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Waterview North Sketch Plan Amendment
Master Traffic Impact Analysis
PCD File No.: SKP202
(LSC #204210)
September 25, 2020

Traffic Engineer's Statement

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

Developer's Statement

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

CPR ENTITLEMENTS, LLC
P.A. KOSCIELSKI, MAG.

9/25/20
Date

Waterview North

Sketch Plan Amendment

Master Traffic Impact Analysis

SKP202

Prepared for:
CPR Entitlements, LLC
31 N Tejon St #500,
Colorado Springs, CO 80903

Contact: Mr. P. A. Koscielski, Manager

SEPTEMBER 25, 2020

LSC Transportation Consultants
Prepared by: Kirstin D. Ferrin, P.E.
Reviewed by: Jeffrey C. Hodsdon, P.E.

LSC #204210

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September 25, 2020

Mr. P. A. Koscielski, Manager
CPR Entitlements, LLC
31 N Tejon St #500,
Colorado Springs, CO 80903

RE: Waterview North Sketch Plan Amendment
Master Traffic Impact Analysis
SKP202
El Paso County, CO
LSC #204210

Dear Mr. Koscielski,

In response to your request, LSC Transportation Consultants, Inc. has prepared this updated traffic impact and access analysis for Waterview North Sketch Plan Amendment. As shown in Figure 1, the "Waterview North site" is located northeast of the intersection of Powers Boulevard and Bradley Road in El Paso County, Colorado. The amendment area also includes an area south of Bradley Road. This report contains the following:

REPORT CONTENTS

This report has been prepared to address the project's traffic impact at the proposed access points and adjacent intersections.

This report contains the following:

- The existing street and traffic conditions in the site's vicinity including the street widths, lane geometries, traffic controls, and existing traffic counts at key area intersections;
- The projected future background traffic volumes, which include estimates of traffic from other area development projects and increases in through traffic on the adjacent arterial streets;
- The estimated average weekday and peak-hour trip generation;
- The estimated directional distribution of site-generated trips and the projected site-generated traffic volumes;
- Estimates of the resulting total traffic volumes on the adjacent streets and intersections; and
- The projected levels of service at the site access point and adjacent intersections.

PREVIOUS TRAFFIC REPORTS COMPLETED IN THE AREA

A list of other traffic studies in the area of study completed within the past five years (that LSC is aware of) is attached for reference. This study accounts for the land use, trip generation and the roadway network included in these studies. Figure 1 shows the location of the other known developments in the area.

LAND USE AND ACCESS

Land Use

The Waterview North site is located north of Bradley Road and east of Powers Boulevard. The site is included as part of the Waterview Sketch Plan area. A copy of the Waterview 2020 Sketch Plan Amendment is attached. The currently-proposed Waterview North Sketch Plan Amendment includes the parcels shown as P-14, P-15, and P-19 on the sketch plan amendment.

The Springs at Waterview East Preliminary Plan area, located south of the site, includes the parcels shown as P-17, P-18, and P-21 on the Waterview 2020 Sketch Plan Amendment. The Trails at Aspen Ridge residential development located within parcel P-18 was recently approved. Parcel P-17 is planned to be developed with commercial uses. This is consistent with prior studies done by LSC for the Waterview development. Parcel P-21 is planned to be developed with multi-family residential uses. This parcel was previously planned to be developed with commercial uses. This change is part of the current Sketch Plan Amendment application.

The Peak Innovation Park is a mixed-use development currently under review that is located north and east of the Waterview North Site. The Peak Innovation Park is planned to include a mix of office, industrial, and commercial land uses.

Figure 2 shows the proposed site plan for Waterview North. The site is planned to include about 22.3 acres for commercial uses, 24.4 acres for industrial uses, 425 single-family homes, and 425 multi-family residential dwelling units.

Access

Access to Bradley Road is proposed via a full-movement intersection 1,030 feet east of Powers Boulevard aligning with the future Legacy Hill Drive, which will serve the Springs at Waterview East Preliminary Plan area. An additional right-in/right-out-only access is proposed about 1,317 feet east of Legacy Hill Drive. These access points were approved as part of the Waterview Sketch Plan SKP162. The approved deviation requests have been attached. The site plan also includes a future connection to the Peak Innovation Park site.

Sight Distance

The criteria for intersection sight distance contained in Table 2-21 of the *El Paso County Engineering Criteria Manual* (ECM) apply only to two-lane roads with stop control. As Bradley Road has two through lanes in each direction, the sight distance has been calculated using the formula $d = 1.47 * V_m * t_c$ where V_m is the design speed in miles per hour and t_c is the gap that drivers will accept for entering a roadway in seconds. The acceptable gap time has been increased by from the typical 7.5 seconds used for a two-lane road to 8.0 seconds to account for multiple lanes on Bradley Road. Based on a design speed of 55 miles per hour, the calculated sight distance is 650 feet. The horizontal and vertical site distance was checked in the field. The available sight distance at the future intersection of Legacy Hill Drive is about 860 feet to the west and more than ¼ of a mile to the east. The available sight distance at the proposed right-in/right-out only access is more than ¼ of a mile to the east. The available sight distance at both access points exceeds the ECM criteria. To maintain acceptable lines of sight, the vegetation within the median on Bradley Road should be maintained so as to be no taller than 18 inches high.

Pedestrian and Bicycle Access

There are currently no schools located within two miles of the proposed development. There are no existing sidewalks on Bradley Road or Powers Boulevard. Sidewalks should be provided on all of the internal streets within Waterview North. Sidewalks are also planned on Legacy Hill Drive south of Bradley Road.

STREET AND TRAFFIC CONDITIONS

Area Streets

The adjacent streets are shown in Figure 1 and are described below. Copies of the 2016 El Paso County Major Transportation Corridors Plan (MTCP) 2040 Roadway Plan and 2016 MTCP 2060 Corridor Preservation Plan with the site location identified on them have been attached to this report.

- **Powers Boulevard** (State Highway 21) is classified as a Freeway (FW). Powers Boulevard is one of the region's main north/south corridors. Powers Boulevard has a center median and a posted speed limit of 60 miles per hour (mph) north of Crestera Parkway. South of this point, the posted speed limit is 65 mph. Powers Boulevard is ultimately planned to be converted to a Freeway with grade-separated intersections.
- **Bradley Road** is shown with a Minor Arterial classification east of Grinnell Boulevard on the 2016 2040 El Paso County *Major Transportation Corridors Plan (MTCP)*. Adjacent to the site, Bradley Road is a four-lane roadway with a 50-mph posted speed limit and has an edge-of-asphalt median, left-turn lanes, and rural paved shoulders. There is a short existing section of raised median approaching Powers Boulevard. The 2040 MTCP includes

the construction of Bradley Road between Grinnell Boulevard and Powers Boulevard in the 2040 roadway improvement B list projects.

- **Marksheffel Road** extends north from the Link Road/C&S Road intersection in Fountain, Colorado to north of Woodmen Road. It has recently been upgraded north and south of Bradley Road with a PPRTA project and is shown as a four-lane Expressway on the El Paso County Major Transportation Corridors Plan (MTCP). The posted speed limit on Marksheffel Road in the vicinity of Bradley Road is 55 mph.

2018 Traffic Volumes

Figure 3 shows the traffic volumes at the intersections of Powers Boulevard/Bradley Road and Marksheffel Road/Bradley Road, based on the attached traffic counts conducted by LSC in April and October 2018. Figure 3 also shows the 2018 Colorado Department of Transportation (CDOT) Average Annual Daily Traffic Volume (AADT) on Powers Boulevard and estimates of the average daily traffic volume on Bradley Road based on the peak-hour traffic counts, assuming the afternoon peak hour represents 10 percent of the daily traffic volume. This ratio was based on the Colorado Department of Transportation 30th highest annual hourly traffic volume, reported as percentage of average annual daily traffic volumes for Powers Boulevard adjacent to the site.

Existing Levels of Service

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A represents control delay of less than 10 seconds for unsignalized and signalized intersections. LOS F represents control delay of more than 50 seconds for unsignalized intersections and more than 80 seconds for signalized intersections. Table 1 shows the level of service delay ranges.

Table 1: Intersection Levels of Service Delay Ranges

	Signalized Intersections	Unsignalized Intersections
Level of Service	Average Control Delay (seconds per vehicle)	Average Control Delay (seconds per vehicle)(1)
A	10.0 sec or less	10.0 sec or less
B	10.1-20.0 sec	10.1-15.0 sec
C	20.1-35.0 sec	15.1-25.0 sec
D	35.1-55.0 sec	25.1-35.0 sec
E	55.1-80.0 sec	35.1-50.0 sec
F	80.1 sec or more	50.1 sec or more

(1) For unsignalized intersections if V/C ratio is greater than 1.0 the level of service is LOS F regardless of the projected average control delay per vehicle.

The intersections of Powers/Bradley and Marksheffel/Bradley have been analyzed based on the unsignalized intersection analysis procedures from the *Highway Capacity Manual, 6th Edition* by

the Transportation Research Board. A summary of the methodology used to calculate the existing peak-hour factors has been attached. Figure 3 shows the level of service analysis results.

All movements at these intersections are currently operating at LOS D or better during the peak hours.

BACKGROUND TRAFFIC

Background traffic is the traffic estimated to be on the adjacent roadways and at adjacent intersections without the proposed development's trip generation of site-generated traffic volumes. Background traffic includes the through traffic and the traffic generated by nearby developments, but assumes zero traffic generated by the site.

Figure 4 shows the projected short-term (Year 2023) background traffic volumes. These traffic volumes are based on the existing traffic volumes shown in Figure 3, assuming a growth rate of 1 percent per year. This growth rate is an estimate by LSC, based on the Colorado Department of Transportation 20-year factor for Powers Boulevard adjacent to the site. The 20-year factor is 1.07 which calculates to a growth rate of less than 1 percent per year. The short-term background traffic volumes also include additional traffic projected to be generated by development of The Trails at Aspen Ridge Filing No. 1 and the Trails at Aspen Ridge PUD. The projected additional traffic volumes were taken from a traffic impact study prepared by LSC. The short-term background traffic volumes assume a connection has not yet been constructed to the Peak Innovation Park.

Figure 5 shows the projected 2040 background traffic volumes. The 2040 background traffic volumes were based on the *Trails at Aspen Ridge Filing No. 1 Updated Traffic Impact and Access Analysis* by LSC dated December 12, 2019. These volumes assume buildout of the Springs at Waterview East Preliminary Plan, Bradley Heights, and the Peak Innovation Park. The long-term background volumes assume Bradley Road has been constructed between Goldfield Drive and Powers Boulevard and assumes a connection to the Peak Innovation Park. The 2040 background traffic volumes have been updated from previous versions of this report to account for the change in trips associated with the portion of the Sketch Plan Amendment south of Bradley Road. The background traffic figures depict this area of amendment.

TRIP GENERATION

The site-generated vehicle trips were estimated using the nationally published trip generation rates from *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). Table 2 shows the average weekday and peak-hour trip generation estimates. Table 2 also shows a projected trip generation estimate for other parcels within the Waterview 2020 Sketch Plan Amendment area and a comparison to the trip generation estimate assumed in previous traffic impact studies prepared by LSC in the vicinity of the site.

The total number of vehicle trips generated by the land uses has been reduced to account for the internal vehicle trips made within the site between land uses, without use of the external streets surrounding the site. Table 2 shows the number of internal trips assumed for each land use. The internal trip reduction for the commercial parcels is an estimate by LSC, based on *National Highway Cooperative Highway Research Program (NCHRP) Report 684 Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. The results of the spreadsheet model are attached.

The total number of vehicle trips generated has also been reduced to take into account the "pass-by" phenomena. A pass-by trip is made by a motorist who would already be on the adjacent roadways regardless of the proposed development, but who stops in at the site while passing by. The motorist would then continue on his or her way to a final destination in the original direction. The pass-by percentages shown in Table 2 are from the *Trip Generation Handbook - An ITE Proposed Recommended Practice, 3rd Edition*, 2017 by ITE.

As there are limited existing mass transit options in the vicinity of the site, no reductions were assumed to account for multimodal travel.

At buildout, the Waterview North site is projected to generate about 14,419 new external vehicle trips on the average weekday, with about half entering and half exiting the site. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 371 vehicles would enter and 496 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 822 vehicles would enter and 759 vehicles would exit the site.

The remaining portion (outside of the Waterview North site) of the Waterview 2020 Sketch Plan Amendment Area located south of Bradley Road is projected to generate about 7,126 total external vehicle trips on the average weekday, with about half entering and half exiting the area. This is about 722 fewer vehicle trips per day than were assumed in the *Trails at Aspen Ridge Filing No. 1 and PUD Updated Traffic Impact Analysis by LSC* dated December 12, 2019 and previous versions of this report. During the morning peak hour about, 129 vehicles would enter and 99 vehicles would exit the Sketch Plan Amendment area located south of Bradley Road. This is about 11 fewer entering vehicles and 13 more exiting vehicles than was previously assumed. During the afternoon peak hour, about 316 vehicles would enter and 328 vehicles would exit the Sketch Plan Amendment area located south of Bradley Road. This is about 33 fewer entering vehicles and 50 fewer exiting vehicles than was previously assumed.

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated traffic volumes on the adjacent roadway system is one of the most important factors in determining the traffic impacts of the site. Figure 6 shows the short-term and long-term directional distributions of traffic projected to be generated by the residential uses. Figure 7 shows the short-term and long-term directional distributions of traffic

projected to be generated by the non-residential uses. The short-term directional distribution estimates were based on the existing area roadway system and the traffic counts. The long-term directional distribution estimates were based on the anticipated regional development and future roadway networks including the construction of Bradley Road between Grinnell Street and Powers Boulevard and a future north/south connection between Bradley Road and Fontaine Boulevard through the Bradley Heights development located east of the Waterview East Preliminary Plan area.

This distribution was estimated with a focus on peak-hour trip assignment, as the intersection analysis is based on peak-hour volumes.

- The distribution percentages to/from the east account for:
  - Some longer trip lengths by commuters;
  - The proximity of this development to Marksheffel Road;
  - Anticipated use of Marksheffel Road north as a viable alternative to Powers to/from many destinations east of and within the Powers Boulevard corridor. Powers Boulevard intersections experience congestion during peak hours. Marksheffel has recently been upgraded north and south of Bradley with a PPRTA project, which has increased its attractiveness as a north/south travel route;
  - Bradley to/from the east being the route to Schriever Air Force Base and the improved east gate of Peterson Air Force Base; and
  - Development occurring in the Marksheffel corridor and, over time, the number of trip destinations continuing to increase.
- The distribution percentages to/from the Bradley Heights connection account for:
  - Planned alternative street connections within Bradley Heights to Bradley Road and Marksheffel Road (south);
  - Future trip destinations within Bradley Heights;
  - The school and some potential future commercial within Lorson Ranch to the southeast;
  - The long-term distribution split accounts for a north-south road connection between Bradley Heights and Fontaine Boulevard, as shown on the Banning Lewis Master Plan and the City of Colorado Springs Intermodal Transportation Plan. This includes trips oriented to the south and southeast.
- The percentages to/from the south on Powers account for trips from the south and southeast, paired with destinations primarily in Fountain and Fort Carson as well as the south connection to Interstate 25.
- The percentages to/from the north on Powers primarily account for trips using Milton Proby Parkway and the Powers Boulevard corridor for travel.

When the distribution percentages (from Figures 5 and 6) are applied to the trip-generation estimates (from Table 2), the resulting site-generated traffic volumes can be determined. Figures 8 and 9 show the projected short-term and long-term site-generated traffic volume due to Waterview North.

Note: The site generated traffic volumes shown in Figures 8 and 9 are for the "Waterview North site" (north of Bradley Road) portion of the Sketch Plan Amendment only. The change in trips/traffic volumes associated with the portion of the current Sketch Plan Amendment south of Bradley (change from commercial to multi-family for 12 acres east of Legacy Hill Drive) are accounted for in the updated 2040 background traffic volumes shown in Figure 5. Technically, these are "site-generated" trips with respect to the Sketch Plan Amendment, but have been shown as part of the background traffic in the figures as these trips are generated from an area south of the "Waterview North site." The trip-generation section describes the change in trips generated for this portion of the Sketch Plan Amendment south of Bradley Road.

BUILDOUT TOTAL TRAFFIC

Figure 10 shows the projected short-term total traffic volumes. The short-term total traffic volumes are the sum of the short-term background traffic volumes (from Figure 4) plus the short-term site-generated traffic volumes (from Figure 8).

Figure 11 shows the projected 2040 total traffic volumes. The 2040 total traffic volumes are the sum of the 2040 background traffic volumes (from Figure 5) plus the long-term site-generated traffic volumes (from Figure 9).

PROJECTED LEVELS OF SERVICE

The key area intersections have been analyzed to determine the projected levels of service for the short-term and 2040 background and short-term and 2040 total traffic volumes. The signalized intersections of Powers/Bradley and Legacy Hill/Bradley were analyzed using Synchro. The proposed right-in/right-out only access to Bradley Road was analyzed based on the unsignalized method of analysis from the *Highway Capacity Manual, 6th Edition* by the Transportation Research Board. Figures 4, 5, 10, and 11 show the results of the level of service analysis. The level of service reports are attached.

Powers/Bradley

The intersection of Powers/Bradley is currently signalized and is operating at a satisfactory level of service. All movements at this intersection are projected to operate at LOS D or better during the peak hours, based on the short-term total traffic volumes. The short-term analysis assumes the addition of a second southbound left-turn lane. By 2040, it was assumed that the section of Bradley Road between Goldfield Drive and Powers Boulevard would be constructed. Based on the 2040 total traffic volumes shown and the lane geometry shown in Figure 11, the intersection is projected to operate at an overall LOS D during the peak hours. However, some of the minor movements are projected to operate at LOS E or F during the peak hours. It is common for left-turn and side-street through movements to have projected delays in the LOS E or F range, as signal coordination timing plans generally give priority to moving through traffic. This often results in higher delay for left-turn and side-street movements and can result in

movement/approach delays in the E or F range even though they are projected to have sufficient capacity for the projected traffic volumes. Note: This intersection is planned to be converted to a grade-separated interchange in the long-term future. Figure 12 shows the projected level of service if this occurs by 2040. As shown in Figure 12, all movements are projected to operate at LOS D or better during the peak hours.

Legacy Hill/Bradley

The intersection of Bradley Road/Legacy Hill Drive is projected to operate at LOS D or better during the peak hours for all movements as a signal-controlled intersection, based on the projected short-term total traffic volumes. By 2040, some of the minor movements are projected to operate at LOS E during the peak hours.

Site Access/Bradley

All movements at the proposed right-in/right-out intersection of Bradley Road are projected to operate at LOS D or better during the peak hours, based on the projected short-term and 2040 total traffic volumes.

Marksheffel/Bradley

The intersection of Marksheffel/Bradley is currently signalized and is operating at a satisfactory level of service. A second eastbound left-turn lane will be needed in the short-term to maintain an acceptable level of service (LOS D or better) for the eastbound left-turn movement. By 2040, the eastbound left-turn movement is projected to operate at LOS E during the peak hours, even with dual eastbound left-turn lanes.

QUEUING ANALYSIS

A queuing analysis was performed using Synchro/SimTraffic to determine the storage length needed to accommodate the projected left-turn queue on Bradley Road, based on the 2040 total traffic volumes. The 2040 total morning and afternoon peak-hour traffic volumes were entered into the Synchro model. The simulation was run five times. The queuing reports are attached.

Based on the projected 2040 total traffic, the projected maximum eastbound left-turn queue on Bradley Road approaching Legacy Hill Drive is about 147 feet during the morning peak hour and 388 feet during the afternoon peak hour.

The projected maximum westbound left-turn queue on Bradley Road approaching Powers Boulevard is about 531 feet during the morning peak hour and 264 feet during the afternoon peak hour.

A copy of Figure 19 Long-Term Bradley Road Lane Recommendations figure from the *Springs at Waterview East Preliminary Plan Traffic Impact Study* has been attached. The projected queues can be accommodated by the lane recommendations shown in the figure.

TRAFFIC-SIGNAL WARRANT ANALYSIS

The intersection of Bradley Road and Legacy Hill Drive was analyzed to determine when either an Eight-Hour or a Four-Hour Vehicular-Volume Traffic-Signal Warrant would be met or be close to being met, based on traffic projected to be generated by the Waterview North development only. As discussed in the *Trails at Aspen Ridge Filing No. 1 Updated Traffic Impact and Access Analysis* by LSC dated December 12, 2019, a Four-Hour Vehicular-Volume Traffic-Signal Warrant is projected to be met, once about 242 of the planned 786 lots for single-family homes are developed. This analysis assumes none of the homes in the Trails at Aspen Ridge have been developed.

Table 3 shows that Four-Hour and Eight-Hour Vehicular-Volume Traffic-Signal Warrants are projected to be met once either the residential or retail portion of the Waterview North site is fully developed. The satisfaction of warrants does not indicate that a signal must be installed. The decision to require a signal to be installed at this location rests with the County.

Details of the Analysis

The lower threshold volume for an Eight-Hour Vehicular-Volume Traffic-Signal Warrant for Condition B - Interruption of Continuous Traffic for a major street with two or more lanes and a posted speed limit greater than 40 mph, and a minor street approach with one lane, is 53 vehicles per hour. This lower threshold is applicable when the major street volumes (eastbound and westbound left, through, and right movements) exceed 630 vehicles per hour. The lower threshold volume for a Four-Hour Vehicular-Volume Traffic-Signal Warrant for a major street with two or more lanes and a posted speed limit greater than 40 mph, and a minor street approach with one lane, is 60 vehicles per hour. This lower threshold is applicable when the major street volumes (eastbound and westbound left, through, and right movements) exceed 1,000 vehicles per hour. The existing through volumes on Bradley Road adjacent to the site currently exceeds 1,000 vehicles per hour, during both the morning and afternoon peak hours.

Detailed analyses are presented in Table 3. The off-peak through volumes on Bradley Road were estimated, based on 24-hour counts conducted by CDOT on Powers Boulevard just south of Bradley Road. The off-peak volumes on Legacy Hill Drive were based on the short-term site-generated traffic volumes and hourly variation data published by the Institute of Transportation Engineers in August 2018.

ROADWAY CLASSIFICATION

Figure 13 shows the recommended street classification for all streets within Waterview North based on the projected 2040 weekday traffic volumes.

COUNTY ROAD IMPACT FEE PROGRAM

The applicant will be required to participate in the County Road Impact Fee Program. Details to be determined at Prelim/Plat stages.

TRAFFIC-SIGNAL PERCENTAGES

During the April 23, 2019 El Paso County Road Impact Free Advisory Committee meeting, it was recommended that a future signal at Bradley Road and Legacy Hill Drive be included as an eligible improvement. A copy of the draft meeting minutes have been attached. The minutes are draft only because, as of the date of this report, the committee has not met again to vote on approval of the minutes. No changes are anticipated.

The *Trails at Aspen Ridge Filing No. 1 Updated Traffic Impact and Access Analysis* by LSC dated December 12, 2019 included a traffic signal escrow analysis for a future traffic signal at the intersection of Bradley Road Legacy Hill Drive. However, as the signal is now considered an eligible improvement under the County free program, escrow will no longer be required. Should the actual cost of the signal installation exceed the reimbursable unit cost, LSC has prepared a table that could be used to determine a fair share contribution towards the amount above the unit cost for each of the area developments anticipated to add traffic to the intersection. The results of the analysis are shown in Table 4.

The table shows a total cost of $350,000, which is likely a reasonable amount for “private project” installation of a traffic signal, should one of the individual area developments need to install the signal sooner than the County would be able to do so (In which case, the development entity installing the signal would be eligible for unit-cost credit in accordance with Fee Program provisions). The primary area developers could potentially agree on a different number for purposes of sharing the up-front cost if the “private project” scenario for signal installation is likely.

DEVIATIONS

Deviations to the El Paso County *Engineering Criteria Manual* for the two access points to Bradley Road were approved as part of the Waterview Sketch Plan SKP162. The approved deviation requests have been attached.

RECOMMENDED IMPROVEMENTS

A list of all recommended improvements in the vicinity of the site is presented in Table 5.

* * * * *

We trust this master traffic impact analysis will assist you in gaining approval of the proposed Sketch Plan Amendment, which includes the Waterview North mixed-use development. Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By_____
Jeffrey C. Hodsdon, P.E.
Principal

JCH:KDF:jas

Enclosures: Tables 2-5
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Tables

TRANSPORTATION
CONSULTANTS, INC.

Table 2
Trip Generation Estimate
Waterview North

Planning Area	Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates [1] Average Weekday Traffic	Morning Peak-Hour In	Morning Peak-Hour Out	Afternoon Peak-Hour In	Afternoon Peak-Hour Out	Total Trips Generated Average Weekday Traffic	Morning Peak-Hour In	Morning Peak-Hour Out	Afternoon Peak-Hour In	Afternoon Peak-Hour Out	Internal Trips[2]	Total Internal Trips Generated Average Weekday Traffic	Morning Peak-Hour In	Morning Peak-Hour Out	Afternoon Peak-Hour In	Afternoon Peak-Hour Out	Total External Trips Generated Average Weekday Traffic	Morning Peak-Hour In	Morning Peak-Hour Out	Afternoon Peak-Hour In	Afternoon Peak-Hour Out	Pass-by Trip Percent[3]	Total Passby Trips Generated Average Weekday Traffic	Morning Peak-Hour In	Morning Peak-Hour Out	Afternoon Peak-Hour In	Afternoon Peak-Hour Out	Total New "External" Trips Generated Trips Generated Average Weekday	Morning Peak-Hour In	Morning Peak-Hour Out	Afternoon Peak-Hour In	Afternoon Peak-Hour Out
Trip Generation Estimate For the Currently Proposed Waterview North Development																																		
P-14	130	Industrial Park	325 KSF	5.33	0.32	0.08	0.08	0.32	1,733	105	25	27	103	0%	0	0	0	0	0	1,733	105	25	27	103	0%	0	0	0	0	0	1,733	105	25	27	103
P-15	820	Shopping Center	175 KSF[4]	50.26	0.85	0.52	2.26	2.44	8,796	148	91	395	428	2%	174	4	2	4	11	8,622	144	89	391	417	34%	2,931	41	41	140	140	5,691	103	48	251	277
P-19	210	Single-Family Detached Housing	425 DU[5]	9.44	0.19	0.56	0.62	0.37	4,012	79	236	265	156	2%	72	1	2	6	2	3,884	77	232	254	152	0%	0	0	0	0	0	3,940	78	234	259	154
	220	Multifamily Housing Low-Rise	425 DU	7.32	0.11	0.35	0.35	0.21	3,111	45	151	150	88	2%	56	1	2	5	2	3,111	45	151	150	88	0%	0	0	0	0	0	3,055	44	149	145	86
		Total Trip Generation Estimate for P-14, P15, and P-19 (Waterview North)							**17,652**	**377**	**502**	**837**	**774**		**302**	**6**	**6**	**15**	**15**	**17,350**	**371**	**496**	**822**	**759**		**2,931**	**41**	**41**	**140**	**140**	**14,419**	**330**	**455**	**682**	**619**
Future Trip Generation Estimate for the Remaining Waterview 2020 Sketch Plan Amendment Area																																		
P-17	820	Shopping Center	121 KSF	56.56	1.09	0.67	2.48	2.69	6,844	132	81	300	325	2%	148	9	3	6	10	6,698	123	78	294	315	34%	2,277	36	36	106	106	4,419	87	42	188	209
P-21	220	Multifamily Housing Low-Rise	60 DU	7.32	0.11	0.35	0.35	0.21	439	6	21	21	12	2%	9	0	0	0	0	430	6	21	21	12	0%	0	0	0	0	0	430	6	21	21	12
		Total Trip Generation Estimate for P-17 & P-21							**7,283**	**138**	**102**	**322**	**338**		**157**	**9**	**3**	**6**	**10**	**7,126**	**129**	**99**	**316**	**328**		**2,277**	**36**	**36**	**106**	**106**	**4,849**	**93**	**63**	**210**	**222**
		Total Trip Generation Estimate for P-14, P15, P-19, P-17 & P-21							**24,935**	**515**	**604**	**1,158**	**1,112**		**459**	**15**	**9**	**21**	**25**	**24,476**	**500**	**595**	**1,137**	**1,087**		**5,208**	**77**	**77**	**246**	**246**	**19,268**	**423**	**518**	**891**	**841**
Trip Generation Estimate Assumed in the *Trails at Aspend Ridge Fil No. 1 and PUD Updated Traffic Impact Analysis* by LSC dated December 12, 2019																																		
P-14 & P-15	770	Business Park	720 KSF	11.61	1.14	0.20	0.32	0.90	8,362	820	145	227	646	2%	167	16	3	5	13	8,195	804	142	222	633	0%	0	0	0	0	0	8,195	804	142	222	633
P-19	220	Multifamily Housing Low-Rise	288 DU	7.32	0.11	0.35	0.35	0.21	2,108	30	102	102	60	1%	21	0	1	1	1	2,087	30	101	101	59	0%	0	0	0	0	0	2,087	30	101	101	59
	210	Single-Family Detached Housing	312 DU	9.44	0.19	0.56	0.62	0.37	2,945	58	173	195	114	1%	29	1	2	2	1	2,916	57	171	193	113	0%	0	0	0	0	0	2,916	57	171	193	113
		Total Trip Generation Estimate for P-14, P-15 & P-19							**13,415**	**908**	**420**	**523**	**820**		**217**	**17**	**6**	**8**	**15**	**13,198**	**891**	**414**	**515**	**805**		**0**	**0**	**0**	**0**	**0**	**13,198**	**891**	**414**	**515**	**805**
		Change in Trip Generation Estimate for P-14, P-15 & P-19							**4,237**	**-531**	**82**	**314**	**-46**							**4,152**	**-520**	**82**	**307**	**-46**							**1,221**	**-561**	**41**	**167**	**-186**
P-17 & P-21	820	Shopping Center	148 KSF	53.03	0.95	0.58	2.36	2.55	7,849	140	86	349	378	2%	148	9	3	6	10	7,849	140	86	349	378	34%	2,669	38	38	123	123	5,032	93	44	219	244
		Change in Trip Generation Estimate for P-17 & P-21							**-565**	**-2**	**16**	**-27**	**-40**							**-722**	**-11**	**13**	**-33**	**-50**							**-182**	**0**	**19**	**-10**	**-22**
		Total Trip Generation Estimate for P-14, P15, P-19, P-17 & P-21							**21,264**	**1,048**	**506**	**872**	**1,197**							**21,047**	**1,031**	**500**	**864**	**1,182**							**18,230**	**984**	**458**	**734**	**1,049**
		Change in Trip Generation Estimate for P-14, P15, P-19, P-17 & P-21							**3,671**	**-533**	**98**	**287**	**-85**							**3,429**	**-531**	**95**	**274**	**-95**							**1,038**	**-561**	**60**	**157**	**-208**

Notes:

(1) Source: based on *Trip Generation* , 10th Edition, 2017 by the Institute of Transportation Engineers (ITE)

(2) Internal trips within P-14, P-15, and P-19 were based on the attached NCHRP 684 Internal Trip Capture Estimation Tool. Internal trips for P-17 and P-21 include trips projected to and from P-18 and were based on the *Trails at Aspend Ridge Fil No. 1 and PUD Updated Traffic Impact Analysis* by LSC dated December 12, 2019

(3) Source: "Trip Generation Handbook - An ITE Proposed Recommended Practice 3rd Edition, September 2017" by ITE

(4) KSF = 1,000 square feet

(5) DU = dwelling unit

Source: LSC Transportation Consultants, Inc.

Aug-20

Table 3
Waterview North
Traffic Signal Warrant Analysis of Legacy Hill Drive/Bradley Road
Based on the Projected Volumes for the North Leg (Waterview North Access) Only

Period	2 or More Lanes on Major Approach & 1 Lane on Minor Approach																											
	Traffic Volumes														Warrant 1, Eight Hour Vehicular Volume Evaluation										Warrant 2, Four Hour Vehicular Volume Evaluation					
																			Warrant Threshold Met?											
															Warrant Thresholds															
	Existing [1]		Added by Residential Uses (950 DUs[4])		Added by Commercial Uses		Added by Industrial Uses		Existing + Residential Uses		Existing + Commercial Uses		Existing + Industrial Uses		Condition A 70%		Condition B 70%		Existing + Residential		Existing + Commercial		Existing + Industrial		Existing + Residential		Existing + Commercial		Existing + Industrial	
Hour	Major[2]	Minor[3]	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	A 70%	B 70%	A 70%	B 70%	A 70%	B 70%	Minor Street Minimum	Met?	Minor Street Minimum	Met?	Minor Street Minimum	Met?
6:00 AM	1002	0	123	58	26	5	64	3	1125	58	1028	5	1066	3	420	105	630	53	No	Yes	No	No	No	No	60	No	60	No	60	No
7:00 AM	1237	0	244	107	119	23	105	7	1481	107	1356	23	1342	7	420	105	630	53	Yes	Yes	No	No	No	No	60	Yes	60	No	60	No
8:00 AM	1098	0	237	88	221	38	63	10	1335	88	1319	38	1161	10	420	105	630	53	No	Yes	No	No	No	No	60	Yes	60	No	60	No
9:00 AM	866	0	195	61	400	64	41	17	1061	61	1266	64	907	17	420	105	630	53	No	Yes	No	Yes	No	No	60	Yes	60	Yes	65	No
10:00 AM	884	0	183	50	604	105	44	19	1067	50	1488	105	928	19	420	105	630	53	No	No	No	Yes	No	No	60	No	60	Yes	64	No
11:00 AM	1039	0	221	53	324	92	173	20	1260	53	1363	92	1212	20	420	105	630	53	No	No	No	Yes	No	No	60	No	60	Yes	60	No
12:00 Noon	824	0	230	55	354	127	239	26	1054	55	1178	127	1063	26	420	105	630	53	No	Yes	Yes	Yes	No	No	60	No	60	Yes	60	No
1:00 PM	789	0	225	54	307	128	206	16	1014	54	1096	128	995	16	420	105	630	53	No	Yes	Yes	Yes	No	No	60	No	60	Yes	60	No
2:00 PM	792	0	266	61	297	124	181	23	1058	61	1089	124	973	23	420	105	630	53	No	Yes	Yes	Yes	No	No	60	Yes	60	Yes	61	No
3:00 PM	949	0	308	57	284	122	148	31	1257	57	1233	122	1097	31	420	105	630	53	No	Yes	Yes	Yes	No	No	60	No	60	Yes	60	No
4:00 PM	1165	0	397	65	297	127	87	25	1562	65	1462	127	1252	25	420	105	630	53	No	Yes	Yes	Yes	No	No	60	Yes	60	Yes	60	No
5:00 PM	1222	0	361	67	307	127	28	31	1583	67	1529	127	1250	31	420	105	630	53	No	Yes	Yes	Yes	No	No	60	Yes	60	Yes	60	No
6:00 PM	995	0	334	60	254	115	3	6	1329	60	1249	115	998	6	420	105	630	53	No	Yes	Yes	Yes	No	No	60	No	60	Yes	60	No
																			1	11	7	10	0	0		6		10		0
																			No	Yes	No	Yes	No	No		Yes		Yes		No

Notes:
(1) Hourly variation based on traffic counts on Powers Boulevard south of Bradley Road
(2) The major street volumes include all (left/through/right) movements on Bradley Rd
(3) The minor street volumes includes only the southbound left movement on Legacy Hills Drive
(4) DU = Dwelling Unit

Source: LSC Transportation Consultants, Inc.

Table 4
Legacy Hill Drive and Bradley Road Signal Fair Share Analysis
Waterview North

Development	Minor Approach Volume[(1)] AM	Minor Approach Volume[(1)] PM	Fair Share
Based on Projected 2040 Total Traffic Volumes			
Trails at Aspen Ridge Fil No. 1	55	37	5.6%
Trails at Aspen Ridge PUD	176	118	17.8%
Springs at Waterview East Commercial	60	231	17.6%
Waterview North	334	543	53.1%
Bradley Heights	10	25	2.1%
Peak Innovation Park	12	52	3.9%

Notes:

(1) Minor approach volume includes all northbound left-turn and through movements plus 25% of northbound right-turn movements and all southbound left-turn and through movements plus the portion of the southbound right-turn movements anticipated to ultimately travel south on Powers Boulevard

Source: LSC Transportation Consultants, Inc. *August 2020*

Table 5
Improvements Table
Waterview North

Improvement	Timing /"Trigger Point(s)"	Required Length	Proposed Length	Responsibility[1]
Access Points to Bradley Road (Future Public Street Intersections)				
Full-movement access to the north side of Bradley Road 1,030 feet east of Powers Boulevard (aligning with Legacy Hill Drive on the south side)	With this development	- - -	- - -	Applicant
Right-in/right-out access 1,317 feet east of Legacy Hill Drive	With this development	- - -	- - -	Applicant
Traffic Signals				
Traffic Signal Installation - Installation of the traffic signal at Legacy Hill Drive/Bradley Road.	As determined by El Paso County Public Works - typically this is when traffic signal warrants are met, however traffic signal warrants are guidelines and the actual timing of installation is at the discretion of El Paso County Public Works. An Eight-Hour Vehicular Volume Traffic Signal Warrant is projected to be met once any of the following levels of development are reached: 31% of the Trails at Aspen Ridge (242 DUs) 23% of the commercial portion of Springs at Waterview East 93% of the residential portion of Waterview North (884 DUs) 44% of the commercial/industrial portion of Waterview North A warrant may be met sooner if the residential and non-residential portions of either Waterview North or the Trails at Aspen Ridge and Springs at Waterview East are developed concurrently.These trigger points/timing estimates and the need for the signal are subject to change and would be evaluated with each final plat application. County public works approval is required for signal installation.	- - -	- - -	This intersection is considered an eligible improvement under the El Paso County Road Impact Fee Program (Please refer to the attached draft minutes of the County Fee Program Advisory Committe dated April 23, 2020 regarding this intersection.)
Auxiliary Turn Lanes				
Extend the existing northbound right-turn deceleration lane on Powers Boulevard approaching Bradley Road	As specified in the terms and conditions of a CDOT Access Permit if not completed sooner by another development. This can be addressed with plat applications.	800' plus 25:1 transition taper	Extend existing lane approximately 200'	To be evaluated with each final plat if not completed sooner by another development
Eastbound dual left-turn lane on Bradley Road approaching Legacy Hill Drive (the dual left would be striped as a single left-turn lane until the intersection is signalized AND dual left-turn operation is operationally necessary)	westbound left-turn volume of 25 vehicles per hour	435' plus 200' taper	250' plus 200' taper	Applicant
Westbound right-turn deceleration lane on Bradley Road approaching proposed right-in/right-out only access	eastbound right-turn volume of 50 vehicles per hour.	235' plus 200' taper	235' plus 200' taper	Applicant
Westbound right-turn deceleration lane on Bradley Road approaching Legacy Hills Drive	eastbound right-turn volume of 50 vehicles per hour.	235' plus 200' taper	235' plus 200' taper	Applicant
Reconstruct the Powers Boulevard median north of Bradley Road to provide dual southbound left-turn lanes	With this development if not completed by other development(s) or CDOT. The timing of this improvement could be evaluated with each final plat.	- - -	- - -	Likely the applicant if not completed by other development(s) or CDOT.
Reconstruct the Bradley Road to provide dual eastbound left-turn lanes approaching Marksheffel Road	The timing of this improvement could be evaluated with each final plat.	- - -	- - -	Applicant
Other Improvements (CDOT)				
Per CDOT comments dated 8/3/2020, *the northbound Powers Blvd right turn onto Bradley Rd. acceleration lane shall be reconfigured to provide necessary sight distance decisions for left turning traffic northbound onto proposed Legacy Hill Drive.* (LSC suggests this be addressed with the Preliminary Plan/Plat and/or through the access permit process - no access permit will be submitted at the Sketch Plan stage of the process).				
Per CDOT comments dated 8/3/2020, *escrow funds will be required as a term and condition of Access Permit for a portion of the future SH21A(Powers Blvd.) / Bradley Rd. interchange based on a pro-rata share determined by the traffic impact study*. (LSC suggests this be determined with the Preliminary Plan/Plat traffic study and/or through the access permit process - no access permit will be submitted at the Sketch Plan stage of the process).				

Source: LSC Transportation Consultants, Inc. (9-25-2020)

Appendix Table 1

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Appendix Table 1
Area Trafffic Impact Studies
Waterview North

Study	Consultant	Date
Bradley Heights Trip Generation Letter	LSC Transportation Consultants,	September 11, 2014
Springs at Waterview East Preliminary Plan Traffic Impact and Access Analysis	LSC Transportation Consultants,	August 24, 2018
Trails as Aspen Ridge Filing No. 1 and PUD Updated Traffic Impact and Access	LSC Transportation Consultants,	December 12, 2019
Redemption Hill Church Traffic Impact Study	LSC Transportation Consultants,	April 13, 2020
Peak Innovation Park	Kimley Horn and Associates, Inc.	April 2020
Source: LSC Transportation Consultants, Inc. ***(May 2020)***		

NCHRP Report 684 Internal Trip Capture Estimation Tool

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Waterview North	**Organization:**	LSC Transportation Consultants, Inc.
Project Location:	Powers/Bradley	**Performed By:**	KDF
Scenario Description:	Buildout	**Date:**	4/22/2020
Analysis Year:	2040	**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				0		
Retail				239	148	91
Restaurant				0		
Cinema/Entertainment				0		
Residential				511	124	387
Hotel				0		
All Other Land Uses[2]				130	105	25
				880	377	503

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		0	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	880	377	503
Internal Capture Percentage	1%	2%	1%
External Vehicle-Trips[5]	868	371	497
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	N/A	N/A
Retail	3%	2%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

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

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

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

[4]Enter 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.

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

[6]Person-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:	Waterview North	**Organization:**	LSC Transportation Consultants, Inc.
Project Location:	Powers/Bradley	**Performed By:**	KDF
Scenario Description:	Buildout	**Date:**	4/22/2020
Analysis Year:	2040	**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				0		
Retail				823	395	428
Restaurant				0		
Cinema/Entertainment				0		
Residential				659	415	244
Hotel				0		
All Other Land Uses[2]				130	27	103
				1,612	837	775

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		1000			5280	
Retail					5280	
Restaurant						
Cinema/Entertainment						
Residential		5280				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	11	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,612	837	775
Internal Capture Percentage	2%	2%	2%
External Vehicle-Trips[5]	1,582	822	760
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	N/A	N/A
Retail	1%	3%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	3%	2%
Hotel	N/A	N/A

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

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

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

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

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

[6]Person-Trips

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

Figures 1-12

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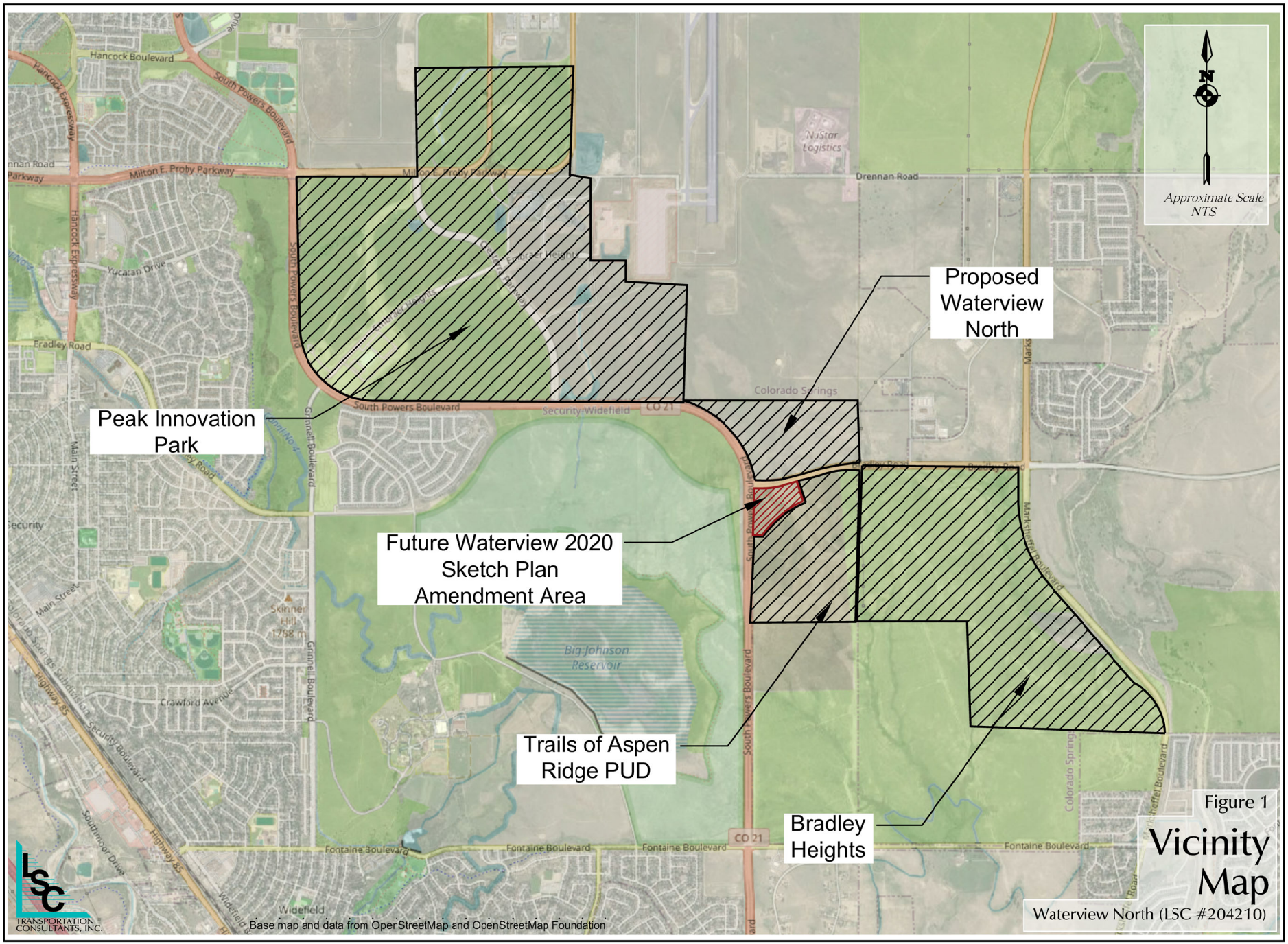

Figure 1

Vicinity Map

Waterview North (LSC #204210)

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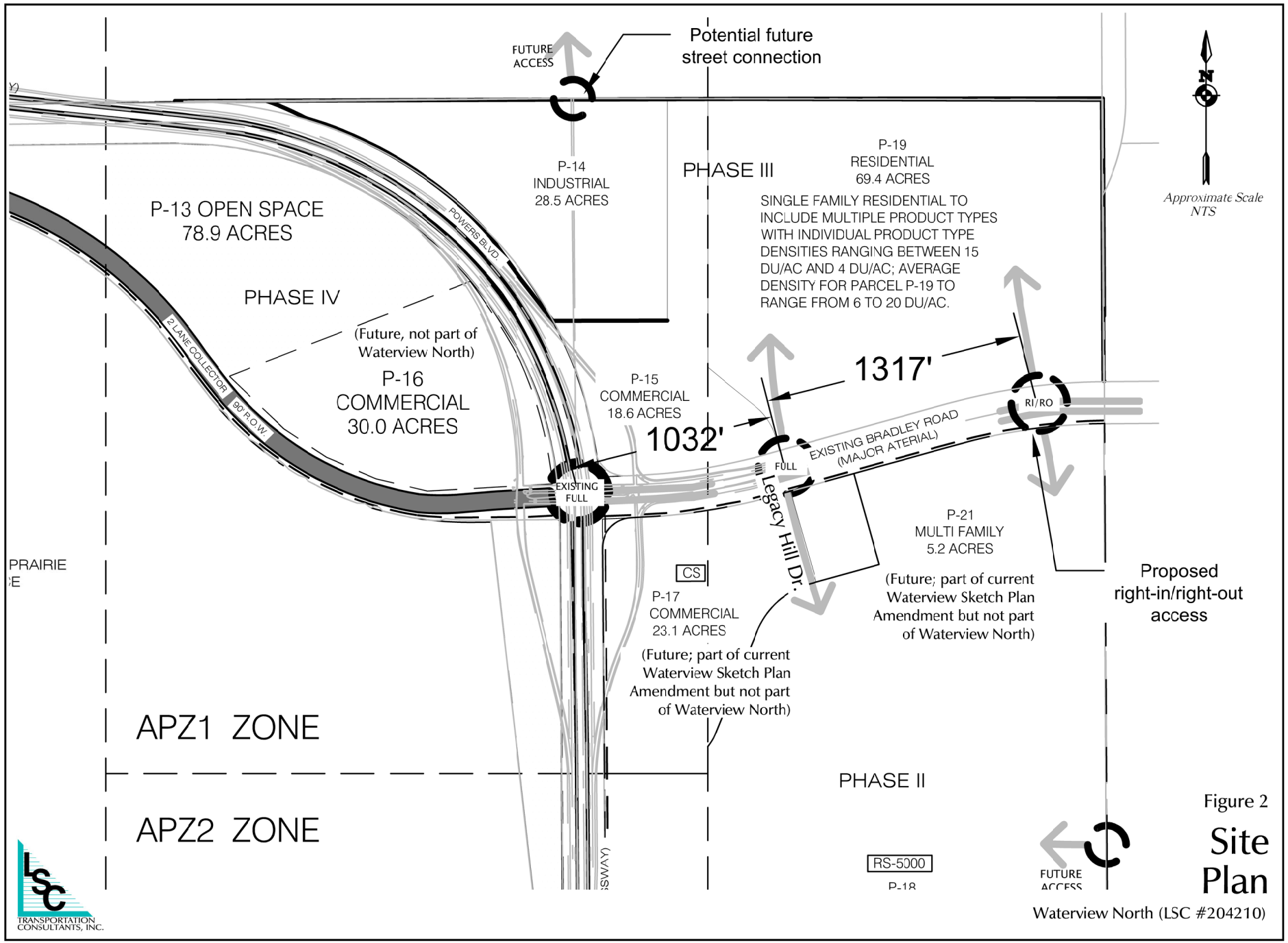
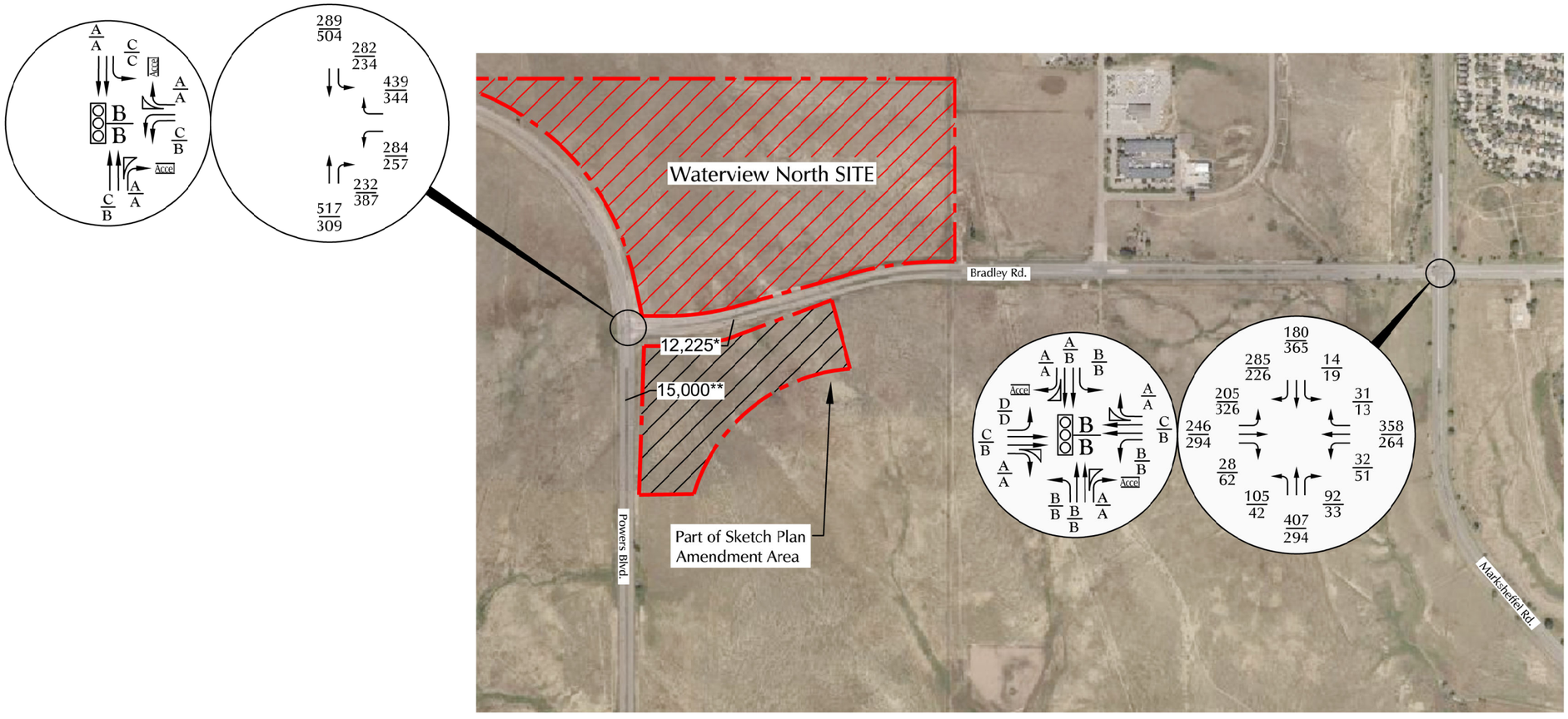


Figure 2

Site Plan

Waterview North (LSC #204210)

LSC TRANSPORTATION CONSULTANTS, INC.



Approximate Scale
Scale: 1"= 1,000'

LEGEND:

= Traffic Signal

XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour) Counts by LSC April and October 2018

A/B = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service

C/C = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service

X,XXX= Average Daily Traffic (vehicles per day)

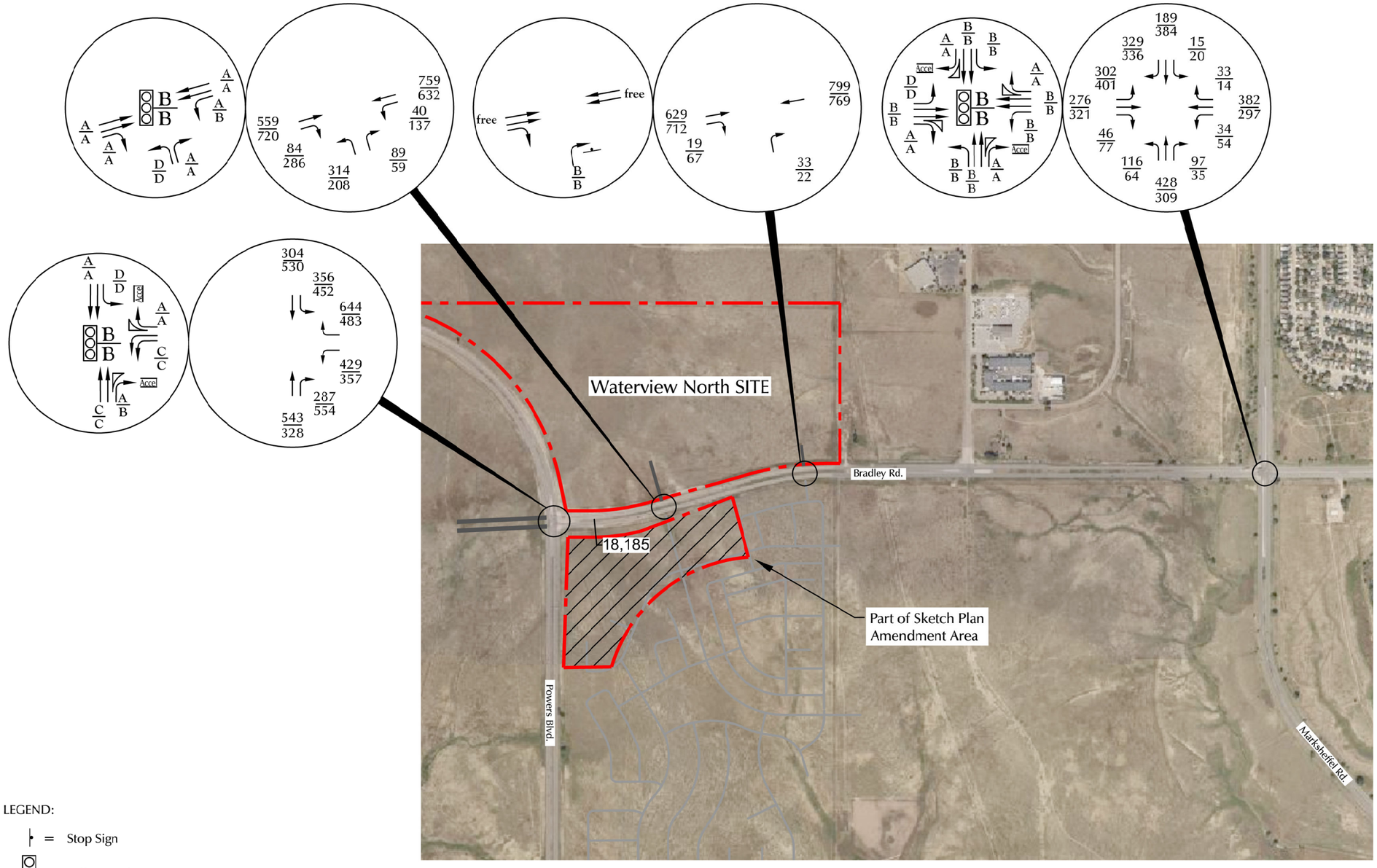
* Estimate by LSC
** 2018 AADT CDOT

TRANSPORTATION CONSULTANTS, INC.

Figure 3

Existing 2018 Traffic, Lane Geometry, Traffic Control and Level of Service

Waterview North (LSC #204210)



LEGEND:

= Stop Sign

= Traffic Signal

= Modern Roundabout

$\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)

$\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service

$\frac{C}{C}$ = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service

X,XXX= Average Daily Traffic (vehicles per day)

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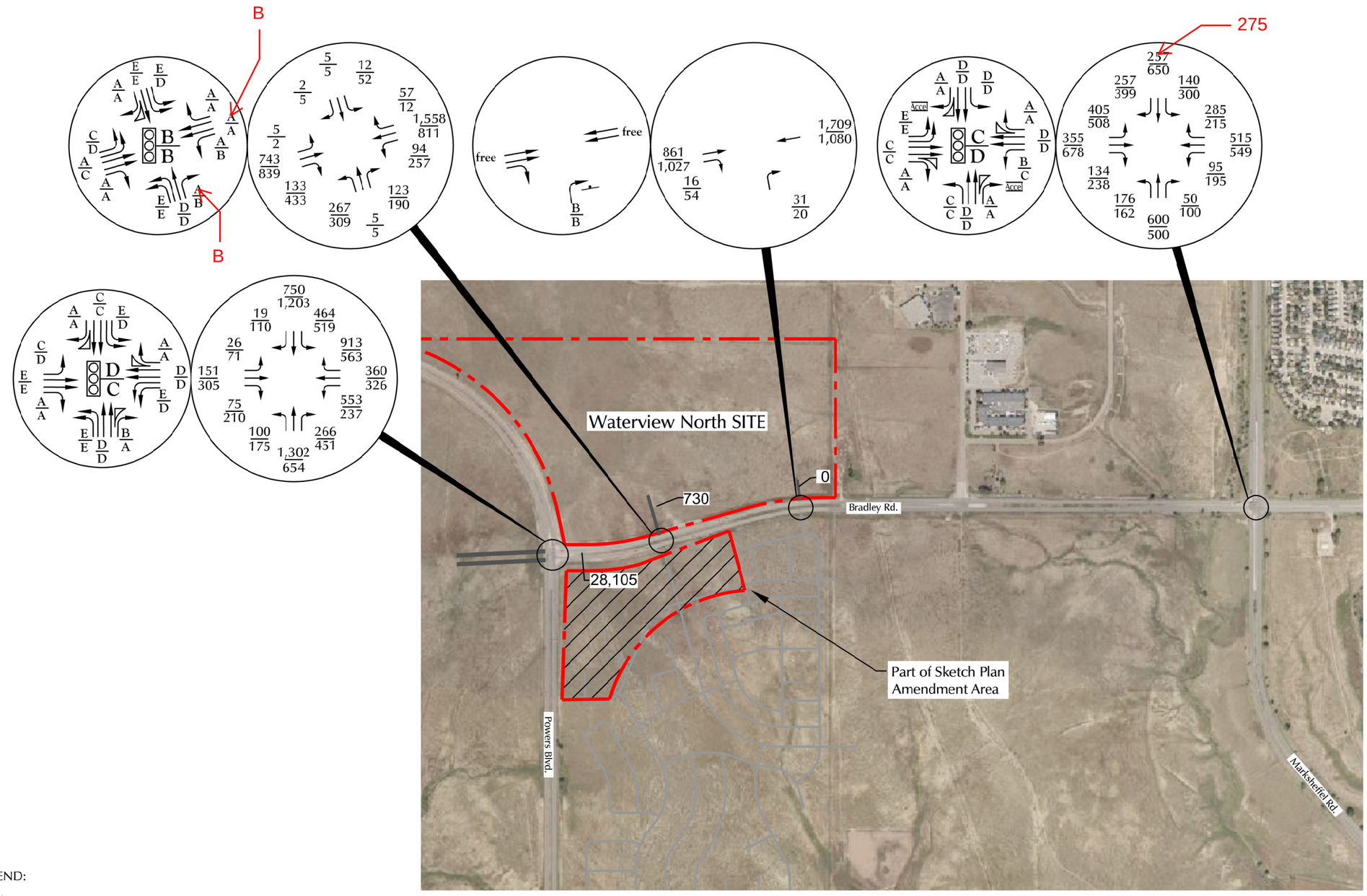
Figure 4

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

Waterview North (LSC #204210)



LEGEND:

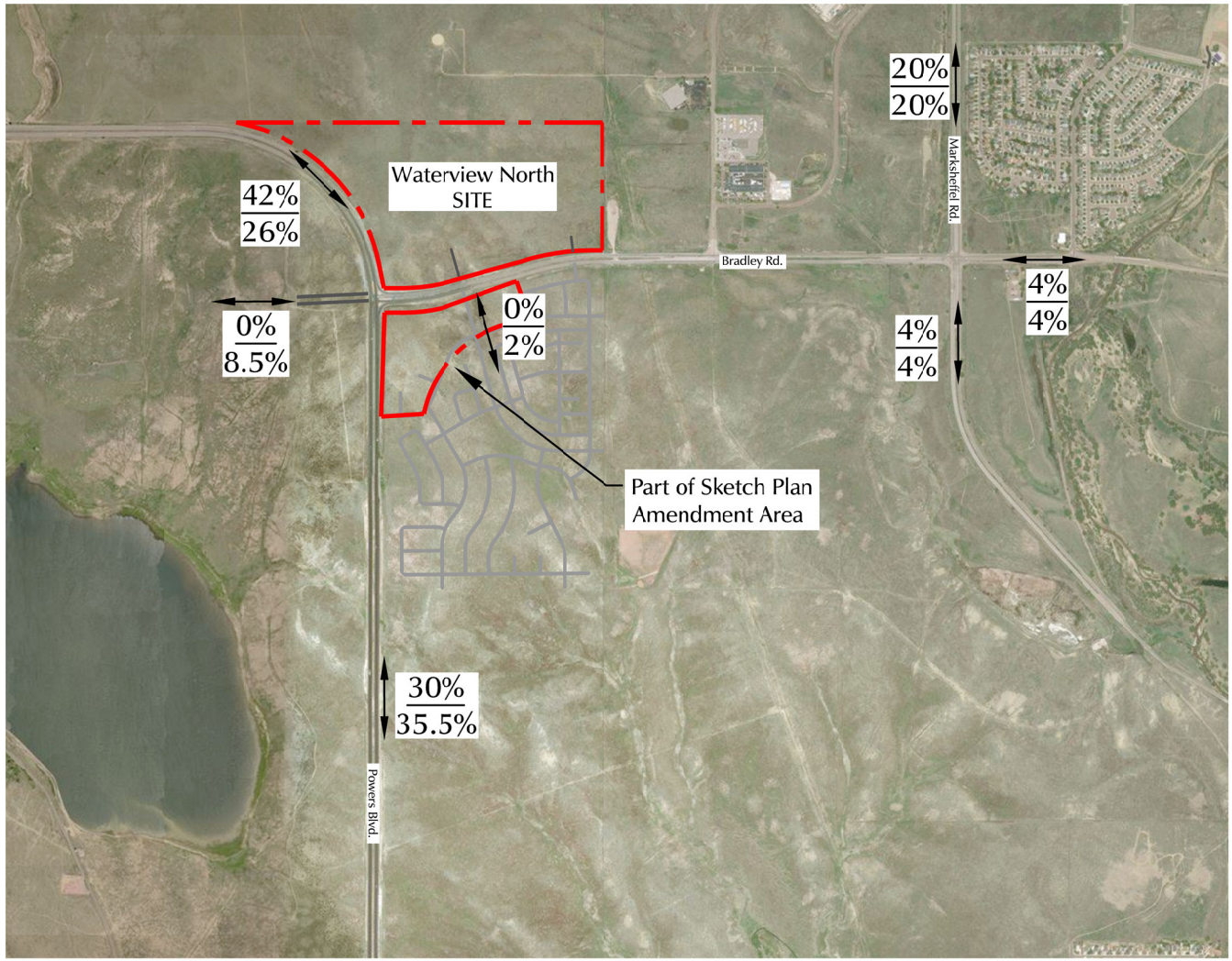
- = Stop Sign
- = Traffic Signal
- XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)
- A/B = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service
- C/C = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service
- X,XXX= Average Daily Traffic (vehicles per day)

TRANSPORTATION CONSULTANTS, INC.

Figure 5

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

Waterview North (LSC #204210)



N

Approximate Scale
Scale: 1"= 2,000'

Figure 6

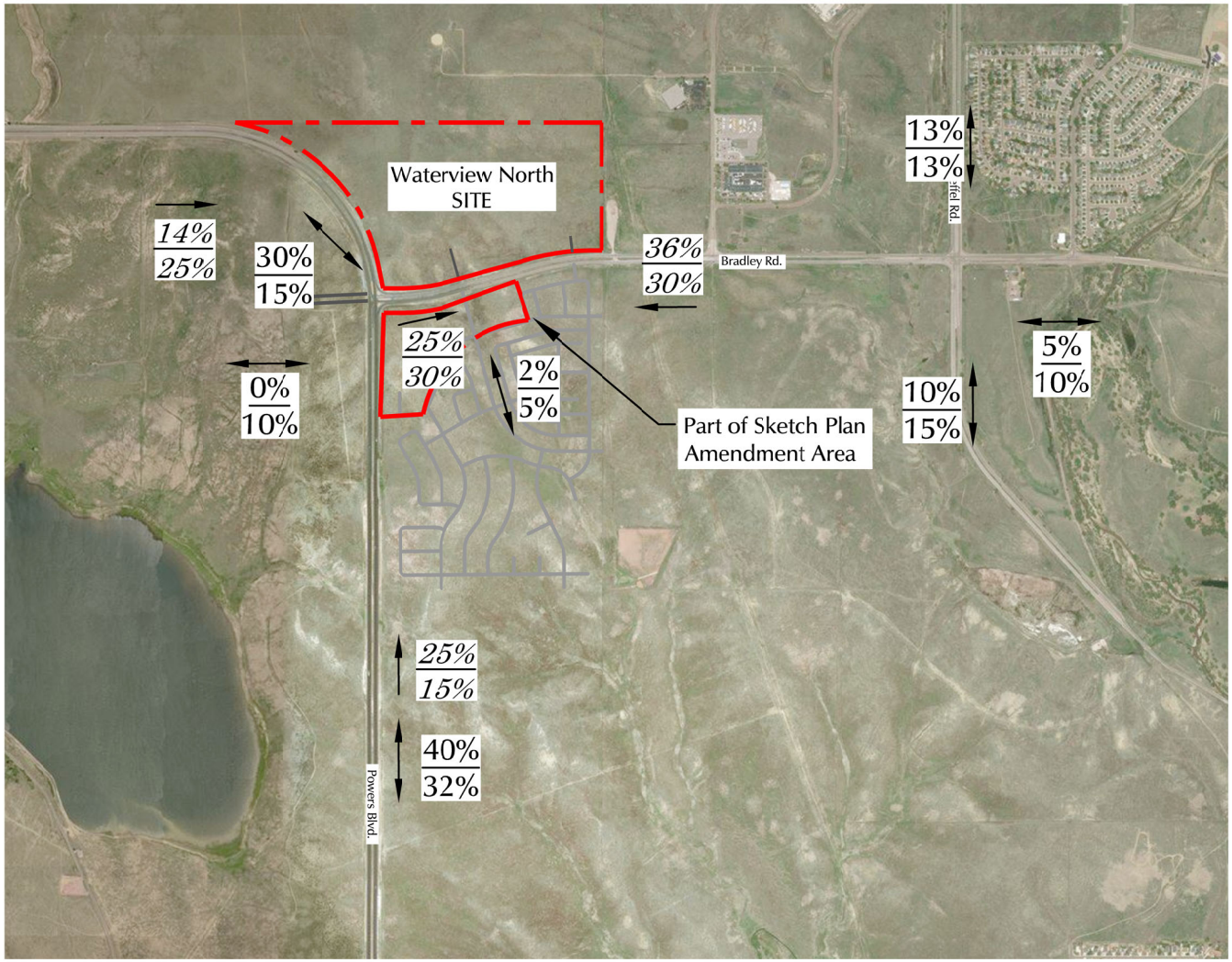
Directional Distribution of Residential Site Generated Traffic

Waterview North (LSC #204210)

LSC TRANSPORTATION CONSULTANTS, INC.

LEGEND:

XX% / XX% = Short-Term Percent Directional Distribution / Long-Term Percent Directional Distribution



N

Approximate Scale
Scale: 1"= 2,000'

LEGEND:

$\frac{\leftrightarrow}{\text{XX\%}}$ / $\frac{\leftrightarrow}{\text{XX\%}}$ = Short-Term Percent Directional Distribution / Long-Term Percent Directional Distribution

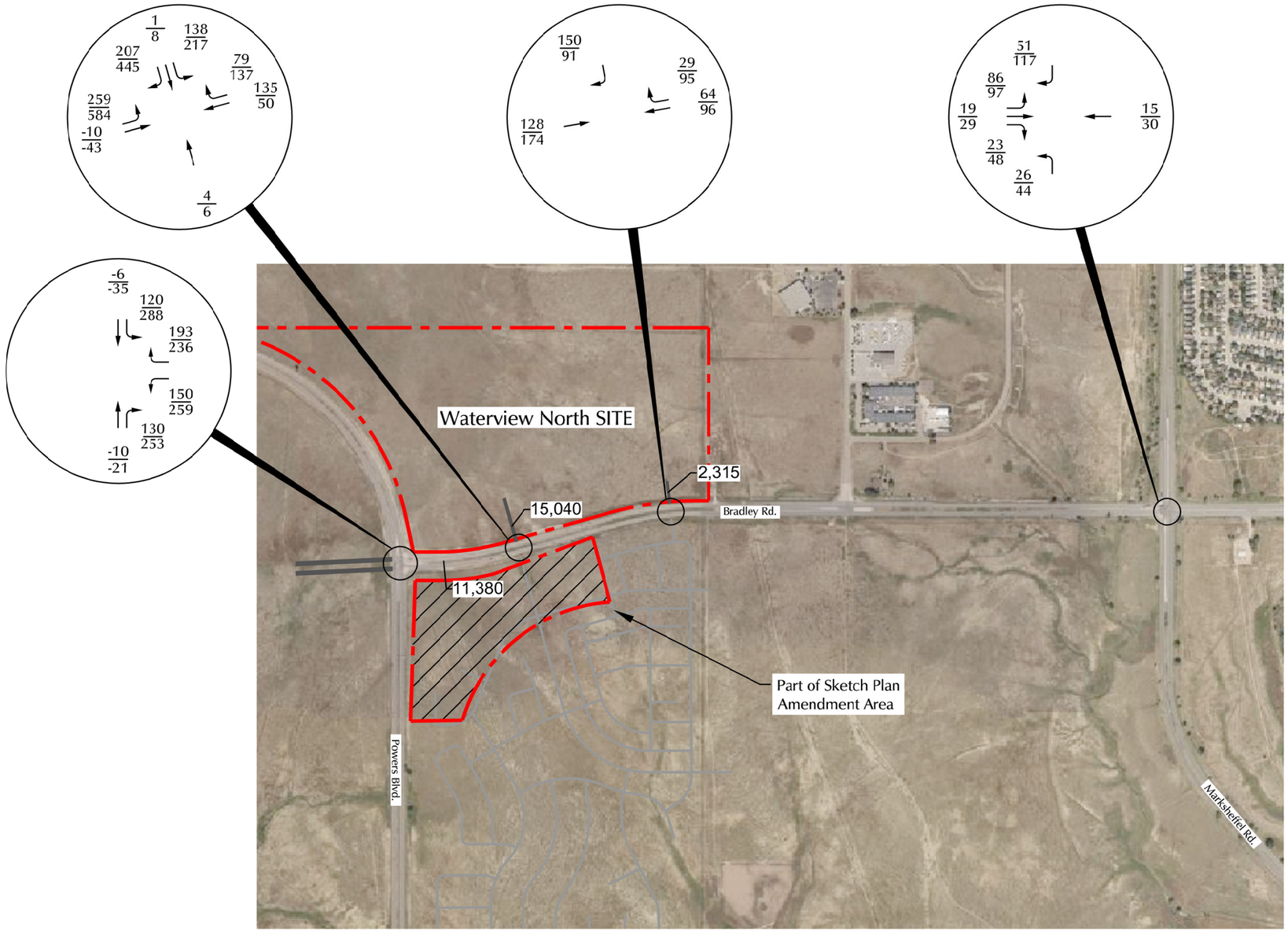
$\frac{\rightarrow}{\textit{XX\%}}$ / $\frac{\rightarrow}{\textit{XX\%}}$ = Passby Percent Directional Distribution AM / Passby Percent Directional Distribution PM

LSC TRANSPORTATION CONSULTANTS, INC.

Figure 7

Directional Distribution of Non-Residential Site Generated Traffic

Waterview North (LSC #204210)



N

Approximate Scale
Scale: 1" = 1,000

LEGEND:

XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)

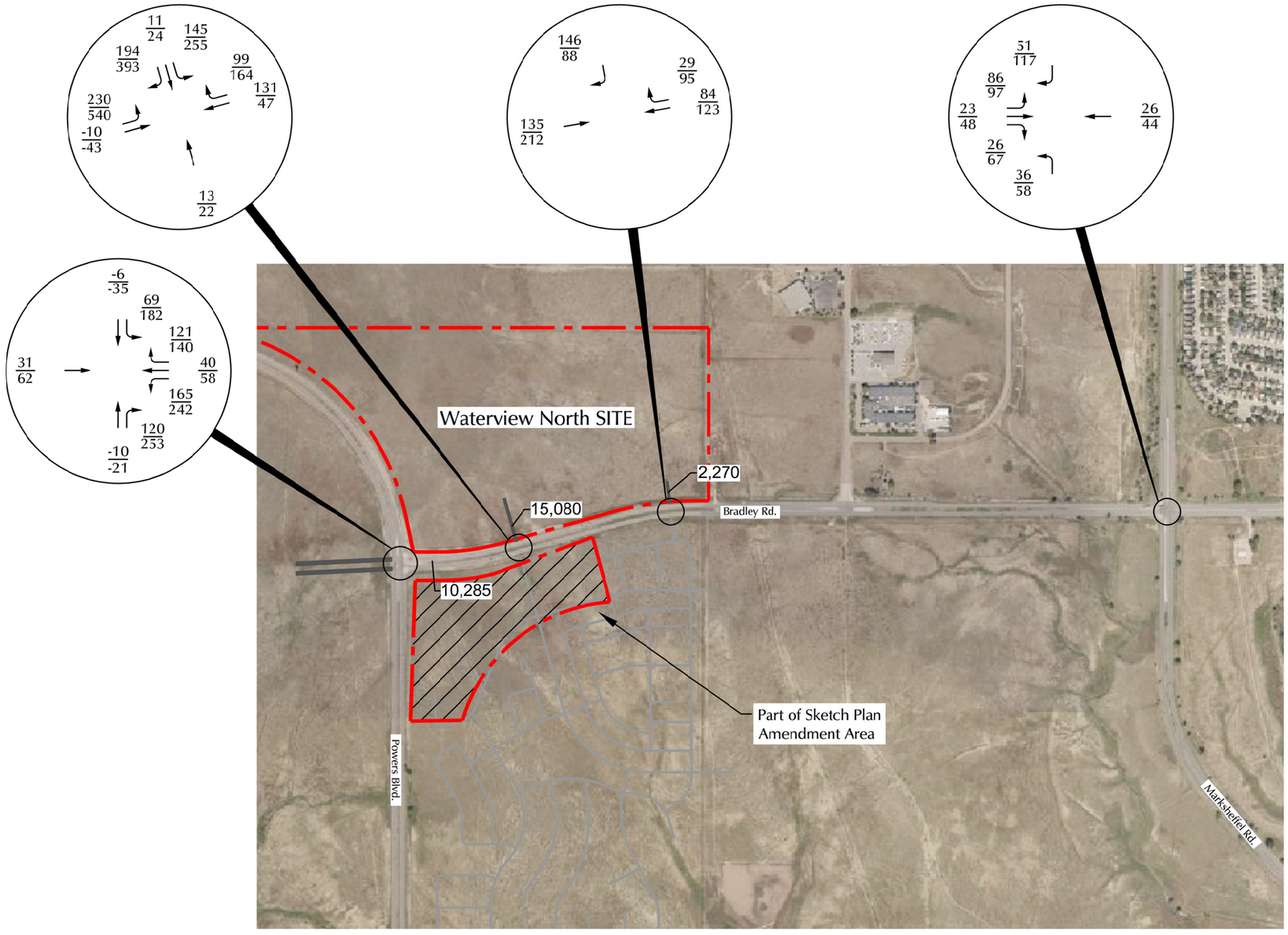
X,XXX= Average Daily Traffic (vehicles per day)

TRANSPORTATION CONSULTANTS, INC.

Figure 8

Short-Term Assignment of Site-Generated Traffic

Waterview North (LSC #204210)



Approximate Scale
Scale: 1" = 1,000

LEGEND:

XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)

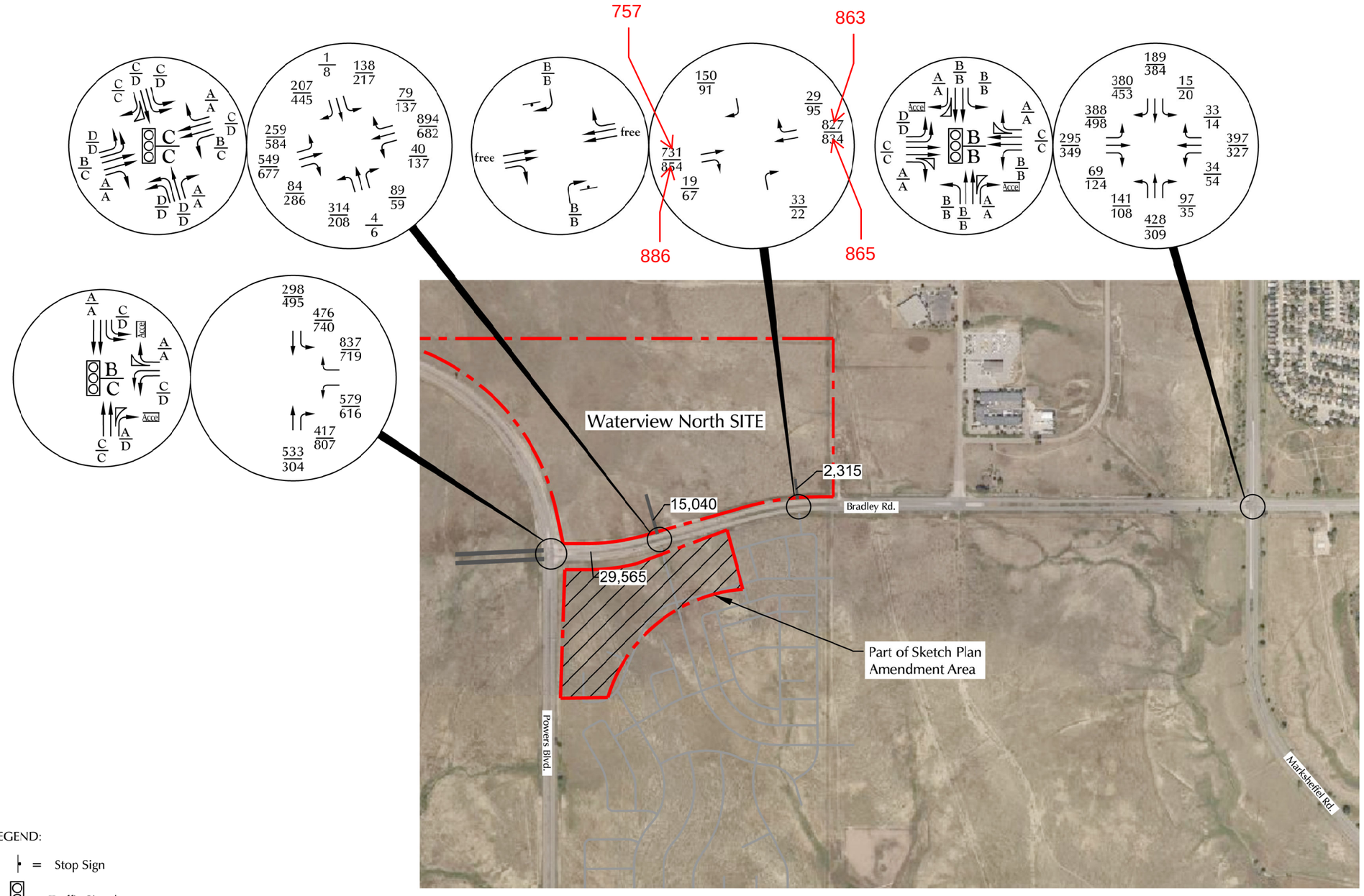
X,XXX= Average Daily Traffic (vehicles per day)

TRANSPORTATION CONSULTANTS, INC.

Figure 9

Long-Term Assignment of Site-Generated Traffic

Waterview North (LSC #204210)



LEGEND:

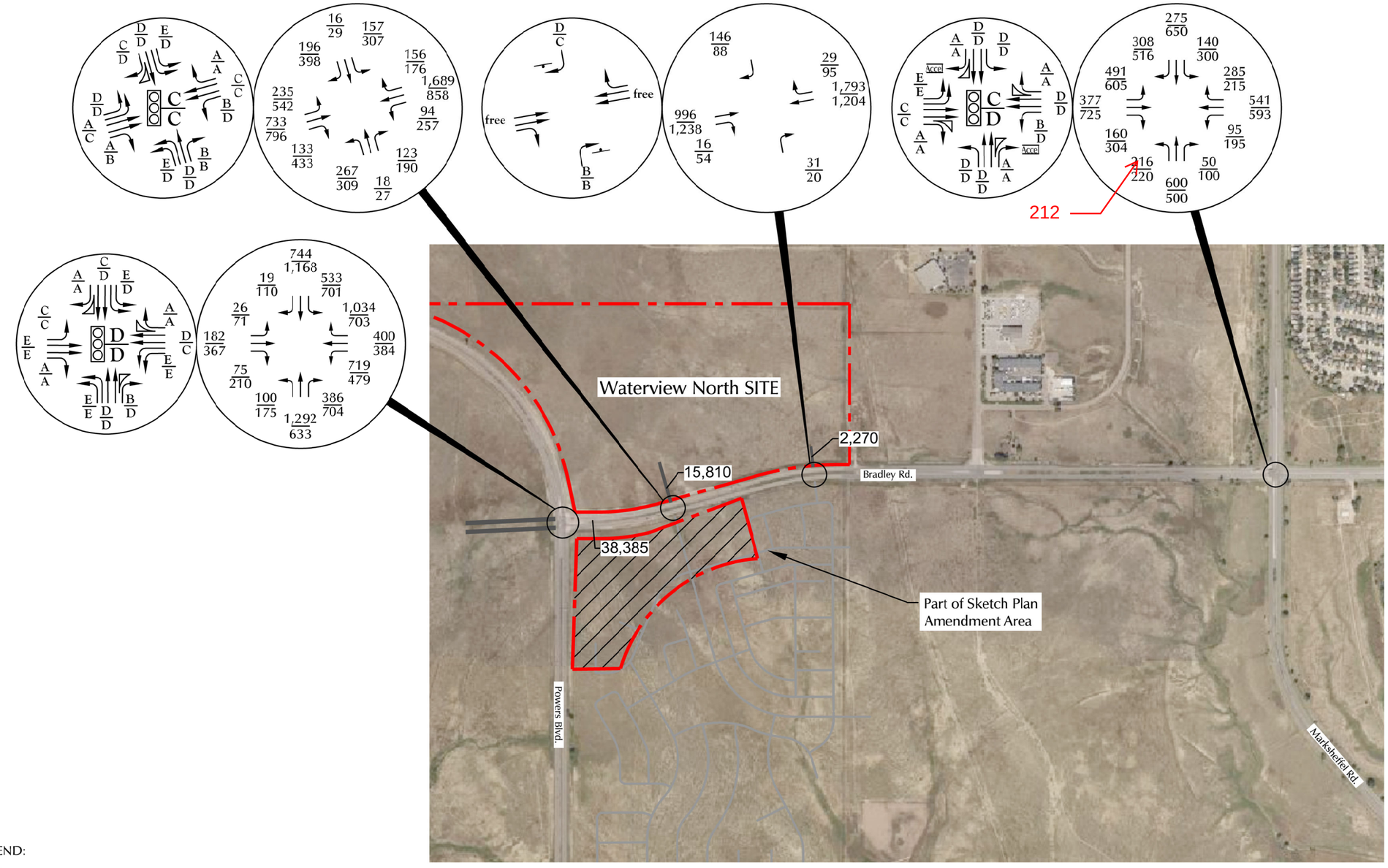
- = Stop Sign
- = Traffic Signal
- = Modern Roundabout
- XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)
- A/B = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service
- C/C = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service
- X,XXX= Average Daily Traffic (vehicles per day)

LSC TRANSPORTATION CONSULTANTS, INC.

Figure 10

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

Trails at Aspen Ridge PUD (LSC #184362)



Approximate Scale
Scale: 1" = 1,000

LEGEND:

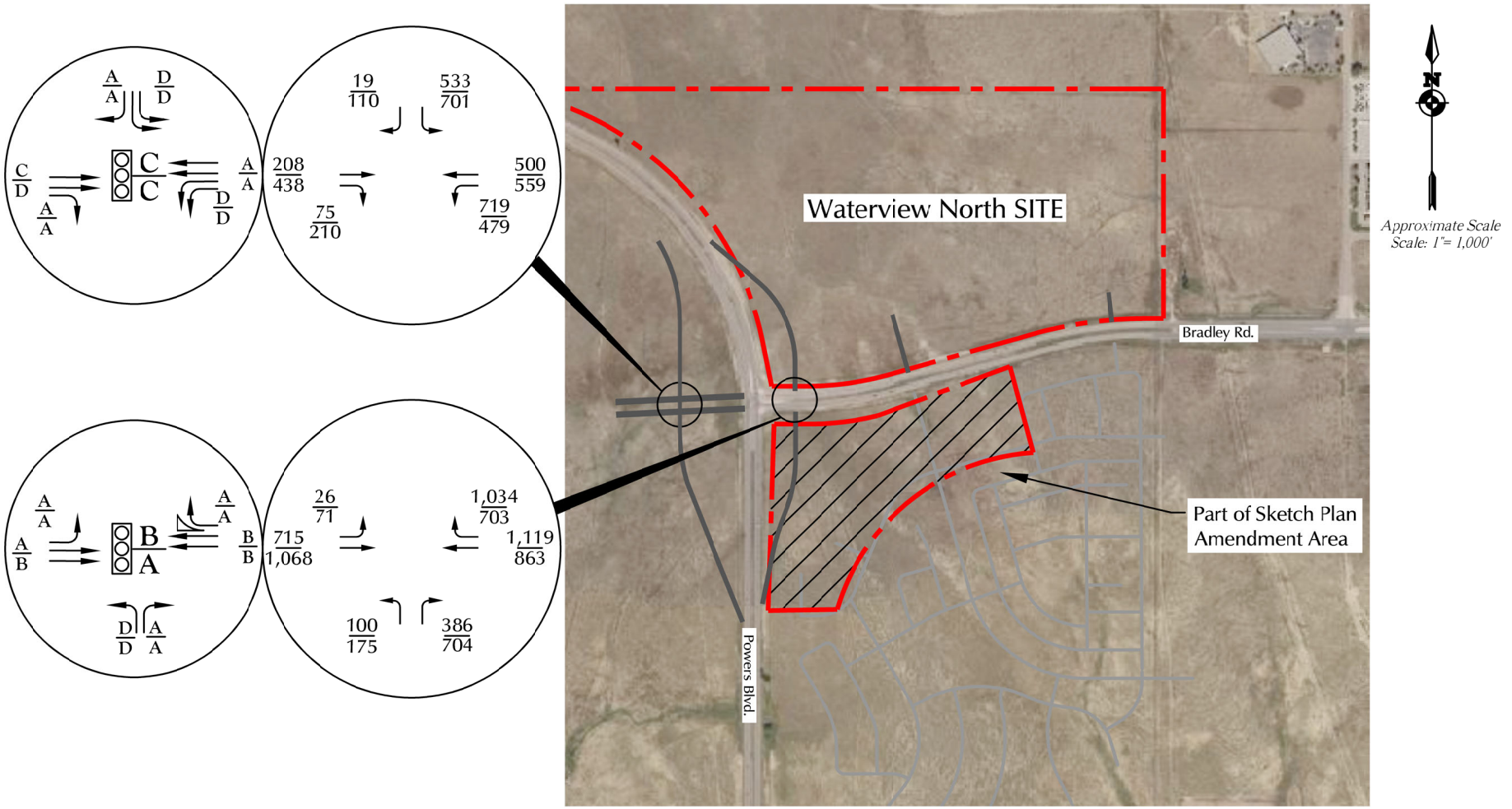
- = Stop Sign
- = Traffic Signal
- XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)
- A/B = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service
- C/C = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service
- X,XXX= Average Daily Traffic (vehicles per day)

TRANSPORTATION CONSULTANTS, INC.

Figure 11

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

Waterview North (LSC #204210)



LEGEND:

= Traffic Signal

XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)

A/B = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service

C/C = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service

LSC TRANSPORTATION CONSULTANTS, INC.

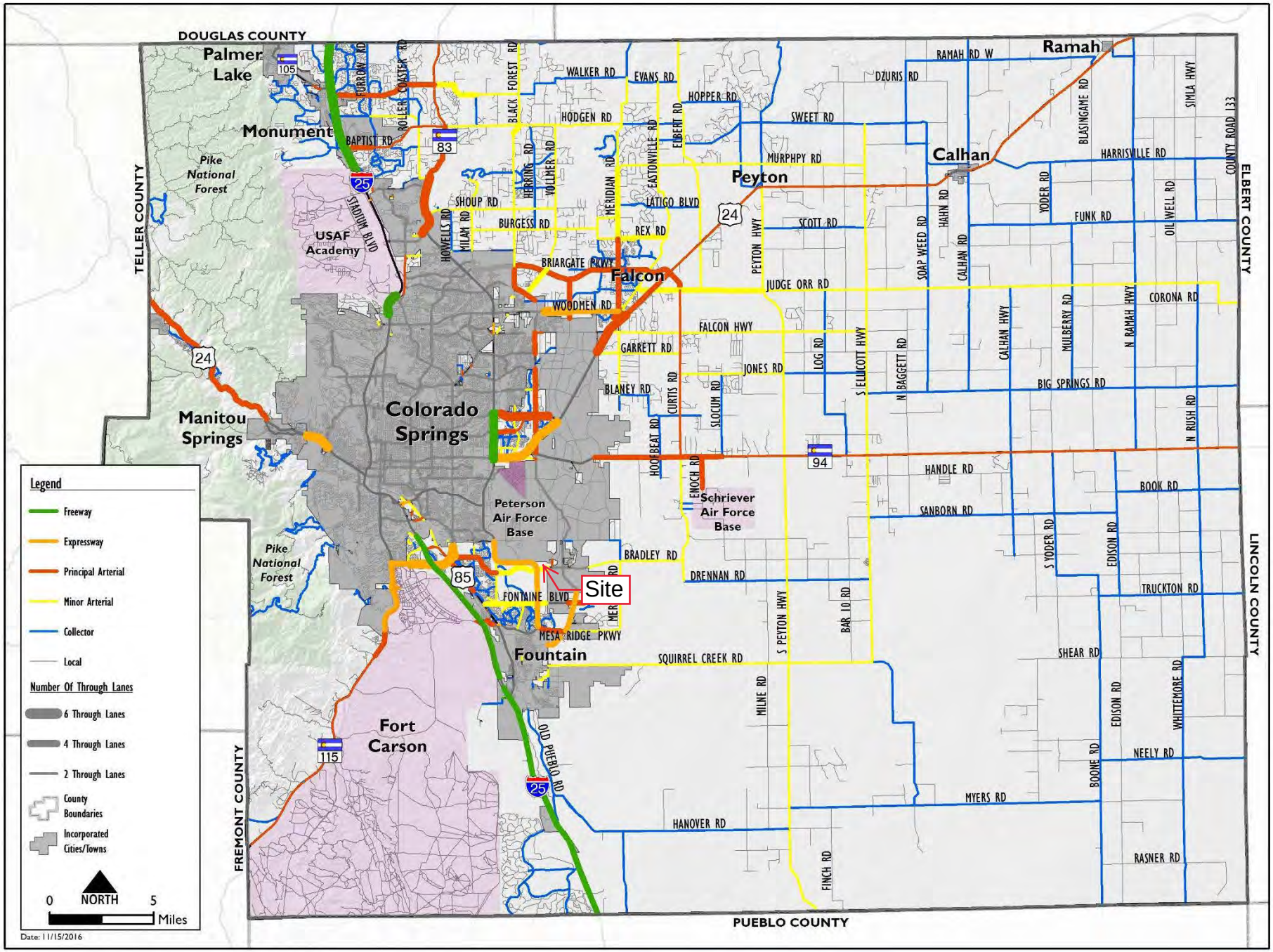
Figure 12

Year 2040 Total Traffic, Lane Geometry, Traffic Control, and Level of Service with an Interchange

Waterview North (LSC #204210)

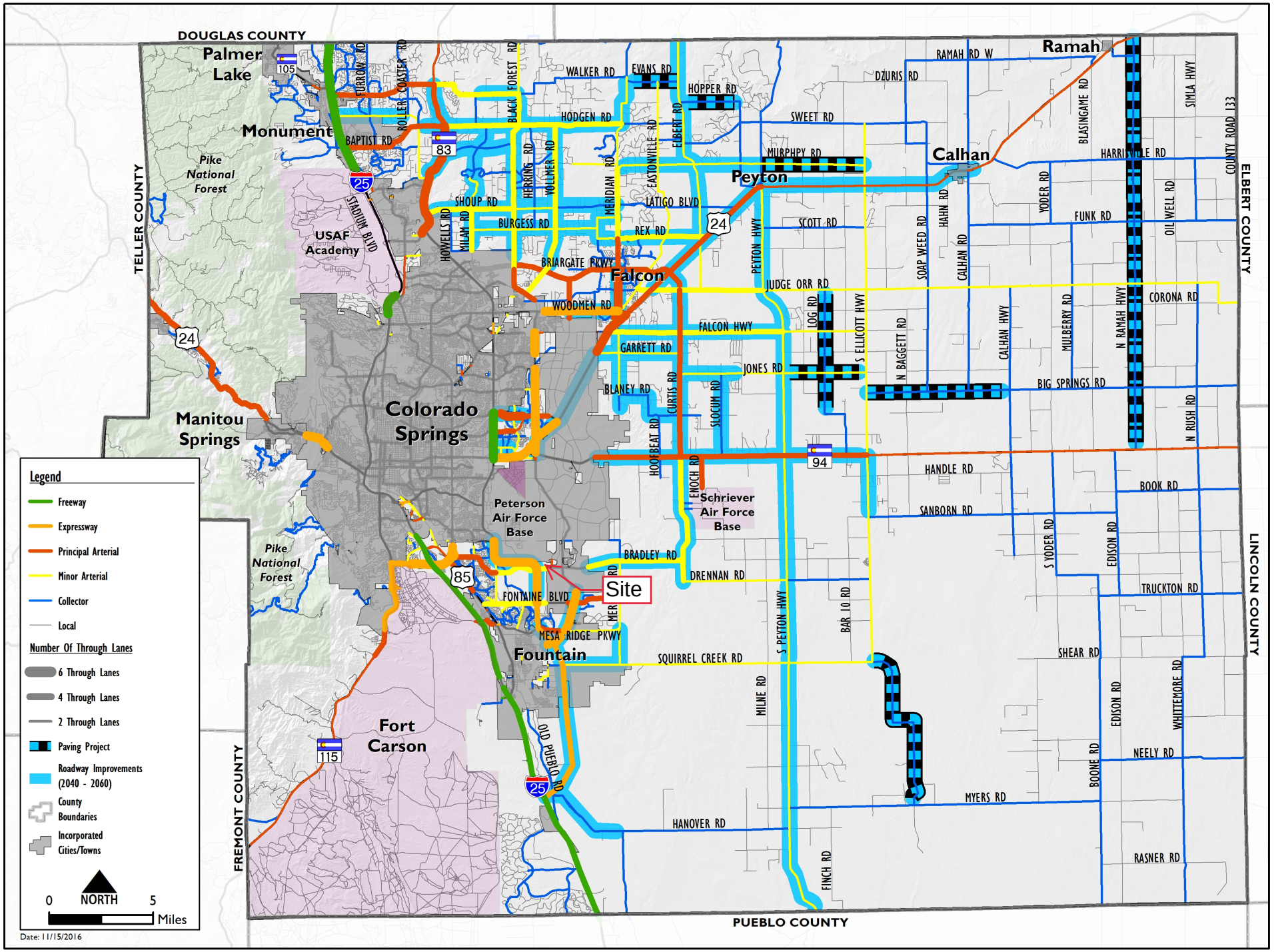
MTCP Maps

TRANSPORTATION
CONSULTANTS, INC.



Map 14: 2040 Roadway Plan (Classification and Lanes)

Map 17: 2060 Corridor Preservation



Approved Deviation Requests

TRANSPORTATION
CONSULTANTS, INC.

Development Services Department
2880 International Circle
Colorado Springs, Colorado 80910

Phone: 719.520.6300
Fax: 719.520.6695
Website www.elpasoco.com

DEVIATION REVIEW AND DECISION FORM

Procedure # R-FM-051-07
Issue Date: 12/31/07
Revision Issued: 00/00/00
DSD FILE NO.:

General Property Information:
Address of Subject Property (Street Number/Name): N/A
Tax Schedule ID(s) #: 5500000135
Legal Description of Property: W2 SEC 9-15-65, EX PT TO RDS

Subdivision or Project Name: Waterview Sketch Plan

Section of ECM from Which Deviation is Sought: 2.2.5.B.1

Specific Criteria from Which a Deviation is Sought: Intersection spacing along a Principal Arterial
Proposed Nature and Extent of Deviation: Request for a full-movement, future public street signalized intersection with Bradley Road approximately 1,030 feet east of Powers Boulevard to serve the proposed residential and non-residential Sketch Plan land uses north and south of Bradley Road and east of Powers.

Applicant Information:
Applicant: CPR Entitlements, LLC Email Address: dse.pak7@gmail.com
Applicant is: _____ Owner __X___ Consultant _____ Contractor
Mailing Address: 31 North Tejon Street, Suite 500, Colorado Springs State: CO Postal Code: 80903
Telephone Number: 719-227-7388 Fax Number: 719-227-7392

Engineer Information:
Engineer: Jeffrey C. Hodsdon, P.E., PTOE Email Address: jchodsdon@lsccs.com
Company Name: LSC Transportation Consultants, Inc.
Mailing Address: 516 North Tejon Street State: CO Postal Code: 80903
Registration Number: 31684 State of Registration: Colorado
Telephone Number: (719) 633-2868 Fax Number: (719) 633-5430

Explanation of Request (Attached diagrams, figures and other documentation to clarify request):
Section of ECM from Which Deviation is Sought: 2.2.5.B.1
Specific Criteria from Which a Deviation is Sought: Access spacing along a Principal Arterial

Proposed Nature and Extent of Deviation: Request for a full-movement, future public street signalized intersection with Bradley Road approximately 1,030 feet east of Powers Boulevard to serve the proposed residential and non-residential Sketch Plan land uses north and south of Bradley Road and east of Powers.

Reason for the Requested Deviation: The deviation is requested to provide a future public street intersection and the major access for the proposed Sketch Plan land uses located north and south of Bradley Road and east of Powers Boulevard. The deviation is needed regardless of the exact location of the access because the access would be either less than 1/2-mile from the Powers/Bradley intersection or less than 1/2-mile from the Foreign Trade Zone intersection. The deviation is requested as the property only has public roadway frontage to Bradley Road and Powers Boulevard and no access will be allowed to Powers. Bradley is the only roadway to which these parcels could have direct access.

EPC file no. SKP 16-002

Also, a full-movement access to Bradley Road was shown on the older approved Sketch Plan.

Comparison of Proposed Deviation to ECM Standard: The requested access would be approximately 2,870 feet west of Foreign Trade Zone Boulevard (exceeds 1/2-mile spacing) and approximately 1,030 feet east of Powers Boulevard, whereas 2,640 feet is the ECM standard.

Applicable Regional or National Standards used as Basis: _____

Application Consideration:

CHECK IF APPLICATION MEETS CRITERIA FOR CONSIDERATION	**JUSTIFICATION**
☐ The ECM standard is inapplicable to a particular situation.	_____
▣ Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship on the applicant, and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.	The parcels northeast and northwest of Powers Boulevard have no access without the proposed access. A future minor connection is planned between Waterview and Bradley Heights to the east; however, this has been planned for connectivity between developments and would not be sufficient access. Also, given the master-planned uses and size of the land area to be served by the access to Bradley, a right-in/right-out access would not suffice. A full-movement access is necessary. A full-movement access between Powers and Foreign Trade Zone Boulevard has been shown on the Waterview Sketch Plan for a number of years. The currently proposed location would be superior to that location previously shown 2,000 feet east of Powers.
☐ A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.	_____

If at least one of the criteria listed above is not met, this application for deviation cannot be considered.

Criteria for Approval:

PLEASE EXPLAIN HOW EACH OF THE FOLLOWING CRITERIA HAVE BEEN SATISFIED BY THIS REQUEST

The request for a deviation is not based exclusively on financial considerations.	The request is not based on financial considerations. The request is based on the need to provide a future public street intersection on Bradley Road to serve the parcels northeast and northwest of Powers Boulevard that would have no access without access to Bradley Road. See the above justification paragraph under "Application Consideration" for additional detail.
The deviation will achieve the intended result with a comparable or superior design and quality of improvement.	The intersection spacing would be sufficient to achieve auxiliary left-turn lanes on Bradley Road. The spacing to Powers (west) and Foreign Trade Zone Boulevard (east) will be sufficient to allow this intersection to be signalized. Given the location of land uses to be served in relation to the Powers/Bradley intersection the proposed intersection location would be optimal. Also, the proposed intersection location would be near the north/south dividing line between the proposed commercial and residential development (established as a result of the airport APZ line). This would result in a north/south public street which would serve both the commercial and residential development well. It would provide a buffer between the commercial and residential areas and it would much better serve the

commercial site and make it more viable by moving the full-movement, future signalized intersection to the adjacent northeast corner of the commercial area. The proposed location would be far superior from this perspective. The previous plan showed the first full-movement east of Powers located nearly a quarter-mile to the east of the commercial development area. This, arguably, would not work for commercial development. Commercial/retail development would be most viable when located adjacent to the intersection of Powers and Bradley with a pre-established full-movement, future signalized intersection on Bradley Road at the proposed location. The intersection should be shown at the best location outside the CDOT A-line now.

The deviation will not adversely affect safety or operations.

The intersection would operate at a satisfactory level of service based on short-term and long-term traffic volume projections. The intersection spacing would be sufficient to achieve auxiliary turn lanes and these lanes would accommodate the projected vehicle queues. Good Bradley Road corridor traffic signal progression could be achieved with a future traffic signal at this intersection. The intersection at the proposed location would also provide the option for coordinating the signal at this intersection with the future signal at the Powers/Bradley intersection. Please refer to the attached LSC Traffic Technical Memorandum for additional technical detail and analysis results. The memorandum also addresses the turning movements from Powers onto eastbound Bradley with the relatively short distances to the entry points to the eastbound auxiliary turn lanes at the proposed Waterview intersection.

The deviation will not adversely affect maintenance and its associated cost.

N/A

The deviation will not adversely affect aesthetic appearance.

N/A

Owner, Applicant and Engineer Declaration:

To the best of my knowledge, the information on this application and all additional or supplemental documentation is true, factual and complete. I am fully aware that any misrepresentation of any information on this application may be grounds for denial. I have familiarized myself with the rules, regulations and procedures with respect to preparing and filing this application. I also understand that an incorrect submittal will be cause to have the project removed from the agenda of the Planning Commission, Board of County Commissioners and/or Board of Adjustment or delay review, and that any approval of this application is based on the representations made in the application and may be revoked on any breach of representation or condition(s) of approval.

Signature of owner (or authorized representative) — Date

Signature of applicant (if different from owner) MANAGER — Date 10/15/17
CPR ENTITLEMENTS, LLC

Signature of Engineer — Date 10/19/17

Engineer's Seal

COLORADO LICENSED
JEFFREY C. HODSDON
31684
10-19-17
PROFESSIONAL ENGINEER

Review and Recommendation:
APPROVED by the ECM Administrator

Approved
by Elizabeth Nijkamp
El Paso County Planning and Community Development
on behalf of Jennifer Irvine, County Engineer, ECM Administrator
03/28/2018 4:03:43 PM

_____ Date_____

This request has been determined to have met the criteria for approval. A deviation from Section 2.2.5.B.1 of ECM is hereby granted based on the justification provided. Comments:

_____
_____
_____
_____

____ Additional comments or information are attached.

DENIED by the ECM Administrator

_____ Date_____

This request has been determined not to have met criteria for approval. A deviation from Section _____of ECM is hereby denied. Comments:

_____
_____
_____
_____

____ Additional comments or information are attached.

Approved Deviation Request

Right-in/Right-Out Deviation

TRANSPORTATION
CONSULTANTS, INC.

Development Services Department
2880 International Circle
Colorado Springs, Colorado 80910

Phone: 719.520.6300
Fax: 719.520.6695
Website www.elpasoco.com

DEVIATION REVIEW AND DECISION FORM

Procedure # R-FM-051-07
Issue Date: 12/31/07
Revision Issued: 00/00/00
DSD FILE NO.:

General Property Information:
Address of Subject Property (Street Number/Name): N/A
Tax Schedule ID(s) #: 5500000135
Legal Description of Property: W2 SEC 9-15-65, EX PT TO RDS

Subdivision or Project Name: Waterview Sketch Plan

Section of ECM from Which Deviation is Sought: 2.2.5.B.1

Specific Criteria from Which a Deviation is Sought: Intersection spacing along a Principal Arterial

Proposed Nature and Extent of Deviation: Request for right-in/right-out access point to both the westbound and eastbound directions of Bradley Road approximately 2,340 feet east of Powers Boulevard to serve the proposed residential (south side of Bradley) and non-residential (north side of Bradley) Sketch Plan land uses east of Powers.

Applicant Information:
Applicant: CPR Entitlements, LLC Email Address: dse.pak7@gmail.com
Applicant is: _____ Owner __X___ Consultant _____ Contractor
Mailing Address: 31 North Tejon St., Suite 500, Colorado Springs State: CO Postal Code: 80903
Telephone Number: 719-227-7388 Fax Number: 719-227-7392

Engineer Information:
Engineer: Jeffrey C. Hodsdon, P.E., PTOE Email Address: jchodsdon@lsccs.com
Company Name: LSC Transportation Consultants, Inc.
Mailing Address: 516 North Tejon Street State: CO Postal Code: 80903
Registration Number: 31684 State of Registration: Colorado
Telephone Number: (719) 633-2868 Fax Number: (719) 633-5430

Explanation of Request (Attached diagrams, figures and other documentation to clarify request):
Section of ECM from Which Deviation is Sought: 2.2.5.B.1
Specific Criteria from Which a Deviation is Sought: Access spacing along a Principal Arterial

Proposed Nature and Extent of Deviation: Request for right-in/right-out access point to both the westbound and eastbound directions of Bradley Road approximately 2,340 feet east of Powers Boulevard to serve the proposed residential (south side of Bradley) and non-residential (north side of Bradley) Sketch Plan land uses east of Powers.

Reason for the Requested Deviation: The deviation is requested to provide second points of access to the proposed sketch plan land uses located north and south of Bradley Road and east of Powers Boulevard. The primary access would be at the currently proposed full-movement access approximately 1,030 feet east of Powers (please refer to separate deviation request). The deviation is requested as the property only has public roadway frontage to Bradley Road and Powers Boulevard and no access will be allowed to Powers. Bradley is the only roadway to which these parcels could have direct access. The right-in/right-out access point would provide a second point of access for these development areas and would improve circulation for these areas. Given the limited access opportunities to these

EPC file no. SKP 16-002

sketch plan areas, the right-in/right-out access point would distribute the site-generated right-turn movements to/from Bradley Road at two locations instead of one. This will reduce the turning movements at the proposed full-movement access to the west.

Comparison of Proposed Deviation to ECM Standard: The requested accesses would be approximately 1,560 feet west of Foreign Trade Zone Boulevard, 2,340 feet east of Powers Boulevard, and about 1,315 feet east of the proposed full-movement intersection location. The south side right-in/right out would be1,135 feet west of a future right-in/right-out access to the Bradley Heights development (City of Colorado Springs).

Applicable Regional or National Standards used as Basis: _____

Application Consideration:

CHECK IF APPLICATION MEETS CRITERIA FOR CONSIDERATION	**JUSTIFICATION**
☐ The ECM standard is inapplicable to a particular situation.	_____
▣ Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship on the applicant, and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.	The parcels northeast and northwest of Powers Boulevard/ Bradley Road have no access without either the proposed full-movement access (separate deviation form) or this proposed access. This proposed access is requested for purposes of providing a second access. A future minor connection is planned between Waterview and Bradley Heights to the east but currently, however, this has been planned for connectivity between developments and is not intended to provide other than a minor connection. Given the master-planned uses, the size of the land area to be served, and essentially access to Bradley Road only, a second point of access (right-in/right-out) to Bradley is needed.
☐ A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.	_____

If at least one of the criteria listed above is not met, this application for deviation cannot be considered.

Criteria for Approval:

PLEASE EXPLAIN HOW EACH OF THE FOLLOWING CRITERIA HAVE BEEN SATISFIED BY THIS REQUEST	
The request for a deviation is not based exclusively on financial considerations.	The request is not based on financial considerations. The request is based on the need to provide a second access to serve the parcels northeast and northwest of Powers Boulevard that would have no access without access to Bradley Road. The first/primary access would be the proposed full-movement to Bradley Road (separate deviation). See the above justification paragraph under "Application Consideration" for additional detail.
The deviation will achieve the intended result with a comparable or superior design and quality of improvement.	The intersection spacing would be sufficient to achieve auxiliary right-turn lanes on Bradley Road. The deviation is requested as the property only has public roadway frontage to Bradley Road and Powers Boulevard and no access will be allowed to Powers. Bradley is the only roadway to which these parcels could have direct access. The right-in/right-out access points would provide a second point of

	access for these development areas and would improve circulation for these areas. Given the limited access opportunities to these parcels, these right-in/right-out access points would distribute the site-generated right-turn movements to/from Bradley Road at two locations instead of one. This will reduce the turning movements at the proposed full-movement access to the west and potentially at the Foreign Trade Zone/Bradley intersection to the east if a future connection is created between Waterview and Foreign Trade Zone Blvd (right-of-way is not currently available, but a connection could potentially be established with the development of the private property to the east of Waterview).
The deviation will not adversely affect safety or operations.	The intersection would operate at a satisfactory level of service based on short-term and long-term traffic volume projections. The intersection spacing would be sufficient to achieve auxiliary right-turn lanes. The center median on Bradley Road would physically prevent left-turn movements. Future traffic signals at the Bradley/ Foreign Trade Zone intersection and at the proposed Waterview full-movement intersection to the west would generate gaps in through traffic on Bradley Road which would be utilized by exiting right-turn movements to turn onto Bradley Road. Please refer to the attached LSC Traffic Technical Memorandum for additional technical detail and analysis results.
The deviation will not adversely affect maintenance and its associated cost.	N/A
The deviation will not adversely affect aesthetic appearance.	N/A

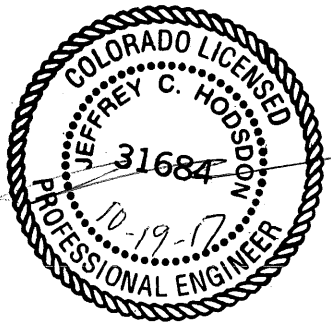
Owner, Applicant and Engineer Declaration:
To the best of my knowledge, the information on this application and all additional or supplemental documentation is true, factual and complete. I am fully aware that any misrepresentation of any information on this application may be grounds for denial. I have familiarized myself with the rules, regulations and procedures with respect to preparing and filing this application. I also understand that an incorrect submittal will be cause to have the project removed from the agenda of the Planning Commission, Board of County Commissioners and/or Board of Adjustment or delay review, and that any approval of this application is based on the representations made in the application and may be revoked on any breach of representation or condition(s) of approval.

Signature of owner (or authorized representative) — Date

Signature of applicant (if different from owner) MANAGER — Date 10/15/17
CDR ENTITLEMENTS, LLC

Signature of Engineer — Date 10/19/17

Engineer's Seal



Review and Recommendation:
APPROVED by the ECM Administrator

Approved
by Elizabeth Nijkamp
El Paso County Planning and Community Development
on behalf of Jennifer Irvine, County Engineer, ECM Administrator
03/28/2018 4:04:26 PM

_____ Date_____

This request has been determined to have met the criteria for approval. A deviation from Section 2.2.5.B.1 of ECM is hereby granted based on the justification provided. Comments:

The approved RIRO may be closed after a second access has been established to the subdivision.

____ Additional comments or information are attached.

DENIED by the ECM Administrator

_____ Date_____

This request has been determined not to have met criteria for approval. A deviation from Section _____of ECM is hereby denied. Comments:

____ Additional comments or information are attached.

Road Impact Fee Advisory Committee Meeting Minutes

ROAD IMPACT FEE ADVISORY COMMITTEE
MEETING MINUTES

Date: **April 23, 2019 (1:30 PM – 3:30 PM)**

Where: Remote meeting

Members Present: Jeff Mark, Jennifer Irvine, Craig Dossey, Ryan Watson, Randy Case, Steve Hicks, Joan Lucia-Treese, Jerry Novak, Nikki Simmons

Others Present: Victoria Chavez, Lori Seago, Jason Alwine, Tim Buschar, Jeff Hodsdon, Matt Dunston, Duncan Bremer, Brian Long

1. Call to order

Mr. Case called the meeting to order at 1:39 PM.

2. Introductions

3. Fee Advisory Committee Approved the Agenda

The Fee Committee unanimously approved the agenda with the date corrected for the meeting notes.

4. Approval of minutes, January 30 Meeting – Vote

Mr. Dossey moved, and Ms. Irvine seconded the motion to approve the January meeting minutes as amended. The vote was unanimous.

5. Eligible Improvements Requests – Discussion/Vote

It was determined that the Furrow Road extension was already included in the fee program as potentially eligible. There may or may not be potentially eligible improvements at the intersection of Furrow and Higby. There may be potentially eligible improvements on Walker Road. However, it is likely that the roundabout as the access to the school is not is not eligible. As listed improvements, there is no role for the committee at this time. The applicants and staff should work together to develop a preliminary credit agreement. After construction and acceptance of the improvements by EPC, the applicant can apply for credits per the process outlined in the Implementation Document.

6. Signal Request for Bradley Road and Legacy Hill Drive – Discussion/Vote

Mr. Alwine described the Trails at Aspen Ridge Filing 2. As part of the filing is built, it is likely that a signal will be needed on Bradley Road and Legacy Hill Drive. There are many acres of vacant land both north and south of Bradley Roads that may develop. Mr. Alwine presented the percent of traffic from nearby developments that will contribute to the need for the signal at this location. Mr. Dossey moved that the signal meets the criteria in the Implementation Document and recommends that the signal be included as an eligible improvement. Ms. Lucia-Treese seconded the motion and it passed unanimously.

7. Public comments on items not on the agenda

There were no public comments.

8. Items for Future Agendas

The committee would like to discuss a format for presentation of improvement requests to the committee, reimbursement requests, bringing credit agreements to the committee as an information item and reevaluating the unit cost prices.

9. Adjourn

Mr. Case closed the meeting.

Peak Hour Factor Methdology

TRANSPORTATION
CONSULTANTS, INC.

LSC Peak Hour Factor Calculation Methodology

Step 1: Determine the peak 15 min for the entire intersection and the overall PHF

The **peak hour factor (PHF)** is the hourly volume during the maximum-volume hour of the day divided by the peak 15-minute flow rate within the peak hour; a measure of traffic demand fluctuations within the peak hour.

The peak hour factor is used in HCM capacity and level of service analysis to account for the variation in traffic volumes during the peak hour. Following is an example of how the peak hour factor is computed and how it might affect the final results of a capacity calculation.

The table below shows flow rates that were measured for four 15-minute time periods for each of the 12 intersection movements. Examination of this table shows that second time period, which begins at 4:15 pm, is the peak 15-minute period of the four that are shown here. The total flow for this time period is 4,220 veh/15 minutes, or 16,880 veh/hr. The average flow rate for the hour is 12,640 veh/hr; this is the sum of the total volumes observed during each of the four 15-minute periods shown below. The peak hour factor can then be computed as follows:

PHF = (average flow rate)/(4*Peak 15 minute flow rate)

=12,640/16,880

=0.75

Time period	Eastbound			Westbound			Northbound			Southbound			Total
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
4:00 pm	40	55	175	50	50	75	120	815	45	40	700	55	2,220
4:15 pm	50	75	375	55	80	125	215	1,025	20	60	1,975	165	4,220
4:30 pm	30	75	125	45	75	115	20	975	35	55	1,200	145	2,895
4:45 pm	45	60	175	55	85	150	145	1,015	45	50	1,350	130	3,305

You can see that the possible values of PHF can range between 0.25 and 1.00, inclusive. Higher numbers indicate a flatter peak. It is rare that PHF drops much below a value of about 0.70. In this case, the PHF of 0.75 is indicative of a very sharp peak for an urban environment, and is probably more characteristics of small towns and cities than larger urban areas.

http://hcmguide.com/Case1/popup_terms/phf_popup.htm

Step 2 - Calculate the Peak Hour Factors based on the common 15 minute peak interval per the following ITE Journal Article (Next Page)

Traffic Volume Adjustments for Impact Analysis

by James A. Bonneson

The traffic impact of new development has traditionally been measured with respect to the deleterious effect that additional, site-related traffic has on the adjacent street system. In particular, this measurement is in terms of a reduction in intersection traffic service and the general quality of traffic flow. Once quantified, this impact can then be mitigated via some type of improvement or transportation system management (TSM) action designed to maintain an acceptable level of traffic service. Most commonly an improvement would involve the design and construction of new roadways, intersections, and site driveways. On the other hand, a TSM action program typically includes measures that effectively lessen traffic demand during peak periods.

The common element in both impact measurement and mitigation, as well as in the design of improvements, is the magnitude of the combined background and site-related traffic volumes. Obviously, any error in quantifying these volumes would compromise the accuracy of the impact analysis and could result in either needless or improperly designed improvements.

Currently no uniform guidelines dictate the correct method for properly determining the appropriate traffic volumes to use in the impact analysis. Each jurisdiction has its own impact study guidelines regarding the derivation of existing volume levels. Obviously, the implementation of a uniform approach would improve the consistency among traffic analyses and strengthen the reviewing agency's confidence in the study results.

Recognizing the need for suitable guidelines in the derivation of representative traffic demands, this article describes a procedure for quantifying background traffic volumes. In particular, this procedure describes a rational method of accounting for the hourly, daily, and seasonal variability of existing traffic volumes. This approach is founded on the establishment of a reasonable level of confidence in the analysis volumes by minimizing the possibility of their underestimation. Obviously, any underestimation of existing traffic could understate the degree of site impact and could potentially lead to underdesigned or inadequate geometric improvements.

Existing Traffic Counts

In evaluating the traffic impact of new development, it is customary to take volume surveys at one or more intersections in the site vicinity. As a minimum, these counts are taken at 15-minute intervals during each of the two hours bracketing the peak periods of the day (typically 7:00 a.m. to 9:00 p.m. and 4:00 p.m. to 6:00 p.m.). In most instances, these counts are taken manually because both vehicle classification and turning movements are needed to accurately describe the character of the traffic flow.

The next step in traffic impact analysis is to estimate the peak hour volume of an average day of year by applying appropriate day-of-week and month-of-year adjustment factors. These factors are generally available via the continuous traffic count data compiled and published by most state transportation departments. Generally, adjustment factors associated with the nearest continuous count station having traffic characteristics similar to the study location are used.

Current Practice and Implications

Recommended practice in the United States is to design roadways and intersections to accommodate the 30th highest hourly volume.[1] This could also be translated into the probability that 99.6% [= 1 − 31/8760] of the hours in a year will have volumes less than the 30th highest volume (i.e., a 99.6% level of confidence). In contrast, common procedure for traffic impact studies is to measure the operational efficiency of a roadway or intersection with respect to its ability to serve peak period traffic demand on an average day.

Based on a study of 30 continuous-count stations in Nebraska and Kansas (Table 1), it is estimated that the peak hour volume of the average day represents approximately the 330th highest hour per year (i.e., a 96.2% level of confidence). This implies that there are 330 hours each year that have traffic volumes greater than the peak hour of the average day. Although this may seem like a relatively small number, it becomes more significant when it is realized that these hours would most likely occur during the a.m. and p.m. peak hours. In other words, any analysis based on the peak hour volume of the average day could, in fact, underestimate the actual vehicular demand during the peak hour of as many as 329 days of the year.

Obviously, some discrepancy exists between the traffic confidence level of the typical impact study (96.2%) and that of a highway design project (99.6%). This discrepancy is significant because quite often the mitigation of site impacts involves the recommendation of specific roadway improvements—improvements that are most likely designed with respect to a 330th highest hour as opposed to the recommended 30th highest hour.

This relationship between design hour volume and system adequacy is best expressed by the following excerpt from the *1965 Highway Capacity Manual:*

> . . . the adequacy of a highway cannot be judged by its ability to carry the average volume, but rather must be evaluated in terms of its ability to function properly under specified peak loads.
>
> Many times the only information may be a group of scattered counts . . . made at intervals throughout the year on the highway under consideration or on similar highways. In such cases, a method for adjusting the available counts to determine the hourly capacity necessary becomes a matter of paramount importance. A clear understanding of the variations in traffic load that may be expected is essential in this determination. Without this knowledge the application of traffic count data to planning, design, and operation cannot be completely successful.[2]

Table 1. Variations in Hourly Traffic volumes

Station	Classification	AADT	30th Highest Hour (%AADT)	Daily Peak Hour (%AADT)	Peak Hour	
					Volume	No. Hours Exceeded
16	Minor arterial	16797	10.38	8.40	1411	246
23	Principal arterial	11410	10.15	8.02	915	298
24	Interstate	81005	10.00	8.09	6553	257
25	Principal arterial	42596	9.90	8.21	3497	216
26	Principal arterial	23607	11.15	8.48	2002	341
28	Principal arterial	32870	9.50	7.60	2498	300
29	Principal arterial	15108	9.90	8.03	1213	255
32	Interstate	7816	11.08	8.61	673	301
36	Interstate	12157	10.15	8.18	994	260
40	Interstate	40732	10.69	8.60	3503	247
42	Minor arterial	3860	9.92	8.04	310	257
44	Collector	1345	10.78	7.74	104	498
46	Interstate	22000	11.57	8.46	1861	412
100	Interstate	38451	10.35	8.49	3264	223
120	Principal arterial	28101	9.64	7.79	2189	273
121	Minor arterial	12976	11.01	8.53	1107	309
123	Minor arterial	4730	15.64	10.49	496	473
551	Freeway	32164	9.40	7.85	2525	217
553	Minor arterial	13363	10.48	8.52	1139	234
555	Collector	4333	13.73	10.13	439	332
558	Principal arterial	19094	10.32	8.05	1537	319
562	Principal arterial	11931	10.56	8.30	990	295
564	Minor arterial	15953	10.11	7.72	1232	377
566	Principal arterial	16793	11.64	8.74	1468	352
568	Minor arterial	18968	9.72	7.99	1516	236
570	Collector	14522	12.09	8.04	1168	631
571	Principal arterial	16906	11.30	8.47	1432	367
572	Principal arterial	16576	9.06	6.75	1119	528
574	Principal arterial	15818	12.91	8.95	1416	482
576	Interstate	22191	11.81	8.96	1988	325
Average			10.83	8.34		329
Standard Deviation			1.38	0.70		104

SOURCE: 1. Continuous Traffic Count Data and Traffic Characteristics on Kansas Highways, Kansas Department of Transportation, 1979.
2. 1984 Continuous Traffic Count Data and Traffic Characteristics on Nebraska Streets and Highways, Nebraska Department of Roads.

Based on the previous discussion, it seems apparent that existing traffic counts should be adjusted such that analysis hour volumes represent a condition that falls nearer the 30th than 330th highest hour. The exact hour chosen should be a function of the intended use of the impact study document. If its results are only used to qualitatively measure relative site impact, then the counts should only be adjusted for the peak hour of the average day of the year. However, if the study results are used for impact mitigation (e.g., geometric design), then the counts should be adjusted to an hour nearer, if not equal, to the 30th highest hour.

Recommended Approach

Once the background traffic counts at the study site have been adjusted to an average day of the year, it is recommended that they be inflated to the peak hour of the peak day of the average week of the year. This can be accomplished by multiplying the estimated average day volume by the percent the peak weekday is of the average annual daily traffic.

As shown in Table 2, the application of this approach suggests that a peak hour traffic count adjusted in this fashion would approximate the 145th highest hour of the year as compared with the 330th hour for the peak hour of the average day. This translates into a 98.3% level of confidence that the analysis hour will not be exceeded. It would appear that this approach offers a reasonable,

conservative compromise between volumes recommended for design and those used for operational analysis.

Peak Hour Adjustment

Typically, site impact is measured using the various techniques described in the 1985 *Highway Capacity Manual* (HCM).[3] In particular, the operation/design techniques are generally used in the analysis of freeway ramps and weaving sections, while the planning analysis is generally recommended for the analysis of signalized intersections.[4] The difference between the two techniques is the amount of data required and the corresponding level of detail provided by the analysis.

With regard to signalized intersections, the adjustment for the peak 15-minute interval is recommended by the 1985 HCM for operation/design analyses; however, it can also be used in planning analyses, if desired. This option is in recognition of the general planning nature of a traffic impact study and the fact that the associated traffic volumes are usually projections of expected future traffic demand. Hence, the adjustment of peak hour volumes to peak 15-minute flow rates can imply a greater degree of refinement to the analysis process than is reasonable. Moreover, if traffic volumes have already been inflated with regard to the previous adjustments, then the use of a peak hour factor could result in unrealistically high volumes.

The use of a peak hour factor (PHF) is also optional in the analysis of unsignalized intersections. However, in contrast to the planning analysis, it is optional because of the minimal effect that short-term volume fluctuations have on the overall traffic operations. In any case, the same concerns regarding the use of a peak hour adjustment apply here.

Recommended Approach

Prior to application of any volume adjustment, its implications and the conditions it is intended to represent should be thoroughly understood. This is particularly true of the PHF adjustment. It is entirely possible that the use of a PHF, in addition to any other variational or growth adjustments, could result in volumes so high as to be completely unrealistic. Accordingly, the general approach recommended in this article is to omit the use of peak hour adjustments in the analysis of intersection efficiency regardless of the technique used (i.e., operation/design or planning). One exception would be for the analysis of existing conditions where the appropriate PHFs can be accurately quantified in accordance with the following discussion.

Alternative Approach

If it is deemed necessary to measure the traffic impact at signalized intersections in terms of peak flow rates, then traffic volumes must be inflated accordingly. This adjustment by peak hour factor is intended to give a better representation of traffic demand during the peak 15 minutes of the peak hour. This factor is calculated by dividing the hourly flow rate by 4 times the highest 15-minute volume observed on the individual intersection approach. However, considering the nature of the capacity analysis (i.e., sum of critical movements), it is recommended that the PHF be based not on the individual peak 15-minute intervals but, rather, on the peak 15-minute intervals occurring simultaneously on all intersection approaches (i.e., their common peak interval).

In most instances, the peak 15-minute interval for any one intersection approach also occurs during the common, peak 15-minute interval. Thus, the PHF is identical among both the traditional and the recommended methods. However, it is conceivable that one or more intersection approaches could have common peak 15-minute intervals different from their individual peaks. If so, this would result in the calculation of different PHF values for each approach. In fact, it is quite possible for 1 or more common PHFs to be greater than 1.

Table 3 illustrates the implications of this approach by comparison of it to the PHFs calculated by the traditional method. As indicated by this table, if the individual PHFs are used in the capacity analysis, the critical sum of conflicting movements is 1216 vehicles per hour. Comparatively, if the common PHF is used the critical sum is more realistically estimated at 812 vehicles per hour—a difference of 404 vehicles. In fact, the volume combination comprising the critical sum of 1216 vehicles never actually occurs during the analysis hour and thus represents an unrealistic situation.

It should be noted that the 1985 HCM

Table 2. Daily Peak Hour Adjusted to Peak Weekday

Station	*Classification*	*AADT*	*Daily Peak Hour (%AADT)*	*Percent Peak Day is of AADT*	*Adjusted Peak Hour (%AADT)*	*No. Hours Exceeded*
100	Interstate	38451	8.49	117.5	9.98	66
120	Principal arterial	28101	7.79	116.1	9.05	78
121	Minor arterial	12976	8.53	113.3	9.66	152
123	Minor arterial	4730	10.49	131.2	13.76	109
551	Freeway	32164	7.85	115.5	9.06	59
553	Minor arterial	13363	8.52	113.9	9.71	93
555	Collector	4333	10.13	113.7	11.51	196
558	Principal arterial	19094	8.05	116.8	9.41	116
562	Principal arterial	11931	8.30	114.2	9.48	146
564	Minor arterial	15953	7.72	120.6	9.31	102
566	Principal arterial	16793	8.74	118.0	10.32	127
568	Minor arterial	18968	7.99	115.2	9.21	85
570	Collector	14522	8.04	121.8	9.80	245
571	Principal arterial	16906	8.47	111.5	9.45	206
572	Principal arterial	16576	6.75	111.8	7.55	273
574	Principal arterial	15818	8.95	116.9	10.47	257
576	Interstate	22191	8.96	114.6	10.27	154
Average			8.46	116.6	9.88	145
Standard Deviation			0.88	4.7	1.29	68

SOURCE: Continuous Traffic Count Data and Traffic Characteristics on Kansas Highways, Kansas Department of Transportation, 1979.

recognizes this discrepancy in its discussion of the operational analysis methodology for signalized intersections. In fact, it recommends the use of the individual PHFs as a conservative estimate of the common peak 15-minute volumes. Although this approach may be conservative in most instances, the magnitude of this overestimation for any specific location would be unknown to the analyst and, in fact, could vary from zero to more than a 50% increase in critical volumes. Obviously, this degree of uncertainty is not acceptable.

In conclusion, if peak hour factors must be used in the capacity analysis of signalized intersections, it is recommended that the common PHF be used instead of individual peak 15-minute periods. In this manner, the capacity analysis will be most representative of true volume conditions occurring during common intervals of time. In addition, this approach will give the analyst a better understanding of the nature and magnitude of any conservative adjustments made to the traffic volumes.

Summary

As suggested at the beginning of this article, a great need exists for a uniform methodology for adjusting traffic volumes associated with site impact analysis. These adjustments must be made to standardize the analysis process and increase the level of confidence that can be placed in the study results.

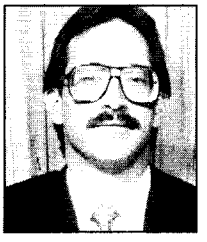
The approach taken here has been to recommend that the impact study analysis be based on reasonable estimates of background traffic volumes. In particular, existing traffic volumes should be adjusted to represent the peak hour of the peak day of an average week of the year. Moreover, it is suggested that a peak hour factor need not be used for planning-level analyses; however, if peak hour adjustments are used, they should be representative of a common, simultaneously occurring 15-minute interval. Regardless of the type of adjustments made, the resulting volumes should reflect the intended use of the impact study: comparative assessment of site impact or mitigation of impact via geometric design.

References

1. American Association of State Highway and Transportation Officials. *A Policy on Geometric Design of Highways and Streets.* Washington, DC: American Association of State Highway and Transportation Officials, 1984.
2. Highway Research Board. "Highway Capacity Manual." *Special Report 87.* Washington, DC: Highway Research Board, National Research Council, 1965, p. 37.
3. Transportation Research Board. "Highway Capacity Manual." *Special Report 209.* Washington, DC: Transportation Research Board, National Research Council, 1985.
4. Keller, C. Richard, and Mehra, J. *Site Impact Traffic Evaluation Handbook.* Washington, DC: Federal Highway Administration, U.S. Department of Transportation, 1985.

Table 3. Peak Hour Factor Comparison

Ending Hour	*Approach Volumes*				*Total Volume*	*Critical Volume*
	Northbound	*Southbound*	*Eastbound*	*Westbound*		
1700	59	74	158	85	376	
1715	88	81	107	115	391	← Peak
1730	117	59	107	106	389	
1745	146	78	88	77	389	
Total	410	292	460	383	1545	870
	Based on Individual 15-minute Peaks					
PHF	0.70	0.90	0.73	0.83	0.99	
Flow rate	584	324	632	460	1564	1216
	Based on Common 15-minute Peaks					
PHF	1.16	0.90	1.07	0.83	0.99	
Flow rate	352	324	428	460	1564	812



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Highway/Transit Bill Passes

At press time, the Senate had just voted to override the President's veto of the Highway/Transit Bill, by a vote of 67 to 33. The House had already voted to override the veto. The bill is now law. Details of the bill will be included in the May issue of *ITE Journal.*

Step 3: Replace the PHF calculated for Individual Approaches/Turning Movments in Step 2 if the calculated PHF exceeds the value in the following Syncho Users Guide

Peak Hour Factor

The traffic volumes are divided by the **Peak Hour Factor** (PHF) to determine the traffic flow rate during the busiest 15-minute period during the hour. For example:

Hourly Flow Rate: 1000 vph

Peak Hour Factor: 0.9

Adjusted Peak Flow Rate: 1000 / 0.9 = 1111 vph

The HCM 6th Edition Chapter 19 provides suggested default values, that may be used in the absence of field measurements of peak-hour factor (PHF). For intersections with a total entering volume ≥ 1,000 veh/h, 0.92 is a reasonable approximation for PHF. For conditions with a total entering volume < 1,000 veh/h, 0.90 is a reasonable estimate for PHF.

If the Analysis Period is set to a value of greater than 15 minutes, the PHF will be set to 1.0 and cannot be changed. The Analysis Period can be modified using the **Network-Settings** command, located in the Options tab.

The default PHF is 0.92 following the guidelines of the HCM 6th Edition. The user may change the default or reset existing Peak Hour Factors in the current data set in the **Network-Settings**. The range of PHF in Synchro is 0.25 to 1.00.

Note that 15-minute traffic volumes read from a UTDF Volume file automatically recalculate PHF for each volume period.

If traffic arrivals fit a Poisson distribution, probability suggests using the values in **Table 9-1** for the PHF. This assumes the highest 15-minute period is the 87.5 percentile based on average 15-minute periods of the hour.

Table 9-1 Suggested Peak Hour Values

Total Approach Volume (vph)	PHF
2000	0.95
1000	0.93
500	0.92
200	0.87
100	0.83
50	0.78

If the upstream intersection is at capacity for the entire peak hour, use a PHF of 1.0.

Traffic Counts

TRANSPORTATION
CONSULTANTS, INC.

LSC Transportation Consultants, Inc.
Colorado Springs, CO 80905
719-633-2868

Default Comments
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Then Click the Comments Tab

Groups Printed- Unshifted

	Powers Blvd Southbound					Bradley Rd Westbound					Powers Blvd Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:30	61	54	0	0	115	68	0	71	0	139	0	89	73	0	162	0	0	0	0	0	416
06:45	67	68	0	0	135	80	0	104	0	184	0	110	55	0	165	0	0	0	0	0	484
Total	128	122	0	0	250	148	0	175	0	323	0	199	128	0	327	0	0	0	0	0	900
07:00	67	87	0	0	154	71	0	119	0	190	0	120	58	0	178	0	0	0	0	0	522
07:15	66	56	5	0	127	65	3	111	2	181	0	154	65	0	219	0	0	0	0	0	527
07:30	82	78	0	0	160	68	0	105	0	173	0	133	54	0	187	0	0	0	0	0	520
07:45	63	77	0	0	140	78	0	62	0	140	0	93	54	0	147	0	0	0	0	0	427
Total	278	298	5	0	581	282	3	397	2	684	0	500	231	0	731	0	0	0	0	0	1996
08:00	36	66	0	0	102	89	0	70	0	159	0	97	47	0	144	0	0	0	0	0	405
08:15	50	72	0	0	122	93	0	61	0	154	0	73	37	0	110	0	0	0	0	0	386

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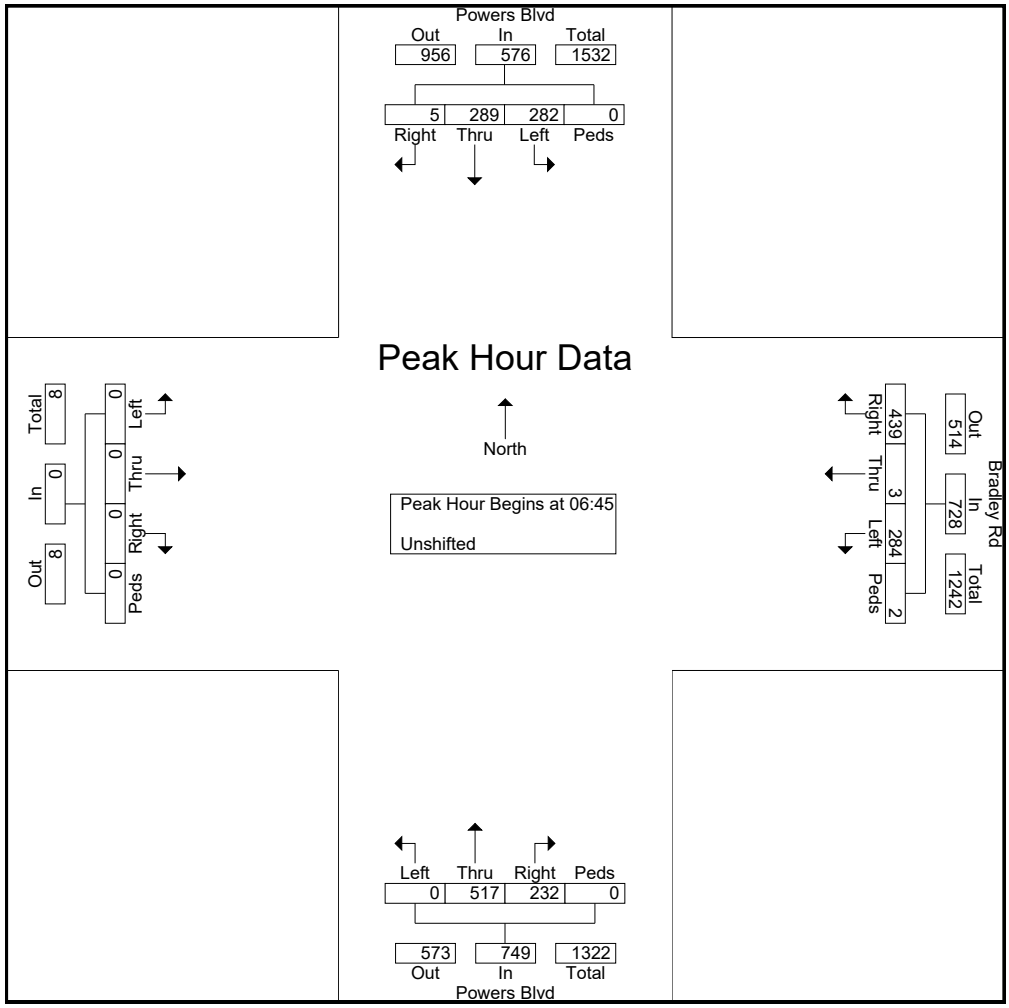
	Powers Blvd Southbound					Bradley Rd Westbound					Powers Blvd Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45																					
06:45	67	68	0	0	135	**80**	0	104	0	184	0	110	55	0	165	0	0	0	0	0	484
07:00	67	**87**	0	0	154	71	0	**119**	0	**190**	0	120	58	0	178	0	0	0	0	0	522
07:15	66	56	**5**	0	127	65	**3**	111	**2**	181	0	**154**	**65**	0	**219**	0	0	0	0	0	**527**
07:30	**82**	78	0	0	**160**	68	0	105	0	173	0	133	54	0	187	0	0	0	0	0	520
Total Volume	282	289	5	0	576	284	3	439	2	728	0	517	232	0	749	0	0	0	0	0	2053
% App. Total	49	50.2	0.9	0		39	0.4	60.3	0.3		0	69	31	0		0	0	0	0		
PHF	.860	.830	.250	.000	.900	.888	.250	.922	.250	.958	.000	.839	.892	.000	.855	.000	.000	.000	.000	.000	.974



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Select File/Preference in the Main Scree
Then Click the Comments Tab

Groups Printed- Unshifted

	Powers Blvd Southbound					Bradley Rd Westbound					Powers Blvd Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
16:00	82	119	0	0	201	55	1	100	0	156	0	75	70	0	145	0	0	0	0	0	502
16:15	66	121	0	0	187	63	0	90	0	153	0	55	115	0	170	0	0	0	0	0	510
16:30	64	122	0	0	186	65	0	95	0	160	0	81	80	0	161	0	0	0	0	0	507
16:45	45	124	0	1	170	64	0	95	0	159	0	66	103	0	169	0	0	0	0	0	498
Total	257	486	0	1	744	247	1	380	0	628	0	277	368	0	645	0	0	0	0	0	2017
17:00	59	137	0	0	196	65	0	64	0	129	0	107	89	0	196	0	0	0	0	0	521
17:15	78	125	0	0	203	52	0	58	0	110	0	77	97	0	174	0	0	0	0	0	487
17:30	55	109	0	0	164	54	0	46	0	100	0	80	78	0	158	0	0	0	0	0	422
17:45	57	116	0	0	173	49	0	52	0	101	0	82	81	0	163	0	0	0	0	0	437
Total	249	487	0	0	736	220	0	220	0	440	0	346	345	0	691	0	0	0	0	0	1867

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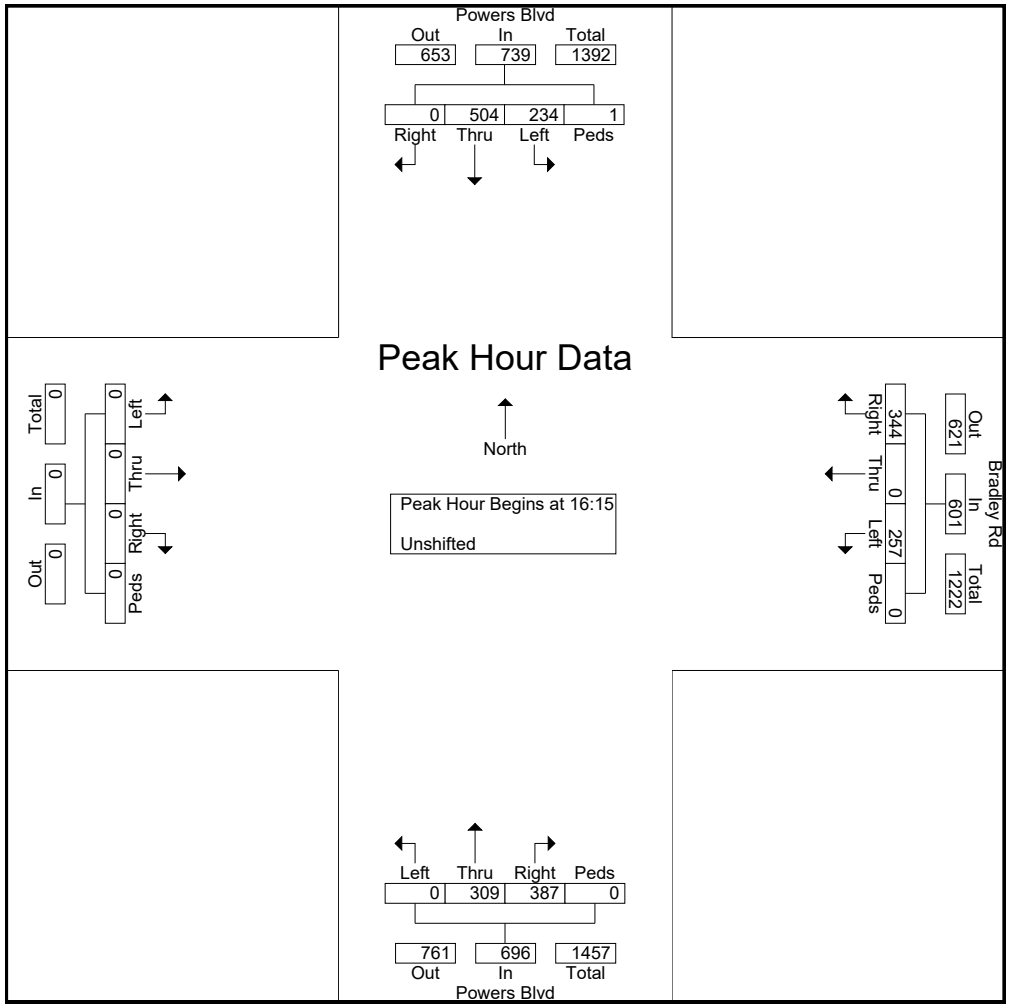
	Powers Blvd Southbound					Bradley Rd Westbound					Powers Blvd Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:15																					
16:15	**66**	121	0	0	187	63	0	90	0	153	0	55	**115**	0	170	0	0	0	0	0	510
16:30	64	122	0	0	186	**65**	0	**95**	0	**160**	0	81	80	0	161	0	0	0	0	0	507
16:45	45	124	0	**1**	170	64	0	95	0	159	0	66	103	0	169	0	0	0	0	0	498
17:00	59	**137**	0	0	**196**	65	0	64	0	129	0	**107**	89	0	**196**	0	0	0	0	0	**521**
Total Volume	234	504	0	1	739	257	0	344	0	601	0	309	387	0	696	0	0	0	0	0	2036
% App. Total	31.7	68.2	0	0.1		42.8	0	57.2	0		0	44.4	55.6	0		0	0	0	0		
PHF	.886	.920	.000	.250	.943	.988	.000	.905	.000	.939	.000	.722	.841	.000	.888	.000	.000	.000	.000	.000	.977



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File Name : Marksheffel Rd - Bradley Rd AM
Site Code : 184690
Start Date : 10/16/2018
Page No : 1

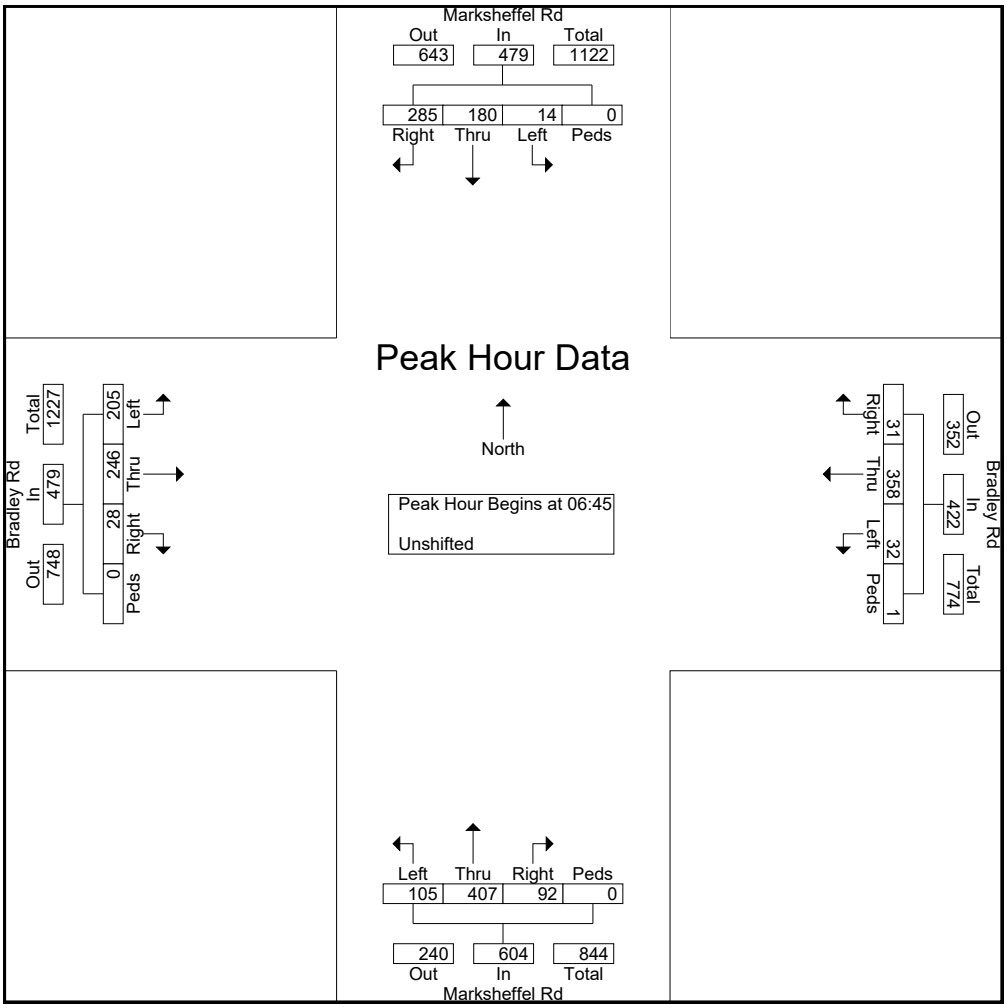
Groups Printed- Unshifted

	Marksheffel Rd Southbound				Bradley Rd Westbound				Marksheffel Rd Northbound				Bradley Rd Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	2	52	59	0	5	78	7	0	12	116	16	0	47	56	6	0	456
06:45	3	48	76	0	7	88	4	0	17	101	21	0	38	54	10	0	467
Total	5	100	135	0	12	166	11	0	29	217	37	0	85	110	16	0	923
07:00	3	36	66	0	12	94	10	0	32	124	31	0	48	69	4	0	529
07:15	6	37	71	0	6	105	6	1	40	91	18	0	65	72	6	0	524
07:30	2	59	72	0	7	71	11	0	16	91	22	0	54	51	8	0	464
07:45	3	49	56	0	4	47	3	0	22	94	9	0	57	59	10	0	413
Total	14	181	265	0	29	317	30	1	110	400	80	0	224	251	28	0	1930
08:00	4	25	48	0	4	54	5	0	14	68	6	0	31	23	8	0	290
08:15	2	43	80	0	9	52	1	0	13	59	2	0	38	30	8	0	337
Grand Total	25	349	528	0	54	589	47	1	166	744	125	0	378	414	60	0	3480
Apprch %	2.8	38.7	58.5	0	7.8	85.2	6.8	0.1	16	71.9	12.1	0	44.4	48.6	7	0	
Total %	0.7	10	15.2	0	1.6	16.9	1.4	0	4.8	21.4	3.6	0	10.9	11.9	1.7	0	

LSC Transportation Consultants, Inc.
545 E Pikes Peak Ave, Suite 210
Colorado Springs, CO 80905
719-633-2868

File Name : Marksheffel Rd - Bradley Rd AM
Site Code : 184690
Start Date : 10/16/2018
Page No : 2

	Marksheffel Rd Southbound					Bradley Rd Westbound					Marksheffel Rd Northbound					Bradley Rd Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45																					
06:45	3	48	**76**	0	127	7	88	4	0	99	17	101	21	0	139	38	54	**10**	0	102	467
07:00	3	36	66	0	105	**12**	94	10	0	116	32	**124**	**31**	0	**187**	48	69	4	0	121	**529**
07:15	**6**	37	71	0	114	6	**105**	6	**1**	**118**	**40**	91	18	0	149	**65**	**72**	6	0	**143**	524
07:30	2	**59**	72	0	**133**	7	71	**11**	0	89	16	91	22	0	129	54	51	8	0	113	464
Total Volume	14	180	285	0	479	32	358	31	1	422	105	407	92	0	604	205	246	28	0	479	1984
% App. Total	2.9	37.6	59.5	0		7.6	84.8	7.3	0.2		17.4	67.4	15.2	0		42.8	51.4	5.8	0		
PHF	.583	.763	.938	.000	.900	.667	.852	.705	.250	.894	.656	.821	.742	.000	.807	.788	.854	.700	.000	.837	.938



LSC Transportation Consultants, Inc.

545 E Pikes Peak Ave, Suite 210
Colorado Springs, CO 80905
719-633-2868

File Name : Marksheffel Rd - Bradley Rd PM
Site Code : 184960
Start Date : 10/16/2018
Page No : 1

Groups Printed- Unshifted

	Marksheffel Rd Southbound				Bradley Rd Westbound				Marksheffel Rd Northbound				Bradlet Rd Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
16:00	3	82	46	0	14	50	9	0	18	64	8	0	87	63	21	0	465
16:15	5	90	46	1	23	75	4	0	8	57	5	0	77	78	18	0	487
16:30	6	89	51	1	15	59	3	0	11	73	10	0	79	76	16	0	489
16:45	4	98	53	0	8	74	5	0	9	57	9	0	91	67	17	0	492
Total	18	359	196	2	60	258	21	0	46	251	32	0	334	284	72	0	1933
17:00	3	82	60	0	15	81	2	0	10	77	6	0	69	83	10	0	498
17:15	6	96	62	0	13	50	3	0	12	87	8	0	87	68	19	0	511
17:30	4	70	49	0	11	53	6	0	11	65	12	0	71	95	24	0	471
17:45	6	79	31	0	8	37	3	0	13	44	6	0	63	71	16	0	377
Total	19	327	202	0	47	221	14	0	46	273	32	0	290	317	69	0	1857
Grand Total	37	686	398	2	107	479	35	0	92	524	64	0	624	601	141	0	3790
Apprch %	3.3	61.1	35.4	0.2	17.2	77.1	5.6	0	13.5	77.1	9.4	0	45.7	44	10.3	0	
Total %	1	18.1	10.5	0.1	2.8	12.6	0.9	0	2.4	13.8	1.7	0	16.5	15.9	3.7	0	

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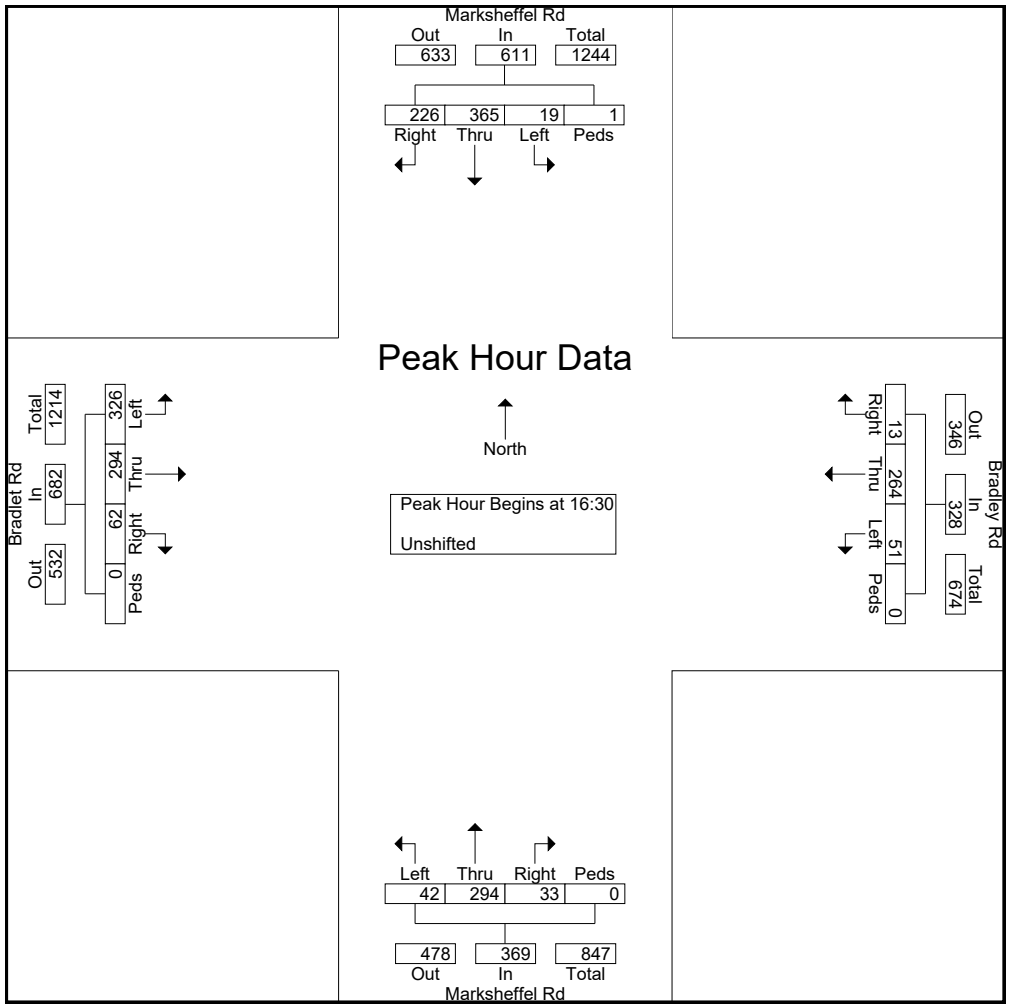
719-633-2868

File Name : Marksheffel Rd - Bradley Rd PM
Site Code : 184960
Start Date : 10/16/2018
Page No : 2

	Marksheffel Rd Southbound					Bradley Rd Westbound					Marksheffel Rd Northbound					Bradlet Rd Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:30																					
16:30	**6**	89	51	**1**	147	**15**	59	3	0	77	11	73	**10**	0	94	79	76	16	0	171	489
16:45	4	**98**	53	0	155	8	74	**5**	0	87	9	57	9	0	75	**91**	67	17	0	**175**	492
17:00	3	82	60	0	145	15	**81**	2	0	**98**	10	77	6	0	93	69	**83**	10	0	162	498
17:15	6	96	**62**	0	**164**	13	50	3	0	66	**12**	**87**	8	0	**107**	87	68	**19**	0	174	**511**
Total Volume	19	365	226	1	611	51	264	13	0	328	42	294	33	0	369	326	294	62	0	682	1990
% App. Total	3.1	59.7	37	0.2		15.5	80.5	4	0		11.4	79.7	8.9	0		47.8	43.1	9.1	0		
PHF	.792	.931	.911	.250	.931	.850	.815	.650	.000	.837	.875	.845	.825	.000	.862	.896	.886	.816	.000	.974	.974



Levels of Service

TRANSPORTATION
CONSULTANTS, INC.

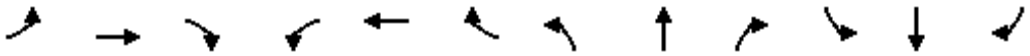
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	284	439	517	232	282	289
Future Volume (vph)	284	439	517	232	282	289
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	299	462	562	252	307	314
Shared Lane Traffic (%)						
Lane Group Flow (vph)	299	462	562	252	307	314

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	284	439	517	232	282	289
Future Volume (vph)	284	439	517	232	282	289
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	20.0	20.0	60.0	60.0	20.0	80.0
Total Split (%)	20.0%	20.0%	60.0%	60.0%	20.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.8	10.8	15.3	15.3	15.2	35.6
Actuated g/C Ratio	0.19	0.19	0.27	0.27	0.27	0.63
v/c Ratio	0.45	0.68	0.58	0.41	0.65	0.14
Control Delay	23.0	8.5	20.7	5.0	28.6	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	8.5	20.7	5.0	28.6	4.7
LOS	C	A	C	A	C	A
Approach Delay	14.2		15.8			16.5
Approach LOS	B		B			B

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 56.5	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 50.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd.



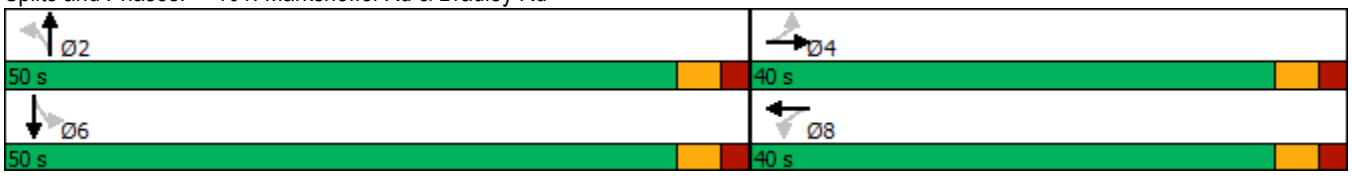
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	205	246	28	32	358	31	105	407	92	14	180	285
Future Volume (vph)	205	246	28	32	358	31	105	407	92	14	180	285
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	236	283	32	35	393	34	114	442	100	16	207	328
Shared Lane Traffic (%)												
Lane Group Flow (vph)	236	283	32	35	393	34	114	442	100	16	207	328

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	246	28	32	358	31	105	407	92	14	180	285
Future Volume (vph)	205	246	28	32	358	31	105	407	92	14	180	285
Turn Type	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	40.0	40.0		40.0	40.0		50.0	50.0		50.0	50.0	
Total Split (%)	44.4%	44.4%		44.4%	44.4%		55.6%	55.6%		55.6%	55.6%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)	25.1	25.1	80.7	25.1	25.1	80.7	45.5	45.5	80.7	45.5	45.5	80.7
Actuated g/C Ratio	0.31	0.31	1.00	0.31	0.31	1.00	0.56	0.56	1.00	0.56	0.56	1.00
v/c Ratio	0.86	0.26	0.02	0.10	0.36	0.02	0.17	0.22	0.06	0.03	0.10	0.21
Control Delay	54.4	20.6	0.0	19.1	21.7	0.0	11.6	10.5	0.1	11.0	9.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.4	20.6	0.0	19.1	21.7	0.0	11.6	10.5	0.1	11.0	9.9	0.3
LOS	D	C	A	B	C	A	B	B	A	B	A	A
Approach Delay		33.9			19.9			9.1			4.2	
Approach LOS		C			B			A			A	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 80.7		
Natural Cycle: 45		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.86		
Intersection Signal Delay: 16.3	Intersection LOS: B	
Intersection Capacity Utilization 52.5%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 101: Marksheffel Rd & Bradley Rd



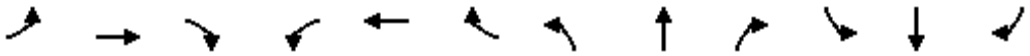
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	257	344	309	387	234	504
Future Volume (vph)	257	344	309	387	234	504
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.89	0.89	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	279	374	347	435	249	536
Shared Lane Traffic (%)						
Lane Group Flow (vph)	279	374	347	435	249	536

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	257	344	309	387	234	504
Future Volume (vph)	257	344	309	387	234	504
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	20.0	20.0	61.0	61.0	19.0	80.0
Total Split (%)	20.0%	20.0%	61.0%	61.0%	19.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	9.9	9.9	11.1	11.1	14.1	30.2
Actuated g/C Ratio	0.20	0.20	0.22	0.22	0.28	0.60
v/c Ratio	0.41	0.61	0.44	0.63	0.50	0.25
Control Delay	19.9	7.4	19.1	7.0	20.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	7.4	19.1	7.0	20.8	5.3
LOS	B	A	B	A	C	A
Approach Delay	12.8		12.4			10.2
Approach LOS	B		B			B

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 50.2	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 45.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd.



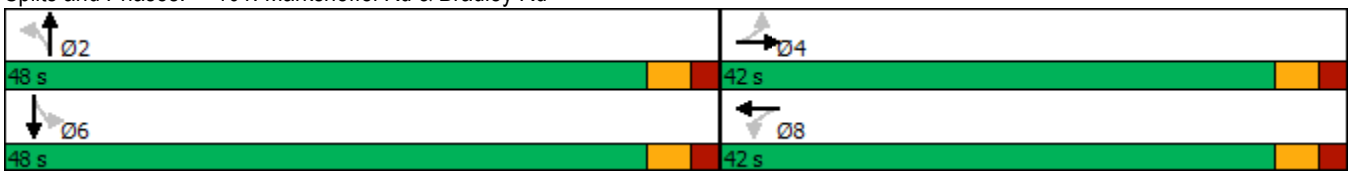
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	326	294	62	51	264	13	42	294	33	19	365	226
Future Volume (vph)	326	294	62	51	264	13	42	294	33	19	365	226
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.86	0.86	0.86	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	354	320	67	59	303	15	49	342	38	20	392	243
Shared Lane Traffic (%)												
Lane Group Flow (vph)	354	320	67	59	303	15	49	342	38	20	392	243

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	326	294	62	51	264	13	42	294	33	19	365	226
Future Volume (vph)	326	294	62	51	264	13	42	294	33	19	365	226
Turn Type	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	42.0	42.0		42.0	42.0		48.0	48.0		48.0	48.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%		53.3%	53.3%		53.3%	53.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)	31.8	31.8	85.1	31.8	31.8	85.1	43.3	43.3	85.1	43.3	43.3	85.1
Actuated g/C Ratio	0.37	0.37	1.00	0.37	0.37	1.00	0.51	0.51	1.00	0.51	0.51	1.00
v/c Ratio	0.90	0.24	0.04	0.15	0.23	0.01	0.10	0.19	0.02	0.04	0.22	0.15
Control Delay	52.8	18.4	0.0	18.1	18.3	0.0	13.5	12.8	0.0	12.8	13.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	18.4	0.0	18.1	18.3	0.0	13.5	12.8	0.0	12.8	13.0	0.2
LOS	D	B	A	B	B	A	B	B	A	B	B	A
Approach Delay		33.2			17.5			11.7			8.2	
Approach LOS		C			B			B			A	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 85.1		
Natural Cycle: 55		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.90		
Intersection Signal Delay: 18.9	Intersection LOS: B	
Intersection Capacity Utilization 55.4%	ICU Level of Service B	
Analysis Period (min) 15		

Splits and Phases: 101: Marksheffel Rd & Bradley Rd



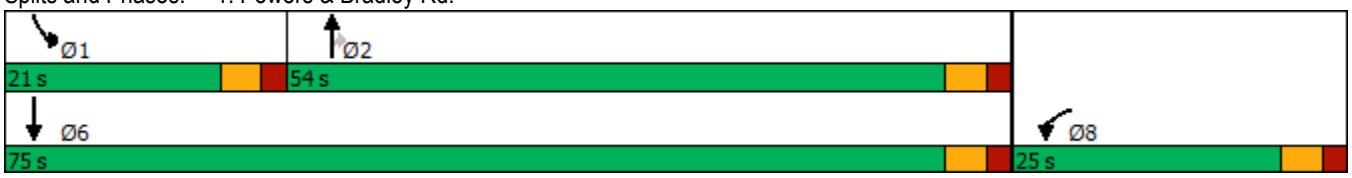
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	429	644	543	287	356	304
Future Volume (vph)	429	644	543	287	356	304
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	452	678	590	312	387	330
Shared Lane Traffic (%)						
Lane Group Flow (vph)	452	678	590	312	387	330

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	429	644	543	287	356	304
Future Volume (vph)	429	644	543	287	356	304
Turn Type	Prot	Free	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		Free		2		
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	9.0		9.0	9.0	9.0	9.0
Total Split (s)	25.0		54.0	54.0	21.0	75.0
Total Split (%)	25.0%		54.0%	54.0%	21.0%	75.0%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None		None	None	None	None
Act Effct Green (s)	14.5	62.9	19.0	19.0	17.2	40.3
Actuated g/C Ratio	0.23	1.00	0.30	0.30	0.27	0.64
v/c Ratio	0.57	0.43	0.55	0.45	0.80	0.15
Control Delay	25.2	0.8	20.6	4.6	38.8	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	0.8	20.6	4.6	38.8	4.9
LOS	C	A	C	A	D	A
Approach Delay	10.6		15.1			23.2
Approach LOS	B		B			C

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 62.9	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 15.3	Intersection LOS: B
Intersection Capacity Utilization 57.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd.



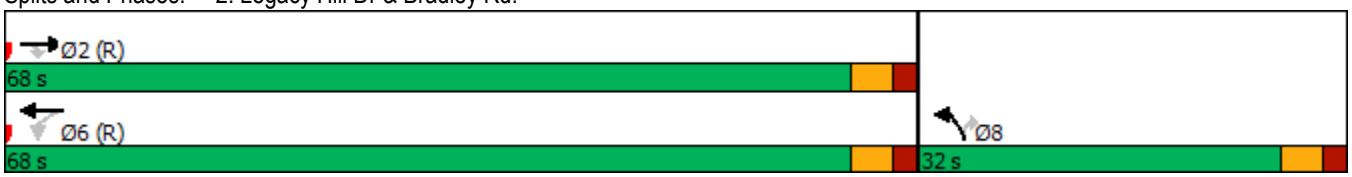
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Volume (vph)	559	84	40	759	314	89
Future Volume (vph)	559	84	40	759	314	89
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.94	0.85	0.85	0.95	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	595	99	47	799	369	105
Shared Lane Traffic (%)						
Lane Group Flow (vph)	595	99	47	799	369	105

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	559	84	40	759	314	89
Future Volume (vph)	559	84	40	759	314	89
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Detector Phase	2	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	68.0	68.0	68.0	68.0	32.0	32.0
Total Split (%)	68.0%	68.0%	68.0%	68.0%	32.0%	32.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	66.8	66.8	66.8	66.8	25.2	25.2
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.25	0.25
v/c Ratio	0.25	0.09	0.09	0.34	0.83	0.22
Control Delay	7.3	1.6	7.3	8.0	51.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	1.6	7.3	8.0	51.5	6.8
LOS	A	A	A	A	D	A
Approach Delay	6.5			7.9	41.6	
Approach LOS	A			A	D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 47.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Hill Dr & Bradley Rd.



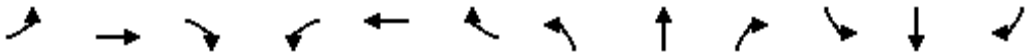
Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	629	19	0	799	0	33
Future Vol, veh/h	629	19	0	799	0	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	500	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	85	85	95	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	669	22	0	841	0	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	335
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	661
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	661
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	661	-	-	-
HCM Lane V/C Ratio	0.059	-	-	-
HCM Control Delay (s)	10.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-



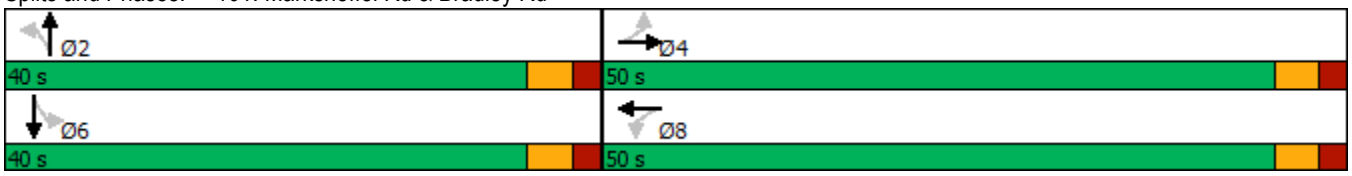
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	302	276	46	34	382	33	116	428	97	15	189	329
Future Volume (vph)	302	276	46	34	382	33	116	428	97	15	189	329
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	347	317	53	37	420	36	126	465	105	17	217	378
Shared Lane Traffic (%)												
Lane Group Flow (vph)	347	317	53	37	420	36	126	465	105	17	217	378

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	276	46	34	382	33	116	428	97	15	189	329
Future Volume (vph)	302	276	46	34	382	33	116	428	97	15	189	329
Turn Type	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	50.0	50.0		50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)	34.3	34.3	80.0	34.3	34.3	80.0	35.6	35.6	80.0	35.6	35.6	80.0
Actuated g/C Ratio	0.43	0.43	1.00	0.43	0.43	1.00	0.44	0.44	1.00	0.44	0.44	1.00
v/c Ratio	0.90	0.21	0.03	0.08	0.28	0.02	0.25	0.30	0.07	0.04	0.14	0.24
Control Delay	47.7	13.9	0.0	12.7	14.6	0.0	18.6	16.7	0.1	17.1	15.7	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.7	13.9	0.0	12.7	14.6	0.0	18.6	16.7	0.1	17.1	15.7	0.4
LOS	D	B	A	B	B	A	B	B	A	B	B	A
Approach Delay		29.2			13.4			14.6			6.3	
Approach LOS		C			B			B			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 80	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 101: Marksheffel Rd & Bradley Rd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	357	483	325	554	452	530
Future Volume (vph)	357	483	325	554	452	530
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.89	0.89	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	388	525	365	622	481	564
Shared Lane Traffic (%)						
Lane Group Flow (vph)	388	525	365	622	481	564

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	357	483	325	554	452	530
Future Volume (vph)	357	483	325	554	452	530
Turn Type	Prot	Free	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		Free		2		
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	9.0		9.0	9.0	9.0	9.0
Total Split (s)	25.0		49.0	49.0	26.0	75.0
Total Split (%)	25.0%		49.0%	49.0%	26.0%	75.0%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None		None	None	None	None
Act Effct Green (s)	12.8	66.0	16.4	16.4	21.5	43.0
Actuated g/C Ratio	0.19	1.00	0.25	0.25	0.33	0.65
v/c Ratio	0.59	0.33	0.41	0.77	0.84	0.24
Control Delay	29.0	0.6	21.9	10.4	39.0	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	0.6	21.9	10.4	39.0	5.2
LOS	C	A	C	B	D	A
Approach Delay	12.7		14.7			20.8
Approach LOS	B		B			C

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 66	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 67.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd.

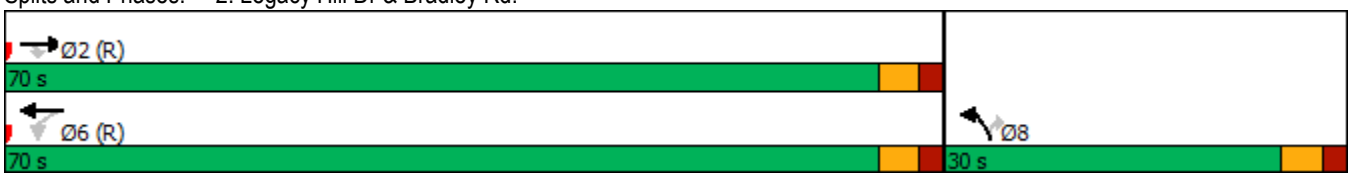
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Volume (vph)	720	286	137	632	208	59
Future Volume (vph)	720	286	137	632	208	59
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.86	0.85	0.85	0.92	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	837	336	161	687	245	69
Shared Lane Traffic (%)						
Lane Group Flow (vph)	837	336	161	687	245	69

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	720	286	137	632	208	59
Future Volume (vph)	720	286	137	632	208	59
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Detector Phase	2	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	70.0	70.0	70.0	70.0	30.0	30.0
Total Split (%)	70.0%	70.0%	70.0%	70.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	71.1	71.1	71.1	71.1	18.9	18.9
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.19	0.19
v/c Ratio	0.33	0.27	0.38	0.27	0.73	0.19
Control Delay	6.4	1.3	10.1	6.0	50.9	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	1.3	10.1	6.0	50.9	9.0
LOS	A	A	B	A	D	A
Approach Delay	4.9			6.8	41.7	
Approach LOS	A			A	D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 10.6	Intersection LOS: B
Intersection Capacity Utilization 51.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Hill Dr & Bradley Rd.



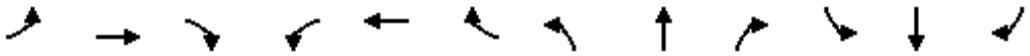
Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	712	67	0	769	0	22
Future Vol, veh/h	712	67	0	769	0	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	500	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	85	85	92	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	828	79	0	836	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	414
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	587
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	587
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	587	-	-	-
HCM Lane V/C Ratio	0.044	-	-	-
HCM Control Delay (s)	11.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-



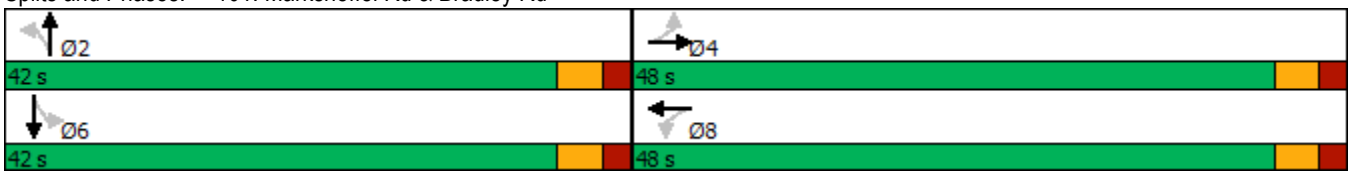
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	401	321	77	54	297	14	64	309	35	20	384	336
Future Volume (vph)	401	321	77	54	297	14	64	309	35	20	384	336
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.86	0.86	0.86	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	436	349	84	62	341	16	74	359	41	22	413	361
Shared Lane Traffic (%)												
Lane Group Flow (vph)	436	349	84	62	341	16	74	359	41	22	413	361

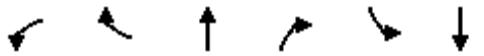
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	401	321	77	54	297	14	64	309	35	20	384	336
Future Volume (vph)	401	321	77	54	297	14	64	309	35	20	384	336
Turn Type	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free	Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	48.0	48.0		48.0	48.0		42.0	42.0		42.0	42.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)	39.7	39.7	86.9	39.7	39.7	86.9	37.2	37.2	86.9	37.2	37.2	86.9
Actuated g/C Ratio	0.46	0.46	1.00	0.46	0.46	1.00	0.43	0.43	1.00	0.43	0.43	1.00
v/c Ratio	0.94	0.22	0.05	0.14	0.21	0.01	0.19	0.24	0.03	0.05	0.27	0.23
Control Delay	54.5	14.3	0.1	14.2	14.3	0.0	18.7	17.1	0.0	16.6	17.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.5	14.3	0.1	14.2	14.3	0.0	18.7	17.1	0.0	16.6	17.5	0.3
LOS	D	B	A	B	B	A	B	B	A	B	B	A
Approach Delay		33.1			13.7			15.9			9.7	
Approach LOS		C			B			B			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 86.9	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 19.5	Intersection LOS: B
Intersection Capacity Utilization 61.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





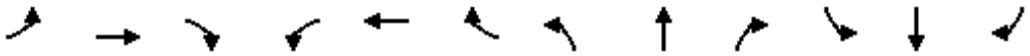
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	579	837	533	417	476	298
Future Volume (vph)	579	837	533	417	476	298
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	609	881	579	453	517	324
Shared Lane Traffic (%)						
Lane Group Flow (vph)	609	881	579	453	517	324

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	579	837	533	417	476	298
Future Volume (vph)	579	837	533	417	476	298
Turn Type	Prot	Free	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		Free		2		
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	9.0		9.0	9.0	9.0	9.0
Total Split (s)	20.0		60.0	60.0	20.0	80.0
Total Split (%)	20.0%		60.0%	60.0%	20.0%	80.0%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None		None	None	None	None
Act Effct Green (s)	15.1	63.0	17.8	17.8	15.1	37.9
Actuated g/C Ratio	0.24	1.00	0.28	0.28	0.24	0.60
v/c Ratio	0.74	0.56	0.58	0.59	0.63	0.15
Control Delay	30.2	1.4	21.6	5.4	26.3	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	1.4	21.6	5.4	26.3	5.6
LOS	C	A	C	A	C	A
Approach Delay	13.2		14.5			18.3
Approach LOS	B		B			B

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 63	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 14.9	Intersection LOS: B
Intersection Capacity Utilization 57.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd.



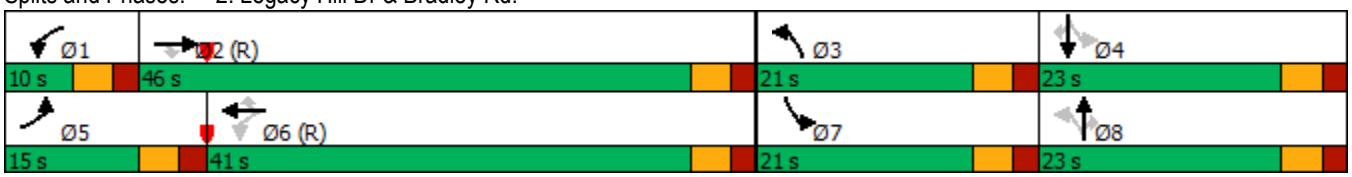
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	259	549	84	40	894	79	314	4	89	138	1	207
Future Volume (vph)	259	549	84	40	894	79	314	4	89	138	1	207
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.94	0.85	0.85	0.95	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	305	584	99	47	941	93	369	5	105	162	1	244
Shared Lane Traffic (%)												
Lane Group Flow (vph)	305	584	99	47	941	93	369	5	105	162	1	244

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	259	549	84	40	894	79	314	4	89	138	1	207
Future Volume (vph)	259	549	84	40	894	79	314	4	89	138	1	207
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (s)	15.0	46.0	46.0	10.0	41.0	41.0	21.0	23.0	23.0	21.0	23.0	23.0
Total Split (%)	15.0%	46.0%	46.0%	10.0%	41.0%	41.0%	21.0%	23.0%	23.0%	21.0%	23.0%	23.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	12.9	51.5	51.5	46.4	40.4	40.4	29.8	14.4	14.4	23.0	10.7	10.7
Actuated g/C Ratio	0.13	0.52	0.52	0.46	0.40	0.40	0.30	0.14	0.14	0.23	0.11	0.11
v/c Ratio	0.69	0.32	0.11	0.11	0.66	0.13	0.86	0.02	0.31	0.44	0.01	0.77
Control Delay	51.0	16.6	1.9	11.9	27.9	2.0	50.5	35.2	6.3	28.9	35.0	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	16.6	1.9	11.9	27.9	2.0	50.5	35.2	6.3	28.9	35.0	30.8
LOS	D	B	A	B	C	A	D	D	A	C	C	C
Approach Delay		25.7			25.0			40.7			30.1	
Approach LOS		C			C			D			C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 37 (37%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 28.5	Intersection LOS: C
Intersection Capacity Utilization 68.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Hill Dr & Bradley Rd.



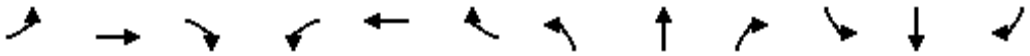
Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱			↱			↱
Traffic Vol, veh/h	0	757	19	0	863	29	0	0	33	0	0	150
Future Vol, veh/h	0	757	19	0	863	29	0	0	33	0	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	500	-	-	500	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	94	85	85	95	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	805	22	0	908	34	0	0	39	0	0	176

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	403	-	-	454
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	597	0	0	553
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	597	-	-	553
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	11.4	14.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	597	-	-	-	-	553
HCM Lane V/C Ratio	0.065	-	-	-	-	0.319
HCM Control Delay (s)	11.4	-	-	-	-	14.5
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	-	1.4



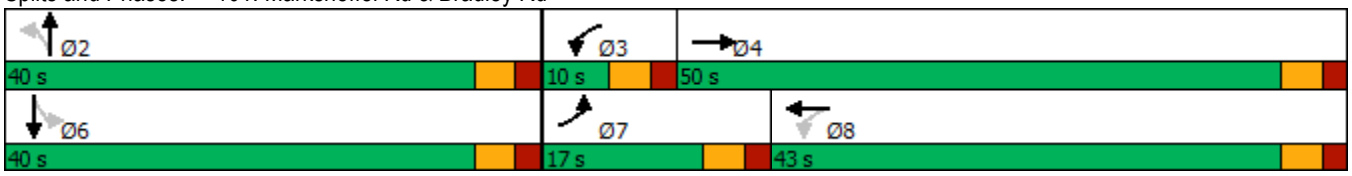
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	388	295	69	34	397	33	141	428	97	15	189	380
Future Volume (vph)	388	295	69	34	397	33	141	428	97	15	189	380
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	446	339	79	37	436	36	153	465	105	17	217	437
Shared Lane Traffic (%)												
Lane Group Flow (vph)	446	339	79	37	436	36	153	465	105	17	217	437

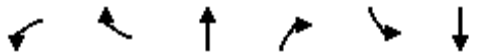
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	388	295	69	34	397	33	141	428	97	15	189	380
Future Volume (vph)	388	295	69	34	397	33	141	428	97	15	189	380
Turn Type	Prot	NA	Free	pm+pt	NA	Free	Perm	NA	Free	Perm	NA	Free
Protected Phases	7	4		3	8			2			6	
Permitted Phases			Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	4.0		5.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	11.0	21.0		10.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	17.0	50.0		10.0	43.0		40.0	40.0		40.0	40.0	
Total Split (%)	17.0%	50.0%		10.0%	43.0%		40.0%	40.0%		40.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)	12.0	25.9	76.8	19.7	14.7	76.8	35.0	35.0	76.8	35.0	35.0	76.8
Actuated g/C Ratio	0.16	0.34	1.00	0.26	0.19	1.00	0.46	0.46	1.00	0.46	0.46	1.00
v/c Ratio	0.83	0.28	0.05	0.12	0.64	0.02	0.29	0.29	0.07	0.04	0.13	0.28
Control Delay	47.2	20.5	0.1	15.0	33.2	0.0	15.8	14.1	0.1	13.3	13.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	20.5	0.1	15.0	33.2	0.0	15.8	14.1	0.1	13.3	13.0	0.4
LOS	D	C	A	B	C	A	B	B	A	B	B	A
Approach Delay		32.4			29.6			12.5			4.8	
Approach LOS		C			C			B			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 76.8			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 20.0		Intersection LOS: B	
Intersection Capacity Utilization 53.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





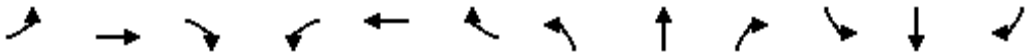
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	616	719	304	807	740	495
Future Volume (vph)	616	719	304	807	740	495
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.89	0.89	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	670	782	342	907	787	527
Shared Lane Traffic (%)						
Lane Group Flow (vph)	670	782	342	907	787	527

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	616	719	304	807	740	495
Future Volume (vph)	616	719	304	807	740	495
Turn Type	Prot	Free	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		Free		2		
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	9.0		9.0	9.0	9.0	9.0
Total Split (s)	27.0		43.0	43.0	30.0	73.0
Total Split (%)	27.0%		43.0%	43.0%	30.0%	73.0%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0		5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None		None	None	None	None
Act Effct Green (s)	21.4	98.6	37.8	37.8	24.4	67.2
Actuated g/C Ratio	0.22	1.00	0.38	0.38	0.25	0.68
v/c Ratio	0.90	0.49	0.25	0.98	0.93	0.22
Control Delay	54.3	1.1	21.7	39.6	54.4	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	1.1	21.7	39.6	54.4	6.2
LOS	D	A	C	D	D	A
Approach Delay	25.7		34.7			35.1
Approach LOS	C		C			D

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 98.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 31.6	Intersection LOS: C
Intersection Capacity Utilization 79.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd.



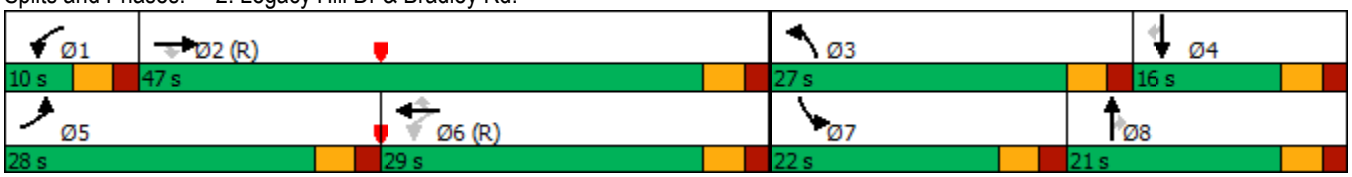
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	584	677	286	137	682	137	208	6	59	217	8	445
Future Volume (vph)	584	677	286	137	682	137	208	6	59	217	8	445
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.86	0.85	0.85	0.92	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	687	787	336	161	741	161	245	7	69	255	9	524
Shared Lane Traffic (%)												
Lane Group Flow (vph)	687	787	336	161	741	161	245	7	69	255	9	524

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	584	677	286	137	682	137	208	6	59	217	8	445
Future Volume (vph)	584	677	286	137	682	137	208	6	59	217	8	445
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (s)	28.0	47.0	47.0	10.0	29.0	29.0	27.0	21.0	21.0	22.0	16.0	16.0
Total Split (%)	28.0%	47.0%	47.0%	10.0%	29.0%	29.0%	27.0%	21.0%	21.0%	22.0%	16.0%	16.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	22.4	42.8	42.8	31.3	25.9	25.9	18.3	13.9	13.9	19.9	13.5	13.5
Actuated g/C Ratio	0.22	0.43	0.43	0.31	0.26	0.26	0.18	0.14	0.14	0.20	0.14	0.14
v/c Ratio	0.89	0.52	0.39	0.61	0.81	0.29	0.76	0.03	0.18	0.72	0.04	0.92
Control Delay	53.2	22.8	3.5	29.6	43.7	4.8	53.8	35.8	1.1	52.6	39.9	33.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	22.8	3.5	29.6	43.7	4.8	53.8	35.8	1.1	52.6	39.9	33.8
LOS	D	C	A	C	D	A	D	D	A	D	D	C
Approach Delay		30.7			35.7			42.0			39.9	
Approach LOS		C			D			D			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 34.8	Intersection LOS: C
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Hill Dr & Bradley Rd.



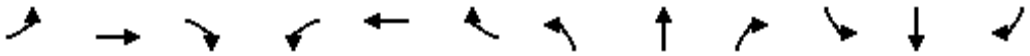
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱			↱			↱
Traffic Vol, veh/h	0	886	67	0	865	95	0	0	22	0	0	91
Future Vol, veh/h	0	886	67	0	865	95	0	0	22	0	0	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	500	-	-	500	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	86	85	85	92	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1030	79	0	940	112	0	0	26	0	0	107

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	515	-	-	470
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	505	0	0	540
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	505	-	-	540
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.5	13.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	505	-	-	-	-	540
HCM Lane V/C Ratio	0.051	-	-	-	-	0.198
HCM Control Delay (s)	12.5	-	-	-	-	13.3
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.7



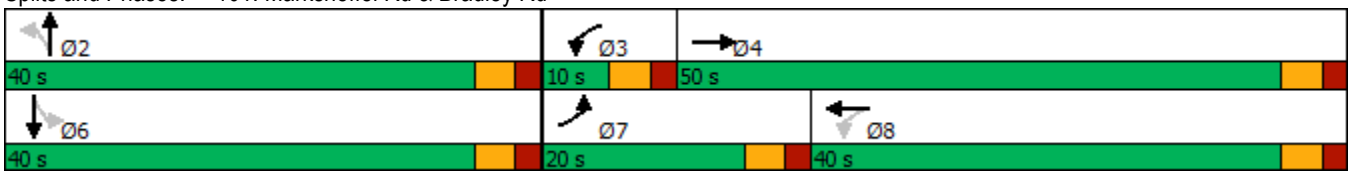
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	498	349	124	54	327	14	108	309	35	20	384	453
Future Volume (vph)	498	349	124	54	327	14	108	309	35	20	384	453
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.86	0.86	0.86	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	541	379	135	62	376	16	126	359	41	22	413	487
Shared Lane Traffic (%)												
Lane Group Flow (vph)	541	379	135	62	376	16	126	359	41	22	413	487

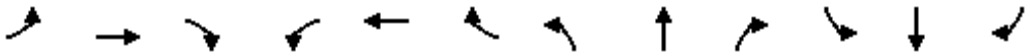
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	498	349	124	54	327	14	108	309	35	20	384	453
Future Volume (vph)	498	349	124	54	327	14	108	309	35	20	384	453
Turn Type	Prot	NA	Free	pm+pt	NA	Free	Perm	NA	Free	Perm	NA	Free
Protected Phases	7	4		3	8			2			6	
Permitted Phases			Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	4.0		5.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	21.0		10.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	20.0	50.0		10.0	40.0		40.0	40.0		40.0	40.0	
Total Split (%)	20.0%	50.0%		10.0%	40.0%		40.0%	40.0%		40.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)	15.0	25.6	78.6	18.5	13.5	78.6	35.1	35.1	78.6	35.1	35.1	78.6
Actuated g/C Ratio	0.19	0.33	1.00	0.24	0.17	1.00	0.45	0.45	1.00	0.45	0.45	1.00
v/c Ratio	0.83	0.33	0.09	0.22	0.62	0.01	0.31	0.23	0.03	0.05	0.26	0.31
Control Delay	43.4	21.6	0.1	16.7	34.8	0.0	17.4	14.3	0.0	13.8	14.6	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	21.6	0.1	16.7	34.8	0.0	17.4	14.3	0.0	13.8	14.6	0.5
LOS	D	C	A	B	C	A	B	B	A	B	B	A
Approach Delay		30.0			31.1			13.9			7.1	
Approach LOS		C			C			B			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 78.6			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 56.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





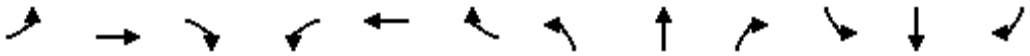
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	26	151	75	553	360	913	100	1302	266	464	750	19
Future Volume (vph)	26	151	75	553	360	913	100	1302	266	464	750	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	27	159	79	570	371	941	103	1342	274	478	773	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	159	79	570	371	941	103	1342	274	478	773	20

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	151	75	553	360	913	100	1302	266	464	750	19
Future Volume (vph)	26	151	75	553	360	913	100	1302	266	464	750	19
Turn Type	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free			Free			2			6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	15.0		9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	15.0	20.0		32.0	37.0		15.0	55.0	55.0	23.0	63.0	63.0
Total Split (%)	11.5%	15.4%		24.6%	28.5%		11.5%	42.3%	42.3%	17.7%	48.5%	48.5%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0		-2.0	-1.0		-1.0	-2.0	0.0	-2.0	-2.0	-1.0
Total Lost Time (s)	4.0	4.0		3.0	4.0		4.0	3.0	5.0	3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	None	None	C-Max	None	None
Act Effct Green (s)	20.4	12.6	130.0	27.1	35.1	130.0	10.1	52.0	50.0	25.3	66.3	65.3
Actuated g/C Ratio	0.16	0.10	1.00	0.21	0.27	1.00	0.08	0.40	0.38	0.19	0.51	0.50
v/c Ratio	0.13	0.47	0.05	0.80	0.39	0.59	0.39	0.95	0.38	0.71	0.43	0.02
Control Delay	31.7	59.9	0.1	55.3	37.8	2.8	61.0	52.4	10.3	56.4	21.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.7	59.9	0.1	55.3	37.8	2.8	61.0	52.4	10.3	56.4	21.7	0.1
LOS	C	E	A	E	D	A	E	D	B	E	C	A
Approach Delay		39.2			25.6			46.2			34.4	
Approach LOS		D			C			D			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 125 (96%), Referenced to phase 1:SBL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 35.4	Intersection LOS: D
Intersection Capacity Utilization 86.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd



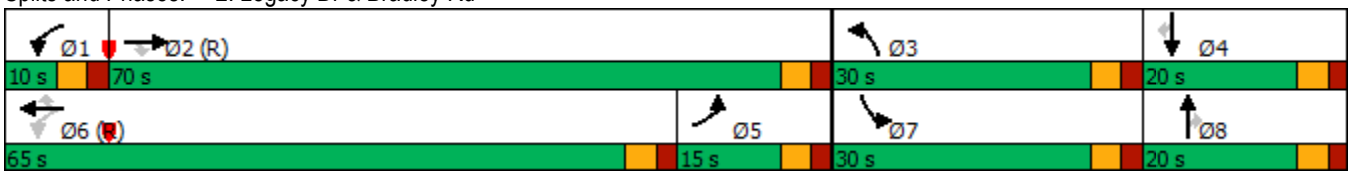
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	5	743	133	94	1558	57	267	5	123	12	5	2
Future Volume (vph)	5	743	133	94	1558	57	267	5	123	12	5	2
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.97	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	782	140	99	1606	60	281	5	129	13	5	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	782	140	99	1606	60	281	5	129	13	5	2

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	743	133	94	1558	57	267	5	123	12	5	2
Future Volume (vph)	5	743	133	94	1558	57	267	5	123	12	5	2
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	15.0	70.0	70.0	10.0	65.0	65.0	30.0	20.0	20.0	30.0	20.0	20.0
Total Split (%)	11.5%	53.8%	53.8%	7.7%	50.0%	50.0%	23.1%	15.4%	15.4%	23.1%	15.4%	15.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	7.5	90.1	90.1	99.6	99.6	99.6	17.0	14.7	14.7	7.0	7.0	7.0
Actuated g/C Ratio	0.06	0.69	0.69	0.77	0.77	0.77	0.13	0.11	0.11	0.05	0.05	0.05
v/c Ratio	0.03	0.32	0.12	0.19	0.59	0.05	0.63	0.02	0.42	0.07	0.05	0.01
Control Delay	33.0	3.5	0.3	7.0	10.1	0.5	59.5	50.2	10.4	58.9	59.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	3.5	0.3	7.0	10.1	0.5	59.5	50.2	10.4	58.9	59.2	0.0
LOS	C	A	A	A	B	A	E	D	B	E	E	A
Approach Delay		3.2			9.6			44.2			53.1	
Approach LOS		A			A			D			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 102 (78%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 71.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Dr & Bradley Rd



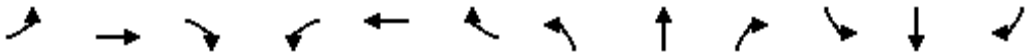
Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	861	16	0	1709	0	31
Future Vol, veh/h	861	16	0	1709	0	31
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	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	95	95	97	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	879	17	0	1762	0	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	440
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	565
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	565
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	565	-	-	-
HCM Lane V/C Ratio	0.058	-	-	-
HCM Control Delay (s)	11.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-



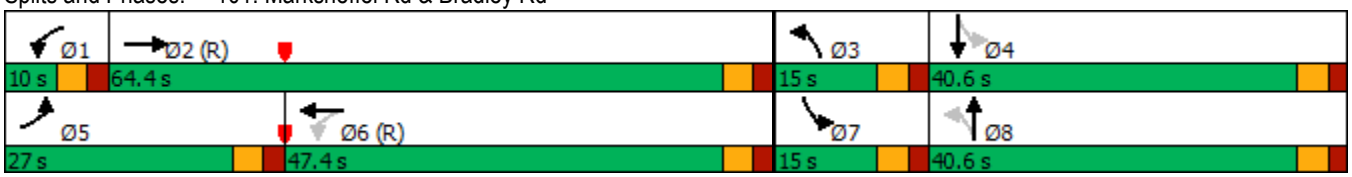
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	405	355	134	95	515	285	176	600	50	140	275	257
Future Volume (vph)	405	355	134	95	515	285	176	600	50	140	275	257
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	426	374	141	100	542	300	185	632	53	147	289	271
Shared Lane Traffic (%)												
Lane Group Flow (vph)	426	374	141	100	542	300	185	632	53	147	289	271

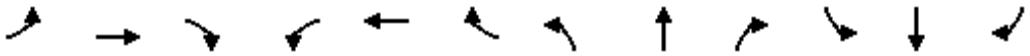
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	405	355	134	95	515	285	176	600	50	140	275	257
Future Volume (vph)	405	355	134	95	515	285	176	600	50	140	275	257
Turn Type	Prot	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free	6		Free	8		Free	4		Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	4.0		5.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	10.0	21.0		10.0	21.0		10.0	21.0		10.0	21.0	
Total Split (s)	27.0	64.4		10.0	47.4		15.0	40.6		15.0	40.6	
Total Split (%)	20.8%	49.5%		7.7%	36.5%		11.5%	31.2%		11.5%	31.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Act Effct Green (s)	20.1	59.4	130.0	49.3	44.3	130.0	45.9	35.9	130.0	45.3	35.6	130.0
Actuated g/C Ratio	0.15	0.46	1.00	0.38	0.34	1.00	0.35	0.28	1.00	0.35	0.27	1.00
v/c Ratio	0.80	0.23	0.09	0.25	0.45	0.19	0.46	0.65	0.03	0.60	0.30	0.17
Control Delay	65.2	21.9	0.1	19.5	35.2	0.3	32.2	45.2	0.0	37.6	38.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.2	21.9	0.1	19.5	35.2	0.3	32.2	45.2	0.0	37.6	38.3	0.2
LOS	E	C	A	B	D	A	C	D	A	D	D	A
Approach Delay		38.3			22.4			39.7			23.6	
Approach LOS		D			C			D			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 31.3	Intersection LOS: C
Intersection Capacity Utilization 66.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





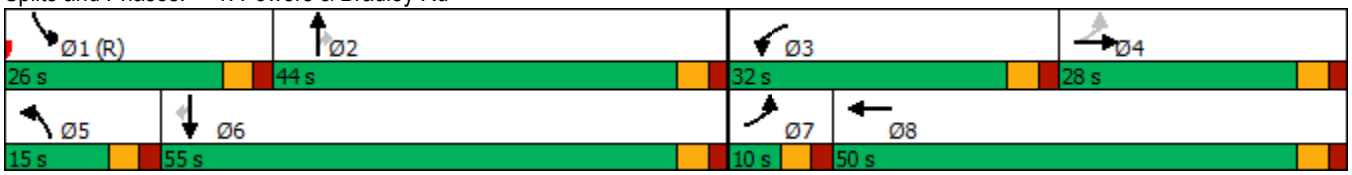
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	71	305	210	237	326	563	175	654	451	519	1203	110
Future Volume (vph)	71	305	210	237	326	563	175	654	451	519	1203	110
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	75	321	221	244	336	580	180	674	465	535	1240	113
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	321	221	244	336	580	180	674	465	535	1240	113

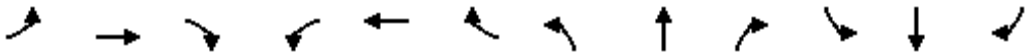
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	305	210	237	326	563	175	654	451	519	1203	110
Future Volume (vph)	71	305	210	237	326	563	175	654	451	519	1203	110
Turn Type	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free			Free			2			6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.0		9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	10.0	28.0		32.0	50.0		15.0	44.0	44.0	26.0	55.0	55.0
Total Split (%)	7.7%	21.5%		24.6%	38.5%		11.5%	33.8%	33.8%	20.0%	42.3%	42.3%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	0.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	5.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Max	Max	C-Max	Max	Max
Act Effct Green (s)	24.0	18.0	130.0	15.6	29.6	130.0	13.1	40.0	39.0	40.4	67.3	67.3
Actuated g/C Ratio	0.18	0.14	1.00	0.12	0.23	1.00	0.10	0.31	0.30	0.31	0.52	0.52
v/c Ratio	0.34	0.66	0.14	0.60	0.42	0.37	0.52	0.62	0.60	0.50	0.68	0.13
Control Delay	38.1	59.3	0.2	53.5	43.9	0.9	60.6	41.5	7.8	39.8	27.2	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	59.3	0.2	53.5	43.9	0.9	60.6	41.5	7.8	39.8	27.2	1.9
LOS	D	E	A	D	D	A	E	D	A	D	C	A
Approach Delay		35.6			24.4			32.2			29.2	
Approach LOS		D			C			C			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 1 (1%), Referenced to phase 1:SBL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 29.7	Intersection LOS: C
Intersection Capacity Utilization 66.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd





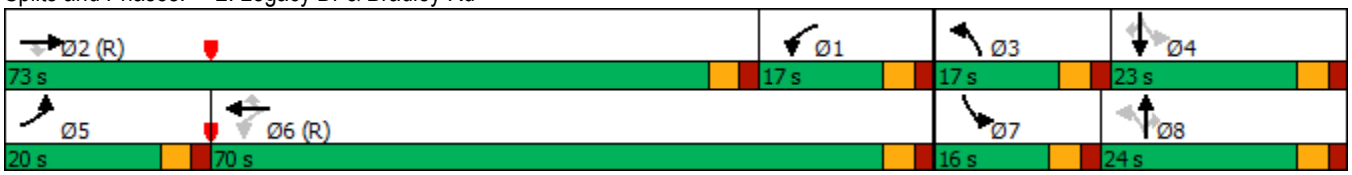
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	2	839	433	257	811	12	309	5	190	52	5	5
Future Volume (vph)	2	839	433	257	811	12	309	5	190	52	5	5
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	883	456	271	854	13	325	5	200	55	5	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	883	456	271	854	13	325	5	200	55	5	5

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	839	433	257	811	12	309	5	190	52	5	5
Future Volume (vph)	2	839	433	257	811	12	309	5	190	52	5	5
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	20.0	73.0	73.0	17.0	70.0	70.0	17.0	24.0	24.0	16.0	23.0	23.0
Total Split (%)	15.4%	56.2%	56.2%	13.1%	53.8%	53.8%	13.1%	18.5%	18.5%	12.3%	17.7%	17.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	6.6	84.3	84.3	99.1	99.1	99.1	20.6	10.6	10.6	12.1	7.8	7.8
Actuated g/C Ratio	0.05	0.65	0.65	0.76	0.76	0.76	0.16	0.08	0.08	0.09	0.06	0.06
v/c Ratio	0.01	0.39	0.38	0.51	0.32	0.01	0.69	0.03	0.64	0.17	0.05	0.02
Control Delay	47.5	21.0	9.3	15.7	6.3	0.0	57.8	53.6	17.0	48.8	56.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	21.0	9.3	15.7	6.3	0.0	57.8	53.6	17.0	48.8	56.8	0.2
LOS	D	C	A	B	A	A	E	D	B	D	E	A
Approach Delay		17.0			8.4			42.3			45.7	
Approach LOS		B			A			D			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 67 (52%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 62.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Dr & Bradley Rd



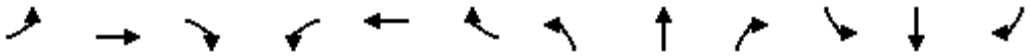
Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1027	54	0	1080	0	20
Future Vol, veh/h	1027	54	0	1080	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	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1081	57	0	1137	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	541
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	485
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	WB	NB
HCM Control Delay, s	0	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	485	-	-	-
HCM Lane V/C Ratio	0.043	-	-	-
HCM Control Delay (s)	12.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-



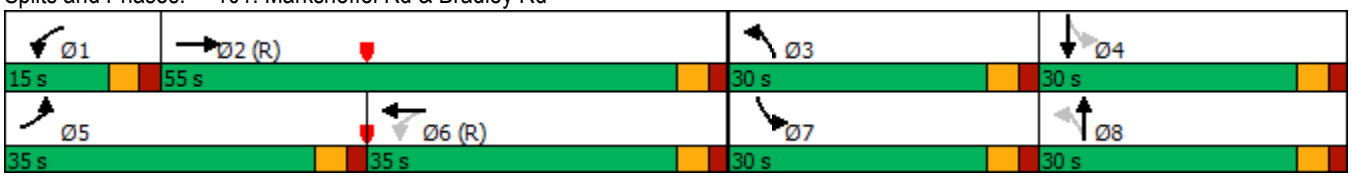
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	508	678	238	195	549	215	162	500	100	300	650	399
Future Volume (vph)	508	678	238	195	549	215	162	500	100	300	650	399
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	535	714	251	205	578	226	171	526	105	316	684	420
Shared Lane Traffic (%)												
Lane Group Flow (vph)	535	714	251	205	578	226	171	526	105	316	684	420

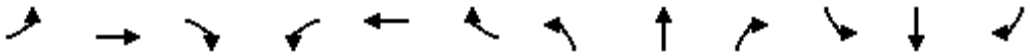
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	508	678	238	195	549	215	162	500	100	300	650	399
Future Volume (vph)	508	678	238	195	549	215	162	500	100	300	650	399
Turn Type	Prot	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free	6		Free	8		Free	4		Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	4.0		5.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	10.0	21.0		10.0	21.0		10.0	21.0		10.0	21.0	
Total Split (s)	35.0	55.0		15.0	35.0		30.0	30.0		30.0	30.0	
Total Split (%)	26.9%	42.3%		11.5%	26.9%		23.1%	23.1%		23.1%	23.1%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Act Effct Green (s)	25.2	50.1	130.0	44.8	34.8	130.0	42.7	28.6	130.0	55.0	35.9	130.0
Actuated g/C Ratio	0.19	0.39	1.00	0.34	0.27	1.00	0.33	0.22	1.00	0.42	0.28	1.00
v/c Ratio	0.81	0.52	0.16	0.64	0.61	0.14	0.59	0.68	0.07	0.81	0.70	0.27
Control Delay	59.8	32.5	0.2	32.8	45.7	0.2	34.0	52.3	0.1	44.1	47.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.8	32.5	0.2	32.8	45.7	0.2	34.0	52.3	0.1	44.1	47.5	0.4
LOS	E	C	A	C	D	A	C	D	A	D	D	A
Approach Delay		36.9			32.9			41.5			32.8	
Approach LOS		D			C			D			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 35.6	Intersection LOS: D
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





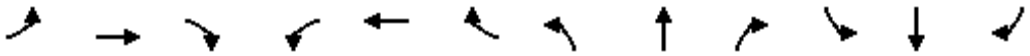
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	26	182	75	719	400	1034	100	1292	386	533	744	19
Future Volume (vph)	26	182	75	719	400	1034	100	1292	386	533	744	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	27	192	79	741	412	1066	103	1332	398	549	767	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	192	79	741	412	1066	103	1332	398	549	767	20

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	182	75	719	400	1034	100	1292	386	533	744	19
Future Volume (vph)	26	182	75	719	400	1034	100	1292	386	533	744	19
Turn Type	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free			Free			2			6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	15.0		9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	14.0	19.0		32.0	37.0		15.0	54.0	54.0	25.0	64.0	64.0
Total Split (%)	10.8%	14.6%		24.6%	28.5%		11.5%	41.5%	41.5%	19.2%	49.2%	49.2%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0		-2.0	-1.0		-1.0	-2.0	0.0	-2.0	-2.0	-1.0
Total Lost Time (s)	4.0	4.0		3.0	4.0		4.0	3.0	5.0	3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	None	None	C-Max	None	None
Act Effct Green (s)	21.1	13.2	130.0	29.0	37.7	130.0	9.9	51.0	49.0	23.8	63.9	62.9
Actuated g/C Ratio	0.16	0.10	1.00	0.22	0.29	1.00	0.08	0.39	0.38	0.18	0.49	0.48
v/c Ratio	0.13	0.53	0.05	0.97	0.40	0.67	0.39	0.96	0.52	0.88	0.44	0.02
Control Delay	31.2	60.9	0.1	79.7	41.6	5.4	61.5	55.0	11.6	67.7	22.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2	60.9	0.1	79.7	41.6	5.4	61.5	55.0	11.6	67.7	22.9	0.1
LOS	C	E	A	E	D	A	E	D	B	E	C	A
Approach Delay		42.1			36.9			45.9			41.0	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 125 (96%), Referenced to phase 1:SBL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 93.1%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd



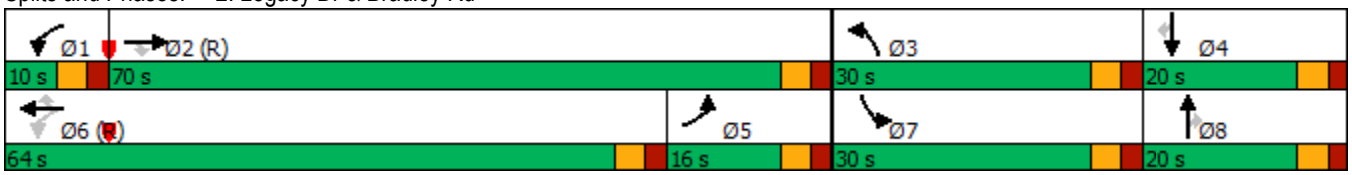
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	235	733	133	94	1689	156	267	18	123	157	16	196
Future Volume (vph)	235	733	133	94	1689	156	267	18	123	157	16	196
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.97	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	247	772	140	99	1741	164	281	19	129	165	17	206
Shared Lane Traffic (%)												
Lane Group Flow (vph)	247	772	140	99	1741	164	281	19	129	165	17	206

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	733	133	94	1689	156	267	18	123	157	16	196
Future Volume (vph)	235	733	133	94	1689	156	267	18	123	157	16	196
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	16.0	70.0	70.0	10.0	64.0	64.0	30.0	20.0	20.0	30.0	20.0	20.0
Total Split (%)	12.3%	53.8%	53.8%	7.7%	49.2%	49.2%	23.1%	15.4%	15.4%	23.1%	15.4%	15.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	12.0	77.7	77.7	74.9	74.9	74.9	16.9	14.5	14.5	12.6	10.2	10.2
Actuated g/C Ratio	0.09	0.60	0.60	0.58	0.58	0.58	0.13	0.11	0.11	0.10	0.08	0.08
v/c Ratio	0.78	0.37	0.14	0.26	0.85	0.17	0.63	0.09	0.43	0.50	0.12	0.70
Control Delay	49.5	7.0	0.6	15.8	29.4	6.7	59.8	49.9	10.2	60.5	54.8	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	7.0	0.6	15.8	29.4	6.7	59.8	49.9	10.2	60.5	54.8	23.6
LOS	D	A	A	B	C	A	E	D	B	E	D	C
Approach Delay		15.3			26.9			44.4			40.7	
Approach LOS		B			C			D			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 102 (78%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 26.7	Intersection LOS: C
Intersection Capacity Utilization 77.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Dr & Bradley Rd



Intersection	
Int Delay, s/veh	1.8

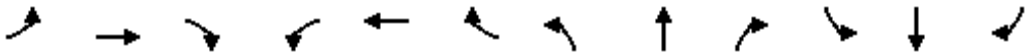
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱			↱			↱
Traffic Vol, veh/h	0	996	16	0	1793	29	0	0	31	0	0	146
Future Vol, veh/h	0	996	16	0	1793	29	0	0	31	0	0	146
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	95	95	95	97	92	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1048	17	0	1848	32	0	0	33	0	0	154

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	524	-	-	924
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*676	0	0	271
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*676	-	-	271
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	10.6	34.4
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	676	-	-	-	-	271
HCM Lane V/C Ratio	0.048	-	-	-	-	0.567
HCM Control Delay (s)	10.6	-	-	-	-	34.4
HCM Lane LOS	B	-	-	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	-	3.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



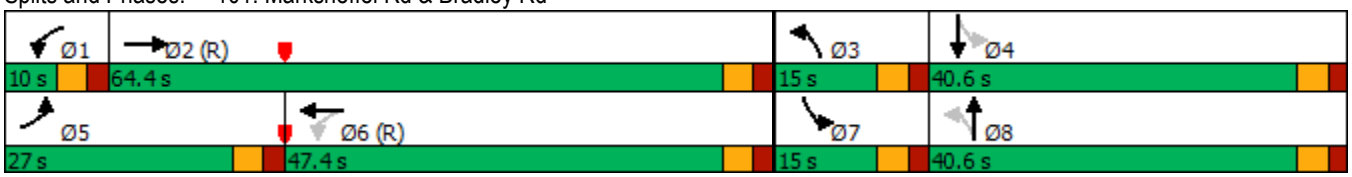
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	491	377	160	95	541	285	212	600	50	140	275	308
Future Volume (vph)	491	377	160	95	541	285	212	600	50	140	275	308
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	517	397	168	100	569	300	223	632	53	147	289	324
Shared Lane Traffic (%)												
Lane Group Flow (vph)	517	397	168	100	569	300	223	632	53	147	289	324

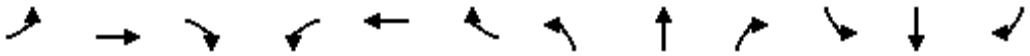
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	491	377	160	95	541	285	212	600	50	140	275	308
Future Volume (vph)	491	377	160	95	541	285	212	600	50	140	275	308
Turn Type	Prot	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free	6		Free	8		Free	4		Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	4.0		5.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	10.0	21.0		10.0	21.0		10.0	21.0		10.0	21.0	
Total Split (s)	27.0	64.4		10.0	47.4		15.0	40.6		15.0	40.6	
Total Split (%)	20.8%	49.5%		7.7%	36.5%		11.5%	31.2%		11.5%	31.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Act Effct Green (s)	21.6	59.4	130.0	47.8	42.8	130.0	45.9	35.9	130.0	45.3	35.6	130.0
Actuated g/C Ratio	0.17	0.46	1.00	0.37	0.33	1.00	0.35	0.28	1.00	0.35	0.27	1.00
v/c Ratio	0.91	0.25	0.11	0.26	0.49	0.19	0.56	0.65	0.03	0.60	0.30	0.20
Control Delay	73.9	22.1	0.1	19.8	36.7	0.3	35.4	45.2	0.0	37.6	38.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.9	22.1	0.1	19.8	36.7	0.3	35.4	45.2	0.0	37.6	38.4	0.3
LOS	E	C	A	B	D	A	D	D	A	D	D	A
Approach Delay		43.4			23.7			40.2			22.0	
Approach LOS		D			C			D			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 33.1	Intersection LOS: C
Intersection Capacity Utilization 70.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





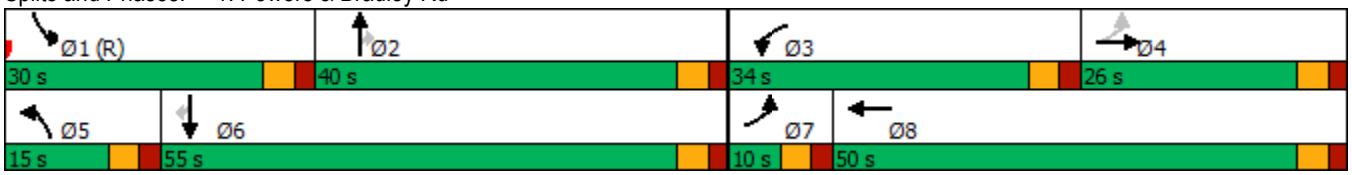
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	71	367	210	479	384	703	175	633	704	701	1168	110
Future Volume (vph)	71	367	210	479	384	703	175	633	704	701	1168	110
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	75	386	221	494	396	725	180	653	726	723	1204	113
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	386	221	494	396	725	180	653	726	723	1204	113

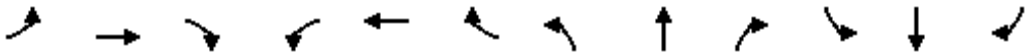
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	367	210	479	384	703	175	633	704	701	1168	110
Future Volume (vph)	71	367	210	479	384	703	175	633	704	701	1168	110
Turn Type	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free			Free			2			6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.0		9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	10.0	26.0		34.0	50.0		15.0	40.0	40.0	30.0	55.0	55.0
Total Split (%)	7.7%	20.0%		26.2%	38.5%		11.5%	30.8%	30.8%	23.1%	42.3%	42.3%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	0.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	5.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Max	Max	C-Max	Max	Max
Act Effct Green (s)	25.7	19.7	130.0	24.8	40.5	130.0	11.8	36.0	35.0	33.5	57.7	57.7
Actuated g/C Ratio	0.20	0.15	1.00	0.19	0.31	1.00	0.09	0.28	0.27	0.26	0.44	0.44
v/c Ratio	0.33	0.72	0.14	0.76	0.36	0.46	0.58	0.67	0.99	0.82	0.77	0.14
Control Delay	31.5	60.5	0.2	57.2	29.4	1.3	64.4	45.6	50.8	54.7	35.9	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	60.5	0.2	57.2	29.4	1.3	64.4	45.6	50.8	54.7	35.9	2.2
LOS	C	E	A	E	C	A	E	D	D	D	D	A
Approach Delay		37.8			25.3			50.2			40.7	
Approach LOS		D			C			D			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 1 (1%), Referenced to phase 1:SBL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 38.6	Intersection LOS: D
Intersection Capacity Utilization 84.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Powers & Bradley Rd





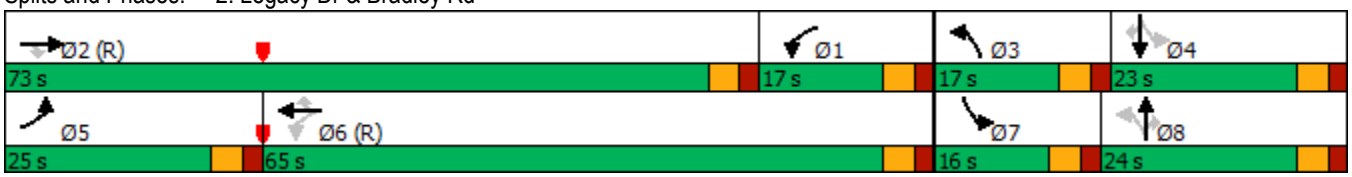
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	542	796	433	257	858	176	309	27	190	307	29	398
Future Volume (vph)	542	796	433	257	858	176	309	27	190	307	29	398
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	571	838	456	271	903	185	325	28	200	323	31	419
Shared Lane Traffic (%)												
Lane Group Flow (vph)	571	838	456	271	903	185	325	28	200	323	31	419

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	542	796	433	257	858	176	309	27	190	307	29	398
Future Volume (vph)	542	796	433	257	858	176	309	27	190	307	29	398
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	25.0	73.0	73.0	17.0	65.0	65.0	17.0	24.0	24.0	16.0	23.0	23.0
Total Split (%)	19.2%	56.2%	56.2%	13.1%	50.0%	50.0%	13.1%	18.5%	18.5%	12.3%	17.7%	17.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	24.7	73.2	73.2	61.5	61.5	61.5	28.8	15.8	15.8	26.8	14.8	14.8
Actuated g/C Ratio	0.19	0.56	0.56	0.47	0.47	0.47	0.22	0.12	0.12	0.21	0.11	0.11
v/c Ratio	0.87	0.42	0.42	0.66	0.54	0.22	0.50	0.12	0.54	0.52	0.15	0.89
Control Delay	52.0	28.5	10.5	41.4	25.9	3.3	43.2	49.7	12.3	43.7	51.1	35.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	28.5	10.5	41.4	25.9	3.3	43.2	49.7	12.3	43.7	51.1	35.5
LOS	D	C	B	D	C	A	D	D	B	D	D	D
Approach Delay		31.3			25.9			32.4			39.6	
Approach LOS		C			C			C			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 67 (52%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 31.2	Intersection LOS: C
Intersection Capacity Utilization 67.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Legacy Dr & Bradley Rd



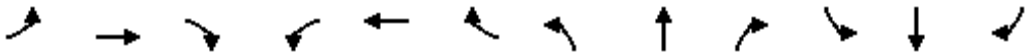
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱			↱			↱
Traffic Vol, veh/h	0	1238	54	0	1204	95	0	0	20	0	0	88
Future Vol, veh/h	0	1238	54	0	1204	95	0	0	20	0	0	88
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	235	-	-	0	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1303	57	0	1267	100	0	0	21	0	0	93

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	652	-	-	634
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	411	0	0	422
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	411	-	-	422
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.2	15.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	411	-	-	-	-	422
HCM Lane V/C Ratio	0.051	-	-	-	-	0.22
HCM Control Delay (s)	14.2	-	-	-	-	15.9
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.8



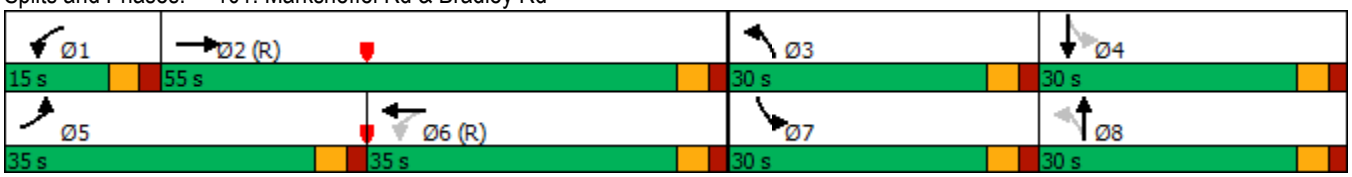
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	605	725	304	195	593	215	220	500	100	300	650	516
Future Volume (vph)	605	725	304	195	593	215	220	500	100	300	650	516
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	637	763	320	205	624	226	232	526	105	316	684	543
Shared Lane Traffic (%)												
Lane Group Flow (vph)	637	763	320	205	624	226	232	526	105	316	684	543

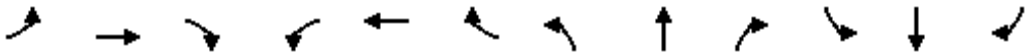
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	605	725	304	195	593	215	220	500	100	300	650	516
Future Volume (vph)	605	725	304	195	593	215	220	500	100	300	650	516
Turn Type	Prot	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free	6		Free	8		Free	4		Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	4.0		5.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	10.0	21.0		10.0	21.0		10.0	21.0		10.0	21.0	
Total Split (s)	35.0	55.0		15.0	35.0		30.0	30.0		30.0	30.0	
Total Split (%)	26.9%	42.3%		11.5%	26.9%		23.1%	23.1%		23.1%	23.1%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Act Effct Green (s)	27.8	50.0	130.0	42.2	32.2	130.0	46.5	28.6	130.0	53.5	32.1	130.0
Actuated g/C Ratio	0.21	0.38	1.00	0.32	0.25	1.00	0.36	0.22	1.00	0.41	0.25	1.00
v/c Ratio	0.87	0.56	0.20	0.68	0.71	0.14	0.74	0.68	0.07	0.81	0.78	0.34
Control Delay	62.5	33.3	0.3	35.7	50.4	0.2	42.9	52.3	0.1	45.1	53.7	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.5	33.3	0.3	35.7	50.4	0.2	42.9	52.3	0.1	45.1	53.7	0.6
LOS	E	C	A	D	D	A	D	D	A	D	D	A
Approach Delay		38.0			36.8			43.4			33.2	
Approach LOS		D			D			D			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 37.2	Intersection LOS: D
Intersection Capacity Utilization 80.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 101: Marksheffel Rd & Bradley Rd





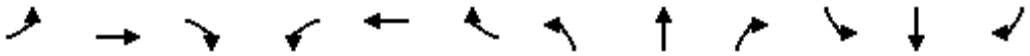
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	26	715	0	0	1119	1034	100	0	386	0	0	0
Future Volume (vph)	26	715	0	0	1119	1034	100	0	386	0	0	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	27	753	0	0	1178	1088	105	0	406	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	753	0	0	1178	1088	105	0	406	0	0	0

Intersection Summary

Lane Group	EBL	EBT	WBT	WBR	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	26	715	1119	1034	100	386
Future Volume (vph)	26	715	1119	1034	100	386
Turn Type	pm+pt	NA	NA	Free	Prot	Free
Protected Phases	5	2	6		8	
Permitted Phases	2			Free		Free
Detector Phase	5	2	6		8	
Switch Phase						
Minimum Initial (s)	4.0	10.0	4.0		20.0	
Minimum Split (s)	9.0	15.0	9.0		25.0	
Total Split (s)	15.0	95.0	80.0		35.0	
Total Split (%)	11.5%	73.1%	61.5%		26.9%	
Yellow Time (s)	3.0	3.0	3.0		3.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	4.0	4.0	4.0		4.0	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	C-Max	C-Max		None	
Act Effct Green (s)	101.0	101.0	94.3	130.0	21.0	130.0
Actuated g/C Ratio	0.78	0.78	0.73	1.00	0.16	1.00
v/c Ratio	0.08	0.27	0.46	0.69	0.37	0.26
Control Delay	2.7	7.3	15.3	6.1	52.8	0.4
Queue Delay	0.0	0.0	0.3	0.0	0.0	0.0
Total Delay	2.7	7.3	15.6	6.1	52.8	0.4
LOS	A	A	B	A	D	A
Approach Delay		7.1	11.0			
Approach LOS		A	B			

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 25 (19%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 10.2	Intersection LOS: B
Intersection Capacity Utilization 60.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Powers NB Ramp & Bradley Rd



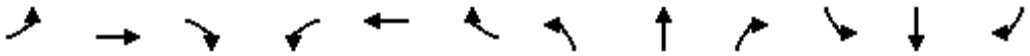
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	0	208	75	719	500	0	0	0	0	533	0	19
Future Volume (vph)	0	208	75	719	500	0	0	0	0	533	0	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	219	79	757	526	0	0	0	0	561	0	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	219	79	757	526	0	0	0	0	561	0	20

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	208	75	719	500	533	19
Future Volume (vph)	208	75	719	500	533	19
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2				4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	10.0	23.0	23.0	23.0
Total Split (s)	45.0	45.0	40.0	85.0	45.0	45.0
Total Split (%)	34.6%	34.6%	30.8%	65.4%	34.6%	34.6%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	40.0	40.0	35.0	80.0	40.0	40.0
Actuated g/C Ratio	0.31	0.31	0.27	0.62	0.31	0.31
v/c Ratio	0.20	0.15	0.82	0.24	0.53	0.04
Control Delay	33.8	7.5	44.9	7.8	39.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	7.5	44.9	7.8	39.5	0.2
LOS	C	A	D	A	D	A
Approach Delay	26.9			29.7		
Approach LOS	C			C		

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 67 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 65	
Control Type: Pretimed	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 31.6	Intersection LOS: C
Intersection Capacity Utilization 60.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 26: Bradley Rd & Powers SB Ramp



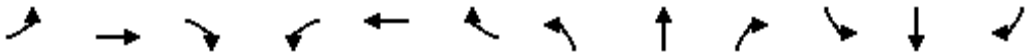
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	71	1068	0	0	863	703	175	0	704	0	0	0
Future Volume (vph)	71	1068	0	0	863	703	175	0	704	0	0	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	75	1124	0	0	908	740	184	0	741	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	1124	0	0	908	740	184	0	741	0	0	0

Intersection Summary

Lane Group	EBL	EBT	WBT	WBR	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	71	1068	863	703	175	704
Future Volume (vph)	71	1068	863	703	175	704
Turn Type	pm+pt	NA	NA	Free	Prot	Free
Protected Phases	5	2	6		8	
Permitted Phases	2			Free		Free
Detector Phase	5	2	6		8	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	
Minimum Split (s)	9.0	9.0	9.0		9.0	
Total Split (s)	15.0	100.0	85.0		30.0	
Total Split (%)	11.5%	76.9%	65.4%		23.1%	
Yellow Time (s)	3.0	3.0	3.0		3.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	4.0	4.0	4.0		4.0	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	C-Max	C-Max		Max	
Act Effct Green (s)	96.0	96.0	86.2	130.0	26.0	130.0
Actuated g/C Ratio	0.74	0.74	0.66	1.00	0.20	1.00
v/c Ratio	0.17	0.43	0.39	0.47	0.52	0.47
Control Delay	9.6	11.0	10.3	1.3	52.5	1.0
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	9.6	11.1	10.3	1.3	52.5	1.0
LOS	A	B	B	A	D	A
Approach Delay		11.0	6.3			
Approach LOS		B	A			

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 47 (36%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 59.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Powers NB Ramp & Bradley Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	0	438	210	479	559	0	0	0	0	701	0	110
Future Volume (vph)	0	438	210	479	559	0	0	0	0	701	0	110
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	461	221	504	588	0	0	0	0	738	0	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	461	221	504	588	0	0	0	0	738	0	116

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	438	210	479	559	701	110
Future Volume (vph)	438	210	479	559	701	110
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2				4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	10.0	23.0	23.0	23.0
Total Split (s)	40.0	40.0	45.0	85.0	45.0	45.0
Total Split (%)	30.8%	30.8%	34.6%	65.4%	34.6%	34.6%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	35.0	35.0	40.0	80.0	40.0	40.0
Actuated g/C Ratio	0.27	0.27	0.31	0.62	0.31	0.31
v/c Ratio	0.48	0.38	0.48	0.27	0.70	0.20
Control Delay	42.0	6.6	44.6	7.7	43.9	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.0	6.6	44.6	7.7	43.9	6.6
LOS	D	A	D	A	D	A
Approach Delay	30.5			24.7		
Approach LOS	C			C		

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 67 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 30.8	Intersection LOS: C
Intersection Capacity Utilization 59.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 26: Bradley Rd & Powers SB Ramp

Queuing Reports

TRANSPORTATION
CONSULTANTS, INC.

Queuing and Blocking Report

Intersection: 1: Powers & Bradley Rd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	L	L	T	T	R
Maximum Queue (ft)	65	165	145	508	531	234	225	101	390	755	759	272
Average Queue (ft)	19	98	53	357	369	108	125	28	156	537	549	15
95th Queue (ft)	51	153	118	513	531	184	190	69	574	917	924	186
Link Distance (ft)		969	969			921	921			4071	4071	4071
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			625	625			750	750			
Storage Blk Time (%)				0	0					10		
Queuing Penalty (veh)				0	0					10		

Intersection: 1: Powers & Bradley Rd

Movement	SB	SB	SB	SB
Directions Served	L	L	T	T
Maximum Queue (ft)	600	618	639	582
Average Queue (ft)	380	399	290	278
95th Queue (ft)	649	666	980	917
Link Distance (ft)			2274	2274
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	670	670		
Storage Blk Time (%)	2	8	0	
Queuing Penalty (veh)	7	28	2	

Queuing and Blocking Report

Intersection: 2: Legacy Dr & Bradley Rd

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	R	L	T	T	R	L	L	T
Maximum Queue (ft)	142	147	158	147	51	275	810	855	225	187	246	59
Average Queue (ft)	64	81	42	56	5	112	452	568	118	74	130	20
95th Queue (ft)	123	135	108	110	31	277	826	936	277	151	207	53
Link Distance (ft)		921	921	921	921		1235	1235				442
Upstream Blk Time (%)							0	1				
Queuing Penalty (veh)							2	9				
Storage Bay Dist (ft)	250					250			200	300	300	
Storage Blk Time (%)						0	20	35	0		0	
Queuing Penalty (veh)						0	19	54	0		0	

Intersection: 2: Legacy Dr & Bradley Rd

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	R
Maximum Queue (ft)	33	187	144	52	207
Average Queue (ft)	2	101	29	18	109
95th Queue (ft)	21	169	100	46	184
Link Distance (ft)		269	269	269	269
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	300				
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Blackmer St/Waterview North RIRO Access & Bradley Rd

Movement	WB	WB	NB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	73	75	55	348
Average Queue (ft)	7	12	18	165
95th Queue (ft)	82	112	44	340
Link Distance (ft)	894	894	236	347
Upstream Blk Time (%)				11
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report

Intersection: 1: Powers & Bradley Rd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	L	L	T	T	L
Maximum Queue (ft)	109	220	213	264	261	152	171	127	133	303	324	388
Average Queue (ft)	46	141	114	173	185	76	84	58	73	192	211	240
95th Queue (ft)	88	206	186	252	255	126	133	108	117	261	280	362
Link Distance (ft)		968	968			921	921			4063	4063	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			625	625			750	750			670
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Powers & Bradley Rd

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	412	412	418
Average Queue (ft)	259	280	289
95th Queue (ft)	377	412	416
Link Distance (ft)		2266	2266
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	670		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report

Intersection: 2: Legacy Dr & Bradley Rd

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	R	L	T	T	R	L	L	T
Maximum Queue (ft)	275	388	409	402	416	274	320	332	225	312	324	446
Average Queue (ft)	229	256	248	263	123	160	180	205	85	110	172	40
95th Queue (ft)	303	364	391	397	355	266	271	269	207	247	294	174
Link Distance (ft)		921	921	921	921		1235	1235				592
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250					250			200	300	300	
Storage Blk Time (%)	1	4				1	2	8	0	0	2	0
Queuing Penalty (veh)	4	11				3	5	15	0	0	5	0

Intersection: 2: Legacy Dr & Bradley Rd

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	R
Maximum Queue (ft)	56	283	282	117	320
Average Queue (ft)	8	144	103	37	260
95th Queue (ft)	40	240	217	85	357
Link Distance (ft)		268	268	268	268
Upstream Blk Time (%)		1	0		67
Queuing Penalty (veh)		0	0		0
Storage Bay Dist (ft)	300				
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Blackmer St/Waterview North RIRO Access & Bradley Rd

Movement	NB	SB
Directions Served	R	R
Maximum Queue (ft)	64	94
Average Queue (ft)	17	41
95th Queue (ft)	41	78
Link Distance (ft)	236	347
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Additional Attachments

Figure 19 Long-Term Bradley Road Lane Recommendations figure from the *Springs at Waterview East Preliminary Plan Traffic Impact Study*

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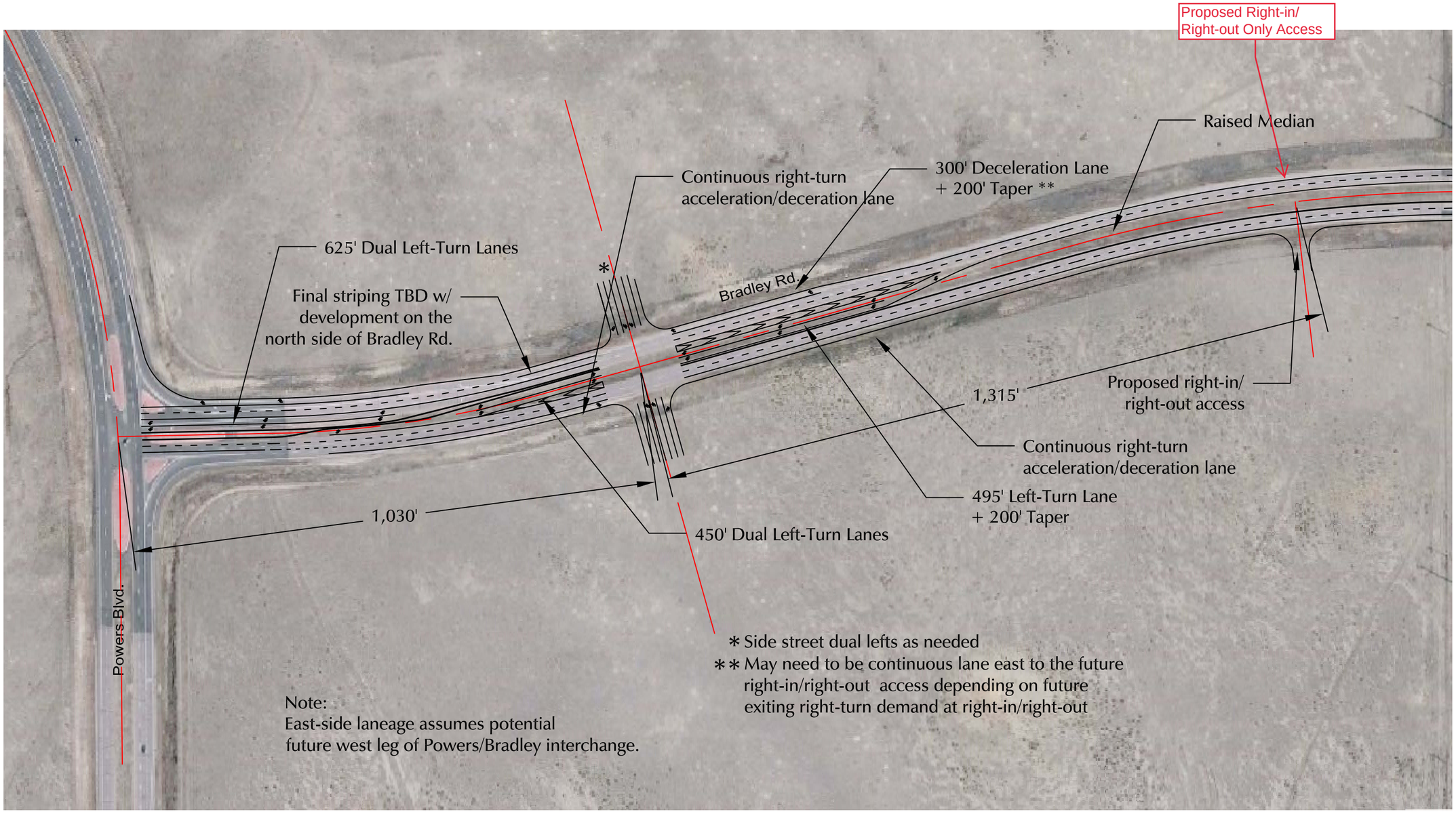


Figure 19

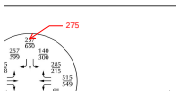
Long-Term
Bradley Road Lane Recommendations

Springs at Waterview East (LSC #184360)

LSC TRANSPORTATION CONSULTANTS, INC.

TIS_v1-FHU r2.pdf Markup Summary

Paul Brown (8)



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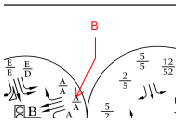

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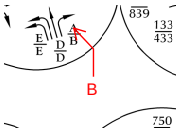

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Author: Paul Brown
Date: 10/21/2020 3:55:35 PM
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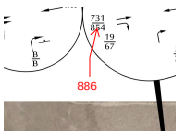

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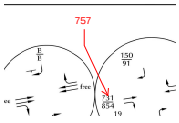
886



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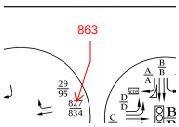

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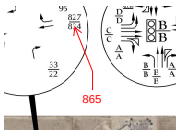

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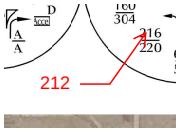

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