay Length (ft)	100		115	125		120	150			50		
Base Capacity (vph)	377	1957	954	524	2195	1035	259	444		237	369	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.11	0.45	0.06	0.50	0.54	0.06	0.21	0.55		0.53	0.10	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 16.1
 Intersection LOS: B
 Intersection Capacity Utilization 72.5%
 ICU Level of Service C
 Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 40: Red Hask/Future



Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Traffic Vol, veh/h	0	1130	1380	80	0	15
Future Vol, veh/h	0	1130	1380	80	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	100	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1228	1500	87	0	16

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	750
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	354
Stage 1	0	-	-	-	-
Stage 2	0	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	354
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	354
HCM Lane V/C Ratio	-	-	-	0.046
HCM Control Delay (s)	-	-	-	15.7
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.1

W. Meadows Blvd./Limelight
2: Limelight & M.P.

PM Peak Hour
02/08/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1470	75	235	1860	65	60	5	235	270	10	75
Future Volume (vph)	30	1470	75	235	1860	65	60	5	235	270	10	75
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1589	0	3433	1617	0
Flt Permitted	0.073			0.065			0.697			0.444		
Satd. Flow (perm)	136	3539	1583	121	3539	1583	2519	1589	0	1604	1617	0
Satd. Flow (RTOR)			100			100		146			82	
Lane Group Flow (vph)	33	1598	82	255	2022	71	65	260	0	293	93	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Total Split (s)	15.0	61.0	61.0	21.0	67.0	67.0	38.0	38.0		38.0	38.0	
Total Lost Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	7.0		7.0	7.0	
Act Effct Green (s)	60.4	55.0	55.0	74.9	67.7	67.7	31.0	31.0		31.0	31.0	
Actuated g/C Ratio	0.50	0.46	0.46	0.62	0.56	0.56	0.26	0.26		0.26	0.26	
v/c Ratio	0.21	0.99	0.11	0.95	1.01	0.08	0.10	0.50		0.71	0.19	
Control Delay	13.7	46.7	6.2	59.8	50.5	6.6	34.5	19.8		51.0	10.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	13.7	46.7	6.2	59.8	50.5	6.6	34.5	19.8		51.0	10.4	
LOS	B	D	A	E	D	A	C	B		D	B	
Approach Delay		44.2			50.2			22.8			41.3	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	7	411	5	178	-918	2	19	71		106	6	
Queue Length 95th (ft)	m19	#790	m23	m#217	m#1048	m11	38	156		159	49	
Internal Link Dist (ft)		730			1326			566			560	
Turn Bay Length (ft)	200			200		300	125			200		
Base Capacity (vph)	179	1622	779	268	1996	936	650	518		414	478	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.18	0.99	0.11	0.95	1.01	0.08	0.10	0.50		0.71	0.19	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 107 (89%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 45.4
 Intersection LOS: D
 Intersection Capacity Utilization 99.8%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Limelight & M.P.



Intersection

Int Delay, s/veh 0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↑
Traffic Vol, veh/h	0	1975	2090	20	0	70
Future Vol, veh/h	0	1975	2090	20	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Stop
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2147	2272	22	0	76

Major/Minor

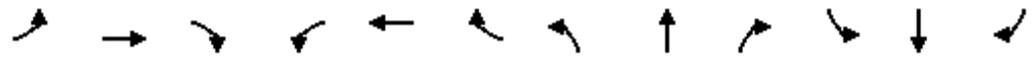
	Major1	Major2	Minor2
Conflicting Flow All	-	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	0	0	34.6
HCM LOS			D

Minor Lane/Major Mvmt

	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	196
HCM Lane V/C Ratio	-	-	0.388
HCM Control Delay (s)	-	-	34.6
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Traffic Volume (vph)	75	1880	20	25	1985	75	95	5	115	120	5	30
Future Volume (vph)	75	1880	20	25	1985	75	95	5	115	120	5	30
Satd. Flow (prot)	1770	3532	0	1770	3539	1583	1770	1595	0	1770	1621	0
Flt Permitted	0.051			0.053			0.512			0.615		
Satd. Flow (perm)	95	3532	0	99	3539	1583	954	1595	0	1146	1621	0
Satd. Flow (RTOR)		1				95		125			33	
Lane Group Flow (vph)	82	2065	0	27	2158	82	103	130	0	130	38	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		
Total Split (s)	12.0	71.0		12.0	71.0	71.0	14.0	21.0		16.0	23.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Act Effct Green (s)	86.6	81.5		83.1	78.1	78.1	19.1	7.5		17.5	8.7	
Actuated g/C Ratio	0.72	0.68		0.69	0.65	0.65	0.16	0.06		0.15	0.07	
v/c Ratio	0.48	0.86		0.18	0.94	0.08	0.42	0.60		0.58	0.26	
Control Delay	28.6	10.7		7.4	22.2	0.3	46.5	22.0		54.6	23.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	28.6	10.7		7.4	22.2	0.3	46.5	22.0		54.6	23.3	
LOS	C	B		A	C	A	D	C		D	C	
Approach Delay		11.4			21.2			32.8			47.5	
Approach LOS		B			C			C			D	
Queue Length 50th (ft)	30	202		3	336	0	70	4		90	4	
Queue Length 95th (ft)	m42	m#235		m8	#1110	m1	116	64		142	37	
Internal Link Dist (ft)		200			1007			565			580	
Turn Bay Length (ft)	165			215		215	100			125		
Base Capacity (vph)	182	2400		173	2304	1063	245	327		231	277	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.45	0.86		0.16	0.94	0.08	0.42	0.40		0.56	0.14	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 12 (10%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 18.3
 Intersection LOS: B
 Intersection Capacity Utilization 83.1%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Office Access/Filing 17 & M.P.



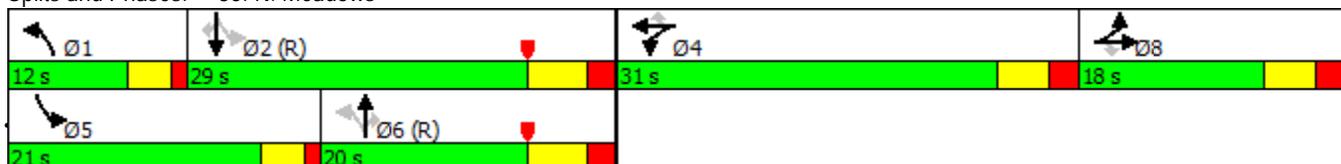


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↖	↕↕	↗	↖↖	↕↕	↗
Traffic Volume (vph)	10	145	10	205	140	355	5	655	250	140	515	5
Future Volume (vph)	10	145	10	205	140	355	5	655	250	140	515	5
Satd. Flow (prot)	0	1857	1583	0	1809	1583	1770	3539	1583	3433	3539	1583
Flt Permitted		0.997			0.971		0.442			0.198		
Satd. Flow (perm)	0	1857	1583	0	1809	1583	823	3539	1583	716	3539	1583
Satd. Flow (RTOR)			200			386			194			145
Lane Group Flow (vph)	0	169	11	0	375	386	5	712	272	152	560	5
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8			4	6		6	2		2
Total Split (s)	18.0	18.0	18.0	31.0	31.0	31.0	12.0	20.0	20.0	21.0	29.0	29.0
Total Lost Time (s)		5.5	5.5		5.5	5.5	4.0	6.0	6.0	4.0	6.0	6.0
Act Effct Green (s)		11.6	11.6		22.9	22.9	34.4	26.7	26.7	40.4	36.5	36.5
Actuated g/C Ratio		0.13	0.13		0.25	0.25	0.38	0.30	0.30	0.45	0.41	0.41
v/c Ratio		0.71	0.03		0.82	0.56	0.01	0.68	0.45	0.27	0.39	0.01
Control Delay		54.3	0.1		46.4	6.3	3.8	10.2	3.0	16.8	21.7	0.0
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		54.3	0.1		46.4	6.3	3.8	10.2	3.0	16.8	21.7	0.0
LOS		D	A		D	A	A	B	A	B	C	A
Approach Delay		51.0			26.0			8.2			20.5	
Approach LOS		D			C			A			C	
Queue Length 50th (ft)		92	0		193	0	0	64	0	26	119	0
Queue Length 95th (ft)		#173	0		#299	65	m1	#278	m15	45	196	0
Internal Link Dist (ft)		298			352			730			568	
Turn Bay Length (ft)			75			160	115		115	345		115
Base Capacity (vph)		258	393		512	725	419	1048	605	835	1435	728
Starvation Cap Reductn		0	0		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.66	0.03		0.73	0.53	0.01	0.68	0.45	0.18	0.39	0.01

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 28 (31%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 19.6
 Intersection LOS: B
 Intersection Capacity Utilization 66.7%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 35: N. Meadows



Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↗	↕			↕	
Traffic Vol, veh/h	0	0	15	0	0	5	15	900	5	0	715	10
Future Vol, veh/h	0	0	15	0	0	5	15	900	5	0	715	10
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									
Storage Length	-	-	0	-	-	0	130	-	-	-	-	-
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	0	0	16	0	0	5	16	978	5	0	777	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	394	-	-	492	788	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	605	0	0	522	827	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	605	-	-	522	827	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.1		12		0.2		0	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	827	-	-	605	522	-
HCM Lane V/C Ratio	0.02	-	-	0.027	0.01	-
HCM Control Delay (s)	9.4	-	-	11.1	12	-
HCM Lane LOS	A	-	-	B	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0	-

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↗	↕		↗	↕	
Traffic Vol, veh/h	0	0	30	0	0	15	95	975	15	10	1120	15
Future Vol, veh/h	0	0	30	0	0	15	95	975	15	10	1120	15
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									
Storage Length	-	-	0	-	-	0	150	-	-	150	-	-
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	0	0	33	0	0	16	103	1060	16	11	1217	16

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	617	-	-	538	1234	0	0	1076	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	0	433	0	0	488	560	-	-	644	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	433	-	-	488	560	-	-	644	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	14		12.6		1.1		0.1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	560	-	-	433	488	644	-	-
HCM Lane V/C Ratio	0.184	-	-	0.075	0.033	0.017	-	-
HCM Control Delay (s)	12.9	-	-	14	12.6	10.7	-	-
HCM Lane LOS	B	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0.7	-	-	0.2	0.1	0.1	-	-

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	55	0	1085	1035	15
Future Vol, veh/h	0	55	0	1085	1035	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	60	0	1179	1125	16

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	571	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.94	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.32	-
Pot Cap-1 Maneuver	0	464	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %			-
Mov Cap-1 Maneuver	-	464	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 464	-	-
HCM Lane V/C Ratio	- 0.129	-	-
HCM Control Delay (s)	- 13.9	-	-
HCM Lane LOS	- B	-	-
HCM 95th %tile Q(veh)	- 0.4	-	-

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↗	↕		↗	↕	
Traffic Vol, veh/h	0	0	5	0	0	55	5	755	10	35	915	15
Future Vol, veh/h	0	0	5	0	0	55	5	755	10	35	915	15
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									
Storage Length	-	-	0	-	-	0	90	-	-	190	-	-
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	0	0	5	0	0	60	5	821	11	38	995	16

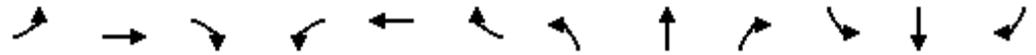
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	505	-	-	416	1011	0	0	832	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	0	512	0	0	585	681	-	-	796	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	512	-	-	585	681	-	-	796	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.1		11.9		0.1		0.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	681	-	-	512	585	796	-	-
HCM Lane V/C Ratio	0.008	-	-	0.011	0.102	0.048	-	-
HCM Control Delay (s)	10.3	-	-	12.1	11.9	9.7	-	-
HCM Lane LOS	B	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.1	-	-

Prairie Hawk/Limelight
63: Low Meadow/Limelight

PM Peak Hour
02/08/2018

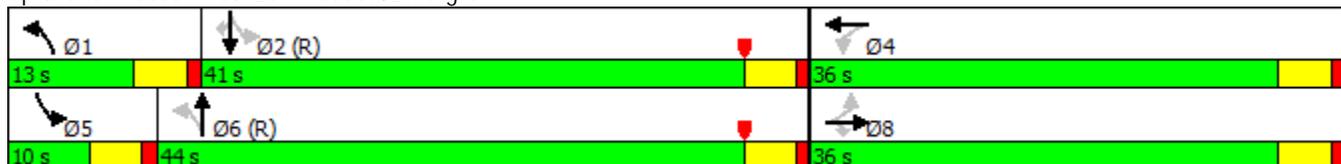


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕		↖	↕	↗
Traffic Volume (vph)	115	40	80	75	45	60	90	595	45	45	720	155
Future Volume (vph)	115	40	80	75	45	60	90	595	45	45	720	155
Satd. Flow (prot)	0	1796	1583	1770	1703	0	1770	3500	0	1770	3539	1583
Flt Permitted		0.689		0.532			0.303			0.370		
Satd. Flow (perm)	0	1283	1583	991	1703	0	564	3500	0	689	3539	1583
Satd. Flow (RTOR)			87		65			11				168
Lane Group Flow (vph)	0	168	87	82	114	0	98	696	0	49	783	168
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4			6			2		2
Total Split (s)	36.0	36.0	36.0	36.0	36.0		13.0	44.0		10.0	41.0	41.0
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		16.7	16.7	16.7	16.7		62.3	57.5		59.9	54.7	54.7
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.69	0.64		0.67	0.61	0.61
v/c Ratio		0.71	0.24	0.45	0.31		0.20	0.31		0.09	0.36	0.16
Control Delay		49.6	8.0	38.7	16.2		6.0	9.4		5.6	11.2	2.4
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		49.6	8.0	38.7	16.2		6.0	9.4		5.6	11.2	2.4
LOS		D	A	D	B		A	A		A	B	A
Approach Delay		35.4			25.6			9.0			9.5	
Approach LOS		D			C			A			A	
Queue Length 50th (ft)		90	0	42	24		14	94		7	114	0
Queue Length 95th (ft)		145	35	79	63		38	162		22	196	32
Internal Link Dist (ft)		237			257			574			663	
Turn Bay Length (ft)			140	90			100			100		160
Base Capacity (vph)		449	610	346	638		508	2240		534	2150	1027
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.37	0.14	0.24	0.18		0.19	0.31		0.09	0.36	0.16

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 13.7
 Intersection LOS: B
 Intersection Capacity Utilization 51.3%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 63: Low Meadow/Limelight



Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕		↖	↕
Traffic Vol, veh/h	0	90	640	20	60	810
Future Vol, veh/h	0	90	640	20	60	810
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	98	696	22	65	880

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	-	359	0	0	717
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22
Pot Cap-1 Maneuver	0	638	-	-	880
Stage 1	0	-	-	-	-
Stage 2	0	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	-	638	-	-	880
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	638	880
HCM Lane V/C Ratio	-	-	0.153	0.074
HCM Control Delay (s)	-	-	11.7	9.4
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.5	0.2

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	5	10	20	5	5	15	635	5	5	775	30
Future Vol, veh/h	20	5	10	20	5	5	15	635	5	5	775	30
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									
Storage Length	0	-	-	-	-	-	100	-	-	100	-	-
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	22	5	11	22	5	5	16	690	5	5	842	33

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1250	1598	438	1161	1612	348	875	0	0	696	0	0
Stage 1	870	870	-	726	726	-	-	-	-	-	-	-
Stage 2	380	728	-	435	886	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	129	105	567	150	103	648	767	-	-	896	-	-
Stage 1	313	367	-	382	428	-	-	-	-	-	-	-
Stage 2	614	427	-	570	361	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	120	102	567	138	100	648	767	-	-	896	-	-
Mov Cap-2 Maneuver	120	102	-	138	100	-	-	-	-	-	-	-
Stage 1	306	365	-	374	419	-	-	-	-	-	-	-
Stage 2	588	418	-	548	359	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	33.2		36.1		0.2		0.1	
HCM LOS	D		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	767	-	-	120	225	148	896	-	-
HCM Lane V/C Ratio	0.021	-	-	0.181	0.072	0.22	0.006	-	-
HCM Control Delay (s)	9.8	-	-	41.5	22.2	36.1	9	-	-
HCM Lane LOS	A	-	-	E	C	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0.8	0	-	-

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	10	20	610	735	70
Future Vol, veh/h	45	10	20	610	735	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	11	22	663	799	76

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1212	438	875	0	-	0
Stage 1	837	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	175	567	767	-	-	-
Stage 1	385	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	170	567	767	-	-	-
Mov Cap-2 Maneuver	170	-	-	-	-	-
Stage 1	385	-	-	-	-	-
Stage 2	646	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.3	0.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	767	-	170	567	-	-
HCM Lane V/C Ratio	0.028	-	0.288	0.019	-	-
HCM Control Delay (s)	9.8	-	34.5	11.5	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	0.1	-	-

Attachment II
Site Plan
Developed Land Use Table

