



Town of Gander 2023 Traffic Study

Town of Gander
Traffic Study Report
Final

December 11, 2023
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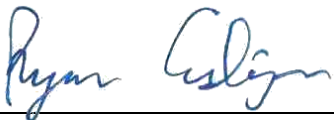
Town of Gander

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1 Introduction

1.1 Project Background

The Town of Gander has experienced consistent growth from both residential and non-residential development in recent years and this growth is expected to continue. The Town is looking to proactively improve the transportation infrastructure to anticipate growth to the year 2025. The Town has retained Englobe Corp. to complete a transportation study of the existing infrastructure at six (6) specific intersections. The main objectives of this study are to explore opportunities to improve the operations at the key intersections and provide recommendations as required. The Town is anticipating a 2-year horizon year (2025).

1.2 Study Tasks

The following tasks were undertaken as part of this study:

- Evaluate traffic operations and safety at six intersections identified by the Town;
- Traffic data for all six locations were collected by the Town and reviewed/summarized by Englobe Corp.;
- Anticipate a horizon year of 2025 (2-year period);
- Examine the viability of the traffic signals at Airport Boulevard at Markham Place;
- Review cross-entrance at Laurell Road to Airport Authority development;
- Develop a list of feasible recommendations to improve the operations and safety of the intersections outlined in the following section.

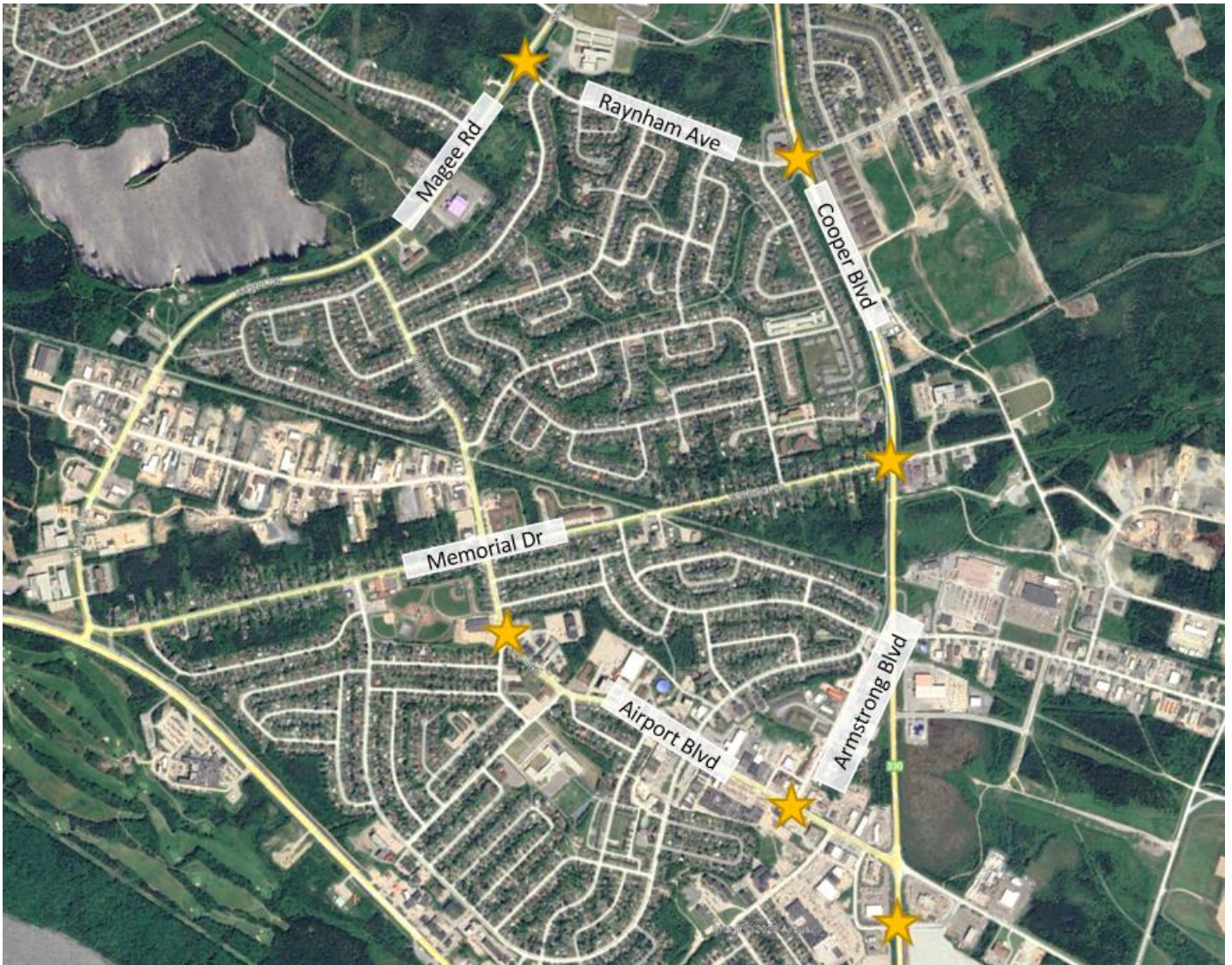
1.3 Study Area

This study included analysis of the following six intersections, as identified by the Town:

- Cooper Boulevard @ Raynham Avenue / Briggs Street;
- Raynham Avenue @ Magee Road;
- Memorial Drive @ Cooper Boulevard;
- Laurell Road @ Cooper Boulevard;
- Markham Place / Lindbergh Road @ Airport Boulevard; and
- Airport Boulevard @ Armstrong Boulevard.

The six locations are identified in Figure 1. Five of the intersections are stop-controlled which operate with stop-control toward the minor approaches and free-flow on the major approaches. The sixth intersection, Airport Boulevard at Markham Place, is a signalized intersection programmed to run with Airport Boulevard as the primary approach. This approach remains in a green phase unless a vehicle is detected on Markham Place/Lindbergh Road. Additional characteristics of each intersection are provided in Section 2.2.

Figure 1 - Study Area





2 Information Gathering

2.1 Previous Reports

2.1.1 Airport Boulevard Shoppers Drug Mart Site Access Review (2014)

An access review study was completed by WSP of the Shoppers Drug Mart parking lot on Airport Boulevard following operational and safety concerns raised by the RCMP at the existing site driveways. Part of this analysis included a review of turning movements at the Armstrong Boulevard / Airport Boulevard intersection. The following conclusions/recommendations were made that are relevant to this report:

1. It was noted that some drivers approaching on Armstrong Boulevard were disobeying the left turn restriction and either turning left onto Airport Boulevard or travelling straight into the Canadian Tire Gas bar and then making a right turn onto Airport Boulevard, essentially circumventing the left turn restriction.
2. It was recommended that the existing RB-11L “No Left Turn” signs at the end of Armstrong Boulevard be replaced with RB-14R “Right Turn Only” signs.
3. Changes were also recommended to the pavement markings along Airport Boulevard.

To date the pavement marking changes have been completed, but Armstrong Boulevard is still signed with RB-11L “No Left Turn” signs.

2.1.2 Airport Boulevard - Access to Airport Lands and Gander Landing (2017)

An access study for a new connection from the Airport Lands to Cooper Boulevard was completed by Crandall Engineering in 2017. The following were concluded from this study:

1. The findings indicated the proposed street access could be implemented on Cooper Boulevard without significant impacts to operations and safety, but:
 - a. the new access would only be 80m from the Laurel Road intersection and would introduce new conflict points to the corridor.
 - b. The access would also cause the new street to become an obvious short cut route for traffic moving between Cooper Boulevard and James Boulevard.
 - c. The access is not critical to serving development traffic and it would not provide operational benefits to the public street network.
2. To preserve the operational integrity of the Cooper Boulevard corridor and to avoid introduction of new conflict points, it was recommended to permit access to the proposed street from James Boulevard only and terminate the street as a cul-de-sac without access to Cooper Boulevard.

2.1.3 Cooper Boulevard Pedestrian Crossing Study (2018)

A pedestrian crossing study of Cooper Boulevard was completed in 2018 by Englobe Corp. The study identified the following recommendations which are relevant to this study:

Cooper Boulevard @ Raynham Avenue

1. It was recommended that the existing RRFB at this intersection be maintained.
2. The following additional treatments to improve pedestrian safety were identified:
 - a. Add zebra markings at the crosswalk to enhance visibility;
 - b. Install concrete island at the northeast channel to provide protection for pedestrians;
 - c. Extend sidewalks with ramps to the crosswalk on both side street approaches.

Cooper Boulevard @ Memorial Drive

1. It was concluded that pedestrian demand here is low and if future development to the east were to generate crossing demands, a crosswalk should be considered with an Rectangular Rapid Flashing Beacon (RRFB) being the most appropriate crossing treatment
2. It was also recommended that if the intersection were to become signalized pedestrian crossings and pedestrian signals could be installed on all four legs.

2.1.4 Airport Boulevard - Lindbergh Road Review (2019)

A traffic signal study was completed for this intersection by Crandall, a Division of Englobe in 2019. The following were concluded from this study:

1. No operational issues were identified at the existing Airport Boulevard/Lindbergh Road intersection.
2. A signal warrant analysis was completed for the intersection which generated 15 priority points, well below the 100 point threshold that is considered as the basis for warranting traffic signals.
3. The pedestrian crossing demand across Airport Boulevard was characterized as low; however, it could be argued that the crossing is a desire line for a school route.
4. It was recommended that the Town consider removing the traffic signal given that it is far from being warranted.
 - a. A level of service analysis indicated that the intersection would operate very well under two-way stop control on the side streets.
 - b. If the crosswalk is maintained, it would be appropriate to use a treatment of either an overhead RA-5 flashing crossing or side-mounted RRFB treatment given the width of the crossing.

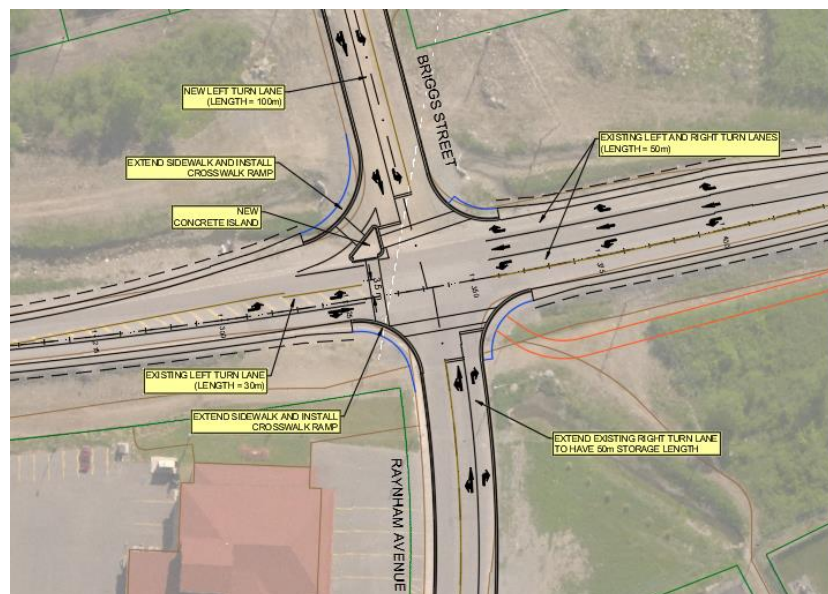
2.1.5 Cooper Boulevard Corridor Study (2020)

The Cooper Boulevard Corridor Study was completed for the Town by Englobe Corp. in 2020. The study included analyses of five intersections along Cooper Boulevard using a 10-year (2030) horizon. Three of the intersections Cooper/Raynham, Cooper/Memorial, and Cooper/Laurell are included in this study. The relevant recommendations for these three intersections included the following:

Cooper Boulevard @ Raynham Avenue

1. A traffic signal warrant analysis was performed in which an intersection requires 100 points to warrant a signal. Cooper/Raynham scored 75 points indicating a signal is not warranted.
2. Pedestrian crossing improvement recommendations were consistent with the 2018 pedestrian crossing study and included:
 - a. install concrete islands in the northeast corner to provide protection;
 - b. extend sidewalks with ramps to crosswalks on the side streets;
 - c. upgrade the adjacent multiuse trail to an active transportation (AT) trail with a paved surface allowing cyclists and pedestrian use only (ATV's would have to be diverted to another location).
3. Traffic flow improvements were recommended including installation of a westbound left turn lane with 100m of storage and an eastbound right turn lane with 50m of storage.

A concept drawing of these improvements was prepared and is illustrated below.



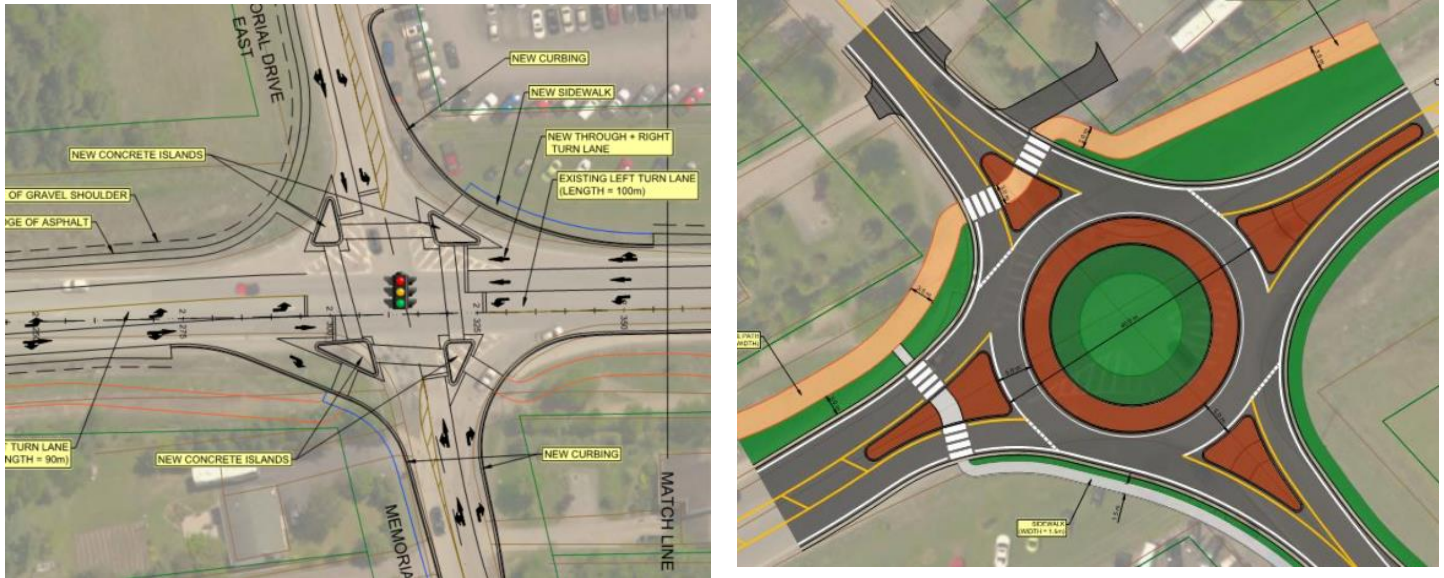
Cooper Boulevard @ Memorial Drive

1. A traffic signal warrant analysis was performed which generated 116 points indicating a signal is warranted. Improvement Option 1 (traffic signals) was identified with the following lane configuration:
 - a. northbound left turn lane, thru lane, and a thru/right lane;
 - b. southbound left turn lane and a thru/right channelized lane;
 - c. eastbound channelized right turn lane with 20m of storage, and a thru/left turn lane; and
 - d. westbound left turn lane with 35m of storage and a thru/right channelized lane.
2. A roundabout analysis was performed at this intersection and a single lane roundabout was recommended with an inscribed diameter of 40m. The roundabout would have crosswalks and

raised sidewalks across the west and south legs. The northwest corner may require property acquisition and relocation of the existing driveway.

3. The roundabout option was recommended as the preferred option due to better operational and safety performance in the long term.

Concept drawings of the signalized and roundabout options were prepared and are shown below.





Cooper Boulevard @ Laurell Road

The Cooper Boulevard Corridor Study did not recommend any improvements to this intersection as traffic delays were projected to be minimal.

2.1.6 Cooper Boulevard - Memorial Drive Roundabout Design (2021)

In 2021 Englobe Corp. completed detailed design for a single-lane roundabout at Cooper Boulevard and Memorial Drive. The design was based on the roundabout configurations recommended in the Cooper Boulevard Corridor Study. A tender package was prepared; however, this project was later put on hold and the roundabout has not been tendered or constructed.

2.2 Intersection Characteristics

| Intersection Characteristics | Intersection |
|--|--|
| <p>Cooper Boulevard at Raynham Avenue/Briggs Street (Stop-controlled)</p> <p>This 4-legged intersection is stop controlled with stop signs on the eastbound Raynham Avenue approach and westbound Briggs Street approach. The eastbound and westbound approaches feature a shared left/thru lane and separate right turn lane. The westbound right turn is channelized with a painted island. The northbound approach features an exclusive left turn lane, a single thru lane and a separate right turn lane that is channelized with a small painted island. The southbound approach features a separate left turn lane and shared thru-right lane. Sidewalk runs along the north side of Raynham Avenue and Briggs Street and a Rectangular Rapid Flashing Beacon (RRFB) pedestrian crossing is located on the north leg of Cooper Boulevard. Street lighting is provided at the crosswalk. A fire station is located in the northwest corner of the intersection. A trail is located along the west side of Cooper Boulevard.</p> |  |
| <p>Cooper Boulevard at Memorial Drive (Stop-controlled)</p> <p>This 4-legged intersection is stop controlled with stop signs on the eastbound and westbound Memorial Drive approaches. The southbound and northbound approaches on Cooper Boulevard feature an exclusive left turn lane with a shared thru / right turn lane. The northbound, eastbound, and westbound approaches feature channelized right turn lanes with painted islands. Sidewalk extends south of the intersection along the west side of Cooper Boulevard and west of the intersection along the north side of Memorial Drive.</p> |  |

Cooper Boulevard at Laurell Road
(Stop-controlled)

This 3-legged intersection has stop control on the eastbound Laurell Road approach. The northbound approach on Cooper Boulevard has a dedicated left turn lane and a through lane. The southbound approach has a right turn lane and through lane. Channelized right turn lanes and painted islands are provided for the eastbound and southbound right turn movements. There are no sidewalks at the intersection but a trail is located on the east side of Cooper Boulevard. A new fourth is currently under construction and will be added at the east side of the intersection to eventually form a 4-leg intersection.



Raynham Avenue at Magee Road
(Stop-controlled)

This 3-legged intersection has stop control on the westbound Raynham Avenue approach. The northbound approach on Magee Road has a dedicated right turn lane and through lane. The southbound approach has a left turn lane and through lane. Channelized right turn lanes and painted islands are provided for the northbound and westbound right turn movements. There is one sidewalk on the north side of Raynham Avenue. A trail is located on the east side of Magee Road which provides access to the elementary school.



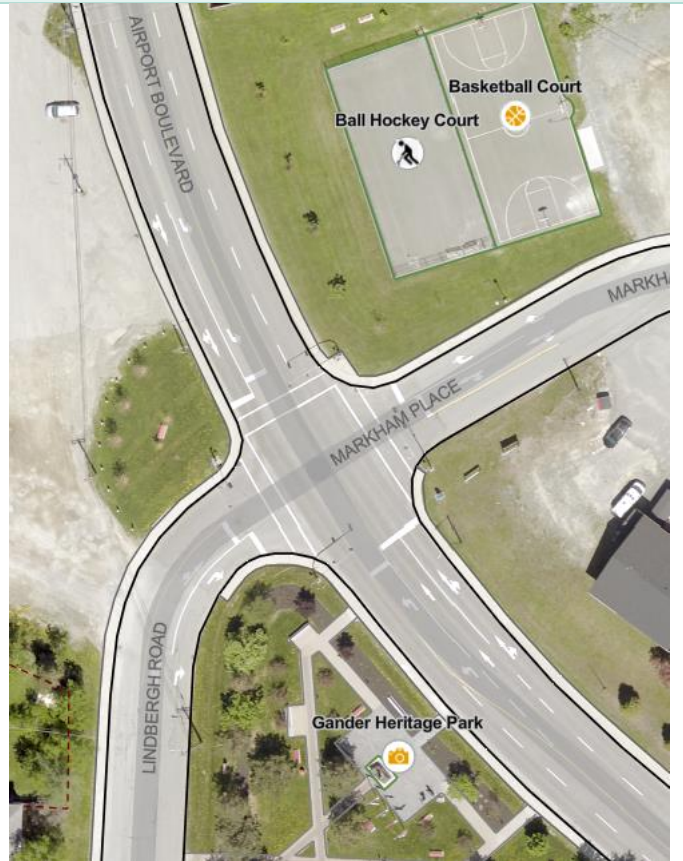
Airport Boulevard at Armstrong Boulevard (Stop-controlled)

This intersection is considered 3-legged and is stop controlled with stop signs on the southbound Armstrong Boulevard approach. The southbound approach features a right turn lane only. The eastbound approach has a thru and shared thru/right lane and the westbound approach has one shared thru/right lane. There is also a turn lane in the center of Airport Boulevard that alternates direction to accommodate left turns in the westbound and eastbound directions. A sidewalk runs along both sides of Airport Boulevard and on the west side of Armstrong Boulevard. A crosswalk is provided across Armstrong Boulevard. This section of Airport Boulevard features retail developments and has a high number of access driveways. Two driveways are shown on either side of Armstrong Boulevard north of the intersection as well as directly across Armstrong Boulevard to separate businesses.



Airport Boulevard at Markham Place/Lindbergh Road (Signalized)

This 4-legged intersection is signalized and programmed to run with a green phase on Airport Boulevard with no recall on the side streets. So the Airport Boulevard approaches remain green unless a call is placed on Markham Place or Lindbergh Road. The eastbound and westbound approaches feature a shared left/thru lane and separate right turn lanes. The northbound approach features an exclusive left turn lane, a thru lane, and a shared thru-right lane. The southbound approach features a separate left turn lane and shared thru-right lane. Sidewalk runs along both sides of Airport Boulevard and the north side of Lindbergh Road/Markham Place. Crosswalks are provided across the eastbound, westbound, and southbound approaches. This section of Airport Boulevard is mixed-use and features retail, offices, churches, and single and multi-family housing.



2.3 Existing Traffic Data

The Town of Gander completed AM, Noon, and PM peak hour traffic counts at the following Study Area intersections in the Summer of 2023:

- Cooper Boulevard/Laurel Road (May 18, 2023).
- Cooper Boulevard/Raynham Avenue (May 17, 2023).
- Cooper Boulevard/Memorial Drive (May 18, 2023).
- Magee Road/Raynham Avenue (May 17, 2023).
- Airport Boulevard/Armstrong Boulevard (June 15, 2023).
- Airport Boulevard/Markham Place (May 17, 2023).

The existing AM and PM peak hour traffic volumes at Study Area intersections are displayed in Figure 2. All traffic count sheets are provided in Appendix A.

Figure 2 - 2023 Existing Traffic Volumes





3 Future Travel Conditions

3.1 Horizon Year

A 2-year horizon period was established to capture ongoing and planned development growth which results in a horizon year of 2025. The future traffic volumes for the horizon period were estimated by adding a combination of background traffic growth and additional trips generated from planned developments to the existing traffic volumes from Figure 2. The horizon year traffic conditions were assessed to determine the future functional requirements of the study area intersections and to determine potential upgrade requirements.

3.2 Background Growth

The Study Team estimated the background traffic volumes to 2025 horizon year by applying an annual traffic growth rate of 1.0% to the existing traffic volumes. This will account for increased traffic through the road network as a result of continued growth throughout the Town.

3.3 Future Development

Several major developments are planned near the study area intersections. The Study Team used a combination of ITE trip generation rates and information gathered from previous traffic impact studies to estimate future trips that will be generated by all planned developments. These trips were added to the road network for the horizon year 2025.

Three planned developments are currently under construction/expansion within the study area. Projected trip generations were included in this analysis for the horizon year. Details of the development

assumptions and future traffic projections are presented in Section 3.4. The following are the developments and their locations:

- Eastgate development - a residential development located between Mitchell Street and 700m south of Raynham Avenue/Briggs Street along the east side of Cooper Boulevard.
- Junior Health College development - the expansion of an existing junior health college located at Markham Place and Airport Boulevard.
- Gander Landing development - a mixed-use development located on the east side of Cooper Boulevard between Roe Avenue and Airport Boulevard /James Boulevard. Two phases of this development are expected to open by 2025.

3.4 Trip Generation

Future trip generation rates for the expansion of the Junior Health College were estimated using the TripGen Web-based software, which is based on the 11th Edition of the Institute of Transportation Engineer’s (ITE) Trip Generation Manual. Future trip generation for the Eastgate development and Gander Landing development were pulled from previous traffic studies completed for the Town. These rates were also based on the ITE Trip Generation Manual.

Weekday, AM Peak, and PM Peak trips and in/out distributions were obtained for the developments. The total trips generated daily and during each period are shown below in Table 1. The ITE Land Use codes, land use types and size for the proposed developments are also provided.

Table 1: Development Trip Generation

| Description (Land Use Code) | Size | AM PEAK | | | PM PEAK | | | WEEKDAY |
|---|--------------|------------|------------|------------|------------|------------|--------------|---------------|
| | | In | Out | Total | In | Out | Total | Total |
| Jr. Health College (Jr. Community College - 540) | 100 Students | 54 | 13 | 67 | 29 | 22 | 51 | 576 |
| Eastgate Development (Single Family Housing - 210) | 80 Lots | 15 | 46 | 61 | 51 | 30 | 81 | 822 |
| Gander Landing Phase 1 (Shopping Centre - 820)* | 166,000 SF | 117 | 69 | 188 | 303 | 330 | 633 | 10,198 |
| Gander Landing Phase 1 (Office - 710) | 264,000 SF | 236 | 39 | 275 | 46 | 241 | 287 | 2,700 |
| Gander Landing Phase 2 (Shopping Centre - 820)* | 50,000 SF | 23 | 14 | 38 | 74 | 79 | 153 | 7,169 |
| TOTAL | | 445 | 181 | 626 | 503 | 702 | 1,205 | 21,465 |

* Retail traffic generations reduced by 20%.

The percent distribution of the Junior Health College expansion traffic was developed based on the existing traffic patterns throughout the study area, the land use types, and trip destinations. Percent distributions for the other developments were distributed according to the development traffic studies. Note that 20% trip reductions were made for the Gander Landing commercial site to account for site synergy (customers who will stop at more than one site during the one visit to the development).

The AM/PM peak hour volumes for 2025 were estimated by adding all development traffic to the 2025 background traffic volumes. The 2025 future traffic volumes with all developments in place are shown in Figure 3. No other known developments are planned near the Study Area at this time.

Figure 3 - 2025 Future Traffic Volumes



4 Level of Service Analysis

4.1 Level of Service Criteria

Intersection performance were evaluated mainly in terms of the level of service (LOS), which is a common performance measurement of an intersection. The LOS is determined based on vehicle delay and is expressed on a scale of A through F, where LOS A represents very short delay (<10 seconds per vehicle) and LOS F represents very long delay (>50 seconds per vehicle at a stop controlled intersection and >80 seconds per vehicle at a signalized intersection). A LOS D is often considered acceptable in urban locations; however, some communities will accept a LOS E. The LOS criteria for signalized intersections and stop control intersections/roundabouts are shown in Table 2.

Table 2: Intersection Level of Service Criteria

| LOS | LOS Description | Control Delay (seconds per vehicle) | |
|-----|---|-------------------------------------|---|
| | | Signalized Intersections | Stop Controlled Intersections and Roundabouts |
| A | Very low delay; most vehicles do not stop (Excellent) | less than 10.0 | less than 10.0 |
| B | Higher delay; more vehicles stop (Very Good) | between 10.0 and 20.0 | between 10.0 and 15.0 |
| C | Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good) | between 20.0 and 35.0 | between 15.0 and 25.0 |
| D | Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (Satisfactory) | between 35.0 and 55.0 | between 25.0 and 35.0 |
| E | Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay | between 55.0 and 80.0 | between 35.0 and 50.0 |
| F | This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable) | greater than 80.0 | greater than 50.0 |

Traffic conditions for signalized and stop control intersections were modelled using Synchro 11, which is a traffic analysis software that uses the Highway Capacity Manual and Intersection Capacity Utilization procedures.

In addition to the LOS criteria described above, the volume to capacity (v/c) ratio, the 95th percentile queue length, and the average delay were reported for each turning movement.

4.2 Level of Service Analysis Results

4.2.1 2025 Future Conditions

A summary table of the study area's intersection performance is provided below in **Table 3**. The LOS results, including average delay, volume to capacity (v/c) ratios, and the 95th percentile queue lengths for 2025 are summarized. The detailed Synchro LOS reports can be found in Appendix B. Improvement options to mitigate the intersection performances are discussed in Section 1.

Cooper Blvd @ Raynham Ave: Overall, the intersection is expected to operate at a very good condition (LOS B) during the AM and PM Peak hours. The eastbound, northbound and southbound movements are expected to operate at a LOS C or better. The westbound approach is expected to operate at a LOS E with 40.7 seconds of delay during the AM peak hour and a LOS F with 164.2 seconds of delay during the PM peak hour. The approach would be over capacity with a v/c ratio of 1.03, and a 95th percentile queue of 55 m in the PM peak hour.

Raynham Ave @ Magee Rd: This intersection is expected to operate at an excellent condition (LOS A) during both peak hours. The westbound movement would operate at a satisfactory LOS D with 33.7 seconds of delay and a 0.75 v/c ratio during the AM peak hour. All other movements would operate well.





Cooper Blvd @ Memorial Dr: During the AM Peak hour, the intersection will be operating at an overall excellent LOS A; however, the westbound movement will perform at LOS E with 41.3 seconds of delay and a v/c ratio of 0.28. In the PM peak hour, the eastbound approach is projected to operate at a LOS F with 76.9 seconds of delay, a v/c ratio of 0.88, and a 95th percentile queue of 57m. The westbound approach is projected to operate at a LOS F with 379 seconds of delay, a v/c ratio of 1.46 (well above capacity), and a 95th percentile queue of 67m.



Cooper Blvd @ Laurell Rd: Overall, this intersection is expected to operate at an excellent overall LOS A during both peak hours. All individual movements would operate at LOS C or better.

Airport Blvd @ Armstrong Blvd: Overall, this intersection is expected to operate at an excellent overall LOS A during both peak hours. All individual movements would operate at LOS B or better.

Airport Blvd @ Markham Pl/Lindbergh Rd: This intersection is expected to operate at a very good LOS B overall during both peak hours. All approaches are expected to perform at LOS B or better.

Table 3: 2025 Future Conditions Level of Service Analysis Results

| Intersection | | | Overall LOS // Delay (sec/veh) | Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m) | | | | | | | | | | | |
|----------------------------------|---|-------------|--------------------------------|--|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|
| Main Street @ Minor Street | Traffic Control | Peak Period | | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
| | | | | L ↶ | T ↑ | R ↷ | L ↶ | T ↑ | R ↷ | L ↶ | T ↑ | R ↷ | L ↶ | T ↑ | R ↷ |
| Cooper Boulevard /Raynham Avenue |  | AM | LOS B 10.7 | Shared | B 13.5 [0.39] 15 | B 13.5 [0.39] 15 | Shared | E 40.7 [0.62] 30 | Shared | A 8.1 [0.05] - | A 0.0 [0.04] - | A 0.0 [0.04] - | A 7.4 [0.0] 1 | A 0.0 [0.20] - | Shared |
| | | PM | LOS B 18.8 | Shared | C 17.5 [0.40] 15 | C 17.5 [0.40] 15 | Shared | F 164.2 [1.03] 55 | Shared | A 8.4 [0.19] 6 | A 0.0 [0.20] - | A 0.0 [0.09] - | A 8.0 [0.01] <1 | A 0.0 [0.15] - | Shared |
| Raynham Avenue /Magee Road |  | AM | LOS B 10.7 | - | - | - | D 33.7 [0.75] 50 | - | D 33.7 [0.75] 50 | A 0.0 [0.13] - | A 0.0 [0.11] - | - | A 8.0 [0.13] - | A 0.0 [0.15] - | - |
| | | PM | LOS A 4.6 | - | - | - | B 11.6 [0.24] 7 | - | B 11.6 [0.24] 7 | A 0.0 [0.04] <1 | A 0.0 [0.05] 1 | - | A 7.6 [0.05] - | A 0.0 [0.07] - | - |
| Cooper Boulevard /Memorial Drive |  | AM | LOS A 5.6 | Shared | C 21.6 [0.49] 21 | Shared | Shared | E 41.3 [0.28] 9 | Shared | A 9.1 [0.01] 2 | A 0.0 [0.14] <1 | Shared | A 7.6 [0.02] <1 | A 0.0 [0.38] <1 | Shared |
| | | PM | LOS C 30.3 | Shared | F 76.9 [0.88] 57 | Shared | Shared | F 378.7 [1.46] 67 | Shared | A 1.5 [0.16] 5 | A 0.0 [0.51] <1 | Shared | A 9.3 [0.02] <1 | A 0.0 [0.26] - | Shared |
| Cooper Boulevard /Laurell Road |  | AM | LOS A 2.3 | B 14.2 [0.17] 5 | - | B 14.2 [0.17] 5 | - | - | A 9.8 [0.02] <1 | A 7.6 [0.03] 1 | A 0.0 [0.16] - | A 0.0 [0.02] - | - | A 0.0 [0.10] - | A 0.0 [0.06] - |
| | | PM | LOS A 2.5 | C 19.9 [0.29] 10 | - | C 19.9 [0.29] 10 | - | - | A 9.8 [0.05] 1 | A 8.3 [0.02] <1 | A 0.0 [0.14] - | A 0.0 [0.03] - | - | A 0.0 [0.26] - | A 0.0 [0.07] - |

| Intersection | | | Overall LOS // Delay (sec/veh) | Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m) | | | | | | | | | | | |
|--|---|----------------|---|--|---------------------------|-------------------------|-------------------------|---------------------------|--------|------------|--------------------------|-------------------------|------------|--------------------------|--------------------------|
| | | | | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
| Main Street @ Minor Street | Traffic Control | Peak Period | | L ↶ | T ↑ | R ↷ | L ↶ | T ↑ | R ↷ | L ↶ | T ↑ | R ↷ | L ↶ | T ↑ | R ↷ |
| Airport Boulevard /Armstrong Boulevard |  | AM | LOS A 0.7 | A 7.9 [0.03] <1 | A 0.0 [0.14] - | A 0.0 [0.07] - | - | A 0.0 [0.16] - | Shared | Shared | - | A 0.0 [0.0] - | - | - | A 10.0 [0.03] 1 |
| | | PM | LOS A 1.1 | A 8.5 [0.03] 1 | A 0.0 [0.14] - | A 0.0 [0.07] - | - | A 0.0 [0.28] - | Shared | Shared | - | A 0.0 [0.0] - | - | - | B 12.6 [0.11] 3 |
| Airport Boulevard/ Markham Place |  | AM | LOS B 11.7 | A 6.9 [0.10] 5 | B 12.9 [0.49] 42 | Shared | A 6.5 [0.01] 1 | B 12.0 [0.25] 16 | Shared | Shared | B 15.0 [0.05] 6 | A 0.1 [0.04] - | Shared | B 14.9 [0.03] 4 | A 0.1 [0.03] - |
| | | PM | LOS B 12.3 | A 6.1 [0.06] 4 | B 12.8 [0.38] 34 | Shared | A 5.9 [0.04] 3 | B 13.9 [0.40] 29 | Shared | Shared | B 14.4 [0.04] 5 | A 0.0 [0.02] - | Shared | B 14.6 [0.10] 9 | A 1.4 [0.09] - |

5

5 Additional Analysis

5.1 Collision Analysis

5.1.1 Data Collection

The Town of Gander provided 10 collision records from Gander’s Fire and Rescue for the project study area. The records included collisions between 2021 and 2023, though the 2023 record was not for a complete year. For the purpose of this study, the 2021-2022 collision data were used. The records contained details on location and pedestrian/cyclist involvement that were pertinent to this review. It is important to note that Fire Department services are not called out to all collisions, so the data may exclude many minor collisions or collisions involving property damage only. A complete list of collisions reported within the Study Area was not available and therefore, the following analysis is specific to the data made available to the Study Team.

The data was summarized into the table below. Details of the collision severity (i.e. fatality, injury, or property damage only) were limited for these incidents and therefore collision severity could not be confirmed.

Table 4: Collision Report

| Incident Intersection | Incident Count | Incident Notes |
|---|----------------|--|
| Airport Boulevard at Markham Place/ Lindbergh Road | 2 | - |
| Cooper Boulevard at Laurell Road | 1 | - |
| Memorial Drive at Cooper Boulevard | 1 | Extrication required |
| Raynham Avenue at Cooper Boulevard | 3 | Extrication required; Pedestrian/vehicle incident |

According to the data collected by the Town's Fire Department, the intersection of Cooper Boulevard and Raynham Avenue had the most incidents reported. The second most common location was Airport Boulevard and Markham Place. It is understood that when these collisions were reported the traffic signal at this intersection was programmed for flash mode, giving vehicles on Airport Boulevard the right of way (a consistent green light) while vehicles on the minor approaches were required to stop (a flashing red light) to wait for a gap in traffic to cross.

5.2 Speed Analysis on Cooper Boulevard

The Town expressed concerns of speeding along Cooper Boulevard between Laurell Road and the Trans Canada Highway. There is a vertical crest curve on Cooper Boulevard approximately 300 m south of Laurell Road which limits sight distance. Cooper Boulevard is an arterial roadway and features a two-lane cross section, 8.0m wide asphalt surface with 2.5-4.0m gravel shoulders on either side. The posted speed limit on Cooper Boulevard in this area is 60 km/h.

Traffic speed data were collected by the Town from July 31, 2023 - September 3, 2023. The data included bidirectional traffic volume and speed data on Cooper Boulevard, just south of Laurell Road. A summary table of the results was then provided to the Study Team. The data collection location is illustrated below.

Figure 4 - Speed Data Collection Location



There were 41,957 samples collected in total on Cooper Boulevard. An analysis indicated that the average speed was 49 km/h the 85th percentile speed was 67 km/h. The results indicate there is relatively good compliance with the 60 km/h speed limit along Cooper Boulevard, as the 85th percentile speed is within less than 10 km/h of the posted speed limit. We would not recommend changing the speed limit in this area as the speed data is appropriate for the current 60 km/h speed limit and roadway characteristics.

A couple traffic calming measures could still be considered on Cooper Boulevard to maintain good speed compliance and help reduce the 85th percentile speed even more. A couple options are described as follows.

Lane Narrowing

Traffic lane narrowing is a tactic used to reduce vehicle speeds. Motorists tend to decrease their travel speed if a narrower lane width is implemented due to an uncomfortable experience driving higher speeds in narrower lanes.

The existing section of Cooper Boulevard generally has 4.0 m travel lanes, which are reduced slightly when left turn lanes are added. The TAC Design Guide recommends a minimum road width of 3.3m for urban roadways with truck traffic and a practical upper limit of 3.7m. Consideration could be given to restriping this section of Cooper Boulevard to provide 3.5 m for through lanes and 3.3 m for left turn lanes. This would also provide wider paved shoulder along both sides of the road.

Gateway Treatment

Another traffic calming option that could be considered is to build some form of 'gateway treatment' for northbound traffic on Cooper Boulevard in advance of Laurell Road. The treatment could include a physical sign or structure on the side of the highway to help alert drivers that they are entering a heavier urban area within Gander. This would help differentiate the rural feel of the Trans-Canada Highway from the urban atmosphere of the Town and would alert drivers that they need to reduce their speed for the urban environment ahead.



6 Recommendations

6.1 Cooper Boulevard at Raynham Avenue

Following additional review of traffic conditions at Cooper Boulevard and Raynham Avenue, the following improvements are recommended:

1. Construct a concrete island at the northeast corner of the intersection to provide pedestrian protection;
2. Extend sidewalks with ramps to crosswalks on both side streets;
3. Upgrade the multi-use trail along the west side of Cooper Boulevard with asphalt and restrict it's use to pedestrians and cyclists only (ATV's would have to be diverted to another location);
4. Adjust the RRFB placement to be compatible with the new pedestrian island and sidewalk/crosswalk upgrades;
5. Convert the westbound approach to have a 100m left turn lane and a shared thru/right turn lane;
6. Convert the eastbound approach to have a 50m right turn lane with a channelized right onto Cooper Boulevard;
7. Maintain a shared left/thru lane and a separate right turn lane at the eastbound approach;
8. Maintain the current lane configuration at the northbound and southbound approaches;
9. A concrete island could also be considered at the west leg, to provide a channelized eastbound right turn movement.

The above recommendations are consistent with recommendations made in the 2018 Pedestrian Study and the 2020 Cooper Boulevard Corridor Study.

Adding the westbound left turn lane would alleviate the delays and volume to capacity ratio in the westbound approach to an acceptable LOS overall; however, the westbound left turn movement would

still operate at a LOS F. Channelizing the eastbound right turn would give priority to the westbound left turn movement, further reducing the delays for the westbound movement.

The collision review identified three incidents occurring at Cooper Boulevard and Raynham Avenue, one which involved a pedestrian. Adding a formal concrete island and upgrading the sidewalk connections and crosswalks will help improve pedestrian safety at this location.

6.2 Raynham Avenue at Magee Road

Pedestrian crossing improvements have been requested at this intersection to accommodate school crossing demand at the north leg of Magee Road at Raynham Ave. Short-Term and Long-Term improvements have been identified, as described below.

Short-Term Improvements:

The TAC Pedestrian Crossing Control Guide provides direction for assessing pedestrian crossings. The guide considers Annual Daily Traffic (ADT), pedestrian demand, posted speed limit, and the number of lanes (roadway width) as main factors.

The ADT on Magee Road, north of Raynham Ave, was estimated at 4,500 vehicles per day (vpd) and the posted speed limit is 40 km/h. TAC generally recommends that crosswalks have at a minimum side mounted signs (RA-4 double-sided), twin parallel line crosswalk markings, advanced warning signs (WC-2) when visibility is limited, and prohibitions on vehicles stopping, passing, or changing lanes near the crosswalk. Within a school area, such as on Magee Road, enhanced treatments such as zebra markings, RA-3 side mounted signs, and WC-16 advance warning signs would be appropriate.

Recommended crossing treatments are provided in Figure 5. This interim treatment will manage crossing demands and improve pedestrian safety at the intersection for the short term without any changes to existing geometry or lane configuration.

Figure 5 - Recommended Crossing Treatment on Magee Road



Long-Term Improvements:

No long-term improvements were identified as a result of the future traffic operations analysis. However, long-term safety improvements were identified for the intersection.

The current configuration of Magee Road features a northbound right turn lane with a large radius into a channelized right onto Raynham Avenue. This large, channelized lane can encourage high vehicle

speeds around the turn entering the side street. Subsequently, the right turn lane merges with Raynham Avenue very close to the multi-use trail crossing. The current configuration has the potential for high speeding vehicles to encounter vulnerable users on the trail crossing, causing an increased safety risk. The Town should consider geometric changes at this intersection to reduce the radius of the northbound right turn to encourage slower speeds around the turn and a greater separation between the trail crossing and the merge point onto Raynham Avenue. Alternatively, the channelization of the right turn lane could be removed completely. Signage and/or pavement markings should also be considered for the trail crossing on Raynham Ave.

6.3 Cooper Boulevard at Memorial Drive

The 2020 Cooper Boulevard Corridor Study concluded that the Cooper Boulevard at Memorial Drive intersection should be signalized or constructed into a roundabout. A single-lane roundabout was recommended at the preferred option due to better operational and safety performance in the long term.

Following a review of the revised traffic projections and operational analysis for this intersection in the 2025 horizon year, the recommendations from the 2020 report remain unchanged. It is recommended the Town consider construction of a roundabout at this intersection in the near future. A roundabout would improve traffic operations as well as formalize pedestrian crossings at the intersection. A traffic signal could also be considered; however, a roundabout would provide additional operational and safety benefits beyond a traffic signal.

Additionally, any intersection improvements at this location should include pedestrian facility improvements for the mixed-use trail on the west side of Cooper Boulevard, which is not currently signed or marked. Side mounted signs (RA-4 double-sided) and twin parallel line crosswalk markings are recommended across the west leg of the intersection.

6.4 Airport Boulevard at Markham Place & Lindbergh Road

The Airport Boulevard - Lindbergh Road review completed in 2019 and the current analysis for 2025 conditions indicate that this signalized intersection is performing and will continue to perform at a good LOS. The Town previously modified the signal timings to run as a flashing signal, with red flashing lights on the minor approach (Lindbergh Road/Markham Place) and a green flashing lights on the major street (Airport Boulevard). However, in 2023 the Town reinstated the typical traffic signal operation at this intersection. The main approach (Airport Boulevard) rests in a green phase with the side approaches set to pedestrian recall. This configuration is appropriate for this location given the very low volume of traffic on the side streets. Should future traffic volumes increase on Markham Place or Lindbergh Road, the Town should consider adjusting the signal timings as needed. At this time no additional improvements are recommended for this intersection.

6.5 Airport Boulevard at Armstrong Boulevard

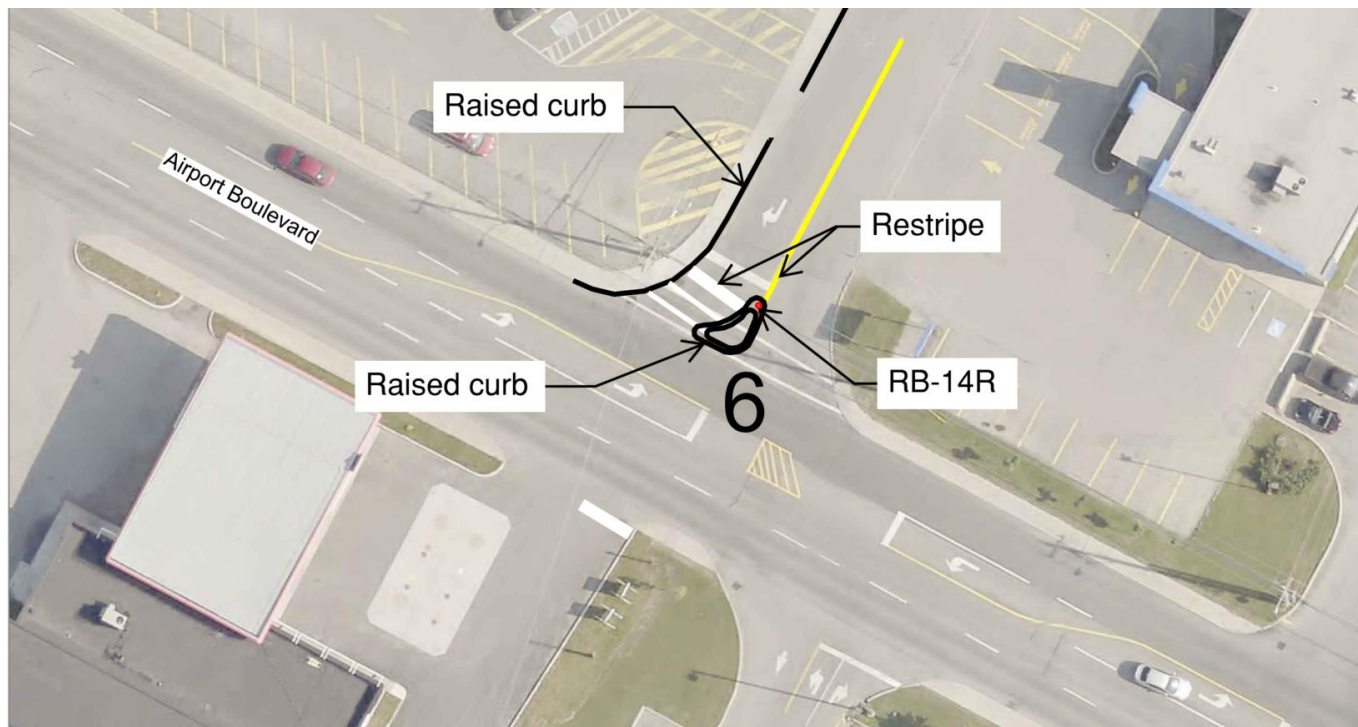
Operational and safety concerns have been raised at Airport Boulevard at Armstrong Boulevard, an unsignalized T-intersection with turning movement restrictions. Cut-through traffic and drivers disobeying turn restrictions are contributing to these concerns. In 2014 a Site Access review by WSP recommended lane marking modifications along the corridor and signage improvements to enforce turn restrictions from Armstrong Boulevard.

Turn restrictions are currently in place along Airport Boulevard restricting westbound left turns at two site driveways on Armstrong Boulevard: the Canadian Tire gas bar driveway across from Armstrong Boulevard, and at Shoppers Drug Mart driveway. Additionally, no left turns are permitted for the

southbound approach from Armstrong Boulevard onto Airport Boulevard. Despite these restrictions, drivers continue to turn left from Armstrong Boulevard onto Airport Boulevard, especially during peak periods. To better enforce turning movement restrictions, it is recommended that a raised curb be installed along the west side of Airport Boulevard, that a curbed island be installed at the intersection to force exiting traffic to turn right, and that RB-14R (Right Only) signage be installed. Recommended treatments are identified in Figure 6.

Future traffic conditions are projected to perform well at the Airport Boulevard and Armstrong Boulevard intersection for the 2025 horizon year therefore, no improvements are recommended to improve traffic operations.

Figure 6 - Armstrong Boulevard at Airport Boulevard Intersection Improvements



Signalizing the intersection of Airport Boulevard and Armstrong Boulevard would facilitate left turns from Armstrong Boulevard and would eliminate the need for the left turn restriction; however, there are two issues with this option:

1. Traffic signals would create additional delay on Airport Boulevard.
2. The TAC geometric design guide also recommends a minimum intersection spacing of 200m between signalized intersections on arterial streets. The signalized intersection of Bennet Drive and Airport Boulevard is only 125m east of Armstrong Boulevard, which is not favourable for installing traffic signals at Armstrong Boulevard.

There are also multiple access points along this section of Airport Boulevard, which create many conflict points along the corridor. It would be beneficial if some accesses could be consolidated or eliminated. The Town could consider completing an access study along Airport Boulevard to determine options for eliminating or consolidating accesses. Consolidating a couple accesses opposite Armstrong Boulevard would make it more conducive to installing traffic signals at that location.

6.6 Laurell Road at Cooper Boulevard

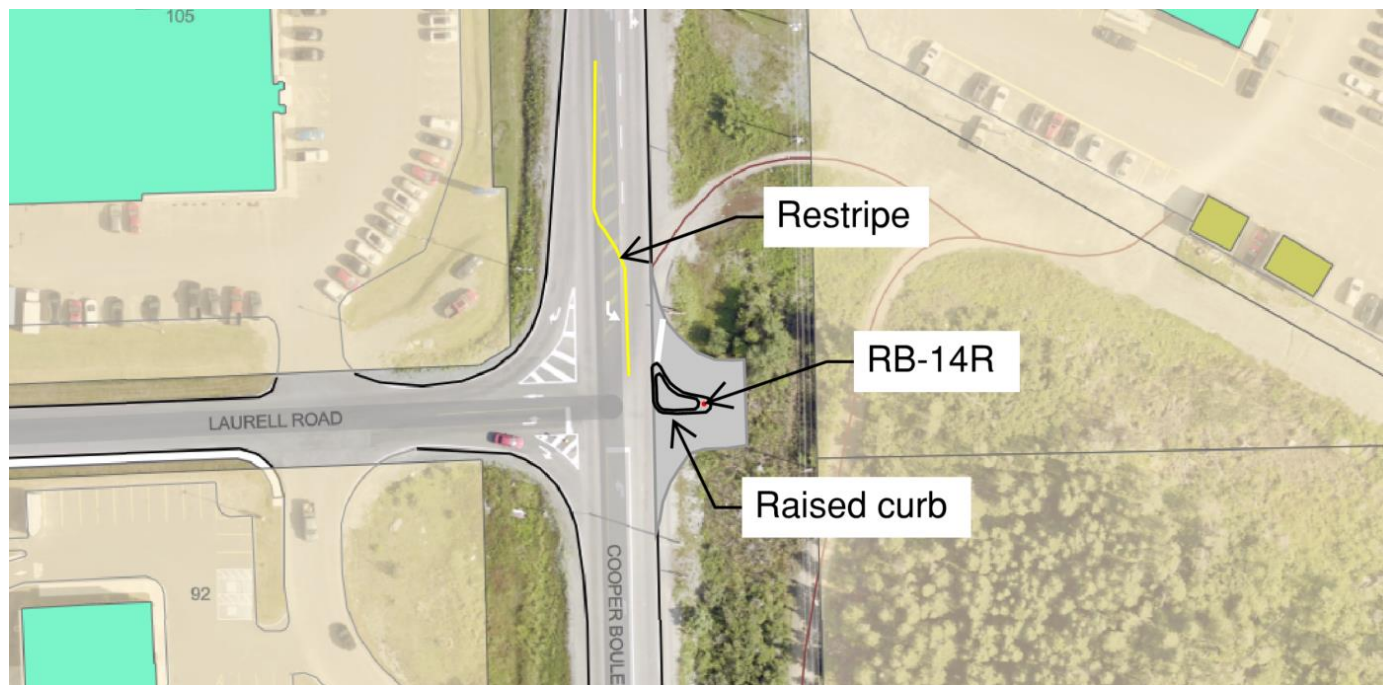
The 2020 Cooper Boulevard Corridor Study identified no improvement options for the intersection of Cooper Boulevard and Laurell Road as the intersection was projected to operate efficiently. The updated 2025 horizon year also shows traffic operating efficiently; therefore, no improvements are recommended because of traffic operations.

The speed analysis review indicated good compliance to the 60 km/h posted speed limit on Cooper Boulevard, south of Laurell Road. However, speeding concerns have been raised and a safety analysis requested at the intersection in anticipation of the new access that is connecting to Cooper Boulevard opposite Laurell Road.

The new access to Cooper Boulevard was discussed in the 2020 Cooper Boulevard study and it was recommended that it be configured as a right-in, right-out only; however, at that time the access was planned to connect with Cooper Boulevard south of Laurell Road. Now that the access is planned to be located directly opposite Laurell Road, it is recommended that the new connection allow full movements entering the new access, but that the exit be restricted to a right out only. Recommended lane configurations at the connection to Cooper Boulevard are shown in **Figure 7**. Note that the configuration shown would not permit left turns for large trucks entering from Cooper Boulevard. Large trucks would have to enter via James Boulevard.

As discussed in Section 5.2, traffic calming options such as lane narrowing (restriping) or installation of a gateway treatment could be considered to help slow traffic down south of Laurell Road as they transition from the rural to urban environment.

Figure 7 - Cooper Boulevard at James Boulevard Extension Lane Configuration



7 LOS with Improvements

The LOS analysis completed in Section 4 for the project 2025 conditions was updated to capture the results with the geometric improvements that were identified in Section 6. A summary table of the results is provided below. The detailed Synchro LOS reports can be found in Appendix B. The LOS results are summarized as follows:

Cooper Boulevard @ Raynham Avenue:

This intersection was modified to include a westbound left turn lane and a shared thru/right turn lane and an eastbound channelized right turn lane onto Cooper Boulevard.



The geometric changes reduced the overall delay by 2 seconds/vehicle in the AM peak period and 5 seconds/vehicle in the PM peak period compared to the existing configuration. The westbound left turn lane would still operate at a LOS F, but would be well below capacity.

Memorial Drive @ Cooper Boulevard Roundabout:

A single lane roundabout with a 40m inscribed diameter under 2030 conditions was analyzed at this intersection.

A single lane roundabout would perform at a LOS A during the AM and PM peak hours. The roundabout would have minimal changes on the overall intersection delay during the AM peak period but would reduce the individual delays to acceptable levels at all individual approaches. In the PM peak period, the roundabout would reduce the overall delay considerably and all individual approaches would operate efficiently, including the eastbound and westbound approaches which operate with high delay in the unsignalized configuration. VISSIM analysis results are shown in the table below.

Table 5: Mitigated Conditions Level of Service Results

| Intersection | | | Overall LOS // Delay (sec/veh) | Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m) | | | | | | | | | | | |
|----------------------------------|---|-------------|--------------------------------|--|---------------------------|---------------------------|----------------------------|--------------------------|--------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------|
| Main Street @ Minor Street | Traffic Control | Peak Period | | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
| | | | | L ← | T ↑ | R → | L ← | T ↑ | R → | L ← | T ↑ | R → | L ← | T ↑ | R → |
| Cooper Boulevard /Raynham Avenue |  | AM | LOS A 8.2 | Shared | B 13.5 [0.39] 15 | B 13.5 [0.39] 15 | D 28.9 [0.42] 16 | B 13.7 [0.10] 3 | Shared | A 8.1 [0.05] - | A 0.0 [0.04] - | A 0.0 [0.04] - | A 7.4 [0.0] 1 | A 0.0 [0.20] - | Shared |
| | | PM | LOS B 13.0 | Shared | C 17.5 [0.40] 15 | C 17.5 [0.40] 15 | F 104.0 [0.76] 33 | D 27.9 [0.19] 5 | Shared | A 8.4 [0.19] 6 | A 0.0 [0.20] - | A 0.0 [0.09] - | A 8.0 [0.01] <1 | A 0.0 [0.15] - | Shared |
| Cooper Boulevard /Memorial Drive |  | AM | LOS A 6.66 | Shared | C 18.44 [-] 63 | Shared | Shared | A 5.97 [-] 12 | Shared | Shared | A 2.69 [-] 33 | Shared | Shared | A 1.81 [-] 125 | Shared |
| | | PM | LOS A 2.35 | Shared | A 1.90 [-] 17 | Shared | Shared | A 2.33 [-] 13 | Shared | Shared | A 5.08 [-] 58 | Shared | Shared | A 2.05 [-] 27 | Shared |

8 Conclusion

Planned development and growth within the Town of Gander is expected to increase future traffic demand. This study included an analysis of traffic conditions at five locations in the Town. A Level of Service (LOS) analysis was completed, and infrastructure improvements were recommended to address operational deficiencies or safety concerns. The recommendations of this traffic analysis are summarized as follows:

Cooper Boulevard @ Raynham Avenue/Briggs Street:

1. Construct a concrete island at the northeast corner of the intersection;
2. Extend sidewalks with ramps to crosswalks on both side streets;
3. Upgrade the multi-use trail along the west side of Cooper Boulevard with asphalt and restrict it's use to pedestrians and cyclists only (ATV's would have to be diverted to another location);
4. Adjust the RRFB placement to be compatible with the new pedestrian island and sidewalk/crosswalk upgrades;
5. Convert the westbound approach to have a 100m left turn lane and a shared thru/right turn;
6. Convert the eastbound approach to have a 50m right turn lane with a channelized right;
7. A concrete island could also be considered at the west leg, to provide a channelized eastbound right turn movement.

Raynham Avenue @ Magee Road:

Short Term:

1. Install zebra crossing markings, RA-3 side mounted signs, and WC-16 advance warning signs at the north leg of Magee Road;

Long Term:

2. Replace striped islands with raised concrete curbs and islands;
3. Reduce the radius of the northbound right turn lane channel. Alternatively, the channelization of the right turn lane could be removed completely; and
4. Formalize the AT crossing treatment across Raynham Ave.

Memorial Drive @ Cooper Boulevard:

1. Construct a 40 m single lane roundabout with crosswalks and raised sidewalks across the west and south legs;
2. Install an AT trail with a formal crossing across the west leg of Memorial Drive with side mounted RA-4 double-sided signs and twin parallel line crosswalk markings.

Markham Place / Lindbergh Road @ Airport Boulevard:

1. Maintain current traffic signal timings; and
2. Monitor and adjust signal timings as needed if traffic volumes increase on Markham Place or Lindbergh Road.

Airport Boulevard @ Armstrong Boulevard:

Short Term:

1. Install raised curb along the west side of Armstrong Boulevard;
2. Add a curbed island at the intersection to force exiting traffic to turn right;
3. Add RB-14R signage at the Armstrong Boulevard southbound approach.

Long Term:

4. Perform an Access Study along Airport Boulevard to assess options for consolidating or eliminating accesses and possibly adding traffic signals.

Laurell Road @ Cooper Boulevard:

1. The new access opposite Laurell Road should be limited right turns only for the exit. This can be facilitated by signage or by installed a raised curb. Full movements can be maintained for the entrance;
2. Restripe Cooper Boulevard to permit southbound left turns and northbound right turns into the development access; and,
3. Additional traffic calming options could be considered such as lane narrowing (restriping) or installation of a gateway treatment to slow traffic while transitioning from the rural to urban environment.

Appendix A

Traffic Data Sheets





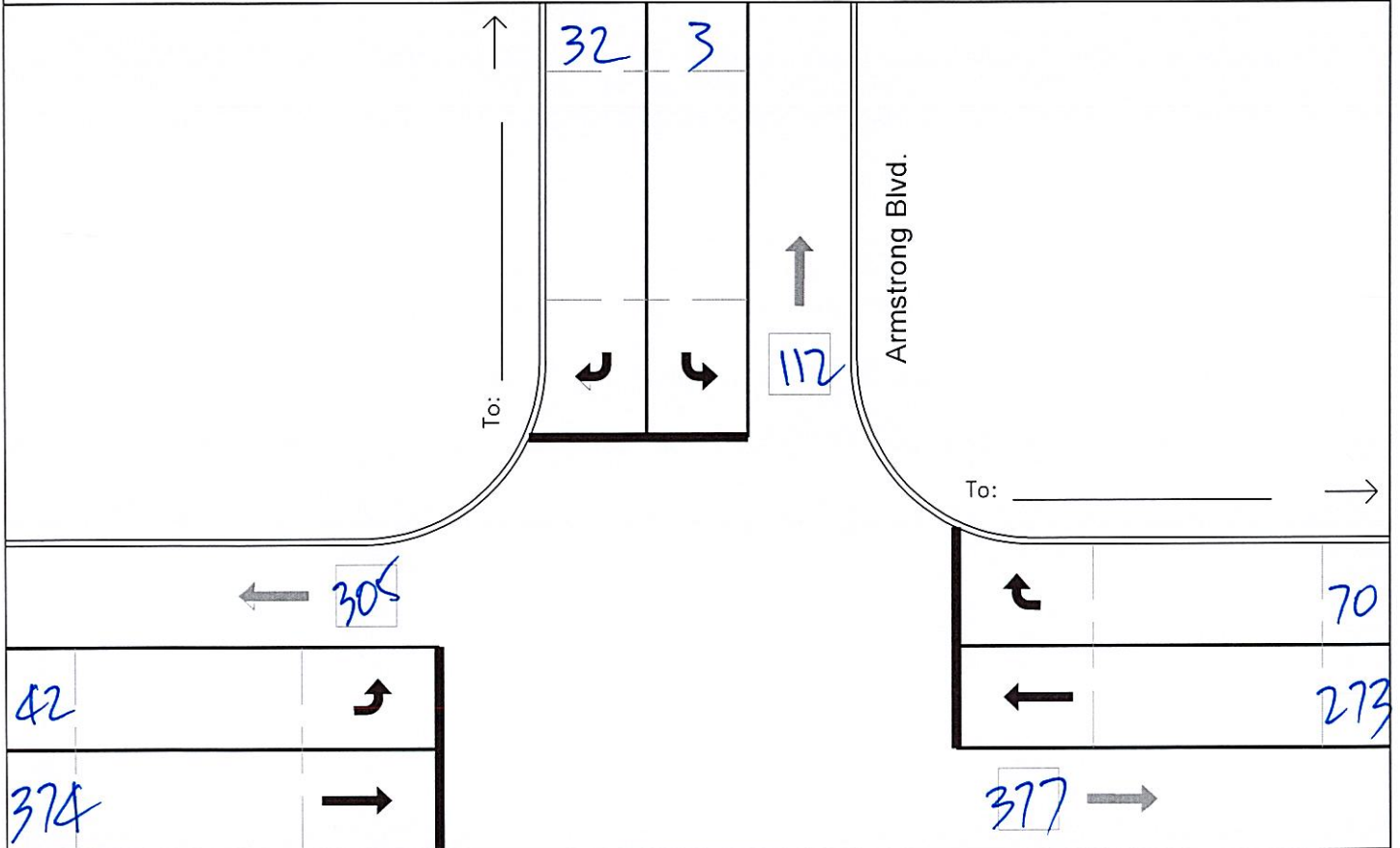
TOWN OF GANDER DIRECTIONAL TRAFFIC FLOWS

SHEET #: *TOTALS*

INTERSECTION: Airport Blvd. Armstrong Blvd.

DATE: June 15, 2023

TIME: 7:30am TO 9:30am



← To: _____ Airport Blvd.



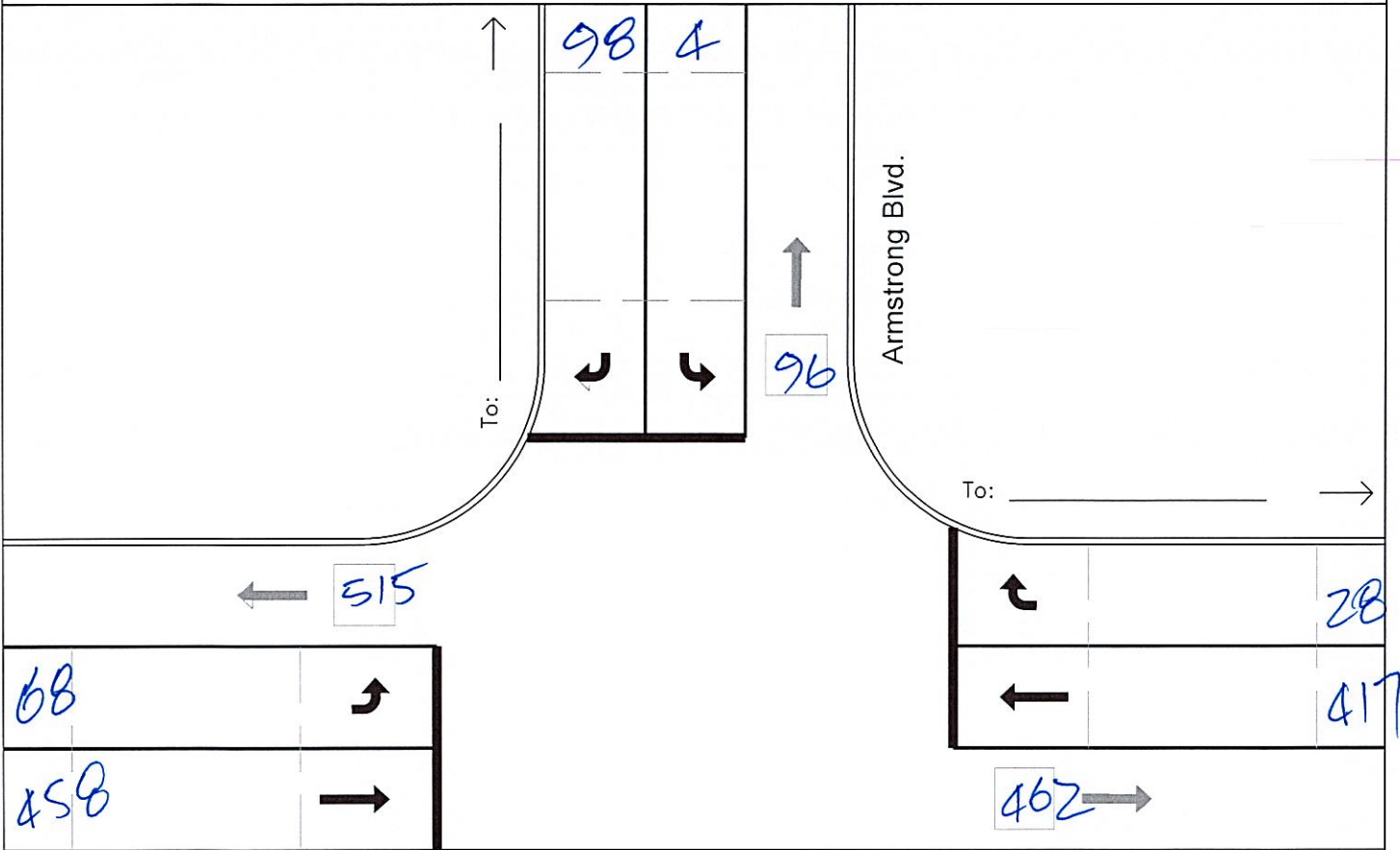
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DATE: June 15, 2023

TIME: 11:30am TO 1:30pm



← To: _____

Airport Blvd.



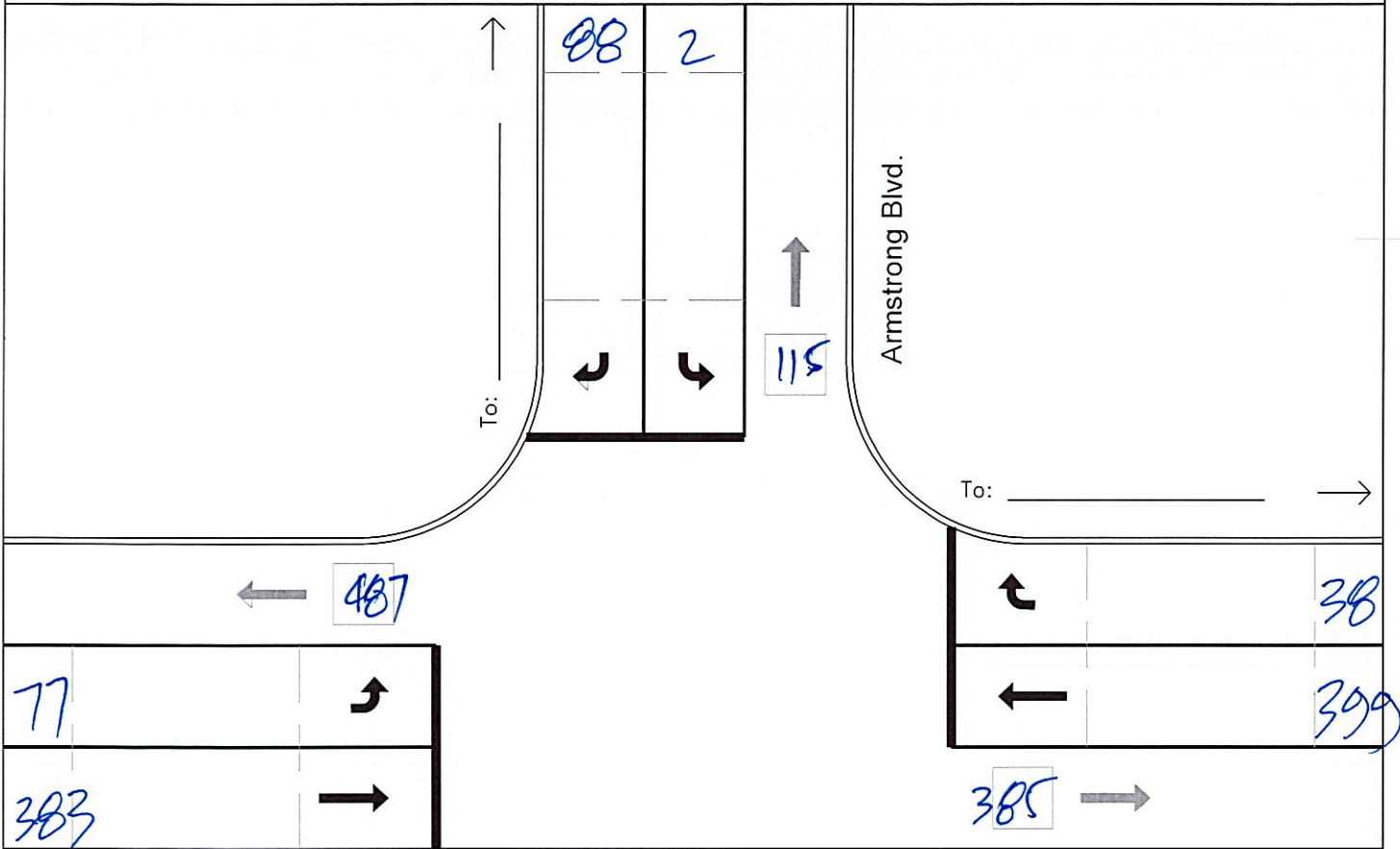
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DATE: June 15, 2023

TIME: 4:00pm TO 6:00pm



← To: _____ Airport Blvd.



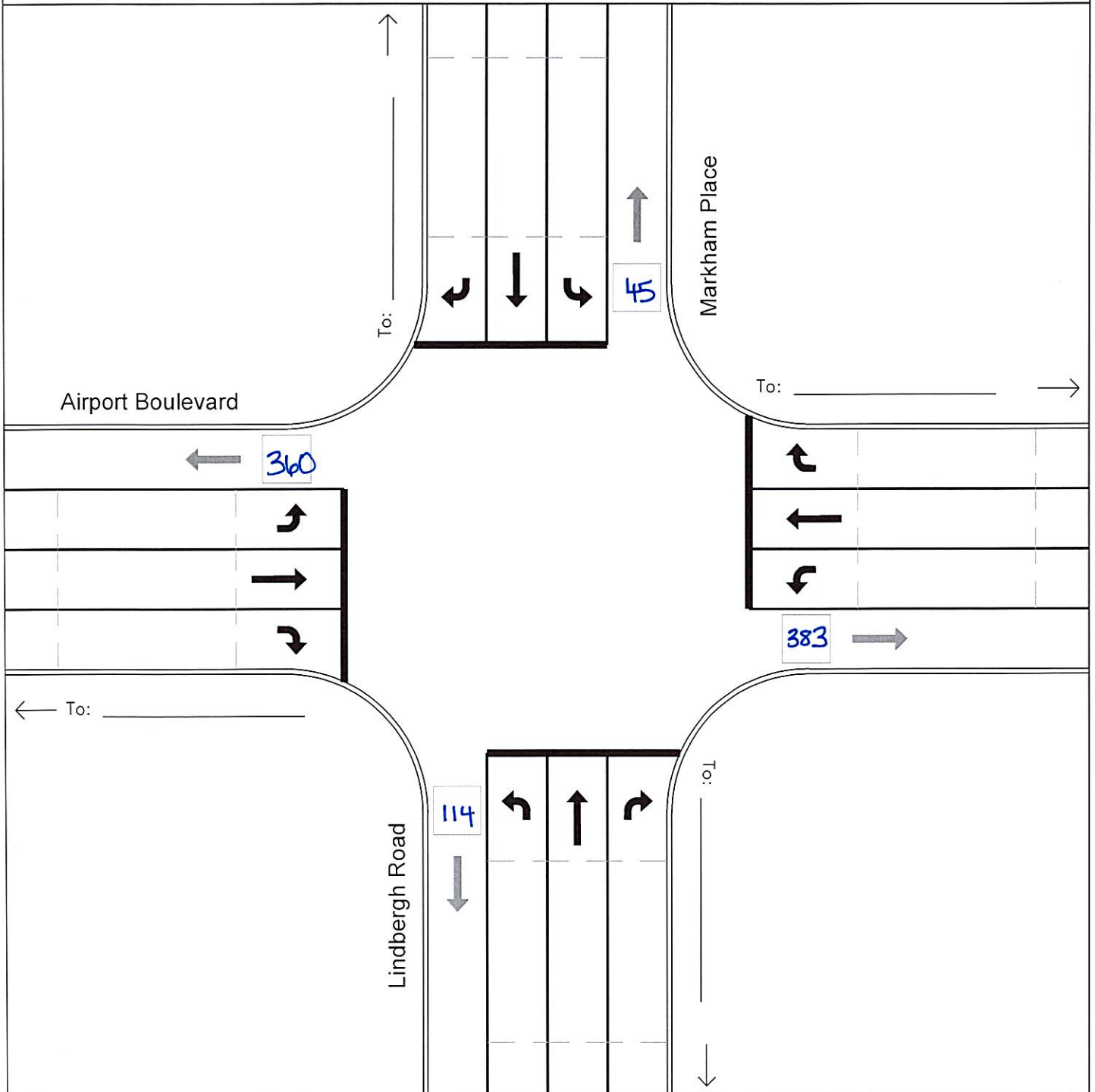
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DATE: May 17, 2023

TIME: 7:30am TO 9:30am





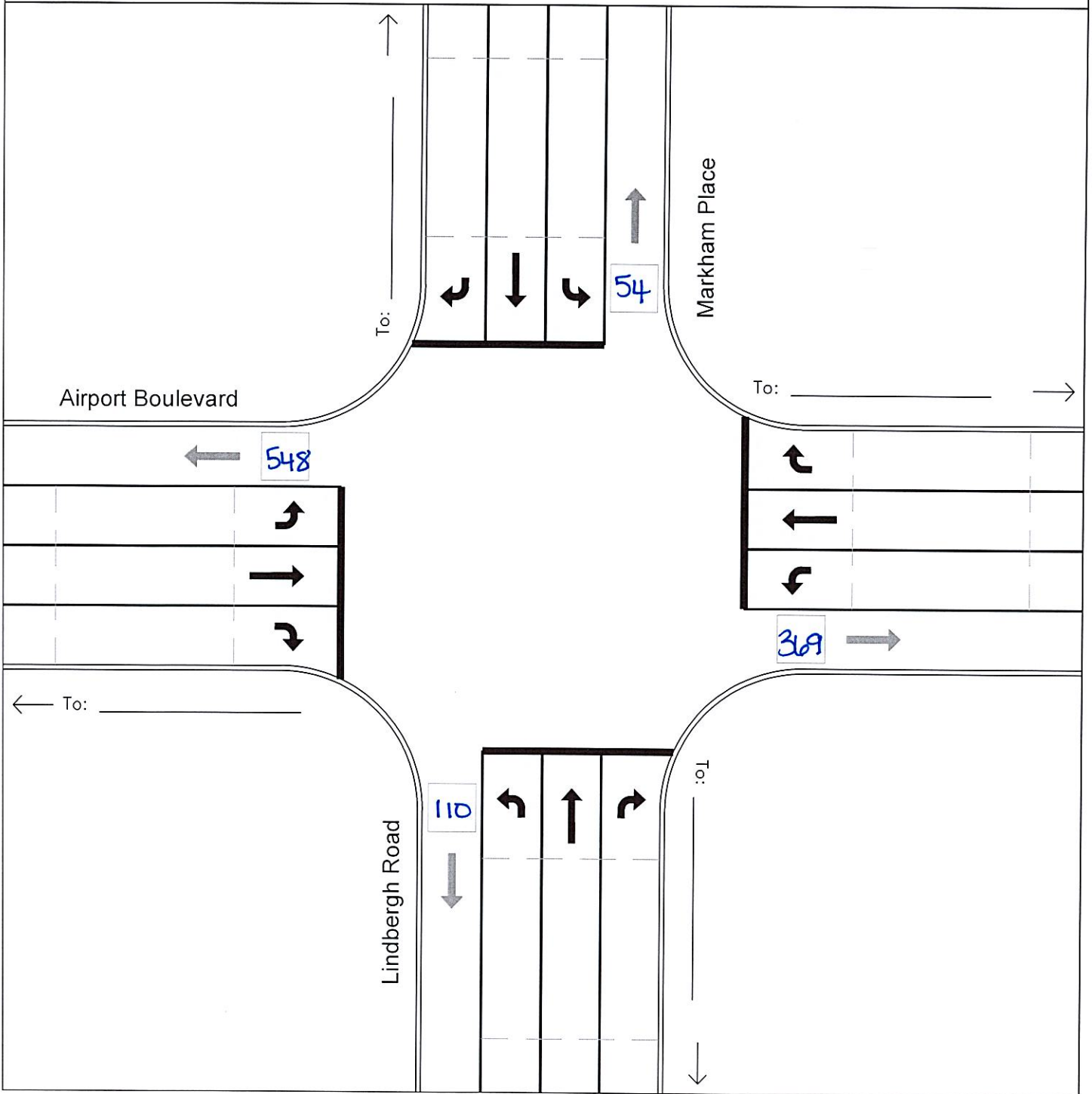
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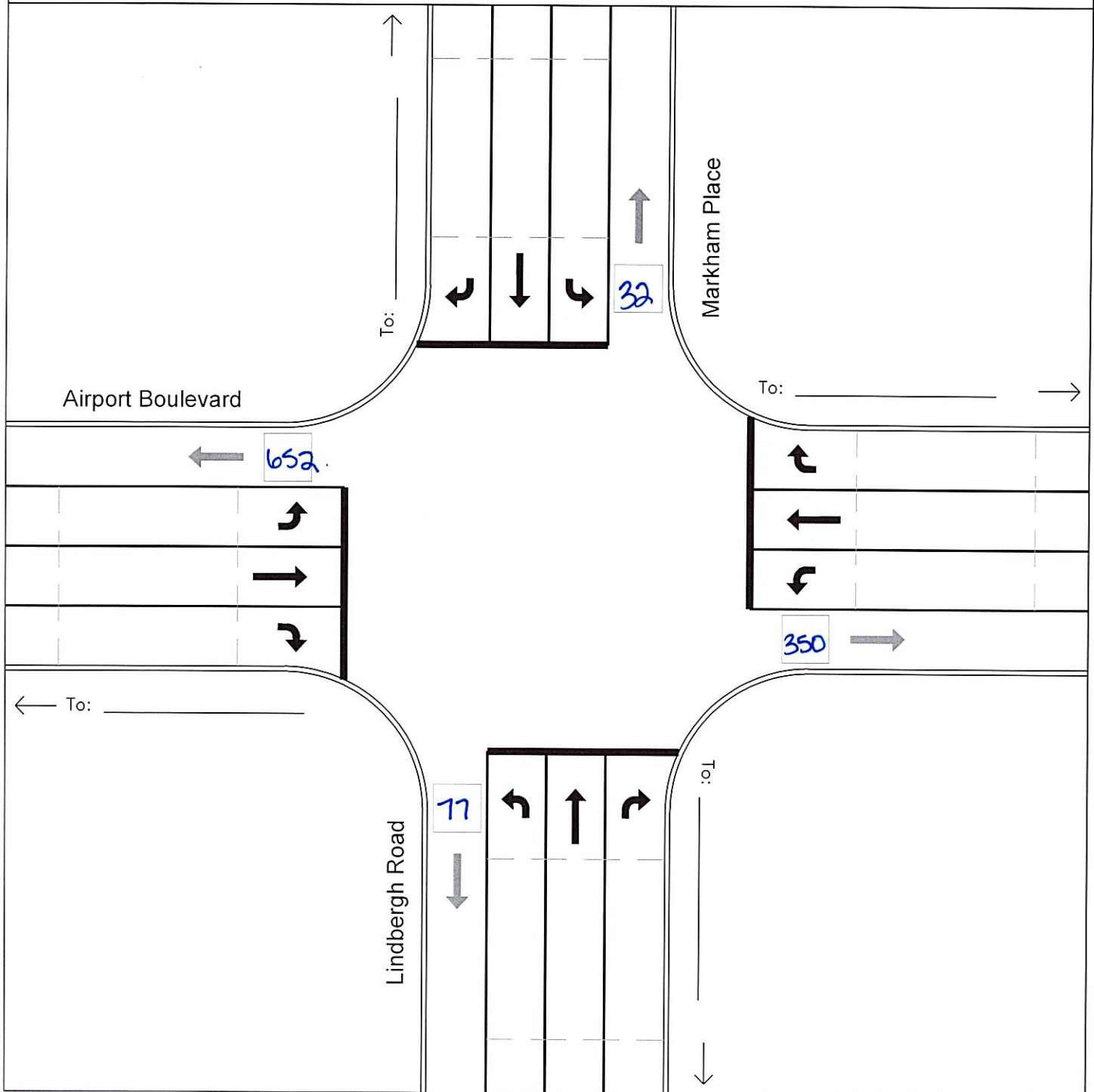
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DATE: May 17, 2023

TIME: 4:00pm TO 6:00pm





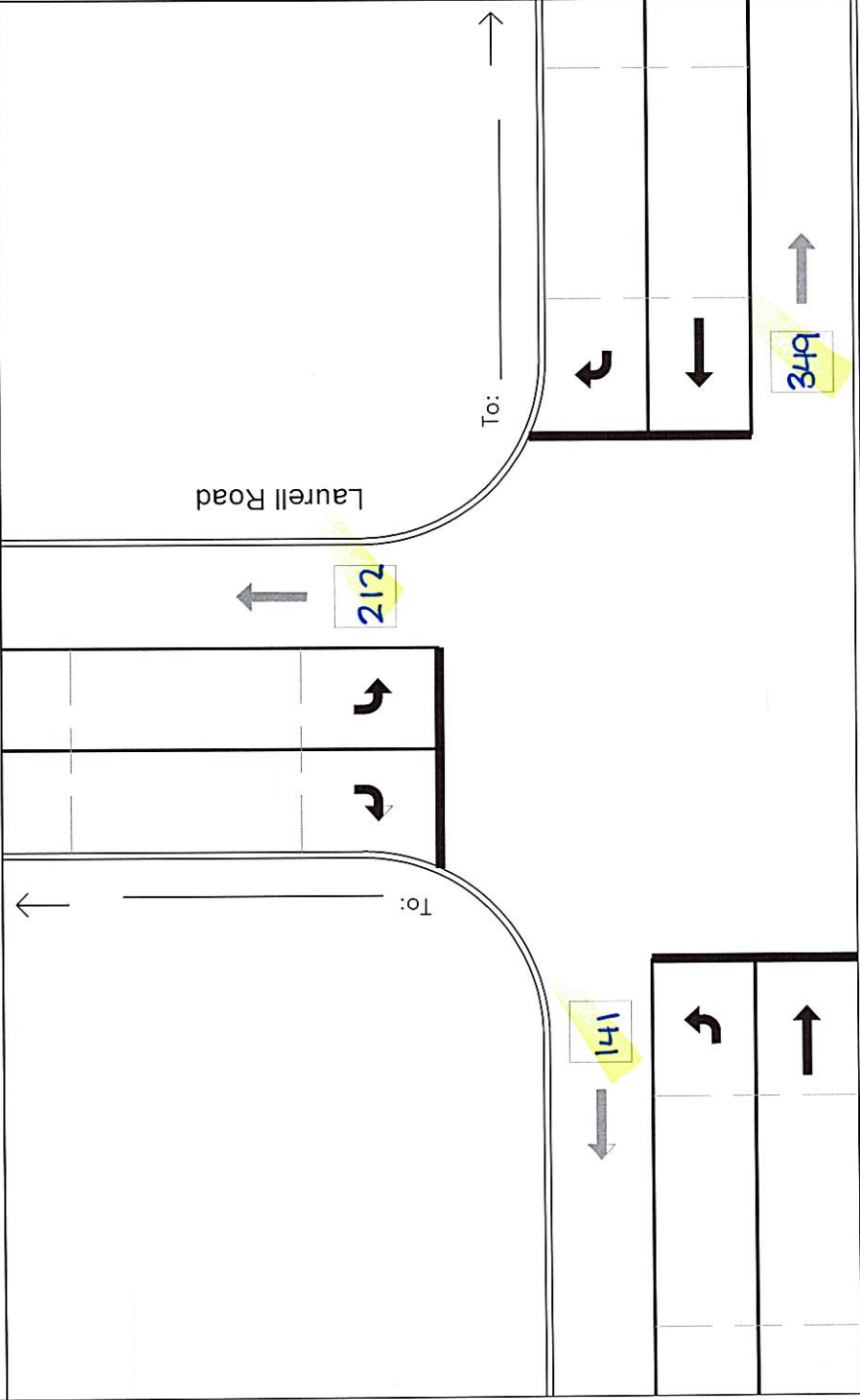
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DIRECTIONAL TRAFFIC FLOWS

SHEET #: **TOTALS**

INTERSECTION: Cooper Boulevard/Laurell Road

DATE: May 18, 2023

TIME: 7:30am TO 9:30am



← To: _____ Cooper Boulevard



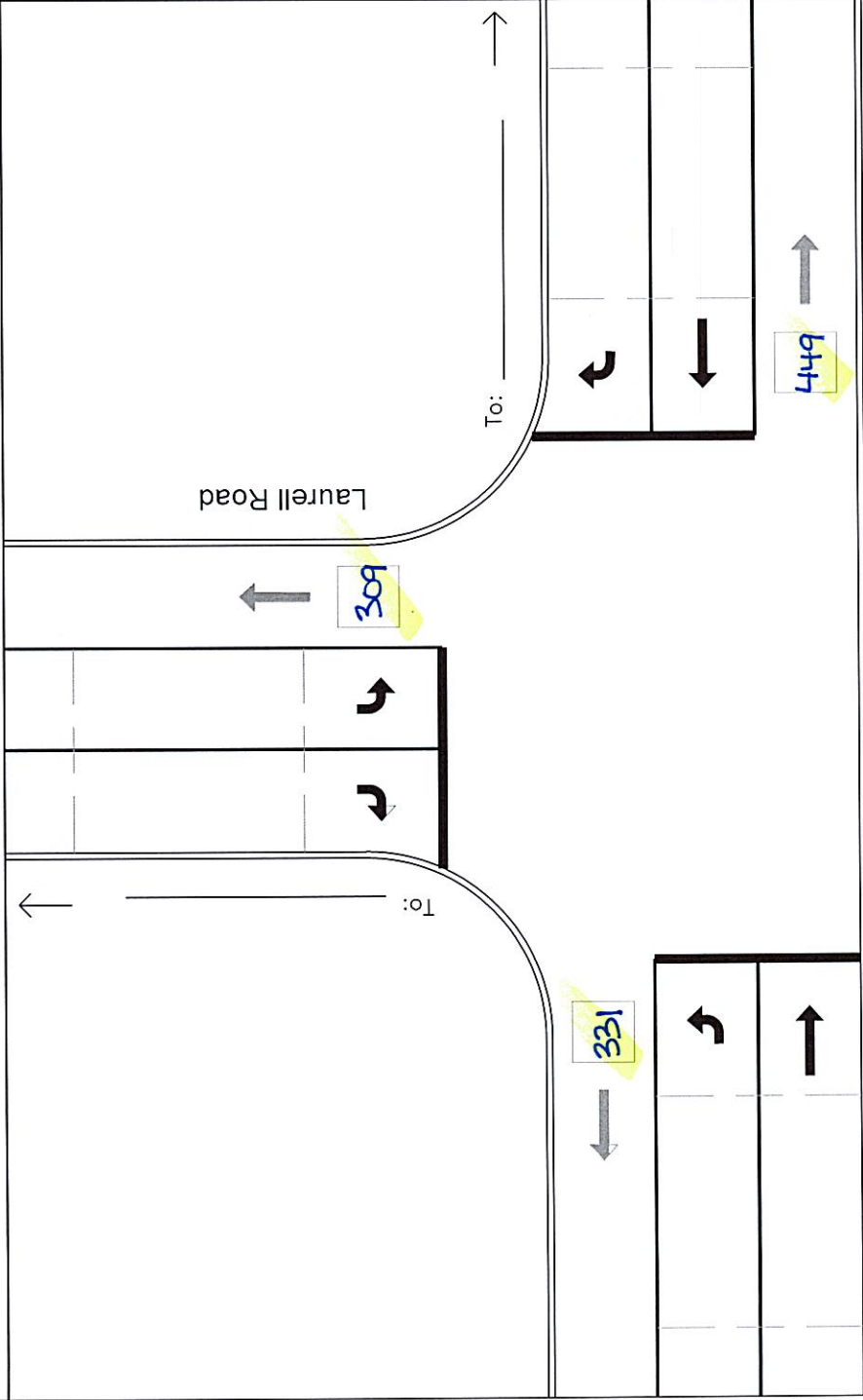
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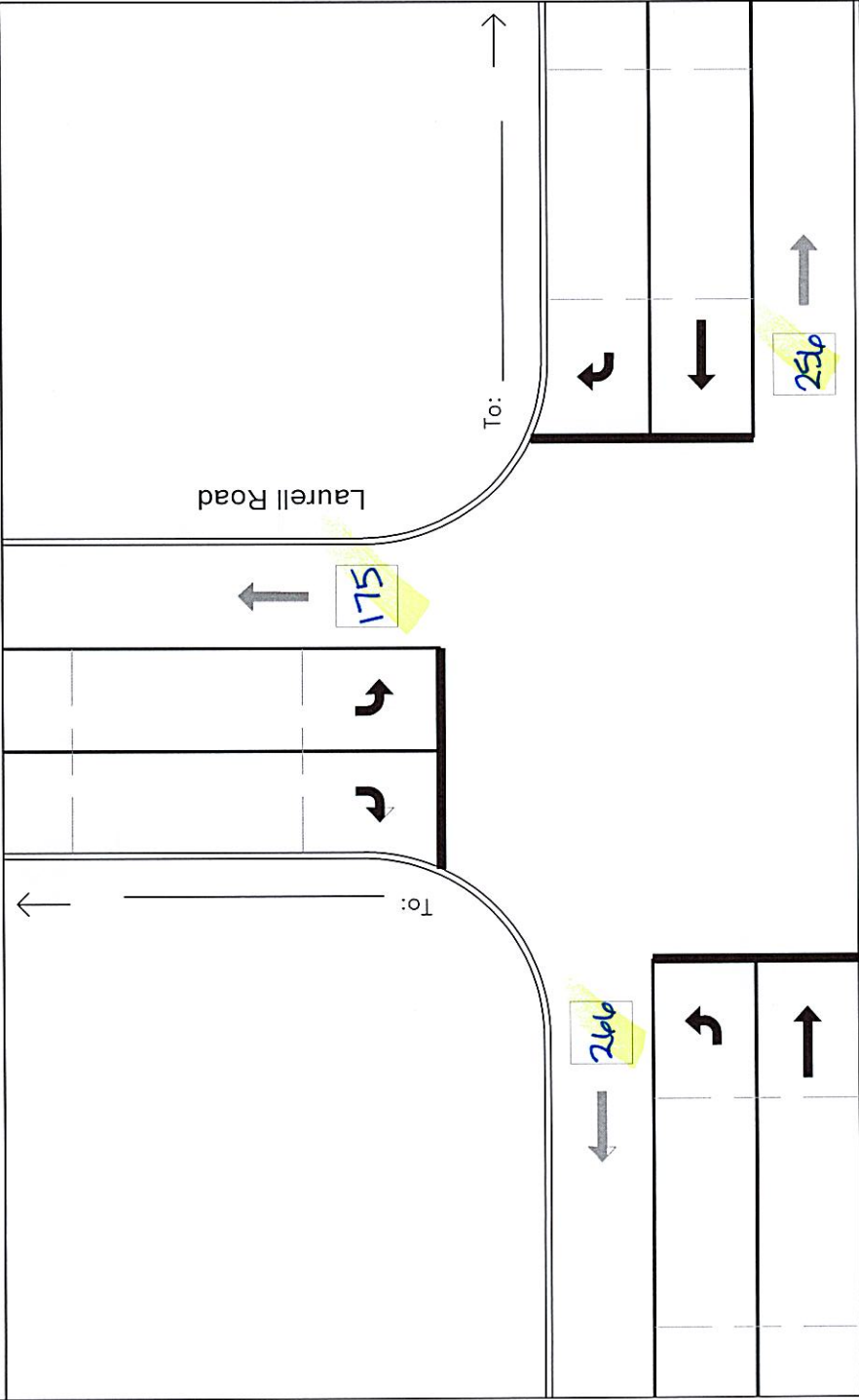
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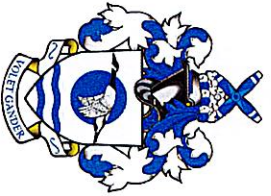
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DATE: May 18, 2023

TIME: 4:00pm TO 6:00pm



← To: _____
Cooper Boulevard



TOWN OF GANDER
DIRECTIONAL TRAFFIC FLOWS

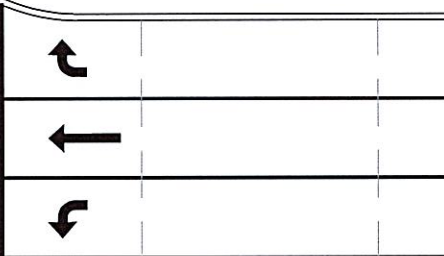
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DATE: May 18, 2023

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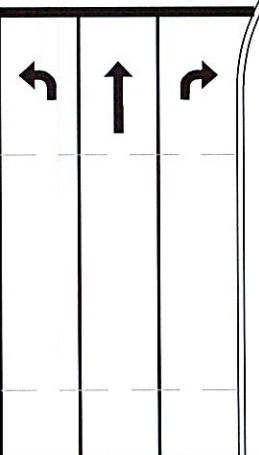
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Memorial Drive East

To: _____

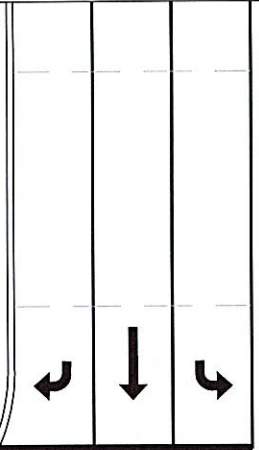


925

Cooper Boulevard

244

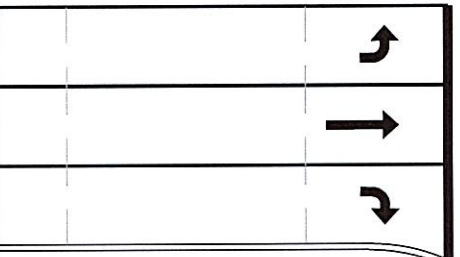
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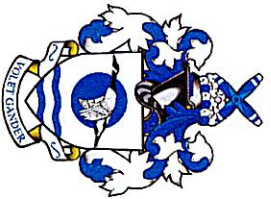


Memorial Drive

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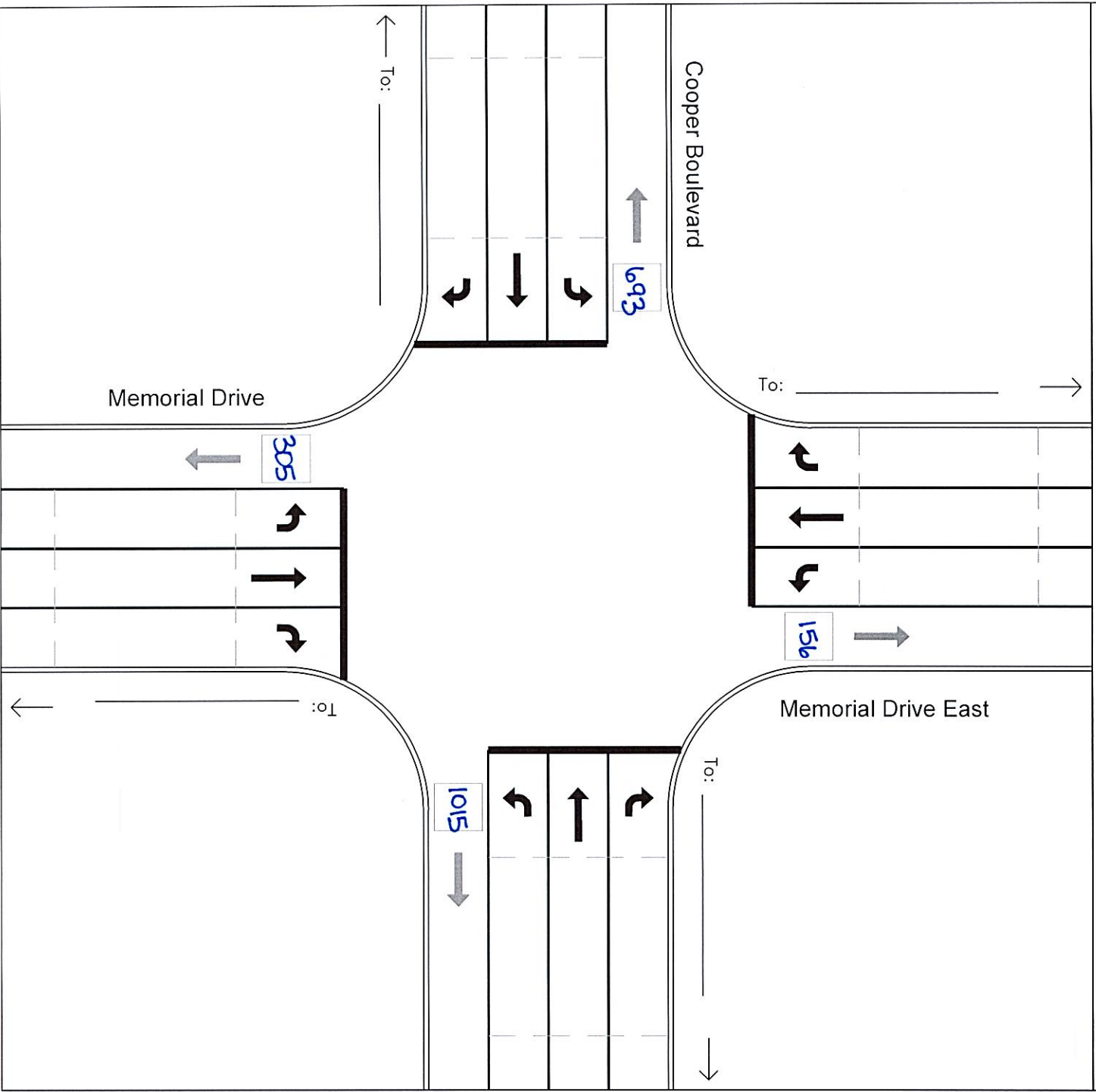
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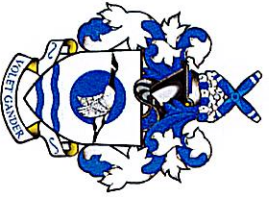
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INTERSECTION: Cooper Boulevard/Memorial Drive

DATE: May 18, 2023

TIME: 11:30am TO 1:30pm





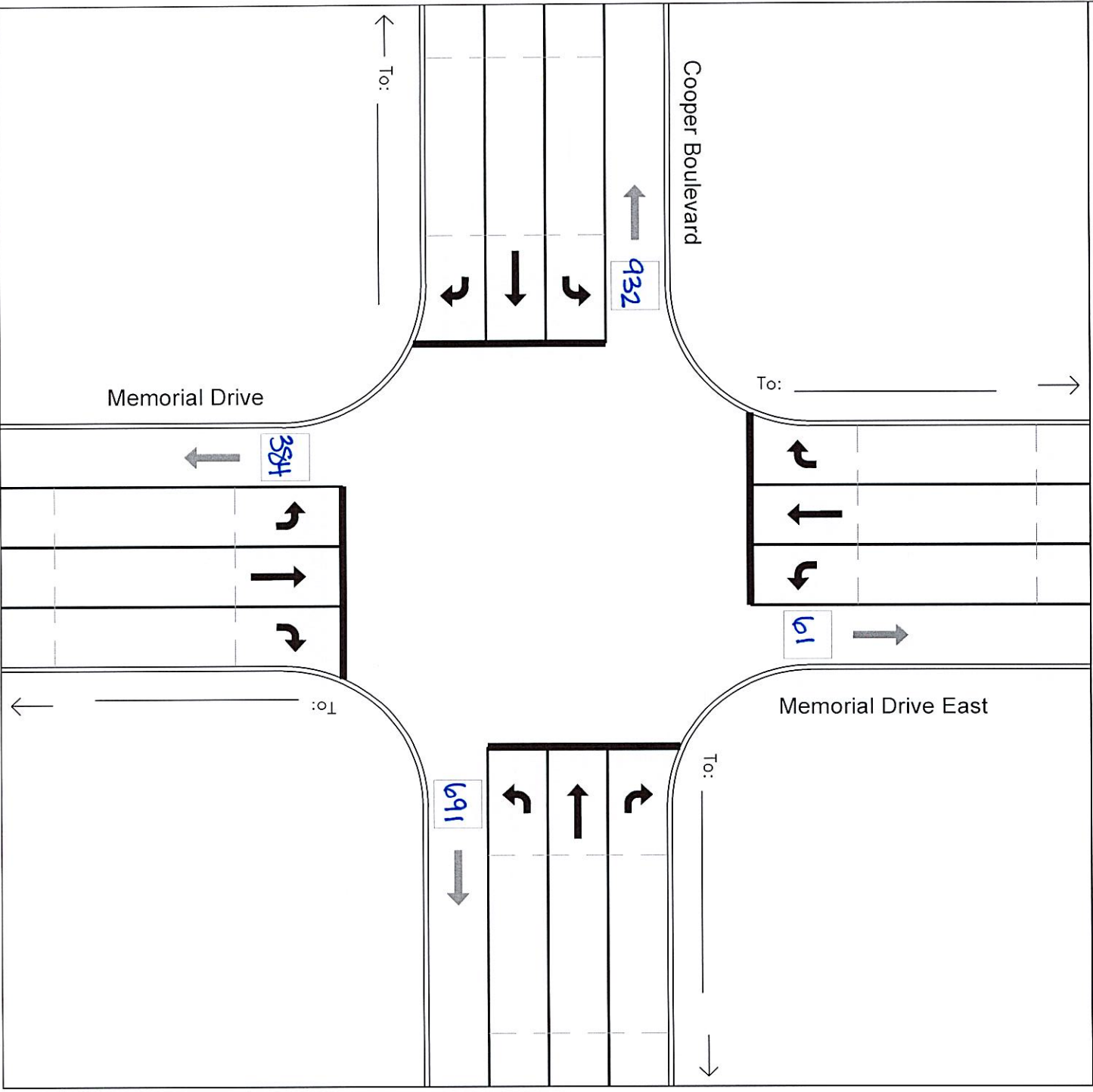
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DIRECTIONAL TRAFFIC FLOWS

SHEET #: **TOTALS**

INTERSECTION: Cooper Boulevard/Memorial Drive

DATE: May 18, 2023

TIME: 4:00pm TO 6:00pm





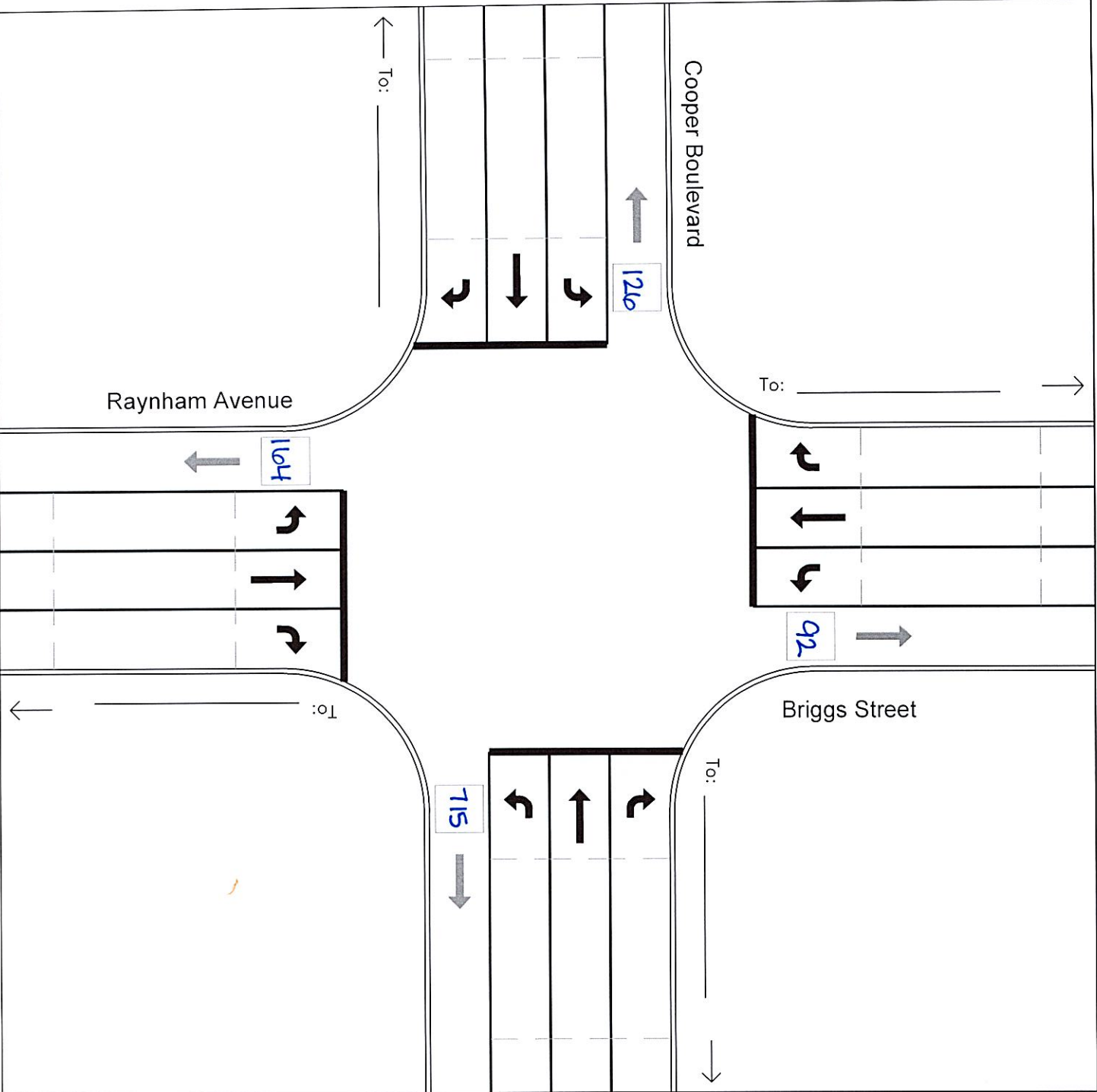
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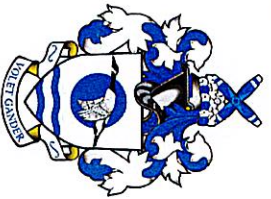
SHEET #: **TOTALS**

INTERSECTION: Cooper Boulevard/Raynham Avenue/Briggs Street

DATE: May 17, 2023

TIME: 7:30am TO 9:30am

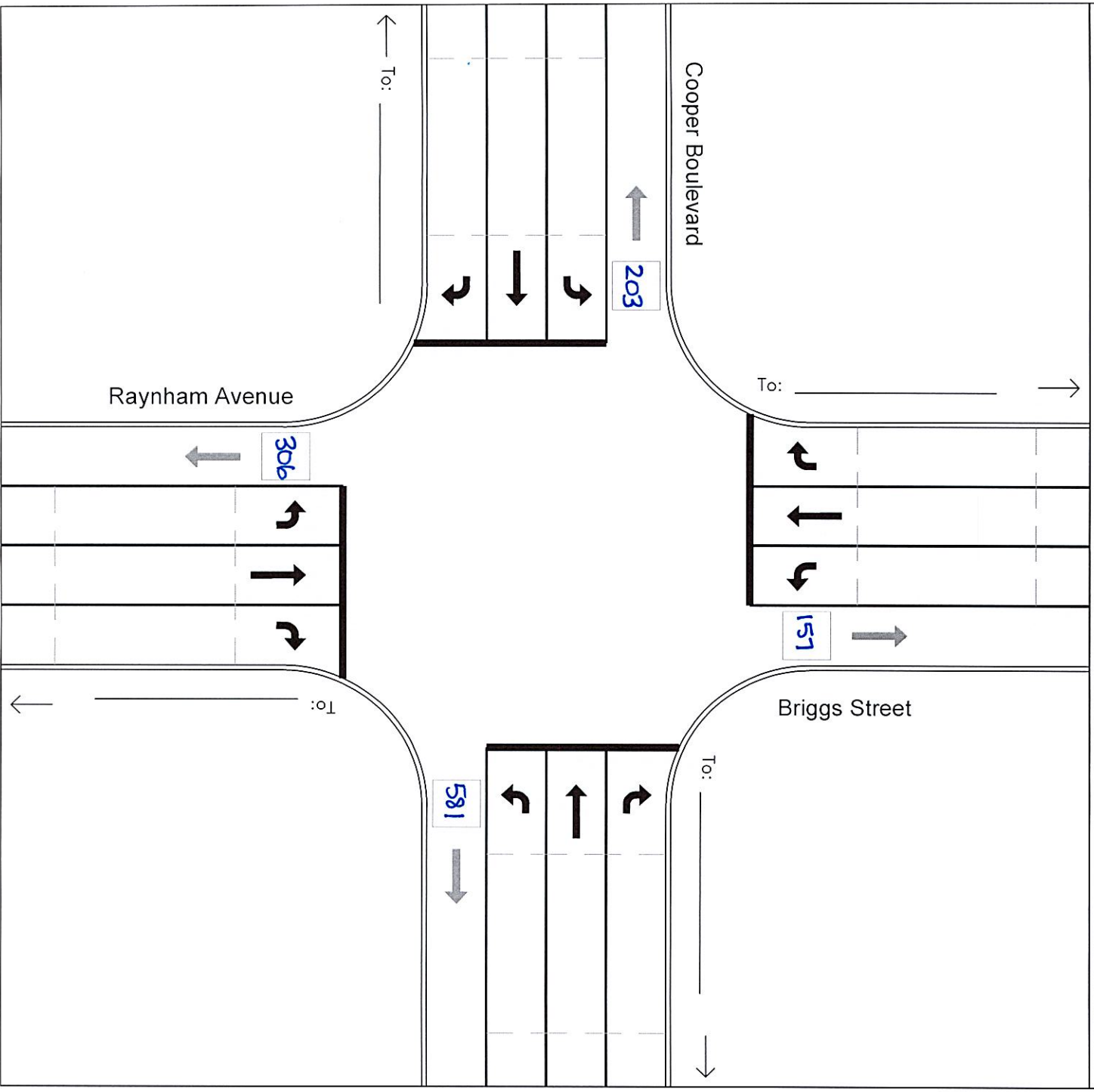


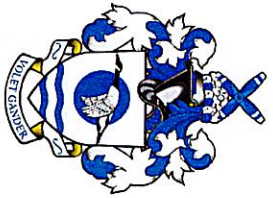


TOWN OF GANDER
DIRECTIONAL TRAFFIC FLOWS

SHEET #: **TOTALS**

INTERSECTION: Cooper Boulevard/Raynham Avenue/Briggs Street
DATE: May 17, 2023
TIME: 11:30am To 1:30pm

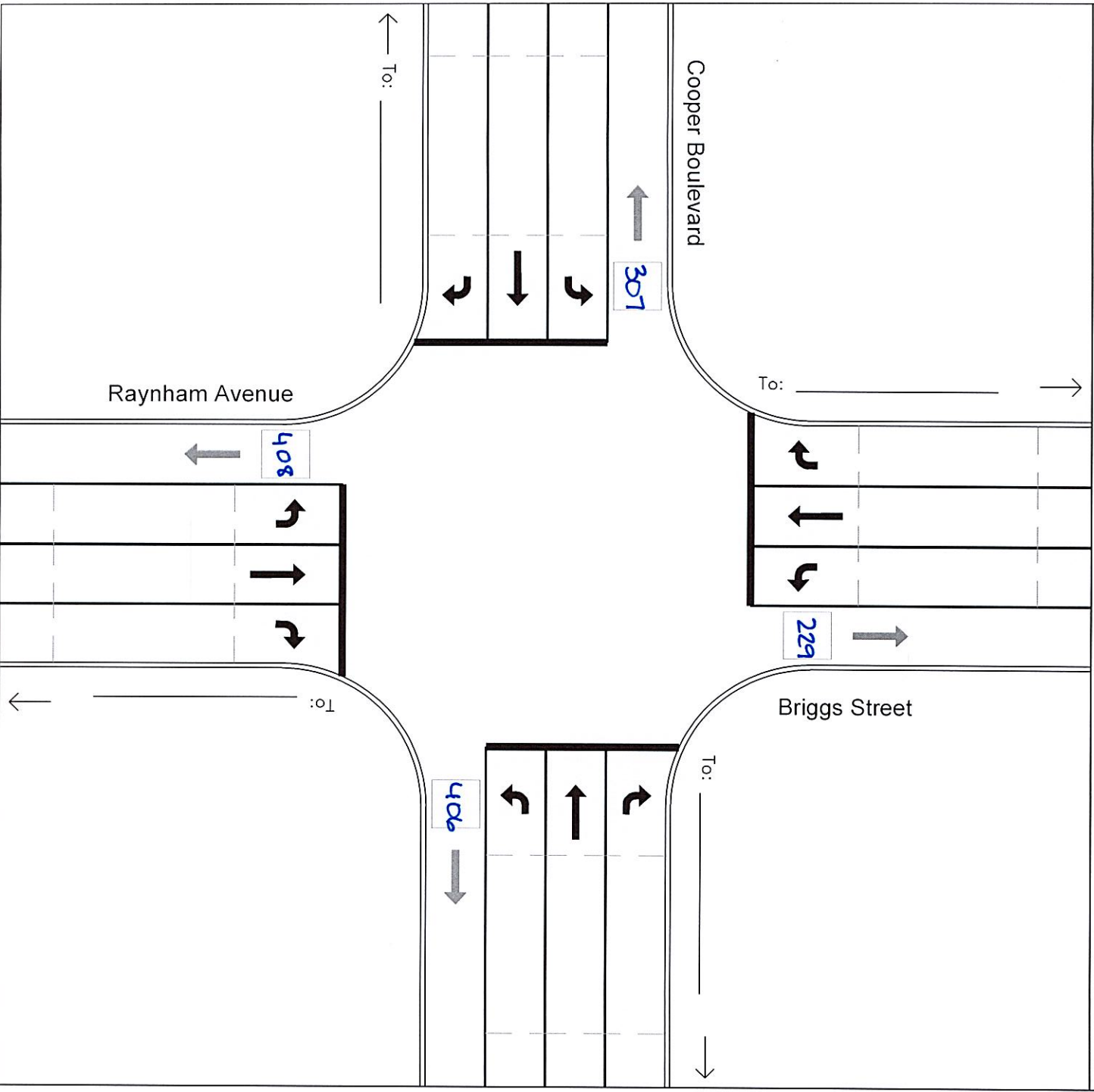


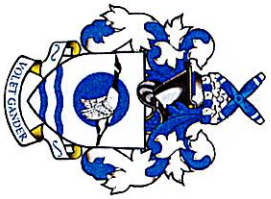


TOWN OF GANDER DIRECTIONAL TRAFFIC FLOWS

SHEET #: **TOTALS**

INTERSECTION: Cooper Boulevard/Raynham Avenue/Briggs Street
DATE: May 17, 2023
TIME: 4:00pm TO 6:00pm





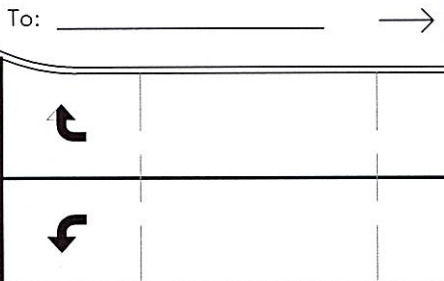
TOWN OF GANDER
DIRECTIONAL TRAFFIC FLOWS

SHEET #: **TOTALS**

INTERSECTION: Magee Road/Raynham Avenue

DATE: May 17, 2023

TIME: 7:30am TO 9:30am

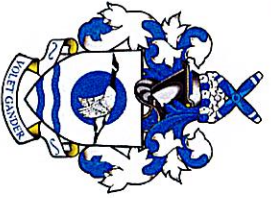


Raynham Avenue



Magee Road

← To: _____



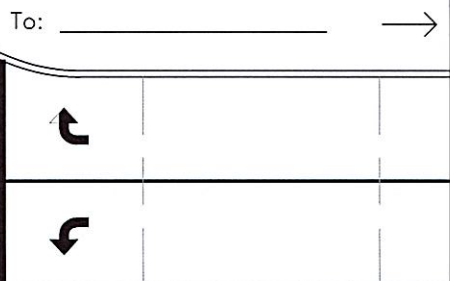
TOWN OF GANDER
DIRECTIONAL TRAFFIC FLOWS

SHEET #: TOTALS

INTERSECTION: Magee Road/Raynham Avenue

DATE: May 17, 2023

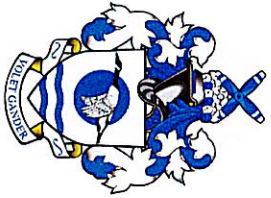
TIME: 11:30am To 1:30pm



Raynham Avenue



← To: Magee Road



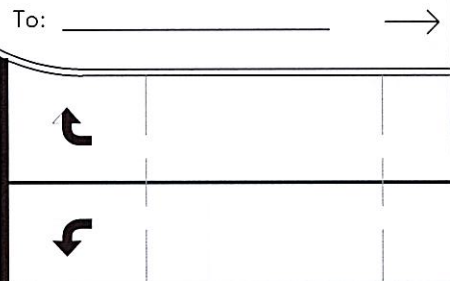
TOWN OF GANDER
DIRECTIONAL TRAFFIC FLOWS

SHEET #: **TOTALS**

INTERSECTION: Magee Road/Raynham Avenue

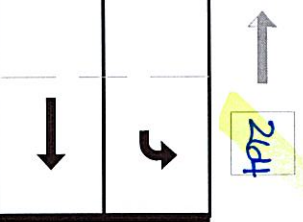
DATE: May 17, 2023

TIME: 4:00pm To 6:00pm



189

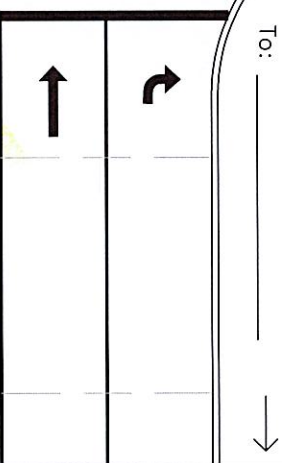
Raynham Avenue



244

← To: _____

Magee Road



239

Appendix B

Synchro LOS Reports



2025 Future Conditions_AM
5: Lindbergh St/Markham PI & Airport Blvd

Timing Plan: AM Peak

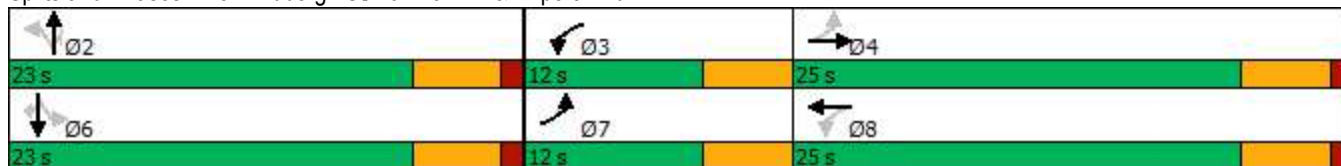


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|------|-------|-------|------|------|-------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 39 | 197 | 92 | 4 | 192 | 41 | 14 | 7 | 15 | 9 | 3 | 12 |
| Future Volume (vph) | 39 | 197 | 92 | 4 | 192 | 41 | 14 | 7 | 15 | 9 | 3 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 30.0 | | 0.0 | 18.0 | | 0.0 | 0.0 | | 30.0 | 0.0 | | 20.0 |
| Storage Lanes | 1 | | 0 | 1 | | 0 | 0 | | 1 | 0 | | 1 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 1770 | 1773 | 0 | 1770 | 3447 | 0 | 0 | 1803 | 1583 | 0 | 1794 | 1583 |
| Flt Permitted | 0.495 | | | 0.479 | | | | 0.873 | | | 0.867 | |
| Satd. Flow (perm) | 922 | 1773 | 0 | 892 | 3447 | 0 | 0 | 1626 | 1583 | 0 | 1615 | 1583 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 42 | | | 45 | | | | 109 | | | 109 |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 108.7 | | | 340.8 | | | 90.5 | | | 92.6 | |
| Travel Time (s) | | 7.8 | | | 24.5 | | | 6.5 | | | 6.7 | |
| Lane Group Flow (vph) | 54 | 402 | 0 | 6 | 324 | 0 | 0 | 29 | 21 | 0 | 17 | 17 |
| Turn Type | pm+pt | NA | | pm+pt | NA | | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | 6 |
| Total Split (s) | 12.0 | 25.0 | | 12.0 | 25.0 | | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| Total Lost Time (s) | 4.0 | 5.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 |
| Act Effct Green (s) | 26.9 | 24.5 | | 25.1 | 20.2 | | | 18.2 | 18.2 | | 18.2 | 18.2 |
| Actuated g/C Ratio | 0.49 | 0.45 | | 0.46 | 0.37 | | | 0.33 | 0.33 | | 0.33 | 0.33 |
| v/c Ratio | 0.10 | 0.49 | | 0.01 | 0.25 | | | 0.05 | 0.04 | | 0.03 | 0.03 |
| Control Delay | 6.9 | 12.9 | | 6.5 | 12.0 | | | 15.0 | 0.1 | | 14.9 | 0.1 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 6.9 | 12.9 | | 6.5 | 12.0 | | | 15.0 | 0.1 | | 14.9 | 0.1 |
| LOS | A | B | | A | B | | | B | A | | B | A |
| Approach Delay | | 12.2 | | | 11.9 | | | 8.8 | | | 7.5 | |
| Approach LOS | | B | | | B | | | A | | | A | |
| Queue Length 50th (m) | 2.6 | 22.1 | | 0.4 | 11.6 | | | 2.3 | 0.0 | | 1.3 | 0.0 |
| Queue Length 95th (m) | 5.3 | 42.4 | | 1.3 | 15.5 | | | 5.9 | 0.0 | | 4.1 | 0.0 |
| Internal Link Dist (m) | | 84.7 | | | 316.8 | | | 66.5 | | | 68.6 | |
| Turn Bay Length (m) | 30.0 | | | 18.0 | | | | | 30.0 | | | 20.0 |
| Base Capacity (vph) | 578 | 814 | | 547 | 1300 | | | 540 | 598 | | 536 | 598 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.09 | 0.49 | | 0.01 | 0.25 | | | 0.05 | 0.04 | | 0.03 | 0.03 |

Intersection Summary





















| | |
|------------------------------------|------------------------|
| Area Type: | Other |
| Cycle Length: | 60 |
| Actuated Cycle Length: | 54.8 |
| Control Type: | Actuated-Uncoordinated |
| Maximum v/c Ratio: | 0.49 |
| Intersection Signal Delay: | 11.7 |
| Intersection LOS: | B |
| Intersection Capacity Utilization: | 49.2% |
| ICU Level of Service: | A |
| Analysis Period (min): | 15 |

Splits and Phases: 5: Lindbergh St/Markham PI & Airport Blvd














2025 Future Conditions_AM
1: Cooper Blvd & Raynham Ave

Timing Plan: AM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  |  |  |  | |
| Traffic Volume (veh/h) | 15 | 13 | 247 | 95 | 34 | 7 | 56 | 74 | 58 | 4 | 284 | 24 |
| Future Volume (Veh/h) | 15 | 13 | 247 | 95 | 34 | 7 | 56 | 74 | 58 | 4 | 284 | 24 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Hourly flow rate (vph) | 17 | 15 | 278 | 107 | 38 | 8 | 63 | 83 | 65 | 4 | 319 | 27 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 568 | 550 | 332 | 682 | 563 | 83 | 346 | | | 83 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 568 | 550 | 332 | 682 | 563 | 83 | 346 | | | 83 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 96 | 96 | 61 | 48 | 91 | 99 | 95 | | | 100 | | |
| cM capacity (veh/h) | 383 | 419 | 709 | 206 | 412 | 976 | 1213 | | | 1514 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | | | | | |
| Volume Total | 310 | 153 | 63 | 83 | 65 | 4 | 346 | | | | | |
| Volume Left | 17 | 107 | 63 | 0 | 0 | 4 | 0 | | | | | |
| Volume Right | 278 | 8 | 0 | 0 | 65 | 0 | 27 | | | | | |
| cSH | 791 | 247 | 1213 | 1700 | 1700 | 1514 | 1700 | | | | | |
| Volume to Capacity | 0.39 | 0.62 | 0.05 | 0.05 | 0.04 | 0.00 | 0.20 | | | | | |
| Queue Length 95th (m) | 15.0 | 29.7 | 1.3 | 0.0 | 0.0 | 0.1 | 0.0 | | | | | |
| Control Delay (s) | 13.5 | 40.7 | 8.1 | 0.0 | 0.0 | 7.4 | 0.0 | | | | | |
| Lane LOS | B | E | A | | | A | | | | | | |
| Approach Delay (s) | 13.5 | 40.7 | 2.4 | | | 0.1 | | | | | | |
| Approach LOS | B | E | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 10.7 | | | | | | | | | |
| Intersection Capacity Utilization | | | 49.2% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |



















2025 Future Conditions_AM
2: Raynham Ave & Magee Rd

Timing Plan: AM Peak

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  | |  |  |  |  |
| Traffic Volume (veh/h) | 126 | 125 | 163 | 148 | 132 | 193 |
| Future Volume (Veh/h) | 126 | 125 | 163 | 148 | 132 | 193 |
| Sign Control | Stop | | Free | | Free | |
| Grade | 0% | | 0% | | 0% | |
| Peak Hour Factor | 0.76 | 0.76 | 0.76 | 0.76 | 0.76 | 0.76 |
| Hourly flow rate (vph) | 166 | 164 | 214 | 195 | 174 | 254 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 816 | 214 | | | 214 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 816 | 214 | | | 214 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 45 | 80 | | | 87 | |
| cM capacity (veh/h) | 302 | 826 | | | 1356 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 330 | 214 | 195 | 174 | 254 | |
| Volume Left | 166 | 0 | 0 | 174 | 0 | |
| Volume Right | 164 | 0 | 195 | 0 | 0 | |
| cSH | 441 | 1700 | 1700 | 1356 | 1700 | |
| Volume to Capacity | 0.75 | 0.13 | 0.11 | 0.13 | 0.15 | |
| Queue Length 95th (m) | 49.4 | 0.0 | 0.0 | 3.5 | 0.0 | |
| Control Delay (s) | 33.7 | 0.0 | 0.0 | 8.0 | 0.0 | |
| Lane LOS | D | | | A | | |
| Approach Delay (s) | 33.7 | 0.0 | | 3.3 | | |
| Approach LOS | D | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 10.7 | | | |
| Intersection Capacity Utilization | | | 40.5% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

2025 Future Conditions_AM
3: Cooper Blvd & Memorial Dr




















Timing Plan: AM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | |  |  | |  |  | |
| Traffic Volume (veh/h) | 7 | 18 | 156 | 27 | 7 | 1 | 54 | 160 | 47 | 30 | 549 | 29 |
| Future Volume (Veh/h) | 7 | 18 | 156 | 27 | 7 | 1 | 54 | 160 | 47 | 30 | 549 | 29 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 8 | 20 | 173 | 30 | 8 | 1 | 60 | 178 | 52 | 33 | 610 | 32 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 994 | 990 | 626 | 1010 | 1032 | 204 | 642 | | | 178 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 994 | 990 | 626 | 1010 | 1032 | 204 | 642 | | | 178 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 96 | 91 | 64 | 75 | 96 | 100 | 94 | | | 98 | | |
| cM capacity (veh/h) | 203 | 225 | 484 | 122 | 213 | 837 | 943 | | | 1398 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | | | | | | |
| Volume Total | 201 | 39 | 60 | 230 | 33 | 642 | | | | | | |
| Volume Left | 8 | 30 | 60 | 0 | 33 | 0 | | | | | | |
| Volume Right | 173 | 1 | 0 | 52 | 0 | 32 | | | | | | |
| cSH | 414 | 137 | 943 | 1700 | 1398 | 1700 | | | | | | |
| Volume to Capacity | 0.49 | 0.28 | 0.06 | 0.14 | 0.02 | 0.38 | | | | | | |
| Queue Length 95th (m) | 20.6 | 8.7 | 1.6 | 0.0 | 0.6 | 0.0 | | | | | | |
| Control Delay (s) | 21.6 | 41.3 | 9.1 | 0.0 | 7.6 | 0.0 | | | | | | |
| Lane LOS | C | E | A | | A | | | | | | | |
| Approach Delay (s) | 21.6 | 41.3 | 1.9 | | 0.4 | | | | | | | |
| Approach LOS | C | E | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 5.6 | | | | | | | | | |
| Intersection Capacity Utilization | | | 58.7% | | ICU Level of Service | | | | | B | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

2025 Future Conditions_AM


















4: Cooper Blvd & Laurel Rd

Timing Plan: AM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | | |  |  |  |  | |  |  |
| Traffic Volume (veh/h) | 60 | 0 | 14 | 0 | 0 | 14 | 40 | 252 | 36 | 0 | 148 | 93 |
| Future Volume (Veh/h) | 60 | 0 | 14 | 0 | 0 | 14 | 40 | 252 | 36 | 0 | 148 | 93 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.90 | 0.92 | 0.90 | 0.92 | 0.92 | 0.92 | 0.90 | 0.90 | 0.92 | 0.92 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 67 | 0 | 16 | 0 | 0 | 15 | 44 | 280 | 39 | 0 | 164 | 103 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 547 | 571 | 164 | 532 | 532 | 280 | 164 | | | 319 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 547 | 571 | 164 | 532 | 532 | 280 | 164 | | | 319 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 84 | 100 | 98 | 100 | 100 | 98 | 97 | | | 100 | | |
| cM capacity (veh/h) | 429 | 417 | 881 | 439 | 439 | 759 | 1414 | | | 1241 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | | | | | |
| Volume Total | 83 | 15 | 44 | 280 | 39 | 164 | 103 | | | | | |
| Volume Left | 67 | 0 | 44 | 0 | 0 | 0 | 0 | | | | | |
| Volume Right | 16 | 15 | 0 | 0 | 39 | 0 | 103 | | | | | |
| cSH | 476 | 759 | 1414 | 1700 | 1700 | 1700 | 1700 | | | | | |
| Volume to Capacity | 0.17 | 0.02 | 0.03 | 0.16 | 0.02 | 0.10 | 0.06 | | | | | |
| Queue Length 95th (m) | 5.0 | 0.5 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Control Delay (s) | 14.2 | 9.8 | 7.6 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Lane LOS | B | A | A | | | | | | | | | |
| Approach Delay (s) | 14.2 | 9.8 | 0.9 | | | 0.0 | | | | | | |
| Approach LOS | B | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 2.3 | | | | | | | | | |
| Intersection Capacity Utilization | | | 30.8% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

2025 Future Conditions_AM
6: Driveway/Armstrong Blvd & Airport Blvd

Timing Plan: AM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  | | | |  | | |  |
| Traffic Volume (veh/h) | 34 | 329 | 0 | 0 | 213 | 40 | 0 | 0 | 0 | 0 | 0 | 20 |
| Future Volume (Veh/h) | 34 | 329 | 0 | 0 | 213 | 40 | 0 | 0 | 0 | 0 | 0 | 20 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Hourly flow rate (vph) | 37 | 362 | 0 | 0 | 234 | 44 | 0 | 0 | 0 | 0 | 0 | 22 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 278 | | | 362 | | | 714 | 714 | 181 | 511 | 692 | 256 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 278 | | | 362 | | | 714 | 714 | 181 | 511 | 692 | 256 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 97 | | | 100 | | | 100 | 100 | 100 | 100 | 100 | 97 |
| cM capacity (veh/h) | 1282 | | | 1193 | | | 302 | 345 | 831 | 436 | 355 | 743 |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | NB 1 | SB 1 | | | | | | |
| Volume Total | 37 | 241 | 121 | 278 | 0 | 22 | | | | | | |
| Volume Left | 37 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Volume Right | 0 | 0 | 0 | 44 | 0 | 22 | | | | | | |
| cSH | 1282 | 1700 | 1700 | 1700 | 1700 | 743 | | | | | | |
| Volume to Capacity | 0.03 | 0.14 | 0.07 | 0.16 | 0.00 | 0.03 | | | | | | |
| Queue Length 95th (m) | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | | | | | | |
| Control Delay (s) | 7.9 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | | | | | | |
| Lane LOS | A | | | | A | A | | | | | | |
| Approach Delay (s) | 0.7 | | | 0.0 | 0.0 | 10.0 | | | | | | |
| Approach LOS | | | | | A | A | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 0.7 | | | | | | | | | |
| Intersection Capacity Utilization | | | 23.6% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

5: Lindbergh St/Markham PI & Airport Blvd

Timing Plan: PM Peak

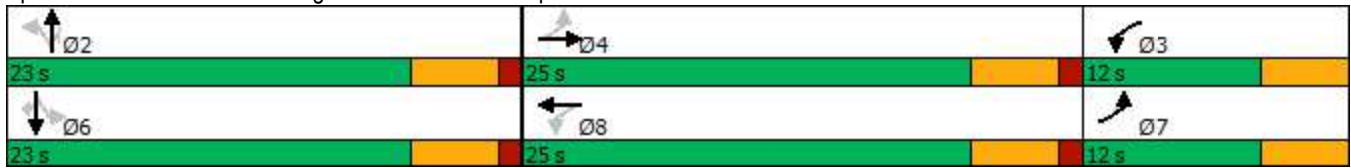


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|------|-------|-------|------|------|-------|------|------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 26 | 193 | 21 | 19 | 370 | 23 | 8 | 9 | 7 | 31 | 8 | 40 |
| Future Volume (vph) | 26 | 193 | 21 | 19 | 370 | 23 | 8 | 9 | 7 | 31 | 8 | 40 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 30.0 | | 0.0 | 18.0 | | 0.0 | 0.0 | | 30.0 | 0.0 | | 20.0 |
| Storage Lanes | 1 | | 0 | 1 | | 0 | 0 | | 1 | 0 | | 1 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 1770 | 1835 | 0 | 1770 | 3507 | 0 | 0 | 1822 | 1583 | 0 | 1792 | 1583 |
| Flt Permitted | 0.412 | | | 0.532 | | | | 0.910 | | | 0.812 | |
| Satd. Flow (perm) | 767 | 1835 | 0 | 991 | 3507 | 0 | 0 | 1695 | 1583 | 0 | 1513 | 1583 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 10 | | | 11 | | | | 109 | | | 109 |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | | 50 |
| Link Distance (m) | | 108.7 | | | 340.8 | | | 90.5 | | | | 92.6 |
| Travel Time (s) | | 7.8 | | | 24.5 | | | 6.5 | | | | 6.7 |
| Lane Group Flow (vph) | 36 | 297 | 0 | 26 | 546 | 0 | 0 | 24 | 10 | 0 | 54 | 56 |
| Turn Type | pm+pt | NA | | pm+pt | NA | | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | | 8 | | | 2 | | 2 | 6 | | 6 |
| Total Split (s) | 12.0 | 25.0 | | 12.0 | 25.0 | | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| Total Lost Time (s) | 4.0 | 5.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 |
| Act Effct Green (s) | 30.1 | 22.4 | | 29.3 | 20.2 | | | 18.2 | 18.2 | | 18.2 | 18.2 |
| Actuated g/C Ratio | 0.57 | 0.42 | | 0.55 | 0.38 | | | 0.34 | 0.34 | | 0.34 | 0.34 |
| v/c Ratio | 0.06 | 0.38 | | 0.04 | 0.40 | | | 0.04 | 0.02 | | 0.10 | 0.09 |
| Control Delay | 6.1 | 12.8 | | 5.9 | 13.9 | | | 14.4 | 0.0 | | 14.6 | 1.4 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 6.1 | 12.8 | | 5.9 | 13.9 | | | 14.4 | 0.0 | | 14.6 | 1.4 |
| LOS | A | B | | A | B | | | B | A | | B | A |
| Approach Delay | | 12.1 | | | 13.5 | | | 10.1 | | | | 7.9 |
| Approach LOS | | B | | | B | | | B | | | | A |
| Queue Length 50th (m) | 0.8 | 16.7 | | 0.5 | 16.2 | | | 1.3 | 0.0 | | 3.0 | 0.0 |
| Queue Length 95th (m) | 4.0 | 34.1 | | 3.2 | 28.6 | | | 5.1 | 0.0 | | 9.2 | 0.0 |
| Internal Link Dist (m) | | 84.7 | | | 316.8 | | | 66.5 | | | | 68.6 |
| Turn Bay Length (m) | 30.0 | | | 18.0 | | | | | 30.0 | | | 20.0 |
| Base Capacity (vph) | 590 | 782 | | 670 | 1351 | | | 584 | 617 | | 521 | 617 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.06 | 0.38 | | 0.04 | 0.40 | | | 0.04 | 0.02 | | 0.10 | 0.09 |

Intersection Summary





















| | |
|------------------------------------|------------------------|
| Area Type: | Other |
| Cycle Length: | 60 |
| Actuated Cycle Length: | 52.8 |
| Control Type: | Actuated-Uncoordinated |
| Maximum v/c Ratio: | 0.40 |
| Intersection Signal Delay: | 12.3 |
| Intersection LOS: | B |
| Intersection Capacity Utilization: | 49.2% |
| ICU Level of Service: | A |
| Analysis Period (min): | 15 |

Splits and Phases: 5: Lindbergh St/Markham PI & Airport Blvd














2025 Future Conditions_PM
 1: Cooper Blvd & Raynham Ave

Timing Plan: PM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  |  |  |  | |
| Traffic Volume (veh/h) | 8 | 41 | 118 | 73 | 27 | 5 | 222 | 304 | 142 | 8 | 193 | 31 |
| Future Volume (Veh/h) | 8 | 41 | 118 | 73 | 27 | 5 | 222 | 304 | 142 | 8 | 193 | 31 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Hourly flow rate (vph) | 9 | 46 | 133 | 82 | 30 | 6 | 249 | 342 | 160 | 9 | 217 | 35 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 1108 | 1092 | 234 | 1164 | 1110 | 342 | 252 | | | 342 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 1108 | 1092 | 234 | 1164 | 1110 | 342 | 252 | | | 342 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 93 | 73 | 83 | 16 | 82 | 99 | 81 | | | 99 | | |
| cM capacity (veh/h) | 137 | 172 | 805 | 97 | 168 | 701 | 1313 | | | 1217 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | | | | | |
| Volume Total | 188 | 118 | 249 | 342 | 160 | 9 | 252 | | | | | |
| Volume Left | 9 | 82 | 249 | 0 | 0 | 9 | 0 | | | | | |
| Volume Right | 133 | 6 | 0 | 0 | 160 | 0 | 35 | | | | | |
| cSH | 474 | 115 | 1313 | 1700 | 1700 | 1217 | 1700 | | | | | |
| Volume to Capacity | 0.40 | 1.03 | 0.19 | 0.20 | 0.09 | 0.01 | 0.15 | | | | | |
| Queue Length 95th (m) | 15.0 | 55.0 | 5.6 | 0.0 | 0.0 | 0.2 | 0.0 | | | | | |
| Control Delay (s) | 17.5 | 164.2 | 8.4 | 0.0 | 0.0 | 8.0 | 0.0 | | | | | |
| Lane LOS | C | F | A | | | A | | | | | | |
| Approach Delay (s) | 17.5 | 164.2 | 2.8 | | | 0.3 | | | | | | |
| Approach LOS | C | F | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 18.8 | | | | | | | | | |
| Intersection Capacity Utilization | | | 46.8% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |



















2025 Future Conditions_PM
2: Raynham Ave & Magee Rd

Timing Plan: PM Peak

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  | |  |  |  |  |
| Traffic Volume (veh/h) | 66 | 63 | 92 | 56 | 56 | 87 |
| Future Volume (Veh/h) | 66 | 63 | 92 | 56 | 56 | 87 |
| Sign Control | Stop | | Free | | Free | |
| Grade | 0% | | 0% | | 0% | |
| Peak Hour Factor | 0.76 | 0.76 | 0.76 | 0.76 | 0.76 | 0.76 |
| Hourly flow rate (vph) | 87 | 83 | 121 | 74 | 74 | 114 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 383 | 121 | | | 121 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 383 | 121 | | | 121 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 85 | 91 | | | 95 | |
| cM capacity (veh/h) | 588 | 930 | | | 1467 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 170 | 121 | 74 | 74 | 114 | |
| Volume Left | 87 | 0 | 0 | 74 | 0 | |
| Volume Right | 83 | 0 | 74 | 0 | 0 | |
| cSH | 717 | 1700 | 1700 | 1467 | 1700 | |
| Volume to Capacity | 0.24 | 0.07 | 0.04 | 0.05 | 0.07 | |
| Queue Length 95th (m) | 7.4 | 0.0 | 0.0 | 1.3 | 0.0 | |
| Control Delay (s) | 11.6 | 0.0 | 0.0 | 7.6 | 0.0 | |
| Lane LOS | B | | | A | | |
| Approach Delay (s) | 11.6 | 0.0 | | 3.0 | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.6 | | | |
| Intersection Capacity Utilization | | | 24.0% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

2025 Future Conditions_PM
3: Cooper Blvd & Memorial Dr




















Timing Plan: PM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | |  |  | |  |  | |
| Traffic Volume (veh/h) | 27 | 9 | 144 | 50 | 14 | 23 | 164 | 680 | 105 | 15 | 384 | 10 |
| Future Volume (Veh/h) | 27 | 9 | 144 | 50 | 14 | 23 | 164 | 680 | 105 | 15 | 384 | 10 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 30 | 10 | 160 | 56 | 16 | 26 | 182 | 756 | 117 | 17 | 427 | 11 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 1594 | 1586 | 432 | 1644 | 1650 | 814 | 438 | | | 756 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 1594 | 1586 | 432 | 1644 | 1650 | 814 | 438 | | | 756 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 49 | 89 | 74 | 0 | 80 | 93 | 84 | | | 98 | | |
| cM capacity (veh/h) | 59 | 89 | 623 | 47 | 81 | 378 | 1122 | | | 855 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | | | | | | |
| Volume Total | 200 | 98 | 182 | 873 | 17 | 438 | | | | | | |
| Volume Left | 30 | 56 | 182 | 0 | 17 | 0 | | | | | | |
| Volume Right | 160 | 26 | 0 | 117 | 0 | 11 | | | | | | |
| cSH | 228 | 67 | 1122 | 1700 | 855 | 1700 | | | | | | |
| Volume to Capacity | 0.88 | 1.46 | 0.16 | 0.51 | 0.02 | 0.26 | | | | | | |
| Queue Length 95th (m) | 56.7 | 66.5 | 4.6 | 0.0 | 0.5 | 0.0 | | | | | | |
| Control Delay (s) | 76.9 | 378.7 | 8.8 | 0.0 | 9.3 | 0.0 | | | | | | |
| Lane LOS | F | F | A | | A | | | | | | | |
| Approach Delay (s) | 76.9 | 378.7 | 1.5 | | 0.3 | | | | | | | |
| Approach LOS | F | F | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 30.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 69.6% | | ICU Level of Service | | | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

2025 Future Conditions_PM



















4: Cooper Blvd & Laurel Rd

Timing Plan: PM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | | |  |  |  |  | |  |  |
| Traffic Volume (veh/h) | 71 | 0 | 19 | 0 | 0 | 34 | 20 | 220 | 50 | 0 | 391 | 100 |
| Future Volume (Veh/h) | 71 | 0 | 19 | 0 | 0 | 34 | 20 | 220 | 50 | 0 | 391 | 100 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.90 | 0.92 | 0.90 | 0.92 | 0.92 | 0.92 | 0.90 | 0.90 | 0.92 | 0.92 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 79 | 0 | 21 | 0 | 0 | 37 | 22 | 244 | 54 | 0 | 434 | 111 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 759 | 776 | 434 | 722 | 722 | 244 | 434 | | | 298 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 759 | 776 | 434 | 722 | 722 | 244 | 434 | | | 298 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 74 | 100 | 97 | 100 | 100 | 95 | 98 | | | 100 | | |
| cM capacity (veh/h) | 303 | 322 | 622 | 326 | 346 | 795 | 1126 | | | 1263 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | | | | | |
| Volume Total | 100 | 37 | 22 | 244 | 54 | 434 | 111 | | | | | |
| Volume Left | 79 | 0 | 22 | 0 | 0 | 0 | 0 | | | | | |
| Volume Right | 21 | 37 | 0 | 0 | 54 | 0 | 111 | | | | | |
| cSH | 340 | 795 | 1126 | 1700 | 1700 | 1700 | 1700 | | | | | |
| Volume to Capacity | 0.29 | 0.05 | 0.02 | 0.14 | 0.03 | 0.26 | 0.07 | | | | | |
| Queue Length 95th (m) | 9.6 | 1.2 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Control Delay (s) | 19.9 | 9.8 | 8.3 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Lane LOS | C | A | A | | | | | | | | | |
| Approach Delay (s) | 19.9 | 9.8 | 0.6 | | | 0.0 | | | | | | |
| Approach LOS | C | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 2.5 | | | | | | | | | |
| Intersection Capacity Utilization | | | 32.3% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |























2025 Future Conditions_PM
6: Driveway/Armstrong Blvd & Airport Blvd

Timing Plan: PM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   | | |  | | | |  | | |  |
| Traffic Volume (veh/h) | 34 | 321 | 0 | 0 | 405 | 32 | 0 | 0 | 0 | 2 | 0 | 49 |
| Future Volume (Veh/h) | 34 | 321 | 0 | 0 | 405 | 32 | 0 | 0 | 0 | 2 | 0 | 49 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Hourly flow rate (vph) | 37 | 353 | 0 | 0 | 445 | 35 | 0 | 0 | 0 | 2 | 0 | 54 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 480 | | | 353 | | | 944 | 907 | 176 | 713 | 890 | 462 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 480 | | | 353 | | | 944 | 907 | 176 | 713 | 890 | 462 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 97 | | | 100 | | | 100 | 100 | 100 | 99 | 100 | 90 |
| cM capacity (veh/h) | 1079 | | | 1202 | | | 190 | 265 | 836 | 311 | 271 | 546 |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | NB 1 | SB 1 | | | | | | |
| Volume Total | 37 | 235 | 118 | 480 | 0 | 56 | | | | | | |
| Volume Left | 37 | 0 | 0 | 0 | 0 | 2 | | | | | | |
| Volume Right | 0 | 0 | 0 | 35 | 0 | 54 | | | | | | |
| cSH | 1079 | 1700 | 1700 | 1700 | 1700 | 532 | | | | | | |
| Volume to Capacity | 0.03 | 0.14 | 0.07 | 0.28 | 0.00 | 0.11 | | | | | | |
| Queue Length 95th (m) | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | | | | | | |
| Control Delay (s) | 8.5 | 0.0 | 0.0 | 0.0 | 0.0 | 12.6 | | | | | | |
| Lane LOS | A | | | | A | B | | | | | | |
| Approach Delay (s) | 0.8 | | | 0.0 | 0.0 | 12.6 | | | | | | |
| Approach LOS | | | | | A | B | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 1.1 | | | | | | | | | |
| Intersection Capacity Utilization | | | Err% | | ICU Level of Service | | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |























2025 Mitigated Conditions_AM
1: Cooper Blvd & Raynham Ave

Timing Plan: AM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  |  |  | |  |  |  |  |  |  |
| Traffic Volume (veh/h) | 15 | 13 | 247 | 95 | 34 | 7 | 56 | 74 | 58 | 4 | 284 | 24 |
| Future Volume (Veh/h) | 15 | 13 | 247 | 95 | 34 | 7 | 56 | 74 | 58 | 4 | 284 | 24 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Hourly flow rate (vph) | 17 | 15 | 278 | 107 | 38 | 8 | 63 | 83 | 65 | 4 | 319 | 27 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | 6 | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 568 | 550 | 332 | 544 | 563 | 83 | 346 | | | 83 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 568 | 550 | 332 | 544 | 563 | 83 | 346 | | | 83 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 96 | 96 | 61 | 58 | 91 | 99 | 95 | | | 100 | | |
| cM capacity (veh/h) | 383 | 419 | 709 | 255 | 412 | 976 | 1213 | | | 1514 | | |
| Direction, Lane # | EB 1 | WB 1 | WB 2 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | | | | |
| Volume Total | 310 | 107 | 46 | 63 | 83 | 65 | 4 | 346 | | | | |
| Volume Left | 17 | 107 | 0 | 63 | 0 | 0 | 4 | 0 | | | | |
| Volume Right | 278 | 0 | 8 | 0 | 0 | 65 | 0 | 27 | | | | |
| cSH | 791 | 255 | 458 | 1213 | 1700 | 1700 | 1514 | 1700 | | | | |
| Volume to Capacity | 0.39 | 0.42 | 0.10 | 0.05 | 0.05 | 0.04 | 0.00 | 0.20 | | | | |
| Queue Length 95th (m) | 15.0 | 15.7 | 2.7 | 1.3 | 0.0 | 0.0 | 0.1 | 0.0 | | | | |
| Control Delay (s) | 13.5 | 28.9 | 13.7 | 8.1 | 0.0 | 0.0 | 7.4 | 0.0 | | | | |
| Lane LOS | B | D | B | A | | | A | | | | | |
| Approach Delay (s) | 13.5 | 24.4 | | 2.4 | | | 0.1 | | | | | |
| Approach LOS | B | C | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 8.2 | | | | | | | | | |
| Intersection Capacity Utilization | | | 47.0% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

2025 Mitigated Conditions_PM
 1: Cooper Blvd & Raynham Ave

Timing Plan: PM Peak

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  |  |  | |  |  |  |  |  |  |
| Traffic Volume (veh/h) | 8 | 41 | 118 | 73 | 27 | 5 | 222 | 304 | 142 | 8 | 193 | 31 |
| Future Volume (Veh/h) | 8 | 41 | 118 | 73 | 27 | 5 | 222 | 304 | 142 | 8 | 193 | 31 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Hourly flow rate (vph) | 9 | 46 | 133 | 82 | 30 | 6 | 249 | 342 | 160 | 9 | 217 | 35 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | 6 | | | | | | | | | |
| Median type | | | | | | | None | | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 1108 | 1092 | 234 | 1098 | 1110 | 342 | 252 | | | 342 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 1108 | 1092 | 234 | 1098 | 1110 | 342 | 252 | | | 342 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 93 | 73 | 83 | 24 | 82 | 99 | 81 | | | 99 | | |
| cM capacity (veh/h) | 137 | 172 | 805 | 108 | 168 | 701 | 1313 | | | 1217 | | |
| Direction, Lane # | EB 1 | WB 1 | WB 2 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | | | | |
| Volume Total | 188 | 82 | 36 | 249 | 342 | 160 | 9 | 252 | | | | |
| Volume Left | 9 | 82 | 0 | 249 | 0 | 0 | 9 | 0 | | | | |
| Volume Right | 133 | 0 | 6 | 0 | 0 | 160 | 0 | 35 | | | | |
| cSH | 570 | 108 | 193 | 1313 | 1700 | 1700 | 1217 | 1700 | | | | |
| Volume to Capacity | 0.33 | 0.76 | 0.19 | 0.19 | 0.20 | 0.09 | 0.01 | 0.15 | | | | |
| Queue Length 95th (m) | 11.5 | 33.2 | 5.3 | 5.6 | 0.0 | 0.0 | 0.2 | 0.0 | | | | |
| Control Delay (s) | 18.1 | 104.0 | 27.9 | 8.4 | 0.0 | 0.0 | 8.0 | 0.0 | | | | |
| Lane LOS | C | F | D | A | | | A | | | | | |
| Approach Delay (s) | 18.1 | 80.8 | | 2.8 | | | 0.3 | | | | | |
| Approach LOS | C | F | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 11.5 | | | | | | | | | |
| Intersection Capacity Utilization | | | 45.0% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |