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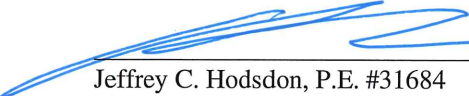
Waterview Sketch Plan
Updated Master TIS
Springs at Waterview East Preliminary Plan
(LSC #164691)

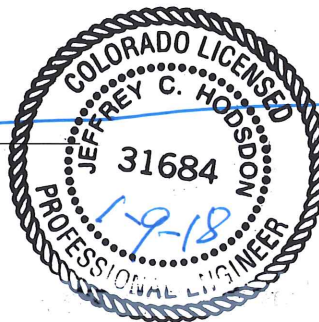
PCD Project No. SKP 16-002

January 9, 2018

Traffic Engineer's Statement

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


Jeffrey C. Hodsdon, P.E. #31684




Date

Developer's Statement

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




Date



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January 9, 2018

Mr. Charles Cothorn, P.E.
Dakota Springs Engineering
31 North Tejon, Suite 311
Colorado Springs, CO 80903

RE: Waterview Sketch Plan
Updated Master Traffic Impact Study
Springs at Waterview East Preliminary Plan
PCD Project No. SKP 16-002
El Paso County, Colorado
LSC #164691

Dear Charles:

In response to your request, LSC Transportation Consultants, Inc. has completed this updated master traffic impact study (TIS) for the Waterview Sketch Plan Amendment. The sketch plan location is shown in Figure 1. The sketch plan amendment involves two separate areas of the previous sketch plan. As shown on Figure 1, the western portion of the sketch plan area to be developed is located south of Powers Boulevard west and east of Grinnell Boulevard and the eastern portion to be developed is located north and south of Bradley Road and east of Powers Boulevard. The Bluestem Prairie Open Space and vacant Waterview Sketch Plan land use parcels are located between these two areas. The county *Major Transportation Corridors Plan (MTCP)* shows a future new section of Bradley Road between Goldfield Drive and Powers Boulevard. The Waterview parcel northwest of the Powers/Bradley intersection is located on the north side of this future Bradley Road alignment.

Site access to the western portion is proposed to Goldfield Drive, to a three-quarter movement (left-in/right-in/right-out-only) access to Grinnell Boulevard, and to a right-in/right-out-only access to Bradley Road. Site access to the eastern portion of the sketch plan is proposed to Bradley Road east and west of Powers.

This is an update to the LSC Master Traffic Impact Study (TIS) for the Waterview Sketch Plan dated July 28, 2014.

REPORT CONTENTS

This updated traffic impact report presents the anticipated traffic impacts of the proposed development on the adjacent roadways and the roadway system improvements needed to mitigate the traffic impacts. The report contains the following:

- A determination of the existing traffic and roadway conditions in the vicinity of the site including the lane geometries and traffic controls
- The projected average weekday and peak-hour vehicle-trips to be generated by the two sketch plan areas
- The assignment of the projected trips on the area roadways
- Projections of the future background and resulting total traffic volumes on the area roadways
- Level of service analysis at key intersections adjacent to and in the vicinity of the site
- A traffic signal progression analysis for Bradley Road east of Powers Boulevard
- Recommendations for intersection laneage, traffic control, and street classifications

LAND USE AND ACCESS

Figure 2 shows the Waterview Sketch Plan Amendment areas. The amendment involves west and east areas. The specific areas included in the study are shown in the red border on the figures. These include areas of amendment as well as sketch plan areas not proposed for amendment but not yet developed. Figure 2 also shows the areas of the sketch plan that have changed since completion of the *Waterview Sketch Plan Amendment Updated Master Traffic Impact Study* dated July 28, 2014 and a technical memorandum to accompany two deviation requests dated February 6, 2015. This report replaces both prior reports.

West Area

West of Grinnell Boulevard

No changes are proposed to the land use and access shown in the 2014 report and memorandum for the parcels located south of Powers Boulevard, north of Bradley Road, and west of Grinnell Boulevard. These parcels are planned to be developed for multi-family uses. Access to these parcels is proposed via an extension of Goldfield Drive west of Grinnell Boulevard, a potential right-in/right-out-only access to Grinnell Boulevard between Powers Boulevard and Goldfield Drive and a potential right-in/right-out on Bradley Road west of Grinnell. A connection would be provided to the Hassell property to the north.

East of Grinnell Boulevard

Previously planned commercial and multi-family residential development parcels southeast of Grinnell and Goldfield have been replaced with one single-family residential (Springs at Waterviews) site on the current Sketch Plan Amendment. The commercial parcel southeast of Powers/Grinnell will remain as is on the Sketch Plan. Access to these planned developments is proposed from Goldfield Drive. Also, as shown in the 2014 report and reflected on the approved Sketch Plan, a three-quarter movement (left-in/right-in/right-out-only) access to Grinnell Boulevard is planned for the commercial parcel located northeast of the intersection of Grinnell Boulevard and Goldfield Drive. The access location is 725 feet north of Goldfield Drive (centerline spacing). The County Engineer approval of this access point included the requirement for a written agreement that would require the developer to install a traffic signal at this intersection in the unlikely event that one becomes warranted/necessary.

Parcel 5 was previously planned to contain multi-family housing and Parcel 6 was previously planned to be developed with commercial uses. These two parcels are now planned to be combined and developed with 100 lots for single-family homes. Primary access to these parcels would be to Escanaba Drive. An additional three-quarter movement access to Bradley Road has been approved about 505 feet east of Grinnell Boulevard (DEV17006, attached). There is an existing access at this location for a pump station. The pump station access would be reconfigured to provide access from a new north/south internal street.

Parcel 7 is planned to be developed with commercial uses. As shown in the 2014 report, Parcel 7 was assumed to contain two restaurants, a gas station with a convenience store, a bank, and about 122,000 square feet of retail floor space. In addition to the proposed three-quarter access to Grinnell, access to this parcel would be via two full-movement access points to Cudahy Drive. The first access is about 400 feet south of Dancing Sun Way and the second access would form the west leg of the intersection of Cudahy/Dancing Sun Way. **Due to intersection spacing limitations, there can be no access to Goldfield.**

Since completion of the 2014 report the residential areas of the Painted Sky at Waterview have been almost entirely built out. At the time the updated traffic counts were conducted there were about 15 lots with homes either under construction (or recently constructed and unoccupied) in the northeast corner of that development.

East Area

West of Powers Boulevard

Parcel 16 is a vacant commercial development parcel of about 30 acres. Access would not be to Powers Boulevard, but rather would need to be to the future Bradley Road connection between Goldfield and Powers. No changes are proposed to Parcel 16.

East of Powers Boulevard

No changes are proposed to general land use for Parcels 14 and 15, which are located east of Powers Boulevard and north of Bradley Road. Parcel 14 is planned to be developed for industrial/warehouse land uses. Parcel 15 is planned to be developed for commercial uses.

Parcel 17 is planned for commercial uses. The southernmost area may potentially be used for a community recreation center.

Parcel 18 is the site of the proposed future Springs at Waterview East development with single-family residential and commercial land uses. The 2014 study assumed a land use of 785 lots for single-family homes for this parcel based on a density of 4.5 dwellings per acre. Since completion of that report a conceptual site plan has been prepared. It is now planned to be developed with 865 single-family homes. Parcel 18 also contains a potential future school site.

The 2014 study showed primary access to these parcels via a full-movement site intersection to Bradley Road about 2,000 feet east of Powers Boulevard and an additional right-in/right-out-only access to Bradley Road about 800 feet east of Powers Boulevard. The 2015 technical memorandum presented a proposed revision to these access points to show the full-movement access 800 feet east of Powers Boulevard and the right-in/right-out switched to the location 2,000 feet east of Powers Boulevard. Based on comments received from the Colorado Department of Transportation (CDOT) and a more recent meeting with CDOT, the proposed location of the full-movement access point is now being proposed at a location about 1,030 feet east of Powers Boulevard. The right-in/right-out access point is now proposed at a location about 1,300 feet east of the full-movement access. Figure 3 shows the proposed access spacing.

ROADWAY AND TRAFFIC CONDITIONS

Area Roadways

Figure 1 shows the roadways in the vicinity of the two sites. The major roadways are identified below, followed by a brief description.

- **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 update to the DRAFT 2040 *El Paso County Major Transportation Corridors Plan (MTCP)*. East of Grinnell Boulevard to Goldfield Drive, Bradley Road has been upgraded to a two-lane Urban Residential Collector rural cross section. West of Grinnell Boulevard, Bradley Road is a four-lane roadway with a 40-mph posted speed limit and has a raised median, left-turn lanes, and rural paved shoulders.
- **Grinnell Boulevard** is shown as a Minor Arterial on the 2016 DRAFT 2040 *El Paso County MTCP Update*. Grinnell Boulevard extends south from Powers Boulevard to Fontaine Boulevard and has a 40-mph posted speed limit (50 mph south of Bradley). The roadway is a median-divided, four-lane facility (plus auxiliary turn lanes) south of Bradley Road. North of Bradley, the roadway transitions to an interim two-lane roadway with auxiliary turn lanes at the Goldfield Drive intersection and the Powers intersection.
- **Goldfield Drive** has been constructed within the Painted Sky at Waterview development between Grinnell Boulevard and Bradley Road. The Grinnell Boulevard/Goldfield Drive intersection is currently unsignalized. Right-turn and left-turn deceleration lanes have been constructed on Grinnell Boulevard at the intersection. Goldfield Drive is classified as a Non-Residential Collector for the first 700 feet east of Grinnell. Between this point and Bradley to the southeast it is classified as a Residential Collector.

Existing Traffic Conditions

Figure 4w shows the existing traffic volumes at the Powers Boulevard/Grinnell Boulevard, Grinnell Boulevard/Goldfield Drive, and Bradley Road/Grinnell Boulevard intersections. The traffic volumes are based on the attached traffic counts conducted by LSC in August and September 2016. Figure 4e shows the existing traffic volumes at the Powers Boulevard/Bradley Road intersection. The traffic volumes are from the attached traffic counts conducted by LSC in October 2016.

Figures 4w and 4e also show the existing lane geometries and traffic controls at the analyzed intersections. The Powers Boulevard/Grinnell Boulevard and Powers/Bradley intersections are traffic signal controlled. The Goldfield Drive/Grinnell Boulevard intersection is Stop-sign controlled but is planned to be signalized in the future. The Bradley Road/Grinnell Boulevard intersection is all-way, Stop-sign controlled.

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 | | |
|--|--|-----------------------------------|
| Level of Service | Signalized Intersections | Unsignalized Intersections |
| | Control Delay (seconds per vehicle) | |
| A | less than 10 sec | less than 10 sec |
| B | 10-20 sec | 10-15 sec |
| C | 20-35 sec | 15-25 sec |
| D | 35-55 sec | 25-35 sec |
| E | 55-80 sec | 35-50 sec |
| F | greater than 80 sec | greater than 50 sec |

The intersection of Goldfield/Grinnell has been analyzed to determine the existing levels of service based on the unsignalized method of analysis procedures from the *Highway Capacity Manual (HCM), 6th Edition* by the Transportation Research Board. The traffic signal-controlled Powers/Grinnell and Powers/Bradley intersections have been analyzed using Synchro. The intersection of Bradley Road/Grinnell Boulevard is currently all-way Stop-sign controlled. The HCM procedure for all-way Stop-sign-controlled intersections is limited to three approach lanes. As the southbound approach at Bradley/Grinnell currently has four approach lanes, it was analyzed using Synchro/

SimTraffic. The simulation was run five times and the average stop delay per vehicle for each lane was averaged over the five runs and compared to the control delay listed in Table 1. Figures 4w and 4e show the level of service analysis results. The analyzed intersections are currently operating at satisfactory levels of service. The level of service reports are attached.

SHORT-TERM (2017) BACKGROUND TRAFFIC

Background traffic is the traffic estimated to be on the adjacent roadways without consideration of the proposed development traffic. Background traffic includes the through traffic and the traffic generated by adjacent developments but assumes zero traffic generated by the future sketch plan amendment development areas. Figures 5w and 5e show the estimated 2017 background traffic volumes for the western and eastern portions of the sketch plan area, respectively. These volumes assume buildout of Painted Sky at Waterview Filings No. 1 through Filing No. 7. In August and September 2016 when the traffic counts were conducted at the nearby intersections, there were about 15 lots with homes either under construction (or recently constructed and unoccupied) in the northeast corner of that development. The 2017 background traffic volumes were developed by first applying a three-percent-per-year growth rate to non-Painted Sky at Waterview traffic on the adjacent roadways and intersections. Estimates of traffic to be generated by completion of the Painted Sky at Waterview Filing Nos. 3 through 7 were then added to the baseline non-Waterview traffic on the adjacent street system.

2040 BACKGROUND TRAFFIC

The background traffic volumes for the year 2040 are shown on Figures 6w and 6e for the western and eastern portions of the sketch plan area, respectively. The 2040 background traffic volumes were based in part on the forecasted traffic volumes from the *El Paso County MTCP 2040 Transportation Model*. Recent adjustments to the prior volumes have been made based on 2040 projected volumes for Bradley Road shown in the DRAFT 2016 MTCP Update and volumes estimated as part of the Marksheffel South Corridor Preservation Plan Study. Background traffic volumes also include traffic volumes from properties west of Powers north of the Grinnell intersection including the Hassell property. Appendix Table 1 shows the land uses and trip generation estimate assumed for the Hassell property. It has been assumed that if the level of traffic shown is realized, there would be some level of secondary access connection on the north end of these properties.

TRIP GENERATION

The traffic volumes to be generated by the parcels within the sketch plan amendment areas have been estimated using the nationally published trip generation rates from *Trip Generation, 9th Edition*, by the Institute of Transportation Engineers (ITE). Table 2 shows the average weekday and weekday morning and afternoon peak hour. The results of the weekday trip generation estimate for the sketch plan areas are shown in Table 2.

The 2014 study assumed the traffic to be generated by 54 lots for single-family homes in Filing 7 of Painted Sky at Waterview to be “site-generated traffic.” As these lots have all now been

approved and mostly constructed, the additional traffic due to the completion of the remaining 15 homes is included as background traffic in this report.

The total number of vehicle-trips generated by the commercial parcels was reduced to account for the pass-by phenomenon. A pass-by trip is made by a motorist who would already be on the roadway system regardless of the 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 for each use were taken from *Trip Generation Handbook, 2nd Edition, June 2004*, by ITE.

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. Table 3 shows the short-term and long-term directional distributions of primary generated traffic by parcel. 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. Pass-by trips were assigned based primarily on the existing traffic volumes on the major streets adjacent to the site. Figure 7w shows the pass-by distribution estimates for Parcel 7 on the west side of the development. Figure 7e shows the pass-by distribution estimates for Parcels 15 and 17 on the east side of the development.

When the distribution percentages (from Table 3 and Figures 7w and 7e) are applied to the trip generation estimates (from Table 2), the resulting site-generated traffic volumes can be determined. Site-generated traffic includes the areas proposed for the sketch plan amendment only. Undeveloped lots previously approved for Painted Sky at Waterview have been included in the background traffic. Figure 8w shows the short-term site-generated traffic volume estimates at the intersections within the western area of the Sketch Plan. Figure 8e shows the short-term site-generated traffic volume at key intersections within the eastern portion of the sketch plan area.

Figure 9w shows the long-term site-generated traffic volume estimates at key intersections within the western area of the sketch plan. Figure 9e shows the long-term site-generated traffic volume estimates at key intersections within the eastern portion of the sketch plan area.

2017 TOTAL TRAFFIC

Figure 10w shows the 2017 total traffic volumes at the key intersections in the western portion of the sketch plan area. These traffic volumes are the sum of the 2017 background traffic volumes (from Figure 5w) plus the short-term site-generated traffic volumes (from Figure 8w). Figure 10e shows the 2017 total traffic volumes at the key intersections in the eastern portion of the sketch plan area. These traffic volumes are the sum of the 2017 background traffic volumes (from Figure 5e) plus the short-term site-generated traffic volumes (from Figure 8e). These volumes have been used in the short-term traffic analysis.

2040 TOTAL TRAFFIC

Figure 11w shows the 2040 total traffic volumes at the key intersections in the western portion of the sketch plan area. These traffic volumes are the sum of the 2040 background traffic volumes (from Figure 6w) plus the long-term site-generated traffic volumes (from Figure 9w). Figure 11e shows the 2040 total traffic volumes at the key intersections in the eastern portion of the sketch plan area. These traffic volumes are the sum of the 2040 background traffic volumes (from Figure 6e) plus the long-term site-generated traffic volumes (from Figure 9e).

PROJECTED LEVELS OF SERVICE

The intersections of Grinnell Boulevard/Powers Boulevard, Bradley Road/Powers Boulevard, Grinnell Boulevard/Goldfield Drive, Goldfield Drive/Cudahy Drive, the proposed three-quarter movement access point to Grinnell Boulevard, and the proposed access points to Bradley Road have been analyzed to determine the projected levels of service for the 2017 background, 2017 total, 2040 background, and 2040 total traffic volumes based on the signalized and unsignalized method of analysis procedures found in Synchro and the *Highway Capacity Manual, 6th Edition* by the Transportation Research Board, respectively. Figures 4w/e, 5w/e, 6w/e, 10w/e, and 11w/e show the level of service analysis results. The level of service reports are attached.

West Intersections

The intersection of Powers/Grinnell is projected to operate at a satisfactory level of service as a signalized intersection based on projected 2017 and 2040 total traffic volumes.

All movements at the proposed three-quarter-movement access point to Grinnell Boulevard are projected to operate at an acceptable level of service based on projected 2017 and 2040 total traffic volumes.

The westbound left-turn movement at the intersection of Goldfield Drive/Grinnell Boulevard is projected to operate at LOS D during the morning peak hour and LOS E during the afternoon peak hour based on projected 2017 total traffic volumes. This intersection is planned to be signalized once warrants are met. Once signalized, this intersection would operate at an acceptable level of service.

All movements at the intersection of Goldfield/Esplanade are projected to operate at an acceptable level of service based on projected 2017 and 2040 total traffic volumes.

East Intersections

The intersection of Powers/Bradley is currently signalized and is operating at a satisfactory level of service based on 2017 total traffic volumes. By 2040 some of the minor movements are projected to operate at LOS E during the peak hours. It is common for left-turn and side-street through movements to have projected delays in the LOS E 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 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.

The intersection of Marksheffel/Bradley is projected to continue to operate at an overall satisfactory level of service based on projected 2040 total traffic volumes, however some movements at this intersection are projected to operate at LOS E during peak hours.

The proposed full-movement intersection to Bradley Road is projected to operate at a satisfactory level of service as a signalized intersection based on projected 2017 and 2040 total traffic volumes. By 2040, some of the movements at this intersection are projected to operate at LOS E during peak hours. A modern roundabout could also be considered for this intersection, although the effect on Bradley Road signal progression would need to be evaluated.

The proposed right-in/right-out-only access to Bradley Road is projected to operate at a satisfactory level of service based on projected 2017 total traffic volumes. By 2040, the southbound right-turn movement at this access is shown by SimTraffic simulation analysis to operate at LOS E during the afternoon peak hour. However, LOS D or better could be achieved by reducing the southbound right-turn volume through site design (shifting traffic demand to the signalized intersection to the east) or using an alternate design for laneage between the access and Powers. This could be addressed at the time of site development.

QUEUING ANALYSIS

A queuing analysis was performed using Synchro/SimTraffic to determine the maximum vehicle queue lengths that can be expected in the vicinity of the site. The 2040 total peak-hour traffic volumes, lane geometry, and signal timings were entered in the model and the simulation was run five times. The queuing reports are attached.

The projected northbound left-turn queue on Grinnell approaching Powers is 307 feet during the morning peak hour and 288 feet during the afternoon peak hour.

The projected southbound left-turn queue on Grinnell approaching the proposed three-quarter movement site access is 97 feet during the morning peak hour and 128 feet during the afternoon peak hour.

TRAFFIC SIGNAL WARRANT ANALYSIS

The full-movement access to Bradley Road just east of Powers Boulevard was analyzed to determine when a Four-Hour Vehicular Volume Traffic Signal Warrant threshold would be reached or exceeded based on the projected peak-hour traffic volumes. This analysis using the peak hours is intended to provide an indication that a warrant may be met or is close to being met. In order for a Four-Hour Traffic Signal Warrant to be satisfied, the volume threshold would need to be met for two additional hours of the day. For example, the four-hour warrant would be satisfied

with the volume thresholds met for two hours in the morning (instead of the one-hour peak), one hour during the afternoon peak period, and an hour during the mid-afternoon.

The analysis was based on the 70% Factor Four-Hour Vehicular Volume Warrant with two or more lanes on both the major and minor approaches (assuming dual northbound left-turn lanes). For this warrant the lower threshold minor approach volume of 80 vehicles per hour is applicable once the major street traffic is above 875 vehicles per hour. The existing morning and afternoon peak-hour volumes on Bradley Road currently exceeds 875 vehicles per hour. The minor approach was assumed to include only the northbound left-turn movements. Figure 4 shows the projected short-term site-generated traffic volumes at this intersection due to the residential portion of the development (Zone 17) and due to the commercial portion of the development (Zone 18). As shown on Figure 4, the residential portion of the development is projected to generated about 322 vehicles per hour during the morning peak hour and 214 vehicles per hour during the afternoon peak hour. Based on these volumes it is anticipated that the minor approach volume threshold would be met based on both the morning and afternoon peak hour once 37 percent of the single-family homes within Zone 18 are occupied. The threshold may be met sooner if all or a portion the commercial development within Zone 17 is constructed.

TRAFFIC SIGNAL PARTICIPATION

The individual Waterview developments located west of Powers will contribute (via escrow) toward the cost of the planned future traffic signal at the intersection of Grinnell/Goldfield based on the formula used previously. The amounts will be determined with final plat submittals.

The individual Waterview developments located east of Powers will contribute (via escrow) toward the cost of the planned future traffic signal at the intersection of Bradley Road/proposed Waterview full-movement access. The amounts will be determined with final plat submittals.

Also, regarding the planned three-quarter movement access to Grinnell Boulevard for the future commercial site located southeast of Powers/Grinnell (the prior County-Engineer-approved access location is 725 feet north of Goldfield Drive - centerline spacing), the County Engineer approval of this access point included the requirement for a written agreement that would require the developer to install a traffic signal at this intersection in the unlikely event that one becomes warranted/necessary. This will be addressed with the Preliminary Plan/final plat for this commercial site.

TRAFFIC SIGNAL PROGRESSION ANALYSIS

LSC has completed an analysis of the traffic signal progression along Bradley Road assuming the proposed signalized, full-movement access location 1,030 feet east of Powers. This analysis includes the potential extension of Bradley Road to the east, which would introduce east and west straight through movement across Powers. Until such time as Bradley is extended west of Powers (which would be in the future on an as-needed basis) there would be no straight through movements/progression bands across Powers to consider.

Two separate analyses have been completed. The first considers progression of vehicles through the Powers/Bradley and Bradley/site access intersections only. The second analysis presents a Bradley Road arterial progression from Powers through Marksheffel.

First Analysis

The first analysis looks at the potential for good efficiency with the coordination of vehicle movement through the Powers/Bradley and Bradley/site access intersections only. This has been analyzed should the County and CDOT decide to have CDOT coordinate these two signals together with the City separately operating Bradley signals to the east at Foreign Trade Zone/Bradley and Marksheffel/Bradley.

The progression bands through these two signals are shown in two related exhibits. The time/space diagram in Exhibit 1A shows the first component—progression bands for through movements east and west across Powers and through the proposed access. As shown by the bands the east/west through green time across Powers would likely be limited even if a future fourth and west leg of the Powers/Bradley intersection is added. The signal green time will likely be more heavily allocated to the priority north/south through movements on Powers and the southbound left turn. Exhibit 1B shows the second component—the “route” progression bands to/from Powers north of Bradley. The diagram shows the “route” band for the heavy southbound left turn from Powers followed by the eastbound movement through the proposed Waterview intersection (at 1,030 feet east of Powers). The westbound band is not restricted by the Powers intersection as in the westbound direction traffic has a free right onto northbound Powers.

As shown, good progression could be achieved east/west straight through both intersections. Good coordination also would be possible for the southbound left followed by the straight through at the Waterview signal. This is a site-specific situation given the significantly lower volumes projected for Bradley (if ever extended) west of Powers (compared to Bradley east of Powers) and the projected heavy southbound left from Powers followed by the eastbound through movement at the proposed Waterview signalized intersection. Effective coordination would be possible due to the relatively close proximity of the two signals.

Second Analysis

The second analysis presents a Bradley Road arterial progression that includes a future signal at the proposed Waterview full-movement access as well as a future signal at the Foreign Trade Zone/Bradley intersection and the existing signal at the Bradley/Marksheffel intersection. This analysis is shown in Exhibit 2A. This analysis assumes a 50-mile-per-hour (mph) progression speed and a 130-second cycle. Good progression bands are shown. Eastbound would have a progression efficiency of 33 percent. Westbound would have a progression efficiency of 27 percent due to the limited westbound through green at the Marksheffel intersection. The westbound through movement is shown limited because of the combination of projected volumes on “competing” approaches and left turning movements. These include a projected future heavy opposing eastbound left-turn movement volume and north/south through and left volumes on Marksheffel.

Exhibit 2A shows Bradley progression bands without including the Powers Boulevard intersection. The reason is the east/west through green time across Powers would likely be limited even if a future fourth and west leg of the Powers/Bradley intersection is added. The signal green time will likely be heavily allocated to the priority north/south movements on Powers. The southbound left-turn movements especially and the eastbound left-turn movements will also require significant green allocation to serve the projected volumes. Exhibit 2B shows the progression analysis from Exhibit 2A, but with the Powers intersection added. For this analysis, the southbound left turn at the Powers intersection was set to be included as part of the eastbound bands on Bradley Road and the offset was positioned to show how the southbound left turn could be coordinated with the signals to the east along Bradley Road. Alternatively, the analysis showing through bands across Powers are shown in Exhibit 2C. Powers could be considered a break point in the east/west through progression as achieving a wide through bandwidth across Powers is not realistic or expected by motorists.

CONCEPTUAL LANE EXHIBIT (EAST SIDE)

Figures 12 and 13 present to-scale conceptual lane exhibits. These exhibits have been prepared to depict the recommended short- and long-term auxiliary turn lane and center median configuration at the west Waterview access point and between this intersection and Powers.

Figure 12 shows the short-term recommended laneage. This assumes no fourth leg of the Powers/Bradley intersection and the Waterview parcel northeast of Bradley and Powers not yet developed. It assumes development southeast of Bradley and Powers and the proposed Waterview access 1,030 feet east of Powers extended south of Bradley (but not yet north of Bradley).

Figure 13 shows the long-term recommended laneage at buildout of the Sketch Plan. Although the lanes on the west side of Powers are not shown on the figure, the lanes on the east leg have been drawn assuming the possible future west leg of Powers/Bradley in place. This has been included so that sufficient width is reserved in case a west leg of Bradley/Powers is ever built. If needed in the future, Bradley Road between Goldfield and Powers is planned to be a two-lane Collector street. Figure 13 shows multiple east/west through lanes on the east leg of the Bradley/Powers intersection in case multiple through lanes on the eastbound and westbound intersection approaches to Powers are needed for signalized intersection capacity. There would be a transition/reduction to two through lanes on Bradley west of the intersection.

POWERS NORTHBOUND TO BRADLEY ROAD RIGHT-TURN MOVEMENT

The northbound right-turn lane on Powers at Bradley Road is currently a channelized right-turn lane into an acceleration lane on eastbound Bradley Road. Figures 12 and 13 show no changes to this current configuration except the right-turn acceleration lane would end as an eastbound right-turn lane at the proposed site access instead of the current transition taper. Once the Waterview parcel on the north side of Bradley Road begins to develop, the eastbound left-turn lane would be added on Bradley Road to the west of the proposed Waterview intersection in the median section between Powers and this intersection. Motorists traveling to the north-side Waterview development from northbound Powers would turn right onto Bradley Road then left at the Waterview intersection 1,030 feet east of Powers. For the foreseeable future, with Powers/Bradley remaining a T-intersection, there will be no traffic

conflicts for motorists wanting to complete the sequential maneuvers to enter the Waterview north-side parcel (except for the period of time during the southbound-to-eastbound left-turn signal phase). If such a motorist arrives at the northbound approach to Powers/Bradley during the period of the southbound left-turn green phase, some motorists may choose to pause and wait for most of the traffic arriving from the southbound Powers left turn to pass before maneuvering to the left in order to enter the downstream eastbound left-turn lanes. The operations (and if necessary, any design details) of this northbound right turn can be evaluated at the time of development of the north-side Waterview parcel and the creation of the fourth/north leg of the full-movement access intersection.

SIGHT DISTANCE

Intersection/Access Sight Distance Analysis

Figure 14 shows the sight distance analysis for the Bradley Road access points east of Powers Boulevard.

CONCEPTUAL LANE EXHIBIT (WEST SIDE)

Long-Term Recommendations

Street improvements in the Waterview Sketch Plan area include upgrades of Grinnell Boulevard to a four-lane Minor Arterial with right-turn and left-turn lanes at the intersections. Figures 15 and 16 show the anticipated short-term and long-term intersection lane geometry and traffic controls adjacent to the future commercial site. These include the spacing of the approved Grinnell three-quarter movement site access north to Powers Boulevard and south to Goldfield Drive and the recommended lengths for northbound right-turn deceleration lanes and southbound left-turn lanes on Grinnell. These are based on an assumed 40-mph posted speed limit between Bradley and Powers. The analysis assumes Powers Boulevard is widened to three through lanes in each direction.

The spacing of the planned future three-quarter-movement access to the future commercial center previously approved by deviation is shown 985 feet south of Powers Boulevard. The exact location and resulting spacing from Powers Boulevard could be adjusted in the future with the Preliminary Plan for this parcel as needed to address CDOT concerns regarding the spacing from the future Powers Grinnell ramp interchange intersection. An adjustment to the access location may not be necessary because the conceptual Powers/Grinnell interchange southbound (actually eastbound) on-ramp alignment may need to be updated with a shift to the north. Such a shift may achieve the CDOT-Access-Code-prescribed 550-foot spacing between the future ramp intersection and the future three-quarter-movement access.

Regarding the potential future segment of Bradley Road between Powers Boulevard and Goldfield Drive, a BOCC resolution approved a 90-foot right-of-way Collector for this segment. Although the current DRAFT 2016 MTCP Update shows this segment with a classification of "Minor Arterial," it is shown as a two-lane Minor Arterial. Therefore, the street cross section/laneage and right-of-way are likely intended to match the resolution although the MTCP update proposes an

arterial classification rather than a collector. LSC would suggest clarification in this Sketch Plan Amendment to the effect that if Bradley is classified as an arterial, that access spacing and type to the Sketch-Plan-designated commercial parcel northwest of Powers/Bradley be consistent with that approved with the BOCC resolution or allowable under the Collector classification designated with the resolution. Note: Two through lanes eastbound/westbound are shown at the intersection with Powers, however the intent is four through lanes at the intersection would transition to two through lanes just west of Powers.

DEVIATION REQUEST FORMS

East of Powers Boulevard

Two El Paso County deviation request forms for the two Waterview Sketch Plan access points to Bradley Road east of Powers have been prepared to accompany this report. This report supports the currently proposed Sketch Plan Amendment by presenting and analyzing the proposed change to the access plan shown on the approved 2014 Waterview Sketch Plan Amendment (and the traffic impact analysis by LSC dated July 24, 2014). The two deviation forms are required as the proposed access spacing is shorter than the one-half mile prescribed by the ECM. This report and accompanying deviation forms **supersede** the February 6, 2015 Technical Memorandum entitled *Waterview Sketch Plan – Bradley Road Access*.

The number of Waterview planned access points to Bradley Road would remain the same at two, but the full-movement access is now proposed to be located 1,030 feet east of Powers and the right-in/right-out access would be switched to the location 2,350 feet east of Powers (centerline spacing). The deviation forms present the reasons and justification for the access point spacing as currently requested and summarize the technical findings developed in this report.

APPROVED ACCESS DEVIATIONS

Two west-area three-quarter movement intersections have been approved by staff. These include one on Bradley Road east of Grinnell Boulevard and one on Grinnell Boulevard between Powers Boulevard and one on Goldfield Drive (on the east side of Grinnell).

The three-quarter movement access to Bradley Road will be about 505 feet east of Grinnell Boulevard for the currently proposed residential subdivision northeast of Grinnell/Bradley. This deviation was recently approved by the County Engineer (DEV17006).

The three-quarter movement (left-in/right-in/right-out-only) access to Grinnell Boulevard is planned to serve the future commercial parcel located northeast of the intersection of Grinnell Boulevard and Goldfield Drive. The county-approved access location is 725 feet north of Goldfield Drive (centerline spacing). The County Engineer approval of this access point included the requirement for a written agreement that would require the developer to install a traffic signal at this intersection in the unlikely event that one becomes warranted/necessary.

The exact location and resulting spacing from Powers Boulevard could be adjusted in the future with the Preliminary Plan for this parcel as needed to address CDOT concerns regarding the spacing from the future Powers/Grinnell ramp interchange intersection. An adjustment may not be necessary because the conceptual Powers/Grinnell interchange southbound (actually eastbound) on-ramp may need to be shifted north as it appears to pass through developed properties.

INTERNAL STREET CLASSIFICATIONS

The street classifications for the Springs at Waterview East streets will be confirmed with the plat submittals, however the main entry drive extending south from the proposed full-movement access to Bradley to the proposed roundabout and southwest along the commercial parcel would be classified as Urban Non-Residential Collector streets. The main street through the project extending southeast from the roundabout to the adjacent property to the east will be an Urban Residential Collector. All other streets are expected to be classified as Urban Local or Urban Local Low Volume. The local-level street classifications will be detailed with the plat submittals.

* * * * *

Please contact me if you have any questions regarding this report.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By 

Jeffrey C. Hodsdon, P.E. PTOE
Principal

JCH:KDF:bjwb

Enclosures: Tables 2 and 3
Figures 1-16
Approved Deviation (DEV17006)
Appendix Table 1
Exhibits 1A-1B, 2A-2C
Traffic Count Reports
Level of Services Reports

**Table 3
Trip Distribution
Waterview Sketch Plan Amendment**

| Parcel | Use | % Directional Distribution | | | | | | | | | | | | | | |
|-------------------|---------------------|----------------------------|--------------|--------------|----------------|-----------------|----------------|-------------------|--------------|-------------------|--------------------------|-----------------------|------------------|------------------|-------------|------------|
| | | North Powers | South Powers | West Bradley | South Grinnell | South Goldfield | West Goldfield | North Marksheffel | East Bradley | South Marksheffel | North Federal Trade Zone | South Bradley Heights | Southeast Retail | Northeast Retail | West Retail | P16 Retail |
| Short Term | | | | | | | | | | | | | | | | |
| 1-4 | W Multi-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 5 | W Multi-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 6 | W Commercial | 24 | 5 | 29 | 20 | 15 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 7 | W Commercial | 24 | 5 | 29 | 20 | 15 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 8 | W Single-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 10 | W Single-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 10 | W Single-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 10 | W Single-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 10 | W Single-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 11 | W Single-Family | 28 | 1 | 37 | 24 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 14 | E Office/Industrial | 27 | 25 | 8 | 4 | 0 | 0 | 28 | 2 | 5 | 1 | 0 | 0 | 0 | 0 | 0 |
| 15 | E Commercial | 15 | 42 | 10 | 5 | 0 | 0 | 10 | 5 | 10 | 1 | 0 | 0 | 2 | 0 | 0 |
| 16 | E Commercial | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | E Commercial | 15 | 42 | 10 | 5 | 0 | 0 | 12 | 5 | 10 | 1 | 0 | 0 | 0 | 0 | 0 |
| 18 | E Single-Family | 30 | 29 | 10 | 1 | 0 | 0 | 20 | 4 | 4 | 0 | 0 | 1 | 0 | 1 | 0 |
| Long Term | | | | | | | | | | | | | | | | |
| 1-4 | W Multi-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 5 | W Multi-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 6 | W Commercial | 19 | 6 | 19 | 19 | 15 | 1 | 5 | 5 | 5 | 2 | 2 | 0 | 0 | 2 | 0 |
| 7 | W Commercial | 19 | 6 | 19 | 19 | 15 | 1 | 5 | 5 | 5 | 2 | 2 | 0 | 0 | 2 | 0 |
| 8 | W Single-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 10 | W Single-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 10 | W Single-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 10 | W Single-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 10 | W Single-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 11 | W Single-Family | 32.5 | 1 | 24 | 21 | 8 | 0 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 |
| 14 | E Office/Industrial | 23 | 25 | 6 | 2 | 0 | 0 | 30 | 5 | 4 | 2 | 3 | 0 | 0 | 0 | 0 |
| 15 | E Commercial | 7 | 26 | 8 | 3 | 0 | 0 | 16 | 15 | 15 | 3 | 5 | 0 | 2 | 0 | 0 |
| 16 | E Commercial | 7 | 26 | 8 | 3 | 0 | 0 | 16 | 15 | 15 | 3 | 5 | 0 | 0 | 0 | 2 |
| 17 | E Commercial | 9 | 26 | 8 | 3 | 0 | 0 | 16 | 15 | 15 | 3 | 5 | 0 | 0 | 0 | 0 |
| 18 | E Single-Family | 24.5 | 26 | 7 | 0 | 0 | 0 | 23 | 8 | 4 | 2 | 2 | 1 | 1 | 1 | 0.5 |

Source: LSC Transportation Consultants, Inc.



Approximate Scale
Scale: 1" = 3,000'



Figure 1

Vicinity Map

Waterview Sketch Plan Amendment (LSC #164691)





Approximate Scale
Scale: NTS

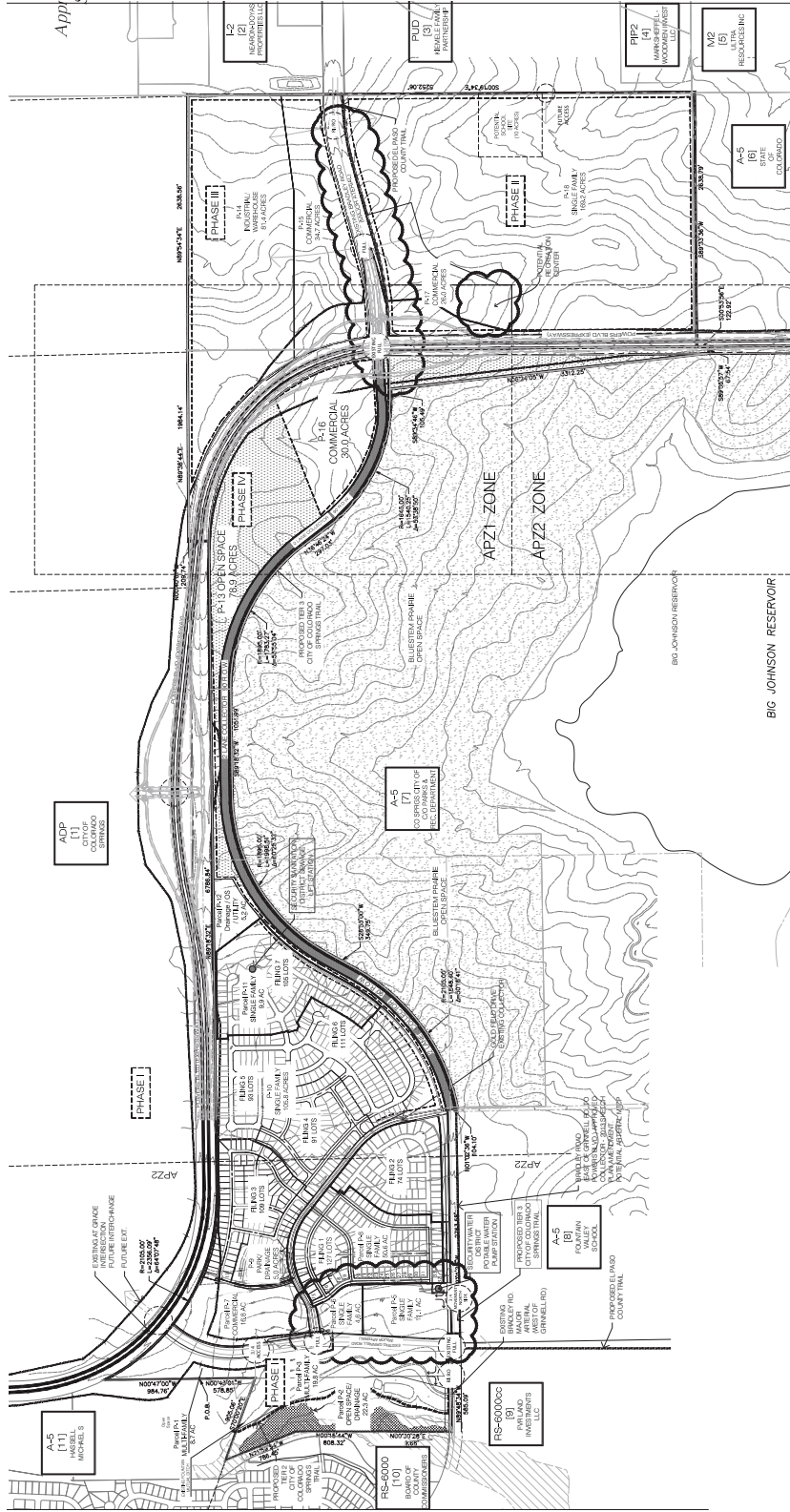


Figure 2
**Sketch
Plan Amendment**
Springs at Waterview East (LSC #164691)

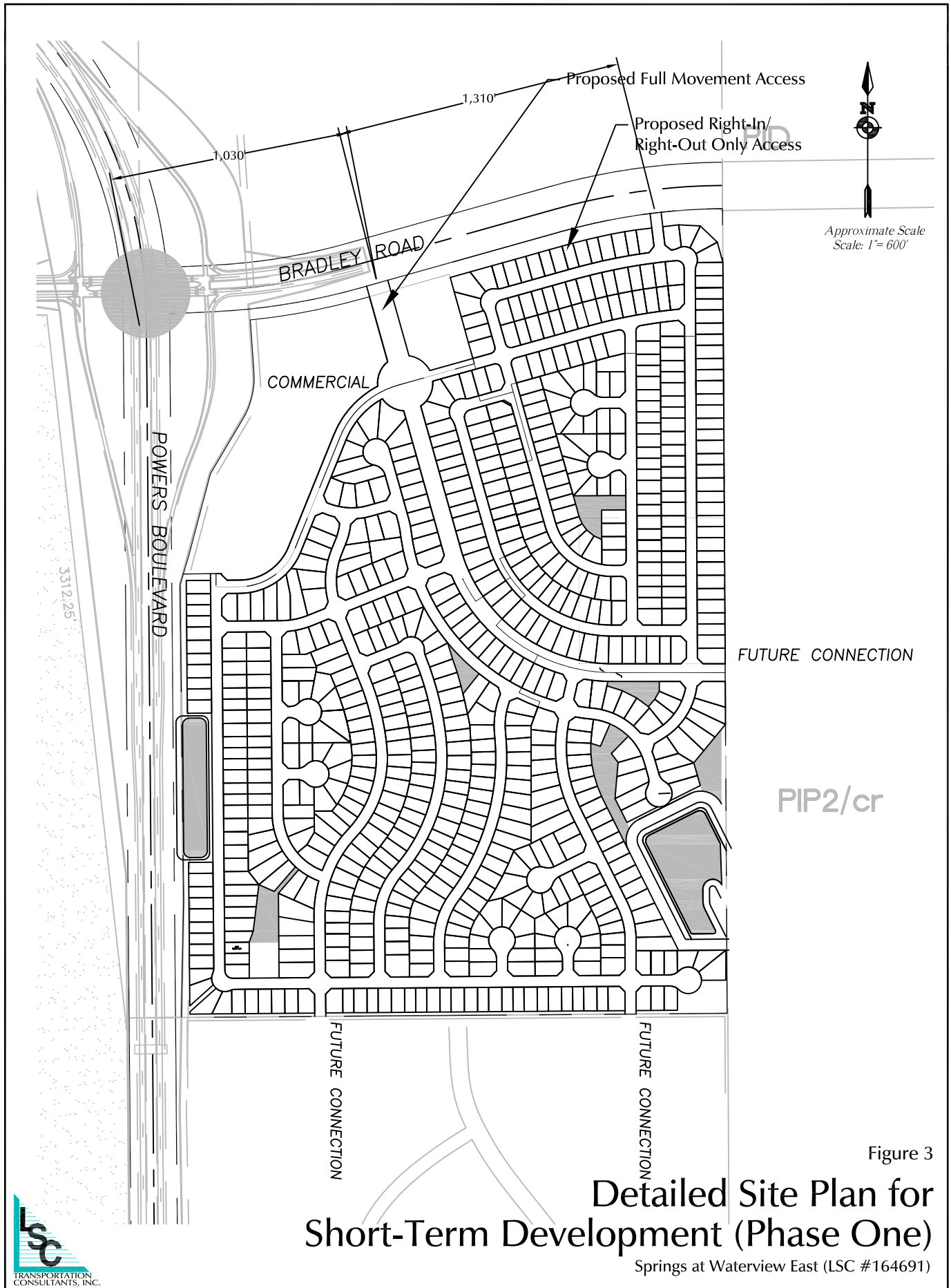


Figure 3

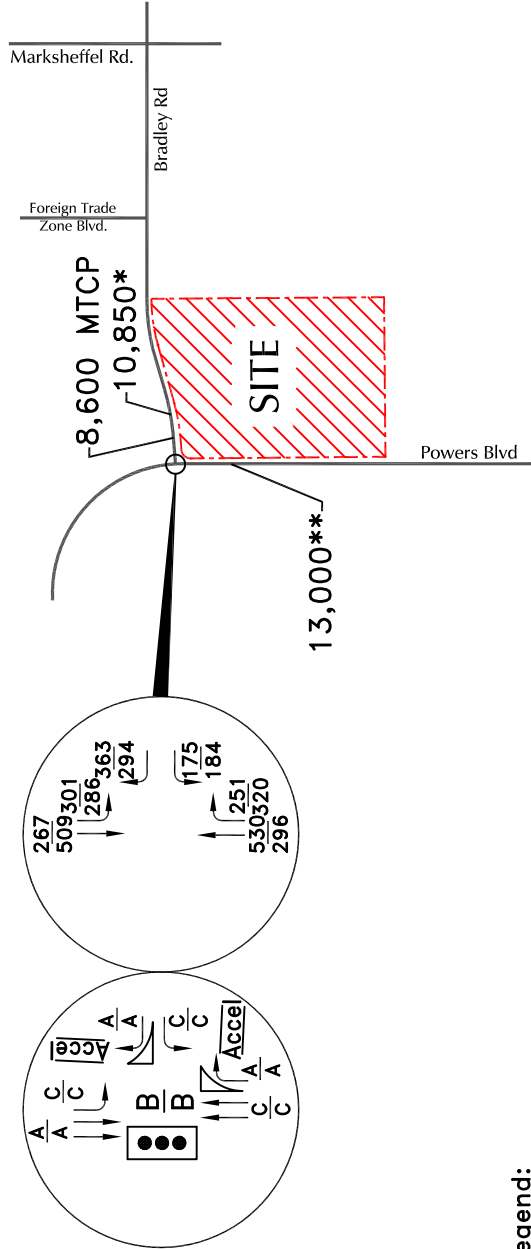
Detailed Site Plan for Short-Term Development (Phase One)

Springs at Waterview East (LSC #164691)





Approximate Scale
Scale: 1" = 3,000'



Legend:

↑ - Stop sign



- Traffic Signal

$\frac{XX}{XX}$ - Weekday peak-hour traffic (vehicles per hour) counts by LSC October 2016

X,XXX - Average weekday traffic (vehicles per day) **2015 AADT CDOT

$\frac{B}{C}$ - Individual movement peak-hour Level of Service

$\frac{B}{B}$ - Entire intersection peak-hour Level of Service (weighted average of all movements)



Figure 4e

East Area Existing Traffic, Lane Geometry, Traffic Control and Level of Service

Waterview Sketch Plan Amendment (LSC #164691)



Approximate Scale
Scale: 1" = 1,200'

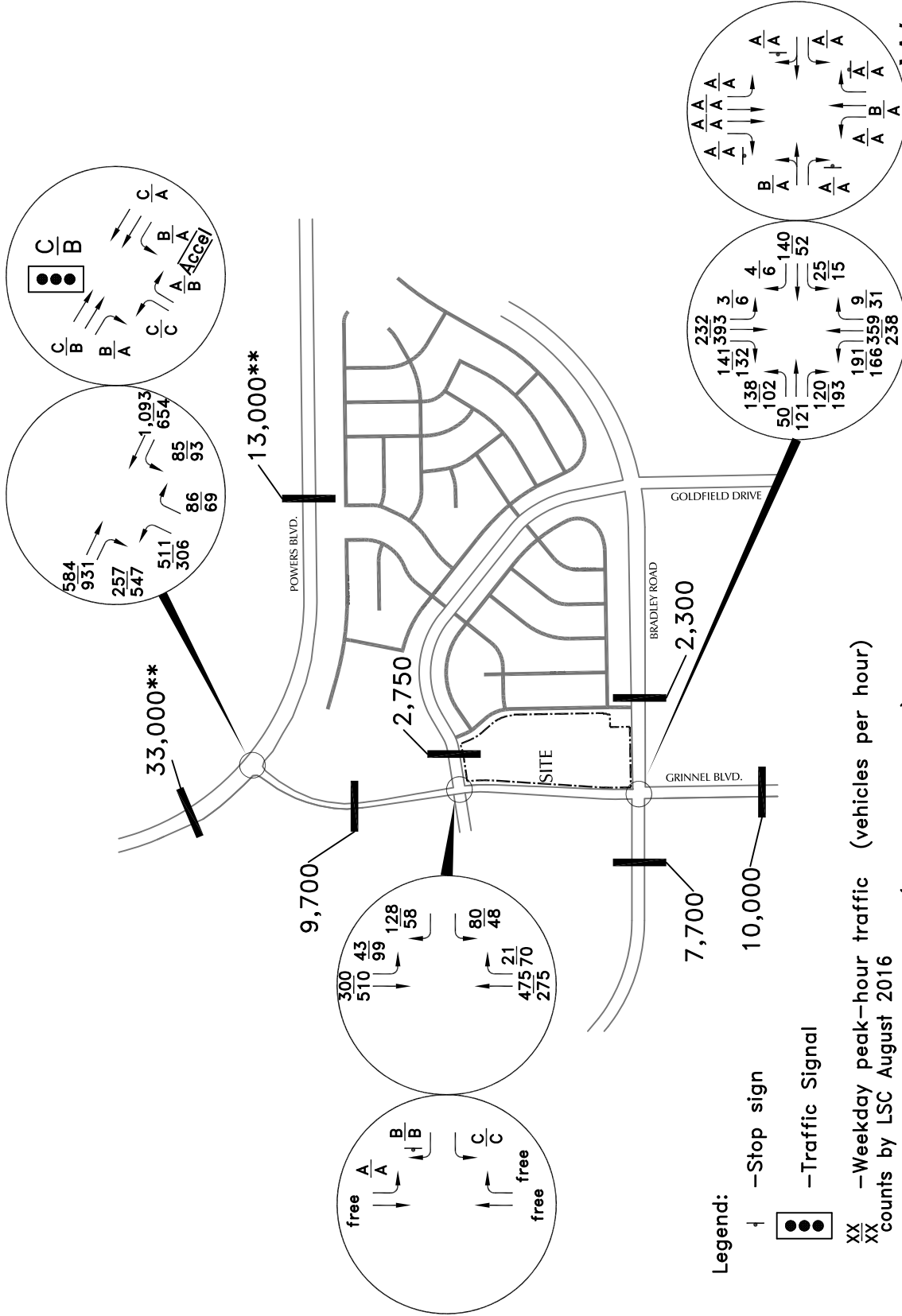
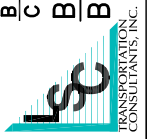


Figure 4w
West Area
Existing Traffic, Lane Geometry,
Traffic Control and Level of Service

Waterview Sketch Plan Amendment (LSC #164691)

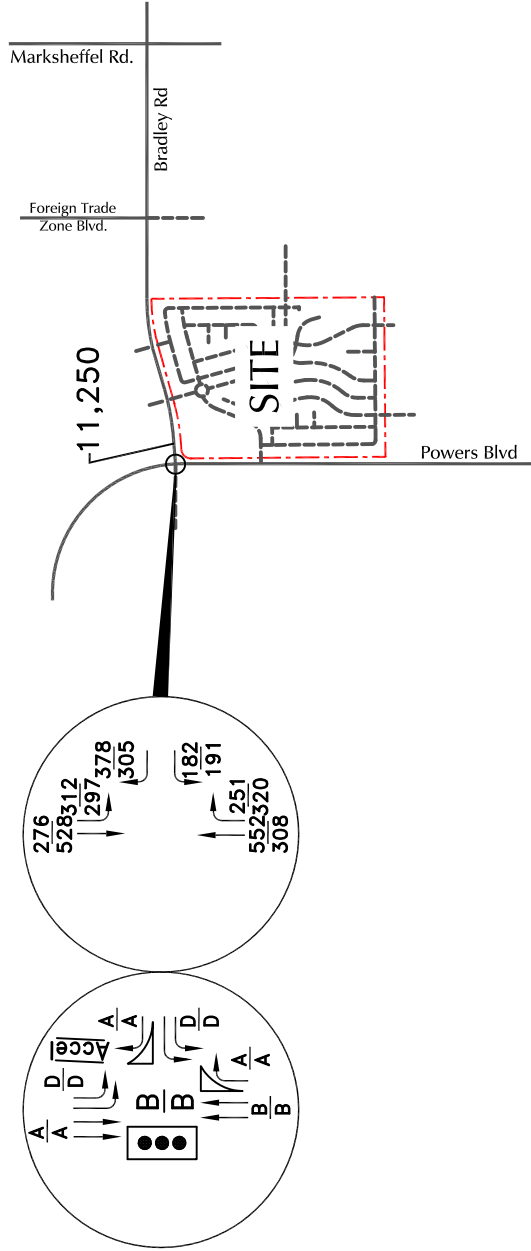
- Legend:**
- | - Stop sign
 - - Traffic Signal

- XX - Weekday peak-hour traffic (vehicles per hour) counts by LSC August 2016
- X,XXX - Average weekday traffic (vehicles per day) **2015 AADT CDOT, otherwise estimates by LSC
- B/C - Individual movement peak-hour Level of Service
- B/B - Entire intersection peak-hour Level of Service (weighted average of all movements)





Approximate Scale
Scale: 1" = 3,000'



Legend:

↑ - Stop sign



- Traffic Signal

XX XX - Weekday peak-hour traffic (vehicles per hour)

X,XXX - Average weekday traffic (vehicles per day)

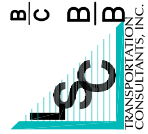
$\frac{B}{C}$ - Individual movement peak-hour Level of Service

$\frac{B}{B}$ - Entire intersection peak-hour Level of Service (weighted average of all movements)

Figure 5e

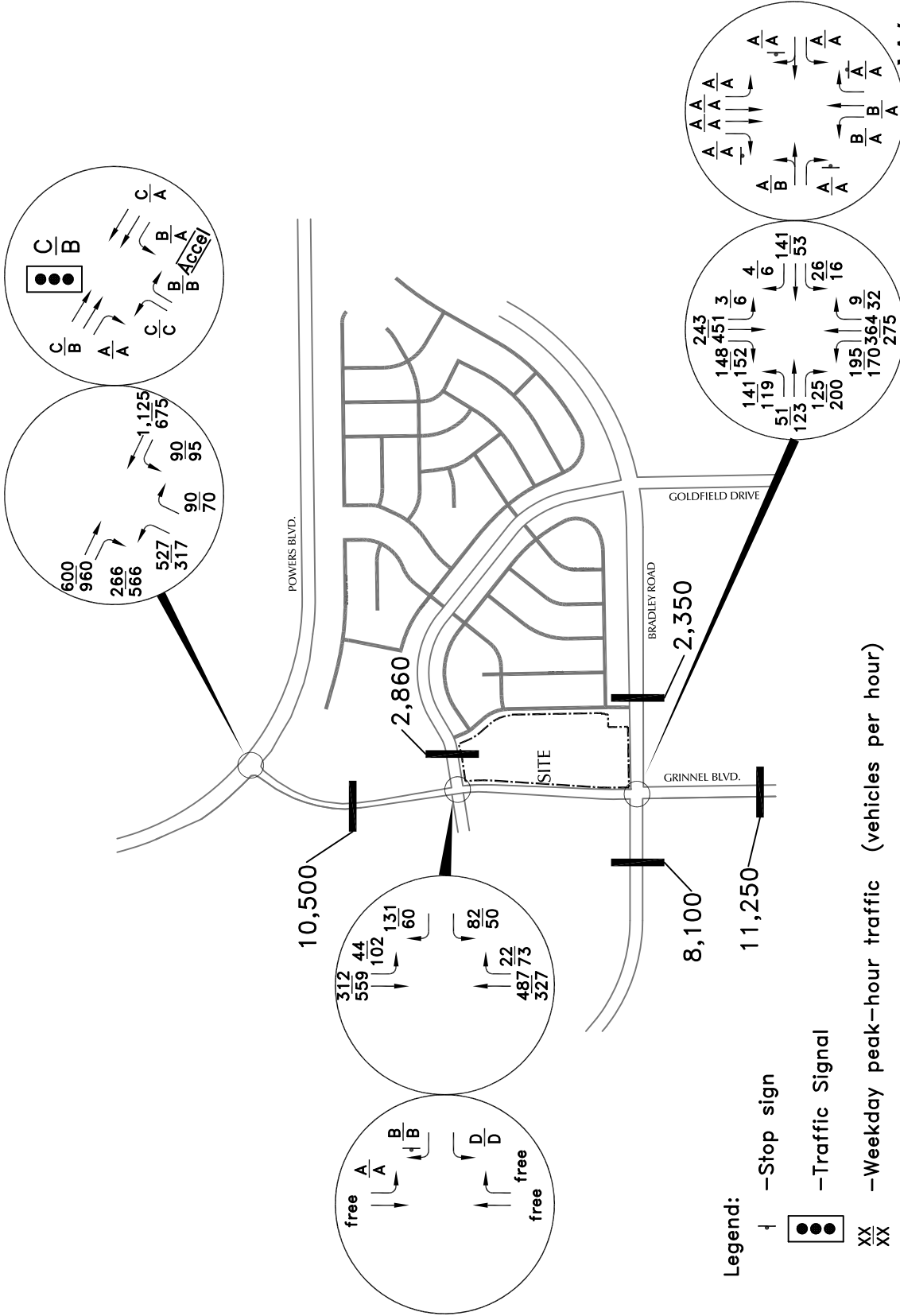
East Area Year 2017 Background Traffic, Lane Geometry, Traffic Control and Level of Service

Waterview Sketch Plan Amendment (LSC #164691)



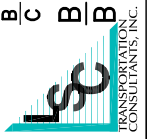


Approximate Scale
Scale: 1" = 1,200'



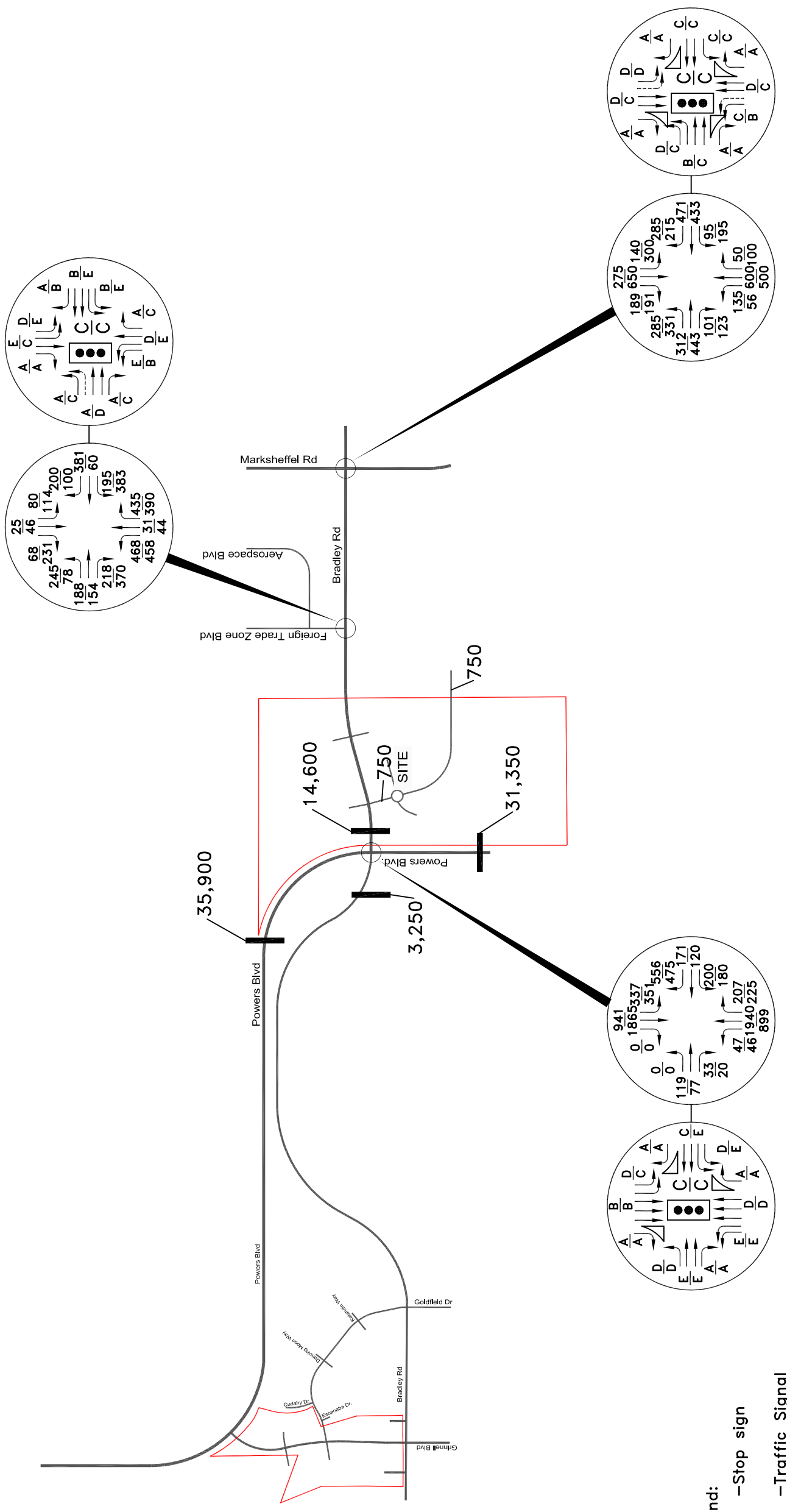
West Area Year 2017 Background Traffic, Lane Geometry, Traffic Control and Level of Service

Waterview Sketch Plan Amendment (LSC #164691)





Approximate Scale
Scale: 1" = 2,000'



Legend:

- ↑ - Stop sign
- - Traffic Signal

XX XX - Weekday peak-hour traffic (vehicles per hour)

X,XXX - Average weekday traffic (vehicles per day)

$\frac{B}{C}$ - Individual movement peak-hour Level of Service

$\frac{B}{B}$ - Entire intersection peak-hour Level of Service (weighted average of all movements)

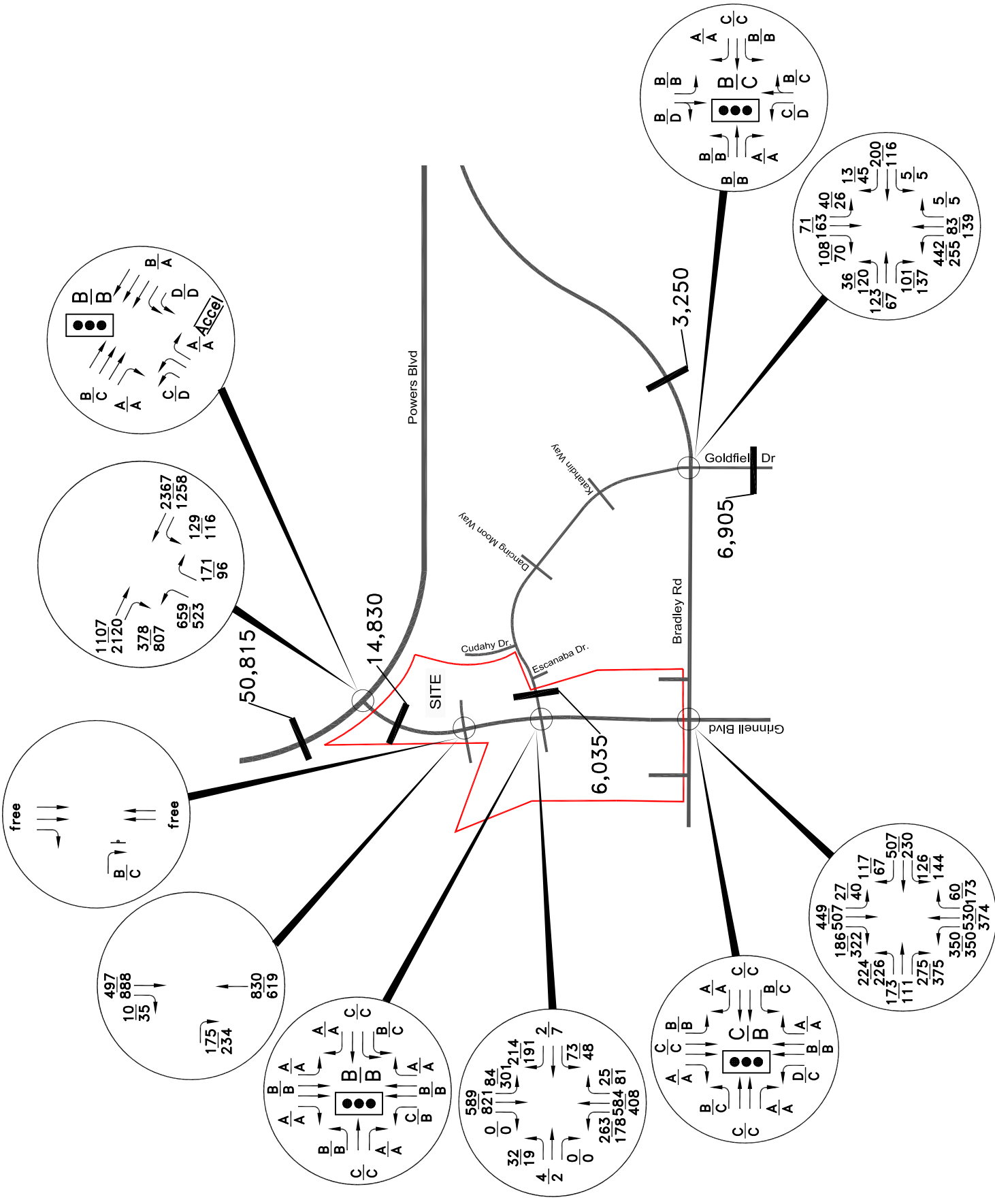
Figure 6e

East Area 2040 Background Traffic, Lane Geometry, Traffic Control and Level of Service





Approximate Scale
Scale: 1" = 1,200'



Legend:

- ↑ - Stop sign
- ◼◼ - Traffic Signal
- XX - Weekday peak-hour traffic (vehicles per hour)
- XX,XXX - Average weekday traffic (vehicles per day)
- $\frac{B}{C}$ - Individual movement peak-hour Level of Service
- $\frac{B}{B}$ - Entire intersection peak-hour Level of Service (weighted average of all movements)

Figure 6w

West Area West Area 2040 Background Traffic, Lane Geometry, Traffic Control and Level of Service





Approximate Scale
Scale: 1" = 3,000'

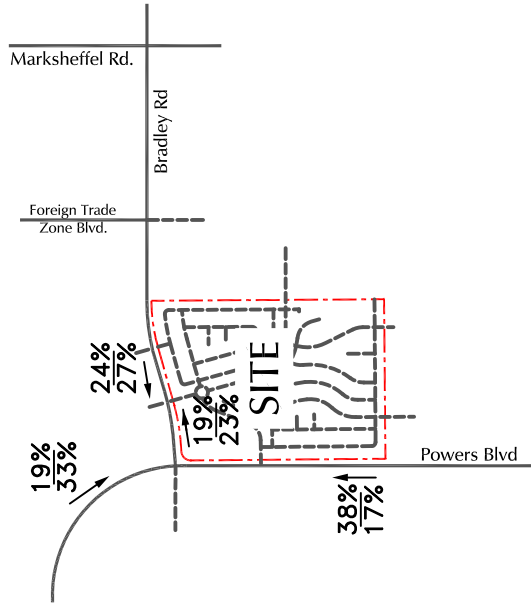


Figure 7e
East Area
Passby Distribution Estimate
Waterview Sketch Plan Amendment (LSC #164691)

Legend:

XX% AM passby distribution estimate
XX% PM passby distribution estimate





Approximate Scale
Scale: 1" = 1,200'

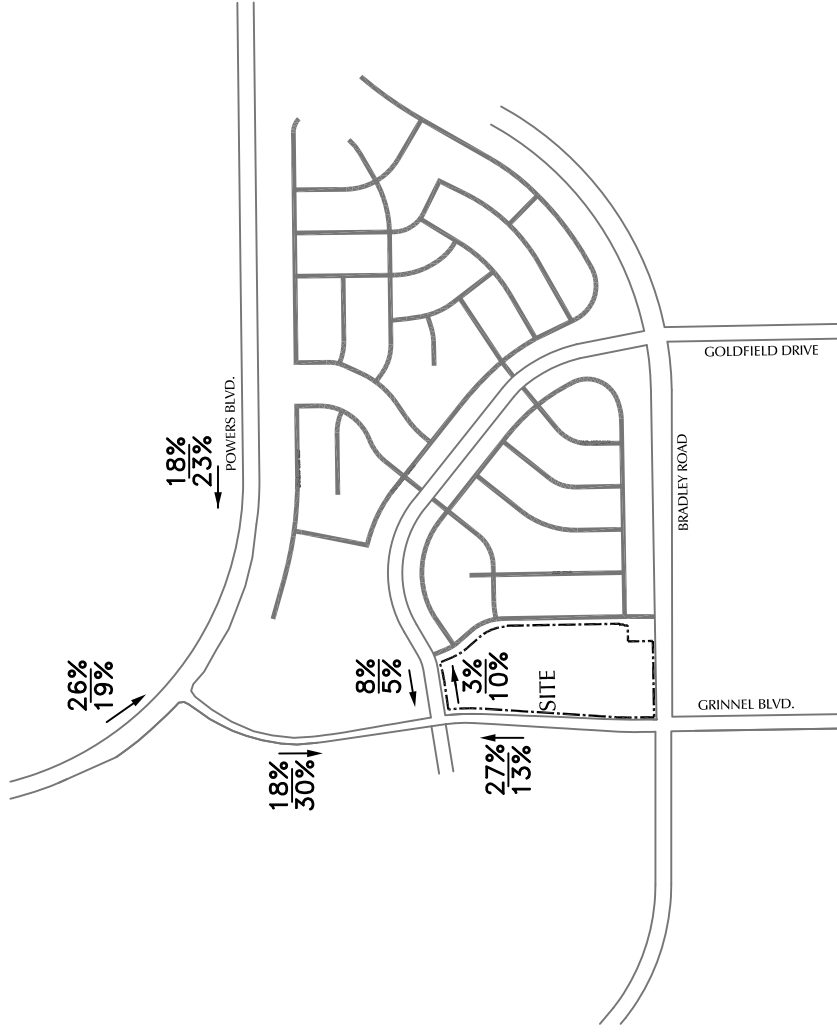


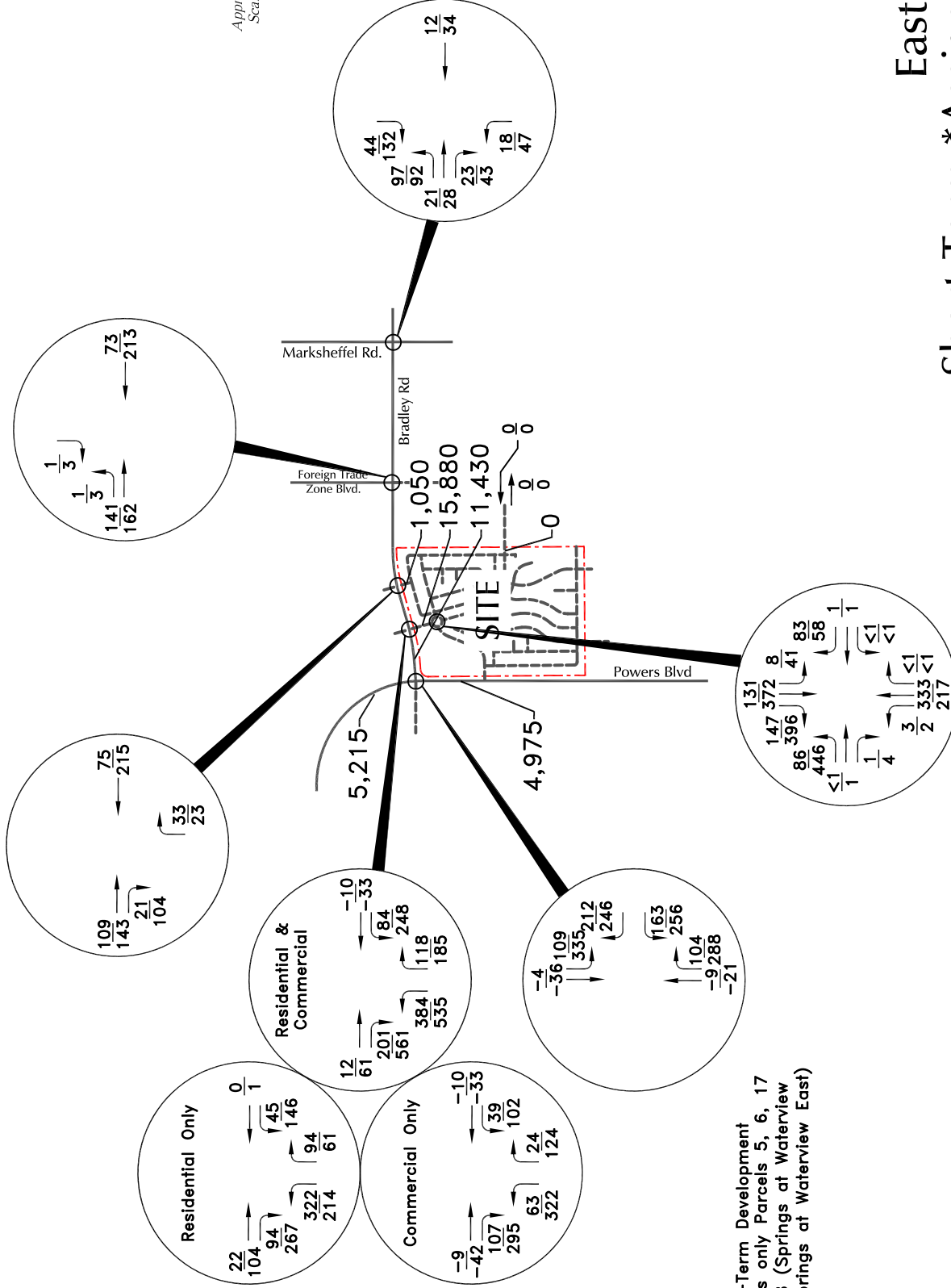
Figure 7w
West Area
Passby Distribution Estimate
Waterview Sketch Plan Amendment (LSC #164691)

Legend:
XX% AM passby distribution estimate
XX% PM passby distribution estimate





Approximate Scale
Scale: 1" = 3,000'



*Short-Term Development
Includes only Parcels 5, 6, 17
and 18 (Springs at Waterview
and Springs at Waterview East)

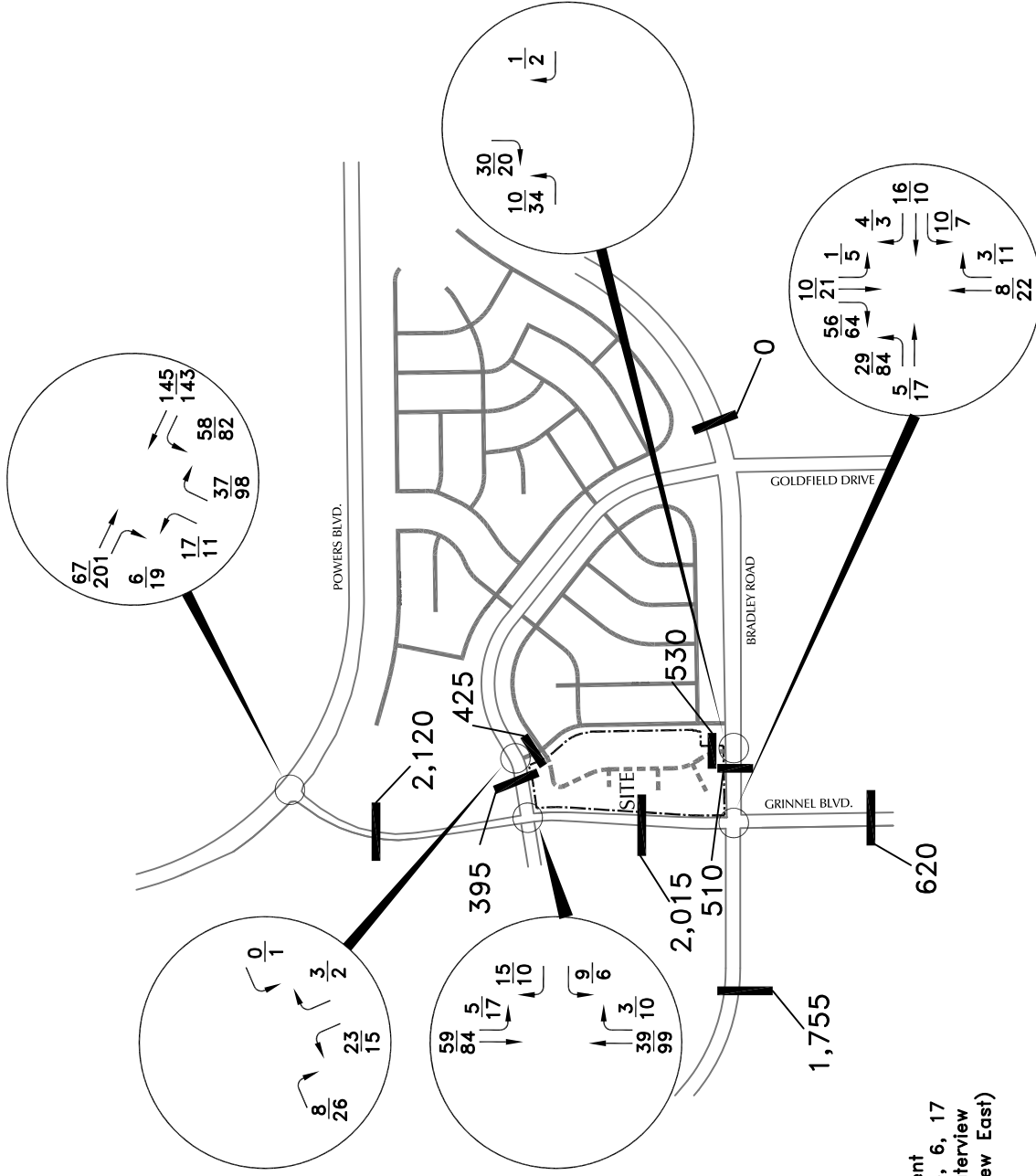
Legend:
XX/XX - Weekday peak-hour traffic (vehicles per hour)
X,XXX - Average weekday traffic (vehicles per day)



Figure 8e
East Area
Short-Term *Assignment
of Site-Generated Traffic
Waterview Sketch Plan Amendment (LSC #164691)



Approximate Scale
Scale: 1" = 1,200'



*Short-Term Development includes only Parcels 5, 6, 17 and 18 (Springs at Waterview and Springs at Waterview East)

Legend:
 XX XX - Weekday peak-hour traffic (vehicles per hour)
 X,XXX - Average weekday traffic (vehicles per day)

Figure 8w
 West Area
 Short-Term *Assignment of Site-Generated Traffic

Waterview Sketch Plan Amendment (LSC #164691)





Approximate Scale
Scale: 1" = 3,000'

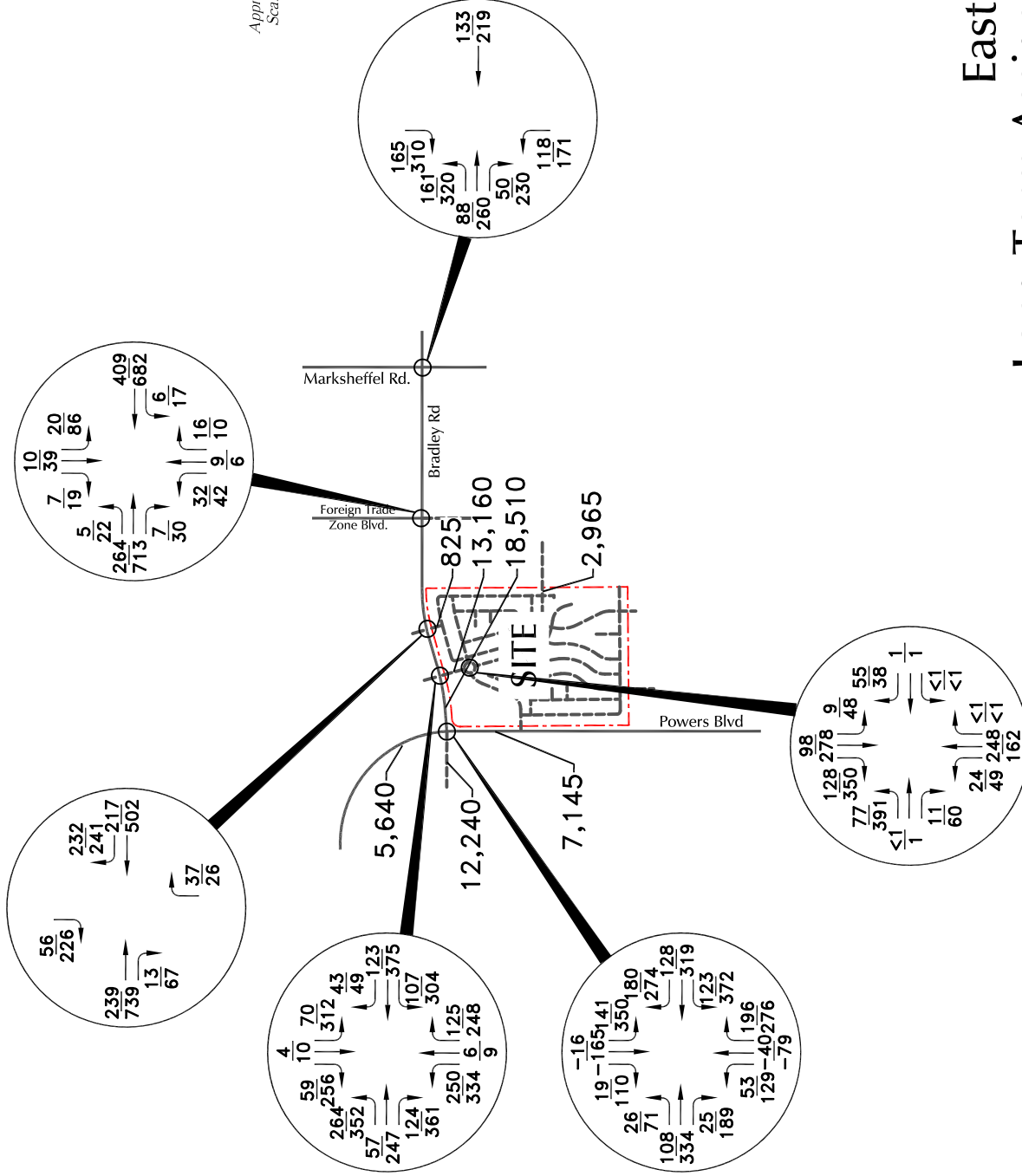


Figure 9e

East Area Long-Term Assignment of Site-Generated Traffic

Waterview Sketch Plan Amendment (LSC #164691)

Legend:
 XX / XX — Weekday peak-hour traffic (vehicles per hour)
 X,XXX — Average weekday traffic (vehicles per day)





Approximate Scale
Scale: 1" = 1,200'

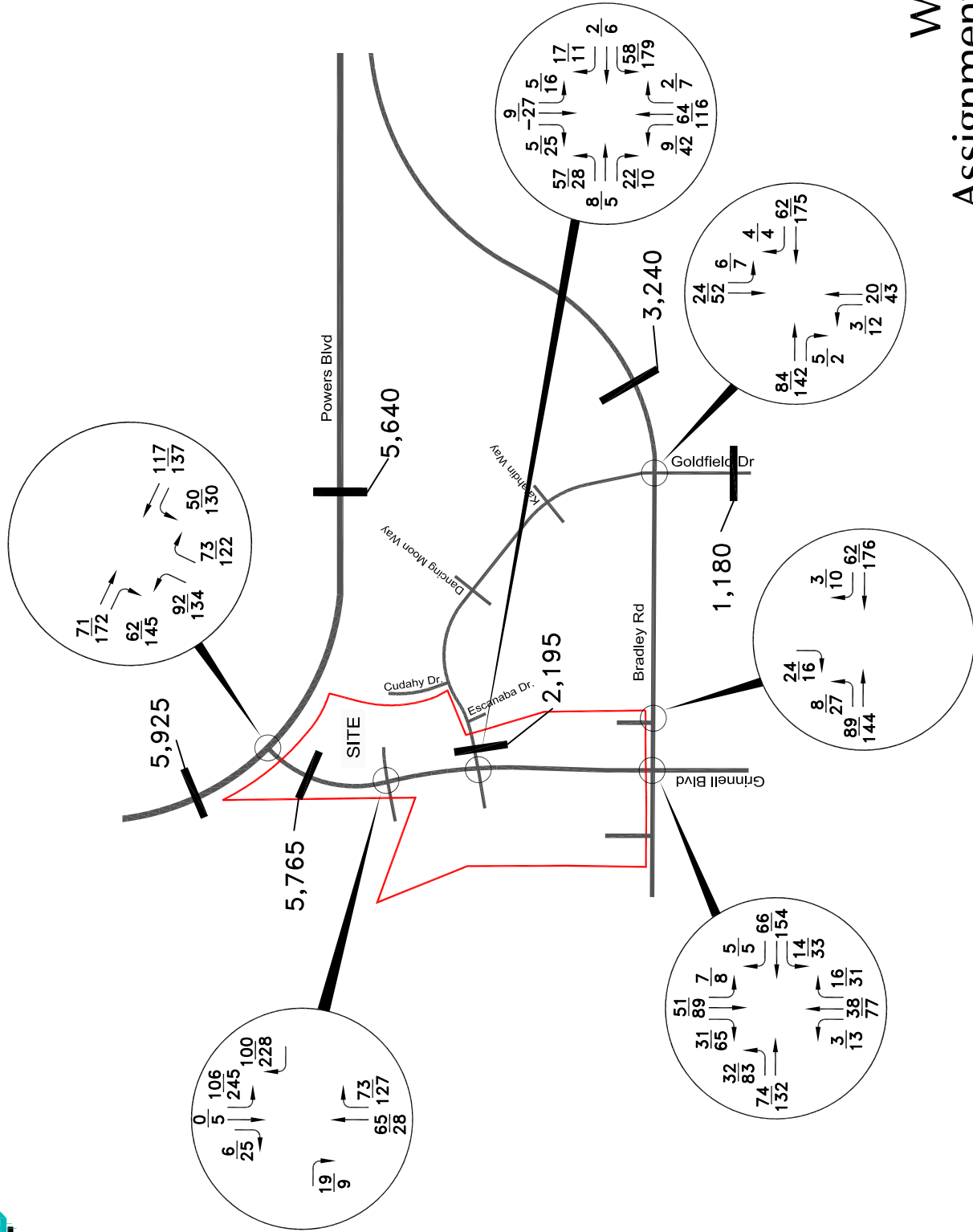
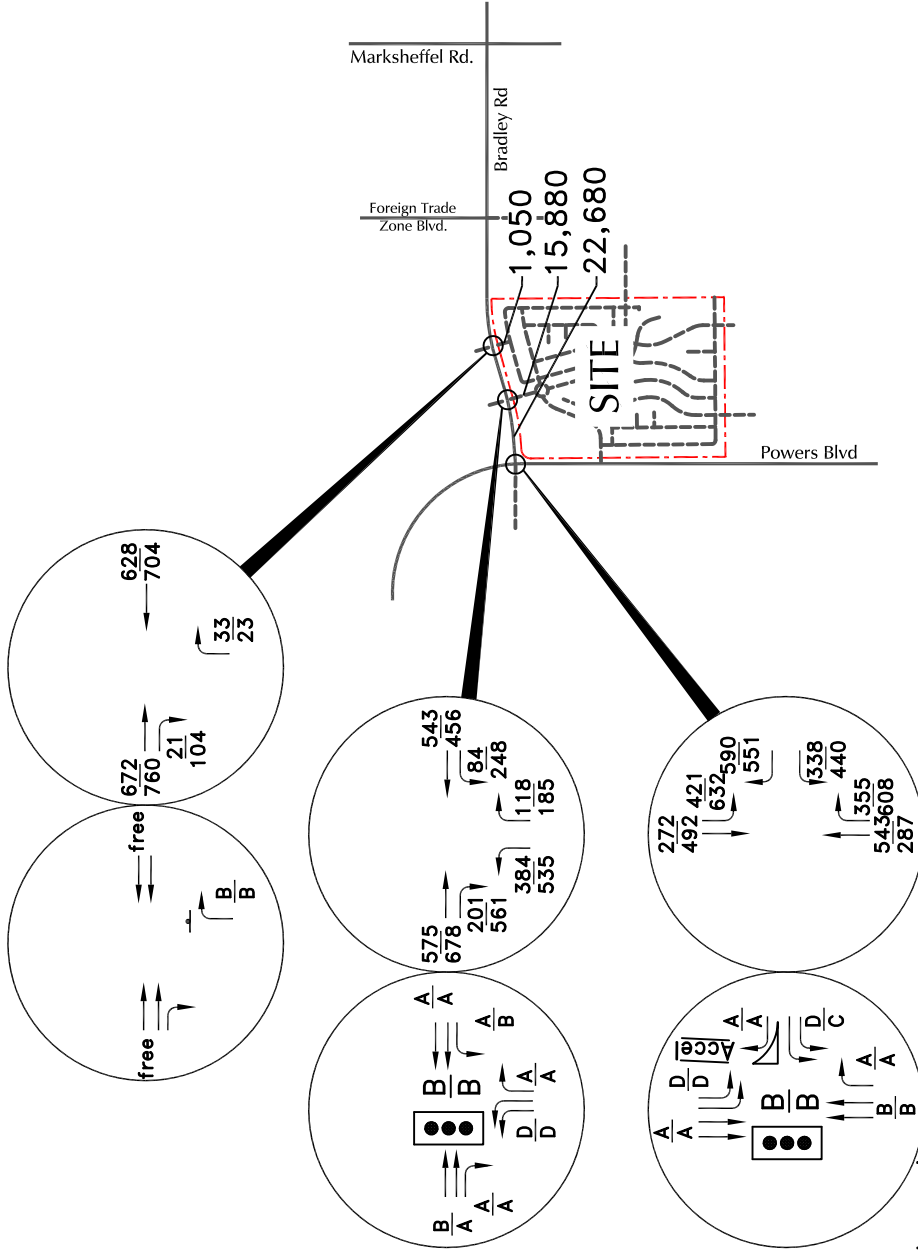


Figure 9w
**West Area
Assignment of Site-
Generated Long-Term Traffic**
Waterview Sketch Plan Amendment (LSC #164691)

Legend:
 XX XX - Weekday peak-hour traffic (vehicles per hour)
 X,XXX - Average weekday traffic (vehicles per day)



Approximate Scale
Scale: 1" = 3,000'



*Short-Term Development
includes only Parcels 5, 6, 17
and 18 (Springs at Waterview
and Springs at Waterview East)

Figure 10e

East Area 2017 Total Traffic*, Lane Geometry, Traffic Control and Level of Service

Waterview Sketch Plan Amendment (LSC #164691)

Legend:

⊥ - Stop sign

⬢ - Traffic Signal

XX/XX - Weekday peak-hour traffic (vehicles per hour)

X,XXX - Average weekday traffic (vehicles per day)

B/C - Individual movement peak-hour Level of Service

B/B - Entire intersection peak-hour Level of Service





Approximate Scale
Scale: 1" = 1,200'

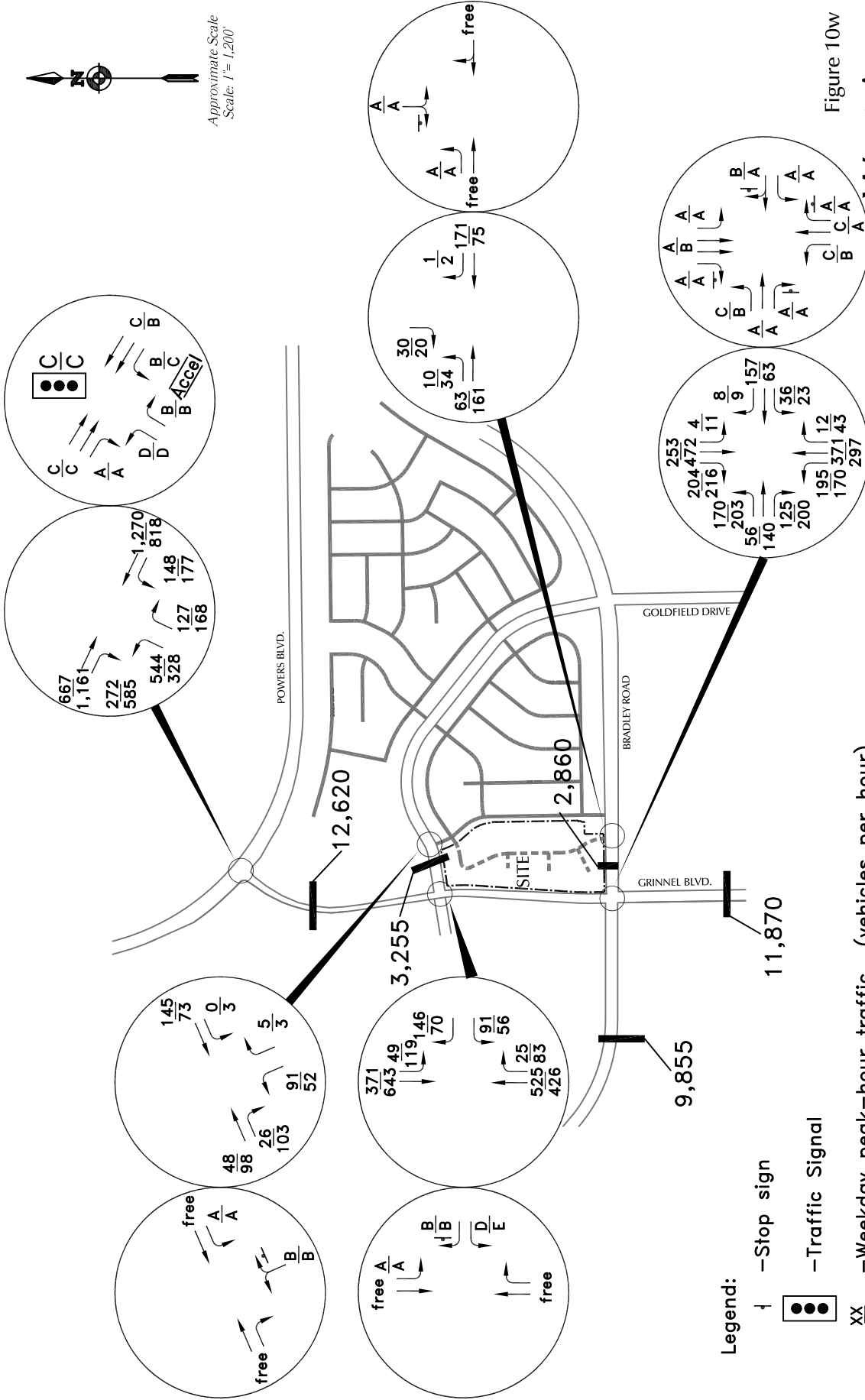


Figure 10w

West Area 2017 Total Traffic, Lane Geometry, Traffic Control and Level of Service

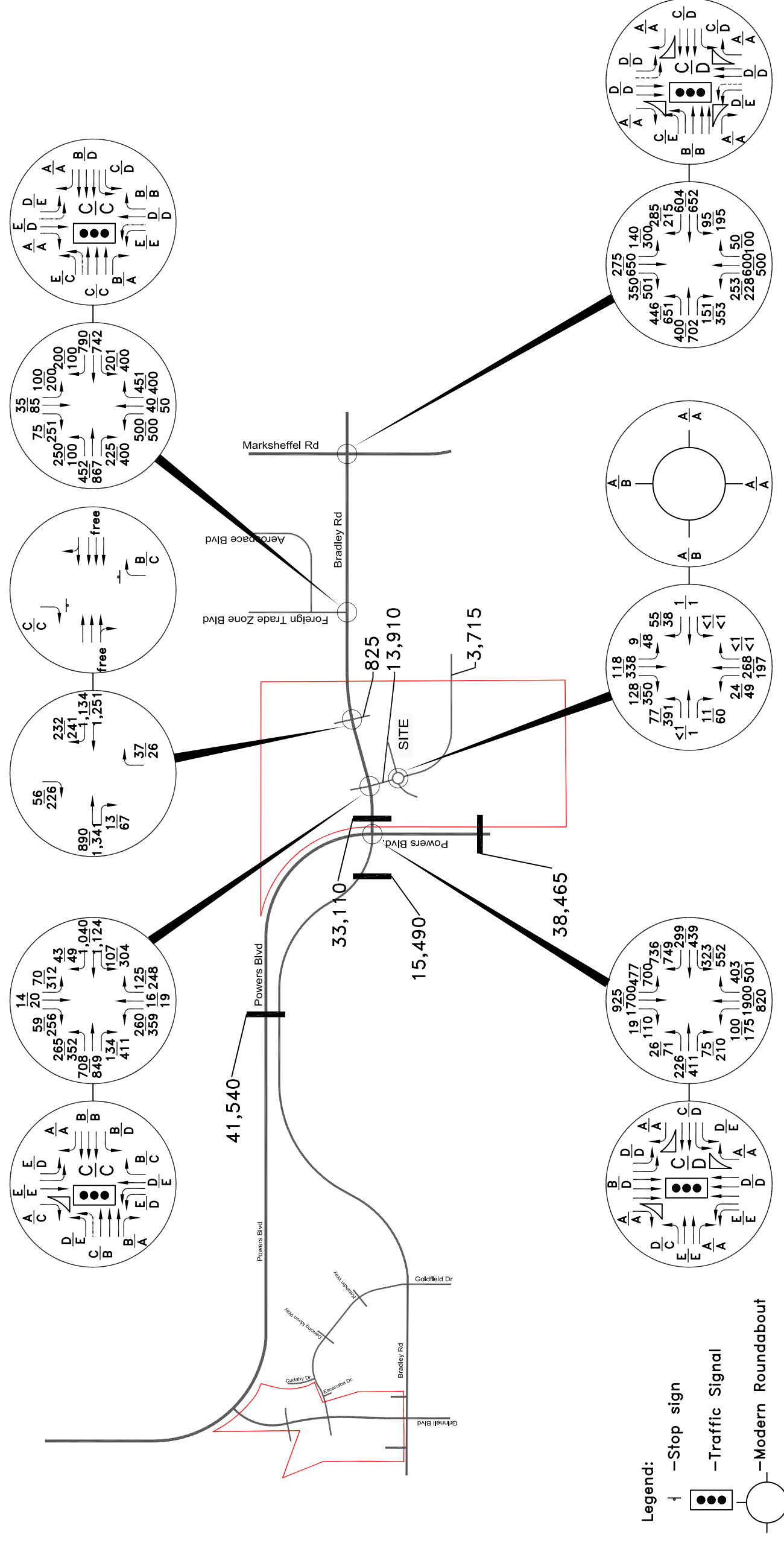
Waterview Sketch Plan Amendment (LSC #164691)

- Legend:**
- ⊥ — Stop sign
 - ⊡ — Traffic Signal
 - XX — Weekday peak-hour traffic (vehicles per hour)
 - XX,XXX — Average weekday traffic (vehicles per day)
 - $\frac{B}{C}$ — Individual movement peak-hour Level of Service
 - $\frac{B}{B}$ — Entire intersection peak-hour Level of Service





Approximate Scale
Scale: 1" = 2,000'

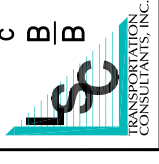


- Legend:**
- | — Stop sign
 - — Traffic Signal
 - — Modern Roundabout

- XX — Weekday peak-hour traffic (vehicles per hour)
- XX,XXX — Average weekday traffic (vehicles per day)
- $\frac{B}{C}$ — Individual movement peak-hour Level of Service
- $\frac{B}{B}$ — Entire intersection peak-hour Level of Service (weighted average of all movements)

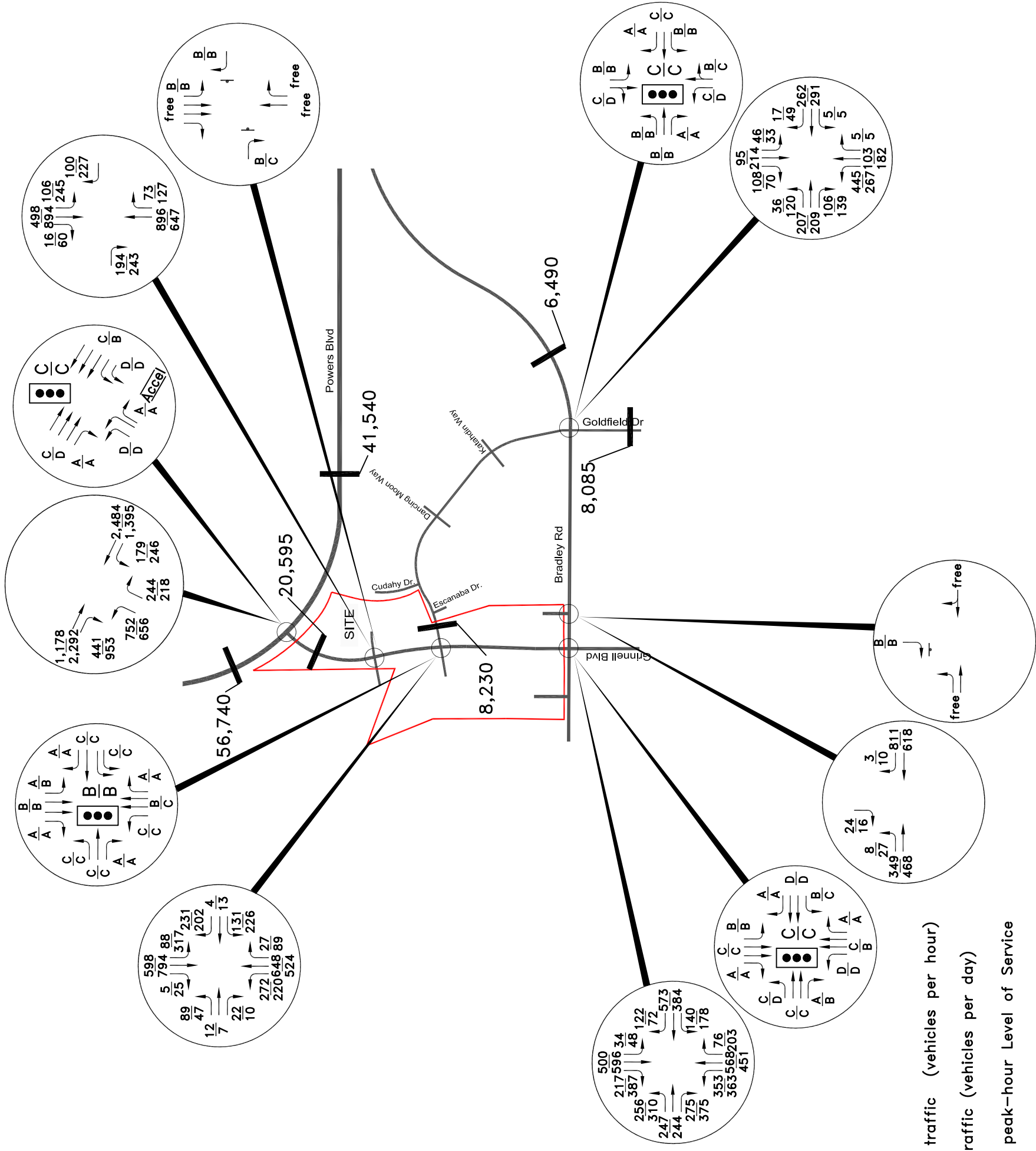
Figure 11e

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





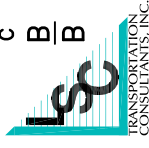
Approximate Scale
Scale: 1" = 1,200'



- Legend:
- ↑ - Stop sign
 - - Traffic Signal
 - XX - Weekday peak-hour traffic (vehicles per hour)
 - X,XXX - Average weekday traffic (vehicles per day)
 - $\frac{B}{C}$ - Individual movement peak-hour Level of Service
 - $\frac{B}{B}$ - Entire intersection peak-hour Level of Service (weighted average of all movements)

Figure 11w

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





Approximate Scale
Scale: 1" = 200'

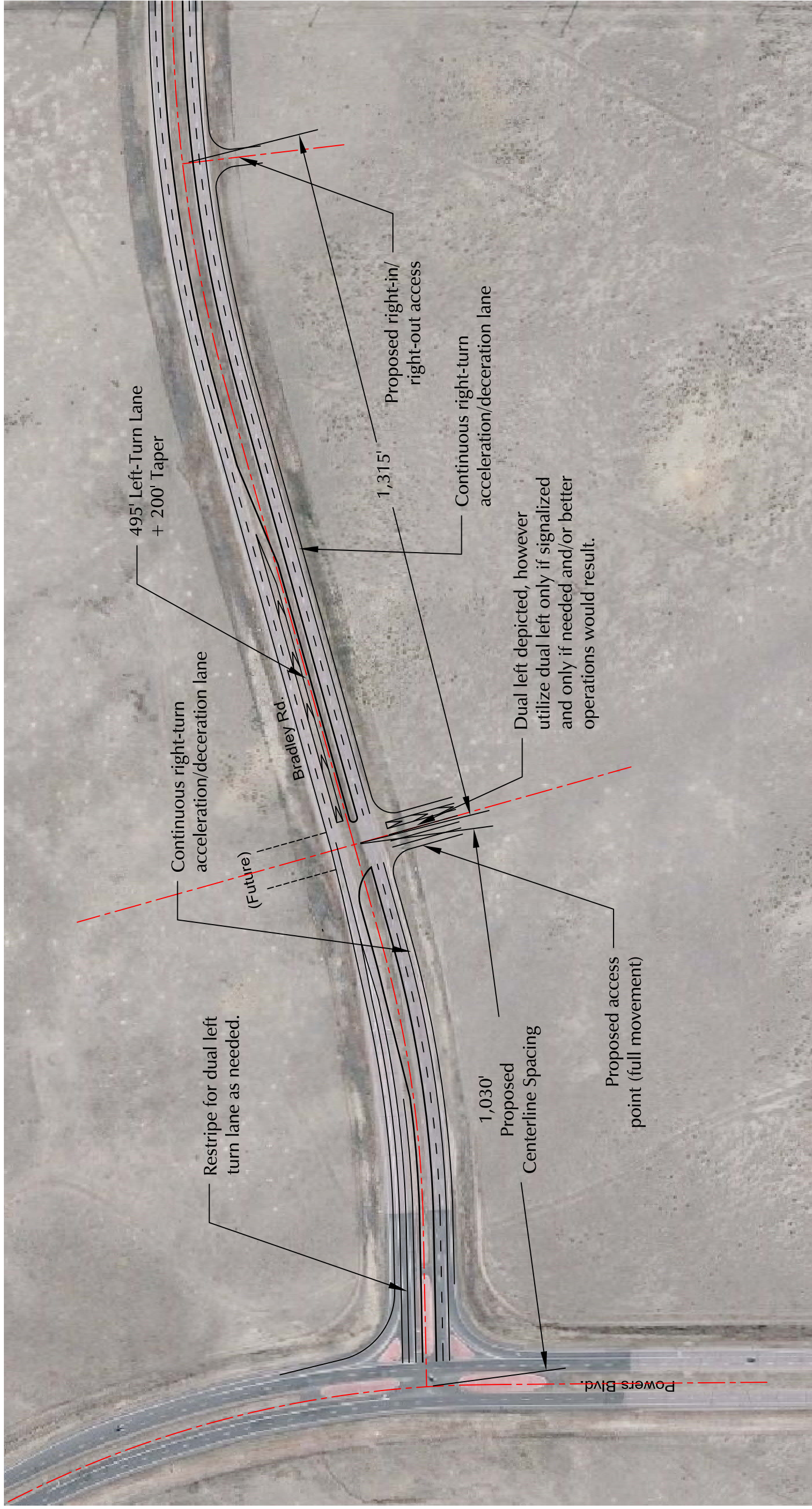


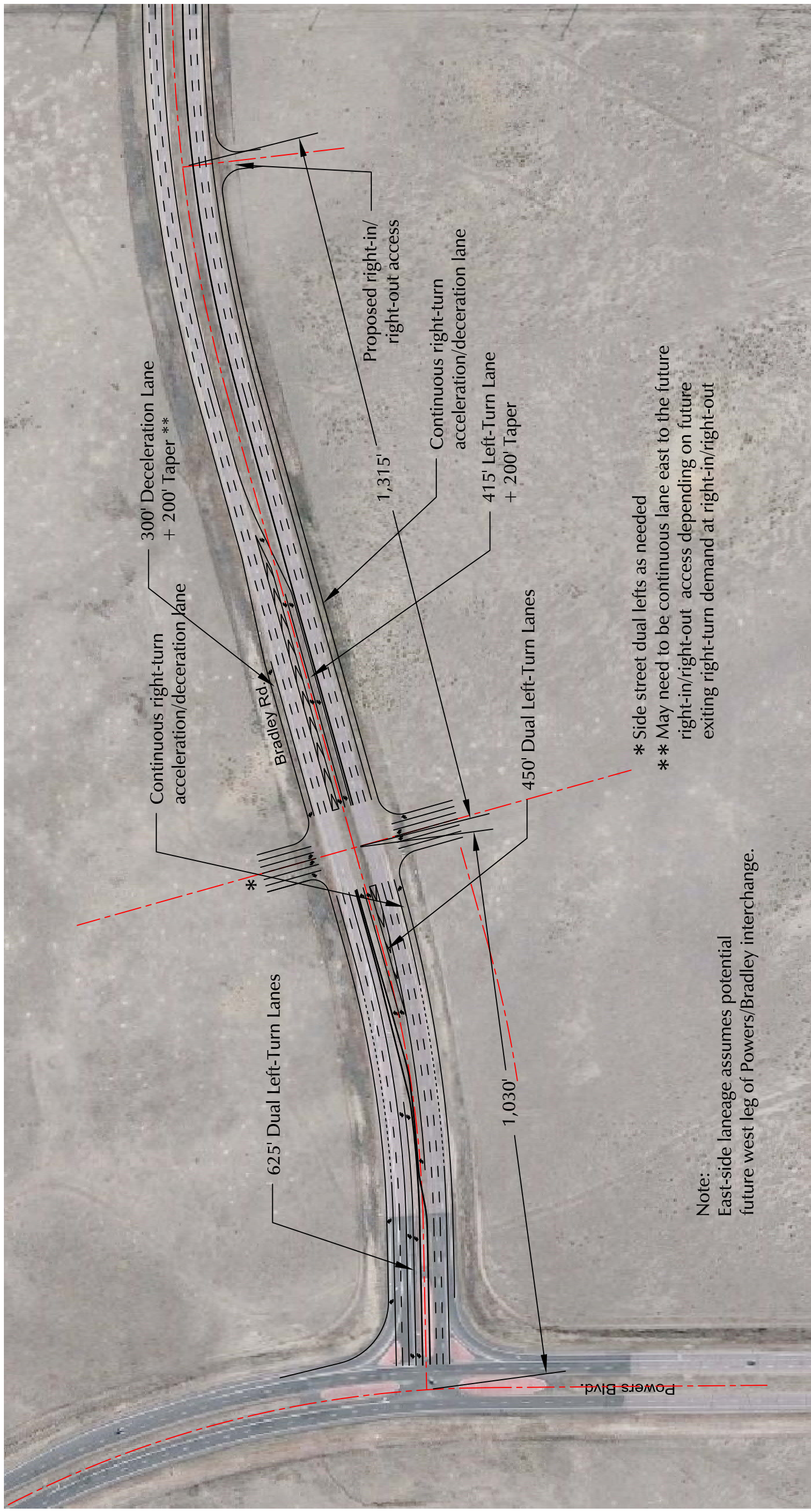
Figure 12

Short-Term Bradley Road Lane Recommendations

Waterview Sketch Plan Amendment (LSC #164691)



Approximate Scale
Scale: 1" = 200'



* Side street dual lefts as needed
 ** May need to be continuous lane east to the future right-in/right-out access depending on future exiting right-turn demand at right-in/right-out

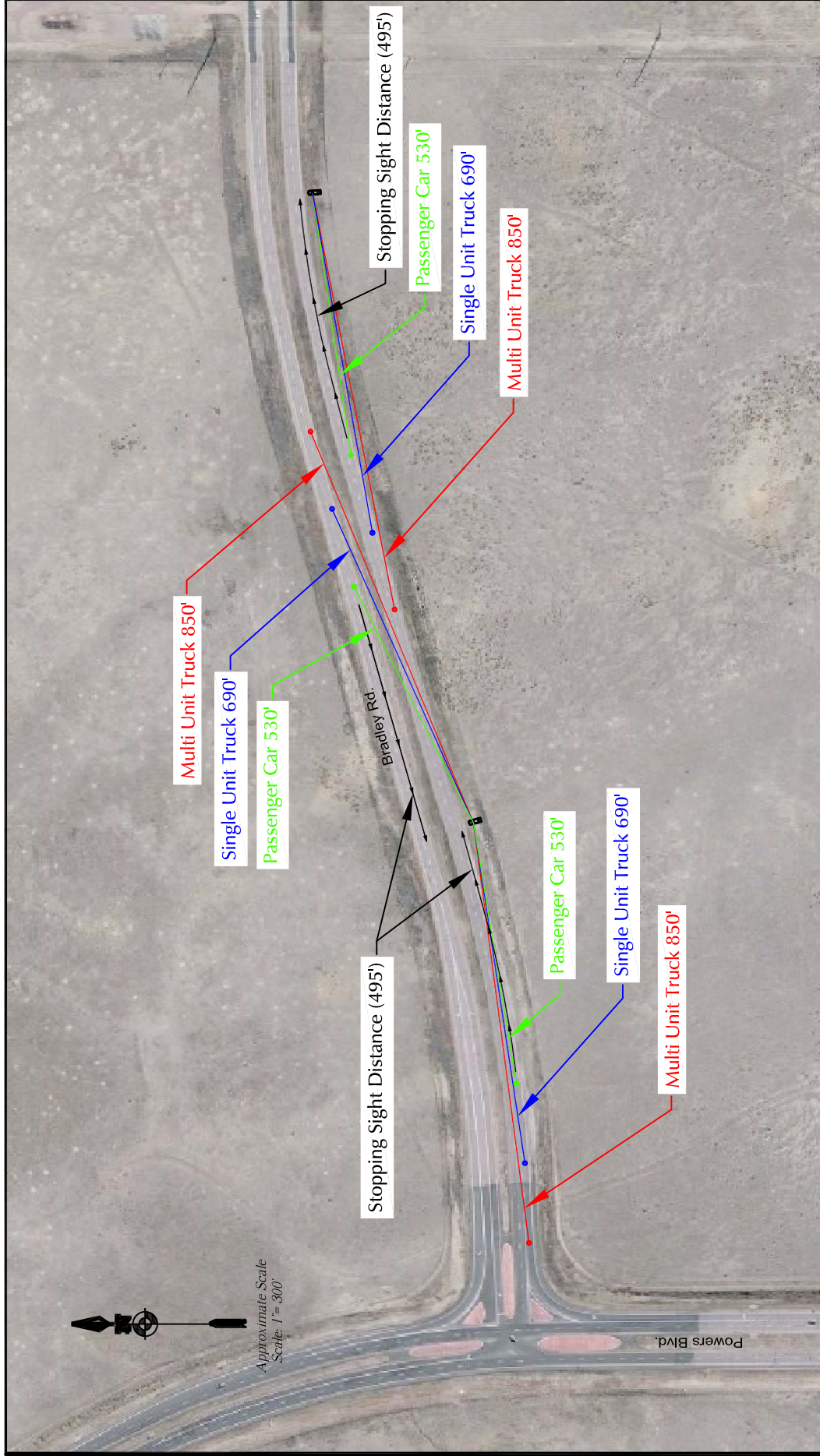
Note:
 East-side laneage assumes potential future west leg of Powers/Bradley interchange.

Figure 13

Long-Term Bradley Road Lane Recommendations

Waterview Sketch Plan Amendment (LSC #164691)



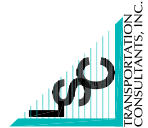


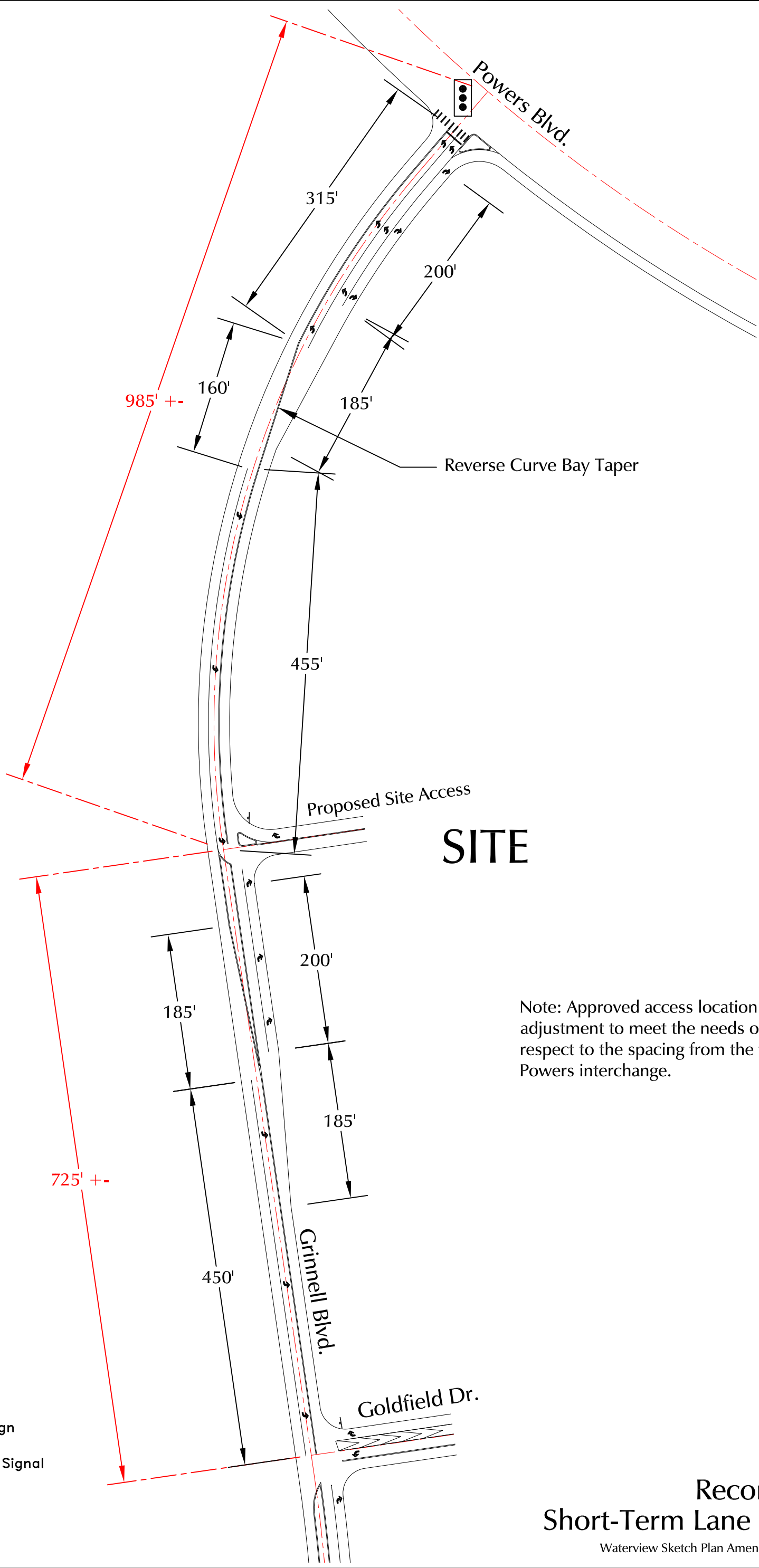
LEGEND:

- = Required intersection sight distance for passenger cars
- = Required intersection sight distance for single-unit trucks
- = Required intersection sight distance for multi-unit trucks
- = Required stopping sight distance

Based on a speed limit of 50mph (55mph design speed)

Figure 14
Sight Distance





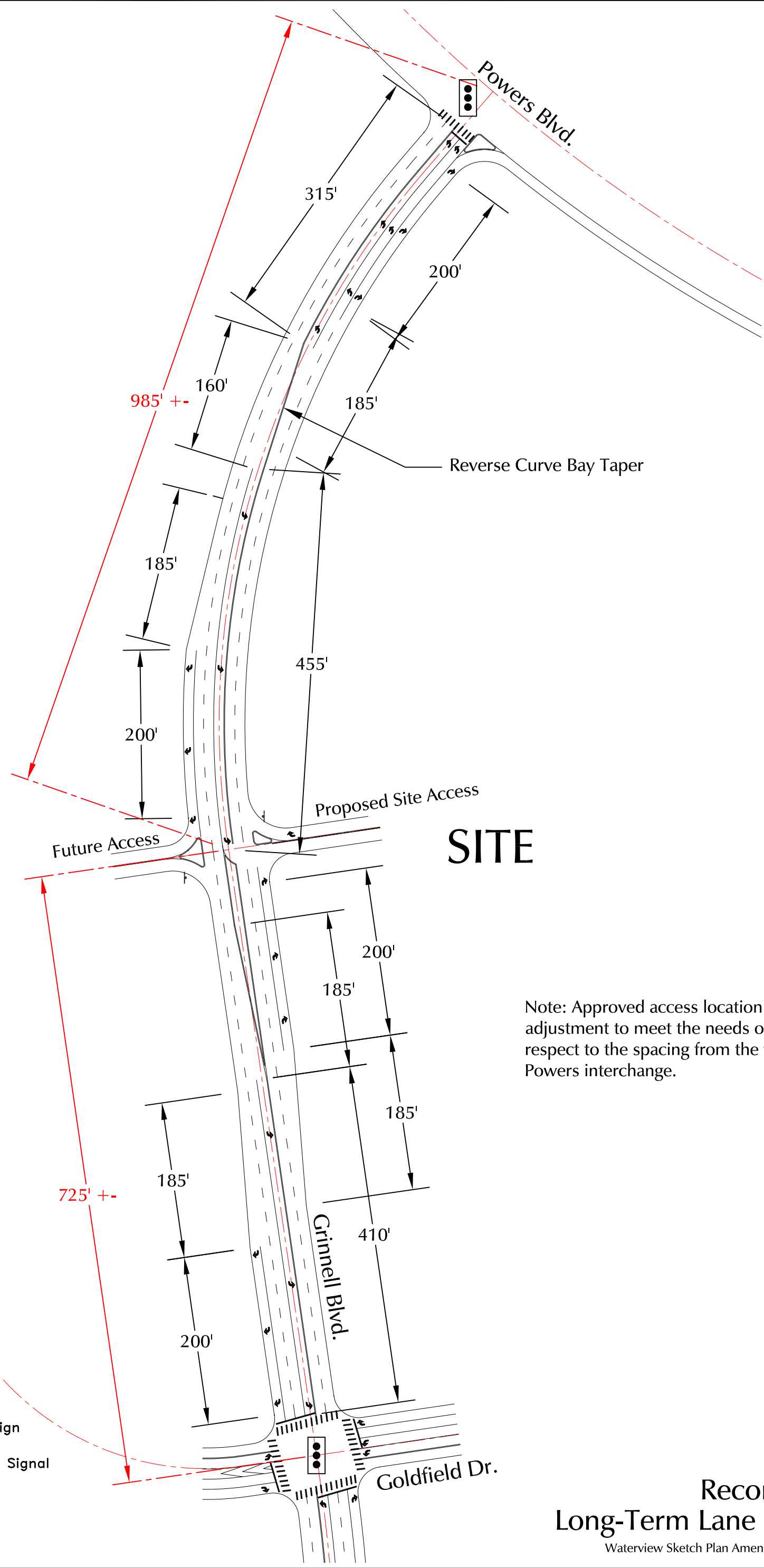
SITE

Note: Approved access location subject to adjustment to meet the needs of CDOT with respect to the spacing from the future Powers interchange.

- Legend:
- ⊥ - Stop sign
 - ⬜●●⬜ - Traffic Signal



Figure 15
Recommended Short-Term Lane Geometry
Waterview Sketch Plan Amendment (LSC #164691)



SITE

Note: Approved access location subject to adjustment to meet the needs of CDOT with respect to the spacing from the future Powers interchange.

- Legend:
- ⊥ - Stop sign
 - ⬢ - Traffic Signal



Figure 16
Recommended Long-Term Lane Geometry
Waterview Sketch Plan Amendment (LSC #164691)



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.:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D | E | V | I | 7 | 0 | 0 | 6 |
|---|---|---|---|---|---|---|---|

General Property Information:

Address of Subject Property (Street Number/Name): N/A

Tax Schedule ID(s) #: 5507206036

Legal Description of Property: PARCEL A WATERVIEW PUMP STATION EXEMPTION PLAT, AS AMENDED BY AFFIDAVIT OF CORRECTION REC #216083733

Subdivision or Project Name: Springs at Waterview

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

Specific Criteria from Which a Deviation is Sought: Access spacing along a Major Collector roadway. On Major Collector roadways, the closest local roadway intersection to an arterial roadway shall be 660 feet (right of way line of Arterial to centerline of local roadway).

Proposed Nature and Extent of Deviation: Request for interim three-quarter movement (left-in/right-in/right-out) access point to Bradley Road approximately 505 east of Grinnell Boulevard (centerline spacing) to provide a second access to the proposed residential development north of Bradley Road. The Collector classification of Bradley Road in this location is per the approved Sketch Plan. The three quarter access is labeled as "interim" because the applicant is agreeable to the access being restricted in the future to right-in/right-out if Bradley Road is connected between Powers and Goldfield Drive.

Applicant Information:

Applicant: FRANK W HOWARD #2 LIMITED PARTNERSHIP LLLP

Email Address:

Applicant is: Owner Consultant Contractor

Mailing Address:

State: CO

Postal Code:

Telephone Number:

Fax Number:

Engineer Information:

Engineer: Jeffrey C. Hodsdon, P.E., PTOE

Email Address: jchodsdon@lscs.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.D.1

Specific Criteria from Which a Deviation is Sought: Access spacing along a Major Collector roadway. On Major Collector roadways, the closest local roadway intersection to an arterial roadway shall be 660 feet (right of way line of Arterial to centerline of local roadway).

Proposed Nature and Extent of Deviation: Request for three-quarter movement (left-in/right-in/right-out) access point to Bradley Road approximately 505 feet east of Grinnell Boulevard (centerline spacing) to provide a second access to the proposed residential development north of Bradley Road. The Collector classification of Bradley Road in this

El Paso County Procedures Manual

Procedure # R-FM-051-07

Issue Date: 12/31/07

Revision Issued: 00/00/00

SF-16-017

location is per the approved Sketch Plan. The three quarter access is labeled as "interim" because the applicant is agreeable to the access being restricted in the future to right-in/right-out if Bradley Road is connected between Powers and Goldfield Drive.

Reason for the Requested Deviation: The deviation is requested to provide a second point of access to the proposed residential development to be located east of Grinnell Boulevard, south of Goldfield Drive, west of Escanaba Drive and north of Bradley Road. The primary access would be to Escanaba Drive near the north end of the site. The deviation is requested as the required grading to provide a secondary access to Escanaba at the south end of the site would be cost-prohibitive and an undue hardship to the applicant. The estimated additional cost associated with a second access to Escanaba versus a second access to Bradley Road would be \$400,000 to \$500,000. Please refer to attached Exhibits A and B.

Comparison of Proposed Deviation to ECM Standard: The requested accesses would be approximately 505 feet east of Grinnell Boulevard (centerline spacing). The ECM criteria for a Major Collector is 660 feet from the right of way line of Arterial to centerline of local roadway (this proposed access). The distance from the centerline of Grinnell to the ROW line is about 75 feet - therefore the ECM required centerline spacing would be 735 feet.

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 cost of required site grading to provide a secondary access to Escanaba at the south end of the site would be cost-prohibitive and an undue hardship to the applicant. The estimated additional cost associated with a second access to Escanaba versus a second access to Bradley Road would be \$400,000 to \$500,000. Please refer to attached Exhibits A and B.

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 based on the need to provide a second access to the proposed residential development.

The deviation will achieve the intended result with a comparable or superior design and quality of improvement.

The intersection spacing would be sufficient to provide back-to-back left-turn lanes with sufficient vehicle stacking distances on Bradley Road for a westbound left-turn lane approaching Grinnell Boulevard and an eastbound left-turn lane (in the form of a striped two-way center left turn lane) approaching the proposed three-quarter movement access. The southbound left movement would be prohibited via a raised right turn channelizing island and no-left-turn signage/pavement markings.

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 posted speed limit is 35 mph. The intersection spacing would be sufficient. The intersection spacing would be sufficient to provide back-to-back left-turn lanes with sufficient vehicle stacking distances on Bradley Road for a westbound left-turn lane approaching Grinnell Boulevard and an eastbound left-turn lane (in the form of a striped two-way center left turn lane) approaching the proposed three-quarter movement access. The southbound left movement would be prohibited via a raised right turn channelizing island and no-left-turn signage/pavement markings. The applicant is agreeable to the access being restricted in the future to right-in/right-out if Bradley Road is connected between Powers and Goldfield Drive.

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

The right turn channelizing island may require some minor maintenance with signs, striping and curb repairs.

The deviation will not adversely affect aesthetic appearance.

The access would not adversely affect aesthetic appearance.

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

12/20/16
Date

Signature of applicant (if different from owner)

12/20/16
Date

Signature of Engineer

12/20/16
Date

Engineer's Seal



Review and Recommendation:

APPROVED by the ECM Administrator *W/CONDITION NOTED BELOW.*

Date *15 MARCH 2017*

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

X CONDITION OF DEVIATION APPROVAL:
3/4 ACCESS MAY BE FURTHER RESTRICTED IF BRADLEY ROAD
IS CONNECTED BETWEEN POWERS BLVD & GOLDFIELD DRIVE OR AS
DETERMINED BY THE COUNTY ENGINEER.

____ Additional comments or information are attached.

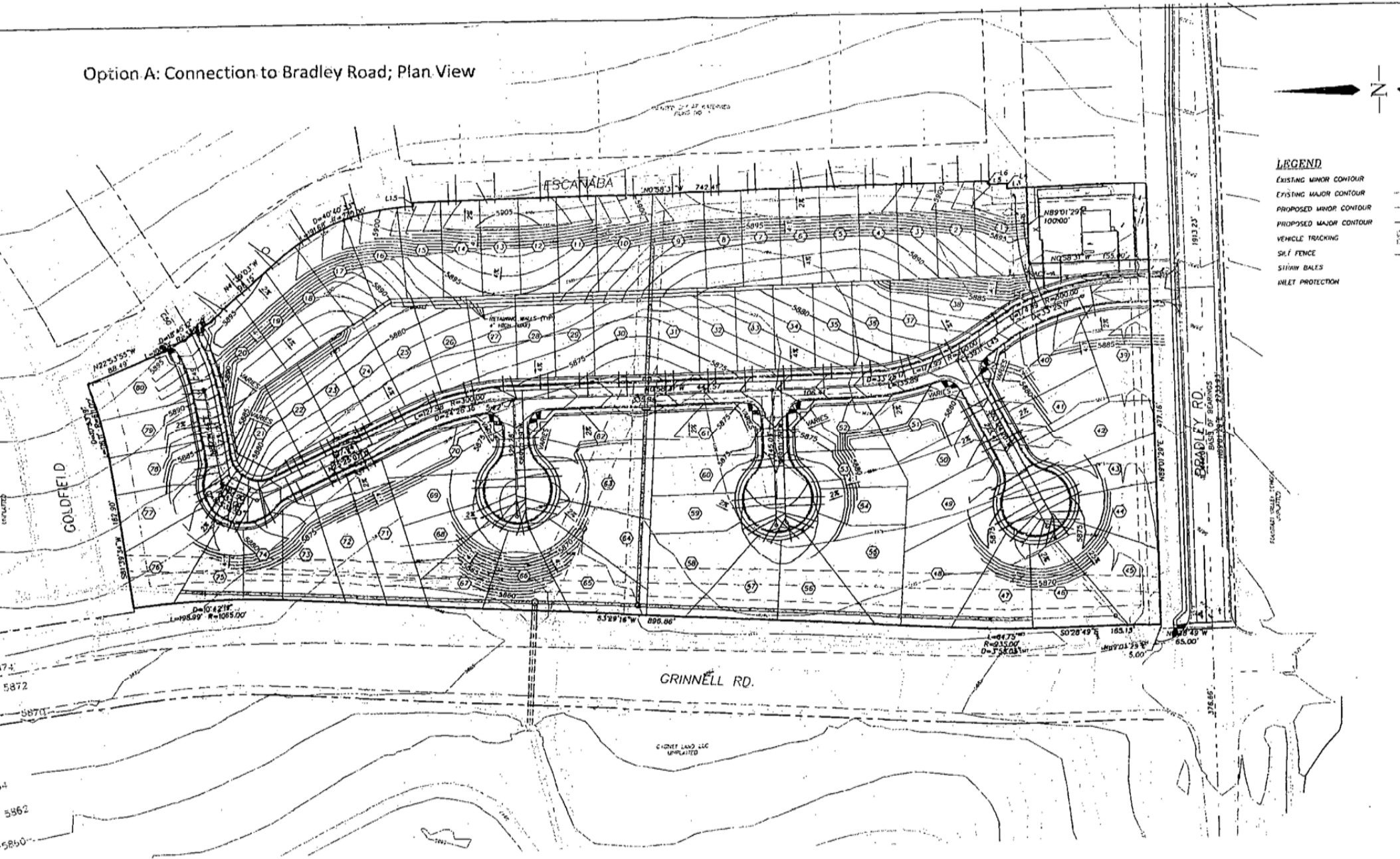
DENIED by the ECM Administrator

_____ 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.

Option A: Connection to Bradley Road; Plan View



- LEGEND**
- EXISTING MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - PROPOSED MAJOR CONTOUR
 - VEHICLE TRACKING
 - SLIT FENCE
 - STRAW BALES
 - INLET PROTECTION

THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE EROSION CONTROL PLAN.

OWNER/REPRESENTATIVE _____ DATE _____
 COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEMENTS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
 FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE COLORADO COUNTY LAND DEVELOPMENT CODE, ORDINANCE CRITERIA, AND ENGINEERING CRITERIA MANUAL AS APPLICABLE.

JENNIFER SWINE, P.E. _____ DATE _____
 COUNTY ENGINEER/TECH. ADMINISTRATOR

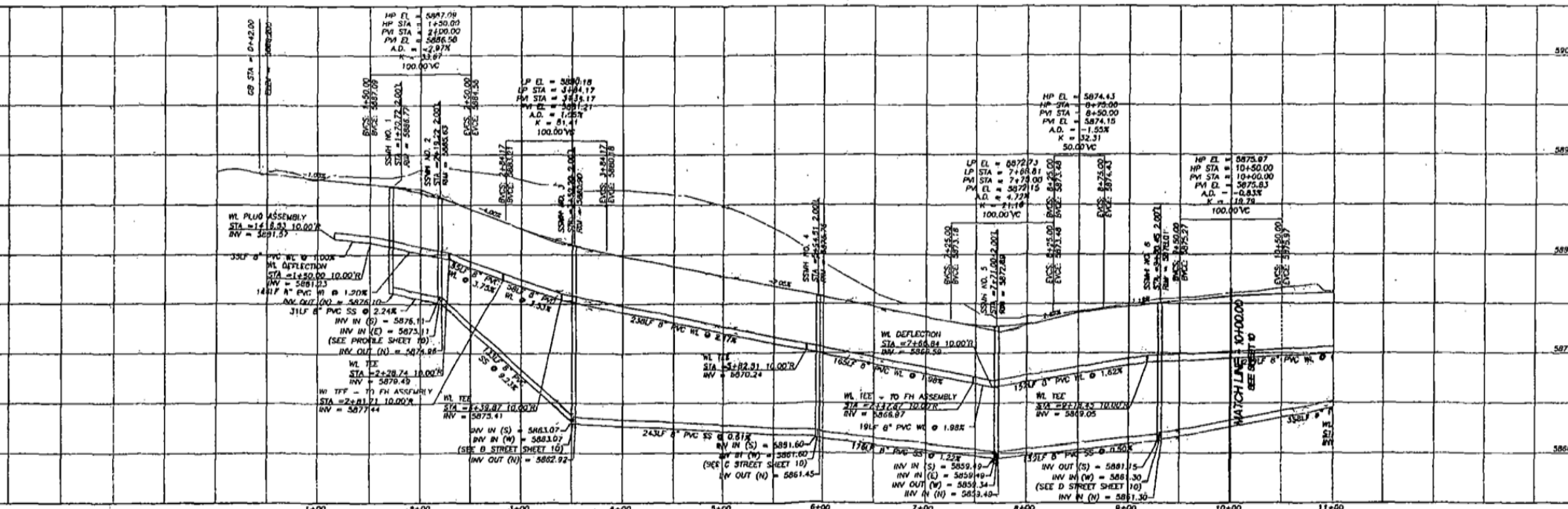
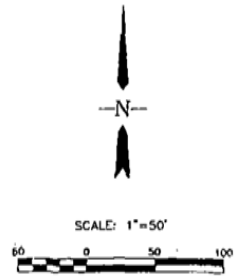
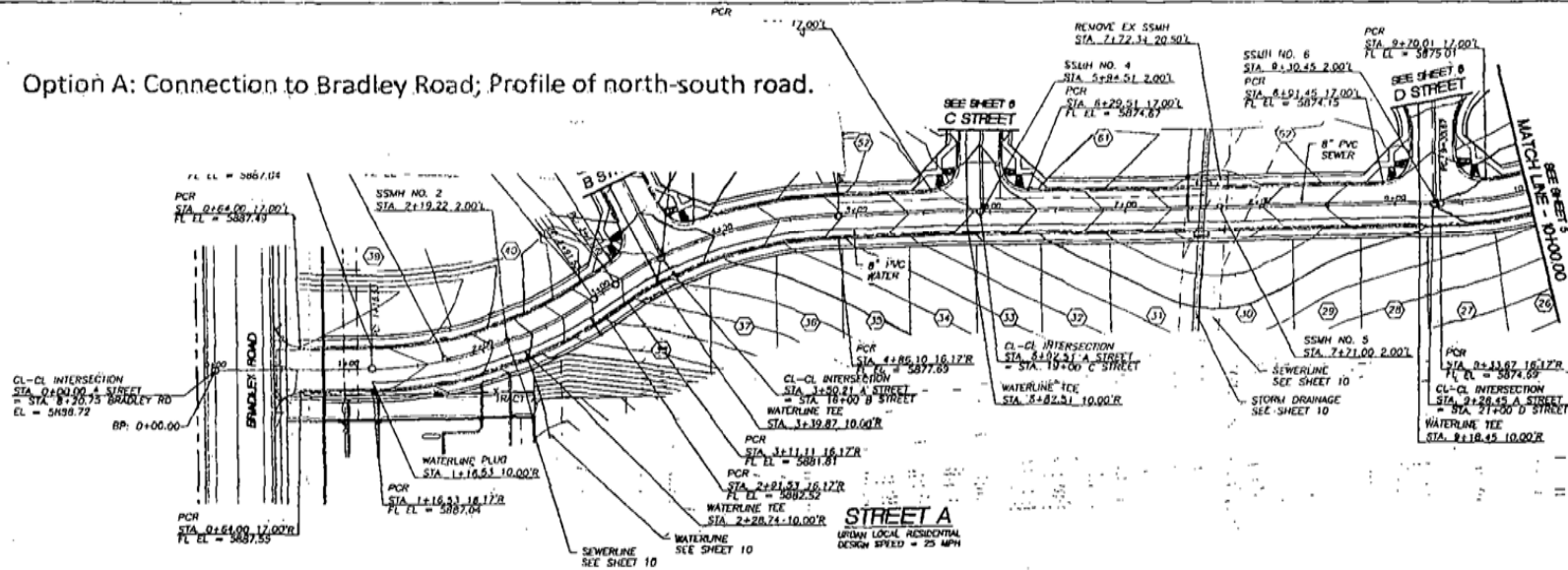
| REVISIONS: | |
|------------|-------------|
| NO. | DESCRIPTION |
| | |
| | |
| | |
| | |
| | |

ENGINEER: DESIGNED BY: PAK/BG. DATE: 8-27-18.
 DRAWN BY: JMM/BG. DATE: 9-3-18.
 CHECKED BY: PAK. DATE: 9-20-18.
 48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS.
8-1-1
 CITY OF COLORADO SPRINGS DEPT. OF UTILITIES
 GAS, ELECTRIC, WATER AND WASTEWATER

DSB *Dakota Springs Engineering*
 PROJECT: THE SPRINGS AT WATERVIEW
 SHEET TITLE: GRINNELL & EROSION CONTROL PLAN
 FROM: 0/a TO: 0/a
 JOB NO.: 0001-02-18-01 SHEET 9 OF 9

CHARLES K. COCHRAN, P.E. 34997 _____ DATE _____
 THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER THE DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SOAK PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENCE, ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLAN.

Option A: Connection to Bradley Road; Profile of north-south road.

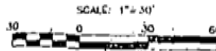
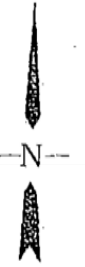
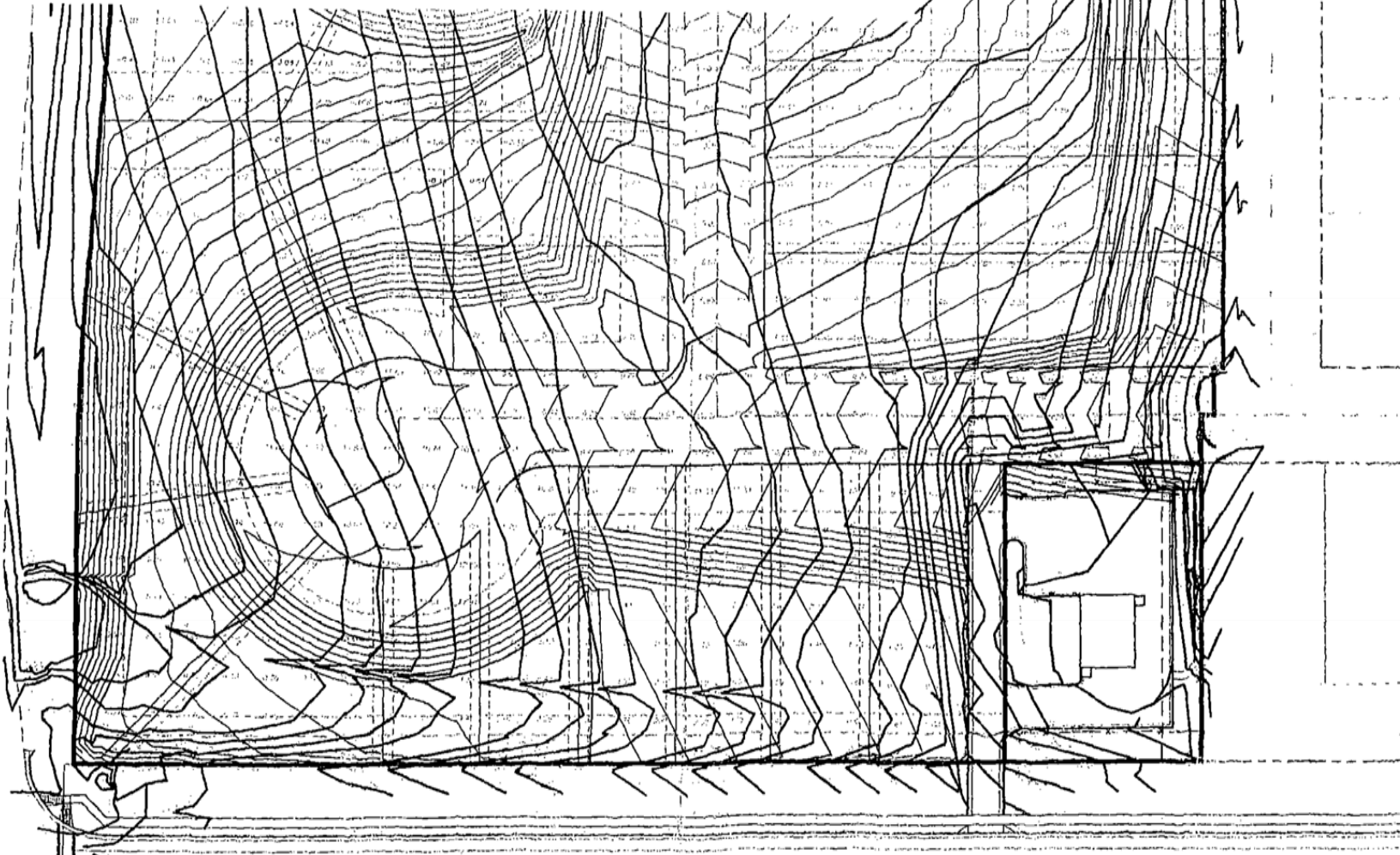


| DESIGN: _____ DATE: _____ OUTTER REVIEW: _____ DATE: _____ DESIGN DRAINAGE BASIN: _____ ACCORDANCE WITH SECTION 15-3-906 RADO SPRINGS 1980, AS AMENDED DATE: _____ | DESIGN DATA: SIDEWALKS: WIDTH 5' LOCATION: ATTACHED # DETACHED: 6" FROM P/L 0 | ASPHALT THICKNESS: AC SURFACE _____ AC BASE _____ | SCALE: HORIZONTAL 1"=50' VERTICAL 1"=5' BENCH MARK: _____ | REVISIONS: <table border="1"> <thead> <tr> <th>NO</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | NO | DESCRIPTION | DATE | | | | ENGINEER: _____ DATE: 8-27-18 DESIGNED BY: PAK/AG DRAWN BY: JBL/BO DATE: 8-27-18 CHECKED BY: BAR DATE: 8-20-18 48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS 8-1-1 CITY OF COLORADO SPRINGS DEPT. OF UTILITIES GAS, ELECTRIC, WATER AND WASTEWATER | PROJECT: THE SPRINGS AT WATERVIEW SHEET TITLE: PLAN & PROFILE - STREET A FROM: 0+00.00 TO: 10+00.00 JOB NO. 0001-02-18-01 SHEET 4 OF 19 |
|---|--|---|--|---|-------------|-------------|------|--|--|--|---|--|
| | NO | DESCRIPTION | DATE | | | | | | | | | |
| | | | | | | | | | | | | |
| CURB TYPE 1.0 TO 3.0 R/W WIDTH 30' +/- F/C STREET TYPE HYVEM | AGGREGATE BASE THICKNESS: CLASS 8 _____ CLASS 5 _____ CLASS 2 _____ | DATE: _____ | DATE: _____ | DATE: _____ | DATE: _____ | | | | | | | |

Option B: Connection to Escanaba (If Bradley Road Deviation is not approved);
Plan View

Additional "cut" on property of 39,000 yards

Additional Import of 32,000 yards.



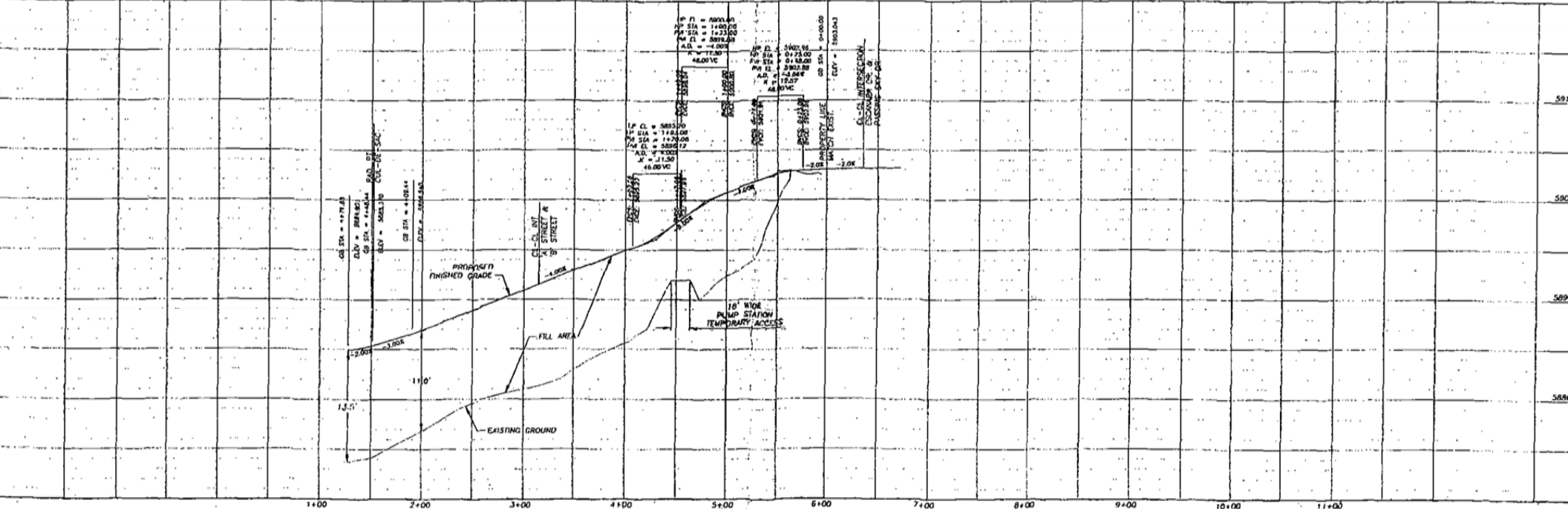
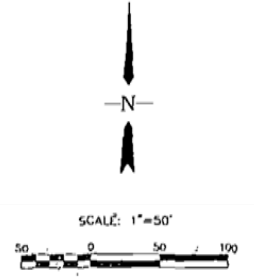
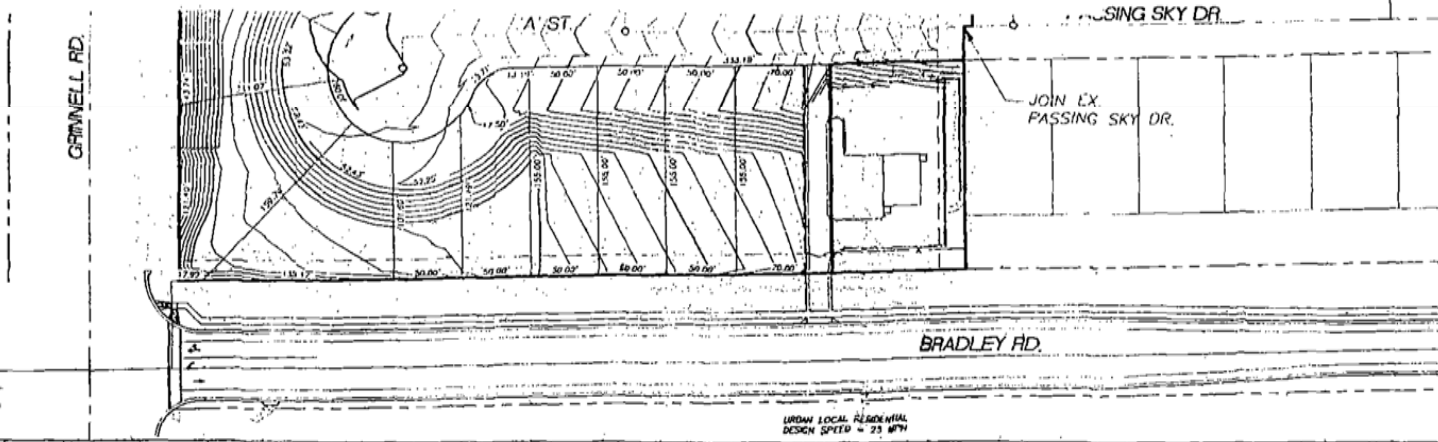
| REVISIONS: | | |
|------------|-------------|------|
| NO. | DESCRIPTION | DATE |
| | | |
| | | |
| | | |
| | | |

ENGINEER:
 DESIGNED BY: EAK DATE: 12-8-16
 DRAWN BY: JBL DATE: 12-7-16
 CHECKED BY: EAK DATE: 12-8-16
 48 HOURS BEFORE YOU DIG.
 CALL UTILITY LOCATORS
 8-1-1
 CITY OF COLORADO SPRINGS DEPT. OF UTILITIES
 GAS, ELECTRIC, WATER AND WASTEWATER

DSE *Colorado Springs*
Engineering
 31 N. HANCOCK BLVD. SUITE 500
 COLORADO SPRINGS, CO 80903
 P: (719) 593-2380
 F: (719) 593-2382

PROJECT: THE SPRINGS AT WATERVIEW
 SHEET TITLE: DBASE COMPARISON EXHIBIT
 FROM: D2a TO: D/S
 JOB NO.: DD01-02-16-01 SHEET: 1 OF 1

Option B: Connection to Escanaba (If Bradley Road Deviation is not approved);
 Profile View of Connector Road to Escanaba



| | | | | | | | |
|---|--|---|---|--|--|---|--|
| DESIGN: UTILITY REVIEW _____ DATE: _____ VIEW _____ DATE: _____ | DESIGN ORNAGE BASIN _____ ACCORDANCE WITH SECTION 15-3-906 ROAD SPRINGS 1980, AS AMENDED _____ DATE: _____ | DESIGN DATA: SIDEWALKS: WIDTH 5' LOCATION: ATTACHED R DETACHED, 6" FROM P/S 0 CURB TYPE 1 0 2 0 3 0 R/W WIDTH 50' F/C F/C STREET TYPE _____ VIEW _____ | ASPHALT THICKNESS: AC SURFACE _____ AC BASE _____ AGGREGATE BASE THICKNESS: CLASS 6 _____ CLASS 5 _____ CLASS 2 _____ | SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5' BENCH MARK: _____ | REVISIONS: NO. _____ DESCRIPTION _____ DATE _____ | ENGINEER: _____ DATE: 8-27-18 DRAWN BY: JWP/BS. DATE: 8-27-18 CHECKED BY: PAR. DATE: 9-24-18 48 HOURS BEFORE YOU GO, CALL UTILITY LOCATIONS CITY OF COLORADO SPRINGS DEPT. OF UTILITIES GAS, ELECTRIC, WATER AND WASTEWATER | DSE Dakota Springs Engineering PROJECT THE SPRINGS AT WATERVIEW SHEET TITLE PLAN & PROFILE - STREET A FROM 0+00.00 TO 10+00.00 JOB NO. 0001-02-16-01 SHEET 4 OF 19 |
|---|--|---|---|--|--|---|--|

Appendix Table 1
Trip Generation Estimate
Hassell Parcel
El Paso County Assessor Schedule Number 6501400009

| Land Use Code | Land Use Description | Trip Generation Units | Trip Generation Rates ⁽¹⁾ | | | | Total Trips Generated | | | | | |
|---------------|-----------------------------------|-----------------------|--------------------------------------|-------------------|------|---------------------|-----------------------|-------------------------|-------------------|-----------|---------------------|-----------|
| | | | Average Weekday Traffic | Morning Peak Hour | | Afternoon Peak Hour | | Average Weekday Traffic | Morning Peak Hour | | Afternoon Peak Hour | |
| | | | | In | Out | In | Out | | In | Out | In | Out |
| 210 | Single-Family Detached Housing | 87 DU ⁽²⁾ | 9.52 | 0.19 | 0.56 | 0.63 | 0.37 | 828 | 16 | 49 | 55 | 32 |
| 230 | Residential Condominium/Townhouse | 61 DU | 5.81 | 0.07 | 0.37 | 0.35 | 0.17 | 354 | 5 | 22 | 21 | 10 |
| | | | | | | | | 1,182 | 21 | 71 | 76 | 42 |

Notes:

(1) Source: "Trip Generation, 9th Edition, 2012" by the Institute of Transportation Engineers (ITE)

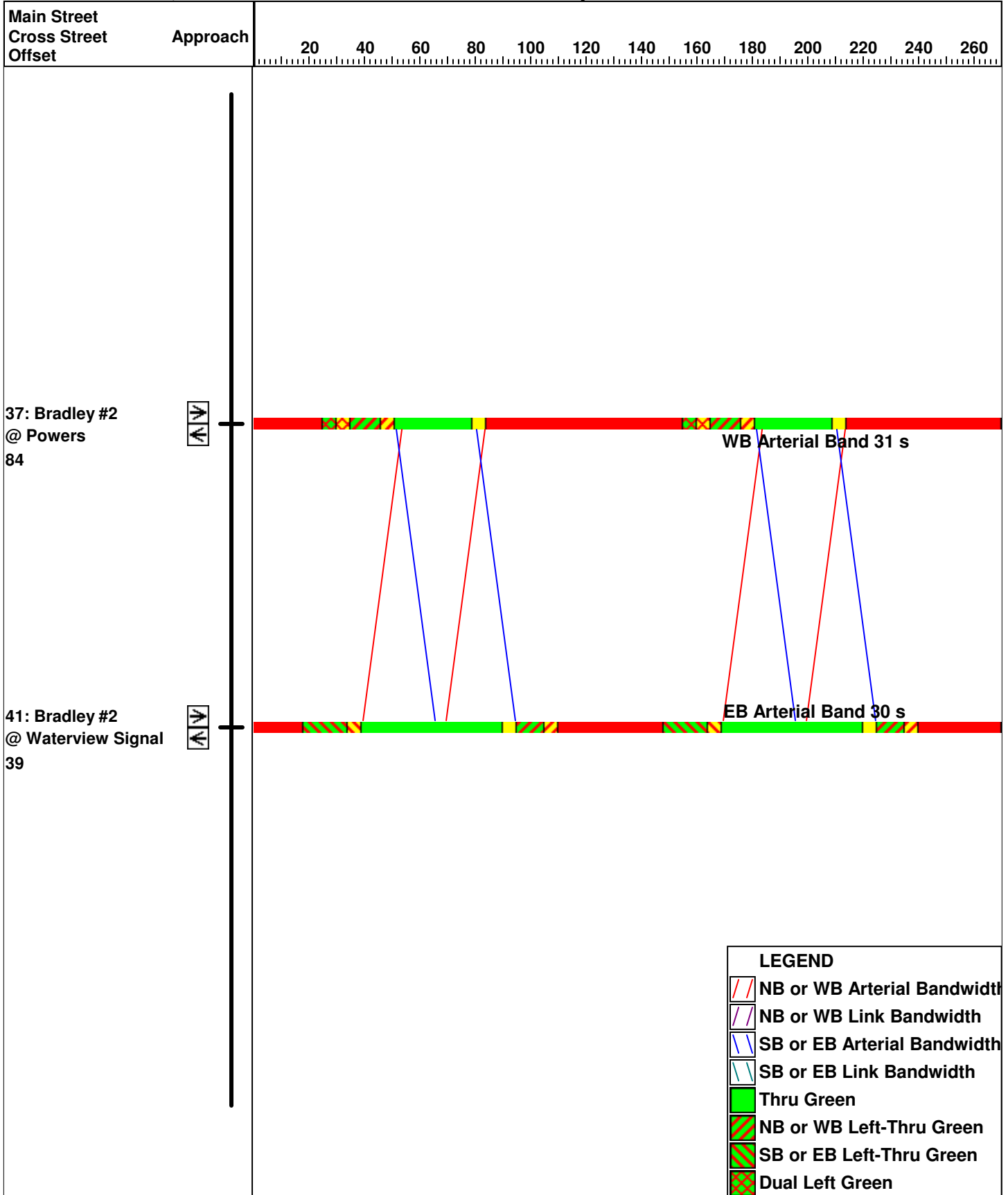
(2) DU = dwelling unit

Source: LSC Transportation Consultants, Inc.

Exhibit 1A

Arterial Bandwidths, Maximum Green Times Powers and Access Only

2040 Total PM Peak Hour



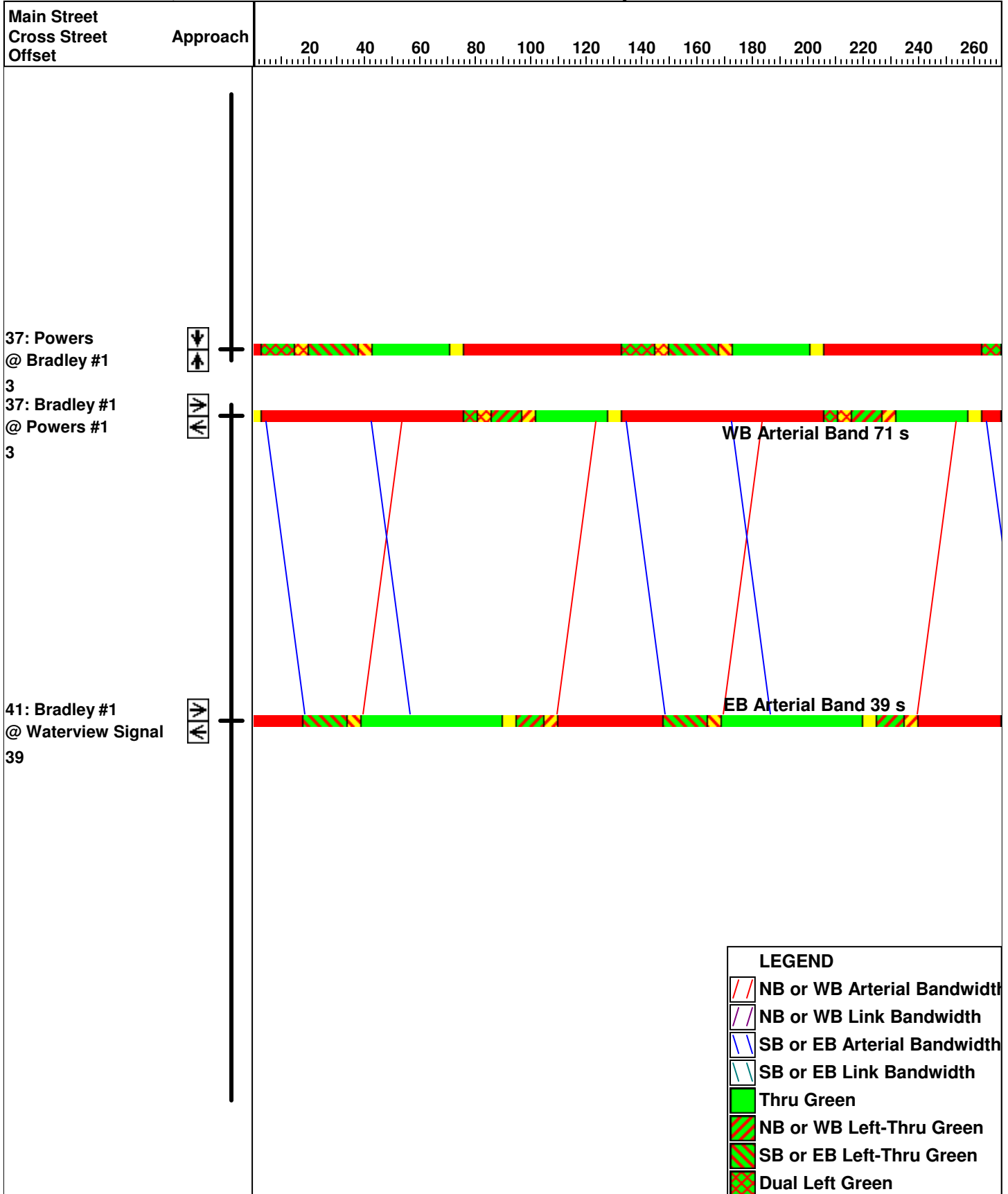
2040 Total PM Peak Hour

KDF

Exhibit 1B

Arterial Bandwidths, Maximum Green Times SB LT @ Powers Access Only

2040 Total PM Peak Hour

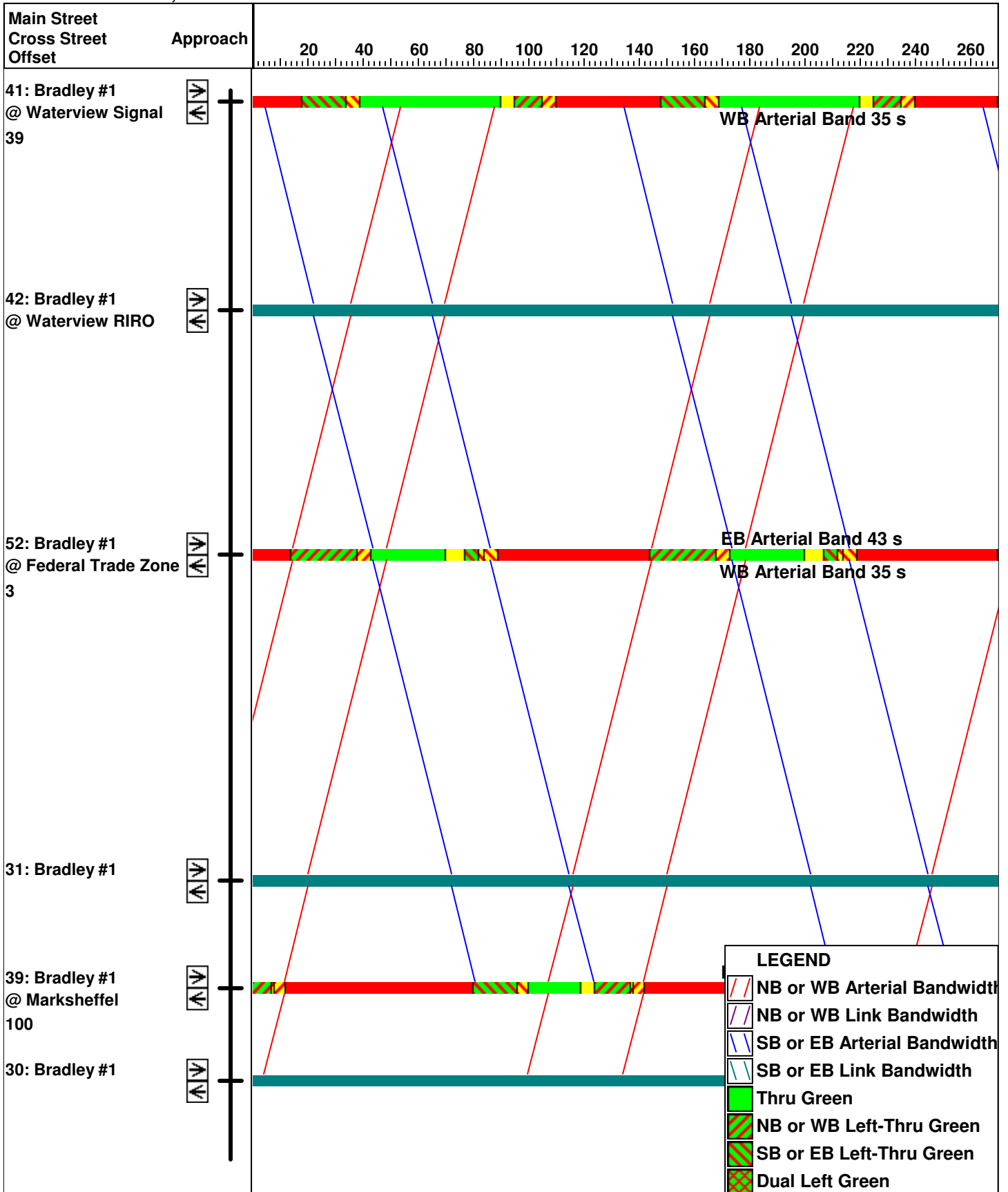


2040 Total PM Peak Hour

KDF

Exhibit 2A
Arterial Bandwidths, Maximum Green Times Without Powers

2040 Total PM Peak Hour



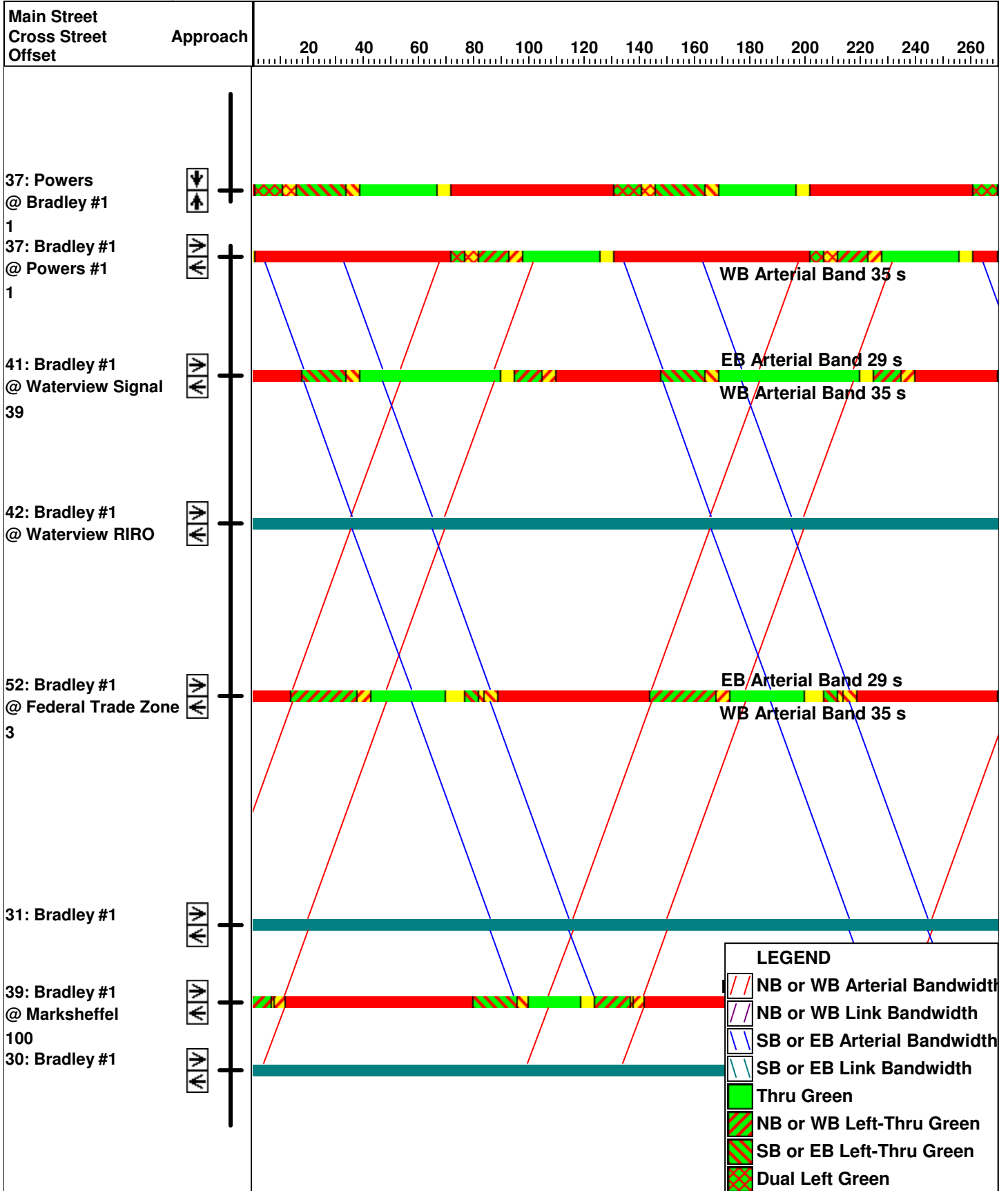
2040 Total PM Peak Hour

KDF

Exhibit 2B

Arterial Bandwidths, Maximum Green Times From SB LT @ Powers

2040 Total PM Peak Hour



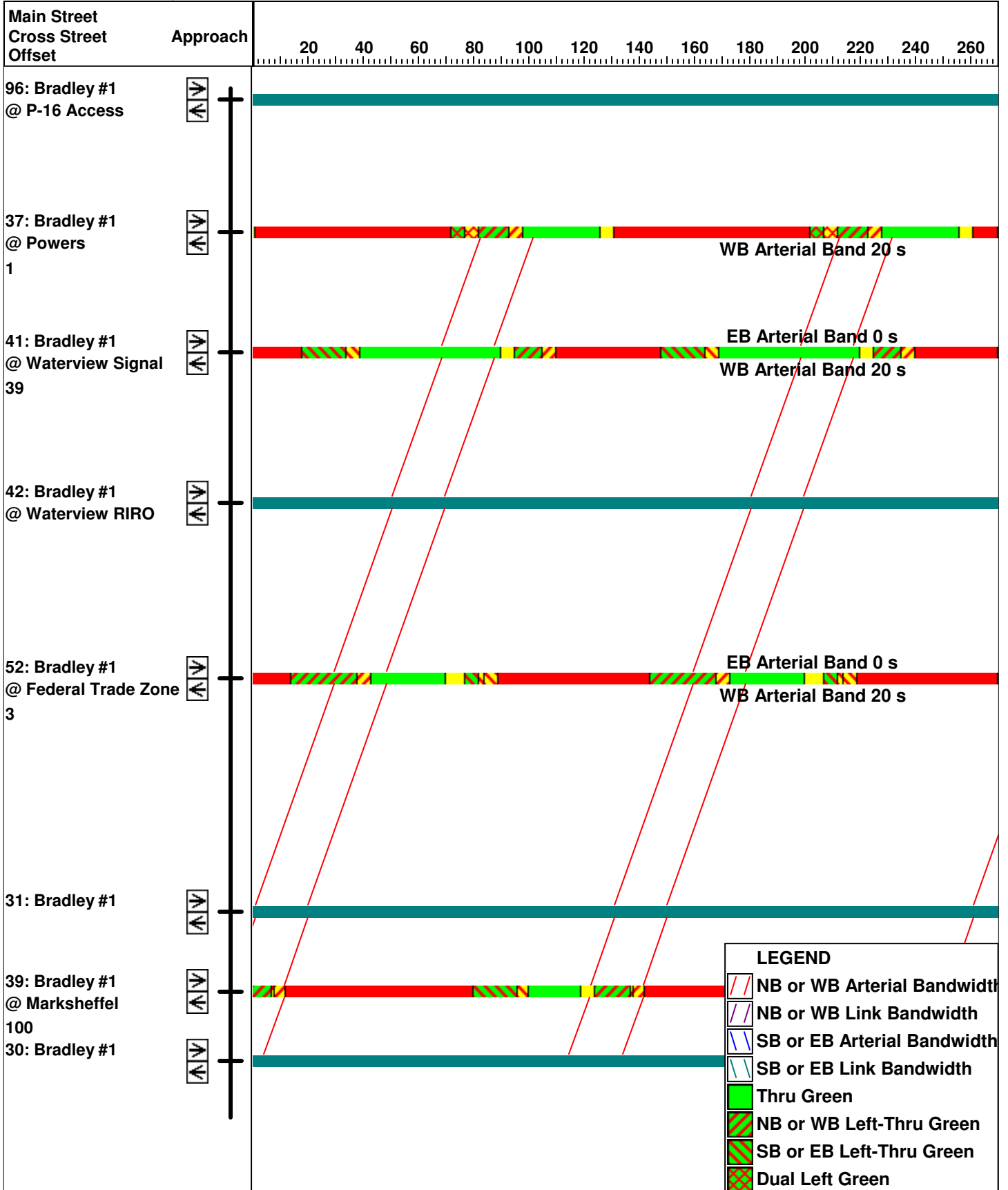
2040 Total PM Peak Hour

KDF

Exhibit 2C

Arterial Bandwidths, Maximum Green Times Across Powers

2040 Total PM Peak Hour



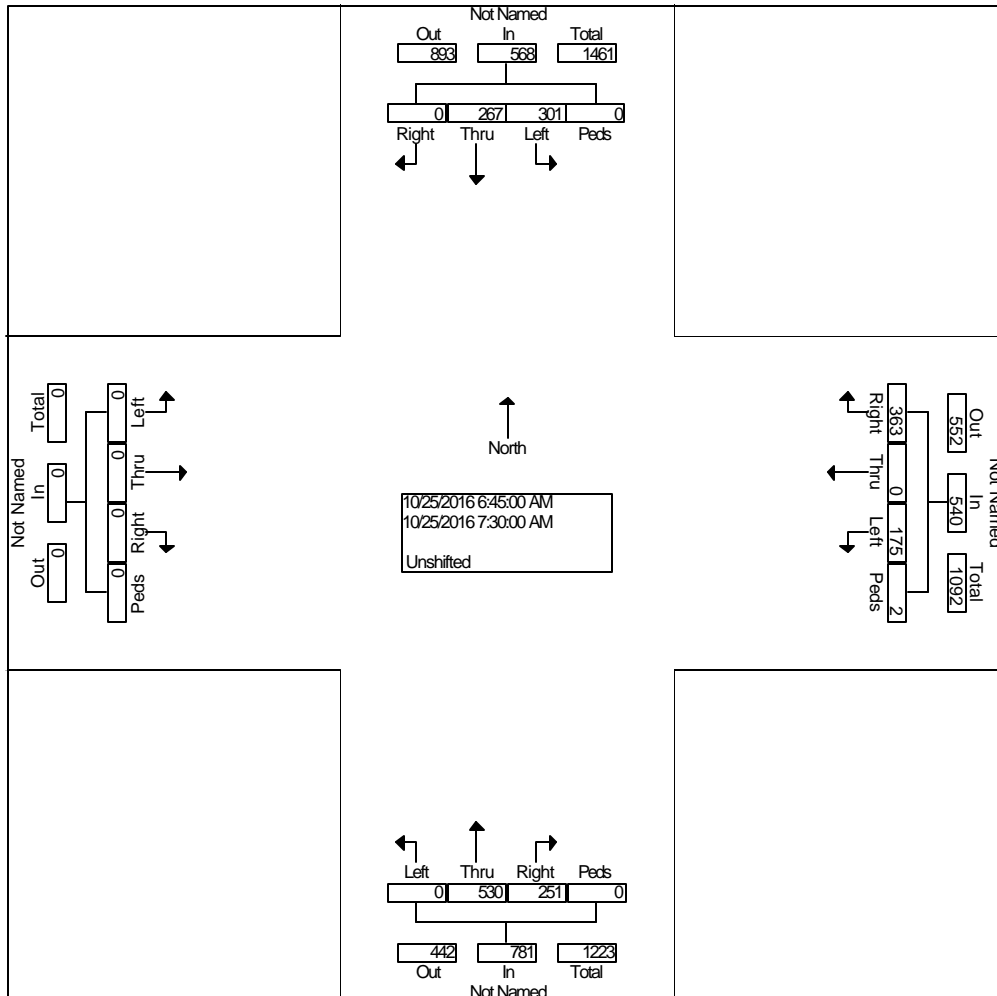
2040 Total PM Peak Hour

KDF

LSC Transportation Consultants, Inc.
 545 E. Pikes Peak Ave., #210
 Colorado Springs, CO 80903
 (719) 633-2868

File Name : Powers - Bradley Rd AM
 Site Code : 00164691
 Start Date : 10/25/2016
 Page No : 2

| Start Time | From North | | | | | From East | | | | | From South | | | | | From West | | | | | Int. Total |
|---|------------|-------|-------|-------|------------|-----------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 06:45 AM | | | | | | | | | | | | | | | | | | | | |
| Volume | 0 | 26 | 30 | 0 | 568 | 36 | 0 | 17 | 2 | 540 | 25 | 53 | 0 | 0 | 781 | 0 | 0 | 0 | 0 | 0 | 1889 |
| Percent | 0.0 | 47. | 53. | 0.0 | | 67. | 0.0 | 32. | 0.4 | | 32. | 67. | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | |
| | | 0 | 0 | | | 2 | | 4 | | | 1 | 9 | | | | | | | | | |
| 07:15 Volume | 0 | 75 | 82 | 0 | 157 | 84 | 0 | 41 | 1 | 126 | 67 | 15 | 0 | 0 | 226 | 0 | 0 | 0 | 0 | 0 | 509 |
| Peak Factor | | | | | | | | | | | | | | | | | | | | | 0.928 |
| High Int. | 07:15 AM | | | | | 07:30 AM | | | | | 07:15 AM | | | | | 6:15:00 AM | | | | | |
| Volume | 0 | 75 | 82 | 0 | 157 | 10 | 0 | 41 | 0 | 147 | 67 | 15 | 0 | 0 | 226 | | | | | | |
| Peak Factor | | | | | 0.90 | | | | | 0.91 | | | | | 0.86 | | | | | | |
| | | | | | 4 | | | | | 8 | | | | | 4 | | | | | | |



LSC Transportation Consultants, Inc.
545 E. Pikes Peak Ave., #210
Colorado Springs, CO 80903
(719) 633-2868

LSC Transportation Consultants, Inc. File Name : Powers - Bradley Rd PM
 Site Code : 00164691
 Start Date : 10/25/2016
 Page No : 1

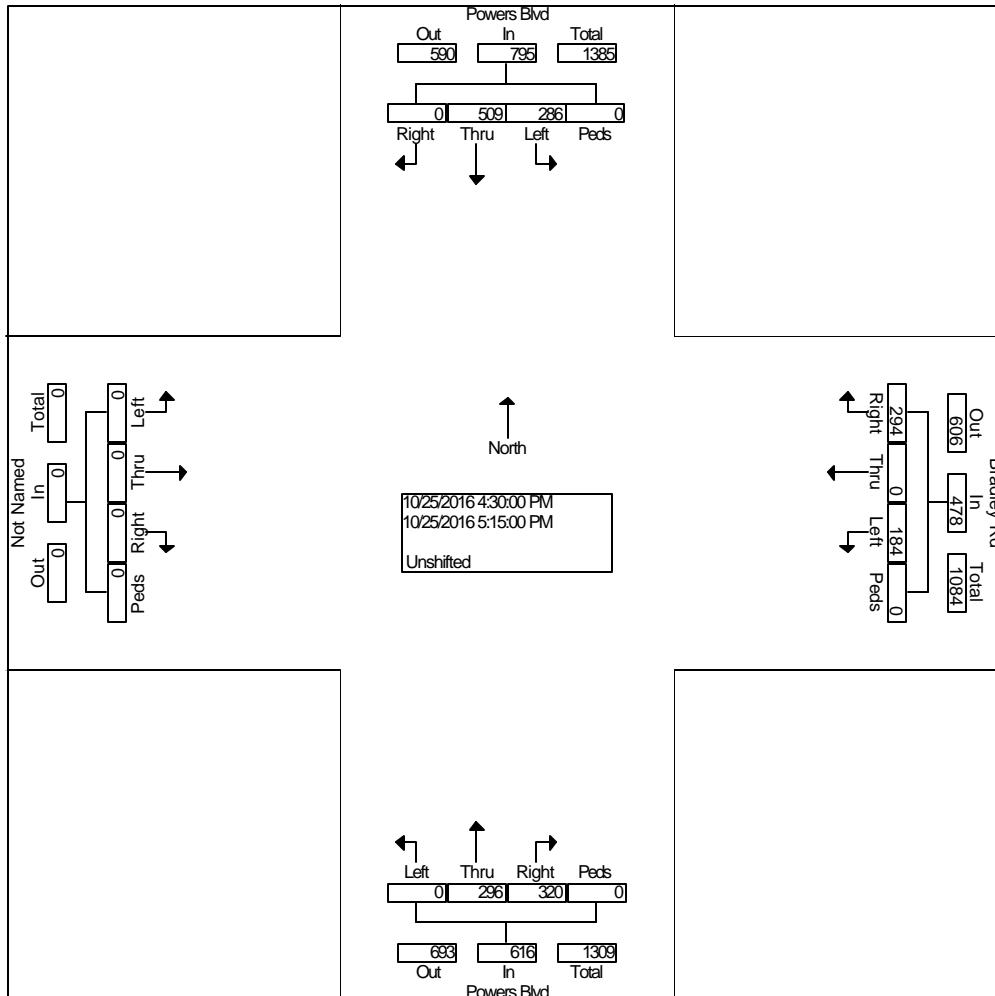
Groups Printed- Unshifted

| Start Time | Powers Blvd From North | | | | Bradley Rd From East | | | | Powers Blvd From South | | | | From West | | | | Int. Total |
|-------------|------------------------|------|------|------|----------------------|------|------|------|------------------------|------|------|------|-----------|------|------|------|------------|
| | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| 04:00 PM | 0 | 119 | 79 | 0 | 58 | 0 | 45 | 1 | 69 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | 431 |
| 04:15 PM | 0 | 135 | 71 | 0 | 89 | 0 | 52 | 0 | 68 | 71 | 0 | 0 | 0 | 0 | 0 | 0 | 486 |
| 04:30 PM | 0 | 129 | 82 | 0 | 65 | 0 | 45 | 0 | 87 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | 475 |
| 04:45 PM | 0 | 119 | 62 | 0 | 85 | 0 | 56 | 0 | 81 | 71 | 0 | 0 | 0 | 0 | 0 | 0 | 474 |
| Total | 0 | 502 | 294 | 0 | 297 | 0 | 198 | 1 | 305 | 269 | 0 | 0 | 0 | 0 | 0 | 0 | 1866 |
| 05:00 PM | 0 | 119 | 73 | 0 | 70 | 0 | 31 | 0 | 78 | 77 | 0 | 0 | 0 | 0 | 0 | 0 | 448 |
| 05:15 PM | 0 | 142 | 69 | 0 | 74 | 0 | 52 | 0 | 74 | 81 | 0 | 0 | 0 | 0 | 0 | 0 | 492 |
| 05:30 PM | 0 | 134 | 70 | 0 | 52 | 0 | 39 | 0 | 90 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 460 |
| 05:45 PM | 0 | 129 | 63 | 1 | 45 | 0 | 36 | 0 | 81 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | 425 |
| Total | 0 | 524 | 275 | 1 | 241 | 0 | 158 | 0 | 323 | 303 | 0 | 0 | 0 | 0 | 0 | 0 | 1825 |
| Grand Total | 0 | 1026 | 569 | 1 | 538 | 0 | 356 | 1 | 628 | 572 | 0 | 0 | 0 | 0 | 0 | 0 | 3691 |
| Apprch % | 0.0 | 64.3 | 35.7 | 0.1 | 60.1 | 0.0 | 39.8 | 0.1 | 52.3 | 47.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total % | 0.0 | 27.8 | 15.4 | 0.0 | 14.6 | 0.0 | 9.6 | 0.0 | 17.0 | 15.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |

LSC Transportation Consultants, Inc.
 545 E. Pikes Peak Ave., #210
 Colorado Springs, CO 80903
 (719) 633-2868

File Name : Powers - Bradley Rd PM
 Site Code : 00164691
 Start Date : 10/25/2016
 Page No : 2

| Start Time | Powers Blvd From North | | | | | Bradley Rd From East | | | | | Powers Blvd From South | | | | | From West | | | | | Int. Total | |
|---|------------------------|-------|-------|-------|------------|----------------------|-------|-------|-------|------------|------------------------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------|-----|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | | |
| Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 04:30 PM | | | | | | | | | | | | | | | | | | | | | |
| Volume | 0 | 50 | 28 | 0 | 795 | 29 | 0 | 18 | 0 | 478 | 32 | 29 | 0 | 0 | 616 | 0 | 0 | 0 | 0 | 0 | 1889 | |
| Percent | 0.0 | 64.9 | 36.0 | 0.0 | | 61.5 | 0.0 | 38.5 | 0.0 | | 51.9 | 48.1 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| 05:15 Volume | 0 | 14 | 2 | 69 | 0 | 211 | 74 | 0 | 52 | 0 | 126 | 74 | 81 | 0 | 0 | 155 | 0 | 0 | 0 | 0 | 0 | 492 |
| Peak Factor | | | | | | | | | | | | | | | | | | | | | | |
| High Int. | 04:30 PM | | | | | 04:45 PM | | | | | 05:00 PM | | | | | 3:45:00 PM | | | | | | |
| Volume | 0 | 12 | 9 | 82 | 0 | 211 | 85 | 0 | 56 | 0 | 141 | 78 | 77 | 0 | 0 | 155 | | | | | | |
| Peak Factor | 0.94 | | | | | 0.84 | | | | | 0.99 | | | | | | | | | | | |
| | 2 | | | | | 8 | | | | | 4 | | | | | | | | | | | |



LSC Transportation Consultants, Inc.

545 E. Pikes Peak Ave., #210

LSC Transportation Consultants, Inc. Colorado Springs, CO 80903 Name : Grinnell Blvd - Bradley Rd AM

(719) 633-2868

Site Code : 00164690

Start Date : 08/30/2016

Page No : 1

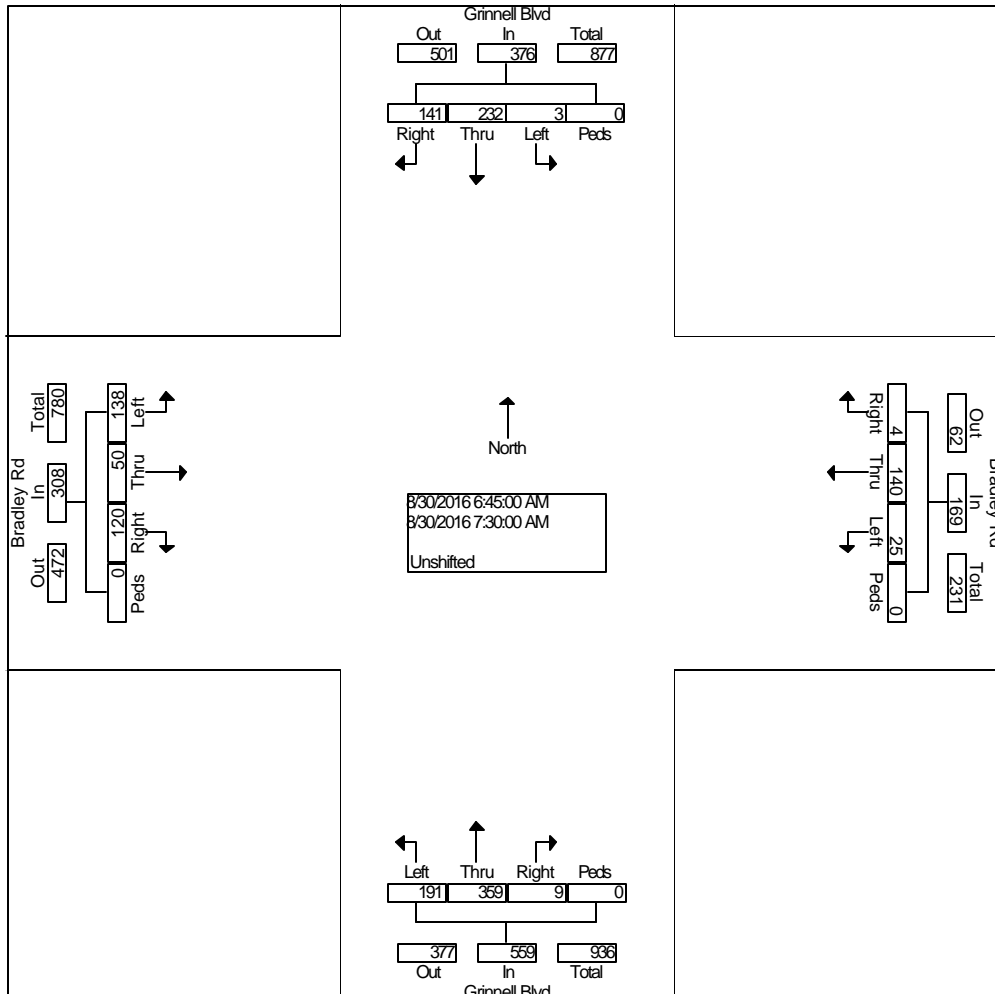
Groups Printed- Unshifted

| Start Time | Grinnell Blvd From North | | | | Bradley Rd From East | | | | Grinnell Blvd From South | | | | Bradley Rd From West | | | | Int. Total |
|-------------|--------------------------|------|------|------|----------------------|------|------|------|--------------------------|------|------|------|----------------------|------|------|------|------------|
| | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| 06:30 AM | 38 | 43 | 1 | 0 | 1 | 35 | 5 | 0 | 2 | 77 | 36 | 0 | 29 | 11 | 31 | 0 | 309 |
| 06:45 AM | 43 | 49 | 1 | 0 | 0 | 39 | 6 | 0 | 3 | 79 | 40 | 0 | 32 | 13 | 35 | 0 | 340 |
| Total | 81 | 92 | 2 | 0 | 1 | 74 | 11 | 0 | 5 | 156 | 76 | 0 | 61 | 24 | 66 | 0 | 649 |
| 07:00 AM | 34 | 56 | 0 | 0 | 2 | 30 | 7 | 0 | 2 | 90 | 51 | 0 | 30 | 16 | 50 | 0 | 368 |
| 07:15 AM | 33 | 54 | 1 | 0 | 0 | 40 | 5 | 0 | 1 | 96 | 58 | 0 | 27 | 10 | 27 | 0 | 352 |
| 07:30 AM | 31 | 73 | 1 | 0 | 2 | 31 | 7 | 0 | 3 | 94 | 42 | 0 | 31 | 11 | 26 | 0 | 352 |
| 07:45 AM | 34 | 57 | 0 | 0 | 1 | 25 | 4 | 0 | 3 | 56 | 31 | 1 | 26 | 9 | 21 | 0 | 268 |
| Total | 132 | 240 | 2 | 0 | 5 | 126 | 23 | 0 | 9 | 336 | 182 | 1 | 114 | 46 | 124 | 0 | 1340 |
| 08:00 AM | 29 | 51 | 4 | 0 | 2 | 18 | 7 | 0 | 3 | 56 | 27 | 0 | 29 | 13 | 25 | 0 | 264 |
| 08:15 AM | 34 | 56 | 2 | 0 | 2 | 31 | 13 | 0 | 2 | 84 | 42 | 0 | 22 | 5 | 18 | 0 | 311 |
| Grand Total | 276 | 439 | 10 | 0 | 10 | 249 | 54 | 0 | 19 | 632 | 327 | 1 | 226 | 88 | 233 | 0 | 2564 |
| Apprch % | 38.1 | 60.6 | 1.4 | 0.0 | 3.2 | 79.6 | 17.3 | 0.0 | 1.9 | 64.6 | 33.4 | 0.1 | 41.3 | 16.1 | 42.6 | 0.0 | |
| Total % | 10.8 | 17.1 | 0.4 | 0.0 | 0.4 | 9.7 | 2.1 | 0.0 | 0.7 | 24.6 | 12.8 | 0.0 | 8.8 | 3.4 | 9.1 | 0.0 | |

LSC Transportation Consultants, Inc.
545 E. Pikes Peak Ave., #210
Colorado Springs, CO 80903
(719) 633-2868

Project Name : Grinnell Blvd - Bradley Rd AM
 Site Code : 00164690
 Start Date : 08/30/2016
 Page No : 2

| Start Time | Grinnell Blvd From North | | | | | Bradley Rd From East | | | | | Grinnell Blvd From South | | | | | Bradley Rd From West | | | | | Int. Total |
|---|--------------------------|-------|-------|-------|------------|----------------------|-------|-------|-------|------------|--------------------------|-------|-------|-------|------------|----------------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 06:45 AM | | | | | | | | | | | | | | | | | | | | |
| Volume | 14 | 23 | 3 | 0 | 376 | 4 | 14 | 25 | 0 | 169 | 9 | 35 | 19 | 0 | 559 | 12 | 50 | 13 | 0 | 308 | 1412 |
| Percent | 37.5 | 61.7 | 0.8 | 0.0 | | 2.4 | 82.8 | 14.8 | 0.0 | | 1.6 | 64.2 | 34.2 | 0.0 | | 39.0 | 16.2 | 44.8 | 0.0 | | |
| 07:00 Volume | 34 | 56 | 0 | 0 | 90 | 2 | 30 | 7 | 0 | 39 | 2 | 90 | 51 | 0 | 143 | 30 | 16 | 50 | 0 | 96 | 368 |
| Peak Factor | 0.959 | | | | | | | | | | | | | | | | | | | | |
| High Int. | 07:30 AM | | | | | | | | | | | | | | | | | | | | |
| Volume | 31 | 73 | 1 | 0 | 105 | 0 | 39 | 6 | 0 | 45 | 1 | 96 | 58 | 0 | 155 | 30 | 16 | 50 | 0 | 96 | 96 |
| Peak Factor | 0.89 | | | | | 0.93 | | | | | 0.90 | | | | | 0.80 | | | | | |
| | 5 | | | | | 9 | | | | | 2 | | | | | 2 | | | | | |



LSC Transportation Consultants, Inc.

545 E. Pikes Peak Ave., #210

LSC Transportation Consultants, Inc. Colorado Springs, CO 80903 Name : Grinnell Blvd - Bradley Rd PM

(719) 633-2868

Site Code : 00164690

Start Date : 08/31/2016

Page No : 1

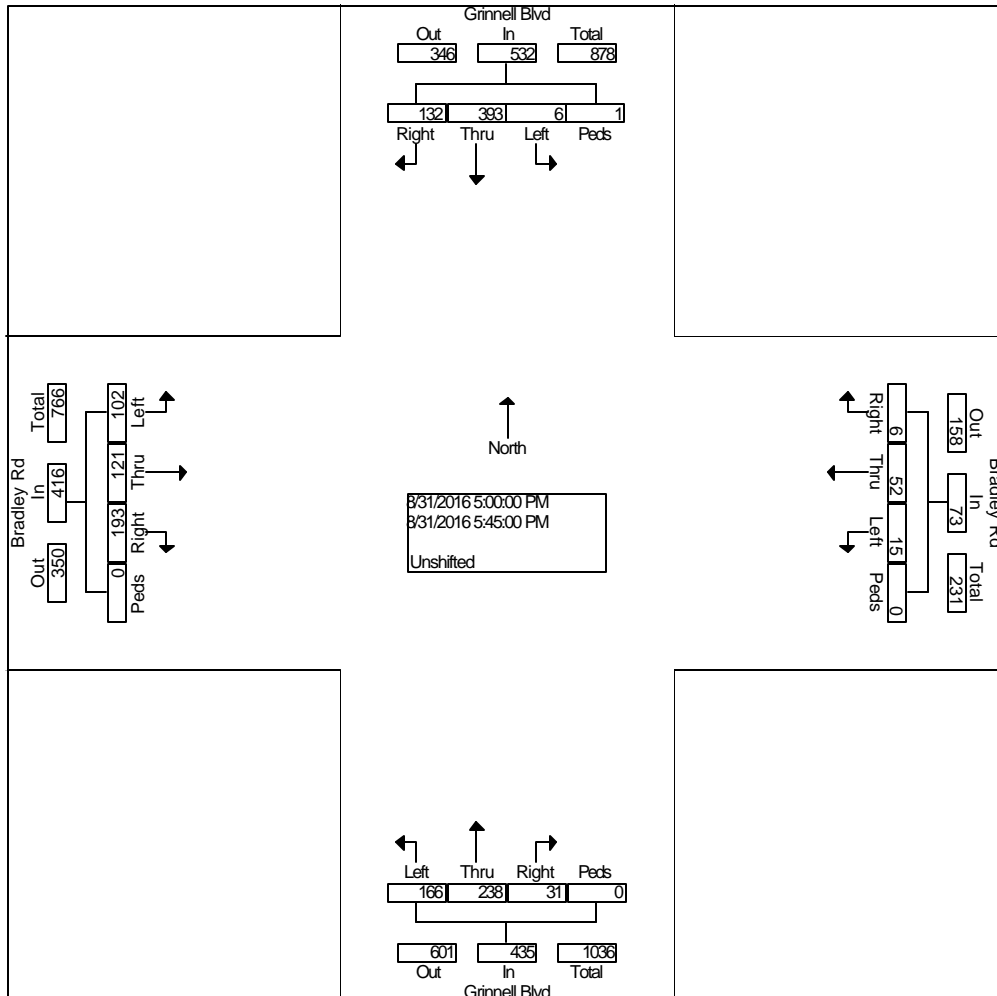
Groups Printed- Unshifted

| Start Time | Grinnell Blvd From North | | | | Bradley Rd From East | | | | Grinnell Blvd From South | | | | Bradley Rd From West | | | | Int. Total |
|-------------|-----------------------------|------|------|------|-------------------------|------|------|------|-----------------------------|------|------|------|-------------------------|------|------|------|---------------|
| | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| 04:00 PM | 38 | 98 | 2 | 0 | 2 | 11 | 5 | 0 | 5 | 49 | 41 | 0 | 41 | 16 | 19 | 0 | 327 |
| 04:15 PM | 43 | 111 | 2 | 0 | 4 | 15 | 6 | 0 | 6 | 57 | 43 | 0 | 46 | 14 | 22 | 0 | 369 |
| 04:30 PM | 41 | 73 | 3 | 0 | 0 | 13 | 6 | 0 | 4 | 70 | 39 | 0 | 62 | 20 | 22 | 0 | 353 |
| 04:45 PM | 40 | 100 | 3 | 0 | 0 | 14 | 7 | 0 | 7 | 43 | 33 | 0 | 44 | 35 | 19 | 0 | 345 |
| Total | 162 | 382 | 10 | 0 | 6 | 53 | 24 | 0 | 22 | 219 | 156 | 0 | 193 | 85 | 82 | 0 | 1394 |
| 05:00 PM | 38 | 102 | 1 | 1 | 1 | 13 | 2 | 0 | 7 | 59 | 56 | 0 | 43 | 27 | 20 | 0 | 370 |
| 05:15 PM | 35 | 93 | 0 | 0 | 1 | 12 | 5 | 0 | 6 | 60 | 32 | 0 | 49 | 37 | 29 | 0 | 359 |
| 05:30 PM | 25 | 106 | 4 | 0 | 1 | 10 | 4 | 0 | 10 | 50 | 39 | 0 | 64 | 31 | 30 | 0 | 374 |
| 05:45 PM | 34 | 92 | 1 | 0 | 3 | 17 | 4 | 0 | 8 | 69 | 39 | 0 | 37 | 26 | 23 | 0 | 353 |
| Total | 132 | 393 | 6 | 1 | 6 | 52 | 15 | 0 | 31 | 238 | 166 | 0 | 193 | 121 | 102 | 0 | 1456 |
| Grand Total | 294 | 775 | 16 | 1 | 12 | 105 | 39 | 0 | 53 | 457 | 322 | 0 | 386 | 206 | 184 | 0 | 2850 |
| Apprch % | 27.1 | 71.4 | 1.5 | 0.1 | 7.7 | 67.3 | 25.0 | 0.0 | 6.4 | 54.9 | 38.7 | 0.0 | 49.7 | 26.5 | 23.7 | 0.0 | |
| Total % | 10.3 | 27.2 | 0.6 | 0.0 | 0.4 | 3.7 | 1.4 | 0.0 | 1.9 | 16.0 | 11.3 | 0.0 | 13.5 | 7.2 | 6.5 | 0.0 | |

LSC Transportation Consultants, Inc.
 545 E. Pikes Peak Ave., #210
 Colorado Springs, CO 80903
 (719) 633-2868

Project Name : Grinnell Blvd - Bradley Rd PM
 Site Code : 00164690
 Start Date : 08/31/2016
 Page No : 2

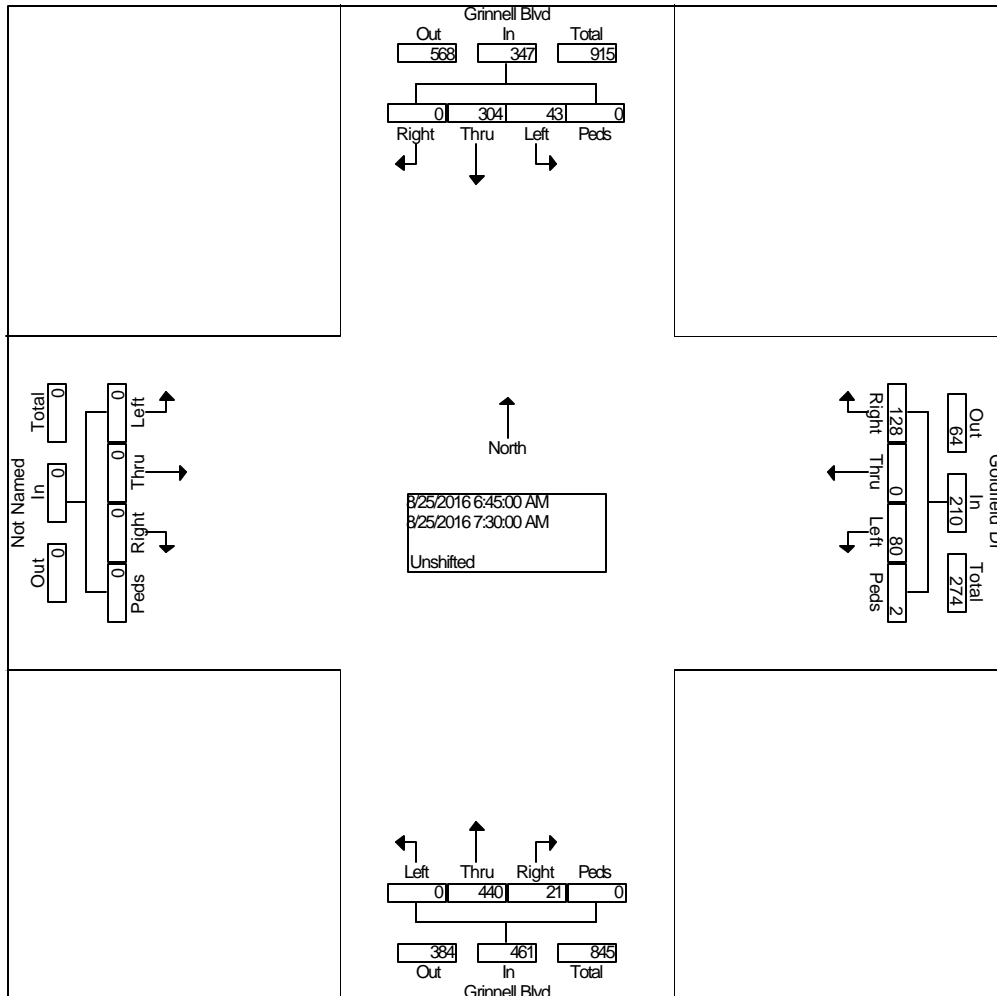
| Start Time | Grinnell Blvd From North | | | | | Bradley Rd From East | | | | | Grinnell Blvd From South | | | | | Bradley Rd From West | | | | | Int. Total |
|---|--------------------------|-------|-------|-------|------------|----------------------|-------|-------|-------|------------|--------------------------|-------|-------|-------|------------|----------------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 05:00 PM | | | | | | | | | | | | | | | | | | | | |
| Volume | 13 | 39 | 6 | 1 | 532 | 6 | 52 | 15 | 0 | 73 | 31 | 23 | 16 | 0 | 435 | 19 | 12 | 10 | 0 | 416 | 1456 |
| Percent | 24.8 | 73.9 | 1.1 | 0.2 | | 8.2 | 71.2 | 20.5 | 0.0 | | 7.1 | 54.7 | 38.2 | 0.0 | | 46.4 | 29.1 | 24.5 | 0.0 | | |
| 05:30 Peak Factor | 25 | 10 | 4 | 0 | 135 | 1 | 10 | 4 | 0 | 15 | 10 | 50 | 39 | 0 | 99 | 64 | 31 | 30 | 0 | 125 | 374 |
| High Int. | 05:00 PM | | | | | 05:45 PM | | | | | 05:00 PM | | | | | 05:30 PM | | | | | 0.973 |
| Volume | 38 | 10 | 1 | 1 | 142 | 3 | 17 | 4 | 0 | 24 | 7 | 59 | 56 | 0 | 122 | 64 | 31 | 30 | 0 | 125 | |
| Peak Factor | | | | | 0.93 | | | | | 0.76 | | | | | 0.89 | | | | | 0.83 | 2 |



LSC Transportation Consultants, Inc.
 545 E. Pikes Peak Ave., #210
 Colorado Springs, CO 80903
 (719) 633-2868

Project Name : Grinnell Blvd - Goldfield Dr AM
 Site Code : 00164690
 Start Date : 08/25/2016
 Page No : 2

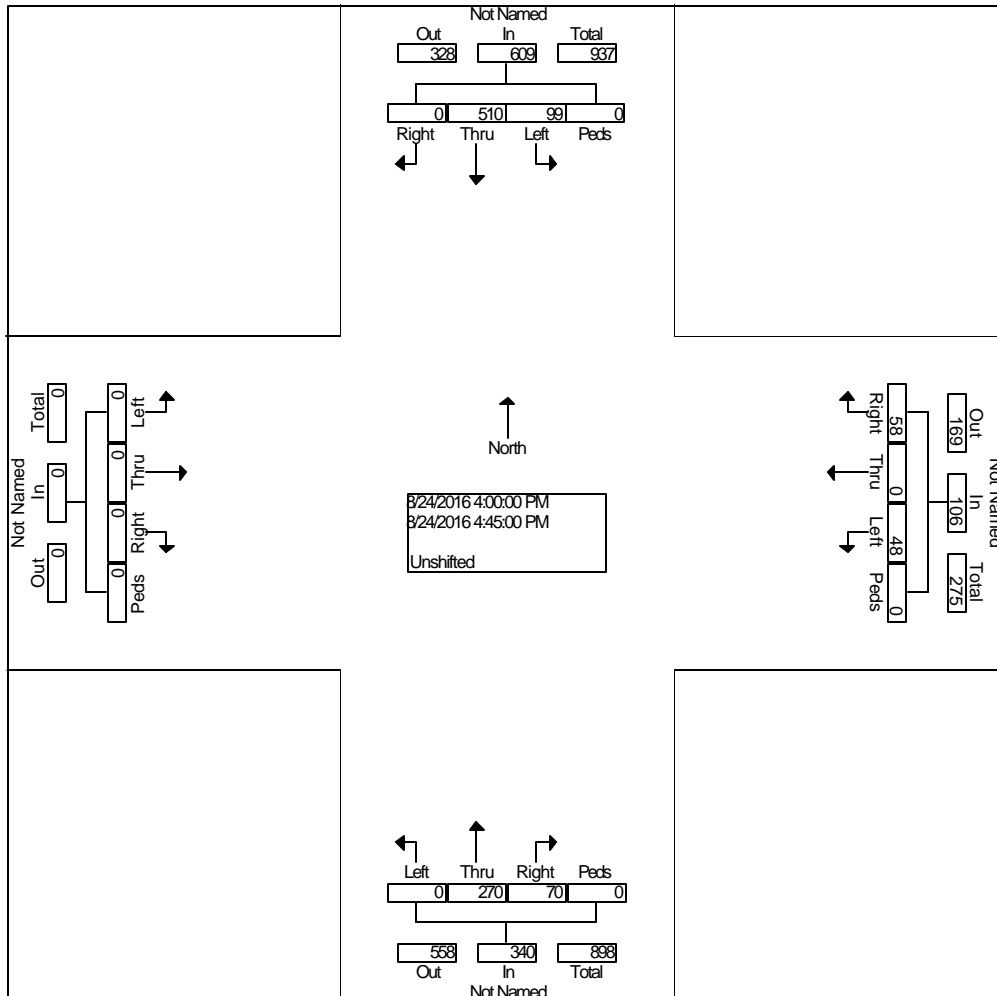
| Start Time | Grinnell Blvd From North | | | | | Goldfield Dr From East | | | | | Grinnell Blvd From South | | | | | From West | | | | | Int. Total |
|---|--------------------------|-------|-------|-------|------------|------------------------|-------|-------|-------|------------|--------------------------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 06:45 AM | | | | | | | | | | | | | | | | | | | | |
| Volume | 0 | 30 | 43 | 0 | 347 | 12 | 0 | 80 | 2 | 210 | 21 | 44 | 0 | 0 | 461 | 0 | 0 | 0 | 0 | 0 | 1018 |
| Percent | 0.0 | 87.6 | 12.4 | 0.0 | | 61.0 | 0.0 | 38.1 | 1.0 | | 4.6 | 95.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | |
| 07:15 Volume | 0 | 86 | 13 | 0 | 99 | 41 | 0 | 15 | 1 | 57 | 5 | 11 | 0 | 0 | 124 | 0 | 0 | 0 | 0 | 0 | 280 |
| Peak Factor | 0.909 | | | | | | | | | | | | | | | | | | | | |
| High Int. | 06:45 AM | | | | | 07:15 AM | | | | | 07:00 AM | | | | | 6:15:00 AM | | | | | |
| Volume | 0 | 88 | 12 | 0 | 100 | 41 | 0 | 15 | 1 | 57 | 7 | 12 | 0 | 0 | 130 | | | | | | |
| Peak Factor | 0.868 | | | | | | | | | | 0.921 | | | | | 0.887 | | | | | |



LSC Transportation Consultants, Inc.
 545 E. Pikes Peak Ave., #210
 Colorado Springs, CO 80903
 (719) 633-2868

Name : Grinnell Blvd - Goldfield Dr PM
 Site Code : 00164690
 Start Date : 08/24/2016
 Page No : 2

| Start Time | From North | | | | | From East | | | | | From South | | | | | From West | | | | | Int. Total |
|---|------------|-------|-------|-------|------------|-----------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 04:00 PM | | | | | | | | | | | | | | | | | | | | |
| Volume | 0 | 51 | 99 | 0 | 609 | 58 | 0 | 48 | 0 | 106 | 70 | 27 | 0 | 0 | 340 | 0 | 0 | 0 | 0 | 0 | 1055 |
| Percent | 0.0 | 83.7 | 16.3 | 0.0 | | 54.7 | 0.0 | 45.3 | 0.0 | | 20.6 | 79.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | |
| 04:15 Volume | 0 | 13 | 26 | 0 | 161 | 17 | 0 | 15 | 0 | 32 | 18 | 64 | 0 | 0 | 82 | 0 | 0 | 0 | 0 | 0 | 275 |
| Peak Factor | 0.959 | | | | | | | | | | | | | | | | | | | | |
| High Int. | 04:15 PM | | | | | 04:15 PM | | | | | 04:00 PM | | | | | 3:45:00 PM | | | | | |
| Volume | 0 | 13 | 26 | 0 | 161 | 17 | 0 | 15 | 0 | 32 | 13 | 79 | 0 | 0 | 92 | | | | | | |
| Peak Factor | 0.946 | | | | | 0.828 | | | | | 0.924 | | | | | | | | | | |



LSC Transportation Consultants, Inc.
545 E. Pikes Peak Ave., #210

LSC Transportation Consultants, Inc. Colorado Springs, CO 80903
 (719) 633-2868
 Site Name : Powers Blvd - Grinnell Blvd AM
 Site Code : 00164690
 Start Date : 08/31/2016
 Page No : 1

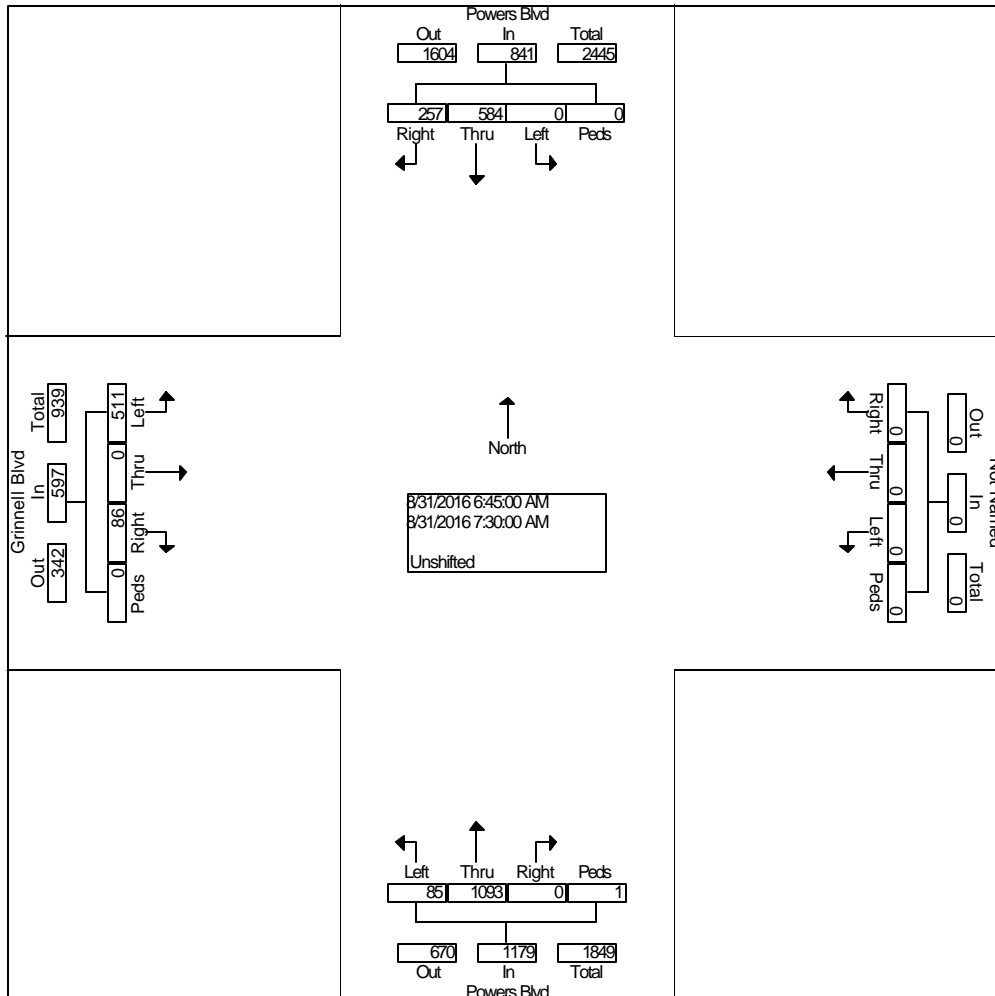
Groups Printed- Unshifted

| Start Time | Powers Blvd From North | | | | From East | | | | Powers Blvd From South | | | | Grinnell Blvd From West | | | | Int. Total |
|-------------|------------------------|------|------|------|-----------|------|------|------|------------------------|------|------|------|-------------------------|------|------|------|------------|
| | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| 06:30 AM | 33 | 73 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 148 | 15 | 0 | 14 | 0 | 89 | 0 | 372 |
| 06:45 AM | 67 | 150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 240 | 30 | 0 | 23 | 0 | 108 | 0 | 618 |
| Total | 100 | 223 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 388 | 45 | 0 | 37 | 0 | 197 | 0 | 990 |
| 07:00 AM | 54 | 150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 291 | 16 | 0 | 26 | 0 | 128 | 0 | 665 |
| 07:15 AM | 68 | 137 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 297 | 18 | 1 | 19 | 0 | 147 | 0 | 687 |
| 07:30 AM | 68 | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 265 | 21 | 0 | 18 | 0 | 128 | 0 | 647 |
| 07:45 AM | 70 | 121 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 202 | 19 | 1 | 9 | 0 | 83 | 0 | 505 |
| Total | 260 | 555 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1055 | 74 | 2 | 72 | 0 | 486 | 0 | 2504 |
| 08:00 AM | 72 | 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 166 | 18 | 0 | 5 | 0 | 87 | 0 | 463 |
| 08:15 AM | 61 | 129 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 165 | 21 | 0 | 16 | 0 | 79 | 0 | 471 |
| Grand Total | 493 | 1022 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1774 | 158 | 2 | 130 | 0 | 849 | 0 | 4428 |
| Apprch % | 32.5 | 67.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 91.7 | 8.2 | 0.1 | 13.3 | 0.0 | 86.7 | 0.0 | |
| Total % | 11.1 | 23.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.1 | 3.6 | 0.0 | 2.9 | 0.0 | 19.2 | 0.0 | |

LSC Transportation Consultants, Inc.
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Name : Powers Blvd - Grinnell Blvd AM
 Site Code : 00164690
 Start Date : 08/31/2016
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| Start Time | Powers Blvd From North | | | | | From East | | | | | Powers Blvd From South | | | | | Grinnell Blvd From West | | | | | Int. Total |
|---|------------------------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------------------|-------|-------|-------|------------|-------------------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 06:45 AM | | | | | | | | | | | | | | | | | | | | |
| Volume | 25 | 58 | 0 | 0 | 841 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 85 | 1 | 1179 | 86 | 0 | 51 | 0 | 597 | 2617 |
| Percent | 30.6 | 69.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 92.7 | 7.2 | 0.1 | | 14.4 | 0.0 | 85.6 | 0.0 | | |
| 07:15 Volume | 68 | 13 | 0 | 0 | 205 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 18 | 1 | 316 | 19 | 0 | 14 | 0 | 166 | 687 |
| Peak Factor | 0.952 | | | | | | | | | | | | | | | | | | | | |
| High Int. | 06:45 AM | | | | | 6:15:00 AM | | | | | 07:15 AM | | | | | 07:15 AM | | | | | |
| Volume | 67 | 15 | 0 | 0 | 217 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 18 | 1 | 316 | 19 | 0 | 14 | 0 | 166 | |
| Peak Factor | 0.969 | | | | | | | | | | 0.933 | | | | | 0.899 | | | | | |



LSC Transportation Consultants, Inc.

545 E. Pikes Peak Ave., #210

LSC Transportation Consultants, Inc. Colorado Springs, CO 80903 Name : Powers Blvd - Grinnell Blvd PM

(719) 633-2868

Site Code : 00164690

Start Date : 09/01/2016

Page No : 1

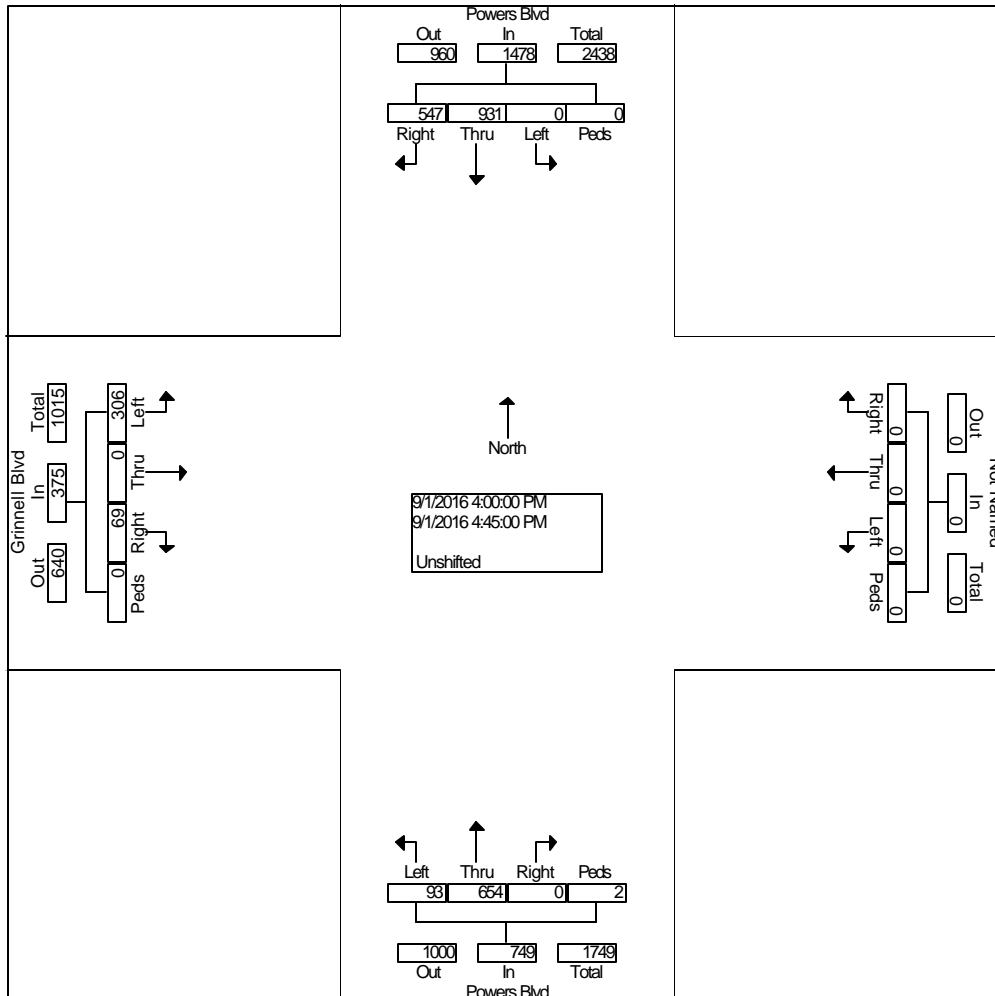
Groups Printed- Unshifted

| Start Time | Powers Blvd From North | | | | From East | | | | Powers Blvd From South | | | | Grinnell Blvd From West | | | | Int. Total |
|-------------|------------------------|------|------|------|-----------|------|------|------|------------------------|------|------|------|-------------------------|------|------|------|------------|
| | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | Right | Thru | Left | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 04:00 PM | 138 | 210 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 157 | 25 | 0 | 30 | 0 | 81 | 0 | 641 |
| 04:15 PM | 146 | 237 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 182 | 24 | 1 | 16 | 0 | 73 | 0 | 679 |
| 04:30 PM | 123 | 195 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 25 | 0 | 12 | 0 | 88 | 0 | 604 |
| 04:45 PM | 140 | 289 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 154 | 19 | 1 | 11 | 0 | 64 | 0 | 678 |
| Total | 547 | 931 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 654 | 93 | 2 | 69 | 0 | 306 | 0 | 2602 |
| 05:00 PM | 117 | 248 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 152 | 27 | 0 | 19 | 0 | 71 | 0 | 634 |
| 05:15 PM | 138 | 205 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 | 11 | 0 | 12 | 0 | 43 | 0 | 586 |
| 05:30 PM | 138 | 231 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 141 | 11 | 0 | 6 | 0 | 47 | 0 | 574 |
| 05:45 PM | 122 | 195 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 154 | 14 | 0 | 12 | 0 | 74 | 0 | 572 |
| Total | 515 | 879 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 624 | 63 | 0 | 49 | 0 | 235 | 0 | 2366 |
| Grand Total | 1062 | 1810 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1278 | 156 | 2 | 118 | 0 | 541 | 0 | 4968 |
| Apprch % | 37.0 | 63.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 89.0 | 10.9 | 0.1 | 17.9 | 0.0 | 82.1 | 0.0 | |
| Total % | 21.4 | 36.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 25.7 | 3.1 | 0.0 | 2.4 | 0.0 | 10.9 | 0.0 | |

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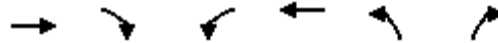
Name : Powers Blvd - Grinnell Blvd PM
 Site Code : 00164690
 Start Date : 09/01/2016
 Page No : 2

| Start Time | Powers Blvd From North | | | | | From East | | | | | Powers Blvd From South | | | | | Grinnell Blvd From West | | | | | Int. Total |
|---|------------------------|-------|-------|-------|------------|------------|-------|-------|-------|------------|------------------------|-------|-------|-------|------------|-------------------------|-------|-------|-------|------------|------------|
| | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | Rig ht | Thr u | Lef t | Pe ds | App. Total | |
| Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Intersection | 04:00 PM | | | | | | | | | | | | | | | | | | | | |
| Volume | 54 | 93 | 0 | 0 | 1478 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 93 | 2 | 749 | 69 | 0 | 30 | 0 | 375 | 2602 |
| Percent | 37.0 | 63.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 87.3 | 12.4 | 0.3 | | 18.4 | 0.0 | 81.6 | 0.0 | | |
| 04:15 Volume | 14 | 23 | 0 | 0 | 383 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 24 | 1 | 207 | 16 | 0 | 73 | 0 | 89 | 679 |
| Peak Factor | 0.958 | | | | | | | | | | | | | | | | | | | | |
| High Int. | 04:45 PM | | | | | 3:45:00 PM | | | | | 04:15 PM | | | | | 04:00 PM | | | | | |
| Volume | 14 | 28 | 0 | 0 | 429 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 24 | 1 | 207 | 30 | 0 | 81 | 0 | 111 | |
| Peak Factor | 0.86 | | | | | | | | | | 0.90 | | | | | 0.84 | | | | | |
| | 1 | | | | | | | | | | 5 | | | | | 5 | | | | | |



Timings
2: Grinnell & Powers

Existing Traffic
AM Peak Hour

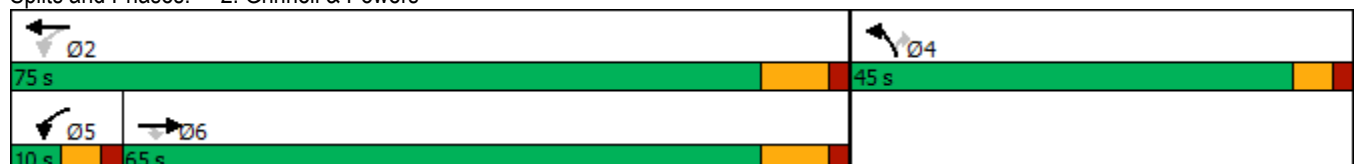


| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↑↑ | ↑ | ↘ | ↑↑ | ↘ | ↗ |
| Traffic Volume (vph) | 584 | 257 | 85 | 1093 | 511 | 86 |
| Future Volume (vph) | 584 | 257 | 85 | 1093 | 511 | 86 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | 6 | 2 | | | 4 |
| Detector Phase | 6 | 6 | 5 | 2 | 4 | 4 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 4.0 | 30.0 | 8.0 | 8.0 |
| Minimum Split (s) | 38.0 | 38.0 | 10.0 | 38.0 | 22.0 | 22.0 |
| Total Split (s) | 65.0 | 65.0 | 10.0 | 75.0 | 45.0 | 45.0 |
| Total Split (%) | 54.2% | 54.2% | 8.3% | 62.5% | 37.5% | 37.5% |
| Yellow Time (s) | 6.0 | 6.0 | 3.5 | 6.0 | 3.5 | 3.5 |
| 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) | 8.0 | 8.0 | 5.5 | 8.0 | 5.5 | 5.5 |
| Lead/Lag | Lag | Lag | Lead | | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | | | |
| Recall Mode | Min | Min | None | Min | None | None |
| Act Effct Green (s) | 32.0 | 32.0 | 42.2 | 39.7 | 37.4 | 37.4 |
| Actuated g/C Ratio | 0.35 | 0.35 | 0.47 | 0.44 | 0.41 | 0.41 |
| v/c Ratio | 0.48 | 0.35 | 0.27 | 0.78 | 0.78 | 0.14 |
| Control Delay | 25.3 | 4.4 | 16.0 | 26.2 | 33.0 | 12.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 25.3 | 4.4 | 16.0 | 26.2 | 33.0 | 12.4 |
| LOS | C | A | B | C | C | B |
| Approach Delay | 18.9 | | | 25.5 | 30.1 | |
| Approach LOS | B | | | C | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 90.7
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 24.6
 Intersection Capacity Utilization 73.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 2: Grinnell & Powers



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.8 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 80 | 128 | 475 | 21 | 43 | 300 |
| Future Vol, veh/h | 80 | 128 | 475 | 21 | 43 | 300 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | 0 | - | 380 | 295 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 88 | 88 |
| Heavy Vehicles, % | 1 | 1 | 2 | 1 | 1 | 2 |
| Mvmt Flow | 86 | 138 | 511 | 23 | 49 | 341 |

| Major/Minor | Minor1 | Major1 | Major2 | | | |
|----------------------|--------|--------|--------|---|-------|---|
| Conflicting Flow All | 950 | 511 | 0 | 0 | 534 | 0 |
| Stage 1 | 511 | - | - | - | - | - |
| Stage 2 | 439 | - | - | - | - | - |
| Critical Hdwy | 6.41 | 6.21 | - | - | 4.11 | - |
| Critical Hdwy Stg 1 | 5.41 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.41 | - | - | - | - | - |
| Follow-up Hdwy | 3.509 | 3.309 | - | - | 2.209 | - |
| Pot Cap-1 Maneuver | 290 | 565 | - | - | 1039 | - |
| Stage 1 | 604 | - | - | - | - | - |
| Stage 2 | 652 | - | - | - | - | - |
| Platoon blocked, % | | | - | - | | |
| Mov Cap-1 Maneuver | 276 | 565 | - | - | 1039 | - |
| Mov Cap-2 Maneuver | 276 | - | - | - | - | - |
| Stage 1 | 576 | - | - | - | - | - |
| Stage 2 | 652 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 17.4 | 0 | 1.1 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 276 | 565 | 1039 |
| HCM Lane V/C Ratio | - | - | 0.312 | 0.244 | 0.047 |
| HCM Control Delay (s) | - | - | 23.8 | 13.4 | 8.6 |
| HCM Lane LOS | - | - | C | B | A |
| HCM 95th %tile Q(veh) | - | - | 1.3 | 0.9 | 0.1 |

Timings
37: Powers & Bradley Rd.

Existing Traffic
AM Peak Hour



| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↙ | ↗ | ↑↑ | ↗ | ↙ | ↑↑ |
| Traffic Volume (vph) | 175 | 363 | 530 | 251 | 301 | 267 |
| Future Volume (vph) | 175 | 363 | 530 | 251 | 301 | 267 |
| 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) | 21.0 | 21.0 | 50.0 | 50.0 | 20.0 | 70.0 |
| Total Split (%) | 23.1% | 23.1% | 54.9% | 54.9% | 22.0% | 76.9% |
| 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 Effect Green (s) | 11.0 | 11.0 | 16.5 | 16.5 | 15.2 | 36.8 |
| Actuated g/C Ratio | 0.19 | 0.19 | 0.28 | 0.28 | 0.26 | 0.63 |
| v/c Ratio | 0.52 | 0.61 | 0.61 | 0.44 | 0.72 | 0.13 |
| Control Delay | 27.9 | 7.9 | 21.0 | 4.8 | 33.2 | 4.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 27.9 | 7.9 | 21.0 | 4.8 | 33.2 | 4.7 |
| LOS | C | A | C | A | C | A |
| Approach Delay | 14.4 | | 15.8 | | | 19.8 |
| Approach LOS | B | | B | | | B |

Intersection Summary

Cycle Length: 91
 Actuated Cycle Length: 58
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 16.6
 Intersection Capacity Utilization 53.5%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 37: Powers & Bradley Rd.



SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 6:45

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|------|-----|-----|-----|-----|------|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 11.2 | 3.4 | 4.5 | 7.7 | 8.3 | 13.0 | 3.0 | | 5.5 | 6.8 | 6.4 | 9.0 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 7:00

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 11.9 | 4.1 | 5.6 | 8.1 | 9.2 | 14.0 | 3.0 | 4.9 | 4.5 | 6.7 | 6.8 | 9.2 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 7:15

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 9.1 | 3.9 | 4.6 | 7.9 | 9.4 | 8.8 | 2.9 | | 6.0 | 6.3 | 5.4 | 7.5 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 7:30

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 7.1 | 3.4 | 6.2 | 8.5 | 7.3 | 9.2 | 2.5 | | 5.2 | 6.7 | 6.6 | 7.3 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

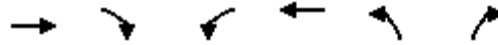
| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 10.3 | 3.8 | 5.2 | 8.2 | 8.8 | 11.7 | 2.9 | 6.1 | 5.4 | 6.8 | 6.4 | 8.5 |

Total Zone Performance By Interval

| Interval Start | 6:45 | 7:00 | 7:15 | 7:30 | All |
|------------------|-------|-------|-------|-------|-------|
| Stop Del/Veh (s) | 228.5 | 116.7 | 282.5 | 293.2 | 427.6 |

Timings
2: Grinnell & Powers

Existing Traffic
PM Peak Hour

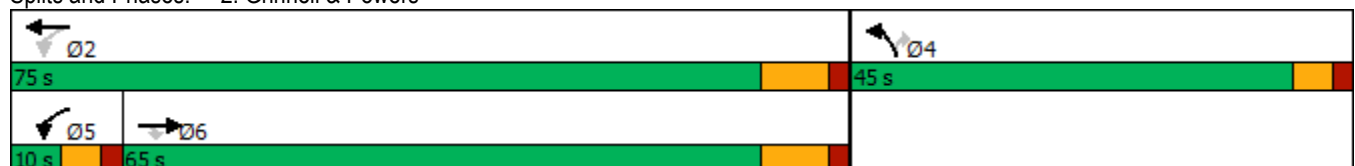


| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↑↑ | ↑ | ↓ | ↑↑ | ↓ | ↓ |
| Traffic Volume (vph) | 931 | 547 | 93 | 654 | 306 | 69 |
| Future Volume (vph) | 931 | 547 | 93 | 654 | 306 | 69 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | 6 | 2 | | | 4 |
| Detector Phase | 6 | 6 | 5 | 2 | 4 | 4 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 4.0 | 30.0 | 8.0 | 8.0 |
| Minimum Split (s) | 38.0 | 38.0 | 10.0 | 38.0 | 22.0 | 22.0 |
| Total Split (s) | 65.0 | 65.0 | 10.0 | 75.0 | 45.0 | 45.0 |
| Total Split (%) | 54.2% | 54.2% | 8.3% | 62.5% | 37.5% | 37.5% |
| Yellow Time (s) | 6.0 | 6.0 | 3.5 | 6.0 | 3.5 | 3.5 |
| 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) | 8.0 | 8.0 | 5.5 | 8.0 | 5.5 | 5.5 |
| Lead/Lag | Lag | Lag | Lead | | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | | | |
| Recall Mode | Min | Min | None | Min | None | None |
| Act Effct Green (s) | 34.1 | 34.1 | 44.3 | 41.7 | 19.0 | 19.0 |
| Actuated g/C Ratio | 0.46 | 0.46 | 0.59 | 0.56 | 0.25 | 0.25 |
| v/c Ratio | 0.62 | 0.55 | 0.34 | 0.37 | 0.68 | 0.16 |
| Control Delay | 18.8 | 3.7 | 10.7 | 10.3 | 34.5 | 11.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 18.8 | 3.7 | 10.7 | 10.3 | 34.5 | 11.2 |
| LOS | B | A | B | B | C | B |
| Approach Delay | 13.2 | | | 10.4 | 30.2 | |
| Approach LOS | B | | | B | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 74.7
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 14.7
 Intersection Capacity Utilization 63.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 2: Grinnell & Powers



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.7 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↖ | ↗ | ↑ | ↖ | ↖ | ↑ |
| Traffic Vol, veh/h | 48 | 58 | 275 | 70 | 99 | 510 |
| Future Vol, veh/h | 48 | 58 | 275 | 70 | 99 | 510 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | 0 | - | 380 | 295 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 83 | 83 | 100 | 100 | 95 | 95 |
| Heavy Vehicles, % | 1 | 1 | 2 | 1 | 1 | 2 |
| Mvmt Flow | 58 | 70 | 275 | 70 | 104 | 537 |















| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 1020 | 275 | 0 | 0 | 345 |
| Stage 1 | 275 | - | - | - | - |
| Stage 2 | 745 | - | - | - | - |
| Critical Hdwy | 6.41 | 6.21 | - | - | 4.11 |
| Critical Hdwy Stg 1 | 5.41 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.41 | - | - | - | - |
| Follow-up Hdwy | 3.509 | 3.309 | - | - | 2.209 |
| Pot Cap-1 Maneuver | 263 | 766 | - | - | 1220 |
| Stage 1 | 774 | - | - | - | - |
| Stage 2 | 471 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 241 | 766 | - | - | 1220 |
| Mov Cap-2 Maneuver | 241 | - | - | - | - |
| Stage 1 | 708 | - | - | - | - |
| Stage 2 | 471 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 16.7 | 0 | 1.3 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 241 | 766 | 1220 |
| HCM Lane V/C Ratio | - | - | 0.24 | 0.091 | 0.085 |
| HCM Control Delay (s) | - | - | 24.6 | 10.2 | 8.2 |
| HCM Lane LOS | - | - | C | B | A |
| HCM 95th %tile Q(veh) | - | - | 0.9 | 0.3 | 0.3 |

Timings
37: Powers & Bradley Rd.

Existing Traffic
PM Peak Hour

| |  |  |  |  |  |  |
|----------------------|---|---|--|---|---|--|
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  |  |   |  |  |   |
| Traffic Volume (vph) | 184 | 294 | 296 | 320 | 286 | 509 |
| Future Volume (vph) | 184 | 294 | 296 | 320 | 286 | 509 |
| 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) | 21.0 | 21.0 | 50.0 | 50.0 | 20.0 | 70.0 |
| Total Split (%) | 23.1% | 23.1% | 54.9% | 54.9% | 22.0% | 76.9% |
| 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) | 11.0 | 11.0 | 10.1 | 10.1 | 15.1 | 30.3 |
| Actuated g/C Ratio | 0.21 | 0.21 | 0.20 | 0.20 | 0.29 | 0.59 |
| v/c Ratio | 0.51 | 0.53 | 0.43 | 0.57 | 0.58 | 0.26 |
| Control Delay | 23.4 | 6.5 | 20.6 | 7.2 | 23.0 | 5.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 23.4 | 6.5 | 20.6 | 7.2 | 23.0 | 5.9 |
| LOS | C | A | C | A | C | A |
| Approach Delay | 13.0 | | 13.6 | | | 12.0 |
| Approach LOS | B | | B | | | B |

Intersection Summary

Cycle Length: 91
 Actuated Cycle Length: 51.4
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.58
 Intersection Signal Delay: 12.8
 Intersection Capacity Utilization 46.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 37: Powers & Bradley Rd.



SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 5:00

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 6.6 | 4.6 | 4.1 | 5.2 | 6.7 | 5.7 | 3.1 | 3.4 | 4.8 | 6.0 | 5.9 | 5.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 5:15

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 9.3 | 5.1 | 6.7 | 5.9 | 7.7 | 6.5 | 3.2 | 3.1 | 5.2 | 7.5 | 5.1 | 6.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 5:30

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 7.2 | 4.5 | 5.7 | 5.9 | 6.3 | 5.4 | 3.2 | 3.6 | 4.9 | 6.6 | 4.4 | 5.7 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 5:45

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 6.8 | 3.7 | 4.2 | 5.3 | 6.4 | 5.3 | 3.0 | 2.6 | 4.6 | 5.6 | 4.1 | 5.2 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 7.8 | 4.5 | 5.0 | 5.7 | 6.9 | 5.9 | 3.1 | 3.7 | 5.0 | 6.6 | 4.9 | 5.9 |

Total Zone Performance By Interval

| Interval Start | 5:00 | 5:15 | 5:30 | 5:45 | All |
|------------------|-------|-------|-------|-------|-------|
| Stop Del/Veh (s) | 123.4 | 106.7 | 131.8 | 175.9 | 231.8 |

Timings
2: Grinnell & Powers

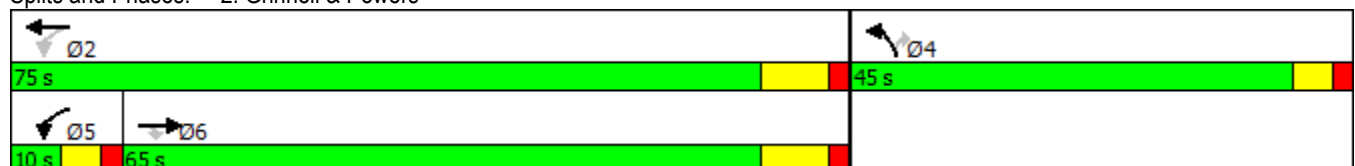
2017 Background Traffic
AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | ↘ | ↑↑ | ↘ | ↗ |
| Traffic Volume (vph) | 600 | 266 | 90 | 1125 | 527 | 90 |
| Future Volume (vph) | 600 | 266 | 90 | 1125 | 527 | 90 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | 6 | 2 | | | 4 |
| Detector Phase | 6 | 6 | 5 | 2 | 4 | 4 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 4.0 | 30.0 | 8.0 | 8.0 |
| Minimum Split (s) | 38.0 | 38.0 | 10.0 | 38.0 | 22.0 | 22.0 |
| Total Split (s) | 65.0 | 65.0 | 10.0 | 75.0 | 45.0 | 45.0 |
| Total Split (%) | 54.2% | 54.2% | 8.3% | 62.5% | 37.5% | 37.5% |
| Yellow Time (s) | 6.0 | 6.0 | 3.5 | 6.0 | 3.5 | 3.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | -4.0 | -4.0 | -1.5 | -4.0 | -1.5 | -1.5 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lead/Lag | Lag | Lag | Lead | | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | | | |
| Recall Mode | Min | Min | None | Min | None | None |
| Act Effct Green (s) | 36.5 | 36.5 | 46.5 | 46.5 | 38.9 | 38.9 |
| Actuated g/C Ratio | 0.39 | 0.39 | 0.50 | 0.50 | 0.42 | 0.42 |
| v/c Ratio | 0.45 | 0.34 | 0.28 | 0.71 | 0.80 | 0.15 |
| Control Delay | 22.5 | 3.7 | 15.1 | 21.2 | 33.9 | 12.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 22.5 | 3.7 | 15.1 | 21.2 | 33.9 | 12.1 |
| LOS | C | A | B | C | C | B |
| Approach Delay | 16.7 | | | 20.8 | 30.7 | |
| Approach LOS | B | | | C | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 93.5
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 21.9
 Intersection Capacity Utilization 69.2%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 2: Grinnell & Powers



Intersection

Int Delay, s/veh 3.9

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|------|------|------|------|------|------|
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 82 | 131 | 487 | 22 | 44 | 312 |
| Future Vol, veh/h | 82 | 131 | 487 | 22 | 44 | 312 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | 0 | - | 380 | 295 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 88 | 88 |
| Heavy Vehicles, % | 1 | 1 | 2 | 1 | 1 | 2 |
| Mvmt Flow | 88 | 141 | 524 | 24 | 50 | 355 |













| Major/Minor | Minor1 | | Major1 | | Major2 | |
|----------------------|--------|-------|--------|---|--------|---|
| Conflicting Flow All | 979 | 524 | 0 | 0 | 524 | 0 |
| Stage 1 | 524 | - | - | - | - | - |
| Stage 2 | 455 | - | - | - | - | - |
| Critical Hdwy | 6.41 | 6.21 | - | - | 4.11 | - |
| Critical Hdwy Stg 1 | 5.41 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.41 | - | - | - | - | - |
| Follow-up Hdwy | 3.509 | 3.309 | - | - | 2.209 | - |
| Pot Cap-1 Maneuver | 279 | 555 | - | - | 1048 | - |
| Stage 1 | 596 | - | - | - | - | - |
| Stage 2 | 641 | - | - | - | - | - |
| Platoon blocked, % | | | - | - | | |
| Mov Cap-1 Maneuver | 266 | 555 | - | - | 1048 | - |
| Mov Cap-2 Maneuver | 266 | - | - | - | - | - |
| Stage 1 | 596 | - | - | - | - | - |
| Stage 2 | 610 | - | - | - | - | - |

| Approach | WB | | NB | | SB |
|----------------------|------|--|----|--|-----|
| HCM Control Delay, s | 18.1 | | 0 | | 1.1 |
| HCM LOS | C | | | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|-----|-------|-------|-------|-----|
| Capacity (veh/h) | - | - | 266 | 555 | 1048 | - |
| HCM Lane V/C Ratio | - | - | 0.331 | 0.254 | 0.048 | - |
| HCM Control Delay (s) | - | - | 25.1 | 13.7 | 8.6 | - |
| HCM Lane LOS | - | - | D | B | A | - |
| HCM 95th %tile Q(veh) | - | - | 1.4 | 1 | 0.1 | - |

Timings
37: Powers & Bradley Rd.

2017 Background Traffic
AM Peak Hour

| |  |  |  |  |  |  |
|----------------------|---|---|---|---|---|---|
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  |  |  |  |  |  |
| Traffic Volume (vph) | 182 | 378 | 552 | 261 | 312 | 276 |
| Future Volume (vph) | 182 | 378 | 552 | 261 | 312 | 276 |
| 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) | 30.0 | | 50.0 | 50.0 | 20.0 | 70.0 |
| Total Split (%) | 30.0% | | 50.0% | 50.0% | 20.0% | 70.0% |
| 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 | | C-Max | C-Max | None | C-Max |
| Act Effect Green (s) | 10.6 | 100.0 | 59.1 | 59.1 | 15.2 | 79.4 |
| Actuated g/C Ratio | 0.11 | 1.00 | 0.59 | 0.59 | 0.15 | 0.79 |
| v/c Ratio | 0.50 | 0.24 | 0.31 | 0.29 | 0.66 | 0.11 |
| Control Delay | 46.6 | 0.4 | 11.4 | 2.2 | 46.1 | 2.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 0.4 | 11.4 | 2.2 | 46.1 | 2.6 |
| LOS | D | A | B | A | D | A |
| Approach Delay | 15.4 | | 8.5 | | | 25.7 |
| Approach LOS | B | | A | | | C |

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 64 (64%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 15.5
 Intersection Capacity Utilization 41.9%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 37: Powers & Bradley Rd.



SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 5:00

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 7.8 | 5.2 | 5.8 | 6.3 | 8.1 | 5.4 | 3.7 | 7.1 | 6.2 | 7.0 | 5.2 | 6.4 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 5:15

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 12.1 | 6.2 | 7.4 | 6.8 | 8.4 | 7.9 | 3.7 | 7.2 | 5.4 | 7.0 | 4.8 | 7.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 5:30

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 10.0 | 4.9 | 5.7 | 6.2 | 7.2 | 5.7 | 2.8 | 2.9 | 5.7 | 7.2 | 4.6 | 6.4 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 5:45

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 8.5 | 4.4 | 6.5 | 6.6 | 7.6 | 7.4 | 2.6 | 5.4 | 6.0 | 8.1 | 4.6 | 6.8 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 10.2 | 5.3 | 6.4 | 6.6 | 7.8 | 6.9 | 3.2 | 6.2 | 5.9 | 7.6 | 4.9 | 7.0 |

Total Zone Performance By Interval

| Interval Start | 5:00 | 5:15 | 5:30 | 5:45 | All |
|------------------|-------|-------|-------|-------|-------|
| Stop Del/Veh (s) | 211.5 | 113.9 | 201.3 | 275.0 | 467.0 |

SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 7:00

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|------|------|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 9.0 | 3.8 | 5.7 | 8.8 | 10.9 | 10.5 | 2.7 | | 6.8 | 7.7 | 6.0 | 8.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 7:15

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 8.6 | 3.5 | 4.8 | 7.8 | 7.1 | 8.7 | 1.7 | | 4.3 | 5.9 | 5.5 | 6.8 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 7:30

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|------|------|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 9.1 | 3.8 | 4.9 | 9.6 | 11.0 | 13.2 | 2.5 | | 6.5 | 7.6 | 7.5 | 9.4 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 7:45

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 7.8 | 3.5 | 5.1 | 6.8 | 8.9 | 9.1 | 2.0 | | 4.7 | 6.0 | 4.5 | 7.0 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB | All |
|------------------|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|-----|
| Movements Served | LT | R | L | TR | L | T | R | L | T | T | R | |
| Stop Del/Veh (s) | 9.0 | 3.7 | 5.1 | 8.5 | 9.8 | 10.7 | 2.2 | 10.0 | 5.6 | 7.1 | 6.0 | 8.1 |

Timings
2: Grinnell & Powers

2017 Background Traffic
PM Peak Hour

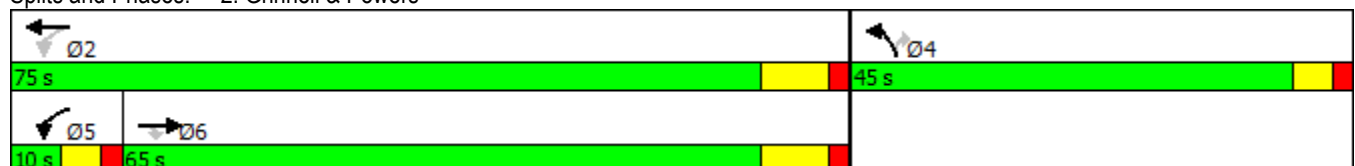


| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↑↑ | ↑ | ↵ | ↑↑ | ↵ | ↵ |
| Traffic Volume (vph) | 960 | 566 | 95 | 675 | 317 | 70 |
| Future Volume (vph) | 960 | 566 | 95 | 675 | 317 | 70 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | 6 | 2 | | | 4 |
| Detector Phase | 6 | 6 | 5 | 2 | 4 | 4 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 4.0 | 30.0 | 8.0 | 8.0 |
| Minimum Split (s) | 38.0 | 38.0 | 10.0 | 38.0 | 22.0 | 22.0 |
| Total Split (s) | 65.0 | 65.0 | 10.0 | 75.0 | 45.0 | 45.0 |
| Total Split (%) | 54.2% | 54.2% | 8.3% | 62.5% | 37.5% | 37.5% |
| Yellow Time (s) | 6.0 | 6.0 | 3.5 | 6.0 | 3.5 | 3.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | -4.0 | -4.0 | -1.5 | -4.0 | -1.5 | -1.5 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lead/Lag | Lag | Lag | Lead | | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | | | |
| Recall Mode | Min | Min | None | Min | None | None |
| Act Effct Green (s) | 39.1 | 39.1 | 46.7 | 46.7 | 21.4 | 21.4 |
| Actuated g/C Ratio | 0.51 | 0.51 | 0.61 | 0.61 | 0.28 | 0.28 |
| v/c Ratio | 0.57 | 0.54 | 0.33 | 0.35 | 0.64 | 0.15 |
| Control Delay | 15.8 | 3.2 | 10.0 | 8.4 | 31.8 | 10.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.8 | 3.2 | 10.0 | 8.4 | 31.8 | 10.8 |
| LOS | B | A | A | A | C | B |
| Approach Delay | 11.2 | | | 8.6 | 28.0 | |
| Approach LOS | B | | | A | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 76.4
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 12.7
 Intersection Capacity Utilization 59.4%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 2: Grinnell & Powers



Intersection

Int Delay, s/veh 3

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|------|------|------|------|------|------|
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 50 | 60 | 327 | 73 | 102 | 559 |
| Future Vol, veh/h | 50 | 60 | 327 | 73 | 102 | 559 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | 0 | - | 380 | 295 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 1 | 1 | 2 | 1 | 1 | 2 |
| Mvmt Flow | 54 | 65 | 355 | 79 | 111 | 608 |

| Major/Minor | Minor1 | Major1 | Major2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 1184 | 355 | 0 |
| Stage 1 | 355 | - | - |
| Stage 2 | 829 | - | - |
| Critical Hdwy | 7.11 | 6.21 | - |
| Critical Hdwy Stg 1 | 6.11 | - | - |
| Critical Hdwy Stg 2 | 6.11 | - | - |
| Follow-up Hdwy | 3.509 | 3.309 | - |
| Pot Cap-1 Maneuver | 167 | 691 | - |
| Stage 1 | 664 | - | - |
| Stage 2 | 366 | - | - |
| Platoon blocked, % | | | |
| Mov Cap-1 Maneuver | 155 | 691 | - |
| Mov Cap-2 Maneuver | 155 | - | - |
| Stage 1 | 664 | - | - |
| Stage 2 | 332 | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 24.2 | 0 | 1.3 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|-----|-------|-------|-------|-----|
| Capacity (veh/h) | - | - | 155 | 691 | 1209 | - |
| HCM Lane V/C Ratio | - | - | 0.351 | 0.094 | 0.092 | - |
| HCM Control Delay (s) | - | - | 40.3 | 10.8 | 8.3 | - |
| HCM Lane LOS | - | - | E | B | A | - |
| HCM 95th %tile Q(veh) | - | - | 1.5 | 0.3 | 0.3 | - |

Timings
37: Powers & Bradley Rd.

2017 Background Traffic
PM Peak Hour

| | ↙ | ↖ | ↑ | ↗ | ↘ | ↓ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↖↗ | ↖ | ↖↗ | ↖ | ↖↗ | ↖↗ |
| Traffic Volume (vph) | 191 | 305 | 308 | 330 | 297 | 528 |
| Future Volume (vph) | 191 | 305 | 308 | 330 | 297 | 528 |
| 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) | 30.0 | | 50.0 | 50.0 | 20.0 | 70.0 |
| Total Split (%) | 30.0% | | 50.0% | 50.0% | 20.0% | 70.0% |
| 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 | | C-Max | C-Max | None | C-Max |
| Act Effct Green (s) | 11.2 | 100.0 | 59.4 | 59.4 | 14.4 | 78.8 |
| Actuated g/C Ratio | 0.11 | 1.00 | 0.59 | 0.59 | 0.14 | 0.79 |
| v/c Ratio | 0.52 | 0.20 | 0.15 | 0.31 | 0.64 | 0.20 |
| Control Delay | 46.5 | 0.3 | 10.1 | 2.2 | 46.2 | 3.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.5 | 0.3 | 10.1 | 2.2 | 46.2 | 3.0 |
| LOS | D | A | B | A | D | A |
| Approach Delay | 18.1 | | 6.0 | | | 18.6 |
| Approach LOS | B | | A | | | B |

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 14.5
 Intersection Capacity Utilization 37.2%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 37: Powers & Bradley Rd.



Timings
2: Grinnell & Powers

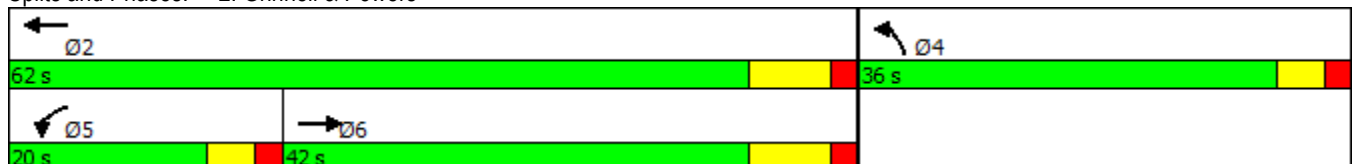
2040 Background AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|------|-------|-------|-------|------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | ↗ | ↘↘ | ↑↑↑ | ↘↘ | ↗ |
| Traffic Volume (vph) | 1107 | 378 | 129 | 2367 | 659 | 171 |
| Future Volume (vph) | 1107 | 378 | 129 | 2367 | 659 | 171 |
| Turn Type | NA | Free | Prot | NA | Prot | Free |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | Free | | | | Free |
| Detector Phase | 6 | | 5 | 2 | 4 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | | 4.0 | 30.0 | 8.0 | |
| Minimum Split (s) | 38.0 | | 9.5 | 38.0 | 21.5 | |
| Total Split (s) | 42.0 | | 20.0 | 62.0 | 36.0 | |
| Total Split (%) | 42.9% | | 20.4% | 63.3% | 36.7% | |
| Yellow Time (s) | 6.0 | | 3.5 | 6.0 | 3.5 | |
| All-Red Time (s) | 2.0 | | 2.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | -4.0 | | -1.5 | -4.0 | -1.5 | |
| Total Lost Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | |
| Lead/Lag | Lag | | Lead | | | |
| Lead-Lag Optimize? | Yes | | Yes | | | |
| Recall Mode | Min | | None | Min | None | |
| Act Effct Green (s) | 40.2 | 87.3 | 10.4 | 54.7 | 24.5 | 87.3 |
| Actuated g/C Ratio | 0.46 | 1.00 | 0.12 | 0.63 | 0.28 | 1.00 |
| v/c Ratio | 0.50 | 0.25 | 0.33 | 0.79 | 0.70 | 0.11 |
| Control Delay | 18.3 | 0.4 | 39.3 | 15.2 | 32.8 | 0.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 18.3 | 0.4 | 39.3 | 15.2 | 32.8 | 0.1 |
| LOS | B | A | D | B | C | A |
| Approach Delay | 13.7 | | | 16.4 | 26.0 | |
| Approach LOS | B | | | B | C | |

Intersection Summary

Cycle Length: 98
 Actuated Cycle Length: 87.3
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 17.2
 Intersection LOS: B
 Intersection Capacity Utilization 71.2%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



Timings

3: Grinnell Blvd. & Goldfield Drive

2040 Background AM Peak Hour



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | |
| Traffic Volume (vph) | 32 | 4 | 73 | 2 | 214 | 263 | 584 | 25 | 84 | 589 |
| Future Volume (vph) | 32 | 4 | 73 | 2 | 214 | 263 | 584 | 25 | 84 | 589 |
| Turn Type | pm+pt | NA | Prot | NA | Perm | pm+pt | NA | Perm | pm+pt | NA |
| Protected Phases | 7 | 4 | 3 | 8 | | 5 | 2 | | 1 | 6 |
| Permitted Phases | 4 | | | | 8 | 2 | | 2 | 6 | |
| Detector Phase | 7 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 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 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 |
| Total Split (s) | 10.0 | 21.0 | 10.0 | 21.0 | 21.0 | 10.0 | 50.0 | 50.0 | 10.0 | 50.0 |
| Total Split (%) | 11.0% | 23.1% | 11.0% | 23.1% | 23.1% | 11.0% | 54.9% | 54.9% | 11.0% | 54.9% |
| 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) | 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 |
| Lead/Lag | Lead | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | Min | Min | None | Min |
| Act Effct Green (s) | 7.1 | 6.6 | 7.5 | 6.9 | 6.9 | 22.0 | 19.3 | 19.3 | 19.5 | 14.2 |
| Actuated g/C Ratio | 0.16 | 0.15 | 0.17 | 0.15 | 0.15 | 0.49 | 0.43 | 0.43 | 0.43 | 0.31 |
| v/c Ratio | 0.12 | 0.01 | 0.13 | 0.01 | 0.52 | 0.67 | 0.41 | 0.03 | 0.19 | 0.56 |
| Control Delay | 18.2 | 21.0 | 19.9 | 20.5 | 8.9 | 21.1 | 12.8 | 0.1 | 7.9 | 15.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 18.2 | 21.0 | 19.9 | 20.5 | 8.9 | 21.1 | 12.8 | 0.1 | 7.9 | 15.9 |
| LOS | B | C | B | C | A | C | B | A | A | B |
| Approach Delay | | 18.5 | | 11.7 | | | 15.0 | | | 14.9 |
| Approach LOS | | B | | B | | | B | | | B |

Intersection Summary

Cycle Length: 91

Actuated Cycle Length: 45.3

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 14.5

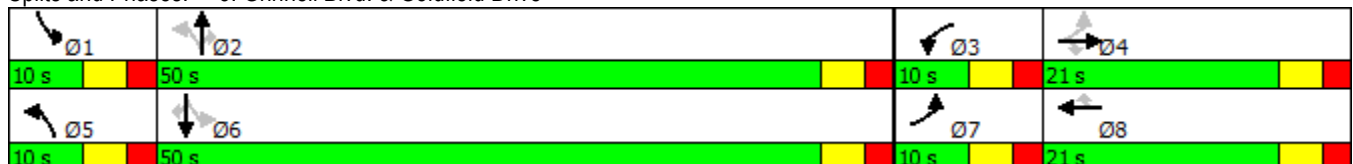
Intersection LOS: B

Intersection Capacity Utilization 52.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Grinnell Blvd. & Goldfield Drive



Timings

4: Grinnell Blvd. & Bradley Rd.

2040 Background AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 224 | 173 | 275 | 126 | 507 | 117 | 350 | 530 | 60 | 27 | 449 | 186 |
| Future Volume (vph) | 224 | 173 | 275 | 126 | 507 | 117 | 350 | 530 | 60 | 27 | 449 | 186 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 |
| Total Split (s) | 21.0 | 29.0 | 29.0 | 14.0 | 22.0 | 22.0 | 16.0 | 36.0 | 36.0 | 11.0 | 31.0 | 31.0 |
| Total Split (%) | 23.3% | 32.2% | 32.2% | 15.6% | 24.4% | 24.4% | 17.8% | 40.0% | 40.0% | 12.2% | 34.4% | 34.4% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 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) | 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 | 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 32.7 | 22.8 | 22.8 | 23.8 | 15.4 | 15.4 | 31.8 | 28.0 | 28.0 | 21.7 | 15.5 | 15.5 |
| Actuated g/C Ratio | 0.45 | 0.31 | 0.31 | 0.33 | 0.21 | 0.21 | 0.44 | 0.39 | 0.39 | 0.30 | 0.21 | 0.21 |
| v/c Ratio | 0.55 | 0.16 | 0.42 | 0.29 | 0.71 | 0.25 | 0.84 | 0.41 | 0.09 | 0.09 | 0.63 | 0.39 |
| Control Delay | 18.4 | 20.7 | 5.1 | 14.9 | 33.4 | 1.6 | 36.7 | 19.7 | 0.2 | 14.3 | 30.6 | 6.2 |
| 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 | 18.4 | 20.7 | 5.1 | 14.9 | 33.4 | 1.6 | 36.7 | 19.7 | 0.2 | 14.3 | 30.6 | 6.2 |
| LOS | B | C | A | B | C | A | D | B | A | B | C | A |
| Approach Delay | | 13.6 | | | 25.3 | | | 24.8 | | | 23.0 | |
| Approach LOS | | B | | | C | | | C | | | C | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 72.7

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 22.0

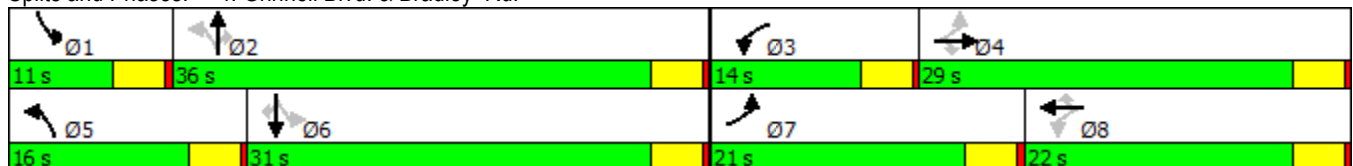
Intersection LOS: C

Intersection Capacity Utilization 71.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Grinnell Blvd. & Bradley Rd.



HCM 2010 TWSC
 22: Grinnell Blvd. & Three-Quarter Site Access

2040 Background AM Peak Hour

Intersection

Int Delay, s/veh 1.3

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | ↗ | | | ↗ | | ↗↗ | ↗ | ↗ | ↗↗ | ↗ |
| Traffic Vol, veh/h | 0 | 0 | 175 | 0 | 0 | 0 | 0 | 830 | 0 | 0 | 498 | 10 |
| Future Vol, veh/h | 0 | 0 | 175 | 0 | 0 | 0 | 0 | 830 | 0 | 0 | 498 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | - | - | 0 | - | - | 200 | 455 | - | 200 |
| 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 | 0 | 184 | 0 | 0 | 0 | 0 | 874 | 0 | 0 | 524 | 11 |

| Major/Minor | Minor2 | | Minor1 | | | Major1 | | | Major2 | | | |
|----------------------|--------|---|--------|---|---|--------|---|---|--------|------|---|---|
| Conflicting Flow All | - | - | 262 | - | - | 437 | - | 0 | 0 | 874 | 0 | 0 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | 6.94 | - | - | 6.94 | - | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | 3.32 | - | - | 3.32 | - | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 0 | 0 | 737 | 0 | 0 | 567 | 0 | - | - | 768 | - | - |
| Stage 1 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Stage 2 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | | | | | |
| Mov Cap-1 Maneuver | - | - | 737 | - | - | 567 | - | - | - | 768 | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|------|----|----|----|
| HCM Control Delay, s | 11.5 | 0 | 0 | 0 |
| HCM LOS | B | A | | |

| Minor Lane/Major Mvmt | NBT | NBR | EBLn1WBLn1 | SBL | SBT | SBR |
|-----------------------|-----|-----|------------|-----|-----|-----|
| Capacity (veh/h) | - | - | 737 | - | 768 | - |
| HCM Lane V/C Ratio | - | - | 0.25 | - | - | - |
| HCM Control Delay (s) | - | - | 11.5 | 0 | 0 | - |
| HCM Lane LOS | - | - | B | A | A | - |
| HCM 95th %tile Q(veh) | - | - | 1 | - | 0 | - |

Timings

37: Powers & Bradley #2

2040 Background AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | |
| Traffic Volume (vph) | 1 | 119 | 49 | 200 | 171 | 556 | 47 | 1940 | 207 | 337 | 941 |
| Future Volume (vph) | 1 | 119 | 49 | 200 | 171 | 556 | 47 | 1940 | 207 | 337 | 941 |
| Turn Type | pm+pt | NA | Free | Prot | NA | Free | Prot | NA | Free | Prot | NA |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 |
| Permitted Phases | 4 | | Free | | | Free | | | Free | | |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 |
| Switch Phase | | | | | | | | | | | |
| Minimum Initial (s) | 4.0 | 10.0 | | 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 |
| Total Split (s) | 10.0 | 20.0 | | 22.0 | 32.0 | | 10.0 | 59.0 | | 29.0 | 78.0 |
| Total Split (%) | 7.7% | 15.4% | | 16.9% | 24.6% | | 7.7% | 45.4% | | 22.3% | 60.0% |
| 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 | | Lead | Lag |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes |
| Recall Mode | None | None | | None | None | | None | None | | C-Max | None |
| Act Effct Green (s) | 15.8 | 10.7 | 130.0 | 13.1 | 26.8 | 130.0 | 7.0 | 53.9 | 130.0 | 32.2 | 81.3 |
| Actuated g/C Ratio | 0.12 | 0.08 | 1.00 | 0.10 | 0.21 | 1.00 | 0.05 | 0.41 | 1.00 | 0.25 | 0.63 |
| v/c Ratio | 0.01 | 0.43 | 0.03 | 0.60 | 0.24 | 0.36 | 0.26 | 0.95 | 0.13 | 0.41 | 0.31 |
| Control Delay | 38.0 | 61.2 | 0.0 | 45.1 | 33.9 | 4.5 | 62.3 | 47.6 | 0.2 | 43.5 | 12.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 38.0 | 61.2 | 0.0 | 45.1 | 33.9 | 4.5 | 62.3 | 47.6 | 0.2 | 43.5 | 12.4 |
| LOS | D | E | A | D | C | A | E | D | A | D | B |
| Approach Delay | | 43.2 | | | 18.7 | | | 43.4 | | | 20.6 |
| Approach LOS | | D | | | B | | | D | | | C |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 125 (96%), Referenced to phase 1:SBL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 32.0
 Intersection Capacity Utilization 72.0%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 37: Powers & Bradley #2



Timings

39: Marksheffel & Bradley #1

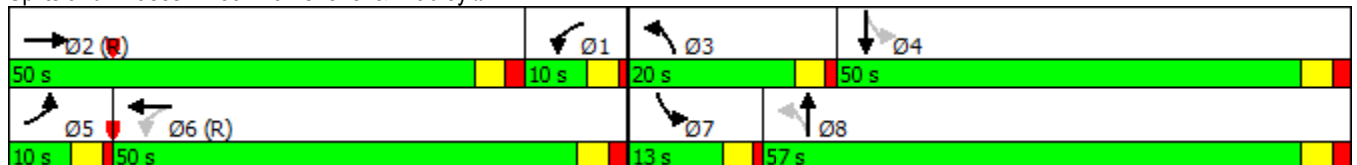
2040 Background AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 285 | 312 | 101 | 95 | 471 | 285 | 135 | 600 | 50 | 140 | 275 | 189 |
| Future Volume (vph) | 285 | 312 | 101 | 95 | 471 | 285 | 135 | 600 | 50 | 140 | 275 | 189 |
| 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) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Minimum Split (s) | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | |
| Total Split (s) | 10.0 | 50.0 | | 10.0 | 50.0 | | 20.0 | 57.0 | | 13.0 | 50.0 | |
| Total Split (%) | 7.7% | 38.5% | | 7.7% | 38.5% | | 15.4% | 43.8% | | 10.0% | 38.5% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 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) | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | |
| Lead/Lag | Lead | Lead | | Lag | 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 | None | | None | None | |
| Act Effct Green (s) | 24.5 | 68.2 | 130.0 | 50.7 | 49.7 | 130.0 | 41.7 | 28.8 | 130.0 | 34.8 | 24.8 | 130.0 |
| Actuated g/C Ratio | 0.19 | 0.52 | 1.00 | 0.39 | 0.38 | 1.00 | 0.32 | 0.22 | 1.00 | 0.27 | 0.19 | 1.00 |
| v/c Ratio | 0.45 | 0.12 | 0.07 | 0.22 | 0.25 | 0.18 | 0.40 | 0.78 | 0.03 | 0.73 | 0.42 | 0.12 |
| Control Delay | 46.1 | 17.7 | 0.1 | 28.5 | 27.8 | 0.3 | 34.2 | 54.8 | 0.0 | 54.4 | 47.9 | 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 | 46.1 | 17.7 | 0.1 | 28.5 | 27.8 | 0.3 | 34.2 | 54.8 | 0.0 | 54.4 | 47.9 | 0.2 |
| LOS | D | B | A | C | C | A | C | D | A | D | D | A |
| Approach Delay | | 26.8 | | | 18.7 | | | 47.7 | | | 34.5 | |
| Approach LOS | | C | | | B | | | D | | | C | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 97 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 31.6
 Intersection LOS: C
 Intersection Capacity Utilization 56.6%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 39: Marksheffel & Bradley #1



Timings

52: Bradley Heights/Federal Trade Zone & Bradley #1

2040 Background AM Peak Hour

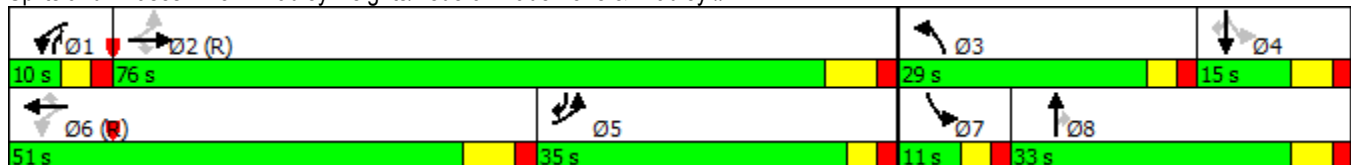
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 245 | 188 | 218 | 195 | 381 | 200 | 468 | 31 | 435 | 80 | 25 | 68 |
| Future Volume (vph) | 245 | 188 | 218 | 195 | 381 | 200 | 468 | 31 | 435 | 80 | 25 | 68 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Prot | NA | pm+ov | pm+pt | NA | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | 6 | | 6 | | | 8 | 4 | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 1 | 7 | 4 | 5 |
| 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 | 2.0 | 5.0 |
| Minimum Split (s) | 10.0 | 12.0 | 12.0 | 10.0 | 12.0 | 12.0 | 10.0 | 11.0 | 10.0 | 10.0 | 8.0 | 10.0 |
| Total Split (s) | 35.0 | 76.0 | 76.0 | 10.0 | 51.0 | 51.0 | 29.0 | 33.0 | 10.0 | 11.0 | 15.0 | 35.0 |
| Total Split (%) | 26.9% | 58.5% | 58.5% | 7.7% | 39.2% | 39.2% | 22.3% | 25.4% | 7.7% | 8.5% | 11.5% | 26.9% |
| Yellow Time (s) | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 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 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | Lead | Lead | Lead | Lag | Lead | 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) | 77.4 | 75.4 | 75.4 | 54.2 | 52.2 | 52.2 | 22.3 | 20.4 | 30.7 | 14.6 | 7.2 | 35.5 |
| Actuated g/C Ratio | 0.60 | 0.58 | 0.58 | 0.42 | 0.40 | 0.40 | 0.17 | 0.16 | 0.24 | 0.11 | 0.06 | 0.27 |
| v/c Ratio | 0.34 | 0.07 | 0.23 | 0.23 | 0.20 | 0.28 | 0.84 | 0.11 | 0.63 | 0.23 | 0.25 | 0.13 |
| Control Delay | 8.6 | 4.4 | 0.7 | 15.3 | 16.2 | 5.7 | 65.3 | 45.0 | 7.4 | 39.8 | 64.2 | 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 | 8.6 | 4.4 | 0.7 | 15.3 | 16.2 | 5.7 | 65.3 | 45.0 | 7.4 | 39.8 | 64.2 | 0.5 |
| LOS | A | A | A | B | B | A | E | D | A | D | E | A |
| Approach Delay | | 4.7 | | | 13.3 | | | 37.7 | | | 27.7 | |
| Approach LOS | | A | | | B | | | D | | | C | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 21.1
 Intersection Capacity Utilization 56.0%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 52: Bradley Heights/Federal Trade Zone & Bradley #1



Timings
2: Grinnell & Powers

2040 Background PM Peak Hour

| | → | ↘ | ↙ | ← | ↗ | ↖ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | ↑ | ↘↙ | ↑↑↑ | ↘↙ | ↑ |
| Traffic Volume (vph) | 2120 | 807 | 116 | 1258 | 523 | 96 |
| Future Volume (vph) | 2120 | 807 | 116 | 1258 | 523 | 96 |
| Turn Type | NA | Free | Prot | NA | Prot | Free |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | Free | | | | Free |
| Detector Phase | 6 | | 5 | 2 | 4 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | | 4.0 | 30.0 | 8.0 | |
| Minimum Split (s) | 38.0 | | 9.5 | 38.0 | 21.5 | |
| Total Split (s) | 62.0 | | 23.0 | 85.0 | 45.0 | |
| Total Split (%) | 47.7% | | 17.7% | 65.4% | 34.6% | |
| Yellow Time (s) | 6.0 | | 3.5 | 6.0 | 3.5 | |
| All-Red Time (s) | 2.0 | | 2.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | -4.0 | | -1.5 | -4.0 | -1.5 | |
| Total Lost Time (s) | 4.0 | | 4.0 | 4.0 | 4.0 | |
| Lead/Lag | Lag | | Lead | | | |
| Lead-Lag Optimize? | Yes | | Yes | | | |
| Recall Mode | Min | | None | Min | None | |
| Act Effct Green (s) | 57.5 | 103.1 | 10.5 | 72.0 | 23.0 | 103.1 |
| Actuated g/C Ratio | 0.56 | 1.00 | 0.10 | 0.70 | 0.22 | 1.00 |
| v/c Ratio | 0.79 | 0.53 | 0.34 | 0.38 | 0.70 | 0.06 |
| Control Delay | 21.8 | 1.3 | 47.0 | 7.1 | 42.5 | 0.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 21.8 | 1.3 | 47.0 | 7.1 | 42.5 | 0.1 |
| LOS | C | A | D | A | D | A |
| Approach Delay | 16.1 | | | 10.5 | 35.9 | |
| Approach LOS | B | | | B | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 103.1
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 17.0
 Intersection LOS: B
 Intersection Capacity Utilization 69.2%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



Timings

3: Grinnell Blvd. & Goldfield Drive

2040 Background PM Peak Hour



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↙ | ↑ | ↙↘ | ↑ | ↗ | ↙ | ↑↑ | ↗ | ↙ | ↑↑ |
| Traffic Volume (vph) | 19 | 2 | 48 | 7 | 191 | 178 | 408 | 81 | 301 | 821 |
| Future Volume (vph) | 19 | 2 | 48 | 7 | 191 | 178 | 408 | 81 | 301 | 821 |
| Turn Type | pm+pt | NA | Prot | NA | Perm | pm+pt | NA | Perm | pm+pt | NA |
| Protected Phases | 7 | 4 | 3 | 8 | | 5 | 2 | | 1 | 6 |
| Permitted Phases | 4 | | | | 8 | 2 | | 2 | 6 | |
| Detector Phase | 7 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 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 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 |
| Total Split (s) | 10.0 | 21.0 | 16.0 | 27.0 | 27.0 | 10.0 | 36.0 | 36.0 | 18.0 | 44.0 |
| Total Split (%) | 11.0% | 23.1% | 17.6% | 29.7% | 29.7% | 11.0% | 39.6% | 39.6% | 19.8% | 48.4% |
| 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) | 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 |
| Lead/Lag | Lead | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | Min | Min | None | Min |
| Act Effct Green (s) | 6.8 | 6.2 | 6.7 | 6.9 | 6.9 | 18.6 | 13.3 | 13.3 | 27.3 | 18.2 |
| Actuated g/C Ratio | 0.14 | 0.13 | 0.14 | 0.15 | 0.15 | 0.39 | 0.28 | 0.28 | 0.57 | 0.38 |
| v/c Ratio | 0.08 | 0.01 | 0.10 | 0.03 | 0.49 | 0.53 | 0.43 | 0.13 | 0.51 | 0.64 |
| Control Delay | 19.1 | 24.0 | 22.5 | 21.7 | 9.0 | 15.0 | 16.5 | 0.4 | 8.5 | 14.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 19.1 | 24.0 | 22.5 | 21.7 | 9.0 | 15.0 | 16.5 | 0.4 | 8.5 | 14.7 |
| LOS | B | C | C | C | A | B | B | A | A | B |
| Approach Delay | | 19.6 | | 12.0 | | | 14.2 | | | 13.0 |
| Approach LOS | | B | | B | | | B | | | B |

Intersection Summary

Cycle Length: 91

Actuated Cycle Length: 47.5

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.4

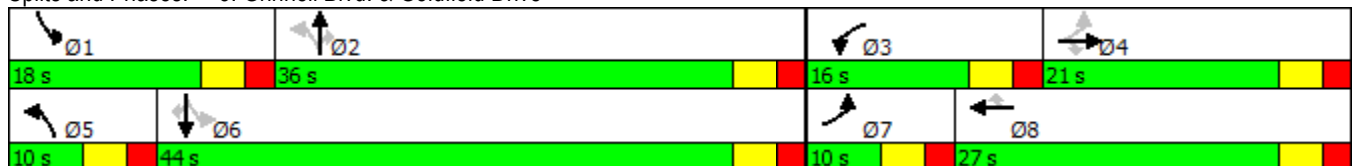
Intersection LOS: B

Intersection Capacity Utilization 53.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Grinnell Blvd. & Goldfield Drive



Timings

4: Grinnell Blvd. & Bradley Rd.

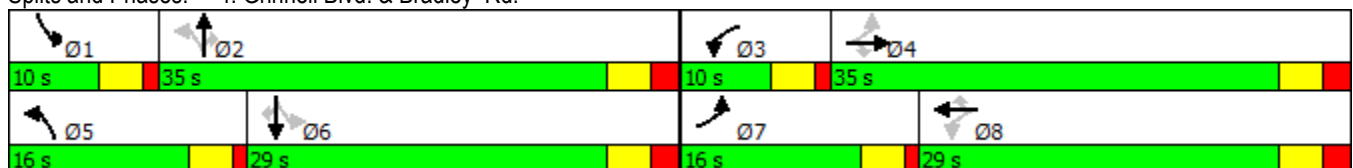
2040 Background PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 226 | 111 | 375 | 144 | 230 | 67 | 350 | 374 | 173 | 40 | 507 | 322 |
| Future Volume (vph) | 226 | 111 | 375 | 144 | 230 | 67 | 350 | 374 | 173 | 40 | 507 | 322 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 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 | 9.0 | 9.0 |
| Total Split (s) | 16.0 | 35.0 | 35.0 | 10.0 | 29.0 | 29.0 | 16.0 | 35.0 | 35.0 | 10.0 | 29.0 | 29.0 |
| Total Split (%) | 17.8% | 38.9% | 38.9% | 11.1% | 32.2% | 32.2% | 17.8% | 38.9% | 38.9% | 11.1% | 32.2% | 32.2% |
| 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) | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 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) | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 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 | None | None | None | None | None | None | Max | Max | None | Max | Max |
| Act Effct Green (s) | 26.7 | 15.8 | 15.8 | 17.5 | 10.5 | 10.5 | 41.0 | 34.2 | 34.2 | 30.9 | 24.0 | 24.0 |
| Actuated g/C Ratio | 0.35 | 0.21 | 0.21 | 0.23 | 0.14 | 0.14 | 0.54 | 0.45 | 0.45 | 0.41 | 0.32 | 0.32 |
| v/c Ratio | 0.56 | 0.16 | 0.64 | 0.46 | 0.50 | 0.17 | 0.72 | 0.25 | 0.22 | 0.09 | 0.48 | 0.46 |
| Control Delay | 23.7 | 24.7 | 9.8 | 23.5 | 34.0 | 0.9 | 21.0 | 15.1 | 3.6 | 10.2 | 23.1 | 5.0 |
| 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 | 23.7 | 24.7 | 9.8 | 23.5 | 34.0 | 0.9 | 21.0 | 15.1 | 3.6 | 10.2 | 23.1 | 5.0 |
| LOS | C | C | A | C | C | A | C | B | A | B | C | A |
| Approach Delay | | 16.5 | | | 25.5 | | | 15.2 | | | 15.8 | |
| Approach LOS | | B | | | C | | | B | | | B | |

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 75.9
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.3
 Intersection Capacity Utilization 67.3%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 4: Grinnell Blvd. & Bradley Rd.



Timings

37: Powers & Bradley #2

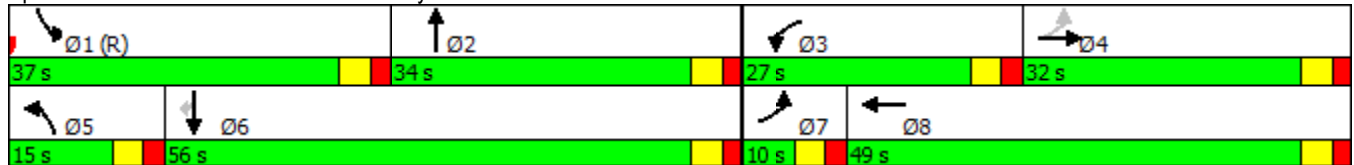
2040 Background PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | |
| Traffic Volume (vph) | 1 | 77 | 21 | 180 | 120 | 475 | 46 | 899 | 225 | 351 | 1865 |
| Future Volume (vph) | 1 | 77 | 21 | 180 | 120 | 475 | 46 | 899 | 225 | 351 | 1865 |
| Turn Type | pm+pt | NA | Free | Prot | NA | Free | Prot | NA | Free | Prot | NA |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 |
| Permitted Phases | 4 | | Free | | | Free | | | Free | | |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 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) | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 |
| Total Split (s) | 10.0 | 32.0 | | 27.0 | 49.0 | | 15.0 | 34.0 | | 37.0 | 56.0 |
| Total Split (%) | 7.7% | 24.6% | | 20.8% | 37.7% | | 11.5% | 26.2% | | 28.5% | 43.1% |
| 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 | None | | None | None | | None | Max | | C-Max | Max |
| Act Effct Green (s) | 13.4 | 8.4 | 130.0 | 12.4 | 23.8 | 130.0 | 7.2 | 29.0 | 130.0 | 60.2 | 84.1 |
| Actuated g/C Ratio | 0.10 | 0.06 | 1.00 | 0.10 | 0.18 | 1.00 | 0.06 | 0.22 | 1.00 | 0.46 | 0.65 |
| v/c Ratio | 0.01 | 0.36 | 0.01 | 0.57 | 0.19 | 0.31 | 0.25 | 0.82 | 0.15 | 0.23 | 0.58 |
| Control Delay | 40.0 | 62.1 | 0.0 | 66.7 | 57.4 | 4.0 | 61.5 | 54.8 | 0.2 | 22.1 | 15.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 40.0 | 62.1 | 0.0 | 66.7 | 57.4 | 4.0 | 61.5 | 54.8 | 0.2 | 22.1 | 15.1 |
| LOS | D | E | A | E | E | A | E | D | A | C | B |
| Approach Delay | | 48.7 | | | 26.9 | | | 44.6 | | | 16.2 |
| Approach LOS | | D | | | C | | | D | | | B |

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: 0.82
 Intersection Signal Delay: 26.7
 Intersection LOS: C
 Intersection Capacity Utilization 63.7%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 37: Powers & Bradley #2



Timings

39: Marksheffel & Bradley #1

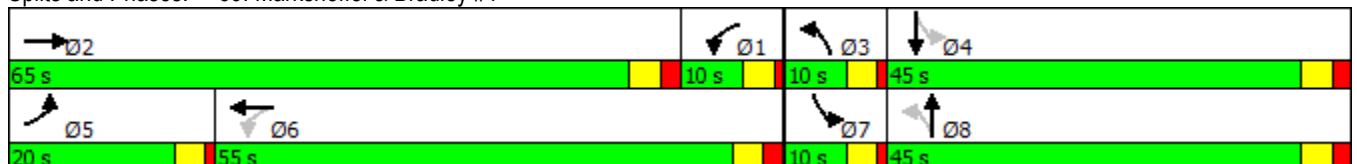
2040 Background PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 331 | 443 | 123 | 195 | 433 | 215 | 56 | 500 | 100 | 300 | 650 | 191 |
| Future Volume (vph) | 331 | 443 | 123 | 195 | 433 | 215 | 56 | 500 | 100 | 300 | 650 | 191 |
| 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) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Minimum Split (s) | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 30.0 | | 9.0 | 30.0 | |
| Total Split (s) | 20.0 | 65.0 | | 10.0 | 55.0 | | 10.0 | 45.0 | | 10.0 | 45.0 | |
| Total Split (%) | 15.4% | 50.0% | | 7.7% | 42.3% | | 7.7% | 34.6% | | 7.7% | 34.6% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 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) | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | |
| Lead/Lag | Lead | Lead | | Lag | Lag | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | | None | None | | None | None | | None | None | |
| Act Effct Green (s) | 13.0 | 12.4 | 67.8 | 13.2 | 12.1 | 67.8 | 25.3 | 18.3 | 67.8 | 26.4 | 20.8 | 67.8 |
| Actuated g/C Ratio | 0.19 | 0.18 | 1.00 | 0.19 | 0.18 | 1.00 | 0.37 | 0.27 | 1.00 | 0.39 | 0.31 | 1.00 |
| v/c Ratio | 0.52 | 0.49 | 0.08 | 0.55 | 0.49 | 0.14 | 0.18 | 0.54 | 0.06 | 0.86 | 0.61 | 0.12 |
| Control Delay | 28.8 | 27.8 | 0.1 | 32.6 | 28.0 | 0.2 | 13.6 | 23.7 | 0.1 | 43.4 | 24.3 | 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 | 28.8 | 27.8 | 0.1 | 32.6 | 28.0 | 0.2 | 13.6 | 23.7 | 0.1 | 43.4 | 24.3 | 0.2 |
| LOS | C | C | A | C | C | A | B | C | A | D | C | A |
| Approach Delay | | 24.3 | | | 22.0 | | | 19.2 | | | 25.3 | |
| Approach LOS | | C | | | C | | | B | | | C | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 67.8
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 23.1
 Intersection LOS: C
 Intersection Capacity Utilization 64.8%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 39: Marksheffel & Bradley #1



Timings

52: Bradley Heights/Federal Trade Zone & Bradley #1

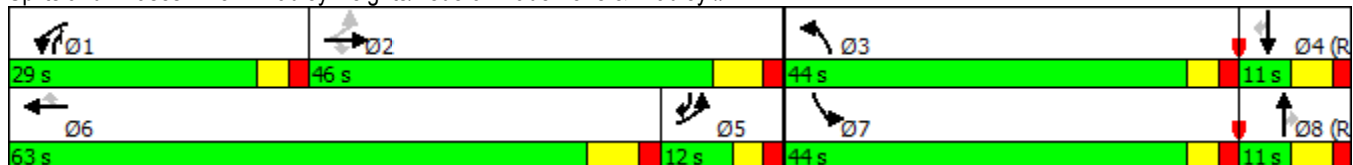
2040 Background PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 78 | 154 | 370 | 383 | 60 | 100 | 458 | 44 | 390 | 114 | 46 | 231 |
| Future Volume (vph) | 78 | 154 | 370 | 383 | 60 | 100 | 458 | 44 | 390 | 114 | 46 | 231 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | Prot | NA | pm+ov | Prot | NA | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | | | 6 | | | 8 | | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 1 | 7 | 4 | 5 |
| 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 | 2.0 | 5.0 |
| Minimum Split (s) | 10.0 | 12.0 | 12.0 | 10.0 | 12.0 | 12.0 | 10.0 | 11.0 | 10.0 | 10.0 | 8.0 | 10.0 |
| Total Split (s) | 12.0 | 46.0 | 46.0 | 29.0 | 63.0 | 63.0 | 44.0 | 11.0 | 29.0 | 44.0 | 11.0 | 12.0 |
| Total Split (%) | 9.2% | 35.4% | 35.4% | 22.3% | 48.5% | 48.5% | 33.8% | 8.5% | 22.3% | 33.8% | 8.5% | 9.2% |
| Yellow Time (s) | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 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 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | Lead | Lead | Lead | Lag | Lead | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | None | None | C-Max | None |
| Act Effct Green (s) | 24.9 | 11.7 | 11.7 | 20.5 | 7.3 | 7.3 | 23.7 | 64.9 | 91.4 | 9.9 | 51.1 | 77.0 |
| Actuated g/C Ratio | 0.19 | 0.09 | 0.09 | 0.16 | 0.06 | 0.06 | 0.18 | 0.50 | 0.70 | 0.08 | 0.39 | 0.59 |
| v/c Ratio | 0.24 | 0.35 | 0.78 | 0.75 | 0.22 | 0.51 | 0.77 | 0.05 | 0.33 | 0.46 | 0.07 | 0.23 |
| Control Delay | 28.0 | 37.3 | 25.2 | 61.0 | 59.9 | 14.6 | 59.1 | 20.8 | 1.6 | 62.7 | 30.5 | 1.5 |
| 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 | 28.0 | 37.3 | 25.2 | 61.0 | 59.9 | 14.6 | 59.1 | 20.8 | 1.6 | 62.7 | 30.5 | 1.5 |
| LOS | C | D | C | E | E | B | E | C | A | E | C | A |
| Approach Delay | | 28.7 | | | 52.4 | | | 32.1 | | | 22.7 | |
| Approach LOS | | C | | | D | | | C | | | C | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 4:SBT and 8:NBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 34.3
 Intersection LOS: C
 Intersection Capacity Utilization 52.2%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 52: Bradley Heights/Federal Trade Zone & Bradley #1



Timings
2: Grinnell & Powers

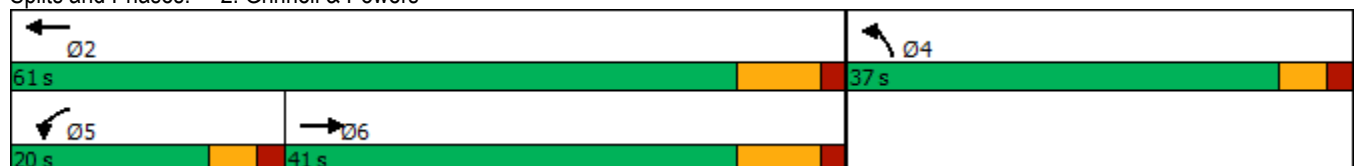
2040 Total AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|------|-------|-------|-------|------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | ↗ | ↘ | ↑↑↑ | ↘ | ↗ |
| Traffic Volume (vph) | 1178 | 441 | 179 | 2484 | 752 | 244 |
| Future Volume (vph) | 1178 | 441 | 179 | 2484 | 752 | 244 |
| Turn Type | NA | Free | Prot | NA | Prot | Free |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | Free | | | | Free |
| Detector Phase | 6 | | 5 | 2 | 4 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | | 4.0 | 30.0 | 8.0 | |
| Minimum Split (s) | 38.0 | | 9.5 | 38.0 | 21.5 | |
| Total Split (s) | 41.0 | | 20.0 | 61.0 | 37.0 | |
| Total Split (%) | 41.8% | | 20.4% | 62.2% | 37.8% | |
| Yellow Time (s) | 6.0 | | 3.5 | 6.0 | 3.5 | |
| All-Red Time (s) | 2.0 | | 2.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | 0.0 | | 0.0 | 0.0 | 0.0 | |
| Total Lost Time (s) | 8.0 | | 5.5 | 8.0 | 5.5 | |
| Lead/Lag | Lag | | Lead | | | |
| Lead-Lag Optimize? | Yes | | Yes | | | |
| Recall Mode | Min | | None | Min | None | |
| Act Effct Green (s) | 36.0 | 91.3 | 10.3 | 51.8 | 25.9 | 91.3 |
| Actuated g/C Ratio | 0.39 | 1.00 | 0.11 | 0.57 | 0.28 | 1.00 |
| v/c Ratio | 0.62 | 0.29 | 0.48 | 0.91 | 0.80 | 0.16 |
| Control Delay | 24.9 | 0.5 | 43.1 | 24.8 | 37.2 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 24.9 | 0.5 | 43.1 | 24.8 | 37.2 | 0.2 |
| LOS | C | A | D | C | D | A |
| Approach Delay | 18.2 | | | 26.1 | 28.1 | |
| Approach LOS | B | | | C | C | |

Intersection Summary

Cycle Length: 98
 Actuated Cycle Length: 91.3
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 24.1
 Intersection LOS: C
 Intersection Capacity Utilization 80.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



Timings

3: Grinnell Blvd. & Goldfield Drive

2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 89 | 12 | 22 | 131 | 4 | 231 | 272 | 648 | 27 | 88 | 598 | 5 |
| Future Volume (vph) | 89 | 12 | 22 | 131 | 4 | 231 | 272 | 648 | 27 | 88 | 598 | 5 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 |
| Total Split (s) | 10.0 | 21.0 | 21.0 | 10.0 | 21.0 | 21.0 | 10.0 | 50.0 | 50.0 | 10.0 | 50.0 | 50.0 |
| Total Split (%) | 11.0% | 23.1% | 23.1% | 11.0% | 23.1% | 23.1% | 11.0% | 54.9% | 54.9% | 11.0% | 54.9% | 54.9% |
| 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 8.5 | 7.1 | 7.1 | 9.5 | 7.0 | 7.0 | 22.1 | 18.4 | 18.4 | 20.7 | 15.4 | 15.4 |
| Actuated g/C Ratio | 0.17 | 0.14 | 0.14 | 0.19 | 0.14 | 0.14 | 0.44 | 0.36 | 0.36 | 0.41 | 0.30 | 0.30 |
| v/c Ratio | 0.33 | 0.05 | 0.07 | 0.21 | 0.02 | 0.57 | 0.78 | 0.53 | 0.04 | 0.25 | 0.58 | 0.01 |
| Control Delay | 20.4 | 22.0 | 0.4 | 22.9 | 21.5 | 9.7 | 29.6 | 16.7 | 0.1 | 9.5 | 17.8 | 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 | 20.4 | 22.0 | 0.4 | 22.9 | 21.5 | 9.7 | 29.6 | 16.7 | 0.1 | 9.5 | 17.8 | 0.0 |
| LOS | C | C | A | C | C | A | C | B | A | A | B | A |
| Approach Delay | | 17.0 | | | 14.5 | | | 19.9 | | | 16.6 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

Cycle Length: 91

Actuated Cycle Length: 50.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 55.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Grinnell Blvd. & Goldfield Drive



Timings

4: Grinnell Blvd. & Bradley Rd.

2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 256 | 247 | 275 | 140 | 573 | 122 | 353 | 568 | 76 | 34 | 500 | 217 |
| Future Volume (vph) | 256 | 247 | 275 | 140 | 573 | 122 | 353 | 568 | 76 | 34 | 500 | 217 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 |
| Total Split (s) | 21.0 | 29.0 | 29.0 | 14.0 | 22.0 | 22.0 | 16.0 | 36.0 | 36.0 | 11.0 | 31.0 | 31.0 |
| Total Split (%) | 23.3% | 32.2% | 32.2% | 15.6% | 24.4% | 24.4% | 17.8% | 40.0% | 40.0% | 12.2% | 34.4% | 34.4% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 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) | 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 | 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 34.3 | 21.9 | 21.9 | 25.2 | 16.5 | 16.5 | 33.4 | 27.5 | 27.5 | 23.5 | 17.2 | 17.2 |
| Actuated g/C Ratio | 0.45 | 0.29 | 0.29 | 0.33 | 0.22 | 0.22 | 0.44 | 0.36 | 0.36 | 0.31 | 0.23 | 0.23 |
| v/c Ratio | 0.64 | 0.26 | 0.44 | 0.33 | 0.79 | 0.25 | 0.91 | 0.47 | 0.12 | 0.11 | 0.66 | 0.43 |
| Control Delay | 22.1 | 22.4 | 5.4 | 16.1 | 37.8 | 1.9 | 46.7 | 22.2 | 0.4 | 14.5 | 31.5 | 6.5 |
| 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 | 22.1 | 22.4 | 5.4 | 16.1 | 37.8 | 1.9 | 46.7 | 22.2 | 0.4 | 14.5 | 31.5 | 6.5 |
| LOS | C | C | A | B | D | A | D | C | A | B | C | A |
| Approach Delay | | 16.3 | | | 28.9 | | | 29.2 | | | 23.5 | |
| Approach LOS | | B | | | C | | | C | | | C | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 76.2

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 24.9

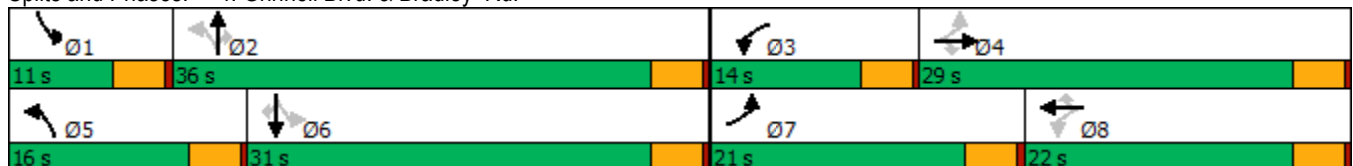
Intersection LOS: C

Intersection Capacity Utilization 76.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Grinnell Blvd. & Bradley Rd.



HCM 6th TWSC
 22: Grinnell Blvd. & Three-Quarter Site Access

2040 Total AM Peak Hour

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.5 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | ↗ | | | ↗ | | ↕ | ↗ | ↘ | ↕ | ↗ |
| Traffic Vol, veh/h | 0 | 0 | 194 | 0 | 0 | 100 | 0 | 896 | 73 | 106 | 498 | 16 |
| Future Vol, veh/h | 0 | 0 | 194 | 0 | 0 | 100 | 0 | 896 | 73 | 106 | 498 | 16 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | - | - | 0 | - | - | 200 | 455 | - | 200 |
| 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 | 0 | 204 | 0 | 0 | 105 | 0 | 943 | 77 | 112 | 524 | 17 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | | Major2 | | | | |
|----------------------|--------|---|--------|---|--------|------|---|--------|---|------|---|---|
| Conflicting Flow All | - | - | 262 | - | - | 472 | - | 0 | 0 | 1020 | 0 | 0 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | 6.94 | - | - | 6.94 | - | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | 3.32 | - | - | 3.32 | - | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 0 | 0 | 737 | 0 | 0 | 538 | 0 | - | - | 676 | - | - |
| Stage 1 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Stage 2 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 737 | - | - | 538 | - | - | - | 676 | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | | SB | | |
|----------------------|------|--|------|--|----|--|--|-----|--|--|
| HCM Control Delay, s | 11.7 | | 13.3 | | 0 | | | 1.9 | | |
| HCM LOS | B | | B | | | | | | | |

| Minor Lane/Major Mvmt | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|-----------------------|-----|-----|-------|-------|-------|-----|-----|
| Capacity (veh/h) | - | - | 737 | 538 | 676 | - | - |
| HCM Lane V/C Ratio | - | - | 0.277 | 0.196 | 0.165 | - | - |
| HCM Control Delay (s) | - | - | 11.7 | 13.3 | 11.4 | - | - |
| HCM Lane LOS | - | - | B | B | B | - | - |
| HCM 95th %tile Q(veh) | - | - | 1.1 | 0.7 | 0.6 | - | - |

Timings
37: Powers & Bradley

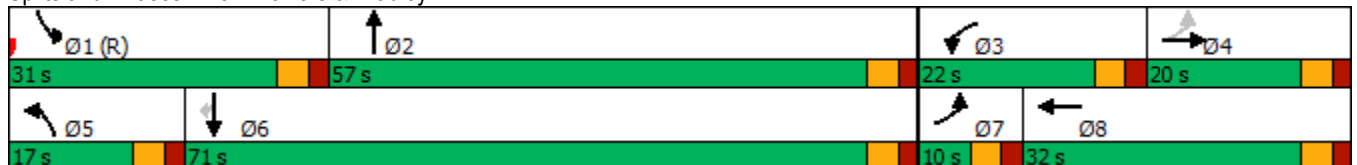
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 26 | 226 | 75 | 323 | 299 | 736 | 100 | 1900 | 403 | 477 | 925 | 19 |
| Future Volume (vph) | 26 | 226 | 75 | 323 | 299 | 736 | 100 | 1900 | 403 | 477 | 925 | 19 |
| Turn Type | pm+pt | NA | Free | Prot | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | | | Free | | | Free | | | 6 |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 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 |
| Minimum Split (s) | 9.0 | 15.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | 9.0 |
| Total Split (s) | 10.0 | 20.0 | | 22.0 | 32.0 | | 17.0 | 57.0 | | 31.0 | 71.0 | 71.0 |
| Total Split (%) | 7.7% | 15.4% | | 16.9% | 24.6% | | 13.1% | 43.8% | | 23.8% | 54.6% | 54.6% |
| Yellow Time (s) | 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 |
| Lost Time Adjust (s) | 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 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | Lead | Lag | | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes | Yes |
| Recall Mode | None | None | | None | None | | None | None | | C-Max | None | None |
| Act Effct Green (s) | 18.4 | 13.4 | 130.0 | 16.1 | 28.4 | 130.0 | 9.3 | 52.0 | 130.0 | 28.6 | 71.3 | 71.3 |
| Actuated g/C Ratio | 0.14 | 0.10 | 1.00 | 0.12 | 0.22 | 1.00 | 0.07 | 0.40 | 1.00 | 0.22 | 0.55 | 0.55 |
| v/c Ratio | 0.15 | 0.66 | 0.05 | 0.79 | 0.40 | 0.48 | 0.42 | 0.96 | 0.26 | 0.65 | 0.34 | 0.02 |
| Control Delay | 37.5 | 64.9 | 0.1 | 50.8 | 34.9 | 6.1 | 62.7 | 51.2 | 0.4 | 51.6 | 17.3 | 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 | 37.5 | 64.9 | 0.1 | 50.8 | 34.9 | 6.1 | 62.7 | 51.2 | 0.4 | 51.6 | 17.3 | 0.1 |
| LOS | D | E | A | D | C | A | E | D | A | D | B | A |
| Approach Delay | | 47.8 | | | 23.1 | | | 43.2 | | | 28.6 | |
| 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: 0.96
 Intersection Signal Delay: 34.7
 Intersection LOS: C
 Intersection Capacity Utilization 84.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 37: Powers & Bradley



Timings

39: Marksheffel & Bradley #1

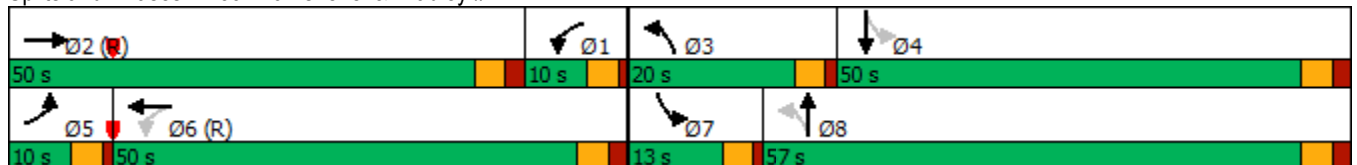
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 446 | 400 | 151 | 95 | 604 | 285 | 253 | 600 | 50 | 140 | 275 | 354 |
| Future Volume (vph) | 446 | 400 | 151 | 95 | 604 | 285 | 253 | 600 | 50 | 140 | 275 | 354 |
| 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) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Minimum Split (s) | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | |
| Total Split (s) | 10.0 | 50.0 | | 10.0 | 50.0 | | 20.0 | 57.0 | | 13.0 | 50.0 | |
| Total Split (%) | 7.7% | 38.5% | | 7.7% | 38.5% | | 15.4% | 43.8% | | 10.0% | 38.5% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 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) | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | |
| Lead/Lag | Lead | Lead | | Lag | 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 | None | | None | None | |
| Act Effct Green (s) | 29.2 | 68.2 | 130.0 | 46.0 | 45.0 | 130.0 | 42.8 | 28.8 | 130.0 | 32.1 | 22.1 | 130.0 |
| Actuated g/C Ratio | 0.22 | 0.52 | 1.00 | 0.35 | 0.35 | 1.00 | 0.33 | 0.22 | 1.00 | 0.25 | 0.17 | 1.00 |
| v/c Ratio | 0.59 | 0.15 | 0.10 | 0.26 | 0.35 | 0.18 | 0.71 | 0.78 | 0.03 | 0.73 | 0.47 | 0.23 |
| Control Delay | 34.3 | 15.9 | 0.1 | 32.8 | 32.3 | 0.3 | 45.1 | 54.8 | 0.0 | 54.3 | 50.5 | 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 | 34.3 | 15.9 | 0.1 | 32.8 | 32.3 | 0.3 | 45.1 | 54.8 | 0.0 | 54.3 | 50.5 | 0.3 |
| LOS | C | B | A | C | C | A | D | D | A | D | D | A |
| Approach Delay | | 21.7 | | | 23.1 | | | 49.0 | | | 28.1 | |
| Approach LOS | | C | | | C | | | D | | | C | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 97 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 30.2
 Intersection LOS: C
 Intersection Capacity Utilization 63.7%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 39: Marksheffel & Bradley #1



Timings

41: Waterview Signal & Bradley/Bradley #1

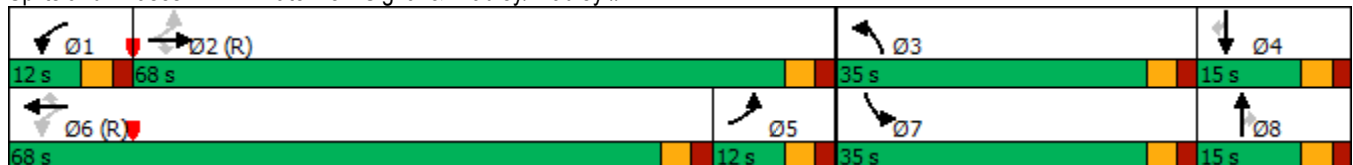
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 265 | 708 | 134 | 107 | 1040 | 43 | 260 | 16 | 125 | 70 | 14 | 59 |
| Future Volume (vph) | 265 | 708 | 134 | 107 | 1040 | 43 | 260 | 16 | 125 | 70 | 14 | 59 |
| Turn Type | pm+pt | 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 | | 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) | 12.0 | 68.0 | 68.0 | 12.0 | 68.0 | 68.0 | 35.0 | 15.0 | 15.0 | 35.0 | 15.0 | 15.0 |
| Total Split (%) | 9.2% | 52.3% | 52.3% | 9.2% | 52.3% | 52.3% | 26.9% | 11.5% | 11.5% | 26.9% | 11.5% | 11.5% |
| 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 | 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) | 80.8 | 80.8 | 80.8 | 82.8 | 82.8 | 82.8 | 15.7 | 14.2 | 14.2 | 8.2 | 6.6 | 6.6 |
| Actuated g/C Ratio | 0.62 | 0.62 | 0.62 | 0.64 | 0.64 | 0.64 | 0.12 | 0.11 | 0.11 | 0.06 | 0.05 | 0.05 |
| v/c Ratio | 0.78 | 0.24 | 0.14 | 0.25 | 0.34 | 0.04 | 0.66 | 0.08 | 0.44 | 0.34 | 0.16 | 0.29 |
| Control Delay | 52.2 | 22.8 | 12.2 | 10.4 | 10.7 | 1.9 | 62.3 | 51.6 | 11.4 | 62.2 | 62.2 | 3.3 |
| 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 | 52.2 | 22.8 | 12.2 | 10.4 | 10.7 | 1.9 | 62.3 | 51.6 | 11.4 | 62.2 | 62.2 | 3.3 |
| LOS | D | C | B | B | B | A | E | D | B | E | E | A |
| Approach Delay | | 28.5 | | | 10.3 | | | 46.0 | | | 38.0 | |
| Approach LOS | | C | | | B | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 74 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 23.9
 Intersection Capacity Utilization 61.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 41: Waterview Signal & Bradley/Bradley #1



| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.7 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↑↑↑ | | | ↑↑↑ | | | | | ↑ | | | ↑ |
| Traffic Vol, veh/h | 0 | 890 | 13 | 0 | 1134 | 232 | 0 | 0 | 37 | 0 | 0 | 56 |
| Future Vol, veh/h | 0 | 890 | 13 | 0 | 1134 | 232 | 0 | 0 | 37 | 0 | 0 | 56 |
| 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 |
| 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 | 937 | 14 | 0 | 1194 | 244 | 0 | 0 | 39 | 0 | 0 | 59 |

| Major/Minor | Major1 | | Major2 | | Minor1 | | Minor2 | | | | | |
|----------------------|--------|---|--------|---|--------|---|--------|---|------|---|---|------|
| Conflicting Flow All | - | 0 | 0 | - | - | 0 | - | - | 476 | - | - | 719 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | - | - | - | - | - | - | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - | - | - | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 0 | - | - | 0 | - | - | 0 | 0 | 458 | 0 | 0 | 318 |
| Stage 1 | 0 | - | - | 0 | - | - | 0 | 0 | - | 0 | 0 | - |
| Stage 2 | 0 | - | - | 0 | - | - | 0 | 0 | - | 0 | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - | - | - | 458 | - | - | 318 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|----|------|------|
| HCM Control Delay, s | 0 | 0 | 13.6 | 18.9 |
| HCM LOS | | | B | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-----|-------|
| Capacity (veh/h) | 458 | - | - | - | - | 318 |
| HCM Lane V/C Ratio | 0.085 | - | - | - | - | 0.185 |
| HCM Control Delay (s) | 13.6 | - | - | - | - | 18.9 |
| HCM Lane LOS | B | - | - | - | - | C |
| HCM 95th %tile Q(veh) | 0.3 | - | - | - | - | 0.7 |

HCM 6th Roundabout
 45: Waterview East N/S St & Retail Access/ Residential Access

2040 Total AM Peak Hour

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 4.8 | | | |
| Intersection LOS | A | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 97 | 62 | 318 | 277 |
| Demand Flow Rate, veh/h | 99 | 63 | 325 | 283 |
| Vehicles Circulating, veh/h | 142 | 410 | 97 | 29 |
| Vehicles Exiting, veh/h | 170 | 12 | 144 | 444 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 3.8 | 4.7 | 5.3 | 4.5 |
| Approach LOS | A | A | A | A |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 99 | 63 | 325 | 283 |
| Cap Entry Lane, veh/h | 1194 | 908 | 1250 | 1340 |
| Entry HV Adj Factor | 0.980 | 0.984 | 0.979 | 0.980 |
| Flow Entry, veh/h | 97 | 62 | 318 | 277 |
| Cap Entry, veh/h | 1169 | 894 | 1224 | 1313 |
| V/C Ratio | 0.083 | 0.069 | 0.260 | 0.211 |
| Control Delay, s/veh | 3.8 | 4.7 | 5.3 | 4.5 |
| LOS | A | A | A | A |
| 95th %tile Queue, veh | 0 | 0 | 1 | 1 |

Timings

52: Bradley Heights/Federal Trade Zone & Bradley #1

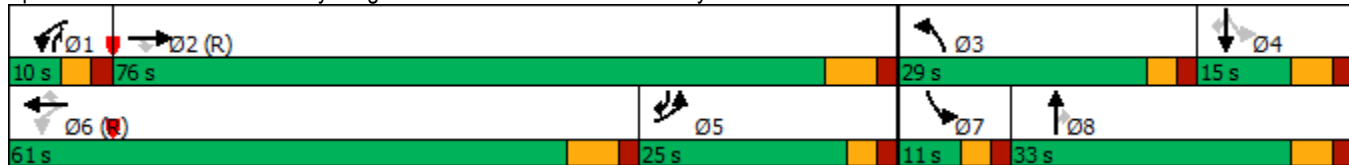
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 250 | 452 | 225 | 201 | 790 | 200 | 500 | 40 | 451 | 100 | 35 | 75 |
| Future Volume (vph) | 250 | 452 | 225 | 201 | 790 | 200 | 500 | 40 | 451 | 100 | 35 | 75 |
| Turn Type | Prot | NA | Perm | pm+pt | NA | Perm | Prot | NA | pm+ov | pm+pt | NA | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | | | 2 | 6 | | 6 | | | 8 | 4 | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 1 | 7 | 4 | 5 |
| 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 | 2.0 | 5.0 |
| Minimum Split (s) | 10.0 | 12.0 | 12.0 | 10.0 | 12.0 | 12.0 | 10.0 | 11.0 | 10.0 | 10.0 | 8.0 | 10.0 |
| Total Split (s) | 25.0 | 76.0 | 76.0 | 10.0 | 61.0 | 61.0 | 29.0 | 33.0 | 10.0 | 11.0 | 15.0 | 25.0 |
| Total Split (%) | 19.2% | 58.5% | 58.5% | 7.7% | 46.9% | 46.9% | 22.3% | 25.4% | 7.7% | 8.5% | 11.5% | 19.2% |
| Yellow Time (s) | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 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 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | Lead | Lead | Lead | Lag | Lead | 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) | 20.0 | 72.0 | 72.0 | 60.7 | 58.7 | 58.7 | 23.0 | 21.9 | 32.2 | 16.1 | 7.7 | 27.4 |
| Actuated g/C Ratio | 0.15 | 0.55 | 0.55 | 0.47 | 0.45 | 0.45 | 0.18 | 0.17 | 0.25 | 0.12 | 0.06 | 0.21 |
| v/c Ratio | 0.50 | 0.17 | 0.24 | 0.51 | 0.36 | 0.25 | 0.87 | 0.13 | 0.74 | 0.54 | 0.34 | 0.17 |
| Control Delay | 69.9 | 25.9 | 14.5 | 20.2 | 15.7 | 3.5 | 67.6 | 43.5 | 18.8 | 51.4 | 66.7 | 0.8 |
| 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 | 69.9 | 25.9 | 14.5 | 20.2 | 15.7 | 3.5 | 67.6 | 43.5 | 18.8 | 51.4 | 66.7 | 0.8 |
| LOS | E | C | B | C | B | A | E | D | B | D | E | A |
| Approach Delay | | 35.0 | | | 14.4 | | | 44.4 | | | 35.9 | |
| Approach LOS | | C | | | B | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 30.4
 Intersection Capacity Utilization 58.3%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 52: Bradley Heights/Federal Trade Zone & Bradley #1



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 8 | 349 | 811 | 3 | 0 | 24 |
| Future Vol, veh/h | 8 | 349 | 811 | 3 | 0 | 24 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 379 | 882 | 3 | 0 | 26 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 885 | 0 | 0 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | 2.22 | - | - |
| Pot Cap-1 Maneuver | 760 | - | 0 |
| Stage 1 | - | - | 0 |
| Stage 2 | - | - | 0 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 760 | - | - |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.2 | 0 | 11.7 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 760 | - | - | - | 562 |
| HCM Lane V/C Ratio | 0.011 | - | - | - | 0.046 |
| HCM Control Delay (s) | 9.8 | - | - | - | 11.7 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

Timings

2: Grinnell & Powers

2040 Total PM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | ↑ | ↘↙ | ↑↑↑ | ↘↙ | ↑ |
| Traffic Volume (vph) | 2292 | 953 | 246 | 1395 | 656 | 218 |
| Future Volume (vph) | 2292 | 953 | 246 | 1395 | 656 | 218 |
| Turn Type | NA | Free | Prot | NA | Prot | Free |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | Free | | | | Free |
| Detector Phase | 6 | | 5 | 2 | 4 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | | 4.0 | 30.0 | 8.0 | |
| Minimum Split (s) | 38.0 | | 9.5 | 38.0 | 21.5 | |
| Total Split (s) | 61.0 | | 26.0 | 87.0 | 43.0 | |
| Total Split (%) | 46.9% | | 20.0% | 66.9% | 33.1% | |
| Yellow Time (s) | 6.0 | | 3.5 | 6.0 | 3.5 | |
| All-Red Time (s) | 2.0 | | 2.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | 0.0 | | 0.0 | 0.0 | 0.0 | |
| Total Lost Time (s) | 8.0 | | 5.5 | 8.0 | 5.5 | |
| Lead/Lag | Lag | | Lead | | | |
| Lead-Lag Optimize? | Yes | | Yes | | | |
| Recall Mode | Min | | None | Min | None | |
| Act Effct Green (s) | 53.3 | 113.7 | 13.7 | 72.5 | 27.6 | 113.7 |
| Actuated g/C Ratio | 0.47 | 1.00 | 0.12 | 0.64 | 0.24 | 1.00 |
| v/c Ratio | 1.01 | 0.61 | 0.61 | 0.45 | 0.80 | 0.14 |
| Control Delay | 52.4 | 1.8 | 54.8 | 11.6 | 48.7 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 52.4 | 1.8 | 54.8 | 11.6 | 48.7 | 0.2 |
| LOS | D | A | D | B | D | A |
| Approach Delay | 37.5 | | | 18.1 | 36.6 | |
| Approach LOS | D | | | B | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 113.7
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 31.8
 Intersection LOS: C
 Intersection Capacity Utilization 85.9%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



Timings

3: Grinnell Blvd. & Goldfield Drive

2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 47 | 7 | 10 | 226 | 13 | 202 | 220 | 524 | 89 | 317 | 794 | 25 |
| Future Volume (vph) | 47 | 7 | 10 | 226 | 13 | 202 | 220 | 524 | 89 | 317 | 794 | 25 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 |
| Total Split (s) | 10.0 | 21.0 | 21.0 | 16.0 | 27.0 | 27.0 | 10.0 | 36.0 | 36.0 | 18.0 | 44.0 | 44.0 |
| Total Split (%) | 11.0% | 23.1% | 23.1% | 17.6% | 29.7% | 29.7% | 11.0% | 39.6% | 39.6% | 19.8% | 48.4% | 48.4% |
| 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) | 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 7.3 | 6.1 | 6.1 | 10.6 | 9.1 | 9.1 | 20.3 | 15.0 | 15.0 | 30.2 | 20.6 | 20.6 |
| Actuated g/C Ratio | 0.13 | 0.11 | 0.11 | 0.19 | 0.16 | 0.16 | 0.36 | 0.27 | 0.27 | 0.54 | 0.37 | 0.37 |
| v/c Ratio | 0.21 | 0.03 | 0.03 | 0.36 | 0.05 | 0.49 | 0.73 | 0.58 | 0.15 | 0.65 | 0.64 | 0.04 |
| Control Delay | 21.4 | 29.1 | 0.1 | 24.3 | 24.6 | 8.7 | 29.1 | 21.8 | 0.5 | 14.4 | 17.7 | 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 | 21.4 | 29.1 | 0.1 | 24.3 | 24.6 | 8.7 | 29.1 | 21.8 | 0.5 | 14.4 | 17.7 | 0.1 |
| LOS | C | C | A | C | C | A | C | C | A | B | B | A |
| Approach Delay | | 18.7 | | | 17.2 | | | 21.4 | | | 16.4 | |
| Approach LOS | | B | | | B | | | C | | | B | |

Intersection Summary

Cycle Length: 91

Actuated Cycle Length: 56

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 18.3

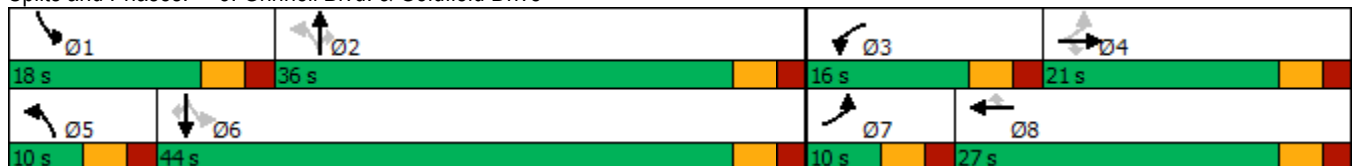
Intersection LOS: B

Intersection Capacity Utilization 59.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Grinnell Blvd. & Goldfield Drive



Timings

4: Grinnell Blvd. & Bradley Rd.

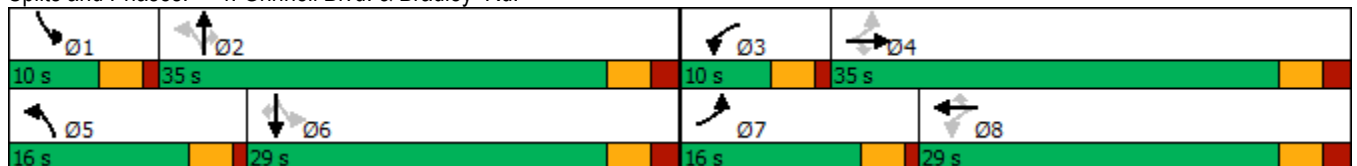
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 310 | 244 | 375 | 178 | 384 | 72 | 363 | 451 | 203 | 48 | 596 | 387 |
| Future Volume (vph) | 310 | 244 | 375 | 178 | 384 | 72 | 363 | 451 | 203 | 48 | 596 | 387 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 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 | 9.0 | 9.0 |
| Total Split (s) | 16.0 | 35.0 | 35.0 | 10.0 | 29.0 | 29.0 | 16.0 | 35.0 | 35.0 | 10.0 | 29.0 | 29.0 |
| Total Split (%) | 17.8% | 38.9% | 38.9% | 11.1% | 32.2% | 32.2% | 17.8% | 38.9% | 38.9% | 11.1% | 32.2% | 32.2% |
| 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) | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 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) | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 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 | None | None | None | None | None | None | Max | Max | None | Max | Max |
| Act Effct Green (s) | 31.5 | 20.5 | 20.5 | 21.5 | 14.5 | 14.5 | 41.1 | 34.2 | 34.2 | 30.9 | 24.0 | 24.0 |
| Actuated g/C Ratio | 0.39 | 0.25 | 0.25 | 0.27 | 0.18 | 0.18 | 0.51 | 0.42 | 0.42 | 0.38 | 0.30 | 0.30 |
| v/c Ratio | 0.83 | 0.29 | 0.62 | 0.54 | 0.64 | 0.16 | 0.88 | 0.32 | 0.27 | 0.13 | 0.59 | 0.58 |
| Control Delay | 38.3 | 24.8 | 10.2 | 25.1 | 35.3 | 0.8 | 39.2 | 17.8 | 3.9 | 12.4 | 27.4 | 9.4 |
| 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 | 38.3 | 24.8 | 10.2 | 25.1 | 35.3 | 0.8 | 39.2 | 17.8 | 3.9 | 12.4 | 27.4 | 9.4 |
| LOS | D | C | B | C | D | A | D | B | A | B | C | A |
| Approach Delay | | 23.4 | | | 28.5 | | | 22.7 | | | 19.9 | |
| Approach LOS | | C | | | C | | | C | | | B | |

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 80.6
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 23.1
 Intersection Capacity Utilization 79.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

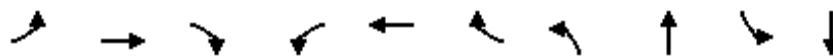
Splits and Phases: 4: Grinnell Blvd. & Bradley Rd.



Timings

5: Bradley Rd. & Goldfield Drive

2040 Total PM Peak Hour



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖ | ↑ | ↗ | ↖ | ↑ | ↗ | ↖ | ↗ | ↖ | ↗ |
| Traffic Volume (vph) | 120 | 209 | 139 | 5 | 291 | 49 | 267 | 182 | 33 | 214 |
| Future Volume (vph) | 120 | 209 | 139 | 5 | 291 | 49 | 267 | 182 | 33 | 214 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | pm+pt | NA |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 7 | 4 |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 4 | |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 7 | 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 |
| Minimum Split (s) | 10.0 | 21.0 | 21.0 | 10.0 | 21.0 | 21.0 | 10.0 | 21.0 | 10.0 | 21.0 |
| Total Split (s) | 15.0 | 33.0 | 33.0 | 10.0 | 28.0 | 28.0 | 15.0 | 37.0 | 10.0 | 32.0 |
| Total Split (%) | 16.7% | 36.7% | 36.7% | 11.1% | 31.1% | 31.1% | 16.7% | 41.1% | 11.1% | 35.6% |
| 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) | 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 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lead | Lag |
| Lead-Lag Optimize? | 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 |
| Act Effct Green (s) | 45.2 | 43.1 | 43.1 | 37.1 | 31.5 | 31.5 | 34.8 | 28.8 | 24.8 | 19.8 |
| Actuated g/C Ratio | 0.50 | 0.48 | 0.48 | 0.41 | 0.35 | 0.35 | 0.39 | 0.32 | 0.28 | 0.22 |
| v/c Ratio | 0.28 | 0.25 | 0.18 | 0.01 | 0.47 | 0.08 | 0.86 | 0.34 | 0.10 | 0.75 |
| Control Delay | 15.3 | 17.3 | 4.2 | 14.4 | 27.8 | 0.2 | 45.8 | 25.0 | 16.4 | 42.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.3 | 17.3 | 4.2 | 14.4 | 27.8 | 0.2 | 45.8 | 25.0 | 16.4 | 42.1 |
| LOS | B | B | A | B | C | A | D | C | B | D |
| Approach Delay | | 12.8 | | | 23.7 | | | 37.2 | | 39.4 |
| Approach LOS | | B | | | C | | | D | | D |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 27.6

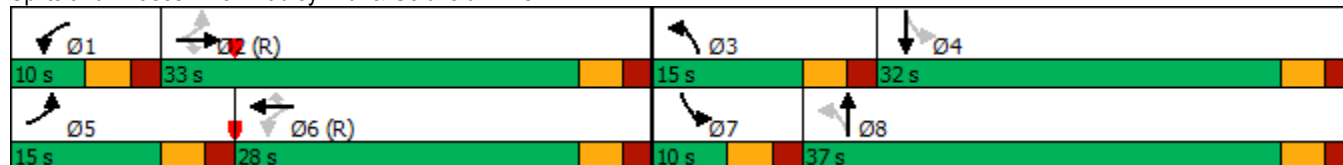
Intersection LOS: C

Intersection Capacity Utilization 68.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Bradley Rd. & Goldfield Drive



HCM 6th TWSC
22: Grinnell Blvd. & Three-Quarter Site Access

2040 Total PM Peak Hour

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.1 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | ↗ | | | ↗ | | ↕↕ | ↗ | ↘ | ↕↕ | ↗ |
| Traffic Vol, veh/h | 0 | 0 | 243 | 0 | 0 | 227 | 0 | 647 | 127 | 244 | 894 | 60 |
| Future Vol, veh/h | 0 | 0 | 243 | 0 | 0 | 227 | 0 | 647 | 127 | 244 | 894 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | - | - | 0 | - | - | 200 | 455 | - | 200 |
| 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 | 0 | 256 | 0 | 0 | 239 | 0 | 681 | 134 | 257 | 941 | 63 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | | Major2 | | | | |
|----------------------|--------|---|--------|---|--------|------|---|--------|---|------|---|---|
| Conflicting Flow All | - | - | 471 | - | - | 341 | - | 0 | 0 | 815 | 0 | 0 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | 6.94 | - | - | 6.94 | - | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | 3.32 | - | - | 3.32 | - | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 0 | 0 | 539 | 0 | 0 | 655 | 0 | - | - | 808 | - | - |
| Stage 1 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Stage 2 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 539 | - | - | 655 | - | - | - | 808 | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | | SB | | |
|----------------------|------|--|------|--|----|--|--|-----|--|--|
| HCM Control Delay, s | 17.6 | | 13.6 | | 0 | | | 2.3 | | |
| HCM LOS | C | | B | | | | | | | |

| Minor Lane/Major Mvmt | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|-----------------------|-----|-----|-------|-------|-------|-----|-----|
| Capacity (veh/h) | - | - | 539 | 655 | 808 | - | - |
| HCM Lane V/C Ratio | - | - | 0.475 | 0.365 | 0.318 | - | - |
| HCM Control Delay (s) | - | - | 17.6 | 13.6 | 11.5 | - | - |
| HCM Lane LOS | - | - | C | B | B | - | - |
| HCM 95th %tile Q(veh) | - | - | 2.5 | 1.7 | 1.4 | - | - |

Timings

37: Powers & Bradley #2

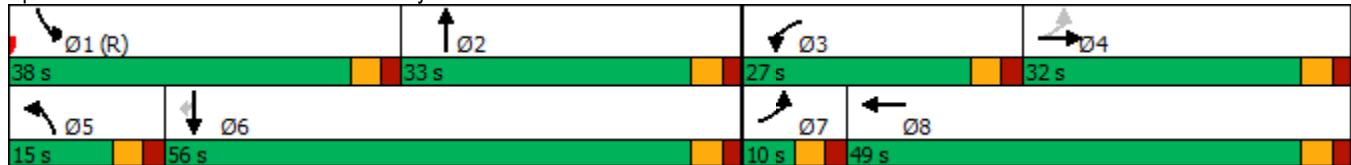
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 71 | 411 | 210 | 552 | 439 | 749 | 175 | 820 | 501 | 700 | 1700 | 110 |
| Future Volume (vph) | 71 | 411 | 210 | 552 | 439 | 749 | 175 | 820 | 501 | 700 | 1700 | 110 |
| Turn Type | pm+pt | NA | Free | Prot | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | | | Free | | | Free | | | 6 |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 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 |
| Minimum Split (s) | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | 9.0 |
| Total Split (s) | 10.0 | 32.0 | | 27.0 | 49.0 | | 15.0 | 33.0 | | 38.0 | 56.0 | 56.0 |
| Total Split (%) | 7.7% | 24.6% | | 20.8% | 37.7% | | 11.5% | 25.4% | | 29.2% | 43.1% | 43.1% |
| Yellow Time (s) | 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 |
| Lost Time Adjust (s) | 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 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | Lead | Lag | | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes | Yes |
| Recall Mode | None | None | | None | None | | None | Max | | C-Max | Max | Max |
| Act Effct Green (s) | 26.3 | 21.3 | 130.0 | 22.0 | 40.3 | 130.0 | 11.1 | 28.0 | 130.0 | 38.7 | 55.7 | 55.7 |
| Actuated g/C Ratio | 0.20 | 0.16 | 1.00 | 0.17 | 0.31 | 1.00 | 0.09 | 0.22 | 1.00 | 0.30 | 0.43 | 0.43 |
| v/c Ratio | 0.35 | 0.75 | 0.14 | 0.98 | 0.41 | 0.49 | 0.62 | 0.77 | 0.33 | 0.71 | 0.81 | 0.15 |
| Control Delay | 33.4 | 60.0 | 0.2 | 70.0 | 36.4 | 3.7 | 66.9 | 53.5 | 0.5 | 45.8 | 36.8 | 2.3 |
| 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 | 33.4 | 60.0 | 0.2 | 70.0 | 36.4 | 3.7 | 66.9 | 53.5 | 0.5 | 45.8 | 36.8 | 2.3 |
| LOS | C | E | A | E | D | A | E | D | A | D | D | A |
| Approach Delay | | 39.1 | | | 33.0 | | | 37.4 | | | 37.8 | |
| 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: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 36.5
 Intersection LOS: D
 Intersection Capacity Utilization 81.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 37: Powers & Bradley #2



Timings

39: Marksheffel & Bradley #1

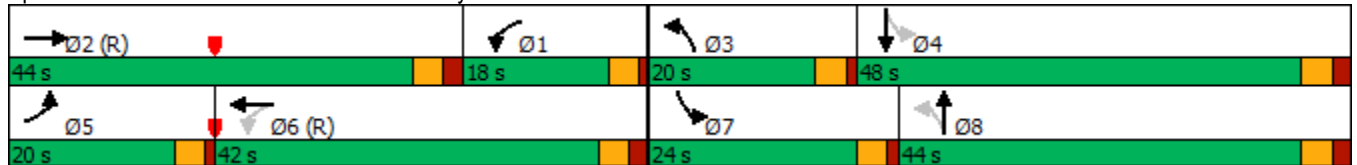
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 651 | 702 | 353 | 195 | 652 | 215 | 228 | 500 | 100 | 300 | 650 | 501 |
| Future Volume (vph) | 651 | 702 | 353 | 195 | 652 | 215 | 228 | 500 | 100 | 300 | 650 | 501 |
| 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) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Minimum Split (s) | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | |
| Total Split (s) | 20.0 | 44.0 | | 18.0 | 42.0 | | 20.0 | 44.0 | | 24.0 | 48.0 | |
| Total Split (%) | 15.4% | 33.8% | | 13.8% | 32.3% | | 15.4% | 33.8% | | 18.5% | 36.9% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 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) | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | |
| Lead/Lag | Lead | Lead | | Lag | 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 | None | | None | None | |
| Act Effct Green (s) | 29.3 | 52.3 | 130.0 | 38.0 | 37.0 | 130.0 | 43.0 | 26.7 | 130.0 | 50.4 | 30.4 | 130.0 |
| Actuated g/C Ratio | 0.23 | 0.40 | 1.00 | 0.29 | 0.28 | 1.00 | 0.33 | 0.21 | 1.00 | 0.39 | 0.23 | 1.00 |
| v/c Ratio | 0.86 | 0.35 | 0.23 | 0.63 | 0.46 | 0.14 | 0.84 | 0.70 | 0.06 | 0.87 | 0.80 | 0.32 |
| Control Delay | 56.9 | 17.6 | 0.3 | 54.6 | 39.5 | 0.2 | 56.1 | 53.1 | 0.1 | 53.1 | 54.7 | 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 | 56.9 | 17.6 | 0.3 | 54.6 | 39.5 | 0.2 | 56.1 | 53.1 | 0.1 | 53.1 | 54.7 | 0.5 |
| LOS | E | B | A | D | D | A | E | D | A | D | D | A |
| Approach Delay | | 29.0 | | | 34.3 | | | 47.5 | | | 35.7 | |
| Approach LOS | | C | | | C | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 100 (77%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 35.1
 Intersection LOS: D
 Intersection Capacity Utilization 76.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 39: Marksheffel & Bradley #1



Timings

41: Waterview Signal & Bradley #2

2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↘ | ↑↑↑ | ↗ | ↘ | ↑↑↑ | ↗ | ↘↗ | ↑ | ↗ | ↘↗ | ↑ | ↗ |
| Traffic Volume (vph) | 352 | 849 | 411 | 304 | 1124 | 49 | 359 | 19 | 248 | 312 | 20 | 256 |
| Future Volume (vph) | 352 | 849 | 411 | 304 | 1124 | 49 | 359 | 19 | 248 | 312 | 20 | 256 |
| Turn Type | pm+pt | 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 | | 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) | 21.0 | 77.0 | 77.0 | 15.0 | 71.0 | 71.0 | 20.0 | 16.0 | 16.0 | 22.0 | 18.0 | 18.0 |
| Total Split (%) | 16.2% | 59.2% | 59.2% | 11.5% | 54.6% | 54.6% | 15.4% | 12.3% | 12.3% | 16.9% | 13.8% | 13.8% |
| 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 | 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) | 75.8 | 75.8 | 75.8 | 66.0 | 66.0 | 66.0 | 23.6 | 8.8 | 8.8 | 24.9 | 9.5 | 9.5 |
| Actuated g/C Ratio | 0.58 | 0.58 | 0.58 | 0.51 | 0.51 | 0.51 | 0.18 | 0.07 | 0.07 | 0.19 | 0.07 | 0.07 |
| v/c Ratio | 0.97 | 0.30 | 0.39 | 0.84 | 0.46 | 0.06 | 0.66 | 0.16 | 0.80 | 0.56 | 0.16 | 0.82 |
| Control Delay | 57.3 | 14.3 | 5.3 | 53.8 | 18.9 | 1.5 | 49.8 | 58.9 | 29.1 | 46.6 | 57.1 | 30.9 |
| 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 | 57.3 | 14.3 | 5.3 | 53.8 | 18.9 | 1.5 | 49.8 | 58.9 | 29.1 | 46.6 | 57.1 | 30.9 |
| LOS | E | B | A | D | B | A | D | E | C | D | E | C |
| Approach Delay | | 21.4 | | | 25.5 | | | 41.9 | | | 40.1 | |
| Approach LOS | | C | | | C | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 39 (30%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 28.3
 Intersection LOS: C
 Intersection Capacity Utilization 70.6%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 41: Waterview Signal & Bradley #2



| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Int Delay, s/veh | 0.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↑↑↑ | | | ↑↑↑ | | | | | ↑ | | | ↑ |
| Traffic Vol, veh/h | 0 | 1341 | 67 | 0 | 1251 | 241 | 0 | 0 | 26 | 0 | 0 | 226 |
| Future Vol, veh/h | 0 | 1341 | 67 | 0 | 1251 | 241 | 0 | 0 | 26 | 0 | 0 | 226 |
| 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 | Yield | Yield | Yield |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Yield |
| Storage Length | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 16983 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 95 | 98 | 95 | 95 | 98 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 1368 | 71 | 0 | 1277 | 254 | 0 | 0 | 27 | 0 | 0 | 238 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|----------------------|--------|---|--------|---|--------|------|
| Conflicting Flow All | - | 0 | 0 | - | - | 0 |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | - | - | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | 3.92 |
| Pot Cap-1 Maneuver | 0 | - | - | 0 | - | 0 |
| Stage 1 | 0 | - | - | 0 | - | 0 |
| Stage 2 | 0 | - | - | 0 | - | 0 |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | 0 |
| Mov Cap-2 Maneuver | - | - | - | - | - | 0 |
| Stage 1 | - | - | - | - | - | 0 |
| Stage 2 | - | - | - | - | - | 0 |

| Approach | EB | WB | NB |
|----------------------|----|----|------|
| HCM Control Delay, s | 0 | 0 | 17.4 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT | WBR |
|-----------------------|-------|-----|-----|-----|-----|
| Capacity (veh/h) | 318 | - | - | - | - |
| HCM Lane V/C Ratio | 0.086 | - | - | - | - |
| HCM Control Delay (s) | 17.4 | - | - | - | - |
| HCM Lane LOS | C | - | - | - | - |
| HCM 95th %tile Q(veh) | 0.3 | - | - | - | - |

HCM 6th Roundabout
 45: Waterview East N/S & Retail Access/Residential Access

2040 Total PM Peak Hour

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 10.5 | | | |
| Intersection LOS | B | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 491 | 42 | 267 | 799 |
| Demand Flow Rate, veh/h | 501 | 43 | 272 | 815 |
| Vehicles Circulating, veh/h | 427 | 705 | 487 | 55 |
| Vehicles Exiting, veh/h | 443 | 54 | 440 | 693 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 12.1 | 6.2 | 8.1 | 10.5 |
| Approach LOS | B | A | A | B |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 501 | 43 | 272 | 815 |
| Cap Entry Lane, veh/h | 893 | 672 | 840 | 1305 |
| Entry HV Adj Factor | 0.980 | 0.976 | 0.981 | 0.980 |
| Flow Entry, veh/h | 491 | 42 | 267 | 799 |
| Cap Entry, veh/h | 875 | 656 | 823 | 1278 |
| V/C Ratio | 0.561 | 0.064 | 0.324 | 0.625 |
| Control Delay, s/veh | 12.1 | 6.2 | 8.1 | 10.5 |
| LOS | B | A | A | B |
| 95th %tile Queue, veh | 4 | 0 | 1 | 5 |

Timings

52: Bradley Heights/Federal Trade Zone & Bradley #1

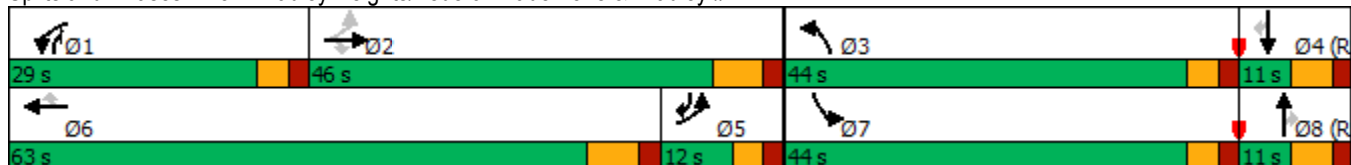
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 100 | 867 | 400 | 400 | 742 | 100 | 500 | 50 | 400 | 200 | 85 | 251 |
| Future Volume (vph) | 100 | 867 | 400 | 400 | 742 | 100 | 500 | 50 | 400 | 200 | 85 | 251 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | Prot | NA | pm+ov | Prot | NA | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | | | 6 | | | 8 | | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 1 | 7 | 4 | 5 |
| 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 | 2.0 | 5.0 |
| Minimum Split (s) | 10.0 | 12.0 | 12.0 | 10.0 | 12.0 | 12.0 | 10.0 | 11.0 | 10.0 | 10.0 | 8.0 | 10.0 |
| Total Split (s) | 12.0 | 46.0 | 46.0 | 29.0 | 63.0 | 63.0 | 44.0 | 11.0 | 29.0 | 44.0 | 11.0 | 12.0 |
| Total Split (%) | 9.2% | 35.4% | 35.4% | 22.3% | 48.5% | 48.5% | 33.8% | 8.5% | 22.3% | 33.8% | 8.5% | 9.2% |
| Yellow Time (s) | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 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 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | Lead | Lead | Lead | Lag | Lead | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | None | None | C-Max | None |
| Act Effct Green (s) | 34.9 | 32.9 | 32.9 | 21.2 | 27.9 | 27.9 | 25.4 | 39.5 | 66.7 | 13.4 | 27.5 | 54.7 |
| Actuated g/C Ratio | 0.27 | 0.25 | 0.25 | 0.16 | 0.21 | 0.21 | 0.20 | 0.30 | 0.51 | 0.10 | 0.21 | 0.42 |
| v/c Ratio | 0.25 | 0.71 | 0.59 | 0.75 | 0.72 | 0.24 | 0.79 | 0.09 | 0.45 | 0.60 | 0.23 | 0.36 |
| Control Delay | 20.7 | 25.1 | 5.1 | 47.9 | 40.1 | 2.7 | 58.3 | 38.1 | 10.3 | 62.5 | 49.6 | 9.3 |
| 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 | 20.7 | 25.1 | 5.1 | 47.9 | 40.1 | 2.7 | 58.3 | 38.1 | 10.3 | 62.5 | 49.6 | 9.3 |
| LOS | C | C | A | D | D | A | E | D | B | E | D | A |
| Approach Delay | | 18.9 | | | 39.6 | | | 37.0 | | | 35.6 | |
| Approach LOS | | B | | | D | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 4:SBT and 8:NBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 31.6
 Intersection LOS: C
 Intersection Capacity Utilization 64.1%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 52: Bradley Heights/Federal Trade Zone & Bradley #1



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑↑ | ↑↑ | | | ↗ |
| Traffic Vol, veh/h | 27 | 468 | 618 | 10 | 0 | 16 |
| Future Vol, veh/h | 27 | 468 | 618 | 10 | 0 | 16 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 29 | 509 | 672 | 11 | 0 | 17 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 683 | 0 | 0 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | 4.14 | - | 6.94 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | 2.22 | - | 3.32 |
| Pot Cap-1 Maneuver | 906 | - | 0 |
| Stage 1 | - | - | 0 |
| Stage 2 | - | - | 0 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 906 | - | 654 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.5 | 0 | 10.7 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 906 | - | - | - | 654 |
| HCM Lane V/C Ratio | 0.032 | - | - | - | 0.027 |
| HCM Control Delay (s) | 9.1 | - | - | - | 10.7 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

Timings
2: Grinnell & Powers

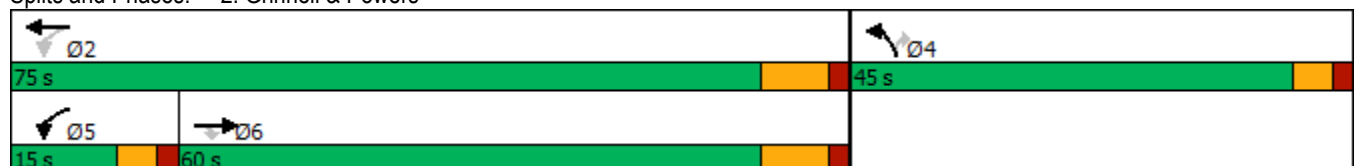
2017 Total Traffic
AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | ↘ | ↑↑ | ↘ | ↘ |
| Traffic Volume (vph) | 667 | 272 | 148 | 1270 | 544 | 127 |
| Future Volume (vph) | 667 | 272 | 148 | 1270 | 544 | 127 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | 6 | 2 | | | 4 |
| Detector Phase | 6 | 6 | 5 | 2 | 4 | 4 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 4.0 | 30.0 | 8.0 | 8.0 |
| Minimum Split (s) | 38.0 | 38.0 | 10.0 | 38.0 | 22.0 | 22.0 |
| Total Split (s) | 60.0 | 60.0 | 15.0 | 75.0 | 45.0 | 45.0 |
| Total Split (%) | 50.0% | 50.0% | 12.5% | 62.5% | 37.5% | 37.5% |
| Yellow Time (s) | 6.0 | 6.0 | 3.5 | 6.0 | 3.5 | 3.5 |
| 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) | 8.0 | 8.0 | 5.5 | 8.0 | 5.5 | 5.5 |
| Lead/Lag | Lag | Lag | Lead | | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | | | |
| Recall Mode | Min | Min | None | Min | None | None |
| Act Effct Green (s) | 34.2 | 34.2 | 51.4 | 48.9 | 39.6 | 39.6 |
| Actuated g/C Ratio | 0.33 | 0.33 | 0.50 | 0.48 | 0.39 | 0.39 |
| v/c Ratio | 0.58 | 0.38 | 0.44 | 0.83 | 0.88 | 0.22 |
| Control Delay | 30.0 | 4.4 | 17.6 | 28.0 | 46.1 | 15.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 30.0 | 4.4 | 17.6 | 28.0 | 46.1 | 15.3 |
| LOS | C | A | B | C | D | B |
| Approach Delay | 22.6 | | | 26.9 | 40.2 | |
| Approach LOS | C | | | C | D | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 102.1
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 28.7
 Intersection LOS: C
 Intersection Capacity Utilization 79.2%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.6 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 91 | 146 | 525 | 25 | 49 | 371 |
| Future Vol, veh/h | 91 | 146 | 525 | 25 | 49 | 371 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | 0 | - | 380 | 295 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 88 | 88 |
| Heavy Vehicles, % | 1 | 1 | 2 | 1 | 1 | 2 |
| Mvmt Flow | 98 | 157 | 565 | 27 | 56 | 422 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 1099 | 565 | 0 | 0 | 592 |
| Stage 1 | 565 | - | - | - | - |
| Stage 2 | 534 | - | - | - | - |
| Critical Hdwy | 6.41 | 6.21 | - | - | 4.11 |
| Critical Hdwy Stg 1 | 5.41 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.41 | - | - | - | - |
| Follow-up Hdwy | 3.509 | 3.309 | - | - | 2.209 |
| Pot Cap-1 Maneuver | 236 | 526 | - | - | 989 |
| Stage 1 | 571 | - | - | - | - |
| Stage 2 | 590 | - | - | - | - |
| Platoon blocked, % | | | | | |
| Mov Cap-1 Maneuver | 223 | 526 | - | - | 989 |
| Mov Cap-2 Maneuver | 223 | - | - | - | - |
| Stage 1 | 538 | - | - | - | - |
| Stage 2 | 590 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 21.8 | 0 | 1 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 223 | 526 | 989 |
| HCM Lane V/C Ratio | - | - | 0.439 | 0.298 | 0.056 |
| HCM Control Delay (s) | - | - | 33.2 | 14.7 | 8.9 |
| HCM Lane LOS | - | - | D | B | A |
| HCM 95th %tile Q(veh) | - | - | 2.1 | 1.2 | 0.2 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.1 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑ | ↗ | ↘ | ↑ | ↘ | |
| Traffic Vol, veh/h | 48 | 26 | 0 | 145 | 91 | 5 |
| Future Vol, veh/h | 48 | 26 | 0 | 145 | 91 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 155 | 175 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 52 | 28 | 0 | 156 | 98 | 5 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|-----|
| Conflicting Flow All | 0 | 0 | 80 | 0 | 208 |
| Stage 1 | - | - | - | - | 52 |
| Stage 2 | - | - | - | - | 156 |
| Critical Hdwy | - | - | 4.1 | - | 6.4 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.4 |
| Critical Hdwy Stg 2 | - | - | - | - | 5.4 |
| Follow-up Hdwy | - | - | 2.2 | - | 3.5 |
| Pot Cap-1 Maneuver | - | - | 1531 | - | 785 |
| Stage 1 | - | - | - | - | 976 |
| Stage 2 | - | - | - | - | 877 |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1531 | - | 785 |
| Mov Cap-2 Maneuver | - | - | - | - | 785 |
| Stage 1 | - | - | - | - | 976 |
| Stage 2 | - | - | - | - | 877 |

| Approach | EB | WB | NB |
|----------------------|----|----|------|
| HCM Control Delay, s | 0 | 0 | 10.2 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|------|-----|
| Capacity (veh/h) | 795 | - | - | 1531 | - |
| HCM Lane V/C Ratio | 0.13 | - | - | - | - |
| HCM Control Delay (s) | 10.2 | - | - | 0 | - |
| HCM Lane LOS | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.4 | - | - | 0 | - |

Timings
37: Powers & Bradley Rd.

2017 Total Traffic
AM Peak Hour

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 338 | 590 | 543 | 355 | 421 | 272 |
| Future Volume (vph) | 338 | 590 | 543 | 355 | 421 | 272 |
| 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) | 30.0 | | 50.0 | 50.0 | 20.0 | 70.0 |
| Total Split (%) | 30.0% | | 50.0% | 50.0% | 20.0% | 70.0% |
| 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 | | C-Max | C-Max | None | C-Max |
| Act Effect Green (s) | 15.1 | 100.0 | 50.8 | 50.8 | 19.1 | 74.9 |
| Actuated g/C Ratio | 0.15 | 1.00 | 0.51 | 0.51 | 0.19 | 0.75 |
| v/c Ratio | 0.65 | 0.37 | 0.35 | 0.41 | 0.71 | 0.11 |
| Control Delay | 53.4 | 1.5 | 16.3 | 3.0 | 44.3 | 3.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 53.4 | 1.5 | 16.3 | 3.0 | 44.3 | 3.9 |
| LOS | D | A | B | A | D | A |
| Approach Delay | 20.4 | | 11.0 | | | 28.5 |
| Approach LOS | C | | B | | | C |

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 64 (64%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 19.1
 Intersection Capacity Utilization 49.2%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 37: Powers & Bradley Rd.



Timings
41: Waterview Full Access & Bradley Rd.

2017 Total Traffic
AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | ↘ | ↑↑ | ↘↘ | ↘ |
| Traffic Volume (vph) | 575 | 201 | 84 | 543 | 384 | 118 |
| Future Volume (vph) | 575 | 201 | 84 | 543 | 384 | 118 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 2 | | 1 | 6 | 8 | |
| Permitted Phases | | 2 | 6 | | | 8 |
| Detector Phase | 2 | 2 | 1 | 6 | 8 | 8 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Minimum Split (s) | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 21.0 |
| Total Split (s) | 65.0 | 65.0 | 10.0 | 75.0 | 25.0 | 25.0 |
| Total Split (%) | 65.0% | 65.0% | 10.0% | 75.0% | 25.0% | 25.0% |
| 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 | C-Max | C-Max | None | C-Max | None | None |
| Act Effct Green (s) | 64.2 | 64.2 | 73.1 | 73.1 | 16.9 | 16.9 |
| Actuated g/C Ratio | 0.64 | 0.64 | 0.73 | 0.73 | 0.17 | 0.17 |
| v/c Ratio | 0.28 | 0.20 | 0.16 | 0.23 | 0.72 | 0.34 |
| Control Delay | 11.4 | 5.2 | 4.9 | 4.9 | 46.4 | 9.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.4 | 5.2 | 4.9 | 4.9 | 46.4 | 9.0 |
| LOS | B | A | A | A | D | A |
| Approach Delay | 9.8 | | | 4.9 | 37.6 | |
| Approach LOS | A | | | A | D | |

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 67 (67%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 15.5
 Intersection Capacity Utilization 44.0%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 41: Waterview Full Access & Bradley Rd.



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.3 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | | ↑↑ | | ↑ |
| Traffic Vol, veh/h | 672 | 21 | 0 | 628 | 0 | 33 |
| Future Vol, veh/h | 672 | 21 | 0 | 628 | 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 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 730 | 23 | 0 | 683 | 0 | 36 |

| Major/Minor | Major1 | Major2 | Minor1 | | | |
|----------------------|--------|--------|--------|---|---|------|
| Conflicting Flow All | 0 | 0 | - | - | - | 365 |
| 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 | 632 |
| Stage 1 | - | - | 0 | - | 0 | - |
| Stage 2 | - | - | 0 | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | 632 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | EB | WB | NB |
|----------------------|----|----|----|
| HCM Control Delay, s | 0 | 0 | 11 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT |
|-----------------------|-------|-----|-----|-----|
| Capacity (veh/h) | 632 | - | - | - |
| HCM Lane V/C Ratio | 0.057 | - | - | - |
| HCM Control Delay (s) | 11 | - | - | - |
| HCM Lane LOS | B | - | - | - |
| HCM 95th %tile Q(veh) | 0.2 | - | - | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑ | ↗ | | | ↗ |
| Traffic Vol, veh/h | 10 | 63 | 171 | 1 | 0 | 30 |
| Future Vol, veh/h | 10 | 63 | 171 | 1 | 0 | 30 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 225 | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 68 | 186 | 1 | 0 | 33 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 187 | 0 | 0 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | 4.12 | - | 6.22 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | 2.218 | - | 3.318 |
| Pot Cap-1 Maneuver | 1387 | - | 855 |
| Stage 1 | - | - | 0 |
| Stage 2 | - | - | 0 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 1387 | - | 855 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | SB |
|----------------------|----|----|-----|
| HCM Control Delay, s | 1 | 0 | 9.4 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1387 | - | - | - | 855 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.038 |
| HCM Control Delay (s) | 7.6 | - | - | - | 9.4 |
| HCM Lane LOS | A | - | - | - | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 7:00

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|------|------|------|-----|-----|-----|-----|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 10.0 | 6.5 | 3.7 | 5.6 | 11.3 | 12.5 | 15.8 | 3.1 | 2.0 | 6.9 | 8.7 | 7.9 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 7:00

| Lane | All |
|------------------|------|
| Movements Served | |
| Stop Del/Veh (s) | 10.5 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 7:15

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|------|------|------|-----|-----|-----|-----|------|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 18.0 | 5.5 | 3.8 | 5.3 | 10.9 | 15.2 | 18.6 | 2.6 | 3.7 | 6.3 | 9.8 | 11.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 7:15

| Lane | All |
|------------------|------|
| Movements Served | |
| Stop Del/Veh (s) | 12.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 7:30

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|-----|-----|-----|-----|------|-----|------|-----|-----|-----|-----|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 9.1 | 5.7 | 3.6 | 5.3 | 10.3 | 7.9 | 13.9 | 2.4 | 1.7 | 5.4 | 6.9 | 7.1 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 7:30

| Lane | All |
|------------------|-----|
| Movements Served | |
| Stop Del/Veh (s) | 8.9 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 7:45

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|------|------|------|-----|-----|-----|-----|------|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 12.5 | 6.8 | 3.9 | 5.4 | 11.6 | 13.1 | 12.2 | 2.7 | 6.1 | 8.0 | 8.1 | 10.1 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 7:45

| Lane | All |
|------------------|------|
| Movements Served | |
| Stop Del/Veh (s) | 10.3 |

SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|------|------|------|-----|-----|-----|-----|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 13.2 | 6.4 | 3.8 | 5.6 | 11.4 | 12.6 | 15.7 | 2.7 | 4.5 | 6.7 | 8.7 | 9.3 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | All |
|------------------|------|
| Movements Served | |
| Stop Del/Veh (s) | 10.9 |

Total Zone Performance By Interval

| Interval Start | 7:00 | 7:15 | 7:30 | 7:45 | All |
|------------------|-------|-------|-------|-------|-------|
| Stop Del/Veh (s) | 281.9 | 174.5 | 272.8 | 324.7 | 549.4 |

Timings
2: Grinnell & Powers

2017 Total Traffic
PM Peak Hour

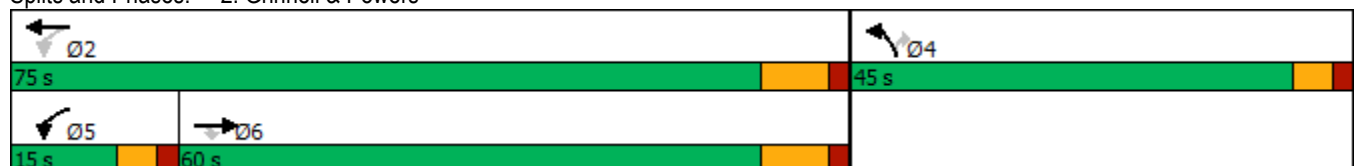
| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | ↘ | ↑↑ | ↘ | ↗ |
| Traffic Volume (vph) | 1161 | 585 | 177 | 818 | 328 | 168 |
| Future Volume (vph) | 1161 | 585 | 177 | 818 | 328 | 168 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | 6 | 2 | | | 4 |
| Detector Phase | 6 | 6 | 5 | 2 | 4 | 4 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 4.0 | 30.0 | 8.0 | 8.0 |
| Minimum Split (s) | 38.0 | 38.0 | 10.0 | 38.0 | 22.0 | 22.0 |
| Total Split (s) | 60.0 | 60.0 | 15.0 | 75.0 | 45.0 | 45.0 |
| Total Split (%) | 50.0% | 50.0% | 12.5% | 62.5% | 37.5% | 37.5% |
| Yellow Time (s) | 6.0 | 6.0 | 3.5 | 6.0 | 3.5 | 3.5 |
| 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) | 8.0 | 8.0 | 5.5 | 8.0 | 5.5 | 5.5 |
| Lead/Lag | Lag | Lag | Lead | | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | | | |
| Recall Mode | Min | Min | None | Min | None | None |
| Act Effct Green (s) | 41.6 | 41.6 | 59.6 | 57.0 | 23.6 | 23.6 |
| Actuated g/C Ratio | 0.44 | 0.44 | 0.63 | 0.60 | 0.25 | 0.25 |
| v/c Ratio | 0.80 | 0.59 | 0.68 | 0.43 | 0.74 | 0.35 |
| Control Delay | 28.1 | 4.1 | 27.8 | 11.5 | 44.5 | 13.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.1 | 4.1 | 27.8 | 11.5 | 44.5 | 13.1 |
| LOS | C | A | C | B | D | B |
| Approach Delay | 20.0 | | | 14.4 | 33.9 | |
| Approach LOS | C | | | B | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 94.5
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 20.2
 Intersection Capacity Utilization 75.9%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 2: Grinnell & Powers



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.3 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 56 | 70 | 426 | 83 | 119 | 643 |
| Future Vol, veh/h | 56 | 70 | 426 | 83 | 119 | 643 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | 0 | - | 380 | 295 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 1 | 1 | 2 | 1 | 1 | 2 |
| Mvmt Flow | 60 | 74 | 453 | 88 | 127 | 684 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 1391 | 453 | 0 | 0 | 541 |
| Stage 1 | 453 | - | - | - | - |
| Stage 2 | 938 | - | - | - | - |
| Critical Hdwy | 6.41 | 6.21 | - | - | 4.11 |
| Critical Hdwy Stg 1 | 5.41 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.41 | - | - | - | - |
| Follow-up Hdwy | 3.509 | 3.309 | - | - | 2.209 |
| Pot Cap-1 Maneuver | 157 | 609 | - | - | 1033 |
| Stage 1 | 642 | - | - | - | - |
| Stage 2 | 382 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 138 | 609 | - | - | 1033 |
| Mov Cap-2 Maneuver | 138 | - | - | - | - |
| Stage 1 | 563 | - | - | - | - |
| Stage 2 | 382 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 28.5 | 0 | 1.4 |
| HCM LOS | D | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 138 | 609 | 1033 |
| HCM Lane V/C Ratio | - | - | 0.432 | 0.122 | 0.123 |
| HCM Control Delay (s) | - | - | 49.6 | 11.7 | 9 |
| HCM Lane LOS | - | - | E | B | A |
| HCM 95th %tile Q(veh) | - | - | 1.9 | 0.4 | 0.4 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.7 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑ | ↗ | ↖ | ↑ | ↘ | ↙ |
| Traffic Vol, veh/h | 98 | 103 | 3 | 73 | 52 | 3 |
| Future Vol, veh/h | 98 | 103 | 3 | 73 | 52 | 3 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 155 | 175 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 105 | 111 | 3 | 78 | 56 | 3 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|-----|
| Conflicting Flow All | 0 | 0 | 216 | 0 | 189 |
| Stage 1 | - | - | - | - | 105 |
| Stage 2 | - | - | - | - | 84 |
| Critical Hdwy | - | - | 4.1 | - | 6.4 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.4 |
| Critical Hdwy Stg 2 | - | - | - | - | 5.4 |
| Follow-up Hdwy | - | - | 2.2 | - | 3.5 |
| Pot Cap-1 Maneuver | - | - | 1366 | - | 805 |
| Stage 1 | - | - | - | - | 924 |
| Stage 2 | - | - | - | - | 944 |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1366 | - | 803 |
| Mov Cap-2 Maneuver | - | - | - | - | 803 |
| Stage 1 | - | - | - | - | 922 |
| Stage 2 | - | - | - | - | 944 |

| Approach | EB | WB | NB |
|----------------------|----|-----|-----|
| HCM Control Delay, s | 0 | 0.3 | 9.8 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 810 | - | - | 1366 | - |
| HCM Lane V/C Ratio | 0.073 | - | - | 0.002 | - |
| HCM Control Delay (s) | 9.8 | - | - | 7.6 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0 | - |

Timings
37: Powers & Bradley Rd.

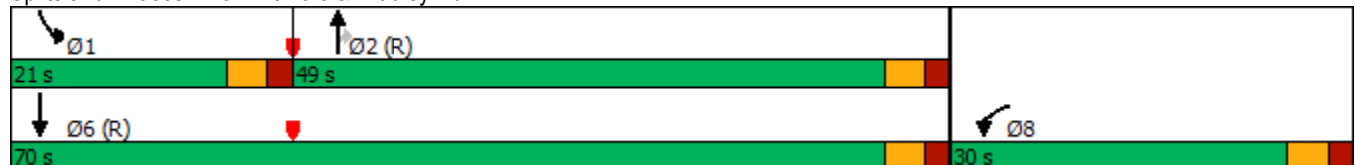
2017 Total Traffic
PM Peak Hour

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 440 | 551 | 287 | 608 | 632 | 492 |
| Future Volume (vph) | 440 | 551 | 287 | 608 | 632 | 492 |
| 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) | 30.0 | | 49.0 | 49.0 | 21.0 | 70.0 |
| Total Split (%) | 30.0% | | 49.0% | 49.0% | 21.0% | 70.0% |
| 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 | | C-Max | C-Max | None | C-Max |
| Act Effct Green (s) | 18.7 | 100.0 | 44.0 | 44.0 | 22.3 | 71.3 |
| Actuated g/C Ratio | 0.19 | 1.00 | 0.44 | 0.44 | 0.22 | 0.71 |
| v/c Ratio | 0.72 | 0.37 | 0.19 | 0.59 | 0.88 | 0.21 |
| Control Delay | 33.3 | 1.6 | 17.5 | 4.1 | 52.8 | 5.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.3 | 1.6 | 17.5 | 4.1 | 52.8 | 5.4 |
| LOS | C | A | B | A | D | A |
| Approach Delay | 15.7 | | 8.4 | | | 32.0 |
| Approach LOS | B | | A | | | C |

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 19.8
 Intersection Capacity Utilization 64.0%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 37: Powers & Bradley Rd.



Timings
41: Waterview Full Access & Bradley Rd.

2017 Total Traffic
PM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | ↘ | ↑↑ | ↘↘ | ↘ |
| Traffic Volume (vph) | 678 | 561 | 248 | 456 | 535 | 185 |
| Future Volume (vph) | 678 | 561 | 248 | 456 | 535 | 185 |
| Turn Type | NA | Perm | pm+pt | NA | Prot | Perm |
| Protected Phases | 2 | | 1 | 6 | 8 | |
| Permitted Phases | | 2 | 6 | | | 8 |
| Detector Phase | 2 | 2 | 1 | 6 | 8 | 8 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Minimum Split (s) | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 21.0 |
| Total Split (s) | 65.0 | 65.0 | 10.0 | 75.0 | 25.0 | 25.0 |
| Total Split (%) | 65.0% | 65.0% | 10.0% | 75.0% | 25.0% | 25.0% |
| 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 | C-Max | C-Max | None | C-Max | None | None |
| Act Effct Green (s) | 60.0 | 60.0 | 70.5 | 70.5 | 19.5 | 19.5 |
| Actuated g/C Ratio | 0.60 | 0.60 | 0.70 | 0.70 | 0.20 | 0.20 |
| v/c Ratio | 0.35 | 0.51 | 0.57 | 0.20 | 0.87 | 0.43 |
| Control Delay | 4.9 | 2.8 | 10.8 | 5.3 | 54.2 | 8.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 4.9 | 2.8 | 10.8 | 5.3 | 54.2 | 8.1 |
| LOS | A | A | B | A | D | A |
| Approach Delay | 4.0 | | | 7.3 | 42.4 | |
| Approach LOS | A | | | A | D | |

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 67 (67%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 15.2
 Intersection Capacity Utilization 60.2%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 41: Waterview Full Access & Bradley Rd.



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.2 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | ↑ | | ↑↑ | | ↑ |
| Traffic Vol, veh/h | 760 | 104 | 0 | 704 | 0 | 23 |
| Future Vol, veh/h | 760 | 104 | 0 | 704 | 0 | 23 |
| 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 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 826 | 113 | 0 | 765 | 0 | 25 |

| Major/Minor | Major1 | Major2 | Minor1 | | | |
|----------------------|--------|--------|--------|---|---|------|
| Conflicting Flow All | 0 | 0 | - | - | - | 413 |
| 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 | 588 |
| Stage 1 | - | - | 0 | - | 0 | - |
| Stage 2 | - | - | 0 | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | 588 |
| 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) | 588 | - | - | - |
| HCM Lane V/C Ratio | 0.043 | - | - | - |
| HCM Control Delay (s) | 11.4 | - | - | - |
| HCM Lane LOS | B | - | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.5 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↖ | ↑ | ↗ | | | ↖ |
| Traffic Vol, veh/h | 34 | 161 | 75 | 2 | 0 | 20 |
| Future Vol, veh/h | 34 | 161 | 75 | 2 | 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 | 225 | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 37 | 175 | 82 | 2 | 0 | 22 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 84 | 0 | 0 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | 4.12 | - | 6.22 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | 2.218 | - | 3.318 |
| Pot Cap-1 Maneuver | 1513 | - | 976 |
| Stage 1 | - | - | 0 |
| Stage 2 | - | - | 0 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 1513 | - | 976 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 1.3 | 0 | 8.8 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1513 | - | - | - | 976 |
| HCM Lane V/C Ratio | 0.024 | - | - | - | 0.022 |
| HCM Control Delay (s) | 7.4 | - | - | - | 8.8 |
| HCM Lane LOS | A | - | - | - | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 5:00

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 11.1 | 7.5 | 5.3 | 6.5 | 8.0 | 10.5 | 8.2 | 3.5 | 5.7 | 8.1 | 10.1 | 6.1 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #1 5:00

| Lane | All |
|------------------|-----|
| Movements Served | |
| Stop Del/Veh (s) | 8.3 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 5:15

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 12.3 | 7.3 | 6.4 | 7.3 | 7.7 | 11.4 | 9.5 | 3.5 | 6.8 | 9.0 | 11.3 | 6.6 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #2 5:15

| Lane | All |
|------------------|-----|
| Movements Served | |
| Stop Del/Veh (s) | 9.0 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 5:30

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 8.0 | 6.9 | 5.2 | 6.6 | 7.2 | 8.1 | 7.1 | 3.1 | 7.4 | 7.1 | 8.9 | 5.4 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #3 5:30

| Lane | All |
|------------------|-----|
| Movements Served | |
| Stop Del/Veh (s) | 7.1 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 5:45

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 9.1 | 7.1 | 5.9 | 6.4 | 7.4 | 8.8 | 8.5 | 3.5 | 4.8 | 6.9 | 9.1 | 6.5 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Interval #4 5:45

| Lane | All |
|------------------|-----|
| Movements Served | |
| Stop Del/Veh (s) | 7.7 |

SimTraffic Performance Report

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | EB | EB | EB | WB | WB | NB | NB | NB | SB | SB | SB | SB |
|------------------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|
| Movements Served | L | T | R | L | TR | L | T | R | L | T | T | R |
| Stop Del/Veh (s) | 10.4 | 7.4 | 5.8 | 6.7 | 7.7 | 10.0 | 8.6 | 3.5 | 5.2 | 8.1 | 10.2 | 6.3 |

4: Grinnell Blvd. & Bradley Rd. Performance by lane Entire Run

| Lane | All |
|------------------|-----|
| Movements Served | |
| Stop Del/Veh (s) | 8.2 |

Total Zone Performance By Interval

| Interval Start | 5:00 | 5:15 | 5:30 | 5:45 | All |
|------------------|-------|-------|-------|-------|-------|
| Stop Del/Veh (s) | 208.2 | 250.6 | 218.5 | 202.3 | 669.0 |

Timings
2: Grinnell & Powers

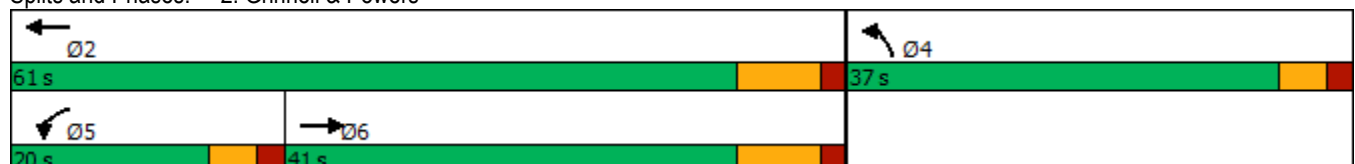
2040 Total AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|------|-------|-------|-------|------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | ↗ | ↘ | ↑↑↑ | ↘ | ↗ |
| Traffic Volume (vph) | 1178 | 441 | 179 | 2484 | 752 | 244 |
| Future Volume (vph) | 1178 | 441 | 179 | 2484 | 752 | 244 |
| Turn Type | NA | Free | Prot | NA | Prot | Free |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | Free | | | | Free |
| Detector Phase | 6 | | 5 | 2 | 4 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | | 4.0 | 30.0 | 8.0 | |
| Minimum Split (s) | 38.0 | | 9.5 | 38.0 | 21.5 | |
| Total Split (s) | 41.0 | | 20.0 | 61.0 | 37.0 | |
| Total Split (%) | 41.8% | | 20.4% | 62.2% | 37.8% | |
| Yellow Time (s) | 6.0 | | 3.5 | 6.0 | 3.5 | |
| All-Red Time (s) | 2.0 | | 2.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | 0.0 | | 0.0 | 0.0 | 0.0 | |
| Total Lost Time (s) | 8.0 | | 5.5 | 8.0 | 5.5 | |
| Lead/Lag | Lag | | Lead | | | |
| Lead-Lag Optimize? | Yes | | Yes | | | |
| Recall Mode | Min | | None | Min | None | |
| Act Effct Green (s) | 36.0 | 91.3 | 10.3 | 51.8 | 25.9 | 91.3 |
| Actuated g/C Ratio | 0.39 | 1.00 | 0.11 | 0.57 | 0.28 | 1.00 |
| v/c Ratio | 0.62 | 0.29 | 0.48 | 0.91 | 0.80 | 0.16 |
| Control Delay | 24.9 | 0.5 | 43.1 | 24.8 | 37.2 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 24.9 | 0.5 | 43.1 | 24.8 | 37.2 | 0.2 |
| LOS | C | A | D | C | D | A |
| Approach Delay | 18.2 | | | 26.1 | 28.1 | |
| Approach LOS | B | | | C | C | |

Intersection Summary

Cycle Length: 98
 Actuated Cycle Length: 91.3
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 24.1
 Intersection LOS: C
 Intersection Capacity Utilization 80.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



Timings

3: Grinnell Blvd. & Goldfield Drive

2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 89 | 12 | 22 | 131 | 4 | 231 | 272 | 648 | 27 | 88 | 598 | 5 |
| Future Volume (vph) | 89 | 12 | 22 | 131 | 4 | 231 | 272 | 648 | 27 | 88 | 598 | 5 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 |
| Total Split (s) | 10.0 | 21.0 | 21.0 | 10.0 | 21.0 | 21.0 | 10.0 | 50.0 | 50.0 | 10.0 | 50.0 | 50.0 |
| Total Split (%) | 11.0% | 23.1% | 23.1% | 11.0% | 23.1% | 23.1% | 11.0% | 54.9% | 54.9% | 11.0% | 54.9% | 54.9% |
| 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 8.5 | 7.1 | 7.1 | 9.5 | 7.0 | 7.0 | 22.1 | 18.4 | 18.4 | 20.7 | 15.4 | 15.4 |
| Actuated g/C Ratio | 0.17 | 0.14 | 0.14 | 0.19 | 0.14 | 0.14 | 0.44 | 0.36 | 0.36 | 0.41 | 0.30 | 0.30 |
| v/c Ratio | 0.33 | 0.05 | 0.07 | 0.21 | 0.02 | 0.57 | 0.78 | 0.53 | 0.04 | 0.25 | 0.58 | 0.01 |
| Control Delay | 20.4 | 22.0 | 0.4 | 22.9 | 21.5 | 9.7 | 29.6 | 16.7 | 0.1 | 9.5 | 17.8 | 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 | 20.4 | 22.0 | 0.4 | 22.9 | 21.5 | 9.7 | 29.6 | 16.7 | 0.1 | 9.5 | 17.8 | 0.0 |
| LOS | C | C | A | C | C | A | C | B | A | A | B | A |
| Approach Delay | | 17.0 | | | 14.5 | | | 19.9 | | | 16.6 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

Cycle Length: 91

Actuated Cycle Length: 50.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 17.8

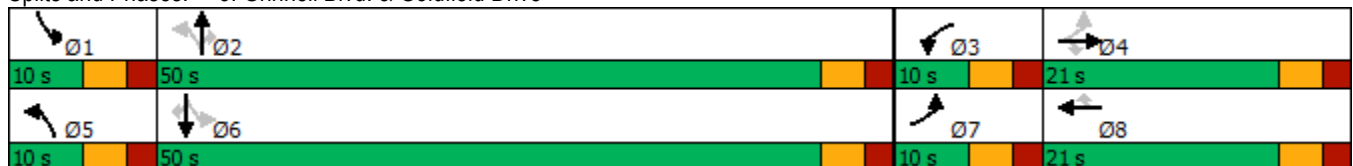
Intersection LOS: B

Intersection Capacity Utilization 55.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Grinnell Blvd. & Goldfield Drive



Timings

4: Grinnell Blvd. & Bradley Rd.

2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 256 | 247 | 275 | 140 | 573 | 122 | 353 | 568 | 76 | 34 | 500 | 217 |
| Future Volume (vph) | 256 | 247 | 275 | 140 | 573 | 122 | 353 | 568 | 76 | 34 | 500 | 217 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 | 8.0 | 20.0 | 20.0 |
| Total Split (s) | 21.0 | 29.0 | 29.0 | 14.0 | 22.0 | 22.0 | 16.0 | 36.0 | 36.0 | 11.0 | 31.0 | 31.0 |
| Total Split (%) | 23.3% | 32.2% | 32.2% | 15.6% | 24.4% | 24.4% | 17.8% | 40.0% | 40.0% | 12.2% | 34.4% | 34.4% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 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) | 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 | 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 34.3 | 21.9 | 21.9 | 25.2 | 16.5 | 16.5 | 33.4 | 27.5 | 27.5 | 23.5 | 17.2 | 17.2 |
| Actuated g/C Ratio | 0.45 | 0.29 | 0.29 | 0.33 | 0.22 | 0.22 | 0.44 | 0.36 | 0.36 | 0.31 | 0.23 | 0.23 |
| v/c Ratio | 0.64 | 0.26 | 0.44 | 0.33 | 0.79 | 0.25 | 0.91 | 0.47 | 0.12 | 0.11 | 0.66 | 0.43 |
| Control Delay | 22.1 | 22.4 | 5.4 | 16.1 | 37.8 | 1.9 | 46.7 | 22.2 | 0.4 | 14.5 | 31.5 | 6.5 |
| 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 | 22.1 | 22.4 | 5.4 | 16.1 | 37.8 | 1.9 | 46.7 | 22.2 | 0.4 | 14.5 | 31.5 | 6.5 |
| LOS | C | C | A | B | D | A | D | C | A | B | C | A |
| Approach Delay | | 16.3 | | | 28.9 | | | 29.2 | | | 23.5 | |
| Approach LOS | | B | | | C | | | C | | | C | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 76.2

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 24.9

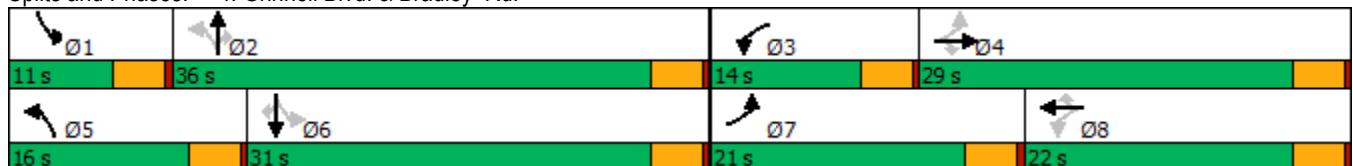
Intersection LOS: C

Intersection Capacity Utilization 76.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Grinnell Blvd. & Bradley Rd.



HCM 6th TWSC
 22: Grinnell Blvd. & Three-Quarter Site Access

2040 Total AM Peak Hour

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.5 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | ↗ | | | ↗ | | ↕ | ↗ | ↘ | ↕ | ↗ |
| Traffic Vol, veh/h | 0 | 0 | 194 | 0 | 0 | 100 | 0 | 896 | 73 | 106 | 498 | 16 |
| Future Vol, veh/h | 0 | 0 | 194 | 0 | 0 | 100 | 0 | 896 | 73 | 106 | 498 | 16 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | - | - | 0 | - | - | 200 | 455 | - | 200 |
| 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 | 0 | 204 | 0 | 0 | 105 | 0 | 943 | 77 | 112 | 524 | 17 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | | Major2 | | | | |
|----------------------|--------|---|--------|---|--------|------|---|--------|---|------|---|---|
| Conflicting Flow All | - | - | 262 | - | - | 472 | - | 0 | 0 | 1020 | 0 | 0 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | 6.94 | - | - | 6.94 | - | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | 3.32 | - | - | 3.32 | - | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 0 | 0 | 737 | 0 | 0 | 538 | 0 | - | - | 676 | - | - |
| Stage 1 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Stage 2 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 737 | - | - | 538 | - | - | - | 676 | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | | SB | | |
|----------------------|------|--|------|--|----|--|--|-----|--|--|
| HCM Control Delay, s | 11.7 | | 13.3 | | 0 | | | 1.9 | | |
| HCM LOS | B | | B | | | | | | | |

| Minor Lane/Major Mvmt | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|-----------------------|-----|-----|-------|-------|-------|-----|-----|
| Capacity (veh/h) | - | - | 737 | 538 | 676 | - | - |
| HCM Lane V/C Ratio | - | - | 0.277 | 0.196 | 0.165 | - | - |
| HCM Control Delay (s) | - | - | 11.7 | 13.3 | 11.4 | - | - |
| HCM Lane LOS | - | - | B | B | B | - | - |
| HCM 95th %tile Q(veh) | - | - | 1.1 | 0.7 | 0.6 | - | - |

Timings
37: Powers & Bradley

2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 26 | 226 | 75 | 323 | 299 | 736 | 100 | 1900 | 403 | 477 | 925 | 19 |
| Future Volume (vph) | 26 | 226 | 75 | 323 | 299 | 736 | 100 | 1900 | 403 | 477 | 925 | 19 |
| Turn Type | pm+pt | NA | Free | Prot | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | | | Free | | | Free | | | 6 |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 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 |
| Minimum Split (s) | 9.0 | 15.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | 9.0 |
| Total Split (s) | 10.0 | 20.0 | | 22.0 | 32.0 | | 17.0 | 57.0 | | 31.0 | 71.0 | 71.0 |
| Total Split (%) | 7.7% | 15.4% | | 16.9% | 24.6% | | 13.1% | 43.8% | | 23.8% | 54.6% | 54.6% |
| Yellow Time (s) | 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 |
| Lost Time Adjust (s) | 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 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | Lead | Lag | | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes | Yes |
| Recall Mode | None | None | | None | None | | None | None | | C-Max | None | None |
| Act Effct Green (s) | 18.4 | 13.4 | 130.0 | 16.1 | 28.4 | 130.0 | 9.3 | 52.0 | 130.0 | 28.6 | 71.3 | 71.3 |
| Actuated g/C Ratio | 0.14 | 0.10 | 1.00 | 0.12 | 0.22 | 1.00 | 0.07 | 0.40 | 1.00 | 0.22 | 0.55 | 0.55 |
| v/c Ratio | 0.15 | 0.66 | 0.05 | 0.79 | 0.40 | 0.48 | 0.42 | 0.96 | 0.26 | 0.65 | 0.34 | 0.02 |
| Control Delay | 37.5 | 64.9 | 0.1 | 50.8 | 34.9 | 6.1 | 62.7 | 51.2 | 0.4 | 51.6 | 17.3 | 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 | 37.5 | 64.9 | 0.1 | 50.8 | 34.9 | 6.1 | 62.7 | 51.2 | 0.4 | 51.6 | 17.3 | 0.1 |
| LOS | D | E | A | D | C | A | E | D | A | D | B | A |
| Approach Delay | | 47.8 | | | 23.1 | | | 43.2 | | | 28.6 | |
| 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: 0.96
 Intersection Signal Delay: 34.7
 Intersection LOS: C
 Intersection Capacity Utilization 84.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 37: Powers & Bradley



Timings

39: Marksheffel & Bradley #1

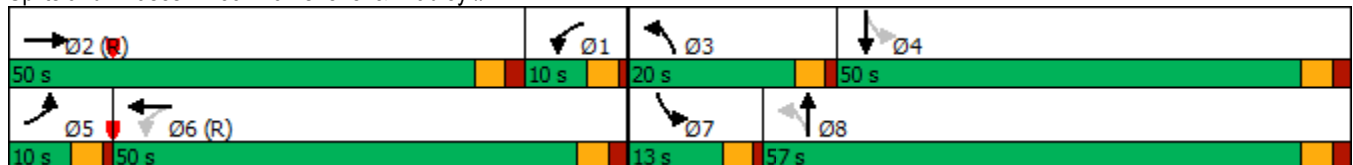
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 446 | 400 | 151 | 95 | 604 | 285 | 253 | 600 | 50 | 140 | 275 | 354 |
| Future Volume (vph) | 446 | 400 | 151 | 95 | 604 | 285 | 253 | 600 | 50 | 140 | 275 | 354 |
| 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) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Minimum Split (s) | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | |
| Total Split (s) | 10.0 | 50.0 | | 10.0 | 50.0 | | 20.0 | 57.0 | | 13.0 | 50.0 | |
| Total Split (%) | 7.7% | 38.5% | | 7.7% | 38.5% | | 15.4% | 43.8% | | 10.0% | 38.5% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 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) | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | |
| Lead/Lag | Lead | Lead | | Lag | 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 | None | | None | None | |
| Act Effct Green (s) | 29.2 | 68.2 | 130.0 | 46.0 | 45.0 | 130.0 | 42.8 | 28.8 | 130.0 | 32.1 | 22.1 | 130.0 |
| Actuated g/C Ratio | 0.22 | 0.52 | 1.00 | 0.35 | 0.35 | 1.00 | 0.33 | 0.22 | 1.00 | 0.25 | 0.17 | 1.00 |
| v/c Ratio | 0.59 | 0.15 | 0.10 | 0.26 | 0.35 | 0.18 | 0.71 | 0.78 | 0.03 | 0.73 | 0.47 | 0.23 |
| Control Delay | 34.3 | 15.9 | 0.1 | 32.8 | 32.3 | 0.3 | 45.1 | 54.8 | 0.0 | 54.3 | 50.5 | 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 | 34.3 | 15.9 | 0.1 | 32.8 | 32.3 | 0.3 | 45.1 | 54.8 | 0.0 | 54.3 | 50.5 | 0.3 |
| LOS | C | B | A | C | C | A | D | D | A | D | D | A |
| Approach Delay | | 21.7 | | | 23.1 | | | 49.0 | | | 28.1 | |
| Approach LOS | | C | | | C | | | D | | | C | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 97 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 30.2
 Intersection LOS: C
 Intersection Capacity Utilization 63.7%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 39: Marksheffel & Bradley #1



Timings

41: Waterview Signal & Bradley/Bradley #1

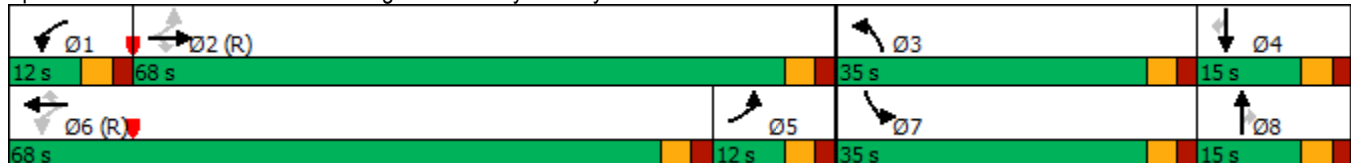
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 265 | 708 | 134 | 107 | 1040 | 43 | 260 | 16 | 125 | 70 | 14 | 59 |
| Future Volume (vph) | 265 | 708 | 134 | 107 | 1040 | 43 | 260 | 16 | 125 | 70 | 14 | 59 |
| Turn Type | pm+pt | 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 | | 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) | 12.0 | 68.0 | 68.0 | 12.0 | 68.0 | 68.0 | 35.0 | 15.0 | 15.0 | 35.0 | 15.0 | 15.0 |
| Total Split (%) | 9.2% | 52.3% | 52.3% | 9.2% | 52.3% | 52.3% | 26.9% | 11.5% | 11.5% | 26.9% | 11.5% | 11.5% |
| 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 | 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) | 80.8 | 80.8 | 80.8 | 82.8 | 82.8 | 82.8 | 15.7 | 14.2 | 14.2 | 8.2 | 6.6 | 6.6 |
| Actuated g/C Ratio | 0.62 | 0.62 | 0.62 | 0.64 | 0.64 | 0.64 | 0.12 | 0.11 | 0.11 | 0.06 | 0.05 | 0.05 |
| v/c Ratio | 0.78 | 0.24 | 0.14 | 0.25 | 0.34 | 0.04 | 0.66 | 0.08 | 0.44 | 0.34 | 0.16 | 0.29 |
| Control Delay | 52.2 | 22.8 | 12.2 | 10.4 | 10.7 | 1.9 | 62.3 | 51.6 | 11.4 | 62.2 | 62.2 | 3.3 |
| 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 | 52.2 | 22.8 | 12.2 | 10.4 | 10.7 | 1.9 | 62.3 | 51.6 | 11.4 | 62.2 | 62.2 | 3.3 |
| LOS | D | C | B | B | B | A | E | D | B | E | E | A |
| Approach Delay | | 28.5 | | | 10.3 | | | 46.0 | | | 38.0 | |
| Approach LOS | | C | | | B | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 74 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 23.9
 Intersection Capacity Utilization 61.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 41: Waterview Signal & Bradley/Bradley #1



| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.7 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↑↑↑ | | | ↑↑↑ | | | | | ↑ | | | ↑ |
| Traffic Vol, veh/h | 0 | 890 | 13 | 0 | 1134 | 232 | 0 | 0 | 37 | 0 | 0 | 56 |
| Future Vol, veh/h | 0 | 890 | 13 | 0 | 1134 | 232 | 0 | 0 | 37 | 0 | 0 | 56 |
| 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 |
| 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 | 937 | 14 | 0 | 1194 | 244 | 0 | 0 | 39 | 0 | 0 | 59 |

| Major/Minor | Major1 | | Major2 | | Minor1 | | Minor2 | | | | | |
|----------------------|--------|---|--------|---|--------|---|--------|---|------|---|---|------|
| Conflicting Flow All | - | 0 | 0 | - | - | 0 | - | - | 476 | - | - | 719 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | - | - | - | - | - | - | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - | - | - | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 0 | - | - | 0 | - | - | 0 | 0 | 458 | 0 | 0 | 318 |
| Stage 1 | 0 | - | - | 0 | - | - | 0 | 0 | - | 0 | 0 | - |
| Stage 2 | 0 | - | - | 0 | - | - | 0 | 0 | - | 0 | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - | - | - | 458 | - | - | 318 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|----|------|------|
| HCM Control Delay, s | 0 | 0 | 13.6 | 18.9 |
| HCM LOS | | | B | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-----|-------|
| Capacity (veh/h) | 458 | - | - | - | - | 318 |
| HCM Lane V/C Ratio | 0.085 | - | - | - | - | 0.185 |
| HCM Control Delay (s) | 13.6 | - | - | - | - | 18.9 |
| HCM Lane LOS | B | - | - | - | - | C |
| HCM 95th %tile Q(veh) | 0.3 | - | - | - | - | 0.7 |

HCM 6th Roundabout
 45: Waterview East N/S St & Retail Access/ Residential Access

2040 Total AM Peak Hour

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 4.8 | | | |
| Intersection LOS | A | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 97 | 62 | 318 | 277 |
| Demand Flow Rate, veh/h | 99 | 63 | 325 | 283 |
| Vehicles Circulating, veh/h | 142 | 410 | 97 | 29 |
| Vehicles Exiting, veh/h | 170 | 12 | 144 | 444 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 3.8 | 4.7 | 5.3 | 4.5 |
| Approach LOS | A | A | A | A |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 99 | 63 | 325 | 283 |
| Cap Entry Lane, veh/h | 1194 | 908 | 1250 | 1340 |
| Entry HV Adj Factor | 0.980 | 0.984 | 0.979 | 0.980 |
| Flow Entry, veh/h | 97 | 62 | 318 | 277 |
| Cap Entry, veh/h | 1169 | 894 | 1224 | 1313 |
| V/C Ratio | 0.083 | 0.069 | 0.260 | 0.211 |
| Control Delay, s/veh | 3.8 | 4.7 | 5.3 | 4.5 |
| LOS | A | A | A | A |
| 95th %tile Queue, veh | 0 | 0 | 1 | 1 |

Timings

52: Bradley Heights/Federal Trade Zone & Bradley #1

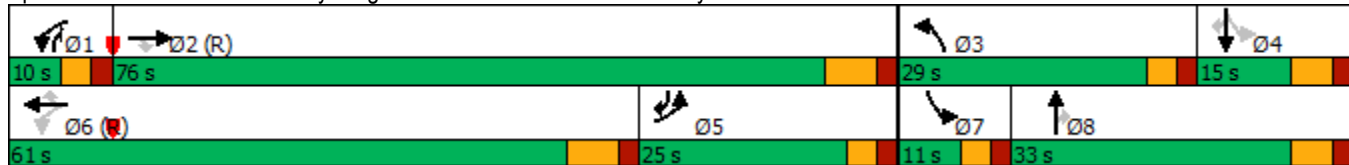
2040 Total AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 250 | 452 | 225 | 201 | 790 | 200 | 500 | 40 | 451 | 100 | 35 | 75 |
| Future Volume (vph) | 250 | 452 | 225 | 201 | 790 | 200 | 500 | 40 | 451 | 100 | 35 | 75 |
| Turn Type | Prot | NA | Perm | pm+pt | NA | Perm | Prot | NA | pm+ov | pm+pt | NA | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | | | 2 | 6 | | 6 | | | 8 | 4 | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 1 | 7 | 4 | 5 |
| 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 | 2.0 | 5.0 |
| Minimum Split (s) | 10.0 | 12.0 | 12.0 | 10.0 | 12.0 | 12.0 | 10.0 | 11.0 | 10.0 | 10.0 | 8.0 | 10.0 |
| Total Split (s) | 25.0 | 76.0 | 76.0 | 10.0 | 61.0 | 61.0 | 29.0 | 33.0 | 10.0 | 11.0 | 15.0 | 25.0 |
| Total Split (%) | 19.2% | 58.5% | 58.5% | 7.7% | 46.9% | 46.9% | 22.3% | 25.4% | 7.7% | 8.5% | 11.5% | 19.2% |
| Yellow Time (s) | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 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 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | Lead | Lead | Lead | Lag | Lead | 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) | 20.0 | 72.0 | 72.0 | 60.7 | 58.7 | 58.7 | 23.0 | 21.9 | 32.2 | 16.1 | 7.7 | 27.4 |
| Actuated g/C Ratio | 0.15 | 0.55 | 0.55 | 0.47 | 0.45 | 0.45 | 0.18 | 0.17 | 0.25 | 0.12 | 0.06 | 0.21 |
| v/c Ratio | 0.50 | 0.17 | 0.24 | 0.51 | 0.36 | 0.25 | 0.87 | 0.13 | 0.74 | 0.54 | 0.34 | 0.17 |
| Control Delay | 69.9 | 25.9 | 14.5 | 20.2 | 15.7 | 3.5 | 67.6 | 43.5 | 18.8 | 51.4 | 66.7 | 0.8 |
| 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 | 69.9 | 25.9 | 14.5 | 20.2 | 15.7 | 3.5 | 67.6 | 43.5 | 18.8 | 51.4 | 66.7 | 0.8 |
| LOS | E | C | B | C | B | A | E | D | B | D | E | A |
| Approach Delay | | 35.0 | | | 14.4 | | | 44.4 | | | 35.9 | |
| Approach LOS | | C | | | B | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 30.4
 Intersection LOS: C
 Intersection Capacity Utilization 58.3%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 52: Bradley Heights/Federal Trade Zone & Bradley #1



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 8 | 349 | 811 | 3 | 0 | 24 |
| Future Vol, veh/h | 8 | 349 | 811 | 3 | 0 | 24 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 379 | 882 | 3 | 0 | 26 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 885 | 0 | 0 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | 2.22 | - | - |
| Pot Cap-1 Maneuver | 760 | - | 0 |
| Stage 1 | - | - | 0 |
| Stage 2 | - | - | 0 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 760 | - | - |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.2 | 0 | 11.7 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 760 | - | - | - | 562 |
| HCM Lane V/C Ratio | 0.011 | - | - | - | 0.046 |
| HCM Control Delay (s) | 9.8 | - | - | - | 11.7 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

Timings

2: Grinnell & Powers

2040 Total PM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | ↑ | ↘↙ | ↑↑↑ | ↘↙ | ↑ |
| Traffic Volume (vph) | 2292 | 953 | 246 | 1395 | 656 | 218 |
| Future Volume (vph) | 2292 | 953 | 246 | 1395 | 656 | 218 |
| Turn Type | NA | Free | Prot | NA | Prot | Free |
| Protected Phases | 6 | | 5 | 2 | 4 | |
| Permitted Phases | | Free | | | | Free |
| Detector Phase | 6 | | 5 | 2 | 4 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 30.0 | | 4.0 | 30.0 | 8.0 | |
| Minimum Split (s) | 38.0 | | 9.5 | 38.0 | 21.5 | |
| Total Split (s) | 61.0 | | 26.0 | 87.0 | 43.0 | |
| Total Split (%) | 46.9% | | 20.0% | 66.9% | 33.1% | |
| Yellow Time (s) | 6.0 | | 3.5 | 6.0 | 3.5 | |
| All-Red Time (s) | 2.0 | | 2.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | 0.0 | | 0.0 | 0.0 | 0.0 | |
| Total Lost Time (s) | 8.0 | | 5.5 | 8.0 | 5.5 | |
| Lead/Lag | Lag | | Lead | | | |
| Lead-Lag Optimize? | Yes | | Yes | | | |
| Recall Mode | Min | | None | Min | None | |
| Act Effct Green (s) | 53.3 | 113.7 | 13.7 | 72.5 | 27.6 | 113.7 |
| Actuated g/C Ratio | 0.47 | 1.00 | 0.12 | 0.64 | 0.24 | 1.00 |
| v/c Ratio | 1.01 | 0.61 | 0.61 | 0.45 | 0.80 | 0.14 |
| Control Delay | 52.4 | 1.8 | 54.8 | 11.6 | 48.7 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 52.4 | 1.8 | 54.8 | 11.6 | 48.7 | 0.2 |
| LOS | D | A | D | B | D | A |
| Approach Delay | 37.5 | | | 18.1 | 36.6 | |
| Approach LOS | D | | | B | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 113.7
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 31.8
 Intersection LOS: C
 Intersection Capacity Utilization 85.9%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 2: Grinnell & Powers



Timings

3: Grinnell Blvd. & Goldfield Drive

2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 47 | 7 | 10 | 226 | 13 | 202 | 220 | 524 | 89 | 317 | 794 | 25 |
| Future Volume (vph) | 47 | 7 | 10 | 226 | 13 | 202 | 220 | 524 | 89 | 317 | 794 | 25 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 4.0 | 4.0 |
| Minimum Split (s) | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 | 9.0 | 21.0 | 21.0 |
| Total Split (s) | 10.0 | 21.0 | 21.0 | 16.0 | 27.0 | 27.0 | 10.0 | 36.0 | 36.0 | 18.0 | 44.0 | 44.0 |
| Total Split (%) | 11.0% | 23.1% | 23.1% | 17.6% | 29.7% | 29.7% | 11.0% | 39.6% | 39.6% | 19.8% | 48.4% | 48.4% |
| 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) | 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 | None | None | None | None | None | None | Min | Min | None | Min | Min |
| Act Effct Green (s) | 7.3 | 6.1 | 6.1 | 10.6 | 9.1 | 9.1 | 20.3 | 15.0 | 15.0 | 30.2 | 20.6 | 20.6 |
| Actuated g/C Ratio | 0.13 | 0.11 | 0.11 | 0.19 | 0.16 | 0.16 | 0.36 | 0.27 | 0.27 | 0.54 | 0.37 | 0.37 |
| v/c Ratio | 0.21 | 0.03 | 0.03 | 0.36 | 0.05 | 0.49 | 0.73 | 0.58 | 0.15 | 0.65 | 0.64 | 0.04 |
| Control Delay | 21.4 | 29.1 | 0.1 | 24.3 | 24.6 | 8.7 | 29.1 | 21.8 | 0.5 | 14.4 | 17.7 | 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 | 21.4 | 29.1 | 0.1 | 24.3 | 24.6 | 8.7 | 29.1 | 21.8 | 0.5 | 14.4 | 17.7 | 0.1 |
| LOS | C | C | A | C | C | A | C | C | A | B | B | A |
| Approach Delay | | 18.7 | | | 17.2 | | | 21.4 | | | 16.4 | |
| Approach LOS | | B | | | B | | | C | | | B | |

Intersection Summary

Cycle Length: 91

Actuated Cycle Length: 56

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 18.3

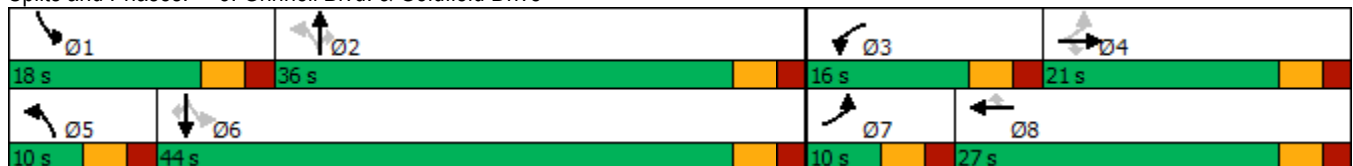
Intersection LOS: B

Intersection Capacity Utilization 59.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Grinnell Blvd. & Goldfield Drive



Timings

4: Grinnell Blvd. & Bradley Rd.

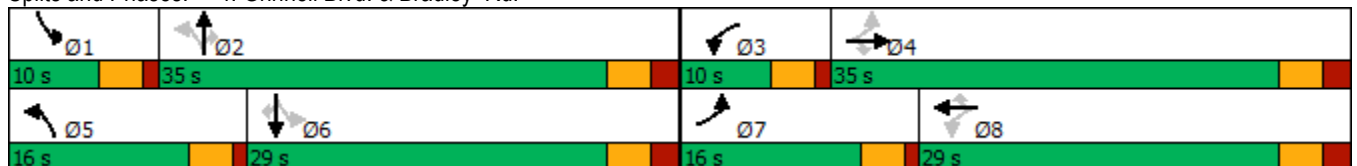
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 310 | 244 | 375 | 178 | 384 | 72 | 363 | 451 | 203 | 48 | 596 | 387 |
| Future Volume (vph) | 310 | 244 | 375 | 178 | 384 | 72 | 363 | 451 | 203 | 48 | 596 | 387 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 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 | 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 | 9.0 | 9.0 |
| Total Split (s) | 16.0 | 35.0 | 35.0 | 10.0 | 29.0 | 29.0 | 16.0 | 35.0 | 35.0 | 10.0 | 29.0 | 29.0 |
| Total Split (%) | 17.8% | 38.9% | 38.9% | 11.1% | 32.2% | 32.2% | 17.8% | 38.9% | 38.9% | 11.1% | 32.2% | 32.2% |
| 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) | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 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) | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 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 | None | None | None | None | None | None | Max | Max | None | Max | Max |
| Act Effct Green (s) | 31.5 | 20.5 | 20.5 | 21.5 | 14.5 | 14.5 | 41.1 | 34.2 | 34.2 | 30.9 | 24.0 | 24.0 |
| Actuated g/C Ratio | 0.39 | 0.25 | 0.25 | 0.27 | 0.18 | 0.18 | 0.51 | 0.42 | 0.42 | 0.38 | 0.30 | 0.30 |
| v/c Ratio | 0.83 | 0.29 | 0.62 | 0.54 | 0.64 | 0.16 | 0.88 | 0.32 | 0.27 | 0.13 | 0.59 | 0.58 |
| Control Delay | 38.3 | 24.8 | 10.2 | 25.1 | 35.3 | 0.8 | 39.2 | 17.8 | 3.9 | 12.4 | 27.4 | 9.4 |
| 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 | 38.3 | 24.8 | 10.2 | 25.1 | 35.3 | 0.8 | 39.2 | 17.8 | 3.9 | 12.4 | 27.4 | 9.4 |
| LOS | D | C | B | C | D | A | D | B | A | B | C | A |
| Approach Delay | | 23.4 | | | 28.5 | | | 22.7 | | | 19.9 | |
| Approach LOS | | C | | | C | | | C | | | B | |

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 80.6
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 23.1
 Intersection Capacity Utilization 79.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

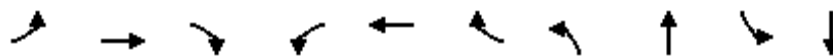
Splits and Phases: 4: Grinnell Blvd. & Bradley Rd.



Timings

5: Bradley Rd. & Goldfield Drive

2040 Total PM Peak Hour



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖ | ↑ | ↗ | ↖ | ↑ | ↗ | ↖ | ↗ | ↖ | ↗ |
| Traffic Volume (vph) | 120 | 209 | 139 | 5 | 291 | 49 | 267 | 182 | 33 | 214 |
| Future Volume (vph) | 120 | 209 | 139 | 5 | 291 | 49 | 267 | 182 | 33 | 214 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | pm+pt | NA |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 7 | 4 |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 4 | |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 7 | 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 |
| Minimum Split (s) | 10.0 | 21.0 | 21.0 | 10.0 | 21.0 | 21.0 | 10.0 | 21.0 | 10.0 | 21.0 |
| Total Split (s) | 15.0 | 33.0 | 33.0 | 10.0 | 28.0 | 28.0 | 15.0 | 37.0 | 10.0 | 32.0 |
| Total Split (%) | 16.7% | 36.7% | 36.7% | 11.1% | 31.1% | 31.1% | 16.7% | 41.1% | 11.1% | 35.6% |
| 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) | 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 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lead | Lag |
| Lead-Lag Optimize? | 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 |
| Act Effct Green (s) | 45.2 | 43.1 | 43.1 | 37.1 | 31.5 | 31.5 | 34.8 | 28.8 | 24.8 | 19.8 |
| Actuated g/C Ratio | 0.50 | 0.48 | 0.48 | 0.41 | 0.35 | 0.35 | 0.39 | 0.32 | 0.28 | 0.22 |
| v/c Ratio | 0.28 | 0.25 | 0.18 | 0.01 | 0.47 | 0.08 | 0.86 | 0.34 | 0.10 | 0.75 |
| Control Delay | 15.3 | 17.3 | 4.2 | 14.4 | 27.8 | 0.2 | 45.8 | 25.0 | 16.4 | 42.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.3 | 17.3 | 4.2 | 14.4 | 27.8 | 0.2 | 45.8 | 25.0 | 16.4 | 42.1 |
| LOS | B | B | A | B | C | A | D | C | B | D |
| Approach Delay | | 12.8 | | | 23.7 | | | 37.2 | | 39.4 |
| Approach LOS | | B | | | C | | | D | | D |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 27.6

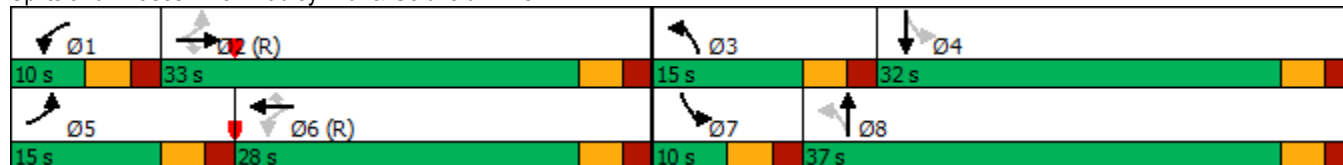
Intersection LOS: C

Intersection Capacity Utilization 68.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Bradley Rd. & Goldfield Drive



HCM 6th TWSC
22: Grinnell Blvd. & Three-Quarter Site Access

2040 Total PM Peak Hour

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.1 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | ↗ | | | ↗ | | ↕ | ↗ | ↘ | ↕ | ↗ |
| Traffic Vol, veh/h | 0 | 0 | 243 | 0 | 0 | 227 | 0 | 647 | 127 | 244 | 894 | 60 |
| Future Vol, veh/h | 0 | 0 | 243 | 0 | 0 | 227 | 0 | 647 | 127 | 244 | 894 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | - | - | 0 | - | - | 200 | 455 | - | 200 |
| 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 | 0 | 256 | 0 | 0 | 239 | 0 | 681 | 134 | 257 | 941 | 63 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | Major2 | | | | | |
|----------------------|--------|---|--------|---|--------|------|--------|---|---|------|---|---|
| Conflicting Flow All | - | - | 471 | - | - | 341 | - | 0 | 0 | 815 | 0 | 0 |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy | - | - | 6.94 | - | - | 6.94 | - | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | 3.32 | - | - | 3.32 | - | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 0 | 0 | 539 | 0 | 0 | 655 | 0 | - | - | 808 | - | - |
| Stage 1 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Stage 2 | 0 | 0 | - | 0 | 0 | - | 0 | - | - | - | - | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 539 | - | - | 655 | - | - | - | 808 | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | SB | |
|----------------------|------|--|------|--|----|--|-----|--|
| HCM Control Delay, s | 17.6 | | 13.6 | | 0 | | 2.3 | |
| HCM LOS | C | | B | | | | | |

| Minor Lane/Major Mvmt | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|-----------------------|-----|-----|-------|-------|-------|-----|-----|
| Capacity (veh/h) | - | - | 539 | 655 | 808 | - | - |
| HCM Lane V/C Ratio | - | - | 0.475 | 0.365 | 0.318 | - | - |
| HCM Control Delay (s) | - | - | 17.6 | 13.6 | 11.5 | - | - |
| HCM Lane LOS | - | - | C | B | B | - | - |
| HCM 95th %tile Q(veh) | - | - | 2.5 | 1.7 | 1.4 | - | - |

Timings

37: Powers & Bradley #2

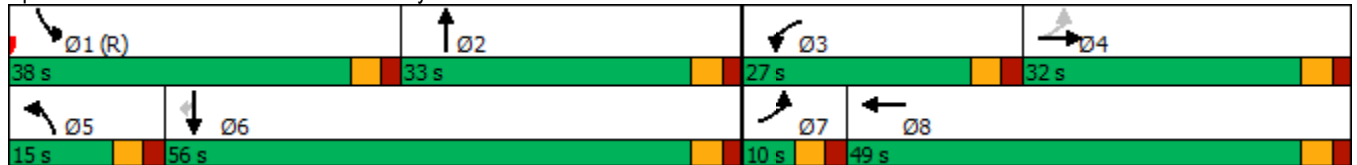
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 71 | 411 | 210 | 552 | 439 | 749 | 175 | 820 | 501 | 700 | 1700 | 110 |
| Future Volume (vph) | 71 | 411 | 210 | 552 | 439 | 749 | 175 | 820 | 501 | 700 | 1700 | 110 |
| Turn Type | pm+pt | NA | Free | Prot | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | | | Free | | | Free | | | 6 |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 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 |
| Minimum Split (s) | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | | 9.0 | 9.0 | 9.0 |
| Total Split (s) | 10.0 | 32.0 | | 27.0 | 49.0 | | 15.0 | 33.0 | | 38.0 | 56.0 | 56.0 |
| Total Split (%) | 7.7% | 24.6% | | 20.8% | 37.7% | | 11.5% | 25.4% | | 29.2% | 43.1% | 43.1% |
| Yellow Time (s) | 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 |
| Lost Time Adjust (s) | 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 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | Lead | Lag | | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes | Yes |
| Recall Mode | None | None | | None | None | | None | Max | | C-Max | Max | Max |
| Act Effct Green (s) | 26.3 | 21.3 | 130.0 | 22.0 | 40.3 | 130.0 | 11.1 | 28.0 | 130.0 | 38.7 | 55.7 | 55.7 |
| Actuated g/C Ratio | 0.20 | 0.16 | 1.00 | 0.17 | 0.31 | 1.00 | 0.09 | 0.22 | 1.00 | 0.30 | 0.43 | 0.43 |
| v/c Ratio | 0.35 | 0.75 | 0.14 | 0.98 | 0.41 | 0.49 | 0.62 | 0.77 | 0.33 | 0.71 | 0.81 | 0.15 |
| Control Delay | 33.4 | 60.0 | 0.2 | 70.0 | 36.4 | 3.7 | 66.9 | 53.5 | 0.5 | 45.8 | 36.8 | 2.3 |
| 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 | 33.4 | 60.0 | 0.2 | 70.0 | 36.4 | 3.7 | 66.9 | 53.5 | 0.5 | 45.8 | 36.8 | 2.3 |
| LOS | C | E | A | E | D | A | E | D | A | D | D | A |
| Approach Delay | | 39.1 | | | 33.0 | | | 37.4 | | | 37.8 | |
| 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: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 36.5
 Intersection LOS: D
 Intersection Capacity Utilization 81.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 37: Powers & Bradley #2



Timings

39: Marksheffel & Bradley #1

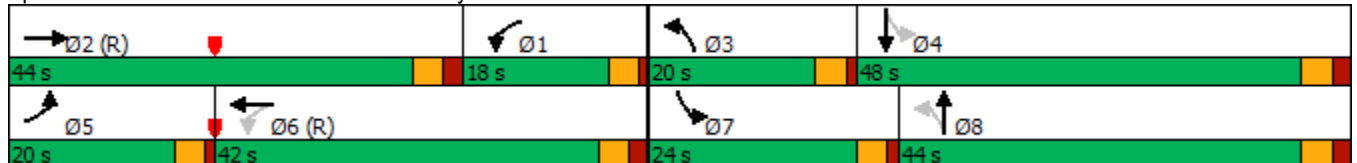
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 651 | 702 | 353 | 195 | 652 | 215 | 228 | 500 | 100 | 300 | 650 | 501 |
| Future Volume (vph) | 651 | 702 | 353 | 195 | 652 | 215 | 228 | 500 | 100 | 300 | 650 | 501 |
| 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) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Minimum Split (s) | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | | 9.0 | 10.0 | |
| Total Split (s) | 20.0 | 44.0 | | 18.0 | 42.0 | | 20.0 | 44.0 | | 24.0 | 48.0 | |
| Total Split (%) | 15.4% | 33.8% | | 13.8% | 32.3% | | 15.4% | 33.8% | | 18.5% | 36.9% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 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) | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | | 4.0 | 5.0 | |
| Lead/Lag | Lead | Lead | | Lag | 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 | None | | None | None | |
| Act Effct Green (s) | 29.3 | 52.3 | 130.0 | 38.0 | 37.0 | 130.0 | 43.0 | 26.7 | 130.0 | 50.4 | 30.4 | 130.0 |
| Actuated g/C Ratio | 0.23 | 0.40 | 1.00 | 0.29 | 0.28 | 1.00 | 0.33 | 0.21 | 1.00 | 0.39 | 0.23 | 1.00 |
| v/c Ratio | 0.86 | 0.35 | 0.23 | 0.63 | 0.46 | 0.14 | 0.84 | 0.70 | 0.06 | 0.87 | 0.80 | 0.32 |
| Control Delay | 56.9 | 17.6 | 0.3 | 54.6 | 39.5 | 0.2 | 56.1 | 53.1 | 0.1 | 53.1 | 54.7 | 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 | 56.9 | 17.6 | 0.3 | 54.6 | 39.5 | 0.2 | 56.1 | 53.1 | 0.1 | 53.1 | 54.7 | 0.5 |
| LOS | E | B | A | D | D | A | E | D | A | D | D | A |
| Approach Delay | | 29.0 | | | 34.3 | | | 47.5 | | | 35.7 | |
| Approach LOS | | C | | | C | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 100 (77%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 35.1
 Intersection LOS: D
 Intersection Capacity Utilization 76.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 39: Marksheffel & Bradley #1



Timings

41: Waterview Signal & Bradley #2

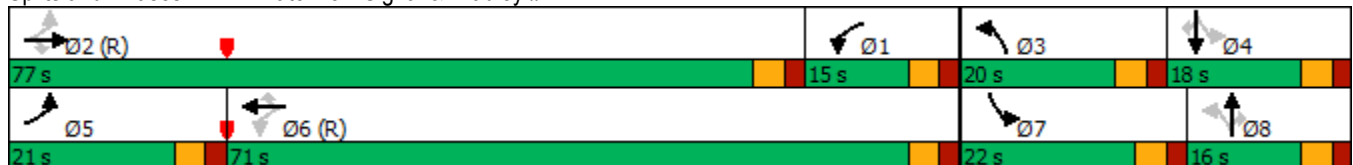
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 352 | 849 | 411 | 304 | 1124 | 49 | 359 | 19 | 248 | 312 | 20 | 256 |
| Future Volume (vph) | 352 | 849 | 411 | 304 | 1124 | 49 | 359 | 19 | 248 | 312 | 20 | 256 |
| Turn Type | pm+pt | 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 | | 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) | 21.0 | 77.0 | 77.0 | 15.0 | 71.0 | 71.0 | 20.0 | 16.0 | 16.0 | 22.0 | 18.0 | 18.0 |
| Total Split (%) | 16.2% | 59.2% | 59.2% | 11.5% | 54.6% | 54.6% | 15.4% | 12.3% | 12.3% | 16.9% | 13.8% | 13.8% |
| 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 | 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) | 75.8 | 75.8 | 75.8 | 66.0 | 66.0 | 66.0 | 23.6 | 8.8 | 8.8 | 24.9 | 9.5 | 9.5 |
| Actuated g/C Ratio | 0.58 | 0.58 | 0.58 | 0.51 | 0.51 | 0.51 | 0.18 | 0.07 | 0.07 | 0.19 | 0.07 | 0.07 |
| v/c Ratio | 0.97 | 0.30 | 0.39 | 0.84 | 0.46 | 0.06 | 0.66 | 0.16 | 0.80 | 0.56 | 0.16 | 0.82 |
| Control Delay | 57.3 | 14.3 | 5.3 | 53.8 | 18.9 | 1.5 | 49.8 | 58.9 | 29.1 | 46.6 | 57.1 | 30.9 |
| 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 | 57.3 | 14.3 | 5.3 | 53.8 | 18.9 | 1.5 | 49.8 | 58.9 | 29.1 | 46.6 | 57.1 | 30.9 |
| LOS | E | B | A | D | B | A | D | E | C | D | E | C |
| Approach Delay | | 21.4 | | | 25.5 | | | 41.9 | | | 40.1 | |
| Approach LOS | | C | | | C | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 39 (30%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 28.3
 Intersection LOS: C
 Intersection Capacity Utilization 70.6%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 41: Waterview Signal & Bradley #2



| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Int Delay, s/veh | 0.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↑↑↑ | | | ↑↑↑ | | | | | ↑ | | | ↑ |
| Traffic Vol, veh/h | 0 | 1341 | 67 | 0 | 1251 | 241 | 0 | 0 | 26 | 0 | 0 | 226 |
| Future Vol, veh/h | 0 | 1341 | 67 | 0 | 1251 | 241 | 0 | 0 | 26 | 0 | 0 | 226 |
| 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 | Yield | Yield | Yield |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Yield |
| Storage Length | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 16983 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 95 | 98 | 95 | 95 | 98 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 1368 | 71 | 0 | 1277 | 254 | 0 | 0 | 27 | 0 | 0 | 238 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|----------------------|--------|---|--------|---|--------|------|
| Conflicting Flow All | - | 0 | 0 | - | - | 0 |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | - | - | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | 3.92 |
| Pot Cap-1 Maneuver | 0 | - | - | 0 | - | 0 |
| Stage 1 | 0 | - | - | 0 | - | 0 |
| Stage 2 | 0 | - | - | 0 | - | 0 |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | 0 |
| Mov Cap-2 Maneuver | - | - | - | - | - | 0 |
| Stage 1 | - | - | - | - | - | 0 |
| Stage 2 | - | - | - | - | - | 0 |

| Approach | EB | WB | NB |
|----------------------|----|----|------|
| HCM Control Delay, s | 0 | 0 | 17.4 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT | WBR |
|-----------------------|-------|-----|-----|-----|-----|
| Capacity (veh/h) | 318 | - | - | - | - |
| HCM Lane V/C Ratio | 0.086 | - | - | - | - |
| HCM Control Delay (s) | 17.4 | - | - | - | - |
| HCM Lane LOS | C | - | - | - | - |
| HCM 95th %tile Q(veh) | 0.3 | - | - | - | - |

HCM 6th Roundabout
 45: Waterview East N/S & Retail Access/Residential Access

2040 Total PM Peak Hour

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 10.5 | | | |
| Intersection LOS | B | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 491 | 42 | 267 | 799 |
| Demand Flow Rate, veh/h | 501 | 43 | 272 | 815 |
| Vehicles Circulating, veh/h | 427 | 705 | 487 | 55 |
| Vehicles Exiting, veh/h | 443 | 54 | 440 | 693 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 12.1 | 6.2 | 8.1 | 10.5 |
| Approach LOS | B | A | A | B |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 501 | 43 | 272 | 815 |
| Cap Entry Lane, veh/h | 893 | 672 | 840 | 1305 |
| Entry HV Adj Factor | 0.980 | 0.976 | 0.981 | 0.980 |
| Flow Entry, veh/h | 491 | 42 | 267 | 799 |
| Cap Entry, veh/h | 875 | 656 | 823 | 1278 |
| V/C Ratio | 0.561 | 0.064 | 0.324 | 0.625 |
| Control Delay, s/veh | 12.1 | 6.2 | 8.1 | 10.5 |
| LOS | B | A | A | B |
| 95th %tile Queue, veh | 4 | 0 | 1 | 5 |

Timings

52: Bradley Heights/Federal Trade Zone & Bradley #1

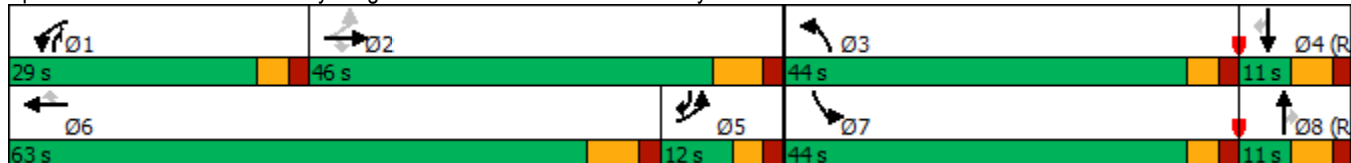
2040 Total PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 100 | 867 | 400 | 400 | 742 | 100 | 500 | 50 | 400 | 200 | 85 | 251 |
| Future Volume (vph) | 100 | 867 | 400 | 400 | 742 | 100 | 500 | 50 | 400 | 200 | 85 | 251 |
| Turn Type | pm+pt | NA | Perm | Prot | NA | Perm | Prot | NA | pm+ov | Prot | NA | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | | | 6 | | | 8 | | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 1 | 7 | 4 | 5 |
| 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 | 2.0 | 5.0 |
| Minimum Split (s) | 10.0 | 12.0 | 12.0 | 10.0 | 12.0 | 12.0 | 10.0 | 11.0 | 10.0 | 10.0 | 8.0 | 10.0 |
| Total Split (s) | 12.0 | 46.0 | 46.0 | 29.0 | 63.0 | 63.0 | 44.0 | 11.0 | 29.0 | 44.0 | 11.0 | 12.0 |
| Total Split (%) | 9.2% | 35.4% | 35.4% | 22.3% | 48.5% | 48.5% | 33.8% | 8.5% | 22.3% | 33.8% | 8.5% | 9.2% |
| Yellow Time (s) | 3.0 | 5.0 | 5.0 | 3.0 | 5.0 | 5.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 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 | 7.0 | 7.0 | 5.0 | 7.0 | 7.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | Lead | Lead | Lead | Lag | Lead | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | None | None | C-Max | None |
| Act Effct Green (s) | 34.9 | 32.9 | 32.9 | 21.2 | 27.9 | 27.9 | 25.4 | 39.5 | 66.7 | 13.4 | 27.5 | 54.7 |
| Actuated g/C Ratio | 0.27 | 0.25 | 0.25 | 0.16 | 0.21 | 0.21 | 0.20 | 0.30 | 0.51 | 0.10 | 0.21 | 0.42 |
| v/c Ratio | 0.25 | 0.71 | 0.59 | 0.75 | 0.72 | 0.24 | 0.79 | 0.09 | 0.45 | 0.60 | 0.23 | 0.36 |
| Control Delay | 20.7 | 25.1 | 5.1 | 47.9 | 40.1 | 2.7 | 58.3 | 38.1 | 10.3 | 62.5 | 49.6 | 9.3 |
| 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 | 20.7 | 25.1 | 5.1 | 47.9 | 40.1 | 2.7 | 58.3 | 38.1 | 10.3 | 62.5 | 49.6 | 9.3 |
| LOS | C | C | A | D | D | A | E | D | B | E | D | A |
| Approach Delay | | 18.9 | | | 39.6 | | | 37.0 | | | 35.6 | |
| Approach LOS | | B | | | D | | | D | | | D | |

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 4:SBT and 8:NBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 31.6
 Intersection Capacity Utilization 64.1%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 52: Bradley Heights/Federal Trade Zone & Bradley #1



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑↑ | ↑↑ | | | ↗ |
| Traffic Vol, veh/h | 27 | 468 | 618 | 10 | 0 | 16 |
| Future Vol, veh/h | 27 | 468 | 618 | 10 | 0 | 16 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 29 | 509 | 672 | 11 | 0 | 17 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 683 | 0 | 0 |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |
| Critical Hdwy | 4.14 | - | 6.94 |
| Critical Hdwy Stg 1 | - | - | - |
| Critical Hdwy Stg 2 | - | - | - |
| Follow-up Hdwy | 2.22 | - | 3.32 |
| Pot Cap-1 Maneuver | 906 | - | 0 |
| Stage 1 | - | - | 0 |
| Stage 2 | - | - | 0 |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 906 | - | 654 |
| Mov Cap-2 Maneuver | - | - | - |
| Stage 1 | - | - | - |
| Stage 2 | - | - | - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.5 | 0 | 10.7 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 906 | - | - | - | 654 |
| HCM Lane V/C Ratio | 0.032 | - | - | - | 0.027 |
| HCM Control Delay (s) | 9.1 | - | - | - | 10.7 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

Intersection: 2: Grinnell & Powers

| Movement | EB | EB | EB | EB | WB | WB | WB | WB | WB | NB | NB | |
|-----------------------|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|---|
| Directions Served | T | T | T | R | L | L | T | T | T | L | L | |
| Maximum Queue (ft) | 313 | 284 | 220 | 77 | 128 | 176 | 426 | 429 | 412 | 288 | 307 | |
| Average Queue (ft) | 223 | 190 | 123 | 13 | 67 | 74 | 260 | 266 | 242 | 180 | 200 | |
| 95th Queue (ft) | 298 | 267 | 206 | 47 | 114 | 131 | 374 | 380 | 370 | 257 | 276 | |
| Link Distance (ft) | 411 | 411 | 411 | | | | 772 | 772 | 772 | | 880 | |
| Upstream Blk Time (%) | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |
| Storage Bay Dist (ft) | 450 | | | | 475 | 475 | | | | | 315 | |
| Storage Blk Time (%) | | | | | | | 0 | | | | | 0 |
| Queuing Penalty (veh) | | | | | | | 0 | | | | | 0 |

Intersection: 22: Grinnell Blvd. & Three-Quarter Site Access

| Movement | EB | WB | NB | NB | SB |
|-----------------------|-----|-----|-----|-----|----|
| Directions Served | R | R | T | R | L |
| Maximum Queue (ft) | 88 | 63 | 4 | 20 | 97 |
| Average Queue (ft) | 46 | 25 | 0 | 1 | 39 |
| 95th Queue (ft) | 77 | 45 | 3 | 9 | 76 |
| Link Distance (ft) | 379 | 406 | 643 | | |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (ft) | | | 200 | 455 | |
| Storage Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |

Zone Summary

| |
|------------------------------|
| Zone wide Queuing Penalty: 1 |
|------------------------------|

Intersection: 2: Grinnell & Powers

| Movement | EB | EB | EB | EB | B12 | B12 | B12 | WB | WB | WB | WB | WB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Directions Served | T | T | T | R | T | T | T | L | L | T | T | T |
| Maximum Queue (ft) | 522 | 524 | 520 | 411 | 625 | 630 | 639 | 318 | 318 | 307 | 261 | 210 |
| Average Queue (ft) | 487 | 480 | 465 | 377 | 471 | 435 | 425 | 176 | 175 | 146 | 147 | 111 |
| 95th Queue (ft) | 525 | 530 | 553 | 546 | 769 | 762 | 825 | 313 | 307 | 239 | 222 | 192 |
| Link Distance (ft) | 411 | 411 | 411 | | 580 | 580 | 580 | | | 772 | 772 | 772 |
| Upstream Blk Time (%) | 49 | 41 | 22 | 4 | 14 | 8 | 26 | | | | | |
| Queuing Penalty (veh) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| Storage Bay Dist (ft) | | | | 450 | | | | 475 | 475 | | | |
| Storage Blk Time (%) | | | 22 | 4 | | | | | | 0 | | |
| Queuing Penalty (veh) | | | 214 | 34 | | | | | | 0 | | |

Intersection: 2: Grinnell & Powers

| Movement | NB | NB | NB |
|-----------------------|-----|-----|-----|
| Directions Served | L | L | R |
| Maximum Queue (ft) | 283 | 288 | 231 |
| Average Queue (ft) | 180 | 195 | 41 |
| 95th Queue (ft) | 263 | 278 | 157 |
| Link Distance (ft) | | 880 | 880 |
| Upstream Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |
| Storage Bay Dist (ft) | 315 | | |
| Storage Blk Time (%) | 0 | 0 | |
| Queuing Penalty (veh) | 0 | 0 | |

Intersection: 22: Grinnell Blvd. & Three-Quarter Site Access

| Movement | EB | WB | NB | SB |
|-----------------------|-----|-----|-----|-----|
| Directions Served | R | R | R | L |
| Maximum Queue (ft) | 156 | 136 | 32 | 128 |
| Average Queue (ft) | 64 | 49 | 3 | 59 |
| 95th Queue (ft) | 113 | 94 | 18 | 108 |
| Link Distance (ft) | 379 | 406 | | |
| Upstream Blk Time (%) | | | | |
| Queuing Penalty (veh) | | | | |
| Storage Bay Dist (ft) | | | 200 | 455 |
| Storage Blk Time (%) | | | | |
| Queuing Penalty (veh) | | | | |

Zone Summary

Zone wide Queuing Penalty: 248