Seritage Overlake Plaza Master Plan Traffic Study

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EXECUTIVE SUMMARY

The purpose of this traffic study is to analyze traffic operations with the proposed Seritage Overlake Plaza Master Plan to determine what roadway improvements are needed to support project access and to mitigate any project impacts. This is an update to the analysis included in our previous traffic study documents dated September 18, 2017 and October 27, 2017, and includes revisions based on comments received from the City of Redmond dated December 12, 2017.

Some of the roadway network assumptions used in this analysis are based on the results of our 2017 update to the analysis included in the City of Redmond's *Overlake Village South Infrastructure Planning Report: Final Draft* (August 2016), which analyzed future year 2030 conditions in the study area. Our preliminary analysis of 2030 conditions was included in our September 18, 2017 and October 27, 2017 traffic studies. It is our understanding that the City of Redmond plans to update their analysis of year 2030 conditions in Overlake Village South in the near future. Therefore, we have removed our preliminary year 2030 analysis from this report.

The proposed Seritage Overlake Plaza Master Plan is located within the Overlake Village (3) zoning district in Redmond. The owner of the property intends to submit for a Master Plan permit and enter into a Development Agreement with the City of Redmond in an effort to obtain long-term certainty of development rights and to adequately plan for the infrastructure needed to support the land uses envisioned by the City of Redmond in the Overlake Neighborhood Plan (ONP). This study will be used to support the traffic-related items that will be incorporated into the Master Plan and Development Agreement.

Master Plan Project Proposal. The proposed Seritage Overlake Plaza site is generally located on the southeast corner of 148th Avenue NE and NE 24th Street. Note that the current property boundaries for Seritage are being revised as a land swap with an adjacent property owner is currently in progress. The property boundaries for Seritage as shown in this report are intended to depict the final boundaries upon completion of the land swap.

The proposed land uses in the current Master Plan by phase include the following:

Phase 1	Phase 2	Phase 3	Full Buildout
• 500 apartments • 34,000 sf general retail • 23,000 sf grocery store • 16,800 sf restaurant	• 25,300 sf general retail • 39,100 sf restaurant • 184,300 sf office • 210 room hotel	• 40,800 sf general retail • 6,800 sf restaurant • 82,500 sf office	• 500 apartments • 100,100 sf general retail • 23,000 sf grocery store • 62,700 sf restaurant • 266,800 sf office • 210 room hotel

As part of the redevelopment, an existing Sears store, a strip retail building on the northeast corner of the site, and a Red Robin restaurant on the northwest corner of the site would be demolished.

Vehicular access to/from the future site at full buildout would be provided via the construction of a portion of the City's future 2030 road network including NE Alhazen Street, Lumiere Ave NE, and the west half of Da Vinci Ave NE. These roadways will connect the Master Plan site to the existing roadway network including 148th Ave NE, NE 24th Street, and NE 20th Street.

Exact timing of the development is unknown but is expected to occur in phases depending on market demands. For the purposes of the Master Plan, three phases have been identified. It is anticipated that the northeast corner of the site (Parcel A) will be the primary component of the first phase, along with redevelopment of the building on the south end of Parcel G. All existing uses on the site except for the Red Robin restaurant would be removed with Phase 1.

For Phase 1, it is assumed that the project would construct NE Alhazen St, Lumiere Ave (between Alhazen and NE 24th), and the west half of Da Vinci Ave (between Alhazen and NE 24th). Vehicular access to Parcel A for Phase 1 is proposed to be provided at a driveway on NE 24th Street and a driveway on Da Vinci Ave NE. Access to the south end of Parcel G is assumed to be provided via an existing driveway on NE 20th Street (and existing internal parking lot connections to the north and west).

For this traffic study, 2 build scenarios were analyzed: Phase 1 and Full Buildout (Phases 1, 2, and 3). The timing of infrastructure and mitigation as outlined in the Master Plan and Development agreement are based on the results of the analysis of these scenarios.

As discussed with the City, a horizon year of 2023 was used to evaluate the impacts of the Master Plan (Full buildout and Phase 1).

Trip Generation. Full buildout of the proposed Master Plan is estimated to generate 13,000 net new weekday daily trips, with 1,079 net new trips occurring during the weekday AM peak hour (638 entering, 441 exiting), and 914 net new trips occurring during the weekday PM peak hour (410 entering, 504 exiting). Phase 1 of the proposed Master Plan is estimated to generate 3,499 net new weekday daily trips, with 289 net new trips occurring during the weekday AM peak hour (87 entering, 202 exiting), and 214 net new trips occurring during the weekday PM peak hour (144 entering, 70 exiting).

Year 2023 Traffic Operations Analysis. A year 2023 LOS and queue analysis was conducted at 17 study intersections and at the proposed Seritage site access driveways to determine what roadway improvements are needed to support project access and to mitigate any project impacts. The 2023 analysis was conducted for the following scenarios:

1. 2023 Baseline (Without Project)
2. 2023 With Project - Full Buildout
3. 2023 With Project - Full Buildout, with a signal at Lumiere/24th
4. 2023 With Project - Phase 1

The results of the 2023 analysis were discussed with the City of Redmond and used to confirm the project's participation in the construction of the ultimate 2030 roadway network and to confirm the on-site improvements and off-site mitigation requirements that are described below.

City of Redmond Mitigation

Note: More detailed descriptions and mitigation requirements will be included in the Development Agreement. If the Development Agreement and Traffic Study conflict, the Development Agreement will govern.

On-site and off-site improvements and mitigation are shown on Figures 1 and 2 and are described below.

On-Site Improvements (Roads/Access/Frontage)

Note: Specific roadway sections including travel lanes, bicycle facilities, on-street parking, pedestrian facilities, and landscaping will be included in the Master Plan and/or Development Agreement.

Phase 1 On-Site Improvements

- Construction of NE Alhazen Street (including right-of-way dedication, pedestrian facilities, and landscaping) to a 3-lane roadway between 148th Ave NE and Da Vinci Avenue. Interim connections to existing uses to remain (Regency parcel, Red Robin restaurant, parking lot south of Parcel A) would be provided with Phase 1.
- Construction of Lumiere Ave NE (including right-of-way dedication, pedestrian facilities, and landscaping) between NE Alhazen Street and NE 24th Street. Lumiere would taper from a 2-

lane roadway to a 3-lane roadway approaching NE 24th St. South of Alhazen, Lumiere would consist of a temporary connection to the existing parking lot south of Parcel A for Phase 1.

- Construction of an interim half-street configuration of Da Vinci Ave between NE Alhazen St and NE 24th Street (including right-of-way dedication, pedestrian facilities, and landscaping). The interim section will allow for two-way operations with two travel lanes. South of Alhazen, Da Vinci would consist of a temporary connection to the existing parking lot south of Parcel A for Phase 1. It should be noted that the alignment of Da Vinci Ave in this section will be analyzed further by the City of Redmond and may shift to the east.
- Widening on NE 24th Street for an eastbound right-turn lane between the existing Red Robin driveway and Lumiere Ave.
- Widening on NE 24th Street for an eastbound right-turn pocket at the Parcel A driveway on NE 24th Street.
- Right-of-Way dedication on NE 24th Street between Lumiere Ave and Da Vinci Ave (Parcel A frontage) to accommodate future widening and improvements planned by the City of Redmond.
- Frontage improvements on NE 24th Street between Lumiere Ave and Da Vinci Ave (Parcel A frontage), including constructing curbs and frontage improvements at their ultimate location.
- Frontage improvements on NE 20th Street along the Parcel G frontage.
- Future signalization is planned by the City at Lumiere Ave NE/NE 24th Street to accommodate a future pedestrian crossing on NE 24th Street. For Phase 1, Seritage will construct a stop-controlled intersection at Lumiere/24th (right-in, right-out). A signal is not required with Phase 1 of the Master Plan project; however, the intersection will be designed in a manner that will accommodate a future signal if/when warranted.
- Future signalization may be required at either Lumiere Ave NE/NE Alhazen St or at Da Vinci Ave NE/NE Alhazen St (if/when signal warrants are met). Seritage will construct an all-way stop-controlled intersection at Lumiere/Alhazen with Phase 1, and an eastbound stop-controlled intersection at Da Vinci/Alhazen with Phase 1. A signal(s) is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted.

<u>Full Buildout On-Site Improvements (Phases 1, 2 and 3)</u>

Note: Specific improvements required for each phase (1, 2, and 3) are included in the Master Plan and Development Agreement.

- Construction of NE Alhazen Street (including right-of-way dedication, pedestrian facilities, and landscaping) to a 3-lane roadway between 148th Ave NE and Da Vinci Avenue (with Phase 1).
- Construction of Lumiere Ave NE (including right-of-way dedication, pedestrian facilities, and landscaping) between NE 20th Street and NE 24th Street (with Phases 1 and 3). Lumiere would be a 2-lane roadway between NE 20th St and NE Alhazen Street. North of Alhazen St, Lumiere would taper from a 2-lane roadway to a 3-lane roadway approaching NE 24th St.
- Construction of an interim half-street configuration of Da Vinci Ave between NE 20th Street and NE 24th Street (including right-of-way dedication, pedestrian facilities, and landscaping, with Phases 1 and 3). The interim section will allow for two-way operations with two travel lanes. It should be noted that the alignment of Da Vinci Ave between NE Alhazen St and NE 24th Street will be analyzed further by the City of Redmond and may shift to the east.

- Construction of a shared street within a 40-foot right-of-way connecting the Regency property to NE Alhazen Street east of 148th Ave NE (with Phase 3).
- Widening on NE 24th Street for an eastbound right-turn lane between 148th Ave NE and Lumiere Ave (with Phases 1 and 2).
- Widening on NE 24th Street for an eastbound right-turn pocket at the Parcel A driveway on NE 24th Street (with Phase 1).
- Right-of-Way dedication on NE 24th Street to accommodate future widening and improvements planned by the City of Redmond (with Phases 1 and 2).
- Frontage improvements on NE 24th Street between 148th Ave NE and Da Vinci Ave including constructing curbs and frontage improvements at their ultimate locations (with Phases 1 and 2).
- Right-of-Way dedication on 148th Ave NE to accommodate future widening and improvements planned by the City of Redmond (with Phases 1, 2, and 3).
- Frontage improvements on 148th Ave NE between NE 24th Street and Seritage's south property line, including constructing curbs and frontage improvements at their ultimate locations (with Phases 1, 2, and 3).
- Frontage improvements on NE 20th Street between Lumiere Ave and Da Vinci Ave (with Phase 1, assuming development occurs on south end of Parcel G).
- Future signalization is planned by the City at Lumiere Ave NE/NE 24th Street to accommodate a future pedestrian crossing on NE 24th Street. Before constructing any development beyond Phase 1, Seritage will conduct a study to determine if estimated pedestrian volumes trigger the need for the signal.
- Future signalization may be required at either Lumiere Ave NE/NE Alhazen St or at Da Vinci Ave NE/NE Alhazen St (if/when signal warrants are met). Seritage will construct an all-way stop-controlled intersection at Lumiere/Alhazen, and an eastbound stop-controlled intersection at Da Vinci/Alhazen with Phase 1. A signal(s) is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted.
- Future signalization may be required at either Lumiere Ave NE/NE 20th Street or Da Vinci Ave NE/NE 20th St (if/when signal warrants are met). Seritage will construct stop-controlled intersections at both locations with Phase 3. A signal(s) is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted.

Off-Site Mitigation

Phase 1 Off-Site Mitigation

- 148th Ave NE/NE Alhazen Street: The City of Bellevue and City of Redmond have a planned improvement at this intersection that includes an additional northbound through lane. As mitigation, Seritage will widen 148th Ave NE to accommodate the additional northbound through lane by converting the northbound right-turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.

Full Buildout Off-Site Mitigation

- 148th Ave NE/NE 24th Street. The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. Seritage will dedicate right-of-way and set the ultimate curbs on 148th and NE 24th Street to accommodate these future improvements in Phase 2. Based on discussions with the City, no additional mitigation at this location will be required.
- 148th Ave NE/NE 20th Street: The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. The KCCLE DA includes mitigation at this intersection. Consistent with the KCCLE DA requirement, Seritage will construct a northbound right turn lane when the cumulative total net new trip generation reaches 335 net new AM peak hour trips (regardless of Phase), so long as KCCLE has not already constructed the improvement, construction of the northbound right turn lane is feasible, and the construction of the mitigation is required under the same terms that KCCLE would be required to implement this mitigation.
- 148th Ave NE/NE Alhazen Street: The City of Bellevue and City of Redmond have a planned improvement at this intersection that includes an additional northbound through lane. As mitigation, for Phase 1, Seritage will widen 148th Ave NE to accommodate the additional northbound through lane by converting the northbound right-turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.
- Lumiere Ave NE/NE 24th Street: For any development beyond Phase 1, Seritage will conduct observations and an analysis to determine if the southbound left-turn lane queue storage on 148th Ave NE at NE Alhazen Street will be exceeded. If the queue exceeds storage and if desired by the City, Seritage will stripe an interim westbound left turn lane on NE 24th Street at Lumiere Avenue while maintaining eastbound left turns to the Safeway property at the traffic signal at 151st Avenue NE. If needed, this improvement at Lumiere/24th will alleviate southbound left-turn queuing at 148th/Alhazen.

Concurrency

The need for concurrency mitigation will be evaluated according to the City's adopted standards at the time of permit applications for individual developments. No detailed concurrency evaluation is included in this study. Additional information may be found in the Development Agreement.

Impact Fees

Transportation impact fees will be evaluated according to the City's adopted impact fee rates at the time of building permit issuance. The calculations for impact fees will need to account for credits associated with transportation infrastructure being provided by this project. No detailed impact fee calculations are included in this study. Additional information may be found in the Development Agreement.

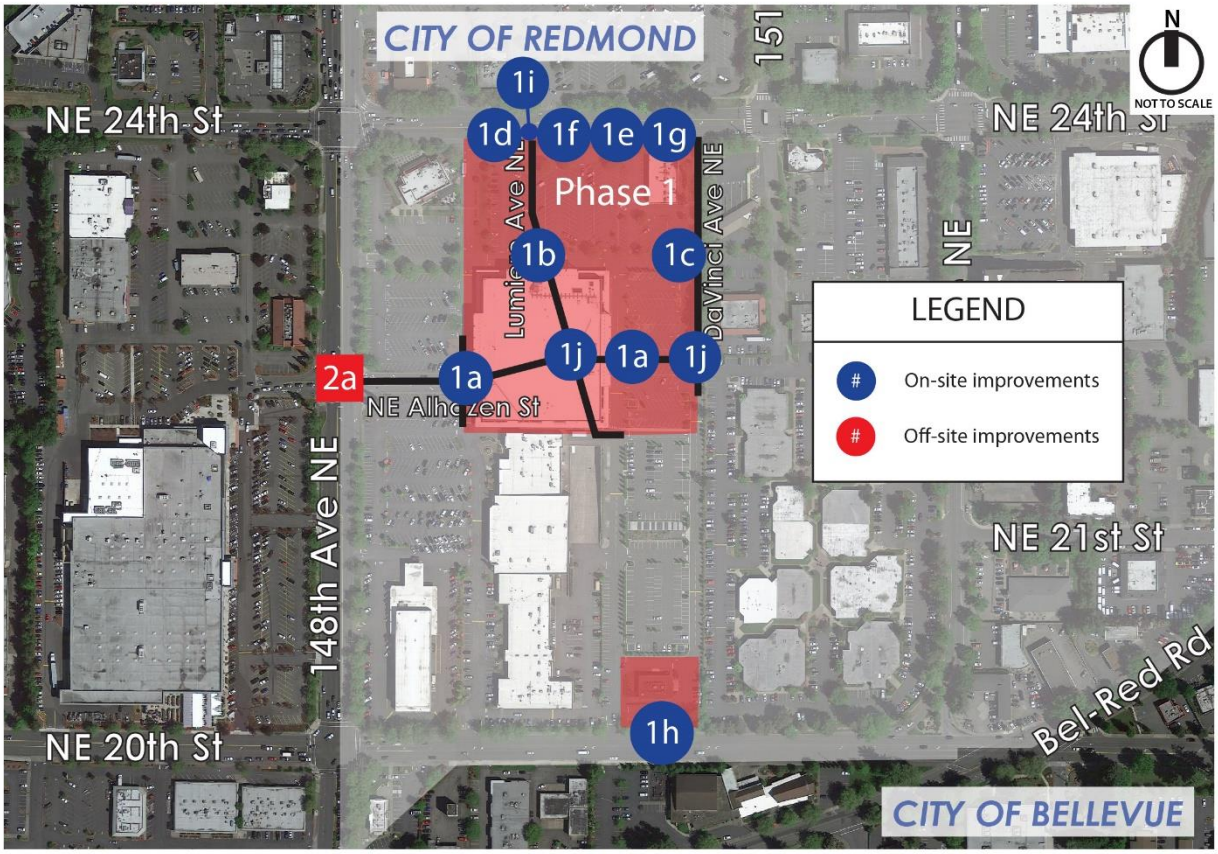
City of Bellevue Mitigation

Transportation impacts to the City of Bellevue from the buildout of the Overlake Neighborhood Plan (ONP) were disclosed in the *Overlake Neighborhood Plan Update and Improvement Project Final Supplemental Environmental Impact Statement (SEIS)* dated August 30, 2007 (we refer to this document as the *2007 ONP SEIS)*. Therefore, the impacts of the Seritage Master Plan (which is a subset of the land use contemplated by the ONP) on City of Bellevue facilities has already been addressed by the environmental document studying the impacts of the ONP—the 2007 ONP SEIS. The relationship of the Seritage Master Plan to the 2007 ONP SEIS is discussed in more detail in the

SEIS Addendum for the Seritage Master Plan project that is being submitted to the City of Redmond *(Addendum to the Overlake Neighborhood Plan Update and Improvement Project Final SEIS prepared for the Overlake Plaza Master Plan Project).* In addition to the vehicular traffic impacts that were analyzed and disclosed in the 2007 ONP SEIS and in the current SEIS Addendum, the City of Bellevue has requested documentation of school walk routes.

It should be noted that the Seritage project is a Master Plan application in the City of Redmond. The Master Plan entitlement does not allow individual buildings to be built; instead, individual buildings contemplated by the Master Plan are required to be individually permitted through the City's Site Plan Entitlement process. The Site Plan Entitlement process requires a determination of an appropriate SEPA process for each individual building. As a result, the City of Bellevue will also have the opportunity to weigh in at a more specific/project-level basis regarding traffic impacts to Bellevue.

A summary of impacts to City of Bellevue transportation facilities and documentation of potential school walk routes are included in Appendix J.



1a Alhazen: Construct 3-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) from 148th to Da Vinci with interim connections to existing uses to remain.

1b Lumiere: Construct 2-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) tapering to 3 lanes approaching 24th with connection to parking lot south of Alhazen.

1c DaVinci: Construct an interim 2-lane, 2-way half-street roadway (including ROW dedication, pedestrian facilities, and landscaping) from 24th to Alhazen with connection to existing parking south of Alhazen.

1d Widening along 24th to include eastbound right-turn lane to Lumiere.

1e Widening along 24th to include eastbound right-turn pocket at Parcel A driveway.

1f ROW dedication along 24th between Lumiere and Da Vinci to accommodate City's future imporvements on 24th.

1g Frontage improvements along 24th between Lumiere and Da Vinci.

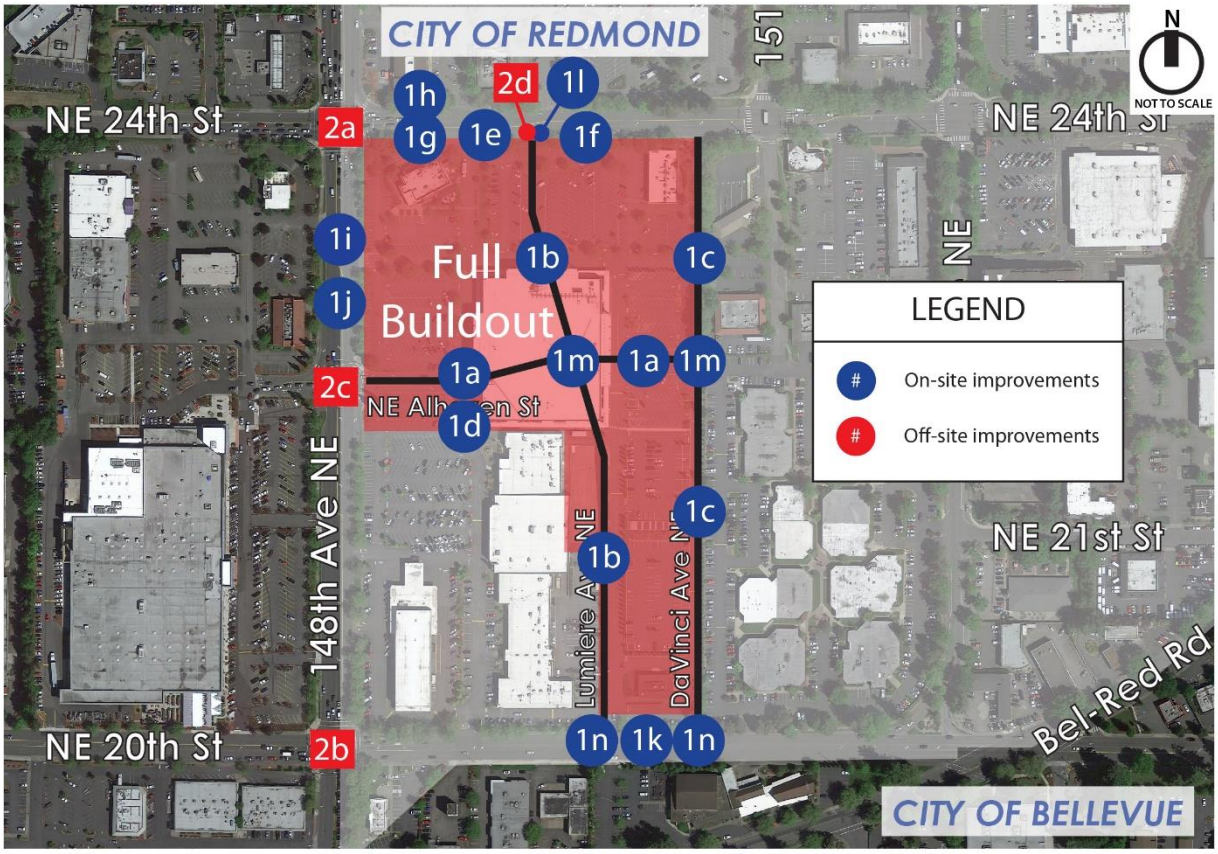
1h Frontage improvements along 20th (extent of Parcel G frontage).

1i Construct a stop-controlled intersection at Lumiere/24th and design to accommodate potential future signal.

1j Design intersections of Lumiere/Alhazen and Da Vinci/Alhazen to accommodate future signal to be built by others if/when warranted.

2a 148th/Alhazen: Widen 148th to accommodate City's planned additional NB through lane by converting NB right-turn lane to shared through-right lane.

Figure 1: Proposed Master Plan Phase 1 Improvements



- **1a** Alhazen: Construct 3-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) from 148th to Da Vinci.
- **1b** Lumiere: Construct 2-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) from 20th to Alhazen, and taper from a 2-lane to 3-lane roadway approaching NE 24th Street.
- **1c** Da Vinci: Construct interim half-street 2-lane, 2-way roadway (including ROW dedication, pedestrian facilities, and landscaping) from 24th to 20th.
- **1d** Construct shared street connecting Regency property to Alhazen east of 148th.
- **1e** Widen along 24th for an EB right-turn lane to Lumiere.
- **1f** Widen along 24th for an EB right-turn pocket at Parcel A driveway.
- **1g** ROW dedication along 24th between 148th and Da Vinci to accommodate City's future planned improvements.
- **1h** Frontage improvements along 24th between 148th and Da Vinci.
- **1i** ROW dedication along 148th between 24th and Seritage's south property line (just south of Alhazen) to accommodate City's future planned improvements.
- **1j** Frontage improvements along 148th between 24th and Seritage's south property line.
- **1k** Frontage improvements along 20th between Lumiere and Da Vinci.
- **1l** Conduct study to determine if pedestrian volumes trigger need for signalized pedestrian crossing at Lumiere/24th.
- **1m** Design intersections of Lumiere/Alhazen and Da Vinci/Alhazen to accommodate future signal to be built by others if/when warranted.
- **1n** Design intersections of Lumiere/20th and Da Vinci/20th to accommodate future signal to be built by others if/when warranted.
- **2a** 148th/24th: Project will dedicate ROW and set the ultimate curbs for City's future NB through lane and EB/WB dual left-turn lanes.
- **2b** 148th/20th: Construct a NB right-turn lane under the same terms as the KCCLE Development Agreement.
- **2c** 148th/Alhazen: Widen 148th to accommodate City's planned additional NB through lane by converting NB right-turn lane to shared through-right lane.
- **2d** Lumiere/24th: Monitor SB left-turn lane queues at 148th/Alhazen and if the queue exceeds storage and if desired by City, restripe/rechannelize WB left-turn lane on 24th at Lumiere.

Note: See Master Plan and Development Agreement for specific improvements by Phase

Figure 2: Proposed Master Plan Full Buildout Improvements (Phases 1, 2, and 3)

INTRODUCTION

The purpose of this traffic study is to analyze traffic operations with the proposed Seritage Overlake Plaza Master Plan to determine what roadway improvements are needed to support project access and to mitigate any project impacts. This is an update to the analysis included in our previous traffic study documents dated September 18, 2017 and October 27, 2017, and includes revisions based on comments received from the City of Redmond dated December 12, 2017.

Some of the roadway network assumptions used in this analysis are based on the results of our 2017 update to the analysis included in the City of Redmond's *Overlake Village South Infrastructure Planning Report: Final Draft* (August 2016), which analyzed future year 2030 conditions in the study area. Our preliminary analysis of 2030 conditions was included in our September 18, 2017 and October 27, 2017 traffic studies. It is our understanding that the City of Redmond plans to update their analysis of year 2030 conditions in Overlake Village South in the near future. Therefore, we have removed our preliminary year 2030 analysis from this report.

The proposed Seritage Overlake Plaza Master Plan is located within the Overlake Village (3) zoning district in Redmond. The owner of the property intends to submit for a Master Plan permit and enter into a Development Agreement with the City of Redmond in an effort to obtain long-term certainty of development rights and to adequately plan for the infrastructure needed to support the land uses envisioned by the City of Redmond in the Overlake Neighborhood Plan (ONP). This study will be used to support the traffic-related items that will be incorporated into the Master Plan and Development Agreement.

Seritage Master Plan Project Description

The proposed Seritage Overlake Plaza site is generally located on the southeast corner of 148th Avenue NE and NE 24th Street (see Figure 3). Note that the current property boundaries for Seritage are being revised as a land swap with an adjacent property owner is currently in progress. The property boundaries for Seritage as shown in this report are intended to depict the final boundaries upon completion of the land swap.

The proposed land uses in the current Master Plan (by phase) include the following:

Phase 1	Phase 2	Phase 3	Full Buildout
• 500 apartments • 34,000 sf general retail • 23,000 sf grocery store • 16,800 sf restaurant	• 25,300 sf general retail • 39,100 sf restaurant • 184,300 sf office • 210 room hotel	• 40,800 sf general retail • 6,800 sf restaurant • 82,500 sf office	• 500 apartments • 100,100 sf general retail • 23,000 sf grocery store • 62,700 sf restaurant • 266,800 sf office • 210 room hotel

As part of the redevelopment, an existing Sears store, a strip retail building on the northeast corner of the site, and a Red Robin restaurant on the northwest corner of the site would be demolished.

Vehicular access to/from the future site at full buildout would be provided via the construction of a portion of the City's future 2030 road network including NE Alhazen Street, Lumiere Ave NE, and the west half of Da Vinci Ave NE. These roadways will connect the Master Plan site to the existing roadway network including 148th Ave NE, NE 24th Street, and NE 20th Street.

Exact timing of the development is unknown but is expected to occur in phases depending on market demands. For the purposes of the Master Plan, three phases have been identified. It is anticipated

that the northeast corner of the site (Parcel A) will be the primary component of the first phase, along with redevelopment of the building on the south end of Parcel G. All existing uses on the site except for the Red Robin restaurant would be removed with Phase 1.

For Phase 1, it is assumed that the project would construct NE Alhazen St, Lumiere Ave (between Alhazen and NE 24th), and the west half of Da Vinci Ave (between Alhazen and NE 24th). Vehicular access to Parcel A for Phase 1 is proposed to be provided at a driveway on NE 24th Street and a driveway on Da Vinci Ave NE. Access to the south end of Parcel G is assumed to be provided via an existing driveway on NE 20th Street (and existing internal parking lot connections to the north and west).

A preliminary site concept with preliminary road layout and driveway assumptions is shown in Figure 4. A parcel and phasing plan is shown in Figure 5. The assumed land uses by parcel at full buildout are shown in Figure 6. The assumed land uses by parcel for Phase 1 are shown in Figure 7.

Overlake SEPA Planned Action

The *Overlake Neighborhood Plan Update and Implementation Project Final Supplemental Environmental Impact Statement* (2007 ONP SEIS) and *Overlake Master Plan and Implementation Strategy* (ONP Master Plan) were adopted by Redmond City Council in December 2007 (Ordinance 2384). Subsequent to the adoption of the 2007 ONP SEIS and ONP Master Plan, the ONP was adopted as a SEPA Planned Action through a Planned Action Ordinance (PAO), which became effective October 31, 2009.

Since significant adverse impacts from the land use and development activities assumed in the ONP have already been adequately addressed in the 2007 ONP SEIS and ONP Master Plan (including Bellevue facilities), the PAO allows qualified development projects located within the ONP boundaries to be reviewed as implementing actions within the scope of the Planned Action and the City's adopted development standards without a SEPA Threshold Determination and further environmental review. It is anticipated that the City of Redmond will confirm that the land uses and development activities proposed for the Seritage Overlake Plaza Master Plan fall within the land use analyzed in the adoption of the ONP, the earlier SEIS issued in support of the ONP, and ONP Master Plan. Since the proposed project is expected to fall within the limits set out in the ONP, the applicant is requesting that the Master Plan and individual parcel development applications that are submitted under the proposed Seritage Overlake Plaza Master Plan Development Agreement be reviewed as planned actions under the PAO, and no SEPA threshold determination or further environmental review be required other than an Addendum to the SEIS.

Project Approach

The scope of analysis for this study was based on scoping discussions with the City of Redmond and was formalized in a scoping document that was approved by the City on August 21, 2017. A copy of the approved scoping document is included in Appendix A.

The 2023 roadway network and study intersections analyzed in this report are shown on Figure 8. The study area was established based on scoping discussions with the City of Redmond. For this traffic study, 2 build scenarios were analyzed: Phase 1 and Full Buildout (Phases 1, 2, and 3). The timing of infrastructure and mitigation as outlined in the Master Plan and Development agreement are based on the results of the analysis of these scenarios.

The following scenarios were analyzed in 2023:

1. 2023 Baseline (Without Project)
2. 2023 With Project - Full Buildout
3. 2023 With Project - Full Buildout, with a signal at Lumiere/24th
4. 2023 With Project - Phase 1

As discussed with the City, a horizon year of 2023 was used to evaluate the impacts of the Master Plan (Full buildout and Phase 1). While the Master Planned Development and Development Agreement will allow the project to be constructed over the course of 15 years, with the possibility of an extension, a 6-year horizon is utilized for the traffic analysis to be consistent with standard project-level traffic studies and to account for completion of the City's planned 6-year funded roadway network. Developing traffic volume assumptions beyond a 6-year horizon typically relies on a greater amount of speculation and becomes less accurate. The horizon year of 2023 is also consistent with the time period assumed for the implementation of transportation improvements to maintain transportation concurrency.

Although the exact timing of development is unknown, the year 2023 conditions are assumed to be representative of the best available traffic forecasts and road network assumptions for the buildout of the Master Plan, a portion of which is likely to occur prior to 2023 and a portion of which may occur later than 2023. Phase 1 is likely to occur prior to 2023 so the analysis for Phase 1 is likely conservative given the additional development in the area that is included in the analysis. In addition, the City is contemplating significant changes to its road network by 2030 via the implementation of their Transportation Master Plan and their ongoing Overlake Village South Infrastructure study. Accordingly, TENW conducted a separate analysis that accounts for the level of development contemplated in this Master Plan and other approved Master Plans in the immediate vicinity on the City's draft 2030 roadway network (see *Overlake Village South Infrastructure Update* provided in our October 27, 2017 traffic study). Even if a portion of the project is constructed after the analysis year of 2023, it is not anticipated that additional impacts beyond those disclosed in this analysis would occur. It should also be noted that compliance with transportation concurrency will be addressed at the time of site plan entitlement for individual development permit applications, regardless of timing.

Transportation impacts to the City of Bellevue from the buildout of the Overlake Neighborhood Plan (ONP) were disclosed in the *Overlake Neighborhood Plan Update and Improvement Project Final Supplemental Environmental Impact Statement (SEIS)* dated August 30, 2007 (we refer to this document as the *2007 ONP SEIS)*. Therefore, the impacts of the Seritage Master Plan (which is a subset of the land use contemplated by the ONP) on City of Bellevue facilities has already been addressed by the environmental document studying the impacts of the ONP—the 2007 ONP SEIS. The relationship of the Seritage Master Plan to the 2007 ONP SEIS is discussed in more detail in the SEIS Addendum for the Seritage Master Plan project that is being submitted to the City of Redmond *(Addendum to the Overlake Neighborhood Plan Update and Improvement Project Final SEIS prepared for the Overlake Plaza Master Plan Project).* In addition to the vehicular traffic impacts that were analyzed and disclosed in the 2007 ONP SEIS and in the current SEIS Addendum, the City of Bellevue has requested documentation of school walk routes.

It should be noted that the Seritage project is a Master Plan application in the City of Redmond. The Master Plan entitlement does not allow individual buildings to be built; instead, individual buildings contemplated by the Master Plan are required to be individually permitted through the City's Site Plan

Entitlement process. The Site Plan Entitlement process requires a determination of an appropriate SEPA process for each individual building. As a result, the City of Bellevue will also have the opportunity to weigh in at a more specific/project-level basis regarding traffic impacts to Bellevue.

A summary of impacts to City of Bellevue transportation facilities and documentation of potential school walk routes are included in Appendix J.

Primary Data and Information Sources

- *Overlake Neighborhood Plan Update and Implementation Project Final Supplemental Environmental Impact Statement* (ONP FSEIS) and *Overlake Master Plan and Implementation Strategy* (ONP Master Plan), adopted by Redmond City Council in 12/2007 (Ordinance 2384).
- ONP SEPA Planned Action Ordinance (PAO), effective October 31, 2009.
- Overlake Village South Infrastructure Planning Report: Final Draft (August 2016), City of Redmond.
- DRAFT Overlake Village South Subarea Traffic Analysis (March 11, 2016), HDR, Inc.
- *The Overlake Access Ramp at the Interchange of SR 520 and 148th Ave NE Interchange Justification Report* (IJR) (February 2011), HDR, Inc.
- Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 9th Edition, 2012.
- Environmental Protection Agency (EPA)/ITE mixed-use development (MXD) trip generation spreadsheet (internal/mode-split adjustments).
- City of Redmond's *Multimodal Plan-Based Concurrency System Administrative Guidelines* dated September 2014.
- Peak Hour traffic counts by All Traffic Data, Year 2013.
- WSDOT Collision Data, 2014-2016.
- *Highway Capacity Manual (HCM),* 6th Edition.
- *Synchro 10* LOS and Queue methodology
- City of Redmond Comprehensive Plan (12/6/11)
- City of Redmond's 2030 Traffic Forecasting Model volumes, conducted January/February 2014.
- City of Redmond 2018 - 2023 Transportation Improvement Program (TIP).
- City of Redmond *Transportation Master Plan*, August 2013, including the Transportation Facilities Plan (2013-2030) and Unfunded Buildout Plan.
- City of Bellevue 2018 - 2023 Transportation Improvement Program (TIP).
- City of Bellevue 2016 - 2027 Transportation Facilities Plan (TFP).

Figure 3: Project Site Vicinity

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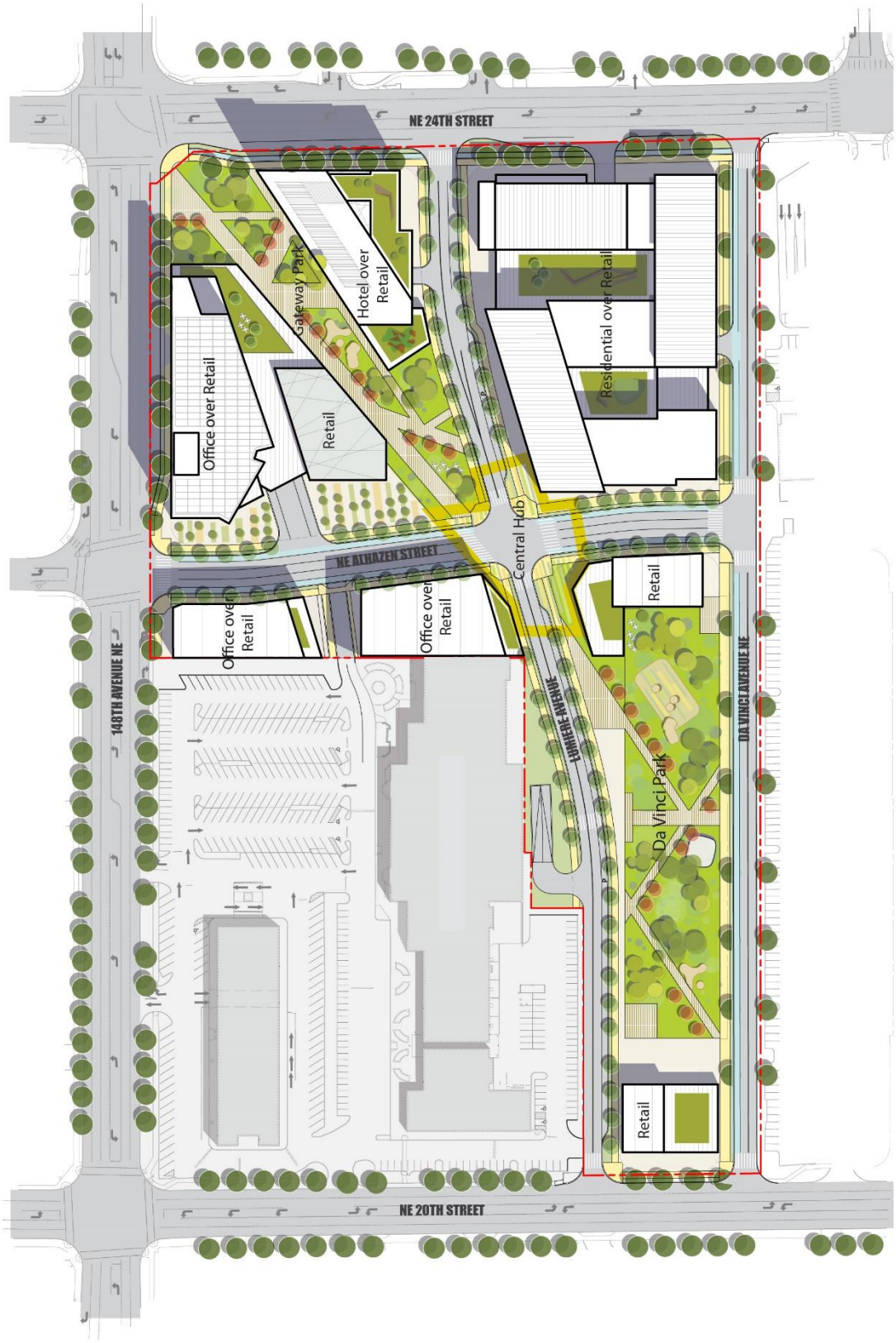

Figure 4: Preliminary Master Plan Full Buildout Site Plan

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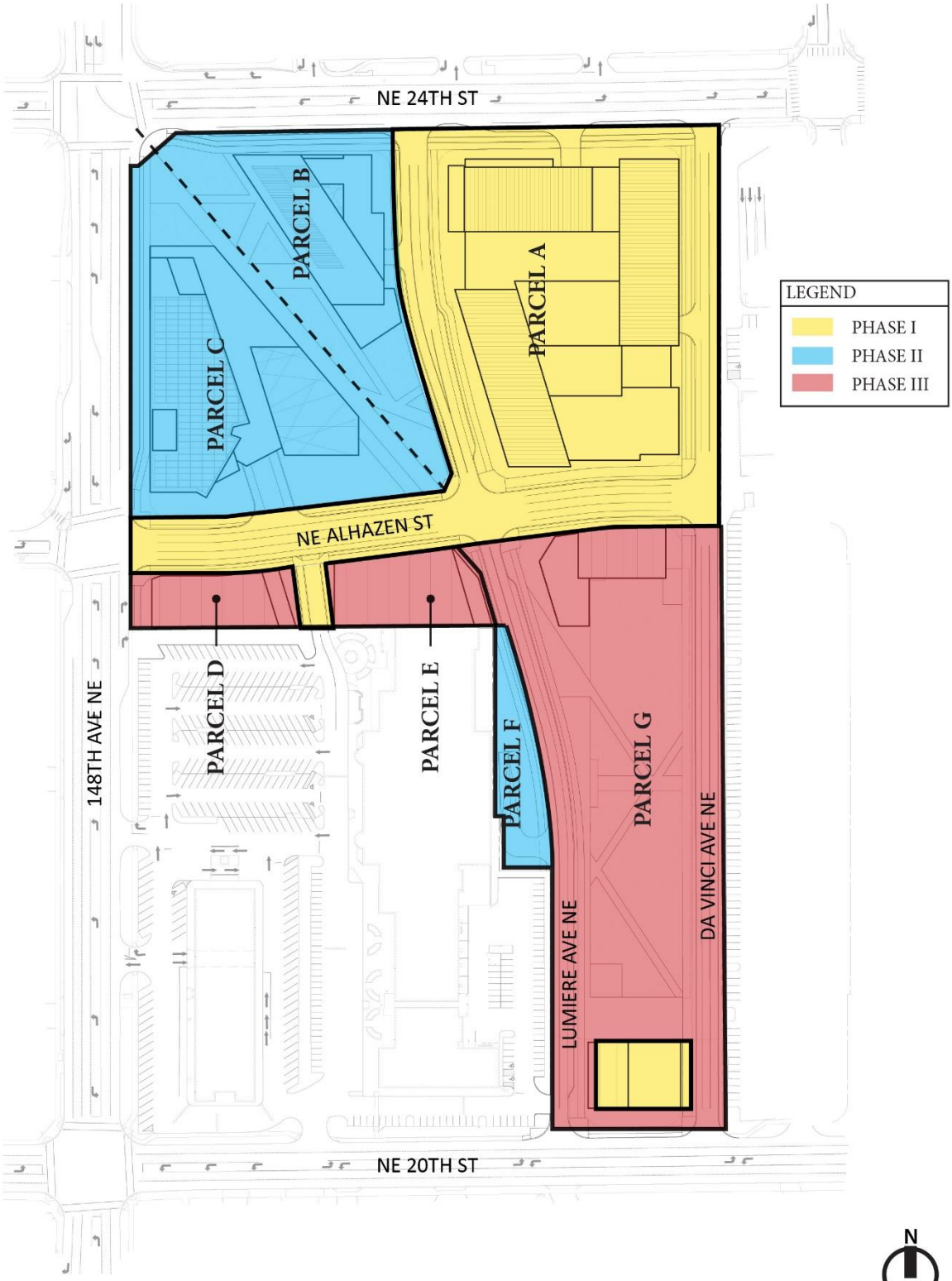

Figure 5: Master Plan Parcel and Phasing Map

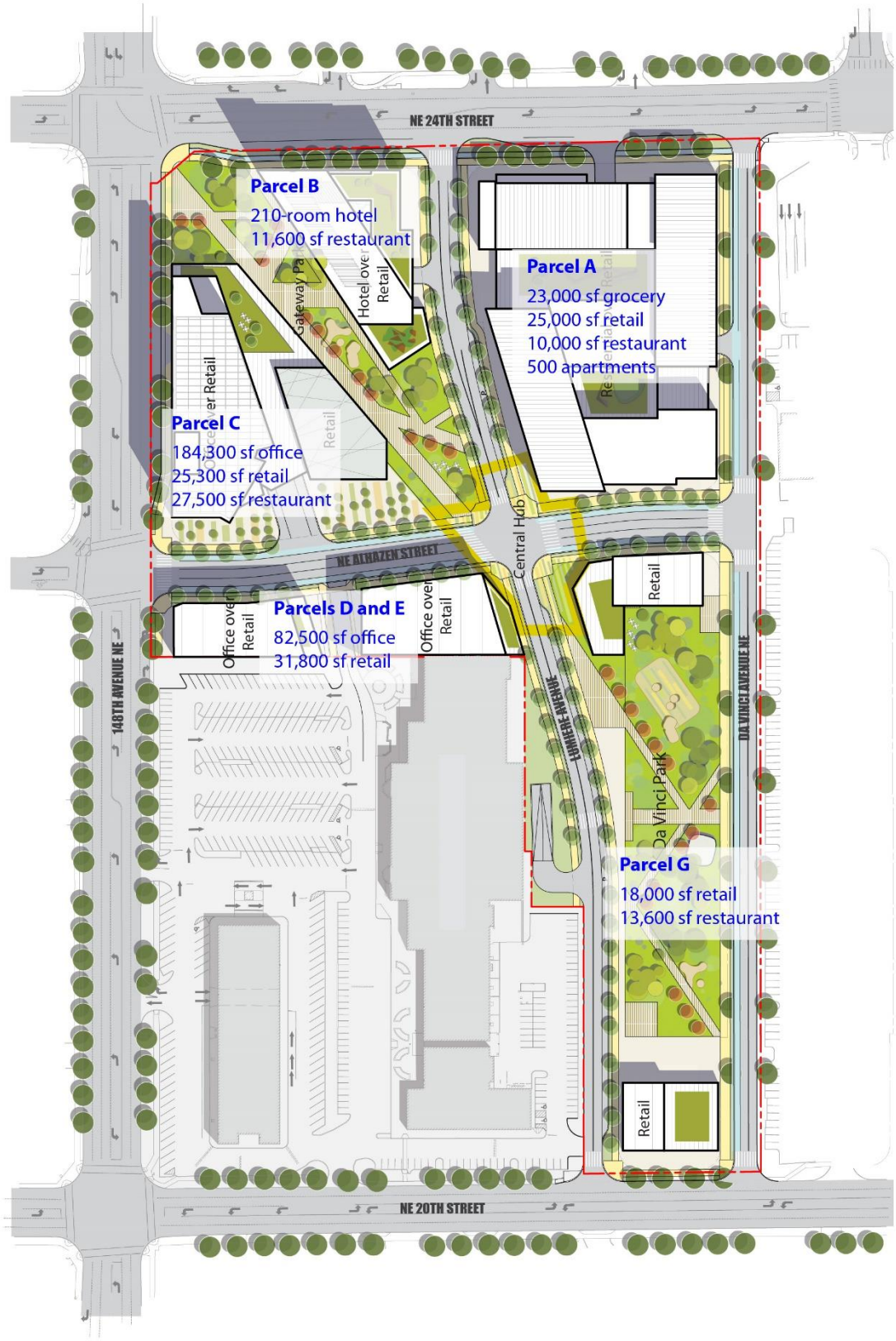

Figure 6: Master Plan Full Buildout Land Use Assumptions

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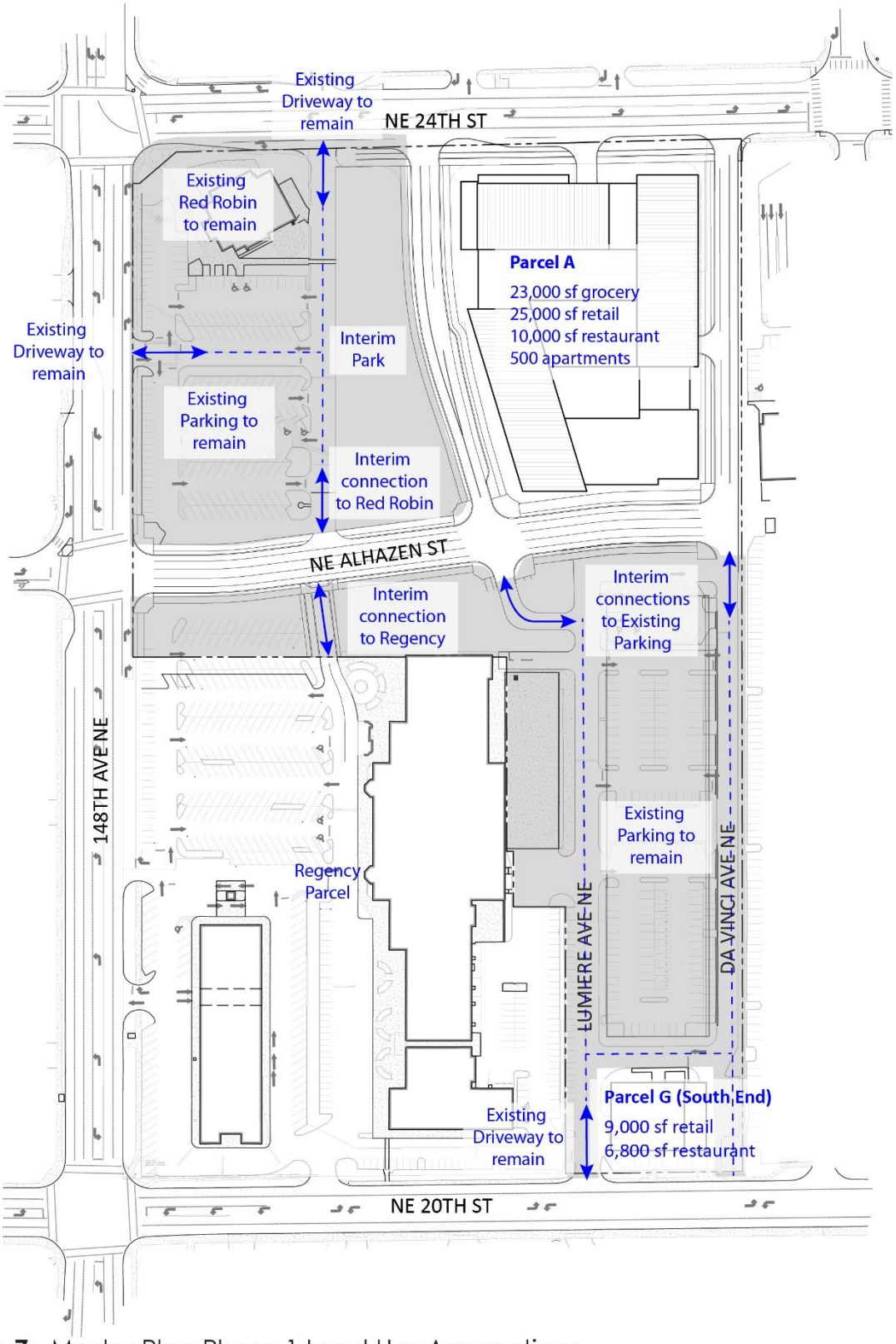


Figure 7: Master Plan Phase 1 Land Use Assumptions

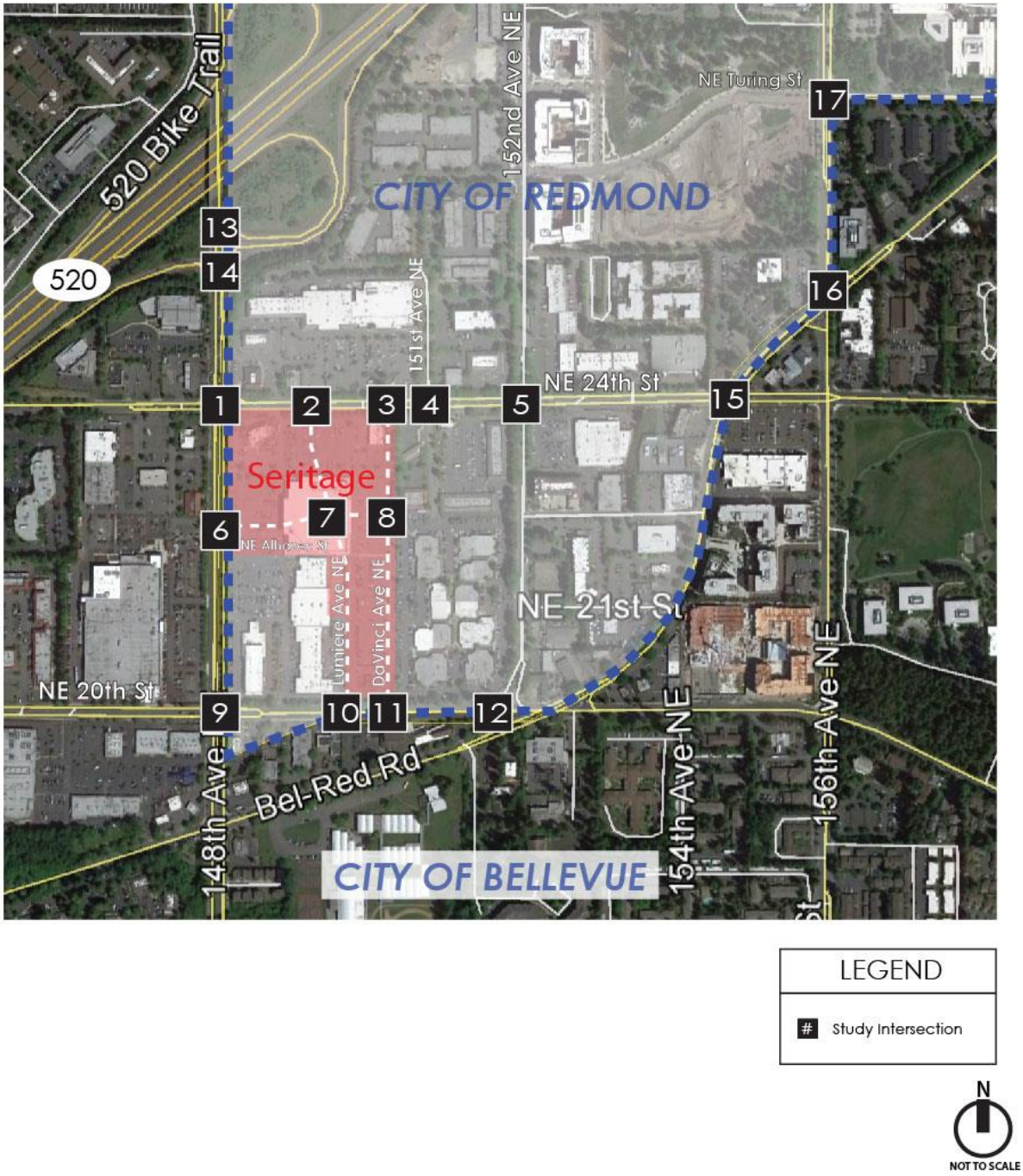


Figure 8: Master Plan Buildout Year 2023 Roadway Network and Study Intersections

EXISTING CONDITIONS

Existing conditions in the study area were recently assessed by HDR in the *Overlake Village South Subarea Traffic Analysis* (March 11, 2016). Based on scoping discussions with the City of Redmond, a limited assessment of existing conditions was conducted by providing an update to HDR's assessment. Included is a description of the roadway network, existing traffic volumes, collision history, pedestrian facilities, bicycle facilities, and transit facilities.

Roadway Network

The primary routes to and from the site include NE 24th Street, 148th Avenue NE, and NE 20th Street. The relationship of these roadways to the project site is shown in the aerial photo below.

NE 24th Street is a 5-lane east-west minor arterial in the project vicinity. Signal control is provided at major intersections along 148th Ave NE and non-signalized driveway access points are typically restricted to right-in, right-out with c-curbing. Curb, gutter and sidewalks exist on both sides of the street. The posted speed limit on NE 24th Street is 30 mph. NE 24th Street provides an east-west link through Overlake between West Lake Sammamish Parkway and Northup Way. Based on City of Redmond 2014 traffic count data, NE 24th Street carries approximately 25,900 vehicles per day (east of 148th Avenue NE).

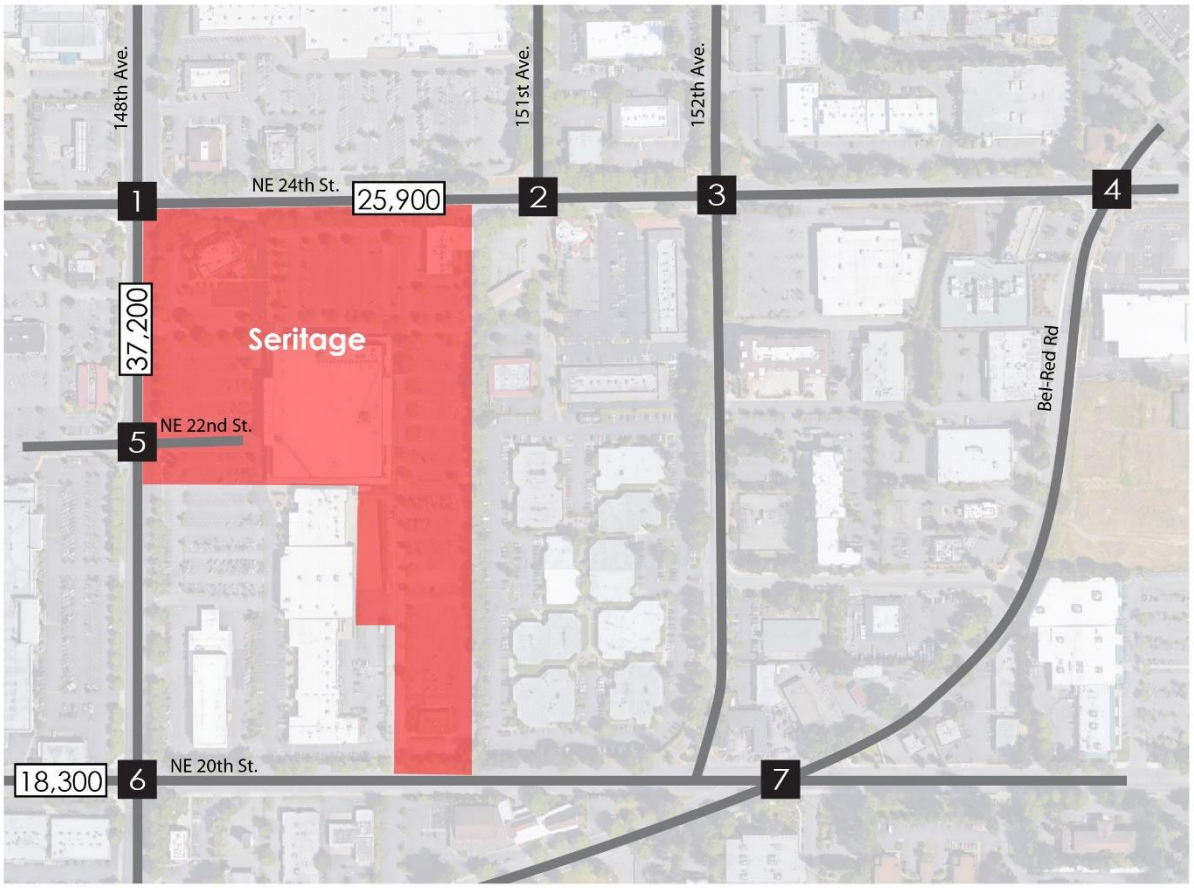
148th Avenue NE is generally a 5-lane north-south principal arterial with turn lanes at signalized intersections in the immediate project vicinity. Signal control is provided at major intersections along 148th Ave NE and non-signalized driveway access points are typically restricted to right-in, right-out with c-curbing. The signals along 148th Ave NE are coordinated. Curb, gutter, and sidewalks exist on both sides of the street. The posted speed limit on 148th Ave NE is 35 mph. 148th Ave NE provides a connection to SR 520 at an interchange just north of NE 24th Street. Based on City of Redmond 2014 traffic count data, 148th Ave NE carries approximately 37,200 vehicles per day (south of NE 24th Street).

NE 20th Street is a 5-lane east-west minor arterial in the project vicinity. Curb, gutter, and sidewalks exist on both sides of the street. The posted speed limit on NE 20th Street is 35 mph. Based on City of Redmond 2014 traffic count data, NE 20th Street carries approximately 18,300 vehicles per day (west of 148th Avenue NE).

Existing Traffic Volumes

Year 2017 existing AM and PM peak hour traffic volumes are shown at seven (7) intersections in the project vicinity. The 2017 traffic volumes were estimated based on 2013 volumes included in HDR's *Overlake Village South Subarea Traffic Analysis* (March 11, 2016). To estimate 2017 volumes, a 2 percent annual growth rate was applied to the 2013 traffic counts.

Figures 9 and 10 illustrate the resulting 2017 existing AM and PM peak hour traffic volumes at the seven intersections in the project vicinity.



AM Peak Hour

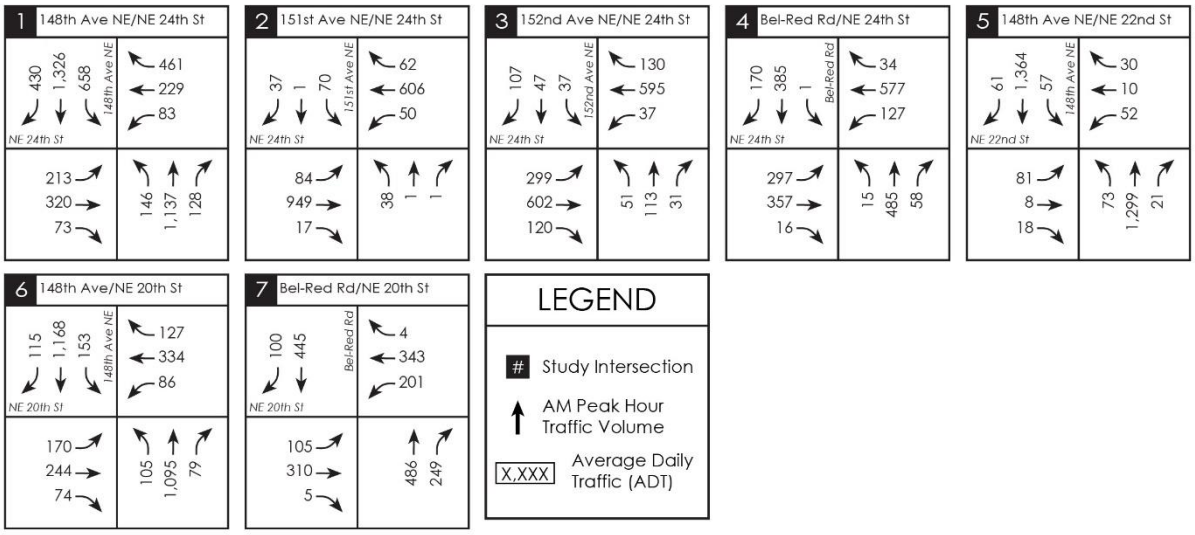


Figure 9: Year 2017 Existing AM Peak Hour Traffic Volumes

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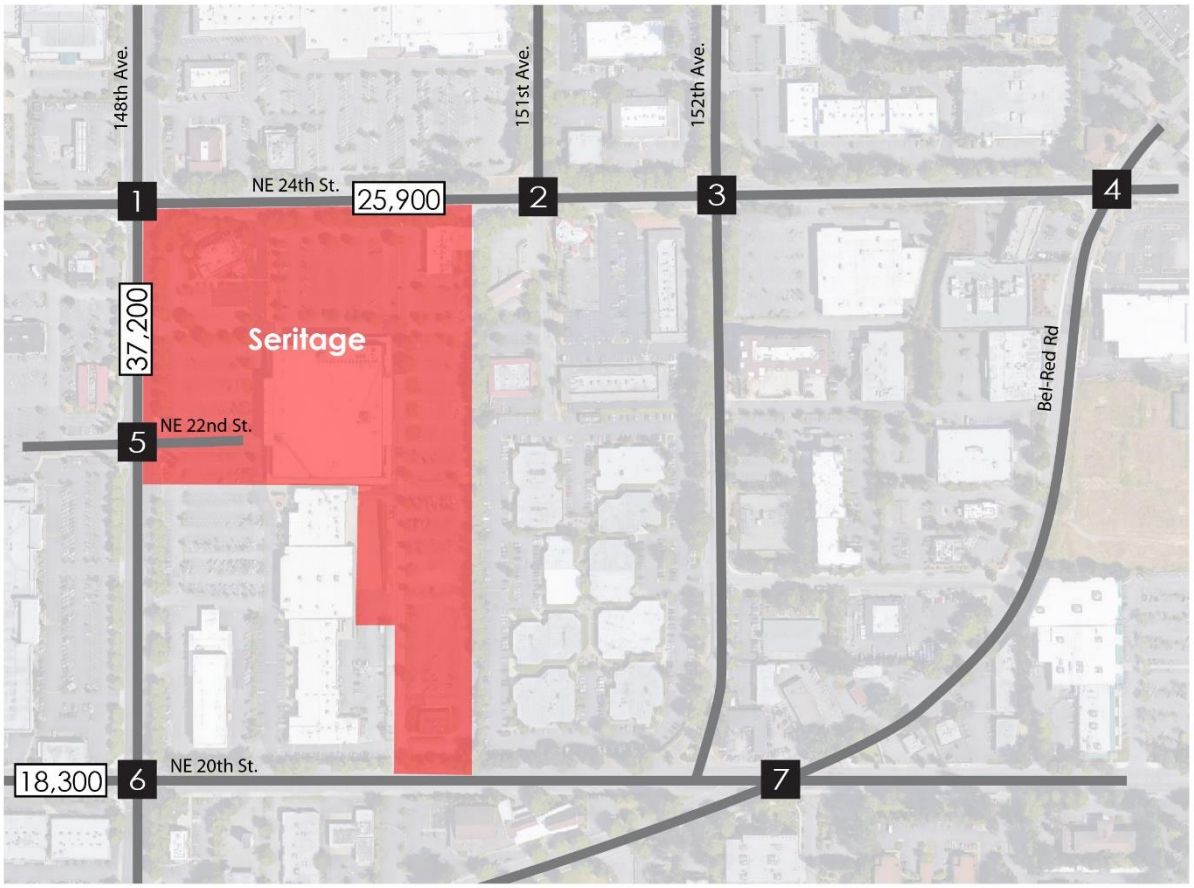

PM Peak Hour

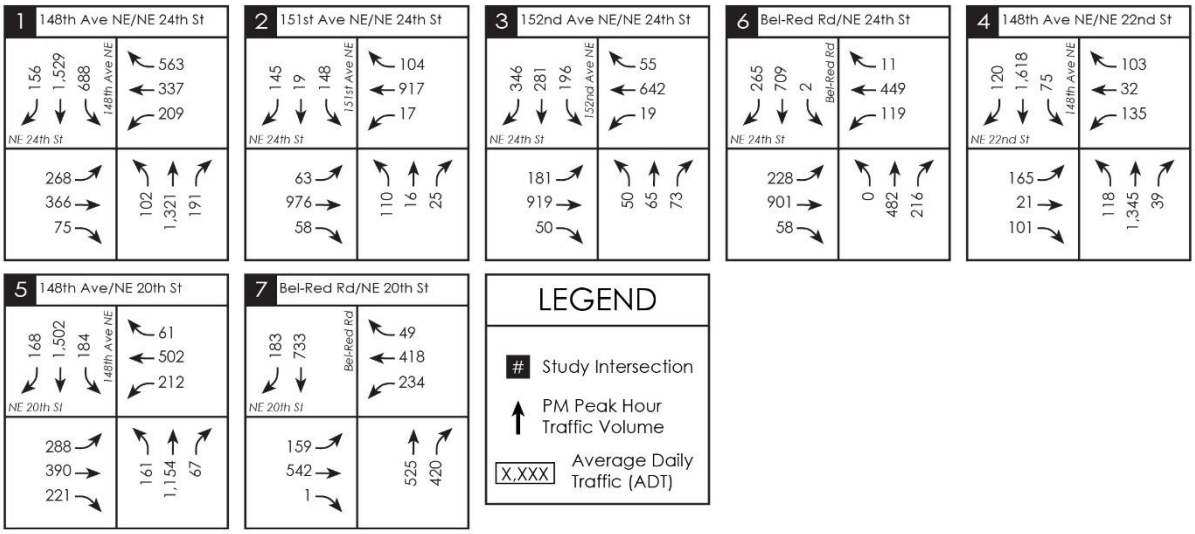

Figure 10: Year 2017 Existing PM Peak Hour Traffic Volumes

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Collision History

Collisions at study intersections and mid-block roadway sections along the 148th Ave NE between NE 20th Street and NE 24th Street were summarized for the most recent three-year period from January 1, 2014 to December 31, 2016. Collision data was provided by the Washington State Department of Transportation (WSDOT). Summaries of the total, yearly average, and collisions per million entering vehicles (MEV) and million vehicle miles (MVM) are provided in Table 1. Summaries of collisions by type are provided in Table 2.

Table 1
3-Year Collision Data Summary – January 1, 2014 to December 31, 2016

Location	Number of Collisions				Average Annual Collisions	Estimated 2015 Daily Volumes[2]	Collisions per MEV[1] or MVM[1]
	2014	2015	2016	3-Year Total			
Intersections:							
148th Ave NE / NE 24th St	24	38	28	1.47	30.00	55,786	1.47
148th Ave NE / NE 22nd St	12	14	9	0.86	11.67	37,215	0.86
148th Ave NE / NE 20th St	22	25	24	1.37	23.67	47,193	1.37
Roadway Segments:							
148th Ave NE (NE 24th to NE 22nd)	6	2	1	2.78	3.00	32,900	2.78
148th Ave NE (NE 22nd to NE 20th)	2	1	2	1.09	1.67	32,300	1.09

Source: WSDOT Collision Records.

1 MEV = Million Entering Vehicles (for intersections), MVM = Million Vehicle Miles (for roadway segments).

2 Estimated 2015 daily volumes are based on 2015 PM volumes and a K-factor of 10.

Table 2
3-Year Collision Data Summary by Type – January 1, 2014 to December 31, 2016

Location	3-Year Total Collisions	Collision Type						
		Approach Turn	Parked Veh/ Fixed Object	Sideswipe	Right Angle	Rear-end	Ped/Bike Involved	Other
Intersections:								
148th Ave NE / NE 24th St	90	20	2	17	18	32	0	1
148th Ave NE / NE 22nd St	35	16	0	2	3	11	3	0
148th Ave NE / NE 20th St	71	14	0	12	14	30	0	1
Roadway Segments:								
148th Ave NE (NE 24th to NE 22nd)	9	1	0	2	1	5	0	0
148th Ave NE (NE 22nd to NE 20th)	5	1	0	0	0	4	0	0

Source: WSDOT Collision Records.

Intersections with collision rates higher than 1.0 per MEV are discussed in more detail below.

148th Ave NE/NE 24th Street: Over the three-year period analyzed a total of 90 collisions occurred at the intersection of 148th Ave NE/NE 24th Street resulting in a collision rate of 1.47 per MEV. A review of the collision data shows multiple collision types, primarily approach turn, sideswipe, right-angle, and rear-end collisions. This intersection is one of the largest traffic volume intersections in Redmond/Bellevue, and improvements have been identified and planned by both cities but have remained unfunded. These improvements include an additional northbound through lane, and eastbound and westbound dual left-turn lanes. The proposed Seritage Master Plan project will dedicate right-of-way and construct the ultimate curb locations on 148th Ave NE and NE 24th Street to accommodate these future improvements. It is anticipated that these improvements will decrease the collision rate at this intersection.

148th Ave NE/NE 20th Street: Over the three-year period analyzed a total of 71 collisions occurred at the intersection of 148th Ave NE/NE 20th Street resulting in a collision rate of 1.37 per MEV. A review of the collision data shows multiple collision types, primarily approach turn, sideswipe, right-angle, and rear-end collisions. Improvements have been identified and planned by both the City of Redmond and the City of Bellevue but have remained unfunded. These improvements include an additional northbound through lane, and eastbound and westbound dual left-turn lanes. The proposed Seritage Master Plan project (and the KCCLE Master Plan) will be required to construct an interim northbound right-turn lane at this location (threshold outlined in the Seritage and KCCLE Development Agreements). It is anticipated that the planned improvements will decrease the collision rate at this intersection.

Collisions on roadway segments are discussed in more detail below.

148th Ave NE (between NE 24th Street and NE 22nd Street): Over the three-year period analyzed a total of 9 collisions occurred resulting in a collision rate of 2.78 collisions per MVM. A review of the collision data indicates that most of the collisions were rear-ends. The collision rate of 2.78 collisions per MVM is more than the published 2011 statewide average collision rate of 2.07 per MVM for urban principal arterials based on the *2011 Washington State Collision Data Summary* (WSDOT). Improvements on this segment have been identified and planned by both the City of Redmond and the City of Bellevue but have remained unfunded. These improvements include widening for an additional northbound through lane on 148th Ave NE. The proposed Seritage Master Plan project will dedicate right-of-way and will also construct the ultimate curb along 148th Ave NE to accommodate these future improvements. It is anticipated that the planned improvements will decrease the collision rate on this segment.

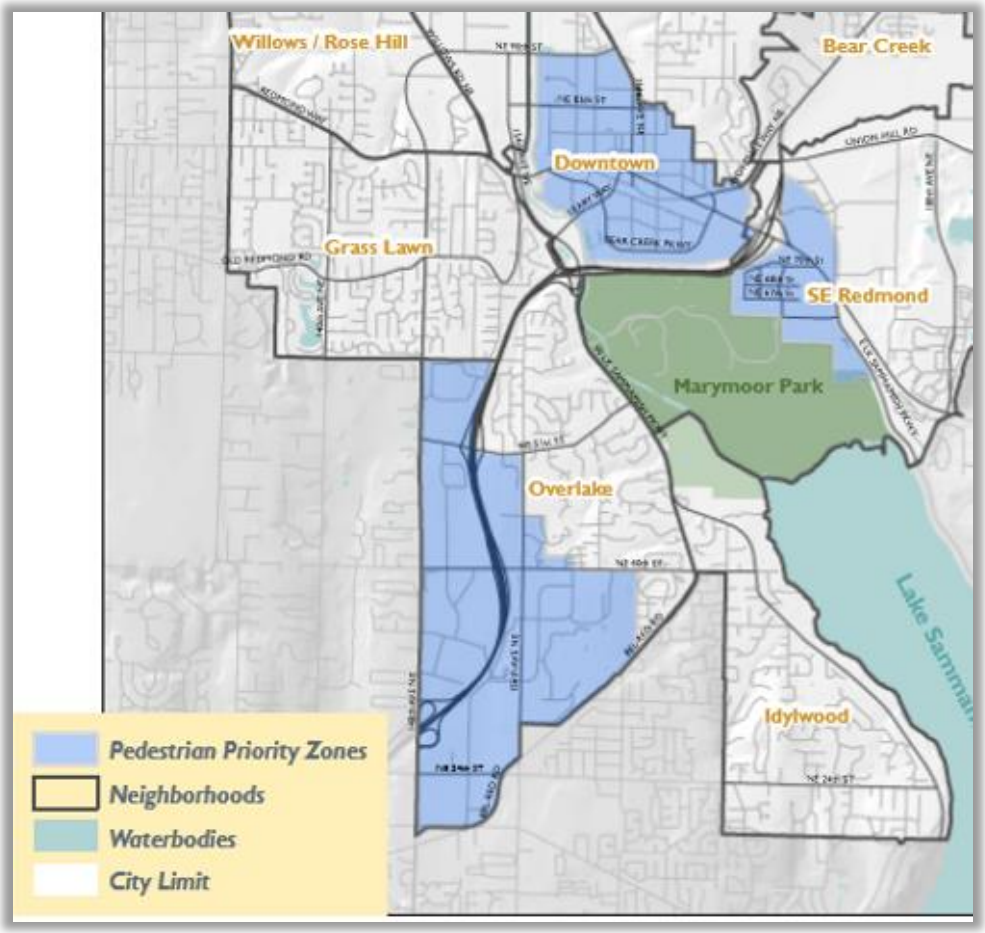
148th Ave NE (between NE 22nd Street and NE 20th Street): Over the three-year period analyzed a total of 5 collisions occurred resulting in a collision rate of 1.09 collisions per MVM. A review of the collision data indicates that most of the collisions were rear-ends. The collision rate of 1.09 collisions per MVM is less than the published 2011 statewide average collision rate of 2.07 per MVM for urban principal arterials based on the *2011 Washington State Collision Data Summary* (WSDOT). Improvements on this segment have been identified and planned by both the City of Redmond and the City of Bellevue but have remained unfunded. These improvements include widening for an additional northbound through lane on 148th Ave NE. It is anticipated that the planned improvements will decrease the collision rate on this segment.

Existing Pedestrian Transportation Facilities

Based on the City of Redmond Comprehensive Plan, the proposed project is located within one of the City of Redmond's *Pedestrian Priority Zones*.

Pedestrian Priority Zones

Urban walking environments will provide mobility for high numbers of pedestrians and form vibrant streetscapes that create a high quality of life in the Downtown and Overlake urban centers and near light rail stations as shown in the pedestrian zone map (Figure 39).



Source: City of Redmond Comprehensive Plan

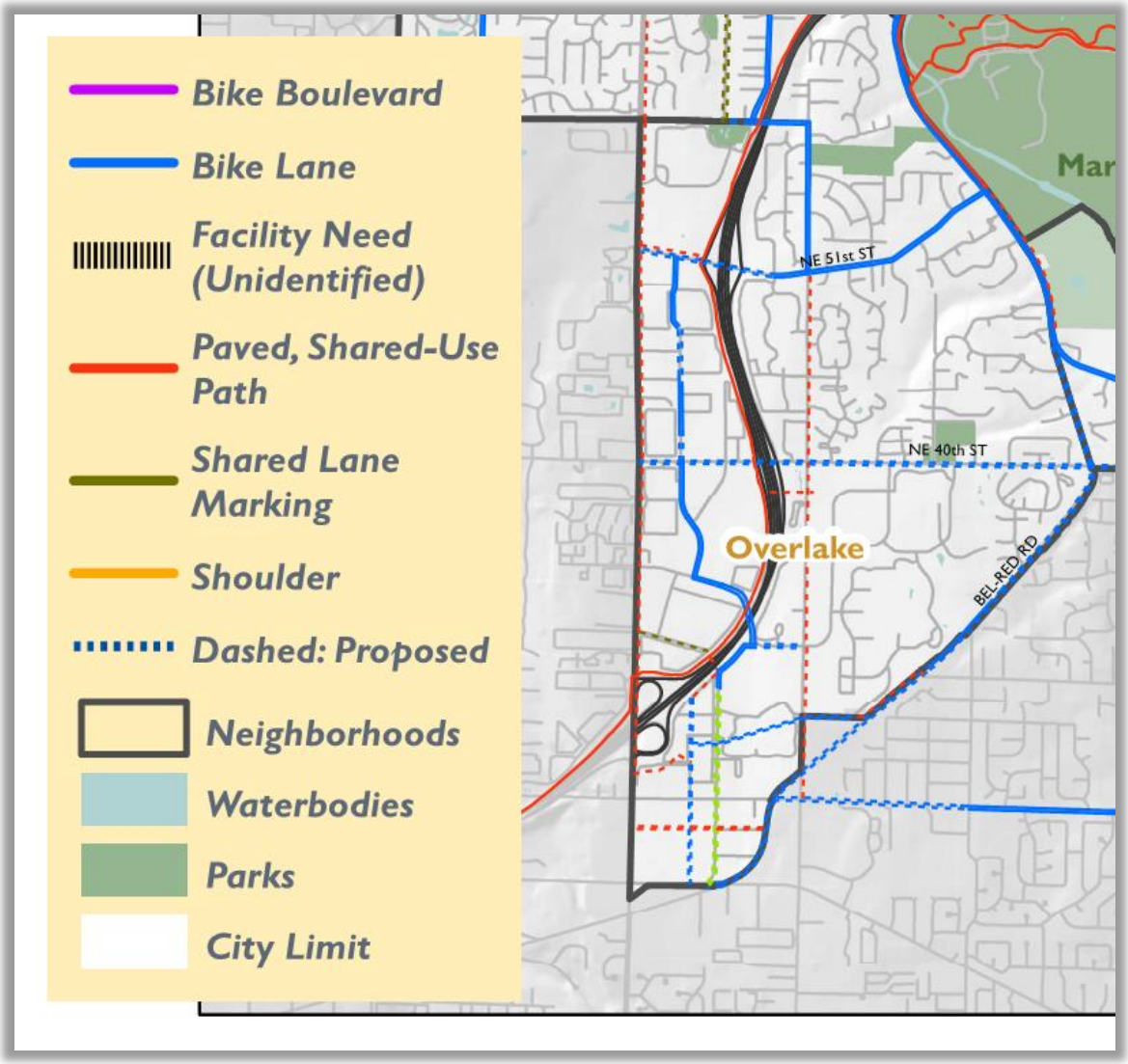
Non-motorized pedestrian transportation facilities adjacent to the project site currently include sidewalks on all streets. Crosswalks and curb ramps exist on all approaches at the signalized intersections on 148th Ave NE between NE 20th Street and NE 24th Street. Crosswalks and curb ramps also exist on all approaches at the signalized intersection of 151st Ave NE/NE 24th Street located northeast of the project site. Many of the sidewalks along the project frontages will be reconstructed to current City of Redmond Zoning Code standards with the proposed project.

Existing pedestrian facilities in the site vicinity are depicted on Figure 11.

Figure 11: Year 2017 Existing Pedestrian Facilities

Existing Bicycle Transportation Facilities

The City of Redmond's Bicycle System Plan is outlined in the *Transportation Master Plan* (see image below). Existing bicycle facilities in the project vicinity include striped bike lanes and/or sharrows on 152nd Ave NE. Other bicycle facilities in the project vicinity include the SR 520 bike trail which extends from Leary Way to near the SR 405 interchange in Bellevue. The closest access to the SR 520 bike trial is located at 148th Ave NE/SR 520 WB off-ramp (NE 29th Street). The other bicycle facilities shown in the figure below in the vicinity of the project site are planned to be constructed in the future, including several with the proposed project.



Source: City of Redmond Transportation Master Plan

Existing Public Transit Services

King County Metro provides public transportation services in the immediate vicinity of the proposed project. Eight bus routes are currently located on 148th Ave NE, 152nd Ave NE, NE 24th Street, NE 20th Street, and Bel-Red Road (Routes 221, 226, 249, 269, 541, 888, and RapidRide B-Line).

The nearest transit stops in the project vicinity are located on 148th Ave NE (south of NE 24th Street) and on NE 24th Street (east of 152nd Street). In addition, the Overlake Park and Ride is located approximately 0.25 mile northeast of the site.

Existing transit service in the project vicinity is summarized on Figure 12.

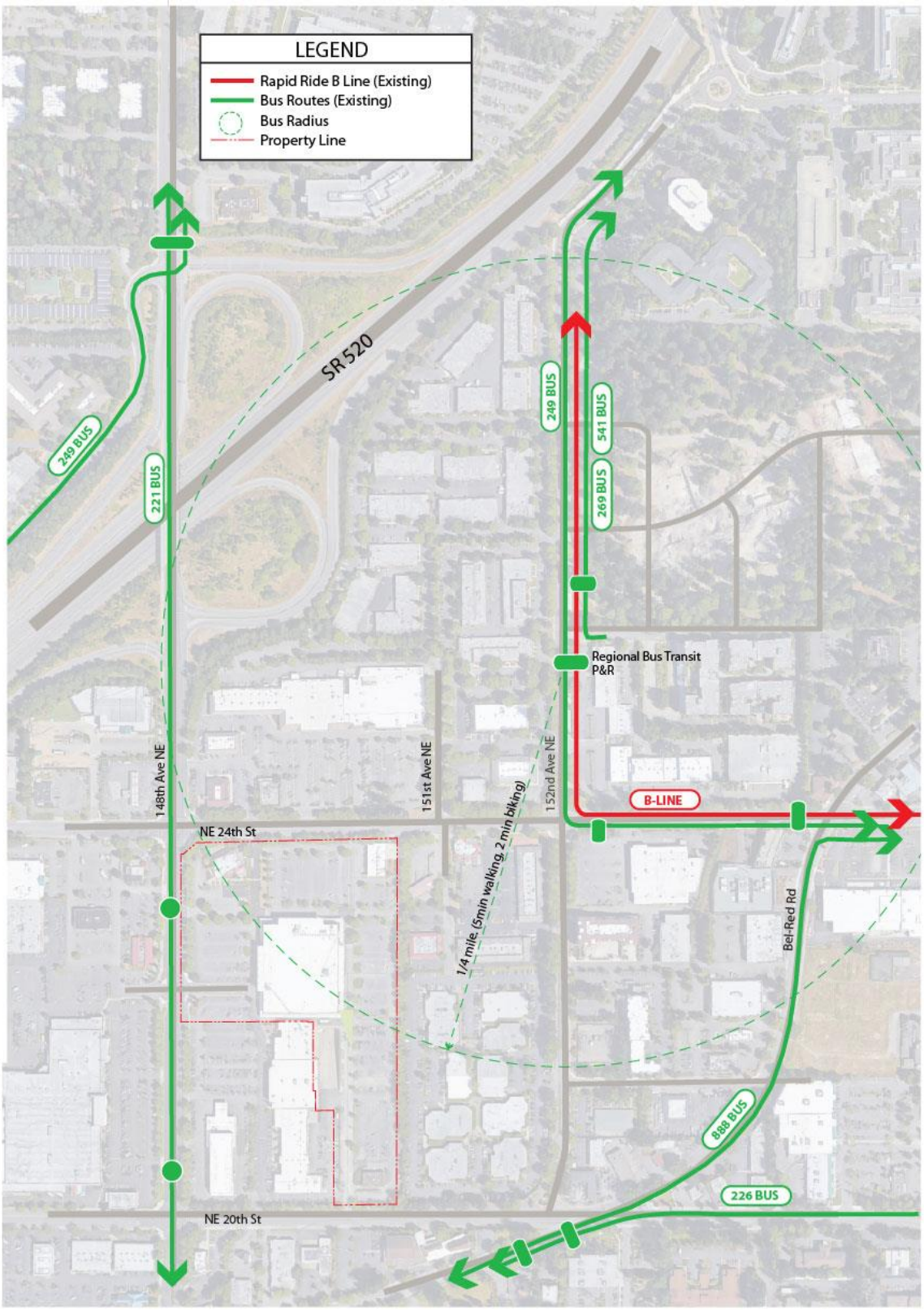


Figure 12: Year 2017 Existing Transit Facilities

FUTURE CONDITIONS

Planned Transportation Improvements

Numerous transportation improvements are planned by the City of Redmond, City of Bellevue, and Sound Transit in the project vicinity. Figure 13 shows the locations of the planned improvements in the study area. This figure and a detailed summary of each project is included in Appendix B. The list of projects was based on our review of the following sources:

- City of Redmond 2018 - 2023 Transportation Improvement Program (TIP).
- City of Redmond *Transportation Master Plan*, August 2013, including the Transportation Facilities Plan (2013-2030) and Unfunded Buildout Plan.
- City of Bellevue 2018 - 2023 Transportation Improvement Program (TIP).
- City of Bellevue 2016 - 2027 Transportation Facilities Plan (TFP).
- Esterra Park (former Group Health) Development Agreement
- Sound Transit East Link Light Rail Planning

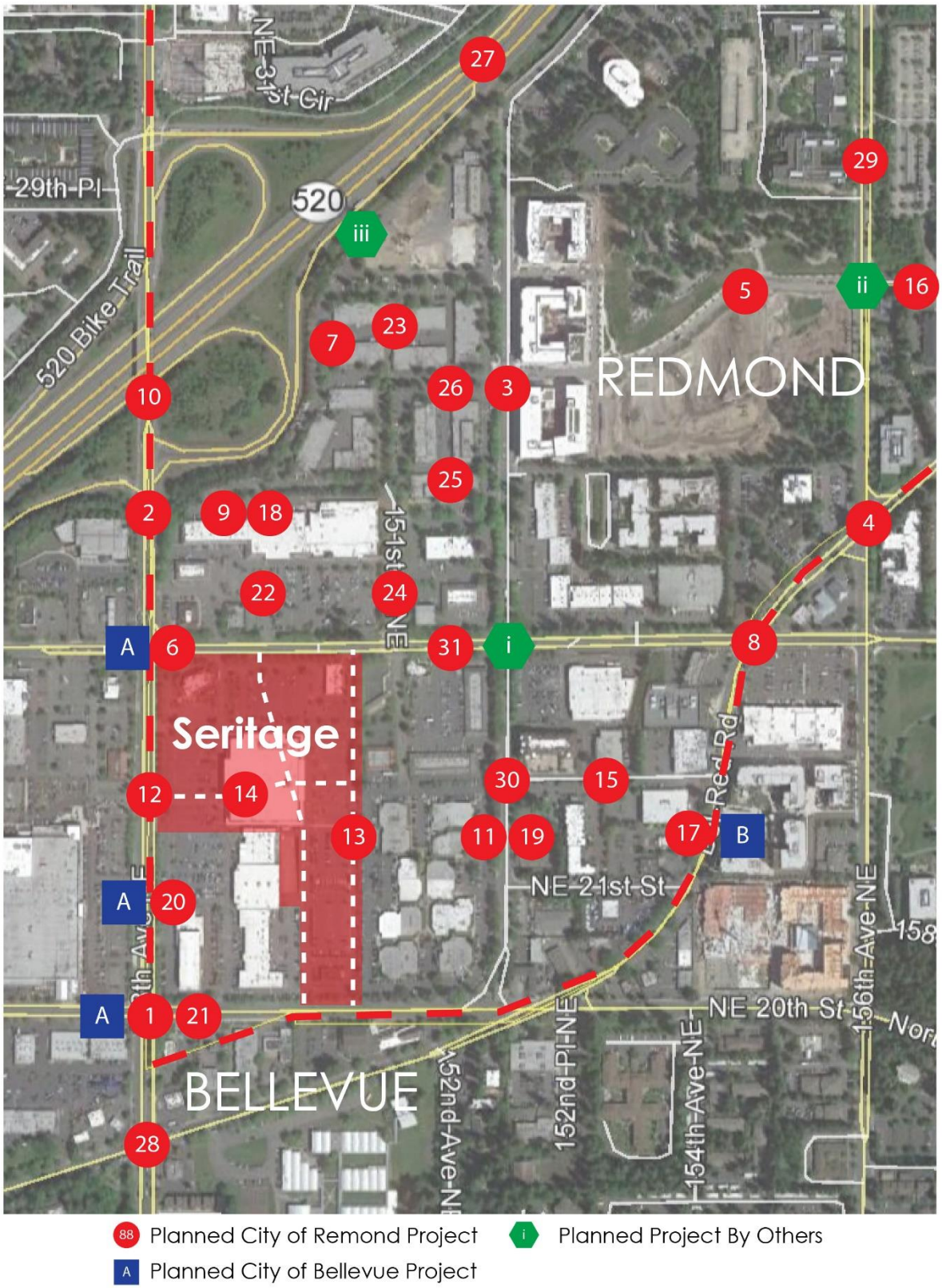


Figure 13: Planned Transportation Improvements

Year 2023 Baseline Volumes

Traffic forecasts for 2023 baseline (without project) conditions were estimated based on the following methodology:

1. Using the year 2030 baseline model volumes from the KCCLE Master Plan Traffic Study (without KCCLE Master Plan development), TENW calculated the total growth forecast between year 2013 and 2030. Based on the growth forecast, an annual growth rate was determined. This annual growth rate was used to factor down the 2030 baseline model volumes by 7 years to obtain year 2023 volume forecasts.
2. The adjacent Regency property, KCCLE property, and property north of KCCLE were all assumed to remain in their current state for the year 2023 analysis. The Seritage property was also assumed to remain as it exists for 2023 baseline conditions. To ensure accurate volume forecasts, TENW adjusted the traffic modeling assumptions (trip generation) from these parcels to match ITE trip generation manual estimates for all existing uses. For KCCLE, the existing use trip generation matches what was used in the KCCLE Master Plan traffic study.
3. The KCCLE modeling did not include the SR 520 Overlake Access Ramp. TENW adjusted the year 2023 baseline forecasts to account for the Overlake Access Ramp based on modeling information from the Interchange Justification Report provided by the City.

The year 2023 AM and PM peak hour baseline (without project) traffic volumes at the study intersections are shown on figures in Appendix C (Figures C1 and C2).

Year 2023 Baseline Road Network

As discussed and approved by the City of Redmond, the future 2023 baseline road network assumed the existing conditions road network, with exception to the following planned improvements (only funded improvements expected to be completed by 2023 were included):

1. East Link Light Rail Extension (the year 2023 volume forecasts derived from the KCCLE 2030 traffic modeling accounted for this).
2. SR 520 Overlake Access Ramp, including local road connections to 151st Place NE and to 152nd Ave NE at NE 28th Street (NE Shen St).
3. Additional southbound lane at 152nd Ave NE/NE 24th Street (separate LT, TH, RT lanes) to be constructed by Sound Transit by year 2023.

Project Trip Generation

Proposed Uses

The gross, unadjusted weekday daily, AM peak hour, and PM peak hour trip generation estimates for the proposed uses were based on the trip rates published in the Institute of Transportation Engineers (ITE) *Trip Generation* Manual, 9th edition. Adjustments to the gross trip generation of the proposed uses were made to account for internal trips, non-vehicle trips, and pass-by trips (PM peak hour only). Consistent with ITE methodology, reductions for internal and non-vehicles trips were made first, followed by pass-by reductions.

<u>Internal and Non-Vehicle Trips</u>. Reductions to the gross trip generation of the proposed mixed-use development were taken to account for internal trips and non-vehicle trips. Consistent with the HDR

Overlake Village South Subarea Traffic Analysis (3/11/16 DRAFT), the internal and non-vehicle trips were determined using a method developed by the Environmental Protection Agency (EPA) in conjunction with the Institute of Transportation Engineers (ITE). The "EPA" method considers the site's size, mix of uses, and proximity to transit and employment to estimate the internal capture of trips within the mixed-use development (MXD) as well as estimates of off-site walking and transit usage for trips starting or ending in the mixed-use development. The EPA method was chosen for use in the HDR study after discussions with City staff. Based on the "EPA" method and approval by City staff, a trip reduction of 20% was used for the proposed uses to account for internal and non-vehicle trips.

Pass-by Trips. Reductions in the vehicular trip generation of the proposed retail, restaurant, and grocery store uses were taken to account for pass-by trips (after internal and non-vehicle adjustments). Pass-by trips are made by vehicles that are already on the adjacent streets and make intermediate stops at the site on route to a primary destination (i.e. on the way from work to home). Pass-by trips are trips that are diverted from the through movements on the adjacent streets, and therefore still impact operations at the site access points. The pass-by reductions for the proposed retail, restaurant, and grocery store uses were based on studies documented in the ITE *Trip Generation Handbook*, 3rd Edition, 2014. Based on discussions with the City, *as a conservative measure and because ITE does not publish specific pass-by rates for daily and AM peak hour periods, no pass-by trip reductions were included in the weekday daily or AM peak hour trip estimates.*

Trip Credit for Existing Uses

The applicant will receive trip generation credits for the existing uses that will be demolished. Existing use trip generation estimates were based on ITE methodology and application of the EPA MXD method to account for internal trips. Pass-by trip reductions were also applied to the existing retail and restaurant uses during the PM peak hour.

Net New Trips

The net new trips associated with the Seritage Overlake Plaza Master Plan were determined by subtracting the existing site trips from the proposed trips. Detailed trip generation calculations are included in Appendix D. A summary of the net new weekday daily, AM peak hour, and PM peak hour trip generation for full buildout and for Phase 1 of the Master Plan is shown in Table 3.

Table 3
Seritage Overlake Plaza Master Plan
Net New Trip Generation Summary

	Net New Trips Generated		
Time Period	In	Out	Total
FULL BUILDOUT			
Weekday Daily	6,500	6,500	13,000
Weekday AM Peak Hour	638	441	1,079
Weekday PM Peak Hour	410	504	914
PHASE 1			
Weekday Daily	1,750	1,749	3,499
Weekday AM Peak Hour	87	202	289
Weekday PM Peak Hour	144	70	214

As shown in Table 3, full buildout of the proposed Master Plan is estimated to generate 13,000 net new weekday daily trips, with 1,079 net new trips occurring during the weekday AM peak hour (638 entering, 441 exiting), and 914 net new trips occurring during the weekday PM peak hour (410 entering, 504 exiting).

Phase 1 of the proposed Master Plan is estimated to generate 3,499 net new weekday daily trips, with 289 net new trips occurring during the weekday AM peak hour (87 entering, 202 exiting), and 214 net new trips occurring during the weekday PM peak hour (144 entering, 70 exiting).

Project Trip Distribution

The distribution of Seritage Master Plan project trips was based on the modeling used for the KCCLE Master Plan.

The AM and PM peak hour trip distribution assumptions for the proposed Seritage Overlake Plaza Master Plan are illustrated on Figures 14 and 15, respectively. Trip distribution is shown as percentages on the streets located at the perimeter of the study area. These distribution assumptions apply to all project scenarios. The assignment of project trips to individual driveways and streets within the study area vary by scenario.

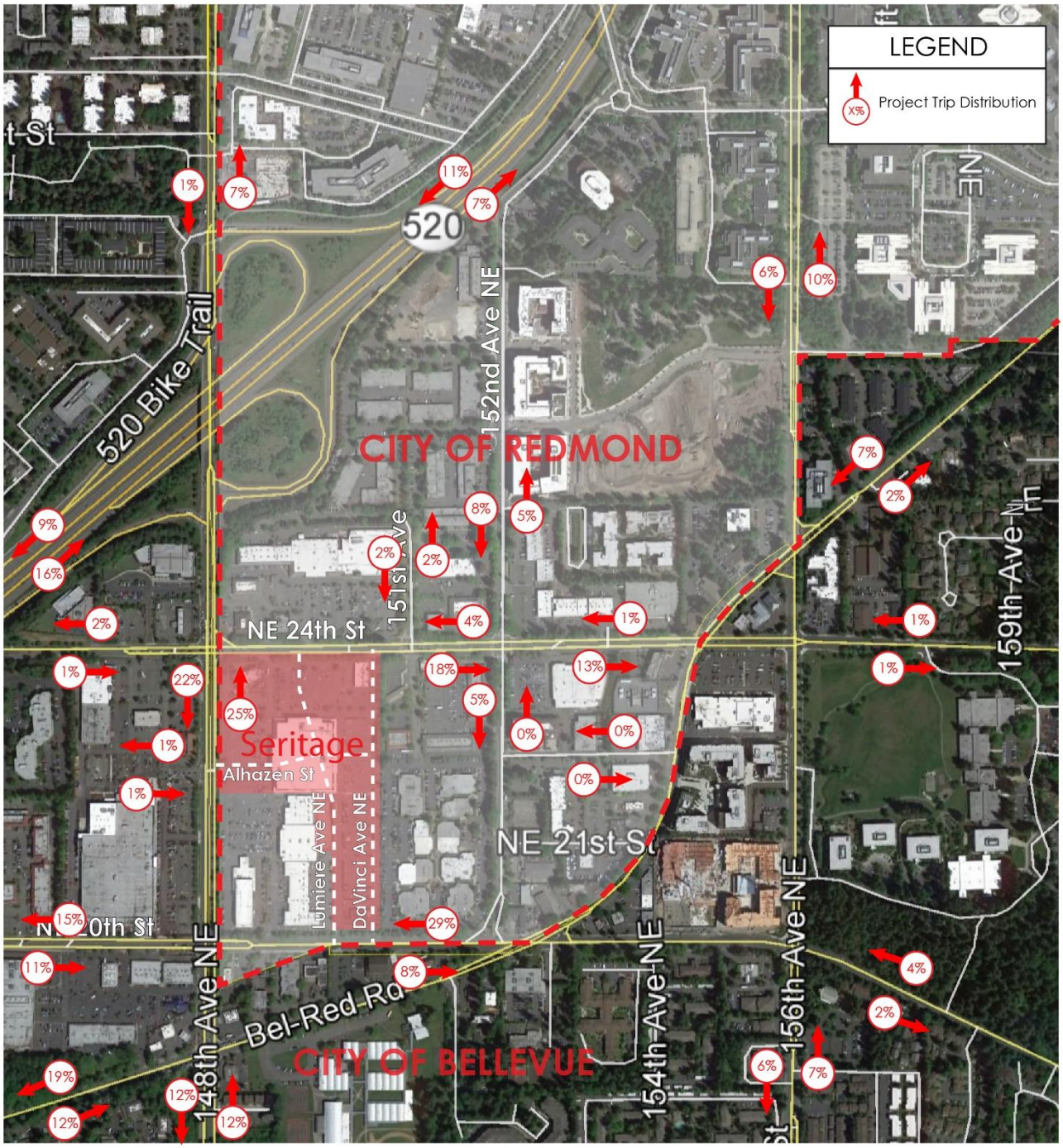


Figure 14: Year 2023 AM Peak Hour Master Plan Buildout Trip Distribution

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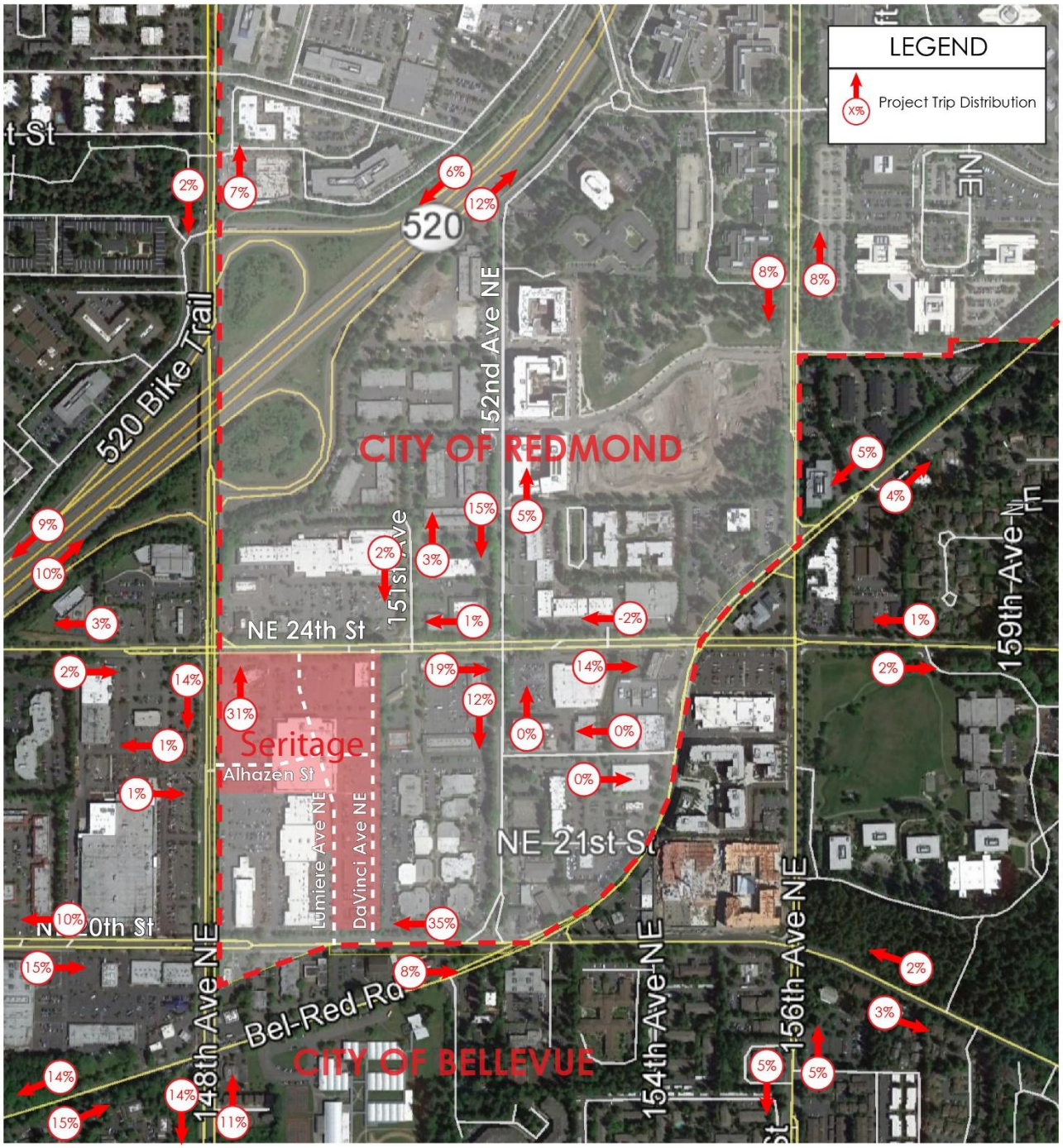

Figure 15: Year 2023 PM Peak Hour Master Plan Buildout Trip Distribution

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Year 2023 Future With Project Traffic Volumes

Our analysis of year 2023 with-project conditions included the following scenarios.

1. 2023 With Project - Full Buildout
2. 2023 With Project - Full Buildout, with a signal at Lumiere/24th
3. 2023 With Project - Phase 1

2023 With Project - Full Buildout Volumes

For 2023 with-project conditions without a signal at Lumiere/24th, Lumiere was assumed to be a right-in, right-out intersection on NE 24th St. Project trips were assigned to Lumiere Ave, NE Alhazen Street, Da Vinci Ave, and to the project driveways based on the location of the proposed site driveways, turn restrictions, and logical routes considering the origins and destinations in the study area.

The AM and PM peak hour project trip assignment at the study intersections and Seritage site access locations for full buildout in 2023 are shown in Appendix E (Figures E1 – E4).

To determine year 2023 with-project volumes at the study intersections for analysis purposes, the existing Seritage trips were removed from the network, and the proposed gross trips and pass-by trips from the proposed Seritage Master Plan were added. Some adjustments were made to the trip assignments for the existing trips from the adjacent Regency parcel to account for the new roadway infrastructure that will be constructed with the proposed Master Plan.

The AM and PM peak hour with-project traffic volumes at the study intersections and Seritage site access locations for full buildout in 2023 are shown in Appendix E (Figures E5 – E8).

2023 With Project - Full Buildout Volumes with Signal at Lumiere

For 2023 with-project conditions with a signal at Lumiere/24th, Lumiere was assumed to allow northbound left turns onto NE 24th Street, but no westbound left turns from NE 24th Street. Volumes were assigned to Lumiere Ave, NE Alhazen Street, Da Vinci Ave, and to the project driveways based on the location of the proposed site driveways, turn restrictions, and logical routes considering the origins and destinations in the study area.

The AM and PM peak hour project trip assignment at the study intersections and Seritage site access locations for full buildout in 2023 <u>with a signal at Lumiere/24th</u> are shown in Appendix F (Figures F1 - F4).

To determine year 2023 with-project volumes at the study intersections for analysis purposes, the existing Seritage trips were removed from the network, and the proposed gross trips and pass-by trips from the proposed Seritage Master Plan were added. Some adjustments were made to the trip assignments for the existing trips from the adjacent Regency parcel to account for the new roadway infrastructure that will be constructed with the proposed Master Plan.

The AM and PM peak hour with-project traffic volumes at the study intersections and Seritage site access locations for full buildout in 2023 <u>with a signal at Lumiere/24th</u> are shown in Appendix F (Figures F5 – F8).

2023 With Project – Phase 1 Volumes

Year 2023 With Project volumes with Phase 1 were estimated similar to Full Buildout volumes, but adjustments were made to account for a more limited roadway network that would be constructed with Phase 1. In addition, traffic from the existing Red Robin restaurant were maintained with Phase 1.

The AM and PM peak hour project trip assignment at the study intersections and Seritage site access locations for Phase 1 in 2023 are shown in Appendix G (Figures G1 – G4).

The AM and PM peak hour with-project traffic volumes at the study intersections and Seritage site access locations for Phase 1 in 2023 are shown in Appendix G (Figures G5 – G8).

Year 2023 With Project Road Network

2023 With Project - Full Buildout Road Network

Note: Specific improvements required for each phase (1, 2, and 3) are included in the Master Plan and Development Agreement.

The future 2023 with-project road network assumed the 2023 baseline road network plus the following improvements:

1. Completion of NE Alhazen Street (including right-of-way dedication, pedestrian facilities, and landscaping) to a 3-lane roadway between 148th Ave NE and Da Vinci Avenue.
2. Completion of Lumiere Ave NE (including right-of-way dedication, pedestrian facilities, and landscaping) to a 2-lane roadway north of NE 20th St and tapering to a 3-lane roadway north of Alhazen Street approaching NE 24th St. For 2023 with-project conditions without a signal at Lumiere/24th, Lumiere was assumed to be a right-in, right-out intersection on NE 24th St.
3. Construction of an interim half-street configuration of Da Vinci Ave that the Seritage project could feasibly construct on property they control (including right-of-way dedication, pedestrian facilities, and landscaping). Between NE 20th Street and NE 24th Street, the interim section will allow for two-way operations with two travel lanes. It should be noted that the alignment of Da Vinci Ave between NE Alhazen St and NE 24th Street will be analyzed further by the City of Redmond and may shift to the east.
4. Widening on NE 24th Street for an eastbound right-turn lane between 148th Ave NE and Lumiere Ave.
5. Construction of a northbound through lane at 148th Ave NE/NE Alhazen St by converting the northbound right turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.
6. Right-of-Way dedications on NE 24th Street and 148th Ave NE to accommodate future widening (this also includes constructing curbs and frontage improvements at their ultimate locations).

Access assumptions (driveways) for full buildout included the following:

1. Parcel A: Right-in, right-out driveway on NE 24th Street and full access driveway on Da Vinci Ave. The driveway on NE 24th Street will include an eastbound right-turn pocket on NE 24th Street.
2. Parcels B/C/D/E/G: Full access driveways on Lumiere north and south of NE Alhazen (south driveway on Parcel F connects to parking below Parcels B/C via a tunnel under NE Alhazen St), a full access driveway to NE Alhazen St, and a right-in, right-out driveway on 148th Ave NE. No parking was assumed to be provided directly on Parcels D/E/F/G.

Based on our forecasted traffic volumes, assumptions for intersection traffic control were made at each study intersection.

The intersection traffic control assumptions used in our analysis of year 2023 full buildout conditions are shown in Figure 16. Channelization assumptions at each study intersection and at the site driveways for full buildout are shown in Figures 17 and 18, with revisions to the existing road network shown in red. Figure 19 shows the conceptual year 2023 layout of roadways in the study area for full buildout conditions showing number of lanes, turn pockets, etc.

2023 With Project - Full Buildout Road Network with Signal at Lumiere

The road network assumptions for full buildout conditions with a signal at Lumiere are the same as those listed above, with exception to the assumption of a traffic signal at Lumiere/24th that will allow northbound left turns onto NE 24th Street, but no westbound left turns from NE 24th Street.

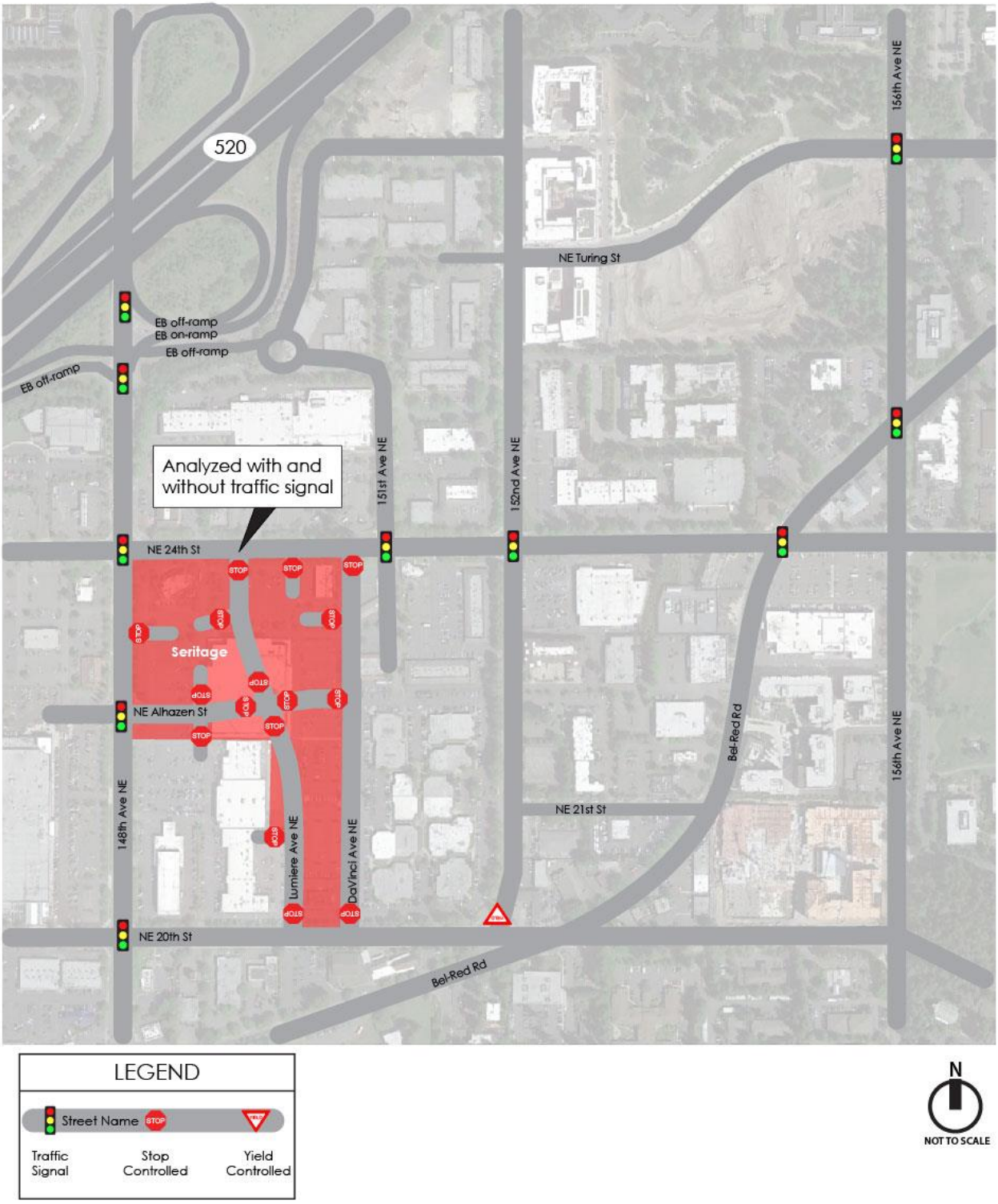


Figure 16: Year 2023 Master Plan Buildout Traffic Control Assumptions

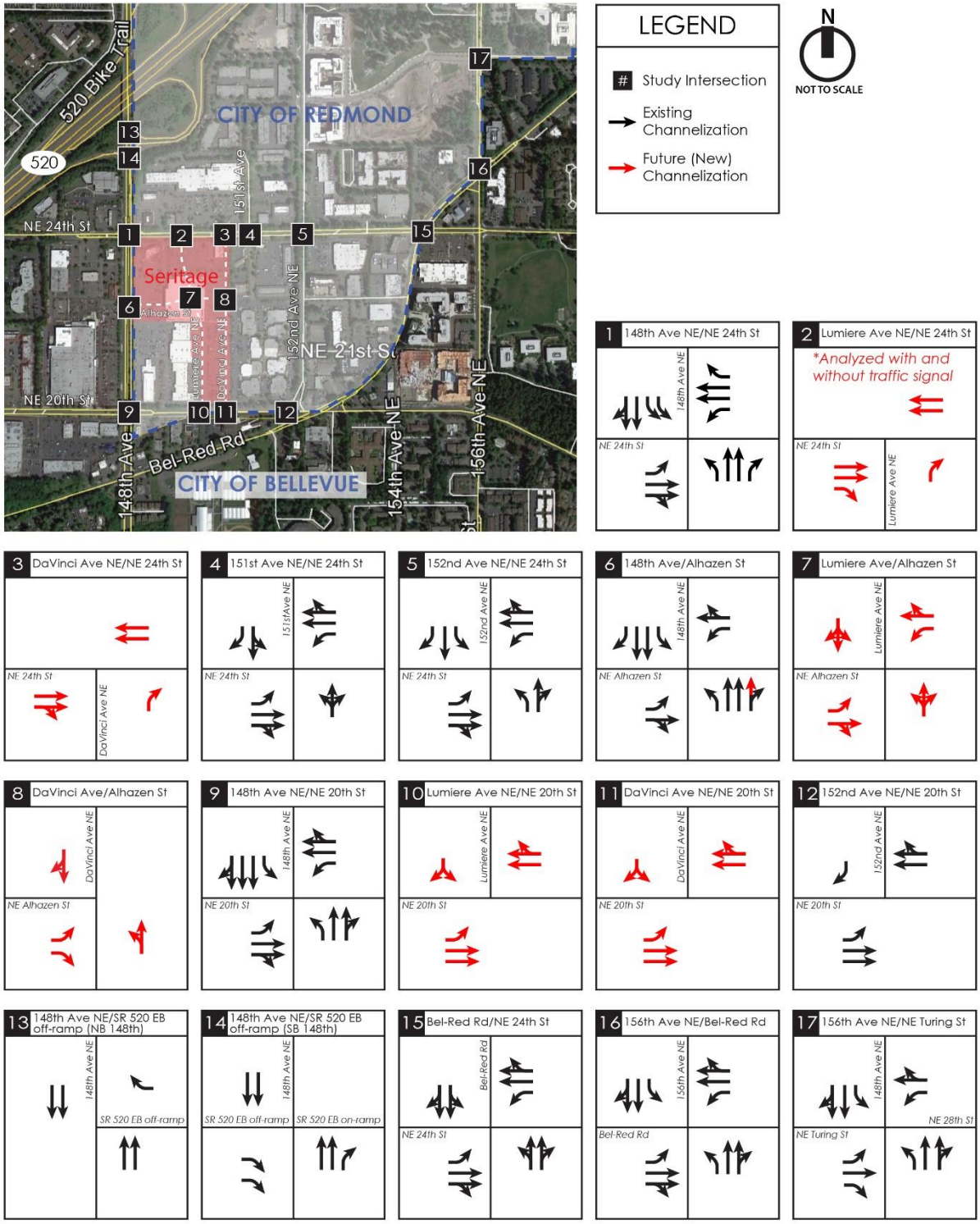


Figure 17: Year 2023 Master Plan Buildout Channelization Assumptions - Study Intersections

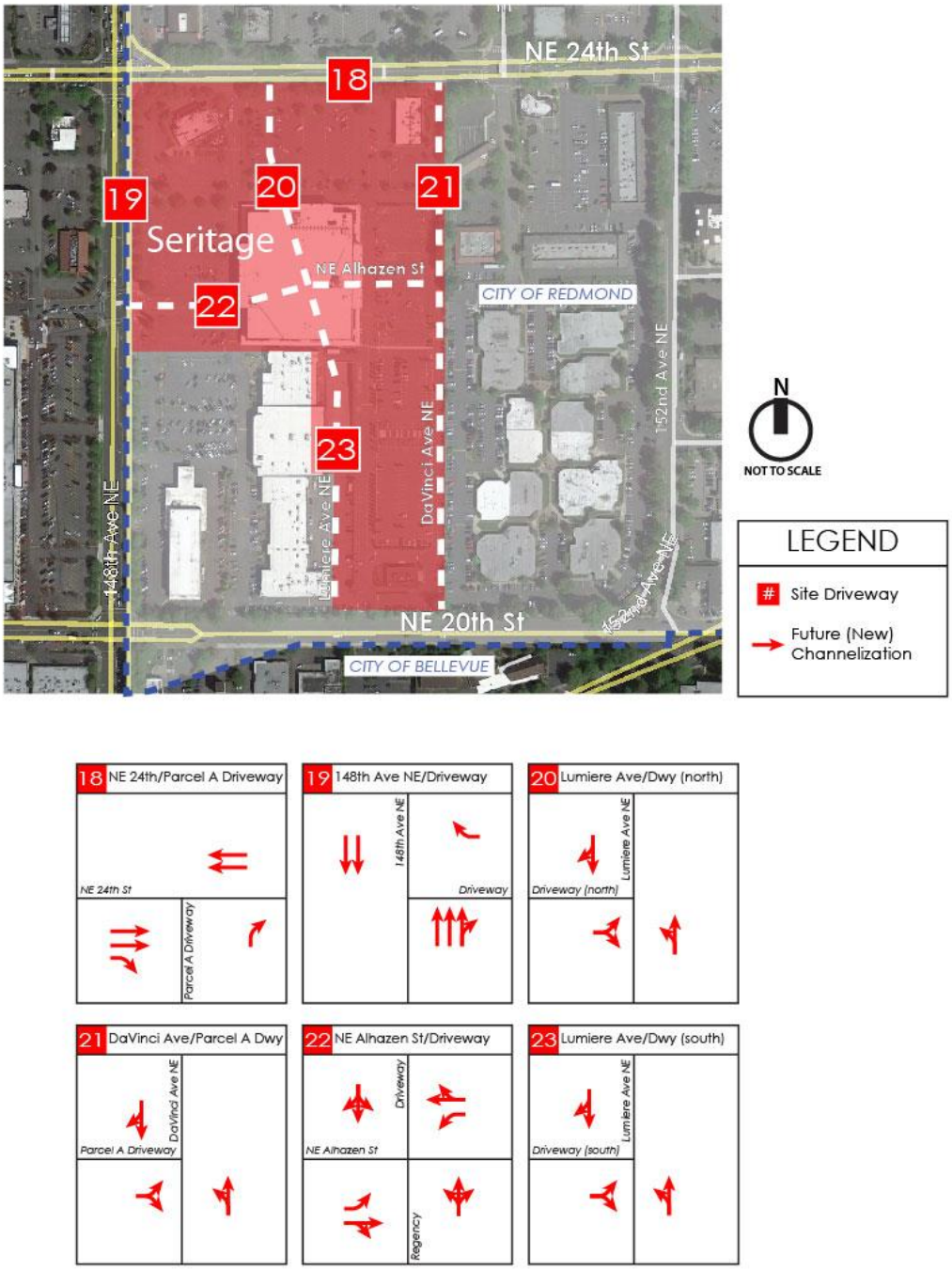


Figure 18: Year 2023 Master Plan Buildout Channelization Assumptions - Driveways

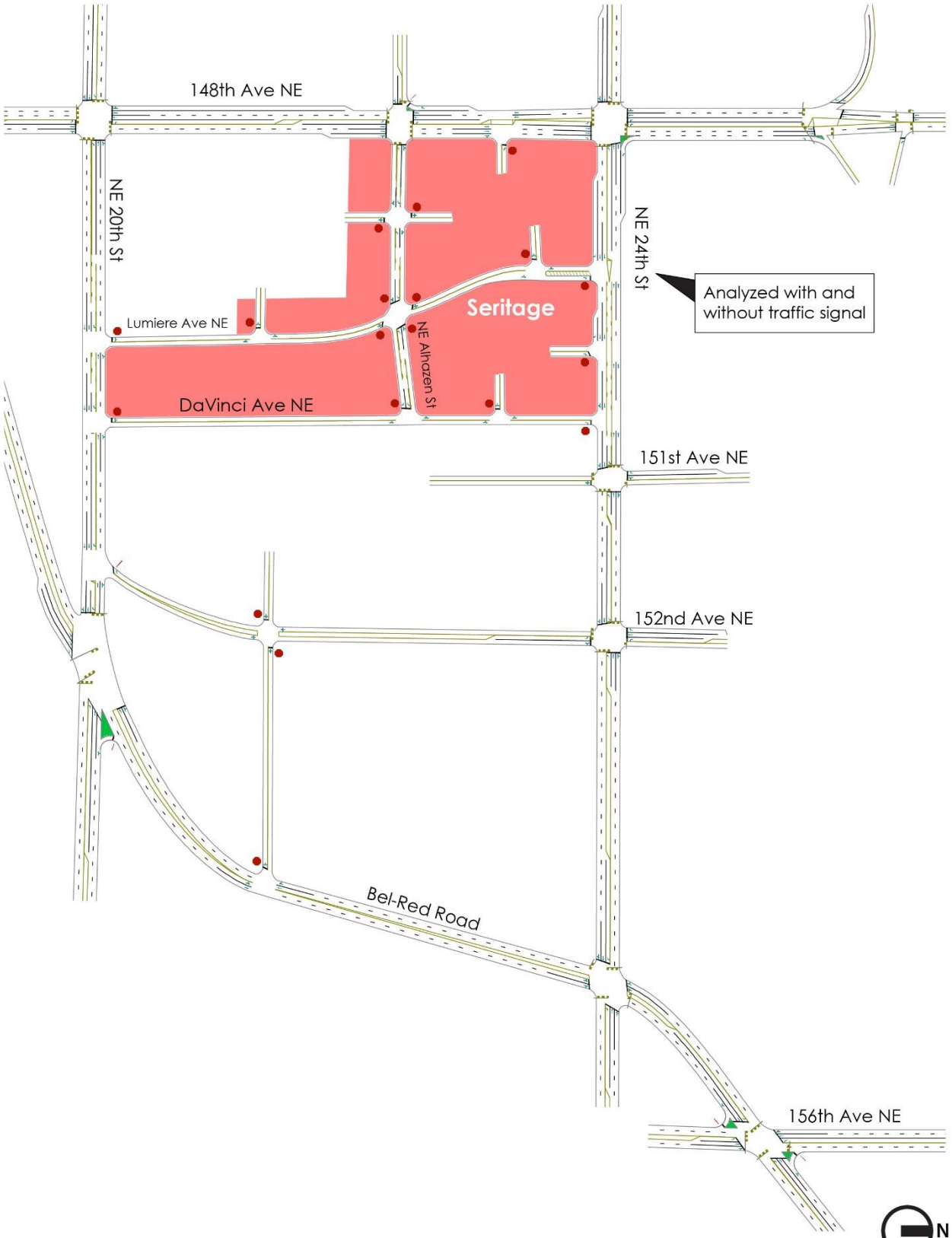


Figure 19: Year 2023 Master Plan Buildout Conceptual Roadway Layout

2023 With Project - Phase 1 Road Network

The road network assumed for the Phase 1 analysis (development of Parcel A and the south end of Parcel G) assumed the 2023 baseline road network plus a portion of the full buildout road network including the following improvements:

- Completion of NE Alhazen Street (including right-of-way dedication, pedestrian facilities, and landscaping) to a 3-lane roadway between 148th Ave NE and Da Vinci Avenue. Connections to existing uses to remain (Regency parcel and Red Robin restaurant) would be provided.
- Completion of Lumiere Ave NE (including right-of-way dedication, pedestrian facilities, and landscaping) between NE Alhazen Street and NE 24th Street with a temporary connection to the existing parking lot south of Parcel A. Lumiere/24th was assumed to be right-in, right-out.
- Construction of an interim half-street configuration of Da Vinci Ave between NE Alhazen St and NE 24th Street (including right-of-way dedication, pedestrian facilities, and landscaping), allowing for two-way operations with two travel lanes. It should be noted that the alignment of Da Vinci Ave in this section will be analyzed further by the City of Redmond and may shift to the east.
- Widening on NE 24th Street for an eastbound right-turn lane between the existing Red Robin driveway and Lumiere Ave.
- Construction of a northbound through lane at 148th Ave NE/NE Alhazen St by converting the northbound right turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.
- Right-of-Way dedication on NE 24th Street along the Phase 1 site (Parcel A) to accommodate future widening.

Access assumptions (driveways) for Phase 1 included the following:

1. Parcel A: Right-in, right-out driveway on NE 24th Street and full access driveway on Da Vinci Ave. The driveway on NE 24th Street will include an eastbound right-turn pocket on NE 24th Street.
2. South end of Parcel G: No new driveway access. It is assumed that the existing building at this location would be redeveloped with access consistent with existing conditions.

The intersection traffic control assumptions used in our analysis of year 2023 Phase 1 conditions are shown in Figure 20. Channelization assumptions at each study intersection and at the site driveways for Phase 1 are shown in Figures 21 and 22, with revisions to the existing road network shown in red. Figure 23 shows the conceptual year 2023 layout of roadways in the study area for Phase 1 conditions showing number of lanes, turn pockets, etc.

Figure 20: Year 2023 Master Plan Phase 1 Traffic Control Assumptions

N
NOT TO SCALE

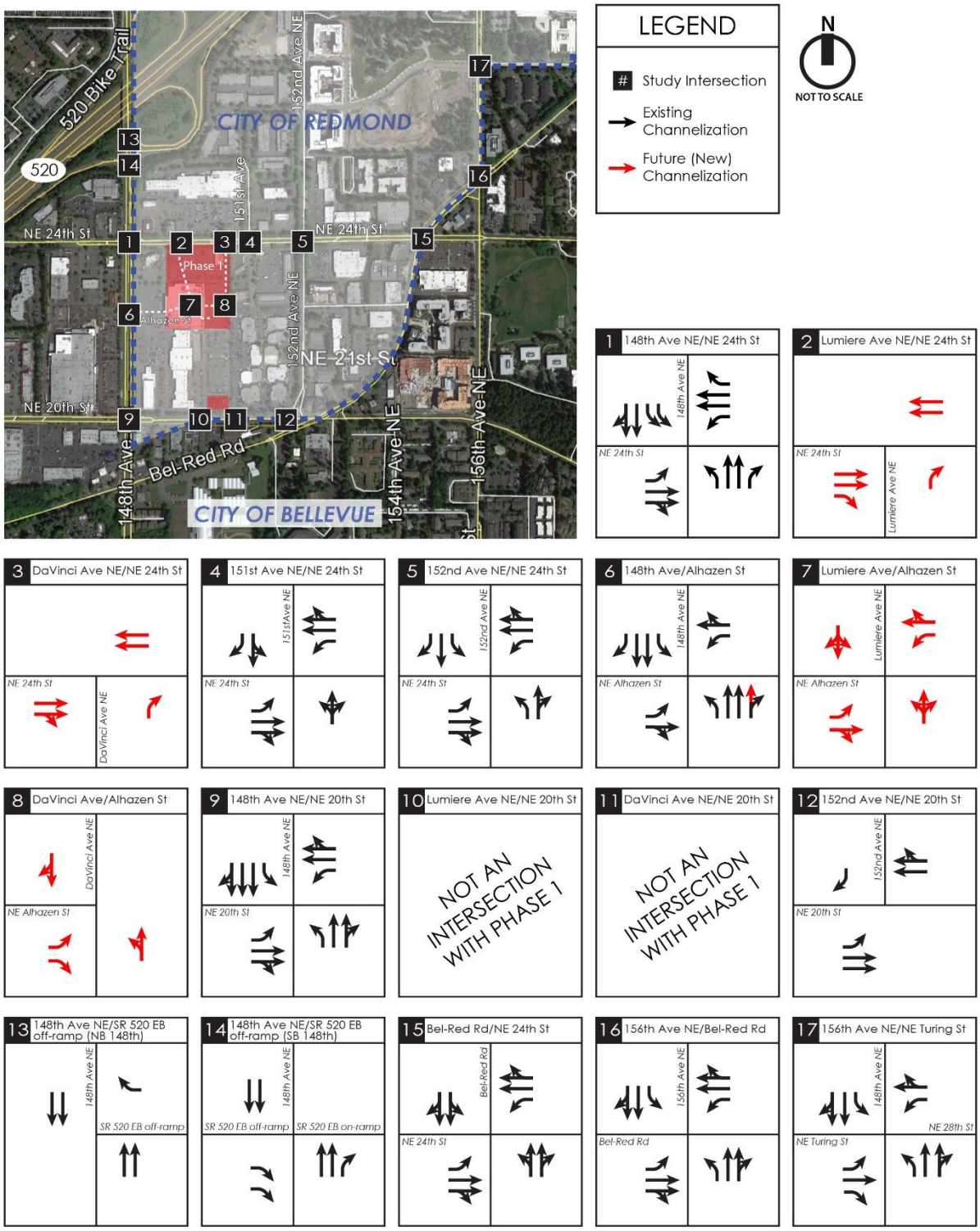


Figure 21: Year 2023 Master Plan Phase 1 Channelization Assumptions - Study Intersections

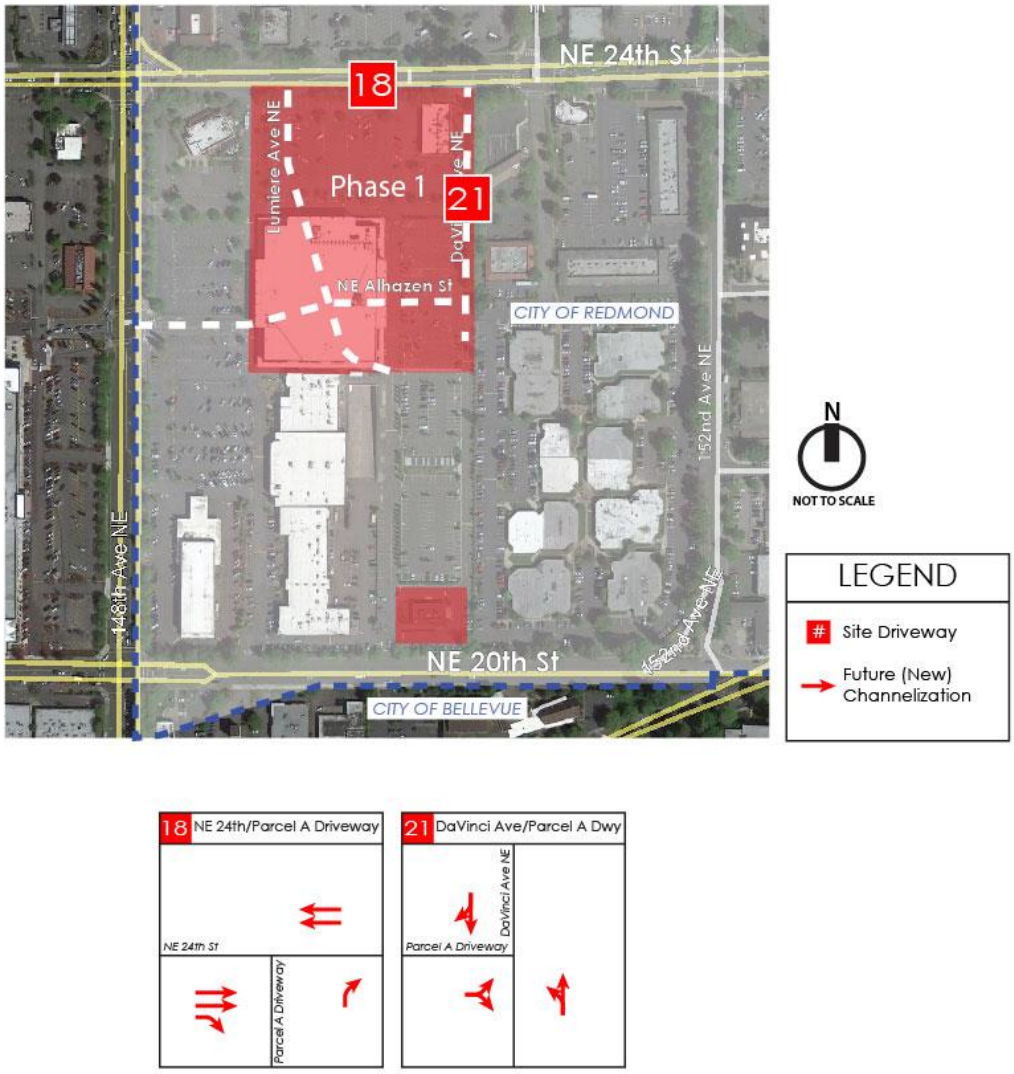


Figure 22: Year 2023 Master Plan Phase 1 Channelization Assumptions - Driveways

Figure 23: Year 2023 Master Plan Phase 1 Conceptual Roadway Layout

Year 2023 Future Level of Service

A future year 2023 AM and PM peak hour Level of Service (LOS) analysis was conducted at the study intersections and site access locations. The LOS analysis was conducted for the following scenarios:

1. 2023 Baseline (Without Project)
2. 2023 With Project - Full Buildout
3. 2023 With Project - Full Buildout, with a signal at Lumiere/24th
4. 2023 With Project - Phase 1

Level of service calculations for stop-controlled intersections were based on methodology and procedures outlined in the *Highway Capacity Manual* (HCM), 6th Edition, Transportation Research Board. LOS at signals was based on *Synchro 10.0* methodology. The initial signal timing and phasing was based on existing conditions, with splits and offsets optimized for each of the 2023 scenarios. Given the future changes in volumes and traffic patterns with or without this project as well as changes to the future year roadway network, using optimized timings for each scenario is warranted and is representative of revised signal timing plans that will need to be implemented in the future. System cycle lengths and coordination along 148th Ave NE and NE 24th Street were maintained when optimizing.

The year 2023 weekday AM peak hour LOS results at the signalized study intersections, stop-controlled study intersections, and stop-controlled site access driveways are summarized in Tables 4 - 6. The year 2023 weekday PM peak hour LOS results at the signalized study intersections, stop-controlled study intersections, and stop-controlled site access driveways are summarized in Tables 7 - 9. The LOS worksheets for 2023 are included in Appendix H.

In the tables, all locations operating at LOS E or F are highlighted in yellow.

Table 4
2023 AM Peak Hour LOS - Signalized Intersections

Study Intersection	Control Type	MOE	LOS and Delay (Overall Intersection) 2023 Without-Project	2023 With-Project	2023 With-Project (Signal at 24th/ Lumiere)	2023 With-Project - Phase 1	Comments
1. 148th Ave NE / NE 24th St	Signal	LOS	C	D	D	C	
		Delay	31.0	39.2	38.4	32.0	
2. Lumiere / NE 24th St	Signal	LOS	-	-	A	-	
		Delay	-	-	6.7	-	
4. 151st Ave NE / NE 24th St	Signal	LOS	B	B	B	B	
		Delay	16.8	17.4	17.3	17.0	
5. 152nd Ave NE / NE 24th St	Signal	LOS	B	C	B	B	
		Delay	19.0	21.0	19.1	18.9	
6. 148th Ave NE / NE Alhazen St	Signal	LOS	A	B	B	A	Operates at LOS C 26.2 with project &
		Delay	8.3	14.7	14.6	9.6	split-phasing with WB LT, LT-TH-RT
9. 148th Ave NE / NE 20th St	Signal	LOS	D	D	D	D	
		Delay	37.9	54.4	54.5	42.9	
13. 148th / SR-520 EB off-ramp (NB)	Signal	LOS	B	B	B	B	
		Delay	15.2	16.8	16.7	15.4	
14. 148th / SR-520 EB off-ramp (SB)	Signal	LOS	A	A	B	A	
		Delay	9.1	9.8	10.3	9.0	
15. Bel-Red Rd / NE 24th St	Signal	LOS	C	C	D	C	
		Delay	33.1	31.8	35.3	34.7	
16. 156th Ave NE / Bel-Red Rd	Signal	LOS	E	E	E	E	Planned improvements include a SB RT lane (not included in this analysis)
		Delay	59.1	65.0	62.5	60.5	
17. 156th / NE Turing / NE 28th	Signal	LOS	B	B	B	B	
		Delay	13.9	12.6	12.5	13.3	

Notes:

Delays are average vehicle delay in sec/veh

MOE = Measure of Effectiveness

LOS E/F highlighted in yellow

OWSC = One Way Stop Control

TWSC = Two Way Stop Control

AWSC = All Way Stop Control

RIRO = Right-in, Right-out

Table 5
2023 AM Peak Hour LOS - Stop Controlled Intersections

Study Intersection	Control Type	MOE	LOS and Delay Worst Approach (OWSC/TWSC) Overall Intersection (AWSC) 2023 Without-Project	2023 With-Project	2023 With-Project (Signal at 24th/ Lumiere)	2023 With-Project - Phase 1	Critical Approach	Comments
2. Lumiere / NE 24th St (RIRO)	OWSC	LOS	-	B	-	B		
		Delay	-	10.5	-	10.0	NB	
3. Da Vinci / NE 24th St (RIRO)	OWSC	LOS	-	B	B	B		
		Delay	-	10.4	10.2	10.2	NB	
7. Lumiere / NE Alhazen St	AWSC	LOS	-	A	A	A		
		Delay	-	8.5	8.4	8.3	Overall	
8. Da Vinci /NE Alhazen St	OWSC	LOS	-	B	B	A		
		Delay	-	10.4	10.4	9.5	EB	
10. Lumiere / NE 20th St	OWSC	LOS	-	C	C	-		
		Delay	-	21.5	21.5	-	SB	
11. Da Vinci / NE 20th St	OWSC	LOS	-	C	C	-		
		Delay	-	17.7	17.7	-	SB	
12. 152nd Ave NE / NE 20th St	Yield	LOS	SB yield	SB yield	SB yield	SB yield		
		Delay	SB yield	SB yield	SB yield	SB yield	SB RT	Yield control

Notes:

Delays are average vehicle delay in sec/veh

MOE = Measure of Effectiveness

LOS E/F highlighted in yellow

OWSC = One Way Stop Control

TWSC = Two Way Stop Control

AWSC = All Way Stop Control

RIRO = Right-in, Right-out

Table 6
2023 AM Peak Hour LOS - Stop Controlled Site Driveways

Site Driveways	Control Type	MOE	LOS and Delay Worst Approach (OWSC/TWSC) Overall Intersection (AWSC) 2023 Without-Project	2023 With-Project	2023 With-Project (Signal at 24th/ Lumiere)	2023 With-Project - Phase 1	Critical Approach	Comments
18. NE 24th / Parcel A Dwy (RIRO)	OWSC	LOS	-	B	B	B		
		Delay	-	10.3	10.1	10.1	NB	
19. 148th Ave NE/ Dwy (RIRO)	OWSC	LOS	-	B	B	-		
		Delay	-	12.1	11.6	-	WB	
20. Lumiere / Driveway (north)	OWSC	LOS	-	B	B	-		
		Delay	-	10.6	11.4	-	EB	
21. Da Vinci / Parcel A Dwy	OWSC	LOS	-	B	B	B		
		Delay	-	10.1	10.1	10.2	EB	
22. Alhazen / Driveway	TWSC	LOS		C	C	-		Existing Regency trips on NB approach.
		Delay	-	18.1	17.2	-	NB	SB Seritage approach operates at LOS B
23. Lumiere / Driveway (south)	OWSC	LOS		B	B	-		
		Delay	-	11.3	11.5	-	EB	

Notes:

Delays are average vehicle delay in sec/veh

MOE = Measure of Effectiveness

LOS E/F highlighted in yellow

OWSC = One Way Stop Control

TWSC = Two Way Stop Control

AWSC = All Way Stop Control

RIRO = Right-in, Right-out

Table 7
2023 PM Peak Hour LOS - Signalized Intersections

Study Intersection	Control Type	MOE	LOS and Delay (Overall Intersection) 2023 Without-Project	2023 With-Project	2023 With-Project (Signal at 24th/ Lumiere)	2023 With-Project - Phase 1	Comments
1. 148th Ave NE / NE 24th St	Signal	LOS	D	E	E	D	Seritage is reserving ROW and setting curbs for planned improvements:
		Delay	50.1	64.9	58.7	50.0	(EB/WB dual lefts, NB TH, NB RT)
2. Lumiere / NE 24th St	Signal	LOS	-	-	B	-	
		Delay	-	-	11.1	-	
4. 151st Ave NE / NE 24th St	Signal	LOS	C	C	C	C	
		Delay	27.1	27.5	27.8	28.0	
5. 152nd Ave NE / NE 24th St	Signal	LOS	C	C	C	C	
		Delay	31.5	33.3	32.9	33.1	
6. 148th Ave NE / NE Alhazen	Signal	LOS	B	C	C	B	Operates at LOS D 38.1 with project &
		Delay	15.5	24.1	23.8	17.3	split-phasing with WB LT, LT-TH-RT
9. 148th Ave NE / NE 20th St	Signal	LOS	F	F	F	F	COB/COR planned improvements: EB/WB dual LT and additional NB TH.
		Delay	81.1	105.9	105.8	89.8	KCCLE required to add NB RT.
13. 148th / SR-520 EB off-ramp (NB)	Signal	LOS	A	A	A	A	
		Delay	7.0	7.4	7.3	7.0	
14. 148th / SR-520 EB off-ramp (SB)	Signal	LOS	A	A	A	A	
		Delay	6.7	8.2	8.2	7.1	
15. Bel-Red Rd / NE 24th St	Signal	LOS	C	C	C	C	
		Delay	30.1	32.3	34.0	31.7	
16. 156th Ave NE / Bel-Red Rd	Signal	LOS	D	D	D	D	
		Delay	45.3	45.8	45.8	45.7	
17. 156th / NE Turing / NE 28th	Signal	LOS	B	B	B	B	
		Delay	18.3	18.8	18.8	18.3	

Notes:

Delays are average vehicle delay in sec/veh

MOE = Measure of Effectiveness

LOS E/F highlighted in yellow

OWSC = One Way Stop Control

TWSC = Two Way Stop Control

AWSC = All Way Stop Control

RIRO = Right-in, Right-out

Table 8
2023 PM Peak Hour LOS - Stop Controlled Intersections

Study Intersection	Control Type	MOE	LOS and Delay Worst Approach (OWSC/TWSC) Overall Intersection (AWSC) 2023 Without-Project	2023 With-Project	2023 With-Project (Signal at 24th/ Lumiere)	2023 With-Project - Phase 1	Critical Approach	Comments
2. Lumiere / NE 24th St (RIRO)	OWSC	LOS	-	B	-	B		
		Delay	-	13.8	-	11.6	NB	
3. Da Vinci / NE 24th St (RIRO)	OWSC	LOS	-	B	B	B		
		Delay	-	12.4	12.6	11.8	NB	
7. Lumiere / NE Alhazen St	AWSC	LOS	-	A	A	A		
		Delay	-	9.3	9.3	9.7	Overall	
8. Da Vinci /NE Alhazen St	OWSC	LOS	-	B	B	B		
		Delay	-	12.6	12.6	11.0	EB	
10. Lumiere / NE 20th St	OWSC	LOS	-	E	E	-		Consider installing signal if/when warranted
		Delay	-	47.8	47.8	-	SB	Not warranted in 2023
11. Da Vinci / NE 20th St	OWSC	LOS	-	D	D	-		
		Delay	-	27.7	27.7	-	SB	
12. 152nd Ave NE / NE 20th St	Yield	LOS	SB yield	SB yield	SB yield	SB yield		
		Delay	SB yield	SB yield	SB yield	SB yield	SB RT	Yield control

Notes:

Delays are average vehicle delay in sec/veh

MOE = Measure of Effectiveness

LOS E/F highlighted in yellow

OWSC = One Way Stop Control

TWSC = Two Way Stop Control

AWSC = All Way Stop Control

RIRO = Right-in, Right-out

Table 9
2023 PM Peak Hour LOS - Stop Controlled Site Driveways

Site Driveways	Control Type	MOE	LOS and Delay Worst Approach (OWSC/TWSC) Overall Intersection (AWSC) 2023 Without-Project	2023 With-Project	2023 With-Project (Signal at 24th/ Lumiere)	2023 With-Project - Phase 1	Critical Approach	Comments
18. NE 24th / Parcel A Dwy (RIRO)	OWSC	LOS	-	B	B	B		
		Delay	-	12.1	11.6	11.5	NB	
19. 148th Ave NE/ Dwy (RIRO)	OWSC	LOS	-	C	B	-		
		Delay	-	15.7	13.3	-	WB	
20. Lumiere / Driveway (north)	OWSC	LOS	-	B	B	-		
		Delay	-	11.0	13.4	-	EB	
21. Da Vinci / Parcel A Dwy	OWSC	LOS	-	B	B	B		
		Delay	-	11.8	11.8	12.7	EB	
22. Alhazen / Driveway	TWSC	LOS	-	D	C	-		Existing Regency trips on NB approach
		Delay	-	30.9	24.7	-	NB	SB Seritage approach operates at LOS C
23. Lumiere / Driveway (south)	OWSC	LOS	-	B	B	-		
		Delay	-	10.8	10.9	-	EB	

Notes:

Delays are average vehicle delay in sec/veh

MOE = Measure of Effectiveness

LOS E/F highlighted in yellow

OWSC = One Way Stop Control

TWSC = Two Way Stop Control

AWSC = All Way Stop Control

RIRO = Right-in, Right-out

The following locations operating at LOS E/F were discussed with City staff after the initial submittal of the traffic study to confirm whether project mitigation is required based on the results of the LOS analysis:

- 148th Ave NE/NE 24th Street: In the PM peak hour, this intersection is forecasted to operate at LOS D in the baseline, LOS E with full buildout of the project, and at LOS D with Phase 1 of the project. The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. Seritage will dedicate right-of-way and set the ultimate curbs on 148th and NE 24th Street to accommodate these future improvements. To fully implement these improvements, the City will require right-of-way from the other 3 corners of the intersection. Based on discussions with the City, no additional mitigation at this location will be required.
- 148th Ave NE/NE 20th Street: In the PM peak hour, this intersection is forecasted to operate at LOS F in the baseline, with full buildout of the project, and with Phase 1 of the project. The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. The KCCLE Development Agreement includes mitigation at this intersection. Consistent with the KCCLE DA requirement, Seritage will construct a northbound right turn lane when the cumulative total net new trip generation reaches 335 net new AM peak hour trips (regardless of Phase), so long as KCCLE has not already constructed the improvement, construction of the northbound right turn lane is feasible, and the construction of the mitigation is required under the same terms that KCCLE would be required to implement this mitigation.
- 156th Ave NE/NE Bel-Red Road: In the AM peak hour, this intersection is forecasted to operate at LOS E in the baseline, with full buildout of the project, and with Phase 1 of the project. The City of Redmond has planned improvements at this intersection including a southbound right-turn lane. The southbound right-turn lane is a mitigation requirement in the Microsoft Development Agreement and Group Health (Esterra Park) Development Agreement. After further review of project impacts (volumes, delay, and queuing), the City confirmed that although the impact of the Seritage traffic is measurable, it is not significant enough to warrant having a third commitment in place to construct this right-turn lane.
- Lumiere Ave NE/NE 20th Street: In the PM peak hour, the southbound approach at this intersection is forecasted to operate at LOS E with full buildout of the project. This is a new intersection that will be constructed with this project, and a traffic signal would not be warranted based on the year 2023 forecasts. Seritage will construct the intersection in a manner that will accommodate a future traffic signal that could be constructed by others if/when warranted.

Year 2023 Queuing Analysis

A future year 2023 queue analysis was conducted the study intersections and site driveways for the following scenarios:

1. 2023 Baseline (Without Project)
2. 2023 With Project - Full Buildout
3. 2023 With Project - Full Buildout, with a signal at Lumiere/24th
4. 2023 With Project - Phase 1

The queues are 95th percentile queues reported by *Synchro* which represent a condition that is exceeded 5 percent of the time. The weekday AM and PM peak hour queue results by lane for the study intersections are summarized in the tables in Appendix I. The *Synchro* queue worksheets are also included in Appendix I. In the tables, the queue results that exceed the available queue storage are highlighted in yellow.

The following locations with queues that exceed the available queue storage were discussed with City staff after the initial submittal of the traffic study to confirm whether project mitigation is required based on the results of the queuing analysis (Note: Some of these locations overlap with the discussion of LOS E/F intersections included in the previous section):

- 148th Ave NE/NE 24th Street: Multiple lane groups at this intersection have estimated 95th percentile queues that are expected to exceed the available queue storage in both the AM and PM peak hours. The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. Seritage will dedicate right-of-way and set the ultimate curbs on 148th and NE 24th Street to accommodate these future improvements. To fully implement these improvements, the City will require right-of-way from the other 3 corners of the intersection. Based on discussions with the City, no additional mitigation at this location will be required.
- 151st Pl NE/NE 24th Street: The southbound left-through lane at this intersection has 95th percentile queues that will extend beyond the driveway to the adjacent Safeway development in the AM and PM peak hours (with or without the project). Also, the westbound through movement has a queue that extends beyond 152nd Ave NE in the PM peak hour (with a signal at Lumiere). Based on discussions with the City, the project does not have a significant impact at this intersection that would warrant mitigation.
- 152nd Ave NE/NE 24th Street: The eastbound left-turn lane at this intersection has 95th percentile queues that will exceed the available queue storage in the AM and PM peak hours (with or without the project). Both Sound Transit and Group Health (Esterra Park) are required to improve this intersection (Sound Transit improvements are accounted for in our analysis). Based on discussions with the City, the project does not have a significant impact at this intersection that would warrant mitigation.
- 148th Ave NE/NE Alhazen Street: The southbound left-turn lane at this intersection has 95th percentile queues that will exceed the available queue storage in the AM and PM peak hours (with full buildout of the project). Also, the eastbound left and northbound through have queues that extend beyond the queue storage. The City of Bellevue and City of Redmond have a planned improvement at this intersection that includes an additional northbound through lane. As mitigation, Seritage will widen 148th Ave NE to accommodate the additional northbound through lane by converting the northbound right-turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen. In addition, for any development beyond Phase 1, Seritage will conduct observations and an analysis to determine if the southbound left-turn lane queue storage on 148th Ave NE will be exceeded. If the queue exceeds storage and if desired by the City, Seritage will stripe an interim westbound left turn lane on NE 24th Street at Lumiere Avenue while maintaining eastbound left turns to the Safeway property at the traffic signal at 151st Avenue NE.
- 148th Ave NE/NE 20th Street: Multiple lane groups at this intersection have estimated 95th percentile queues that are expected to exceed the available queue storage, primarily in the PM peak hour (with or without the project). The City of Bellevue and City of Redmond have planned

improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. The KCCLE Development Agreement includes mitigation at this intersection. Consistent with the KCCLE DA requirement, Seritage will construct a northbound right turn lane when the cumulative total net new trip generation reaches 335 net new AM peak hour trips (regardless of Phase), so long as KCCLE has not already constructed the improvement, construction of the northbound right turn lane is feasible, and the construction of the mitigation is required under the same terms that KCCLE would be required to implement this mitigation.

- Bel-Red Road/NE 24th Street: The eastbound left-turn lane at this intersection has 95th percentile queues that will exceed the available queue storage in the AM peak hour (with or without the project). Group Health (Esterra Park) is required to improve this intersection by adding a southbound right-turn lane. Based on discussions with the City, the project does not have a significant impact at this intersection that would warrant mitigation.
- 156th Ave NE/NE Bel-Red Road: The eastbound left-turn lane and northbound through lanes at this intersection have 95th percentile queues that will exceed the available queue storage in the AM peak hour (with or without the project). The City of Redmond has planned improvements at this intersection including a southbound right-turn lane. The southbound right-turn lane is a mitigation requirement in the Microsoft Development Agreement and Group Health (Esterra Park) Development Agreement. After further review of project impacts (volumes, delay, and queuing), the City confirmed that although the impact of the Seritage traffic is measurable, it is not significant enough to warrant having a third commitment in place to construct the right-turn lane.

Year 2023 Pedestrian, Bicycle, and Transit Network

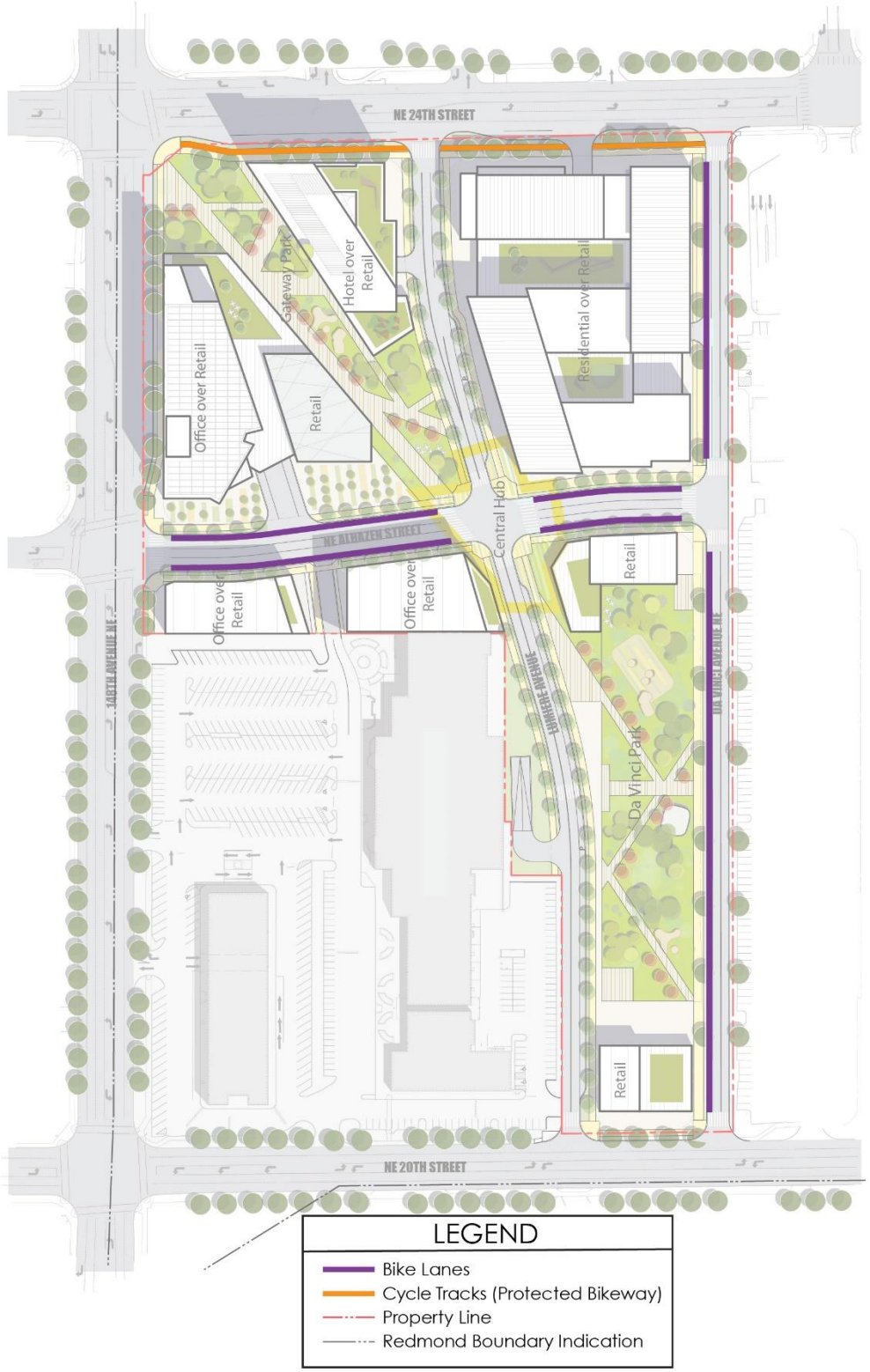
The proposed Seritage Overlake Plaza Master Plan will include the construction of new pedestrian and bicycle facilities that will be part of a larger multimodal network planned by the City. Connections to existing and future transit will be enhanced with these pedestrian and bicycle improvements.

The proposed system of pedestrian, bicycle, and transit facilities in the immediate study area assuming full buildout of the Master Plan in 2023 is illustrated in Figures 24, 25, and 26. The Master Plan and Development Agreement will include the final street sections including locations and dimensions of all sidewalks, urban pathways, and bike lanes. It will also indicate which facilities will be constructed with Phase 1 and Full Buildout. If there are any conflicts between this Traffic Study and the Master Plan/Development Agreement, the Master Plan and Development Agreement will govern.

Transportation Concurrency and Impact Fees

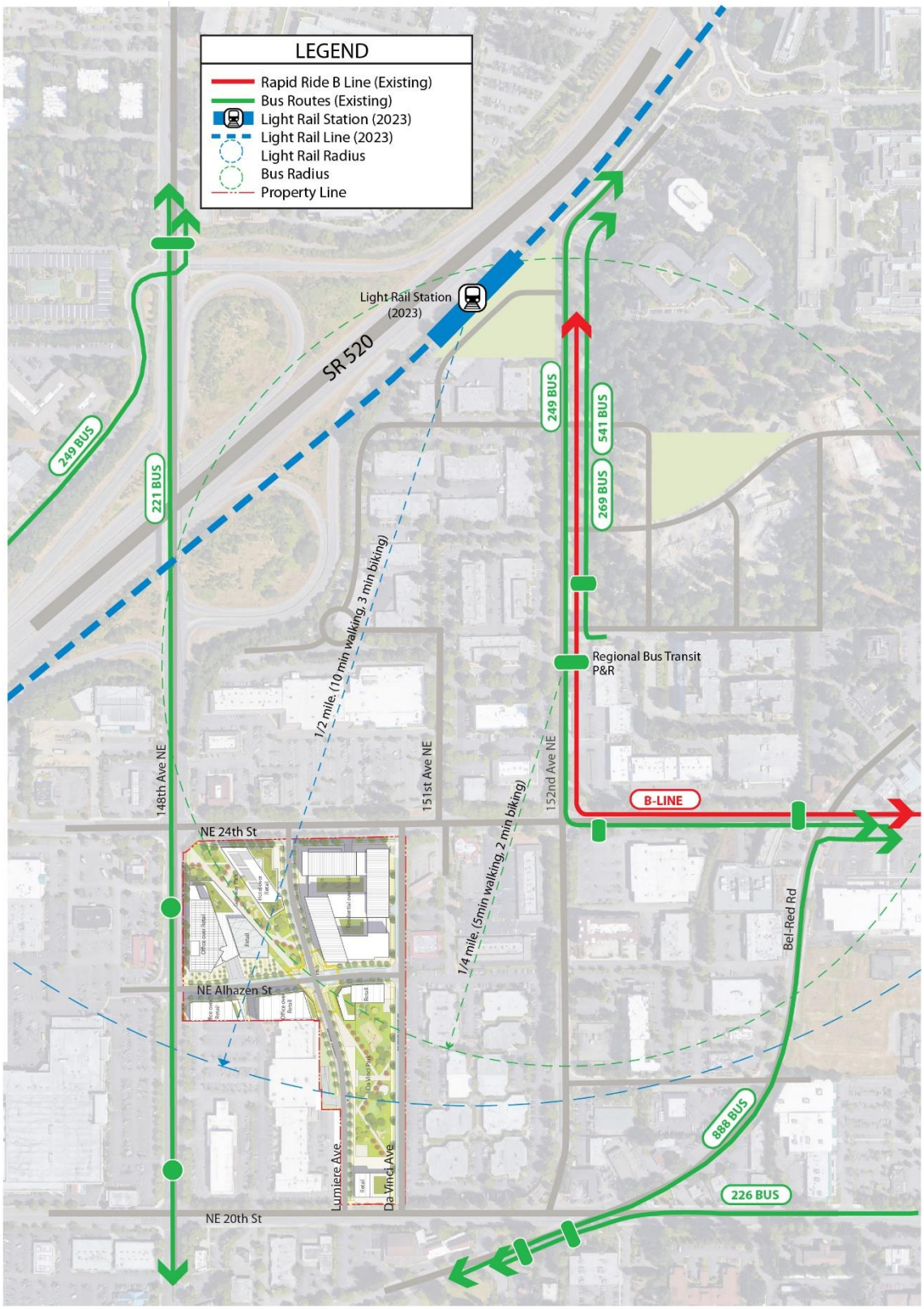
Transportation concurrency and transportation impact fees for City of Redmond developments are determined based on an assessment of Person-Miles Travelled (PMT), or Mobility Unit (MU) demand, where 1 PMT = 1 MU. It is assumed that MU demand for the proposed development will be calculated based on the City of Redmond's *Multimodal Plan-Based Concurrency System Administrative Guidelines* in effect at the time of permit application. The applicant may also choose to conduct an independent calculation for mobility unit demand and impact fees as allowed by Redmond Municipal Code (RMC 3.10.120) and as described in the City's *Multimodal Plan-Based Concurrency System Administrative Guidelines*. The calculations for impact fees will also need to account for credits associated with transportation infrastructure being provided by this project. No detailed MU or impact fee calculations are included in this study. Additional information may be found in the Development Agreement.

Figure 24: Year 2023 Pedestrian Facilities



N
NOT TO SCALE

Figure 25: Year 2023 Bicycle Facilities



Note: Future 2023 bus routes/stops to be determined.

Figure 26: Year 2023 Transit Facilities

MITIGATION

Note: More detailed descriptions and mitigation requirements will be included in the Development Agreement. If the Development Agreement and Traffic Study conflict, the Development Agreement will govern.

City of Redmond Mitigation

On-site and off-site improvements and mitigation are shown on Figures 27 and 28, and are described below.

On-Site Improvements (Roads/Access/Frontage)

Note: Specific roadway sections including travel lanes, bicycle facilities, on-street parking, pedestrian facilities, and landscaping will be included in the Master Plan and/or Development Agreement.

Phase 1 On-Site Improvements

- Construction of NE Alhazen Street (including right-of-way dedication, pedestrian facilities, and landscaping) to a 3-lane roadway between 148th Ave NE and Da Vinci Avenue. Interim connections to existing uses to remain (Regency parcel, Red Robin restaurant, parking lot south of Parcel A) would be provided with Phase 1.
- Construction of Lumiere Ave NE (including right-of-way dedication, pedestrian facilities, and landscaping) between NE Alhazen Street and NE 24th Street. Lumiere would taper from a 2-lane roadway to a 3-lane roadway approaching NE 24th St. South of Alhazen, Lumiere would consist of a temporary connection to the existing parking lot south of Parcel A for Phase 1.
- Construction of an interim half-street configuration of Da Vinci Ave between NE Alhazen St and NE 24th Street (including right-of-way dedication, pedestrian facilities, and landscaping). The interim section will allow for two-way operations with two travel lanes. South of Alhazen, Da Vinci would consist of a temporary connection to the existing parking lot south of Parcel A for Phase 1. It should be noted that the alignment of Da Vinci Ave in this section will be analyzed further by the City of Redmond and may shift to the east.
- Widening on NE 24th Street for an eastbound right-turn lane between the existing Red Robin driveway and Lumiere Ave.
- Widening on NE 24th Street for an eastbound right-turn pocket at the Parcel A driveway on NE 24th Street.
- Right-of-Way dedication on NE 24th Street between Lumiere Ave and Da Vinci Ave (Parcel A frontage) to accommodate future widening and improvements planned by the City of Redmond.
- Frontage improvements on NE 24th Street between Lumiere Ave and Da Vinci Ave (Parcel A frontage), including constructing curbs and frontage improvements at their ultimate location.
- Frontage improvements on NE 20th Street along the Parcel G frontage.
- Future signalization is planned by the City at Lumiere Ave NE/NE 24th Street to accommodate a future pedestrian crossing on NE 24th Street. For Phase 1, Seritage will construct a stop-controlled intersection at Lumiere/24th (right-in, right-out). A signal is not required with Phase 1 of the Master Plan project; however, the intersection will be designed in a manner that will accommodate a future signal if/when warranted.
- Future signalization may be required at either Lumiere Ave NE/NE Alhazen St or at Da Vinci Ave NE/NE Alhazen St (if/when signal warrants are met). Seritage will construct an all-way

stop-controlled intersection at Lumiere/Alhazen with Phase 1, and an eastbound stop controlled intersection at Da Vinci/Alhazen with Phase 1. A signal(s) is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted.

Full Buildout On-Site Improvements (Phases 1, 2 and 3)

Note: Specific improvements required for each phase (1, 2, and 3) are included in the Master Plan and Development Agreement.

- Construction of NE Alhazen Street (including right-of-way dedication, pedestrian facilities, and landscaping) to a 3-lane roadway between 148th Ave NE and Da Vinci Avenue (with Phase 1).
- Construction of Lumiere Ave NE (including right-of-way dedication, pedestrian facilities, and landscaping) between NE 20th Street and NE 24th Street (with Phases 1 and 3). Lumiere would be a 2-lane roadway between NE 20th St and NE Alhazen Street. North of Alhazen St, Lumiere would taper from a 2-lane roadway to a 3-lane roadway approaching NE 24th St.
- Construction of an interim half-street configuration of Da Vinci Ave between NE 20th Street and NE 24th Street (including right-of-way dedication, pedestrian facilities, and landscaping, with Phases 1 and 3). The interim section will allow for two-way operations with two travel lanes. It should be noted that the alignment of Da Vinci Ave between NE Alhazen St and NE 24th Street will be analyzed further by the City of Redmond and may shift to the east.
- Construction of a shared street within a 40-foot right-of-way connecting the Regency property to NE Alhazen Street east of 148th Ave NE (with Phase 3).
- Widening on NE 24th Street for an eastbound right-turn lane between 148th Ave NE and Lumiere Ave (with Phases 1 and 2).
- Widening on NE 24th Street for an eastbound right-turn pocket at the Parcel A driveway on NE 24th Street (with Phase 1).
- Right-of-Way dedication on NE 24th Street to accommodate future widening and improvements planned by the City of Redmond (with Phases 1 and 2).
- Frontage improvements on NE 24th Street between 148th Ave NE and Da Vinci Ave including constructing curbs and frontage improvements at their ultimate locations (with Phases 1 and 2).
- Right-of-Way dedication on 148th Ave NE to accommodate future widening and improvements planned by the City of Redmond (with Phases 1, 2, and 3).
- Frontage improvements on 148th Ave NE between NE 24th Street and Seritage's south property line, including constructing curbs and frontage improvements at their ultimate locations (with Phases 1, 2, and 3).
- Frontage improvements on NE 20th Street between Lumiere Ave and Da Vinci Ave (with Phase 1, assuming development occurs on south end of Parcel G).
- Future signalization is planned by the City at Lumiere Ave NE/NE 24th Street to accommodate a future pedestrian crossing on NE 24th Street. Before constructing any development beyond Phase 1, Seritage will conduct a study to determine if estimated pedestrian volumes trigger the need for the signal.
- Future signalization may be required at either Lumiere Ave NE/NE Alhazen St or at Da Vinci Ave NE/NE Alhazen St (if/when signal warrants are met). Seritage will construct an all-way

stop-controlled intersection at Lumiere/Alhazen, and an eastbound stop controlled intersection at Da Vinci/Alhazen with Phase 1. A signal(s) is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted.

- Future signalization may be required at either Lumiere Ave NE/NE 20th Street or Da Vinci Ave NE/NE 20th St (if/when signal warrants are met). Seritage will construct stop-controlled intersections at both locations with Phase 3. A signal(s) is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted.

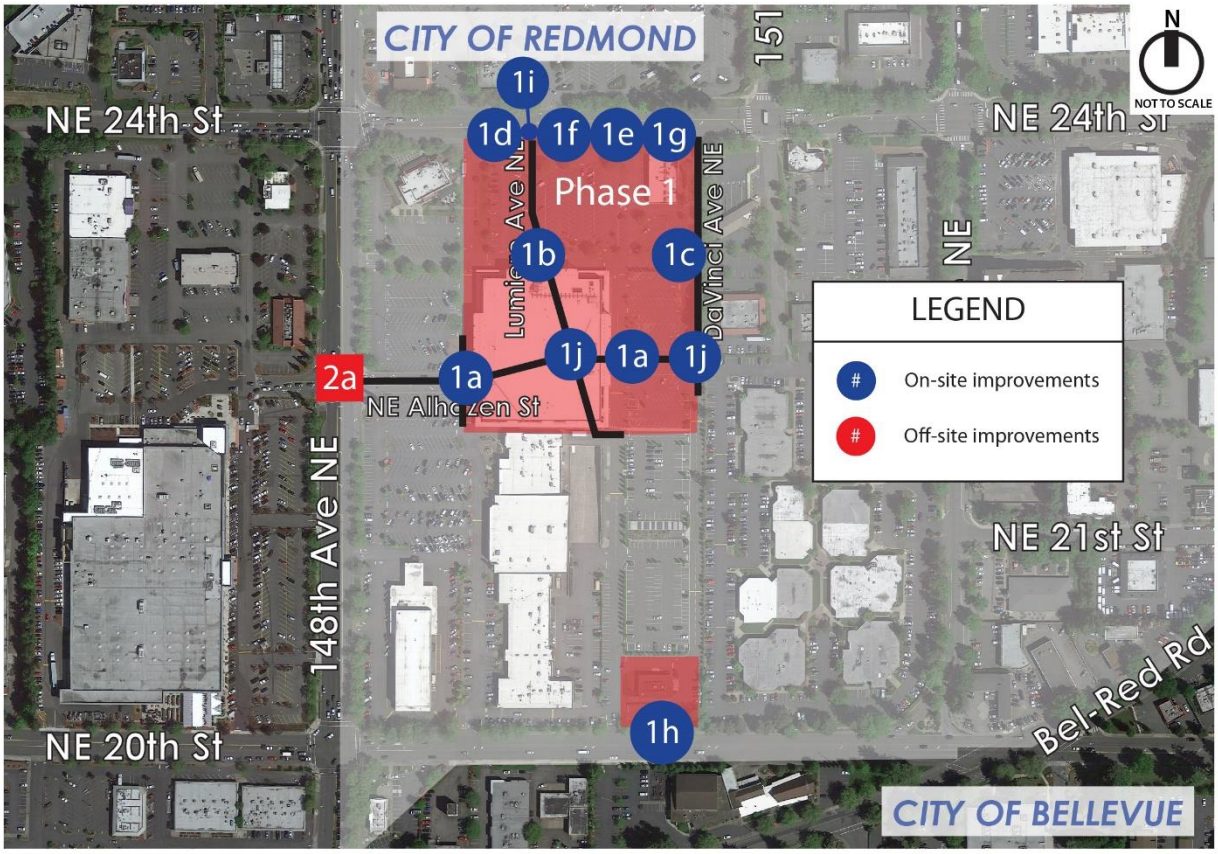
Off-Site Mitigation

Phase 1 Off-Site Mitigation

- 148th Ave NE/NE Alhazen Street: The City of Bellevue and City of Redmond have a planned improvement at this intersection that includes an additional northbound through lane. As mitigation, Seritage will widen 148th Ave NE to accommodate the additional northbound through lane by converting the northbound right-turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.

Full Buildout Off-Site Mitigation

- 148th Ave NE/NE 24th Street. The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. Seritage will dedicate right-of-way and set the ultimate curbs on 148th and NE 24th Street to accommodate these future improvements in Phase 2. Based on discussions with the City, no additional mitigation at this location will be required.
- 148th Ave NE/NE 20th Street: The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes. The KCCLE Development Agreement includes mitigation at this intersection. Consistent with the KCCLE DA requirement, Seritage will construct a northbound right turn lane when the cumulative total net new trip generation reaches 335 net new AM peak hour trips (regardless of Phase), so long as KCCLE has not already constructed the improvement, construction of the northbound right turn lane is feasible, and the construction of the mitigation is required under the same terms that KCCLE would be required to implement this mitigation.
- 148th Ave NE/NE Alhazen Street: The City of Bellevue and City of Redmond have a planned improvement at this intersection that includes an additional northbound through lane. As mitigation, for Phase 1, Seritage will widen 148th Ave NE to accommodate the additional northbound through lane by converting the northbound right-turn lane to a shared through-right lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.
- Lumiere Ave NE/NE 24th Street: For any development beyond Phase 1, Seritage will conduct observations and an analysis to determine if the southbound left-turn lane queue storage on 148th Ave NE at NE Alhazen Street will be exceeded. If the queue exceeds storage and if desired by the City, Seritage will stripe an interim westbound left turn lane on NE 24th Street at Lumiere Avenue while maintaining eastbound left turns to the Safeway property at the traffic signal at 151st Avenue NE. If needed, this improvement at Lumiere/24th will alleviate southbound left-turn queuing at 148th/Alhazen.



1a Alhazen: Construct 3-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) from 148th to Da Vinci with interim connections to existing uses to remain.

1b Lumiere: Construct 2-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) tapering to 3 lanes approaching 24th with connection to parking lot south of Alhazen.

1c DaVinci: Construct an interim 2-lane, 2-way half-street roadway (including ROW dedication, pedestrian facilities, and landscaping) from 24th to Alhazen with connection to existing parking south of Alhazen.

1d Widening along 24th to include eastbound right-turn lane to Lumiere.

1e Widening along 24th to include eastbound right-turn pocket at Parcel A driveway.

1f ROW dedication along 24th between Lumiere and Da Vinci to accommodate City's future imporvements on 24th.

1g Frontage improvements along 24th between Lumiere and Da Vinci.

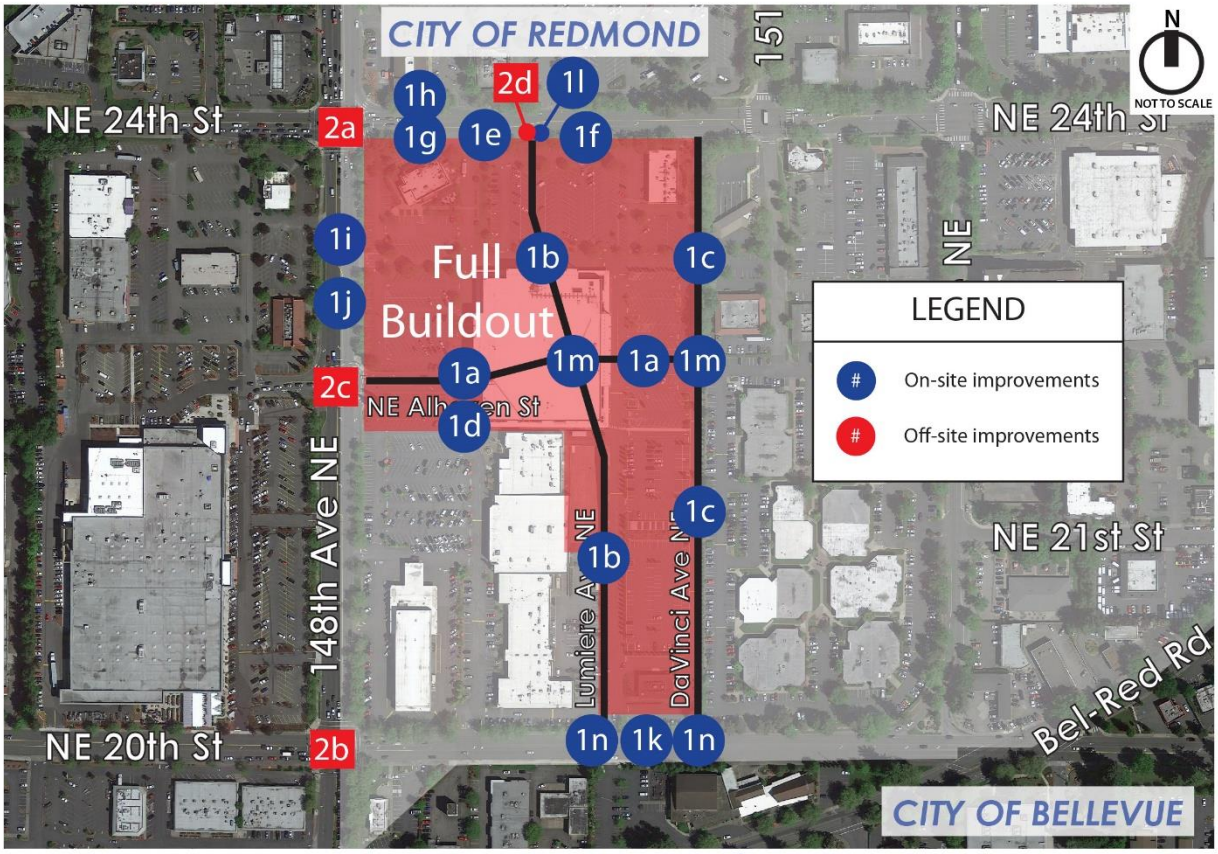
1h Frontage improvements along 20th (extent of Parcel G frontage).

1i Construct a stop-controlled intersection at Lumiere/24th and design to accommodate potential future signal.

1j Design intersections of Lumiere/Alhazen and Da Vinci/Alhazen to accommodate future signal to be built by others if/when warranted.

2a 148th/Alhazen: Widen 148th to accommodate City's planned additional NB through lane by converting NB right-turn lane to shared through-right lane.

Figure 27: Proposed Master Plan Phase 1 Improvements



- **1a** Alhazen: Construct 3-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) from 148th to Da Vinci.
- **1b** Lumiere: Construct 2-lane roadway (including ROW dedication, pedestrian facilities, and landscaping) from 20th to Alhazen, and taper from a 2-lane to 3-lane roadway approaching NE 24th Street.
- **1c** Da Vinci: Construct interim half-street 2-lane, 2-way roadway (including ROW dedication, pedestrian facilities, and landscaping) from 24th to 20th.
- **1d** Construct shared street connecting Regency property to Alhazen east of 148th.
- **1e** Widen along 24th for an EB right-turn lane to Lumiere.
- **1f** Widen along 24th for an EB right-turn pocket at Parcel A driveway.
- **1g** ROW dedication along 24th between 148th and Da Vinci to accommodate City's future planned improvements.
- **1h** Frontage improvements along 24th between 148th and Da Vinci.
- **1i** ROW dedication along 148th between 24th and Seritage's south property line (just south of Alhazen) to accommodate City's future planned improvements.
- **1j** Frontage improvements along 148th between 24th and Seritage's south property line.
- **1k** Frontage improvements along 20th between Lumiere and Da Vinci.
- **1l** Conduct study to determine if pedestrian volumes trigger need for signalized pedestrian crossing at Lumiere/24th.
- **1m** Design intersections of Lumiere/Alhazen and Da Vinci/Alhazen to accommodate future signal to be built by others if/when warranted.
- **1n** Design intersections of Lumiere/20th and Da Vinci/20th to accommodate future signal to be built by others if/when warranted.
- **2a** 148th/24th: Project will dedicate ROW and set the ultimate curbs for City's future NB through lane and EB/WB dual left-turn lanes.
- **2b** 148th/20th: Construct a NB right-turn lane under the same terms as the KCCLE Development Agreement.
- **2c** 148th/Alhazen: Widen 148th to accommodate City's planned additional NB through lane by converting NB right-turn lane to shared through-right lane.
- **2d** Lumiere/24th: Monitor SB left-turn lane queues at 148th/Alhazen and if the queue exceeds storage and if desired by City, restripe/rechannelize WB left-turn lane on 24th at Lumiere.

Note: See Master Plan and Development Agreement for specific improvements by Phase

Figure 28: Proposed Master Plan Full Buildout Improvements (Phases 1, 2, and 3)

Concurrency

The need for concurrency mitigation will be evaluated according to the City's adopted standards at the time of permit applications for individual developments. No detailed concurrency evaluation is included in this study. Additional information may be found in the Development Agreement.

Impact Fees

Transportation impact fees will be evaluated according to the City's adopted impact fee rates at the time of building permit issuance. The calculations for impact fees will need to account for credits associated with transportation infrastructure being provided by this project. No detailed impact fee calculations are included in this study. Additional information may be found in the Development Agreement.

City of Bellevue Mitigation

Transportation impacts to the City of Bellevue from the buildout of the Overlake Neighborhood Plan (ONP) were disclosed in the *Overlake Neighborhood Plan Update and Improvement Project Final Supplemental Environmental Impact Statement (SEIS)* dated August 30, 2007 (we refer to this document as the *2007 ONP SEIS)*. Therefore, the impacts of the Seritage Master Plan (which is a subset of the land use contemplated by the ONP) on City of Bellevue facilities has already been addressed by the environmental document studying the impacts of the ONP—the 2007 ONP SEIS. The relationship of the Seritage Master Plan to the 2007 ONP SEIS is discussed in more detail in the SEIS Addendum for the Seritage Master Plan project that is being submitted to the City of Redmond *(Addendum to the Overlake Neighborhood Plan Update and Improvement Project Final SEIS prepared for the Overlake Plaza Master Plan Project).* In addition to the vehicular traffic impacts that were analyzed and disclosed in the 2007 ONP SEIS and in the current SEIS Addendum, the City of Bellevue has requested documentation of school walk routes.

It should be noted that the Seritage project is a Master Plan application in the City of Redmond. The Master Plan entitlement does not allow individual buildings to be built; instead, individual buildings contemplated by the Master Plan are required to be individually permitted through the City's Site Plan Entitlement process. The Site Plan Entitlement process requires a determination of an appropriate SEPA process for each individual building. As a result, the City of Bellevue will also have the opportunity to weigh in at a more specific/project-level basis regarding traffic impacts to Bellevue.

A summary of impacts to City of Bellevue transportation facilities and documentation of potential school walk routes are included in Appendix J.

Appendix A

Approved Traffic Study Scoping Document (8/16/17)

MEMORANDUM

DATE: August 16, 2017

SUBJECT: Final Traffic Study Scope
Seritage Overlake Plaza Master Plan
TENW Project No. 5356

FINAL SCOPE OF WORK FOR SERITAGE OVERLAKE PLAZA MASTER PLAN TRAFFIC STUDY (REVISED 8/16/17)

The following scope constitutes the entirety of the agreed upon scope of work for the Traffic Study:

1. Executive Summary

2. Introduction/Project Description
    a. Master Plan Land Use
        - 500 apartments
        - 100,100 sf general retail
        - 23,000 sf grocery store
        - 62,700 sf restaurant
        - 266,800 sf office
        - 210 room hotel
    b. Description of site access assumptions including conceptual site plan/map
    c. Description of phasing including land use and project site location
    d. Description of relationship to Overlake SEPA planned Action
    e. Show ultimate street network
    f. Outline Scope of Analysis

3. Project Approach/Key Assumptions:
    a. Analysis Time Periods: AM and PM peak hours
    b. Analysis software: *Synchro* 10
    c. Measures of Effectiveness (MOEs): LOS and 95th percentile queues as reported by *Synchro 10*. LOS by intersection and queues by movement.
    d. All intersections operating at LOS E/F will be identified for further discussion with the City. The following guidelines will be used in determining whether mitigation is required at specific intersections:
        i. If the intersection will operate at LOS-D or better in the forecasted year with the proposed project, no mitigation is required.

ii. If the intersection will operate at LOS-E/F in the forecasted year with the proposed project, and the addition of the project traffic decreases the LOS, mitigation may be required to alleviate project impacts. These locations will be discussed further with the City.

iii. New intersections: goal is to design any new signalized intersections to operate at LOS E or better.

e. Scenarios to be included (detailed assumptions discussed on the following pages):

- Existing Conditions
- Overlake Village South Infrastructure Study Update
- Seritage Overlake Plaza Master Plan Traffic Study - Full Buildout of land use and street network
- Seritage Overlake Plaza Master Plan Traffic Study - Phasing Analysis of land use and street network

4. Existing Conditions

a. Provide description of study area including:

- aerial photo of project site and study area
- roads
- transit service
- pedestrian facilities
- bike facilities

b. Provide a summary of the latest 3 year collision history and collision rates at the following locations:

- 148th/24th
- 148th/22nd
- 148th/20th
- 148th between 20th and 22nd
- 148th between 22nd and 24th

c. Existing Traffic Volumes:

- Show on a figure 2017 existing AM and PM peak hour turning movement volumes at the 7 locations shown in HDR's traffic analysis for the draft Overlake Village South Infrastructure plan. The volumes will be based on the year 2013 volumes shown in the HDR study increased 2 percent annually to year 2017.

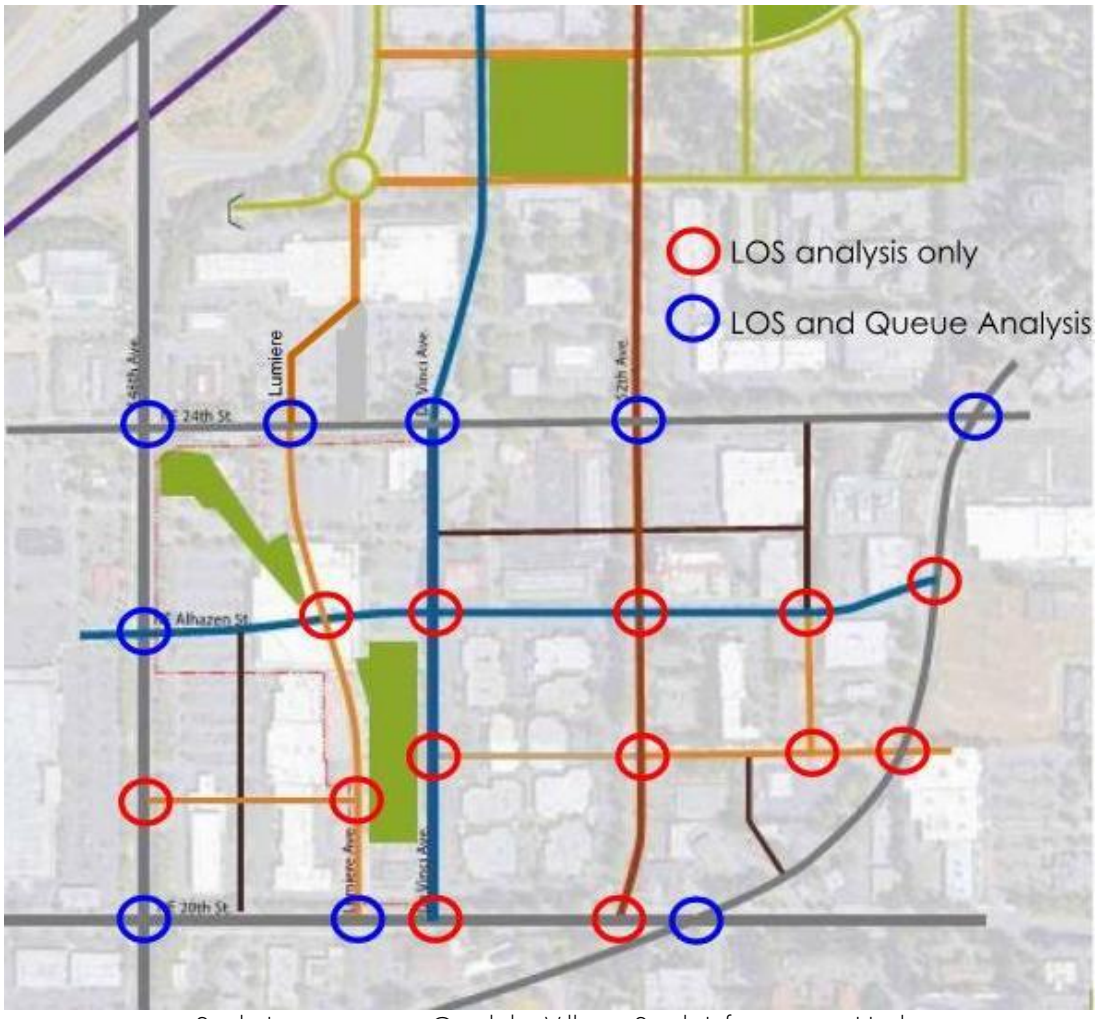
d. No existing conditions LOS/queue analysis is required.

5. Planned Road Improvements

a. Document City of Redmond and Bellevue Planned Improvements in the study area. Review Redmond TIP, TFP, and 2030 Buildout Plan, and Bellevue TIP and TFP.

6. Trip Generation
    a. AM/PM/Daily
    b. ITE Methodology using the EPA method to account for internal and non-vehicle trips (20% reduction approved for proposed use)
    c. ITE reductions for pass-by trips (PM only, no pass-by for AM and daily to be conservative)
    d. Existing use trip credit using ITE methodology and EPA method for internal/non-vehicle trips
7. Mobility Unit (MU) Demand
    a. Provide preliminary MU demand estimates for the purposes of concurrency

8. Overlake Village South Infrastructure Study Update
    a. Purpose is to confirm the ultimate roadway network for Overlake Village South by updating the work already done by HDR. This work is mostly complete (5/24/17 deliverable to the City) but will be updated with the adjustment to the road network (Lumiere aligned at a signal on 24th) and the recently approved trip generation revisions.
    b. Year 2030
    c. The Seritage-proposed network will be used (as already disclosed to the City in the 5/24/17 deliverable, but adjusted to account for Lumiere being aligned at a signal on 24th that allows NB/SB through and turn movements. EB/WB Left turns would be prohibited). No comparisons will be made to the City's previous draft roadway network (the one used in the HDR study). The road network included all year 2030 planned improvements - funded and unfunded, buildout and TFP.
    d. Volume forecasts were based on HDR's methodology with Seritage and KCCLE Master Plan trip generation replacing the HDR assumptions for those parcels.
    e. Trip distribution will be based on the distribution used by HDR (recently approved by the City)
    f. Study Area
        - 22 study intersections as shown below (this is consistent with the HDR study)
        - LOS and queue analysis disclosed as indicated on figure below (consistent with HDR study)



Study Intersections: Overlake Village South Infrastructure Update

g. Provide a qualitative discussion of how parcels located east of Da Vinci along NE 24th Street will access NE 24th Street prior to their redevelopment, but after Da Vinci is realigned and the signal at 151st Ave NE is decommissioned.

9. Seritage Overlake Plaza Master Plan Traffic Study – 2023 Full Buildout of Master Plan

   a. Purpose is to analyze traffic operations assuming Seritage completes the master plan prior to any adjacent development and prior to unfunded road improvements. Goal is to determine what street improvements are needed to support project access and to mitigate any project impacts.

   b. Year 2023 (exact timing of development is unknown, but we propose to assume a 6-Year horizon consistent with typical transportation funding and concurrency assumptions)

   c. Analysis to include 2023 without and with project for comparison purposes

   d. Network to include funded improvements only. Specifically:

      - East Link Light Rail Extension (KCCLE 2030 modeling accounted for this)
      - SR 520 Overlake Access Ramp
      - City of Redmond to confirm if any other improvements are funded in study area.
      - 2023 With-project conditions to include:

        1. An interim configuration of Da Vinci that the Seritage project could feasibly construct on property they control (generally the western half of the ultimate section). KCCLE is NOT assumed be developed/occupied.
        2. Frontage improvement on 148th – add northbound lane
        3. Full buildout of Alhazen and Lumiere Ave

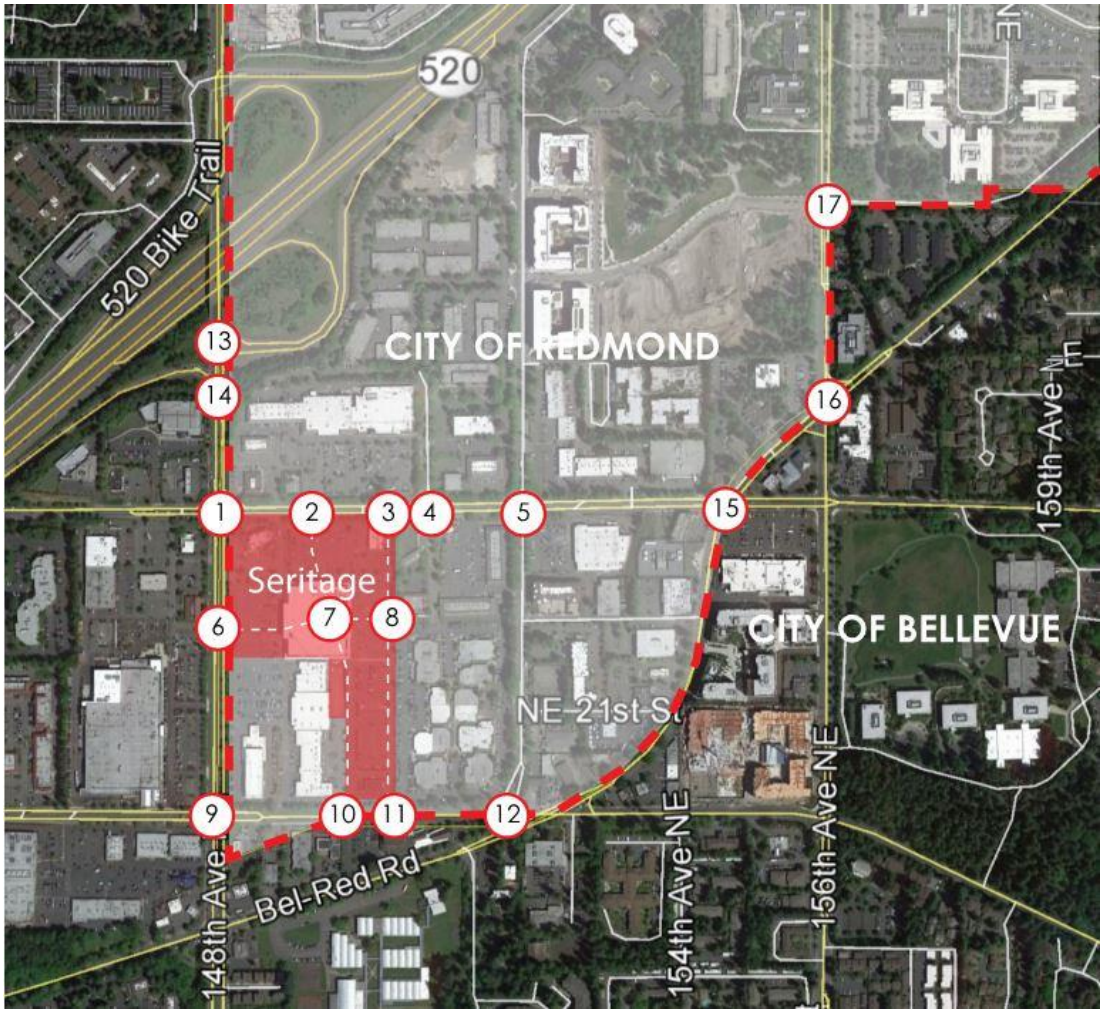
   e. Volume forecasts: we propose to estimate year 2023 baseline volumes by doing the following:

      - Taking the year 2030 baseline model volumes from the KCCLE project (without KCCLE Master Plan) and calculating the total growth forecast between year 2013 and 2030. Then we will take the total growth and divide by 17 to determine the annual growth. We will then take the annual growth and factor down the 2030 baseline volumes by 7 years to obtain 2023 volume forecasts.
      - The KCCLE modeling did not include the SR 520 Overlake Access Ramp. We will adjust the year 2023 baseline forecasts by hand to account for the Overlake Access Ramp, based on modeling information (future ramp volumes) to be provided by the City.

   f. The trip distribution for the Seritage Master Plan Traffic Study will be based on the modeling used for the KCCLE Master Plan but adjusted to account for the SR 520 Overlake Access Ramp. Volumes at assumed site driveways will be shown.

   g. Study Area

      - 17 study intersections as agreed to by the City in a meeting dated 8/10/17 (shown below, plus all site access driveways
      - LOS and queue analysis to be conducted at all study intersections
      - Analyze intersection 2 (Lumiere/24th) with and without a traffic signal.



Study Intersections: Seritage Overlake Plaza Master Plan Traffic Study

10. Seritage Overlake Plaza Master Plan Traffic Study - Phasing Analysis

    a. Development may occur in 2 or more phases. The purpose of this portion of the traffic study is to confirm what portion of the infrastructure is required to be constructed for each Phase to provide sufficient access. It may also be used to determine when certain off-site improvements are needed (if any are determined to be needed at full buildout, or if any interim improvements are needed to support traffic from each phase).

    b. Year 2023, same overall roadway network and baseline traffic volumes as in the study of full buildout conditions.

    c. Study Area would be a subset of the study area shown for full buildout conditions, and would depend on what roads are proposed to be built with each phase.

11. Future Pedestrian/Bicycle/Transit Facilities

    a. Identify the future ped/bike/transit network in the ultimate 2030 network

    b. Identify the future ped/bike/transit network in the short term 2023 network assuming Seritage Master Plan buildout, focusing on connections to the surrounding network.

12. Mitigation

    a. Summary of Roadway/Access/Frontage Improvements

    b. Potential Off-Site Mitigation consistent with Overlake Planned Action

    c. Transportation Impact Fees

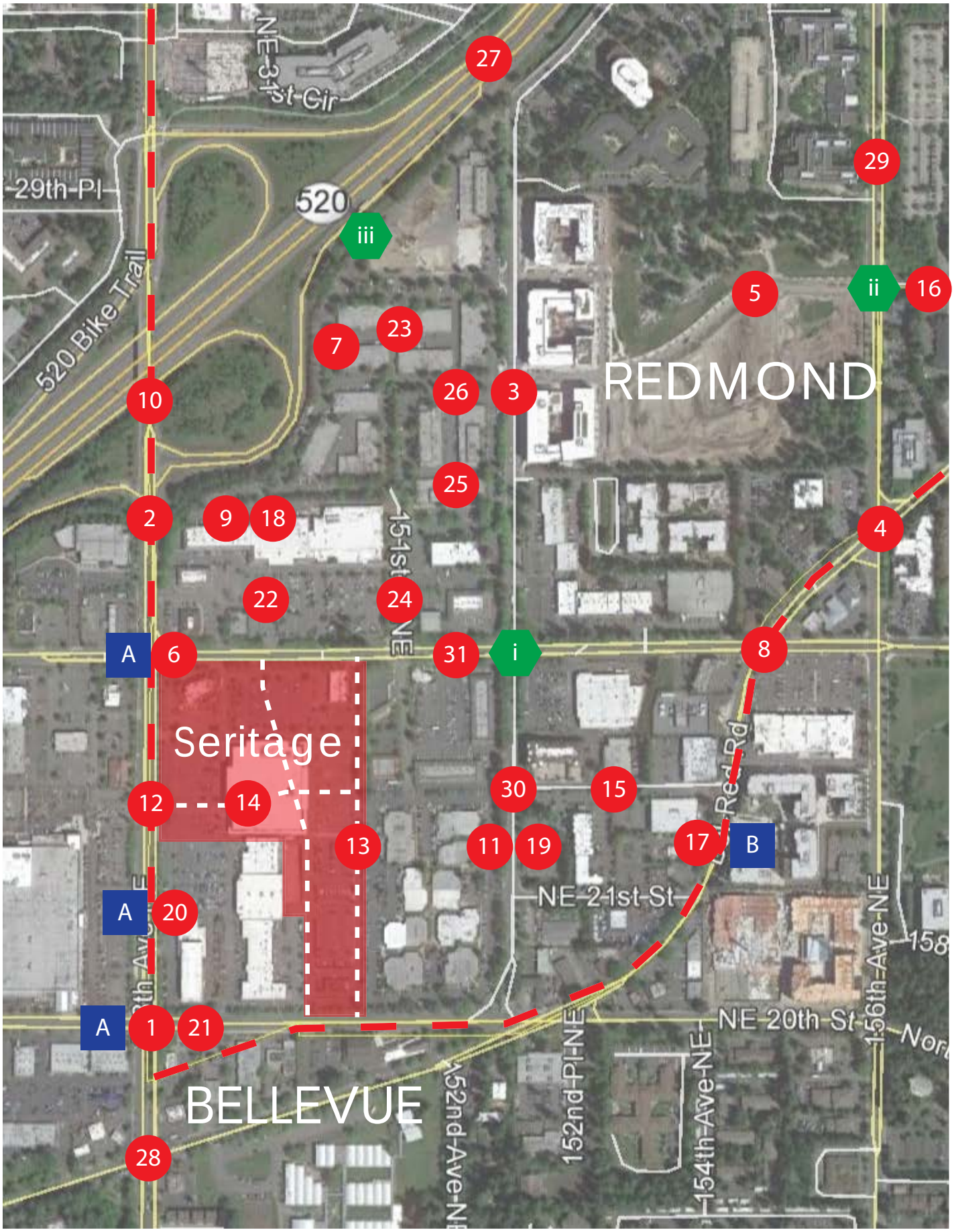
        - Document the City's transportation impact fee methodology, and note what ROW and infrastructure will be eligible for impact fee credits. Assumption is that impact fee credits for ROW and infrastructure will be significantly greater than impact fees due.

    d. City of Bellevue Mitigation

        - Document that applicant intends to generally follow former BROTS interlocal agreement methodology (Exhibit F), where mitigation to Bellevue is determined via a pro-rata share methodology at the time that individual development applications are submitted (consistent with GHC, Microsoft, KCCLE DAs).

Appendix B

Bellevue/Redmond Planned Transportation Improvements



88 Planned City of Remond Project

i Planned Project By Others

A Planned City of Bellevue Project

Appendix B: Planned Transportation Improvements

CITY OF REDMOND PROJECTS

Map ID	Project Location/Name	COR Buildout Plan #	2018-2023 TIP#	2013-2030 TFP#	Project Description
1	148th Ave NE and NE 20th St Turn Lanes			39	Add second westbound left turn and second eastbound left turn lanes. Associated with Projects 41 and 264.
2	148th Ave NE and SR 520 Freeway Access Lane		C70	41	Create third northbound through lane on 148th Ave NE from NE 22nd St to SR 520 eastbound on-ramp using primarily existing right-turn lanes and modify SR 520 eastbound on-ramp to allow HOV access. At NE 24th St and 148th Ave NE intersection add right turn lane on northbound approach, and extend right turn lane on westbound approach. Improve intersection on 148th Ave NE at NE 20th Street.
3	152nd Avenue (Main St): NE 24th Street to NE 31st Street	-	-	47, 355, 363	Main Street improvements between NE 26th Street and NE 31st Street (half street improvements) and between NE 24th Street and NE 26th Street.
4	156th Ave NE / Bel-Red Rd	-	C45	50	Add southbound right turn lane.
5	NE 27th Street-NE 28th Street	-	-	175	A new street connection from 152nd Ave to 156th Ave NE at NE 28th Street.
6	148th Ave NE & NE 24th Street Turn Lanes			264	Add left-turn lanes to make dual left-turn lanes on the eastbound and westbound approaches on NE 24th Street at 148th Avenue.
7	Overlake Access Ramp - Local Street Portion	-	-	315	Local access street connecting the Overlake Access Ramp roundabout and 152nd Avenue NE.
8	Bel-Red Rd / NE 24th St	-	-	349	Provide a southbound right-turn lane.
9	SR 520/148th Interchange Overlake Access Ramp and Trail Connection Within WSDOT Limited Access.	2	-	-	Construct a second eastbound off ramp at 148th Avenue NE. This ramp will go under 148th Avenue NE, terminate at the east side of 148th Avenue NE with a roundabout, and connect the Overlake Access Street and NE 28th Street west of 152nd Avenue NE. Improvements along the ramp include two lanes on the ramp, walls, shoulders, stormwater, utilities, street lights, and a multi-user trail connecting the SR 520 eastbound on ramp with the roundabout. Coordinate with project #315, the Overlake Access Street and project #3, 520 Trail Grade Separation at 148th Avenue NE.
10	SR 520/148th Interchange Overlake Access Ramp and Trail Connection: The Trail Improvement Portion	3	B83	-	Modify channelization and signals, and provide wide multi-use trail that is separated from the roadway on the east side of 148th Ave NE from the eastbound SR 520 on ramp to the SR 520 Trail at the westbound SR 520 off ramp at NE 29th Place (148th Ave NE bridge over SR 520). Design to accommodate future grade separation project at 148th Avenue NE and NE 29th Place. Coordinate with the Overlake Access Ramp Project #2.
11	152nd Midblock Crossing	284	-	-	Provide a mid-block crossing on 152nd Avenue NE between NE 20th Street and NE 24th Street to improve pedestrian accessibility.
12	148th Ave NE Pedestrian Overpass	287	-	-	Provide a grade-separated pedestrian overpass that crosses 148th Avenue NE in the vicinity of 22nd street.
13	151st Avenue NE South (NE 20th Street to NE 24th Street)	288	-	-	Construct new 151st Avenue NE between NE 20th Street and NE 24th Street. Refer to the Overlake Neighborhood Plan for more details. Coordinate with the Overlake Village South Study.
14	NE 22nd St, West	289	-	-	Construct new NE 22nd Street from 148th Avenue NE to 152nd Avenue NE and design the street as a local access street using pedestrian supportive design with on-street parking and one through lane in each direction. Major street connections would be signalized.
15	NE 22nd St, East	290	-	-	Construct new NE 22nd Street from 152nd Avenue NE to Bel-Red Road and design the street as a local access street using pedestrian supportive design with on-street parking and one through lane in each direction. Major street connections would be signalized.
16	NE 28th Street to Bel-Red Road Ped. and Bike Connection	346	-	-	Provide a hard surface trail connecting NE 28th Street to Bel-Red Road. Acquire public pedestrian and bike easement on NE 28th Street to access Bel-Red Road at the intersection of NE 30th Street and Bel-Red Road.

CITY OF REDMOND PROJECTS

Map ID	Project Location/Name	COR Buildout Plan #	2018-2023 TIP#	2013-2030 TFP#	Project Description
17	Bel-Red Road Widening between NE 20th Street and NE 24th Street	375	-	-	Widen Bel-Red Rd from NE 20th Street and NE 24th Street. Improvements include 2 through lane in each direction, a center turn lanes, bike lanes, curb, gutter, sidewalks, street lights and storm drainage.
18	Overlake Access Ramp	-	C56	-	Construct eastbound access ramp from SR 520 to roundabout at 150th Ave NE and interim at-grade roadway connection between the roundabout and 152nd Ave NE. Ramp would diverge from eastbound 148th Ave NE off-ramp, be grade-separated from 148th Ave NE and connect with City streets at 150th Ave NE. The ramp would include 1 general purpose lane, and auxiliary lanes and HOV/Transit treatments as applicable.
19	152nd Avenue NE Improvements - NE 20th St to NE 24th St	-	C69	49	Continues 152nd Ave NE Main Street improvements south from NE 24th St to NE 20th street. Half street improvements on west side will be completed through KCC Limited Edition development agreement.
20	148th Ave NE Northbound Through Lane - Bel-Red Road to NE 22nd St	-	C71	387	Create continuous northbound through lane on 148th Ave NE between Bel-Red Road and NE 22nd St.
21	148th Ave NE Right Turn Lane at NE 20th St	-	C74	-	Add northbound right turn lane at 148th Ave NE and NE 20th St.
22	150th Avenue NE Connection (NE 26th Street to NE 24th Street)	310	-	-	Construct Access Street in accordance with Overlake Village Design Standards, including 1 travel lane, parking lane and sidewalk in each direction.
23	151st Avenue NE Connection Segment II (NE 27th Street to NE 28th Street)	311	-	-	Construct neighborhood street in accordance with Overlake Village Design Standards, including 1 travel lane, parking lane, cycle track, and sidewalk in each direction as well as an urban pathway trail.
24	151st Avenue NE Connection Segment I NE 24th Street to NE 27th Street)	312	-	-	Construct neighborhood street in accordance with Overlake Village Design Standards, including one travel lane, parking lane, cycle track, and sidewalk in each direction as well as an urban pathway trail.
25	NE 26th Street Connection (152nd Ave Ne to Overlake Access Ramp Terminus)	313	-	-	Construct Access Street in accordance with Overlake Design Standards, including one travel lane, parking lane and sidewalk in each direction.
26	NE 27th Street Connection (152nd Ave NE to Overlake Access Ramp Terminus)	314	-	-	Construct Access Street in accordance with Overlake Village Design Standards, including one travel lane, parking lane and sidewalk in each direction.
27	Overlake Village Ped & Bike Bridge (ST)	-	-	5	Provide a new pedestrian and bike connection over SR 520 to the Overlake Village light rail station.
28	Bel-Red Road & 148th Ave NE Turn Lanes	40	-	-	Work with the City of Bellevue to add additional capacity in the vicinity of this intersection by creating eastbound and westbound dual left turn lanes at Bel-Red Road and 148th Avenue NE, adding a third northbound through lane on 148th Avenue NE starting south of Bel-Red Road and
29	156th Ave NE Side path (NE 24th Street to NE 40th Street)	-	B80	-	Add multiuse trail along 156th Ave NE between NE 24th St and NE 40th St
30	152nd Ave NE Pedestrian crossing at NE 21st St	-	S57	-	Pedestrian crossing of 152nd Ave NE at NE 21st St
31	NE 24th Street Multimodal Improvements (148th Ave NE to Bel-Red Road)	-	C80	-	Construct 6 foot cycle tracks on both sides of the street, separated from travel lanes by a continuous 6.5 foot planter strip. Sidewalk to be expanded to 9 feet starting from back of cycle track. See Overlake Village South Plan for Details.

Sources:

1. City of Redmond Transportation Master Plan, August 2013.
2. City of Redmond 2013-2030 Transportation Facilities Plan (TFP).
3. City of Redmond 2018-2023 Transportation Improvement Plan (TIP).

CITY OF BELLEVUE PROJECTS

Map ID	Project Location/Name	2018-2023 TIP#	2016-2027 TFP#	Project Description
A	148th Improvements	58	250	The project will evaluate and refine improvements to the 148th Avenue NE Master Plan. Potential improvements include the following: 1) a third northbound through lane on 148th Avenue NE from 350 feet south of Bel-Red Road to the SR 520 eastbound on- ramp, 2) a northbound right-turn lane, and eastbound and westbound dual left-turn lanes at 148th Avenue NE and Bel-Red Road, 3) eastbound and westbound dual left-turn lanes at NE 20th Street and 148th Avenue NE, 4) extend the northbound and westbound right-turn lanes at NE 24th Street and 148th Avenue, 5) eastbound and westbound dual left-turn lanes at NE 24th Street and 148th Avenue NE, 6) configure the northbound 3-lane approach on 148th Avenue NE at the SR 520 eastbound on-ramp to right turn only, through/optional HOV right turn, and through only, and 7) convert and extend southbound right-turn lane on 148th Ave NE between NE 24th and NE 20th into a BAT lane. Improvements at NE 24th Street will accommodate or implement a wide-lane east-west bicycle facility. The project may be phased with the initial phase focusing on the north end of the 148th Avenue NE corridor. Scope and cost may be modified based future analysis and coordination with the City of Redmond associated with the 148th Avenue NE Master Plan. Funding allocation will support work in coordination with Redmond to identify project phasing and conduct predesign work.
B	Bel-Red Road (NE 20th Street to NE 24th Street)	62	254	This project will widen the roadway to five lanes, including two travel lanes in each direction, with a center turn lane, and bicycle lanes. Project implementation will be coordinated with potential future private development in the immediate vicinity.

Sources:

1 City of Bellevue 2018-2023 Transportation Improvement Plan (TIP).

2. City of Bellevue 2016-2027 Transportation Facilities Plan (TFP).

OTHER PROJECTS

Map ID	Project Location/Name	Project Description
i	152nd Ave NE/NE 24th Street	Esterra Park DA Condition includes an intersection modification which includes an EB left-turn. Sound Transit to modify SB channelization to include an exclusive left-turn lane, thru lane, and an exclusive right turn lane.
ii	156th Ave NE/NE 28th Street	Esterra Park DA Condition. Extension of NB left-turn
iii	ST East Link Light Rail	Link Light Rail Line along SR 520 with Stations at Overlake Village and Redmond Technology Center

Appendix C

2023 Baseline Traffic Volumes

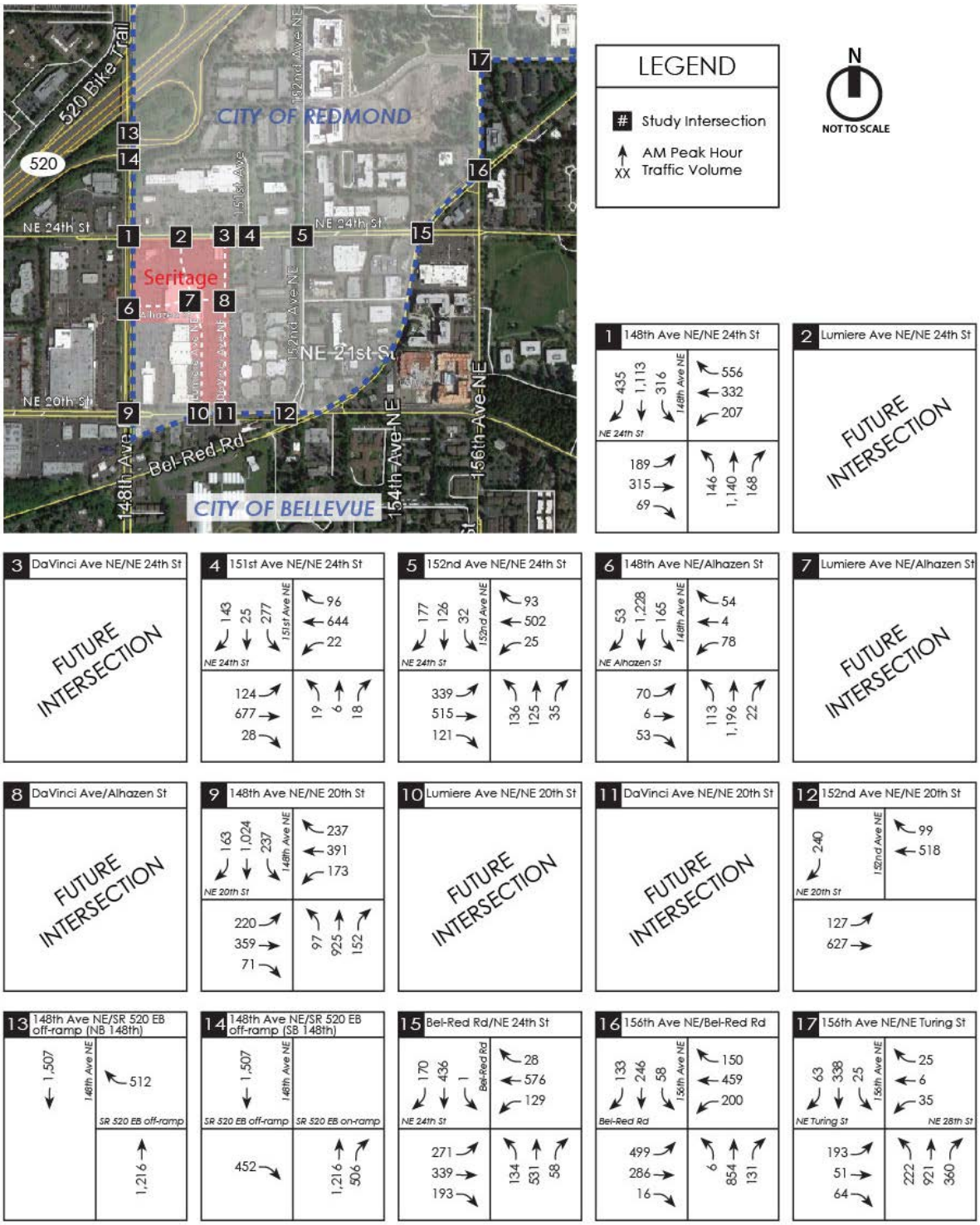


Figure C1: Year 2023 AM Peak Hour Baseline (Without Project) Traffic Volumes

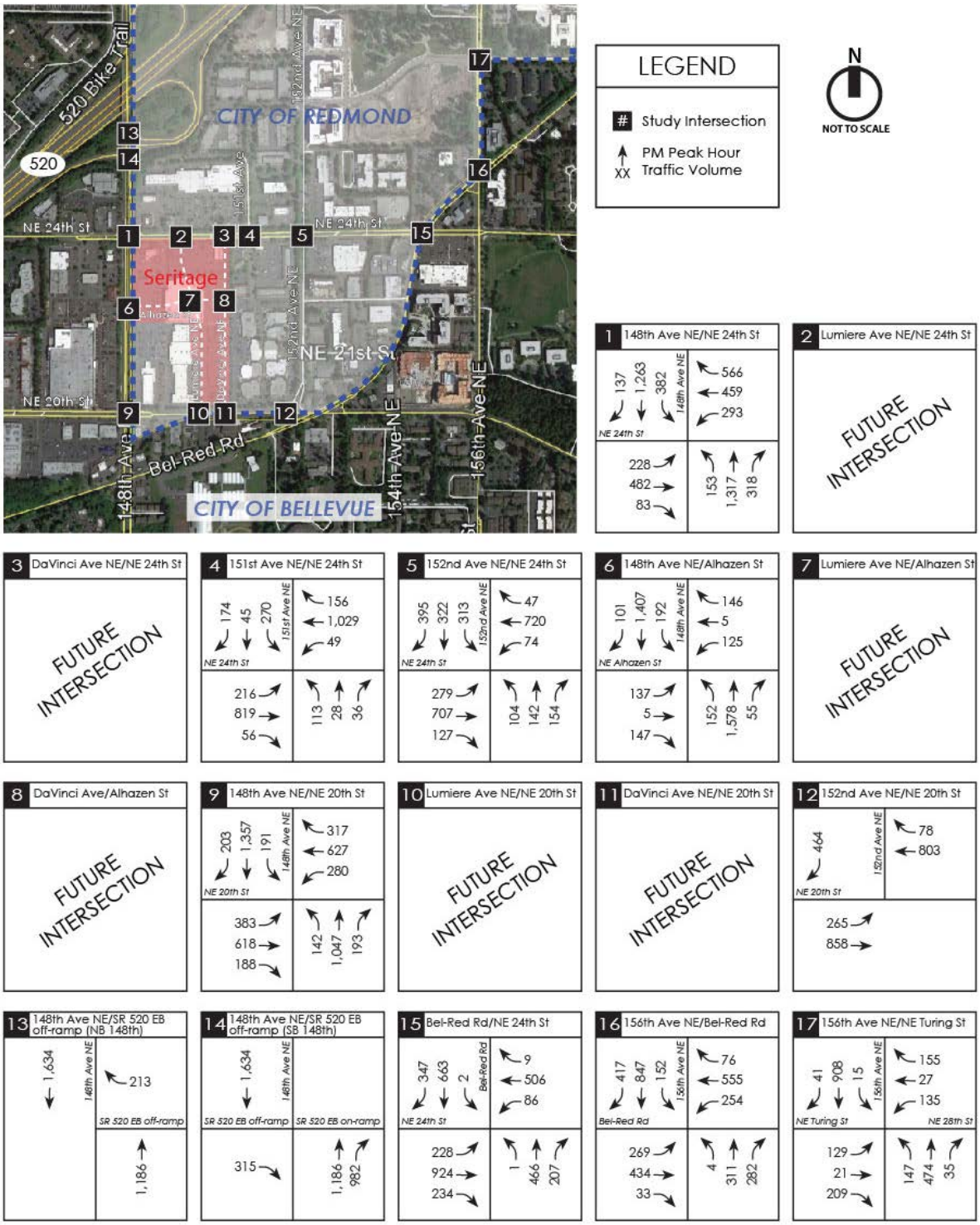


Figure C2: Year 2023 PM Peak Hour Baseline (Without Project) Traffic Volumes

Appendix D

Trip Generation Estimates (Full Buildout and Phase 1)

Seritage Overlake Plaza
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
Daily									
Multifamily (Apartments)	500	DU	220	Equation	50%	50%	1,577	1,577	3,154
EPA Mixed Use Reduction	20%						*-316*	*-315*	*-631*
							1,261	1,262	2,523
General Retail	100,100	GLA	820	Equation	50%	50%	3,397	3,398	6,795
EPA Mixed Use Reduction	20%						*-679*	*-680*	*-1,359*
							2,718	2,718	5,436
Grocery Store	23,000	GFA	850	102.24	50%	50%	1,176	1,176	2,352
EPA Mixed Use Reduction	20%						*-235*	*-235*	*-470*
							941	941	1,882
Restaurant	62,700	GFA	932	127.15	50%	50%	3,986	3,986	7,972
EPA Mixed Use Reduction	20%						*-797*	*-797*	*-1,594*
							3,189	3,189	6,378
Office	266,800	GFA	710	Equation	50%	50%	1,384	1,384	2,768
EPA Mixed Use Reduction	20%						*-277*	*-277*	*-554*
							1,107	1,107	2,214
Hotel	210	Rooms	310	8.17	50%	50%	858	858	1,716
EPA Mixed Use Reduction	20%						*-171*	*-172*	*-343*
							687	686	1,373
GROSS DAILY TRIP GENERATION =							**12,378**	**12,379**	**24,757**
EPA Mixed Use Reduction =							***-2,475***	***-2,476***	***-4,951***
NET TRIP GENERATION (NOT INCLUDING EXISTING USE CREDIT)							**9,903**	**9,903**	**19,806**
EXISTING USES - NET TRIP GENERATION							**-3,403**	**-3,403**	**-6,806**
TOTAL NET NEW TRIP GENERATION (PROPOSED LESS EXISTING)							**6,500**	**6,500**	**13,000**

[1] DU = Dwelling Units, GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
AM Peak									
Multifamily (Apartments)	500	DU	220	Equation	20%	80%	50	199	249
EPA Mixed Use Reduction	20%						*-10*	*-40*	*-50*
							40	159	199
General Retail	100,100	GLA	820	Equation	62%	38%	97	59	156
EPA Mixed Use Reduction	20%						*-19*	*-12*	*-31*
							78	47	125
Grocery Store	23,000	GFA	850	3.40	62%	38%	48	30	78
EPA Mixed Use Reduction	20%						*-10*	*-6*	*-16*
							38	24	62
Restaurant	62,700	GFA	932	10.81	55%	45%	373	305	678
EPA Mixed Use Reduction	20%						*-75*	*-61*	*-136*
							298	244	*542*
Office	266,800	GFA	710	Equation	88%	12%	370	50	420
EPA Mixed Use Reduction	20%						*-74*	*-10*	*-84*
							296	40	336
Hotel	210	Rooms	310	0.53	59%	41%	65	46	111
EPA Mixed Use Reduction	20%						*-13*	*-9*	*-22*
							52	37	89
GROSS AM PEAK HOUR TRIP GENERATION =							**1,003**	**689**	**1,692**
EPA Mixed Use Reduction =							***-201***	***-138***	***-339***
NET TRIP GENERATION (NOT INCLUDING EXISTING USE CREDIT)							**802**	**551**	**1,353**
EXISTING USES - NET TRIP GENERATION							**-164**	**-110**	**-274**
TOTAL NET NEW TRIP GENERATION (PROPOSED LESS EXISTING)							**638**	**441**	**1,079**

[1] DU = Dwelling Units, GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
PM Peak									
Multifamily (Apartments)	500	DU	220	Equation	65%	35%	190	103	293
EPA Mixed Use Reduction	20%						*-38*	*-21*	*-59*
							152	82	234
General Retail	100,100	GLA	820	Equation	48%	52%	288	312	600
EPA Mixed Use Reduction	20%						*-58*	*-62*	*-120*
Pass-by [3]	34%						*-78*	*-85*	*-163*
							152	165	317
Grocery Store	23,000	GFA	850	Equation	51%	49%	134	129	263
EPA Mixed Use Reduction	20%						*-27*	*-26*	*-53*
Pass-by [3]	36%						*-39*	*-37*	*-76*
							68	66	134
Restaurant	62,700	GFA	932	9.85	60%	40%	371	247	618
EPA Mixed Use Reduction	20%						*-75*	*-49*	*-124*
Pass-by [3]	43%						*-127*	*-85*	*-212*
							169	113	282
Office	266,800	GFA	710	Equation	17%	83%	64	313	377
EPA Mixed Use Reduction	20%						*-12*	*-63*	*-75*
							52	250	302
Hotel	210	Rooms	310	0.60	51%	49%	64	62	126
EPA Mixed Use Reduction	20%						*-13*	*-12*	*-25*
							51	50	101
GROSS PM PEAK HOUR TRIP GENERATION =							**1,111**	**1,166**	**2,277**
EPA Mixed Use Reduction =							***-223***	***-233***	***-456***
Pass-By Trip Reduction =							***-244***	***-207***	***-451***
NET TRIP GENERATION (NOT INCLUDING EXISTING USE CREDIT)							**644**	**726**	**1,370**
EXISTING USES - NET TRIP GENERATION							**-234**	**-222**	**-456**
TOTAL NET NEW TRIP GENERATION (PROPOSED LESS EXISTING)							**410**	**504**	**914**

[1] DU = Dwelling Units, GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.
[3] Pass-by percent based on studies documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014.

Seritage Overlake Plaza - Existing Uses to be Removed
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
Daily									
Department Store (Sears)	231,682	GFA	875	22.88	50%	50%	2,651	2,650	5,301
EPA Mixed Use Reduction	11.11%						*-295*	*-294*	*-589*
							2,356	2,356	4,712
General Retail (Bldg. on SE Corner)	2,546	GLA	820	Equation	50%	50%	312	313	625
EPA Mixed Use Reduction	11.11%						*-34*	*-35*	*-69*
							278	278	556
Restaurant (Red Robin)	7,500	GFA	932	127.15	50%	50%	477	477	954
EPA Mixed Use Reduction	11.11%						*-53*	*-53*	*-106*
							424	424	848
Fast Food without Drive-Through Window (Subway/Yumiko/Five Guys)	4,510	GFA	932	127.15	50%	50%	286	287	573
EPA Mixed Use Reduction	11.11%						-32	-32	-64
							254	255	509
High Turnover (Sit Down) Restaurant (Sichuanese)	1,605	GFA	932	127.15	50%	50%	102	102	204
EPA Mixed Use Reduction	11.11%						*-11*	*-12*	*-23*
							91	90	181
						GROSS DAILY TRIP GENERATION =	**3,828**	**3,829**	***7,657***
						EPA Mixed Use Reduction =	***-425***	***-426***	***-851***
						NET TRIP GENERATION	**3,403**	**3,403**	**6,806**

[1] GFA = Gross Floor Area, GLA = Gross Leasable Area.

[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza - Existing Uses to be Removed
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
AM Peak									
Department Store (Sears)	231,682	GFA	875	0.58	64%	36%	86	48	134
EPA Mixed Use Reduction	8.28%						*-7*	*-4*	*-11*
							79	44	123
General Retail (Bldg. on SE Corner)	2,546	GLA	820	Equation	62%	38%	11	6	17
EPA Mixed Use Reduction	8.28%						*-1*	*0*	*-1*
							10	6	16
Restaurant (Red Robin)	7,500	GFA	932	10.81	55%	45%	45	36	81
EPA Mixed Use Reduction	8.28%						*-4*	*-3*	*-7*
							41	33	74
Fast Food without Drive-Through Window (Subway/Yumiko/Five Guys)	4,510	GFA	932	10.81	55%	45%	27	22	49
EPA Mixed Use Reduction	8.28%						*-2*	*-2*	*-4*
							25	20	45
High Turnover (Sit Down) Restaurant (Sichuanese)	1,605	GFA	932	10.81	55%	45%	9	8	17
EPA Mixed Use Reduction	8.28%						*0*	*-1*	*-1*
							9	7	16
GROSS AM PEAK HOUR TRIP GENERATION =							**178**	**120**	**298**
EPA Mixed Use Reduction =							***-14***	***-10***	***-24***
NET TRIP GENERATION							**164**	**110**	**274**

[1] GFA = Gross Floor Area, GLA = Gross Leasable Area.

[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza - Existing Uses to be Removed
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
PM Peak									
Department Store (Sears)	231,682	GFA	875	1.87	51%	49%	221	212	433
EPA Mixed Use Reduction	10.81%						*-24*	*-23*	*-47*
Pass-by [3]	17%						*-34*	*-32*	*-66*
							163	157	320
General Retail (Bldg. on SE Corner)	2,546	GLA	820	Equation	48%	52%	24	27	51
EPA Mixed Use Reduction	10.81%						*-3*	*-3*	*-6*
Pass-by [3]	34%						*-7*	*-8*	*-15*
							14	16	30
Restaurant (Red Robin)	7,500	GFA	932	9.85	60%	40%	44	30	74
EPA Mixed Use Reduction	10.81%						*-5*	*-3*	*-8*
Pass-by [3]	43%						*-17*	*-11*	*-28*
							22	16	38
Fast Food without Drive-Through Window (Subway/Yumiko/Five Guys)	4,510	GFA	933	26.15	51%	49%	60	58	118
EPA Mixed Use Reduction	10.81%						*-7*	*-6*	*-13*
Pass-by [3]	43%						*-23*	*-22*	*-45*
							30	30	60
High Turnover (Sit Down) Restaurant (Sichuanese)	1,605	GFA	932	9.85	60%	40%	10	6	16
EPA Mixed Use Reduction	10.81%						*-1*	*-1*	*-2*
Pass-by [3]	43%						*-4*	*-2*	*-6*
							5	3	8
GROSS PM PEAK HOUR TRIP GENERATION =							**359**	**333**	**692**
EPA Mixed Use Reduction =							***-40***	***-36***	***-76***
Pass-By Trip Reduction =							***-85***	***-75***	***-160***
NET TRIP GENERATION							**234**	**222**	**456**

[1] GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.
[3] Pass-by percent based on studies documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014.

Seritage Overlake Plaza - Phase I
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
Daily									
Multifamily (Parcel A)	500	DU	220	Equation	50%	50%	1,577	1,577	3,154
EPA Mixed Use Reduction	20%						*-315*	*-316*	*-631*
							1,262	1,261	2,523
General Retail (Parcel A)	25,000	GLA	820	Equation	50%	50%	1,379	1,379	2,758
EPA Mixed Use Reduction	20%						*-276*	*-276*	*-552*
							1,103	1,103	2,206
Grocery Store (Parcel A)	23,000	GFA	850	102.24	50%	50%	1,176	1,176	2,352
EPA Mixed Use Reduction	20%						*-235*	*-235*	*-470*
							941	941	1,882
Restaurant (Parcel A)	10,000	GFA	932	127.15	50%	50%	636	636	1,272
EPA Mixed Use Reduction	20%						*-127*	*-127*	*-254*
							509	509	1,018
Restaurant (Parcel D2)	6,800	GFA	932	127.15	50%	50%	433	432	865
EPA Mixed Use Reduction	20%						*-87*	*-86*	*-173*
							346	346	692
General Retail (Parcel D2)	9,000	GLA	820	Equation	50%	50%	710	710	1,420
EPA Mixed Use Reduction	20%						*-142*	*-142*	*-284*
							568	568	1,136
GROSS DAILY TRIP GENERATION =							**5,911**	**5,910**	**11,821**
EPA Mixed Use Reduction =							***-1,182***	***-1,182***	***-2,364***
NET TRIP GENERATION (NOT INCLUDING EXISTING USE CREDIT)							**4,729**	**4,728**	**9,457**
EXISTING USES - NET TRIP GENERATION							**-2,979**	**-2,979**	**-5,958**
TOTAL NET NEW TRIP GENERATION (PROPOSED LESS EXISTING)							**1,750**	**1,749**	**3,499**

[1] DU = Dwelling Units, GFA = Gross Floor Area, GLA = Gross Leasable Area.

[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza - Phase I
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
AM Peak									
Multifamily (Parcel A)	500	DU	220	Equation	20%	80%	50	199	249
EPA Mixed Use Reduction	20%						*-10*	*-40*	*-50*
							40	159	199
General Retail (Parcel A)	25,000	GLA	820	Equation	62%	38%	42	25	67
EPA Mixed Use Reduction	20%						*-8*	*-5*	*-13*
							34	20	54
Grocery Store (Parcel A)	23,000	GFA	850	3.40	62%	38%	48	30	78
EPA Mixed Use Reduction	20%						*-10*	*-6*	*-16*
							38	24	62
Restaurant (Parcel A)	10,000	GFA	932	10.81	55%	45%	59	49	108
EPA Mixed Use Reduction	20%						*-12*	*-10*	*-22*
							47	39	86
Restaurant (Parcel D2)	6,800	GFA	932	10.81	55%	45%	41	33	74
EPA Mixed Use Reduction	20%						*-8*	*-7*	*-15*
							33	26	59
General Retail (Parcel D2)	9,000	GLA	820	Equation	62%	38%	22	14	36
EPA Mixed Use Reduction	20%						*-4*	*-3*	*-7*
							18	11	29
GROSS AM PEAK HOUR TRIP GENERATION =							**262**	**350**	**612**
EPA Mixed Use Reduction =							***-52***	***-71***	***-123***
NET TRIP GENERATION (NOT INCLUDING EXISTING USE CREDIT)							**210**	**279**	**489**
EXISTING USES - NET TRIP GENERATION							**-123**	**-77**	**-200**
TOTAL NET NEW TRIP GENERATION (PROPOSED LESS EXISTING)							**87**	**202**	**289**

[1] DU = Dwelling Units, GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza - Phase I
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
PM Peak									
Multifamily (Parcel A)	500	DU	220	Equation	65%	35%	190	103	293
EPA Mixed Use Reduction	20%						-38	-21	-59
							152	82	234
General Retail (Parcel A)	25,000	GLA	820	Equation	48%	52%	114	123	237
EPA Mixed Use Reduction	20%						-22	-25	-47
Pass-by [3]	34%						-31	-34	-65
							61	64	125
Grocery Store (Parcel A)	23,000	GFA	850	Equation	51%	49%	134	129	263
EPA Mixed Use Reduction	20%						-27	-26	-53
Pass-by [3]	36%						-39	-37	-76
							68	66	134
Restaurant (Parcel A)	10,000	GFA	932	9.85	60%	40%	59	40	99
EPA Mixed Use Reduction	20%						-12	-8	-20
Pass-by [3]	43%						-20	-14	-34
							27	18	45
Restaurant (Parcel D2)	6,800	GFA	932	9.85	60%	40%	40	27	67
EPA Mixed Use Reduction	20%						-8	-5	-13
Pass-by [3]	43%						-14	-9	-23
							18	13	31
General Retail (Parcel D2)	9,000	GLA	820	Equation	48%	52%	57	62	119
EPA Mixed Use Reduction	20%						-12	-12	-24
Pass-by [3]	34%						-15	-17	-32
							30	33	63
GROSS PM PEAK HOUR TRIP GENERATION =							**594**	**484**	**1,078**
EPA Mixed Use Reduction =							***-119***	***-97***	***-216***
Pass-By Trip Reduction =							***-119***	***-111***	***-230***
NET TRIP GENERATION (NOT INCLUDING EXISTING USE CREDIT)							**356**	**276**	**632**
EXISTING USES - NET TRIP GENERATION							**-212**	**-206**	**-418**
TOTAL NET NEW TRIP GENERATION (PROPOSED LESS EXISTING)							**144**	**70**	**214**

[1] DU = Dwelling Units, GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.
[3] Pass-by percent based on studies documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014.

Seritage Overlake Plaza (Phase 1) - Existing Uses to be Removed
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
Daily									
Department Store (Sears)	231,682	GFA	875	22.88	50%	50%	2,651	2,650	5,301
EPA Mixed Use Reduction	11.11%						*-295*	*-294*	*-589*
							2,356	2,356	4,712
General Retail (Bldg. on SE Corner)	2,546	GLA	820	Equation	50%	50%	312	313	625
EPA Mixed Use Reduction	11.11%						*-34*	*-35*	*-69*
							278	278	556
Fast Food without Drive-Through Window (Subway/Yumiko/Five Guys)	4,510	GFA	932	127.15	50%	50%	286	287	573
EPA Mixed Use Reduction	11.11%						*-32*	*-32*	*-64*
							254	255	509
High Turnover (Sit Down) Restaurant (Sichuanese)	1,605	GFA	932	127.15	50%	50%	102	102	204
EPA Mixed Use Reduction	11.11%						*-11*	*-12*	*-23*
							91	90	181
						GROSS DAILY TRIP GENERATION =	**3,351**	**3,352**	**6,703**
						EPA Mixed Use Reduction =	***-372***	***-373***	***-745***
						NET TRIP GENERATION	**2,979**	**2,979**	**5,958**

[1] GFA = Gross Floor Area, GLA = Gross Leasable Area.

[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza (Phase 1) - Existing Uses to be Removed
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
AM Peak									
Department Store (Sears)	231,682	GFA	875	0.58	64%	36%	86	48	134
EPA Mixed Use Reduction	8.28%						*-7*	*-4*	*-11*
							79	44	123
General Retail (Bldg. on SE Corner)	2,546	GLA	820	Equation	62%	38%	11	6	17
EPA Mixed Use Reduction	8.28%						*-1*	*0*	*-1*
							10	6	16
Fast Food without Drive-Through Window (Subway/Yumiko/Five Guys)	4,510	GFA	932	10.81	55%	45%	27	22	49
EPA Mixed Use Reduction	8.28%						-2	-2	-4
							25	20	45
High Turnover (Sit Down) Restaurant (Sichuanese)	1,605	GFA	932	10.81	55%	45%	9	8	17
EPA Mixed Use Reduction	8.28%						*0*	*-1*	*-1*
							9	7	16
GROSS AM PEAK HOUR TRIP GENERATION =							**133**	**84**	**217**
EPA Mixed Use Reduction =							***-10***	***-7***	***-17***
NET TRIP GENERATION							**123**	**77**	**200**

[1] GFA = Gross Floor Area, GLA = Gross Leasable Area.

[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.

Seritage Overlake Plaza (Phase 1) - Existing Uses to be Removed
Trip Generation Estimate - UPDATED WITH COR TIA COMMENTS 10/9/17

Land Use	Size	Units [1]	ITE LUC [2]	Trip Rate	Directional Split Enter	Directional Split Exit	Vehicle Trip Generation Enter	Vehicle Trip Generation Exit	Vehicle Trip Generation Total
PM Peak									
Department Store (Sears)	231,682	GFA	875	1.87	51%	49%	221	212	433
EPA Mixed Use Reduction	10.81%						*-24*	*-23*	*-47*
Pass-by [3]	17%						*-34*	*-32*	*-66*
							163	157	320
General Retail (Bldg. on SE Corner)	2,546	GLA	820	Equation	48%	52%	24	27	51
EPA Mixed Use Reduction	10.81%						*-3*	*-3*	*-6*
Pass-by [3]	34%						*-7*	*-8*	*-15*
							14	16	30
Fast Food without Drive-Through Window (Subway/Yumiko/Five Guys)	4,510	GFA	933	26.15	51%	49%	60	58	118
EPA Mixed Use Reduction	10.81%						*-7*	*-6*	*-13*
Pass-by [3]	43%						*-23*	*-22*	*-45*
							30	30	60
High Turnover (Sit Down) Restaurant (Sichuanese)	1,605	GFA	932	9.85	60%	40%	10	6	16
EPA Mixed Use Reduction	10.81%						*-1*	*-1*	*-2*
Pass-by [3]	43%						*-4*	*-2*	*-6*
							5	3	8
GROSS PM PEAK HOUR TRIP GENERATION =							**315**	**303**	**618**
EPA Mixed Use Reduction =							***-35***	***-33***	***-68***
Pass-By Trip Reduction =							***-68***	***-64***	***-132***
NET TRIP GENERATION							**212**	**206**	**418**

[1] GFA = Gross Floor Area, GLA = Gross Leasable Area.
[2] Land Use Code from ITE 9th Edition *Trip Generation* Manual, updated 2012.
[3] Pass-by percent based on studies documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014.

Appendix E

Year 2023 Master Plan Full Buildout
Project Trips & Traffic Volumes

Figure E1: Year 2023 AM Peak Hour Master Plan Buildout Project Trips Only - Study Intersections

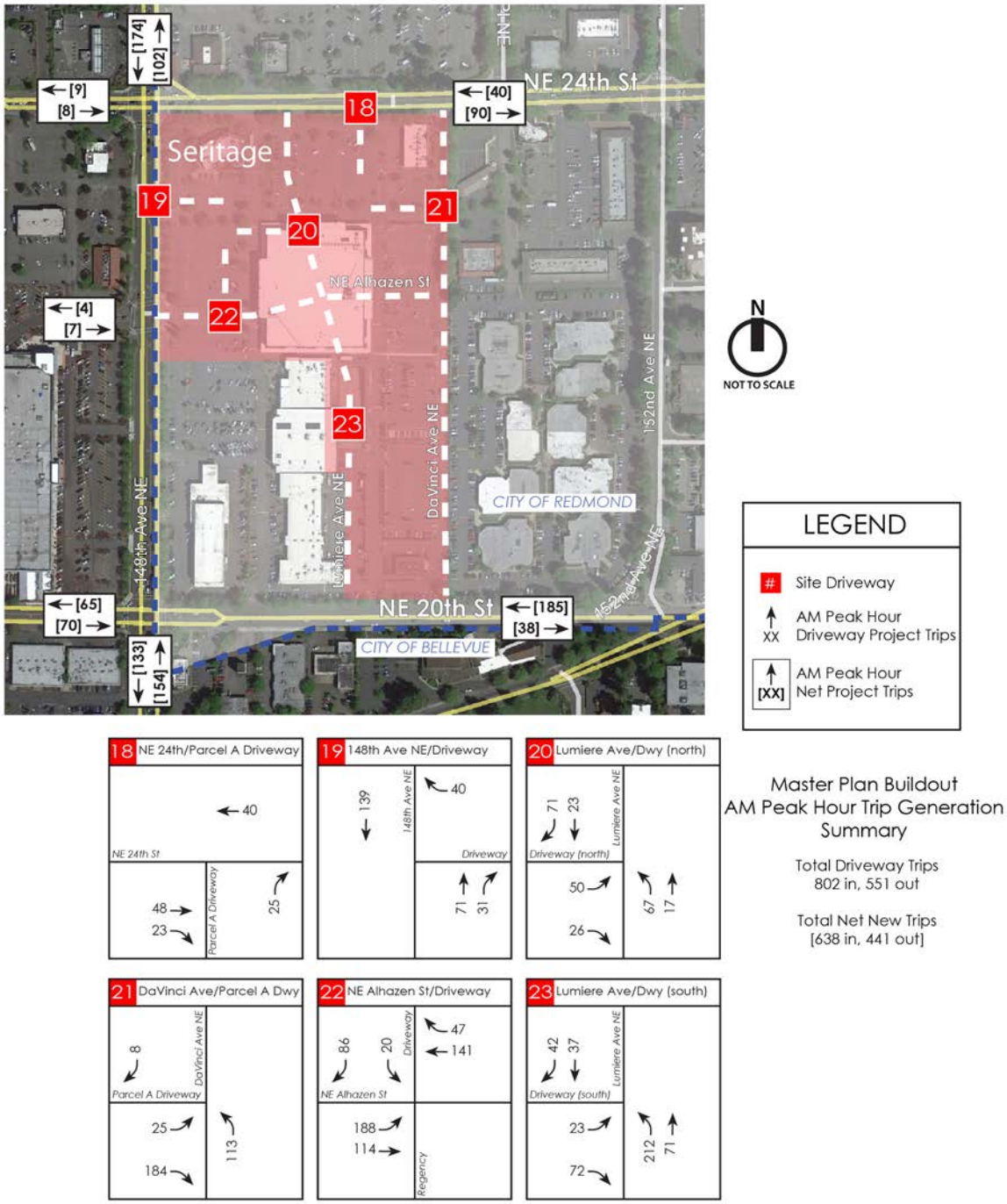


Figure E2: Year 2023 AM Peak Hour Master Plan Buildout Project Trips Only - Driveways

Figure E3: Year 2023 PM Peak Hour Master Plan Buildout Project Trips Only - Study Intersections

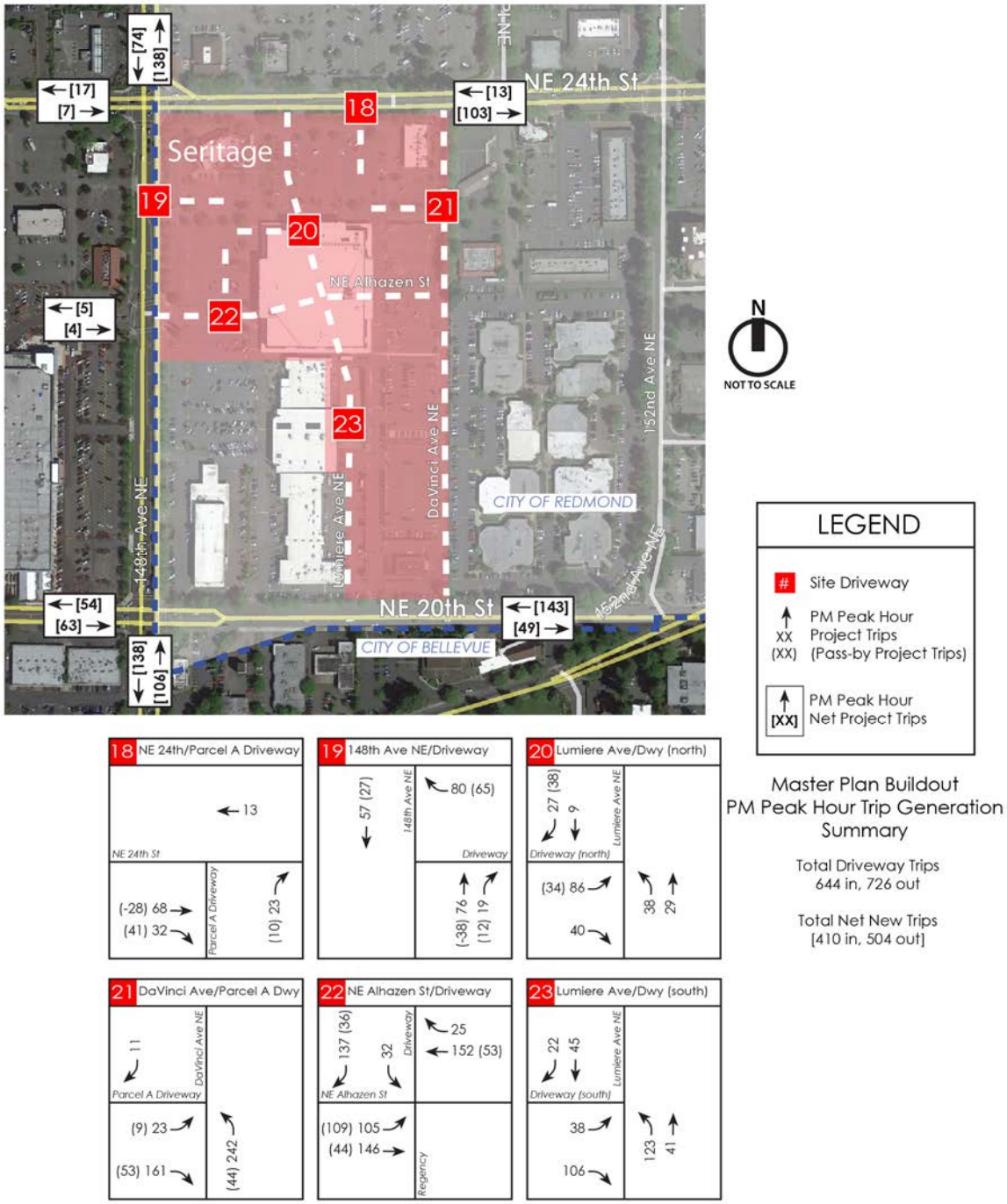


Figure E4: Year 2023 PM Peak Hour Master Plan Buildout Project Trips Only - Driveways

Figure E5: Year 2023 AM Peak Hour With Master Plan Buildout Traffic Volumes - Study Intersections

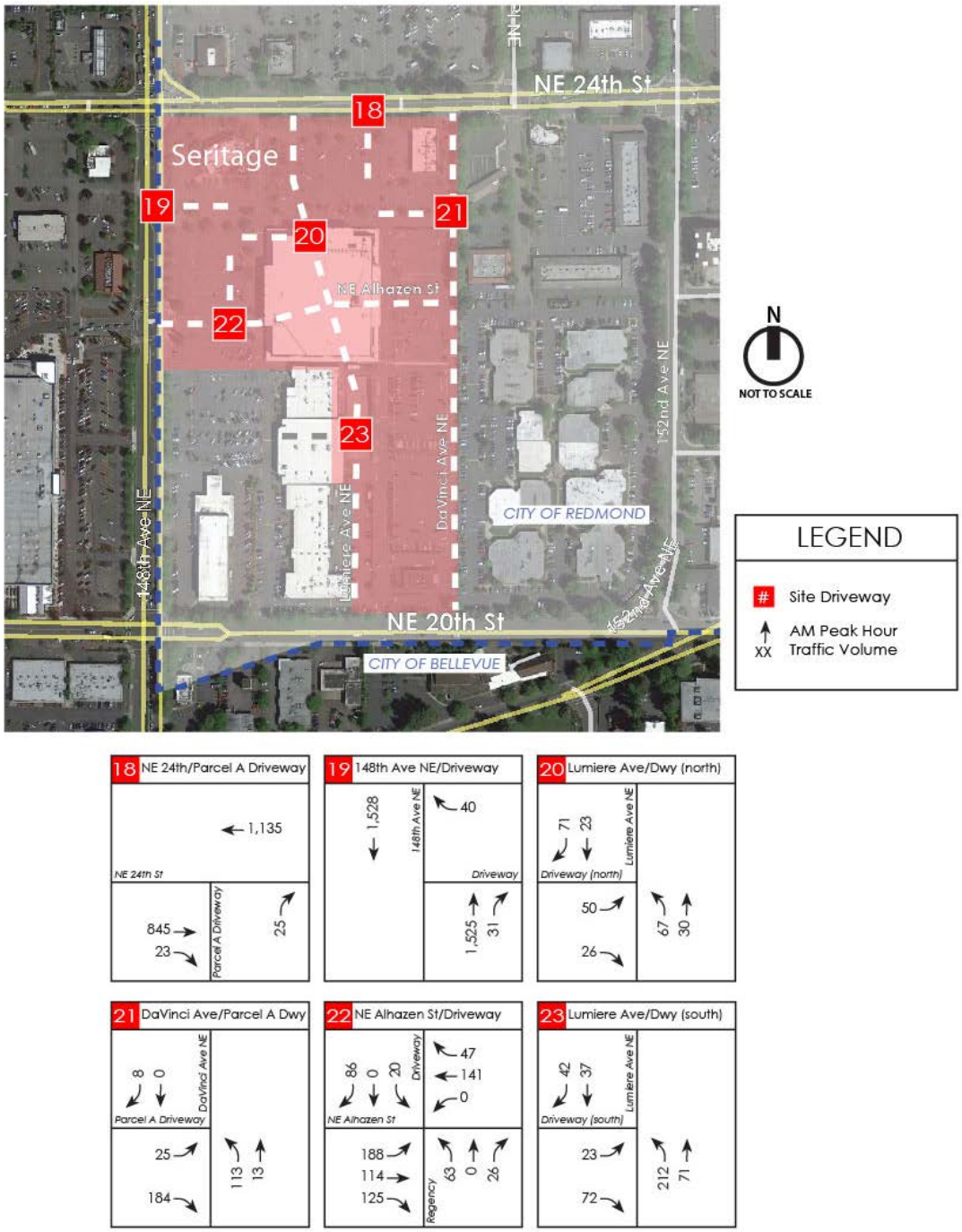


Figure E6: Year 2023 AM Peak Hour With Master Plan Buildout Traffic Volumes - Driveways

Figure E7: Year 2023 PM Peak Hour With Master Plan Buildout Traffic Volumes - Study Intersections

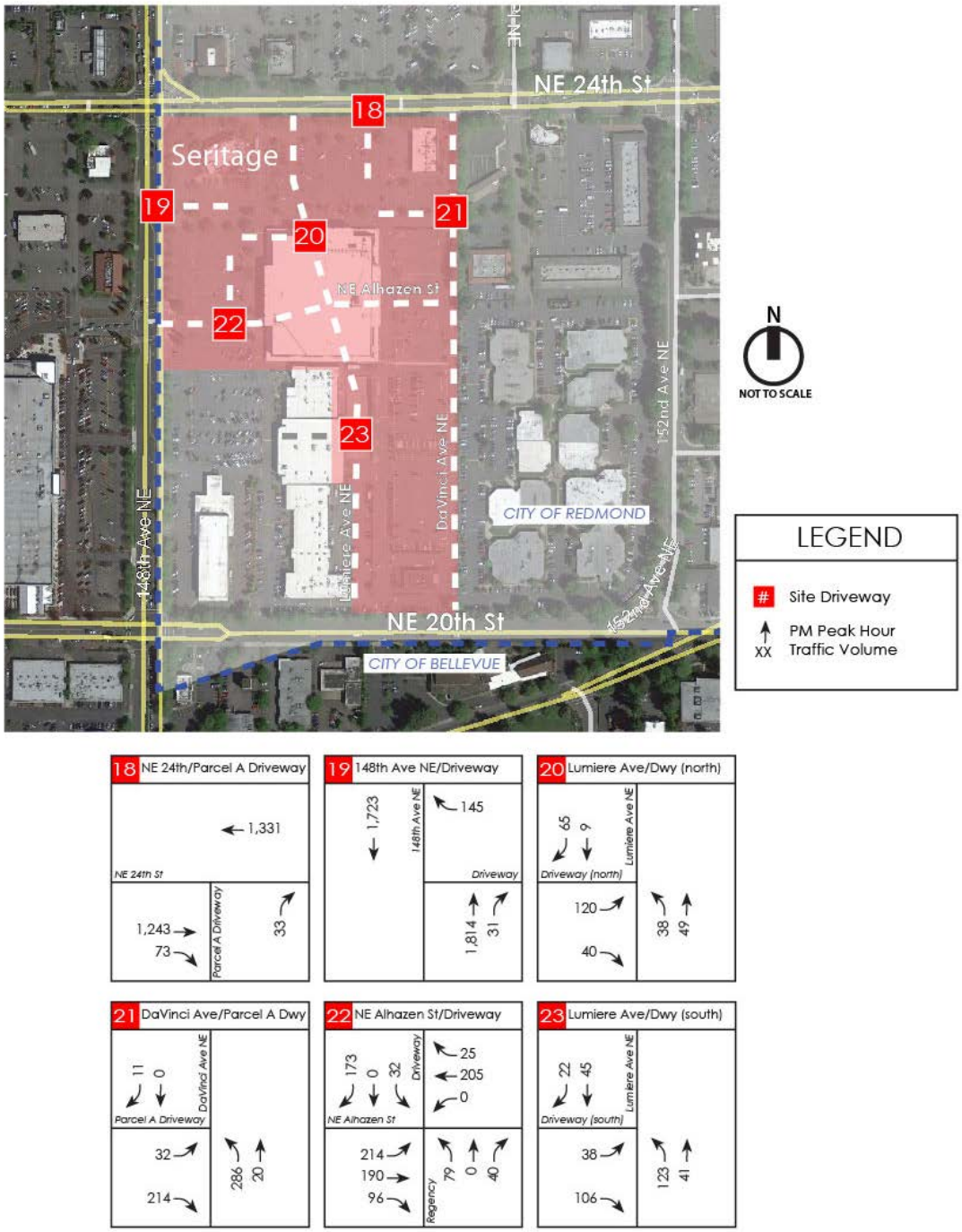


Figure E8: Year 2023 PM Peak Hour With Master Plan Buildout Traffic Volumes - Driveways

Appendix F

Year 2023 Master Plan Full Buildout (signal at Lumiere/24th)
Project Trips & Traffic Volumes

Figure F1: Year 2023 AM Peak Hour Master Plan Buildout Project Trips Only - Study Intersections (Scenario with Signal at Lumiere/24th)

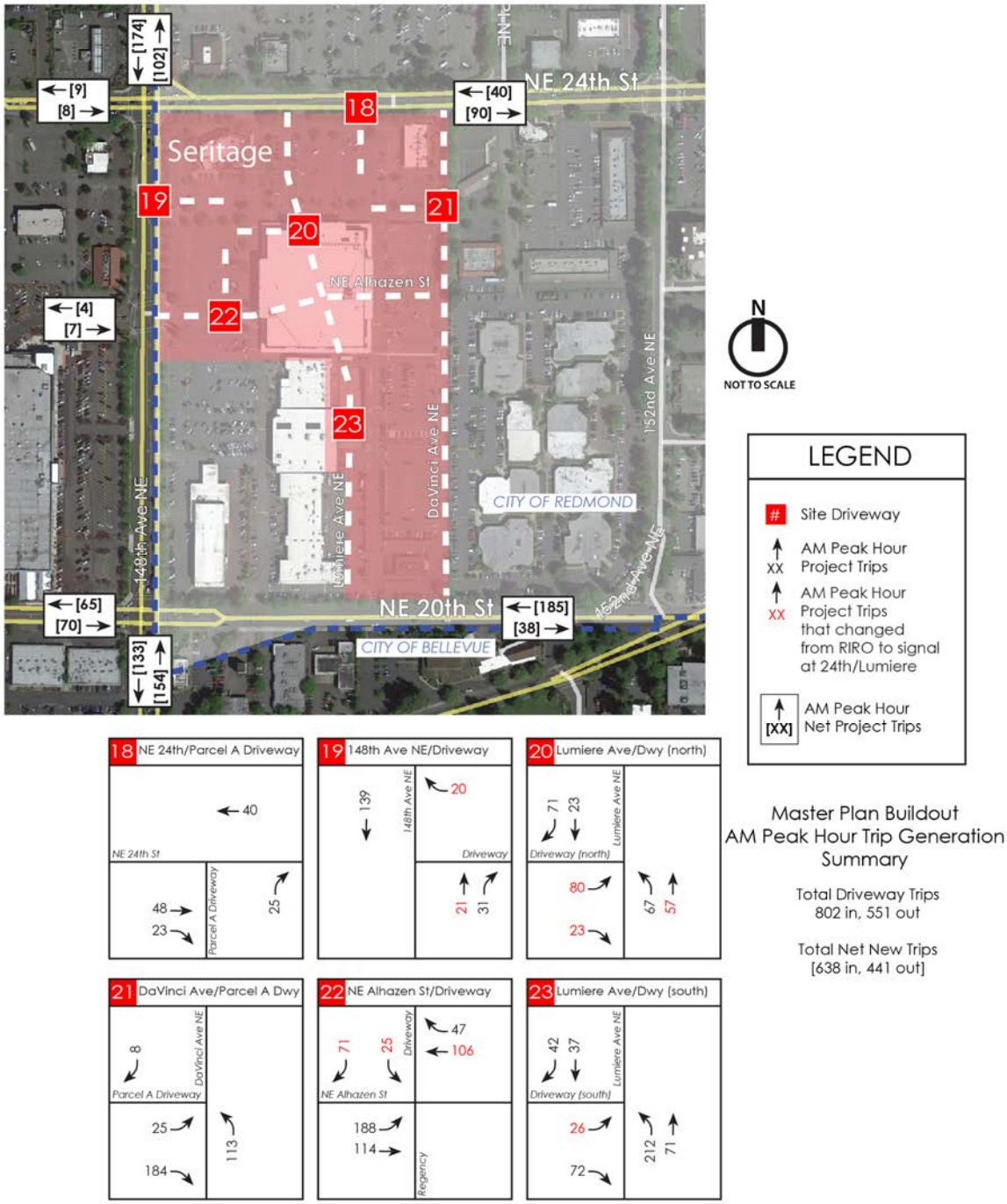


Figure F2: Year 2023 AM Peak Hour Master Plan Buildout Project Trips Only - Driveways (Scenario with Signal at Lumiere/24th)

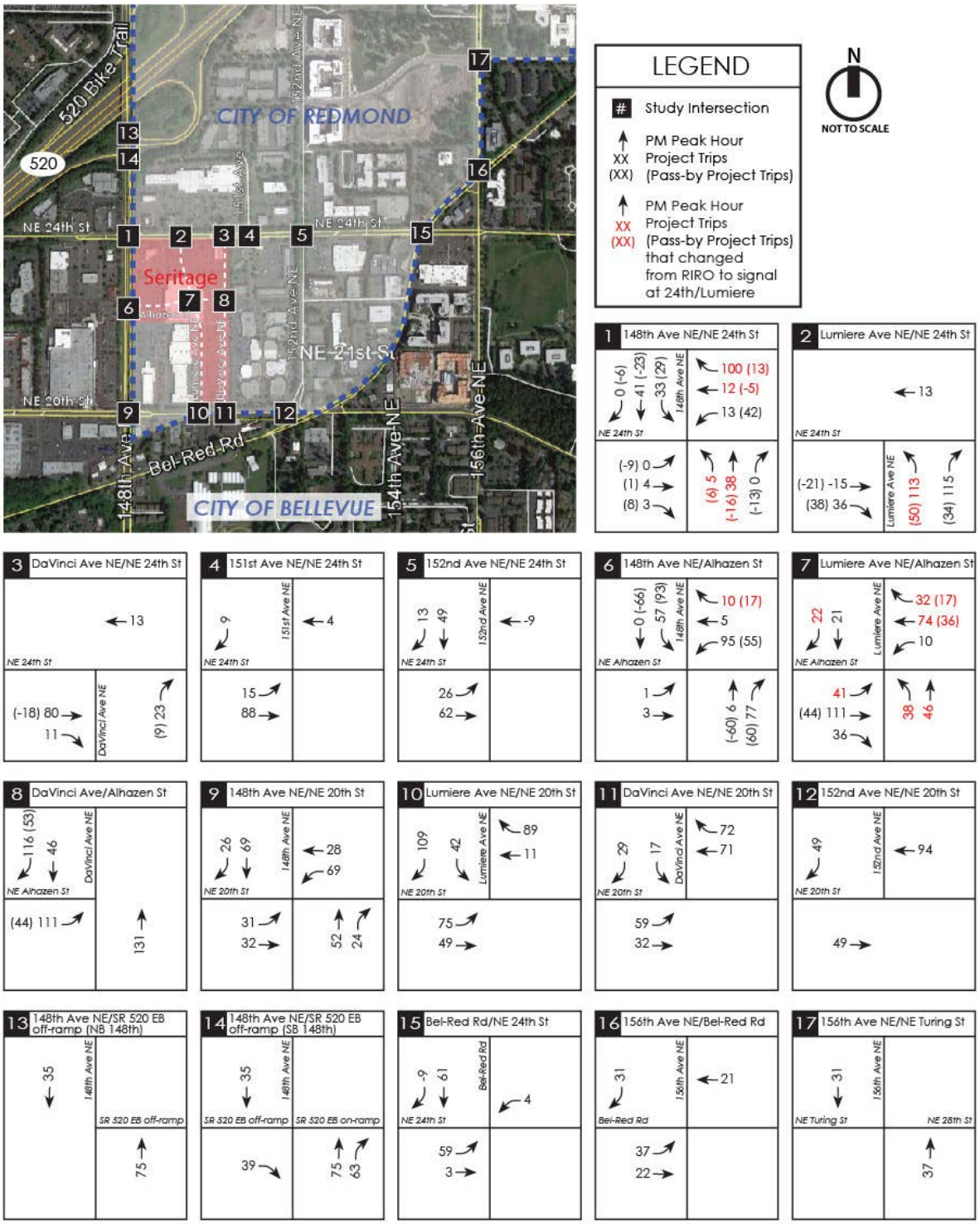


Figure F3: Year 2023 PM Peak Hour Master Plan Buildout Project Trips Only - Study Intersections (Scenario with Signal at Lumiere/24th)

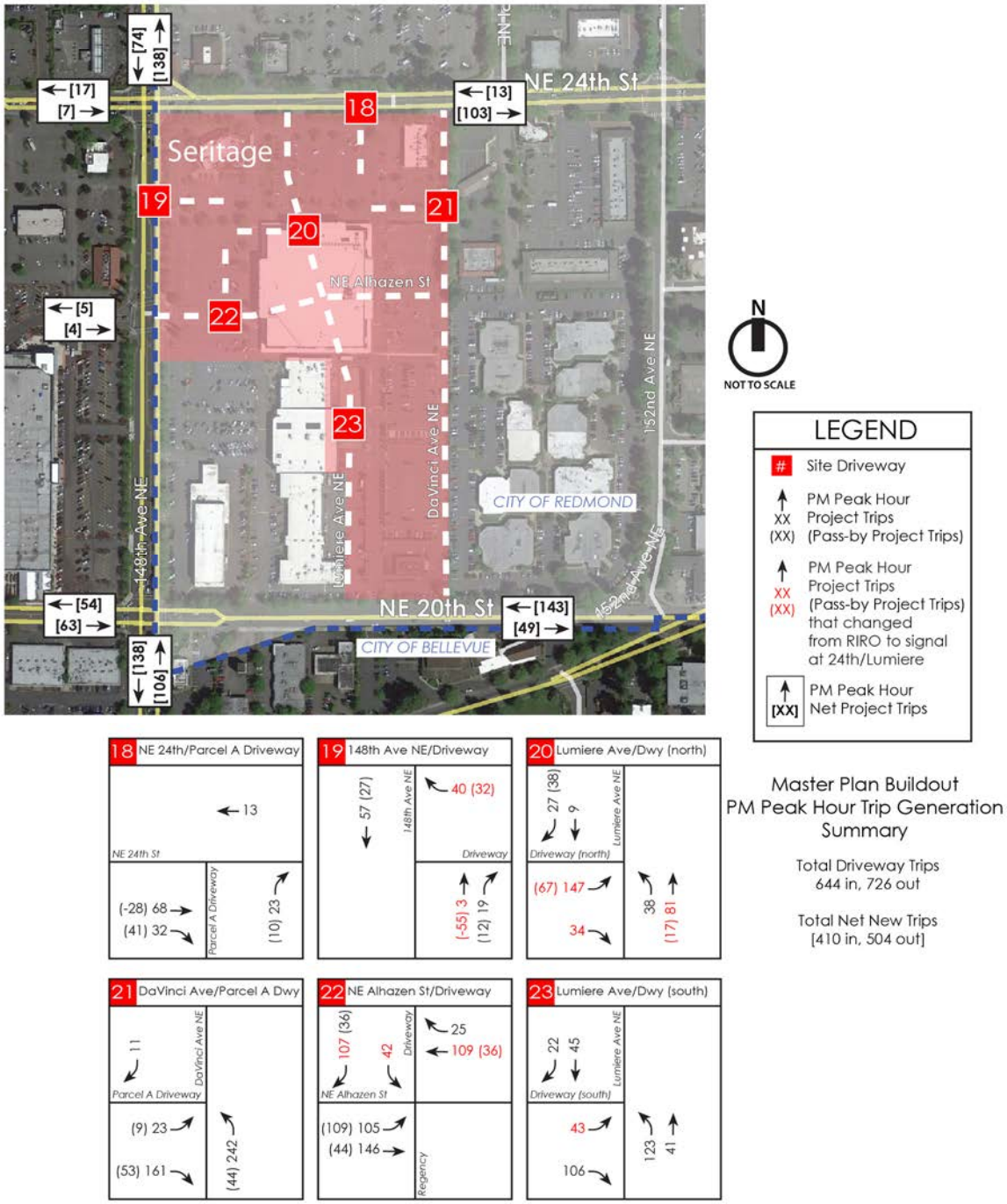


Figure F4: Year 2023 PM Peak Hour Master Plan Buildout Project Trips Only - Driveways (Scenario with Signal at Lumiere/24th)

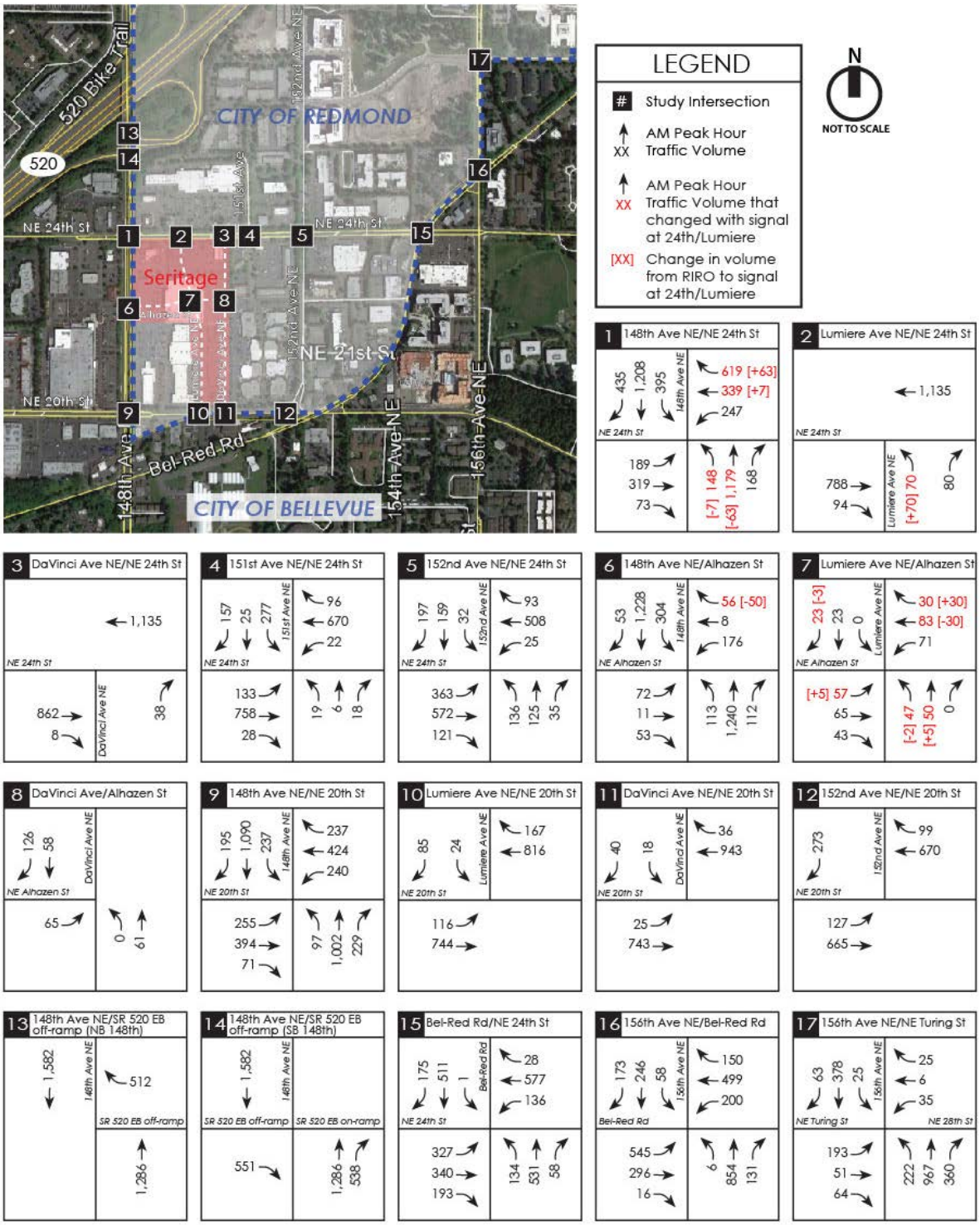


Figure F5: Year 2023 AM Peak Hour With Master Plan Buildout Traffic Volumes - Study Intersections (Scenario with Signal at Lumiere/24th)

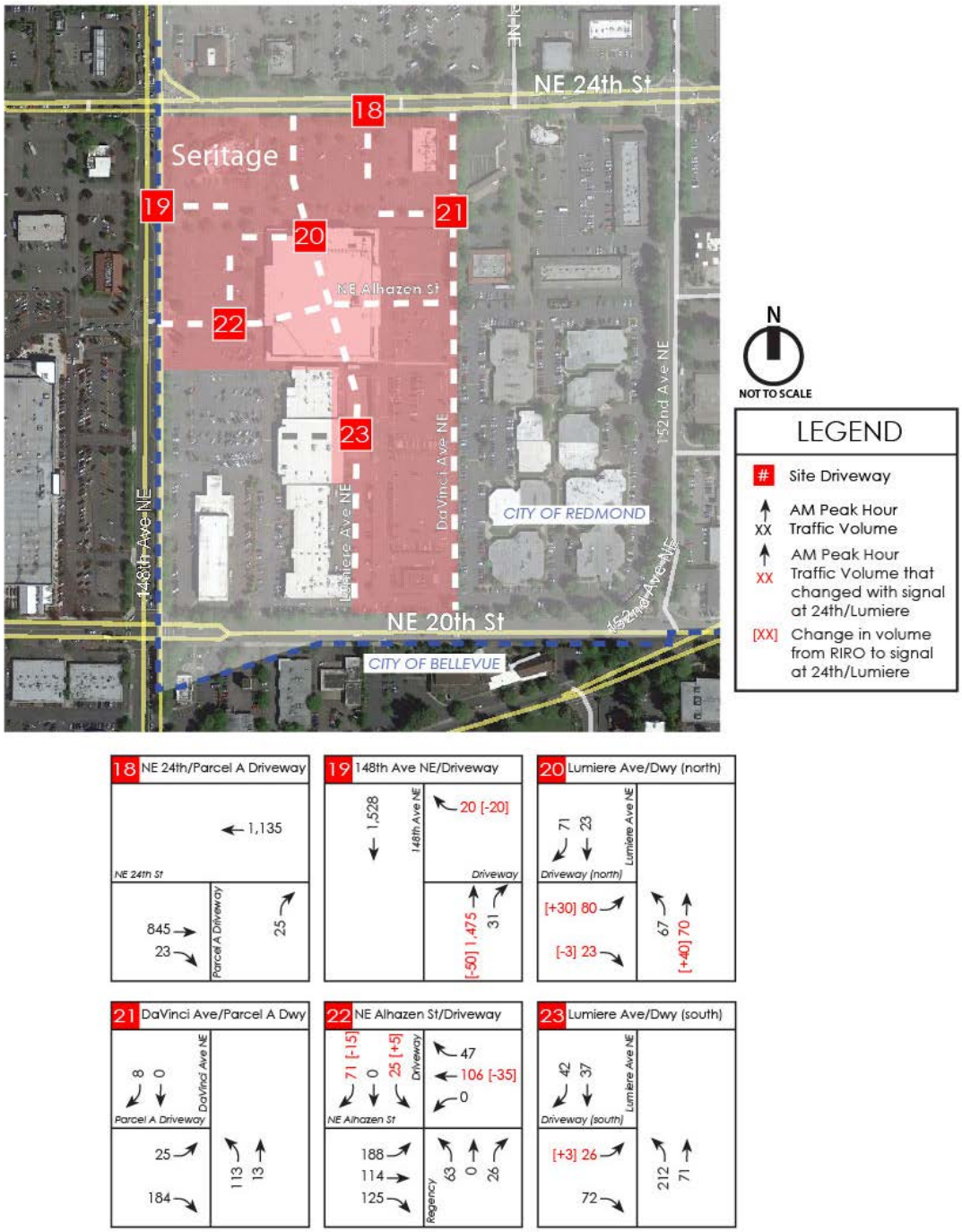


Figure F6: Year 2023 AM Peak Hour With Master Plan Buildout Traffic Volumes - Driveways (Scenario with Signal at Lumiere/24th)

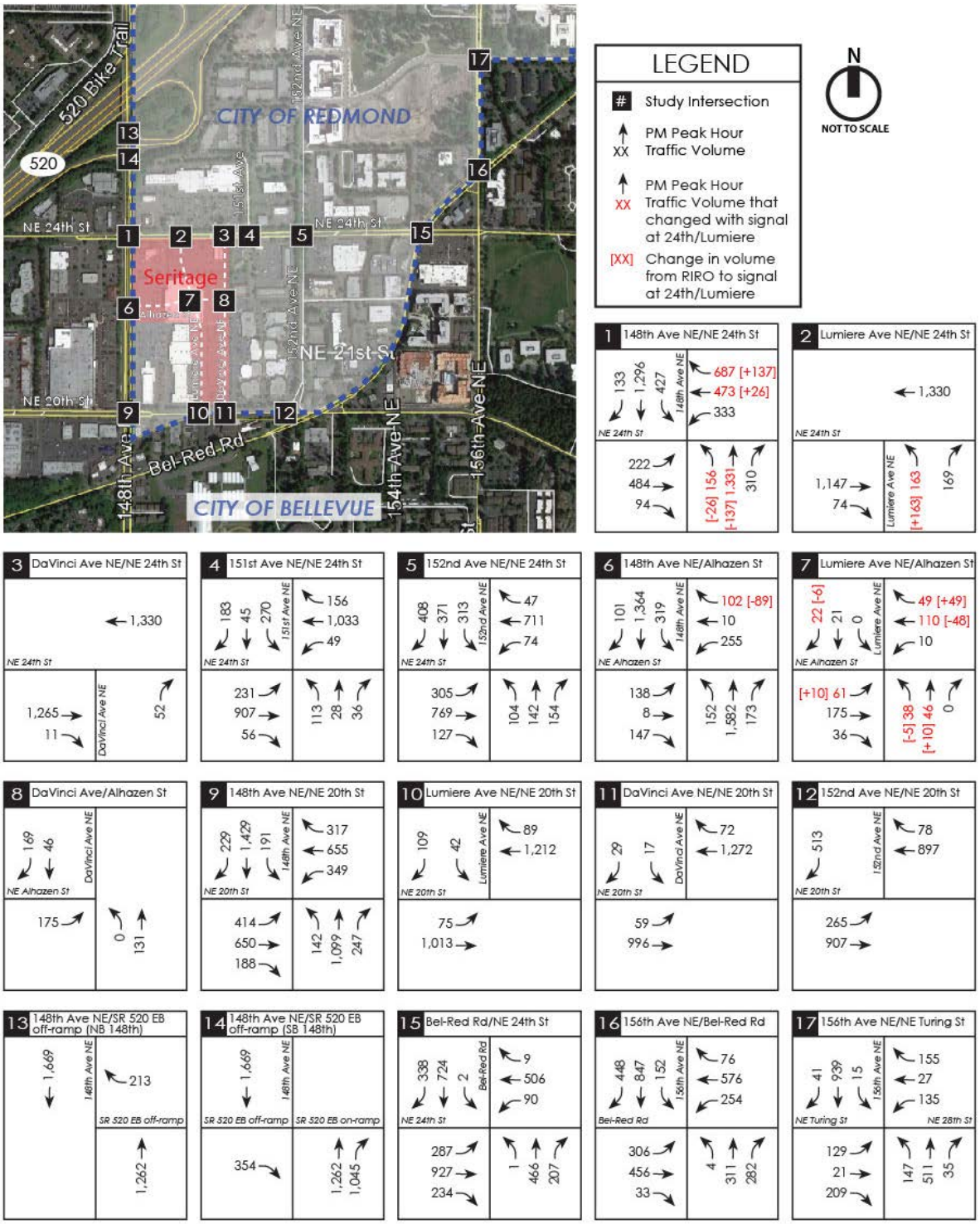


Figure F7: Year 2023 PM Peak Hour With Master Plan Buildout Traffic Volumes - Study Intersections (Scenario with Signal at Lumiere/24th)

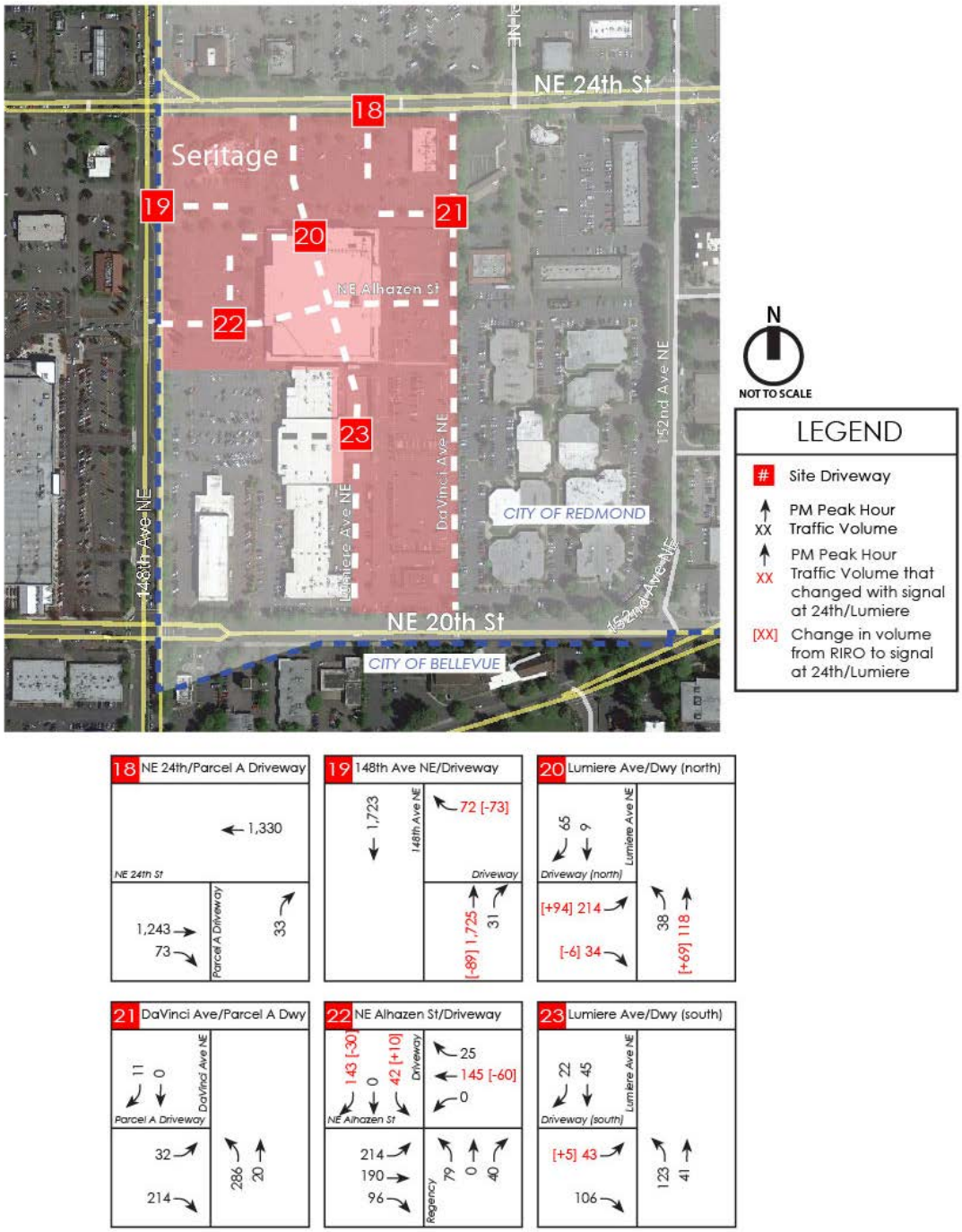
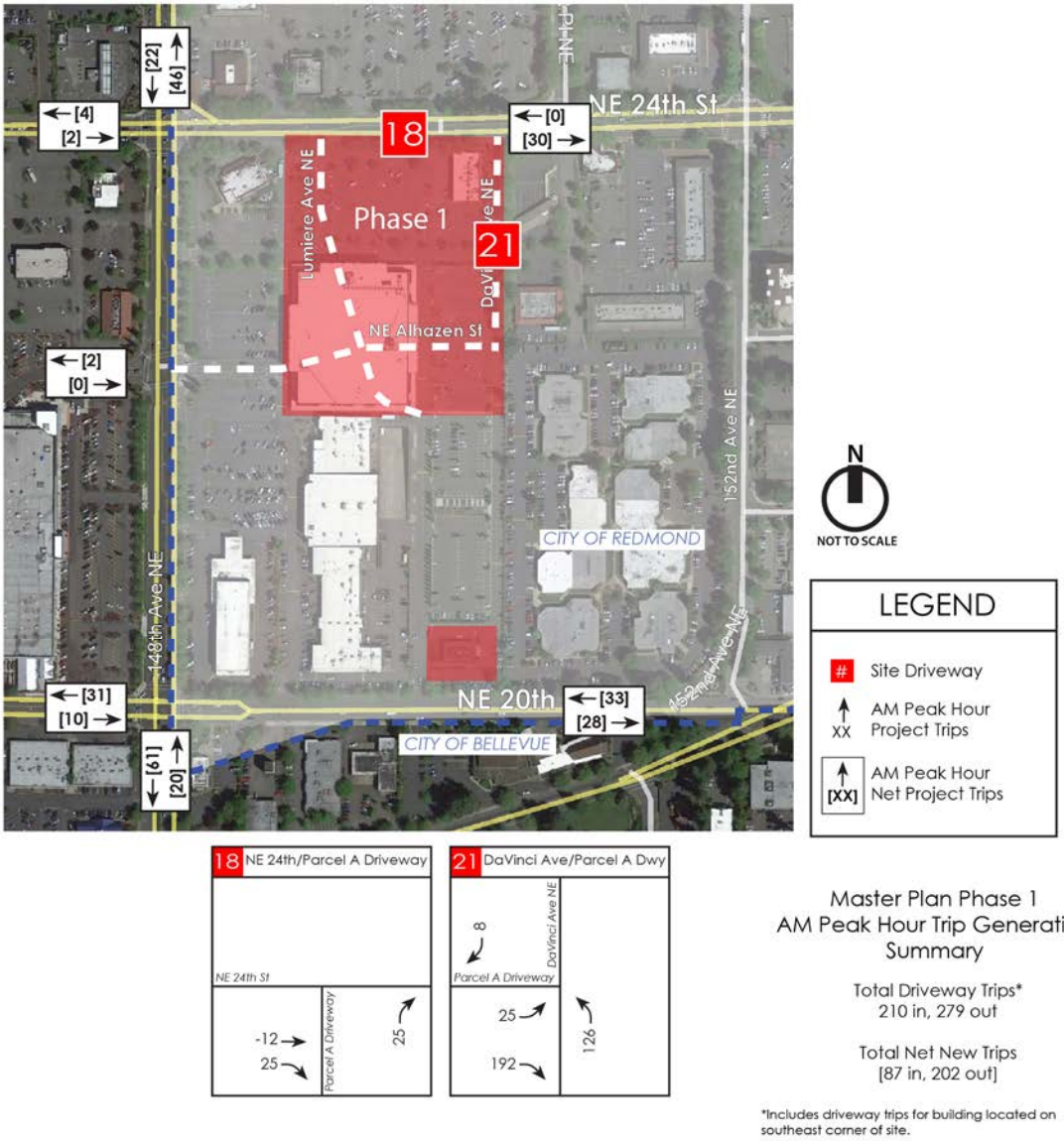


Figure F8: Year 2023 PM Peak Hour With Master Plan Buildout Traffic Volumes - Driveways (Scenario with Signal at Lumiere/24th)

Appendix G

Year 2023 Master Plan Phase 1
Project Trips & Traffic Volumes

Figure G1: Year 2023 AM Peak Hour Master Plan Phase 1 Project Trips Only - Study Intersections



Master Plan Phase 1
AM Peak Hour Trip Generation Summary

Total Driveway Trips*
210 in, 279 out

Total Net New Trips
[87 in, 202 out]

*Includes driveway trips for building located on southeast corner of site.

Figure G2: Year 2023 AM Peak Hour Master Plan Phase 1 Project Trips Only - Driveways

Figure G3: Year 2023 PM Peak Hour Master Plan Phase 1 Project Trips Only - Study Intersections

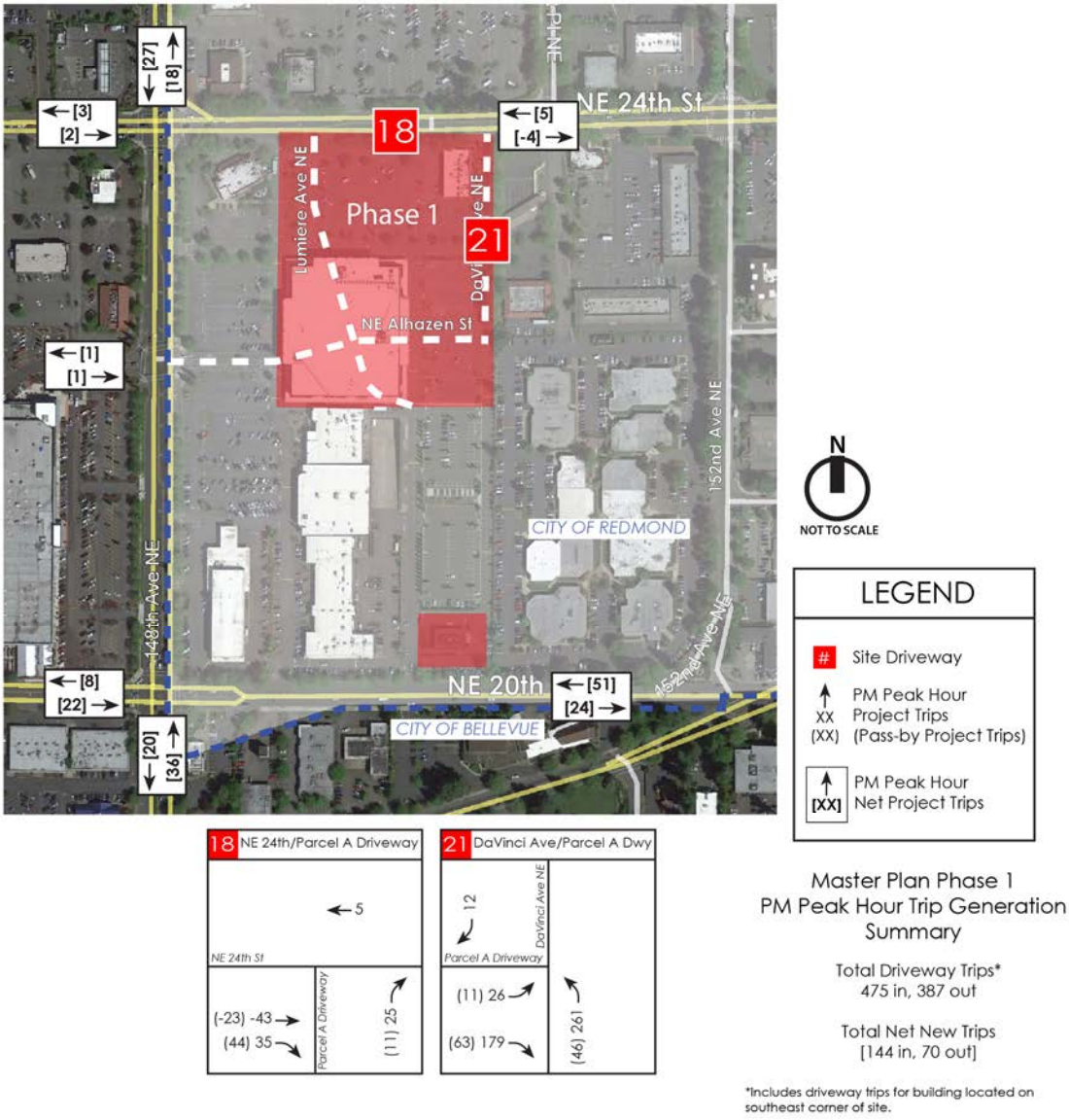


Figure G4: Year 2023 PM Peak Hour Master Plan Phase 1 Project Trips Only - Driveways

Figure G5: Year 2023 AM Peak Hour With Master Plan Phase 1 Traffic Volumes - Study Intersections

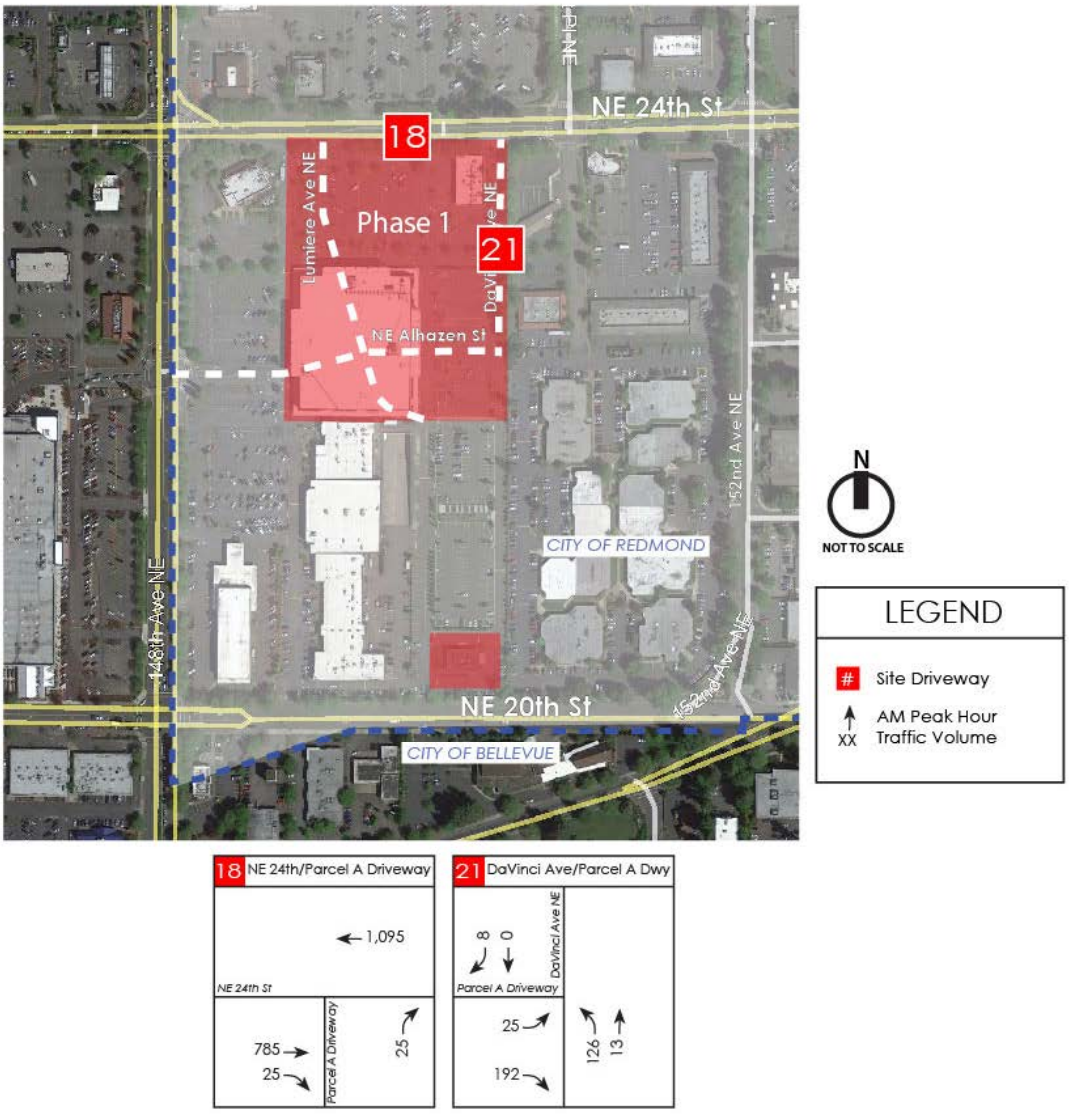


Figure G6: Year 2023 AM Peak Hour With Master Plan Phase 1 Traffic Volumes - Driveways

Figure G7: Year 2023 PM Peak Hour With Master Plan Phase 1 Traffic Volumes - Study Intersections

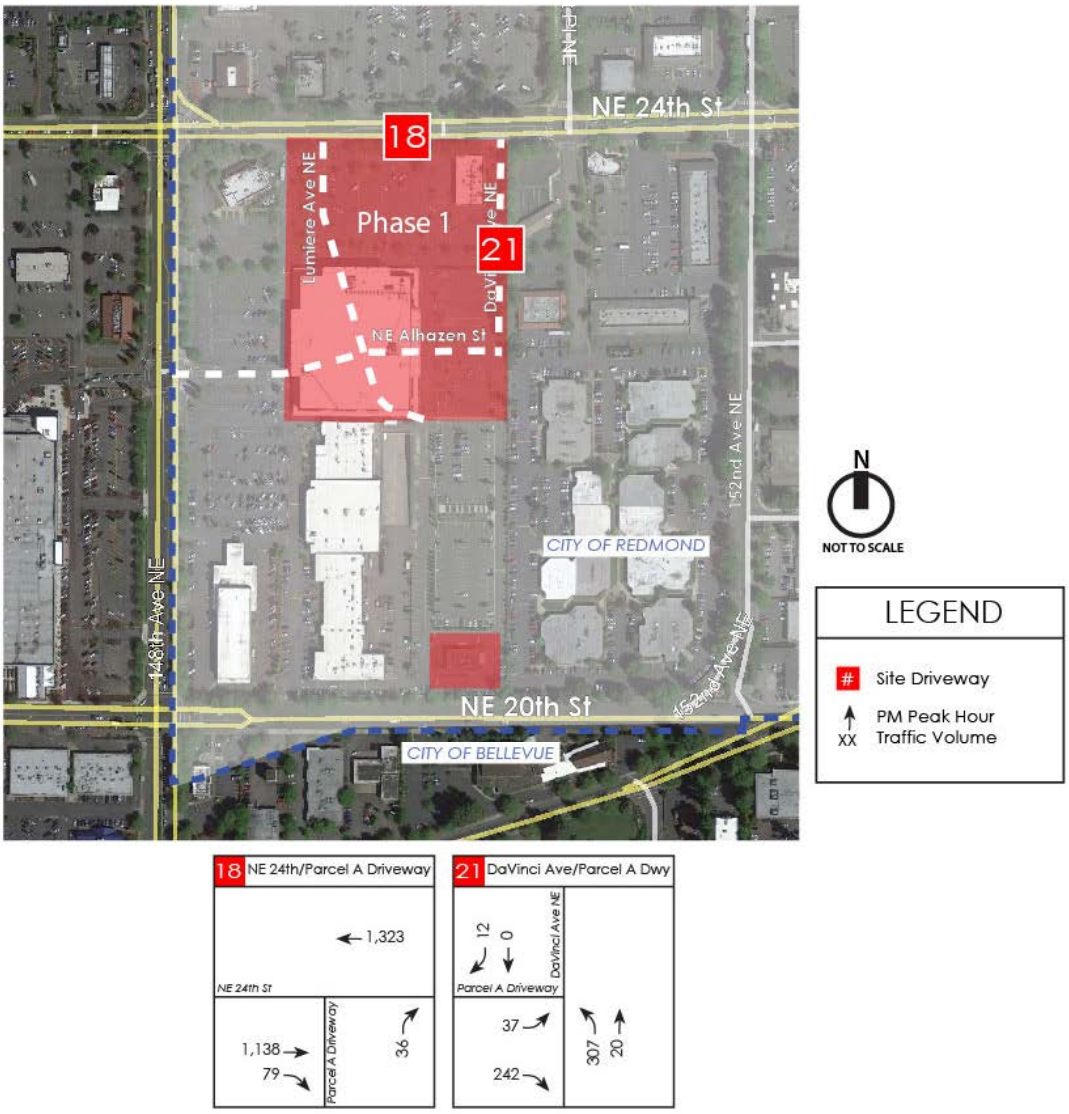


Figure G8: Year 2023 PM Peak Hour With Master Plan Phase 1 Traffic Volumes - Driveways

Appendix H

Year 2023 LOS Worksheets

2023 Baseline

Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

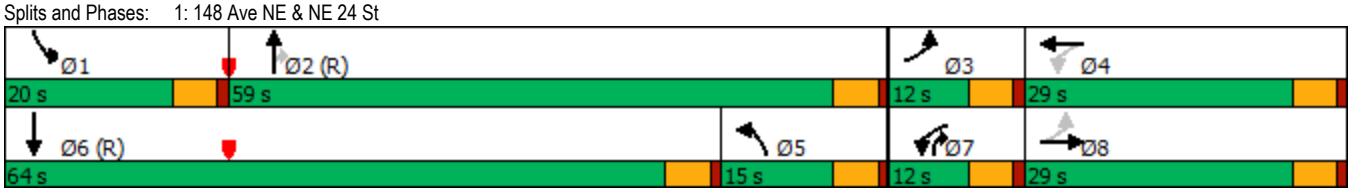
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	315	69	207	332	556	146	1140	168	316	1113	435
Future Volume (vph)	189	315	69	207	332	556	146	1140	168	316	1113	435
Satd. Flow (prot)	1787	3449	0	1770	3539	1583	1770	3539	1583	3400	3274	0
Flt Permitted	0.328			0.260			0.950			0.950		
Satd. Flow (perm)	607	3449	0	478	3539	1553	1764	3539	1513	3366	3274	0
Satd. Flow (RTOR)		20				347			79		70	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	405	0	218	349	585	154	1200	177	333	1630	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	12.0	29.0		12.0	29.0		15.0	59.0	12.0	20.0	64.0	
Total Split (%)	10.0%	24.2%		10.0%	24.2%		12.5%	49.2%	10.0%	16.7%	53.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	29.9	20.9		29.9	20.9	120.0	12.0	61.7	70.7	16.4	66.1	
Actuated g/C Ratio	0.25	0.17		0.25	0.17	1.00	0.10	0.51	0.59	0.14	0.55	
v/c Ratio	0.83	0.66		1.01	0.57	0.38	0.87	0.66	0.19	0.72	0.89	
Control Delay	64.6	48.6		103.9	49.8	0.9	76.0	9.6	0.8	67.1	24.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.7	
Total Delay	64.6	48.6		103.9	49.8	0.9	76.0	9.7	0.8	67.1	26.8	
LOS	E	D		F	D	A	E	A	A	E	C	
Approach Delay		53.9			35.2			15.3			33.7	
Approach LOS		D			D			B			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 103 (86%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 31.0 — Intersection LOS: C
Intersection Capacity Utilization 93.6% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: 148 Ave NE & NE 24 St



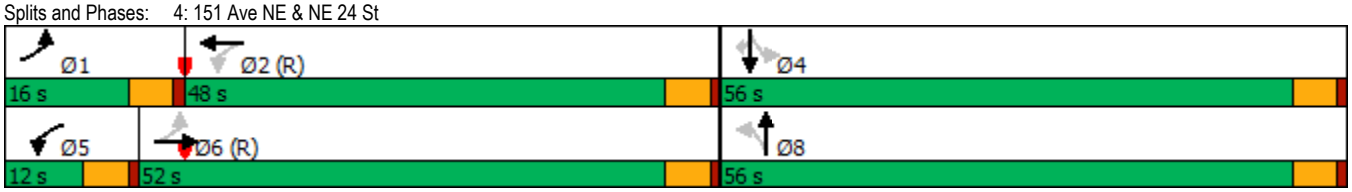
Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	124	677	28	22	644	96	19	6	18	277	25	143
Future Volume (vph)	124	677	28	22	644	96	19	6	18	277	25	143
Satd. Flow (prot)	1787	3541	0	1752	3401	0	0	1505	0	0	1730	1538
Flt Permitted	0.260			0.330				0.829			0.731	
Satd. Flow (perm)	489	3541	0	600	3401	0	0	1266	0	0	1282	1462
Satd. Flow (RTOR)		4			16			19				151
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	14%	14%	14%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	131	742	0	23	779	0	0	45	0	0	318	151
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		5.0	5.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		25.0	25.0		25.0	25.0	25.0
Total Split (s)	16.0	52.0		12.0	48.0		56.0	56.0		56.0	56.0	56.0
Total Split (%)	13.3%	43.3%		10.0%	40.0%		46.7%	46.7%		46.7%	46.7%	46.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.5	68.6		69.4	61.2			38.5			38.5	38.5
Actuated g/C Ratio	0.63	0.57		0.58	0.51			0.32			0.32	0.32
v/c Ratio	0.30	0.37		0.05	0.45			0.11			0.78	0.26
Control Delay	6.1	9.5		8.8	14.9			16.6			49.1	4.7
Queue Delay	0.0	0.0		0.0	0.2			0.0			0.0	0.0
Total Delay	6.1	9.5		8.8	15.1			16.6			49.1	4.7
LOS	A	A		A	B			B			D	A
Approach Delay		9.0			14.9			16.6			34.8	
Approach LOS		A			B			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 104 (87%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 16.8	Intersection LOS: B
Intersection Capacity Utilization 61.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: 151 Ave NE & NE 24 St



Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

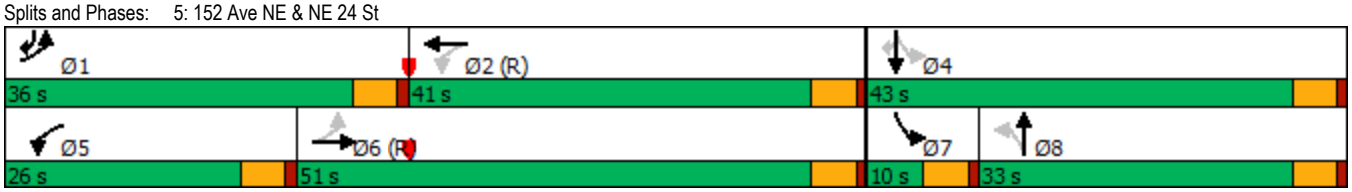
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	339	515	121	25	502	93	136	125	35	32	126	177
Future Volume (vph)	339	515	121	25	502	93	136	125	35	32	126	177
Satd. Flow (prot)	1770	3329	0	1779	3440	0	1752	1761	0	1612	1696	1442
Flt Permitted	0.330			0.397			0.672			0.368		
Satd. Flow (perm)	615	3329	0	722	3440	0	1196	1761	0	609	1696	1362
Satd. Flow (RTOR)		28			19			11				100
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	12%	12%	12%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	357	669	0	26	626	0	143	169	0	34	133	186
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	3.0	3.0		8.0	8.0		4.0	4.0		5.0	5.0	3.0
Minimum Split (s)	26.0	26.0		26.0	26.0		25.0	25.0		10.0	25.0	26.0
Total Split (s)	36.0	51.0		26.0	41.0		33.0	33.0		10.0	43.0	36.0
Total Split (%)	30.0%	42.5%		21.7%	34.2%		27.5%	27.5%		8.3%	35.8%	30.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	87.3	79.2		73.7	63.4		20.7	20.7		26.7	26.7	45.6
Actuated g/C Ratio	0.73	0.66		0.61	0.53		0.17	0.17		0.22	0.22	0.38
v/c Ratio	0.55	0.30		0.05	0.34		0.69	0.54		0.18	0.35	0.31
Control Delay	17.5	7.4		7.7	12.4		63.3	47.6		34.1	39.3	9.1
Queue Delay	0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	17.5	7.5		7.7	12.4		63.3	47.6		34.1	39.3	9.1
LOS	B	A		A	B		E	D		C	D	A
Approach Delay		11.0			12.2			54.8			22.9	
Approach LOS		B			B			D			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 114 (95%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 19.0 — Intersection LOS: B
Intersection Capacity Utilization 67.1% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: 152 Ave NE & NE 24 St



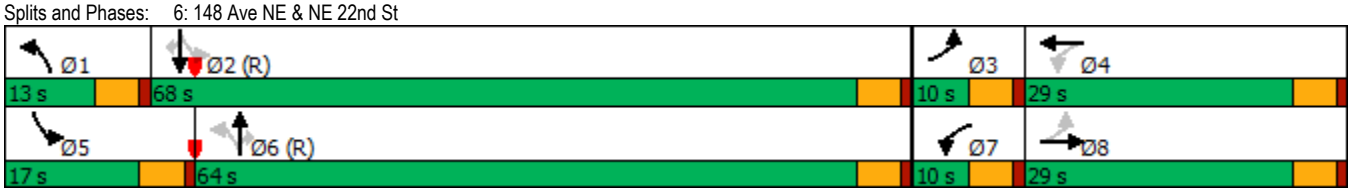
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	6	53	78	4	54	113	1196	22	165	1228	53
Future Volume (vph)	70	6	53	78	4	54	113	1196	22	165	1228	53
Satd. Flow (prot)	1736	1514	0	1736	1503	0	1752	3505	1568	1736	3471	1553
Flt Permitted	0.697			0.694			0.154			0.150		
Satd. Flow (perm)	1238	1514	0	1233	1503	0	284	3505	1434	274	3471	1421
Satd. Flow (RTOR)		55			56				109			109
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	61	0	80	60	0	116	1233	23	170	1266	55
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6		6	2		2
Detector Phase	3	8		7	4		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	29.0		10.0	29.0		12.0	24.0	24.0	12.0	24.0	24.0
Total Split (s)	10.0	29.0		10.0	29.0		13.0	64.0	64.0	17.0	68.0	68.0
Total Split (%)	8.3%	24.2%		8.3%	24.2%		10.8%	53.3%	53.3%	14.2%	56.7%	56.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	24.4	19.2		24.4	19.2		84.5	75.0	75.0	87.7	76.7	76.7
Actuated g/C Ratio	0.20	0.16		0.20	0.16		0.70	0.62	0.62	0.73	0.64	0.64
v/c Ratio	0.26	0.21		0.29	0.21		0.37	0.56	0.02	0.51	0.57	0.06
Control Delay	35.9	13.5		36.8	12.8		5.7	5.4	0.0	13.0	7.3	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2	0.0	0.0	0.1	0.0
Total Delay	35.9	13.5		36.8	12.8		5.7	5.5	0.0	13.0	7.4	0.1
LOS	D	B		D	B		A	A	A	B	A	A
Approach Delay		25.7			26.5			5.4			7.8	
Approach LOS		C			C			A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 89 (74%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 8.3	Intersection LOS: A
Intersection Capacity Utilization 67.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St



Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

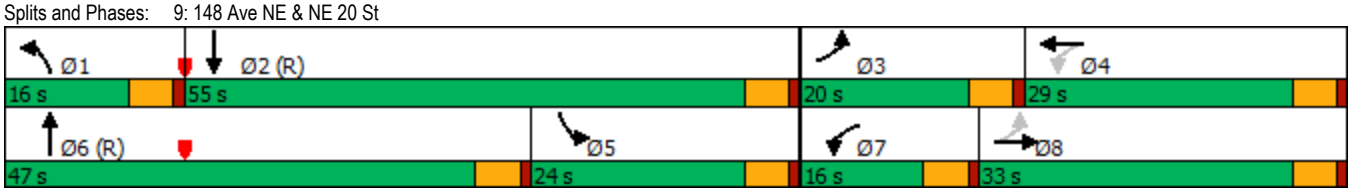
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	359	71	173	391	237	97	925	152	237	1024	163
Future Volume (vph)	220	359	71	173	391	237	97	925	152	237	1024	163
Satd. Flow (prot)	1703	3296	0	1752	3247	0	1770	3401	0	1736	4813	0
Flt Permitted	0.144			0.357			0.950			0.950		
Satd. Flow (perm)	256	3296	0	649	3247	0	1759	3401	0	1723	4813	0
Satd. Flow (RTOR)		18			96			17			32	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	227	443	0	178	647	0	100	1111	0	244	1224	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	12.0	29.0		12.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	20.0	33.0		16.0	29.0		16.0	47.0		24.0	55.0	
Total Split (%)	16.7%	27.5%		13.3%	24.2%		13.3%	39.2%		20.0%	45.8%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	43.9	28.4		37.3	24.8		11.7	46.1		21.0	55.3	
Actuated g/C Ratio	0.37	0.24		0.31	0.21		0.10	0.38		0.18	0.46	
v/c Ratio	0.79	0.56		0.56	0.87		0.58	0.84		0.81	0.55	
Control Delay	48.9	41.3		34.0	52.2		65.2	40.9		52.8	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	9.1		0.0	0.0	
Total Delay	48.9	41.3		34.0	52.2		65.2	50.0		52.8	11.6	
LOS	D	D		C	D		E	D		D	B	
Approach Delay		43.9			48.2			51.3			18.5	
Approach LOS		D			D			D			B	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 108 (90%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 37.9 — Intersection LOS: D
Intersection Capacity Utilization 88.9% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	127	627	518	99	0	240
Future Volume (vph)	127	627	518	99	0	240
Satd. Flow (prot)	1770	3539	3454	0	0	1580
Flt Permitted	0.950					
Satd. Flow (perm)	1770	3539	3454	0	0	1580
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	134	660	649	0	0	253
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 43.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	127	627	518	99	0	240
Future Vol, veh/h	127	627	518	99	0	240
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	134	660	545	104	0	253

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	669	0	-	0	-	365
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	917	-	-	-	0	626
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	902	-	-	-	-	605
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	15.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	902	-	-	-	605
HCM Lane V/C Ratio	0.148	-	-	-	0.418
HCM Control Delay (s)	9.7	-	-	-	15.1
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	2.1

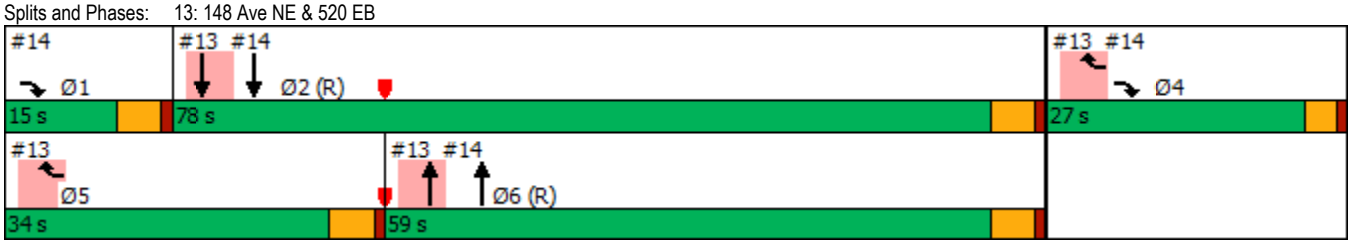
Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	512	1216	0	0	1507			
Future Volume (vph)	0	512	1216	0	0	1507			
Satd. Flow (prot)	0	1526	3320	0	0	3320			
Flt Permitted									
Satd. Flow (perm)	0	1526	3320	0	0	3320			
Satd. Flow (RTOR)		26							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98			
Heavy Vehicles (%)	2%	2%	3%	3%	3%	3%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	522	1241	0	0	1538			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			59.0			78.0	15.0	27.0	34.0
Total Split (%)			49.2%			65.0%	13%	23%	28%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		44.4	69.6			84.8			
Actuated g/C Ratio		0.37	0.58			0.71			
v/c Ratio		0.90	0.64			0.66			
Control Delay		52.2	2.8			12.5			
Queue Delay		0.0	0.0			0.0			
Total Delay		52.2	2.8			12.5			
LOS		D	A			B			
Approach Delay	52.2		2.8			12.5			
Approach LOS	D		A			B			

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 111 (93%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 15.2	Intersection LOS: B
Intersection Capacity Utilization 77.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 13: 148 Ave NE & 520 EB



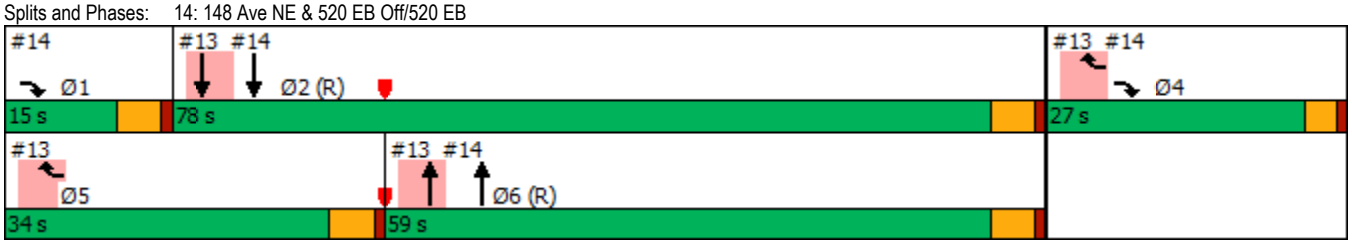
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	452	0	0	0	0	1216	506	0	1507	0
Future Volume (vph)	0	0	452	0	0	0	0	1216	506	0	1507	0
Satd. Flow (prot)	0	0	2614	0	0	0	0	3320	1485	0	3320	0
Flt Permitted												
Satd. Flow (perm)	0	0	2614	0	0	0	0	3320	1438	0	3320	0
Satd. Flow (RTOR)			64						261			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	461	0	0	0	0	1241	516	0	1538	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								59.0			78.0	
Total Split (%)								49.2%			65.0%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			29.2					69.6	120.0		84.8	
Actuated g/C Ratio			0.24					0.58	1.00		0.71	
v/c Ratio			0.67					0.64	0.36		0.66	
Control Delay			39.5					9.7	0.6		2.2	
Queue Delay			0.0					0.1	0.0		0.0	
Total Delay			39.5					9.8	0.6		2.2	
LOS			D					A	A		A	
Approach Delay		39.5						7.1			2.2	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 111 (93%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 77.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

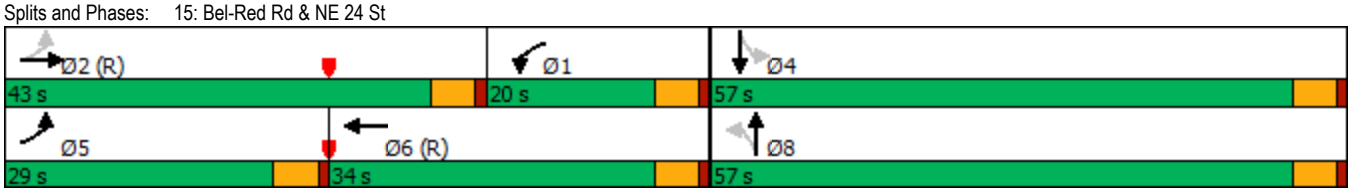
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	271	339	193	129	576	28	134	531	58	1	436	170
Future Volume (vph)	271	339	193	129	576	28	134	531	58	1	436	170
Satd. Flow (prot)	1752	3262	0	1770	3465	0	0	3487	0	0	3285	0
Flt Permitted	0.156			0.950				0.616			0.954	
Satd. Flow (perm)	285	3262	0	1745	3465	0	0	2164	0	0	3133	0
Satd. Flow (RTOR)		99			4			10			62	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	285	560	0	136	635	0	0	761	0	0	639	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	29.0	43.0		20.0	34.0		57.0	57.0		57.0	57.0	
Total Split (%)	24.2%	35.8%		16.7%	28.3%		47.5%	47.5%		47.5%	47.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	46.8	46.8		17.0	42.6			47.2			47.2	
Actuated g/C Ratio	0.39	0.39		0.14	0.36			0.39			0.39	
v/c Ratio	0.77	0.42		0.54	0.52			0.89			0.50	
Control Delay	45.8	25.8		56.9	34.4			46.4			10.8	
Queue Delay	0.0	0.0		0.0	0.5			0.0			0.0	
Total Delay	45.8	25.8		56.9	35.0			46.4			10.8	
LOS	D	C		E	C			D			B	
Approach Delay		32.6			38.8			46.4			10.8	
Approach LOS		C			D			D			B	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 63 (53%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 33.1 — Intersection LOS: C
Intersection Capacity Utilization 87.9% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 15: Bel-Red Rd & NE 24 St



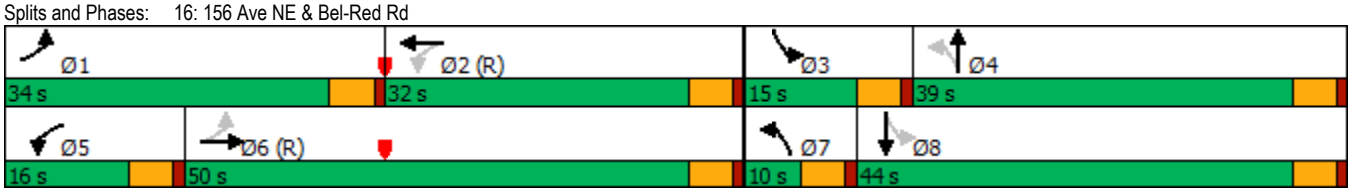
Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	499	286	16	200	459	150	6	854	131	58	246	133
Future Volume (vph)	499	286	16	200	459	150	6	854	131	58	246	133
Satd. Flow (prot)	1728	3420	0	1728	3292	0	1770	3334	0	1671	3013	0
Flt Permitted	0.143			0.559			0.504			0.088		
Satd. Flow (perm)	258	3420	0	998	3292	0	924	3334	0	155	3013	0
Satd. Flow (RTOR)		6			35			14			91	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	525	318	0	211	641	0	6	1037	0	61	399	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0		7.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		10.0	32.0		15.0	31.0	
Total Split (s)	34.0	50.0		16.0	32.0		10.0	39.0		15.0	44.0	
Total Split (%)	28.3%	41.7%		13.3%	26.7%		8.3%	32.5%		12.5%	36.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	63.9	48.6		41.3	29.0		45.4	39.8		50.1	48.1	
Actuated g/C Ratio	0.53	0.40		0.34	0.24		0.38	0.33		0.42	0.40	
v/c Ratio	0.99	0.23		0.50	0.78		0.02	0.93		0.33	0.32	
Control Delay	64.4	34.2		22.4	47.7		20.3	53.9		18.6	12.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	45.1		0.0	0.0	
Total Delay	64.4	34.2		22.4	47.7		20.3	99.1		18.6	12.8	
LOS	E	C		C	D		C	F		B	B	
Approach Delay		53.0			41.5			98.6			13.6	
Approach LOS		D			D			F			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 72 (60%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 115	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 59.1	Intersection LOS: E
Intersection Capacity Utilization 97.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

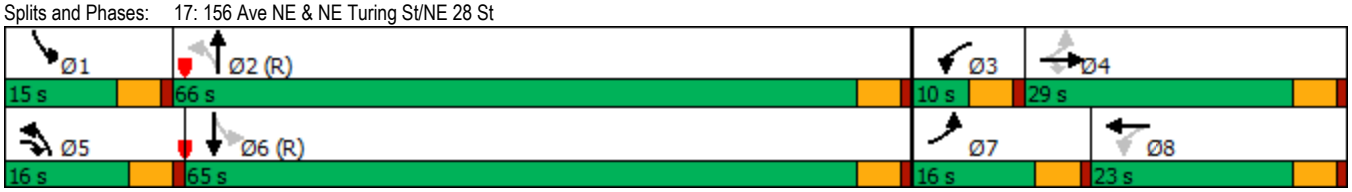
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	51	64	35	6	25	222	921	360	25	338	63
Future Volume (vph)	193	51	64	35	6	25	222	921	360	25	338	63
Satd. Flow (prot)	1770	1863	1583	1656	1459	0	1787	3299	0	1656	3153	0
Flt Permitted	0.594			0.723			0.466			0.157		
Satd. Flow (perm)	1068	1863	1497	1213	1459	0	849	3299	0	274	3153	0
Satd. Flow (RTOR)			65		26			72			26	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	1%	1%	1%	9%	9%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	197	52	65	36	32	0	227	1307	0	26	409	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	23.0	15.0	10.0	23.0		15.0	23.0		15.0	23.0	
Total Split (s)	16.0	29.0	16.0	10.0	23.0		16.0	66.0		15.0	65.0	
Total Split (%)	13.3%	24.2%	13.3%	8.3%	19.2%		13.3%	55.0%		12.5%	54.2%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	26.5	20.5	30.0	18.1	12.6		87.5	80.6		81.2	73.0	
Actuated g/C Ratio	0.22	0.17	0.25	0.15	0.10		0.73	0.67		0.68	0.61	
v/c Ratio	0.63	0.16	0.15	0.17	0.18		0.32	0.58		0.09	0.21	
Control Delay	48.8	41.8	7.4	35.3	21.5		3.3	11.1		7.8	7.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	48.8	41.8	7.4	35.3	21.5		3.3	11.1		7.8	7.2	
LOS	D	D	A	D	C		A	B		A	A	
Approach Delay		39.0			28.8			9.9			7.3	
Approach LOS		D			C			A			A	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 47 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 13.9 — Intersection LOS: B
Intersection Capacity Utilization 69.0% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



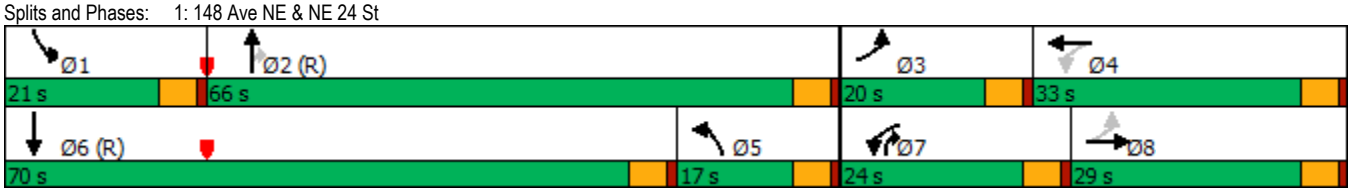
Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	228	482	83	293	459	566	153	1317	318	382	1263	137
Future Volume (vph)	228	482	83	293	459	566	153	1317	318	382	1263	137
Satd. Flow (prot)	1693	3286	0	1676	3353	1500	1660	3320	1485	3285	3279	0
Flt Permitted	0.285			0.138			0.950			0.950		
Satd. Flow (perm)	501	3286	0	242	3353	1472	1652	3320	1412	3255	3279	0
Satd. Flow (RTOR)		12				321			55		11	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	588	0	305	478	590	159	1372	331	398	1459	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	20.0	29.0		24.0	33.0		17.0	66.0	24.0	21.0	70.0	
Total Split (%)	14.3%	20.7%		17.1%	23.6%		12.1%	47.1%	17.1%	15.0%	50.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	42.7	26.0		50.0	30.3	140.0	14.0	63.0	84.0	18.0	67.0	
Actuated g/C Ratio	0.30	0.19		0.36	0.22	1.00	0.10	0.45	0.60	0.13	0.48	
v/c Ratio	0.81	0.95		1.01	0.66	0.40	0.96	0.92	0.38	0.94	0.93	
Control Delay	56.5	80.4		95.6	55.2	0.8	89.7	24.9	3.8	92.5	37.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	13.8	0.1	0.0	14.0	
Total Delay	56.5	80.4		95.6	55.2	0.8	89.7	38.7	3.9	92.5	50.9	
LOS	E	F		F	E	A	F	D	A	F	D	
Approach Delay		73.5			40.8			36.9			59.8	
Approach LOS		E			D			D			E	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 29 (21%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 50.1	Intersection LOS: D
Intersection Capacity Utilization 99.6%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: 148 Ave NE & NE 24 St



Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

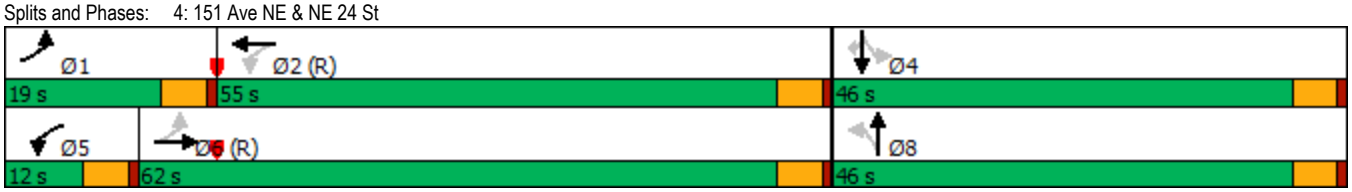
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	819	56	49	1029	156	113	28	36	270	45	174
Future Volume (vph)	216	819	56	49	1029	156	113	28	36	270	45	174
Satd. Flow (prot)	1693	3329	0	1693	3271	0	0	1678	0	0	1709	1515
Flt Permitted	0.096			0.268				0.438			0.646	
Satd. Flow (perm)	171	3329	0	471	3271	0	0	751	0	0	1128	1429
Satd. Flow (RTOR)		8			18			12				179
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	223	902	0	51	1222	0	0	182	0	0	324	179
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	8.0		3.0	8.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		26.0	26.0		26.0	26.0	26.0
Total Split (s)	19.0	62.0		12.0	55.0		46.0	46.0		46.0	46.0	46.0
Total Split (%)	15.8%	51.7%		10.0%	45.8%		38.3%	38.3%		38.3%	38.3%	38.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.2	66.0		65.2	57.0			38.8			38.8	38.8
Actuated g/C Ratio	0.63	0.55		0.54	0.48			0.32			0.32	0.32
v/c Ratio	0.74	0.49		0.15	0.78			0.73			0.89	0.31
Control Delay	37.4	19.2		9.3	21.5			50.3			64.7	5.3
Queue Delay	0.0	0.0		0.0	0.2			0.0			0.0	0.0
Total Delay	37.4	19.2		9.3	21.7			50.3			64.7	5.3
LOS	D	B		A	C			D			E	A
Approach Delay		22.8			21.2			50.3			43.5	
Approach LOS		C			C			D			D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 99 (83%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 27.1 — Intersection LOS: C
Intersection Capacity Utilization 82.4% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 4: 151 Ave NE & NE 24 St



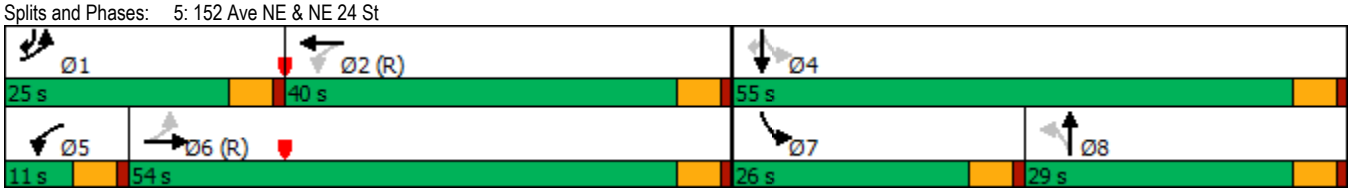
Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	707	127	74	720	47	104	142	154	313	322	395
Future Volume (vph)	279	707	127	74	720	47	104	142	154	313	322	395
Satd. Flow (prot)	1693	3222	0	1718	3394	0	1693	1593	0	1660	1748	1485
Flt Permitted	0.162			0.274			0.559			0.154		
Satd. Flow (perm)	289	3222	0	487	3394	0	970	1593	0	269	1748	1403
Satd. Flow (RTOR)		21			6			41				34
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	291	868	0	77	799	0	108	308	0	326	335	411
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	5.0	3.0		4.0	8.0		4.0	4.0		4.0	5.0	5.0
Minimum Split (s)	24.0	26.0		11.0	26.0		22.0	22.0		11.0	22.0	24.0
Total Split (s)	25.0	54.0		11.0	40.0		29.0	29.0		26.0	55.0	25.0
Total Split (%)	20.8%	45.0%		9.2%	33.3%		24.2%	24.2%		21.7%	45.8%	20.8%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	64.1	55.3		49.5	41.6		24.1	24.1		49.9	49.9	67.4
Actuated g/C Ratio	0.53	0.46		0.41	0.35		0.20	0.20		0.42	0.42	0.56
v/c Ratio	0.76	0.58		0.27	0.68		0.55	0.88		0.87	0.46	0.50
Control Delay	45.3	18.1		14.9	27.6		54.2	65.0		53.6	27.4	14.4
Queue Delay	0.0	0.3		0.0	0.2		0.0	0.0		0.0	0.0	0.0
Total Delay	45.3	18.3		14.9	27.8		54.2	65.0		53.6	27.4	14.4
LOS	D	B		B	C		D	E		D	C	B
Approach Delay		25.1			26.7			62.2			30.4	
Approach LOS		C			C			E			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 107 (89%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 31.5	Intersection LOS: C
Intersection Capacity Utilization 89.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: 152 Ave NE & NE 24 St



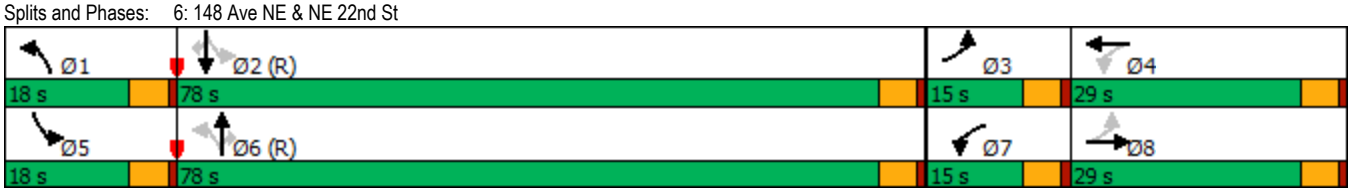
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	5	147	125	5	146	152	1578	55	192	1407	101
Future Volume (vph)	137	5	147	125	5	146	152	1578	55	192	1407	101
Satd. Flow (prot)	1710	1462	0	1710	1462	0	1660	3320	1485	1693	3386	1515
Flt Permitted	0.370			0.379			0.105			0.063		
Satd. Flow (perm)	650	1462	0	666	1462	0	183	3320	1344	112	3386	1370
Satd. Flow (RTOR)		150			149				94			94
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	155	0	128	154	0	155	1610	56	196	1436	103
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6		6	2		2
Detector Phase	3	8		7	4		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	15.0	29.0		15.0	29.0		12.0	24.0	24.0	12.0	24.0	24.0
Total Split (s)	15.0	29.0		15.0	29.0		18.0	78.0	78.0	18.0	78.0	78.0
Total Split (%)	10.7%	20.7%		10.7%	20.7%		12.9%	55.7%	55.7%	12.9%	55.7%	55.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	31.3	19.3		31.0	19.2		95.1	82.5	82.5	98.2	84.2	84.2
Actuated g/C Ratio	0.22	0.14		0.22	0.14		0.68	0.59	0.59	0.70	0.60	0.60
v/c Ratio	0.59	0.47		0.54	0.47		0.61	0.82	0.07	0.82	0.70	0.12
Control Delay	52.9	12.9		50.5	12.9		19.3	10.7	0.2	55.3	7.7	1.0
Queue Delay	0.0	0.0		0.0	0.1		0.0	1.9	0.0	0.0	0.6	0.0
Total Delay	52.9	12.9		50.5	13.0		19.3	12.6	0.2	55.3	8.3	1.0
LOS	D	B		D	B		B	B	A	E	A	A
Approach Delay		31.9			30.0			12.8			13.2	
Approach LOS		C			C			B			B	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 8 (6%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 94.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St



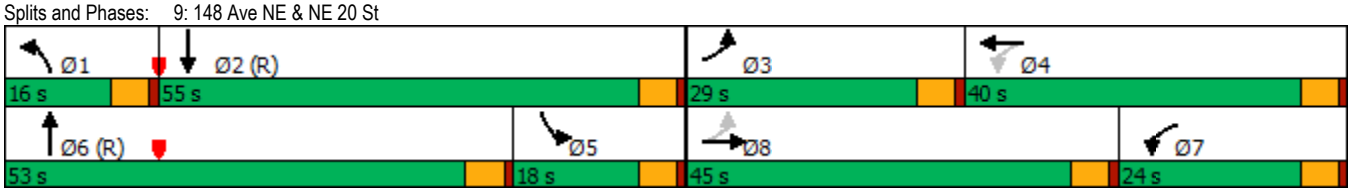
Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	383	618	188	280	627	317	142	1047	193	191	1357	203
Future Volume (vph)	383	618	188	280	627	317	142	1047	193	191	1357	203
Satd. Flow (prot)	1660	3167	0	1693	3163	0	1693	3242	0	1693	4703	0
Flt Permitted	0.284			0.323			0.950			0.950		
Satd. Flow (perm)	493	3167	0	569	3163	0	1686	3242	0	1682	4703	0
Satd. Flow (RTOR)		29			62			17			22	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	399	840	0	292	983	0	148	1292	0	199	1625	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	15.0	29.0		15.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	29.0	45.0		24.0	40.0		16.0	53.0		18.0	55.0	
Total Split (%)	20.7%	32.1%		17.1%	28.6%		11.4%	37.9%		12.9%	39.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	40.1	40.1		37.0	37.0		13.0	50.0		15.0	52.0	
Actuated g/C Ratio	0.29	0.29		0.26	0.26		0.09	0.36		0.11	0.37	
v/c Ratio	1.12	0.91		0.88	1.12		0.94	1.11		1.10	0.92	
Control Delay	125.1	60.3		79.9	111.2		94.8	87.8		133.1	34.9	
Queue Delay	0.0	0.4		53.5	0.0		0.0	0.3		0.0	5.2	
Total Delay	125.1	60.7		133.5	111.2		94.8	88.1		133.1	40.1	
LOS	F	E		F	F		F	F		F	D	
Approach Delay		81.4			116.3			88.8			50.2	
Approach LOS		F			F			F			D	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 36 (26%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 81.1	Intersection LOS: F
Intersection Capacity Utilization 113.9%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	265	858	803	78	0	464
Future Volume (vph)	265	858	803	78	0	464
Satd. Flow (prot)	1787	3574	3528	0	0	1627
Flt Permitted	0.950					
Satd. Flow (perm)	1787	3574	3528	0	0	1627
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	279	903	927	0	0	488
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 62.2%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	13.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	265	858	803	78	0	464
Future Vol, veh/h	265	858	803	78	0	464
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	279	903	845	82	0	488

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	947	0	-	0	-	504
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	727	-	-	-	0	516
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	715	-	-	-	-	499
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	64
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	715	-	-	-	499
HCM Lane V/C Ratio	0.39	-	-	-	0.979
HCM Control Delay (s)	13.2	-	-	-	64
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	1.9	-	-	-	12.9

Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

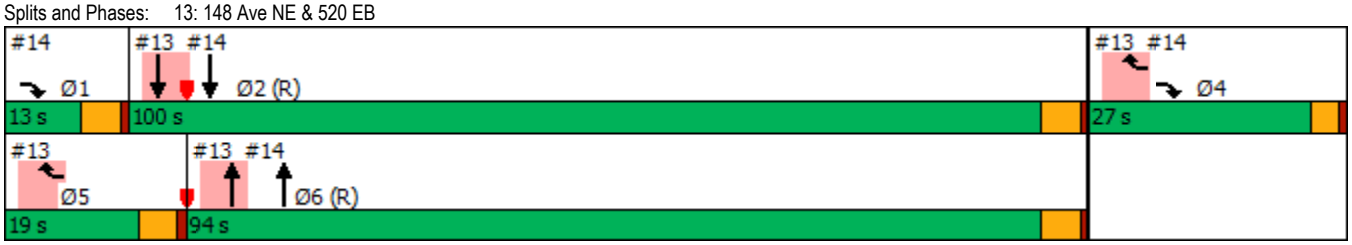
10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	213	1186	0	0	1634			
Future Volume (vph)	0	213	1186	0	0	1634			
Satd. Flow (prot)	0	1497	3320	0	0	3386			
Flt Permitted									
Satd. Flow (perm)	0	1497	3320	0	0	3386			
Satd. Flow (RTOR)		87							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99			
Growth Factor	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	4%	4%	3%	3%	1%	1%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	215	1198	0	0	1651			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			94.0			100.0	13.0	27.0	19.0
Total Split (%)			67.1%			71.4%	9%	19%	14%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		25.7	108.3			106.9			
Actuated g/C Ratio		0.18	0.77			0.76			
v/c Ratio		0.62	0.47			0.64			
Control Delay		37.2	1.2			7.3			
Queue Delay		0.0	0.0			0.0			
Total Delay		37.2	1.2			7.3			
LOS		D	A			A			
Approach Delay	37.2		1.2			7.3			
Approach LOS	D		A			A			

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 30 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 7.0 — Intersection LOS: A
Intersection Capacity Utilization 67.9% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 13: 148 Ave NE & 520 EB



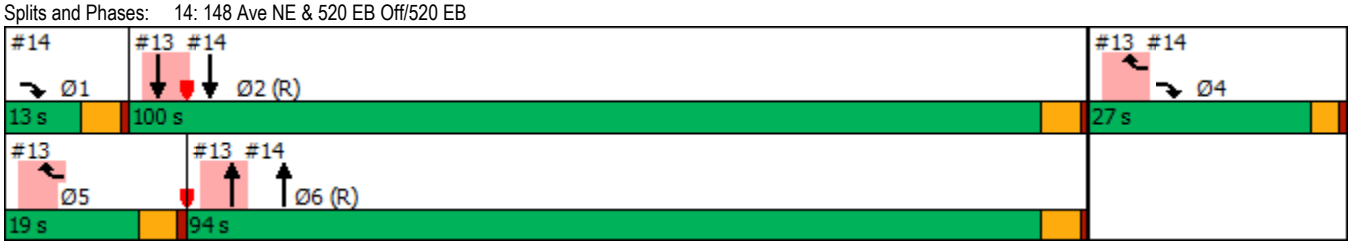
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	315	0	0	0	0	1186	982	0	1634	0
Future Volume (vph)	0	0	315	0	0	0	0	1186	982	0	1634	0
Satd. Flow (prot)	0	0	2640	0	0	0	0	3320	1485	0	3386	0
Flt Permitted												
Satd. Flow (perm)	0	0	2640	0	0	0	0	3320	1438	0	3386	0
Satd. Flow (RTOR)			72						445			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	318	0	0	0	0	1198	992	0	1651	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								94.0			100.0	
Total Split (%)								67.1%			71.4%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			27.1					108.3	140.0		106.9	
Actuated g/C Ratio			0.19					0.77	1.00		0.76	
v/c Ratio			0.56					0.47	0.69		0.64	
Control Delay			41.5					2.2	8.0		2.3	
Queue Delay			0.0					0.2	0.0		0.2	
Total Delay			41.5					2.4	8.0		2.4	
LOS			D					A	A		A	
Approach Delay		41.5						4.9			2.4	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 30 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 6.7	Intersection LOS: A
Intersection Capacity Utilization 67.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



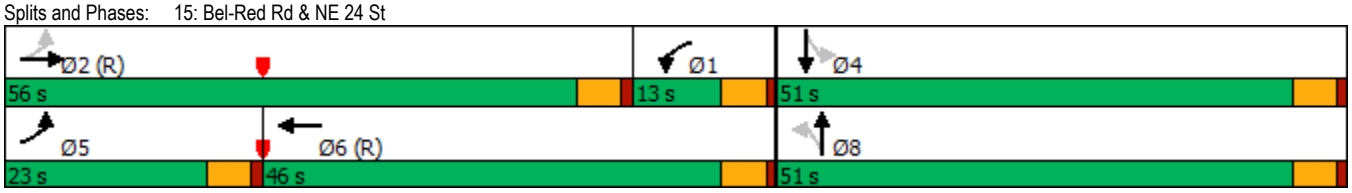
Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	228	924	234	86	506	9	1	466	207	2	663	347
Future Volume (vph)	228	924	234	86	506	9	1	466	207	2	663	347
Satd. Flow (prot)	1676	3224	0	1660	3268	0	0	3187	0	0	3165	0
Flt Permitted	0.306			0.950				0.954			0.954	
Satd. Flow (perm)	535	3224	0	1651	3268	0	0	3040	0	0	3019	0
Satd. Flow (RTOR)		33			2			70			94	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	235	1194	0	89	531	0	0	694	0	0	1044	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	23.0	56.0		13.0	46.0		51.0	51.0		51.0	51.0	
Total Split (%)	19.2%	46.7%		10.8%	38.3%		42.5%	42.5%		42.5%	42.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	56.6	56.6		10.0	49.5			44.4			44.4	
Actuated g/C Ratio	0.47	0.47		0.08	0.41			0.37			0.37	
v/c Ratio	0.57	0.78		0.64	0.39			0.59			0.89	
Control Delay	23.5	24.4		75.5	30.8			29.1			34.1	
Queue Delay	0.0	0.1		0.0	0.0			0.0			0.3	
Total Delay	23.5	24.5		75.5	30.8			29.1			34.4	
LOS	C	C		E	C			C			C	
Approach Delay		24.3			37.2			29.1			34.4	
Approach LOS		C			D			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 108 (90%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 30.1	Intersection LOS: C
Intersection Capacity Utilization 85.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 15: Bel-Red Rd & NE 24 St



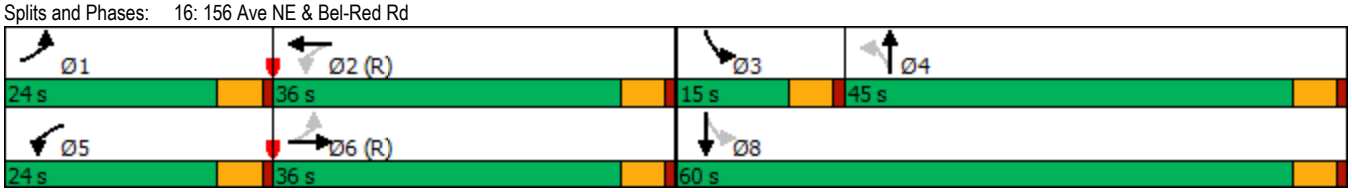
Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	269	434	33	254	555	76	4	311	282	152	847	417
Future Volume (vph)	269	434	33	254	555	76	4	311	282	152	847	417
Satd. Flow (prot)	1637	3231	0	1637	3198	0	1676	2952	0	1693	3069	0
Flt Permitted	0.218			0.353			0.100			0.248		
Satd. Flow (perm)	373	3231	0	601	3198	0	176	2952	0	439	3069	0
Satd. Flow (RTOR)		6			12			212			96	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	280	486	0	265	657	0	4	618	0	158	1316	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		4	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		5.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		32.0	32.0		15.0	31.0	
Total Split (s)	24.0	36.0		24.0	36.0		45.0	45.0		15.0	60.0	
Total Split (%)	20.0%	30.0%		20.0%	30.0%		37.5%	37.5%		12.5%	50.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	57.0	38.4		55.2	37.5		40.2	40.2		54.9	54.9	
Actuated g/C Ratio	0.48	0.32		0.46	0.31		0.34	0.34		0.46	0.46	
v/c Ratio	0.75	0.47		0.62	0.65		0.07	0.55		0.49	0.90	
Control Delay	39.5	45.2		26.1	39.8		12.5	4.1		17.9	28.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.1		0.0	47.3	
Total Delay	39.5	45.2		26.1	39.8		12.5	4.2		17.9	75.9	
LOS	D	D		C	D		B	A		B	E	
Approach Delay		43.1			35.9			4.2			69.7	
Approach LOS		D			D			A			E	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 118 (98%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 45.3	Intersection LOS: D
Intersection Capacity Utilization 96.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



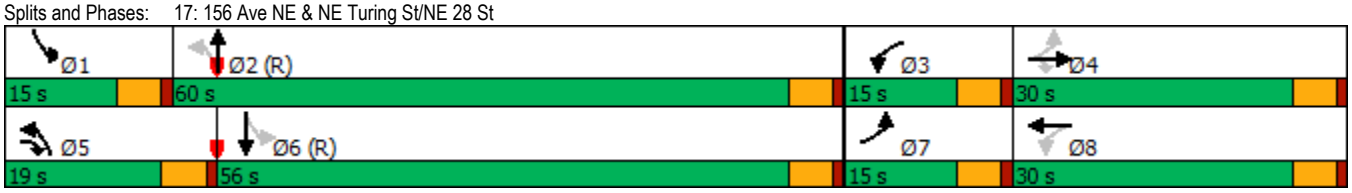
Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	21	209	135	27	155	147	474	35	15	908	41
Future Volume (vph)	129	21	209	135	27	155	147	474	35	15	908	41
Satd. Flow (prot)	1710	1800	1530	1710	1506	0	1660	3230	0	1693	3314	0
Flt Permitted	0.387			0.602			0.196			0.453		
Satd. Flow (perm)	683	1800	1460	1051	1506	0	343	3230	0	788	3314	0
Satd. Flow (RTOR)			88		163			9			5	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	22	220	142	191	0	155	536	0	16	999	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	28.0	15.0	15.0	28.0		15.0	26.0		15.0	26.0	
Total Split (s)	15.0	30.0	19.0	15.0	30.0		19.0	60.0		15.0	56.0	
Total Split (%)	12.5%	25.0%	15.8%	12.5%	25.0%		15.8%	50.0%		12.5%	46.7%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	23.8	15.1	23.0	28.0	15.0		84.2	79.6		76.5	68.5	
Actuated g/C Ratio	0.20	0.13	0.19	0.23	0.12		0.70	0.66		0.64	0.57	
v/c Ratio	0.57	0.10	0.61	0.43	0.58		0.41	0.25		0.03	0.53	
Control Delay	47.0	42.8	29.8	39.2	17.0		11.2	12.3		3.9	13.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.1	
Total Delay	47.0	42.8	29.8	39.2	17.0		11.2	12.3		3.9	13.3	
LOS	D	D	C	D	B		B	B		A	B	
Approach Delay		36.7			26.5			12.0			13.1	
Approach LOS		D			C			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 32 (27%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 73.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



2023 With-Project - Full Buildout

Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

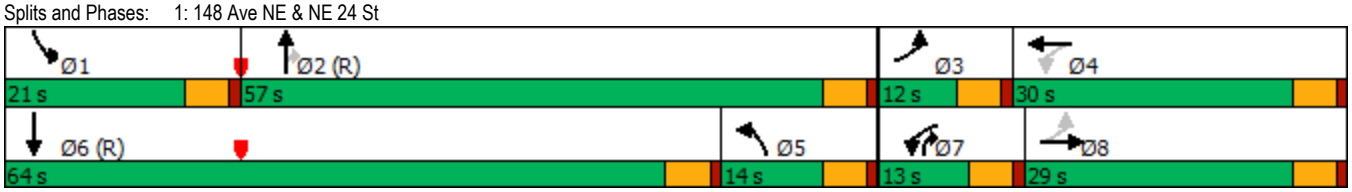
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	319	73	247	332	556	155	1242	168	395	1208	435
Future Volume (vph)	189	319	73	247	332	556	155	1242	168	395	1208	435
Satd. Flow (prot)	1787	3444	0	1770	3539	1583	1770	3539	1583	3400	3284	0
Flt Permitted	0.359			0.243			0.950			0.950		
Satd. Flow (perm)	665	3444	0	447	3539	1553	1764	3539	1513	3371	3284	0
Satd. Flow (RTOR)		21				352			71		62	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	413	0	260	349	585	163	1307	177	416	1730	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	12.0	29.0		13.0	30.0		14.0	57.0	13.0	21.0	64.0	
Total Split (%)	10.0%	24.2%		10.8%	25.0%		11.7%	47.5%	10.8%	17.5%	53.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	30.1	21.1		32.1	22.1	120.0	11.0	58.3	68.3	18.6	65.9	
Actuated g/C Ratio	0.25	0.18		0.27	0.18	1.00	0.09	0.49	0.57	0.16	0.55	
v/c Ratio	0.80	0.67		1.14	0.54	0.38	1.01	0.76	0.20	0.79	0.94	
Control Delay	58.8	48.7		135.1	46.5	0.9	107.3	11.7	1.0	66.1	30.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	
Total Delay	58.8	48.7		135.1	46.5	0.9	107.3	11.7	1.0	66.1	43.5	
LOS	E	D		F	D	A	F	B	A	E	D	
Approach Delay		52.0			43.4			20.0			47.9	
Approach LOS		D			D			C			D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 111 (93%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 39.2 — Intersection LOS: D
Intersection Capacity Utilization 99.1% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: 148 Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	788	94	0	1135	0	80
Future Volume (vph)	788	94	0	1135	0	80
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20			20	20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	829	99	0	1195	0	84
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	788	94	0	1135	0	80
Future Vol, veh/h	788	94	0	1135	0	80
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	829	99	0	1195	0	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	455
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.114	-	-	-
HCM Control Delay (s)	10.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	862	8	0	1135	0	38
Future Volume (vph)	862	8	0	1135	0	38
Satd. Flow (prot)	3536	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3536	0	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	915	0	0	1195	0	40
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	862	8	0	1135	0	38
Future Vol, veh/h	862	8	0	1135	0	38
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	907	8	0	1195	0	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	498
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	*737
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*712
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	712	-	-	-
HCM Lane V/C Ratio	0.056	-	-	-
HCM Control Delay (s)	10.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

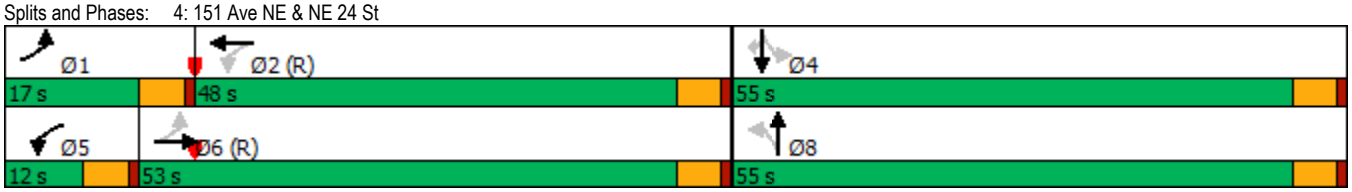
Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	758	28	22	670	96	19	6	18	277	25	157
Future Volume (vph)	133	758	28	22	670	96	19	6	18	277	25	157
Satd. Flow (prot)	1787	3546	0	1752	3402	0	0	1505	0	0	1730	1538
Flt Permitted	0.249			0.293				0.829			0.731	
Satd. Flow (perm)	468	3546	0	534	3402	0	0	1266	0	0	1282	1462
Satd. Flow (RTOR)		4			15			19				165
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	14%	14%	14%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	827	0	23	806	0	0	45	0	0	318	165
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		5.0	5.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		25.0	25.0		25.0	25.0	25.0
Total Split (s)	17.0	53.0		12.0	48.0		55.0	55.0		55.0	55.0	55.0
Total Split (%)	14.2%	44.2%		10.0%	40.0%		45.8%	45.8%		45.8%	45.8%	45.8%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.7	68.7		69.3	61.1			38.3			38.3	38.3
Actuated g/C Ratio	0.63	0.57		0.58	0.51			0.32			0.32	0.32
v/c Ratio	0.33	0.41		0.06	0.46			0.11			0.78	0.28
Control Delay	7.7	11.6		8.7	15.0			16.7			49.4	4.8
Queue Delay	0.0	0.0		0.0	0.2			0.0			0.0	0.0
Total Delay	7.7	11.6		8.7	15.2			16.7			49.4	4.8
LOS	A	B		A	B			B			D	A
Approach Delay		11.1			15.0			16.7			34.2	
Approach LOS		B			B			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 114 (95%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: 151 Ave NE & NE 24 St



Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

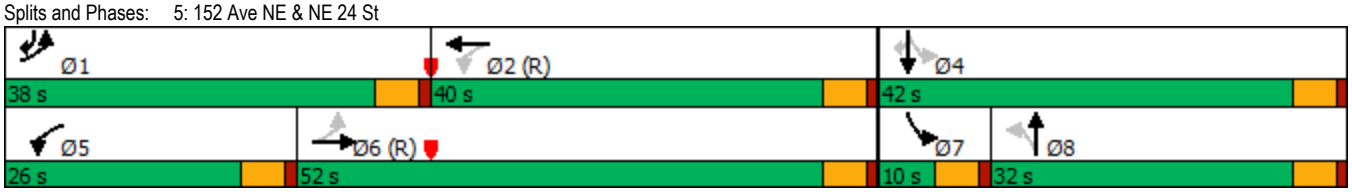
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	363	572	121	25	508	93	136	125	35	32	159	197
Future Volume (vph)	363	572	121	25	508	93	136	125	35	32	159	197
Satd. Flow (prot)	1770	3342	0	1779	3441	0	1752	1761	0	1612	1696	1442
Flt Permitted	0.319			0.375			0.651			0.372		
Satd. Flow (perm)	594	3342	0	684	3441	0	1161	1761	0	616	1696	1362
Satd. Flow (RTOR)		25			18			11				90
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	12%	12%	12%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	382	729	0	26	633	0	143	169	0	34	167	207
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	3.0	3.0		8.0	8.0		4.0	4.0		5.0	5.0	3.0
Minimum Split (s)	26.0	26.0		26.0	26.0		25.0	25.0		10.0	25.0	26.0
Total Split (s)	38.0	52.0		26.0	40.0		32.0	32.0		10.0	42.0	38.0
Total Split (%)	31.7%	43.3%		21.7%	33.3%		26.7%	26.7%		8.3%	35.0%	31.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	87.0	78.9		71.1	60.8		21.0	21.0		27.0	27.0	48.2
Actuated g/C Ratio	0.72	0.66		0.59	0.51		0.18	0.18		0.22	0.22	0.40
v/c Ratio	0.58	0.33		0.05	0.36		0.70	0.53		0.17	0.44	0.34
Control Delay	19.8	7.3		6.1	18.8		64.2	47.1		33.8	41.3	10.8
Queue Delay	0.1	0.1		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	19.9	7.4		6.1	18.8		64.2	47.1		33.8	41.3	10.8
LOS	B	A		A	B		E	D		C	D	B
Approach Delay		11.7			18.3			54.9			25.2	
Approach LOS		B			B			D			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 21.0 — Intersection LOS: C
Intersection Capacity Utilization 69.5% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: 152 Ave NE & NE 24 St



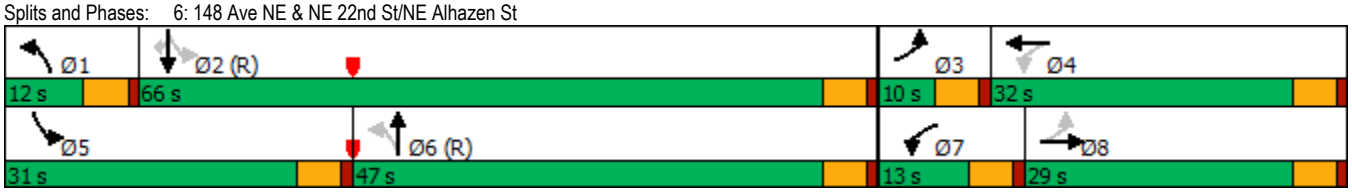
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	11	53	176	8	106	113	1240	112	304	1228	53
Future Volume (vph)	72	11	53	176	8	106	113	1240	112	304	1228	53
Satd. Flow (prot)	1736	1537	0	1736	1504	0	1752	4940	0	1736	3471	1553
Flt Permitted	0.682			0.580			0.169			0.111		
Satd. Flow (perm)	1214	1537	0	1033	1504	0	309	4940	0	203	3471	1421
Satd. Flow (RTOR)		55			109			14				109
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	66	0	181	117	0	116	1393	0	313	1266	55
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		2
Detector Phase	3	8		7	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	29.0		10.0	29.0		12.0	24.0		12.0	24.0	24.0
Total Split (s)	10.0	29.0		13.0	32.0		12.0	47.0		31.0	66.0	66.0
Total Split (%)	8.3%	24.2%		10.8%	26.7%		10.0%	39.2%		25.8%	55.0%	55.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.4	19.2		29.8	21.8		69.1	60.1		84.0	72.2	72.2
Actuated g/C Ratio	0.20	0.16		0.25	0.18		0.58	0.50		0.70	0.60	0.60
v/c Ratio	0.27	0.23		0.57	0.32		0.41	0.56		0.76	0.61	0.06
Control Delay	34.2	14.9		43.2	10.5		11.0	10.4		38.3	9.5	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.1	0.0
Total Delay	34.2	14.9		43.2	10.5		11.0	10.4		38.3	9.6	0.2
LOS	C	B		D	B		B	B		D	A	A
Approach Delay		25.1			30.3			10.5			14.8	
Approach LOS		C			C			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 110 (92%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St/NE Alhazen St



Lanes, Volumes, Timings
7: Lumiere Ave NE & NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	65	43	13	113	0	49	45	0	0	23	26
Future Volume (vph)	52	65	43	13	113	0	49	45	0	0	23	26
Satd. Flow (prot)	1770	1751	0	1770	1863	0	0	1814	0	0	1730	0
Flt Permitted	0.950			0.950				0.974				
Satd. Flow (perm)	1770	1751	0	1770	1863	0	0	1814	0	0	1730	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	113	0	14	119	0	0	99	0	0	51	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 30.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	65	43	13	113	0	49	45	0	0	23	26
Future Vol, veh/h	52	65	43	13	113	0	49	45	0	0	23	26
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	68	45	14	119	0	52	47	0	0	24	27
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8.5	8.8	8.6	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	52%	100%	0%	100%	0%	0%
Vol Thru, %	48%	0%	60%	0%	100%	47%
Vol Right, %	0%	0%	40%	0%	0%	53%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	94	52	108	13	113	49
LT Vol	49	52	0	13	0	0
Through Vol	45	0	65	0	113	23
RT Vol	0	0	43	0	0	26
Lane Flow Rate	99	55	114	14	119	52
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.133	0.084	0.15	0.021	0.167	0.064
Departure Headway (Hd)	4.833	5.524	4.741	5.556	5.053	4.477
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	743	650	757	645	710	799
Service Time	2.857	3.25	2.467	3.284	2.781	2.506
HCM Lane V/C Ratio	0.133	0.085	0.151	0.022	0.168	0.065
HCM Control Delay	8.6	8.8	8.3	8.4	8.8	7.8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.5	0.1	0.6	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	65	0	0	61	58	126
Future Volume (vph)	65	0	0	61	58	126
Satd. Flow (prot)	1770	1863	0	1863	1690	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1863	0	1863	1690	0
Confl. Peds. (#/hr)	20		20			20
Confl. Bikes (#/hr)						5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	68	0	0	64	194	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 23.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	0	0	61	58	126
Future Vol, veh/h	65	0	0	61	58	126
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	0	0	64	61	133

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	232	148	214	0	-	0
Stage 1	148	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	756	899	1356	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	730	884	1333	-	-	-
Mov Cap-2 Maneuver	730	-	-	-	-	-
Stage 1	865	-	-	-	-	-
Stage 2	923	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1333	-	730	-	-	-
HCM Lane V/C Ratio	-	-	0.094	-	-	-
HCM Control Delay (s)	0	-	10.4	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-	-

Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

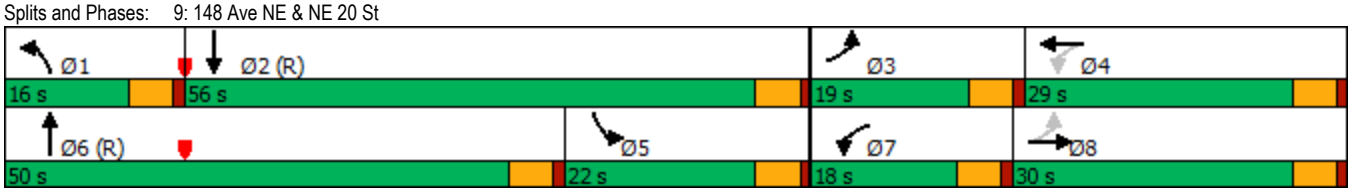
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	394	71	240	424	237	97	1002	229	237	1090	195
Future Volume (vph)	255	394	71	240	424	237	97	1002	229	237	1090	195
Satd. Flow (prot)	1703	3304	0	1752	3261	0	1770	3369	0	1736	4800	0
Flt Permitted	0.150			0.273			0.950			0.950		
Satd. Flow (perm)	267	3304	0	498	3261	0	1760	3369	0	1726	4800	0
Satd. Flow (RTOR)		16			82			27			38	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	263	479	0	247	681	0	100	1269	0	244	1325	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	12.0	29.0		12.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	19.0	30.0		18.0	29.0		16.0	50.0		22.0	56.0	
Total Split (%)	15.8%	25.0%		15.0%	24.2%		13.3%	41.7%		18.3%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	42.7	26.7		40.1	25.4		11.7	47.6		19.0	54.9	
Actuated g/C Ratio	0.36	0.22		0.33	0.21		0.10	0.40		0.16	0.46	
v/c Ratio	0.92	0.64		0.77	0.90		0.58	0.94		0.89	0.60	
Control Delay	68.4	45.3		45.6	56.9		65.2	48.3		68.7	15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	44.6		0.0	0.0	
Total Delay	68.4	45.3		45.6	56.9		65.2	92.8		68.7	15.2	
LOS	E	D		D	E		E	F		E	B	
Approach Delay		53.5			53.9			90.8			23.5	
Approach LOS		D			D			F			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 112 (93%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 54.4 — Intersection LOS: D
Intersection Capacity Utilization 96.0% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	116	744	816	167	24	85
Future Volume (vph)	116	744	816	167	24	85
Satd. Flow (prot)	1770	3539	3447	0	1649	0
Flt Permitted	0.950				0.989	
Satd. Flow (perm)	1770	3539	3447	0	1649	0
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	122	783	1035	0	114	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 55.3%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	116	744	816	167	24	85
Future Vol, veh/h	116	744	816	167	24	85
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	783	859	176	25	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1055	0	-	0	1623	558
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	656	-	-	-	93	473
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	478	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	73	457
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	21.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	645	-	-	-	332
HCM Lane V/C Ratio	0.189	-	-	-	0.346
HCM Control Delay (s)	11.9	-	-	-	21.5
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	1.5

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	743	943	36	18	40
Future Volume (vph)	25	743	943	36	18	40
Satd. Flow (prot)	1770	3539	3450	0	1697	0
Flt Permitted	0.950				0.985	
Satd. Flow (perm)	1770	3539	3450	0	1697	0
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	4%	4%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	782	1031	0	61	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 42.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	743	943	36	18	40
Future Vol, veh/h	25	743	943	36	18	40
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	4	4	0	0
Mvmt Flow	26	782	993	38	19	42

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1051	0	-	0	1495	556
Stage 1	-	-	-	-	1032	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	4.14	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.22	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	658	-	-	-	116	480
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	647	-	-	-	108	464
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	647	-	-	-	344
HCM Lane V/C Ratio	0.041	-	-	-	0.177
HCM Control Delay (s)	10.8	-	-	-	17.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	127	665	670	99	0	273
Future Volume (vph)	127	665	670	99	0	273
Satd. Flow (prot)	1770	3539	3472	0	0	1580
Flt Permitted	0.950					
Satd. Flow (perm)	1770	3539	3472	0	0	1580
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	134	700	809	0	0	287
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 47.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	127	665	670	99	0	273
Future Vol, veh/h	127	665	670	99	0	273
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	134	700	705	104	0	287

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	829	0	-	0	-	445
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	798	-	-	-	0	555
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	785	-	-	-	-	537
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

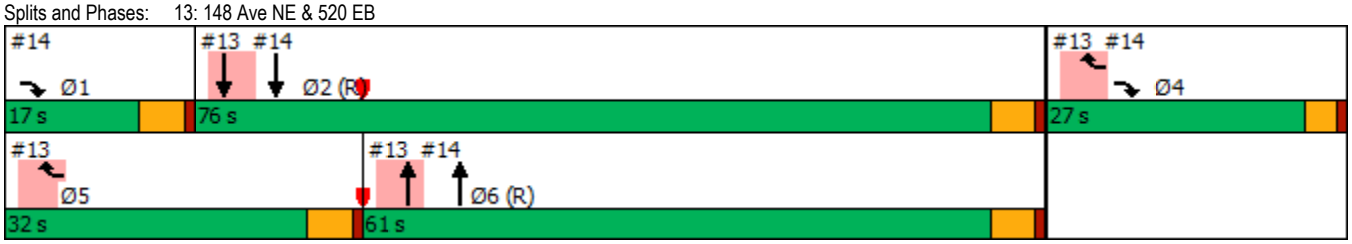
Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	19.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	785	-	-	-	537
HCM Lane V/C Ratio	0.17	-	-	-	0.535
HCM Control Delay (s)	10.5	-	-	-	19.2
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	3.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	512	1286	0	0	1582			
Future Volume (vph)	0	512	1286	0	0	1582			
Satd. Flow (prot)	0	1526	3320	0	0	3320			
Flt Permitted									
Satd. Flow (perm)	0	1526	3320	0	0	3320			
Satd. Flow (RTOR)		24							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98			
Heavy Vehicles (%)	2%	2%	3%	3%	3%	3%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	522	1312	0	0	1614			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			61.0			76.0	17.0	27.0	32.0
Total Split (%)			50.8%			63.3%	14%	23%	27%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		43.8	70.2			81.8			
Actuated g/C Ratio		0.36	0.58			0.68			
v/c Ratio		0.91	0.68			0.71			
Control Delay		55.1	3.2			15.5			
Queue Delay		0.0	0.0			0.0			
Total Delay		55.1	3.2			15.5			
LOS		E	A			B			
Approach Delay	55.1		3.2			15.5			
Approach LOS	E		A			B			

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 116 (97%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 16.8	Intersection LOS: B
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 13: 148 Ave NE & 520 EB



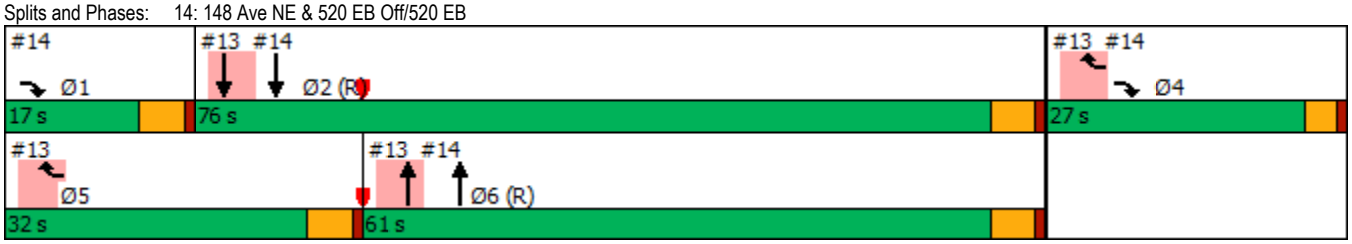
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	551	0	0	0	0	1286	538	0	1582	0
Future Volume (vph)	0	0	551	0	0	0	0	1286	538	0	1582	0
Satd. Flow (prot)	0	0	2614	0	0	0	0	3320	1485	0	3320	0
Flt Permitted												
Satd. Flow (perm)	0	0	2614	0	0	0	0	3320	1438	0	3320	0
Satd. Flow (RTOR)			64						262			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	562	0	0	0	0	1312	549	0	1614	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								61.0			76.0	
Total Split (%)								50.8%			63.3%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			32.2					70.2	120.0		81.8	
Actuated g/C Ratio			0.27					0.58	1.00		0.68	
v/c Ratio			0.75					0.68	0.38		0.71	
Control Delay			41.4					8.6	0.6		2.5	
Queue Delay			1.0					0.2	0.0		0.0	
Total Delay			42.3					8.8	0.6		2.5	
LOS			D					A	A		A	
Approach Delay		42.3						6.4			2.5	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 116 (97%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

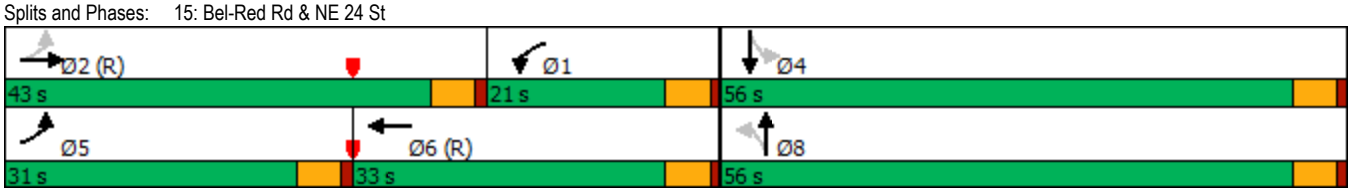
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	327	340	193	136	577	28	134	531	58	1	511	175
Future Volume (vph)	327	340	193	136	577	28	134	531	58	1	511	175
Satd. Flow (prot)	1752	3262	0	1770	3465	0	0	3487	0	0	3302	0
Flt Permitted	0.197			0.950				0.589			0.954	
Satd. Flow (perm)	360	3262	0	1745	3465	0	0	2070	0	0	3150	0
Satd. Flow (RTOR)		99			4			10			50	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	344	561	0	143	636	0	0	761	0	0	723	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	31.0	43.0		21.0	33.0		56.0	56.0		56.0	56.0	
Total Split (%)	25.8%	35.8%		17.5%	27.5%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	44.7	44.7		18.0	38.5			48.3			48.3	
Actuated g/C Ratio	0.37	0.37		0.15	0.32			0.40			0.40	
v/c Ratio	0.83	0.44		0.54	0.57			0.91			0.56	
Control Delay	45.6	21.4		55.5	38.2			48.6			5.1	
Queue Delay	0.0	0.0		0.0	0.4			0.0			0.0	
Total Delay	45.6	21.4		55.5	38.6			48.6			5.1	
LOS	D	C		E	D			D			A	
Approach Delay		30.6			41.7			48.6			5.1	
Approach LOS		C			D			D			A	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 60 (50%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 31.8 — Intersection LOS: C
Intersection Capacity Utilization 92.3% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 15: Bel-Red Rd & NE 24 St



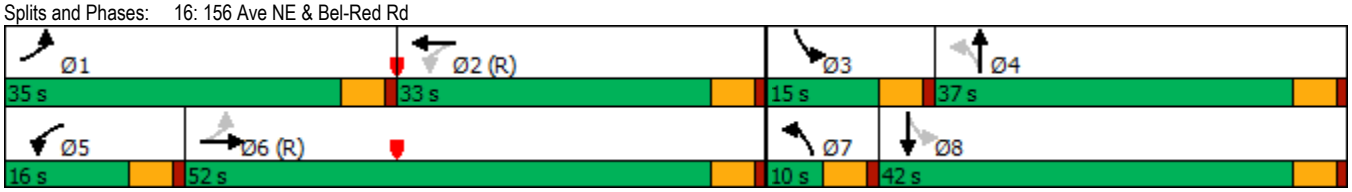
Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	545	296	16	200	499	150	6	854	131	58	246	173
Future Volume (vph)	545	296	16	200	499	150	6	854	131	58	246	173
Satd. Flow (prot)	1728	3420	0	1728	3301	0	1770	3334	0	1671	2976	0
Flt Permitted	0.138			0.553			0.468			0.090		
Satd. Flow (perm)	249	3420	0	987	3301	0	859	3334	0	158	2976	0
Satd. Flow (RTOR)		6			31			14			159	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	574	329	0	211	683	0	6	1037	0	61	441	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0		7.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		10.0	32.0		15.0	31.0	
Total Split (s)	35.0	52.0		16.0	33.0		10.0	37.0		15.0	42.0	
Total Split (%)	29.2%	43.3%		13.3%	27.5%		8.3%	30.8%		12.5%	35.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	65.0	49.7		42.3	30.0		44.2	38.6		49.0	47.0	
Actuated g/C Ratio	0.54	0.41		0.35	0.25		0.37	0.32		0.41	0.39	
v/c Ratio	1.09	0.23		0.50	0.81		0.02	0.96		0.32	0.35	
Control Delay	92.7	34.5		21.5	48.7		21.5	59.5		22.9	17.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	42.5		0.0	0.0	
Total Delay	92.7	34.5		21.5	48.7		21.5	102.0		22.9	17.2	
LOS	F	C		C	D		C	F		C	B	
Approach Delay		71.5			42.3			101.6			17.9	
Approach LOS		E			D			F			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 80 (67%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 65.0	Intersection LOS: E
Intersection Capacity Utilization 99.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

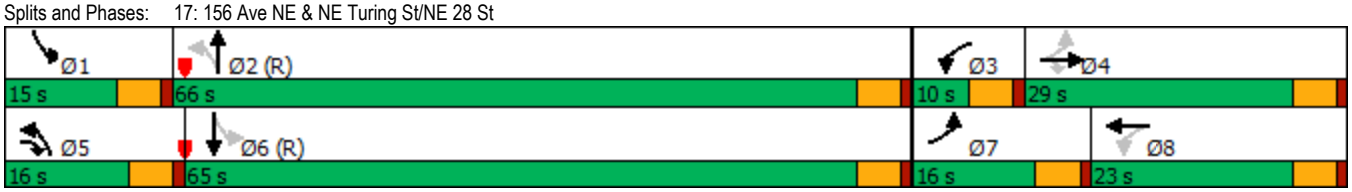
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	51	64	35	6	25	222	967	360	25	378	63
Future Volume (vph)	193	51	64	35	6	25	222	967	360	25	378	63
Satd. Flow (prot)	1770	1863	1583	1656	1459	0	1787	3305	0	1656	3163	0
Flt Permitted	0.594			0.723			0.443			0.145		
Satd. Flow (perm)	1068	1863	1497	1213	1459	0	809	3305	0	253	3163	0
Satd. Flow (RTOR)			65		26			67			23	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	1%	1%	1%	9%	9%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	197	52	65	36	32	0	227	1354	0	26	450	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	23.0	15.0	10.0	23.0		15.0	23.0		15.0	23.0	
Total Split (s)	16.0	29.0	16.0	10.0	23.0		16.0	66.0		15.0	65.0	
Total Split (%)	13.3%	24.2%	13.3%	8.3%	19.2%		13.3%	55.0%		12.5%	54.2%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	26.5	20.5	30.0	18.1	12.6		87.5	80.6		81.2	73.0	
Actuated g/C Ratio	0.22	0.17	0.25	0.15	0.10		0.73	0.67		0.68	0.61	
v/c Ratio	0.63	0.16	0.15	0.17	0.18		0.33	0.60		0.10	0.23	
Control Delay	48.8	41.8	7.4	35.3	21.5		2.8	9.3		7.5	6.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	48.8	41.8	7.4	35.3	21.5		2.8	9.3		7.5	6.8	
LOS	D	D	A	D	C		A	A		A	A	
Approach Delay		39.0			28.8			8.4			6.9	
Approach LOS		D			C			A			A	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 12.6 — Intersection LOS: B
Intersection Capacity Utilization 70.3% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	845	23	0	1135	0	25
Future Volume (vph)	845	23	0	1135	0	25
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	889	24	0	1195	0	26
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	845	23	0	1135	0	25
Future Vol, veh/h	845	23	0	1135	0	25
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	889	24	0	1195	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	485
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	*737
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*712
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	712	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-
HCM Control Delay (s)	10.3	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	40	1525	31	0	1528
Future Volume (vph)	0	40	1525	31	0	1528
Satd. Flow (prot)	0	1611	5070	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1611	5070	0	0	3539
Confl. Peds. (#/hr)		20		20		
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	42	1638	0	0	1608
Sign Control	Stop		Free			Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	40	1525	31	0	1528
Future Vol, veh/h	0	40	1525	31	0	1528
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	42	1605	33	0	1608

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	859	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	*567	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*548	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	548	-
HCM Lane V/C Ratio	-	-	0.077	-
HCM Control Delay (s)	-	-	12.1	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.2	-

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

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	26	67	30	23	71
Future Volume (vph)	50	26	67	30	23	71
Satd. Flow (prot)	1720	0	0	1801	1673	0
Flt Permitted	0.968			0.967		
Satd. Flow (perm)	1720	0	0	1801	1673	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	0	103	99	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 27.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	26	67	30	23	71
Future Vol, veh/h	50	26	67	30	23	71
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	27	71	32	24	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	276	102	119	0	-	0
Stage 1	82	-	-	-	-	-
Stage 2	194	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	714	953	1469	-	-	-
Stage 1	941	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	655	921	1445	-	-	-
Mov Cap-2 Maneuver	655	-	-	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	825	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	5.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1445	-	727	-	-
HCM Lane V/C Ratio	0.049	-	0.11	-	-
HCM Control Delay (s)	7.6	0	10.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	184	113	13	0	8
Future Volume (vph)	25	184	113	13	0	8
Satd. Flow (prot)	1631	0	0	1783	1611	0
Flt Permitted	0.994			0.957		
Satd. Flow (perm)	1631	0	0	1783	1611	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	0	0	133	8	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	184	113	13	0	8
Future Vol, veh/h	25	184	113	13	0	8
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	194	119	14	0	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	296	44	28	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	695	1026	1585	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	620	992	1559	-	-	-
Mov Cap-2 Maneuver	620	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	761	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	6.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	926	-	-
HCM Lane V/C Ratio	0.076	-	0.238	-	-
HCM Control Delay (s)	7.5	0	10.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

Lanes, Volumes, Timings
22: NE Alhazen St & Driveway

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	114	125	0	141	47	63	0	26	20	0	86
Future Volume (vph)	188	114	125	0	141	47	63	0	26	20	0	86
Satd. Flow (prot)	1770	1716	0	1863	1794	0	0	1729	0	0	1643	0
Flt Permitted	0.950							0.966			0.991	
Satd. Flow (perm)	1770	1716	0	1863	1794	0	0	1729	0	0	1643	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	198	252	0	0	197	0	0	93	0	0	112	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	188	114	125	0	141	47	63	0	26	20	0	86
Future Vol, veh/h	188	114	125	0	141	47	63	0	26	20	0	86
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	198	120	132	0	148	49	66	0	27	21	0	91

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	217	0	0	272	0	0	840	819	226	809	861	213
Stage 1	-	-	-	-	-	-	602	602	-	193	193	-
Stage 2	-	-	-	-	-	-	238	217	-	616	668	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1353	-	-	1301	-	-	286	309	866	302	291	827
Stage 1	-	-	-	-	-	-	494	488	-	809	741	-
Stage 2	-	-	-	-	-	-	765	723	-	485	453	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1330	-	-	1279	-	-	218	254	838	250	239	800
Mov Cap-2 Maneuver	-	-	-	-	-	-	299	320	-	326	318	-
Stage 1	-	-	-	-	-	-	413	408	-	677	728	-
Stage 2	-	-	-	-	-	-	667	711	-	392	379	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	18.1	12
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1330	-	-	1279	-	-	628
HCM Lane V/C Ratio	0.255	0.149	-	-	-	-	-	0.178
HCM Control Delay (s)	18.1	8.2	-	-	0	-	-	12
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1	0.5	-	-	0	-	-	0.6

Lanes, Volumes, Timings
23: Driveway & Lumiere Ave NE

10/26/2017

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	23	72	212	71	37	42
Future Volume (vph)	23	72	212	71	37	42
Satd. Flow (prot)	1651	0	0	1796	1729	0
Flt Permitted	0.988			0.964		
Satd. Flow (perm)	1651	0	0	1796	1729	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	100	0	0	298	83	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 39.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	72	212	71	37	42
Future Vol, veh/h	23	72	212	71	37	42
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	76	223	75	39	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	622	101	103	0	-	0
Stage 1	81	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	450	954	1489	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	366	922	1464	-	-	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	573	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	5.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1464	-	674	-	-
HCM Lane V/C Ratio	0.152	-	0.148	-	-
HCM Control Delay (s)	7.9	0	11.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.5	-	-

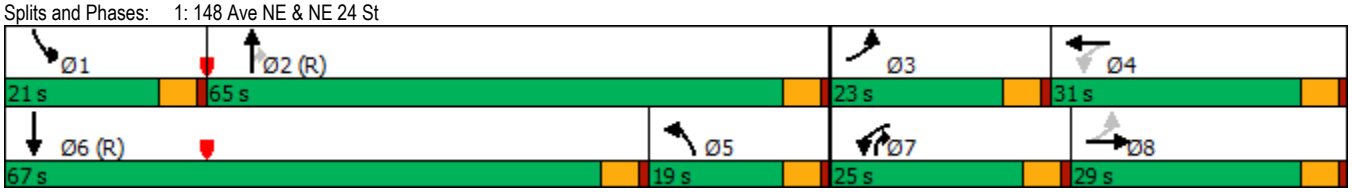
Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	484	94	333	447	551	182	1467	310	427	1296	133
Future Volume (vph)	222	484	94	333	447	551	182	1467	310	427	1296	133
Satd. Flow (prot)	1693	3277	0	1676	3353	1500	1660	3320	1485	3285	3283	0
Flt Permitted	0.283			0.138			0.950			0.950		
Satd. Flow (perm)	498	3277	0	242	3353	1472	1652	3320	1412	3261	3283	0
Satd. Flow (RTOR)		14				333			55		10	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	231	602	0	347	466	574	190	1528	323	445	1489	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	23.0	29.0		25.0	31.0		19.0	65.0	25.0	21.0	67.0	
Total Split (%)	16.4%	20.7%		17.9%	22.1%		13.6%	46.4%	17.9%	15.0%	47.9%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	44.4	26.0		50.4	29.6	140.0	16.0	62.0	84.0	18.0	64.0	
Actuated g/C Ratio	0.32	0.19		0.36	0.21	1.00	0.11	0.44	0.60	0.13	0.46	
v/c Ratio	0.73	0.97		1.11	0.66	0.39	1.01	1.04	0.37	1.05	0.99	
Control Delay	47.8	85.0		123.3	56.2	0.8	98.5	50.0	2.7	115.2	48.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	1.6	0.1	0.0	32.2	
Total Delay	47.8	85.0		123.3	56.2	0.8	98.5	51.6	2.7	115.2	81.0	
LOS	D	F		F	E	A	F	D	A	F	F	
Approach Delay		74.7			50.0			48.2			88.9	
Approach LOS		E			D			D			F	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 30 (21%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 64.9	Intersection LOS: E
Intersection Capacity Utilization 107.2%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: 148 Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1147	74	0	1331	0	169
Future Volume (vph)	1147	74	0	1331	0	169
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20			20	20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1207	78	0	1401	0	178
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	1147	74	0	1331	0	169
Future Vol, veh/h	1147	74	0	1331	0	169
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1207	78	0	1401	0	178

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	644
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	*608
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*588
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	588	-	-	-
HCM Lane V/C Ratio	0.303	-	-	-
HCM Control Delay (s)	13.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	1.3	-	-	-

Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1265	11	0	1331	0	52
Future Volume (vph)	1265	11	0	1331	0	52
Satd. Flow (prot)	3536	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3536	0	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1344	0	0	1401	0	55
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1265	11	0	1331	0	52
Future Vol, veh/h	1265	11	0	1331	0	52
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1332	12	0	1401	0	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	712
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	*563
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*544
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	544	-	-	-
HCM Lane V/C Ratio	0.101	-	-	-
HCM Control Delay (s)	12.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

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

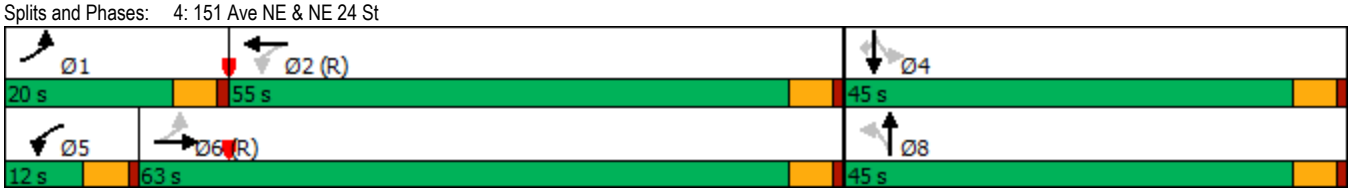
Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	907	56	49	1033	156	113	28	36	270	45	183
Future Volume (vph)	231	907	56	49	1033	156	113	28	36	270	45	183
Satd. Flow (prot)	1693	3335	0	1693	3271	0	0	1678	0	0	1709	1515
Flt Permitted	0.093			0.235				0.433			0.646	
Satd. Flow (perm)	166	3335	0	414	3271	0	0	742	0	0	1128	1429
Satd. Flow (RTOR)		7			18			12				189
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	993	0	51	1226	0	0	182	0	0	324	189
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	8.0		3.0	8.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		26.0	26.0		26.0	26.0	26.0
Total Split (s)	20.0	63.0		12.0	55.0		45.0	45.0		45.0	45.0	45.0
Total Split (%)	16.7%	52.5%		10.0%	45.8%		37.5%	37.5%		37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.6	66.3		64.8	56.6			38.4			38.4	38.4
Actuated g/C Ratio	0.63	0.55		0.54	0.47			0.32			0.32	0.32
v/c Ratio	0.77	0.54		0.16	0.79			0.74			0.90	0.32
Control Delay	41.1	19.8		8.9	21.2			52.3			66.5	5.4
Queue Delay	0.0	0.0		0.0	0.2			0.0			0.0	0.0
Total Delay	41.1	19.8		8.9	21.4			52.3			66.5	5.4
LOS	D	B		A	C			D			E	A
Approach Delay		23.9			20.9			52.3			44.0	
Approach LOS		C			C			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 53 (44%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 27.5	Intersection LOS: C
Intersection Capacity Utilization 83.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: 151 Ave NE & NE 24 St



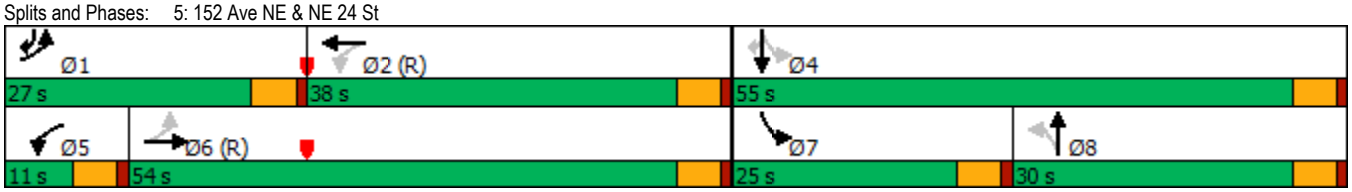
Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	769	127	74	711	47	104	142	154	313	371	408
Future Volume (vph)	305	769	127	74	711	47	104	142	154	313	371	408
Satd. Flow (prot)	1693	3232	0	1718	3394	0	1693	1594	0	1660	1748	1485
Flt Permitted	0.155			0.255			0.533			0.164		
Satd. Flow (perm)	276	3232	0	454	3394	0	926	1594	0	287	1748	1403
Satd. Flow (RTOR)		19			6			42				29
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	318	933	0	77	790	0	108	308	0	326	386	425
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	5.0	3.0		4.0	8.0		4.0	4.0		4.0	5.0	5.0
Minimum Split (s)	24.0	26.0		11.0	26.0		22.0	22.0		11.0	22.0	24.0
Total Split (s)	27.0	54.0		11.0	38.0		30.0	30.0		25.0	55.0	27.0
Total Split (%)	22.5%	45.0%		9.2%	31.7%		25.0%	25.0%		20.8%	45.8%	22.5%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	64.5	55.7		47.7	39.9		24.6	24.6		49.5	49.5	69.1
Actuated g/C Ratio	0.54	0.46		0.40	0.33		0.20	0.20		0.41	0.41	0.58
v/c Ratio	0.79	0.62		0.29	0.70		0.57	0.86		0.88	0.54	0.51
Control Delay	47.8	17.7		12.5	36.7		54.9	61.8		55.3	29.3	13.9
Queue Delay	0.0	0.3		0.0	0.2		0.0	0.0		0.0	0.0	0.0
Total Delay	47.8	18.0		12.5	36.9		54.9	61.8		55.3	29.3	13.9
LOS	D	B		B	D		D	E		E	C	B
Approach Delay		25.6			34.7			60.0			31.0	
Approach LOS		C			C			E			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 62 (52%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 33.3	Intersection LOS: C
Intersection Capacity Utilization 90.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: 152 Ave NE & NE 24 St



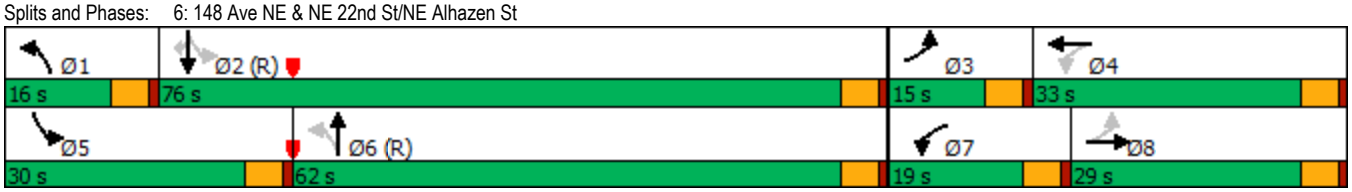
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	8	147	255	10	191	152	1582	173	319	1364	101
Future Volume (vph)	138	8	147	255	10	191	152	1582	173	319	1364	101
Satd. Flow (prot)	1710	1468	0	1710	1467	0	1660	4655	0	1693	3386	1515
Flt Permitted	0.374			0.313			0.125			0.056		
Satd. Flow (perm)	658	1468	0	551	1467	0	218	4655	0	100	3386	1370
Satd. Flow (RTOR)		150			195			16				94
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	158	0	260	205	0	155	1791	0	326	1392	103
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		2
Detector Phase	3	8		7	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	29.0		15.0	29.0		12.0	24.0		12.0	24.0	24.0
Total Split (s)	15.0	29.0		19.0	33.0		16.0	62.0		30.0	76.0	76.0
Total Split (%)	10.7%	20.7%		13.6%	23.6%		11.4%	44.3%		21.4%	54.3%	54.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	31.0	19.2		38.2	23.4		79.6	67.8		95.8	81.1	81.1
Actuated g/C Ratio	0.22	0.14		0.27	0.17		0.57	0.48		0.68	0.58	0.58
v/c Ratio	0.61	0.48		0.92	0.50		0.63	0.79		0.93	0.71	0.12
Control Delay	50.6	13.5		80.6	11.6		19.3	20.8		68.1	8.3	1.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.7		0.0	0.9	0.0
Total Delay	50.6	13.5		80.6	11.7		19.3	21.5		68.1	9.1	1.2
LOS	D	B		F	B		B	C		E	A	A
Approach Delay		31.0			50.2			21.3			19.2	
Approach LOS		C			D			C			B	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 24 (17%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 24.1	Intersection LOS: C
Intersection Capacity Utilization 99.2%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St/NE Alhazen St



Lanes, Volumes, Timings
7: Lumiere Ave NE & NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	175	36	10	158	0	43	36	0	0	21	28
Future Volume (vph)	51	175	36	10	158	0	43	36	0	0	21	28
Satd. Flow (prot)	1770	1814	0	1770	1863	0	0	1814	0	0	1719	0
Flt Permitted	0.950			0.950				0.974				
Satd. Flow (perm)	1770	1814	0	1770	1863	0	0	1814	0	0	1719	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	222	0	11	166	0	0	83	0	0	51	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 37.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	175	36	10	158	0	43	36	0	0	21	28
Future Vol, veh/h	51	175	36	10	158	0	43	36	0	0	21	28
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	184	38	11	166	0	45	38	0	0	22	29
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	9.6	9.4	9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	54%	100%	0%	100%	0%	0%
Vol Thru, %	46%	0%	83%	0%	100%	43%
Vol Right, %	0%	0%	17%	0%	0%	57%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	79	51	211	10	158	49
LT Vol	43	51	0	10	0	0
Through Vol	36	0	175	0	158	21
RT Vol	0	0	36	0	0	28
Lane Flow Rate	83	54	222	11	166	52
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.12	0.083	0.303	0.016	0.237	0.069
Departure Headway (Hd)	5.194	5.539	4.916	5.631	5.128	4.796
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	689	646	731	635	699	744
Service Time	3.238	3.277	2.654	3.373	2.87	2.843
HCM Lane V/C Ratio	0.12	0.084	0.304	0.017	0.237	0.07
HCM Control Delay	9	8.8	9.8	8.5	9.5	8.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0.3	1.3	0	0.9	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	175	0	0	131	46	168
Future Volume (vph)	175	0	0	131	46	168
Satd. Flow (prot)	1770	1863	0	1863	1665	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1863	0	1863	1665	0
Confl. Peds. (#/hr)	20		20			20
Confl. Bikes (#/hr)						5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	184	0	0	138	225	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 30.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	0	0	131	46	168
Future Vol, veh/h	175	0	0	131	46	168
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	184	0	0	138	48	177

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	315	157	245	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	678	889	1321	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	655	874	1299	-	-	-
Mov Cap-2 Maneuver	655	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1299	-	655	-	-	-
HCM Lane V/C Ratio	-	-	0.281	-	-	-
HCM Control Delay (s)	0	-	12.6	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-	-

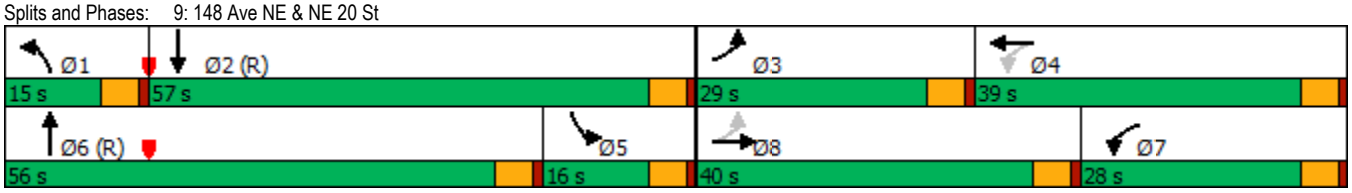
Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	414	650	188	349	655	317	142	1099	247	191	1429	229
Future Volume (vph)	414	650	188	349	655	317	142	1099	247	191	1429	229
Satd. Flow (prot)	1660	3171	0	1693	3167	0	1693	3224	0	1693	4691	0
Flt Permitted	0.364			0.364			0.950			0.950		
Satd. Flow (perm)	632	3171	0	642	3167	0	1687	3224	0	1684	4691	0
Satd. Flow (RTOR)		26			56			22			25	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	431	873	0	364	1012	0	148	1402	0	199	1728	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	15.0	29.0		15.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	29.0	40.0		28.0	39.0		15.0	56.0		16.0	57.0	
Total Split (%)	20.7%	28.6%		20.0%	27.9%		10.7%	40.0%		11.4%	40.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	37.0	37.0		36.0	36.0		12.0	53.0		13.0	54.0	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.09	0.38		0.09	0.39	
v/c Ratio	1.21	1.02		1.03	1.18		1.02	1.14		1.27	0.95	
Control Delay	158.6	84.4		104.8	134.2		132.3	96.3		194.2	38.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2		0.0	44.1	
Total Delay	158.6	84.4		104.8	134.2		132.3	96.5		194.2	82.6	
LOS	F	F		F	F		F	F		F	F	
Approach Delay		108.9			126.4			99.9			94.1	
Approach LOS		F			F			F			F	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 37 (26%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 105.9	Intersection LOS: F
Intersection Capacity Utilization 119.9%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	1013	1212	89	42	109
Future Volume (vph)	75	1013	1212	89	42	109
Satd. Flow (prot)	1787	3574	3539	0	1690	0
Flt Permitted	0.950				0.986	
Satd. Flow (perm)	1787	3574	3539	0	1690	0
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	79	1066	1370	0	159	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	1013	1212	89	42	109
Future Vol, veh/h	75	1013	1212	89	42	109
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	79	1066	1276	94	44	115

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1390	0	-	0	2054	725
Stage 1	-	-	-	-	1343	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	493	-	-	-	49	372
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	453	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	~ 40	360
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	445	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	47.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	485	-	-	-	234
HCM Lane V/C Ratio	0.163	-	-	-	0.679
HCM Control Delay (s)	13.9	-	-	-	47.8
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0.6	-	-	-	4.3

Notes

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

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	59	996	1272	72	17	29
Future Volume (vph)	59	996	1272	72	17	29
Satd. Flow (prot)	1770	3539	3511	0	1672	0
Flt Permitted	0.950				0.982	
Satd. Flow (perm)	1770	3539	3511	0	1672	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	64	1083	1461	0	50	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	59	996	1272	72	17	29
Future Vol, veh/h	59	996	1272	72	17	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	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	64	1083	1383	78	18	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1461	0	-	0	2092	731
Stage 1	-	-	-	-	1422	-
Stage 2	-	-	-	-	670	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	458	-	-	-	45	364
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	470	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	458	-	-	-	39	364
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	27.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	458	-	-	-	208
HCM Lane V/C Ratio	0.14	-	-	-	0.24
HCM Control Delay (s)	14.1	-	-	-	27.7
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	265	907	897	78	0	513
Future Volume (vph)	265	907	897	78	0	513
Satd. Flow (prot)	1787	3574	3531	0	0	1627
Flt Permitted	0.950					
Satd. Flow (perm)	1787	3574	3531	0	0	1627
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	279	955	1026	0	0	540
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 67.8%	ICU Level of Service C
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	25.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	265	907	897	78	0	513
Future Vol, veh/h	265	907	897	78	0	513
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	279	955	944	82	0	540

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1046	0	-	0	-	553
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	667	-	-	-	0	~ 479
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	656	-	-	-	-	~ 463
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	124.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	656	-	-	-	463
HCM Lane V/C Ratio	0.425	-	-	-	1.166
HCM Control Delay (s)	14.5	-	-	-	124.2
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	2.1	-	-	-	19.8

Notes

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

Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

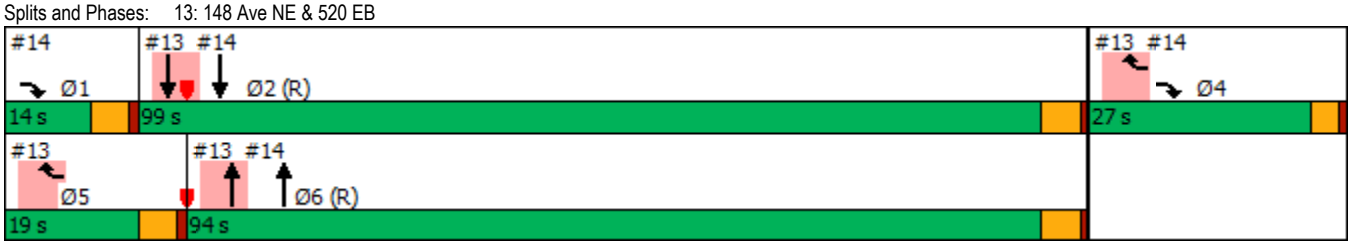
10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	213	1261	0	0	1669			
Future Volume (vph)	0	213	1261	0	0	1669			
Satd. Flow (prot)	0	1497	3320	0	0	3386			
Flt Permitted									
Satd. Flow (perm)	0	1497	3320	0	0	3386			
Satd. Flow (RTOR)		74							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99			
Growth Factor	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	4%	4%	3%	3%	1%	1%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	215	1274	0	0	1686			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			94.0			99.0	14.0	27.0	19.0
Total Split (%)			67.1%			70.7%	10%	19%	14%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		26.2	107.8			105.9			
Actuated g/C Ratio		0.19	0.77			0.76			
v/c Ratio		0.63	0.50			0.66			
Control Delay		40.9	1.2			7.9			
Queue Delay		0.0	0.0			0.0			
Total Delay		40.9	1.2			7.9			
LOS		D	A			A			
Approach Delay	40.9		1.2			7.9			
Approach LOS	D		A			A			

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 29 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 7.4 — Intersection LOS: A
Intersection Capacity Utilization 70.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 13: 148 Ave NE & 520 EB



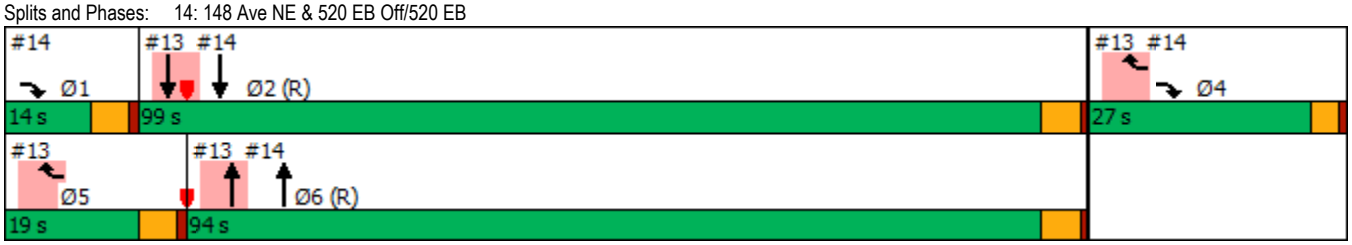
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	354	0	0	0	0	1261	1045	0	1669	0
Future Volume (vph)	0	0	354	0	0	0	0	1261	1045	0	1669	0
Satd. Flow (prot)	0	0	2640	0	0	0	0	3320	1485	0	3386	0
Flt Permitted												
Satd. Flow (perm)	0	0	2640	0	0	0	0	3320	1438	0	3386	0
Satd. Flow (RTOR)			64						445			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	358	0	0	0	0	1274	1056	0	1686	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								94.0			99.0	
Total Split (%)								67.1%			70.7%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			28.1					107.8	140.0		105.9	
Actuated g/C Ratio			0.20					0.77	1.00		0.76	
v/c Ratio			0.62					0.50	0.73		0.66	
Control Delay			45.3					2.2	11.0		2.4	
Queue Delay			1.8					0.2	0.0		0.3	
Total Delay			47.0					2.5	11.0		2.7	
LOS			D					A	B		A	
Approach Delay		47.0						6.3			2.7	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 29 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 8.2	Intersection LOS: A
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



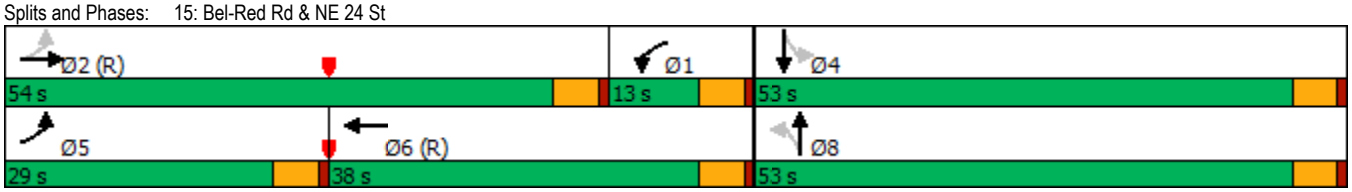
Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	927	234	90	506	9	1	466	207	2	724	338
Future Volume (vph)	287	927	234	90	506	9	1	466	207	2	724	338
Satd. Flow (prot)	1676	3224	0	1660	3268	0	0	3187	0	0	3179	0
Flt Permitted	0.257			0.950				0.954			0.954	
Satd. Flow (perm)	449	3224	0	1651	3268	0	0	3040	0	0	3032	0
Satd. Flow (RTOR)		32			1			72			78	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	1197	0	93	531	0	0	694	0	0	1096	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	29.0	54.0		13.0	38.0		53.0	53.0		53.0	53.0	
Total Split (%)	24.2%	45.0%		10.8%	31.7%		44.2%	44.2%		44.2%	44.2%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	54.1	54.1		10.0	42.8			46.9			46.9	
Actuated g/C Ratio	0.45	0.45		0.08	0.36			0.39			0.39	
v/c Ratio	0.70	0.81		0.67	0.46			0.56			0.89	
Control Delay	27.5	29.9		77.5	37.3			27.0			32.1	
Queue Delay	0.0	0.2		0.0	0.0			0.0			0.9	
Total Delay	27.5	30.2		77.5	37.3			27.0			33.0	
LOS	C	C		E	D			C			C	
Approach Delay		29.6			43.3			27.0			33.0	
Approach LOS		C			D			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 32.3	Intersection LOS: C
Intersection Capacity Utilization 86.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 15: Bel-Red Rd & NE 24 St



Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

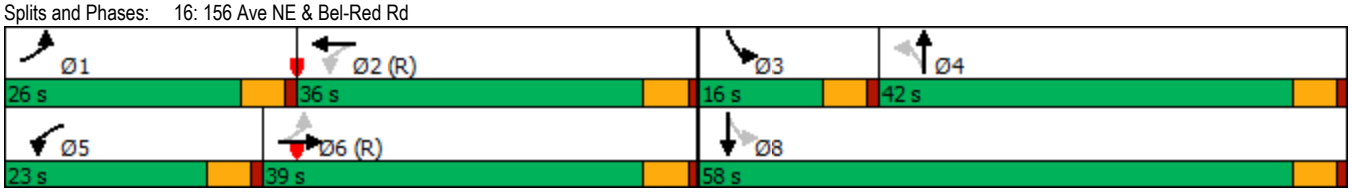
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	306	456	33	254	576	76	4	311	282	152	847	448
Future Volume (vph)	306	456	33	254	576	76	4	311	282	152	847	448
Satd. Flow (prot)	1637	3231	0	1637	3202	0	1676	2952	0	1693	3057	0
Flt Permitted	0.181			0.370			0.103			0.239		
Satd. Flow (perm)	310	3231	0	630	3202	0	181	2952	0	423	3057	0
Satd. Flow (RTOR)		6			12			204			106	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	319	509	0	265	679	0	4	618	0	158	1349	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		4	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		5.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		32.0	32.0		15.0	31.0	
Total Split (s)	26.0	39.0		23.0	36.0		42.0	42.0		16.0	58.0	
Total Split (%)	21.7%	32.5%		19.2%	30.0%		35.0%	35.0%		13.3%	48.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	59.8	39.5		53.0	35.7		38.8	38.8		54.2	54.2	
Actuated g/C Ratio	0.50	0.33		0.44	0.30		0.32	0.32		0.45	0.45	
v/c Ratio	0.82	0.48		0.63	0.71		0.07	0.57		0.49	0.94	
Control Delay	37.7	37.3		25.8	42.4		16.5	7.1		19.1	31.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.1		0.0	46.0	
Total Delay	37.7	37.3		25.8	42.4		16.5	7.2		19.1	77.6	
LOS	D	D		C	D		B	A		B	E	
Approach Delay		37.4			37.7			7.2			71.4	
Approach LOS		D			D			A			E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 111 (93%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 45.8 — Intersection LOS: D
Intersection Capacity Utilization 100.1% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



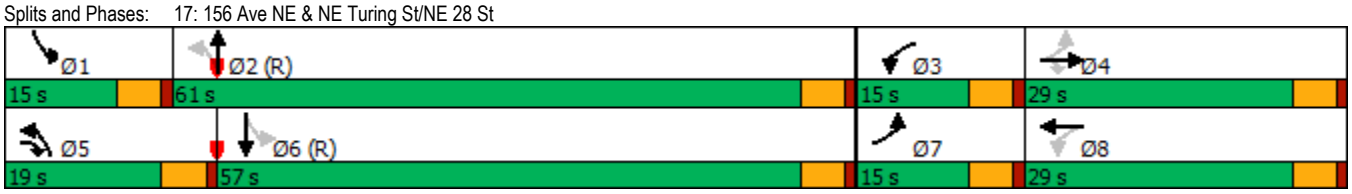
Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	21	209	135	27	155	147	511	35	15	939	41
Future Volume (vph)	129	21	209	135	27	155	147	511	35	15	939	41
Satd. Flow (prot)	1710	1800	1530	1710	1506	0	1660	3231	0	1693	3314	0
Flt Permitted	0.387			0.602			0.185			0.436		
Satd. Flow (perm)	683	1800	1460	1051	1506	0	323	3231	0	760	3314	0
Satd. Flow (RTOR)			85		163			8			5	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	22	220	142	191	0	155	575	0	16	1031	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	28.0	15.0	15.0	28.0		15.0	26.0		15.0	26.0	
Total Split (s)	15.0	29.0	19.0	15.0	29.0		19.0	61.0		15.0	57.0	
Total Split (%)	12.5%	24.2%	15.8%	12.5%	24.2%		15.8%	50.8%		12.5%	47.5%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	23.8	15.1	23.2	28.0	15.0		84.2	79.6		76.3	68.4	
Actuated g/C Ratio	0.20	0.13	0.19	0.23	0.12		0.70	0.66		0.64	0.57	
v/c Ratio	0.57	0.10	0.62	0.43	0.58		0.42	0.27		0.03	0.55	
Control Delay	47.0	42.8	30.5	39.2	17.0		13.6	16.0		3.4	12.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.1	
Total Delay	47.0	42.8	30.5	39.2	17.0		13.6	16.0		3.4	12.3	
LOS	D	D	C	D	B		B	B		A	B	
Approach Delay		37.1			26.5			15.5			12.2	
Approach LOS		D			C			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 74.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1243	73	0	1331	0	33
Future Volume (vph)	1243	73	0	1331	0	33
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1308	77	0	1401	0	35
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1243	73	0	1331	0	33
Future Vol, veh/h	1243	73	0	1331	0	33
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1308	77	0	1401	0	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	694
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	*563
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*544
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	544	-	-	-
HCM Lane V/C Ratio	0.064	-	-	-
HCM Control Delay (s)	12.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	145	1814	31	0	1723
Future Volume (vph)	0	145	1814	31	0	1723
Satd. Flow (prot)	0	1611	5070	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1611	5070	0	0	3539
Confl. Peds. (#/hr)		20		20		
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	153	1942	0	0	1814
Sign Control	Stop		Free			Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	145	1814	31	0	1723
Future Vol, veh/h	0	145	1814	31	0	1723
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	153	1909	33	0	1814

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1011	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	*506	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*489	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	489	-
HCM Lane V/C Ratio	-	-	0.312	-
HCM Control Delay (s)	-	-	15.7	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	1.3	-

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

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	120	40	38	49	9	65
Future Volume (vph)	120	40	38	49	9	65
Satd. Flow (prot)	1735	0	0	1824	1641	0
Flt Permitted	0.964			0.979		
Satd. Flow (perm)	1735	0	0	1824	1641	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	168	0	0	92	77	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 29.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	120	40	38	49	9	65
Future Vol, veh/h	120	40	38	49	9	65
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	126	42	40	52	9	68

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	215	83	97	0	-	0
Stage 1	63	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	773	976	1496	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	726	944	1471	-	-	-
Mov Cap-2 Maneuver	726	-	-	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	861	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	3.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1471	-	770	-	-
HCM Lane V/C Ratio	0.027	-	0.219	-	-
HCM Control Delay (s)	7.5	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	32	214	286	20	0	11
Future Volume (vph)	32	214	286	20	0	11
Satd. Flow (prot)	1633	0	0	1779	1611	0
Flt Permitted	0.993			0.955		
Satd. Flow (perm)	1633	0	0	1779	1611	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	259	0	0	322	12	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	214	286	20	0	11
Future Vol, veh/h	32	214	286	20	0	11
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	225	301	21	0	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	669	46	32	0	-	0
Stage 1	26	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	423	1023	1580	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	523	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	329	989	1554	-	-	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	7.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1554	-	784	-	-
HCM Lane V/C Ratio	0.194	-	0.33	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.7	-	1.4	-	-

Lanes, Volumes, Timings
22: NE Alhazen St & Driveway

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	214	190	96	0	205	25	79	0	40	32	0	173
Future Volume (vph)	214	190	96	0	205	25	79	0	40	32	0	173
Satd. Flow (prot)	1770	1770	0	1863	1833	0	0	1722	0	0	1637	0
Flt Permitted	0.950							0.968			0.992	
Satd. Flow (perm)	1770	1770	0	1863	1833	0	0	1722	0	0	1637	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	301	0	0	242	0	0	125	0	0	216	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 57.0%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	214	190	96	0	205	25	79	0	40	32	0	173
Future Vol, veh/h	214	190	96	0	205	25	79	0	40	32	0	173
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	225	200	101	0	216	26	83	0	42	34	0	182

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	262	0	0	321	0	0	1061	983	291	991	1020	269
Stage 1	-	-	-	-	-	-	721	721	-	249	249	-
Stage 2	-	-	-	-	-	-	340	262	-	742	771	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1302	-	-	1252	-	-	194	240	826	220	226	770
Stage 1	-	-	-	-	-	-	423	424	-	755	701	-
Stage 2	-	-	-	-	-	-	675	691	-	410	399	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1280	-	-	1231	-	-	123	191	798	174	180	745
Mov Cap-2 Maneuver	-	-	-	-	-	-	195	262	-	256	267	-
Stage 1	-	-	-	-	-	-	342	343	-	612	689	-
Stage 2	-	-	-	-	-	-	502	679	-	315	324	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	30.9	15
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	261	1280	-	-	1231	-	-	574
HCM Lane V/C Ratio	0.48	0.176	-	-	-	-	-	0.376
HCM Control Delay (s)	30.9	8.4	-	-	0	-	-	15
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	2.4	0.6	-	-	0	-	-	1.7

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	38	106	123	41	45	22
Future Volume (vph)	38	106	123	41	45	22
Satd. Flow (prot)	1657	0	0	1796	1781	0
Flt Permitted	0.987			0.964		
Satd. Flow (perm)	1657	0	0	1796	1781	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	152	0	0	172	70	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	106	123	41	45	22
Future Vol, veh/h	38	106	123	41	45	22
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	112	129	43	47	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	400	99	90	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	321	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	606	957	1505	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	533	925	1480	-	-	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	5.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	775	-	-
HCM Lane V/C Ratio	0.087	-	0.196	-	-
HCM Control Delay (s)	7.7	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.7	-	-

2023 With-Project - Full Buildout (with Signal at Lumiere/24th)

Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

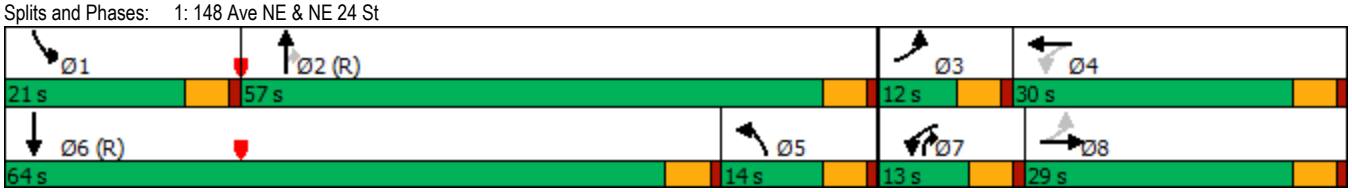
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	319	73	247	339	619	148	1179	168	395	1208	435
Future Volume (vph)	189	319	73	247	339	619	148	1179	168	395	1208	435
Satd. Flow (prot)	1787	3444	0	1770	3539	1583	1770	3539	1583	3400	3284	0
Flt Permitted	0.349			0.243			0.950			0.950		
Satd. Flow (perm)	646	3444	0	447	3539	1553	1764	3539	1513	3368	3284	0
Satd. Flow (RTOR)		21				355			71		62	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	413	0	260	357	652	156	1241	177	416	1730	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	12.0	29.0		13.0	30.0		14.0	57.0	13.0	21.0	64.0	
Total Split (%)	10.0%	24.2%		10.8%	25.0%		11.7%	47.5%	10.8%	17.5%	53.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	30.1	21.1		32.1	22.1	120.0	11.0	58.3	68.3	18.6	65.9	
Actuated g/C Ratio	0.25	0.18		0.27	0.18	1.00	0.09	0.49	0.57	0.16	0.55	
v/c Ratio	0.81	0.67		1.14	0.55	0.42	0.96	0.72	0.20	0.79	0.94	
Control Delay	60.3	48.7		132.9	44.6	1.7	95.4	10.7	0.8	66.5	30.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	
Total Delay	60.3	48.7		132.9	44.6	1.7	95.4	10.7	0.8	66.5	43.5	
LOS	E	D		F	D	A	F	B	A	E	D	
Approach Delay		52.5			40.6			18.0			47.9	
Approach LOS		D			D			B			D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 115 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 38.4 — Intersection LOS: D
Intersection Capacity Utilization 98.7% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: 148 Ave NE & NE 24 St



Lanes, Volumes, Timings
2: Lumiere Ave NE & NE 24 St

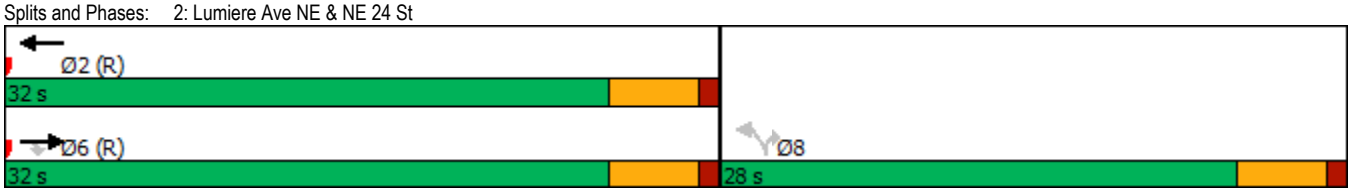
10/26/2017

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	788	94	0	1135	70	80
Future Volume (vph)	788	94	0	1135	70	80
Satd. Flow (prot)	3539	1583	0	3539	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	1494	0	3539	1742	1536
Satd. Flow (RTOR)		99				84
Confl. Peds. (#/hr)		20			20	20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	829	99	0	1195	74	84
Turn Type	NA	Perm		NA	Perm	Perm
Protected Phases	6			2		
Permitted Phases		6			8	8
Detector Phase	6	6		2	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	26.0	26.0		26.0	28.0	28.0
Total Split (s)	32.0	32.0		32.0	28.0	28.0
Total Split (%)	53.3%	53.3%		53.3%	46.7%	46.7%
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0
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						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max		C-Max	None	None
Act Effct Green (s)	42.7	42.7		42.7	10.4	10.4
Actuated g/C Ratio	0.71	0.71		0.71	0.17	0.17
v/c Ratio	0.33	0.09		0.47	0.24	0.25
Control Delay	6.6	2.4		6.2	20.8	6.3
Queue Delay	0.0	0.0		0.0	0.0	0.0
Total Delay	6.6	2.4		6.2	20.8	6.3
LOS	A	A		A	C	A
Approach Delay	6.1			6.2	13.1	
Approach LOS	A			A	B	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 1 (2%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 6.7 — Intersection LOS: A
Intersection Capacity Utilization 51.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Lumiere Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	862	8	0	1135	0	38
Future Volume (vph)	862	8	0	1135	0	38
Satd. Flow (prot)	3536	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3536	0	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	915	0	0	1195	0	40
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	862	8	0	1135	0	38
Future Vol, veh/h	862	8	0	1135	0	38
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	907	8	0	1195	0	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	498
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	*755
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*730
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	730	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-
HCM Control Delay (s)	10.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

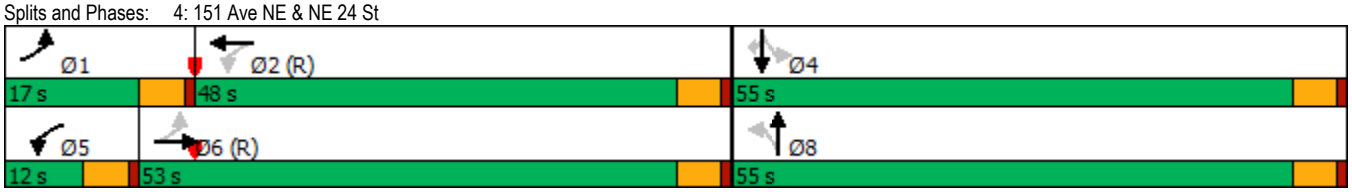
Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	758	28	22	670	96	19	6	18	277	25	157
Future Volume (vph)	133	758	28	22	670	96	19	6	18	277	25	157
Satd. Flow (prot)	1787	3546	0	1752	3402	0	0	1505	0	0	1730	1538
Flt Permitted	0.249			0.293				0.829			0.731	
Satd. Flow (perm)	468	3546	0	534	3402	0	0	1266	0	0	1282	1462
Satd. Flow (RTOR)		4			15			19				165
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	14%	14%	14%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	827	0	23	806	0	0	45	0	0	318	165
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		5.0	5.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		25.0	25.0		25.0	25.0	25.0
Total Split (s)	17.0	53.0		12.0	48.0		55.0	55.0		55.0	55.0	55.0
Total Split (%)	14.2%	44.2%		10.0%	40.0%		45.8%	45.8%		45.8%	45.8%	45.8%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.7	68.7		69.3	61.1			38.3			38.3	38.3
Actuated g/C Ratio	0.63	0.57		0.58	0.51			0.32			0.32	0.32
v/c Ratio	0.33	0.41		0.06	0.46			0.11			0.78	0.28
Control Delay	8.5	9.7		10.1	16.3			16.7			49.4	4.8
Queue Delay	0.0	0.1		0.0	0.2			0.0			0.0	0.0
Total Delay	8.5	9.9		10.1	16.5			16.7			49.4	4.8
LOS	A	A		B	B			B			D	A
Approach Delay		9.7			16.3			16.7			34.2	
Approach LOS		A			B			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 117 (98%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 17.3	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: 151 Ave NE & NE 24 St



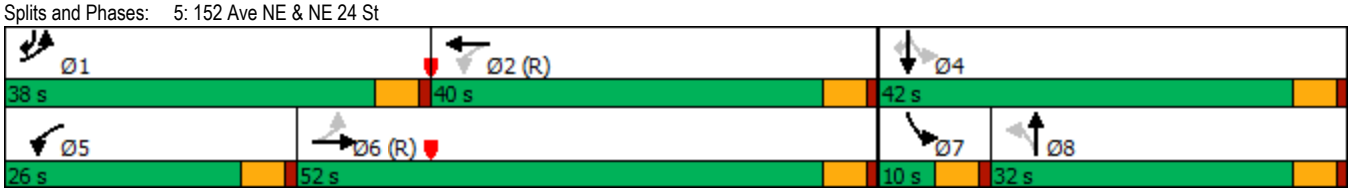
Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	363	572	121	25	508	93	136	125	35	32	159	197
Future Volume (vph)	363	572	121	25	508	93	136	125	35	32	159	197
Satd. Flow (prot)	1770	3342	0	1779	3441	0	1752	1761	0	1612	1696	1442
Flt Permitted	0.319			0.375			0.651			0.372		
Satd. Flow (perm)	594	3342	0	684	3441	0	1161	1761	0	616	1696	1362
Satd. Flow (RTOR)		25			18			11				90
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	12%	12%	12%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	382	729	0	26	633	0	143	169	0	34	167	207
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	3.0	3.0		8.0	8.0		4.0	4.0		5.0	5.0	3.0
Minimum Split (s)	26.0	26.0		26.0	26.0		25.0	25.0		10.0	25.0	26.0
Total Split (s)	38.0	52.0		26.0	40.0		32.0	32.0		10.0	42.0	38.0
Total Split (%)	31.7%	43.3%		21.7%	33.3%		26.7%	26.7%		8.3%	35.0%	31.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	87.0	78.9		71.1	60.8		21.0	21.0		27.0	27.0	48.2
Actuated g/C Ratio	0.72	0.66		0.59	0.51		0.18	0.18		0.22	0.22	0.40
v/c Ratio	0.58	0.33		0.05	0.36		0.70	0.53		0.17	0.44	0.34
Control Delay	15.3	7.5		8.4	13.7		64.2	47.1		33.8	41.3	10.8
Queue Delay	0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	15.4	7.6		8.4	13.7		64.2	47.1		33.8	41.3	10.8
LOS	B	A		A	B		E	D		C	D	B
Approach Delay		10.2			13.5			54.9			25.2	
Approach LOS		B			B			D			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 12 (10%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 19.1	Intersection LOS: B
Intersection Capacity Utilization 69.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: 152 Ave NE & NE 24 St



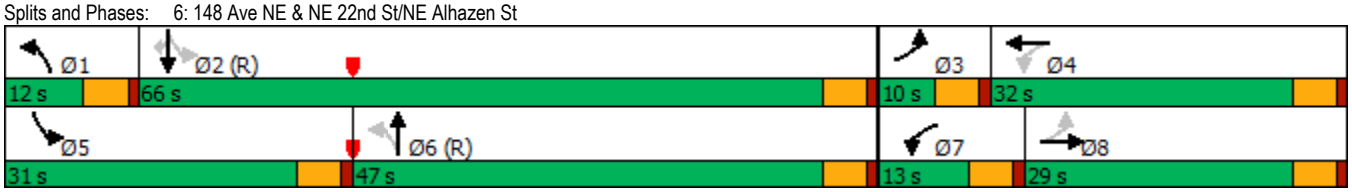
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	11	53	176	8	56	113	1240	112	304	1228	53
Future Volume (vph)	72	11	53	176	8	56	113	1240	112	304	1228	53
Satd. Flow (prot)	1736	1537	0	1736	1522	0	1752	4940	0	1736	3471	1553
Flt Permitted	0.714			0.580			0.169			0.111		
Satd. Flow (perm)	1269	1537	0	1033	1522	0	309	4940	0	203	3471	1421
Satd. Flow (RTOR)		55			58			14				109
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	66	0	181	66	0	116	1393	0	313	1266	55
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		2
Detector Phase	3	8		7	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	29.0		10.0	29.0		12.0	24.0		12.0	24.0	24.0
Total Split (s)	10.0	29.0		13.0	32.0		12.0	47.0		31.0	66.0	66.0
Total Split (%)	8.3%	24.2%		10.8%	26.7%		10.0%	39.2%		25.8%	55.0%	55.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.4	19.2		29.8	21.8		69.1	60.1		84.0	72.2	72.2
Actuated g/C Ratio	0.20	0.16		0.25	0.18		0.58	0.50		0.70	0.60	0.60
v/c Ratio	0.26	0.23		0.57	0.20		0.41	0.56		0.76	0.61	0.06
Control Delay	34.0	14.9		43.2	12.7		11.0	10.4		38.0	9.1	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.1	0.0
Total Delay	34.0	14.9		43.2	12.7		11.0	10.4		38.0	9.3	0.2
LOS	C	B		D	B		B	B		D	A	A
Approach Delay		25.0			35.0			10.5			14.5	
Approach LOS		C			D			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 115 (96%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St/NE Alhazen St



Lanes, Volumes, Timings
7: Lumiere Ave NE & NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	65	43	13	83	30	47	50	0	0	23	23
Future Volume (vph)	57	65	43	13	83	30	47	50	0	0	23	23
Satd. Flow (prot)	1770	1751	0	1770	1788	0	0	1820	0	0	1736	0
Flt Permitted	0.950			0.950				0.977				
Satd. Flow (perm)	1770	1751	0	1770	1788	0	0	1820	0	0	1736	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	113	0	14	119	0	0	102	0	0	48	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 30.8%	ICU Level of Service A	
Analysis Period (min) 15		

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	65	43	13	83	30	47	50	0	0	23	23
Future Vol, veh/h	57	65	43	13	83	30	47	50	0	0	23	23
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	68	45	14	87	32	49	53	0	0	24	24
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8.5	8.5	8.6	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	48%	100%	0%	100%	0%	0%
Vol Thru, %	52%	0%	60%	0%	73%	50%
Vol Right, %	0%	0%	40%	0%	27%	50%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	97	57	108	13	113	46
LT Vol	47	57	0	13	0	0
Through Vol	50	0	65	0	83	23
RT Vol	0	0	43	0	30	23
Lane Flow Rate	102	60	114	14	119	48
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.137	0.092	0.15	0.021	0.161	0.061
Departure Headway (Hd)	4.824	5.522	4.739	5.564	4.874	4.502
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	744	650	757	644	736	796
Service Time	2.849	3.248	2.465	3.292	2.602	2.53
HCM Lane V/C Ratio	0.137	0.092	0.151	0.022	0.162	0.06
HCM Control Delay	8.6	8.8	8.3	8.4	8.5	7.8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.5	0.1	0.6	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	65	0	0	61	58	126
Future Volume (vph)	65	0	0	61	58	126
Satd. Flow (prot)	1770	1863	0	1863	1690	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1863	0	1863	1690	0
Confl. Peds. (#/hr)	20		20			20
Confl. Bikes (#/hr)						5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	68	0	0	64	194	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 23.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	0	0	61	58	126
Future Vol, veh/h	65	0	0	61	58	126
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	0	0	64	61	133

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	232	148	214	0	-	0
Stage 1	148	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	756	899	1356	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	730	884	1333	-	-	-
Mov Cap-2 Maneuver	730	-	-	-	-	-
Stage 1	865	-	-	-	-	-
Stage 2	923	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1333	-	730	-	-	-
HCM Lane V/C Ratio	-	-	0.094	-	-	-
HCM Control Delay (s)	0	-	10.4	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-	-

Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

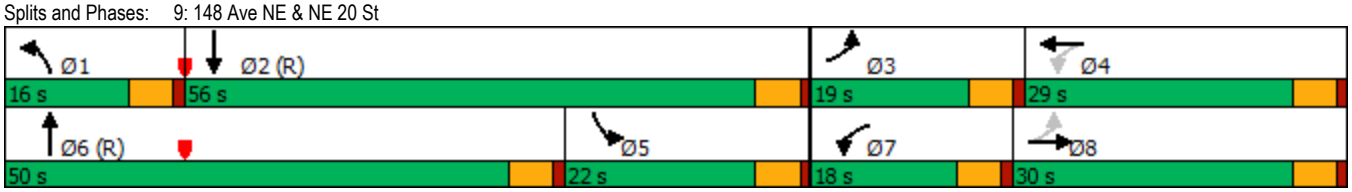
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	394	71	240	424	237	97	1002	229	237	1090	195
Future Volume (vph)	255	394	71	240	424	237	97	1002	229	237	1090	195
Satd. Flow (prot)	1703	3304	0	1752	3261	0	1770	3369	0	1736	4800	0
Flt Permitted	0.150			0.273			0.950			0.950		
Satd. Flow (perm)	267	3304	0	498	3261	0	1760	3369	0	1726	4800	0
Satd. Flow (RTOR)		16			82			27			38	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	263	479	0	247	681	0	100	1269	0	244	1325	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	12.0	29.0		12.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	19.0	30.0		18.0	29.0		16.0	50.0		22.0	56.0	
Total Split (%)	15.8%	25.0%		15.0%	24.2%		13.3%	41.7%		18.3%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	42.7	26.7		40.1	25.4		11.7	47.6		19.0	54.9	
Actuated g/C Ratio	0.36	0.22		0.33	0.21		0.10	0.40		0.16	0.46	
v/c Ratio	0.92	0.64		0.77	0.90		0.58	0.94		0.89	0.60	
Control Delay	68.4	45.3		45.6	56.9		65.2	48.3		68.7	15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	44.6		0.0	0.0	
Total Delay	68.4	45.3		45.6	56.9		65.2	92.8		68.7	15.2	
LOS	E	D		D	E		E	F		E	B	
Approach Delay		53.5			53.9			90.8			23.5	
Approach LOS		D			D			F			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 54.5 — Intersection LOS: D
Intersection Capacity Utilization 96.0% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	116	744	816	167	24	85
Future Volume (vph)	116	744	816	167	24	85
Satd. Flow (prot)	1770	3539	3447	0	1649	0
Flt Permitted	0.950				0.989	
Satd. Flow (perm)	1770	3539	3447	0	1649	0
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	122	783	1035	0	114	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 55.3%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	116	744	816	167	24	85
Future Vol, veh/h	116	744	816	167	24	85
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	783	859	176	25	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1055	0	-	0	1623	558
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	656	-	-	-	93	473
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	478	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	73	457
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	21.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	645	-	-	-	332
HCM Lane V/C Ratio	0.189	-	-	-	0.346
HCM Control Delay (s)	11.9	-	-	-	21.5
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	1.5

Lanes, Volumes, Timings
11: NE 20 St & DaVinci Ave NE

10/26/2017

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	743	943	36	18	40
Future Volume (vph)	25	743	943	36	18	40
Satd. Flow (prot)	1770	3539	3450	0	1697	0
Flt Permitted	0.950				0.985	
Satd. Flow (perm)	1770	3539	3450	0	1697	0
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	4%	4%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	782	1031	0	61	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 42.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	743	943	36	18	40
Future Vol, veh/h	25	743	943	36	18	40
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	4	4	0	0
Mvmt Flow	26	782	993	38	19	42

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1051	0	-	0	1495	556
Stage 1	-	-	-	-	1032	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	4.14	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.22	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	658	-	-	-	116	480
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	647	-	-	-	108	464
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	647	-	-	-	344
HCM Lane V/C Ratio	0.041	-	-	-	0.177
HCM Control Delay (s)	10.8	-	-	-	17.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	127	665	670	99	0	273
Future Volume (vph)	127	665	670	99	0	273
Satd. Flow (prot)	1770	3539	3472	0	0	1580
Flt Permitted	0.950					
Satd. Flow (perm)	1770	3539	3472	0	0	1580
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	134	700	809	0	0	287
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 47.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	127	665	670	99	0	273
Future Vol, veh/h	127	665	670	99	0	273
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	134	700	705	104	0	287

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	829	0	-	0	-	445
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	798	-	-	-	0	555
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	785	-	-	-	-	537
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	19.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	785	-	-	-	537
HCM Lane V/C Ratio	0.17	-	-	-	0.535
HCM Control Delay (s)	10.5	-	-	-	19.2
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	3.1

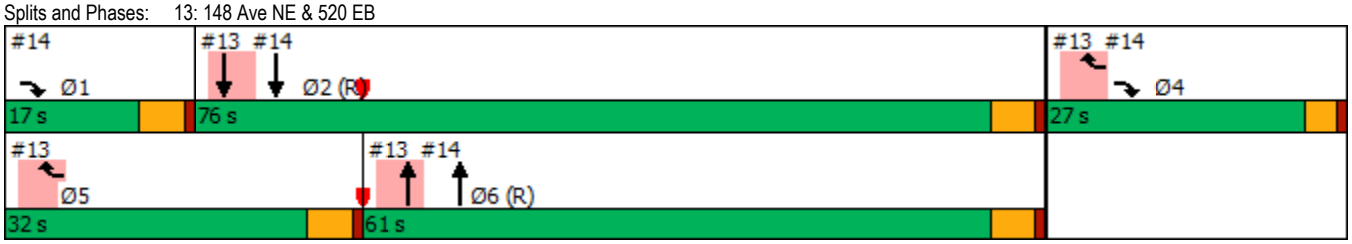
Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	512	1286	0	0	1582			
Future Volume (vph)	0	512	1286	0	0	1582			
Satd. Flow (prot)	0	1526	3320	0	0	3320			
Flt Permitted									
Satd. Flow (perm)	0	1526	3320	0	0	3320			
Satd. Flow (RTOR)		24							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98			
Heavy Vehicles (%)	2%	2%	3%	3%	3%	3%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	522	1312	0	0	1614			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			61.0			76.0	17.0	27.0	32.0
Total Split (%)			50.8%			63.3%	14%	23%	27%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		43.8	70.2			81.8			
Actuated g/C Ratio		0.36	0.58			0.68			
v/c Ratio		0.91	0.68			0.71			
Control Delay		55.1	2.9			15.5			
Queue Delay		0.0	0.0			0.0			
Total Delay		55.1	2.9			15.5			
LOS		E	A			B			
Approach Delay	55.1		2.9			15.5			
Approach LOS	E		A			B			

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 119 (99%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 16.7	Intersection LOS: B
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 13: 148 Ave NE & 520 EB



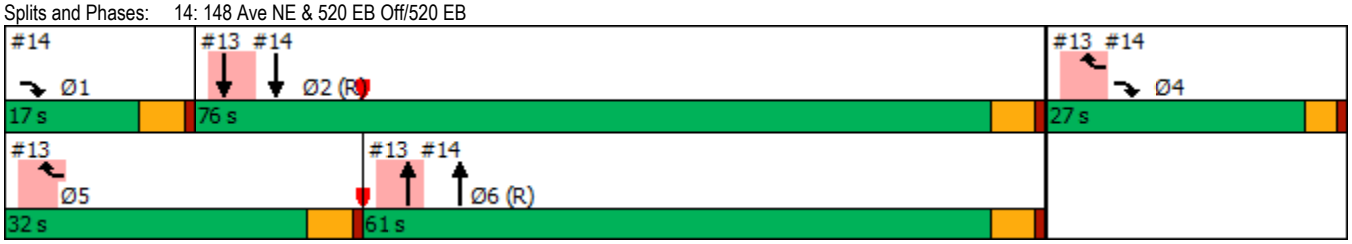
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	551	0	0	0	0	1286	538	0	1582	0
Future Volume (vph)	0	0	551	0	0	0	0	1286	538	0	1582	0
Satd. Flow (prot)	0	0	2614	0	0	0	0	3320	1485	0	3320	0
Flt Permitted												
Satd. Flow (perm)	0	0	2614	0	0	0	0	3320	1438	0	3320	0
Satd. Flow (RTOR)			64						262			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	562	0	0	0	0	1312	549	0	1614	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								61.0			76.0	
Total Split (%)								50.8%			63.3%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			32.2					70.2	120.0		81.8	
Actuated g/C Ratio			0.27					0.58	1.00		0.68	
v/c Ratio			0.75					0.68	0.38		0.71	
Control Delay			41.4					10.2	0.6		2.5	
Queue Delay			0.8					0.1	0.0		0.0	
Total Delay			42.1					10.4	0.6		2.5	
LOS			D					B	A		A	
Approach Delay		42.1						7.5			2.5	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 119 (99%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 10.3	Intersection LOS: B
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

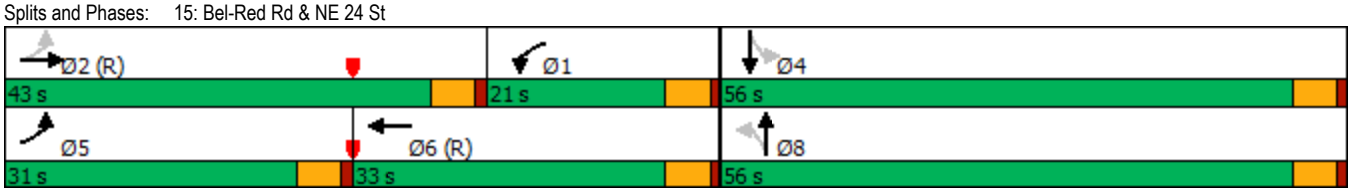
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	327	340	193	136	577	28	134	531	58	1	511	175
Future Volume (vph)	327	340	193	136	577	28	134	531	58	1	511	175
Satd. Flow (prot)	1752	3262	0	1770	3465	0	0	3487	0	0	3302	0
Flt Permitted	0.197			0.950				0.589			0.954	
Satd. Flow (perm)	360	3262	0	1745	3465	0	0	2070	0	0	3150	0
Satd. Flow (RTOR)		99			4			10			50	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	344	561	0	143	636	0	0	761	0	0	723	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	31.0	43.0		21.0	33.0		56.0	56.0		56.0	56.0	
Total Split (%)	25.8%	35.8%		17.5%	27.5%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	44.7	44.7		18.0	38.5			48.3			48.3	
Actuated g/C Ratio	0.37	0.37		0.15	0.32			0.40			0.40	
v/c Ratio	0.83	0.44		0.54	0.57			0.91			0.56	
Control Delay	49.9	26.3		55.5	38.2			48.6			14.7	
Queue Delay	0.0	0.0		0.0	0.4			0.0			0.0	
Total Delay	49.9	26.3		55.5	38.6			48.6			14.7	
LOS	D	C		E	D			D			B	
Approach Delay		35.3			41.7			48.6			14.7	
Approach LOS		D			D			D			B	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 77 (64%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 35.3 — Intersection LOS: D
Intersection Capacity Utilization 92.3% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 15: Bel-Red Rd & NE 24 St



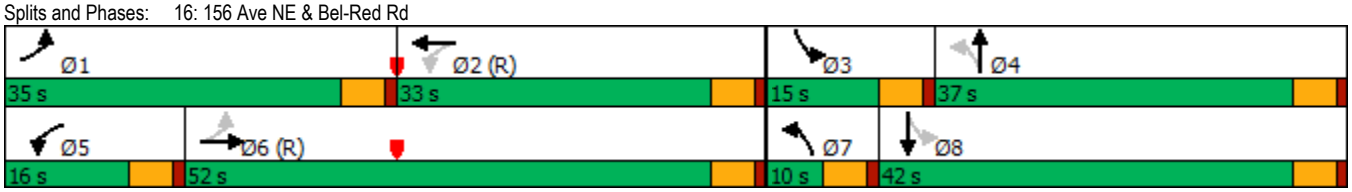
Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	545	296	16	200	499	150	6	854	131	58	246	173
Future Volume (vph)	545	296	16	200	499	150	6	854	131	58	246	173
Satd. Flow (prot)	1728	3420	0	1728	3301	0	1770	3334	0	1671	2976	0
Flt Permitted	0.138			0.553			0.468			0.090		
Satd. Flow (perm)	249	3420	0	987	3301	0	859	3334	0	158	2976	0
Satd. Flow (RTOR)		6			31			14			159	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	574	329	0	211	683	0	6	1037	0	61	441	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0		7.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		10.0	32.0		15.0	31.0	
Total Split (s)	35.0	52.0		16.0	33.0		10.0	37.0		15.0	42.0	
Total Split (%)	29.2%	43.3%		13.3%	27.5%		8.3%	30.8%		12.5%	35.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	65.0	49.7		42.3	30.0		44.2	38.6		49.0	47.0	
Actuated g/C Ratio	0.54	0.41		0.35	0.25		0.37	0.32		0.41	0.39	
v/c Ratio	1.09	0.23		0.50	0.81		0.02	0.96		0.32	0.35	
Control Delay	82.8	27.7		21.5	48.7		21.5	59.5		21.7	16.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	42.5		0.0	0.0	
Total Delay	82.8	27.7		21.5	48.7		21.5	102.0		21.7	16.5	
LOS	F	C		C	D		C	F		C	B	
Approach Delay		62.7			42.3			101.6			17.2	
Approach LOS		E			D			F			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 81 (68%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 62.5	Intersection LOS: E
Intersection Capacity Utilization 99.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

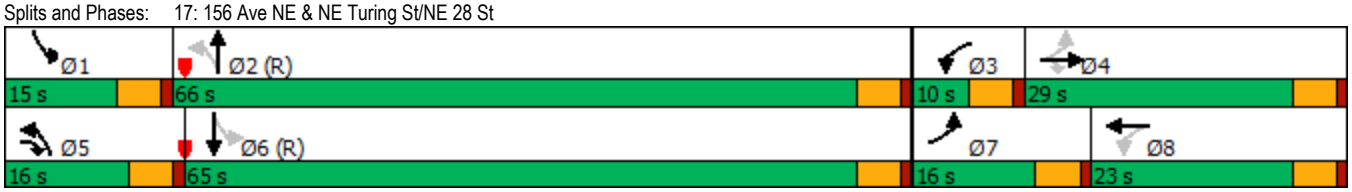
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	51	64	35	6	25	222	967	360	25	378	63
Future Volume (vph)	193	51	64	35	6	25	222	967	360	25	378	63
Satd. Flow (prot)	1770	1863	1583	1656	1459	0	1787	3305	0	1656	3163	0
Flt Permitted	0.594			0.723			0.443			0.145		
Satd. Flow (perm)	1068	1863	1497	1213	1459	0	809	3305	0	253	3163	0
Satd. Flow (RTOR)			65		26			67			23	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	1%	1%	1%	9%	9%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	197	52	65	36	32	0	227	1354	0	26	450	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	23.0	15.0	10.0	23.0		15.0	23.0		15.0	23.0	
Total Split (s)	16.0	29.0	16.0	10.0	23.0		16.0	66.0		15.0	65.0	
Total Split (%)	13.3%	24.2%	13.3%	8.3%	19.2%		13.3%	55.0%		12.5%	54.2%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	26.5	20.5	30.0	18.1	12.6		87.5	80.6		81.2	73.0	
Actuated g/C Ratio	0.22	0.17	0.25	0.15	0.10		0.73	0.67		0.68	0.61	
v/c Ratio	0.63	0.16	0.15	0.17	0.18		0.33	0.60		0.10	0.23	
Control Delay	48.8	41.8	7.4	35.3	21.5		2.8	9.7		6.1	5.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	48.8	41.8	7.4	35.3	21.5		2.8	9.7		6.1	5.2	
LOS	D	D	A	D	C		A	A		A	A	
Approach Delay		39.0			28.8			8.7			5.2	
Approach LOS		D			C			A			A	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 51 (43%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 12.5 — Intersection LOS: B
Intersection Capacity Utilization 70.3% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	845	23	0	1135	0	25
Future Volume (vph)	845	23	0	1135	0	25
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	889	24	0	1195	0	26
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	845	23	0	1135	0	25
Future Vol, veh/h	845	23	0	1135	0	25
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	889	24	0	1195	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	485
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	*755
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*730
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	730	-	-	-
HCM Lane V/C Ratio	0.036	-	-	-
HCM Control Delay (s)	10.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	20	1475	31	0	1528
Future Volume (vph)	0	20	1475	31	0	1528
Satd. Flow (prot)	0	1611	5070	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1611	5070	0	0	3539
Confl. Peds. (#/hr)		20		20		
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	21	1586	0	0	1608
Sign Control	Stop		Free			Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	20	1475	31	0	1528
Future Vol, veh/h	0	20	1475	31	0	1528
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	1553	33	0	1608

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	833	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	*588	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*569	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	569	-
HCM Lane V/C Ratio	-	-	0.037	-
HCM Control Delay (s)	-	-	11.6	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.1	-

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

Lanes, Volumes, Timings
20: Lumiere Ave NE & Driveway

10/26/2017

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	80	23	67	70	23	71
Future Volume (vph)	80	23	67	70	23	71
Satd. Flow (prot)	1740	0	0	1818	1673	0
Flt Permitted	0.963			0.976		
Satd. Flow (perm)	1740	0	0	1818	1673	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	108	0	0	145	99	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 30.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	80	23	67	70	23	71
Future Vol, veh/h	80	23	67	70	23	71
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	84	24	71	74	24	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	318	102	119	0	-	0
Stage 1	82	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	675	953	1469	-	-	-
Stage 1	941	-	-	-	-	-
Stage 2	803	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	619	921	1445	-	-	-
Mov Cap-2 Maneuver	619	-	-	-	-	-
Stage 1	878	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	3.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1445	-	668	-	-
HCM Lane V/C Ratio	0.049	-	0.162	-	-
HCM Control Delay (s)	7.6	0	11.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	184	113	13	0	8
Future Volume (vph)	25	184	113	13	0	8
Satd. Flow (prot)	1631	0	0	1783	1611	0
Flt Permitted	0.994			0.957		
Satd. Flow (perm)	1631	0	0	1783	1611	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	0	0	133	8	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	184	113	13	0	8
Future Vol, veh/h	25	184	113	13	0	8
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	194	119	14	0	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	296	44	28	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	695	1026	1585	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	620	992	1559	-	-	-
Mov Cap-2 Maneuver	620	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	761	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	6.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	926	-	-
HCM Lane V/C Ratio	0.076	-	0.238	-	-
HCM Control Delay (s)	7.5	0	10.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

Lanes, Volumes, Timings
22: NE Alhazen St & Driveway

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	114	125	0	106	47	63	0	26	25	0	71
Future Volume (vph)	188	114	125	0	106	47	63	0	26	25	0	71
Satd. Flow (prot)	1770	1716	0	1863	1777	0	0	1729	0	0	1655	0
Flt Permitted	0.950							0.966			0.987	
Satd. Flow (perm)	1770	1716	0	1863	1777	0	0	1729	0	0	1655	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	198	252	0	0	161	0	0	93	0	0	101	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 44.3%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	188	114	125	0	106	47	63	0	26	25	0	71
Future Vol, veh/h	188	114	125	0	106	47	63	0	26	25	0	71
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	198	120	132	0	112	49	66	0	27	26	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	181	0	0	272	0	0	796	783	226	773	825	177
Stage 1	-	-	-	-	-	-	602	602	-	157	157	-
Stage 2	-	-	-	-	-	-	194	181	-	616	668	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1394	-	-	1301	-	-	309	326	866	321	306	866
Stage 1	-	-	-	-	-	-	494	488	-	845	768	-
Stage 2	-	-	-	-	-	-	808	750	-	485	453	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1371	-	-	1279	-	-	242	269	838	267	253	837
Mov Cap-2 Maneuver	-	-	-	-	-	-	319	330	-	334	324	-
Stage 1	-	-	-	-	-	-	415	410	-	711	755	-
Stage 2	-	-	-	-	-	-	724	737	-	395	381	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	17.2	12.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	389	1371	-	-	1279	-	-	601
HCM Lane V/C Ratio	0.241	0.144	-	-	-	-	-	0.168
HCM Control Delay (s)	17.2	8.1	-	-	0	-	-	12.2
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.9	0.5	-	-	0	-	-	0.6

Lanes, Volumes, Timings
23: Driveway & Lumiere Ave NE

10/26/2017

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	26	72	212	71	37	42
Future Volume (vph)	26	72	212	71	37	42
Satd. Flow (prot)	1655	0	0	1796	1729	0
Flt Permitted	0.987			0.964		
Satd. Flow (perm)	1655	0	0	1796	1729	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	0	0	298	83	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 39.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	72	212	71	37	42
Future Vol, veh/h	26	72	212	71	37	42
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	76	223	75	39	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	622	101	103	0	-	0
Stage 1	81	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	450	954	1489	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	366	922	1464	-	-	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	573	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	5.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1464	-	657	-	-
HCM Lane V/C Ratio	0.152	-	0.157	-	-
HCM Control Delay (s)	7.9	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.6	-	-

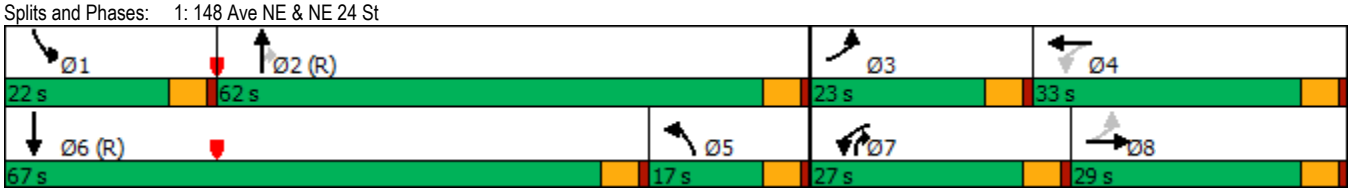
Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	484	94	333	473	687	156	1331	310	427	1296	133
Future Volume (vph)	222	484	94	333	473	687	156	1331	310	427	1296	133
Satd. Flow (prot)	1693	3277	0	1676	3353	1500	1660	3320	1485	3285	3283	0
Flt Permitted	0.299			0.138			0.950			0.950		
Satd. Flow (perm)	526	3277	0	244	3353	1472	1652	3320	1412	3255	3283	0
Satd. Flow (RTOR)		14				347			55		10	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	231	602	0	347	493	716	163	1386	323	445	1489	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	23.0	29.0		27.0	33.0		17.0	62.0	27.0	22.0	67.0	
Total Split (%)	16.4%	20.7%		19.3%	23.6%		12.1%	44.3%	19.3%	15.7%	47.9%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	44.3	26.0		53.0	31.7	140.0	14.0	59.0	83.0	19.0	64.0	
Actuated g/C Ratio	0.32	0.19		0.38	0.23	1.00	0.10	0.42	0.59	0.14	0.46	
v/c Ratio	0.73	0.97		1.03	0.65	0.49	0.98	0.99	0.37	1.00	0.99	
Control Delay	45.9	85.0		96.9	54.2	1.2	95.0	36.0	2.3	102.8	49.5	
Queue Delay	0.0	0.0		0.0	0.3	0.0	0.0	5.1	0.1	0.0	32.2	
Total Delay	45.9	85.0		96.9	54.5	1.2	95.0	41.1	2.4	102.8	81.7	
LOS	D	F		F	D	A	F	D	A	F	F	
Approach Delay		74.1			39.4			39.1			86.6	
Approach LOS		E			D			D			F	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 32 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 58.7	Intersection LOS: E
Intersection Capacity Utilization 103.3%	ICU Level of Service G
Analysis Period (min) 15	

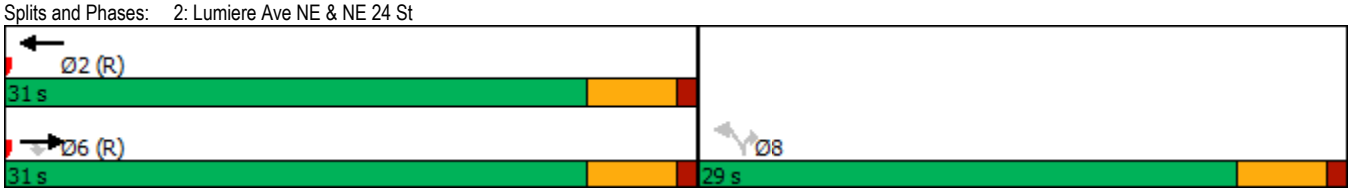
Splits and Phases: 1: 148 Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1147	74	0	1330	163	169
Future Volume (vph)	1147	74	0	1330	163	169
Satd. Flow (prot)	3539	1583	0	3539	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	1493	0	3539	1742	1536
Satd. Flow (RTOR)		78				22
Confl. Peds. (#/hr)		20			20	20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1207	78	0	1400	172	178
Turn Type	NA	Perm		NA	Perm	Perm
Protected Phases	6			2		
Permitted Phases		6			8	8
Detector Phase	6	6		2	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	27.0	27.0		27.0	29.0	29.0
Total Split (s)	31.0	31.0		31.0	29.0	29.0
Total Split (%)	51.7%	51.7%		51.7%	48.3%	48.3%
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0
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						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max		C-Max	None	None
Act Effct Green (s)	37.1	37.1		37.1	12.9	12.9
Actuated g/C Ratio	0.62	0.62		0.62	0.22	0.22
v/c Ratio	0.55	0.08		0.64	0.46	0.51
Control Delay	9.2	2.7		10.2	23.0	21.9
Queue Delay	0.2	0.0		0.0	0.0	0.0
Total Delay	9.5	2.7		10.2	23.0	21.9
LOS	A	A		B	C	C
Approach Delay	9.0			10.2	22.4	
Approach LOS	A			B	C	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 37 (62%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 11.1	Intersection LOS: B
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Lumiere Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1265	11	0	1330	0	52
Future Volume (vph)	1265	11	0	1330	0	52
Satd. Flow (prot)	3536	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3536	0	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1344	0	0	1400	0	55
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1265	11	0	1330	0	52
Future Vol, veh/h	1265	11	0	1330	0	52
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1332	12	0	1400	0	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	712
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	*547
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*529
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	529	-	-	-
HCM Lane V/C Ratio	0.103	-	-	-
HCM Control Delay (s)	12.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

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

Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

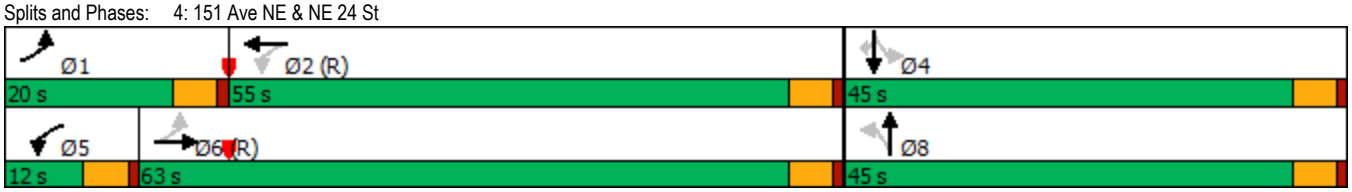
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	907	56	49	1033	156	113	28	36	270	45	183
Future Volume (vph)	231	907	56	49	1033	156	113	28	36	270	45	183
Satd. Flow (prot)	1693	3335	0	1693	3271	0	0	1678	0	0	1709	1515
Flt Permitted	0.093			0.235				0.433			0.646	
Satd. Flow (perm)	166	3335	0	414	3271	0	0	742	0	0	1128	1429
Satd. Flow (RTOR)		7			18			12				189
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	993	0	51	1226	0	0	182	0	0	324	189
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	8.0		3.0	8.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		26.0	26.0		26.0	26.0	26.0
Total Split (s)	20.0	63.0		12.0	55.0		45.0	45.0		45.0	45.0	45.0
Total Split (%)	16.7%	52.5%		10.0%	45.8%		37.5%	37.5%		37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.6	66.3		64.8	56.6			38.4			38.4	38.4
Actuated g/C Ratio	0.63	0.55		0.54	0.47			0.32			0.32	0.32
v/c Ratio	0.77	0.54		0.16	0.79			0.74			0.90	0.32
Control Delay	42.1	16.3		10.9	24.4			52.3			66.5	5.4
Queue Delay	0.0	0.1		0.0	0.2			0.0			0.0	0.0
Total Delay	42.1	16.4		10.9	24.6			52.3			66.5	5.4
LOS	D	B		B	C			D			E	A
Approach Delay		21.4			24.1			52.3			44.0	
Approach LOS		C			C			D			D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 22 (18%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 27.8 — Intersection LOS: C
Intersection Capacity Utilization 83.4% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 4: 151 Ave NE & NE 24 St



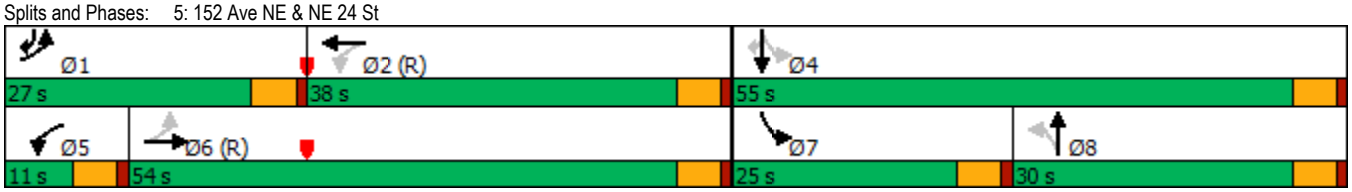
Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	769	127	74	711	47	104	142	154	313	371	408
Future Volume (vph)	305	769	127	74	711	47	104	142	154	313	371	408
Satd. Flow (prot)	1693	3232	0	1718	3394	0	1693	1594	0	1660	1748	1485
Flt Permitted	0.155			0.255			0.533			0.164		
Satd. Flow (perm)	276	3232	0	454	3394	0	926	1594	0	287	1748	1403
Satd. Flow (RTOR)		19			6			42				29
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	318	933	0	77	790	0	108	308	0	326	386	425
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	5.0	3.0		4.0	8.0		4.0	4.0		4.0	5.0	5.0
Minimum Split (s)	24.0	26.0		11.0	26.0		22.0	22.0		11.0	22.0	24.0
Total Split (s)	27.0	54.0		11.0	38.0		30.0	30.0		25.0	55.0	27.0
Total Split (%)	22.5%	45.0%		9.2%	31.7%		25.0%	25.0%		20.8%	45.8%	22.5%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	64.5	55.7		47.7	39.9		24.6	24.6		49.5	49.5	69.1
Actuated g/C Ratio	0.54	0.46		0.40	0.33		0.20	0.20		0.41	0.41	0.58
v/c Ratio	0.79	0.62		0.29	0.70		0.57	0.86		0.88	0.54	0.51
Control Delay	37.9	19.9		18.9	35.5		54.9	61.8		55.3	29.3	13.9
Queue Delay	0.0	0.3		0.0	0.1		0.0	0.0		0.0	0.0	0.1
Total Delay	37.9	20.2		18.9	35.6		54.9	61.8		55.3	29.3	14.0
LOS	D	C		B	D		D	E		E	C	B
Approach Delay		24.7			34.1			60.0			31.0	
Approach LOS		C			C			E			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 39 (33%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 32.9	Intersection LOS: C
Intersection Capacity Utilization 90.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: 152 Ave NE & NE 24 St



Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St/NE Alhazen St

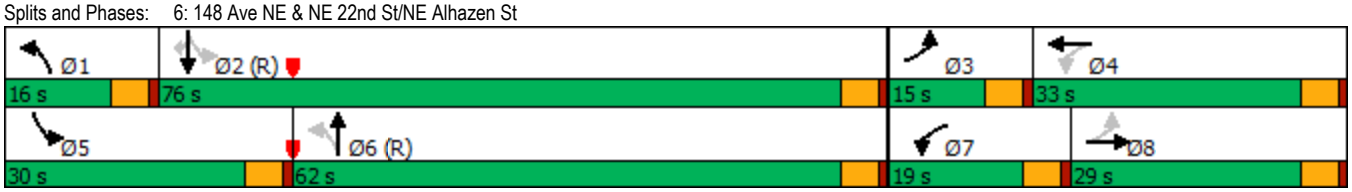
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	8	147	255	10	102	152	1582	173	319	1364	101
Future Volume (vph)	138	8	147	255	10	102	152	1582	173	319	1364	101
Satd. Flow (prot)	1710	1468	0	1710	1481	0	1660	4655	0	1693	3386	1515
Flt Permitted	0.659			0.313			0.125			0.056		
Satd. Flow (perm)	1151	1468	0	551	1481	0	218	4655	0	100	3386	1370
Satd. Flow (RTOR)		150			104			16				94
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	158	0	260	114	0	155	1791	0	326	1392	103
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		2
Detector Phase	3	8		7	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	29.0		15.0	29.0		12.0	24.0		12.0	24.0	24.0
Total Split (s)	15.0	29.0		19.0	33.0		16.0	62.0		30.0	76.0	76.0
Total Split (%)	10.7%	20.7%		13.6%	23.6%		11.4%	44.3%		21.4%	54.3%	54.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	31.0	19.2		38.2	23.4		79.6	67.8		95.8	81.1	81.1
Actuated g/C Ratio	0.22	0.14		0.27	0.17		0.57	0.48		0.68	0.58	0.58
v/c Ratio	0.47	0.48		0.92	0.34		0.63	0.79		0.93	0.71	0.12
Control Delay	44.5	13.5		80.6	12.8		19.7	19.8		69.8	8.3	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.5		0.0	0.8	0.0
Total Delay	44.5	13.5		80.6	12.8		19.7	20.3		69.8	9.1	1.0
LOS	D	B		F	B		B	C		E	A	A
Approach Delay		28.1			60.0			20.2			19.5	
Approach LOS		C			E			C			B	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 24 (17%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 23.8 — Intersection LOS: C
Intersection Capacity Utilization 99.2% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 6: 148 Ave NE & NE 22nd St/NE Alhazen St



Lanes, Volumes, Timings
7: Lumiere Ave NE & NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	175	36	10	110	49	38	46	0	0	21	22
Future Volume (vph)	61	175	36	10	110	49	38	46	0	0	21	22
Satd. Flow (prot)	1770	1814	0	1770	1777	0	0	1822	0	0	1734	0
Flt Permitted	0.950			0.950				0.978				
Satd. Flow (perm)	1770	1814	0	1770	1777	0	0	1822	0	0	1734	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	222	0	11	168	0	0	88	0	0	45	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 38.1%	ICU Level of Service A	
Analysis Period (min) 15		

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	61	175	36	10	110	49	38	46	0	0	21	22
Future Vol, veh/h	61	175	36	10	110	49	38	46	0	0	21	22
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	184	38	11	116	52	40	48	0	0	22	23
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	9.6	9.1	9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	45%	100%	0%	100%	0%	0%
Vol Thru, %	55%	0%	83%	0%	69%	49%
Vol Right, %	0%	0%	17%	0%	31%	51%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	84	61	211	10	159	43
LT Vol	38	61	0	10	0	0
Through Vol	46	0	175	0	110	21
RT Vol	0	0	36	0	49	22
Lane Flow Rate	88	64	222	11	167	45
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.127	0.099	0.303	0.017	0.229	0.061
Departure Headway (Hd)	5.173	5.533	4.91	5.644	4.923	4.846
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	691	647	731	633	728	736
Service Time	3.217	3.27	2.647	3.384	2.663	2.896
HCM Lane V/C Ratio	0.127	0.099	0.304	0.017	0.229	0.061
HCM Control Delay	9	8.9	9.8	8.5	9.1	8.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0.3	1.3	0.1	0.9	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	175	0	0	131	46	169
Future Volume (vph)	175	0	0	131	46	169
Satd. Flow (prot)	1770	1863	0	1863	1665	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1863	0	1863	1665	0
Confl. Peds. (#/hr)	20		20			20
Confl. Bikes (#/hr)						5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	184	0	0	138	226	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 30.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	0	0	131	46	169
Future Vol, veh/h	175	0	0	131	46	169
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	184	0	0	138	48	178

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	315	157	246	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	678	889	1320	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	655	874	1298	-	-	-
Mov Cap-2 Maneuver	655	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1298	-	655	-	-	-
HCM Lane V/C Ratio	-	-	0.281	-	-	-
HCM Control Delay (s)	0	-	12.6	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-	-

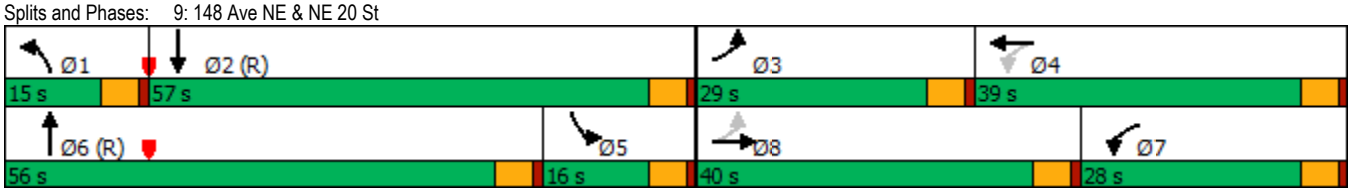
Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	414	650	188	349	655	317	142	1099	247	191	1429	229
Future Volume (vph)	414	650	188	349	655	317	142	1099	247	191	1429	229
Satd. Flow (prot)	1660	3171	0	1693	3167	0	1693	3224	0	1693	4691	0
Flt Permitted	0.364			0.364			0.950			0.950		
Satd. Flow (perm)	632	3171	0	642	3167	0	1687	3224	0	1684	4691	0
Satd. Flow (RTOR)		26			56			22			25	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	431	873	0	364	1012	0	148	1402	0	199	1728	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	15.0	29.0		15.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	29.0	40.0		28.0	39.0		15.0	56.0		16.0	57.0	
Total Split (%)	20.7%	28.6%		20.0%	27.9%		10.7%	40.0%		11.4%	40.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	37.0	37.0		36.0	36.0		12.0	53.0		13.0	54.0	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.09	0.38		0.09	0.39	
v/c Ratio	1.21	1.02		1.03	1.18		1.02	1.14		1.27	0.95	
Control Delay	158.6	84.4		103.3	132.9		132.3	96.3		194.4	39.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2		0.0	44.1	
Total Delay	158.6	84.4		103.3	132.9		132.3	96.5		194.4	83.1	
LOS	F	F		F	F		F	F		F	F	
Approach Delay		108.9			125.1			99.9			94.6	
Approach LOS		F			F			F			F	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 35 (25%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 105.8	Intersection LOS: F
Intersection Capacity Utilization 119.9%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	1013	1212	89	42	109
Future Volume (vph)	75	1013	1212	89	42	109
Satd. Flow (prot)	1787	3574	3539	0	1690	0
Flt Permitted	0.950				0.986	
Satd. Flow (perm)	1787	3574	3539	0	1690	0
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	79	1066	1370	0	159	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	1013	1212	89	42	109
Future Vol, veh/h	75	1013	1212	89	42	109
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	79	1066	1276	94	44	115

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1390	0	-	0	2054	725
Stage 1	-	-	-	-	1343	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	493	-	-	-	49	372
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	453	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	~ 40	360
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	445	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	47.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	485	-	-	-	234
HCM Lane V/C Ratio	0.163	-	-	-	0.679
HCM Control Delay (s)	13.9	-	-	-	47.8
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0.6	-	-	-	4.3

Notes

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

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	59	996	1272	72	17	29
Future Volume (vph)	59	996	1272	72	17	29
Satd. Flow (prot)	1770	3539	3511	0	1672	0
Flt Permitted	0.950				0.982	
Satd. Flow (perm)	1770	3539	3511	0	1672	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	64	1083	1461	0	50	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	59	996	1272	72	17	29
Future Vol, veh/h	59	996	1272	72	17	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	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	64	1083	1383	78	18	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1461	0	-	0	2092	731
Stage 1	-	-	-	-	1422	-
Stage 2	-	-	-	-	670	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	458	-	-	-	45	364
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	470	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	458	-	-	-	39	364
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	27.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	458	-	-	-	208
HCM Lane V/C Ratio	0.14	-	-	-	0.24
HCM Control Delay (s)	14.1	-	-	-	27.7
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	265	907	897	78	0	513
Future Volume (vph)	265	907	897	78	0	513
Satd. Flow (prot)	1787	3574	3531	0	0	1627
Flt Permitted	0.950					
Satd. Flow (perm)	1787	3574	3531	0	0	1627
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	279	955	1026	0	0	540
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 67.8%	ICU Level of Service C
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	25.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	265	907	897	78	0	513
Future Vol, veh/h	265	907	897	78	0	513
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	279	955	944	82	0	540

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1046	0	-	0	-	553
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	667	-	-	-	0	~ 479
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	656	-	-	-	-	~ 463
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	124.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	656	-	-	-	463
HCM Lane V/C Ratio	0.425	-	-	-	1.166
HCM Control Delay (s)	14.5	-	-	-	124.2
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	2.1	-	-	-	19.8

Notes

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

Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

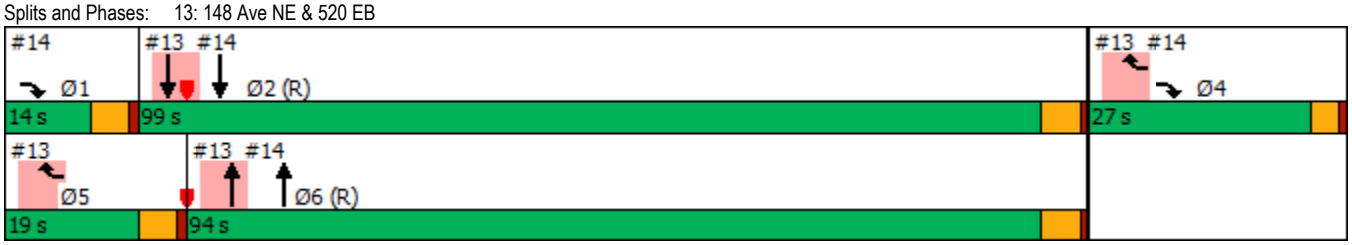
10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	213	1261	0	0	1669			
Future Volume (vph)	0	213	1261	0	0	1669			
Satd. Flow (prot)	0	1497	3320	0	0	3386			
Flt Permitted									
Satd. Flow (perm)	0	1497	3320	0	0	3386			
Satd. Flow (RTOR)		74							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99			
Growth Factor	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	4%	4%	3%	3%	1%	1%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	215	1274	0	0	1686			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			94.0			99.0	14.0	27.0	19.0
Total Split (%)			67.1%			70.7%	10%	19%	14%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		26.2	107.8			105.9			
Actuated g/C Ratio		0.19	0.77			0.76			
v/c Ratio		0.63	0.50			0.66			
Control Delay		40.9	1.2			7.6			
Queue Delay		0.0	0.0			0.0			
Total Delay		40.9	1.2			7.6			
LOS		D	A			A			
Approach Delay	40.9		1.2			7.6			
Approach LOS	D		A			A			

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 29 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 7.3 — Intersection LOS: A
Intersection Capacity Utilization 70.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 13: 148 Ave NE & 520 EB



Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

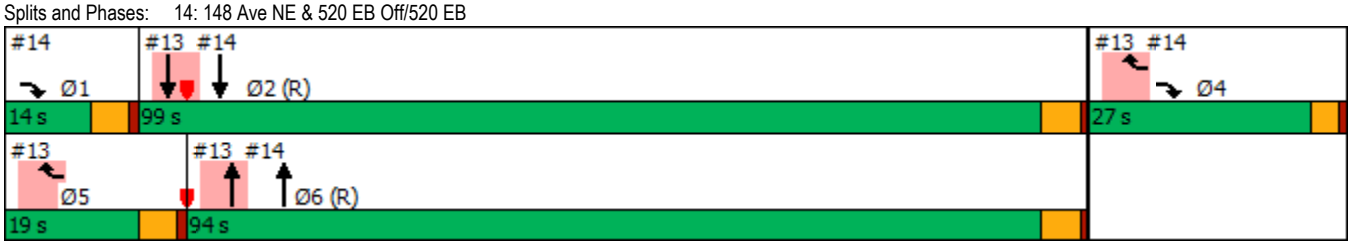
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	354	0	0	0	0	1261	1045	0	1669	0
Future Volume (vph)	0	0	354	0	0	0	0	1261	1045	0	1669	0
Satd. Flow (prot)	0	0	2640	0	0	0	0	3320	1485	0	3386	0
Flt Permitted												
Satd. Flow (perm)	0	0	2640	0	0	0	0	3320	1438	0	3386	0
Satd. Flow (RTOR)			64						445			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	358	0	0	0	0	1274	1056	0	1686	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								94.0			99.0	
Total Split (%)								67.1%			70.7%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			28.1					107.8	140.0		105.9	
Actuated g/C Ratio			0.20					0.77	1.00		0.76	
v/c Ratio			0.62					0.50	0.73		0.66	
Control Delay			45.3					2.5	10.6		2.4	
Queue Delay			1.4					0.2	0.0		0.3	
Total Delay			46.7					2.7	10.6		2.7	
LOS			D					A	B		A	
Approach Delay		46.7						6.3			2.7	
Approach LOS		D						A			A	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 29 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 8.2 — Intersection LOS: A
Intersection Capacity Utilization 70.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



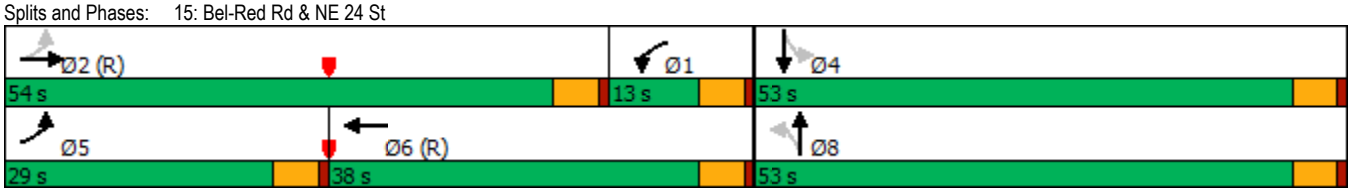
Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	927	234	90	506	9	1	466	207	2	724	338
Future Volume (vph)	287	927	234	90	506	9	1	466	207	2	724	338
Satd. Flow (prot)	1676	3224	0	1660	3268	0	0	3187	0	0	3179	0
Flt Permitted	0.257			0.950				0.954			0.954	
Satd. Flow (perm)	449	3224	0	1651	3268	0	0	3040	0	0	3032	0
Satd. Flow (RTOR)		32			1			72			78	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	1197	0	93	531	0	0	694	0	0	1096	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	29.0	54.0		13.0	38.0		53.0	53.0		53.0	53.0	
Total Split (%)	24.2%	45.0%		10.8%	31.7%		44.2%	44.2%		44.2%	44.2%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	54.1	54.1		10.0	42.8			46.9			46.9	
Actuated g/C Ratio	0.45	0.45		0.08	0.36			0.39			0.39	
v/c Ratio	0.70	0.81		0.67	0.46			0.56			0.89	
Control Delay	31.5	34.5		77.5	37.3			27.0			32.1	
Queue Delay	0.0	0.2		0.0	0.0			0.0			0.9	
Total Delay	31.5	34.7		77.5	37.3			27.0			33.0	
LOS	C	C		E	D			C			C	
Approach Delay		34.1			43.3			27.0			33.0	
Approach LOS		C			D			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 34.0	Intersection LOS: C
Intersection Capacity Utilization 86.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 15: Bel-Red Rd & NE 24 St



Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

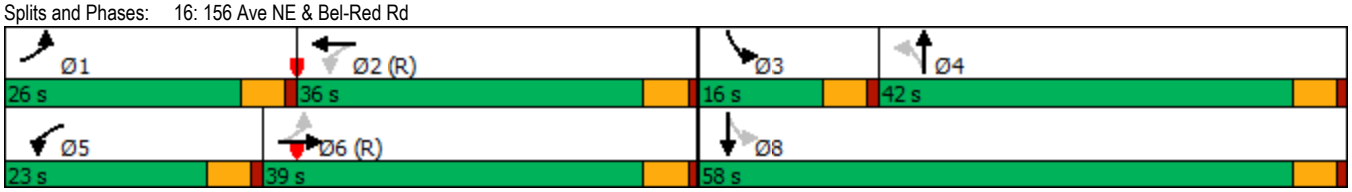
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	306	456	33	254	576	76	4	311	282	152	847	448
Future Volume (vph)	306	456	33	254	576	76	4	311	282	152	847	448
Satd. Flow (prot)	1637	3231	0	1637	3202	0	1676	2952	0	1693	3057	0
Flt Permitted	0.181			0.370			0.103			0.239		
Satd. Flow (perm)	310	3231	0	630	3202	0	181	2952	0	423	3057	0
Satd. Flow (RTOR)		6			12			204			106	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	319	509	0	265	679	0	4	618	0	158	1349	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		4	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		5.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		32.0	32.0		15.0	31.0	
Total Split (s)	26.0	39.0		23.0	36.0		42.0	42.0		16.0	58.0	
Total Split (%)	21.7%	32.5%		19.2%	30.0%		35.0%	35.0%		13.3%	48.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	59.8	39.5		53.0	35.7		38.8	38.8		54.2	54.2	
Actuated g/C Ratio	0.50	0.33		0.44	0.30		0.32	0.32		0.45	0.45	
v/c Ratio	0.82	0.48		0.63	0.71		0.07	0.57		0.49	0.94	
Control Delay	37.7	37.1		25.8	42.4		16.5	7.1		19.1	31.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.1		0.0	46.0	
Total Delay	37.7	37.1		25.8	42.4		16.5	7.2		19.1	77.6	
LOS	D	D		C	D		B	A		B	E	
Approach Delay		37.3			37.7			7.3			71.4	
Approach LOS		D			D			A			E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 111 (93%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 45.8 — Intersection LOS: D
Intersection Capacity Utilization 100.1% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



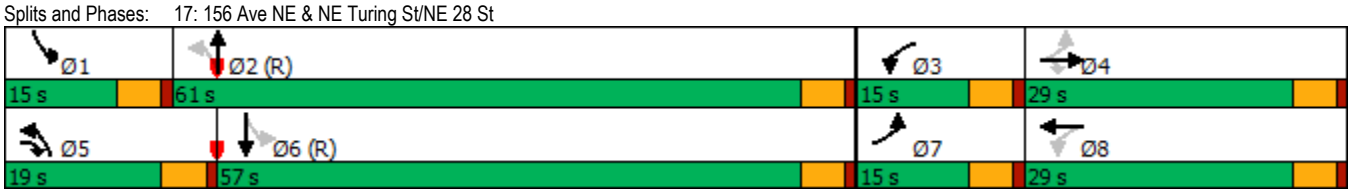
Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	21	209	135	27	155	147	511	35	15	939	41
Future Volume (vph)	129	21	209	135	27	155	147	511	35	15	939	41
Satd. Flow (prot)	1710	1800	1530	1710	1506	0	1660	3231	0	1693	3314	0
Flt Permitted	0.387			0.602			0.185			0.436		
Satd. Flow (perm)	683	1800	1460	1051	1506	0	323	3231	0	760	3314	0
Satd. Flow (RTOR)			85		163			8			5	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	22	220	142	191	0	155	575	0	16	1031	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	28.0	15.0	15.0	28.0		15.0	26.0		15.0	26.0	
Total Split (s)	15.0	29.0	19.0	15.0	29.0		19.0	61.0		15.0	57.0	
Total Split (%)	12.5%	24.2%	15.8%	12.5%	24.2%		15.8%	50.8%		12.5%	47.5%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	23.8	15.1	23.2	28.0	15.0		84.2	79.6		76.3	68.4	
Actuated g/C Ratio	0.20	0.13	0.19	0.23	0.12		0.70	0.66		0.64	0.57	
v/c Ratio	0.57	0.10	0.62	0.43	0.58		0.42	0.27		0.03	0.55	
Control Delay	47.0	42.8	30.5	39.2	17.0		13.6	16.0		3.4	12.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.1	
Total Delay	47.0	42.8	30.5	39.2	17.0		13.6	16.0		3.4	12.3	
LOS	D	D	C	D	B		B	B		A	B	
Approach Delay		37.1			26.5			15.5			12.2	
Approach LOS		D			C			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 74.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1243	73	0	1330	0	33
Future Volume (vph)	1243	73	0	1330	0	33
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1308	77	0	1400	0	35
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1243	73	0	1330	0	33
Future Vol, veh/h	1243	73	0	1330	0	33
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1308	77	0	1400	0	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	694
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	*599
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*579
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	579	-	-	-
HCM Lane V/C Ratio	0.06	-	-	-
HCM Control Delay (s)	11.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	72	1725	31	0	1723
Future Volume (vph)	0	72	1725	31	0	1723
Satd. Flow (prot)	0	1611	5070	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1611	5070	0	0	3539
Confl. Peds. (#/hr)		20		20		
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	76	1849	0	0	1814
Sign Control	Stop		Free			Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	72	1725	31	0	1723
Future Vol, veh/h	0	72	1725	31	0	1723
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	76	1816	33	0	1814

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	965	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	*524	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*507	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	507	-
HCM Lane V/C Ratio	-	-	0.149	-
HCM Control Delay (s)	-	-	13.3	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.5	-

Notes

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

Lanes, Volumes, Timings
20: Lumiere Ave NE & North Driveway

10/26/2017

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	214	34	38	118	9	65
Future Volume (vph)	214	34	38	118	9	65
Satd. Flow (prot)	1752	0	0	1840	1641	0
Flt Permitted	0.959			0.988		
Satd. Flow (perm)	1752	0	0	1840	1641	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	0	0	164	77	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 35.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	214	34	38	118	9	65
Future Vol, veh/h	214	34	38	118	9	65
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	225	36	40	124	9	68

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	287	83	97	0	-	0
Stage 1	63	-	-	-	-	-
Stage 2	224	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	703	976	1496	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	813	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	659	944	1471	-	-	-
Mov Cap-2 Maneuver	659	-	-	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.4	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1471	-	687	-	-
HCM Lane V/C Ratio	0.027	-	0.38	-	-
HCM Control Delay (s)	7.5	0	13.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	32	214	286	20	0	11
Future Volume (vph)	32	214	286	20	0	11
Satd. Flow (prot)	1633	0	0	1779	1611	0
Flt Permitted	0.993			0.955		
Satd. Flow (perm)	1633	0	0	1779	1611	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	259	0	0	322	12	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	214	286	20	0	11
Future Vol, veh/h	32	214	286	20	0	11
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	225	301	21	0	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	669	46	32	0	-	0
Stage 1	26	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	423	1023	1580	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	523	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	329	989	1554	-	-	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	7.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1554	-	784	-	-
HCM Lane V/C Ratio	0.194	-	0.33	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.7	-	1.4	-	-

Lanes, Volumes, Timings
22: NE Alhazen St & Driveway

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	214	190	96	0	145	25	79	0	40	42	0	143
Future Volume (vph)	214	190	96	0	145	25	79	0	40	42	0	143
Satd. Flow (prot)	1770	1770	0	1863	1822	0	0	1722	0	0	1649	0
Flt Permitted	0.950							0.968			0.989	
Satd. Flow (perm)	1770	1770	0	1863	1822	0	0	1722	0	0	1649	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	301	0	0	179	0	0	125	0	0	195	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 50.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	214	190	96	0	145	25	79	0	40	42	0	143
Future Vol, veh/h	214	190	96	0	145	25	79	0	40	42	0	143
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	225	200	101	0	153	26	83	0	42	44	0	151

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	199	0	0	321	0	0	983	920	291	928	957	206
Stage 1	-	-	-	-	-	-	721	721	-	186	186	-
Stage 2	-	-	-	-	-	-	262	199	-	742	771	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1373	-	-	1252	-	-	223	265	826	247	249	835
Stage 1	-	-	-	-	-	-	423	424	-	816	746	-
Stage 2	-	-	-	-	-	-	743	736	-	410	399	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1350	-	-	1231	-	-	153	213	798	197	201	807
Mov Cap-2 Maneuver	-	-	-	-	-	-	233	278	-	268	277	-
Stage 1	-	-	-	-	-	-	346	347	-	668	733	-
Stage 2	-	-	-	-	-	-	594	723	-	318	327	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.5	0	24.7	15
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	306	1350	-	-	1231	-	-	554
HCM Lane V/C Ratio	0.409	0.167	-	-	-	-	-	0.352
HCM Control Delay (s)	24.7	8.2	-	-	0	-	-	15
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.9	0.6	-	-	0	-	-	1.6

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	106	123	41	45	22
Future Volume (vph)	43	106	123	41	45	22
Satd. Flow (prot)	1660	0	0	1796	1781	0
Flt Permitted	0.986			0.964		
Satd. Flow (perm)	1660	0	0	1796	1781	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	157	0	0	172	70	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	43	106	123	41	45	22
Future Vol, veh/h	43	106	123	41	45	22
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	112	129	43	47	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	400	99	90	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	321	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	606	957	1505	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	533	925	1480	-	-	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	5.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	763	-	-
HCM Lane V/C Ratio	0.087	-	0.206	-	-
HCM Control Delay (s)	7.7	0	10.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.8	-	-

2023 With-Project – Phase 1

Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

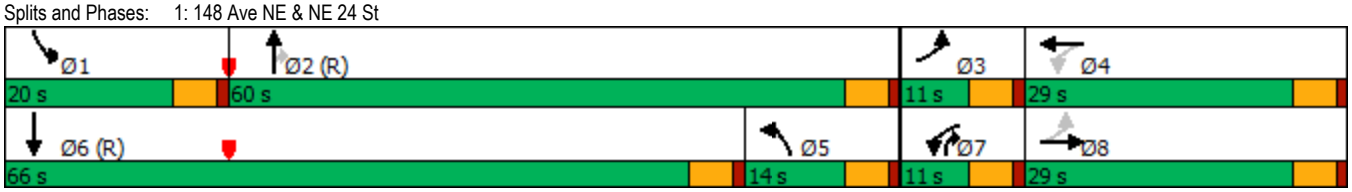
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	316	70	207	332	556	150	1186	168	318	1133	435
Future Volume (vph)	189	316	70	207	332	556	150	1186	168	318	1133	435
Satd. Flow (prot)	1787	3448	0	1770	3539	1583	1770	3539	1583	3400	3275	0
Flt Permitted	0.329			0.260			0.950			0.950		
Satd. Flow (perm)	609	3448	0	478	3539	1553	1764	3539	1513	3368	3275	0
Satd. Flow (RTOR)		20				339			78		70	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	407	0	218	349	585	158	1248	177	335	1651	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	11.0	29.0		11.0	29.0		14.0	60.0	11.0	20.0	66.0	
Total Split (%)	9.2%	24.2%		9.2%	24.2%		11.7%	50.0%	9.2%	16.7%	55.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	29.0	21.0		29.0	21.0	120.0	11.0	62.7	70.7	16.4	68.0	
Actuated g/C Ratio	0.24	0.18		0.24	0.18	1.00	0.09	0.52	0.59	0.14	0.57	
v/c Ratio	0.88	0.66		1.08	0.57	0.38	0.98	0.68	0.19	0.72	0.87	
Control Delay	74.9	48.6		127.2	50.7	0.9	102.0	8.9	0.8	67.1	22.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	
Total Delay	74.9	48.6		127.2	50.7	0.9	102.0	8.9	0.8	67.1	24.3	
LOS	E	D		F	D	A	F	A	A	E	C	
Approach Delay		57.3			39.9			17.3			31.5	
Approach LOS		E			D			B			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 32.0 — Intersection LOS: C
Intersection Capacity Utilization 94.4% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: 148 Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	797	0	0	1095	0	13
Future Volume (vph)	797	0	0	1095	0	13
Satd. Flow (prot)	3539	1863	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1863	0	3539	0	1611
Confl. Peds. (#/hr)		20			20	20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	839	0	0	1153	0	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	797	0	0	1095	0	13
Future Vol, veh/h	797	0	0	1095	0	13
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	839	0	0	1153	0	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	460
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-
HCM Control Delay (s)	10	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	802	8	0	1095	0	38
Future Volume (vph)	802	8	0	1095	0	38
Satd. Flow (prot)	3536	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3536	0	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	852	0	0	1153	0	40
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	802	8	0	1095	0	38
Future Vol, veh/h	802	8	0	1095	0	38
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	844	8	0	1153	0	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	466
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.054	-	-	-
HCM Control Delay (s)	10.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

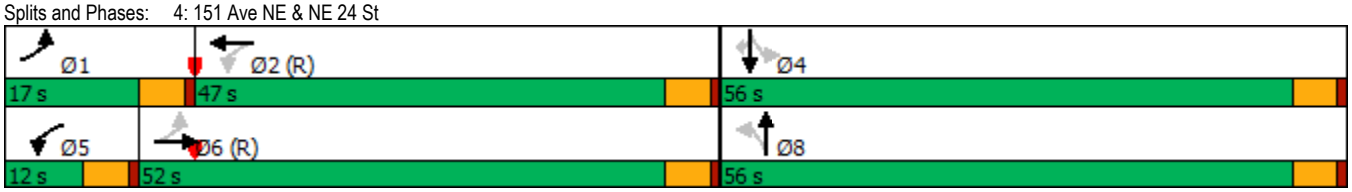
Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	704	28	22	644	97	19	6	18	278	25	143
Future Volume (vph)	127	704	28	22	644	97	19	6	18	278	25	143
Satd. Flow (prot)	1787	3542	0	1752	3397	0	0	1505	0	0	1730	1538
Flt Permitted	0.260			0.318				0.829			0.731	
Satd. Flow (perm)	489	3542	0	578	3397	0	0	1266	0	0	1282	1462
Satd. Flow (RTOR)		4			16			19				151
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	14%	14%	14%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	770	0	23	780	0	0	45	0	0	319	151
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		5.0	5.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		25.0	25.0		25.0	25.0	25.0
Total Split (s)	17.0	52.0		12.0	47.0		56.0	56.0		56.0	56.0	56.0
Total Split (%)	14.2%	43.3%		10.0%	39.2%		46.7%	46.7%		46.7%	46.7%	46.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.5	68.5		69.2	61.0			38.5			38.5	38.5
Actuated g/C Ratio	0.63	0.57		0.58	0.51			0.32			0.32	0.32
v/c Ratio	0.31	0.38		0.06	0.45			0.11			0.78	0.26
Control Delay	6.6	9.9		9.0	15.2			16.6			49.1	4.7
Queue Delay	0.0	0.0		0.0	0.2			0.0			0.0	0.0
Total Delay	6.6	9.9		9.0	15.4			16.6			49.1	4.7
LOS	A	A		A	B			B			D	A
Approach Delay		9.4			15.2			16.6			34.8	
Approach LOS		A			B			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 113 (94%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 17.0	Intersection LOS: B
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: 151 Ave NE & NE 24 St



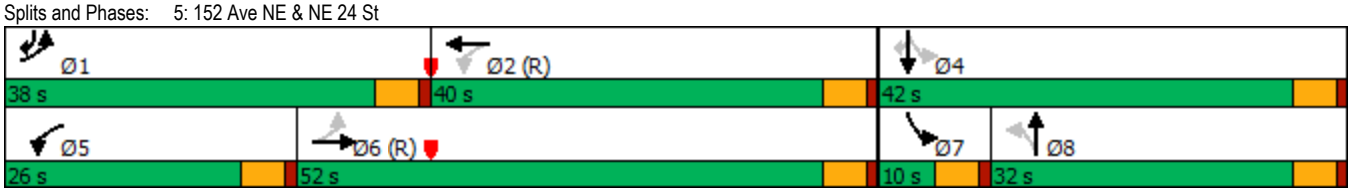
Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	348	533	122	25	502	93	137	127	35	32	133	177
Future Volume (vph)	348	533	122	25	502	93	137	127	35	32	133	177
Satd. Flow (prot)	1770	3331	0	1779	3440	0	1752	1763	0	1612	1696	1442
Flt Permitted	0.327			0.390			0.668			0.365		
Satd. Flow (perm)	609	3331	0	709	3440	0	1189	1763	0	604	1696	1362
Satd. Flow (RTOR)		28			18			11				93
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	12%	12%	12%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	366	689	0	26	626	0	144	171	0	34	140	186
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	3.0	3.0		8.0	8.0		4.0	4.0		5.0	5.0	3.0
Minimum Split (s)	26.0	26.0		26.0	26.0		25.0	25.0		10.0	25.0	26.0
Total Split (s)	38.0	52.0		26.0	40.0		32.0	32.0		10.0	42.0	38.0
Total Split (%)	31.7%	43.3%		21.7%	33.3%		26.7%	26.7%		8.3%	35.0%	31.7%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	87.2	79.1		72.6	62.3		20.8	20.8		26.8	26.8	46.7
Actuated g/C Ratio	0.73	0.66		0.60	0.52		0.17	0.17		0.22	0.22	0.39
v/c Ratio	0.56	0.31		0.05	0.35		0.70	0.54		0.18	0.37	0.31
Control Delay	18.0	7.4		8.2	11.9		63.4	47.5		33.9	39.6	9.4
Queue Delay	0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	18.0	7.5		8.2	11.9		63.4	47.5		33.9	39.6	9.4
LOS	B	A		A	B		E	D		C	D	A
Approach Delay		11.1			11.7			54.8			23.5	
Approach LOS		B			B			D			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 3 (3%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 18.9	Intersection LOS: B
Intersection Capacity Utilization 67.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: 152 Ave NE & NE 24 St



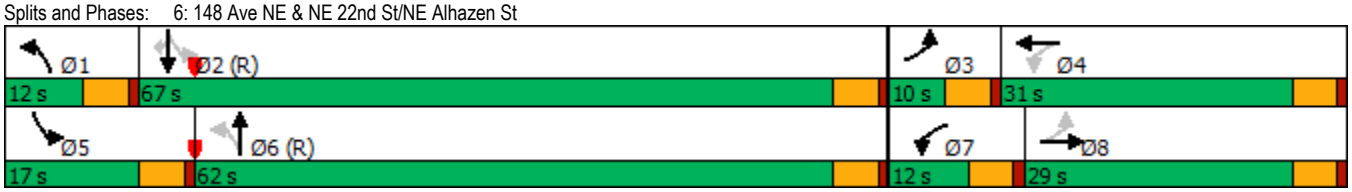
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	6	53	154	6	68	113	1239	42	171	1243	53
Future Volume (vph)	70	6	53	154	6	68	113	1239	42	171	1243	53
Satd. Flow (prot)	1736	1514	0	1736	1508	0	1752	4997	0	1736	3471	1553
Flt Permitted	0.708			0.594			0.144			0.148		
Satd. Flow (perm)	1259	1514	0	1057	1508	0	266	4997	0	270	3471	1421
Satd. Flow (RTOR)		55			70			6				109
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	61	0	159	76	0	116	1320	0	176	1281	55
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		2
Detector Phase	3	8		7	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	29.0		10.0	29.0		12.0	24.0		12.0	24.0	24.0
Total Split (s)	10.0	29.0		12.0	31.0		12.0	62.0		17.0	67.0	67.0
Total Split (%)	8.3%	24.2%		10.0%	25.8%		10.0%	51.7%		14.2%	55.8%	55.8%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.4	19.2		28.0	20.8		80.0	71.0		83.9	73.2	73.2
Actuated g/C Ratio	0.20	0.16		0.23	0.17		0.67	0.59		0.70	0.61	0.61
v/c Ratio	0.25	0.21		0.54	0.24		0.40	0.45		0.54	0.61	0.06
Control Delay	34.5	13.5		42.6	11.8		7.2	5.2		14.7	8.2	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.1	0.0
Total Delay	34.5	13.5		42.6	11.8		7.2	5.2		14.7	8.3	0.1
LOS	C	B		D	B		A	A		B	A	A
Approach Delay		24.9			32.7			5.3			8.7	
Approach LOS		C			C			A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 104 (87%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 9.6	Intersection LOS: A
Intersection Capacity Utilization 68.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St/NE Alhazen St



Lanes, Volumes, Timings
7: Lumiere Ave NE & NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	97	0	45	147	0	0	0	42	0	0	0
Future Volume (vph)	13	97	0	45	147	0	0	0	42	0	0	0
Satd. Flow (prot)	1770	1863	0	1770	1863	0	0	1611	0	0	1863	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	1863	0	1770	1863	0	0	1611	0	0	1863	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	102	0	47	155	0	0	44	0	0	0	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 27.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	97	0	45	147	0	0	0	42	0	0	0
Future Vol, veh/h	13	97	0	45	147	0	0	0	42	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	102	0	47	155	0	0	0	44	0	0	0
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8.2	8.5	7.3	0
HCM LOS	A	A	A	-

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	0%	100%	0%	100%	100%
Vol Right, %	100%	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	42	13	97	45	147	0
LT Vol	0	13	0	45	0	0
Through Vol	0	0	97	0	147	0
RT Vol	42	0	0	0	0	0
Lane Flow Rate	44	14	102	47	155	0
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.05	0.02	0.134	0.068	0.201	0
Departure Headway (Hd)	4.083	5.216	4.715	5.17	4.669	4.737
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	882	680	753	690	764	0
Service Time	2.083	2.994	2.493	2.923	2.422	2.74
HCM Lane V/C Ratio	0.05	0.021	0.135	0.068	0.203	0
HCM Control Delay	7.3	8.1	8.2	8.3	8.6	7.7
HCM Lane LOS	A	A	A	A	A	N
HCM 95th-tile Q	0.2	0.1	0.5	0.2	0.7	0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	139	0	0	0	0	192
Future Volume (vph)	139	0	0	0	0	192
Satd. Flow (prot)	1770	0	0	0	0	1611
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	1611
Confl. Peds. (#/hr)	20		20			20
Confl. Bikes (#/hr)						5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	146	0	0	0	0	202
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 17.2%	ICU Level of Service A
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
8: Existing Driveway/DaVinci Ave NE & NE Alhazen St

10/26/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	139	0	0	0	0	192
Future Volume (Veh/h)	139	0	0	0	0	192
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	146	0	0	0	0	202
Pedestrians	20				20	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	2				2	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	40	20	222			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	40	20	222			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	100	100			
cM capacity (veh/h)	939	1040	1325			

Direction, Lane #	EB 1	SB 1
Volume Total	146	202
Volume Left	146	0
Volume Right	0	202
cSH	939	1700
Volume to Capacity	0.16	0.12
Queue Length 95th (ft)	14	0
Control Delay (s)	9.5	0.0
Lane LOS	A	
Approach Delay (s)	9.5	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

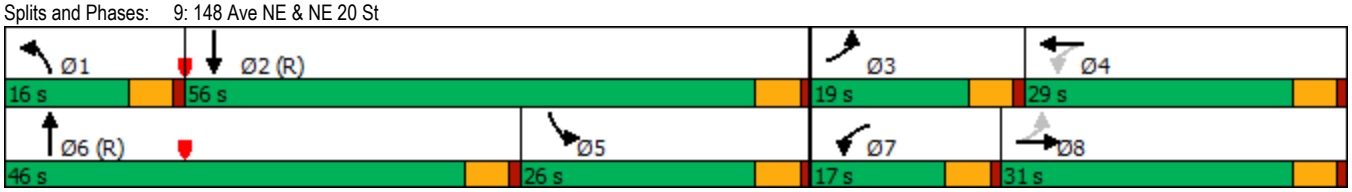
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	228	361	71	185	398	251	97	944	153	255	1073	187
Future Volume (vph)	228	361	71	185	398	251	97	944	153	255	1073	187
Satd. Flow (prot)	1703	3296	0	1752	3242	0	1770	3401	0	1736	4805	0
Flt Permitted	0.146			0.327			0.950			0.950		
Satd. Flow (perm)	260	3296	0	595	3242	0	1760	3401	0	1724	4805	0
Satd. Flow (RTOR)		18			107			17			37	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	235	445	0	191	669	0	100	1131	0	263	1299	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	12.0	29.0		12.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	19.0	31.0		17.0	29.0		16.0	46.0		26.0	56.0	
Total Split (%)	15.8%	25.8%		14.2%	24.2%		13.3%	38.3%		21.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	43.0	27.4		38.3	25.0		11.7	44.3		23.0	55.6	
Actuated g/C Ratio	0.36	0.23		0.32	0.21		0.10	0.37		0.19	0.46	
v/c Ratio	0.84	0.58		0.60	0.88		0.58	0.89		0.79	0.58	
Control Delay	55.4	42.8		35.6	52.5		65.2	45.7		51.4	14.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	19.4		0.0	0.0	
Total Delay	55.4	42.8		35.6	52.5		65.2	65.1		51.4	14.2	
LOS	E	D		D	D		E	E		D	B	
Approach Delay		47.2			48.8			65.1			20.4	
Approach LOS		D			D			E			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 42.9 — Intersection LOS: D
Intersection Capacity Utilization 91.2% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	130	652	543	99	0	248
Future Volume (vph)	130	652	543	99	0	248
Satd. Flow (prot)	1770	3539	3458	0	0	1580
Flt Permitted	0.950					
Satd. Flow (perm)	1770	3539	3458	0	0	1580
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	137	686	676	0	0	261
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 43.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	130	652	543	99	0	248
Future Vol, veh/h	130	652	543	99	0	248
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	137	686	572	104	0	261

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	696	0	-	0	-	378
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	896	-	-	-	0	614
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	881	-	-	-	-	594
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	881	-	-	-	594
HCM Lane V/C Ratio	0.155	-	-	-	0.439
HCM Control Delay (s)	9.8	-	-	-	15.7
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	2.2

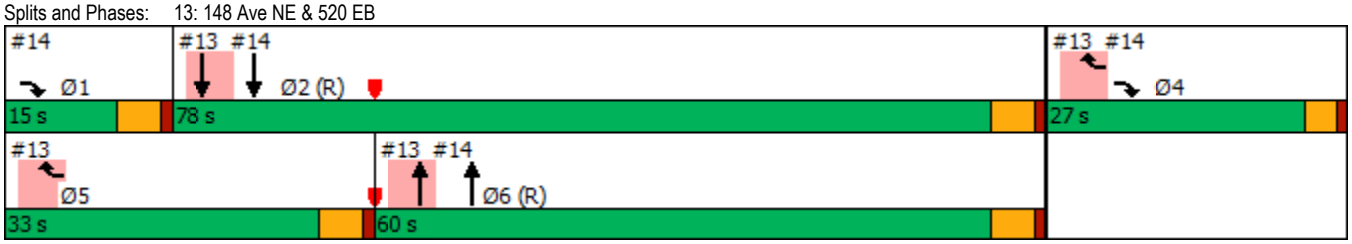
Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	512	1248	0	0	1517			
Future Volume (vph)	0	512	1248	0	0	1517			
Satd. Flow (prot)	0	1526	3320	0	0	3320			
Flt Permitted									
Satd. Flow (perm)	0	1526	3320	0	0	3320			
Satd. Flow (RTOR)		26							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98			
Heavy Vehicles (%)	2%	2%	3%	3%	3%	3%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	522	1273	0	0	1548			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			60.0			78.0	15.0	27.0	33.0
Total Split (%)			50.0%			65.0%	13%	23%	28%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		44.1	69.9			84.5			
Actuated g/C Ratio		0.37	0.58			0.70			
v/c Ratio		0.90	0.66			0.66			
Control Delay		53.5	3.0			12.9			
Queue Delay		0.0	0.0			0.0			
Total Delay		53.5	3.0			12.9			
LOS		D	A			B			
Approach Delay	53.5		3.0			12.9			
Approach LOS	D		A			B			

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 1 (1%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 78.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 13: 148 Ave NE & 520 EB



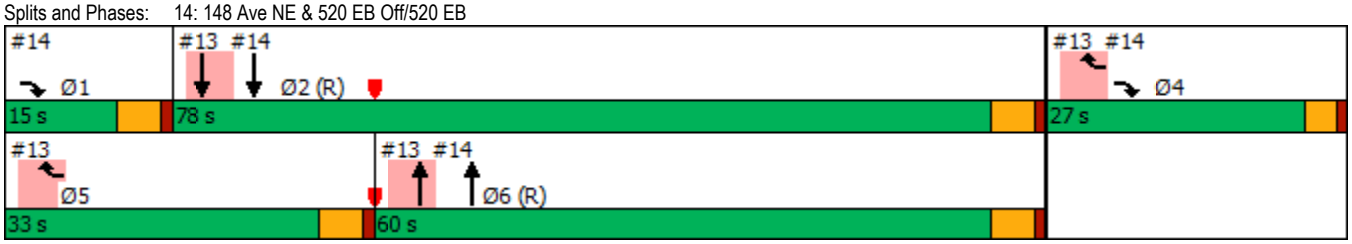
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	464	0	0	0	0	1248	520	0	1517	0
Future Volume (vph)	0	0	464	0	0	0	0	1248	520	0	1517	0
Satd. Flow (prot)	0	0	2614	0	0	0	0	3320	1485	0	3320	0
Flt Permitted												
Satd. Flow (perm)	0	0	2614	0	0	0	0	3320	1438	0	3320	0
Satd. Flow (RTOR)			64						262			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	473	0	0	0	0	1273	531	0	1548	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								60.0			78.0	
Total Split (%)								50.0%			65.0%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			29.5					69.9	120.0		84.5	
Actuated g/C Ratio			0.25					0.58	1.00		0.70	
v/c Ratio			0.68					0.66	0.37		0.66	
Control Delay			39.7					9.3	0.6		2.2	
Queue Delay			0.0					0.1	0.0		0.0	
Total Delay			39.7					9.5	0.6		2.2	
LOS			D					A	A		A	
Approach Delay		39.7						6.8			2.2	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 1 (1%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 78.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

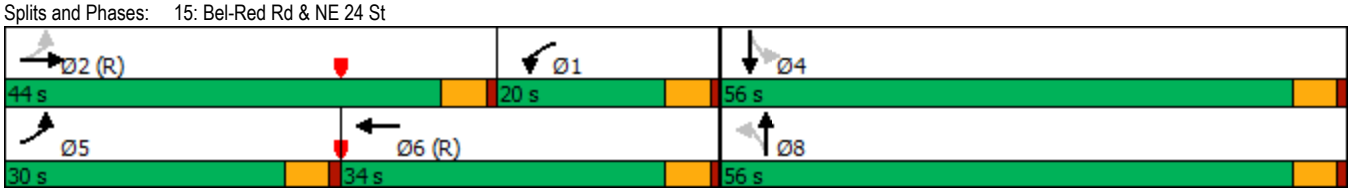
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	336	193	130	575	28	134	536	58	1	447	171
Future Volume (vph)	292	336	193	130	575	28	134	536	58	1	447	171
Satd. Flow (prot)	1752	3258	0	1770	3465	0	0	3487	0	0	3289	0
Flt Permitted	0.166			0.950				0.611			0.954	
Satd. Flow (perm)	304	3258	0	1745	3465	0	0	2147	0	0	3137	0
Satd. Flow (RTOR)		103			4			10			59	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	307	557	0	137	634	0	0	766	0	0	652	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	10.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	30.0	44.0		20.0	34.0		56.0	56.0		56.0	56.0	
Total Split (%)	25.0%	36.7%		16.7%	28.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	46.7	46.7		17.0	41.3			47.3			47.3	
Actuated g/C Ratio	0.39	0.39		0.14	0.34			0.39			0.39	
v/c Ratio	0.79	0.42		0.55	0.53			0.90			0.51	
Control Delay	46.8	25.4		57.0	35.6			47.8			15.3	
Queue Delay	0.0	0.0		0.0	0.5			0.0			0.0	
Total Delay	46.8	25.4		57.0	36.1			47.8			15.3	
LOS	D	C		E	D			D			B	
Approach Delay		33.0			39.8			47.8			15.3	
Approach LOS		C			D			D			B	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 34.7 — Intersection LOS: C
Intersection Capacity Utilization 89.4% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 15: Bel-Red Rd & NE 24 St



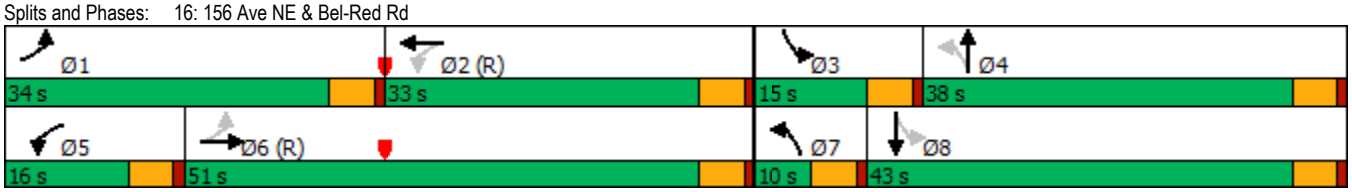
Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	520	291	16	200	465	150	6	854	131	58	246	139
Future Volume (vph)	520	291	16	200	465	150	6	854	131	58	246	139
Satd. Flow (prot)	1728	3420	0	1728	3293	0	1770	3334	0	1671	3009	0
Flt Permitted	0.138			0.556			0.499			0.088		
Satd. Flow (perm)	249	3420	0	992	3293	0	915	3334	0	155	3009	0
Satd. Flow (RTOR)		6			35			14			98	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	547	323	0	211	647	0	6	1037	0	61	405	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0		7.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		10.0	32.0		15.0	31.0	
Total Split (s)	34.0	51.0		16.0	33.0		10.0	38.0		15.0	43.0	
Total Split (%)	28.3%	42.5%		13.3%	27.5%		8.3%	31.7%		12.5%	35.8%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	64.0	48.7		42.3	30.0		45.2	39.6		50.0	48.0	
Actuated g/C Ratio	0.53	0.41		0.35	0.25		0.38	0.33		0.42	0.40	
v/c Ratio	1.06	0.23		0.50	0.76		0.02	0.93		0.32	0.32	
Control Delay	77.8	28.7		21.7	46.1		20.8	54.8		19.0	13.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	44.2		0.0	0.0	
Total Delay	77.8	28.7		21.7	46.1		20.8	99.0		19.0	13.8	
LOS	E	C		C	D		C	F		B	B	
Approach Delay		59.6			40.1			98.5			14.4	
Approach LOS		E			D			F			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 75 (63%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 60.5	Intersection LOS: E
Intersection Capacity Utilization 98.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

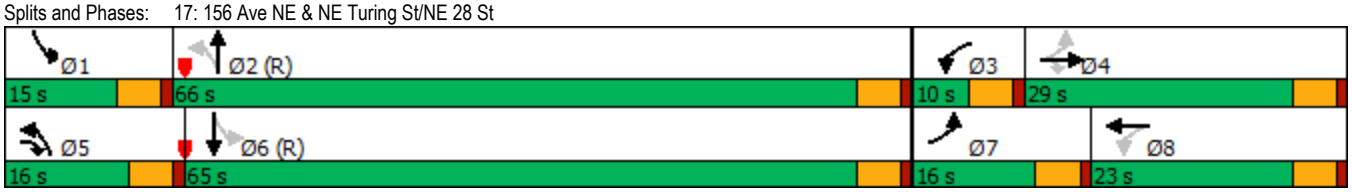
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	51	64	35	6	25	222	942	360	25	344	63
Future Volume (vph)	193	51	64	35	6	25	222	942	360	25	344	63
Satd. Flow (prot)	1770	1863	1583	1656	1459	0	1787	3304	0	1656	3153	0
Flt Permitted	0.594			0.723			0.462			0.151		
Satd. Flow (perm)	1068	1863	1497	1213	1459	0	842	3304	0	263	3153	0
Satd. Flow (RTOR)			65		26			70			26	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	1%	1%	1%	9%	9%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	197	52	65	36	32	0	227	1328	0	26	415	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	23.0	15.0	10.0	23.0		15.0	23.0		15.0	23.0	
Total Split (s)	16.0	29.0	16.0	10.0	23.0		16.0	66.0		15.0	65.0	
Total Split (%)	13.3%	24.2%	13.3%	8.3%	19.2%		13.3%	55.0%		12.5%	54.2%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	26.5	20.5	30.0	18.1	12.6		87.5	80.6		81.2	73.0	
Actuated g/C Ratio	0.22	0.17	0.25	0.15	0.10		0.73	0.67		0.68	0.61	
v/c Ratio	0.63	0.16	0.15	0.17	0.18		0.32	0.59		0.10	0.22	
Control Delay	48.8	41.8	7.4	35.3	21.5		3.0	10.8		6.6	5.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	48.8	41.8	7.4	35.3	21.5		3.0	10.8		6.6	5.6	
LOS	D	D	A	D	C		A	B		A	A	
Approach Delay		39.0			28.8			9.6			5.7	
Approach LOS		D			C			A			A	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 50 (42%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 13.3 — Intersection LOS: B
Intersection Capacity Utilization 69.6% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	785	25	0	1095	0	25
Future Volume (vph)	785	25	0	1095	0	25
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	826	26	0	1153	0	26
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	785	25	0	1095	0	25
Future Vol, veh/h	785	25	0	1095	0	25
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	826	26	0	1153	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	453
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.036	-	-	-
HCM Control Delay (s)	10.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

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

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	192	126	13	0	8
Future Volume (vph)	25	192	126	13	0	8
Satd. Flow (prot)	1629	0	0	1783	1611	0
Flt Permitted	0.994			0.957		
Satd. Flow (perm)	1629	0	0	1783	1611	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	228	0	0	147	8	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 35.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	192	126	13	0	8
Future Vol, veh/h	25	192	126	13	0	8
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	202	133	14	0	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	324	44	28	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	670	1026	1585	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	592	992	1559	-	-	-
Mov Cap-2 Maneuver	592	-	-	-	-	-
Stage 1	897	-	-	-	-	-
Stage 2	739	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	6.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	920	-	-
HCM Lane V/C Ratio	0.085	-	0.248	-	-
HCM Control Delay (s)	7.5	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1	-	-

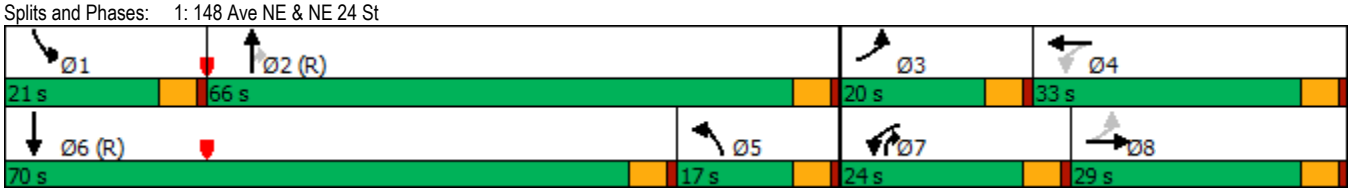
Lanes, Volumes, Timings
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	228	485	82	299	459	565	156	1337	318	394	1278	137
Future Volume (vph)	228	485	82	299	459	565	156	1337	318	394	1278	137
Satd. Flow (prot)	1693	3287	0	1676	3353	1500	1660	3320	1485	3285	3279	0
Flt Permitted	0.285			0.138			0.950			0.950		
Satd. Flow (perm)	501	3287	0	242	3353	1472	1652	3320	1412	3256	3279	0
Satd. Flow (RTOR)		12				321			55		11	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	590	0	311	478	589	163	1393	331	410	1474	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		5	2	7	1	6	
Permitted Phases	8			4		Free			2			
Detector Phase	3	8		7	4		5	2	7	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	29.0		11.0	29.0		11.0	28.0	11.0	11.0	27.0	
Total Split (s)	20.0	29.0		24.0	33.0		17.0	66.0	24.0	21.0	70.0	
Total Split (%)	14.3%	20.7%		17.1%	23.6%		12.1%	47.1%	17.1%	15.0%	50.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Act Effct Green (s)	42.7	26.0		50.0	30.3	140.0	14.0	63.0	84.0	18.0	67.0	
Actuated g/C Ratio	0.30	0.19		0.36	0.22	1.00	0.10	0.45	0.60	0.13	0.48	
v/c Ratio	0.81	0.95		1.03	0.66	0.40	0.98	0.93	0.38	0.97	0.94	
Control Delay	56.5	81.0		100.5	55.2	0.8	102.0	28.4	3.5	96.8	38.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.5	0.1	0.0	17.0	
Total Delay	56.5	81.0		100.5	55.2	0.8	102.0	28.9	3.6	96.8	55.4	
LOS	E	F		F	E	A	F	C	A	F	E	
Approach Delay		73.9			42.2			30.8			64.4	
Approach LOS		E			D			C			E	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 32 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 50.0	Intersection LOS: D
Intersection Capacity Utilization 100.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: 148 Ave NE & NE 24 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1197	0	0	1323	0	20
Future Volume (vph)	1197	0	0	1323	0	20
Satd. Flow (prot)	3539	1863	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1863	0	3539	0	1611
Confl. Peds. (#/hr)		20			20	20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1260	0	0	1393	0	21
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	1197	0	0	1323	0	20
Future Vol, veh/h	1197	0	0	1323	0	20
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1260	0	0	1393	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	670
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	*585
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*566
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	566	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-
HCM Control Delay (s)	11.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1162	12	0	1323	0	57
Future Volume (vph)	1162	12	0	1323	0	57
Satd. Flow (prot)	3532	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3532	0	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1236	0	0	1393	0	60
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1162	12	0	1323	0	57
Future Vol, veh/h	1162	12	0	1323	0	57
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1223	13	0	1393	0	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	658
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	*608
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*588
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	588	-	-	-
HCM Lane V/C Ratio	0.102	-	-	-
HCM Control Delay (s)	11.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

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

Lanes, Volumes, Timings
4: 151 Ave NE & NE 24 St

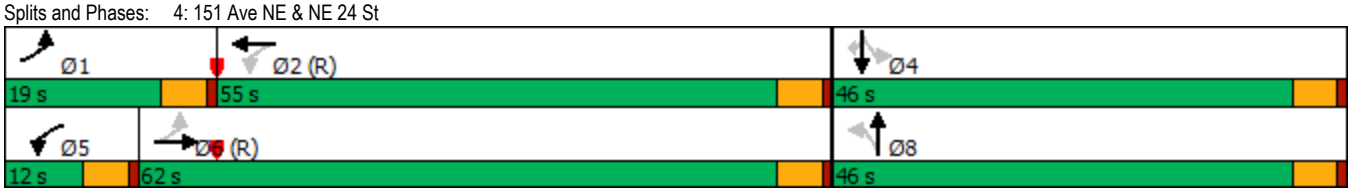
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	217	814	56	49	1032	157	113	28	36	271	45	176
Future Volume (vph)	217	814	56	49	1032	157	113	28	36	271	45	176
Satd. Flow (prot)	1693	3329	0	1693	3271	0	0	1678	0	0	1709	1515
Flt Permitted	0.094			0.270				0.436			0.646	
Satd. Flow (perm)	168	3329	0	474	3271	0	0	747	0	0	1128	1429
Satd. Flow (RTOR)		8			18			12				181
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	224	897	0	51	1226	0	0	182	0	0	325	181
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	8.0		3.0	8.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	13.0	28.0		12.0	28.0		26.0	26.0		26.0	26.0	26.0
Total Split (s)	19.0	62.0		12.0	55.0		46.0	46.0		46.0	46.0	46.0
Total Split (%)	15.8%	51.7%		10.0%	45.8%		38.3%	38.3%		38.3%	38.3%	38.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	75.2	65.9		65.1	56.9			38.8			38.8	38.8
Actuated g/C Ratio	0.63	0.55		0.54	0.47			0.32			0.32	0.32
v/c Ratio	0.75	0.49		0.15	0.79			0.73			0.89	0.31
Control Delay	38.5	19.2		10.7	23.2			50.6			64.8	5.2
Queue Delay	0.0	0.0		0.0	0.2			0.0			0.0	0.0
Total Delay	38.5	19.2		10.7	23.4			50.6			64.8	5.2
LOS	D	B		B	C			D			E	A
Approach Delay		23.1			22.9			50.6			43.5	
Approach LOS		C			C			D			D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 28.0 — Intersection LOS: C
Intersection Capacity Utilization 82.6% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 4: 151 Ave NE & NE 24 St



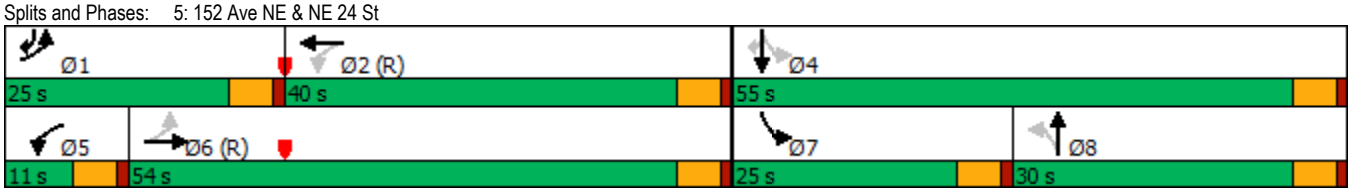
Lanes, Volumes, Timings
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	701	128	74	723	47	105	144	154	313	343	395
Future Volume (vph)	280	701	128	74	723	47	105	144	154	313	343	395
Satd. Flow (prot)	1693	3222	0	1718	3394	0	1693	1596	0	1660	1748	1485
Flt Permitted	0.162			0.278			0.548			0.163		
Satd. Flow (perm)	289	3222	0	494	3394	0	951	1596	0	285	1748	1403
Satd. Flow (RTOR)		22			6			41				33
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	6	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	292	863	0	77	802	0	109	310	0	326	357	411
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	pm+ov
Protected Phases	1	6		5	2			8		7	4	1
Permitted Phases	6			2			8			4		4
Detector Phase	1	6		5	2		8	8		7	4	1
Switch Phase												
Minimum Initial (s)	5.0	3.0		4.0	8.0		4.0	4.0		4.0	5.0	5.0
Minimum Split (s)	24.0	26.0		11.0	26.0		22.0	22.0		11.0	22.0	24.0
Total Split (s)	25.0	54.0		11.0	40.0		30.0	30.0		25.0	55.0	25.0
Total Split (%)	20.8%	45.0%		9.2%	33.3%		25.0%	25.0%		20.8%	45.8%	20.8%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-1.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		Lead
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	64.4	55.6		49.7	41.9		24.7	24.7		49.6	49.6	67.1
Actuated g/C Ratio	0.54	0.46		0.41	0.35		0.21	0.21		0.41	0.41	0.56
v/c Ratio	0.76	0.57		0.27	0.68		0.56	0.86		0.88	0.49	0.51
Control Delay	35.1	20.2		14.1	36.0		54.0	62.6		55.3	28.2	14.5
Queue Delay	0.0	0.2		0.0	0.1		0.0	0.0		0.0	0.0	0.1
Total Delay	35.1	20.4		14.1	36.1		54.0	62.6		55.3	28.2	14.7
LOS	D	C		B	D		D	E		E	C	B
Approach Delay		24.1			34.2			60.4			31.2	
Approach LOS		C			C			E			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 57 (48%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 33.1	Intersection LOS: C
Intersection Capacity Utilization 89.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: 152 Ave NE & NE 24 St



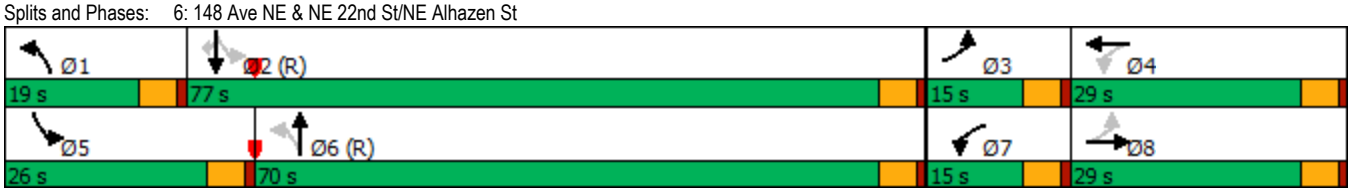
Lanes, Volumes, Timings
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	6	147	161	5	122	153	1624	120	204	1415	101
Future Volume (vph)	137	6	147	161	5	122	153	1624	120	204	1415	101
Satd. Flow (prot)	1710	1464	0	1710	1464	0	1660	4692	0	1693	3386	1515
Flt Permitted	0.460			0.364			0.105			0.070		
Satd. Flow (perm)	807	1464	0	640	1464	0	183	4692	0	125	3386	1370
Satd. Flow (RTOR)		150			124			11				94
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	156	0	164	129	0	156	1779	0	208	1444	103
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		2
Detector Phase	3	8		7	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	29.0		15.0	29.0		12.0	24.0		12.0	24.0	24.0
Total Split (s)	15.0	29.0		15.0	29.0		19.0	70.0		26.0	77.0	77.0
Total Split (%)	10.7%	20.7%		10.7%	20.7%		13.6%	50.0%		18.6%	55.0%	55.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	31.0	19.2		31.4	19.4		92.3	79.1		99.4	83.6	83.6
Actuated g/C Ratio	0.22	0.14		0.22	0.14		0.66	0.56		0.71	0.60	0.60
v/c Ratio	0.55	0.47		0.70	0.42		0.60	0.67		0.73	0.71	0.12
Control Delay	50.6	13.1		59.5	13.1		19.8	15.2		50.1	8.1	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2		0.0	0.6	0.0
Total Delay	50.6	13.1		59.5	13.1		19.8	15.4		50.1	8.7	1.0
LOS	D	B		E	B		B	B		D	A	A
Approach Delay		30.8			39.1			15.7			13.2	
Approach LOS		C			D			B			B	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 20 (14%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 17.3	Intersection LOS: B
Intersection Capacity Utilization 88.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 6: 148 Ave NE & NE 22nd St/NE Alhazen St



Lanes, Volumes, Timings
7: Lumiere Ave NE & NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	247	0	41	201	0	0	0	80	0	0	0
Future Volume (vph)	20	247	0	41	201	0	0	0	80	0	0	0
Satd. Flow (prot)	1770	1863	0	1770	1863	0	0	1611	0	0	1863	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	1863	0	1770	1863	0	0	1611	0	0	1863	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	260	0	43	212	0	0	84	0	0	0	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 36.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	247	0	41	201	0	0	0	80	0	0	0
Future Vol, veh/h	20	247	0	41	201	0	0	0	80	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	260	0	43	212	0	0	0	84	0	0	0
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	10.3	9.5	8.2	0
HCM LOS	B	A	A	-

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	0%	100%	0%	100%	100%
Vol Right, %	100%	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	20	247	41	201	0
LT Vol	0	20	0	41	0	0
Through Vol	0	0	247	0	201	0
RT Vol	80	0	0	0	0	0
Lane Flow Rate	84	21	260	43	212	0
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.107	0.032	0.357	0.066	0.292	0
Departure Headway (Hd)	4.587	5.449	4.947	5.464	4.961	5.319
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	781	658	728	656	726	0
Service Time	2.618	3.176	2.673	3.191	2.688	3.363
HCM Lane V/C Ratio	0.108	0.032	0.357	0.066	0.292	0
HCM Control Delay	8.2	8.4	10.4	8.6	9.7	8.4
HCM Lane LOS	A	A	B	A	A	N
HCM 95th-tile Q	0.4	0.1	1.6	0.2	1.2	0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	327	0	0	0	0	242
Future Volume (vph)	327	0	0	0	0	242
Satd. Flow (prot)	1770	0	0	0	0	1611
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	1611
Confl. Peds. (#/hr)	20		20			20
Confl. Bikes (#/hr)						5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	344	0	0	0	0	255
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 21.4%	ICU Level of Service A
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
8: DaVinci Ave NE & NE Alhazen St

10/26/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	327	0	0	0	0	242
Future Volume (Veh/h)	327	0	0	0	0	242
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	344	0	0	0	0	255
Pedestrians	20				20	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	2				2	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	40	20	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	40	20	275			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	63	100	100			
cM capacity (veh/h)	939	1040	1267			

Direction, Lane #	EB 1	SB 1
Volume Total	344	255
Volume Left	344	0
Volume Right	0	255
cSH	939	1700
Volume to Capacity	0.37	0.15
Queue Length 95th (ft)	42	0
Control Delay (s)	11.0	0.0
Lane LOS	B	
Approach Delay (s)	11.0	0.0
Approach LOS	B	

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

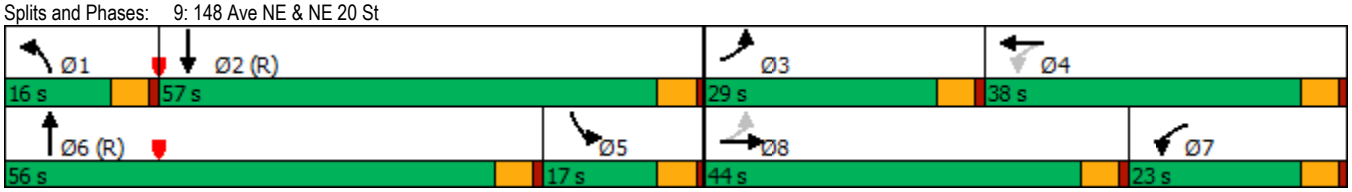
Lanes, Volumes, Timings
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	404	619	188	278	626	335	142	1081	195	203	1381	211
Future Volume (vph)	404	619	188	278	626	335	142	1081	195	203	1381	211
Satd. Flow (prot)	1660	3167	0	1693	3154	0	1693	3243	0	1693	4697	0
Flt Permitted	0.294			0.317			0.950			0.950		
Satd. Flow (perm)	511	3167	0	559	3154	0	1687	3243	0	1683	4697	0
Satd. Flow (RTOR)		29			67			17			24	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	421	841	0	290	1001	0	148	1329	0	211	1659	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	7.0		5.0	7.0		6.0	7.0		6.0	7.0	
Minimum Split (s)	15.0	29.0		15.0	29.0		11.0	28.0		11.0	28.0	
Total Split (s)	29.0	44.0		23.0	38.0		16.0	56.0		17.0	57.0	
Total Split (%)	20.7%	31.4%		16.4%	27.1%		11.4%	40.0%		12.1%	40.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	39.6	39.6		35.0	35.0		13.0	53.0		14.0	54.0	
Actuated g/C Ratio	0.28	0.28		0.25	0.25		0.09	0.38		0.10	0.39	
v/c Ratio	1.18	0.92		0.93	1.19		0.94	1.07		1.25	0.91	
Control Delay	146.1	62.4		88.2	140.5		96.9	73.7		184.6	32.3	
Queue Delay	0.0	0.1		46.5	0.0		0.0	11.1		0.0	10.1	
Total Delay	146.1	62.5		134.7	140.5		96.9	84.7		184.6	42.4	
LOS	F	E		F	F		F	F		F	D	
Approach Delay		90.4			139.2			86.0			58.5	
Approach LOS		F			F			F			E	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 46 (33%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.25	
Intersection Signal Delay: 89.8	Intersection LOS: F
Intersection Capacity Utilization 117.5%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 9: 148 Ave NE & NE 20 St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	268	879	832	78	0	486
Future Volume (vph)	268	879	832	78	0	486
Satd. Flow (prot)	1787	3574	3528	0	0	1627
Flt Permitted	0.950					
Satd. Flow (perm)	1787	3574	3528	0	0	1627
Confl. Peds. (#/hr)	20			20	20	20
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	282	925	958	0	0	512
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 64.3%	ICU Level of Service C
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	17.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	268	879	832	78	0	486
Future Vol, veh/h	268	879	832	78	0	486
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	282	925	876	82	0	512

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	978	0	-	0	-	519
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	707	-	-	-	0	~ 504
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	695	-	-	-	-	~ 487
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	83.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	695	-	-	-	487
HCM Lane V/C Ratio	0.406	-	-	-	1.05
HCM Control Delay (s)	13.7	-	-	-	83.9
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	2	-	-	-	15.5

Notes

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

Lanes, Volumes, Timings
13: 148 Ave NE & 520 EB

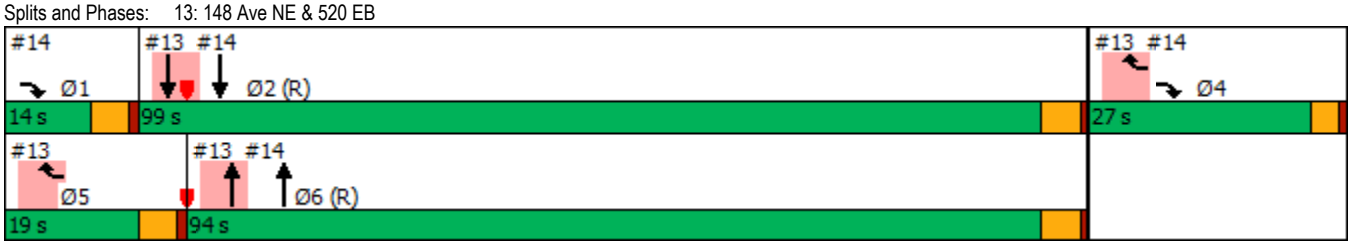
10/26/2017

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø4	Ø5
Lane Configurations									
Traffic Volume (vph)	0	213	1195	0	0	1646			
Future Volume (vph)	0	213	1195	0	0	1646			
Satd. Flow (prot)	0	1497	3320	0	0	3386			
Flt Permitted									
Satd. Flow (perm)	0	1497	3320	0	0	3386			
Satd. Flow (RTOR)		85							
Confl. Peds. (#/hr)	20	20		20	20				
Confl. Bikes (#/hr)		5		5					
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99			
Growth Factor	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	4%	4%	3%	3%	1%	1%			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	215	1207	0	0	1663			
Turn Type		custom	NA			NA			
Protected Phases		5 4	6			2	1	4	5
Permitted Phases									
Detector Phase		5	6			2			
Switch Phase									
Minimum Initial (s)			7.0			7.0	7.0	5.0	5.0
Minimum Split (s)			23.0			26.0	12.0	27.0	15.0
Total Split (s)			94.0			99.0	14.0	27.0	19.0
Total Split (%)			67.1%			70.7%	10%	19%	14%
Yellow Time (s)			4.0			4.0	4.0	3.0	4.0
All-Red Time (s)			1.0			1.0	1.0	1.0	1.0
Lost Time Adjust (s)			-2.0			-2.0			
Total Lost Time (s)			3.0			3.0			
Lead/Lag			Lag			Lag	Lead		Lead
Lead-Lag Optimize?									
Recall Mode			C-Max			C-Max	None	None	None
Act Effct Green (s)		25.8	108.2			106.5			
Actuated g/C Ratio		0.18	0.77			0.76			
v/c Ratio		0.62	0.47			0.65			
Control Delay		37.8	1.1			7.2			
Queue Delay		0.0	0.0			0.0			
Total Delay		37.8	1.1			7.2			
LOS		D	A			A			
Approach Delay	37.8		1.1			7.2			
Approach LOS	D		A			A			

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 34 (24%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 7.0 — Intersection LOS: A
Intersection Capacity Utilization 68.8% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 13: 148 Ave NE & 520 EB



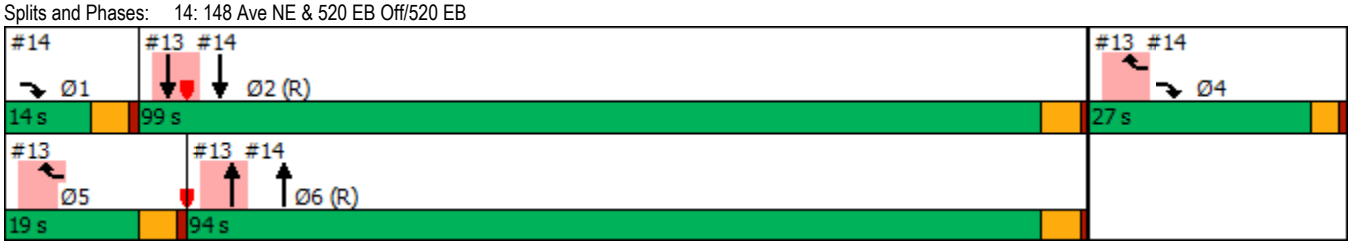
Lanes, Volumes, Timings
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	330	0	0	0	0	1195	991	0	1646	0
Future Volume (vph)	0	0	330	0	0	0	0	1195	991	0	1646	0
Satd. Flow (prot)	0	0	2640	0	0	0	0	3320	1485	0	3386	0
Flt Permitted												
Satd. Flow (perm)	0	0	2640	0	0	0	0	3320	1438	0	3386	0
Satd. Flow (RTOR)			67						446			
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	333	0	0	0	0	1207	1001	0	1663	0
Turn Type			custom					NA	Free		NA	
Protected Phases			1 4					6			2	
Permitted Phases									Free			
Detector Phase			1					6			2	
Switch Phase												
Minimum Initial (s)								7.0			7.0	
Minimum Split (s)								23.0			26.0	
Total Split (s)								94.0			99.0	
Total Split (%)								67.1%			70.7%	
Yellow Time (s)								4.0			4.0	
All-Red Time (s)								1.0			1.0	
Lost Time Adjust (s)								-2.0			-2.0	
Total Lost Time (s)								3.0			3.0	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?												
Recall Mode								C-Max			C-Max	
Act Effct Green (s)			27.5					108.2	140.0		106.5	
Actuated g/C Ratio			0.20					0.77	1.00		0.76	
v/c Ratio			0.58					0.47	0.70		0.65	
Control Delay			43.3					2.2	8.2		2.3	
Queue Delay			0.8					0.2	0.0		0.2	
Total Delay			44.1					2.4	8.2		2.5	
LOS			D					A	A		A	
Approach Delay		44.1						5.0			2.5	
Approach LOS		D						A			A	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 34 (24%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 68.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 14: 148 Ave NE & 520 EB Off/520 EB



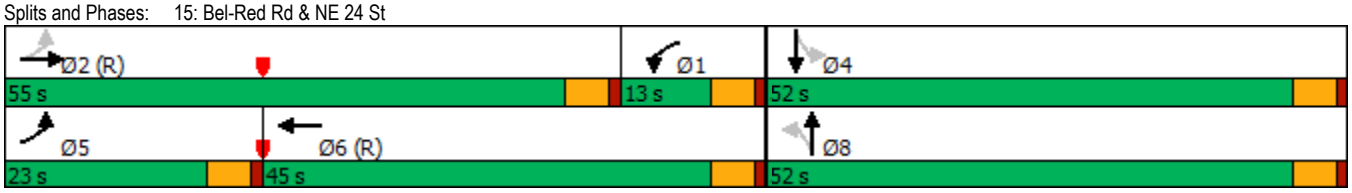
Lanes, Volumes, Timings
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	915	234	87	506	9	1	472	208	2	680	350
Future Volume (vph)	231	915	234	87	506	9	1	472	208	2	680	350
Satd. Flow (prot)	1676	3220	0	1660	3268	0	0	3187	0	0	3165	0
Flt Permitted	0.299			0.950				0.954			0.954	
Satd. Flow (perm)	522	3220	0	1651	3268	0	0	3040	0	0	3020	0
Satd. Flow (RTOR)		33			2			70			92	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	6	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	1184	0	90	531	0	0	702	0	0	1064	0
Turn Type	pm+pt	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2						8	8		4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0		13.0	29.0		29.0	29.0		29.0	29.0	
Total Split (s)	23.0	55.0		13.0	45.0		52.0	52.0		52.0	52.0	
Total Split (%)	19.2%	45.8%		10.8%	37.5%		43.3%	43.3%		43.3%	43.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?		Yes			Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	55.7	55.7		10.0	48.4			45.3			45.3	
Actuated g/C Ratio	0.46	0.46		0.08	0.40			0.38			0.38	
v/c Ratio	0.58	0.78		0.65	0.40			0.59			0.89	
Control Delay	23.9	29.3		76.4	32.3			28.4			33.4	
Queue Delay	0.0	0.2		0.0	0.0			0.0			0.5	
Total Delay	23.9	29.5		76.4	32.3			28.4			33.9	
LOS	C	C		E	C			C			C	
Approach Delay		28.6			38.7			28.4			33.9	
Approach LOS		C			D			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 110 (92%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 31.7	Intersection LOS: C
Intersection Capacity Utilization 85.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 15: Bel-Red Rd & NE 24 St



Lanes, Volumes, Timings
16: 156 Ave NE & Bel-Red Rd

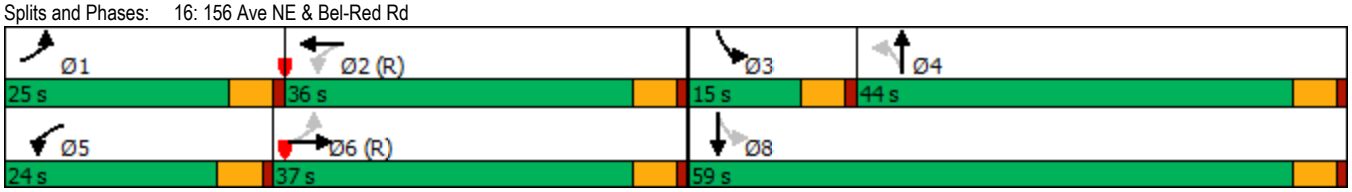
10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	274	438	33	254	563	76	4	311	282	152	847	429
Future Volume (vph)	274	438	33	254	563	76	4	311	282	152	847	429
Satd. Flow (prot)	1637	3231	0	1637	3198	0	1676	2952	0	1693	3065	0
Flt Permitted	0.209			0.358			0.101			0.244		
Satd. Flow (perm)	358	3231	0	610	3198	0	178	2952	0	432	3065	0
Satd. Flow (RTOR)		6			12			209			100	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	285	490	0	265	665	0	4	618	0	158	1329	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		4	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		5.0	7.0	
Minimum Split (s)	12.0	31.0		12.0	32.0		32.0	32.0		15.0	31.0	
Total Split (s)	25.0	37.0		24.0	36.0		44.0	44.0		15.0	59.0	
Total Split (%)	20.8%	30.8%		20.0%	30.0%		36.7%	36.7%		12.5%	49.2%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	58.0	38.9		55.0	37.3		39.7	39.7		54.5	54.5	
Actuated g/C Ratio	0.48	0.32		0.46	0.31		0.33	0.33		0.45	0.45	
v/c Ratio	0.76	0.47		0.62	0.66		0.07	0.55		0.50	0.92	
Control Delay	37.5	43.8		25.6	40.2		13.5	4.7		18.9	30.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.1		0.0	46.8	
Total Delay	37.5	43.8		25.6	40.2		13.5	4.8		18.9	77.2	
LOS	D	D		C	D		B	A		B	E	
Approach Delay		41.5			36.0			4.9			71.0	
Approach LOS		D			D			A			E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 45.7 — Intersection LOS: D
Intersection Capacity Utilization 97.5% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 16: 156 Ave NE & Bel-Red Rd



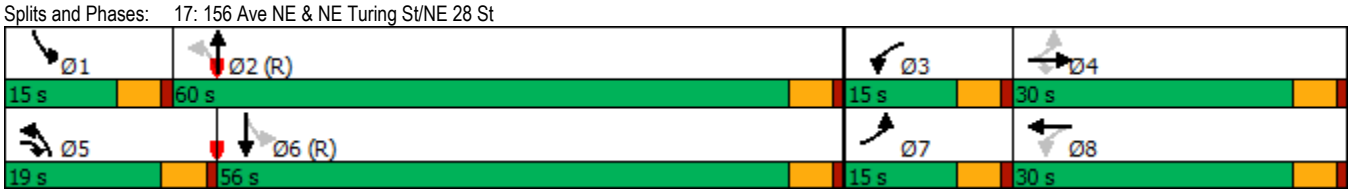
Lanes, Volumes, Timings
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	21	209	135	27	155	147	479	35	15	920	41
Future Volume (vph)	129	21	209	135	27	155	147	479	35	15	920	41
Satd. Flow (prot)	1710	1800	1530	1710	1506	0	1660	3230	0	1693	3314	0
Flt Permitted	0.387			0.602			0.192			0.450		
Satd. Flow (perm)	683	1800	1460	1051	1506	0	336	3230	0	783	3314	0
Satd. Flow (RTOR)			86		163			9			5	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	6	0	0	6	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	22	220	142	191	0	155	541	0	16	1011	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	5	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	28.0	15.0	15.0	28.0		15.0	26.0		15.0	26.0	
Total Split (s)	15.0	30.0	19.0	15.0	30.0		19.0	60.0		15.0	56.0	
Total Split (%)	12.5%	25.0%	15.8%	12.5%	25.0%		15.8%	50.0%		12.5%	46.7%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0	-1.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	4.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	23.8	15.1	23.1	28.0	15.0		84.2	79.6		76.4	68.5	
Actuated g/C Ratio	0.20	0.13	0.19	0.23	0.12		0.70	0.66		0.64	0.57	
v/c Ratio	0.57	0.10	0.62	0.43	0.58		0.41	0.25		0.03	0.53	
Control Delay	47.0	42.8	30.3	39.2	17.0		11.8	13.0		3.6	12.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.1	
Total Delay	47.0	42.8	30.3	39.2	17.0		11.8	13.0		3.6	12.8	
LOS	D	D	C	D	B		B	B		A	B	
Approach Delay		37.0			26.5			12.7			12.6	
Approach LOS		D			C			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 31 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 73.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 17: 156 Ave NE & NE Turing St/NE 28 St



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1138	79	0	1323	0	36
Future Volume (vph)	1138	79	0	1323	0	36
Satd. Flow (prot)	3539	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	1583	0	3539	0	1611
Confl. Peds. (#/hr)		20				20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1198	83	0	1393	0	38
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1138	79	0	1323	0	36
Future Vol, veh/h	1138	79	0	1323	0	36
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1198	83	0	1393	0	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	639
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	*608
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*588
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	588	-	-	-
HCM Lane V/C Ratio	0.064	-	-	-
HCM Control Delay (s)	11.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

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

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	37	242	307	20	0	12
Future Volume (vph)	37	242	307	20	0	12
Satd. Flow (prot)	1633	0	0	1779	1611	0
Flt Permitted	0.993			0.955		
Satd. Flow (perm)	1633	0	0	1779	1611	0
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	294	0	0	344	13	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 50.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	242	307	20	0	12
Future Vol, veh/h	37	242	307	20	0	12
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	255	323	21	0	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	714	47	33	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	398	1022	1579	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	304	988	1553	-	-	-
Mov Cap-2 Maneuver	304	-	-	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	7.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1553	-	761	-	-
HCM Lane V/C Ratio	0.208	-	0.386	-	-
HCM Control Delay (s)	7.9	0	12.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.8	-	1.8	-	-

Appendix I

Year 2023 Vehicle Queue Summary Tables and Worksheets

Seritage Overlake Plaza
TENW Project No. 5356

AM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	AM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
1	EB	LT	350+	350+	200	200	200	225	
148th Ave NE/NE 24th St		Thru	2,530	2,530	200	200	200	200	
		Thru-RT	220	220	200	200	200	200	
Note: Green indicates storage and	WB	LT	325	325/220	225	300	325	250	Signal at Lumiere shortens WB LT pocket to approx. 220 ft
queues with a signal at Lumiere		Thru	805	805/280	200	200	125	200	COB/COR planned improvements include additional NB through,
		Thru	805	805/280	200	200	125	200	EB/WB dual lefts
		RT	175	175	Free	Free	Free	Free	Project will reserve ROW and set curbs for future improvements
	NB	LT	225	225	250	275	250	250	COB/COR planned improvements include additional NB through,
		Thru	450	450	175	125	100	75	EB/WB dual lefts
		Thru	450	450	175	125	100	75	Project will reserve ROW and set curbs for future improvements
		RT	395	395	<25	<25	<25	<25	
	SB	LT	475	475	175	250	250	200	
		LT	475	475	175	250	250	200	COB/COR planned improvements include additional NB through,
		Thru	525	525	375	550	525	350	EB/WB dual lefts
		Thru-RT	525	525	375	550	525	350	Project will reserve ROW and set curbs for future improvements
2	EB	Thru	-	280		-	250	-	
Lumiere Ave NE/NE 24th St		Thru	-	280		-	250	-	
		RT	-	210		-	50	-	
	WB	Thru	-	400		-	275	-	
		Thru	-	400		-	275	-	
	NB	LT		200			50		
		RT	-	400		<25	25	<25	
3	EB	Thru	-	300		-	-	-	
DaVinci Ave NE/NE 24th St (RIRO)		Thru-RT	-	300		-	-	-	
	WB	Thru	-	50		-	-	-	
		Thru	-	50		-	-	-	
	NB	RT	-	415		<25	<25	<25	
4	EB	LT	420	420/340	50	50	75	50	Signal at Lumiere shortens EB LT pocket to approx. 340 ft
151st Pl NE/NE 24th St		Thru	805	805/400	300	375	200	275	
Note: Green indicates storage and		Thru-RT	805	805/400	300	375	200	275	
queues with a signal at Lumiere	WB	LT	60	60	25	25	25	25	
		Thru	310	310	150	175	200	150	
		Thru-RT	310	310	150	175	200	150	
	NB	LT-Thru-Rt	465	465	25	25	25	25	
	SB	Thru-LT	235	235	275	300	300	300	Queue extends beyond Safeway driveway
		RT	235	235	50	50	50	50	
5	EB	LT	200	200	200	225	175	200	Planned improvement includes part-time EB dual left turn (Esterra Par
152nd Ave NE/NE 24th St		Thru	310	310	100	100	100	100	DA condition, interim improvement)
		Thru-RT	310	310	100	100	100	100	
	WB	LT	95	95	25	<25	25	25	
		Thru	800	800	275	250	275	275	
		Thru-RT	800	800	275	250	275	275	
	NB	LT	TBD	TBD	175	175	175	175	
		Thru-RT	500+	500+	175	175	175	175	
	SB	LT	TBD	TBD	50	50	50	50	Includes Sound Transit Improvements
		Thru	530	530	125	150	150	125	
		RT	TBD	TBD	50	75	75	50	

Seritage Overlake Plaza
TENW Project No. 5356

AM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	AM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
6	EB	LT	75	75	75	75	75	75	
148th Ave NE/NE 22nd St/NE Alhazen St		Thru-RT	130	130	50	50	50	50	
	WB	LT	85	275	75	175	175	150	
		Thru-RT	200	380	50	50	50	50	
	NB	LT	220	220	25	25	25	25	
		Thru	670	670	200	275	275	150	
		Thru	670	670	200	275	275	150	
		Thru-RT	145	145		275	275	150	Queue extends into adjacent through lane
		RT	145	145	<25				
	SB	LT	175	175	50	175	175	50	
		Thru	450	450	175	200	200	200	
		Thru	450	450	175	200	200	200	
		RT	145	145	<25	<25	<25	<25	
7	EB	LT	-	50		<25	<25	<25	
Lumiere Ave NE/NE Alhazen St		Th-Rt	-	380		25	25	25	
	WB	LT	-	75		<25	<25	<25	
		Th-Rt	-	225		25	25	25	
	NB	LT-Th-RT	-	700		25	25	<25	
	SB	LT-Th-RT	-	400		<25	<25	<25	
8	EB	LT	-	75		<25	<25	25	
		RT	-	225		-	-	-	
DaVinci Ave NE/NE Alhazen St	NB	LT-Thru	-	700		-	-	-	
	SB	Thru-RT	-	400		-	-	-	
9	EB	LT	520	520	225	325	325	250	COB/COR planned improvements include EB/WB dual lefts
148th Ave NE/NE 20th St		Thru	1,540	1,540	200	225	225	200	and additional NB TH lane
		Thru-RT	1,540	1,540	200	225	225	200	
	WB	LT	225+	TBD	150	200	200	175	COB/COR planned improvements include EB/WB dual lefts
		Thru	1,360	500	300	350	350	325	and additional NB TH lane
		Thru-RT	1,360	500	300	350	350	325	
	NB	LT	355	355	125	125	125	125	
		Thru	370	370	525	650	650	575	COB/COR planned improvements include NB TH lane
		Thru-RT	370	370	525	650	650	575	KCCLE DA required improvement includes interim NB RT lane
	SB	LT	425	425	300	350	350	325	
		Thru	675	675	200	250	250	225	
		Thru	675	675	200	250	250	225	
		Thru-RT	610	610	200	250	250	225	
10	EB	LT	-	TBD		25	25		
Lumiere Ave NE/NE 20th St		Thru	-	500		-	-		
		Thru	-	500		-	-		
	WB	Thru	-	125		-	-		
		Thru-RT	-	125		-	-		
	SB	LT-Th-RT	-	700		50	50		
11	EB	LT	-	75		<25	<25		
DaVinci Ave NE/NE 20th St		Thru	-	125		-	-		
		Thru	-	125		-	-		
	WB	Thru	-	550		-	-		
		Thru-RT	-	550		-	-		
	SB	LT-RT	-	740		25	25		
12	EB	LT	300	300	25	25	25	25	
152nd Ave NE/NE 20th St	SB	RT	yield	yield	yield	yield	yield	yield	
13	WB	RT	2,075	2,075	425	450	450	425	
148th Ave NE/SR 520 EB Ramps	NB	Thru	675	675	25	50	25	25	
(to NB 148th Ave NE)		Thru	675	675	25	50	25	25	
	SB	Thru	1,090	1,090					
		Thru	1,090	1,090					

Seritage Overlake Plaza
TENW Project No. 5356

AM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	AM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
14	EB	RT	260	260	200	250	250	200	
148th Ave NE/SR 520 EB Ramps		RT	1,700	1,700	200	250	250	200	
(to SB 148th Ave NE)	NB	Thru	675	675					
		Thru	675	675					
		RT	555	555	Free	Free	Free	Free	
	SB	Thru	1,090	1,090	25	25	25	25	
		Thru	1,090	1,090	25	25	25	25	
15	EB	LT	260	260	300	350	350	325	no planned improvements on this approach, additional storage avai
Bel-Red Rd/NE 24th St		Thru	785	785	225	200	225	225	with access control
		Thru-RT	785	785	225	200	225	225	
	WB	LT	200	200	175	175	175	175	
		Thru	315	315	300	300	300	300	
		Thru-RT	315	315	300	300	300	300	
	NB	Thru-LT	1,490	1,490	350	350	350	350	
		Thru-RT	1,490	1,490	350	350	350	350	
	SB	Thru-LT	505	505	250	25	275	250	
		Thru-RT	505	505	250	25	275	250	
16	EB	LT	280	280	575	650	650	625	no planned improvements at this location other than SB RT lane
156th Ave NE/Bel-Red Rd		Thru	440	440	150	150	100	125	
		Thru-RT	440	440	150	150	100	125	
	WB	LT	320+	320+	125	125	125	125	
		Thru	2,300	2,300	300	325	325	300	
		Thru-RT	2,300	2,300	300	325	325	300	
	NB	LT	75	75	<25	<25	<25	<25	
		Thru	320	320	575	600	600	600	thru lane queue
		Thru-RT	320	320	575	600	600	600	thru lane queue
	SB	LT	480	480	50	50	50	50	
		Thru	790	790	150	175	175	150	
		Thru-RT	790	790	150	175	175	150	
17	EB	LT	225	225	200	200	200	200	
156th Ave NE/NE 28th St/NE Turing St		Thru	320	320	75	75	75	75	
		RT	200	200	25	25	25	25	
	WB	LT	80+	80+	50	50	50	50	
		Thru-RT	180	180	25	25	25	25	
	NB	LT	150	150	50	25	25	50	
		Thru	830	830	475	425	450	475	
		Thru-RT	830	830	475	425	450	475	
	SB	LT	230	230	25	25	25	25	
		Thru	1,020	1,020	75	75	75	75	
		Thru-RT	1,020	1,020	75	75	75	75	

Seritage Overlake Plaza
TENW Project No. 5356

AM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	AM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
18	EB	Thru		-		-	-	-	
NE 24th / RIRO Driveway		Thru		-		-	-	-	
		RT		-		-	-	-	
	WB	Thru		-		-	-	-	
		Thru		-		-	-	-	
	NB	RT		TBD		<25	<25	<25	
19	WB	RT		TBD		<25	<25		
148th Ave / RIRO Driveway	NB	Thru		-		-	-		
		Thru		-		-	-		
		Thru-RT		-		-	-		
	SB	Thru		-		-	-		
		Thru		-		-	-		
20	EB	LT-RT		TBD		<25	25		
Lumiere Ave / North Driveway	NB	LT-Thru		TBD		<25	<25		
	SB	Thru-RT		-		-	-		
21	EB	LT-RT		TBD		25	25	25	
DaVinci Ave / Driveway	NB	LT-Thru		TBD		<25	<25	<25	
	SB	Thru-RT		-		-	-	-	
22	EB	LT		TBD		25	25		
Alhazen / Driveway / Regency Access		Th-RT		TBD		-	-		
	WB	LT		TBD		<25	<25		
		Th-RT		TBD		-	-		
	NB	LT-Thru-RT		TBD		25	25		NB approach from Regency site
	SB	LT-Thru-RT		TBD		25	25		
23	EB	LT-RT		TBD		25	25		
Lumiere Ave / South Driveway	NB	LT-Thru		TBD		25	25		
	SB	Thru-RT		-		-	-		

Notes:
Existing/Baseline Storage based on field measurements and confirmed by aerial mapping
Where possible, future storage was estimated for future improvements based on preliminary measurements based on Seritage proposed 2023 network.
Storage for through lane queues measured to next signalized intersection unless otherwise noted.
TBD = Storage To Be Determined (future storage unknown and was not estimated - pending future design)
+ = More storage is available in TWLT lane
Queues that exceed storage are highlighted in yellow

Seritage Overlake Plaza
TENW Project No. 5356

PM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	PM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
1	EB	LT	350+	350+	250	225	225	250	
148th Ave NE/NE 24th St		Thru	2,530	2,530	400	400	400	400	
		Thru-RT	220	220	400	400	400	400	spillover into inside through lane
Note: Green indicates storage and	WB	LT	325	325/220	425	525	500	450	Signal at Lumiere shortens WB LT pocket to approx. 220 ft
queues with a signal at Lumiere		Thru	805	805/280	275	275	275	275	COB/COR planned improvements include additional NB through,
		Thru	805	805/280	275	275	275	275	EB/WB dual lefts
		RT	175	175	Free	Free	Free	Free	Project will reserve ROW and set curbs for future improvements
	NB	LT	225	225	225	275	250	300	COB/COR planned improvements include additional NB through,
		Thru	450	450	650	900	800	775	EB/WB dual lefts
		Thru	450	450	650	900	800	775	Project will reserve ROW and set curbs for future improvements
		RT	395	395	50	25	<25	<25	
	SB	LT	475	475	300	350	325	300	
		LT	475	475	300	350	325	300	COB/COR planned improvements include additional NB through,
		Thru	525	525	700	850	850	800	EB/WB dual lefts
		Thru-RT	525	525	700	850	850	800	Project will reserve ROW and set curbs for future improvements
2	EB	Thru	-	280		-	250	-	
Lumiere Ave NE/NE 24th St		Thru	-	280		-	250	-	
		RT	-	210		-	25	-	
	WB	Thru	-	400		-	325	-	
		Thru	-	400		-	325	-	
	NB	LT		200			50		
		RT	-	400		25	50	<25	
3	EB	Thru	-	300		-	-	-	
DaVinci Ave NE/NE 24th St (RIRO)		Thru-RT	-	300		-	-	-	
	WB	Thru	-	50		-	-	-	
		Thru	-	50		-	-	-	
	NB	RT	-	415		<25	<25	<25	
4	EB	LT	420	420/340	200	225	250	225	Signal at Lumiere shortens EB LT pocket to approx. 340 ft
151st Pl NE/NE 24th St		Thru	805	805/400	300	350	275	300	
Note: Green indicates storage and		Thru-RT	805	805/400	300	350	275	300	
queues with a signal at Lumiere	WB	LT	60	60	25	25	25	25	
		Thru	310	310	250	250	350	300	thru lane queue
		Thru-RT	310	310	250	250	350	300	thru lane queue
	NB	LT-Thru-Rt	465	465	200	225	225	200	
	SB	Thru-LT	235	235	375	375	375	375	Queue extends past Safeway dwy
		RT	235	235	50	50	50	50	
5	EB	LT	200	200	225	250	200	175	exceeds storage with or without project
152nd Ave NE/NE 24th St		Thru	310	310	150	175	175	300	
		Thru-RT	310	310	150	175	175	300	
	WB	LT	95	95	50	50	50	50	
		Thru	800	800	250	375	375	375	
		Thru-RT	800	800	250	375	375	375	
	NB	LT	TBD	TBD	125	125	125	125	
		Thru-RT	500+	500+	350	325	325	350	
	SB	LT	TBD	TBD	350	350	350	350	Includes Sound Transit Improvements
		Thru	530	530	250	300	300	275	
		RT	TBD	TBD	200	200	200	200	

Seritage Overlake Plaza
TENW Project No. 5356

PM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	PM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
6	EB	LT	75	75	150	150	150	150	Queue extends into Fred Meyer Parking lot
148th Ave NE/NE 22nd St/NE Alhazen St		Thru-RT	130	130	75	75	75	75	
	WB	LT	85	275	150	275	275	175	baseline queue
		Th-Rt	200	380	75	75	50	50	
	NB	LT	220	220	50	25	25	50	
		Thru	670	670	275	300	300	275	
		Thru	670	670	275	300	300	275	
		Thru-RT	145	145		300	300	275	Queue extends into adjacent through lane
		RT	145	145	<25				
	SB	LT	175	175	150	250	275	150	consider interim WB LT at Lumiere/24th (monitor beyond Phase 1)
		Thru	450	450	225	200	175	250	
		Thru	450	450	225	200	175	250	
		RT	145	145	<25	<25	<25	<25	
7	EB	LT	-	50		<25	<25	<25	
		Th-Rt	-	380		25	25	50	
Lumiere Ave NE/NE Alhazen St	WB	LT	-	75		<25	<25	<25	
		Th-Rt	-	225		25	25	25	
	NB	LT-Th-RT	-	700		<25	<25	<25	
	SB	LT-Th-RT	-	400		<25	<25	<25	
8	EB	LT	-	75		25	25	50	
		RT	-	225		-	-	-	
DaVinci Ave NE/NE Alhazen St	NB	LT-Thru	-	700		-	-	-	
	SB	Thru-RT	-	400		-	-	-	
9	EB	LT	520	520	575	650	650	625	COB/COR planned improvements include EB/WB dual lefts
148th Ave NE/NE 20th St		Thru	1,540	1,540	450	575	575	500	and additional NB TH lane
		Thru-RT	1,540	1,540	450	575	575	500	
	WB	LT	225+	TBD	450	500	500	375	COB/COR planned improvements include EB/WB dual lefts
		Thru	1,360	500	650	700	700	700	and additional NB TH lane
		Thru-RT	1,360	500	650	700	700	700	
	NB	LT	355	355	200	200	200	200	
		Thru	370	370	625	775	775	625	COB/COR planned improvements include NB TH lane
		Thru-RT	370	370	625	775	775	625	KCCLE DA required improvement includes interim NB RT lane
	SB	LT	425	425	350	375	375	400	
		Thru	675	675	550	650	650	550	
		Thru	675	675	550	650	650	550	COB/COR planned improvements include EB/WB dual lefts
		Thru-RT	610	610	550	650	650	550	and additional NB TH lane
10	EB	LT	-	TBD		25	25		
Lumiere Ave NE/NE 20th St		Thru	-	500		-	-		
		Thru	-	500		-	-		
	WB	Thru	-	125		-	-		
		Thru-RT	-	125		-	-		
	SB	LT-Th-RT	-	700		100	100		
11	EB	LT	-	75		25	25		
DaVinci Ave NE/NE 20th St		Thru	-	125		-	-		
		Thru	-	125		-	-		
	WB	Thru	-	550		-	-		
		Thru-RT	-	550		-	-		
	SB	LT-RT	-	740		25	25		
12	EB	LT	300	300	50	50	50	50	
152nd Ave NE/NE 20th St	SB	RT	yield	yield	yield	yield	yield	yield	
13	WB	RT	2,075	2,075	175	200	200	175	
148th Ave NE/SR 520 EB Ramps	NB	Thru	675	675	25	25	25	25	
(to NB 148th Ave NE)		Thru	675	675	25	25	25	25	
	SB	Thru	1,090	1,090					
		Thru	1,090	1,090					

Seritage Overlake Plaza
TENW Project No. 5356

PM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	PM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
14	EB	RT	260	260	150	200	200	175	
148th Ave NE/SR 520 EB Ramps		RT	1,700	1,700	150	200	200	175	
(to SB 148th Ave NE)	NB	Thru	675	675					
		Thru	675	675					
		RT	555	555	Free	Free	Free	Free	
	SB	Thru	1,090	1,090	25	50	50	25	
		Thru	1,090	1,090	25	50	50	25	
15	EB	LT	260	260	150	225	225	175	
Bel-Red Rd/NE 24th St		Thru	785	785	375	500	550	475	
		Thru-RT	785	785	375	500	550	475	
	WB	LT	200	200	100	100	100	100	
		Thru	315	315	175	225	225	200	
		Thru-RT	315	315	175	225	225	200	
	NB	Thru-LT	1,490	1,490	250	250	250	250	
		Thru-RT	1,490	1,490	250	250	250	250	
	SB	Thru-LT	505	505	450	450	450	450	
		Thru-RT	505	505	450	450	450	450	
16	EB	LT	280	280	275	275	275	275	
156th Ave NE/Bel-Red Rd		Thru	440	440	250	250	250	250	
		Thru-RT	440	440	250	250	250	250	
	WB	LT	320+	320+	200	175	175	175	
		Thru	2,300	2,300	300	325	325	325	
		Thru-RT	2,300	2,300	300	325	325	325	
	NB	LT	75	75	<25	<25	<25	<25	
		Thru	320	320	25	25	25	25	
		Thru-RT	320	320	25	25	25	25	
	SB	LT	480	480	75	75	75	75	
		Thru	790	790	200	625	625	200	
		Thru-RT	790	790	200	625	625	200	
17	EB	LT	225	225	125	125	125	125	
156th Ave NE/NE 28th St/NE Turing St		Thru	320	320	25	25	25	25	
		RT	200	200	150	150	150	150	
	WB	LT	80+	80+	125	125	125	125	
		Thru-RT	180	180	75	75	75	75	
	NB	LT	150	150	100	100	100	100	
		Thru	830	830	200	250	250	200	
		Thru-RT	830	830	200	250	250	200	
	SB	LT	230	230	<25	<25	<25	<25	
		Thru	1,020	1,020	425	325	325	425	
		Thru-RT	1,020	1,020	425	325	325	425	

Seritage Overlake Plaza
TENW Project No. 5356

PM Peak Hour Queuing Analysis Summary - Year 2023

Intersection	Direction	2023 With Project Movement	2023 Baseline (Existing) Storage (ft)	2023 With Project Storage (ft)	PM Peak Hour 95th Percentile Queue (ft)				Comments
					2023 Baseline	2023 With Project	2023 With Project (signal at 24th/Lumiere)	2023 With Project - Phase 1	
18	EB	Thru		-		-	-	-	
NE 24th / RIRO Driveway		Thru		-		-	-	-	
		RT		-		-	-	-	
	WB	Thru		-		-	-	-	
		Thru		-		-	-	-	
	NB	RT		TBD		<25	<25	<25	
19	WB	RT		TBD		25	25		
148th Ave / RIRO Driveway	NB	Thru		-		-	-		
		Thru		-		-	-		
		Thru-RT		-		-	-		
	SB	Thru		-		-	-		
		Thru		-		-	-		
20	EB	LT-RT		TBD		25	50		
Lumiere Ave / North Driveway	NB	LT-Thru		TBD		<25	<25		
	SB	Thru-RT		-		-	-		
21	EB	LT-RT		TBD		25	25	50	
DaVinci Ave / Driveway	NB	LT-Thru		TBD		25	25	25	
	SB	Thru-RT		-		-	-	-	
22	EB	LT		TBD		25	25		
Alhazen / Driveway / Regency Access		Th-RT		TBD		-	-		
	WB	LT		TBD		<25	<25		
		Th-RT		TBD		-	-		
	NB	LT-Thru-RT		TBD		50	50		NB approach from Regency site
	SB	LT-Thru-RT		TBD		50	50		
23	EB	LT-RT		TBD		25	25		
Lumiere Ave / South Driveway	NB	LT-Thru		TBD		<25	<25		
	SB	Thru-RT		-		-	-		

Notes:
Existing/Baseline Storage based on field measurements and confirmed by aerial mapping
Where possible, future storage was estimated for future improvements based on preliminary measurements based on Seritage proposed 2023 network.
Storage for through lane queues measured to next signalized intersection unless otherwise noted.
TBD = Storage To Be Determined (future storage unknown and was not estimated - pending future design)
+ = More storage is available in TWLT lane
Queues that exceed storage are highlighted in yellow

2023 Baseline

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	199	405	218	349	585	154	1200	177	333	1630
v/c Ratio	0.83	0.66	1.01	0.57	0.38	0.87	0.66	0.19	0.72	0.89
Control Delay	64.6	48.6	103.9	49.8	0.9	76.0	9.6	0.8	67.1	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.7
Total Delay	64.6	48.6	103.9	49.8	0.9	76.0	9.7	0.8	67.1	26.8
Queue Length 50th (ft)	128	149	~172	145	4	122	63	0	139	217
Queue Length 95th (ft)	#210	192	#236	191	12	#243	181	1	186	#380
Internal Link Dist (ft)		688		839			626			445
Turn Bay Length (ft)	350		325		175	220		395	475	
Base Capacity (vph)	239	762	216	766	1553	177	1820	929	487	1834
Starvation Cap Reductn	0	0	0	0	0	0	45	0	0	120
Spillback Cap Reductn	0	0	0	0	10	0	23	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.53	1.01	0.46	0.38	0.87	0.68	0.19	0.68	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	131	742	23	779	45	318	151
v/c Ratio	0.30	0.37	0.05	0.45	0.11	0.78	0.26
Control Delay	6.1	9.5	8.8	14.9	16.6	49.1	4.7
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	6.1	9.5	8.8	15.1	16.6	49.1	4.7
Queue Length 50th (ft)	11	153	6	123	14	221	0
Queue Length 95th (ft)	m48	293	m16	157	36	287	40
Internal Link Dist (ft)		839		341	389	451	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	452	2025	438	1742	569	566	730
Starvation Cap Reductn	0	0	0	303	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.37	0.05	0.54	0.08	0.56	0.21

Intersection Summary

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	357	669	26	626	143	169	34	133	186
v/c Ratio	0.55	0.30	0.05	0.34	0.69	0.54	0.18	0.35	0.31
Control Delay	17.5	7.4	7.7	12.4	63.3	47.6	34.1	39.3	9.1
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	7.5	7.7	12.4	63.3	47.6	34.1	39.3	9.1
Queue Length 50th (ft)	86	88	6	165	105	113	20	83	38
Queue Length 95th (ft)	197	107	m17	268	165	170	43	127	60
Internal Link Dist (ft)		341		805		423		609	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	765	2207	707	1827	299	448	193	565	727
Starvation Cap Reductn	19	475	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.39	0.04	0.34	0.48	0.38	0.18	0.24	0.26

Intersection Summary

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

Queues
6: 148 Ave NE & NE 22nd St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	72	61	80	60	116	1233	23	170	1266	55
v/c Ratio	0.26	0.21	0.29	0.21	0.37	0.56	0.02	0.51	0.57	0.06
Control Delay	35.9	13.5	36.8	12.8	5.7	5.4	0.0	13.0	7.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0
Total Delay	35.9	13.5	36.8	12.8	5.7	5.5	0.0	13.0	7.4	0.1
Queue Length 50th (ft)	41	4	45	2	12	164	0	21	149	0
Queue Length 95th (ft)	78	40	86	39	m13	195	m0	m39	m181	m0
Internal Link Dist (ft)		207		192		532			626	
Turn Bay Length (ft)	75		85		220		145	175		145
Base Capacity (vph)	280	371	280	369	323	2189	936	374	2219	947
Starvation Cap Reductn	0	0	0	0	0	233	0	0	160	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.29	0.16	0.36	0.63	0.02	0.45	0.61	0.06

Intersection Summary

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

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	227	443	178	647	100	1111	244	1224
v/c Ratio	0.79	0.56	0.56	0.87	0.58	0.84	0.81	0.55
Control Delay	48.9	41.3	34.0	52.2	65.2	40.9	52.8	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0
Total Delay	48.9	41.3	34.0	52.2	65.2	50.0	52.8	11.6
Queue Length 50th (ft)	124	150	94	218	74	415	180	198
Queue Length 95th (ft)	#232	204	150	#296	133	#520	#312	211
Internal Link Dist (ft)		836		700		406		532
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	298	837	323	778	191	1316	303	2236
Starvation Cap Reductn	0	0	0	0	0	186	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.53	0.55	0.83	0.52	0.98	0.81	0.55

Intersection Summary

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

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	127	627	518	99	0	240
Future Vol, veh/h	127	627	518	99	0	240
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	134	660	545	104	0	253

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	669	0	-	0	-	365
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	917	-	-	-	0	626
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	902	-	-	-	-	605
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	15.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	902	-	-	-	605
HCM Lane V/C Ratio	0.148	-	-	-	0.418
HCM Control Delay (s)	9.7	-	-	-	15.1
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	2.1

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	522	1241	1538
v/c Ratio	0.90	0.64	0.66
Control Delay	52.2	2.8	12.5
Queue Delay	0.0	0.0	0.0
Total Delay	52.2	2.8	12.5
Queue Length 50th (ft)	~455	11	366
Queue Length 95th (ft)	427	30	456
Internal Link Dist (ft)		137	722
Turn Bay Length (ft)			
Base Capacity (vph)	638	1925	2346
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.82	0.64	0.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	461	1241	516	1538
v/c Ratio	0.67	0.64	0.36	0.66
Control Delay	39.5	9.7	0.6	2.2
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	39.5	9.8	0.6	2.2
Queue Length 50th (ft)	148	87	0	21
Queue Length 95th (ft)	207	230	m0	23
Internal Link Dist (ft)		445		137
Turn Bay Length (ft)	260			
Base Capacity (vph)	718	1925	1438	2346
Starvation Cap Reductn	0	110	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.64	0.68	0.36	0.66

Intersection Summary

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

Queues
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	285	560	136	635	761	639
v/c Ratio	0.77	0.42	0.54	0.52	0.89	0.50
Control Delay	45.8	25.8	56.9	34.4	46.4	10.8
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	45.8	25.8	56.9	35.0	46.4	10.8
Queue Length 50th (ft)	193	171	99	205	278	203
Queue Length 95th (ft)	292	237	167	301	339	258
Internal Link Dist (ft)		805		342	841	510
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	429	1333	250	1233	979	1443
Starvation Cap Reductn	0	0	0	250	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.42	0.54	0.65	0.78	0.44

Intersection Summary

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	525	318	211	641	6	1037	61	399
v/c Ratio	0.99	0.23	0.50	0.78	0.02	0.93	0.33	0.32
Control Delay	64.4	34.2	22.4	47.7	20.3	53.9	18.6	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	45.1	0.0	0.0
Total Delay	64.4	34.2	22.4	47.7	20.3	99.1	18.6	12.8
Queue Length 50th (ft)	~418	126	85	233	3	407	24	73
Queue Length 95th (ft)	#585	m150	133	303	11	#577	56	153
Internal Link Dist (ft)		510		1853		326		805
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	528	1387	428	822	398	1114	216	1262
Starvation Cap Reductn	0	0	0	0	0	185	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.23	0.49	0.78	0.02	1.12	0.28	0.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	52	65	36	32	227	1307	26	409
v/c Ratio	0.63	0.16	0.15	0.17	0.18	0.32	0.58	0.09	0.21
Control Delay	48.8	41.8	7.4	35.3	21.5	3.3	11.1	7.8	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	41.8	7.4	35.3	21.5	3.3	11.1	7.8	7.2
Queue Length 50th (ft)	139	37	0	23	4	5	323	2	6
Queue Length 95th (ft)	189	68	31	46	33	m51	m477	18	75
Internal Link Dist (ft)		592			450		805		580
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	311	403	449	208	264	720	2240	332	1929
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.13	0.14	0.17	0.12	0.32	0.58	0.08	0.21

Intersection Summary

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

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	238	588	305	478	590	159	1372	331	398	1459
v/c Ratio	0.81	0.95	1.01	0.66	0.40	0.96	0.92	0.38	0.94	0.93
Control Delay	56.5	80.4	95.6	55.2	0.8	89.7	24.9	3.8	92.5	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	13.8	0.1	0.0	14.0
Total Delay	56.5	80.4	95.6	55.2	0.8	89.7	38.7	3.9	92.5	50.9
Queue Length 50th (ft)	162	276	~237	211	0	142	485	34	197	449
Queue Length 95th (ft)	#251	#395	#436	274	0	m#221	#639	m41	#296	#705
Internal Link Dist (ft)		688		829			468			466
Turn Bay Length (ft)	350		325		175	220		395	475	
Base Capacity (vph)	298	620	301	726	1472	166	1494	880	422	1574
Starvation Cap Reductn	0	0	0	0	0	0	143	101	0	141
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	21
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.95	1.01	0.66	0.40	0.96	1.02	0.42	0.94	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	223	902	51	1222	182	324	179
v/c Ratio	0.74	0.49	0.15	0.78	0.73	0.89	0.31
Control Delay	37.4	19.2	9.3	21.5	50.3	64.7	5.3
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	37.4	19.2	9.3	21.7	50.3	64.7	5.3
Queue Length 50th (ft)	98	238	12	213	112	228	0
Queue Length 95th (ft)	#209	308	m22	262	203	#379	48
Internal Link Dist (ft)		829		334	387	287	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	312	1834	350	1562	276	404	626
Starvation Cap Reductn	0	0	0	42	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.49	0.15	0.80	0.66	0.80	0.29

Intersection Summary

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

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	291	868	77	799	108	308	326	335	411
v/c Ratio	0.76	0.58	0.27	0.68	0.55	0.88	0.87	0.46	0.50
Control Delay	45.3	18.1	14.9	27.6	54.2	65.0	53.6	27.4	14.4
Queue Delay	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	18.3	14.9	27.8	54.2	65.0	53.6	27.4	14.4
Queue Length 50th (ft)	139	137	19	161	74	200	189	179	136
Queue Length 95th (ft)	m231	162	m45	261	137	#346	#348	261	205
Internal Link Dist (ft)		334		819		812		540	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	411	1496	283	1181	210	377	378	757	845
Starvation Cap Reductn	0	162	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	52	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.65	0.27	0.71	0.51	0.82	0.86	0.44	0.49

Intersection Summary

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

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

Queues
6: 148 Ave NE & NE 22nd St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	155	128	154	155	1610	56	196	1436	103
v/c Ratio	0.59	0.47	0.54	0.47	0.61	0.82	0.07	0.82	0.70	0.12
Control Delay	52.9	12.9	50.5	12.9	19.3	10.7	0.2	55.3	7.7	1.0
Queue Delay	0.0	0.0	0.0	0.1	0.0	1.9	0.0	0.0	0.6	0.0
Total Delay	52.9	12.9	50.5	13.0	19.3	12.6	0.2	55.3	8.3	1.0
Queue Length 50th (ft)	99	4	89	4	54	330	0	128	174	1
Queue Length 95th (ft)	159	67	146	67	m41	m283	m0	m140	m215	m2
Internal Link Dist (ft)		148		154		702			468	
Turn Bay Length (ft)	75		85		220		145	175		145
Base Capacity (vph)	236	393	238	392	285	1956	830	249	2037	861
Starvation Cap Reductn	0	0	0	0	0	91	0	0	246	0
Spillback Cap Reductn	0	0	0	8	0	202	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.39	0.54	0.40	0.54	0.92	0.07	0.79	0.80	0.12

Intersection Summary

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

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	399	840	292	983	148	1292	199	1625
v/c Ratio	1.12	0.91	0.88	1.12	0.94	1.11	1.10	0.92
Control Delay	125.1	60.3	79.9	111.2	94.8	87.8	133.1	34.9
Queue Delay	0.0	0.4	53.5	0.0	0.0	0.3	0.0	5.2
Total Delay	125.1	60.7	133.5	111.2	94.8	88.1	133.1	40.1
Queue Length 50th (ft)	~355	370	238	~517	127	~662	~204	475
Queue Length 95th (ft)	#566	#461	#439	#656	m#189	m#635	m#362	#555
Internal Link Dist (ft)		507		675		408		702
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	357	970	333	881	157	1168	181	1760
Starvation Cap Reductn	0	0	0	0	0	66	0	0
Spillback Cap Reductn	0	12	103	0	0	37	0	105
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	0.88	1.27	1.12	0.94	1.17	1.10	0.98

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Intersection	
Int Delay, s/veh	13.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	265	858	803	78	0	464
Future Vol, veh/h	265	858	803	78	0	464
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	279	903	845	82	0	488

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	947	0	-	0	-	504
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	727	-	-	-	0	516
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	715	-	-	-	-	499
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	64
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	715	-	-	-	499
HCM Lane V/C Ratio	0.39	-	-	-	0.979
HCM Control Delay (s)	13.2	-	-	-	64
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	1.9	-	-	-	12.9

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	215	1198	1651
v/c Ratio	0.62	0.47	0.64
Control Delay	37.2	1.2	7.3
Queue Delay	0.0	0.0	0.0
Total Delay	37.2	1.2	7.3
Queue Length 50th (ft)	100	12	337
Queue Length 95th (ft)	184	16	m442
Internal Link Dist (ft)		147	685
Turn Bay Length (ft)			
Base Capacity (vph)	406	2568	2584
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.53	0.47	0.64

Intersection Summary

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

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	318	1198	992	1651
v/c Ratio	0.56	0.47	0.69	0.64
Control Delay	41.5	2.2	8.0	2.3
Queue Delay	0.0	0.2	0.0	0.2
Total Delay	41.5	2.4	8.0	2.4
Queue Length 50th (ft)	107	61	241	37
Queue Length 95th (ft)	159	m75	m295	37
Internal Link Dist (ft)		466		147
Turn Bay Length (ft)	260			
Base Capacity (vph)	580	2568	1438	2584
Starvation Cap Reductn	0	534	0	0
Spillback Cap Reductn	3	0	0	214
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.55	0.59	0.69	0.70

Intersection Summary

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

Queues
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	235	1194	89	531	694	1044
v/c Ratio	0.57	0.78	0.64	0.39	0.59	0.89
Control Delay	23.5	24.4	75.5	30.8	29.1	34.1
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.3
Total Delay	23.5	24.5	75.5	30.8	29.1	34.4
Queue Length 50th (ft)	92	284	71	130	198	356
Queue Length 95th (ft)	m155	377	m98	m176	253	m451
Internal Link Dist (ft)		819		335	851	499
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	442	1537	138	1349	1258	1264
Starvation Cap Reductn	0	0	0	0	0	27
Spillback Cap Reductn	0	22	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.79	0.64	0.39	0.55	0.84

Intersection Summary

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

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	280	486	265	657	4	618	158	1316
v/c Ratio	0.75	0.47	0.62	0.65	0.07	0.55	0.49	0.90
Control Delay	39.5	45.2	26.1	39.8	12.5	4.1	17.9	28.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	47.3
Total Delay	39.5	45.2	26.1	39.8	12.5	4.2	17.9	75.9
Queue Length 50th (ft)	187	178	125	238	0	7	55	504
Queue Length 95th (ft)	275	247	190	310	m1	14	63	192
Internal Link Dist (ft)		499		1850		326		819
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	400	1037	468	1007	61	1171	326	1508
Starvation Cap Reductn	0	0	0	0	0	67	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	360
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.47	0.57	0.65	0.07	0.56	0.48	1.15

Intersection Summary

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	22	220	142	191	155	536	16	999
v/c Ratio	0.57	0.10	0.61	0.43	0.58	0.41	0.25	0.03	0.53
Control Delay	47.0	42.8	29.8	39.2	17.0	11.2	12.3	3.9	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	47.0	42.8	29.8	39.2	17.0	11.2	12.3	3.9	13.3
Queue Length 50th (ft)	92	16	94	96	21	19	43	1	158
Queue Length 95th (ft)	128	37	141	133	84	m103	194	m10	430
Internal Link Dist (ft)		551			173		819		482
Turn Bay Length (ft)	225		200	80		100		230	
Base Capacity (vph)	239	405	398	333	465	416	2145	619	1894
Starvation Cap Reductn	0	0	0	0	0	0	0	0	199
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.05	0.55	0.43	0.41	0.37	0.25	0.03	0.59

Intersection Summary

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

2023 With-Project - Full Buildout

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	199	413	260	349	585	163	1307	177	416	1730
v/c Ratio	0.80	0.67	1.14	0.54	0.38	1.01	0.76	0.20	0.79	0.94
Control Delay	58.8	48.7	135.1	46.5	0.9	107.3	11.7	1.0	66.1	30.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5
Total Delay	58.8	48.7	135.1	46.5	0.9	107.3	11.7	1.0	66.1	43.5
Queue Length 50th (ft)	126	152	~228	144	5	~128	90	0	171	222
Queue Length 95th (ft)	#196	195	#297	191	10	#272	114	0	#243	#538
Internal Link Dist (ft)		688		344			275			445
Turn Bay Length (ft)	350		325		175	220			475	
Base Capacity (vph)	250	762	229	796	1553	162	1720	898	536	1832
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	138
Spillback Cap Reductn	0	0	0	0	0	0	1	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.54	1.14	0.44	0.38	1.01	0.76	0.20	0.78	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	788	94	0	1135	0	80
Future Vol, veh/h	788	94	0	1135	0	80
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	829	99	0	1195	0	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	455
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.114	-	-	-
HCM Control Delay (s)	10.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-

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

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	862	8	0	1135	0	38
Future Vol, veh/h	862	8	0	1135	0	38
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	907	8	0	1195	0	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	498
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	*737
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*712
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	712	-	-	-
HCM Lane V/C Ratio	0.056	-	-	-
HCM Control Delay (s)	10.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	140	827	23	806	45	318	165
v/c Ratio	0.33	0.41	0.06	0.46	0.11	0.78	0.28
Control Delay	7.7	11.6	8.7	15.0	16.7	49.4	4.8
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	7.7	11.6	8.7	15.2	16.7	49.4	4.8
Queue Length 50th (ft)	14	162	6	128	14	221	0
Queue Length 95th (ft)	m62	386	m16	165	36	289	42
Internal Link Dist (ft)		128		341	389	451	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	451	2032	404	1739	559	555	727
Starvation Cap Reductn	0	0	0	280	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.41	0.06	0.55	0.08	0.57	0.23

Intersection Summary

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	382	729	26	633	143	169	34	167	207
v/c Ratio	0.58	0.33	0.05	0.36	0.70	0.53	0.17	0.44	0.34
Control Delay	19.8	7.3	6.1	18.8	64.2	47.1	33.8	41.3	10.8
Queue Delay	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	7.4	6.1	18.8	64.2	47.1	33.8	41.3	10.8
Queue Length 50th (ft)	93	93	4	180	105	112	20	107	51
Queue Length 95th (ft)	223	112	m11	m261	166	170	43	156	70
Internal Link Dist (ft)		341		805		423		609	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	773	2206	678	1751	280	433	196	551	748
Starvation Cap Reductn	25	419	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.41	0.04	0.36	0.51	0.39	0.17	0.30	0.28

Intersection Summary

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

Queues
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	74	66	181	117	116	1393	313	1266	55
v/c Ratio	0.27	0.23	0.57	0.32	0.41	0.56	0.76	0.61	0.06
Control Delay	34.2	14.9	43.2	10.5	11.0	10.4	38.3	9.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	34.2	14.9	43.2	10.5	11.0	10.4	38.3	9.6	0.2
Queue Length 50th (ft)	40	7	105	5	14	184	163	188	0
Queue Length 95th (ft)	78	45	168	53	m15	m278	m179	m196	m0
Internal Link Dist (ft)		207		168		532		271	
Turn Bay Length (ft)	75		100		220		175		145
Base Capacity (vph)	277	376	315	446	286	2480	500	2088	898
Starvation Cap Reductn	0	0	0	0	0	0	0	144	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.18	0.57	0.26	0.41	0.56	0.63	0.65	0.06

Intersection Summary

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

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	65	43	13	113	0	49	45	0	0	23	26
Future Vol, veh/h	52	65	43	13	113	0	49	45	0	0	23	26
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	68	45	14	119	0	52	47	0	0	24	27
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8.5	8.8	8.6	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	52%	100%	0%	100%	0%	0%
Vol Thru, %	48%	0%	60%	0%	100%	47%
Vol Right, %	0%	0%	40%	0%	0%	53%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	94	52	108	13	113	49
LT Vol	49	52	0	13	0	0
Through Vol	45	0	65	0	113	23
RT Vol	0	0	43	0	0	26
Lane Flow Rate	99	55	114	14	119	52
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.133	0.084	0.15	0.021	0.167	0.064
Departure Headway (Hd)	4.833	5.524	4.741	5.556	5.053	4.477
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	743	650	757	645	710	799
Service Time	2.857	3.25	2.467	3.284	2.781	2.506
HCM Lane V/C Ratio	0.133	0.085	0.151	0.022	0.168	0.065
HCM Control Delay	8.6	8.8	8.3	8.4	8.8	7.8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.5	0.1	0.6	0.2

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	0	0	61	58	126
Future Vol, veh/h	65	0	0	61	58	126
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	0	0	64	61	133

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	232	148	214	0	-	0
Stage 1	148	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	756	899	1356	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	730	884	1333	-	-	-
Mov Cap-2 Maneuver	730	-	-	-	-	-
Stage 1	865	-	-	-	-	-
Stage 2	923	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1333	-	730	-	-	-
HCM Lane V/C Ratio	-	-	0.094	-	-	-
HCM Control Delay (s)	0	-	10.4	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-	-

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	263	479	247	681	100	1269	244	1325
v/c Ratio	0.92	0.64	0.77	0.90	0.58	0.94	0.89	0.60
Control Delay	68.4	45.3	45.6	56.9	65.2	48.3	68.7	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	44.6	0.0	0.0
Total Delay	68.4	45.3	45.6	56.9	65.2	92.8	68.7	15.2
Queue Length 50th (ft)	152	172	138	241	74	486	186	233
Queue Length 95th (ft)	#314	230	#211	#344	133	#641	#339	247
Internal Link Dist (ft)		836		480		406		532
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	286	755	324	770	191	1352	274	2215
Starvation Cap Reductn	0	0	0	0	0	215	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.63	0.76	0.88	0.52	1.12	0.89	0.60

Intersection Summary

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

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	116	744	816	167	24	85
Future Vol, veh/h	116	744	816	167	24	85
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	783	859	176	25	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1055	0	-	0	1623	558
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	656	-	-	-	93	473
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	478	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	73	457
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	21.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	645	-	-	-	332
HCM Lane V/C Ratio	0.189	-	-	-	0.346
HCM Control Delay (s)	11.9	-	-	-	21.5
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	1.5

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	743	943	36	18	40
Future Vol, veh/h	25	743	943	36	18	40
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	4	4	0	0
Mvmt Flow	26	782	993	38	19	42

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1051	0	-	0	1495	556
Stage 1	-	-	-	-	1032	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	4.14	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.22	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	658	-	-	-	116	480
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	647	-	-	-	108	464
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	647	-	-	-	344
HCM Lane V/C Ratio	0.041	-	-	-	0.177
HCM Control Delay (s)	10.8	-	-	-	17.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	127	665	670	99	0	273
Future Vol, veh/h	127	665	670	99	0	273
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	134	700	705	104	0	287

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	829	0	-	0	-	445
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	798	-	-	-	0	555
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	785	-	-	-	-	537
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	19.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	785	-	-	-	537
HCM Lane V/C Ratio	0.17	-	-	-	0.535
HCM Control Delay (s)	10.5	-	-	-	19.2
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	3.1

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	522	1312	1614
v/c Ratio	0.91	0.68	0.71
Control Delay	55.1	3.2	15.5
Queue Delay	0.0	0.0	0.0
Total Delay	55.1	3.2	15.5
Queue Length 50th (ft)	~457	12	401
Queue Length 95th (ft)	444	38	573
Internal Link Dist (ft)		137	722
Turn Bay Length (ft)			
Base Capacity (vph)	622	1942	2261
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.84	0.68	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	562	1312	549	1614
v/c Ratio	0.75	0.68	0.38	0.71
Control Delay	41.4	8.6	0.6	2.5
Queue Delay	1.0	0.2	0.0	0.0
Total Delay	42.3	8.8	0.6	2.5
Queue Length 50th (ft)	196	84	0	22
Queue Length 95th (ft)	247	184	0	24
Internal Link Dist (ft)		445		137
Turn Bay Length (ft)	260			
Base Capacity (vph)	784	1942	1438	2261
Starvation Cap Reductn	0	112	0	0
Spillback Cap Reductn	68	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.72	0.38	0.71

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	344	561	143	636	761	723
v/c Ratio	0.83	0.44	0.54	0.57	0.91	0.56
Control Delay	45.6	21.4	55.5	38.2	48.6	5.1
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	45.6	21.4	55.5	38.6	48.6	5.1
Queue Length 50th (ft)	248	181	104	224	277	8
Queue Length 95th (ft)	#360	207	173	305	357	32
Internal Link Dist (ft)		805		342	841	510
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	459	1277	265	1113	919	1419
Starvation Cap Reductn	0	0	0	144	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.44	0.54	0.66	0.83	0.51

Intersection Summary

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

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	574	329	211	683	6	1037	61	441
v/c Ratio	1.09	0.23	0.50	0.81	0.02	0.96	0.32	0.35
Control Delay	92.7	34.5	21.5	48.7	21.5	59.5	22.9	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	42.5	0.0	0.0
Total Delay	92.7	34.5	21.5	48.7	21.5	102.0	22.9	17.2
Queue Length 50th (ft)	~453	120	82	251	3	~419	32	113
Queue Length 95th (ft)	m#662	m154	128	324	11	#603	62	179
Internal Link Dist (ft)		510		1853		326		805
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	529	1419	433	848	369	1081	215	1262
Starvation Cap Reductn	0	0	0	0	0	148	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.23	0.49	0.81	0.02	1.11	0.28	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	52	65	36	32	227	1354	26	450
v/c Ratio	0.63	0.16	0.15	0.17	0.18	0.33	0.60	0.10	0.23
Control Delay	48.8	41.8	7.4	35.3	21.5	2.8	9.3	7.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	41.8	7.4	35.3	21.5	2.8	9.3	7.5	6.8
Queue Length 50th (ft)	139	37	0	23	4	13	198	1	5
Queue Length 95th (ft)	189	68	31	46	33	m26	m430	17	78
Internal Link Dist (ft)		592			450		805		580
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	311	403	449	208	264	695	2242	319	1934
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.13	0.14	0.17	0.12	0.33	0.60	0.08	0.23

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	845	23	0	1135	0	25
Future Vol, veh/h	845	23	0	1135	0	25
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	889	24	0	1195	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	485
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	*737
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*712
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	712	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-
HCM Control Delay (s)	10.3	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	40	1525	31	0	1528
Future Vol, veh/h	0	40	1525	31	0	1528
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	42	1605	33	0	1608

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	859	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	*567	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*548	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	548	-
HCM Lane V/C Ratio	-	-	0.077	-
HCM Control Delay (s)	-	-	12.1	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.2	-

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

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	26	67	30	23	71
Future Vol, veh/h	50	26	67	30	23	71
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	27	71	32	24	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	276	102	119	0	-	0
Stage 1	82	-	-	-	-	-
Stage 2	194	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	714	953	1469	-	-	-
Stage 1	941	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	655	921	1445	-	-	-
Mov Cap-2 Maneuver	655	-	-	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	825	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	5.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1445	-	727	-	-
HCM Lane V/C Ratio	0.049	-	0.11	-	-
HCM Control Delay (s)	7.6	0	10.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	184	113	13	0	8
Future Vol, veh/h	25	184	113	13	0	8
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	194	119	14	0	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	296	44	28	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	695	1026	1585	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	620	992	1559	-	-	-
Mov Cap-2 Maneuver	620	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	761	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	6.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	926	-	-
HCM Lane V/C Ratio	0.076	-	0.238	-	-
HCM Control Delay (s)	7.5	0	10.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	188	114	125	0	141	47	63	0	26	20	0	86
Future Vol, veh/h	188	114	125	0	141	47	63	0	26	20	0	86
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	198	120	132	0	148	49	66	0	27	21	0	91

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	217	0	0	272	0	0	840	819	226	809	861	213
Stage 1	-	-	-	-	-	-	602	602	-	193	193	-
Stage 2	-	-	-	-	-	-	238	217	-	616	668	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1353	-	-	1301	-	-	286	309	866	302	291	827
Stage 1	-	-	-	-	-	-	494	488	-	809	741	-
Stage 2	-	-	-	-	-	-	765	723	-	485	453	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1330	-	-	1279	-	-	218	254	838	250	239	800
Mov Cap-2 Maneuver	-	-	-	-	-	-	299	320	-	326	318	-
Stage 1	-	-	-	-	-	-	413	408	-	677	728	-
Stage 2	-	-	-	-	-	-	667	711	-	392	379	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	18.1	12
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1330	-	-	1279	-	-	628
HCM Lane V/C Ratio	0.255	0.149	-	-	-	-	-	0.178
HCM Control Delay (s)	18.1	8.2	-	-	0	-	-	12
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1	0.5	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	72	212	71	37	42
Future Vol, veh/h	23	72	212	71	37	42
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	76	223	75	39	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	622	101	103	0	-	0
Stage 1	81	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	450	954	1489	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	366	922	1464	-	-	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	573	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	5.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1464	-	674	-	-
HCM Lane V/C Ratio	0.152	-	0.148	-	-
HCM Control Delay (s)	7.9	0	11.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.5	-	-

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	231	602	347	466	574	190	1528	323	445	1489
v/c Ratio	0.73	0.97	1.11	0.66	0.39	1.01	1.04	0.37	1.05	0.99
Control Delay	47.8	85.0	123.3	56.2	0.8	98.5	50.0	2.7	115.2	48.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.1	0.0	32.2
Total Delay	47.8	85.0	123.3	56.2	0.8	98.5	51.6	2.7	115.2	81.0
Queue Length 50th (ft)	154	284	~315	209	0	~172	~781	4	~233	561
Queue Length 95th (ft)	229	#409	#516	272	0	m#283	#910	m14	#347	#861
Internal Link Dist (ft)		688		325			202			466
Turn Bay Length (ft)	350		325		175	220			475	
Base Capacity (vph)	334	619	312	707	1472	189	1470	880	422	1506
Starvation Cap Reductn	0	0	0	0	0	0	6	78	0	133
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	25
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.97	1.11	0.66	0.39	1.01	1.04	0.40	1.05	1.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	1147	74	0	1331	0	169
Future Vol, veh/h	1147	74	0	1331	0	169
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1207	78	0	1401	0	178

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	644
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	*608
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*588
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	588	-	-	-
HCM Lane V/C Ratio	0.303	-	-	-
HCM Control Delay (s)	13.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	1.3	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1265	11	0	1331	0	52
Future Vol, veh/h	1265	11	0	1331	0	52
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1332	12	0	1401	0	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	712
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	*563
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*544
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	544	-	-	-
HCM Lane V/C Ratio	0.101	-	-	-
HCM Control Delay (s)	12.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	238	993	51	1226	182	324	189
v/c Ratio	0.77	0.54	0.16	0.79	0.74	0.90	0.32
Control Delay	41.1	19.8	8.9	21.2	52.3	66.5	5.4
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	41.1	19.8	8.9	21.4	52.3	66.5	5.4
Queue Length 50th (ft)	113	273	13	216	112	228	0
Queue Length 95th (ft)	#229	343	m20	260	#220	#386	50
Internal Link Dist (ft)		55		334	387	287	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	320	1847	322	1551	267	394	623
Starvation Cap Reductn	0	0	0	44	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.54	0.16	0.81	0.68	0.82	0.30

Intersection Summary

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

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	318	933	77	790	108	308	326	386	425
v/c Ratio	0.79	0.62	0.29	0.70	0.57	0.86	0.88	0.54	0.51
Control Delay	47.8	17.7	12.5	36.7	54.9	61.8	55.3	29.3	13.9
Queue Delay	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	18.0	12.5	36.9	54.9	61.8	55.3	29.3	13.9
Queue Length 50th (ft)	163	144	37	302	74	197	185	213	137
Queue Length 95th (ft)	m251	168	m46	375	137	#334	#348	308	205
Internal Link Dist (ft)		334		819		812		540	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	431	1509	265	1131	208	391	370	757	863
Starvation Cap Reductn	0	163	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	39	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.69	0.29	0.72	0.52	0.79	0.88	0.51	0.49

Intersection Summary

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

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

Queues
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	141	158	260	205	155	1791	326	1392	103
v/c Ratio	0.61	0.48	0.92	0.50	0.63	0.79	0.93	0.71	0.12
Control Delay	50.6	13.5	80.6	11.6	19.3	20.8	68.1	8.3	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.9	0.0
Total Delay	50.6	13.5	80.6	11.7	19.3	21.5	68.1	9.1	1.2
Queue Length 50th (ft)	95	6	190	7	48	430	259	192	2
Queue Length 95th (ft)	153	70	#270	77	m33	m310	m258	m188	m2
Internal Link Dist (ft)		148		154		702		186	
Turn Bay Length (ft)	75		100		220		175		145
Base Capacity (vph)	236	394	282	467	260	2264	375	1960	832
Starvation Cap Reductn	0	0	0	0	0	0	0	280	0
Spillback Cap Reductn	0	0	0	7	0	196	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.40	0.92	0.45	0.60	0.87	0.87	0.83	0.12

Intersection Summary

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

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

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	175	36	10	158	0	43	36	0	0	21	28
Future Vol, veh/h	51	175	36	10	158	0	43	36	0	0	21	28
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	184	38	11	166	0	45	38	0	0	22	29
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	9.6	9.4	9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	54%	100%	0%	100%	0%	0%
Vol Thru, %	46%	0%	83%	0%	100%	43%
Vol Right, %	0%	0%	17%	0%	0%	57%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	79	51	211	10	158	49
LT Vol	43	51	0	10	0	0
Through Vol	36	0	175	0	158	21
RT Vol	0	0	36	0	0	28
Lane Flow Rate	83	54	222	11	166	52
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.12	0.083	0.303	0.016	0.237	0.069
Departure Headway (Hd)	5.194	5.539	4.916	5.631	5.128	4.796
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	689	646	731	635	699	744
Service Time	3.238	3.277	2.654	3.373	2.87	2.843
HCM Lane V/C Ratio	0.12	0.084	0.304	0.017	0.237	0.07
HCM Control Delay	9	8.8	9.8	8.5	9.5	8.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0.3	1.3	0	0.9	0.2

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	0	0	131	46	168
Future Vol, veh/h	175	0	0	131	46	168
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	184	0	0	138	48	177

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	315	157	245	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	678	889	1321	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	655	874	1299	-	-	-
Mov Cap-2 Maneuver	655	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1299	-	655	-	-	-
HCM Lane V/C Ratio	-	-	0.281	-	-	-
HCM Control Delay (s)	0	-	12.6	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-	-

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	431	873	364	1012	148	1402	199	1728
v/c Ratio	1.21	1.02	1.03	1.18	1.02	1.14	1.27	0.95
Control Delay	158.6	84.4	104.8	134.2	132.3	96.3	194.2	38.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	44.1
Total Delay	158.6	84.4	104.8	134.2	132.3	96.5	194.2	82.6
Queue Length 50th (ft)	~428	~432	~341	~568	~133	~783	~228	508
Queue Length 95th (ft)	#641	#567	m#501	m#701	m#204	m#782	m#365	#651
Internal Link Dist (ft)		507		480		408		702
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	357	857	352	855	145	1234	157	1824
Starvation Cap Reductn	0	0	0	0	0	52	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	273
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	1.02	1.03	1.18	1.02	1.19	1.27	1.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	1013	1212	89	42	109
Future Vol, veh/h	75	1013	1212	89	42	109
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	79	1066	1276	94	44	115

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1390	0	-	0	2054	725
Stage 1	-	-	-	-	1343	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	493	-	-	-	49	372
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	453	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	~ 40	360
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	445	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	47.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	485	-	-	-	234
HCM Lane V/C Ratio	0.163	-	-	-	0.679
HCM Control Delay (s)	13.9	-	-	-	47.8
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0.6	-	-	-	4.3

Notes

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

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	59	996	1272	72	17	29
Future Vol, veh/h	59	996	1272	72	17	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	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	64	1083	1383	78	18	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1461	0	-	0	2092	731
Stage 1	-	-	-	-	1422	-
Stage 2	-	-	-	-	670	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	458	-	-	-	45	364
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	470	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	458	-	-	-	39	364
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	27.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	458	-	-	-	208
HCM Lane V/C Ratio	0.14	-	-	-	0.24
HCM Control Delay (s)	14.1	-	-	-	27.7
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	25.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	265	907	897	78	0	513
Future Vol, veh/h	265	907	897	78	0	513
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	279	955	944	82	0	540

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1046	0	-	0	-	553
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	667	-	-	-	0	~ 479
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	656	-	-	-	-	~ 463
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	124.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	656	-	-	-	463
HCM Lane V/C Ratio	0.425	-	-	-	1.166
HCM Control Delay (s)	14.5	-	-	-	124.2
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	2.1	-	-	-	19.8

Notes

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

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	215	1274	1686
v/c Ratio	0.63	0.50	0.66
Control Delay	40.9	1.2	7.9
Queue Delay	0.0	0.0	0.0
Total Delay	40.9	1.2	7.9
Queue Length 50th (ft)	111	12	361
Queue Length 95th (ft)	196	15	m468
Internal Link Dist (ft)		147	685
Turn Bay Length (ft)			
Base Capacity (vph)	397	2556	2562
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.54	0.50	0.66

Intersection Summary

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

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	358	1274	1056	1686
v/c Ratio	0.62	0.50	0.73	0.66
Control Delay	45.3	2.2	11.0	2.4
Queue Delay	1.8	0.2	0.0	0.3
Total Delay	47.0	2.5	11.0	2.7
Queue Length 50th (ft)	131	61	286	38
Queue Length 95th (ft)	188	m74	m302	38
Internal Link Dist (ft)		466		147
Turn Bay Length (ft)	260			
Base Capacity (vph)	602	2556	1438	2562
Starvation Cap Reductn	0	532	0	0
Spillback Cap Reductn	118	0	0	283
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.74	0.63	0.73	0.74

Intersection Summary

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

Queues
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	296	1197	93	531	694	1096
v/c Ratio	0.70	0.81	0.67	0.46	0.56	0.89
Control Delay	27.5	29.9	77.5	37.3	27.0	32.1
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.9
Total Delay	27.5	30.2	77.5	37.3	27.0	33.0
Queue Length 50th (ft)	162	410	75	205	190	378
Queue Length 95th (ft)	m227	512	m102	m236	245	m455
Internal Link Dist (ft)		819		335	851	499
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	468	1471	138	1164	1308	1308
Starvation Cap Reductn	0	0	0	0	0	63
Spillback Cap Reductn	0	30	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.83	0.67	0.46	0.53	0.88

Intersection Summary

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

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	319	509	265	679	4	618	158	1349
v/c Ratio	0.82	0.48	0.63	0.71	0.07	0.57	0.49	0.94
Control Delay	37.7	37.3	25.8	42.4	16.5	7.1	19.1	31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	46.0
Total Delay	37.7	37.3	25.8	42.4	16.5	7.2	19.1	77.6
Queue Length 50th (ft)	160	197	121	250	1	18	55	526
Queue Length 95th (ft)	#283	257	183	322	m2	31	75	#623
Internal Link Dist (ft)		499		1850		326		819
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	408	1068	459	961	58	1099	328	1458
Starvation Cap Reductn	0	0	0	0	0	46	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	402
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.48	0.58	0.71	0.07	0.59	0.48	1.28

Intersection Summary

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	22	220	142	191	155	575	16	1031
v/c Ratio	0.57	0.10	0.62	0.43	0.58	0.42	0.27	0.03	0.55
Control Delay	47.0	42.8	30.5	39.2	17.0	13.6	16.0	3.4	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	47.0	42.8	30.5	39.2	17.0	13.6	16.0	3.4	12.3
Queue Length 50th (ft)	92	16	96	96	21	37	96	1	178
Queue Length 95th (ft)	128	37	143	133	84	m112	238	m6	321
Internal Link Dist (ft)		551			173		819		482
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	239	390	395	333	453	404	2146	602	1890
Starvation Cap Reductn	0	0	0	0	0	0	0	0	156
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.06	0.56	0.43	0.42	0.38	0.27	0.03	0.59

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1243	73	0	1331	0	33
Future Vol, veh/h	1243	73	0	1331	0	33
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1308	77	0	1401	0	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	694
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	*563
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*544
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	544	-	-	-
HCM Lane V/C Ratio	0.064	-	-	-
HCM Control Delay (s)	12.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	145	1814	31	0	1723
Future Vol, veh/h	0	145	1814	31	0	1723
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	153	1909	33	0	1814

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1011	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	*506	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*489	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	489	-
HCM Lane V/C Ratio	-	-	0.312	-
HCM Control Delay (s)	-	-	15.7	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	1.3	-

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

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	120	40	38	49	9	65
Future Vol, veh/h	120	40	38	49	9	65
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	126	42	40	52	9	68

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	215	83	97	0	-	0
Stage 1	63	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	773	976	1496	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	726	944	1471	-	-	-
Mov Cap-2 Maneuver	726	-	-	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	861	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	3.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1471	-	770	-	-
HCM Lane V/C Ratio	0.027	-	0.219	-	-
HCM Control Delay (s)	7.5	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	-	-

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	214	286	20	0	11
Future Vol, veh/h	32	214	286	20	0	11
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	225	301	21	0	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	669	46	32	0	-	0
Stage 1	26	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	423	1023	1580	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	523	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	329	989	1554	-	-	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	7.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1554	-	784	-	-
HCM Lane V/C Ratio	0.194	-	0.33	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.7	-	1.4	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	214	190	96	0	205	25	79	0	40	32	0	173
Future Vol, veh/h	214	190	96	0	205	25	79	0	40	32	0	173
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	225	200	101	0	216	26	83	0	42	34	0	182

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	262	0	0	321	0	0	1061	983	291	991	1020	269
Stage 1	-	-	-	-	-	-	721	721	-	249	249	-
Stage 2	-	-	-	-	-	-	340	262	-	742	771	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1302	-	-	1252	-	-	194	240	826	220	226	770
Stage 1	-	-	-	-	-	-	423	424	-	755	701	-
Stage 2	-	-	-	-	-	-	675	691	-	410	399	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1280	-	-	1231	-	-	123	191	798	174	180	745
Mov Cap-2 Maneuver	-	-	-	-	-	-	195	262	-	256	267	-
Stage 1	-	-	-	-	-	-	342	343	-	612	689	-
Stage 2	-	-	-	-	-	-	502	679	-	315	324	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	30.9	15
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	261	1280	-	-	1231	-	-	574
HCM Lane V/C Ratio	0.48	0.176	-	-	-	-	-	0.376
HCM Control Delay (s)	30.9	8.4	-	-	0	-	-	15
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	2.4	0.6	-	-	0	-	-	1.7

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	106	123	41	45	22
Future Vol, veh/h	38	106	123	41	45	22
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	112	129	43	47	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	400	99	90	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	321	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	606	957	1505	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	533	925	1480	-	-	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	5.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	775	-	-
HCM Lane V/C Ratio	0.087	-	0.196	-	-
HCM Control Delay (s)	7.7	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.7	-	-

2023 With-Project - Full Buildout (with Signal at Lumiere/24th)

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	199	413	260	357	652	156	1241	177	416	1730
v/c Ratio	0.81	0.67	1.14	0.55	0.42	0.96	0.72	0.20	0.79	0.94
Control Delay	60.3	48.7	132.9	44.6	1.7	95.4	10.7	0.8	66.5	30.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5
Total Delay	60.3	48.7	132.9	44.6	1.7	95.4	10.7	0.8	66.5	43.5
Queue Length 50th (ft)	126	152	~229	148	10	120	77	1	171	208
Queue Length 95th (ft)	#200	195	#317	131	28	#259	101	0	#243	#528
Internal Link Dist (ft)		688		344			275			445
Turn Bay Length (ft)	350		325		175	220			475	
Base Capacity (vph)	247	762	229	796	1553	162	1720	898	536	1832
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	138
Spillback Cap Reductn	0	0	0	0	3	0	8	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.54	1.14	0.45	0.42	0.96	0.72	0.20	0.78	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBT	EBR	WBT	NBL	NBR
Lane Group Flow (vph)	829	99	1195	74	84
v/c Ratio	0.33	0.09	0.47	0.24	0.25
Control Delay	6.6	2.4	6.2	20.8	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	2.4	6.2	20.8	6.3
Queue Length 50th (ft)	170	5	61	25	0
Queue Length 95th (ft)	243	m41	284	40	22
Internal Link Dist (ft)	344		64	270	
Turn Bay Length (ft)		165		200	
Base Capacity (vph)	2516	1090	2516	667	640
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.33	0.09	0.47	0.11	0.13

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	862	8	0	1135	0	38
Future Vol, veh/h	862	8	0	1135	0	38
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	907	8	0	1195	0	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	498
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	*755
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*730
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	730	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-
HCM Control Delay (s)	10.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	140	827	23	806	45	318	165
v/c Ratio	0.33	0.41	0.06	0.46	0.11	0.78	0.28
Control Delay	8.5	9.7	10.1	16.3	16.7	49.4	4.8
Queue Delay	0.0	0.1	0.0	0.2	0.0	0.0	0.0
Total Delay	8.5	9.9	10.1	16.5	16.7	49.4	4.8
Queue Length 50th (ft)	16	161	5	135	14	221	0
Queue Length 95th (ft)	75	189	m20	202	36	289	42
Internal Link Dist (ft)		128		341	389	451	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	451	2032	404	1739	559	555	727
Starvation Cap Reductn	0	339	0	280	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.49	0.06	0.55	0.08	0.57	0.23

Intersection Summary

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	382	729	26	633	143	169	34	167	207
v/c Ratio	0.58	0.33	0.05	0.36	0.70	0.53	0.17	0.44	0.34
Control Delay	15.3	7.5	8.4	13.7	64.2	47.1	33.8	41.3	10.8
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	7.6	8.4	13.7	64.2	47.1	33.8	41.3	10.8
Queue Length 50th (ft)	84	85	7	173	105	112	20	107	51
Queue Length 95th (ft)	181	103	m17	m271	166	170	43	156	70
Internal Link Dist (ft)		341		805		423		609	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	773	2206	678	1751	280	433	196	551	748
Starvation Cap Reductn	9	420	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.41	0.04	0.36	0.51	0.39	0.17	0.30	0.28

Intersection Summary

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

Queues
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	74	66	181	66	116	1393	313	1266	55
v/c Ratio	0.26	0.23	0.57	0.20	0.41	0.56	0.76	0.61	0.06
Control Delay	34.0	14.9	43.2	12.7	11.0	10.4	38.0	9.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	34.0	14.9	43.2	12.7	11.0	10.4	38.0	9.3	0.2
Queue Length 50th (ft)	40	7	105	5	14	184	161	185	0
Queue Length 95th (ft)	78	45	168	41	m15	m278	m177	m189	m0
Internal Link Dist (ft)		207		168		532		271	
Turn Bay Length (ft)	75		100		220		175		145
Base Capacity (vph)	285	376	315	411	286	2480	500	2088	898
Starvation Cap Reductn	0	0	0	0	0	0	0	144	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.18	0.57	0.16	0.41	0.56	0.63	0.65	0.06

Intersection Summary

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

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	65	43	13	83	30	47	50	0	0	23	23
Future Vol, veh/h	57	65	43	13	83	30	47	50	0	0	23	23
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	68	45	14	87	32	49	53	0	0	24	24
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8.5	8.5	8.6	7.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	48%	100%	0%	100%	0%	0%
Vol Thru, %	52%	0%	60%	0%	73%	50%
Vol Right, %	0%	0%	40%	0%	27%	50%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	97	57	108	13	113	46
LT Vol	47	57	0	13	0	0
Through Vol	50	0	65	0	83	23
RT Vol	0	0	43	0	30	23
Lane Flow Rate	102	60	114	14	119	48
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.137	0.092	0.15	0.021	0.161	0.061
Departure Headway (Hd)	4.824	5.522	4.739	5.564	4.874	4.502
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	744	650	757	644	736	796
Service Time	2.849	3.248	2.465	3.292	2.602	2.53
HCM Lane V/C Ratio	0.137	0.092	0.151	0.022	0.162	0.06
HCM Control Delay	8.6	8.8	8.3	8.4	8.5	7.8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.5	0.1	0.6	0.2

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	0	0	61	58	126
Future Vol, veh/h	65	0	0	61	58	126
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	0	0	64	61	133

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	232	148	214	0	-	0
Stage 1	148	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	756	899	1356	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	730	884	1333	-	-	-
Mov Cap-2 Maneuver	730	-	-	-	-	-
Stage 1	865	-	-	-	-	-
Stage 2	923	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1333	-	730	-	-	-
HCM Lane V/C Ratio	-	-	0.094	-	-	-
HCM Control Delay (s)	0	-	10.4	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-	-

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	263	479	247	681	100	1269	244	1325
v/c Ratio	0.92	0.64	0.77	0.90	0.58	0.94	0.89	0.60
Control Delay	68.4	45.3	45.6	56.9	65.2	48.3	68.7	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	44.6	0.0	0.0
Total Delay	68.4	45.3	45.6	56.9	65.2	92.8	68.7	15.2
Queue Length 50th (ft)	152	172	138	241	74	486	185	232
Queue Length 95th (ft)	#314	230	#211	#344	133	#641	#339	247
Internal Link Dist (ft)		836		480		406		532
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	286	755	324	770	191	1352	274	2215
Starvation Cap Reductn	0	0	0	0	0	215	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.63	0.76	0.88	0.52	1.12	0.89	0.60

Intersection Summary

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

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	116	744	816	167	24	85
Future Vol, veh/h	116	744	816	167	24	85
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	783	859	176	25	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1055	0	-	0	1623	558
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	656	-	-	-	93	473
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	478	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	73	457
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	21.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	645	-	-	-	332
HCM Lane V/C Ratio	0.189	-	-	-	0.346
HCM Control Delay (s)	11.9	-	-	-	21.5
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	1.5

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	743	943	36	18	40
Future Vol, veh/h	25	743	943	36	18	40
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	4	4	0	0
Mvmt Flow	26	782	993	38	19	42

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1051	0	-	0	1495	556
Stage 1	-	-	-	-	1032	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	4.14	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.22	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	658	-	-	-	116	480
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	647	-	-	-	108	464
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	647	-	-	-	344
HCM Lane V/C Ratio	0.041	-	-	-	0.177
HCM Control Delay (s)	10.8	-	-	-	17.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	127	665	670	99	0	273
Future Vol, veh/h	127	665	670	99	0	273
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	134	700	705	104	0	287

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	829	0	-	0	-	445
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	798	-	-	-	0	555
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	785	-	-	-	-	537
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	19.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	785	-	-	-	537
HCM Lane V/C Ratio	0.17	-	-	-	0.535
HCM Control Delay (s)	10.5	-	-	-	19.2
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	3.1

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	522	1312	1614
v/c Ratio	0.91	0.68	0.71
Control Delay	55.1	2.9	15.5
Queue Delay	0.0	0.0	0.0
Total Delay	55.1	2.9	15.5
Queue Length 50th (ft)	~457	14	401
Queue Length 95th (ft)	444	30	573
Internal Link Dist (ft)		137	722
Turn Bay Length (ft)			
Base Capacity (vph)	622	1942	2261
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.84	0.68	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	562	1312	549	1614
v/c Ratio	0.75	0.68	0.38	0.71
Control Delay	41.4	10.2	0.6	2.5
Queue Delay	0.8	0.1	0.0	0.0
Total Delay	42.1	10.4	0.6	2.5
Queue Length 50th (ft)	196	104	0	22
Queue Length 95th (ft)	247	236	m0	24
Internal Link Dist (ft)		445		137
Turn Bay Length (ft)	260			
Base Capacity (vph)	784	1942	1438	2261
Starvation Cap Reductn	0	86	0	0
Spillback Cap Reductn	58	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.71	0.38	0.71

Intersection Summary

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

Queues
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	344	561	143	636	761	723
v/c Ratio	0.83	0.44	0.54	0.57	0.91	0.56
Control Delay	49.9	26.3	55.5	38.2	48.6	14.7
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	49.9	26.3	55.5	38.6	48.6	14.7
Queue Length 50th (ft)	250	182	104	224	277	237
Queue Length 95th (ft)	#359	215	173	305	357	284
Internal Link Dist (ft)		805		342	841	510
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	459	1277	265	1113	919	1419
Starvation Cap Reductn	0	0	0	144	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.44	0.54	0.66	0.83	0.51

Intersection Summary

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

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	574	329	211	683	6	1037	61	441
v/c Ratio	1.09	0.23	0.50	0.81	0.02	0.96	0.32	0.35
Control Delay	82.8	27.7	21.5	48.7	21.5	59.5	21.7	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	42.5	0.0	0.0
Total Delay	82.8	27.7	21.5	48.7	21.5	102.0	21.7	16.5
Queue Length 50th (ft)	~456	112	82	251	3	~419	32	117
Queue Length 95th (ft)	m#643	m107	128	324	11	#603	60	171
Internal Link Dist (ft)		510		1853		326		805
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	529	1419	433	848	369	1081	215	1262
Starvation Cap Reductn	0	0	0	0	0	148	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.23	0.49	0.81	0.02	1.11	0.28	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	52	65	36	32	227	1354	26	450
v/c Ratio	0.63	0.16	0.15	0.17	0.18	0.33	0.60	0.10	0.23
Control Delay	48.8	41.8	7.4	35.3	21.5	2.8	9.7	6.1	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	41.8	7.4	35.3	21.5	2.8	9.7	6.1	5.2
Queue Length 50th (ft)	139	37	0	23	4	11	240	1	2
Queue Length 95th (ft)	189	68	31	46	33	m31	m441	14	64
Internal Link Dist (ft)		592			450		805		580
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	311	403	449	208	264	695	2242	319	1934
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.13	0.14	0.17	0.12	0.33	0.60	0.08	0.23

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	845	23	0	1135	0	25
Future Vol, veh/h	845	23	0	1135	0	25
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	889	24	0	1195	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	485
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	*755
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*730
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	730	-	-	-
HCM Lane V/C Ratio	0.036	-	-	-
HCM Control Delay (s)	10.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	20	1475	31	0	1528
Future Vol, veh/h	0	20	1475	31	0	1528
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	1553	33	0	1608

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	833	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	*588	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*569	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	569	-
HCM Lane V/C Ratio	-	-	0.037	-
HCM Control Delay (s)	-	-	11.6	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.1	-

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

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	80	23	67	70	23	71
Future Vol, veh/h	80	23	67	70	23	71
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	84	24	71	74	24	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	318	102	119	0	-	0
Stage 1	82	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	675	953	1469	-	-	-
Stage 1	941	-	-	-	-	-
Stage 2	803	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	619	921	1445	-	-	-
Mov Cap-2 Maneuver	619	-	-	-	-	-
Stage 1	878	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	3.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1445	-	668	-	-
HCM Lane V/C Ratio	0.049	-	0.162	-	-
HCM Control Delay (s)	7.6	0	11.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	184	113	13	0	8
Future Vol, veh/h	25	184	113	13	0	8
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	194	119	14	0	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	296	44	28	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	695	1026	1585	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	620	992	1559	-	-	-
Mov Cap-2 Maneuver	620	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	761	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	6.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	926	-	-
HCM Lane V/C Ratio	0.076	-	0.238	-	-
HCM Control Delay (s)	7.5	0	10.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	188	114	125	0	106	47	63	0	26	25	0	71
Future Vol, veh/h	188	114	125	0	106	47	63	0	26	25	0	71
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	198	120	132	0	112	49	66	0	27	26	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	181	0	0	272	0	0	796	783	226	773	825	177
Stage 1	-	-	-	-	-	-	602	602	-	157	157	-
Stage 2	-	-	-	-	-	-	194	181	-	616	668	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1394	-	-	1301	-	-	309	326	866	321	306	866
Stage 1	-	-	-	-	-	-	494	488	-	845	768	-
Stage 2	-	-	-	-	-	-	808	750	-	485	453	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1371	-	-	1279	-	-	242	269	838	267	253	837
Mov Cap-2 Maneuver	-	-	-	-	-	-	319	330	-	334	324	-
Stage 1	-	-	-	-	-	-	415	410	-	711	755	-
Stage 2	-	-	-	-	-	-	724	737	-	395	381	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	17.2	12.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	389	1371	-	-	1279	-	-	601
HCM Lane V/C Ratio	0.241	0.144	-	-	-	-	-	0.168
HCM Control Delay (s)	17.2	8.1	-	-	0	-	-	12.2
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.9	0.5	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	72	212	71	37	42
Future Vol, veh/h	26	72	212	71	37	42
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	76	223	75	39	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	622	101	103	0	-	0
Stage 1	81	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	450	954	1489	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	366	922	1464	-	-	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	573	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	5.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1464	-	657	-	-
HCM Lane V/C Ratio	0.152	-	0.157	-	-
HCM Control Delay (s)	7.9	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.6	-	-

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	231	602	347	493	716	163	1386	323	445	1489
v/c Ratio	0.73	0.97	1.03	0.65	0.49	0.98	0.99	0.37	1.00	0.99
Control Delay	45.9	85.0	96.9	54.2	1.2	95.0	36.0	2.3	102.8	49.5
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	5.1	0.1	0.0	32.2
Total Delay	45.9	85.0	96.9	54.5	1.2	95.0	41.1	2.4	102.8	81.7
Queue Length 50th (ft)	151	284	~288	220	0	148	370	0	221	625
Queue Length 95th (ft)	224	#409	#489	283	0	m#242	#800	m3	#336	#861
Internal Link Dist (ft)		688		325			202			466
Turn Bay Length (ft)	350		325		175	220			475	
Base Capacity (vph)	339	619	337	759	1472	166	1399	872	445	1506
Starvation Cap Reductn	0	0	0	42	0	0	29	67	0	133
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	20
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.97	1.03	0.69	0.49	0.98	1.01	0.40	1.00	1.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Queues
2: Lumiere Ave NE & NE 24 St

10/26/2017

Lane Group	EBT	EBR	WBT	NBL	NBR
Lane Group Flow (vph)	1207	78	1400	172	178
v/c Ratio	0.55	0.08	0.64	0.46	0.51
Control Delay	9.2	2.7	10.2	23.0	21.9
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	9.5	2.7	10.2	23.0	21.9
Queue Length 50th (ft)	103	0	267	56	51
Queue Length 95th (ft)	252	19	320	80	78
Internal Link Dist (ft)	325		77	204	
Turn Bay Length (ft)		165		200	
Base Capacity (vph)	2190	953	2190	696	627
Starvation Cap Reductn	320	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.65	0.08	0.64	0.25	0.28

Intersection Summary

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1265	11	0	1330	0	52
Future Vol, veh/h	1265	11	0	1330	0	52
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1332	12	0	1400	0	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	712
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	*547
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*529
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	529	-	-	-
HCM Lane V/C Ratio	0.103	-	-	-
HCM Control Delay (s)	12.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	238	993	51	1226	182	324	189
v/c Ratio	0.77	0.54	0.16	0.79	0.74	0.90	0.32
Control Delay	42.1	16.3	10.9	24.4	52.3	66.5	5.4
Queue Delay	0.0	0.1	0.0	0.2	0.0	0.0	0.0
Total Delay	42.1	16.4	10.9	24.6	52.3	66.5	5.4
Queue Length 50th (ft)	131	243	12	233	112	228	0
Queue Length 95th (ft)	#238	280	m26	342	#220	#386	50
Internal Link Dist (ft)		55		334	387	287	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	320	1847	322	1551	267	394	623
Starvation Cap Reductn	0	188	0	44	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.60	0.16	0.81	0.68	0.82	0.30

Intersection Summary

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

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	318	933	77	790	108	308	326	386	425
v/c Ratio	0.79	0.62	0.29	0.70	0.57	0.86	0.88	0.54	0.51
Control Delay	37.9	19.9	18.9	35.5	54.9	61.8	55.3	29.3	13.9
Queue Delay	0.0	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Total Delay	37.9	20.2	18.9	35.6	54.9	61.8	55.3	29.3	14.0
Queue Length 50th (ft)	119	264	18	287	74	197	185	213	137
Queue Length 95th (ft)	m203	168	m39	375	137	#334	#348	308	205
Internal Link Dist (ft)		334		819		812		540	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	431	1509	265	1131	208	391	370	757	863
Starvation Cap Reductn	0	163	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	21	0	0	0	0	48
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.69	0.29	0.71	0.52	0.79	0.88	0.51	0.52

Intersection Summary

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

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

Queues
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	141	158	260	114	155	1791	326	1392	103
v/c Ratio	0.47	0.48	0.92	0.34	0.63	0.79	0.93	0.71	0.12
Control Delay	44.5	13.5	80.6	12.8	19.7	19.8	69.8	8.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.8	0.0
Total Delay	44.5	13.5	80.6	12.8	19.7	20.3	69.8	9.1	1.0
Queue Length 50th (ft)	95	6	190	7	48	430	262	181	1
Queue Length 95th (ft)	153	70	#270	60	m32	m310	m265	m185	m1
Internal Link Dist (ft)		148		154		702		186	
Turn Bay Length (ft)	75		100		220		175		145
Base Capacity (vph)	304	394	282	399	260	2264	375	1960	832
Starvation Cap Reductn	0	0	0	0	0	0	0	268	0
Spillback Cap Reductn	0	0	0	2	0	150	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.40	0.92	0.29	0.60	0.85	0.87	0.82	0.12

Intersection Summary

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

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

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	61	175	36	10	110	49	38	46	0	0	21	22
Future Vol, veh/h	61	175	36	10	110	49	38	46	0	0	21	22
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	184	38	11	116	52	40	48	0	0	22	23
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	9.6	9.1	9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	45%	100%	0%	100%	0%	0%
Vol Thru, %	55%	0%	83%	0%	69%	49%
Vol Right, %	0%	0%	17%	0%	31%	51%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	84	61	211	10	159	43
LT Vol	38	61	0	10	0	0
Through Vol	46	0	175	0	110	21
RT Vol	0	0	36	0	49	22
Lane Flow Rate	88	64	222	11	167	45
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.127	0.099	0.303	0.017	0.229	0.061
Departure Headway (Hd)	5.173	5.533	4.91	5.644	4.923	4.846
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	691	647	731	633	728	736
Service Time	3.217	3.27	2.647	3.384	2.663	2.896
HCM Lane V/C Ratio	0.127	0.099	0.304	0.017	0.229	0.061
HCM Control Delay	9	8.9	9.8	8.5	9.1	8.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0.3	1.3	0.1	0.9	0.2

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	0	0	131	46	169
Future Vol, veh/h	175	0	0	131	46	169
Conflicting Peds, #/hr	20	0	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	184	0	0	138	48	178

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	315	157	246	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	678	889	1320	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	655	874	1298	-	-	-
Mov Cap-2 Maneuver	655	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1298	-	655	-	-	-
HCM Lane V/C Ratio	-	-	0.281	-	-	-
HCM Control Delay (s)	0	-	12.6	0	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-	-

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	431	873	364	1012	148	1402	199	1728
v/c Ratio	1.21	1.02	1.03	1.18	1.02	1.14	1.27	0.95
Control Delay	158.6	84.4	103.3	132.9	132.3	96.3	194.4	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	44.1
Total Delay	158.6	84.4	103.3	132.9	132.3	96.5	194.4	83.1
Queue Length 50th (ft)	~428	~432	~339	~565	~133	~783	~228	508
Queue Length 95th (ft)	#641	#567	m#501	m#701	m#204	m#782	m#365	#650
Internal Link Dist (ft)		507		480		408		702
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	357	857	352	855	145	1234	157	1824
Starvation Cap Reductn	0	0	0	0	0	52	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	273
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	1.02	1.03	1.18	1.02	1.19	1.27	1.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	1013	1212	89	42	109
Future Vol, veh/h	75	1013	1212	89	42	109
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	79	1066	1276	94	44	115

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1390	0	-	0	2054	725
Stage 1	-	-	-	-	1343	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	493	-	-	-	49	372
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	453	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	~ 40	360
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	445	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	47.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	485	-	-	-	234
HCM Lane V/C Ratio	0.163	-	-	-	0.679
HCM Control Delay (s)	13.9	-	-	-	47.8
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0.6	-	-	-	4.3

Notes

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

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	59	996	1272	72	17	29
Future Vol, veh/h	59	996	1272	72	17	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	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	64	1083	1383	78	18	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1461	0	-	0	2092	731
Stage 1	-	-	-	-	1422	-
Stage 2	-	-	-	-	670	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	458	-	-	-	45	364
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	470	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	458	-	-	-	39	364
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	27.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	458	-	-	-	208
HCM Lane V/C Ratio	0.14	-	-	-	0.24
HCM Control Delay (s)	14.1	-	-	-	27.7
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	25.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	265	907	897	78	0	513
Future Vol, veh/h	265	907	897	78	0	513
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	279	955	944	82	0	540

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1046	0	-	0	-	553
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	667	-	-	-	0	~ 479
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	656	-	-	-	-	~ 463
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	124.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	656	-	-	-	463
HCM Lane V/C Ratio	0.425	-	-	-	1.166
HCM Control Delay (s)	14.5	-	-	-	124.2
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	2.1	-	-	-	19.8

Notes

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

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	215	1274	1686
v/c Ratio	0.63	0.50	0.66
Control Delay	40.9	1.2	7.6
Queue Delay	0.0	0.0	0.0
Total Delay	40.9	1.2	7.6
Queue Length 50th (ft)	111	10	355
Queue Length 95th (ft)	196	16	m464
Internal Link Dist (ft)		147	685
Turn Bay Length (ft)			
Base Capacity (vph)	397	2556	2562
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.54	0.50	0.66

Intersection Summary

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

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	358	1274	1056	1686
v/c Ratio	0.62	0.50	0.73	0.66
Control Delay	45.3	2.5	10.6	2.4
Queue Delay	1.4	0.2	0.0	0.3
Total Delay	46.7	2.7	10.6	2.7
Queue Length 50th (ft)	131	73	293	38
Queue Length 95th (ft)	188	m88	m345	38
Internal Link Dist (ft)		466		147
Turn Bay Length (ft)	260			
Base Capacity (vph)	602	2556	1438	2562
Starvation Cap Reductn	0	472	0	0
Spillback Cap Reductn	104	0	0	317
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.72	0.61	0.73	0.75

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	296	1197	93	531	694	1096
v/c Ratio	0.70	0.81	0.67	0.46	0.56	0.89
Control Delay	31.5	34.5	77.5	37.3	27.0	32.1
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.9
Total Delay	31.5	34.7	77.5	37.3	27.0	33.0
Queue Length 50th (ft)	165	448	75	205	190	378
Queue Length 95th (ft)	m232	548	m102	m236	245	m455
Internal Link Dist (ft)		819		335	851	499
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	468	1471	138	1164	1308	1308
Starvation Cap Reductn	0	0	0	0	0	63
Spillback Cap Reductn	0	29	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.83	0.67	0.46	0.53	0.88

Intersection Summary

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

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	319	509	265	679	4	618	158	1349
v/c Ratio	0.82	0.48	0.63	0.71	0.07	0.57	0.49	0.94
Control Delay	37.7	37.1	25.8	42.4	16.5	7.1	19.1	31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	46.0
Total Delay	37.7	37.1	25.8	42.4	16.5	7.2	19.1	77.6
Queue Length 50th (ft)	158	198	121	250	1	18	55	526
Queue Length 95th (ft)	#283	258	183	322	m2	31	75	#623
Internal Link Dist (ft)		499		1850		326		819
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	408	1068	459	961	58	1099	328	1458
Starvation Cap Reductn	0	0	0	0	0	46	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	402
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.48	0.58	0.71	0.07	0.59	0.48	1.28

Intersection Summary

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	22	220	142	191	155	575	16	1031
v/c Ratio	0.57	0.10	0.62	0.43	0.58	0.42	0.27	0.03	0.55
Control Delay	47.0	42.8	30.5	39.2	17.0	13.6	16.0	3.4	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	47.0	42.8	30.5	39.2	17.0	13.6	16.0	3.4	12.3
Queue Length 50th (ft)	92	16	96	96	21	37	97	1	178
Queue Length 95th (ft)	128	37	143	133	84	m112	238	m6	321
Internal Link Dist (ft)		551			173		819		482
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	239	390	395	333	453	404	2146	602	1890
Starvation Cap Reductn	0	0	0	0	0	0	0	0	156
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.06	0.56	0.43	0.42	0.38	0.27	0.03	0.59

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1243	73	0	1330	0	33
Future Vol, veh/h	1243	73	0	1330	0	33
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1308	77	0	1400	0	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	694
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	*599
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*579
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	579	-	-	-
HCM Lane V/C Ratio	0.06	-	-	-
HCM Control Delay (s)	11.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	72	1725	31	0	1723
Future Vol, veh/h	0	72	1725	31	0	1723
Conflicting Peds, #/hr	0	20	0	20	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	76	1816	33	0	1814

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	965	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	*524	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		1	-	-		-
Mov Cap-1 Maneuver	-	*507	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	507	-
HCM Lane V/C Ratio	-	-	0.149	-
HCM Control Delay (s)	-	-	13.3	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.5	-

Notes

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

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	214	34	38	118	9	65
Future Vol, veh/h	214	34	38	118	9	65
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	225	36	40	124	9	68

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	287	83	97	0	-	0
Stage 1	63	-	-	-	-	-
Stage 2	224	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	703	976	1496	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	813	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	659	944	1471	-	-	-
Mov Cap-2 Maneuver	659	-	-	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.4	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1471	-	687	-	-
HCM Lane V/C Ratio	0.027	-	0.38	-	-
HCM Control Delay (s)	7.5	0	13.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	214	286	20	0	11
Future Vol, veh/h	32	214	286	20	0	11
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	225	301	21	0	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	669	46	32	0	-	0
Stage 1	26	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	423	1023	1580	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	523	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	329	989	1554	-	-	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	7.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1554	-	784	-	-
HCM Lane V/C Ratio	0.194	-	0.33	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.7	-	1.4	-	-

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	214	190	96	0	145	25	79	0	40	42	0	143
Future Vol, veh/h	214	190	96	0	145	25	79	0	40	42	0	143
Conflicting Peds, #/hr	20	0	20	20	0	20	20	0	20	20	0	20
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
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	225	200	101	0	153	26	83	0	42	44	0	151

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	199	0	0	321	0	0	983	920	291	928	957	206
Stage 1	-	-	-	-	-	-	721	721	-	186	186	-
Stage 2	-	-	-	-	-	-	262	199	-	742	771	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1373	-	-	1252	-	-	223	265	826	247	249	835
Stage 1	-	-	-	-	-	-	423	424	-	816	746	-
Stage 2	-	-	-	-	-	-	743	736	-	410	399	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	1350	-	-	1231	-	-	153	213	798	197	201	807
Mov Cap-2 Maneuver	-	-	-	-	-	-	233	278	-	268	277	-
Stage 1	-	-	-	-	-	-	346	347	-	668	733	-
Stage 2	-	-	-	-	-	-	594	723	-	318	327	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.5	0	24.7	15
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	306	1350	-	-	1231	-	-	554
HCM Lane V/C Ratio	0.409	0.167	-	-	-	-	-	0.352
HCM Control Delay (s)	24.7	8.2	-	-	0	-	-	15
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.9	0.6	-	-	0	-	-	1.6

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	43	106	123	41	45	22
Future Vol, veh/h	43	106	123	41	45	22
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	112	129	43	47	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	400	99	90	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	321	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	606	957	1505	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	533	925	1480	-	-	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	5.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	763	-	-
HCM Lane V/C Ratio	0.087	-	0.206	-	-
HCM Control Delay (s)	7.7	0	10.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.8	-	-

2023 With-Project – Phase 1

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	199	407	218	349	585	158	1248	177	335	1651
v/c Ratio	0.88	0.66	1.08	0.57	0.38	0.98	0.68	0.19	0.72	0.87
Control Delay	74.9	48.6	127.2	50.7	0.9	102.0	8.9	0.8	67.1	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Total Delay	74.9	48.6	127.2	50.7	0.9	102.0	8.9	0.8	67.1	24.3
Queue Length 50th (ft)	129	150	~185	145	0	126	66	0	140	206
Queue Length 95th (ft)	#226	193	#250	192	12	#262	84	0	190	#355
Internal Link Dist (ft)		688		344			626			445
Turn Bay Length (ft)	350		325		175	220			475	
Base Capacity (vph)	225	762	201	766	1553	162	1848	927	487	1887
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	127
Spillback Cap Reductn	0	0	0	0	10	0	22	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.53	1.08	0.46	0.38	0.98	0.68	0.19	0.69	0.94

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	797	0	0	1095	0	13
Future Vol, veh/h	797	0	0	1095	0	13
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	839	0	0	1153	0	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	460
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-
HCM Control Delay (s)	10	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	802	8	0	1095	0	38
Future Vol, veh/h	802	8	0	1095	0	38
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	844	8	0	1153	0	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	466
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.054	-	-	-
HCM Control Delay (s)	10.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	134	770	23	780	45	319	151
v/c Ratio	0.31	0.38	0.06	0.45	0.11	0.78	0.26
Control Delay	6.6	9.9	9.0	15.2	16.6	49.1	4.7
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	6.6	9.9	9.0	15.4	16.6	49.1	4.7
Queue Length 50th (ft)	14	162	6	123	14	221	0
Queue Length 95th (ft)	m45	271	m17	162	36	288	40
Internal Link Dist (ft)		128		341	389	451	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	461	2023	426	1735	569	566	730
Starvation Cap Reductn	0	0	0	294	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.38	0.05	0.54	0.08	0.56	0.21

Intersection Summary

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	366	689	26	626	144	171	34	140	186
v/c Ratio	0.56	0.31	0.05	0.35	0.70	0.54	0.18	0.37	0.31
Control Delay	18.0	7.4	8.2	11.9	63.4	47.5	33.9	39.6	9.4
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	7.5	8.2	11.9	63.4	47.5	33.9	39.6	9.4
Queue Length 50th (ft)	87	88	6	166	106	114	20	88	41
Queue Length 95th (ft)	204	108	m18	266	166	172	43	133	61
Internal Link Dist (ft)		341		805		423		609	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	780	2204	696	1795	287	434	193	551	748
Starvation Cap Reductn	20	451	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.39	0.04	0.35	0.50	0.39	0.18	0.25	0.25

Intersection Summary

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

Queues
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	72	61	159	76	116	1320	176	1281	55
v/c Ratio	0.25	0.21	0.54	0.24	0.40	0.45	0.54	0.61	0.06
Control Delay	34.5	13.5	42.6	11.8	7.2	5.2	14.7	8.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	34.5	13.5	42.6	11.8	7.2	5.2	14.7	8.3	0.1
Queue Length 50th (ft)	40	4	92	4	13	123	26	222	0
Queue Length 95th (ft)	76	40	151	44	m15	m142	m45	m202	m0
Internal Link Dist (ft)		207		168		532		626	
Turn Bay Length (ft)	75		100		220		175		145
Base Capacity (vph)	284	371	297	405	288	2959	363	2117	909
Starvation Cap Reductn	0	0	0	0	0	0	0	143	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.16	0.54	0.19	0.40	0.45	0.48	0.65	0.06

Intersection Summary

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

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	97	0	45	147	0	0	0	42	0	0	0
Future Vol, veh/h	13	97	0	45	147	0	0	0	42	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	102	0	47	155	0	0	0	44	0	0	0
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8.2	8.5	7.3	0
HCM LOS	A	A	A	-

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	0%	100%	0%	100%	100%
Vol Right, %	100%	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	42	13	97	45	147	0
LT Vol	0	13	0	45	0	0
Through Vol	0	0	97	0	147	0
RT Vol	42	0	0	0	0	0
Lane Flow Rate	44	14	102	47	155	0
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.05	0.02	0.134	0.068	0.201	0
Departure Headway (Hd)	4.083	5.216	4.715	5.17	4.669	4.737
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	882	680	753	690	764	0
Service Time	2.083	2.994	2.493	2.923	2.422	2.74
HCM Lane V/C Ratio	0.05	0.021	0.135	0.068	0.203	0
HCM Control Delay	7.3	8.1	8.2	8.3	8.6	7.7
HCM Lane LOS	A	A	A	A	A	N
HCM 95th-tile Q	0.2	0.1	0.5	0.2	0.7	0

HCM Unsignalized Intersection Capacity Analysis
8: Existing Driveway/DaVinci Ave NE & NE Alhazen St

10/26/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	139	0	0	0	0	192
Future Volume (Veh/h)	139	0	0	0	0	192
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	146	0	0	0	0	202
Pedestrians	20				20	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	2				2	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	40	20	222			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	40	20	222			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	100	100			
cM capacity (veh/h)	939	1040	1325			

Direction, Lane #	EB 1	SB 1
Volume Total	146	202
Volume Left	146	0
Volume Right	0	202
cSH	939	1700
Volume to Capacity	0.16	0.12
Queue Length 95th (ft)	14	0
Control Delay (s)	9.5	0.0
Lane LOS	A	
Approach Delay (s)	9.5	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	235	445	191	669	100	1131	263	1299
v/c Ratio	0.84	0.58	0.60	0.88	0.58	0.89	0.79	0.58
Control Delay	55.4	42.8	35.6	52.5	65.2	45.7	51.4	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	19.4	0.0	0.0
Total Delay	55.4	42.8	35.6	52.5	65.2	65.1	51.4	14.2
Queue Length 50th (ft)	131	154	103	225	74	432	196	225
Queue Length 95th (ft)	#260	210	163	#318	133	#570	#324	228
Internal Link Dist (ft)		836		480		406		532
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	285	782	328	786	191	1266	332	2245
Starvation Cap Reductn	0	0	0	0	0	166	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.57	0.58	0.85	0.52	1.03	0.79	0.58

Intersection Summary

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

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	130	652	543	99	0	248
Future Vol, veh/h	130	652	543	99	0	248
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	4	4
Mvmt Flow	137	686	572	104	0	261

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	696	0	-	0	-	378
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.34
Pot Cap-1 Maneuver	896	-	-	-	0	614
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	881	-	-	-	-	594
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	881	-	-	-	594
HCM Lane V/C Ratio	0.155	-	-	-	0.439
HCM Control Delay (s)	9.8	-	-	-	15.7
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	2.2

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	522	1273	1548
v/c Ratio	0.90	0.66	0.66
Control Delay	53.5	3.0	12.9
Queue Delay	0.0	0.0	0.0
Total Delay	53.5	3.0	12.9
Queue Length 50th (ft)	~455	11	371
Queue Length 95th (ft)	434	30	473
Internal Link Dist (ft)		137	722
Turn Bay Length (ft)			
Base Capacity (vph)	630	1934	2337
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.83	0.66	0.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	473	1273	531	1548
v/c Ratio	0.68	0.66	0.37	0.66
Control Delay	39.7	9.3	0.6	2.2
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	39.7	9.5	0.6	2.2
Queue Length 50th (ft)	153	85	0	21
Queue Length 95th (ft)	211	212	m0	23
Internal Link Dist (ft)		445		137
Turn Bay Length (ft)	260			
Base Capacity (vph)	722	1934	1438	2337
Starvation Cap Reductn	0	110	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.66	0.70	0.37	0.66

Intersection Summary

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

Queues
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	307	557	137	634	766	652
v/c Ratio	0.79	0.42	0.55	0.53	0.90	0.51
Control Delay	46.8	25.4	57.0	35.6	47.8	15.3
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	46.8	25.4	57.0	36.1	47.8	15.3
Queue Length 50th (ft)	208	166	100	210	281	214
Queue Length 95th (ft)	313	233	168	301	351	260
Internal Link Dist (ft)		805		342	841	510
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	445	1331	250	1194	953	1418
Starvation Cap Reductn	0	0	0	220	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.42	0.55	0.65	0.80	0.46

Intersection Summary

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	547	323	211	647	6	1037	61	405
v/c Ratio	1.06	0.23	0.50	0.76	0.02	0.93	0.32	0.32
Control Delay	77.8	28.7	21.7	46.1	20.8	54.8	19.0	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	44.2	0.0	0.0
Total Delay	77.8	28.7	21.7	46.1	20.8	99.0	19.0	13.8
Queue Length 50th (ft)	~424	116	83	233	3	412	27	86
Queue Length 95th (ft)	m#625	m113	130	302	11	#591	52	158
Internal Link Dist (ft)		510		1853		326		805
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	514	1390	435	849	394	1110	216	1262
Starvation Cap Reductn	0	0	0	0	0	166	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	0.23	0.49	0.76	0.02	1.10	0.28	0.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	52	65	36	32	227	1328	26	415
v/c Ratio	0.63	0.16	0.15	0.17	0.18	0.32	0.59	0.10	0.22
Control Delay	48.8	41.8	7.4	35.3	21.5	3.0	10.8	6.6	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	41.8	7.4	35.3	21.5	3.0	10.8	6.6	5.6
Queue Length 50th (ft)	139	37	0	23	4	5	326	1	2
Queue Length 95th (ft)	189	68	31	46	33	m46	m468	15	64
Internal Link Dist (ft)		592			450		805		580
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	311	403	449	208	264	716	2242	325	1929
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.13	0.14	0.17	0.12	0.32	0.59	0.08	0.22

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	785	25	0	1095	0	25
Future Vol, veh/h	785	25	0	1095	0	25
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	826	26	0	1153	0	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	453
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	*763
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	738	-	-	-
HCM Lane V/C Ratio	0.036	-	-	-
HCM Control Delay (s)	10.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

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

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	192	126	13	0	8
Future Vol, veh/h	25	192	126	13	0	8
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	202	133	14	0	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	324	44	28	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	670	1026	1585	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	592	992	1559	-	-	-
Mov Cap-2 Maneuver	592	-	-	-	-	-
Stage 1	897	-	-	-	-	-
Stage 2	739	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	6.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	920	-	-
HCM Lane V/C Ratio	0.085	-	0.248	-	-
HCM Control Delay (s)	7.5	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1	-	-

Queues
1: 148 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	238	590	311	478	589	163	1393	331	410	1474
v/c Ratio	0.81	0.95	1.03	0.66	0.40	0.98	0.93	0.38	0.97	0.94
Control Delay	56.5	81.0	100.5	55.2	0.8	102.0	28.4	3.5	96.8	38.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.0	17.0
Total Delay	56.5	81.0	100.5	55.2	0.8	102.0	28.9	3.6	96.8	55.4
Queue Length 50th (ft)	162	277	~254	211	0	147	535	8	204	473
Queue Length 95th (ft)	#251	#397	#448	274	0	#303	#776	5	#309	#810
Internal Link Dist (ft)		688		325			468			466
Turn Bay Length (ft)	350		325		175	220			475	
Base Capacity (vph)	298	620	301	726	1472	166	1494	880	422	1574
Starvation Cap Reductn	0	0	0	0	0	0	13	81	0	142
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	32
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.95	1.03	0.66	0.40	0.98	0.94	0.41	0.97	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	1197	0	0	1323	0	20
Future Vol, veh/h	1197	0	0	1323	0	20
Conflicting Peds, #/hr	0	20	0	0	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	165	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1260	0	0	1393	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	670
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	*585
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*566
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	566	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-
HCM Control Delay (s)	11.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1162	12	0	1323	0	57
Future Vol, veh/h	1162	12	0	1323	0	57
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1223	13	0	1393	0	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	658
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	*608
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*588
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	588	-	-	-
HCM Lane V/C Ratio	0.102	-	-	-
HCM Control Delay (s)	11.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

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

Queues
4: 151 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	224	897	51	1226	182	325	181
v/c Ratio	0.75	0.49	0.15	0.79	0.73	0.89	0.31
Control Delay	38.5	19.2	10.7	23.2	50.6	64.8	5.2
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	38.5	19.2	10.7	23.4	50.6	64.8	5.2
Queue Length 50th (ft)	100	237	11	231	112	228	0
Queue Length 95th (ft)	#213	305	m27	341	203	#380	48
Internal Link Dist (ft)		55		334	387	287	
Turn Bay Length (ft)	420		60				235
Base Capacity (vph)	311	1832	351	1560	275	404	628
Starvation Cap Reductn	0	0	0	42	0	0	0
Spillback Cap Reductn	0	61	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.51	0.15	0.81	0.66	0.80	0.29

Intersection Summary

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

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

Queues
5: 152 Ave NE & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	292	863	77	802	109	310	326	357	411
v/c Ratio	0.76	0.57	0.27	0.68	0.56	0.86	0.88	0.49	0.51
Control Delay	35.1	20.2	14.1	36.0	54.0	62.6	55.3	28.2	14.5
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Total Delay	35.1	20.4	14.1	36.1	54.0	62.6	55.3	28.2	14.7
Queue Length 50th (ft)	91	301	37	287	74	200	186	193	136
Queue Length 95th (ft)	m178	300	m58	372	137	#340	#349	280	205
Internal Link Dist (ft)		334		819		812		540	
Turn Bay Length (ft)	200		90		250		200		350
Base Capacity (vph)	412	1503	286	1187	213	390	369	757	842
Starvation Cap Reductn	0	164	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	20	0	0	0	0	48
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.64	0.27	0.69	0.51	0.79	0.88	0.47	0.52

Intersection Summary

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

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

Queues
6: 148 Ave NE & NE 22nd St/NE Alhazen St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	140	156	164	129	156	1779	208	1444	103
v/c Ratio	0.55	0.47	0.70	0.42	0.60	0.67	0.73	0.71	0.12
Control Delay	50.6	13.1	59.5	13.1	19.8	15.2	50.1	8.1	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.6	0.0
Total Delay	50.6	13.1	59.5	13.1	19.8	15.4	50.1	8.7	1.0
Queue Length 50th (ft)	99	5	117	4	53	308	133	174	1
Queue Length 95th (ft)	159	68	184	62	m43	m283	m146	m242	m2
Internal Link Dist (ft)		148		154		702		468	
Turn Bay Length (ft)	75		100		220		175		145
Base Capacity (vph)	257	394	235	372	292	2657	346	2021	856
Starvation Cap Reductn	0	0	0	0	0	0	0	244	0
Spillback Cap Reductn	0	0	0	5	0	227	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.40	0.70	0.35	0.53	0.73	0.60	0.81	0.12

Intersection Summary

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

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	247	0	41	201	0	0	0	80	0	0	0
Future Vol, veh/h	20	247	0	41	201	0	0	0	80	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	260	0	43	212	0	0	0	84	0	0	0
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	10.3	9.5	8.2	0
HCM LOS	B	A	A	-

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	0%	100%	0%	100%	100%
Vol Right, %	100%	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	20	247	41	201	0
LT Vol	0	20	0	41	0	0
Through Vol	0	0	247	0	201	0
RT Vol	80	0	0	0	0	0
Lane Flow Rate	84	21	260	43	212	0
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.107	0.032	0.357	0.066	0.292	0
Departure Headway (Hd)	4.587	5.449	4.947	5.464	4.961	5.319
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	781	658	728	656	726	0
Service Time	2.618	3.176	2.673	3.191	2.688	3.363
HCM Lane V/C Ratio	0.108	0.032	0.357	0.066	0.292	0
HCM Control Delay	8.2	8.4	10.4	8.6	9.7	8.4
HCM Lane LOS	A	A	B	A	A	N
HCM 95th-tile Q	0.4	0.1	1.6	0.2	1.2	0

HCM Unsignalized Intersection Capacity Analysis
8: DaVinci Ave NE & NE Alhazen St

10/26/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	327	0	0	0	0	242
Future Volume (Veh/h)	327	0	0	0	0	242
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	344	0	0	0	0	255
Pedestrians	20				20	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	2				2	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	40	20	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	40	20	275			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	63	100	100			
cM capacity (veh/h)	939	1040	1267			

Direction, Lane #	EB 1	SB 1
Volume Total	344	255
Volume Left	344	0
Volume Right	0	255
cSH	939	1700
Volume to Capacity	0.37	0.15
Queue Length 95th (ft)	42	0
Control Delay (s)	11.0	0.0
Lane LOS	B	
Approach Delay (s)	11.0	0.0
Approach LOS	B	

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
9: 148 Ave NE & NE 20 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	421	841	290	1001	148	1329	211	1659
v/c Ratio	1.18	0.92	0.93	1.19	0.94	1.07	1.25	0.91
Control Delay	146.1	62.4	88.2	140.5	96.9	73.7	184.6	32.3
Queue Delay	0.0	0.1	46.5	0.0	0.0	11.1	0.0	10.1
Total Delay	146.1	62.5	134.7	140.5	96.9	84.7	184.6	42.4
Queue Length 50th (ft)	~399	375	258	~562	127	~662	~240	494
Queue Length 95th (ft)	#616	#488	m#379	m#694	m#189	m#625	m#401	550
Internal Link Dist (ft)		507		480		408		702
Turn Bay Length (ft)	520		300		355		425	
Base Capacity (vph)	358	947	312	838	157	1238	169	1826
Starvation Cap Reductn	0	0	0	0	0	70	0	0
Spillback Cap Reductn	0	2	55	0	0	0	0	172
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.89	1.13	1.19	0.94	1.14	1.25	1.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Intersection	
Int Delay, s/veh	17.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	268	879	832	78	0	486
Future Vol, veh/h	268	879	832	78	0	486
Conflicting Peds, #/hr	20	0	0	20	20	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	305	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	282	925	876	82	0	512

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	978	0	-	0	-	519
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.21	-	-	-	-	3.31
Pot Cap-1 Maneuver	707	-	-	-	0	~ 504
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	695	-	-	-	-	~ 487
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	83.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	695	-	-	-	487
HCM Lane V/C Ratio	0.406	-	-	-	1.05
HCM Control Delay (s)	13.7	-	-	-	83.9
HCM Lane LOS	B	-	-	-	F
HCM 95th %tile Q(veh)	2	-	-	-	15.5

Notes

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

Queues
13: 148 Ave NE & 520 EB

10/26/2017

Lane Group	WBR	NBT	SBT
Lane Group Flow (vph)	215	1207	1663
v/c Ratio	0.62	0.47	0.65
Control Delay	37.8	1.1	7.2
Queue Delay	0.0	0.0	0.0
Total Delay	37.8	1.1	7.2
Queue Length 50th (ft)	102	8	337
Queue Length 95th (ft)	185	14	m443
Internal Link Dist (ft)		147	685
Turn Bay Length (ft)			
Base Capacity (vph)	404	2566	2575
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.53	0.47	0.65

Intersection Summary

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

Queues
14: 148 Ave NE & 520 EB Off/520 EB

10/26/2017

Lane Group	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	333	1207	1001	1663
v/c Ratio	0.58	0.47	0.70	0.65
Control Delay	43.3	2.2	8.2	2.3
Queue Delay	0.8	0.2	0.0	0.2
Total Delay	44.1	2.4	8.2	2.5
Queue Length 50th (ft)	117	61	240	38
Queue Length 95th (ft)	171	m73	m295	37
Internal Link Dist (ft)		466		147
Turn Bay Length (ft)	260			
Base Capacity (vph)	595	2566	1438	2575
Starvation Cap Reductn	0	547	0	0
Spillback Cap Reductn	84	0	0	221
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.65	0.60	0.70	0.71

Intersection Summary

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

Queues
15: Bel-Red Rd & NE 24 St

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	238	1184	90	531	702	1064
v/c Ratio	0.58	0.78	0.65	0.40	0.59	0.89
Control Delay	23.9	29.3	76.4	32.3	28.4	33.4
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.5
Total Delay	23.9	29.5	76.4	32.3	28.4	33.9
Queue Length 50th (ft)	135	396	72	128	199	364
Queue Length 95th (ft)	m181	483	m98	m199	253	m448
Internal Link Dist (ft)		819		335	851	499
Turn Bay Length (ft)	260		200			
Base Capacity (vph)	434	1511	138	1319	1282	1287
Starvation Cap Reductn	0	0	0	0	0	41
Spillback Cap Reductn	0	38	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.80	0.65	0.40	0.55	0.85

Intersection Summary

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

Queues
16: 156 Ave NE & Bel-Red Rd

10/26/2017

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	285	490	265	665	4	618	158	1329
v/c Ratio	0.76	0.47	0.62	0.66	0.07	0.55	0.50	0.92
Control Delay	37.5	43.8	25.6	40.2	13.5	4.7	18.9	30.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	46.8
Total Delay	37.5	43.8	25.6	40.2	13.5	4.8	18.9	77.2
Queue Length 50th (ft)	181	192	123	241	0	8	56	513
Queue Length 95th (ft)	263	250	187	314	m1	18	70	#201
Internal Link Dist (ft)		499		1850		326		819
Turn Bay Length (ft)	280		320		75		480	
Base Capacity (vph)	409	1050	471	1003	60	1146	322	1483
Starvation Cap Reductn	0	0	0	0	0	61	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	359
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.47	0.56	0.66	0.07	0.57	0.49	1.18

Intersection Summary

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

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

Queues
17: 156 Ave NE & NE Turing St/NE 28 St

10/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	22	220	142	191	155	541	16	1011
v/c Ratio	0.57	0.10	0.62	0.43	0.58	0.41	0.25	0.03	0.53
Control Delay	47.0	42.8	30.3	39.2	17.0	11.8	13.0	3.6	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	47.0	42.8	30.3	39.2	17.0	11.8	13.0	3.6	12.8
Queue Length 50th (ft)	92	16	95	96	21	24	56	1	160
Queue Length 95th (ft)	128	37	142	133	84	m106	200	m9	417
Internal Link Dist (ft)		551			173		819		482
Turn Bay Length (ft)	225		200	80		150		230	
Base Capacity (vph)	239	405	396	333	465	412	2145	615	1893
Starvation Cap Reductn	0	0	0	0	0	0	0	0	170
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.05	0.56	0.43	0.41	0.38	0.25	0.03	0.59

Intersection Summary

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

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1138	79	0	1323	0	36
Future Vol, veh/h	1138	79	0	1323	0	36
Conflicting Peds, #/hr	0	20	0	0	0	20
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1198	83	0	1393	0	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	639
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	*608
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*588
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	588	-	-	-
HCM Lane V/C Ratio	0.064	-	-	-
HCM Control Delay (s)	11.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

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

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	242	307	20	0	12
Future Vol, veh/h	37	242	307	20	0	12
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	255	323	21	0	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	714	47	33	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	398	1022	1579	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	304	988	1553	-	-	-
Mov Cap-2 Maneuver	304	-	-	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	7.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1553	-	761	-	-
HCM Lane V/C Ratio	0.208	-	0.386	-	-
HCM Control Delay (s)	7.9	0	12.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.8	-	1.8	-	-

Appendix J

City of Bellevue Transportation Assessment

MEMORANDUM

DATE: February 12, 2018

SUBJECT: City of Bellevue Transportation Assessment
Seritage Overlake Plaza Master Plan
TENW Project No. 5356

APPENDIX J – CITY OF BELLEVUE TRANSPORTATION ASSESSMENT

The following is a summary of impacts to the City of Bellevue associated with the Seritage Overlake Plaza Master Plan. Transportation impacts to the City of Bellevue from the buildout of the Overlake Neighborhood Plan (ONP) were disclosed in the *Overlake Neighborhood Plan Update and Improvement Project Final Supplemental Environmental Impact Statement (SEIS)* dated August 30, 2007 (we refer to this document as the *2007 ONP SEIS)*. Therefore, the impacts of the Seritage Master Plan (which is a subset of the land use contemplated by the ONP) on City of Bellevue facilities has already been addressed by the environmental document studying the impacts of the ONP—the 2007 ONP SEIS. The relationship of the Seritage Master Plan to the 2007 ONP SEIS is discussed in more detail in the SEIS Addendum for the Seritage Master Plan project that is being submitted to the City of Redmond *(Addendum to the Overlake Neighborhood Plan Update and Improvement Project Final SEIS prepared for the Overlake Plaza Master Plan Project).*

In addition to the vehicular traffic impacts that were analyzed and disclosed in the 2007 ONP SEIS and in the current SEIS Addendum, the City of Bellevue has requested documentation of school walk routes.

It should be noted that the Seritage project is a Master Plan application in the City of Redmond. The Master Plan entitlement does not allow individual buildings to be built; instead, individual buildings contemplated by the Master Plan are required to be individually permitted through the City's Site Plan Entitlement process. The Site Plan Entitlement process requires a determination of an appropriate SEPA process for each individual building. As a result, the City of Bellevue will also have the opportunity to weigh in at a more specific/project-level basis regarding traffic impacts to Bellevue.

Below is a summary of the portions of the SEIS Addendum specifically related to City of Bellevue transportation facilities, as well as disclosure of potential school walk routes to Interlake High School and Highland Middle School which are in the Bellevue School District.

2007 ONP SEIS – Analysis of City of Bellevue Facilities

The 2007 ONP SEIS included traffic operations analysis at 23 intersections that are either entirely within the City of Bellevue or on the City of Bellevue/City of Redmond border. These included:

12 intersections entirely within the City of Bellevue:

- 140th Avenue NE and NE 24th Street
- 140th Avenue NE and NE 20th Street
- 140th Avenue NE and Bellevue-Redmond Road
- 148th Avenue NE and Bellevue-Redmond Road
- 156th Avenue NE and Bellevue-Redmond Road
- 156th Avenue NE and NE 24th Street

- *148th Avenue NE and NE 8th Street*
- *148th Avenue NE and SE 24th Street*
- *156th Avenue NE and NE Northup Way*
- *156th Avenue NE and NE 8th Street*
- *156th Avenue NE and SE Eastgate Way*
- *164th Avenue NE and NE 24th Street*

11 intersections on City of Bellevue/City of Redmond Border:

- 148th Avenue NE and NE 51st Street
- 148th Avenue NE and NE 40th Street
- 148th Avenue NE and NE 36th Street
- 148th Avenue NE and NE 29th Place
- 148th Avenue NE and EB 520 Off-Ramp
- 148th Avenue NE and EB 520 Ramps
- 148th Avenue NE and NE 24th Street
- 148th Avenue NE and NE 22nd Street
- 148th Avenue NE and NE 20th Street
- Bellevue-Redmond Road and NE 24th Street
- Bellevue-Redmond Road and NE 20th Street

The traffic operations results (Level of Service and delay) at these intersections for Existing (2005), 2030 No Action, and 2030 Action alternatives are included in Tables 3-13, 3-21, and 3-22 of the 2007 ONP SEIS, and are replicated on the following pages. In reference to the six City of Bellevue intersections included in Table 3-22 (*italicized above*), the 2007 ONP SEIS made the following conclusions:

- The study did not assume any facility improvements at the six Bellevue intersections under either the No Action or Action Alternative. The changes in the delay between the two alternatives are slight, which indicates that the increased land use density for the Action Alternative would not significantly impact those intersections.
- The explanation of LOS E and F at five of the six Bellevue intersections is not entirely clear based on the analysis done as part of this document. Growth in Overlake would partially contribute to the increased delay but a combined effect of the growth in Bellevue and the surrounding region would also cause increased traffic congestion at those intersections.

Table 3-13:
Existing (2005) PM Peak Average Intersection Levels of Service and Concurrency Levels of Service in the Overlake TMD

Intersection		Intersection Delay (Seconds)	Delay Based LOS	Concurrency Analysis	
				V/C	LOS
140th Avenue NE	NE 24th Street	35.2	D	0.97	E
140th Avenue NE	NE 20th Street	59.1	E	0.94	E
140th Avenue NE	Bel-Red Road	50.6	D	0.87	D
148th Avenue NE	NE 51st Street	31.7	C	1.09	F
148th Avenue NE	NE 40th Street	28.1	C	0.96	E
148th Avenue NE	NE 36th Street	23.1	C	0.8	D
148th Avenue NE	NE 29th Place	66.7	E	1.32	F
148th Avenue NE	EB 520 Off-Ramp	46.3	D	1.01	F
148th Avenue NE	EB 520 Ramps	11.2	B	1.01	F
148th Avenue NE	NE 24th Street	101.2	F	1.31	F
148th Avenue NE	NE 22nd Street	13.5	B	N/A	N/A
148th Avenue NE	NE 20th Street	53.1	D	1.14	F
148th Avenue NE	Bel-Red Road	97.6	F	1.3	F
150th Avenue NE	NE 40th Street	21.9	C	0.59	A
152nd Avenue NE	NE 24th Street	25.0	C	0.48	A
156th Avenue NE	NE 51st Street	26.0	C	0.78	C
156th Avenue NE	NE 45th Street	11.1	B	N/A	N/A
156th Avenue NE	NE 40th Street	39.1	D	1.05	F
156th Avenue NE	NE 36th Street	78.3	E	1.2	F
156th Avenue NE	NE 31st Street	31.0	C	0.93	E
156th Avenue NE	NE 24th Street	21.6	C	0.91	E
156th Avenue NE	Bel-Red Road	30.5	C	0.98	E
159th Place NE	NE 40th Street	106.2	F	1.09	F
Bel-Red Road	NE 24th Street	28.2	C	0.77	C
W Lk Samm. Pkwy	WB 520 On-Ramp	43.3	D	N/A	N/A
W Lk Samm. Pkwy	EB SR 520 Off-Ramp	46.5	D	N/A	N/A
W Lk Samm. Pkwy	Marymoor Parkway	10.6	B	N/A	N/A
W Lk Samm. Pkwy	NE 51st Street	12.0	B	0.79	D
Bel-Red Road	W Lk Samm. Pkwy	45.6	D	1.02	F
Bel-Red Road	NE 40th Street	47.5	D	0.96	E
Bel-Red Road	NE 20th Street	34.0	D	0.76	C
WB SR 520 Ramps	NE 51Street	5.8	A	0.39	A
EB SR 520 Ramps	NE 51Street	10.9	B	0.51	A
EB SR 520 Ramps	NE 40th Street	19.8	B	0.53	A
WB SR 520 Ramps	NE 40th Street	56.2	E	0.71	C
District Average		N/A	N/A	0.92	E

Source: Mirai Transportation Planning and Engineering, 2006 and Bel-Red/Overlake Transportation Study Annual Reconciliation Report for 2005

Table 3-21:
2030 PM Peak Hour Intersection Levels of Service and Delay

Intersection		No Action Alternative		Action Alternative*	
		Intersection Delay (Seconds)	Delay Based LOS	Intersection Delay (Seconds)	Delay Based LOS
140th Avenue NE	NE 24th Street	68.2	E	59.3	E
140th Avenue NE	NE 20th Street	75.6	E	102.4	F
140th Avenue NE	Bel-Red Road	78.1	E	91.4	F
148th Avenue NE	NE 51st Street	141.3	F	142.9	F
148th Avenue NE	NE 40th Street	96.7	F	72.5	E
148th Avenue NE	NE 36th Street	119.0	F	77.0	E
148th Avenue NE	NE 29th Place	56.8	E	62.8	E
148th Avenue NE	EB 520 Off-Ramp	32.6	C	13.4	B
148th Avenue NE	EB 520 Ramps	16.3	B	16.0	B
148th Avenue NE	NE 24th Street	168.9	F	78.0	E
148th Avenue NE	NE 22nd Street	47.8	D	41.7	D
148th Avenue NE	NE 20th Street	107.9	F	64.6	E
148th Avenue NE	Bel-Red Road	120.8	F	72.5	E
150th Avenue NE	NE 40th Street	21.0	C	30.1	C
152nd Avenue NE	NE 24th Street	70.0	E	27.5	C
156th Avenue NE	NE 51st Street	69.0	E	49.8	D
156th Avenue NE	NE 45th Street	13.5	B	14.1	B
156th Avenue NE	NE 40th Street	68.3	E	84.9	F
156th Avenue NE	NE 36th Street	82.2	F	93.8	F
156th Avenue NE	NE 31st Street	46.5	D	46.4	D
156th Avenue NE	Bel-Red Road	49.4	D	74.9	E
156th Avenue NE	NE 24th Street	55.2	E	71.3	E
159th Place NE	NE 40th Street	17.3	B	20.3	C
W Lake Sammamish Pkwy	WB SR 520 On-Ramp	170.1	F	175.1	F
W Lake Sammamish Pkwy	EB SR 520 Off-Ramp	173.4	F	146.3	F
W Lake Sammamish Pkwy	Marymoor Parkway	23.5	C	37.9	D
W Lake Sammamish Pkwy	NE 51st Street	148.2	F	34.6	C
Bel-Red Road	W Lake Sammamish Pkwy	83.2	F	20.6	C
Bel-Red Road	NE 40th Street	108.1	F	72.7	E
Bel-Red Road	NE 24th Street	50.0	D	72.3	E
Bel-Red Road	NE 20th Street	28.8	C	36.3	D
WB SR 520 Ramps	NE 51stStreet	9.0	A	8.8	A
EB SR 520 Ramps	NE 51st Street	19.5	B	14.7	B
EB SR 520 Ramps	NE 40th Street	29.4	C	21.1	C
WB SR 520 Ramps	NE 40th Street	46.1	D	72.0	E

*The shaded cells indicate the intersections where the Action Alternative shows reduced delays compared with the No Action Alternative.

Table 3-22:
Existing, 2030 No Action and Action Alternative Levels of Service at Intersections Outside the Overlake Study Area

Intersection		Existing (2005)		No Action		Action Alternative	
		Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS
148th Avenue NE	NE Redmond Way	76.6	E	198.1	F	135.4	F
148th Avenue NE	Old Redmond Road	12.3	B	277.2	F	176.2	F
148th Avenue NE	NE 8th Street	52.8	D	122.9	F	117.5	F
148th Avenue SE	SE 24th Street	31.7	C	123.9	F	119.9	F
156th Avenue NE	NE Northup Way	54.3	D	123.8	F	124.5	F
156th Avenue NE	NE 8th Street	41.8	D	62.9	E	64.1	E
156th Avenue SE	SE Eastgate Way	40.6	D	56.1	E	58.8	E
164th Avenue NE	NE 24th Street	11.2	B	18.4	B	16.8	B
West Lake Sammamish Pkwy	NE 40th Street	12.1	B	16.2	B	19.8	B
West Lake Sammamish Pkwy	NE 24th Street*	24.4	C	27.5	D	30.6	D

*Unsignalized intersection – Delay and LOS are reported for the worst operating leg.

Seritage Overlake Plaza SEIS Addendum – Summary of Project-Specific Impacts

Based on the *Seritage Overlake Plaza Master Plan Traffic Study*, a year 2023 LOS and queue analysis was conducted at 17 study intersections and at the proposed Seritage site access driveways to determine what roadway improvements are needed to support project access and to mitigate any project impacts. The 2023 analysis was conducted for the following scenarios:

1. 2023 Baseline (Without Project)
2. 2023 With Project - Full Buildout
3. 2023 With Project - Full Buildout, with a signal at Lumiere/24th
4. 2023 With Project - Phase 1

The results of the 2023 analysis are contained in the *Seritage Overlake Plaza Master Plan Traffic Study* and were used to confirm the project's participation in the construction of the ultimate 2030 roadway network and to confirm the on-site improvements and off-site mitigation requirements that are described in the traffic study.

In summary, 8 of the 17 study intersections included in the Seritage Overlake Plaza Master Plan Traffic Study were included as study intersections in the 2007 ONP SEIS (the remaining 9 intersections are either new intersections created by new roadways not specifically identified in the 2007 ONP SEIS or are existing intersections that were not included in the scope of the 2007 ONP SEIS). The overall results showed that the intersections common to both studies are expected to operate at the same or better LOS in the PM peak hour in 2023 with the Seritage Master Plan (without mitigation) when compared to the 2030 Action Alternative results from the 2007 ONP SEIS, with exception to 148th Ave NE/NE 20th Street. To mitigate impacts at 148th Ave NE/NE 20th Street, the Seritage Overlake Plaza Master Plan project will be required to provide

mitigation (northbound right-turn lane) for development exceeding 335 net new AM peak hour trips. This improvement is a portion of a larger improvement project already planned by the City of Redmond and City of Bellevue to address congestion at 148th/20th.

In addition to 148th Ave NE/NE 20th Street improvements, other mitigation measures that will be provided by the Seritage Overlake Plaza Master Plan include:

- 148th Ave NE/NE Alhazen Street: The City of Bellevue and City of Redmond have a planned improvement at this intersection that includes an additional northbound through lane. As mitigation, Seritage will widen 148th Ave NE to accommodate the additional northbound through lane by converting the northbound right-turn lane to a through lane and eliminating the island south of Alhazen and the curb bulb north of Alhazen.
- 148th Ave NE/NE 24th Street. The City of Bellevue and City of Redmond have planned improvements at this intersection including an additional northbound through lane and eastbound/westbound dual left turn lanes (these dual left turn lanes are included in the 2007 ONP SEIS). Seritage will dedicate right-of-way and set the ultimate curbs on 148th and NE 24th Street to accommodate these future improvements.
- Lumiere Ave NE/NE 24th Street. For any development beyond Phase 1, Seritage will conduct observations and an analysis to determine if the southbound left-turn lane queue storage on 148th Ave NE at NE Alhazen Street will be exceeded. If the queue exceeds storage and if desired by the City, Seritage will stripe an interim westbound left turn lane on NE 24th Street at Lumiere Avenue while maintaining eastbound left turns to the Safeway property at the traffic signal at 151st Avenue NE. In addition, future signalization is planned by the City at Lumiere Ave NE/NE 24th Street to accommodate a future pedestrian crossing on NE 24th Street. Before constructing any development beyond Phase 1, Seritage will conduct a study to determine if estimated pedestrian volumes trigger the need for the signal.
- Frontage improvements and right-of-way dedications on NE 20th Street, 148th Ave NE, and NE 24th Street including constructing curbs at their ultimate locations to accommodate future improvements planned by the City of Redmond and City of Bellevue.
- Construction of new public street connections (including right-of-way dedications), some of which were contemplated in the 2007 ONP SEIS Action Alternative. These new public streets include:
    - NE Alhazen Street between 148th Ave NE and Da Vinci Ave NE
    - Lumiere Ave NE between NE 20th St and NE 24th St
    - A portion of Da Vinci Ave (approximate half-street improvements) between NE 20th St and NE 24th St (Note: future alignment of Da Vinci Ave north of Alhazen St to be determined by the City of Redmond at a later date).
- New pedestrian and bicycle facilities within project limits including:
    - Reconstructed sidewalks on NE 20th St, 148th Ave NE, and NE 24th St
    - New sidewalks on Lumiere Ave and NE Alhazen St
    - Urban pathway along Da Vinci Ave, NE Alhazen St, and through Gateway Park
    - Bike path along the south side of NE 24th Street

- Bike lanes on both sides of NE Alhazen Street
- Bike lane on the west side of Da Vinci Ave

Please refer to the *Seritage Overlake Plaza Master Plan Traffic Study* for more detailed information.

Project-Specific Impacts at City of Bellevue Intersections

The *Seritage Overlake Plaza Master Plan Traffic Study* analyzed project specific impacts at the following 7 locations entirely in the City of Bellevue or on the City of Bellevue/City of Redmond Border:

1 intersection entirely within the City of Bellevue:

- 156th Avenue NE and Bellevue-Redmond Road

6 intersections on City of Bellevue/City of Redmond Border:

- 148th Avenue NE and EB 520 Off-Ramp
- 148th Avenue NE and EB 520 Ramps
- 148th Avenue NE and NE 24th Street
- 148th Avenue NE and NE 22nd Street
- 148th Avenue NE and NE 20th Street
- Bellevue-Redmond Road and NE 24th Street

The Seritage Overlake Plaza Master Plan will provide improvements at 3 of the City of Bellevue/City of Redmond border intersections including:

- 148th Avenue NE and NE 24th Street
- 148th Avenue NE and NE 22nd Street
- 148th Avenue NE and NE 20th Street

The improvements at these intersections are as described earlier in this section and include a northbound right turn lane at 148th Ave NE/NE 20th Street, and constructing the ultimate curb locations, signal modifications, right-of-way dedication, and road widening at 148th Ave NE/NE 24th Street and 148th Ave NE/NE 22nd Street (aka NE Alhazen Street). All of these improvements will be constructed pursuant to coordinated planning efforts by both the City of Bellevue and City of Redmond over the last 20 years.

Based on the comparison of land use impacts discussed in more detail in the SEIS Addendum, project specific impacts at other City of Bellevue intersections not included in the *Seritage Overlake Plaza Master Plan Traffic Study* would fall well within the level of impact disclosed in the 2007 ONP SEIS. Specifically, the proposed net increase in non-residential building space (208,417 square feet) and 500 multifamily units on the Seritage site is within the 4.5 million square feet of new non-residential building space and 5,764 new residential units over the entire ONP area, and is also within the 845,467 square feet of new non-residential building space and 4,516 new multifamily units assumed for Overlake Village in the 2007 ONP SEIS. In summary, the proposed Seritage Overlake Plaza Master Plan represents a fraction of the overall land use anticipated in Overlake; therefore, no unmitigated significant traffic impacts beyond those identified in the *2007 ONP FSEIS* are anticipated.

SCHOOL WALK ROUTES WITH SERITAGE OVERLAKE MASTER PLAN

As requested by the City of Bellevue, TENW documented the potential school walk routes with the proposed master plan to two nearby schools within the Bellevue School District: Interlake High School and Highland Middle School. Sherwood Forest Elementary School is also nearby, however, it is over one mile away from the Master Plan site (east of Interlake High School), and the Bellevue School District determines this to be too far for elementary school children to walk to school. The Master Plan contemplates up to 500 multifamily residential units within the Seritage Master Plan project site. However, at this time, the type, size, and exact location of residential uses within the project site cannot be confirmed. As a result, it is difficult to determine impacts with specificity. The type, size, and location of future residential uses within the project site will be identified at the time that a specific development application for Site Plan Entitlement is submitted for a residential use. At that time, the City of Bellevue will have the opportunity to weigh in at a more specific/project-level basis regarding school walk routes.

Interlake High School Walk Routes

Interlake High School is located at 16245 NE 24th Street in Bellevue. It is located approximately one mile from the Master Plan site. Future high school students who reside within future residential uses within the Seritage Master Plan and decide to walk to school are expected to use sidewalks and/or urban pathways that will be provided on new streets within the project site, as well as existing sidewalks located on NE 24th Street. This walk route would be just under one mile in length measured from the intersection of Lumiere Ave/Alhazen St and includes signalized pedestrian crossings at 4 intersections at NE 24th Street and 151st Place NE, 152nd Ave NE, Bel-Red Road, and 156th Ave NE. A depiction of the anticipated walk route for Interlake High School is shown below.

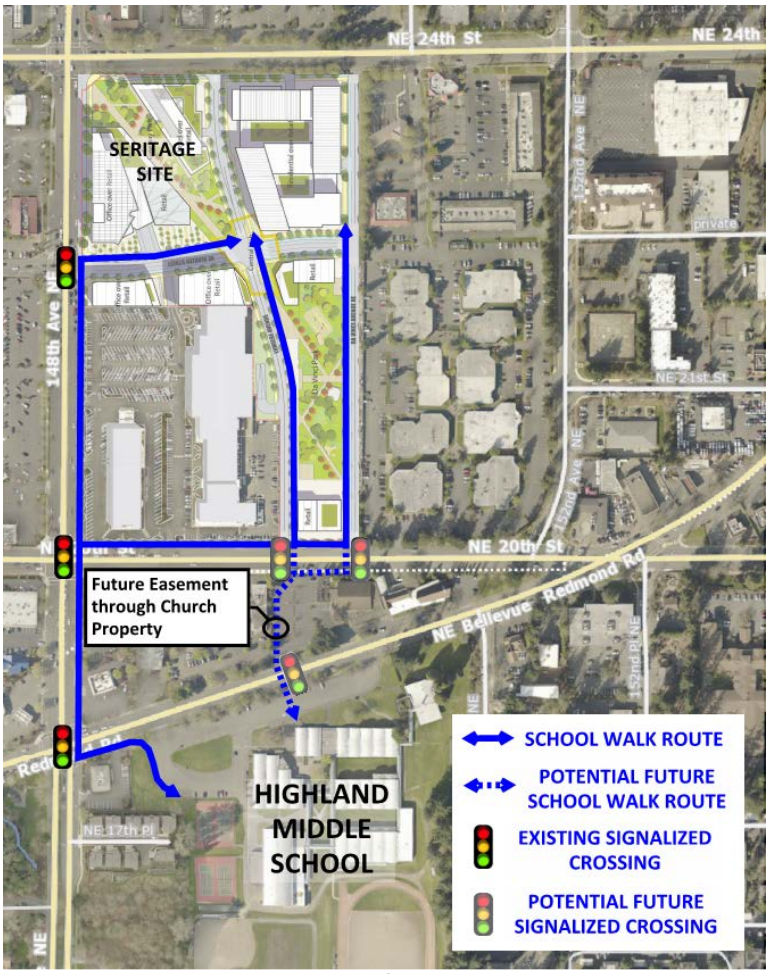
Possible school walk route for Interlake High School

Highland Middle School Walk Routes

Highland Middle School is located at 15027 Bel Red Road in Bellevue. It is located approximately 0.5 miles from the Master Plan site. Future middle school students who reside within future residential uses within the Seritage Master Plan and walk to school are expected to use sidewalks and/or urban pathways that will be provided on new streets within the project site, as well as existing sidewalks located on NE 20th Street,

148th Ave NE, and Bel-Red Rd. The walk route using these new and existing sidewalks would be just under 0.5 miles in length measured from the intersection of Lumiere Ave/Alhazen St and would include signalized pedestrian crossings at 3 intersections on 148th Ave NE at NE Alhazen St, NE 20th St, and Bel-Red Rd.

It is our understanding that the City of Bellevue is planning a potential new walk route that would utilize a future signalized intersection at the main driveway to the middle school on Bel-Red Road as part of the Bellevue School District's upcoming reconstruction of the school. In addition to the new traffic signal, the City of Bellevue is seeking to obtain a pedestrian access easement through the church property to the north of the school that would provide a new public access connection between NE 20th Street and Bel-Red Road which would be approximately aligned with the future Lumiere Avenue north of NE 20th Street. Based on the results of the *Seritage Overlake Master Plan Traffic Study*, future signalization may be required by the City of Redmond at either Lumiere Ave NE/NE 20th Street or Da Vinci Ave NE/NE 20th St (if/when signal warrants are met). Seritage will construct stop-controlled intersections at both locations with Phase 3 of the Master Plan. A signal(s) on NE 20th Street is not required with the Seritage Master Plan project; however, the intersections will be designed in a manner that will accommodate a future signal to be built by others if/when warranted. If/when new signals are constructed and the future pedestrian easement is obtained, the potential new walk route would be approximately one-quarter of a mile in length measured from the intersection of Lumiere Ave/Alhazen St and would include signalized pedestrian crossings at 2 new signals. A depiction of the potential walk routes for Highland Middle School is shown below.



Possible school walk routes for Highland Middle School