CITY OF WINNIPEG

2017 Walk Bike Grade Separations

Osborne to Downtown Walk Bike Bridge and Connections

Functional Design of the Cycling Network in Osborne Village

AUGUST 7, 2019

CONFIDENTIAL

2017 WALK BIKE GRADE SEPARATIONS

OSBORNE TO DOWNTOWN WALK BIKE BRIDGE AND CONNECTIONS FUNCTIONAL DESIGN OF THE CYCLING NETWORK IN OSBORNE VILLAGE

CITY OF WINNIPEG

FINAL REPORT
CONFIDENTIAL

PROJECT NO.: 17M-02210-00
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EXECUTIVE SUMMARY

One of the recommendations contained in the City of Winnipeg's *Pedestrian and Cycling Strategies* (PCS) is the provision of a new pedestrian and cycling bridge over the Assiniboine River to connect McFadyen and Fort Rouge Parks. Additionally, the PCS identifies the need for new cycling routes in Osborne Village. WSP was retained to undertake studies for the following:

— The preliminary design of a new pedestrian and cycling bridge and park modifications to provide connectivity between McFadyen Park on the north side of the Assiniboine River and Fort Rouge Park on the south side of the Assiniboine River. The preliminary design study is summarized in a separate report produced by WSP titled *2017 Walk Bike Grade Separations: Preliminary Design of the Fort Rouge-McFadyen Pedestrian/Cycling Bridge over the Assiniboine River*.

— The functional design of a pedestrian and cycling network in Osborne Village that connects the proposed bridge to the Harkness Bus Rapid Transit Station, the Pembina Highway Buffered Bike Lanes and Nassau Street Neighbourhood Greenway, and east to the Northwood Bridge. The functional design study is summarized in this report.

The functional design study included an existing conditions analysis, establishment of design and evaluation criteria, development of cycling route options, and the functional design of the recommended pedestrian and cycling network in Osborne Village. Public engagement was conducted throughout the study and public input was considered in the selection of the recommended route option and the functional design.

The existing condition analysis provides information on:

— **City of Winnipeg Planning Documents, Land Uses and Destinations** – The City of Winnipeg planning documents set the framework for land use planning in the study area, such as OurWinnipeg, Complete Communities, Osborne Village Neighbourhood Plan and Zoning By-Law. The majority of the study area is either lower density single-family residential, higher density multi-family residential, or commercial. There are a number of destinations (i.e., places of worship / meeting, parks, schools, community recreation/social services and commercial establishments) located within the study area.

— **Walking and Cycling** – Osborne Village is a neighbourhood with a high concentration of pedestrians and cyclists within central Winnipeg. Pedestrian facilities include sidewalks that are located on both sides on most streets, pedestrian corridors, crosswalks, and signalized intersections with countdown pedestrian signals. Existing cycling facilities within the study area include:

  — Nassau Street North is a neighbourhood greenway from Roslyn Road to Pembina Highway;

  — Donald Street has a multi-use pathway on the east side from Osborne Street to Stradbrook Avenue;

  — Stradbrook Avenue has a multi-use pathway on the south side from Donald Street to Main Street;

  — Pembina Highway has buffered bike lanes from Warsaw Avenue to Grant Avenue and a connection from Warsaw Avenue to the Donald Street shared sidewalk is scheduled to be constructed in 2018/2019; and

  — Assiniboine Avenue has two-way protected bike lanes from Kennedy Street to Main Street and a neighbourhood greenway from Kennedy Street to Osborne Street.

  Some of the existing cycling facilities do not provide the safety and comfort necessary to attract cyclists of all ages and abilities. The combination of this and a lack of cycling facilities in Osborne Village in general are significant barriers for increasing the number of cyclists travelling from Osborne Village to downtown.

— **Parking and Loading** – A review of parking and loading identified that almost all streets within the study area permit on-street parking or loading on at least one side of the street, and there are numerous types of parking and loading restrictions. There is significant parking utilization (greater than 85%) on certain streets, particularly closer to Osborne Street. Parking on River Avenue and Stradbrook Avenue generally peaks overnight on Saturday and mid-afternoon on weekdays.

- **Transit** – Osborne Village has a significant amount of Transit bus activity which can be particularly hazardous for cyclists attempting to pass buses. The stops with the highest activity are at Osborne Street and River Avenue, Osborne Station, Confusion Corner, Osborne Street and Stradbrook Avenue, Osborne Street and Wardlaw Avenue, Harkness Station, and Queen Elizabeth Way / Stradbrook Avenue / Mayfair Avenue.
- **Traffic Volumes –** Existing traffic volumes are greater than 34,000 vehicles per day on Osborne Street and Donald Street; range from 8,600 to 10,200 vehicles per day on River Avenue and Stradbrook Avenue (west of Donald Street); range from 2,300 to 2,700 vehicles per day on Scott Street; and are approximately 1,000 vehicles per day on Wardlaw Avenue.
- **Collisions –** A collision analysis was conducted to identify possible relationships between the collisions that have occurred and the geometric features and operational conditions of the facility. Nine intersections and ten road segments were identified as having collision rates that warrant further investigation of an intersection.
- **Utilities –** The utilities on River Avenue and Stradbrook Avenue were reviewed to determine potential impacts to utilities with the construction of bicycle lanes. The curb-to-curb width of the roadway would remain unchanged with the construction of bicycle lanes; therefore, impacts to utilities should be minimal.

The City and WSP met with the public in January 2018, to identify issues and considerations for the cycling network in Osborne Village. The first round of public engagement included an open house, stakeholder meetings and online survey hosted on the City's website.

The Pedestrian and Cycling Strategies, existing conditions analysis and public input were used for the development of options for the cycling network in Osborne Village. Options were developed in areas where there are constraints and / or where there are alternate viable options that were not included in the PCS recommendations. The following five options were developed for the cycling network in the study area:

- **Option A:** Improvements to the existing neighbourhood greenway on Nassau Street (from River Avenue to Roslyn Road), one-way bicycle lanes on Roslyn Road (from Nassau Street to Osborne Street), neighbourhood greenway on Roslyn Road (from Osborne Street to Bryce Street), and neighbourhood greenway on Bryce Street (from Roslyn Road to River Avenue);
- **Option B:** One-way protected bicycle lanes on River Avenue and Stradbrook Avenue (from Nassau Street to Harkness Avenue) and neighbourhood greenway on River Avenue from Harkness Avenue to Main Street;
- **Option C:** Neighbourhood greenway on Wardlaw Avenue (from Nassau Street to Scott Street);
- **Option D:** Neighbourhood greenway on Gertrude Avenue (from Nassau Street to Scott Street); and
- **Option E:** Neighbourhood Greenway on Scott Street (from Gertrude Avenue to River Avenue).

The following six options were developed for the connection to Fort Rouge Park:

- **Option 1**: Bike friendly back lane (from Bryce Street to Fort Rouge Park);
- **Option 2**: Two-way bicycle lane on River Avenue (from Bryce Street to Fort Rouge Park);
- **Option 3**: Two-way bicycle lane on River Avenue (from Scott Street to Fort Rouge Park);
- **Option 4**: Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to River Avenue) and two-way bicycle lane on River Avenue (from Clarke Street to Bryce Street);
- **Option 5**: Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to River Avenue) and two-way bicycle lane on River Avenue (from Clarke Street to Fort Rouge Park); and
- **Option 6**: Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to back lane), bike friendly back lane (from Clarke Street to Lewis Street) and neighbourhood greenway on Lewis Street (from back lane to River Avenue).

The options developed for the cycling network in Osborne Village were presented to the public in June 2018. The second round of public engagement included an Open House, stakeholder meetings and an online survey hosted on the City's website.

The options for the cycling network were evaluated based on technical merits and public input. The evaluation resulted in Options C, B, E, 3 and 6 being recommended as the preferred options for the cycling network in Osborne Village. These options connect to the major destinations and existing cycling facilities within the study area. An overview of the recommended cycling network is shown in **Figure 7.0**.

The recommended cycling network was designed to a functional level and is consistent with the approved design criteria and City standards and guidelines that represent best practices for pedestrian and cycling facility design.

The following conclusions and recommendations were made:

— **River Avenue** – Construct a neighbourhood greenway from Main Street to Harkness Avenue, a one-way protected bicycle lane on the north side between Harkness Avenue and the west entrance to Fort Rouge Park, a two-way protected bicycle lane on the north side between the west entrance to Fort Rouge Park and Scott Street, and a one-way protected bicycle lane on the north side between Scott Street and Nassau Street. Parking is to be located adjacent to the bicycle lane. This route provides a safe and convenient connection to Main Street, Harkness Station (via the east sidewalk along Harkness Avenue), Fort Rouge Park (and the proposed pedestrian and cycling bridge connecting to downtown), the proposed neighbourhood greenway on Scott Street, Osborne Village commercial hub and the existing neighbourhood greenway on Nassau Street.

— **Stradbrook Avenue** – Construct a one-way protected bicycle lane on the south side between Nassau Street and Donald Street and a multi-use path between Donald Street and the access to Harkness Station. Parking is to be located adjacent to the bicycle lane. This route provides a safe and convenient connection to Harkness Station, the off-street path along Donald Street (which connects to Osborne Station), the proposed neighbourhood greenway on Scott Street, the Osborne Village commercial hub, and the existing neighbourhood greenway on Nassau Street.

— **Wardlaw Avenue** – Construct a neighbourhood greenway on Wardlaw Avenue to connect the neighbourhood greenway on Nassau Street to the proposed neighbourhood greenway on Scott Street. This low-stress route would complement the bicycle lanes on River Avenue and Stradbrook Avenue and provide direct access to businesses on Osborne Street.

— **Scott Street** – Construct a neighbourhood greenway from Wardlaw Avenue to River Avenue to provide a connection to the proposed one-way bicycle lanes on River Avenue and Stradbrook Avenue and Fort Rouge Park (and the proposed pedestrian and cycling bridge connecting to downtown).

— **Clarke Street, Back Lane, and Lewis Street** – Widen the off-street path along the west side of Donald Street (between Stradbrook Avenue and Clarke Street) and construct a neighbourhood greenway on Clarke Street, bicycle friendly back lane (between Clarke Street and Lewis Street) and neighbourhood greenway on Lewis Street. A pilot project would need to be implemented for the bicycle friendly back lane, as it is a relatively new concept in Winnipeg.

— **Intersections** – Several intersection treatments were recommended to improve cyclist safety at intersections. Some intersection treatments included green paint pavement markings to show the cyclist path, signage to indicate that drivers making right-turns must yield to cyclists; protective barriers; two-stage turn queue boxes; raised intersections; curb bulb-outs; bicycle forward stop bars; and protected intersection treatments. It is recommended that intersections be monitored to determine whether leading bicycle intervals or protected bicycle phases should be implemented. Leading bicycle intervals or protected bicycle phases should be considered if safety issues are observed or when vehicle, cyclist and pedestrian volumes justify the need for a signal phase to be exclusively dedicated to cyclists.

— **Parking and Loading** – Changes to the existing street cross-sections are recommended on both River Avenue and Stradbrook Avenue to accommodate the proposed bicycle lanes and will impact on-street parking and loading. A permanent parking and loading lane is recommended on the north side of River Avenue and on the south side of Stradbrook Avenue. The functional design results in a net loss of approximately 75 spaces on River Avenue (due to the south parking lane being removed) and 9 spaces on Stradbrook Avenue. This estimation assumes that the loading zones that currently exist on the north side of River Avenue and Stradbrook Avenue would be accommodated in the proposed parking/loading lanes.

Parking and loading could also be accommodated on the opposite side of River Avenue and Stradbrook Avenue during off-peak periods (e.g. midday, evenings, overnight, and weekends). Adding off-peak parking to the north side of Stradbrook Avenue between Osborne Street and Donald Street would result in a net gain of approximately 53 parking spaces on Stradbrook Avenue. It is recommended that at a minimum, off-peak loading be considered for River Avenue and Stradbrook Avenue. The traffic analysis showed minimal reduction in the overall level of service of the River Avenue and Stradbrook Avenue intersections with one travel lane on River Avenue between Osborne Street and Donald Street and one travel lane on Stradbrook Avenue between Nassau Street and Donald Street during off-peak periods. However, if a vehicle stalls in the single travel lane, traffic operations would be more significantly affected than if there were two travel lanes. If parking/loading is allowed on both sides of the street, there may be locations along a block where parking and loading would need to be prohibited to allow space for an emergency services vehicle to stop or for vehicles to pull into when an emergency vehicle is approaching from behind.

The final location and configuration of loading zones and parking spaces on both River Avenue and Stradbrook Avenue, as well as the off-peak periods for parking and loading on the opposite sides of River Avenue and Stradbrook Avenue, will need to be confirmed with the Winnipeg Parking Authority and the Winnipeg Fire and Paramedic Service during future design phases.

— **Transit Stops** – Two types of transit stops were recommended. West of Osborne Street and east of Donald Street along River Avenue, the bicycle lane is diverted behind the transit stop and is raised to the level of the sidewalk. Between Osborne Street and Donald Street along Stradbrook Avenue and River Avenue, transit stop islands are located in the parking lane and pedestrians are required to cross a raised bicycle lane to access the transit stop.

— **Bicycle Parking** – There are currently several bicycle racks located in front of businesses in the vicinity of the Osborne Street intersections with River Avenue and Stradbrook Avenue. It is recommended that additional bicycle parking be implemented in close proximity to Osborne Street and at Fort Rouge Park, as demand will likely increase.

— **Cost Estimate** – A Class 4 cost estimate was completed for the functional design and the estimated total project cost for the recommended cycling network is **$2,785,000** if constructed in the year 2021.

— **Future Design Phases** – Complete a survey during future design phases to develop a profile and confirm geometry to optimize barrier widths, lane widths, and sidewalk widths. Confirm the locations and sizes of the on-street parking, loading zones and transit stops. Work with the Osborne Village BIZ and other stakeholders to identify additional locations for bicycle parking.

1 INTRODUCTION

1.1 PROJECT BACKGROUND

One of the Key Strategic Goals of the Transportation Master Plan (TMP) approved by Winnipeg City Council in 2011 is "a transportation system that supports active, accessible and healthy lifestyle options". To achieve this goal, there is a need to improve the walking and cycling environment in Winnipeg by providing new and upgraded pedestrian and cycling facilities. The initial step in this process was the development of the *Pedestrian and Cycling Strategies* (PCS) document approved by Council in 2015. This Strategies document established directions for walking and cycling policies, infrastructure, and programs over a 20 year plus time frame to ensure the accessibility, comfort, and safety of walking and cycling in Winnipeg.

One of the recommendations contained in the PCS is the provision of a new pedestrian and cycling bridge over the Assiniboine River to connect McFadyen and Fort Rouge Parks. Additionally, the PCS identifies the need for new cycling routes in Osborne Village. This includes a pedestrian and cycling connection from the proposed new McFadyen / Fort Rouge Bridge to the Harkness Bus Rapid Transit Station, the Pembina Highway Buffered Bike Lanes, and Nassau Street Neighbourhood Greenway, and the Norwood Bridge. A connection to the Southwest Transit Way multi-use path could also be provided in the future.

This project therefore encompasses two components:

— The undertaking of the preliminary design of a new pedestrian and cycling bridge and park modifications to provide connectivity between McFadyen Park on the north side of the Assiniboine River and Fort Rouge Park on the south side of the Assiniboine River; and

— The undertaking of the functional design of a pedestrian and cycling connection between the new bridge to the Harkness Bus Rapid Transit Station, the Pembina Highway Buffered Bike Lanes and Nassau Street Neighbourhood Greenway, and east to the Northwood Bridge. In this future, this will provide a connection to the Southwest Transit Way multi-use path.

This portion of the final report outlines the study of the pedestrian and cycling network in Osborne Village to identify new cycling routes. This section outlines the existing conditions, design criteria, conceptual options, traffic analysis, evaluation and functional design for the recommended pedestrian and cycling network in Osborne Village.

1.2 STUDY AREA

The study area for the pedestrian and cycling network in Osborne Village is bounded by:

— Assiniboine Avenue to the north;

— Main Street to the east;

— Nassau Street to the west; and

— Donald Street / Red River to the south.

The study area is illustrated in **Figure 1.1**.

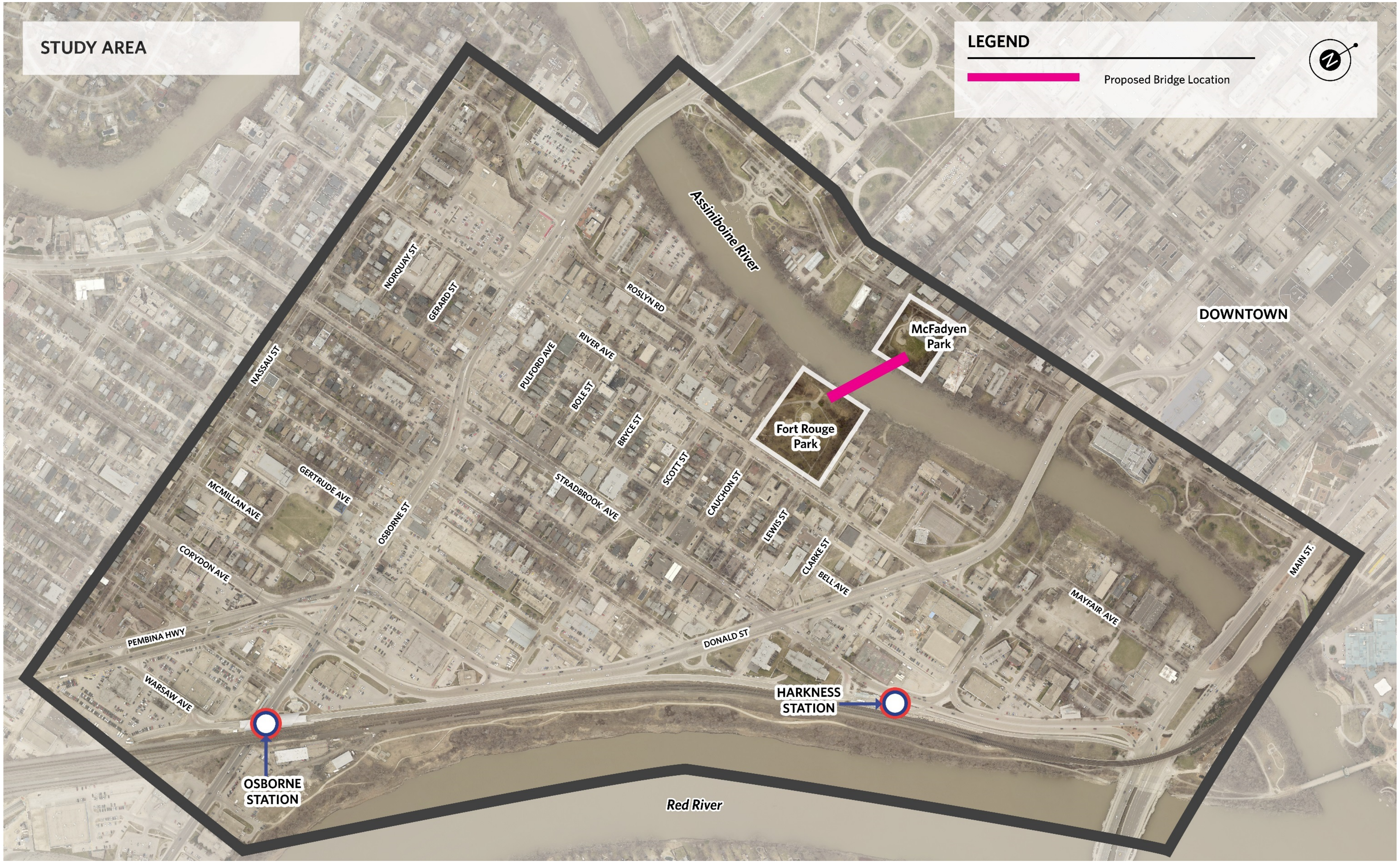


Figure 1.1: Study Area

2 EXISTING CONDITIONS

2.1 LAND USE

The Province of Manitoba, through the City of Winnipeg Charter, sets the legislative framework for land use planning in the City of Winnipeg. As part of this legislation, the City must, by By-law, adopt a development plan, which is currently OurWinnipeg, adopted in 2011.

OurWinnipeg presents a 25-year vision for the City that guides and informs growth and change for the entire City. OurWinnipeg is supported by four direction strategies (**Figure 2.1**):

— Complete Communities;

— Sustainable Transportation;

— Sustainable Water and Waste; and

— A Sustainable Winnipeg.

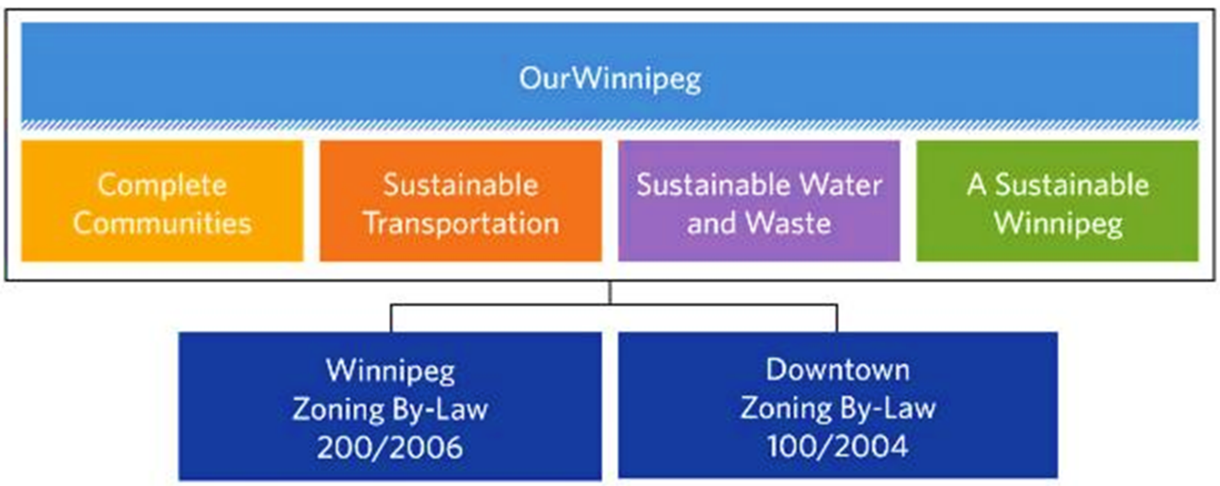


Figure 2.1: Key City of Winnipeg Planning Documents

Complete Communities is the direction strategy that is most commonly referred to for land use planning purposes. Complete Communities is adopted as a Secondary Plan By-law whereas the remaining three direction strategies are Council endorsed policy.

The primary focus of Complete Communities is to provide a vision for the growth and development of the City. It is based on an "urban structure" that differentiates areas of the City based on when the areas were developed and their physical characteristics. The study area for this project is identified as a mature community.

Mature communities are defined as an area of stability that can accommodate moderate growth and change which fits within the existing form and character of its location. The study area includes a grid road network with back lanes and sidewalks, older housing stock in the form of low-to-moderate densities, multi-family buildings with moderate-to-high densities, and mixed land uses along many of the commercial streets. In addition, a number of infill medium density multi-family apartment and condominium buildings (six stories or less) have been built in recent years.

The City is currently reviewing and updating the Osborne Village Neighbourhood Plan (secondary plan adopted in 2006) which is used to describe the detailed statutory plan for the area.

The Plan outlines policies relating to the character, land uses, heritage elements, parks and open spaces, and transportation for the area. Bicycle-related policies include:

- 9.1.7.A – Encourage well-marked and safe bicycle paths, including improvements to existing rights-of-way and establishments of alternative routes;
- 9.1.7.B – Provide bicycle lanes or wider curb lanes as part of any arterial or collector street improvement;
- 9.1.7.C – Encourage co-location of bicycle locker facilities with key transit and transportation nodes, such as the Confusion Corner transit hub and the proposed South West Transit Corridor station; and
- 9.1.7.D – Encourage innovative alternatives to vehicle parking and access including the integration of cycling and active transportation facilities such as bike racks, lockers, and shower facilities in employment areas.

The City uses the Zoning By-law to implement the objectives and policies of OurWinnipeg and Complete Communities. The Zoning By-law regulates the use and development of land and buildings. It establishes various zoning districts, determines both permitted uses and conditional uses, and prescribes relevant development standards and requirements that are applicable in each zoning district. The zoning map (**Figure 2.2**) is a good indicator of what type of development exists, and can exist, within the study area.

Figure 2.2 shows that the majority of the study area is either lower density single-family residential, higher density multi-family residential, or commercial. The single-family residential is primarily located west of Osborne Street and Pembina Highway and south of River Avenue. The multi-family residential is primarily located east of Osborne Street, as well as north of River Avenue west of Osborne Street. Commercial land-uses are generally located along Osborne Street and Donald Street. There are also some manufacturing land uses at the south of the study area, and parks (including McFadyen Park and Fort Rouge Park) at the north end of the study area.

There are a number of destinations (i.e., places of worship / meeting, parks, schools, community recreation/social services and commercial establishments) located within the study area. **Figure 2.3** shows some potential destinations for pedestrians and cyclists within the study area.

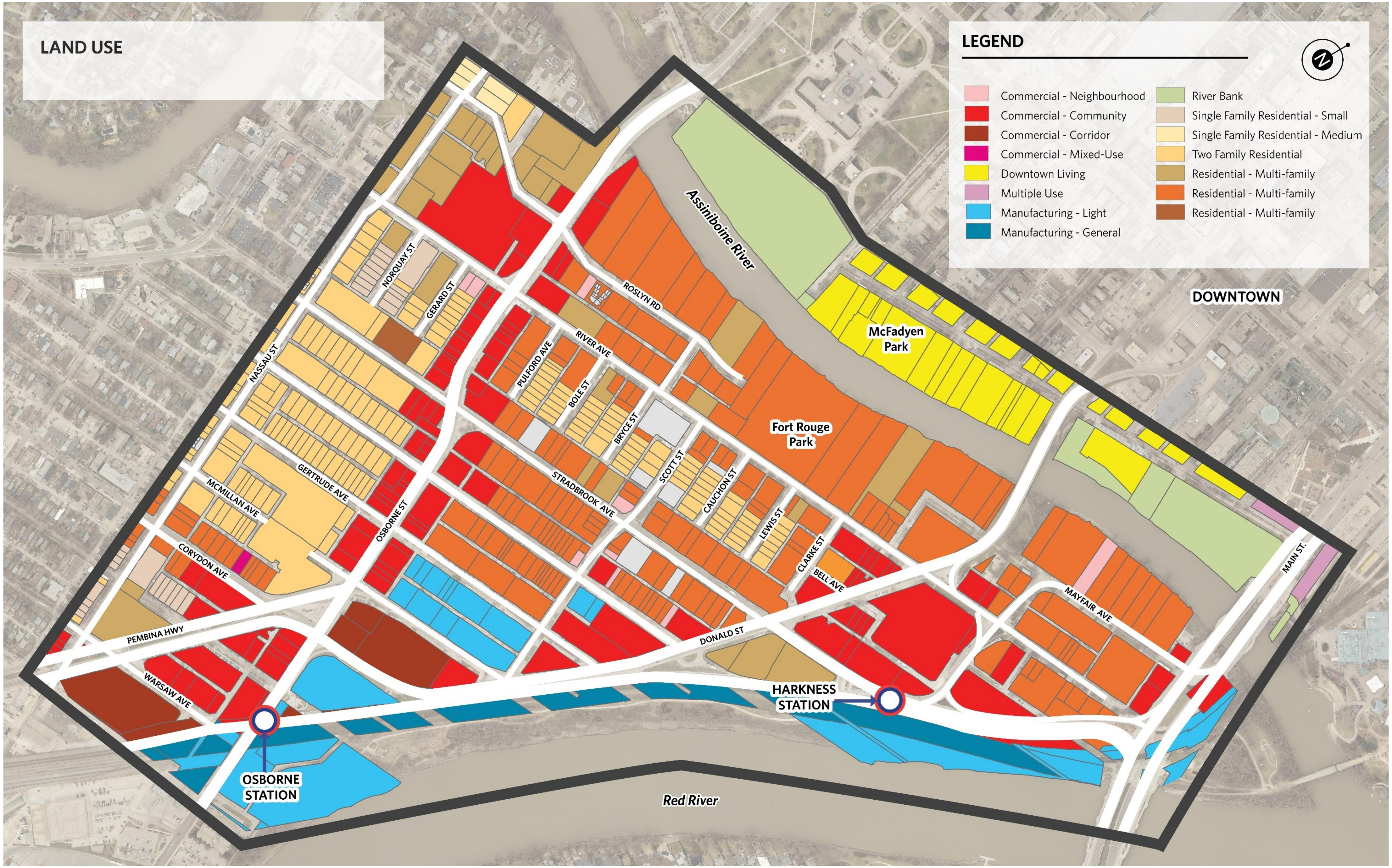


Figure 2.2: Land Use Zoning

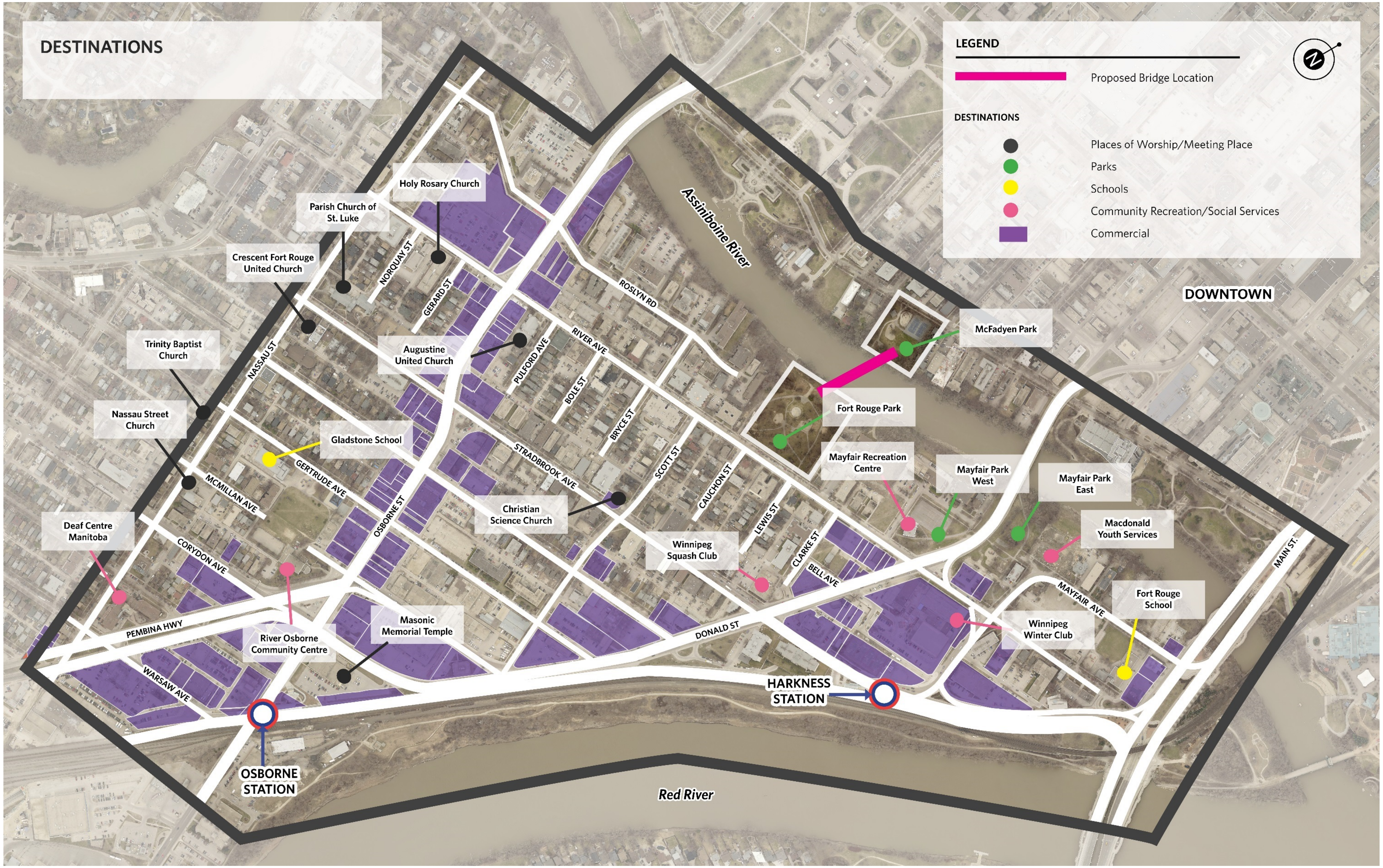


Figure 2.3: Destinations

2.2 WALKING & CYCLING

2.2.1 WALKING & CYCLING ACTIVITY

Osborne Village is a neighbourhood with a high concentration of pedestrians and cyclists within central Winnipeg. The City of Winnipeg *Pedestrian and Cycling Strategies* (PCS) states that "neighbourhoods with good walkability near downtown include Fort Rouge (Osborne and South Osborne) with 11,360 daily trips on foot…These neighbourhoods have high residential density, sidewalks, and employment centres attracting more travel by foot." The PCS also states that "cycling levels are higher in central neighbourhoods, in close proximity to downtown businesses, post-secondary campuses and other key destinations where short bicycle trips are a preferred and convenient mode of transportation." The proximity of Osborne Village to downtown and the types of land uses make the area ideal for cycling trips. **Tables 2.1** and **2.2** show pedestrian and cyclist volumes at key locations within the study area. The volumes are from counts conducted by the City of Winnipeg from 2002 to 2017.

Table 2.1: Pedestrian Volumes within the Study Area

LOCATION	YEAR	COUNT DURATION	TYPE	COUNT VOLUME	AVERAGE VOLUME/HR
Assiniboine and Main	2014	15	Pedestrian	3555	237
Assiniboine and Fort	2015	12	Pedestrian	1322	110
Assiniboine and Garry	2015	12	Pedestrian	1141	95
Assiniboine and Hargrave	2015	12	Pedestrian	1372	114
Riverwalk Access to McFadyen Park	2017	24	Pedestrian	923	38
Nassau and Roslyn	2010	8	Pedestrian	159	19
Nassau and Stradbrook	2015	12	Pedestrian	1077	89
Nassau and McMillan	2011	15	Pedestrian	242	16
Nassau and Jessie	2011	15	Pedestrian	161	10
Nassau and Pembina	2002	11	Pedestrian	164	14
Osborne Bridge	2015	12	Pedestrian	3171	264
Osborne and Roslyn	2013	17	Pedestrian	3520	207
Osborne and River	2002	11	Pedestrian	6028	548
Osborne and Wardlaw	2010	15	Pedestrian	2111	140
River and Cauchon	2014	12	Pedestrian	364	30
River and Donald	2007	15	Pedestrian	594	39
River and Lewis	2014	12	Pedestrian	406	33
Scott and River	2006	11	Pedestrian	326	29
Scott and Stradbrook	2006	11	Pedestrian	376	34
Scott and Wardlaw	2015	11	Pedestrian	367	33

Table 2.2: Cyclist Volumes within the Study Area

LOCATION	YEAR	COUNT DURATION	TYPE	COUNT VOLUME	AVERAGE VOLUME/HR
Assiniboine and Fort	2015	12	Bicycle	448	37
Assiniboine and Garry	2015	12	Bicycle	582	48
Assiniboine and Hargrave	2015	12	Bicycle	1271	105
Riverwalk Access to McFadyen Park	2017	24	Bicycle	318	13
Nassau and Roslyn	2010	8	Bicycle	177	22
Nassau and Stradbrook	2015	12	Bicycle	496	41
Nassau - Gertrude to McMillan	2011	15	Bicycle	640	42
Nassau - Jessie to Corydon	2011	15	Bicycle	272	18
Osborne Bridge	2015	12	Bicycle	942	78
Osborne and Roslyn	2013	17	Bicycle	648	38
Scott and Wardlaw	2015	11	Bicycle	64	5

2.2.2 WALKING & CYCLING FACILITIES

Osborne Village is in an older area of the City that has a grid-like network of streets and sidewalks. Most streets within the study area have sidewalks on both sides of the street. There are a number of signalized intersections along the main arterial streets (Osborne Street, Donald Street, River Avenue and Stradbrook Avenue), one half signal (at Osborne Street / Wardlaw Avenue), two pedestrian corridors (at Osborne Street / Gertrude Avenue and Corydon Avenue / Nassau Street), and one crosswalk on River Avenue (at Fort Rouge Park) that provide safe opportunities for pedestrians and cyclists to cross the street.

Bicycle parking within the study area is primarily provided at schools and community centers. Bicycle parking has also been provided by some businesses within the study area. The Osborne Station also has bicycle lockers that provide a secure location for cyclists to leave their bicycles before boarding the bus.

Existing cycling facilities within the study area include:

- Nassau Street North is a neighbourhood greenway from Roslyn Road to Pembina Highway;
- Donald Street has a multi-use pathway on the east side from Osborne Street to Stradbrook Avenue;
- Stradbrook Avenue has a multi-use pathway on the south side from Donald Street to Main Street;
- Pembina Highway has buffered bike lanes from Warsaw Avenue to Grant Avenue and a connection from Warsaw Avenue to the Donald Street shared sidewalk is scheduled to be constructed in 2018/2019; and
- Assiniboine Avenue has two-way protected bike lanes from Kennedy Street to Main Street and a neighbourhood greenway from Kennedy Street to Osborne Street.

These facilities are all prominent parts of the pedestrian and cycling network; however, there are currently gaps in the network at the Osborne Street Bridge and the Donald Street Bridge to safely connect the routes south of the Assiniboine River to the Assiniboine Avenue bike lanes and other facilities on the north side of the river. Gaps also exist to access the commercial properties on and adjacent to Osborne Street.

The PCS provides recommendations for future cycling facilities in Winnipeg. The PCS's recommended bicycle network in the Osborne Village area is outlined in **Figure 2.4**.

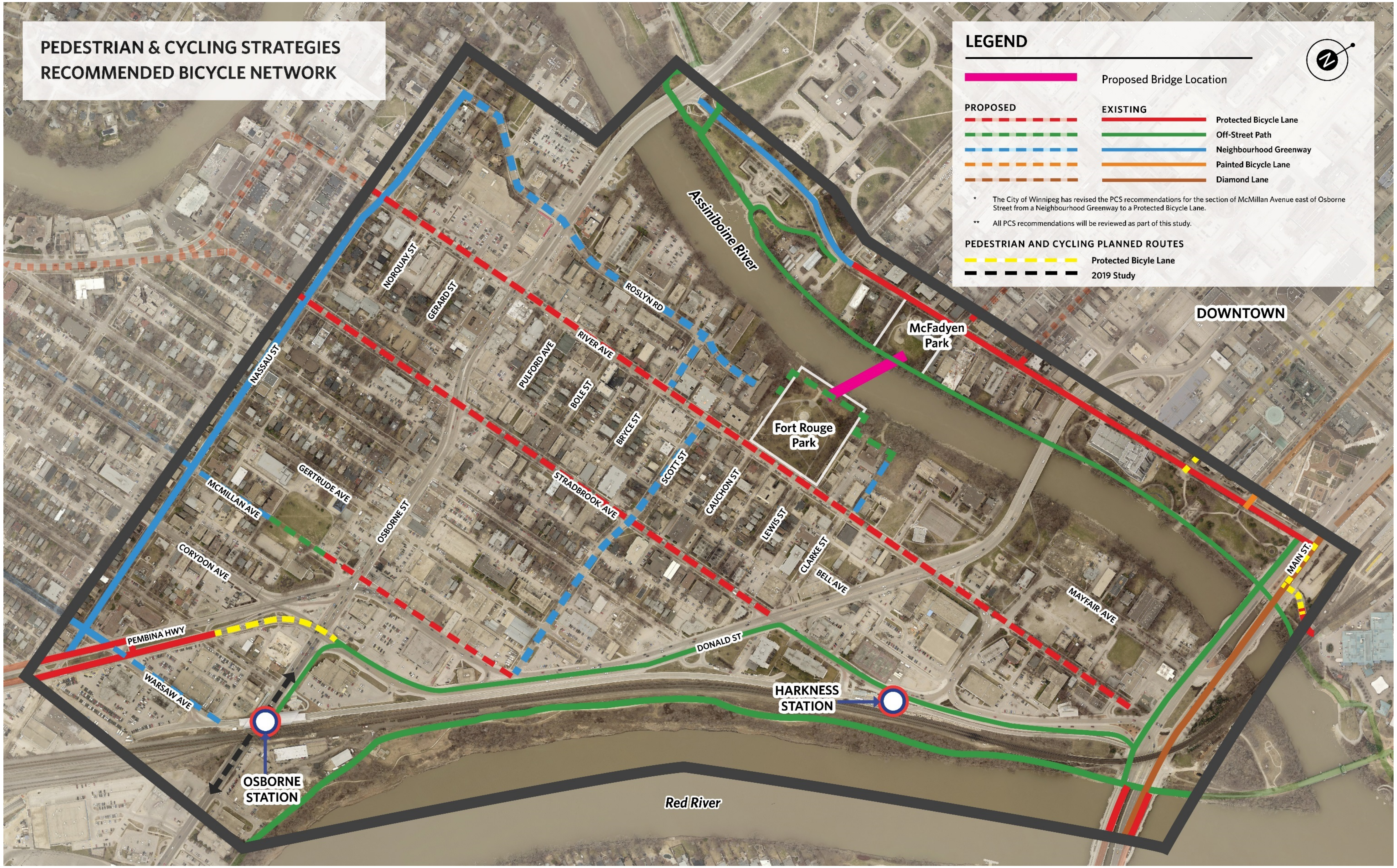


Figure 2.4: PCS Recommended Bicycle Network

2.2.3 BARRIERS TO WALKING & CYCLING

Walkability is emerging as an important measure of success in urban design for its contribution to property values, economic activity, health, security, and vibrancy. Modest, strategic improvements in pedestrian facilities can help a neighbourhood reach its full potential as a walkable urban environment.

Issues with the existing pedestrian facilities within the study area include:

— Broken sidewalk concrete;

— Instances where sidewalks lead to streets with no formal crossing;

— Lack of signed crossings at midblock locations;

— Driver non-compliance at the Ground-Mounted System (GM) crosswalk on River Avenue at Lewis Street; and

— Lack of pedestrian amenities at bus stops.

Accessibility improvements that have been made within the study area are limited to tactile warning pads that have been installed at some intersections, as well as countdown pedestrian signals.

The existing neighbourhood greenway on Nassau Street includes several traffic calming measures to lower vehicle volumes and speeds; however, traffic volumes on Nassau Street north of Stradbrook Avenue (6,000 to 7,000 vehicles per day) are well above the desired 1,500 vehicles per day threshold for neighbourhood greenways. This section of Nassau Street, as well as Roslyn Road (which has volumes of around 8,400 vehicles per day), do not provide the safety and comfort necessary to attract cyclists of all ages and abilities. The combination of this and a lack of cycling facilities for the rest of Osborne Village in general are significant barriers to the increase of bicycle traffic from Osborne Village to downtown. The implementation of an enhanced bicycle network will provide opportunities for cyclists of all ages and abilities.

Osborne Village also has a significant amount of on-street parking / loading, Transit bus activity, and high traffic volumes on Osborne Street, Stradbrook Avenue, and River Avenue. This can be particularly hazardous for cyclists attempting to pass parked vehicles or buses.

2.3 PARKING & LOADING

Almost all streets within the study area permit on-street parking on at least one side of the street. There are numerous types of parking and loading restrictions throughout the study area, including:

— No parking anytime;

— No parking anytime – Loading Zone;

— No parking anytime – Loading Zone (09:00-17:30, Mon-Fri);

— No parking anytime – Loading Zone (09:00-15:30, Mon-Fri);

— No parking anytime – Loading Zone (08:00-18:00, Mon-Fri);

— No parking anytime – Loading Zone (06:30-18:30, Mon-Fri);

— No parking anytime – Loading Zone (07:00-22:00);

— No parking anytime – Loading Zone (07:00-19:00);

— No parking anytime – Loading Zone (09:00-17:30);

— No parking anytime – Disabled Loading Zone (09:00-17:00);

— No stopping anytime – Disabled Loading Zone;

— No stopping anytime;

- No stopping (15:30-17:30, Mon-Fri);
- No stopping (07:00-09:00, Mon-Fri);
- No stopping (07:00-09:00, 15:30-17:30, Mon-Fri);
- No stopping (04:00-19:00);
- 1-hour parking (09:00-17:30, Mon-Sat); and
- 2-hour parking (09:00-17:30, Mon-Sat).

Figure 2.5 shows the parking and loading locations within the study area.

A parking study for the Osborne Village area was completed by WSP (formerly MMM Group Limited) in 2011 (see **Appendix A**). The Osborne Village Parking Study found that parking in the area is limited and on-street parking is heavily utilized by residents, since many of the older residences in the area do not have sufficient off-street parking. Retail in the area is reliant on on-street parking as well. There are places of worship in the area that also generate parking demand on Sundays. There are some small parking lots in the area for customer parking (with time limits and restrictions on shared use), as well as small paid public lots run by Impark and the Winnipeg Parking Authority (WPA).

The Osborne Village Parking Study included a review of parking conditions on a Friday evening from 5:30 to 7:30 p.m. and on a Sunday from 11:00 a.m. to 2:00 p.m. The review indicated that on-street parking near the central area of Osborne Village is heavily utilized (greater than 85% utilization, which is generally considered "at practical capacity" for casual parking) during the Friday peak period. There were spots available on adjacent streets; however, parking utilization was not uniform throughout the area. The review also indicated that several off-street parking lots are heavily utilized (including the City's paid parking lot and the lot at Safeway), but many of the other off-street lots were underutilized. The study also found that parking turnover was occurring on all streets; the streets were not being heavily used for long-term parking.

Due to recent parking and loading restriction changes in the Osborne Village Area, a new parking utilization study was conducted for the study area in 2018. The Winnipeg Parking Authority (WPA) recorded the number of parked vehicles within the study area on a weekday and a Saturday using licence plate recognition (LPR) vehicles in order to determine parking demand. The LPR vehicles recorded on-street parked vehicles between 11:00 p.m. (Monday, February 26, 2018) and 6:00 p.m. (Tuesday, February 27, 2018), as well as between 12:00 p.m. and 10:00 p.m. (Saturday, March 3, 2018). Parking supply was determined by measuring the length of available on-street parking (using Google Earth's measuring tool) and calculating the number of spaces (a parallel parking space was assumed to be 6.1 m in length). The calculated parking supply was then verified by counting parked vehicles using Google's Street View. **Figures 2.6**, **2.7**, and **2.8** show parking utilization for the entire study area during the weekday a.m. peak (8:00 a.m. on a Tuesday), weekday p.m. peak (5:00 p.m. on a Tuesday), and weekend peak (10:00 p.m. on a Saturday). Overall, the parking utilization study showed that:

- There is demand for parking on all streets within the study area and significant parking utilization (greater than 85%) on certain streets within the study area;
- During the weekday a.m. peak hour, parking utilization is greater than 85% on Roslyn Road (east of Osborne Street), Nassau Street (between McMillan Avenue and Wardlaw Avenue), Wardlaw Avenue (between Scott Street and Donald Street), Scott Street (between Stradbrook Avenue and Wardlaw Avenue), Bryce Street, Bole Street, and Lewis Street;
- During the weekday p.m. peak hour, parking utilization is greater than 85% on Nassau Street (between McMillan Avenue and Gertrude Avenue), Scott Street (between Stradbrook Avenue and Wardlaw Avenue), Evergreen Place, Gerard Street, Bryce Street, and Lewis Street;
- Saturday parking peaks in the late evening around 10:00 p.m. Parking utilization is greater than 85% on the majority of streets within the study area, include Stradbrook Avenue, River Avenue, Roslyn Road, Mayfair Place, Nassau Street, Wardlaw Avenue, Gertrude Avenue (west of Osborne Street), Norquay Street, Gerard Street, Pulford Avenue, Bryce Street, Scott Street, Cauchon Street, Lewis Street, and Bell Avenue; and

— Parking utilization in some locations was greater than 100% due to vehicles parking in loading zones when they become available.

As indicated in **Section 2.2**, the PCS recommends bicycle lanes on River Avenue and Stradbrook Avenue; therefore, a review of the on-street parking on River Avenue and Stradbrook Avenue and adjacent streets was completed to determine the potential impacts if parking were to be converted to a bicycle facility. **Figures 2.9** and **2.10** show parking utilization for Stradbrook Avenue on a Saturday and weekday. Parking utilization on Stradbrook Avenue peaks overnight on Saturdays and mid-afternoon on weekdays. Similarly, **Figures 2.11** and **2.12** show parking utilization for River Avenue on a Saturday and weekday. Similar to Stradbrook Avenue, parking on River Avenue generally peaks overnight on Saturday and mid-afternoon on weekdays. In addition, parking varies from block to block and is typically lower farther from Osborne Street.

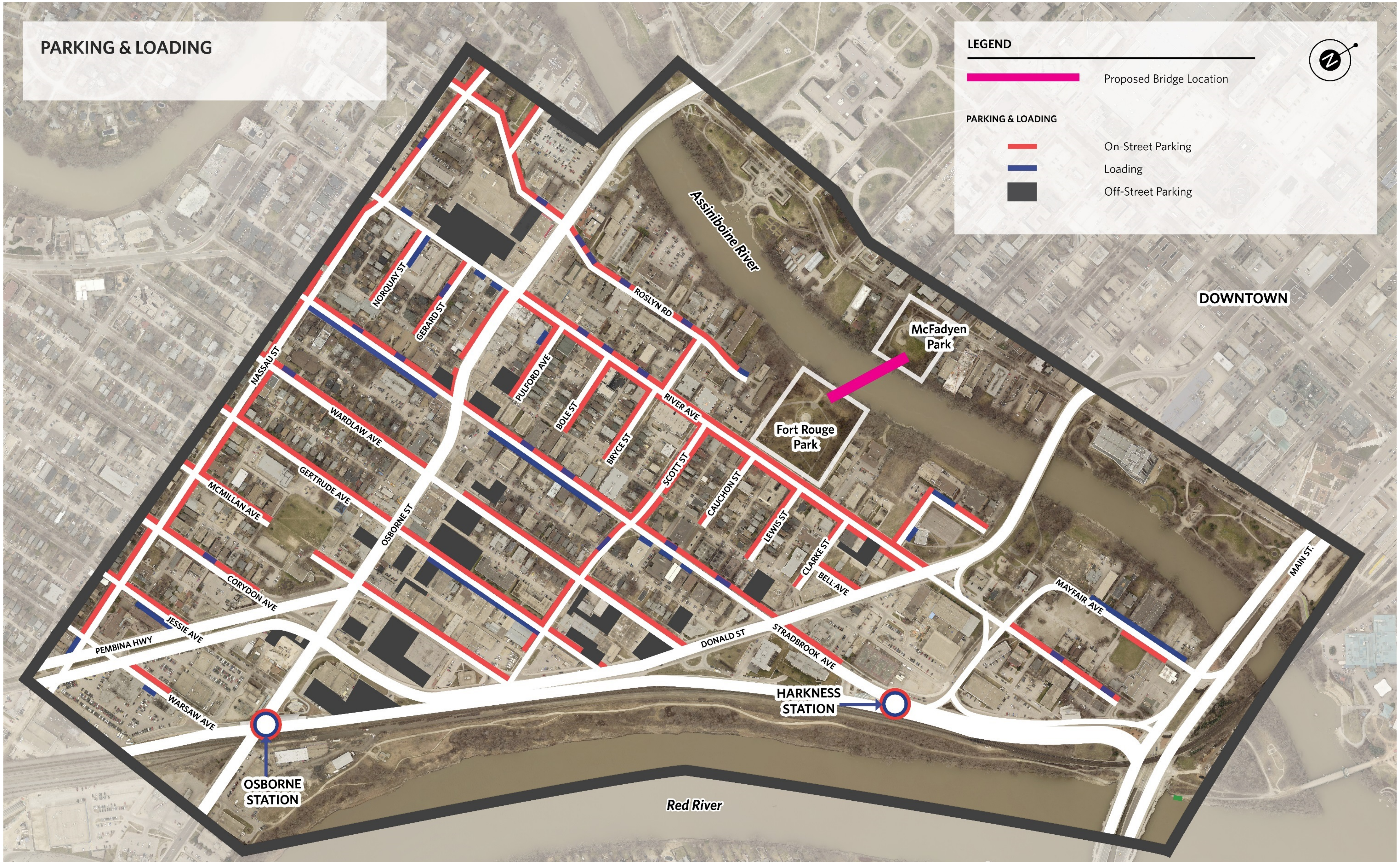


Figure 2.5: Parking and Loading

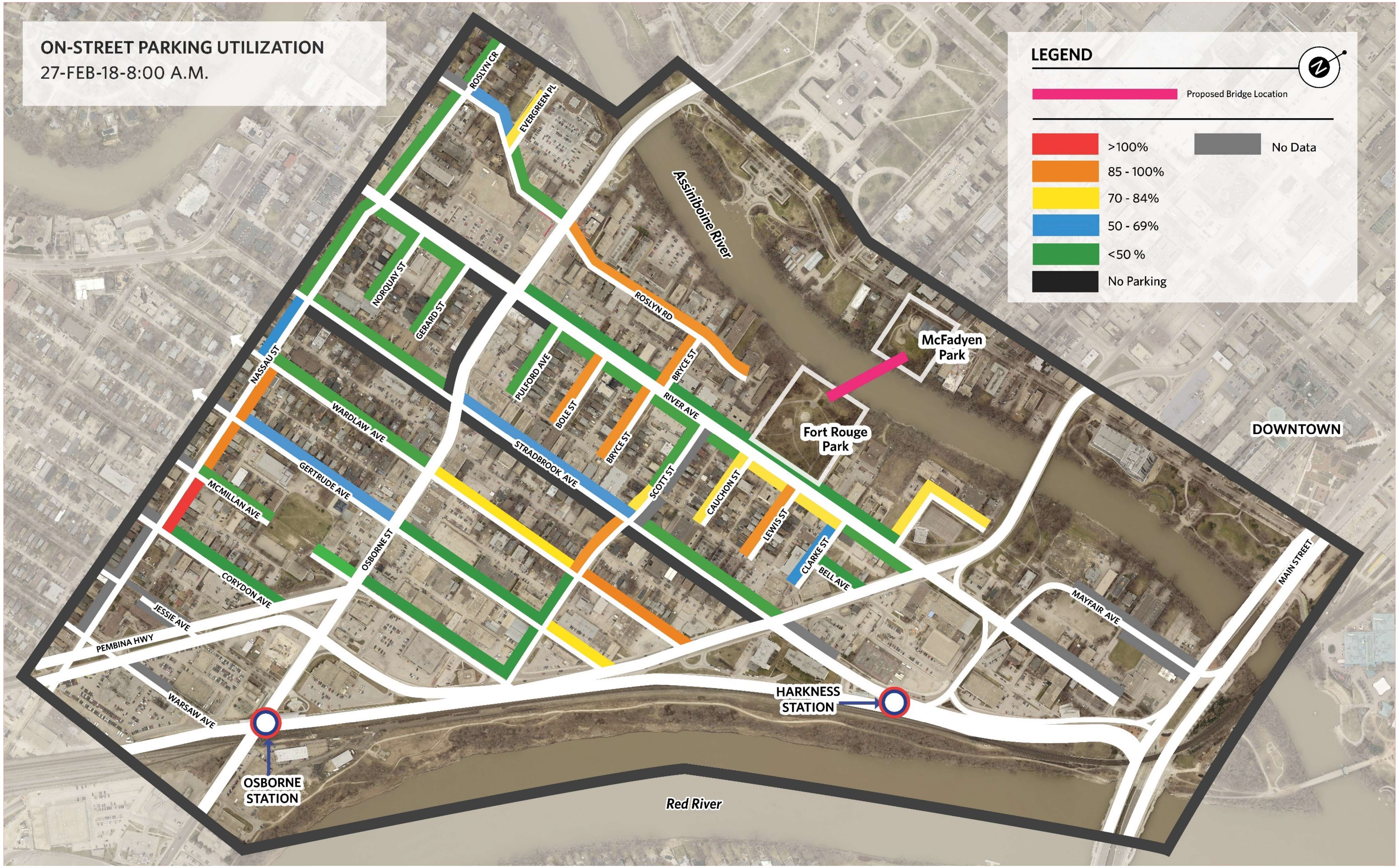


Figure 2.6: Parking Utilization in Osborne Village during the A.M. Peak Hour

Figure 2.7: Parking Utilization in Osborne Village during the P.M. Peak Hour

Figure 2.8: Parking Utilization in Osborne Village during the Weekend Peak Hour

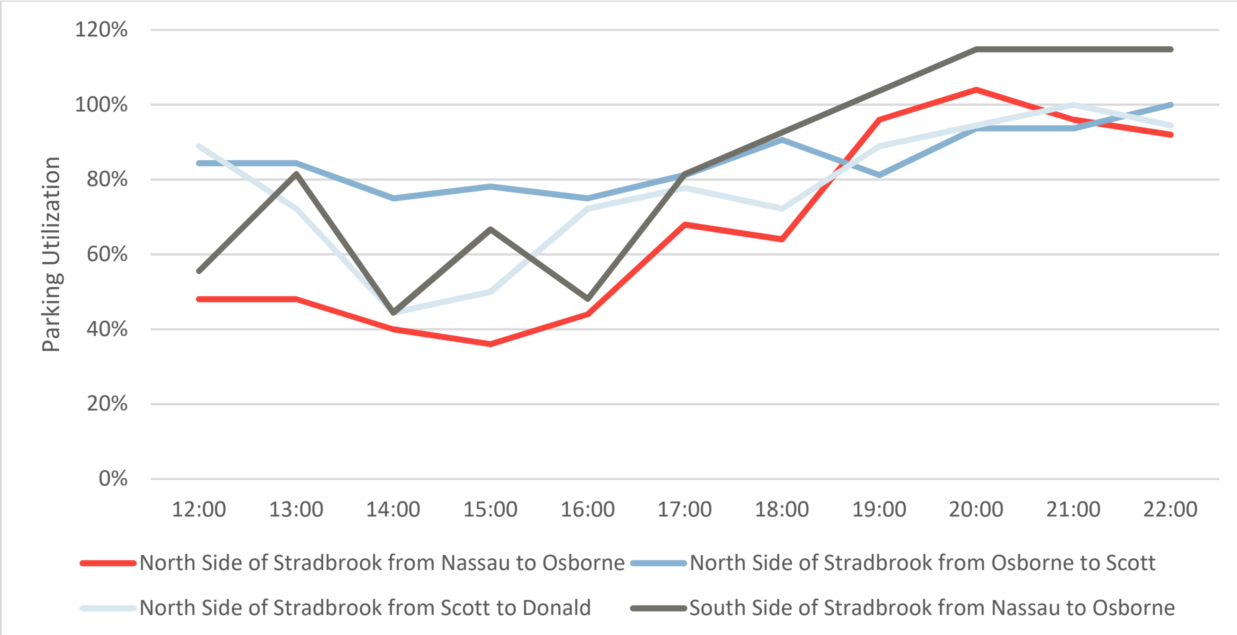


Figure 2.9: Parking Utilization for Stradbrook Avenue on a Saturday

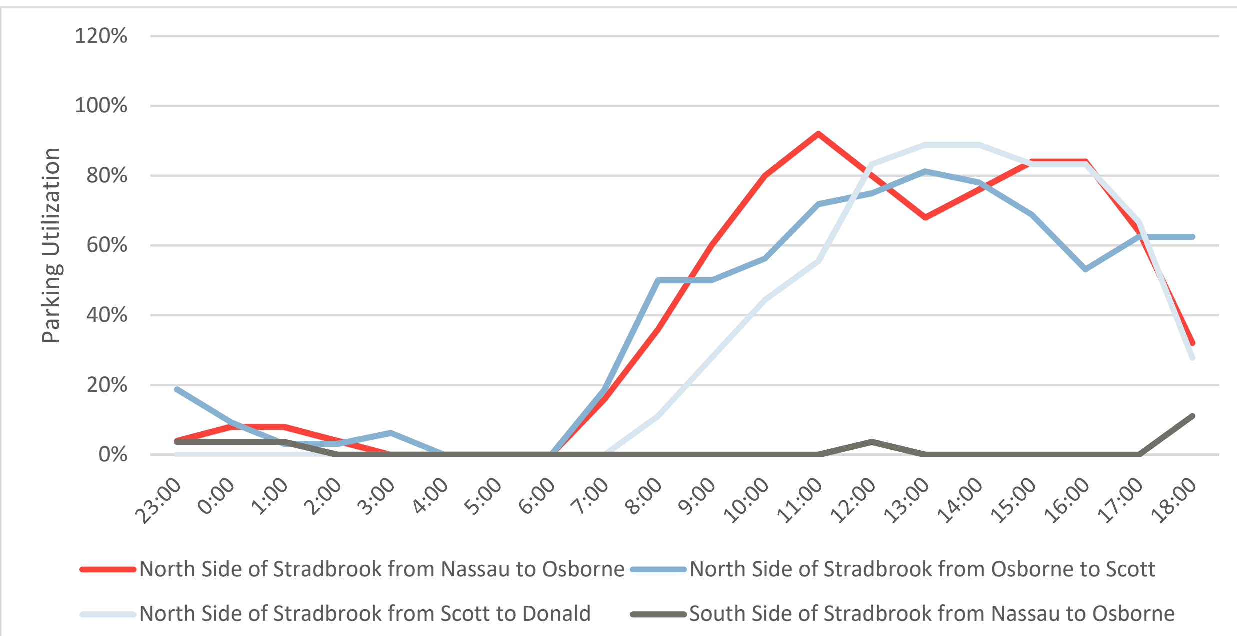


Figure 2.10: Parking Utilization for Stradbrook Avenue on a Tuesday

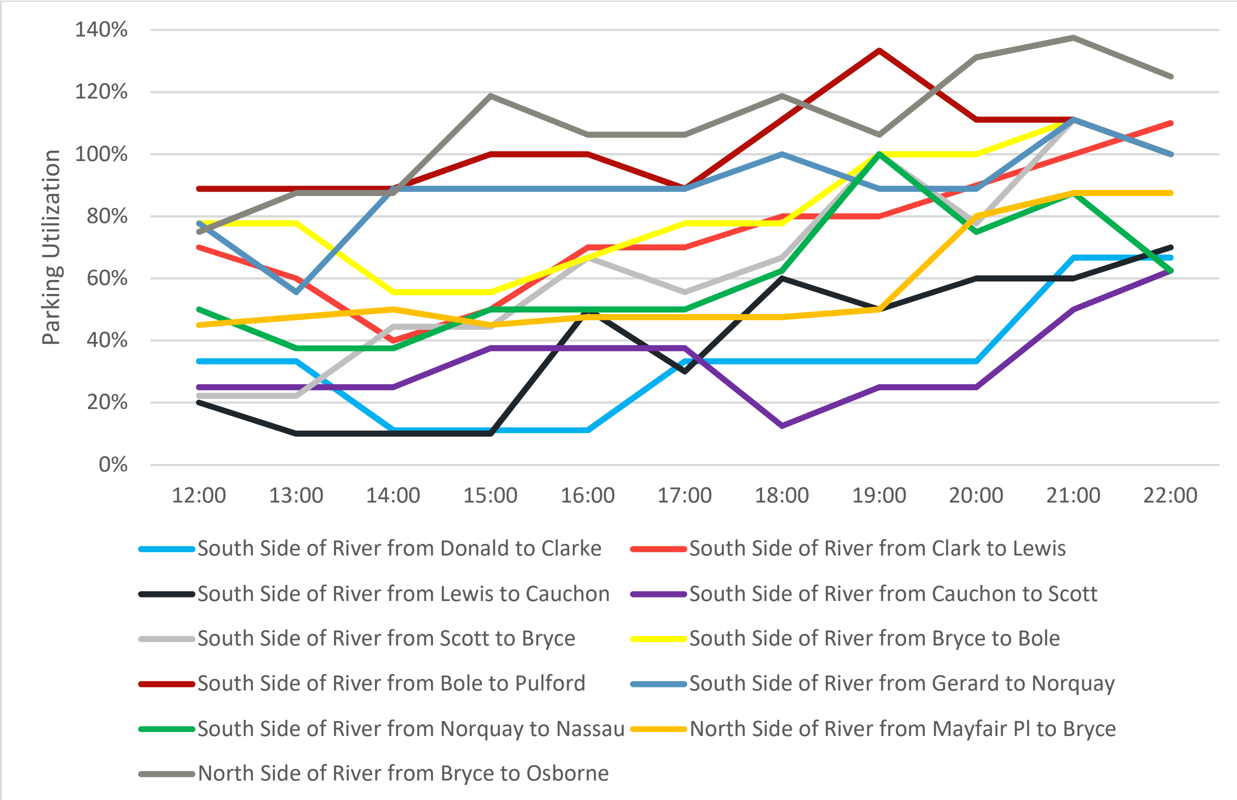


Figure 2.11: Parking Utilization for River Avenue on a Saturday

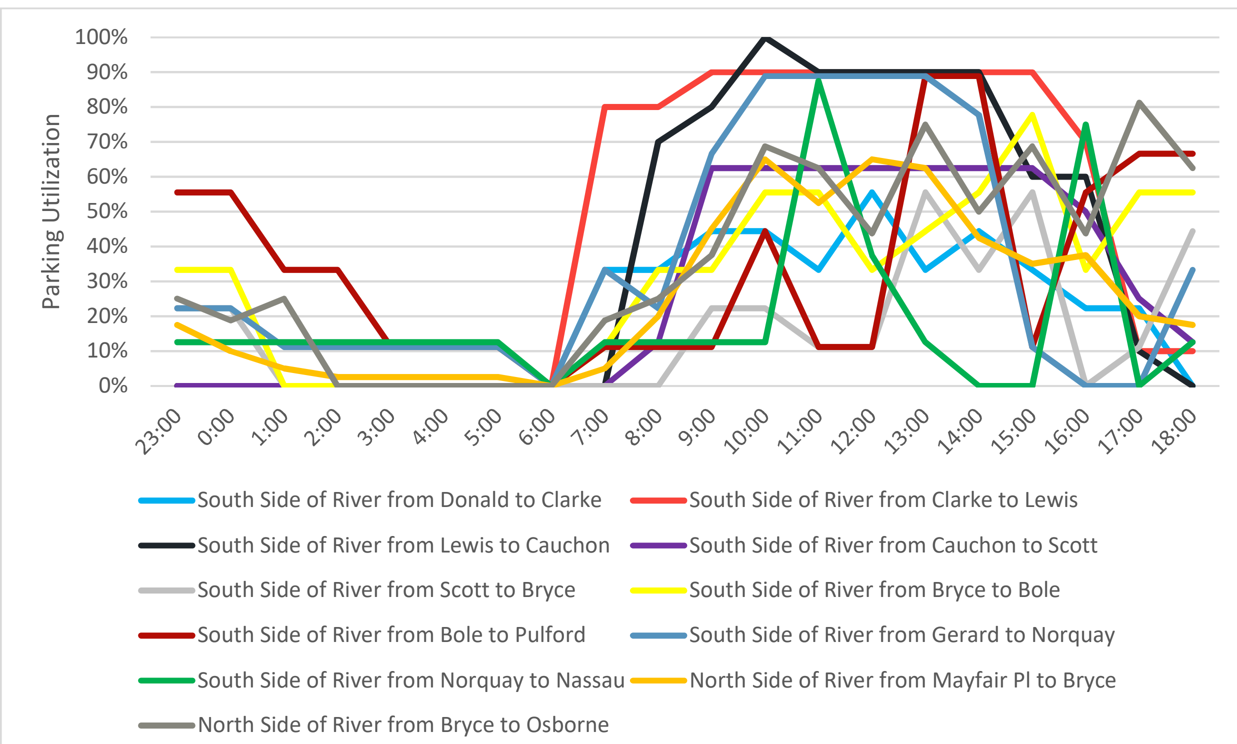


Figure 2.12: Parking Utilization for River Avenue on a Tuesday

2.4 TRANSIT ROUTES & STOPS

There are a number of existing transit routes serving portions of the study area including:

— Route 16 – Osborne-Selkirk;

— Route 18 – North Main-Corydon;

— Route 39 – Taylor Park & Ride Express;

— Route 58 – Dakota Express;

— Route 60 – Pembina;

— Route 64 – Lindenwoods Express;

— Route 65 – Grant Express;

— Route 66 – Grant;

— Route 68 – Crescent;

— Route 84 – Lindenwoods-Fort Rouge Station;

— Route 99 – Downtown-Misericordia Health Centre-Windermere & Pembina; and

— Route 185 – Osborne Village Express.

Note: Transitway routes not included in this list.

Figure 2.13 illustrates all of the existing routes within the study area. Routes 68, 99, and 185 use River Avenue and Stradbrook Avenue, while routes 16, 18, 39, 58 and 60 use Osborne Street.

Figure 2.13: Transit Routes

Source: Winnipeg Transit

Winnipeg Transit tracks activity at bus stops by recording the number of boarding's and alightings at the stop. These are the number of riders getting on and off buses at the individual stops, which includes people transferring from one route to another. Winnipeg Transit provided boarding and alighting counts for the Transit stops within the study area for a typical weekday in Fall 2017. **Table 2.3** provides a complete list of the boarding and alighting data and **Figure 2.14** shows the total number of boarding's and alighting for each transit stop in the study area. The stops with the highest activity are at Osborne Street and River Avenue (Stop 10172 and 10171), Osborne Station (Stop 11029 and 11030), Confusion Corner (Stop 10066 and 10068), Osborne Street and Stradbrook Avenue (Stop 10186), Osborne Street and Wardlaw Avenue (Stop 10185), Harkness Station (Stop 11027 and 11028), and Queen Elizabeth Way / Stradbrook Avenue / Mayfair Avenue (Stop 10158 and 10159).

User amenities at the Transit stops within the study area vary from a heated station with bicycle parking (at bus rapid transit stops) to a shelter with a bench (generally at intersections) to no amenities (generally at mid-block locations). Sidewalk conditions at the bus stops range from good to poor condition.

Table 2.3: Boarding and Alighting Data for Transit Stops within the Study Area

STOP ID	NAME	BOARDINGS	ALIGHTINGS	TOTAL
10071	Northbound Pembina at Nassau	53	68	121
10072	Southbound Pembina at Fleet	26	38	64
10149	Westbound Corydon at Nassau	25	107	132
10150	Eastbound Corydon at Nassau	137	50	187
10184	Eastbound Stradbrook at Nassau	17	12	29
10174	Westbound River at Nassau	5	9	14
10173	Westbound River at Gerard	34	26	60
11029	**Southbound Southwest Transitway at Osborne Station**	**538**	**156**	**694**
11030	**Northbound Southwest Transitway at Osborne Station**	**201**	**813**	**1014**
10911	Southbound Osborne at Osborne Station	115	73	188
10910	Northbound Osborne at Osborne Station	44	187	231
10067	Southbound Osborne at Osborne Junction	236	145	381
10066	**Northbound Osborne at Osborne Junction**	**430**	**362**	**792**
10068	**Southbound Pembina at Osborne Junction**	**302**	**209**	**511**
10069	Northbound Pembina at Osborne	3	7	10
10185	**Southbound Osborne at Wardlaw**	**124**	**241**	**365**
10187	Eastbound Stradbrook at Osborne	19	26	45
10186	**Northbound Osborne at Stradbrook**	**301**	**125**	**426**
10172	**Southbound Osborne at River**	**448**	**984**	**1432**
10171	**Northbound Osborne at River**	**903**	**366**	**1269**
10170	Westbound River at Osborne	15	57	72
10169	Westbound River at Bryce	8	15	23
10168	Westbound River at Cauchon	7	15	22
10167	Westbound River at Clarke	11	17	28
11035	Westbound River at Mayfair	5	12	17
11016	Westbound River at Donald East	29	13	42
10188	Eastbound Stradbrook at Scott	19	6	25
10730	Eastbound Stradbrook at Donald West	24	6	30
10189	Eastbound Stradbrook at Donald East	44	9	53

STOP ID	NAME	BOARDINGS	ALIGHTINGS	TOTAL
10166	Southbound Donald at River	2	27	29
10153	Southbound Donald at Stradbrook	0	12	12
10152	Northbound Donald at Wardlaw	2	1	3
10151	Southbound Donald at Gertrude	0	3	3
11046	Southbound Southwest Transitway at Harkness Station	2	9	11
11027	**Southbound Southwest Transitway at Harkness Station**	**157**	**123**	**280**
11028	**Northbound Southwest Transitway at Harkness Station**	**155**	**202**	**357**
10161	Westbound Stradbrook at Harkness	1	6	7
10676	Westbound Stradbrook at Queen Elizabeth	6	4	10
10156	Northbound Harkness at River	23	22	45
10645	Eastbound Mayfair at Harkness	1	1	2
10157	**Eastbound Mayfair at Queen Elizabeth**	**107**	**368**	**475**
10159	**Southbound Queen Elizabeth at Stradbrook**	**606**	**179**	**785**
10158	**Northbound Queen Elizabeth at Mayfair**	**51**	**268**	**319**

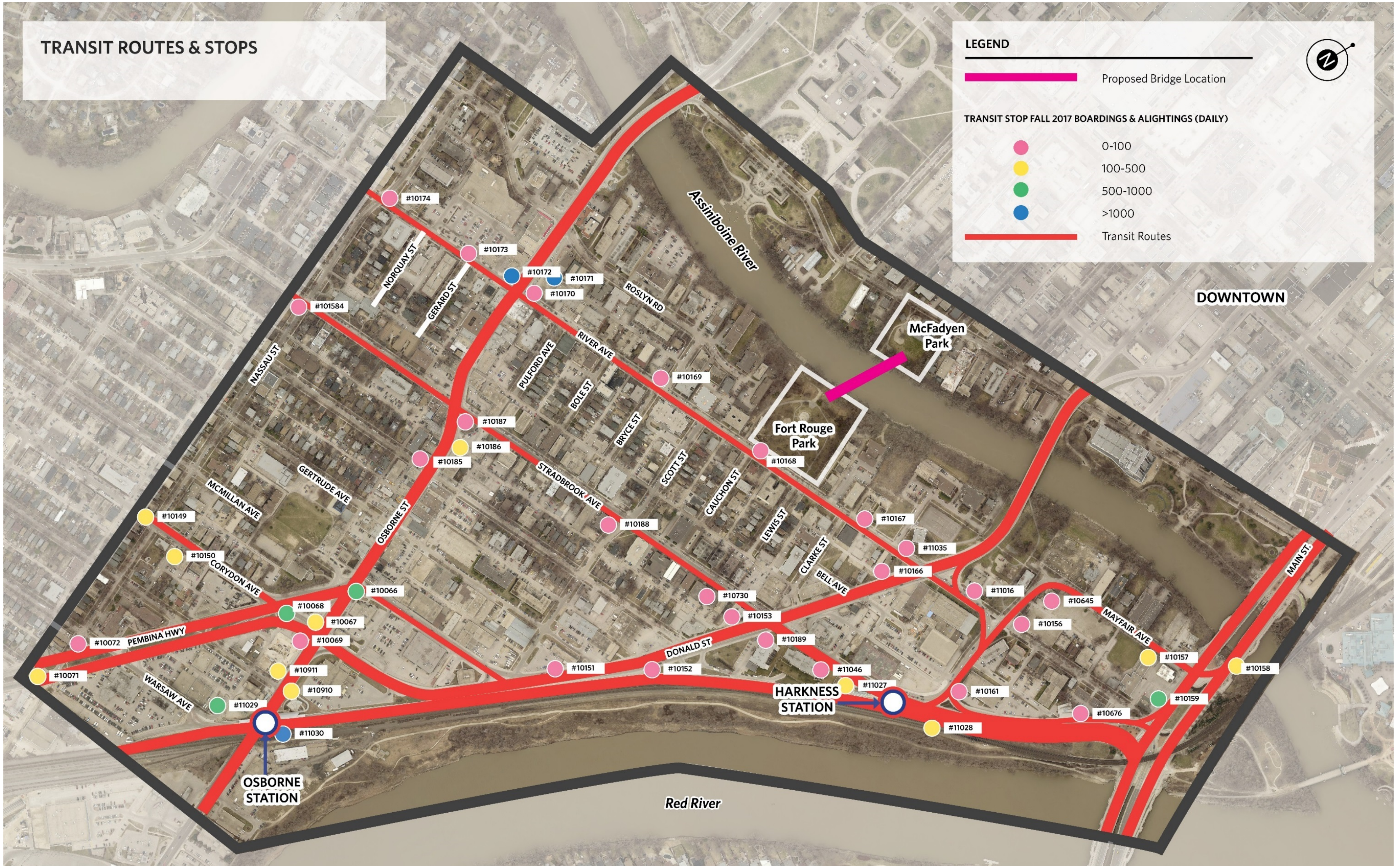


Figure 2.14: Transit Stop Boarding and Alightings

2.5 TRAFFIC VOLUMES

2.5.1 DAILY TRAFFIC VOLUMES

The existing average weekday traffic (AWDT) volumes throughout the study area are based on 24-hour traffic counts conducted by Public Works between 2001 and 2017. The traffic counts were forecast to 2018 volumes using a 0.5% growth rate. **Figure 2.15** shows average weekday traffic volumes for streets where data was available within the study area. To summarize:

- Existing traffic volumes on Osborne Street and Donald Street are greater than 34,000 vehicles per day;
- Existing traffic volumes on River Avenue and Stradbrook Avenue (west of Donald Street) range from 8,600 to 10,200 vehicles per day;
- Existing traffic volumes on Nassau Street range from 5,900 to 7,100 vehicles per day between Stradbrook Avenue and Roslyn Road;
- Existing traffic volumes on Roslyn Road west of Osborne Street are approximately 8,400 vehicles per day and east of Osborne Street are approximately 2,600 vehicles per day;
- Existing traffic volumes on Scott Street range from 2,300 to 2,700 vehicles per day;
- Existing traffic volumes on Wardlaw Avenue are approximately 1,000 vehicles per day; and
- Existing traffic volumes on Gertrude Avenue west of Osborne Street are approximately 2,500 vehicles per day and east of Osborne Street are approximately 1,200 vehicles per day.

2.5.2 PEAK HOUR TRAFFIC VOLUMES

Weekday a.m. and p.m. peak hour traffic counts were obtained from Public Works for the study area intersections. The traffic counts were conducted between 2013 and 2017 and were forecast to 2018 volumes using a 0.5% growth rate. The weekday a.m. and p.m. peak hours are generally the busiest times for on-street traffic.

The 2018 peak hour traffic volumes for the signalized intersections within the study area are illustrated in **Figure 2.16**.

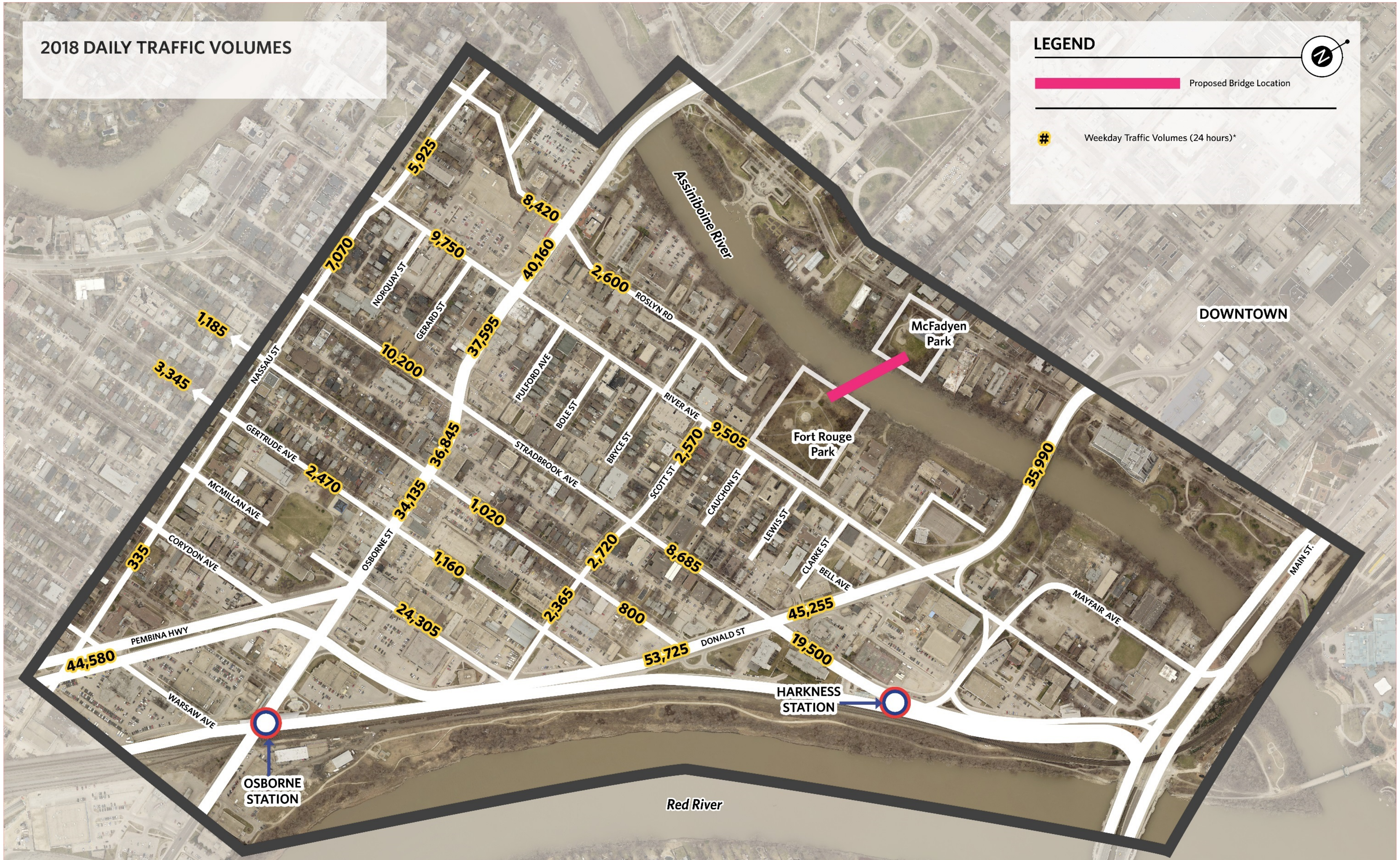


Figure 2.15: 2018 Daily Traffic Volumes

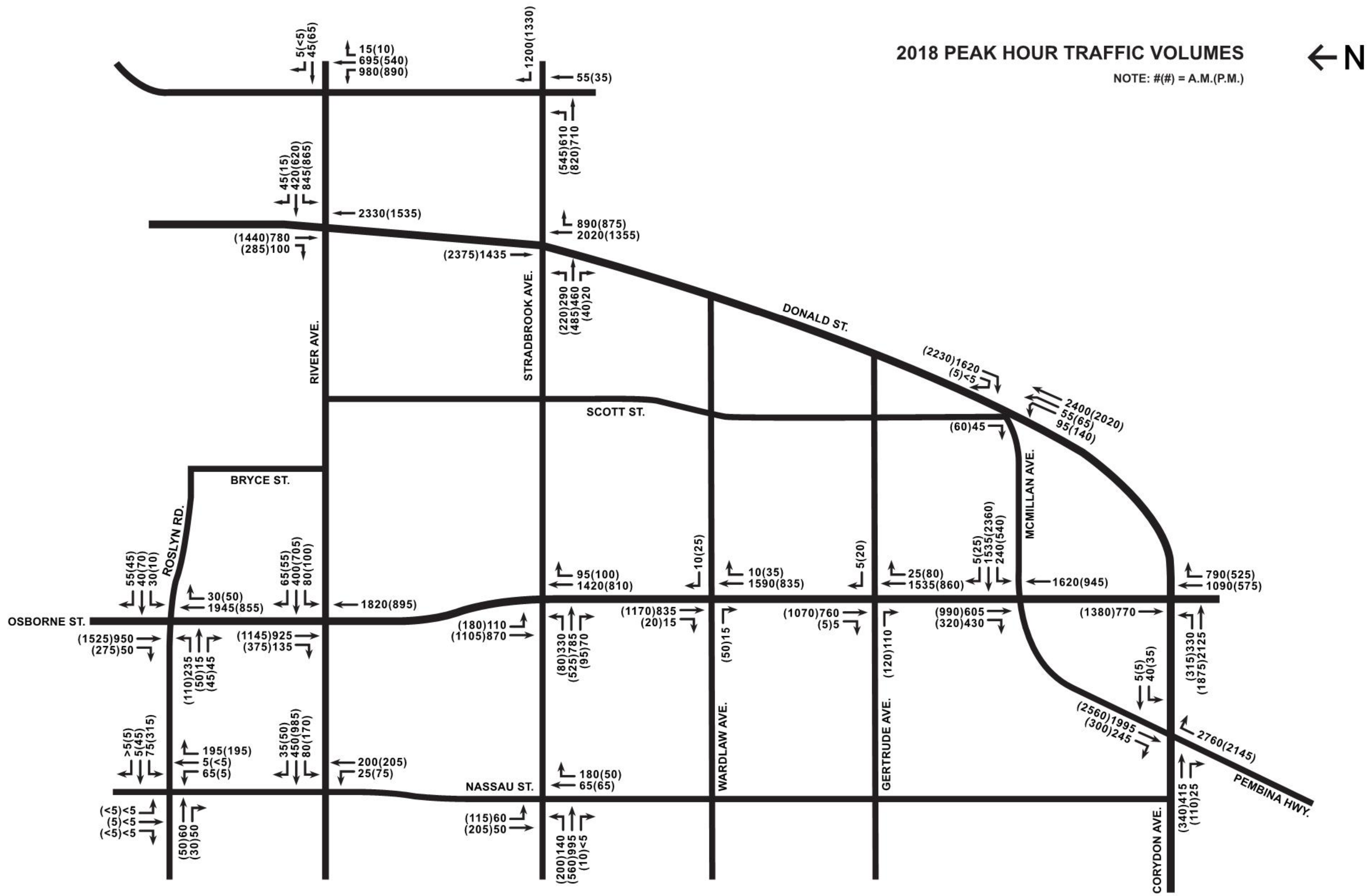


Figure 2.16: 2018 Weekday Peak Hour Traffic Volumes

2.6 COLLISIONS

A collision analysis involves a review of the collision history of a facility through an assessment of multiple years of collision statistics. The purpose of this review is to establish collision rates and to identify possible relationships between the collisions that have occurred and the geometric features and operational conditions of the facility. Collision data provided by Public Works was available from 2012 and 2015 for:

- Assiniboine Avenue;
- Bryce Street;
- Clarke Street;
- Donald Street;
- Gertrude Avenue;
- Harkness Street;
- Lewis Street;
- McMillan Avenue;
- Nassau Street;
- Osborne Street;
- River Avenue;
- Roslyn Road;
- Scott Street;
- Stradbrook Avenue; and
- Wardlaw Avenue.

The data included a summary of the number, type and related statistics of the reported collisions at these locations. The average daily number of entering vehicles for the intersections were determined using historical intersection traffic counts from 2002 to 2018 and estimating the average daily number of entering vehicles by multiplying the 12-hour volumes by 1.33 or the p.m. peak hour volumes by 10 (when 12-hours of data were not available). The average daily vehicles for links were determined using historical tube traffic counts from 2001 to 2018. The daily traffic volumes were then projected to the year 2015 using a compound annual growth rate of 0.5%. Summaries of the intersection and link collision data are provided in **Tables 2.4** and **2.5**, respectively.

Collision rate is a measure of the risk faced by the road user and is based on the number of incidents that occurred and the volume of traffic during a specified period. Collision rates exceeding 1.5 incidents per million entering vehicles (MEV) for an intersection are often considered as warranting further investigation. The intersections with collision rates greater than 1.5 are:

- Assiniboine Avenue & Kennedy Street;
- Assiniboine Avenue & Carlton Street;
- Assiniboine Avenue & Hargrave Street;
- Donald Street & River Avenue;
- Osborne Street & McMillan Avenue / Pembina Highway;
- Osborne Street & Roslyn Road;
- Osborne Street & River Avenue;
- Osborne Street & Stradbrook Avenue; and
- Scott Street & Wardlaw Avenue.

Ten pedestrian collisions were recorded within the study area, with the highest frequency (three collisions) occurring at the River Avenue and Osborne Street intersection. Eleven cyclist collisions were recorded within the study area, with the highest frequency (two collisions) occurring at the Main Street and Assiniboine Avenue intersection. River Avenue and Osborne Street can be characterised as having a high volume of pedestrians, while Main Street and Assiniboine Avenue can be characterised as having a high volume of both pedestrians and cyclists.

Table 2.4: 2012-2015 Intersection Collision Analysis

INTERSECTION	COLLISIONS PER YEAR				AVERAGE DAILY ENTERING VEHICLES	COLLISION RATE	PEDESTRIAN / BICYCLE COLLISIONS (2012-2015)
	2012	2013	2014	2015			
Assiniboine Ave & Osborne St	2	2	2	3	-	-	-
Assiniboine Ave & Kennedy St	2	3	2	4	1,040	**7.24**	-
Assiniboine Ave & Edmonton St	2	3	2	1	-	**-**	-
Assiniboine Ave & Carlton St	2	1	1	1	1,570	**2.18**	-

INTERSECTION	COLLISIONS PER YEAR				AVERAGE DAILY ENTERING VEHICLES	COLLISION RATE	PEDESTRIAN / BICYCLE COLLISIONS (2012-2015)
	2012	2013	2014	2015			
Assiniboine Ave & Hargrave St	2	3	2	4	3,199	**2.36**	1 / 0
Assiniboine Ave & Navy Way	1	2	4	0	-	-	0 / 1
Assiniboine Ave & Garry St	1	3	1	1	-	-	0 / 1
Assiniboine Ave & Fort St	0	0	2	1	4,240	0.48	0 / 1
Assiniboine Ave & Main St	34	26	28	25	51,600	1.50	1 / 2
Bryce St & Roslyn Rd	0	0	1	0	-	-	-
Clarke St & River Ave	0	1	2	1	-	-	-
Clarke St & Bell Ave	0	0	1	0	-	-	-
Clarke St & Donald St	0	1	0	1	-	-	-
Donald St & Stradbrook Ave	28	12	25	11	52,200	1.00	-
Donald St & Bell Ave	0	4	1	1	-	-	-
Donald St & River Ave	31	29	19	33	43,245	**1.77**	1 / 1
Donald St & Gertrude Ave	3	0	0	1	-	-	-
Donald St & McMillan Ave	5	5	6	4	-	-	-
Donald St & Access to Confusion Corner Stores	0	0	3	0	-	-	-
Donald St & Lagopoulos Way	2	1	3	8	-	-	-
Donald St & Midtown Bridge	0	2	1	1	31,194	0.09	-
Gertrude Ave & Nassau St N	7	7	4	2	-	-	-
Gertrude Ave & Osborne St	13	9	16	8	31,591	1.00	0 / 1
Gertrude Ave & Donald St	3	0	0	1	-	-	-
Gertrude Ave & Scott St	1	0	4	0	-	-	-
Harkness St & Mayfair Ave	1	1	0	1	-	-	-
Harkness St & River Ave	4	5	4	3	14,780	0.74	-
Harkness St & Stradbrook Ave	5	4	9	4	26,800	0.56	-
Lewis St & River Ave	4	2	3	1	-	-	-
McMillan Ave & Nassau St N	3	2	1	2			-
McMillan Ave/Pembina Hwy & Osborne St	46	81	55	63	50,730	**3.31**	1 / 1
Nassau St N & Roslyn Rd	2	2	1	1	6,385	0.64	-
Nassau St N & River Ave	2	6	6	2	17,270	0.63	-
Nassau St N & Stradbrook Ave	2	5	3	5	12,060	0.85	0 / 1
Nassau St N & Wardlaw Ave	2	3	2	0	-	-	0 / 1
Nassau St N & Corydon Ave	4	9	7	5	-	-	-

INTERSECTION	COLLISIONS PER YEAR				AVERAGE DAILY ENTERING VEHICLES	COLLISION RATE	PEDESTRIAN / BICYCLE COLLISIONS (2012-2015)
	2012	2013	2014	2015			
Nassau St N & Jessie Ave	2	0	1	2	-	-	-
Nassau St N & Pembina Hwy	2	1	8	3	51,120	0.19	-
Osborne St & Roslyn Rd	23	20	22	18	29,670	**1.92**	1 / 1
Osborne St & River Ave	38	46	33	46	30,880	**3.62**	3 / 0
Osborne St & Stradbrook Ave	14	27	20	18	27,525	**1.97**	1 / 0
Osborne St & Wardlaw Ave	13	10	9	11	21,080	1.40	-
Osborne St & Corydon Ave	34	16	23	23	44,940	1.46	-
Osborne St & Mulvey Ave	7	7	5	6	25,150	0.68	-
River Ave & Norquay St	2	0	1	2	-	-	-
River Ave & Gerard St	1	4	2	5	-	-	-
River Ave & Pulford St	4	3	3	5	-	-	-
River Ave & Bole St	0	1	3	1	-	-	-
River Ave & Bryce St (W)	0	2	1	0	-	-	-
River Ave & Scott St	4	3	3	4	-	-	1 / 0
River Ave & Lewis St	4	2	3	1	-	-	-
River Ave & Mayfair Pl	2	0	2	4	-	-	-
River Ave & Wellington Cres	1	2	4	2	-	-	-
Scott St & Stradbrook Ave	3	6	2	1	-	-	-
Scott St & Wardlaw Ave	3	4	2	5	2,805	**3.42**	-
Scott St & McMillan Ave & Donald St	5	5	6	4	45,150	0.30	-

Collision rates exceeding 1.5 incidents per million vehicle-kilometres travelled (MVKT) for a road link are often considered as warranting further investigation. The road links with collision rates greater than 1.5 are:

— Assiniboine Avenue – Edmonton Street to Kennedy Street;

— Assiniboine Avenue – Carlton Street to Edmonton Street;

— Gertrude Avenue – Nassau Street to Osborne Street;

— Nassau Street – Corydon Avenue to Jessie Avenue;

— Osborne Street – River Avenue to Stradbrook Avenue;

— Osborne Street – Corydon Avenue to Pembina Highway;

— River Avenue – Gerard Street to Osborne Street;

— Scott Street – River Avenue to Stradbrook Avenue;

— Scott Street – Gertrude Avenue to Wardlaw Avenue; and

— Wardlaw Avenue – Osborne Street to Scott Street.

Pedestrian collisions were not recorded for any link within the study area. The only bicycle collision recorded that occurred on a link within the study area was on Osborne Street between River Avenue and Roslyn Road.

Table 2.5: 2012-2015 Link Collision Analysis

LINK	COLLISIONS PER YEAR				AVERAGE DAILY LINK VEHICLES	LINK LENGTH (M)	COLLISION RATE
	2012	2013	2014	2015			
Assiniboine Ave - Edmonton St to Kennedy St	0	1	0	1	1,015	101	**13.36**
Assiniboine Ave - Carlton St to Edmonton St	0	1	0	0	2,195	100	**3.12**
Assiniboine Ave - Garry St to Navy Way	1	0	0	0	3,785	100	1.81
Donald St - Bell Ave to River Ave	0	0	1	0	35,350	106	0.18
Donald St - Gertrude Ave to Wardlaw Ave	1	0	0	0	52,930	132	0.10
Donald St - Lagopoulos Way to Wardlaw Ave	0	0	1	0	52,930	34	0.38
Gertrude Ave - Nassau St N to Osborne St	1	0	1	1	2,435	200	**4.22**
McMillan Ave - Donald St to Scott St	0	1	0	0	25,915	314	0.08
Nassau St N - Corydon Ave to Jessie Ave	1	0	0	0	330	97	**21.40**
Nassau St N - River Ave to Stradbrook Ave	0	1	0	0	6,965	191	0.51
Osborne St - Stradbrook Ave to Wardlaw Ave	0	0	3	2	36,300	107.5	0.88
Osborne St - River Ave to Stradbrook Ave	5	4	2	9	37,040	194	**1.91**
Osborne St - River Ave to Roslyn Rd	2	4	2	2	39,560	122	1.42
Osborne St - Gertrude Ave to Pembina Hwy	0	1	1	0	26,413	107.5	0.48
Osborne St - Gertrude Ave to Wardlaw Ave	0	0	0	2	33,625	99	0.41
Osborne St - Jessie Ave to Mulvey Ave	0	1	1	0	25,273	182	0.30
Osborne St - Corydon Ave to Pembina Hwy	2	1	3	3	23,370	76	**3.47**
River Ave - Bole St to Pulford St	0	0	0	1	9,365	79	0.93
River Ave - Bryce St to Scott St	1	0	0	0	9,365	83	0.88
River Ave - Cauchon St to Lewis St	1	0	0	0	9,365	85	0.86
River Ave - Clarke St to Mayfair Pl	0	0	1	0	9,365	85	0.86
River Ave - Gerard St to Osborne St	0	2	1	0	9,605	79	**2.71**
River Ave - Osborne St to Pulford St	0	1	0	0	9,365	79	0.93
Scott St - River Ave to Stradbrook Ave	1	1	1	1	2,535	181	**5.97**
Scott St - Gertrude Ave to Wardlaw Ave	0	0	1	0	2,330	94	**3.13**
Stradbrook Ave - Osborne St to Scott St	1	0	1	0	8,560	302	0.53
Stradbrook Ave - Donald St to Harkness St	0	0	1	0	19,210	250	0.14
Stradbrook Ave - Nassau St N to Osborne St	1	1	0	1	10,050	260	0.79
Stradbrook Ave - Harkness St to River Ave	0	0	0	1	21,090	261	0.12
Stradbrook Ave - Main St to River Ave	0	0	2	0	21,090	124	0.52
Wardlaw Ave - Osborne St to Scott St	0	1	0	0	1,005	265	**2.57**

2.7 UTILITIES

The utilities on River Avenue and Stradbrook Avenue were reviewed to determine potential impacts to utilities with the construction of bicycle lanes.

2.7.1 WATERMAINS

On River Avenue:

— A watermain is located on the south side of the roadway between the sidewalk and back of curb; and

— Hydrants are located on both sides of the street and are at the front of the sidewalk or set back in the boulevard of intersecting streets.

On Stradbrook Avenue:

— A watermain is located on the south side of the roadway between the sidewalk and back of curb; and

— Hydrants are located on both sides of the street and are at the front of the sidewalk.

2.7.2 WASTEWATER AND LAND DRAINAGE SEWER

The curb-to-curb width of the roadway would remain unchanged with the construction of bicycle lanes due to the limited space between the mature trees on River Avenue and Stradbrook Avenue. Therefore, it is unlikely that catch basins would need to be adjusted since the width of the roadway would remain the same. The separation barrier between the bicycle lane and travel lanes will be designed to avoid modifications to catch basins and drainage.

On River Avenue:

— A combined sewer is located along the centre of the roadway between Nassau Street and Osborne Street and along the north side of the roadway between Osborne Street and Harkness Street;

— A storm relief sewer is located along the centre of the roadway between Bryce Street and Clarke Street; and

— A wastewater sewer is located along the north lane between Clarke Street and Harkness Street.

On Stradbrook Avenue:

— A combined sewer is located along the centre of the roadway between Nassau Street and Donald Street; and

— A storm relief sewer is located along the north side of the roadway between Nassau Street and Donald Street.

A review of the condition of the sewer lines in the study area should be conducted as part of the detailed design and construction of any bike facilities on River Avenue and Stradbrook Avenue.

2.7.3 NON-CITY UTILITIES

There are many gas, hydro, and fibre optic cables that run throughout the study area. Locations of these utilities should be determined as part of the detailed design and construction. As the depth of all of the existing cables is unknown, it is possible that they may be shallow and therefore extreme care must be taken while working in these areas.

Light standards on River Avenue and Stradbrook Avenue are predominately located on the south side of the roadway. It is unlikely that light standards will be impacted with the construction of bicycle lanes since the width of River Avenue and Stradbrook Avenue would likely remain unchanged. Hydro lines are located along the back lanes that run perpendicular to River Avenue and parallel to Stradbrook Avenue.

3 DESIGN CRITERIA

The design criteria outlined below was submitted to the City on February 6, 2017, and was approved for the functional design of the recommended option.

3.1 ROADWAYS

All aspects of the roadway design will reflect the City of Winnipeg's *Transportation Standards Manual*, *Accessibility Design Standards*, *Standard Construction Specifications, and Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads.*

All roadway design dimensions presented in this technical memo are to the face of curb (to avoid confusion when presenting to the public). For the functional design drawings, all measurements will be to back of curb (a theoretical curb width of 0.15 m is part of the dimensions) as per the City of Winnipeg's *Transportation Standards Manual*.

3.2 PEDESTRIAN & CYCLING FACILITIES

There is no single design code governing City of Winnipeg pedestrian and cycling facilities. Instead, Public Works has adopted best practices from various jurisdictions that are applicable to the Winnipeg context. The design criteria summarized below are based on those selected practices, as advised by Public Works, and the following documents:

- City of Winnipeg *Pedestrian and Cycling Strategies (2015);*
- City of Winnipeg *Transportation Standards Manual (latest edition);*
- City of Winnipeg *Accessibility Design Standards (2015);*
- CAN/CSA S6-14 *Canadian Highway Bridge Design Code (2014);*
- Current *Standard Construction Specifications*; and
- TAC *Geometric Design Guide for Canadian Roads (2017).*

A summary of general design criteria for pedestrian and cycling facilities are summarized in **Table 3.1**. The criteria are considered to be a high standard and will be used for the design of the pedestrian and cycling facilities; however, in constrained locations, a reduced standard may be considered on a case-by-case basis, consistent with various design guidelines and subject to the City's approval.

Table 3.1: General Pedestrian and Cycling Facilities Design Criteria

CRITERIA	
Design Speed	25 km/h
Maximum Superelevation	2%
Minimum Vertical Clearance	3.0 m

3.2.1 SHARED USE PATHWAYS

Widths:

- Shared Use Path – 3.5 m minimum, 4.5 m preferred (1.5 m concrete sidewalk + 3.0 m asphalt path separated by a rumble strip);
- Neighbourhood AT overpass structures – minimum 3.5 m clear width between bridge rails or curbs;
- Regional AT overpass structures – minimum 4.5 m clear width between bridge rails or curbs;
- AT underpass structures with one side open – 4.5 m;

— AT tunnels width – 6.0 m; and

— All other locations – 4.5 m preferred, 3.5 m minimum.

Shy distance fixed objects: 1.0 m preferred, 0.5 m minimum.

Buffer to cut and fill slopes: 0.9 m.

Minimum radius: 25 m preferred, 20 m minimum.

Lateral sight clearance: TAC 5.5.3

Cyclist stopping sight distance: 35 m.

Materials:

— Dual track preferred (asphalt for cyclists and concrete for pedestrians).

Optimal Cross Slope: 2.0%.

Design Vehicle: 3.0 m long bicycle with trailer.

Railing Height: 1.37 m.

Accessibility Features: Tactile warnings for pedestrians at curb ramps, compliant with *Winnipeg Accessibility Design Standards (2015).*

3.2.2 ON-STREET SEPARATED BIKE LANES

Widths:

— Bike lane – 1.8 m clear width minimum, 2.1 m clear width desired; and

— Separation – 0.6 m minimum, 1.0 m desired.

Type of Protection along Separated Bike Lanes: To be determined during functional design phase.

Cyclist stopping sight distance: 35 m.

Optimal Cross Slope: 2.0%.

Design Vehicle: 3.0 m long bicycle with trailer.

Other Features: Bike pushbutton poles for signal actuation and additional space required for the poles; approach grades to accommodate bike lane.

3.2.3 SIDEWALKS

Width: 1.5 m minimum, 1.8 m preferred.

Material: Concrete.

Optimal Cross Slope: 2.0%.

Accessibility Features: Tactile warnings at curb ramps, compliant with *Winnipeg Accessibility Design Standards (2015).*

3.2.4 BRIDGE APPROACHES

Width: 5.0 m minimum.

Material: Context specific (e.g., asphalt may not be suitable in floodable locations).

Optimal Cross Slope: 2.0%.

Accessibility Features: Running slope max 5% preferred with level landings at 30 m intervals per *Winnipeg Accessibility Design Standards (2015)*, Section 1.1.3; if greater than 5%, handrails and landings at maximum 9 m intervals will be required, and a maximum slope of 6.7%, curves are not permitted.

Other Requirements:

— Lighting and surveillance from roadway preferred; and

— Staircases, if used, must incorporate bike troughs and flat rest areas.

3.2.5 NEIGHBOURHOOD GREENWAY

Suitable Vehicle Volume Threshold: 1,500 vehicles per day maximum preferred.

Appropriate Maximum Speed Limit: 30-40 km/hr. TAC recommends 40 km/hr depending on the context . Other best practice guidance recommends vehicular speed limits of 30 km/hr to reduce and mitigate conflicts.

Roadway Width (parking on both sides): Practical lower limit = 8.0 m, practical upper limit = 10.0 m (TAC).

Roadway Width (parking on one side): Practical lower limit = 5.5 m, practical upper limit = 7.5 m (TAC).

Material: Same as roadway.

Optimal Cross Slope: 2.0%.

Cyclist stopping sight distance: 35 m.

Design Vehicle: 3.0 m long bicycle with trailer.

Intersection Design Options: Diagonal diverters, bicycle crossable medians, neighbourhood traffic circles, and bicycle signals with bicycle-friendly actuation.

Other Design Features: Chicanes, speed bumps, speed tables, pavement markings, signage, sharrows, and other traffic calming features.

4 NETWORK OPTIONS

4.1 PUBLIC ENGAGEMENT – FIRST ROUND

The City and WSP met with the public in January 2018, to identify issues and considerations for the cycling network in Osborne Village. The first round of public engagement included an open house, stakeholder meetings and online survey hosted on the City's website. The complete public engagement report can be found in **Appendix A**. **Table 4.1** lists the main themes ("what we heard") from the public and how the public's input was considered in the development of options, which are presented in Sections 4.2 and 4.3.

Table 4.1: Public Engagement Themes

WHAT WE HEARD	HOW IT WAS CONSIDERED
The public identified "key connections" in Osborne Village to be at Confusion Corner, River Avenue / Osborne Street and Fort Rouge Park.	The conceptual route options developed connect to Fort Rouge Park and River Avenue / Osborne Street. Confusion Corner is connected to the pedestrian and cycling network by the Pembina Highway protected bicycle lanes and Donald Street off-street path.
The public identified "routes with best connections" on Donald Street, Stradbrook Street, River Avenue, Roslyn Road, Nassau Street and Assiniboine Avenue.	The conceptual route options include all of the streets identified as "best connections" by the public.
The public identified "routes that are currently unsafe" to be on Osborne Street between Stradbrook Avenue and Assiniboine Avenue.	The proposed pedestrian and cycling bridge from Fort Rouge Park to McFadyen Park and neighbourhood greenway on Scott Street, as well as the existing neighbourhood greenway on Nassau Street, will provide alternative north-south routes in Osborne Village, as well as a connection to Downtown for pedestrians and cyclists. When evaluating the cycling network options safety for all users of the system was considered, and the design of the cycling network in Osborne Village will utilize best practices to improve the safety of intersections. By developing a formal cycling network in Osborne Village, cyclists will be directed to intersections that have been designed with cyclist safety in mind.
The public identified "routes with lots of use" on Roslyn Road (west of Osborne Street), Osborne Street Bridge, Assiniboine Avenue.	These roadways are currently used as the main cycling route from the Nassau Street neighbourhood greenway to the Assiniboine Avenue protected bicycle lane. Roslyn Road and the Osborne Street Bridge are not ideal as they have high vehicle traffic volumes and do not have separated cycling facilities. The conceptual route options developed for the pedestrian and cycling network and proposed pedestrian and cycling bridge from Fort Rouge Park to McFadyen Park provide alternative routes to connect to the existing facilities on Nassau Street and Assiniboine Avenue.
The public identified "places with issues" to be at the Osborne Street Bridge, Midtown Bridge, Confusion Corner, River Avenue, and Stradbrook Avenue.	The proposed pedestrian and cycling bridge from Fort Rouge Park to McFadyen Park will provide an alternative crossing of the Assiniboine River so issues at the Osborne Street and Midtown bridges can be avoided. Protected bicycle lanes on River Avenue and Stradbrook Avenue (Option B) will address most issues identified by the public. Other issues identified relate to crossing River Avenue and Stradbrook Avenue at Scott Street, which will be reviewed during the functional design.

4.2 OPTIONS FOR CYCLING NETWORK

The PCS recommendations shown in **Figure 2.4** were used as a starting point for the development of options for the cycling network in Osborne Village. Options were developed in areas where there are constraints and / or where there are alternate viable options that were not included in the PCS recommendations. The options described in the following sections provide alternatives for the:

1 Cycling network in Osborne Village; and

2 Connections to Fort Rouge Park.

The options presented in the following sections are not "either-or" options, as multiple options may be selected or combined where appropriate to form the cycling network in Osborne Village and provide a connection to Fort Rouge Park.

Five options have been developed for the cycling network in the study area. The options are illustrated in **Figure 4.1** and include:

Option A: Improvements to the existing neighbourhood greenway on Nassau Street (from River Avenue to Roslyn Road), one-way bicycle lanes on Roslyn Road (from Nassau Street to Osborne Street), neighbourhood greenway on Roslyn Road (from Osborne Street to Bryce Street), and neighbourhood greenway on Bryce Street (from Roslyn Road to River Avenue);

Option B: One-way protected bicycle lanes on River Avenue and Stradbrook Avenue (from Nassau Street to Harkness Avenue) and neighbourhood greenway on River Avenue from Harkness Avenue to Main Street;

Option C: Neighbourhood greenway on Wardlaw Avenue (from Nassau Street to Scott Street);

Option D: Neighbourhood greenway on Gertrude Avenue (from Nassau Street to Scott Street); and

Option E: Neighbourhood Greenway on Scott Street (from Gertrude Avenue to River Avenue).

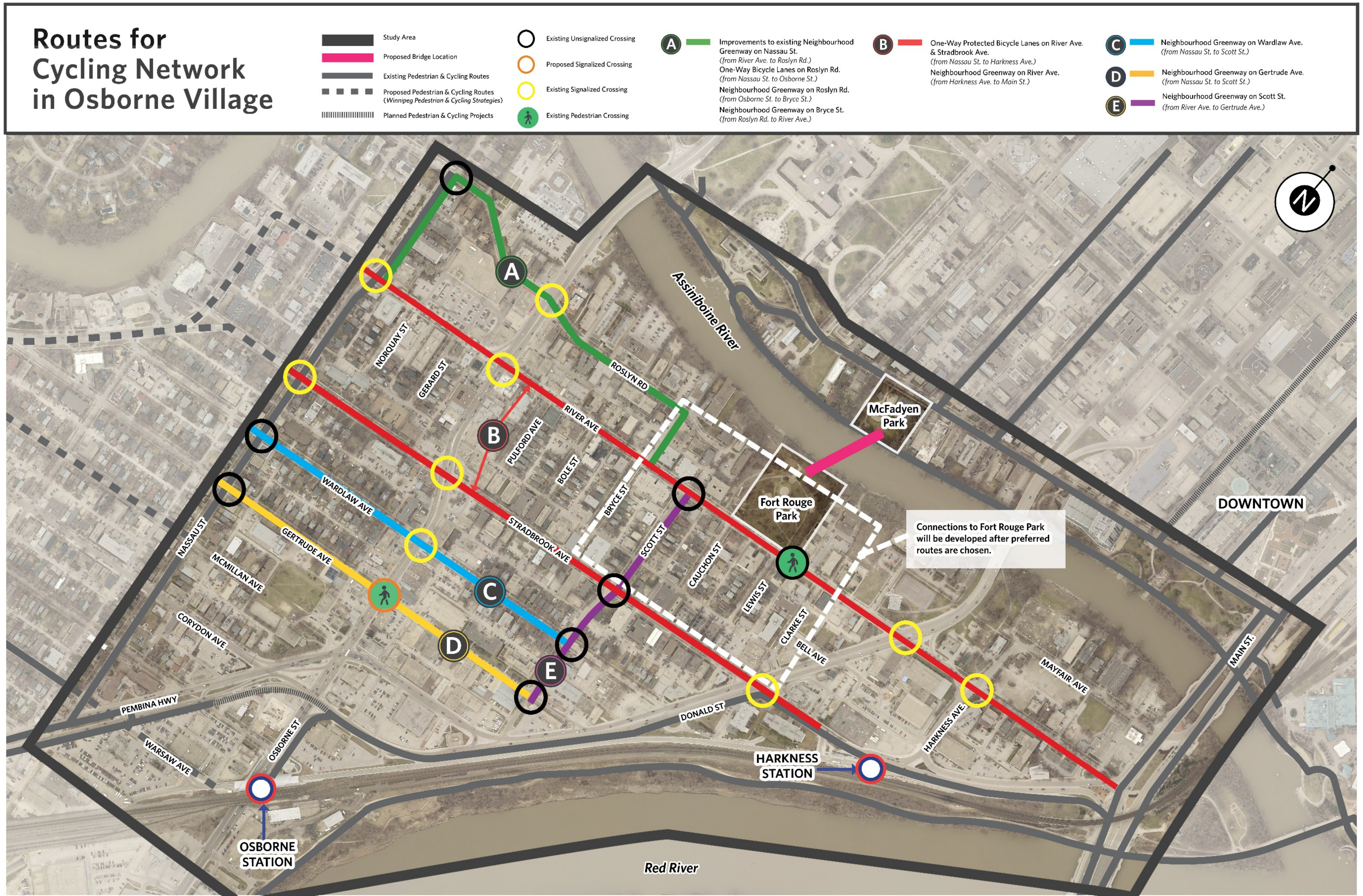


Figure 4.1: Options for Cycling Network in Osborne Village

4.2.1 OPTION A

The existing traffic volume on Roslyn Road west of Osborne Street is approximately 8,420 vehicles per day and east of Osborne Street is approximately 2,600 vehicles per day. Therefore, significant traffic calming measures would need to be implemented to reduce the traffic volumes to the desired traffic volume threshold of 1,500 vehicles per day for neighbourhood greenways. Since the PCS identifies Nassau Street, Roslyn Road and Bryce Street as neighbourhood greenways, potential traffic calming treatments could include:

— Adding signage that states “Local Traffic Only.” This would require a significant enforcement effort to be effective;

— Adding signage and sharrows to indicate that cyclists and vehicles share the road; and

— Adding speed humps to reduce vehicles speeds.

Even with the traffic calming measures, reducing the traffic volumes to 1,500 vehicles per day west of Osborne Street would be difficult as there are several large apartment / condominium buildings that are accessed off Roslyn Road.

Following the initial submission of these potential traffic calming treatments to the City (outlined in a Technical Memo issued to the City on March 28, 2018), the City asked that WSP:

— Investigate whether bicycle lanes could be incorporated into the cross-section on Roslyn Road west of Osborne Street and Nassau Street as an alternative to traffic calming;

— Prepare a cross-section of Roslyn Road to include raised bicycle lanes; and

— Prepare a concept drawing of Nassau Road that includes the conversion of Nassau Street from two-way to one-way (northbound) with back-in angled parking between River Avenue and Roslyn Road.

The resulting investigations are summarized below.

BUFFERED BICYCLE LANES ON ROSLYN ROAD AND NASSAU STREET

The average clear width of Roslyn Road west of Osborne Street and Nassau Street north of Stradbrook Avenue was measured to be approximately 9.8 m based on manual measurements undertaken by WSP in the field. A cross-section for Roslyn Road and Stradbrook Avenue is identified in **Figure 4.2**. In order to incorporate bicycle lanes sub-standard widths would be required. The cross-section includes:

— 1.4 m bicycle lane;

— 0.4 m painted buffer;

— 3.1 m travel lane;

— 3.1 m travel lane;

— 0.4 m painted buffer; and

— 1.4 m bicycle lane.

On-street parking would need to be completely removed to incorporate one-way buffered bicycle lanes on either side of Roslyn Road and Nassau Street. Removing the parking lane would result in approximately:

— 19 parking spaces being lost on the north side of Roslyn Road between Osborne Street and Nassau Street; and

— 35 parking spaces being lost on the west side of Nassau Street between Roslyn Road and Stradbrook Avenue.

There is also an accessible loading zone on the north side of Roslyn Road that would be impacted by the bicycle lane. This loading zone is used for a physiotherapy business.

An off-street path alternative was also looked at; however, there is limited space and a number of mature trees within the boulevard that would make it challenging and costly to incorporate an off-street path.

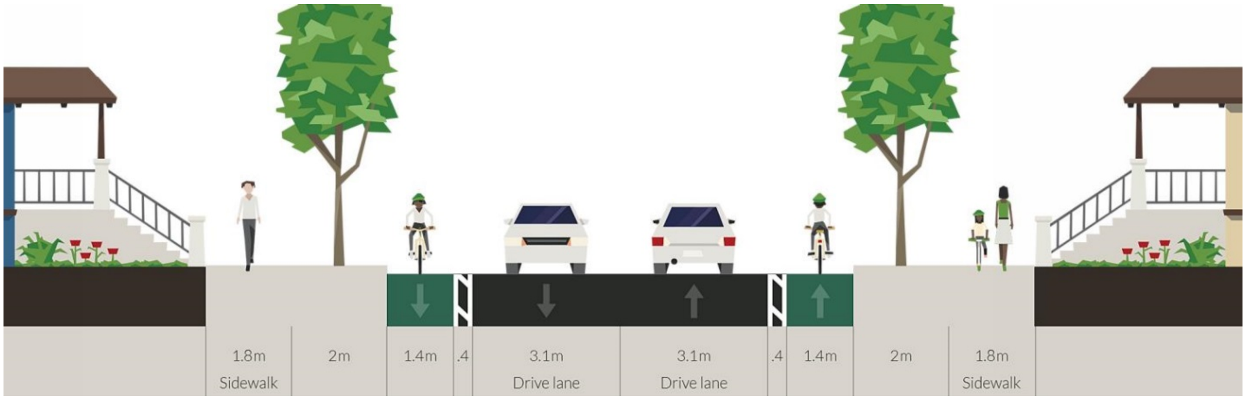


Figure 4.2: Roslyn Road and Nassau Street with Buffered Bicycle Lanes

RAISED BICYCLE LANES ON ROSLYN ROAD

The City asked that WSP prepare a cross-section for Roslyn Road west of Osborne Street that included raised bicycle lanes. This option would require modifications to drainage and utility infrastructure. A cross-section with raised bicycle lanes on Roslyn Road west of Osborne Street is shown in **Figure 4.3**.

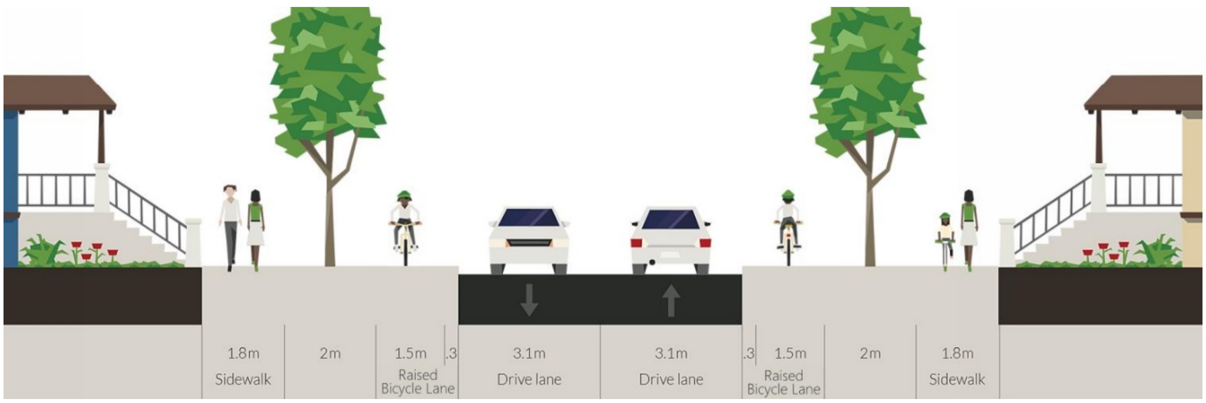


Figure 4.3: Roslyn Road with Raised Bicycle Lanes

CONVERSION TO ONE-WAY ON NASSAU STREET WITH BACK-IN ANGLED PARKING

The City also asked that WSP prepare a concept drawing of Nassau Road that includes the conversion of Nassau Street from two-way to one-way (northbound) between River Avenue and Roslyn Road with back-in angled parking. The conversion to one-way northbound would eliminate southbound short-cutting traffic. The concept drawing is shown in **Figure 4.4**.

The resulting Option A that was presented to the public during the second round of public engagement in June 2018 included:

- Neighbourhood greenway on Nassau Street as shown in **Figure 4.4**.
- Two sub-options for Roslyn Road (west of Osborne Street):
  - A1 – Buffered bicycle lanes as shown in **Figure 4.2**; and
  - A2 – Raised bicycle lanes as shown in **Figure 4.3**.
- Neighbourhood greenway on Roslyn Road.
- Neighbourhood greenway on Bryce Street.

Figure 4.4: One-Way Back-In Angled Parking on Nassau Street

4.2.2 OPTION B

Option B incorporates one-way bicycle lanes on River Avenue and Stradbrook Avenue. Due to variations in the clear width of the roadway, the typical cross-sections of River Avenue and Stradbrook Avenue for Option B are different between:

— Nassau Street and Osborne Street;

— Osborne Street and Donald Street; and

— Donald Street and Main Street.

RIVER AVENUE AND STRADBROOK AVENUE BETWEEN NASSAU STREET AND OSBORNE STREET

Between Nassau Street and Osborne Street, the existing clear width to the face of the curb on River Avenue and Stradbrook Avenue is approximately 10.9 m and therefore it would be difficult to incorporate protected bicycle lanes as per the design standards outlined in **Section 3.0** without eliminating a travel or parking lane. Instead, 1.8 m protected bicycle lanes with 0.3 m raised concrete curb buffer are recommended for River Avenue and Stradbrook Avenue between Nassau Street and Osborne Street. The one-way bicycle lanes would be located on the north side of River Avenue and the south side of Stradbrook Avenue (right-hand side of the road in the direction of traffic). The typical cross-section for this option (Option B1) between Nassau Street and Osborne Street includes a:

— 1.8 m protected bicycle lane at street level;

— 0.3 m raised concrete curb buffer (the buffer is below the minimum standard; however still allows for sufficient space for the pre-cast concrete curbs (adjustable curbs), which are approximately 0.3 m wide);

— 3.35 m travel lane (this is below the standard 3.5 m width for lanes where buses operate; however, the buffer zone allows for additional space that bus mirrors can extend into);

— 3.05 m travel lane (the City informed WSP that they would be willing to reduce the width of the travel lane next to the parking lane to 3.05 m); and

— 2.4 m parking lane (this is below the minimum standard of 2.8 m outlined in the City's Transportation Standards Manual; however, the TAC Geometric Design Guide states that "parking lane width is generally 2.4 m").

Following the initial submission of this option to the City (outlined in a Technical Memo issued to the City on March 28, 2018), the City asked that WSP prepare a cross-section for Roslyn Road west of Osborne Street that included raised bicycle lanes. This option would require modifications to drainage and utility infrastructure. The typical cross-section for this option (Option B2) between Nassau Street and Osborne Street includes:

— 1.6 m raised bicycle lane;

— 0.3 m roll curb;
— 3.5 m travel lane (to allow for buses);
— 3.1 m travel lane; and
— 2.4 m parking lane.

Widening the roadway to accommodate bicycle lanes was not considered to be a viable alternative since there are several mature trees in the boulevard less than 0.5 m from the curb.

Removing the parking lane was also not considered to be a desirable alternative due to the high parking demand in the area. Removing the parking lane would result in approximately:

— 17 parking spaces and five loading spaces being lost on the south side of River Avenue; and
— 25 parking spaces and six loading spaces being lost on the north side of Stradbrook Avenue.

The existing and proposed cross-sections for the protected bicycle lane and raised bicycle lane on River Avenue and Stradbrook Avenue between Nassau Street and Osborne Street are shown in **Figure 4.7**.

For the protected bicycle lane option (B1) at transit stops, the bus would cross a dashed bicycle lane line to access the curb-side transit stop (as shown in **Figure 4.5**). Cyclists would be required to stop and wait for the bus to complete loading / unloading or pass along the left side of the bus. Potential conflicts may occur between buses and cyclists when the bus pulls into the stop or between cyclists and vehicles when the cyclist tries to pass the bus.

On-street parking would be accommodated for Option B between Nassau Street and Osborne Street as follows:

— On-street parking on River Avenue would remain on the south side and be available at all times of the day;
— On-street parking on Stradbrook Avenue would remain on the north side at all times of the day and on the south side during off-peak hours (mid-day, evenings and weekends); and
— Some on-street parking spaces may be lost at certain locations along a block to accommodate emergency vehicles.

The traffic analysis for the scenario where on-street parking would be allowed in the curb-side travel lane (where appropriate) during off-peak times on River Avenue and Stradbrook Avenue has been included in **Section 5.0**. At Osborne Street, westbound incoming peak hour traffic volumes on River Avenue and eastbound incoming peak hour traffic on Stradbrook Avenue are less than the typical saturation flow rate of 1,900 vehicles per hour per lane.

RIVER AVENUE AND STRADBROOK AVENUE BETWEEN OSBORNE STREET AND DONALD STREET

Between Osborne Street and Donald Street, the existing clear width to the face of the curb on Stradbrook Avenue and River Avenue is approximately 11.8 m. The typical cross-section for Option B between Osborne Street and Donald Street includes:

— 1.8 m protected bicycle lane at street level;
— 0.6 m raised concrete curb buffer (e.g., pre-cast concrete curb);
— 2.6 m parking lane;
— 3.5 m travel lane (to allow for buses); and
— 3.3 m travel lane.

The existing and proposed cross-sections for River Avenue and Stradbrook Avenue between Osborne Street and Donald Street are shown in **Figure 4.8**.

Transit stops would be accommodated in the parking lane (as shown in **Figure 4.6**) and bicycle lanes would be raised to the level of the sidewalk.

At the intersections with Scott Street, it is recommended that the River Avenue and Stradbrook Avenue crossings include improvements to improve safety by reducing the pedestrian crossing distance, improving sightlines and increasing the visibility of the crossing. This can be achieved by adding curb bulb-outs, signage in advance and at the crossing, zebra pavement markings (for the pedestrian crossing) and chevrons or green paint (for the cyclist crossing). If the crossing includes a curb bulb-out (reducing the crossing distance to two lanes), the TAC *Pedestrian Crossing Control Guide (3rd Edition)* recommends that the ground-mounted system (GM) be implemented based on the existing traffic volumes, roadway geometry and speed limit. The Guide also stated that "The treatment systems are hierarchical (GM→GM+→RRFB→OF→TS). Higher order treatments may be substituted for lower order treatments systems. The rationale for substituting higher order treatment systems should be consistent throughout the jurisdiction." Therefore, a higher-level treatment system, such as an rectangular rapid flashing beacon (RRFB) system, overhead flashing (OF) system or traffic signal (TS), could be implemented if the City deems it appropriate.

On-street parking on River Avenue is currently on the north and south sides, while on-street parking on Stradbrook Avenue is on the north side and on-street loading is on the south side during off-peak hours. On-street parking would be accommodated for Option B between Osborne Street and Donald Street as follows:

- On-street parking on River Avenue would remain on the north side at all times and could remain on the south side during off-peak hours. This would result in approximately 75 spaces being lost during peak hours on the south side of River Avenue;
- On-street parking on Stradbrook Avenue would be moved to the south side of the roadway adjacent to the protected bicycle lane. This would result in several of the loading zones being converted to on-street parking. The loss of parking during peak hours would be dependent on the number of loading zones that are required to remain on the south side of the roadway and should be determined during future design phases. During off-peak hours, loading and / or on-street parking could also be allowed on the north side of the roadway; and
- Some on-street parking spaces may be lost at certain locations along a block to accommodate emergency vehicles.

The traffic analysis for the scenario where on-street parking would be allowed in the curb-side travel lane (where appropriate) during off-peak times on River Avenue and Stradbrook Avenue has been included in **Section 5.0**. At Donald Street, westbound incoming peak hour traffic volumes on River Avenue and eastbound incoming peak hour traffic on Stradbrook Avenue are less than the typical saturation flow rate of 1,900 vehicles per hour per lane.

RIVER AVENUE AND STRADBROOK AVENUE BETWEEN DONALD STREET AND MAIN STREET

Between Donald Street and Main Street, River Avenue would include a protected bicycle lane (Donald Street to Harkness Avenue) and a neighbourhood greenway (Harkness Avenue to Main Street). The existing clear width to the face of curb on River Avenue between Donald Street and Harkness Avenue is 12.2 m. The typical cross-section for Option B on River Avenue between Donald Street and Harkness Street includes a:

- 1.8 m protected bicycle lane at street level;
- 0.6 m raised concrete curb buffer (e.g., pre-cast concrete curb);
- 3.5 m shared through-right-turn cut-off lane (to allow for buses);
- 3.2 m shared through-left turn lane; and
- 3.1 m left-turn lane.

The existing and proposed cross-sections for River Avenue between Donald Street and Main Street are shown in **Figure 4.9**.

At the transit stop on River Avenue east of Donald Street, the bus would cross a dashed bicycle lane line to access the curb-side transit stop (as shown in **Figure 4.5**). Cyclists would be required to stop and wait for the bus to complete loading/unloading or pass along the left side of the bus. On-street parking would remain as it currently exists.

The neighbourhood greenway on River Avenue between Harkness Avenue and Main Street would require minimal traffic calming features as there are already left-turn restrictions from Stradbrook Avenue onto River Avenue between 15:30 and 17:30 Monday – Friday to reduce traffic volumes. This section of River Avenue also includes a school zone and has a reduced speed limit of 30 km/hr.

Stradbrook Avenue has an existing off-street pathway between Donald Street and Main Street that connects to Harkness Station and the bicycle lanes on the Norwood Bridge. Three options were identified for the connection of the bicycle lane west of Donald Street to Harkness Station:

— **Option 1:** The bicycle lane could lead to a widened shared sidewalk east of Donald Street; however, this would require the relocation of seven trees to meet the width requirements for a shared-use path (3.5 m minimum);

— **Option 2:** The bicycle lane could lead to a raised bicycle lane east of Donald Street north of the existing curb; however, to meet the minimum requirements for a shared-use path (3.5 m minimum) the parking lane on the north side would need to be removed; and

— **Option 3:** The protected bicycle lane could be extended; the proposed cross-section could be similar to what is proposed for Stradbrook Avenue west of Osborne Street. The cross-section would include a 2.25 m parking lane on the north side, 3.05 m travel lane, 3.3 m travel / bus lane, 0.6 m buffer, and 1.8 m bicycle lane. Shifting the parking from the south side of the street (between Osborne Street and Donald Street) to the north side of the street (east of Donald Street) would require the reconfiguration of the approaching legs of the intersection. Alternatively, the parking lane could be moved to the south side east of Stradbrook east of Donald.

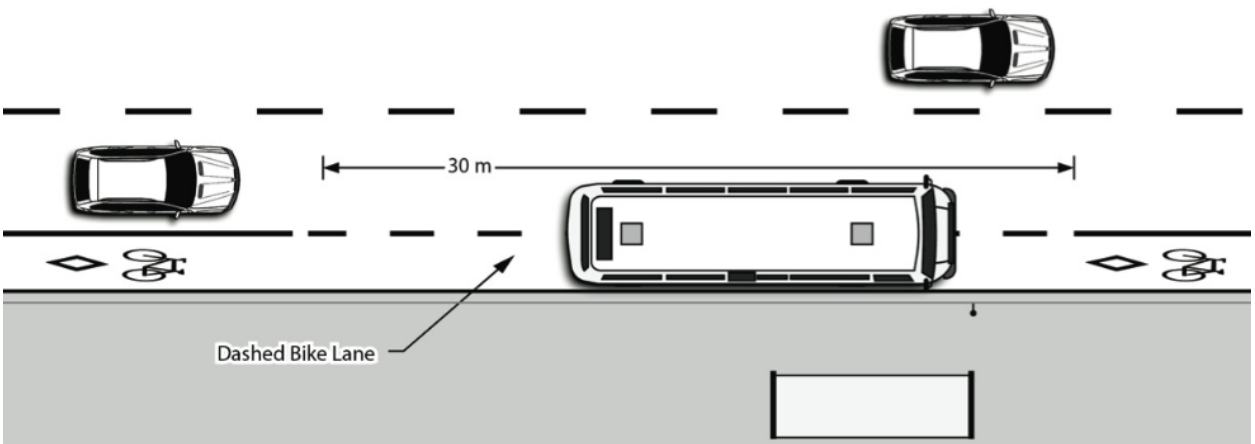
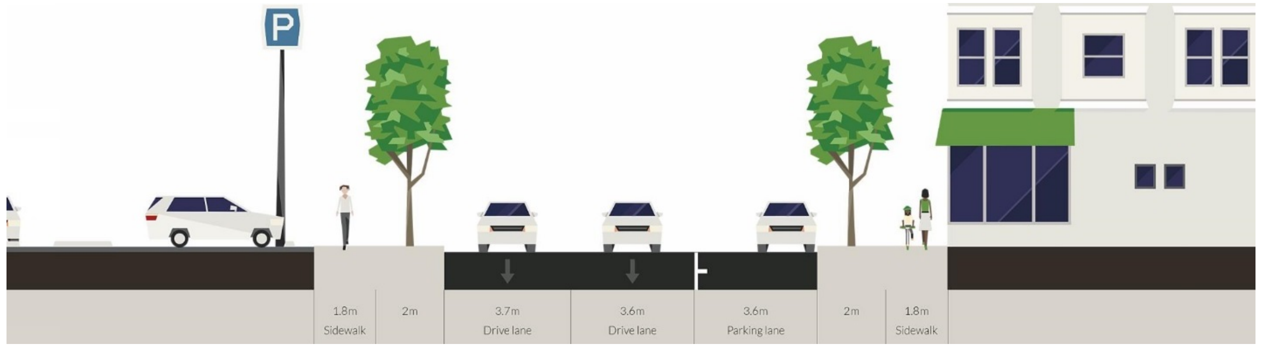


Figure 4.5: Example of Possible Transit Stop Treatment for River Avenue and Stradbrook Avenue west of Osborne Street and east of Donald Street

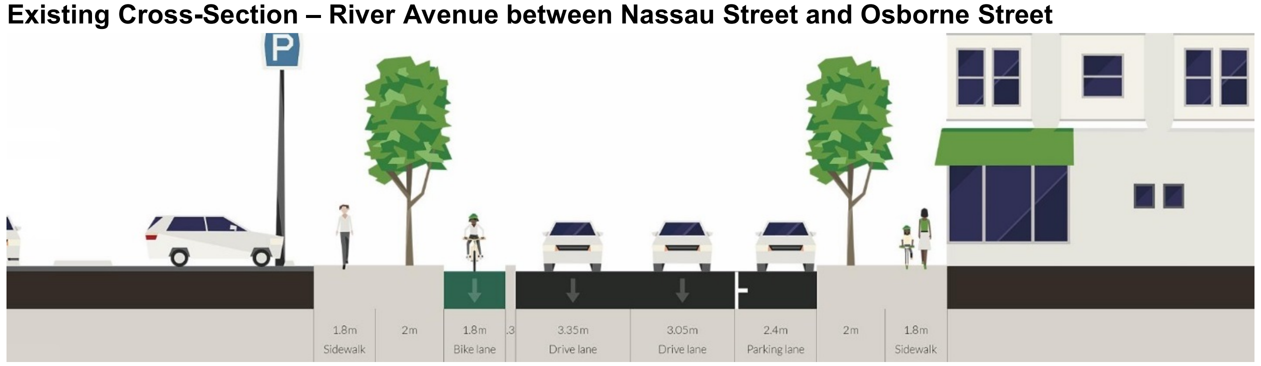
Source: TAC Geometric Design Guide for Canadian Roads

Figure 4.6: Example of Possible Transit Stop Treatment for River Avenue and Stradbrook Avenue between Osborne Street and Donald Street

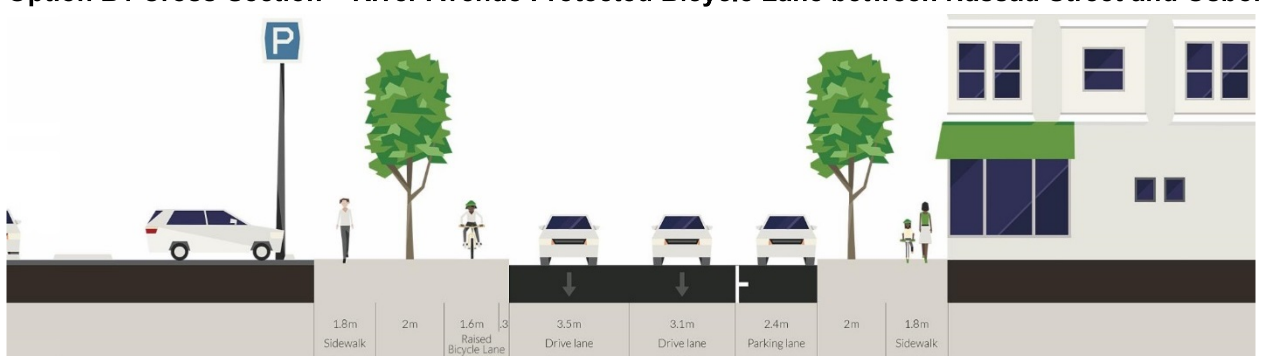
River Avenue



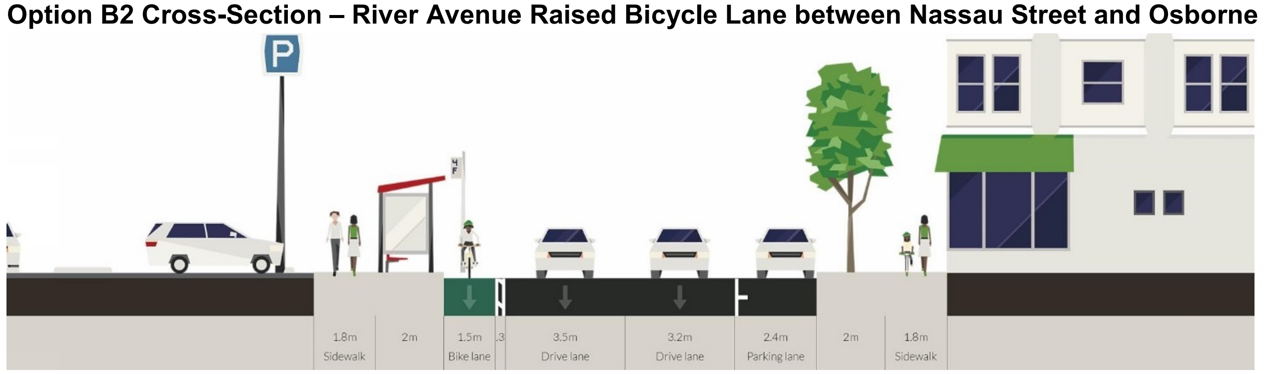
Existing Cross-Section – River Avenue between Nassau Street and Osborne Street



Option B1 Cross-Section – River Avenue Protected Bicycle Lane between Nassau Street and Osborne Street

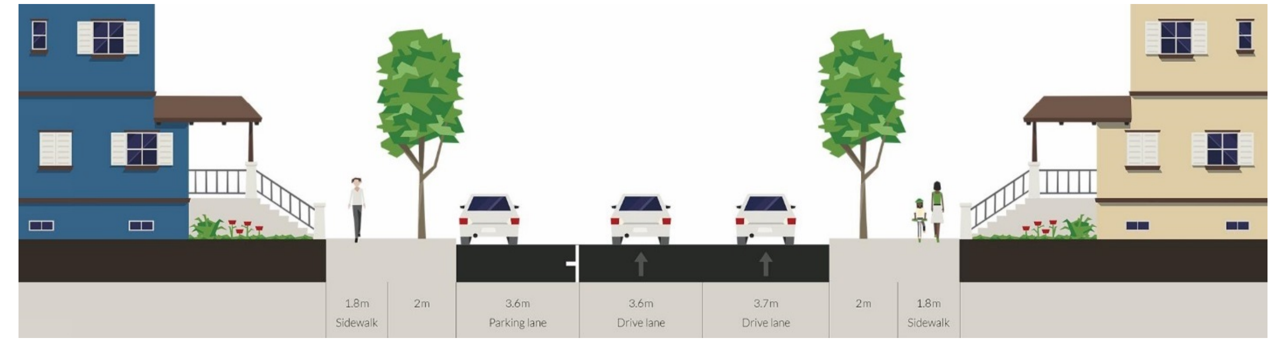


Option B2 Cross-Section – River Avenue Raised Bicycle Lane between Nassau Street and Osborne Street

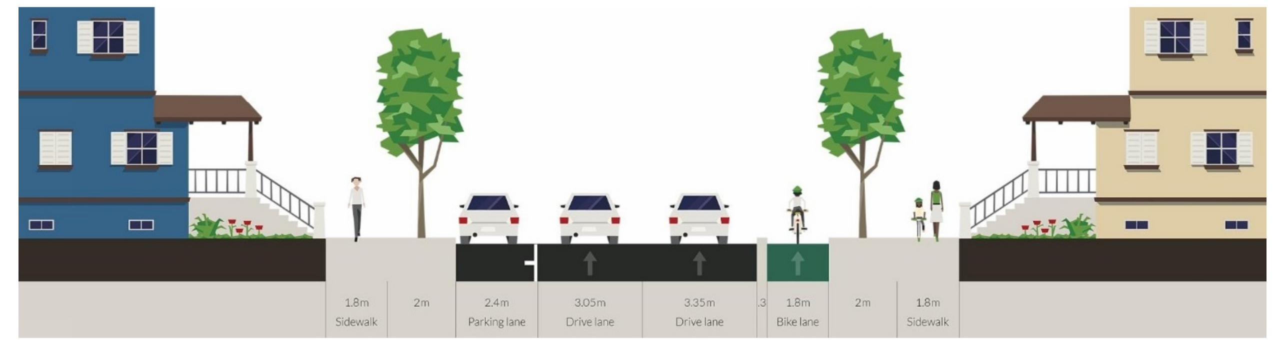


Option B Transit Stop Cross-Section – River Avenue between Nassau Street and Osborne Street

Stradbrook Avenue

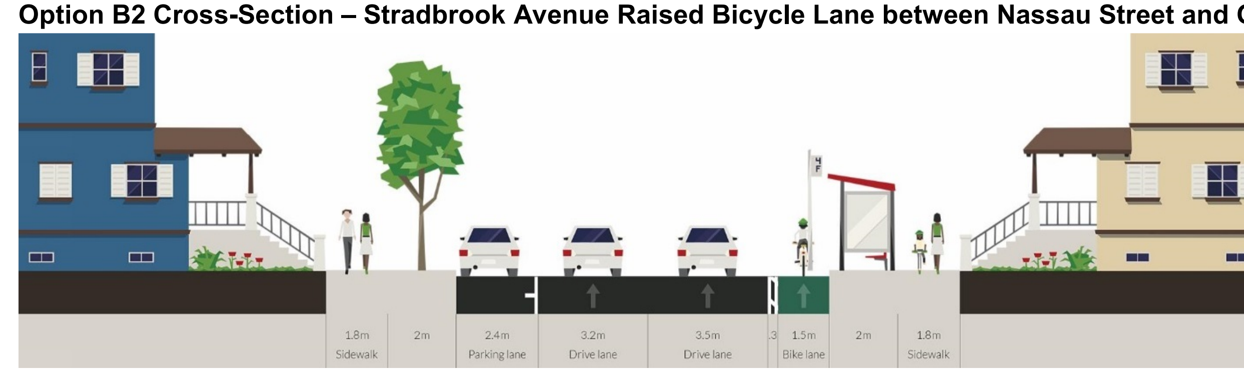


Existing Cross-Section – Stradbrook Avenue between Nassau Street and Osborne Street



Option B1 Cross-Section – Stradbrook Avenue Protected Bicycle Lane between Nassau Street and Osborne Street

Option B2 Cross-Section – Stradbrook Avenue Raised Bicycle Lane between Nassau Street and Osborne Street

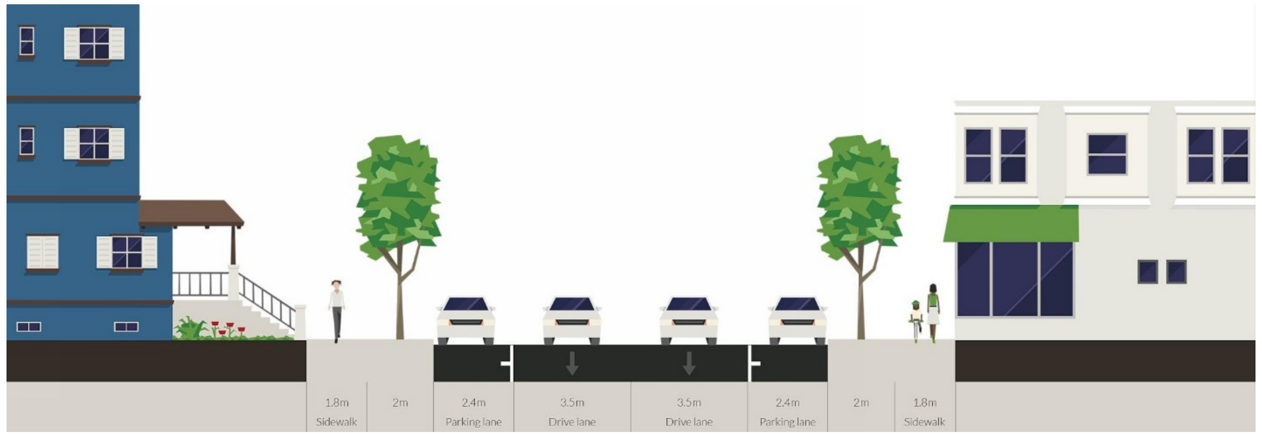


Option B Transit Stop Cross-Section – Stradbrook Avenue between Nassau Street and Osborne Street

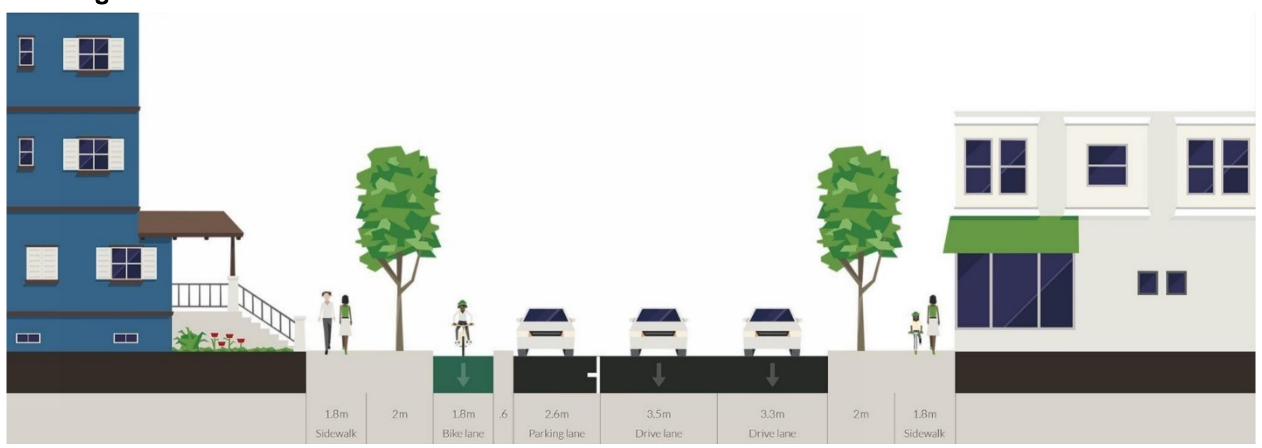
Figure 4.7: River Avenue and Stradbrook Avenue Typical Cross-Sections between Nassau Street and Osborne Street

Source: Streetmix

River Avenue



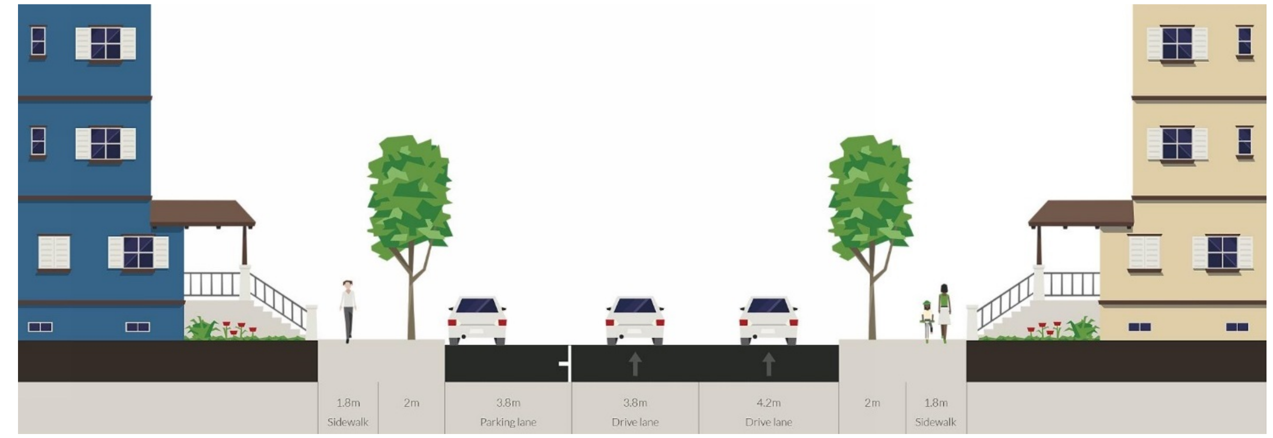
Existing Cross-Section – River Avenue between Osborne Street and Donald Street



Option B Cross-Section – River Avenue between Osborne Street and Donald Street

Option B Transit Stop Cross-Section – River Avenue between Osborne Street and Donald Street

Stradbrook Avenue



Existing Cross-Section – Stradbrook Avenue between Osborne Street and Donald Street

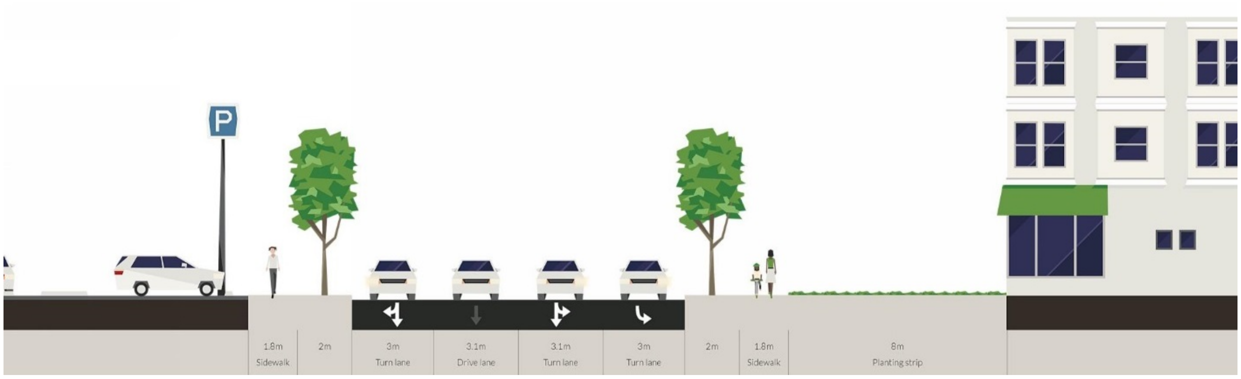
Option B Cross-Section – Stradbrook Avenue between Osborne Street and Donald Street

Option B Transit Stop Cross-Section – Stradbrook Avenue between Osborne Street and Donald Street

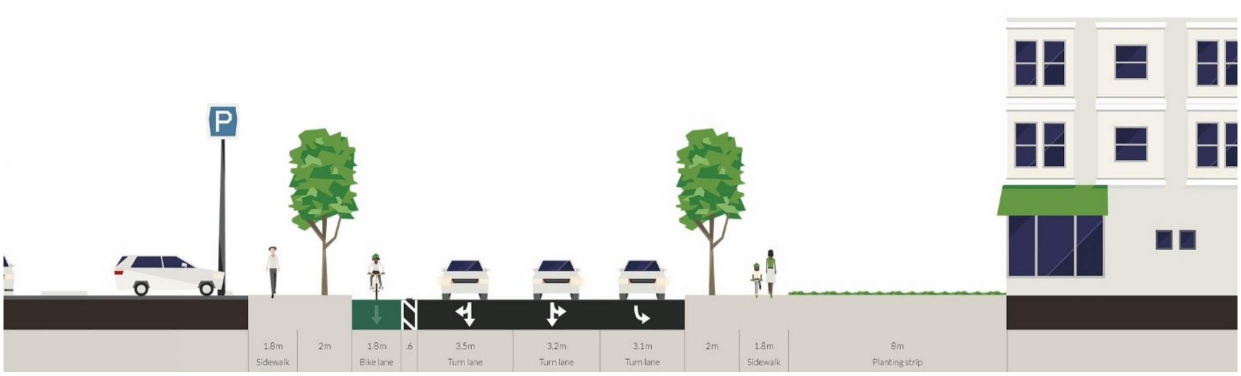
Figure 4.8: River Avenue and Stradbrook Avenue Typical Cross-Sections between Osborne Street to Donald Street

Source: Streetmix

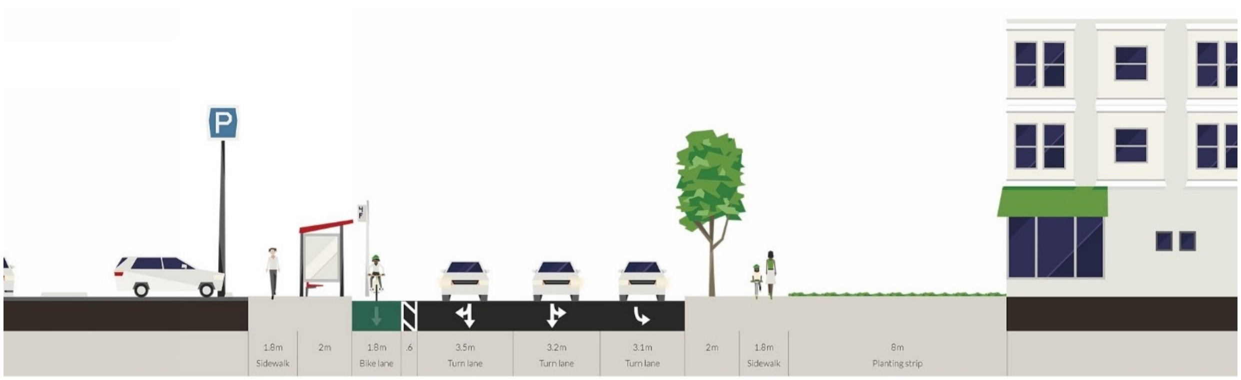
River Avenue



Existing Cross-Section – River Avenue between Donald Street and Harkness Avenue



Option B Cross-Section – River Avenue between Donald Street and Harkness Avenue



Option B Transit Stop Cross-Section – River Avenue between Donald Street and Harkness Avenue

Figure 4.9: River Avenue Typical Cross-Sections between Donald Street and Harkness Street

Source: Streetmix

4.2.3 OPTION C

Option C is a neighbourhood greenway on Wardlaw Avenue. The existing intersection of Wardlaw Avenue and Osborne Street is signalized (half signal) and would provide a safe crossing opportunity for cyclists. The existing traffic volume on Wardlaw Avenue is approximately 1,000 vehicles per day, which is below the desired traffic volume threshold for neighbourhood greenways. Minimal traffic calming treatments would be required; however, potential treatments could include:

— Signage and sharrows that indicate that cyclists and vehicles share the road; and

— Speed humps to reduce vehicles speeds.

At the half signal, it is recommended that pavement markings (with green paint) that indicate the path for cyclists be added through the intersection. Pushbutton activation for cyclists should be added to the half signal. No right-turn on red signage could be added on Osborne Street. Vehicles on Wardlaw Avenue should be required to turn right at Osborne Street as currently exists.

4.2.4 OPTION D

Option D is a neighbourhood greenway on Gertrude Avenue. The neighbourhood greenway would provide a connection to Gladstone School that is suitable for all ages and abilities (younger students would still be able to cycle on the sidewalk). The existing intersection of Gertrude Avenue and Osborne Street includes a pedestrian corridor which would provide a safe crossing opportunity for cyclists; however, cyclists would be required to dismount and walk across the street if the pedestrian corridor were to be used properly. In addition, cyclists would need to cross Gertrude Avenue twice (in addition to crossing Osborne Street), since the pedestrian corridor is only on the south side of the roadway. Existing traffic volumes on Gertrude Avenue west of Osborne Street are approximately 2,500 vehicles per day and east of Osborne Street are approximately 1,200 vehicles per day. Minimal traffic calming treatments would likely be required on Gertrude Avenue between Scott Street and Nassau Street; however, potential treatments could include:

— Signage and sharrows that indicate that cyclists and vehicles share the road;

— Speed humps to reduce vehicles speeds;

— Upgrading the Osborne Street and Gertrude Avenue intersection to a half signal so that cyclists would not have to dismount. It is recommended that pavement markings (with green paint) that indicate the path for cyclists be added through the intersection. Pushbutton activation for cyclists should be provided. No right-turn on red signage could be added on Osborne Street. Vehicles on Gertrude Avenue should be required to turn right at Osborne Street as currently exists; and

— Convert existing perpendicular parking to parallel parking on Gertrude Avenue east of Osborne Street. The perpendicular parking spaces are important for an adjacent business; however, they are also a potential safety concern as drivers have limited sight lines when leaving their parking space. There are currently 13 perpendicular parking spaces; seven spaces would be lost if they were converted to parallel parking spaces.

4.2.5 OPTION E

The PCS proposes a neighbourhood greenway on Scott Street to act as the north-south connection east of Osborne Street. The neighbourhood greenway on Scott Street would connect Option C (neighbourhood greenway on Wardlaw Avenue) and Option D (neighbourhood greenway on Gertrude Avenue) to Option B (one-way protected bicycle lanes on River Avenue and Stradbrook.

The existing traffic volumes on Scott Street range from 2,300 to 2,700 vehicles per day (**Figure 2.15**) and are slightly above the desired threshold for neighbourhood greenways (1,500 vehicles per day). Traffic calming features should be incorporated to reduce vehicle volumes and speeds and provide the safety and comfort necessary to attract cyclists of all ages and abilities.

Potential traffic calming features for Scott Street could include:

— Prohibit left-turns from northbound Donald Street to Scott Street to deter traffic from using Scott Street to bypass traffic congestion on Osborne Street. Restricting the northbound left turn from Donald Street to Scott Street could potentially have safety benefits, as this is currently an unsignalized movement on a high volume and high speed curved portion of a road with limited gaps during the peak hours. It would also reduce the traffic volumes on Scott Street to a more desirable level for a neighbourhood greenway. Traffic wanting to enter the neighbourhood would use northbound Osborne Street instead;

— Add a traffic calming circle at either Wardlaw Avenue or Gertrude Avenue (depending on selected east-west neighbourhood greenway) to reduce vehicle speeds;

— Signage and sharrows to indicate that cyclists and vehicles share the road; and

— Speed humps / tables to reduce vehicles speeds.

As mentioned in **Section 4.1.2**, it is recommended that the Scott Street crossings of River Avenue and Stradbrook Avenue be enhanced to improve safety by reducing the pedestrian crossing distance, improving sightlines and increasing the visibility of the crossing. This can be achieved by adding curb bulb-outs, signage in advance and at the crossing, zebra pavement markings (for the pedestrian crossing) and chevrons or green paint (for the cyclist crossing). If the crossing includes a curb bulb-out (reducing the crossing distance to two lanes), the TAC *Pedestrian Crossing Control Guide (3rd Edition)* recommends that the ground-mounted system (GM) be implemented based on the existing traffic volumes, roadway geometry and speed limit; however, a higher-level treatment system, such as an overhead flashing system (OF), could be implemented if the City deems it appropriate.

The addition of a half signal at the intersection of Donald Street and Scott Street to provide a connection to the Donald Street off-street path was also investigated. The results of the traffic analysis are presented in **Section 5.0**. There are safety concerns related to the high traffic volumes, high vehicle speeds and limited sight distance through this area and the City is not willing to consider a crossing at this location at this time.

4.2.6 OTHER CYCLING NETWORK OPTIONS CONSIDERED

The City also asked WSP to investigate two additional options for the cycling network in Osborne Village:

1 Two-way protected bicycle lane on Stradbrook Avenue.

2 Two-way protected bicycle lane on McMillan Avenue and through Confusion Corner.

The results of the analyses are presented below. These options were deemed to not be viable based on the significant impacts to traffic operations and were not presented to the public.

TWO-WAY PROTECTED BICYCLE LANE ON STRADBROOK AVENUE

The City asked WSP to explore using two-way protected bicycle lanes on Stradbrook Avenue.

The average clear width of Stradbrook Avenue west and east of Osborne Street is approximately 11.0 m and 11.8 m respectively. It was assumed that the minimum lane widths are:

— 2.4 m bidirectional bicycle lane with a 0.3 m buffer with adjacent parking and 0.6 m buffer without adjacent parking (TAC practical lower limit);

— 2.25 m parking lane (TAC suggests 2.4 m, subtracting curb gives 2.25 m);

— 3.00 m travel lane (TAC recommended lower limit); and

— 3.30 m travel / bus lane (TAC recommended).

Three cross-section scenarios were developed and are described below.

Scenario 1: Bicycle Lane on North Side

— West of Osborne Street, the cross-section includes a 2.4 m bicycle lane, 0.3 m buffer, two 3.05 m travel lanes, and a 2.2 m parking lane; the parking lane and travel / bus lane are below the minimum widths outlined above. East of Osborne Street, the cross-section includes a 2.4 m bicycle lane, 0.6 m buffer, a 3.1 m travel lane, a 3.3 m travel / bus lane and a 2.4 m parking lane; which meet the minimums outlined above. The cross-sections west and east of Osborne Street are shown in **Figure 4.10**.

— This option eliminates conflicts with transit stops.

— Parking would need to be switched to the south side of the street.

- The connection to Harkness Station would not be ideal, as cyclists would have to cross Stradbrook Avenue east of Donald.
- Dedicated bicycle phases would be needed at Osborne Street and Donald Street to accommodate westbound left-turns which will decrease the LOS of the intersections.
- A traffic analysis for the Osborne Street and Stradbrook Avenue intersection is shown in **Table 4.2**. The eastbound lane configuration was changed to have a shared left / through lane, though lane and right-turn lane, as opposed to the existing left-turn lane, through lane and shared through / right lane configuration. In addition, a 20 second bicycle phase added, cycle length remained the same, and splits were optimized. With the addition of the bicycle phase the LOS of the intersection decreased from LOS C/D to LOS F in the a.m. and p.m. peak hours.
- A traffic analysis for the Donald Street and Stradbrook Avenue intersection is shown in **Table 4.3** (20 second bicycle phase added, northbound right-turns on red were prohibited, cycle length remained the same, offsets on Donald Street were optimized). With the addition of the bicycle phase the LOS of the intersection remained at LOS D in the a.m. and p.m. peak hours.

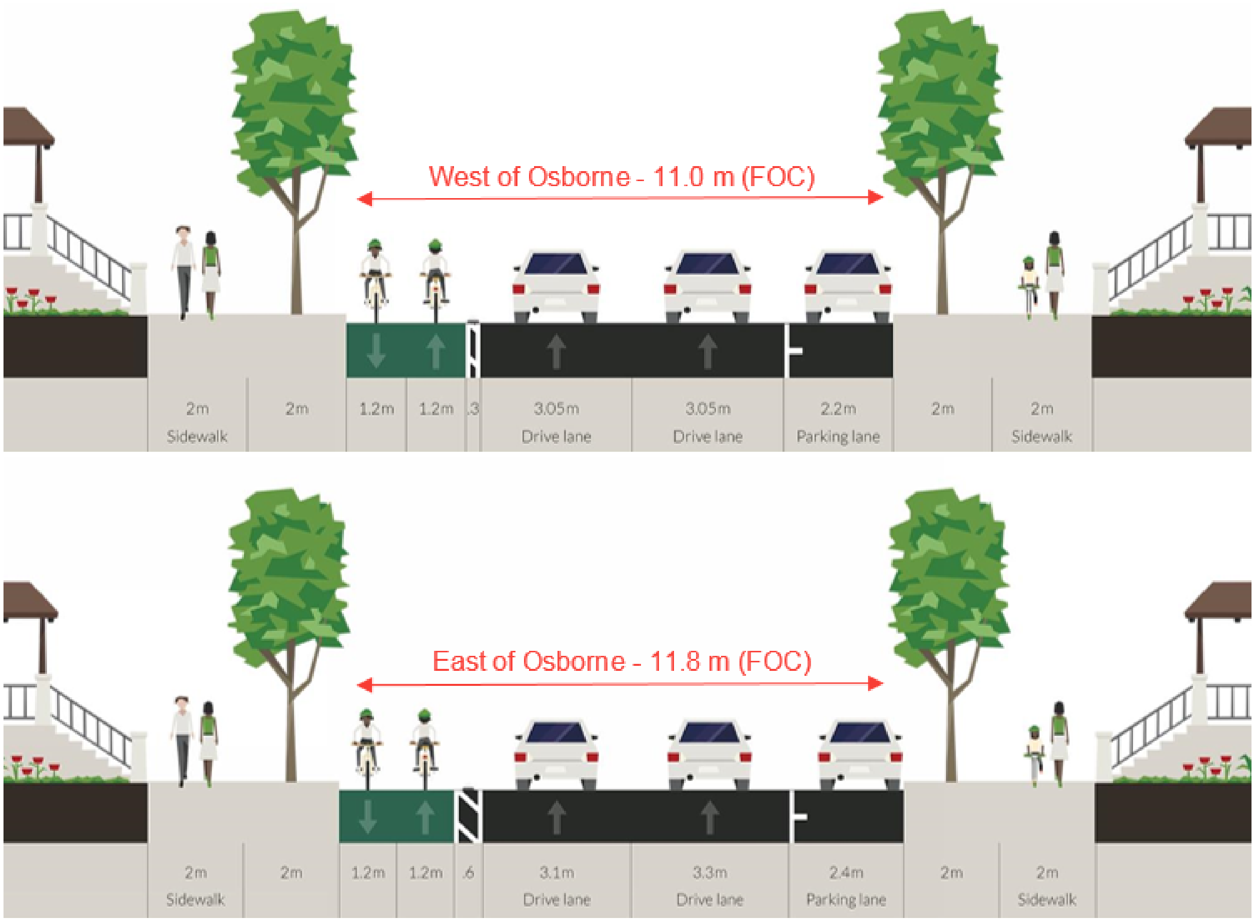


Figure 4.10: Two-Way Bicycle Lane on Stradbrook Avenue on North Side

Table 4.2: Osborne Street and Stradbrook Street Intersection Analysis – Two-Way Bicycle Lane

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	D (44 sec)	E (88%)	0.93 (NBT)	SBL	E (67 sec)	EBL – 115 m SBL – 36 m
2018 – One-Way Bicycle Lane	D (44 sec)	E (88%)	0.93 (NBT)	SBL	E (67 sec)	EBL – 116 m SBL – 35 m*
2018 – Two-Way Bicycle Lane & Protected Bicycle Phase	F (130 sec)	F (95%)	1.31 (NBT)	NBT	F (200 sec)	SBL – 50 m*
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	C (23 sec)	C (72%)	0.80 (NBT)	NBT	D (42 sec)	EBL – 21 m SBL – 31m
2018 – One-Way Bicycle Lane	C (24 sec)	C (72%)	0.83 (NBT)	NBT	D (45 sec)	EBL – 21 m SBL – 24 m
2018 – Two-Way Bicycle Lane & Protected Bicycle Phase	F (112 sec)	C (72%)	1.43 (SBL)	SBL	F (254 sec)	SBL – 68 m

**Metered by upstream signal*

Table 4.3: Donald Street and Stradbrook Avenue Intersection Analysis – Two-Way Bicycle Lane

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	D (46 sec)	G (102%)	0.94 (NBT)	NBT	E (73 sec)	EBL – 80 m NBR – 312 m
2018 – One-Way Bicycle Lane	D (52 sec)	G (105%)	0.97 (EBT & NBR)	NBT	E (75 sec)	NBR – 304 m
2018 – Two-Way Bicycle Lane & Protected Bicycle Phase	D (44 sec)	G (105%)	1.00 (EBT)	NBR	E (75 sec)	NBR – 315 m
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	C (33 sec)	F (97%)	1.02 (SBT)	EBL	D (50 sec)	EBL – 75 m NBR – 282 m
2018 – One-Way Bicycle Lane	D (43 sec)	G (100%)	1.08 (SBT)	EBT	D (54 sec)	NBR – 282 m
2018 – Two-Way Bicycle Lane & Protected Bicycle Phase	D (43 sec)	G (100%)	1.08 (SBT)	EBT	D (54 sec)	NBR – 293 m

**Metered by upstream signal*

Scenario 2: Bicycle Lane on South Side

— West of Osborne Street, the cross-section has two 3.0 m travel lanes, a 2.0 m parking lane, 0.6 m buffer, and 2.4 m bicycle lane; the parking lane and travel / bus lane are below the minimum widths outlined above. East of Osborne Street, the cross-section includes a 3.1 m travel lane, a 3.3 m travel / bus lane, a 2.4 m parking lane, a 0.6 m buffer and a 2.4 m bicycle lane, which meet the minimums outlined above. The cross-section west and east of Osborne Street are shown in **Figure 4.11**.

— The transit stops would be located in the parking lane; however, riders would have to cross the bi-directional bicycle lane to get to the stop.

— There are safety issues and potential conflicts with the eastbound right-turn cut-off at Donald Street and Stradbrook Avenue and westbound cyclists. Also, having opposing direction cyclists adjacent to the travel lane could be confusing for drivers.

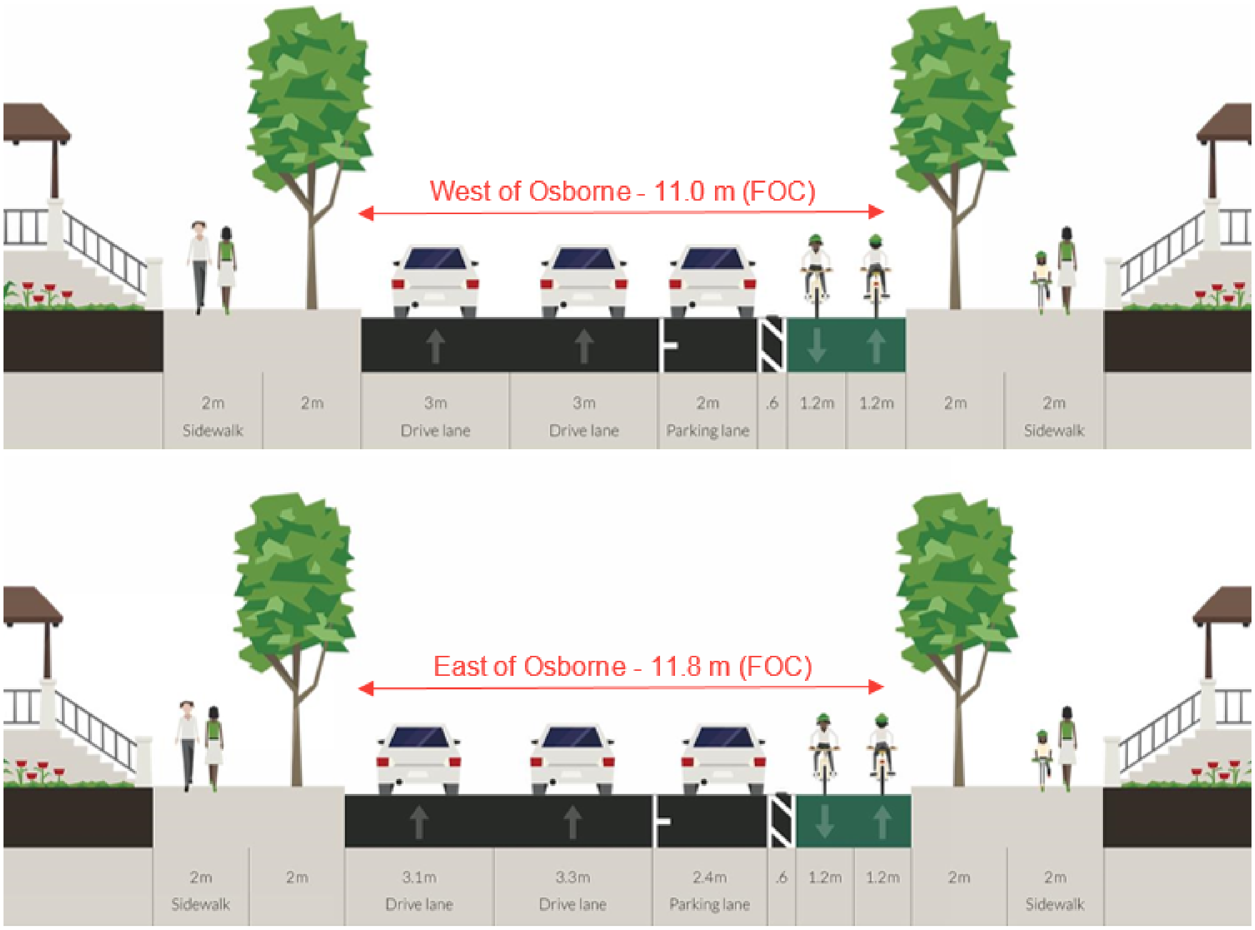


Figure 4.11: Two-Way Bicycle Lane on Stradbrook Avenue on South Side

Scenario 3: Bicycle Lane on North Side, Removes Parking West of Osborne Street

— West of Osborne Street, the cross-section has a 3.2 m bicycle lane, 1.0 m buffer, a 3.3 m travel lane, and a 3.5 m travel lane. East of Osborne Street, the cross-section is the same as what is shown in **Figure 4.10**. The cross-sections west and east of Osborne Street are shown in **Figure 4.12**.

— This option would eliminate approximately 25 parking spaces on the north side of Stradbrook Avenue (between Osborne Street and Nassau Street) during peak hours and an additional 27 parking spaces during off-peak hours (which are currently allowed on the south side).

— Similar to the options shown in **Figure 4.9**, dedicated bicycle phases will be needed at Osborne Street and Donald Street to accommodate westbound left-turns which will decrease the LOS of the intersections.

— Parking would need to be switched to the south side of the street.

— The connection to Harkness Station would not be ideal, as cyclists would have to cross Stradbrook Avenue east of Donald Street.

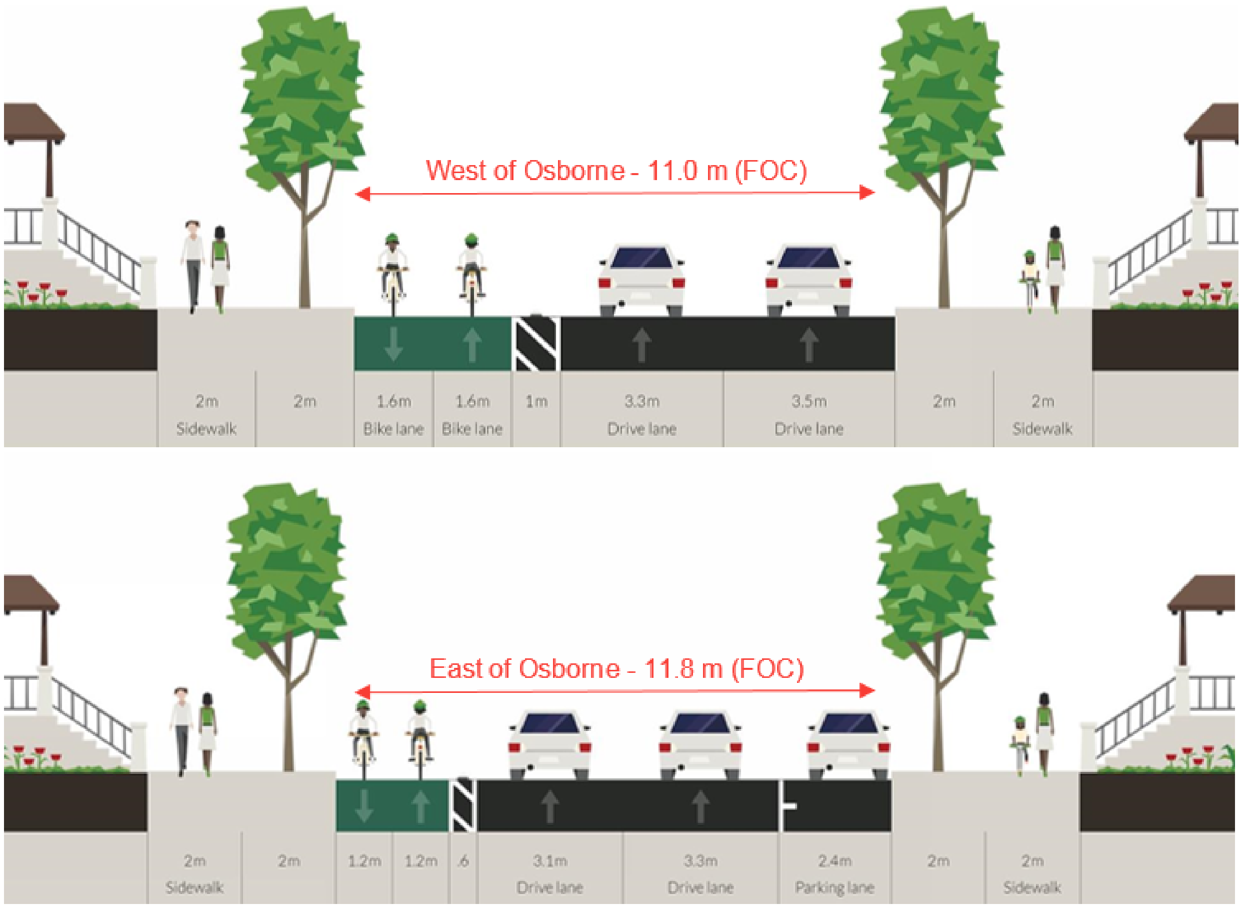


Figure 4.12: Two-Way Bicycle Lane on Stradbrook Avenue on North Side with no Parking West of Osborne Street

TWO-WAY PROTECTED BICYCLE LANE ON MCMILLAN AVENUE

The City asked WSP to explore using the McMillan Avenue north curb lane as a two-way protected bicycle lane to Osborne Street, then explore an in-boulevard two-way protected bicycle lane connection along the west side of Osborne Street through the transit terminal to the Osborne Street/Donald Street/Pembina Highway intersection. A connection to River Osborne Community Centre was also to be provided.

Using the McMillan Avenue north curb lane as a bi-directional protected bicycle lane and routing through Confusion Corner would:

— Provide a connection to the Pembina Highway bicycle lanes;

— Negatively impact the LOS of the intersections at Confusion Corner. The results of the traffic analysis are presented in **Table 4.4**. The westbound approach was changed from a left-turn lane, two through lanes, and a through/right-turn lane to a left-turn lane, one through lane and a through / right-turn lane. Due to the high southbound right-turn volumes (430 vehicles in a.m. peak hour and 320 in p.m. peak hour) a 20 second protected bicycle phase was added for cyclists crossing the west leg of the intersection. The results show that the intersection LOS changes from LOS D/E to LOS F with the addition of a two-way bicycle lane and protected bicycle phase;

— Provide more conflict points than the Scott Street / Donald Street intersection option. Cyclists must cross Osborne Street, then Pembina Highway, then the access to the bus terminal, then Pembina Highway, then Osborne Street to get to Osborne Station (as opposed to just crossing Donald Street); and

— The transit hub is heavily used by pedestrians; routing the bicycle lane through this location could lead to pedestrian and cyclist conflicts.

Table 4.4: McMillan Avenue and Osborne Street Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
McMillan / Osborne Existing	D (51 sec)	E (88%)	0.99 (NBT)	NBT	E (57 sec)	WBL – 70 m WBT – 133 m NBT – 288 m SBT – 161 m
McMillan / Osborne with 2-Way Bicycle Lane	F (158 sec)	G (104%)	1.38 (NBT)	NBT	F (210 sec)	WBL – 70 m WBT – 278 m NBT – 356 m SBT – 99 m
WEEKDAY P.M. PEAK HOUR						
McMillan / Osborne Existing	E (74 sec)	F (98%)	1.05 (SBT)	WBL	F (87 sec)	WBL – 117 m WBT – 173 m NBT – 118 m SBT – 177 m
McMillan / Osborne with 2-Way Bicycle Lane	F (270 sec)	H (122%)	2.03 (WBT)	WBT	F (490 sec)	WBL – 162 m WBT – 364 m NBT – 146 m SBT – 142 m

4.3 OPTIONS FOR CONNECTIONS TO FORT ROUGE PARK

Six options were developed for the connection to Fort Rouge Park. The options are illustrated in **Figure 4.13** and include:

- **Option 1**: Bike friendly back lane (from Bryce Street to Fort Rouge Park);
- **Option 2**: Two-way bicycle lane on River Avenue (from Bryce Street to Fort Rouge Park);
- **Option 3**: Two-way bicycle lane on River Avenue (from Scott Street to Fort Rouge Park);
- **Option 4**: Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to River Avenue) and two-way bicycle lane on River Avenue (from Clarke Street to Bryce Street);
- **Option 5**: Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to River Avenue) and two-way bicycle lane on River Avenue (from Clarke Street to Fort Rouge Park); and
- **Option 6**: Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to back lane), bike friendly back lane (from Clarke Street to Lewis Street) and neighbourhood greenway on Lewis Street (from back lane to River Avenue).

Options 1 and 6 are low-cost alternatives that have minimal costs and impacts to parking and could be implemented easily and quickly with signage; however, these options have potential safety concerns associated with vehicles backing out of parking spaces in the back lanes. Options 2, 3, 4 and 5 are higher-cost alternatives that have more significant costs and impacts to trees in the boulevard or on-street parking, as these options would require the construction of a two-way bicycle lane within the boulevard or parking lane. Description of the options are presented in the following sections.

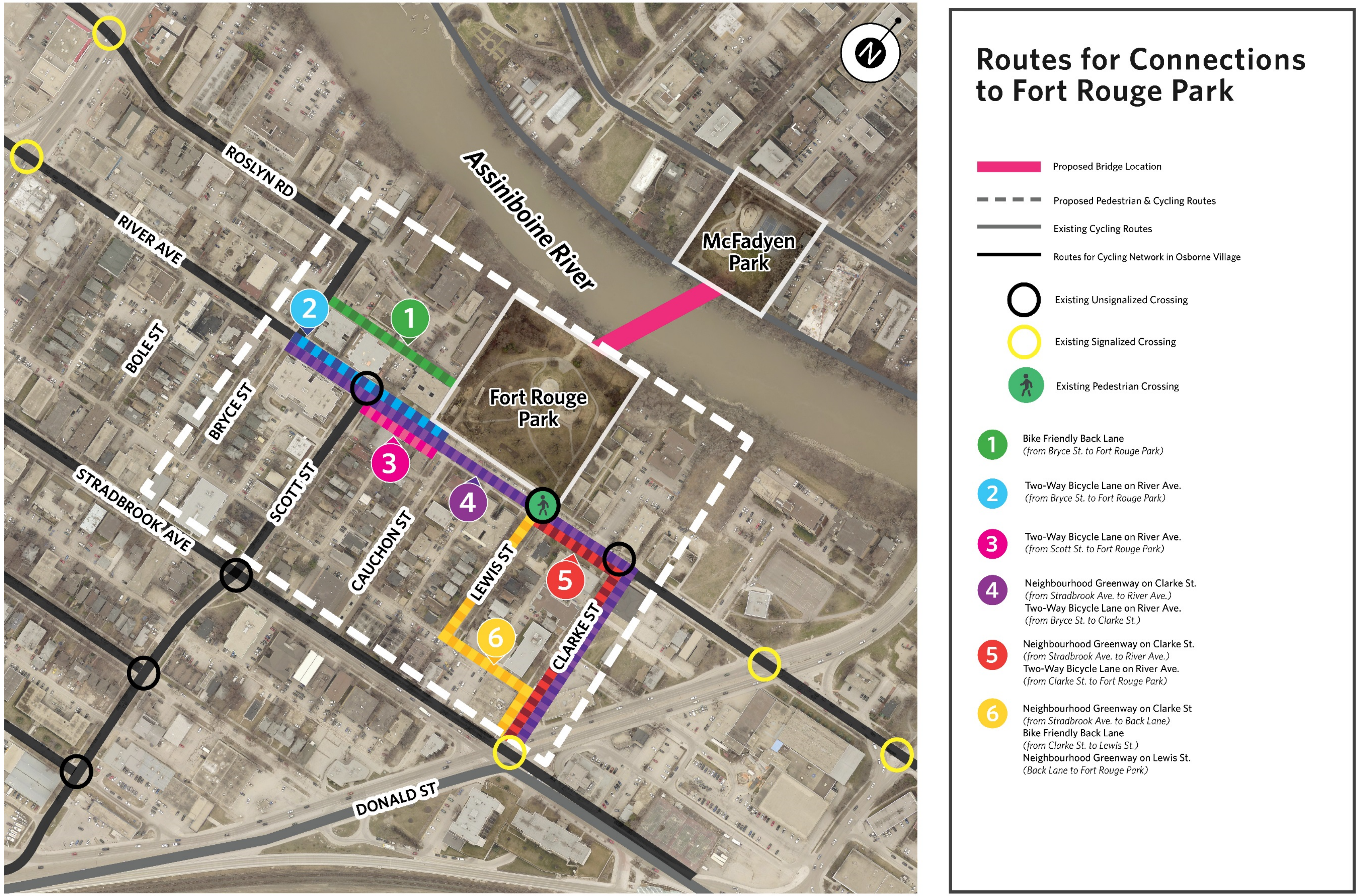


Figure 4.13: Options for Connection to Fort Rouge Park

4.3.1 OPTION 1 & 6

Option 1 and 6 both utilize a back lane to provide a connection to Fort Rouge Park.

Option 1 connects the proposed neighbourhood greenway on Roslyn Road to Fort Rouge Park via Bryce Street and a bicycle friendly back lane that is parallel to River Avenue. This option would require a portion of the fence that separates Fort Rouge Park from the back lane to be removed.

Option 6 connects the off-street path on Donald Street and Stradbrook Avenue (east of Donald Street) to Fort Rouge Park via a bicycle friendly back lane (between Stradbrook Avenue and River Avenue) and a neighbourhood greenway on Lewis Street. The crossing of River Avenue at Lewis Street would also need to be addressed; potential treatments could include signage that indicates a cyclist crossing and pavement markings (Zebra pavement marking for pedestrian crossing, chevrons or green paint for cyclist crossing). If the crossing includes a curb bulb-out (reducing the crossing distance to two lanes), the TAC *Pedestrian Crossing Control Guide (3rd Edition)* recommends that the ground-mounted system (GM) be implemented based on the existing traffic volumes, roadway geometry and speed limit; however, a higher-level treatment system, such as an overhead flashing system (OF), could be implemented if the City deems it appropriate.

Both options provide a two-way connection to Fort Rouge Park on a low traffic volume back lane; however, there are some safety concerns relating to:

— Potential conflicts with waste collection services (large trucks with blind spots);

— Reduced visibility if not properly lighted;

— Cyclists may be concerned with perceived/actual safety; and

— Vehicle / cyclist conflicts due to perpendicular parking spaces.

Potential upgrades to the back lanes to enhance cyclist safety and experience could include resurfacing, lighting, sharrows, wayfinding, placemaking / street art, etc. These options would need to be treated as a pilot / demonstration projects and may be good short-term or temporary solutions for the connection to Fort Rouge Park.

4.3.2 OPTIONS 2, 3, 4 & 5

Options 2, 3, 4 and 5 provide two-way bicycle lane connections to Fort Rouge Park on different sections of River Avenue.

Option 2 connects the proposed Scott Street and Roslyn Road neighbourhood greenways (Option A and E) to Fort Rouge Park via a two-way protected bicycle lane on River Avenue between the west property line of Fort Rouge Park and Bryce Street.

Option 3 connects the proposed Scott Street neighbourhood greenway (Option E) to Fort Rouge park via a two-way protected bicycle lane on River Avenue between the west property line of Fort Rouge Park and Scott Street.

Option 4 connects the off-street path on Donald Street and Stradbrook Street (east of Donald Street) to Fort Rouge Park, neighbourhood greenway on Scott Street (Option E) and neighbourhood greenway on Roslyn Road (Option A) via a neighbourhood greenway on Clarke Street and a two-way protected bicycle lane on River Avenue between Clarke Street and Bryce Street.

Option 5 connects the off-street path on Donald Street and Stradbrook Street (east of Donald Street) to Fort Rouge Park via a neighbourhood greenway on Clarke Street and a two-way protected bicycle lane on River Avenue between Clarke Street and the east property line of Fort Rouge Park.

All options would require either the removal of trees in the boulevard or the removal of parking on the north side of River Avenue to accommodate the two-way protected bicycle lane:

— Option 2 would require the removal of seven trees or approximately 18 parking spaces on the north side of River Avenue;

- Option 3 would require the removal of four trees or approximately five parking spaces on the north side of River Avenue;
- Option 4 would require the removal of 24 tress or approximately 34 parking spaces on the north side of River Avenue; and
- Option 5 would require the removal of 10 trees or approximately five parking spaces on the north side of River Avenue.

For these options, it is recommended that no transit stops be allowed within the 2-way bicycle lane section of River Avenue as there are safety issues related to crossing a two-way bicycle facility and impacts to additional trees in the park. There are stops approximately 200 m on either side of the transit stop at Fort Rouge Park (that are outside of the proposed two-way bicycle lane section of River Ave) that could be used instead. Winnipeg Transit utilizes a 400 m spacing requirement for transit stops.

The crossings of River Avenue at Scott Street and Cauchon Street would also need to be addressed; potential treatments could include signage that indicates a pedestrian and cyclist crossing and pavement markings (Zebra pavement marking for pedestrian crossing, chevrons or green paint for cyclist crossing). If the crossing includes a curb bulb-out (reducing the crossing distance to two lanes), the TAC *Pedestrian Crossing Control Guide (3rd Edition)* recommends that the ground-mounted system (GM) be implemented based on the existing traffic volumes, roadway geometry and speed limit; however, a higher-level treatment system, such as an overhead flashing system (OF), could be implemented if the City deems it appropriate.

5 TRAFFIC ANALYSIS

A traffic analysis was conducted to determine the impact to traffic operations by incorporating bicycle lanes on River Avenue and Stradbrook Avenue and allowing parking on both sides of River Avenue and Stradbrook Avenue during off-peak hours.

The traffic analysis was undertaken using Synchro 9.0 traffic analysis software. The relative performance of an intersection is measured in terms of level of service (LOS) which ranges from A (excellent) to F (beyond capacity). In general, LOS E is considered to be at capacity. Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption and lost travel time. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, cycle length, green ratio and ratio for the lane group in question.

Level of service criteria for un-signalized intersections is also defined in terms of delay. Delay is the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line. This includes the time required for the vehicle to travel from the last in-queue position to the first.

LOS D or better for the overall intersection is widely considered desirable in an urban area during peak traffic periods. At un-signalized intersections, LOS E or better is generally considered acceptable for minor streets accessing a major arterial, with LOS F not uncommon.

Intersection capacity utilization level of service (ICU LOS) provides additional insight into how a signalized intersection is functioning and how much extra capacity is available to handle traffic fluctuations and incidents. ICU LOS ranges from A (excellent) to H (beyond capacity), with ICU LOS E generally considered to be at practical capacity.

The volume to capacity (v/c) ratio is used to determine the level of congestion for each lane group. If the v/c ratio is greater or equal to 1.00 that approach is operating above capacity. A v/c ratio of 0.85 is considered the maximum acceptable level for through and shared through/turning lanes, and a v/c ratio of 0.90 is considered the maximum acceptable level for turning lanes as defined by the City of Winnipeg, Public Works Department.

The existing scenarios use traffic signal timing information obtained from Public Works. Existing cycle lengths with optimized splits and offsets are used for all other scenarios. The results of the analysis for each intersection are discussed in the following sections. The detailed Synchro results are included in **Appendix B**.

5.1 OSBORNE STREET AND ROSLYN ROAD

The existing intersection of Osborne Street and Roslyn Road is a four-legged signalized intersection that consists of the following geometry:

— The northbound approach on Osborne Street consists of a shared left-turn / through lane (left-turns are prohibited during peak hours) and a through lane;

— The southbound approach on Osborne Street consists of two through lanes and a right-turn cut-off lane; and

— The westbound approach on Roslyn Road consists of a shared left-turn / through / right-turn lane.

The City asked WSP to investigate implications to delay and queueing if:

— No right-turns on red (NRTOR) is implemented for the southbound to westbound movement; and

— Actuated Leading Bicycle Intervals (LBI) are implemented. The time added for the leading bicycle interval (five seconds based on discussions with the Signals Branch) was subtracted from the Roslyn Road green time.

The results of the 2018 intersection analysis for Osborne Street and Roslyn are summarised in **Table 5.1**. The analysis showed no change in the overall LOS for the intersection and minimal changes to the queue lengths with the implementation of NTROR for the southbound to westbound movement and LBI.

Table 5.1: Osborne Street and Roslyn Road Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	D (42 sec)	E (91%)	1.08 (EB)	EB	F (116 sec)	EB – 79 m WB – 43 m NB – 343 m SB – 44 m
2018 – NRTOR SB-WB	D (42 sec)	E (91%)	1.08 (EB)	EB	F (116 sec)	EB – 79 m WB – 43 m NB – 344 m SB – 45 m
2018 – NRTOR SB-WB and LBI	D (42 sec)	E (91%)	1.09 (EB)	EB	F (117 sec)	EB – 80 m WB – 40 m NB – 344 m SB – 45 m
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	B (15 sec)	C (65%)	0.79 (EB)	EB	D (48 sec)	EB – 51 m WB – 28 m NB – 87 m SB – 17 m
2018 – No NRTOR SB-WB	B (15 sec)	C (65%)	0.79 (EB)	EB	D (48 sec)	EB – 51 m WB – 28 m NB – 87 m SB – 19 m
2018 – No NRTOR SB-WB and LBI	B (16 sec)	C (65%)	0.80 (EB)	EB	D (49 sec)	EB – 51 m WB – 28 m NB – 87 m SB – 19 m

5.2 OSBORNE STREET AND RIVER AVENUE

The existing intersection of Osborne Street and River Avenue is a four-legged signalized intersection that consists of the following geometry:

— The northbound approach on Osborne Street consists of a shared left-turn / through lane (left-turns are prohibited during peak hours) and a through lane;

— The southbound approach on Osborne Street consists of two through lanes and a right-turn cut-off lane; and

— The westbound approach on River Avenue consists of a left-turn lane, two through lanes and a right-turn lane.

The bicycle lane scenario during the weekday a.m. and p.m. peak hours includes two travel lanes and on-street parking on one side of River Avenue. The geometry of the Osborne Street and River Avenue intersection was altered so that:

— The westbound approach on River Avenue consists of a shared left-turn / through lane, a through lane and a right-turn lane.

The bicycle lane scenario during the weekday off-peak hour includes one travel lane and on-street parking on both sides of the street on River Avenue between Osborne Street and Donald Street. The geometry of the Osborne Street and River Avenue intersection was altered so that:

— The westbound approach on River Avenue consists of a shared left-turn/through lane, a through lane and a right-turn lane.

The City asked WSP to investigate implications to delay and queueing if:

— Actuated Leading Bicycle Intervals (LBI) and full time Leading Pedestrian Intervals (LPI) are implemented. The existing signal has a LPI (four seconds) for the east and west legs of the intersection. For the analysis, it was assumed that the LBI and LPI for the north and south legs of the intersection was five seconds. Westbound right turn on red is currently prohibited and would continue to be prohibited with the LBI.

The results of the 2018 intersection analysis for Osborne Street and River Avenue are summarised in **Table 5.2**.

Table 5.2: Osborne Street and River Avenue Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	B (18 sec)	E (88%)	0.84 (NB Thru)	WB Thru	D (52 sec)	WBL – 34 m WBR – 18 m SBR – 5 m
2018 – Bicycle Lane & 2 Travel Lanes	B (14 sec)	E (88%)	0.84 (NB Thru)	WB Thru	E (58 sec)	WBL/T – 86 m WBR – 28 m SBR – 5 m
2018 – Bicycle Lane & 2 Travel Lanes, LBI and LPI	B (18 sec)	E (86%)	0.92 (NB Thru)	WB Thru	E (68 sec)	WBL/T – 96 m WBR – 29 m SBR – 2 m*
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	B (12 sec)	C (72%)	0.75 (WB Thru)	WB Thru	D (39 sec)	WBL – 27 m WBR – 8 m SBR – 2 m*
2018 – Bicycle Lane & 2 Travel Lanes	B (12 sec)	C (72%)	0.82 (WB Thru)	WB Thru	C (35 sec)	WBL/T – 93 m WBR – 14 m SBR – 4 m*
2018 – Bicycle Lane & 2 Travel Lanes, LBI and LPI	B (15 sec)	C (72%)	0.85 (WB Thru)	WB Thru	D (37 sec)	WBL/T – 97 m WBR – 15 m SBR – 0 m*
WEEKDAY HIGHEST OFF-PEAK HOUR						
2018 – Existing Road Layout	A (10 sec)	E (87%)	0.74 (NB Thru)	WB Thru	C (24 sec)	WBL – 23 m WBR – 7 m SBR – 4 m*
2018 – Bicycle Lane & 1 Travel Lane	A (10 sec)	E (87%)	0.74 (NB Thru)	WB Thru	C (25 sec)	WBL/T – 53 m WBR – 7 m SBR – 2 m*

**Metered by upstream signal.*

The analysis showed no change in the overall LOS for the intersection and minimal changes to the queue lengths during the peak and off-peak hours.

SimTraffic simulations show:

— No issues of major concern in the weekday a.m. peak hour, p.m. peak hour and off-peak peak hour for the existing road layout and proposed bicycle lane scenario.

5.3 OSBORNE STREET AND STRADBROOK AVENUE

The existing intersection of Osborne Street and Stradbrook Avenue is a four-legged signalized intersection that consists of the following geometry:

— The northbound approach on Osborne Street consists of two through lanes and a right-turn lane;

— The southbound approach on Osborne Street consists of a left-turn lane and two through lanes; and

— The eastbound approach on Stradbrook Avenue consists of a left-turn lane, a shared left/through lane and a shared through/right-turn lane.

The bicycle lane scenario during the weekday a.m. and p.m. peak hours includes two travel lanes and on-street parking on one side of Stradbrook Avenue. The geometry of the Osborne Street and Stradbrook Avenue intersection remains the same as existing.

The bicycle lane scenario during the weekday off-peak hour includes one travel lane and on-street parking on both sides of the street on Stradbrook Avenue between Nassau Street and Donald Street. The geometry of the Osborne Street and Stradbrook Avenue intersection was altered so that:

— The eastbound approach on Stradbrook Avenue consists of a left-turn lane, a shared left/through lane and a right-turn lane.

The City asked WSP to investigate implications to delay and queueing if:

— Actuated Leading Bicycle Intervals (LBI) are implemented. For the analysis, it was assumed that the LBI is five seconds and the eastbound right turn on red is prohibited.

The results of the 2018 intersection analysis for Osborne Street and Stradbrook Avenue are summarised in **Table 5.3**.

The analysis showed no change in the overall LOS for the intersection and minimal changes to the queue lengths during the peak and off-peak hours. SimTraffic simulations show:

— No issues of major concern in the weekday a.m. peak hour, p.m. peak hour and off-peak peak hour for the existing road layout and proposed bicycle lane scenario.

Table 5.3: Osborne Street and Stradbrook Avenue Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	D (46 sec)	E (86%)	0.97 (EB Thru)	SB Left	E (67 sec)	EBL – 117 m EBT – 173 m NBR – 7 m SBL – 37 m
2018 – Bicycle Lane & 2 Travel Lanes	D (48 sec)	E (86%)	0.95 (NB Thru)	SB Left	E (76 sec)	EBL – 113 m EBT – 165 m NBR – 7 m SBL – 41 m
2018 – Bicycle Lane & 2 Travel Lanes, LBI and LPI	D (54 sec)	E (86%)	1.05 (SB Left)	SB Left	F (121 sec)	EBL – 120 m EBT – 178 m NBR – 7 m SBL – 48 m
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	C (24 sec)	C (72%)	0.80 (NB Thru)	NB Thru	D (42 sec)	EBL – 21 m EBT – 75 m NBR – 12 m SBL – 31 m
2018 – Bicycle Lane & 2 Travel Lanes	C (23 sec)	C (72%)	0.83 (NB Thru)	NB Thru	D (36 sec)	EBL – 21 m EBT/R – 57 m NBR – 10 m SBL – 24 m
2018 – Bicycle Lane & 2 Travel Lanes, LBI and LPI	C (26 sec)	C (72%)	0.91 (NB Thru)	NB Thru	D (42 sec)	EBL – 21 m EBT/R – 77 m NBR – 0 m SBL – 30 m
WEEKDAY HIGHEST OFF-PEAK HOUR						
2018 – Existing Road Layout	B (15 sec)	C (69%)	0.74 (NB Thru)	SB Left	C (20 sec)	EBL – 25 m EBT – 51 m NBR – 1 m SBL – 16 m
2018 – Bicycle Lane & 1 Travel Lanes	B (16 sec)	C (69%)	0.80 (NB Thru)	SB Left	C (28 sec)	EBL – 22 m EBT – 95 m NBR – 0 m SBL – 18 m

5.4 DONALD STREET AND RIVER AVENUE

The existing intersection of Donald Street and River Avenue is a four-legged signalized intersection that consists of the following geometry:

— The northbound approach on Donald Street consists of two through lanes;

- The southbound approach on Donald Street consists of two through lanes and a right-turn lane; and
- The westbound approach on River Avenue consists of a left-turn lane, a shared left-turn / through lane, a through lane and a shared through / right-turn cut-off lane.

The bicycle lane scenario during the weekday a.m. and p.m. peak hours includes two travel lanes and on-street parking on one side of River Avenue. The geometry of the Donald Street and River Avenue intersection was altered so that:

- The westbound approach on River Avenue consists of a left-turn lane, a shared left-turn / through lane and a shared through / right-turn cut-off lane.

The bicycle lane scenario during the weekday off-peak hour includes one travel lane and on-street parking on both sides of the street on River Avenue. The geometry of the Donald Street and River Avenue intersection was altered so that:

- The westbound approach on River Avenue consists of two left-turn lanes and a shared through / right-turn cut-off lane.

The City asked WSP to investigate implications to delay and queueing if:

- No right turn on red (NRTOR) is implemented for the southbound to westbound movement.

The results of the 2018 intersection analysis for Donald Street and River Avenue are summarised in **Table 5.4**. The analysis showed no change in the overall LOS for the intersection in the a.m. peak hour and a slight increase to the southbound right-turn queue length with NRTOR. The p.m. peak hour analysis showed a slight reduction in the overall LOS for the intersection with the bicycle lane and two travel lane scenario; however, the overall LOS for the intersection is within the desirable range for signalized intersections.

The analysis results also indicate that the westbound through group (which includes a shared left-turn / through lane, through lane, and shared through / right-turn cut-off lane) has a defacto left turning lane for the existing road layout in the a.m. and p.m. peak hours. Synchro flags defacto turning lanes if the turning movement of a single lane would have a v/c ratio greater than the group as a whole and its v/c ratio is greater than 0.85. A defacto left-turn lane usually indicates the need for an additional exclusive turning lane.

SimTraffic simulations show:

- In the a.m. peak hour for the existing road layout and bicycle lane scenario, westbound left-turn queues occasionally extend down Harkness Avenue.
- No issues of major concern in the weekday p.m. peak hour and off-peak hour for the existing road layout and bicycle lane scenario.

Table 5.4: Donald Street and River Avenue Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	E (60 sec)	G (102%)	1.15 (NB Thru)	NB Thru	F (91 sec)	WBL – 132 m WBT – 98 m SBR – 4 m
2018 – Bicycle Lane & 2 Travel Lanes	E (73 sec)	G (105%)	1.18 (NB Thru)	NB Thru	F (102 sec)	WBL – 132 m WBT – 178 m SBR – 5 m
2018 – Bicycle Lane & 2 Travel Lanes, NRTOR SB-WB	E (73 sec)	G (105%)	1.18 (NB Thru)	NB Thru	F (102 sec)	WBL – 132 m WBT – 178 m SBR – 17 m

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	C (30 sec)	**F (97%)**	**0.86 (WB Thru)**	WB Thru	D (44 sec)	WBL – 109 m WBT – 84 m SBR – 50 m
2018 – Bicycle Lane & 2 Travel Lanes	D (50 sec)	**G (100%)**	**0.92 (WB Thru)**	**WB Thru**	**F (92 sec)**	WBL – 135 m WBT – 138 m SBR – 50 m
2018 – Bicycle Lane & 2 Travel Lanes, NRTOR SB-WB	D (50 sec)	**G (100%)**	**0.92 (WB Thru)**	**WB Thru**	**F (92 sec)**	WBL – 135 m WBT – 138 m SBR – 57 m
WEEKDAY HIGHEST OFF-PEAK HOUR						
2018 – Existing Road Layout	C (25 sec)	E (90%)	**0.91 (NB Thru)**	NB Thru	C (28 sec)	WBL – 78 m WBT – 59 m SBR – 26 m
2018 – Bicycle Lane & 1 Travel Lanes	C (35 sec)	**F (93%)**	**1.01 (NB Thru)**	NB Thru	D (45 sec)	WBL – 75 m WBT – 113 m SBR – 26 m

5.5 DONALD STREET AND STRADBROOK AVENUE

The existing intersection of Donald Street and Stradbrook Avenue is a four-legged signalized intersection that consists of the following geometry:

— The northbound approach on Donald Street consists of two through lanes and a right-turn lane;

— The southbound approach on Donald Street consists of two through lanes; and

— The eastbound approach on Stradbrook Avenue consists of a left-turn lane, a shared left-turn / through lane and a shared through / right-turn cut-off lane.

The bicycle lane scenario during the weekday a.m. and p.m. peak hours includes two travel lanes and on-street parking on one side of Stradbrook Avenue. The geometry of the Donald Street and Stradbrook Avenue intersection was altered so that:

— The eastbound approach on Stradbrook Avenue consists of a shared left-turn/through lane and a shared through / right-turn cut-off lane.

The bicycle lane scenario during the weekday off-peak hour includes one travel lane and on-street parking on both sides of the street on Stradbrook Avenue. The geometry of the Donald Street and Stradbrook Avenue intersection was altered so that:

— The eastbound approach on Stradbrook Avenue consists of a left-turn lane and a shared through / right-turn cut-off lane.

The City also asked WSP to investigate implications to delay and queueing if:

— No right turn on red (NRTOR) is implemented for the northbound to eastbound movement.

The results of the 2018 intersection analysis for Donald Street and Stradbrook Avenue are summarised in **Table 5.5**. The analysis showed no change in the overall LOS for the intersection in the a.m. peak hour and a slight increase to the northbound right-turn queue length with NRTOR. The p.m. peak hour analysis showed a slight reduction in the overall LOS for the intersection with the bicycle lane and two travel lane scenario; however, the overall LOS for the intersection is within the desirable range for signalized intersections.

SimTraffic simulations show:

— No issues of concern in the weekday a.m. peak hour, p.m. peak hour and off-peak hour for the existing road layout and bicycle lane scenario.

Table 5.5: Donald Street and Stradbrook Avenue Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
2018 – Existing Road Layout	D (46 sec)	**G (102%)**	0.94 (NB Thru)	NB Thru	E (73 sec)	EBL – 80 m NBR – 312 m
2018 – Bicycle Lane & 2 Travel Lanes	D (52 sec)	**G (105%)**	**0.97 (EB Thru & NB Right)**	NB Thru	E (75 sec)	EBL/T – 146 m NBR – 304 m
2018 – Bicycle Lane & 2 Travel Lanes, NRTOR NB-EB	D (54 sec)	**G (105%)**	**1.00 (NB Right)**	NB Thru	E (75 sec)	EBL/T – 146 m NBR – 315 m
WEEKDAY P.M. PEAK HOUR						
2018 – Existing Road Layout	C (33 sec)	**F (97%)**	**1.02 (SB Thru)**	EB Left	D (50 sec)	EBL – 75 m NBR – 282 m
2018 – Bicycle Lane & 2 Travel Lanes	D (43 sec)	**G (100%)**	**1.08 (SB Thru)**	EB Thru	D (54 sec)	EBL/T – 115 m NBR – 282 m
2018 – Bicycle Lane & 2 Travel Lanes, NRTOR NB-EB	D (43 sec)	**G (100%)**	**1.08 (SB Thru)**	EB Thru	D (54 sec)	EBL/T – 115 m NBR – 293 m
WEEKDAY HIGHEST OFF-PEAK HOUR						
2018 – Existing Road Layout	C (31 sec)	E (90%)	**1.06 (NB Right)**	NB Right	E (64 sec)	EBL – 27 m NBR – 255 m
2018 – Bicycle Lane & 1 Travel Lanes	D (54 sec)	**F (93%)**	**1.17 (NB Right)**	**NB Right**	**F (107 sec)**	EBL – 27 m NBR – 255 m

5.6 DONALD STREET AND SCOTT STREET

The existing intersection of Donald Street and Scott Street is a three-legged unsignalized intersection that consists of the following geometry:

— The northbound approach on Donald Street consists of a left-turn lane and three through lanes;

— The southbound approach on Donald Street consists of a through lane and shared through / right-turn lane; and

— The southbound approach on Scott Street consists of a shared left-turn / through / right-turn lane.

A traffic analysis was conducted to determine the impacts of a new signalized intersection (half signal) at Donald Street and Scott Street. The results for the traffic analysis are shown in **Table 5.6** below. It was assumed that there would be 50 calls an hour for the half signal. The signal timings at Confusion Corner were locked and offsets on Donald Street were optimized. There were minimal changes to the LOS and queues at the adjacent intersections with the incorporation of a half signal at Scott Street and Donald Street. At the half signal, the a.m. peak hour is forecast to operate at LOS A and the p.m. peak hour is forecast to operate at LOS B.

However, as mentioned in **Section 4.1.5**, there are safety concerns related to the high traffic volumes, high vehicle speeds and limited sight distance through this area and the City is not willing to consider a crossing at this location at this time.

Table 5.6: Donald Street and Scott Street Intersection Analysis

SCENARIO	OVERALL INTERSECTION			CRITICAL MOVEMENT		95TH QUEUE LENGTH
	LOS (DELAY)	ICU LOS	MAX V/C	MOVEMENT	LOS (DELAY)	
WEEKDAY A.M. PEAK HOUR						
Donald / Stradbrook Existing	D (47 sec)	G (102%)	0.93 (NBR)	NBT	E (73 sec)	EBL – 80 m NBR – 313m
Donald / Stradbrook with Half Signal at Scott	D (41 sec)	G (102%)	0.93 (NBR)	NBT	E (65 sec)	EBL – 87 m NBR – 299 m
Donald / Scott with Half Signal at Scott	A (8 sec)	A (51%)	0.68 (NBT)	NBT	B (12 sec)	NBT – 148 m SBT – 123 m
McMillan / Osborne Existing	D (51 sec)	E (88%)	0.99 (NBT)	NBT	E (57 sec)	WBL – 70 m
McMillan / Osborne with Half Signal at Scott	D (51 sec)	E (88%)	0.99 (NBT)	NBT	E (57 sec)	WBL – 67 m*
WEEKDAY P.M. PEAK HOUR						
Donald / Stradbrook Existing	C (33 sec)	F (97%)	1.02 (SBT)	EBL	D (50 sec)	EBL – 75 m NBR – 282 m
Donald / Stradbrook with Half Signal at Scott	C (28 sec)	F (97%)	1.02 (SBT)	EBL	D (50 sec)	EBL – 75 m NBR – 143 m
Donald / Scott with Half Signal	B (13 sec)	C (67%)	0.91 (SBT)	SBT	B (15 sec)	NBT – 108 m SBT – 127 m*
McMillan / Osborne Existing	E (74 sec)	F (98%)	1.05 (SBT)	WBL	F (87 sec)	WBL – 117 m
McMillan / Osborne with Half Signal at Scott	E (74 sec)	F (98%)	1.05 (SBT)	WBL	F (87 sec)	WBL – 115 m*

6 EVALUATION OF OPTIONS

6.1 PUBLIC ENGAGEMENT – SECOND ROUND

Prior to the technical evaluation, the options developed for the cycling network in Osborne Village were presented to the public in June 2018. The second round of public engagement included an Open House, stakeholder meetings and an online survey hosted on the City's website. The complete public engagement report can be found in **Appendix A**. **Table 6.1** lists the main themes ("what we heard") from the public and how the public's input was considered in the evaluation of options (presented in Section 6.3) and ultimately in the functional design of the cycling network in Osborne Village.

Table 6.1: Public Engagement Themes

WHAT WE HEARD	HOW IT WAS CONSIDERED
Participants prioritized the addition of bike lanes on River Avenue and Stradbrook Avenue (protected east of Osborne Street) above all other locations in Osborne Village. Treatments on other areas of these roads additionally gained more support than all other proposed locations outside of Scott Street (ranked 4th in terms of support).	Protected bicycle lanes on Stradbrook Avenue and River Avenue were recommended based on the public input and technical evaluation of the proposed cycling network options.
In locations where two road treatments were tested raised bike lanes did not receive as much support as the other option presented – River / Stradbrook: protected, Roslyn: buffered.	Raised bicycle lanes were not recommended for the network. Where protected bicycle lanes are recommended they will be located at street-level.
Respondents both online and at the public workshop requested a two-way bike lane on River Avenue.	A two-way bicycle lane on River Avenue was not recommended due to the negative impact to on-street parking.
Suppression of parking was noted with concern.	The proposed cycling network for Osborne Village includes one-way bicycle lanes on River Avenue and Stradbrook Avenue. On-street parking would be maintained on the north side of River Avenue and the south side of Stradbrook Avenue. On-street parking and loading on the south side of River Avenue and north side of Stradbrook Avenue may be allowed during off-peak travel periods.
The top theme tied to support for a neighbourhood greenway on Scott Street was concern about the safe crossing of River and Stradbrook.	Improvements are proposed for the crossings of River Avenue and Stradbrook Avenue at Scott Street to improve safety by reducing the pedestrian crossing distance, improving sightlines, and increasing the visibility of the crossing.
Respondents questioned why Scott Street didn't cross Donald Street at the south end.	The analysis included an investigation of implementing a traffic signal at Scott Street and Donald Street to provide a crossing for pedestrians and cyclists. There are safety concerns related to the high traffic volumes, high vehicle speeds and limited sight distance through this area and the City is not willing to consider a crossing at this location at this time.

WHAT WE HEARD	HOW IT WAS CONSIDERED
All three changes proposed on Roslyn Road received more opposition than support – comments noted concerns over lost parking, and a perceived reduction in traffic flow at the Osborne and Roslyn intersection.	Roslyn Road remains a priority in the City's Pedestrian and Cycling Strategies; however, was not recommended for the cycling network as part of this study based on the public input. Improvements to Roslyn Road may be considered in the future if there continues to be a desire for cyclists to use the Osborne Bridge.
Significant concern was noted in response to removing south bound traffic on the north end of Nassau Street to allow for increased back-in angled parking. The most common comment in opposition was that limiting traffic would make access to the nearby apartment buildings difficult for residents.	Cycling improvements to Nassau Street were not recommended as part of this study based on public input. However, Nassau Street is an existing neighbourhood greenway and cycling improvements may be considered in the future.
Neighbourhood greenways on Gertrude Avenue and Wardlaw Avenue received the lowest levels of support.	Although the neighbourhood greenway on Wardlaw Avenue received a lower level of support, it was recommended for the cycling network since it already has the characteristics required for a neighbourhood greenway and would require minimal treatments. The Wardlaw Avenue neighbourhood greenway would act as a low-stress route connecting the Nassau Street neighbourhood greenway and the proposed Scott Street neighbourhood greenway, and would complement the River Avenue and Stradbrook Avenue protected bicycle lanes as it provides an alternative parallel route to access commercial areas. Gertrude Avenue was not recommended as part of the cycling network since it would provide a similar function as Wardlaw Avenue but has higher traffic volumes and would require additional traffic calming treatments.

6.2 EVALUATION CRITERIA

The technical criteria used to evaluate the options were divided into three categories in order of their significance to the cycling network:

— Fatal Flaw Criteria – Highest significance;

— Critical Criteria – Average significance; and

— Important Criteria – Lowest significance.

Fatal Flaw Criteria (30 points)

— Does the option have a significant impact on the community / businesses?

— Does the option create accessibility concerns / pedestrian crossing risks?

— Is the option difficult to construct and stage?

— Is the option difficult to maintain (including snow clearing, street cleaning, etc.)?

— Is the option problematic in accommodating emergency vehicles?

Critical Criteria (20 points)

— How well does the option maintain traffic operations (congestion/delays)?

— How does the option impact on-street parking and loading areas?

— What are the capital costs and maintenance costs associated with the option (are they reasonable or abnormal)?

— Does the option connect well to the larger network now or in the foreseeable future?

Important Criteria (10 points)

- What level of comfort does the option provide for cyclists?
- How well does the option meet the needs of cyclists of different skill levels/ages?
- How well does the option improve cycling operations within the study area (dedicated signals, good stacking room on islands, minimal detouring, reduces potential dooring conflicts, etc.)?
- How does the option impact transit operations?

6.3 TECHNICAL EVALUATION

WSP met with the City of Winnipeg in July 2018 at Public Works to evaluate the options for the cycling network in Osborne Village and discuss the connections to Fort Rouge Park. The goal of the meeting was to identify a recommended network of cycling options for the study area that would connect to the required destinations and existing cycling facilities as identified in the original terms of reference for the project. The options evaluated are shown in **Figure 4.1** and include:

- **Option A:** Improvements to existing neighbourhood greenway on Nassau Street (from River Avenue to Roslyn Road), one-way bicycle lanes on Roslyn Road (from Nassau Street to Osborne Street), neighbourhood greenway on Roslyn Road. (from Osborne Street to Bryce Street), and neighbourhood greenway on Bryce Street (from Roslyn Road to River Avenue);
- **Option B:** One-way protected bicycle lanes on River Avenue & Stradbrook Avenue (from Nassau Street to Harkness Avenue), Neighbourhood Greenway on River Avenue (from Harkness Avenue to Main Street);
- **Option C:** Neighbourhood Greenway on Wardlaw Avenue (from Nassau Street to Scott Street);
- **Option D:** Neighbourhood Greenway on Gertrude Avenue (from Nassau Street to Scott Street); and
- **Option E:** Neighbourhood Greenway on Scott Street (from River Avenue to Gertrude Avenue).

Raised bicycle lanes were presented to the public as sub-options for Option A on Roslyn Road and Option B on River Avenue / Stradbrook Avenue west of Osborne Street; however, the alternate sub-options (buffered bicycle lanes for Option A and protected bicycle lanes for Option B) were preferred by the public so it was decided that the raised bicycle lane sub-options would be eliminated from consideration and were therefore not evaluated.

The results of the evaluation are shown in **Table 6.2**. The options were scored on a scale of zero (poor) to three (good) and were assigned different weightings based on whether they were considered fatal flaw criteria (30 points), critical criteria (20 points) or important criteria (10 points). Options C, E and B scored highest and were selected as the preferred options to include in the recommended cycling network for Osborne Village for this project. To summarize:

- **Option C** scored the highest since it already has the characteristics required for a neighbourhood greenway and would require minimal treatments;
- **Option E** scored second highest since it already has some characteristics required for a neighbourhood greenway and would improve safety at the intersections of Scott Street with River Avenue and Stradbrook Avenue and provide an important north-south connection in the study area;
- **Option B** scored third highest in the technical evaluation, was the most supported option by the public, and is the only option that provides a connection to Nassau Street, Main Street, the proposed Walk Bike bridge, and Osborne Station (via the Donald Street shared-use path). Option B also provides a direct connection to the commercial hub in Osborne Village. In addition, the other highly scored options (Option C and E) require Option B from Scott Street to Main Street to provide a continuous network;
- **Option D** scored second lowest in the technical evaluation. Option D is considered similar to Option C in terms of the location and start / end points, but has higher traffic volumes (more than what is desirable for a neighbourhood greenway), costs (traffic calming features, additional sidewalk construction and new half signal at Osborne Street) and impacts to on-street parking (existing perpendicular parking east of Osborne Street

would need to be converted to parallel parking). As a result, Option C was selected over Option D as the preferred neighbourhood greenway east-west connection in the south end of the study area; and

— **Option A** scored the lowest in the technical evaluation. The conversion of Nassau Street to one-way operations between River Avenue and Roslyn Avenue was highly contentious for the public and the loss of parking on Roslyn Road west of Osborne Street also received negative feedback. Nassau Street and Roslyn Road (west of Osborne Street) are currently used by cyclists to connect to the Osborne Bridge. It was decided that this option not be considered as part of the network for the proposed Walk Bike bridge connecting Fort Rouge Park and McFadyen Park; however, it could be considered in the future if there continues to be a desire for cyclists to use the Osborne Bridge as it is identified in the City of Winnipeg *Pedestrian and Cycling Strategies*.

The connection options to Fort Rouge Park were discussed following the selection of Options C, E and B for the cycling network in Osborne Village. The options considered for the connection to Fort Rouge Park are shown in **Figure 4.13** and include:

— **Option 1:** Bicycle friendly back lane (from Bryce Street to Fort Rouge Park). This connection option is linked to cycling network Option A;

— **Option 2:** Two-way protected bicycle lane on River Avenue (from Bryce Street to Fort Rouge Park). This connection option is linked to cycling network Option A;

— **Option 3:** Two-way protected bicycle lane on River Avenue (from Scott Street to Fort Rouge Park). This connection option is linked to cycling network Option E;

— **Option 4:** Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to River Avenue) and two-way protected bicycle lane on River Avenue (from Bryce Street to Clarke Street). This connection option is linked to cycling network Options A and E;

— **Option 5:** Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to River Avenue) and two-way protected bicycle lane on River Avenue (from Clarke Street to Fort Rouge Park). This connection option is not specifically linked to any of the cycling network options, but provides a connection to the off-street path on Donald Street; and

— **Option 6:** Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to back lane), bicycle friendly back lane (from Clarke Street to Lewis Street) and neighbourhood greenway on Lewis Street (from back lane to Fort Rouge Park). This connection option is not specifically linked to any of the cycling network options, but provides a connection to the off-street path on Donald Street.

Options 3 and 6 were selected for the connections to Fort Rouge Park based on the following:

— **Option 1** was eliminated from consideration since Option A was not selected to be part of the cycling network in Osborne Village;

— **Option 2** was eliminated from consideration since Option A was not selected to be part of the cycling network in Osborne Village;

— **Option 3** was selected to be part of the cycling network for Osborne Village since it provides the most direct connection to Fort Rouge Park for cyclists travelling from the southwest to Fort Rouge Park (and vice versa). Option 3 would require the removal of approximately ten spaces on River Avenue to accommodate a two-way protected bicycle lane between Scott Street and Fort Rouge Park if the bicycle lane were to be implemented within the existing clear width of the roadway. The City has asked WSP to instead investigate the feasibility of utilizing the boulevard for the two-way bicycle lane section on River Avenue to reduce impacts to parking;

— **Option 4** was considered to have too significant of an impact to parking / loading on River Avenue and therefore was eliminated from consideration;

— **Option 5** provides the same connection as Option 6; however, has more impacts to parking / loading so was eliminated from consideration; and

— **Option 6** was selected to be part of the cycling network for Osborne Village since it has no impact to parking and provides a connection for cyclists travelling from the Donald Street shared-use path to Fort Rouge Park (and vice versa). It also uses the existing pedestrian crossing of River Avenue at Lewis Street. A pilot program would be required for the implementation of a bicycle friendly back lane.

Table 6.2: Evaluation of Cycling Network Options for Osborne Village

	EVALUATION FACTOR	WEIGHTING (PERCENTAGE OF OVERALL SCORE)	SCORE SCALE: POOR 0 TO 3 GOOD				
			OPTION A	OPTION B	OPTON C	OPTION D	OPTION E
			Roslyn Road Neighbourhood Greenway and Buffered Bike Lanes West of Osborne	River Avenue and Stradbrook Avenue One Way Protected Bike Lanes	Neighbourhood Greenway on Wardlaw Avenue	Neighbourhood Greenway on Gertrude Avenue	Neighbourhood Greenway on Scott Street
FATAL FLAW CRITERIA							
1	Does the option have a significant impact on the community / businesses?	30	1	2	3	2	3
2	Does the option create accessibility concerns / pedestrian crossing risks?	30	3	3	3	3	2
3	Is the option difficult to construct and stage?	30	2	2	3	3	3
4	Is the option difficult to maintain (including snow clearing, street cleaning, etc.)?	30	3	3	3	3	3
5	Is the option problematic in accommodating emergency vehicles?	30	3	2	3	3	3
CRITICAL CRITERIA							
6	How well does the option maintain traffic operations (congestion/delays)?	20	1	2	3	2	1
7	How does the option impact on-street parking and loading areas?	20	2	2	3	2	3
8	What are the capital costs and maintenance costs associated with the option?	20	2	1	3	1	2
9	Does the option connect well to the larger network now or in the foreseeable future?	20	2	3	1	1	3
IMPORTANT CRITERIA							
10	What level of comfort does the option provide for cyclists?	10	2	3	1	1	1
11	How well does the option meet the needs of cyclists of different skill levels/ages?	10	1	2	1	1	1
12	How well does the option improve cycling operations within the study area (dedicated signals, good stacking room on islands, minimal detouring, reduces potential dooring conflicts, etc.)?	10	2	2	1	1	2
13	How does the option impact transit operations?	10	3	2	3	3	3
		OPTION WEIGHTED TOTAL	580	610	710	600	670
		OPTION RANK	5	3	1	4	2

7 FUNCTIONAL DESIGN OF RECOMMENDED NETWORK

7.1 DESIGN OVERVIEW

The functional design of the recommended cycling network for the study area presented in this section is consistent with the approved design criteria and City standards and guidelines that represent best practices for pedestrian and cycling facility design. The recommended cycling network for Osborne Village includes:

— **Option B:** One-way protected bicycle lanes on River Avenue & Stradbrook Avenue (from Nassau Street to Harkness Avenue) and neighbourhood greenway on River Avenue (from Harkness Avenue to Main Street);

— **Option C:** Neighbourhood greenway on Wardlaw Avenue (from Nassau Street to Scott Street);

— **Option E:** Neighbourhood greenway on Scott Street (from River Avenue to Wardlaw Avenue);

— **Option 3:** Two-way protected bicycle lane on River Avenue (from Scott Street to Fort Rouge Park); and

— **Option 6:** Neighbourhood greenway on Clarke Street (from Stradbrook Avenue to back lane), neighbourhood greenway in back lane (from Clarke Street to Lewis Street) and neighbourhood greenway on Lewis Street (from back lane to Fort Rouge Park). In addition, an off-street path would be required along Donald Street to connect the neighbourhood greenway on Clarke Street to the Stradbrook Avenue and Donald Street intersection.

An overview recommended cycling network for Osborne Village is shown in **Figure 7.0**.

The functional design drawings for the recommended options are shown in:

— **Figures 7.1.1 to 7.1.9**: Drawings illustrate the one-way protected bicycle lane and neighbourhood greenway (Option B), as well as the two-way protected bicycle lane (Option 3) on River Avenue;

— **Figures 7.2.1** to **7.2.7**: Drawings illustrate the one-way protected bicycle lane (Option B) on Stradbrook Avenue;

— **Figures 7.3.1** to **7.3.3**: Drawings illustrate the neighbourhood greenway on Clarke Street, bicycle friendly back lane and neighbourhood greenway on Lewis Street (Option 6);

— **Figures 7.4.1** to **7.4.3**: Drawings illustrate the neighbourhood greenway on Scott Street (Option E); and

— **Figures 7.5.1** to **7.5.5**: Drawings illustrate the neighbourhood greenway on Wardlaw Avenue (Option C).

7.2 CROSS-SECTIONS

The functional design includes most modifications within the existing clear width (face-of-curb to face-of curb) of the roadway; however, some modification to the existing curbs are required at intersections and north of the curb on River Avenue between Scott Street and Fort Rouge Park. Due to variations in the clear width of the roadway, the typical cross-sections of River Avenue and Stradbrook Avenue for Option B are different between:

— Nassau Street and Osborne Street;

— Osborne Street and Donald Street;

— Donald Street and Harkness Street; and

— Harkness Street and Main Street.

The typical cross-sections for River Avenue and Stradbrook Avenue are shown in **Figures 7.1.9** and **7.2.7**, respectively. The cross-sections for Lewis Street, Scott Street and Wardlaw Avenue would remain as they currently exist and are shown in **Figures 7.3.3**, **7.4.3** and **7.5.5**.

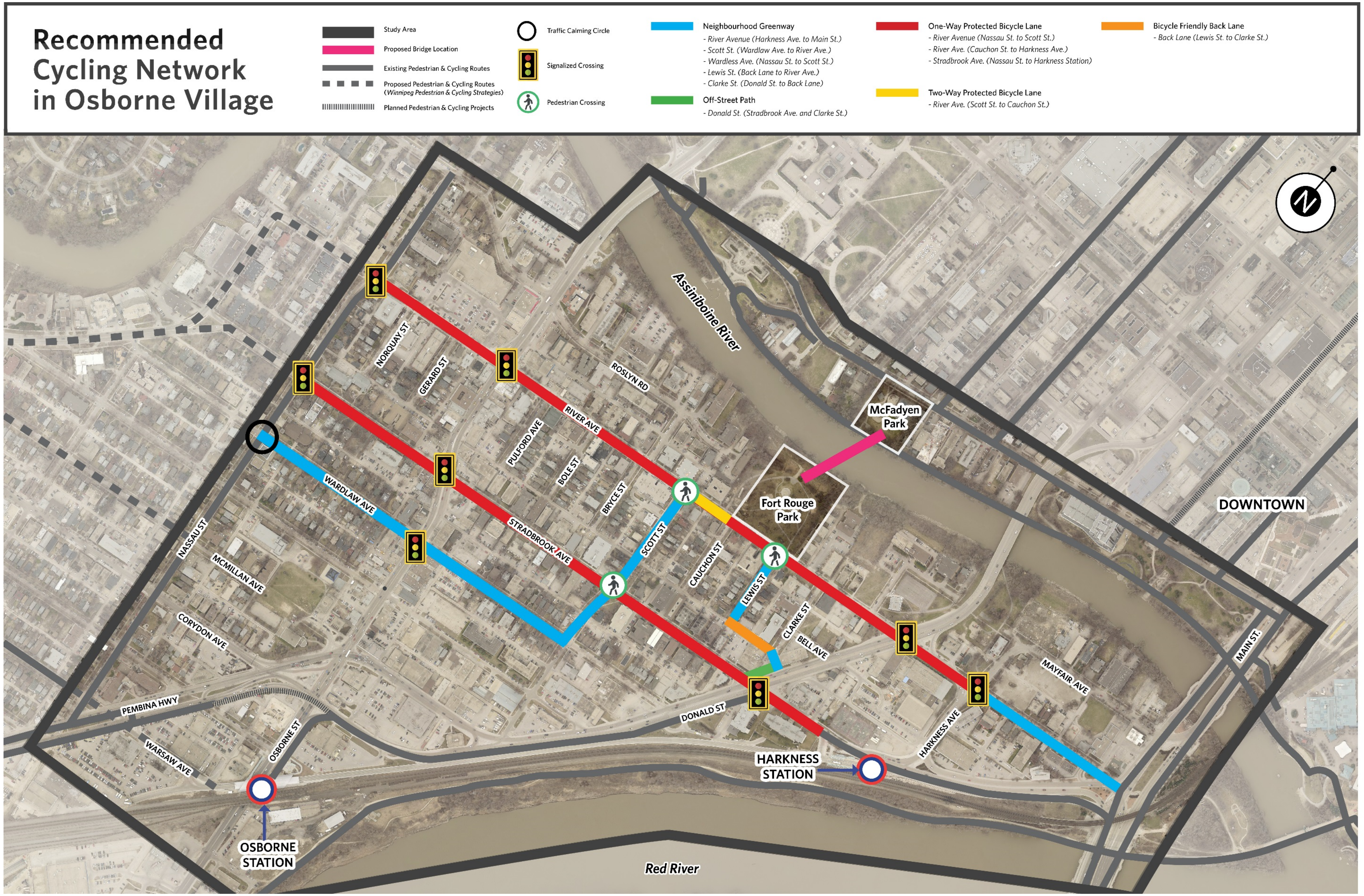
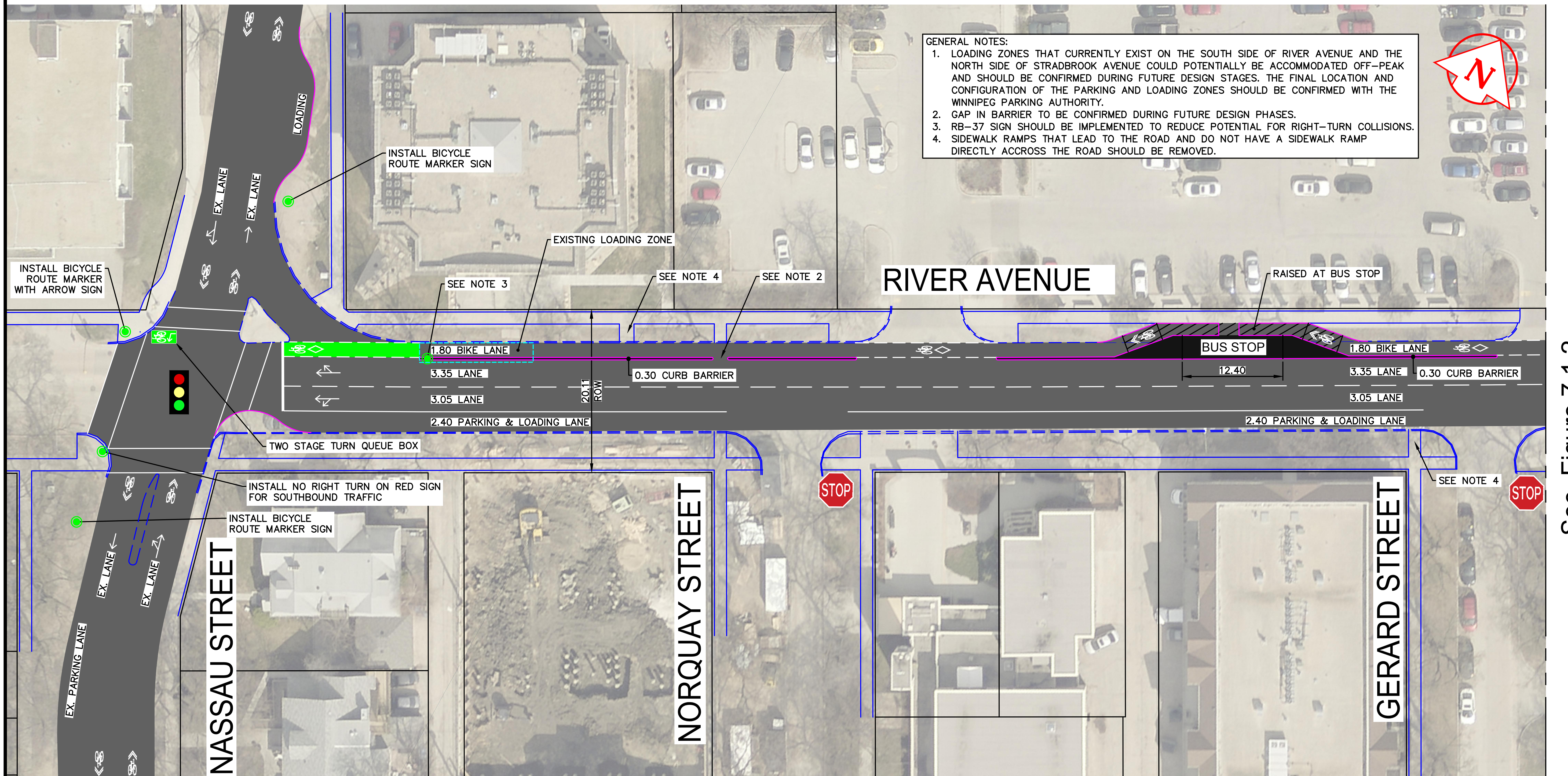


Figure 7.0: Recommended Cycling Network in Osborne Village



NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
- EXISTING SIDEWALK
- EXISTING CURB AND GUTTER
- EXISTING LOADING ZONE
- PROPOSED CURB (FOC)
- RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

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1:500	3/20/2019	Figure 7.1.1

Aug 02, 2019 – 10:20am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 River Ave_Nassau to Main_Plan.dwg –tab:Figure 7.1.1

GENERAL NOTES:
1. LOADING ZONES THAT CURRENTLY EXIST ON THE SOUTH SIDE OF RIVER AVENUE AND THE NORTH SIDE OF STRADBROOK AVENUE COULD POTENTIALLY BE ACCOMMODATED OFF–PEAK AND SHOULD BE CONFIRMED DURING FUTURE DESIGN STAGES. THE FINAL LOCATION AND CONFIGURATION OF THE PARKING AND LOADING ZONES SHOULD BE CONFIRMED WITH THE WINNIPEG PARKING AUTHORITY.
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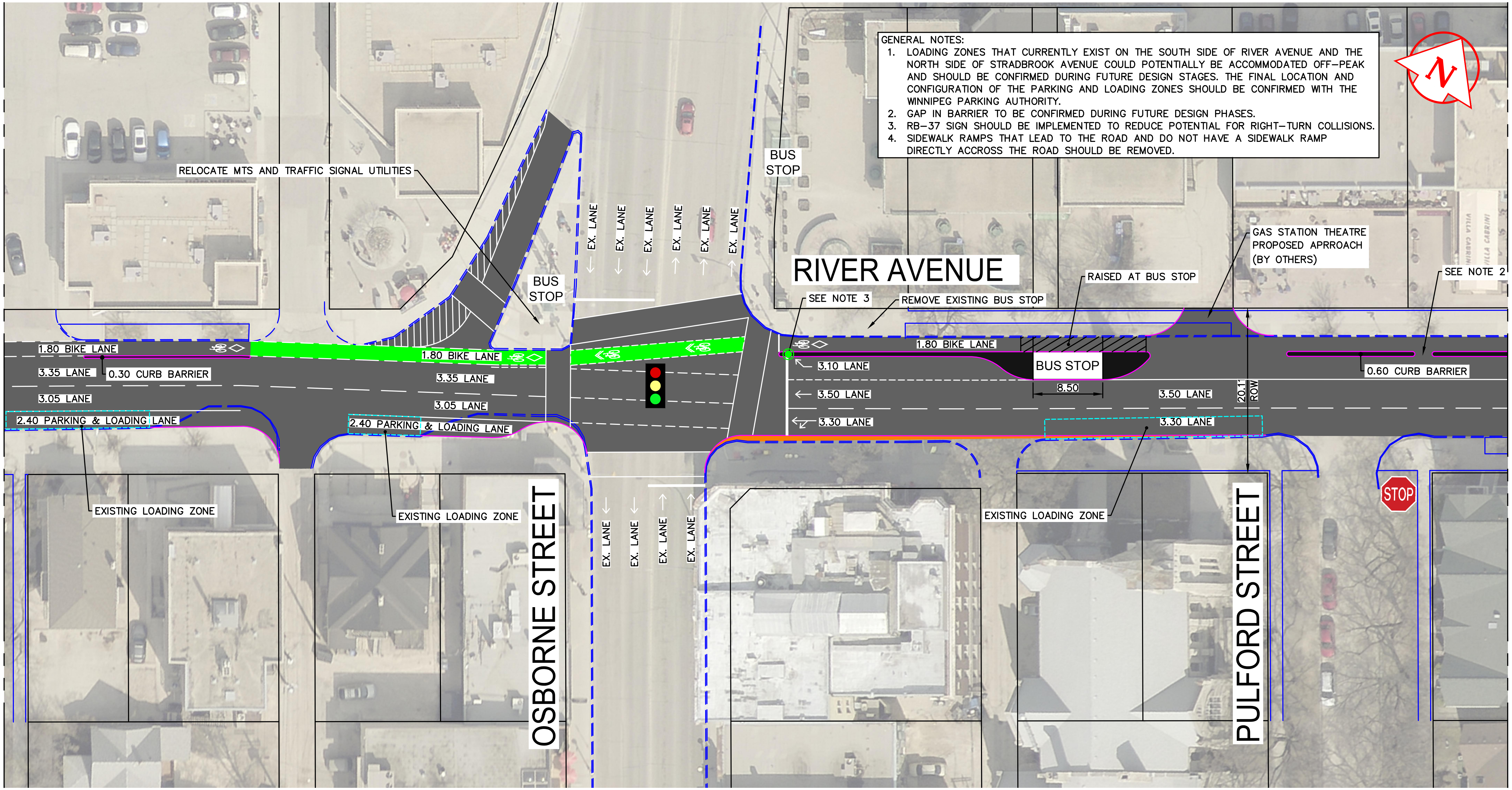
3. RB–37 SIGN SHOULD BE IMPLEMENTED TO REDUCE POTENTIAL FOR RIGHT–TURN COLLISIONS.
4. SIDEWALK RAMPS THAT LEAD TO THE ROAD AND DO NOT HAVE A SIDEWALK RAMP DIRECTLY ACCROSS THE ROAD SHOULD BE REMOVED.

See Figure 7.1.1



See Figure 7.1.3

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)
RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)	

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1:500	3/20/2019	Figure 7.1.2

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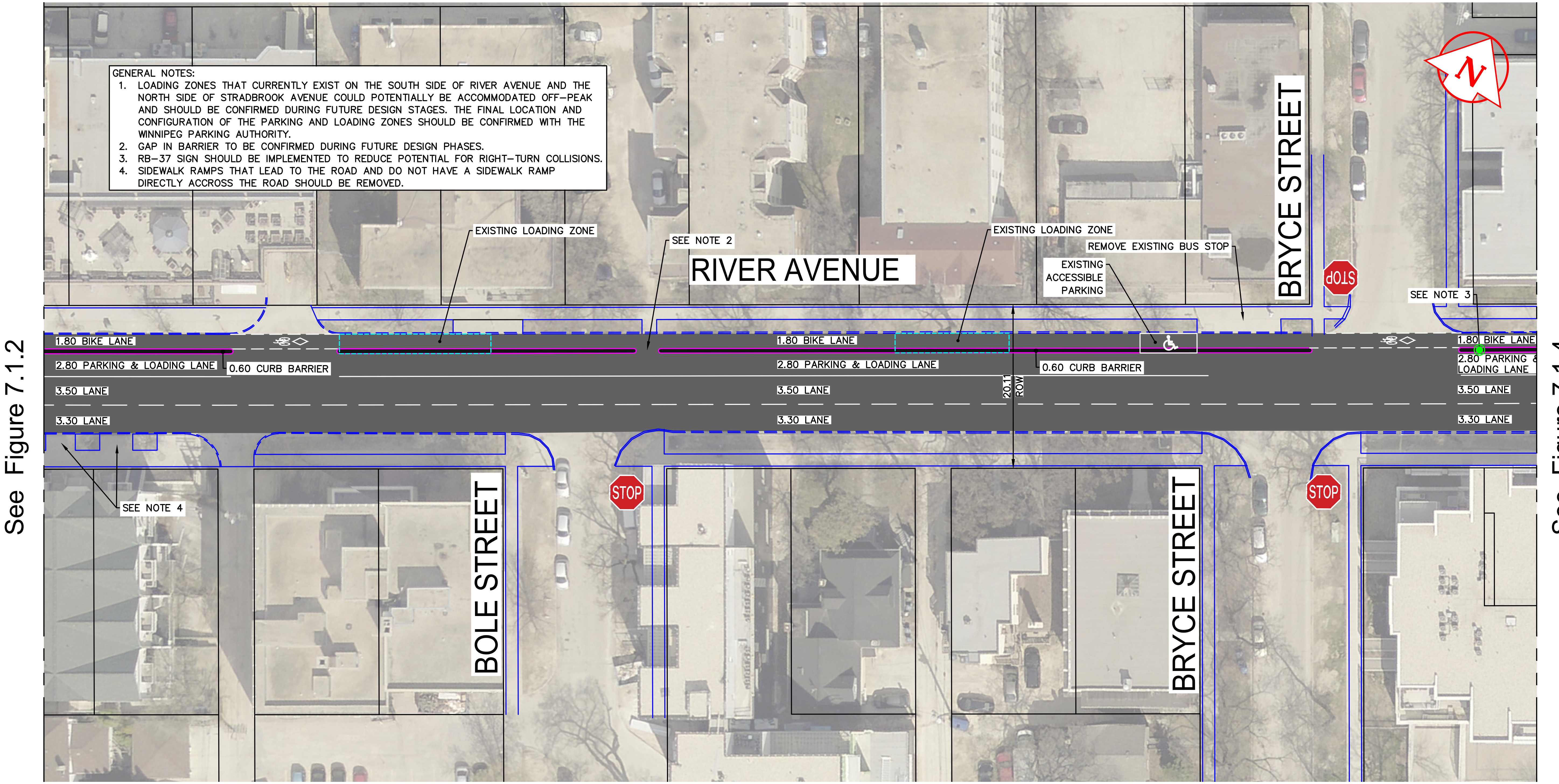

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL
BICYCLE AND DIAMOND STENCIL
GREEN SURFACE TREATMENT
BIKE ROUTE PAVED SURFACE
PROPOSED SIGNS
SIGNALIZED INTERSECTION
SCHOOL
PROPOSED MEDIAN
STOP SIGN
PROPOSED SIDEWALK
PROPOSED OFF-STREET MUTI-USE PATH
RAISED PAVEMENT
EXISTING SIDEWALK
EXISTING CURB AND GUTTER
EXISTING LOADING ZONE
PROPOSED CURB (FOC)
RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

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1:500	3/20/2019	Figure 7.1.3

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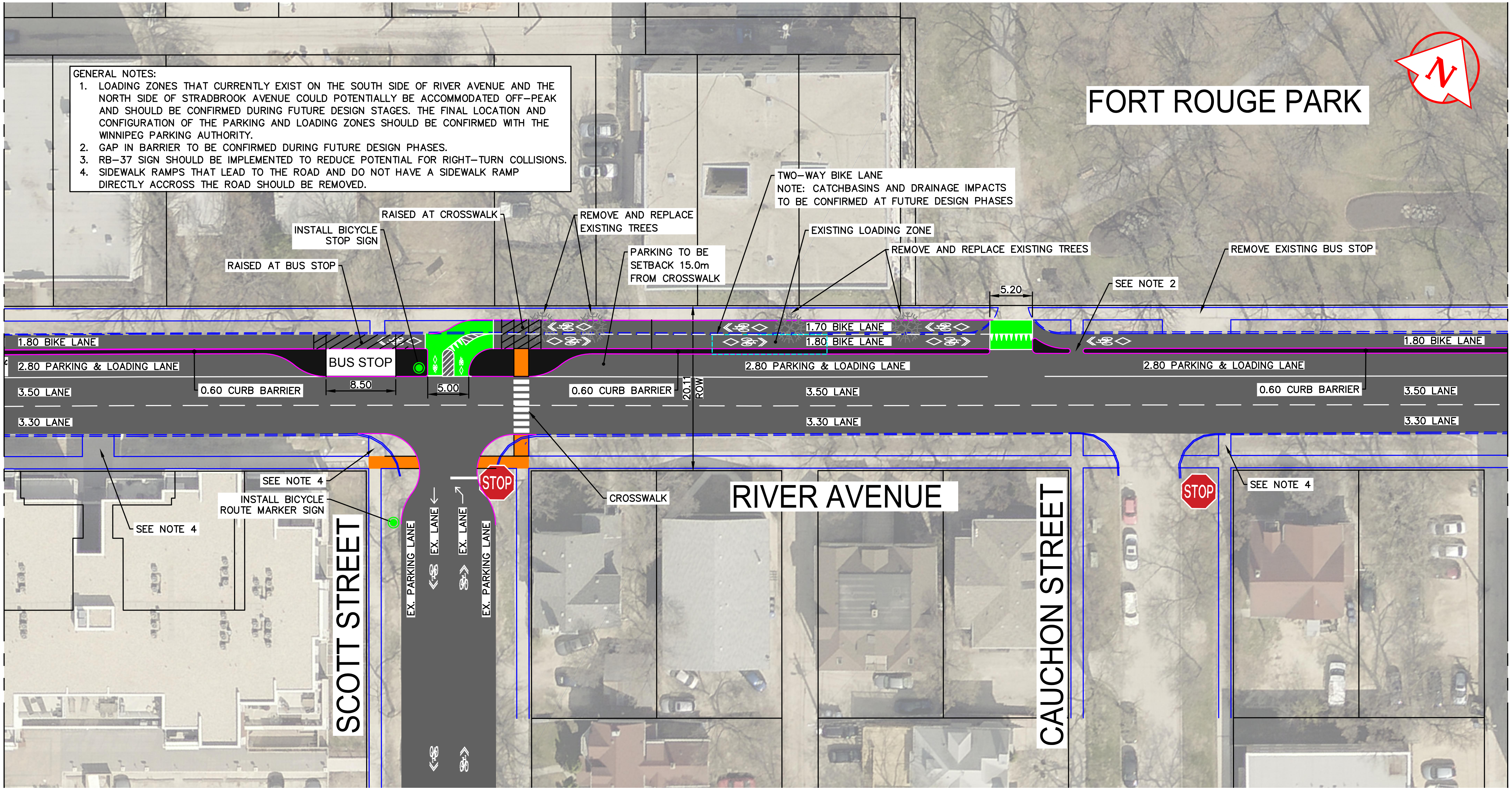

See Figure 7.1.3

See Figure 7.1.5

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
- EXISTING SIDEWALK
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1:500	3/20/2019	Figure 7.1.4

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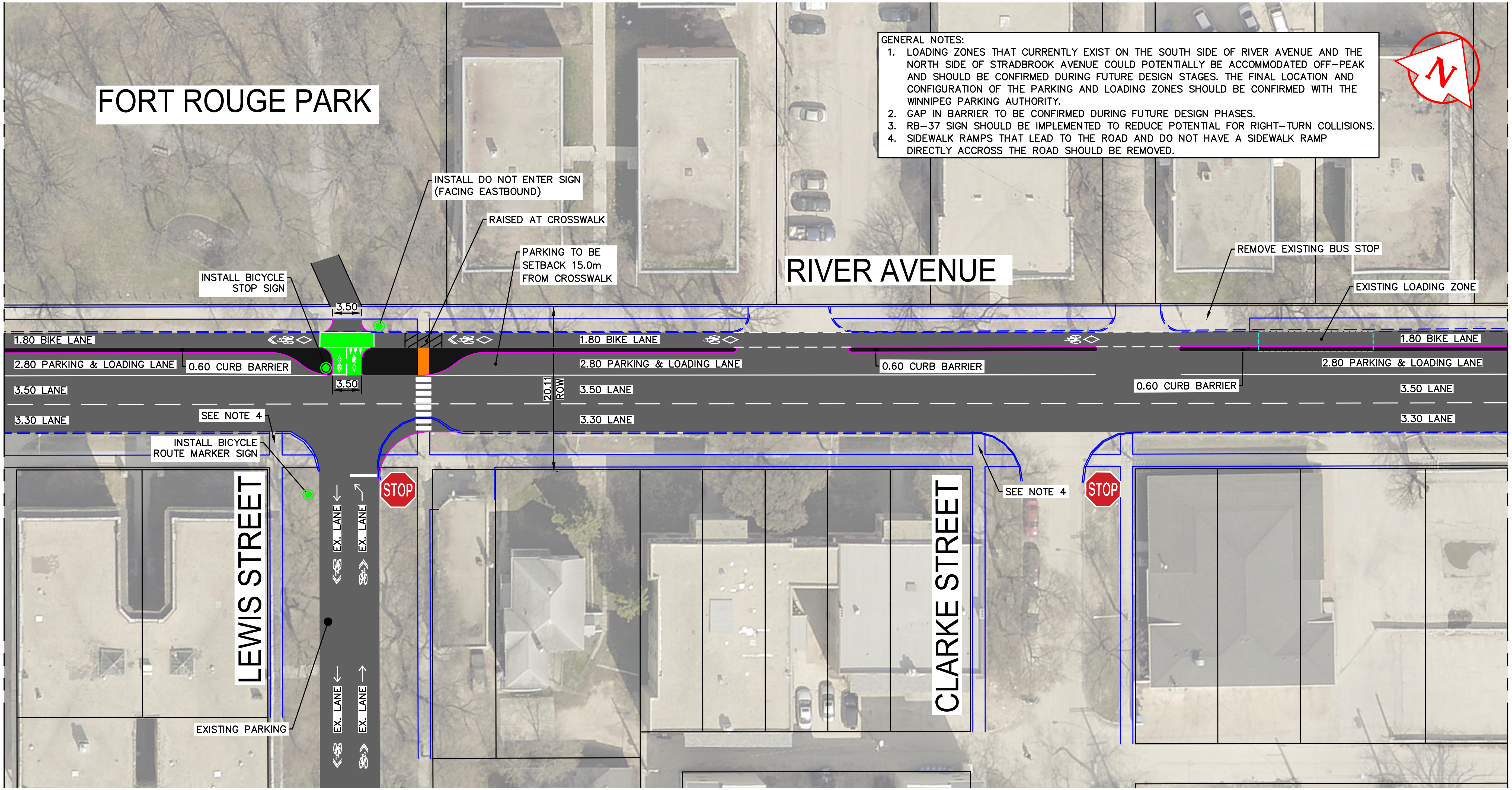
See Figure 7.1.4



See Figure 7.1.6

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)
RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)	

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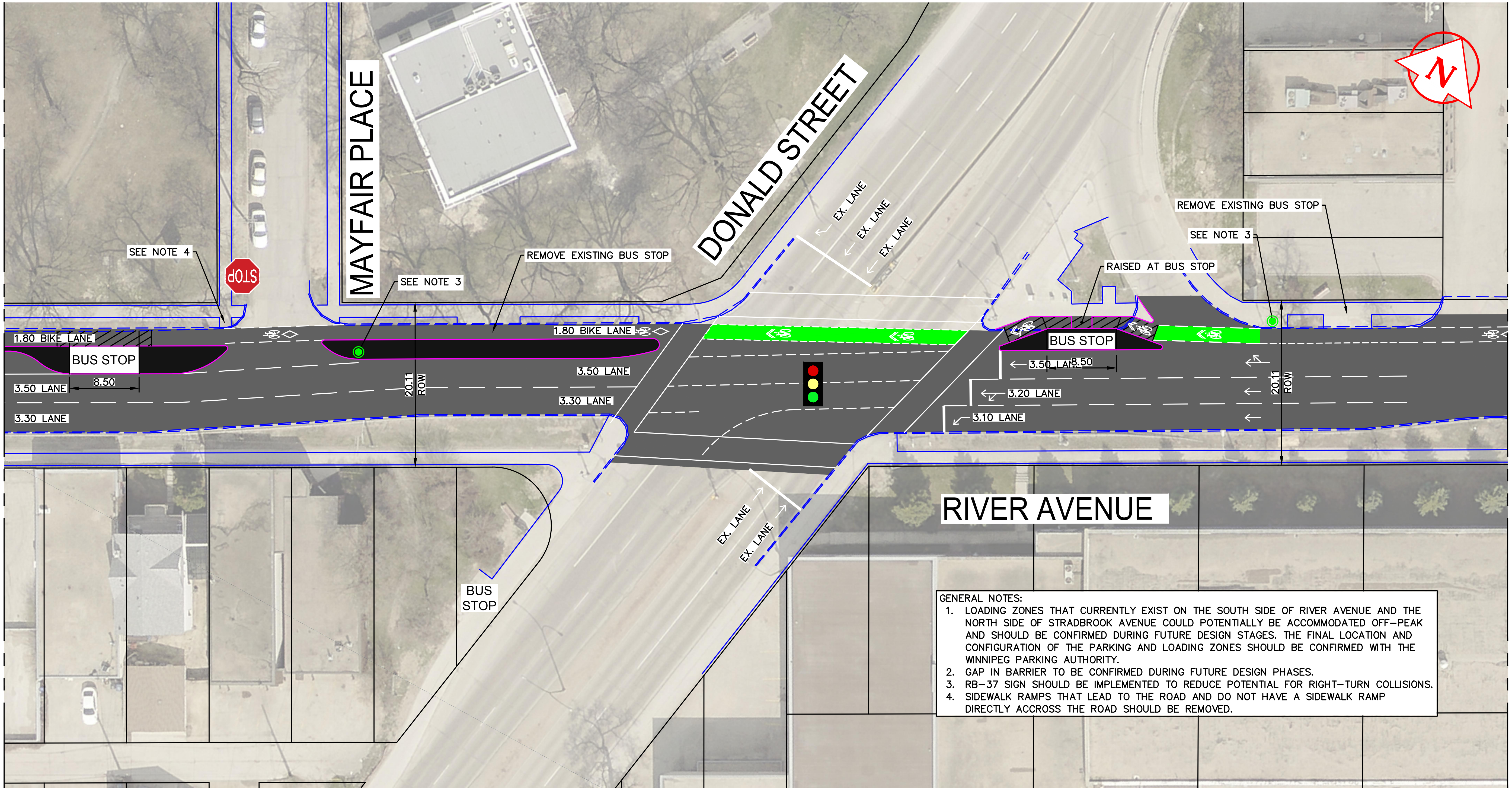
See Figure 7.1.5



See Figure 7.1.7

GENERAL NOTES:

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LEGEND

SHARROW STENCIL	PROPOSED SIGNS	STOP SIGN	EXISTING SIDEWALK
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION	PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
GREEN SURFACE TREATMENT	SCHOOL	PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN	RAISED PAVEMENT	PROPOSED CURB (FOC)

RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

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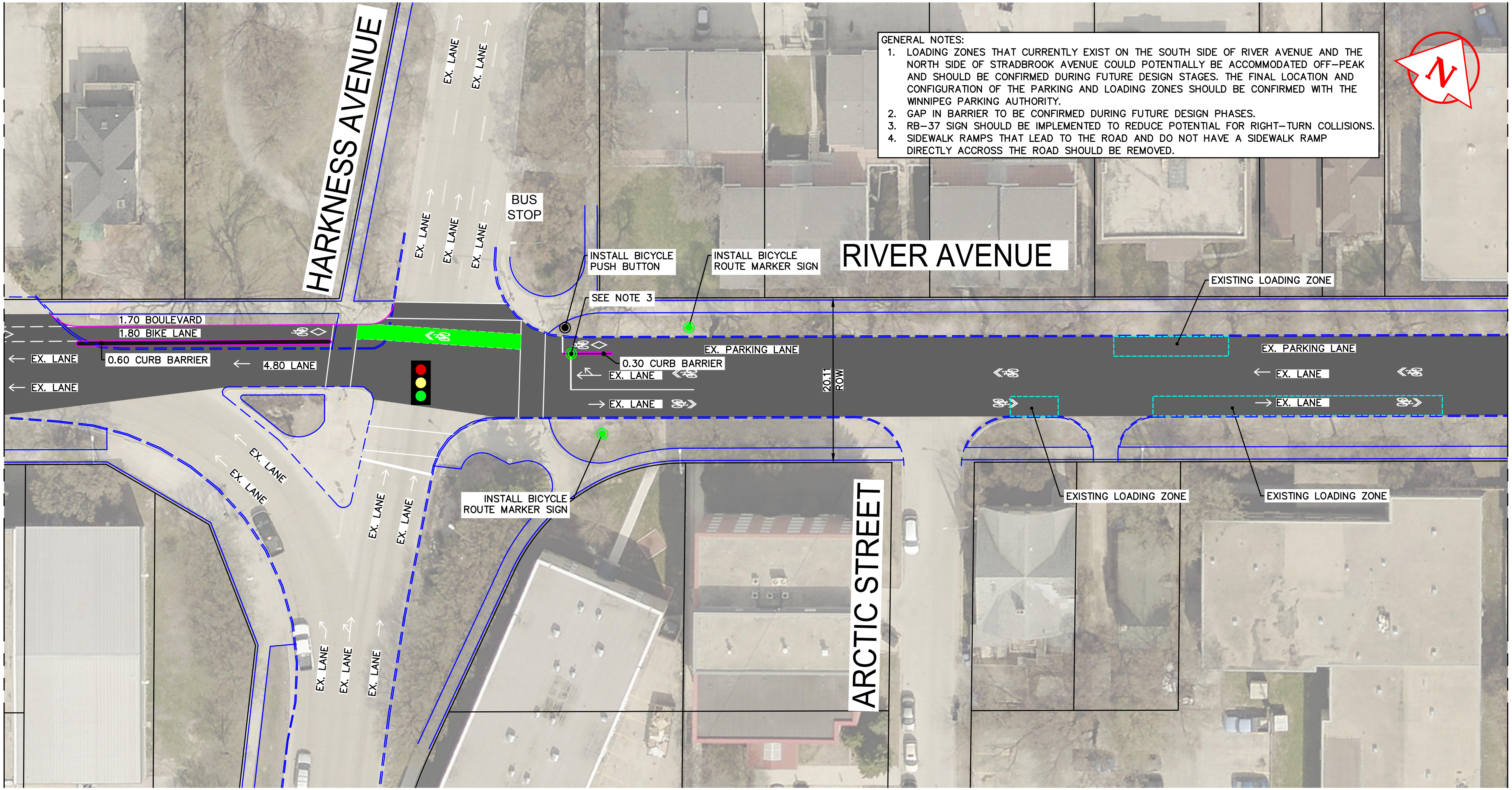
See Figure 7.1.6



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See Figure 7.1.8

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
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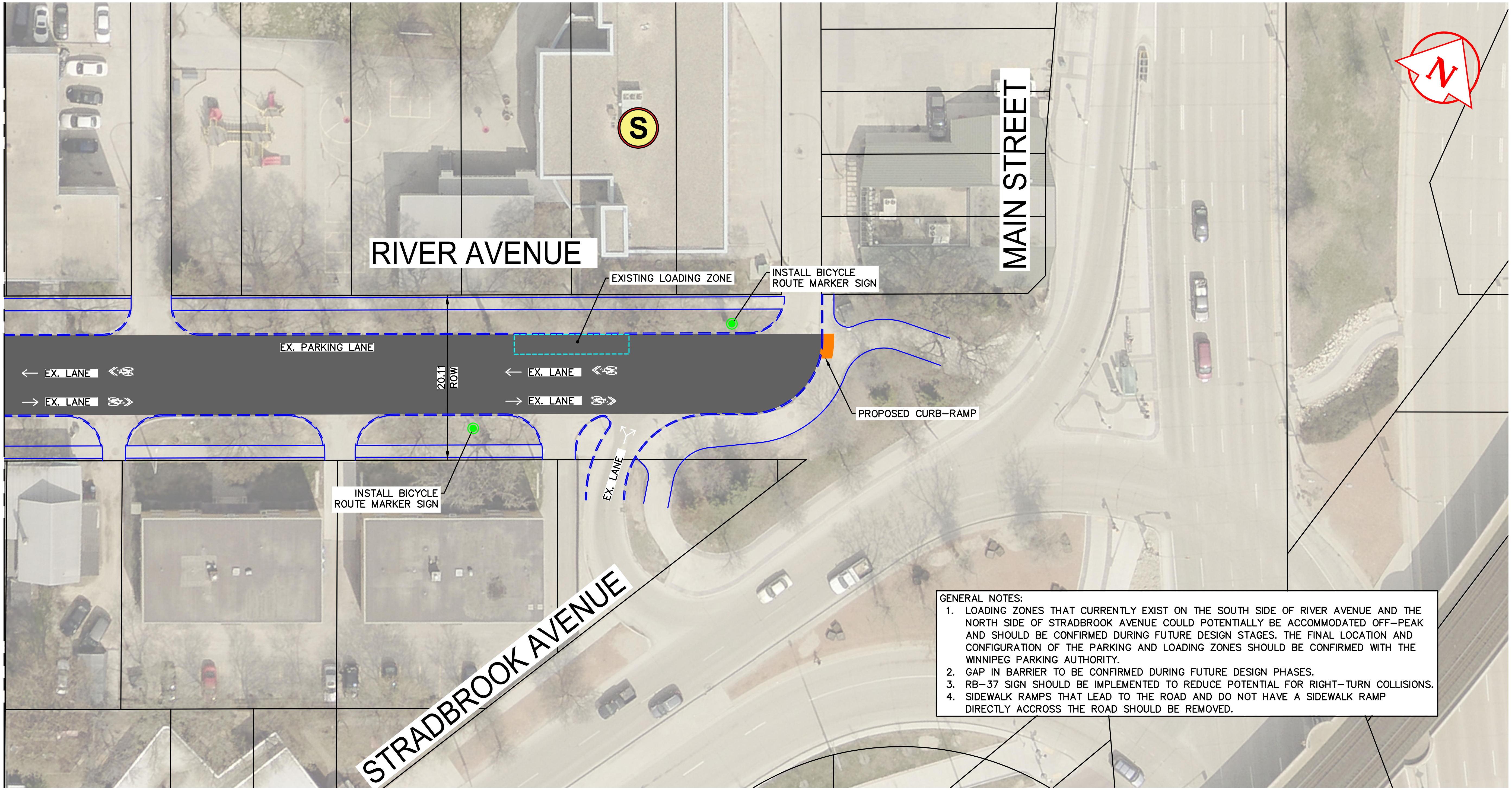
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 River Ave_Nassau to Main_Plan.dwg –tab:Figure 7.1.7

See Figure 7.1.7



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LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
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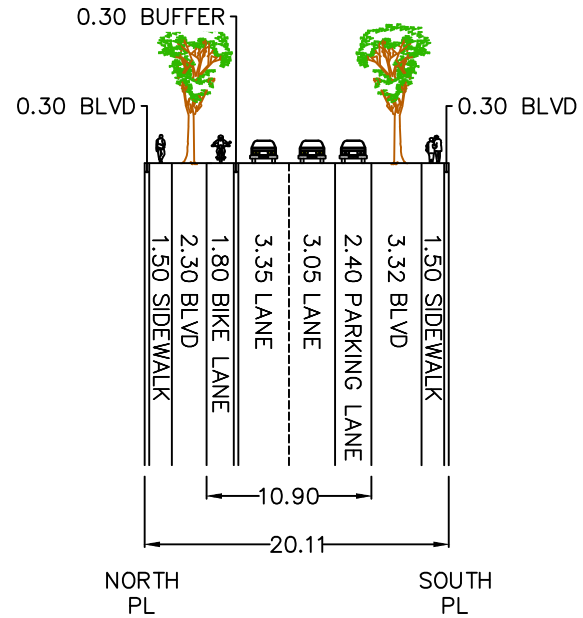
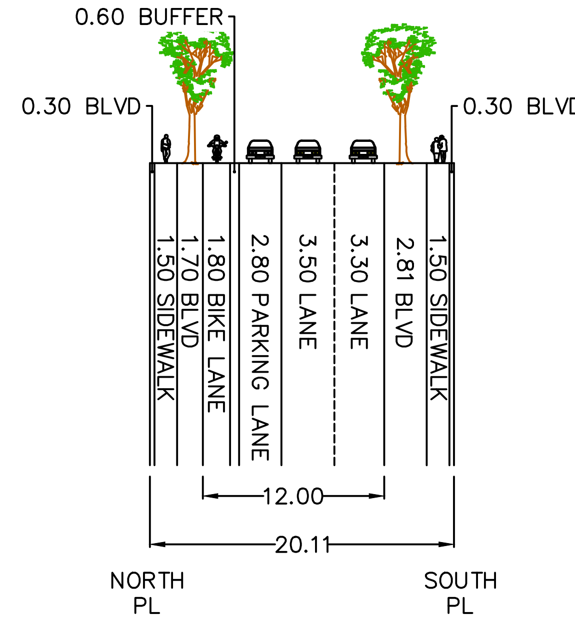
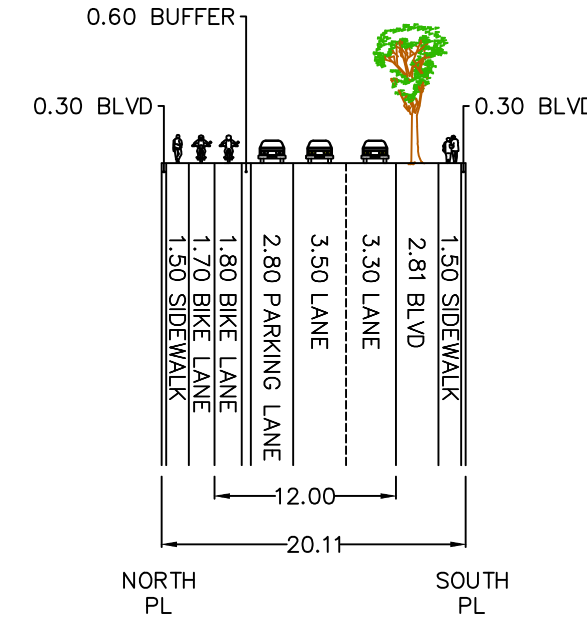
Aug 02, 2019 – 10:29am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 River Ave_Nassau to Main_Plan.dwg –tab:Figure 7.1.8



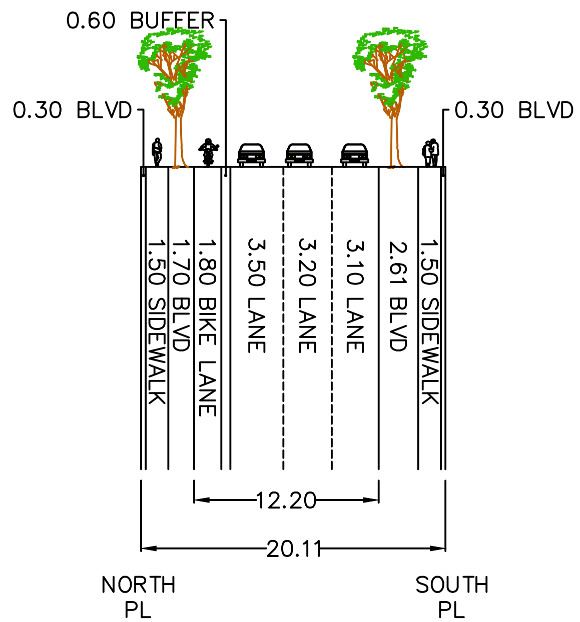
RIVER AVENUE
(NASSAU ST. TO OSBORNE ST.)



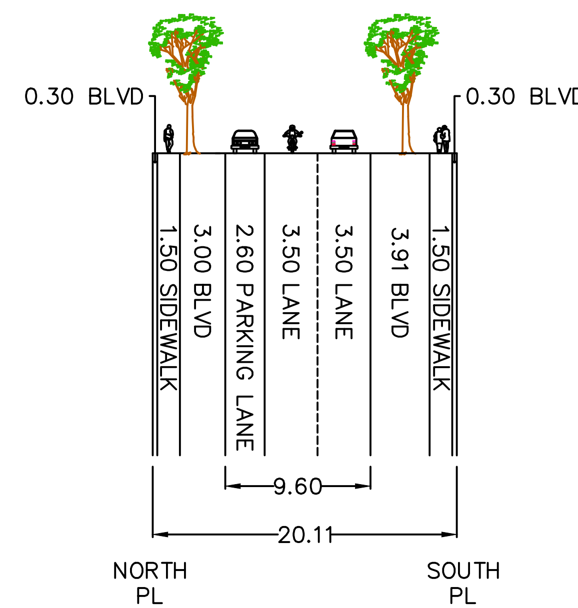
RIVER AVENUE
(OSBORNE ST. TO SCOTT ST.)



RIVER AVENUE
(SCOTT ST. TO FORT ROUGE PARK)



RIVER AVENUE
(DONALD ST. TO HARKNESS AV.)



RIVER AVENUE
(HARKNESS AV. TO MAIN ST.)

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

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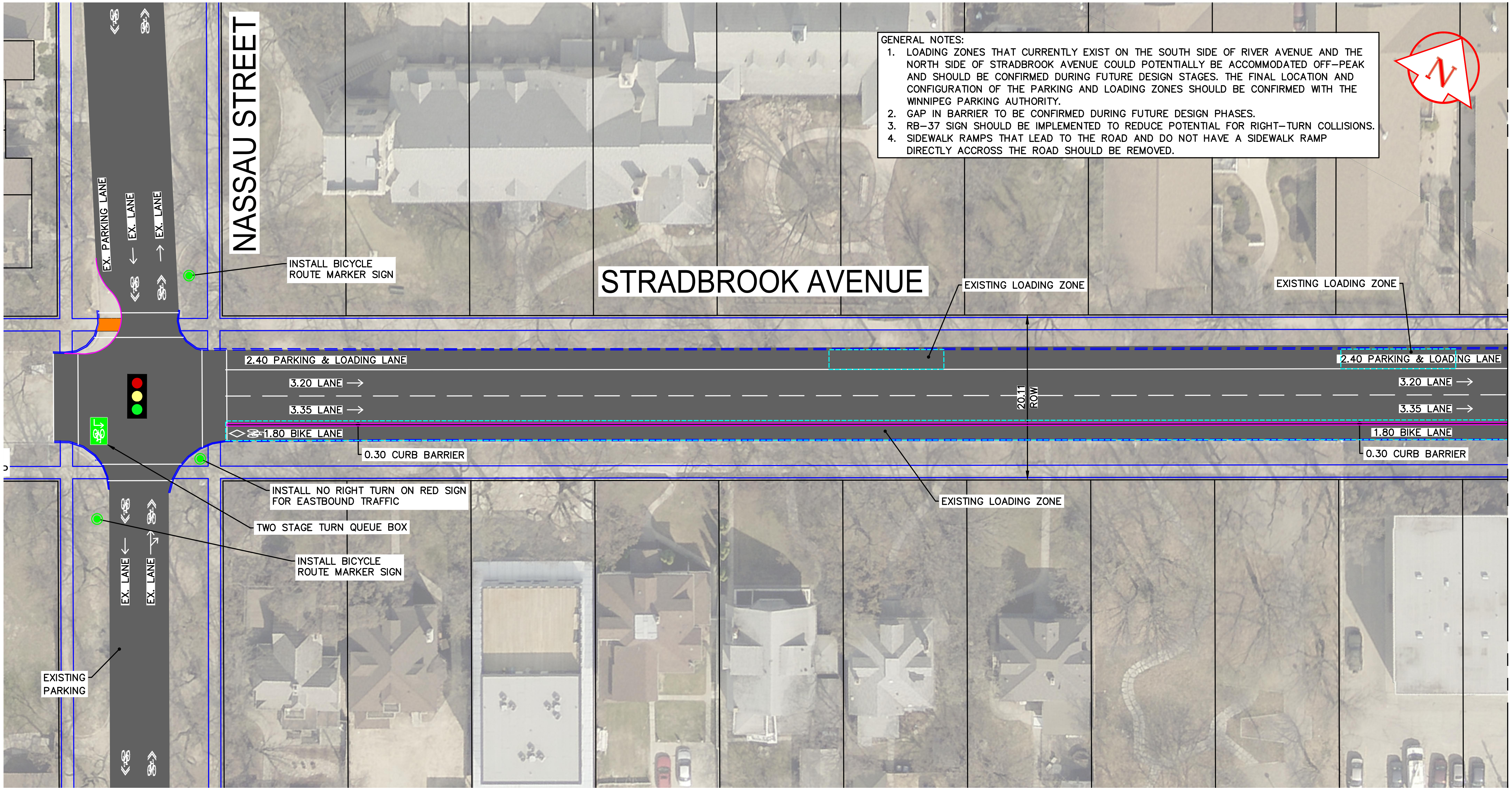
THE CITY OF WINNIPEG
OSBORNE TO DOWNTOWN WALK BIKE BRIDGE CONNECTIONS
TYPICAL CROSS SECTIONS ON RIVER AVENUE
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	8/28/2018	Figure 7.1.9

Aug 02, 2019 – 10:47am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Typical Cross Sections.dwg –tab:Figure 7.1.9



See Figure 7.2.2

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)

RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

METRIC

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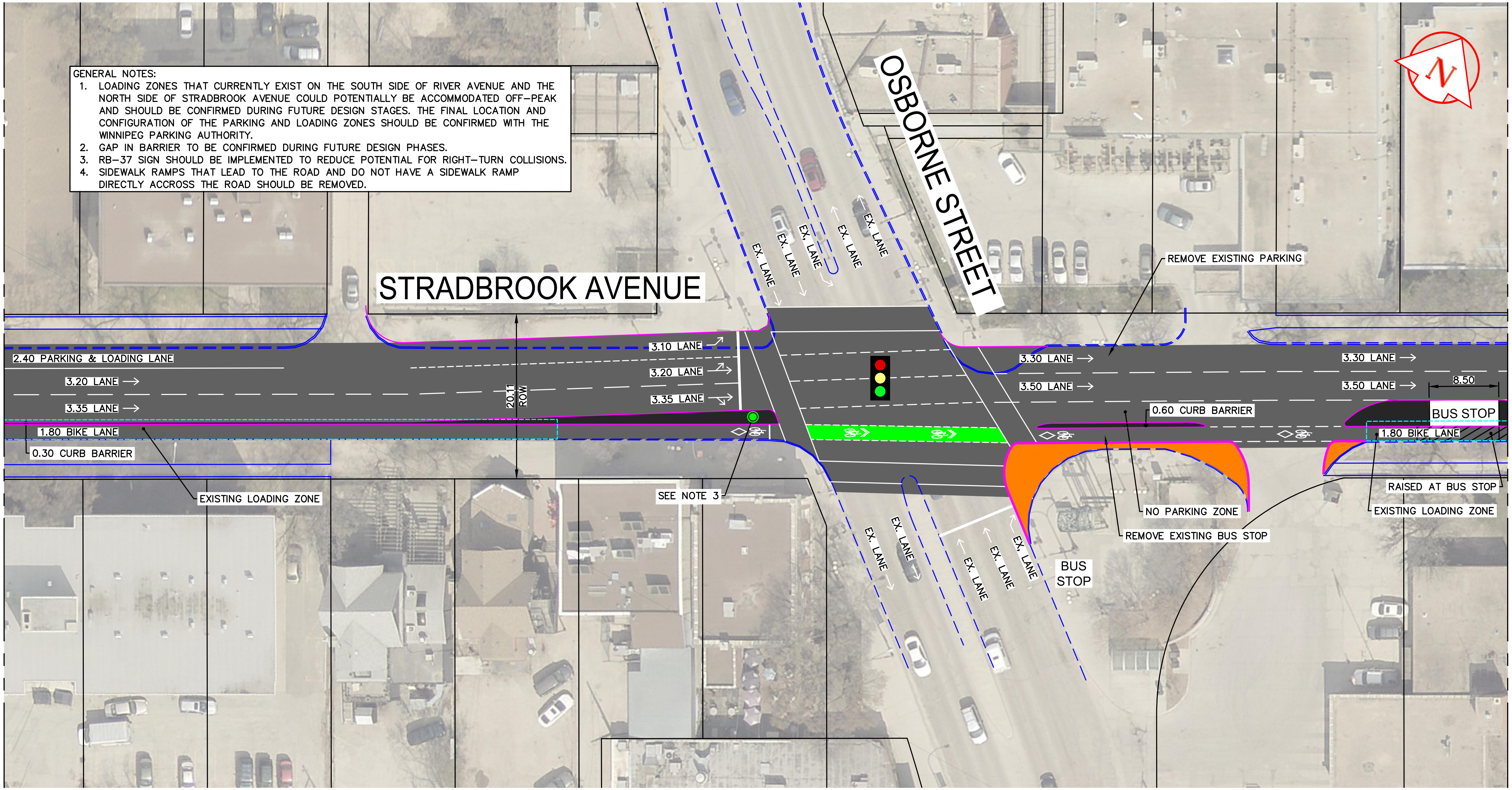
OSBORNE TO DOWNTOWN WALK BIKE BRIDGE & CONNECTIONS
STRADBROOK AVENUE (NASSAU STREET TO HARKNESS STATION)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/14/2019	Figure 7.2.1

Aug 02, 2019 – 10:38am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Stradbrook Ave_Nassau to Donald_Plan.dwg –tab:Figure 7.2.1

GENERAL NOTES:
1. LOADING ZONES THAT CURRENTLY EXIST ON THE SOUTH SIDE OF RIVER AVENUE AND THE NORTH SIDE OF STRADBROOK AVENUE COULD POTENTIALLY BE ACCOMMODATED OFF–PEAK AND SHOULD BE CONFIRMED DURING FUTURE DESIGN STAGES. THE FINAL LOCATION AND CONFIGURATION OF THE PARKING AND LOADING ZONES SHOULD BE CONFIRMED WITH THE WINNIPEG PARKING AUTHORITY.
2. GAP IN BARRIER TO BE CONFIRMED DURING FUTURE DESIGN PHASES.
3. RB–37 SIGN SHOULD BE IMPLEMENTED TO REDUCE POTENTIAL FOR RIGHT–TURN COLLISIONS.
4. SIDEWALK RAMPS THAT LEAD TO THE ROAD AND DO NOT HAVE A SIDEWALK RAMP DIRECTLY ACCROSS THE ROAD SHOULD BE REMOVED.

See Figure 7.2.1



See Figure 7.2.3

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)

RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

METRIC

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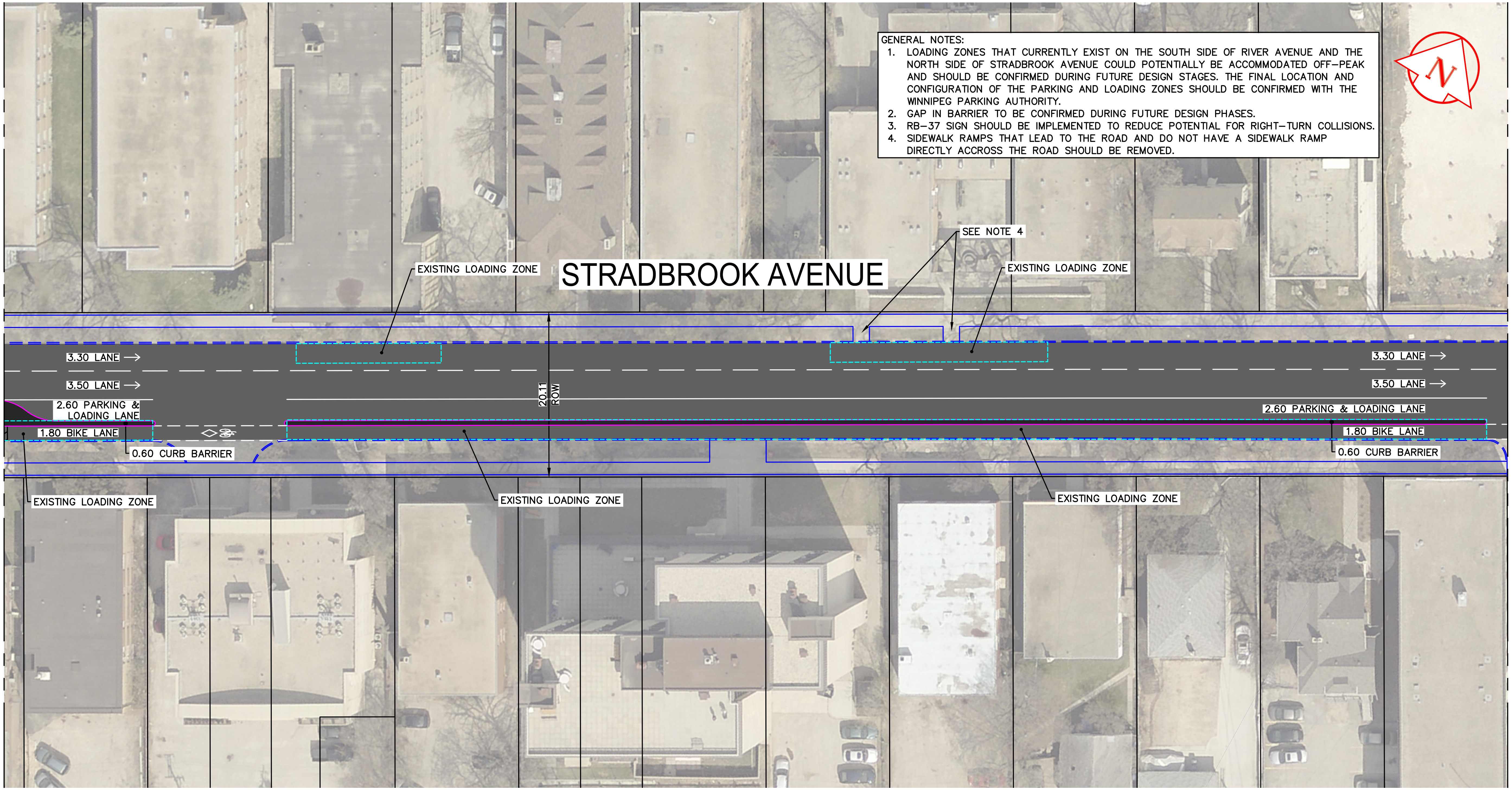
STRADBROOK AVENUE (NASSAU STREET TO HARKNESS STATION)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/14/2019	Figure 7.2.2

Aug 02, 2019 – 10:39am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Stradbrook Ave_Nassau to Donald_Plan.dwg –tab:Figure 7.2.2



See Figure 7.2.2

See Figure 7.2.4

GENERAL NOTES:
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NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
- EXISTING SIDEWALK
- EXISTING CURB AND GUTTER
- EXISTING LOADING ZONE
- PROPOSED CURB (FOC)
- RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

METRIC

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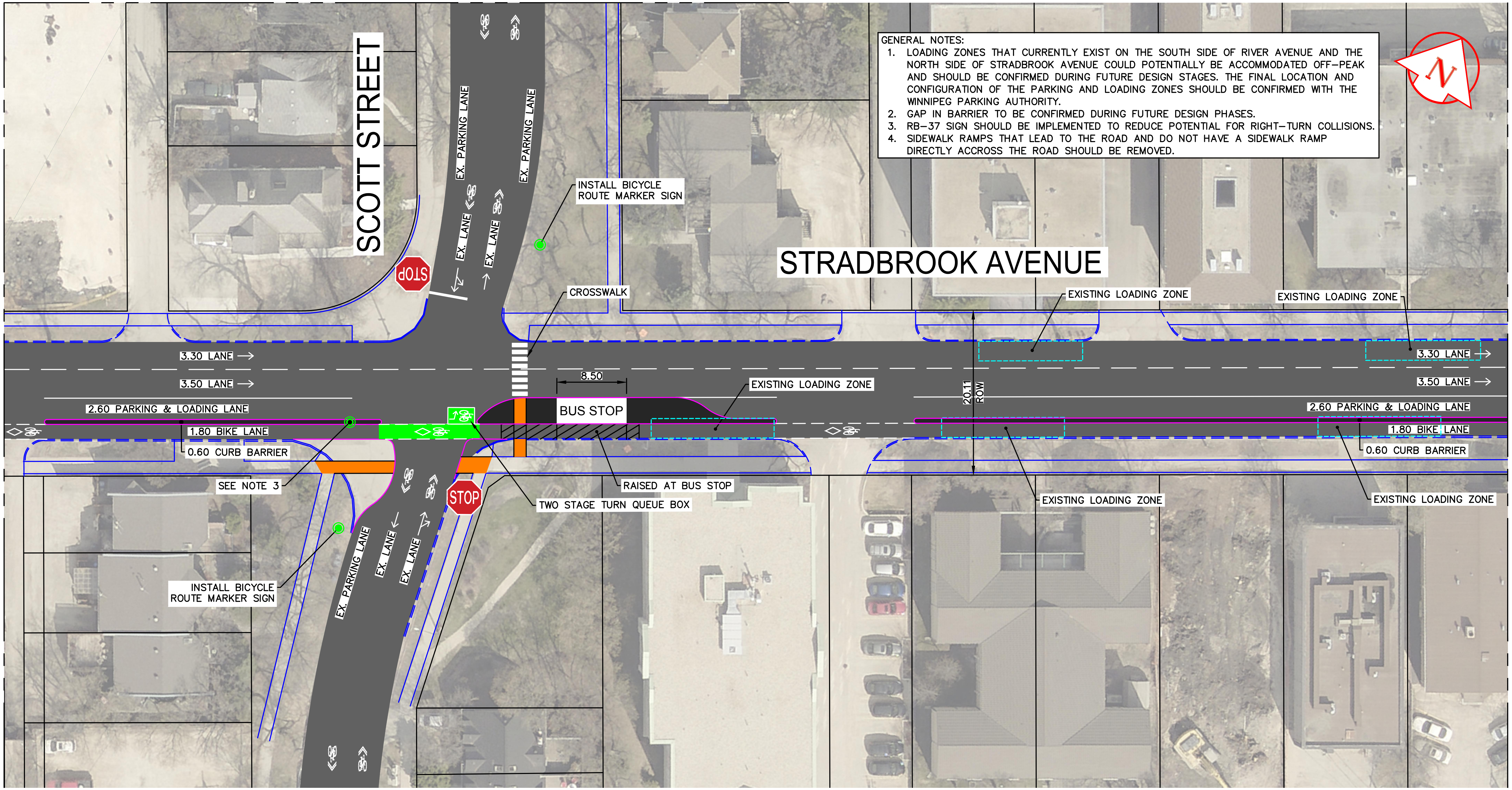
STRADBROOK AVENUE (NASSAU STREET TO HARKNESS STATION)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/14/2019	Figure 7.2.3

Aug 02, 2019 – 10:40am P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Stradbrook Ave_Nassau to Donald_Plan.dwg -tab:Figure 7.2.3

See Figure 7.4.2



See Figure 7.2.3

See Figure 7.2.5

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)

RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

METRIC
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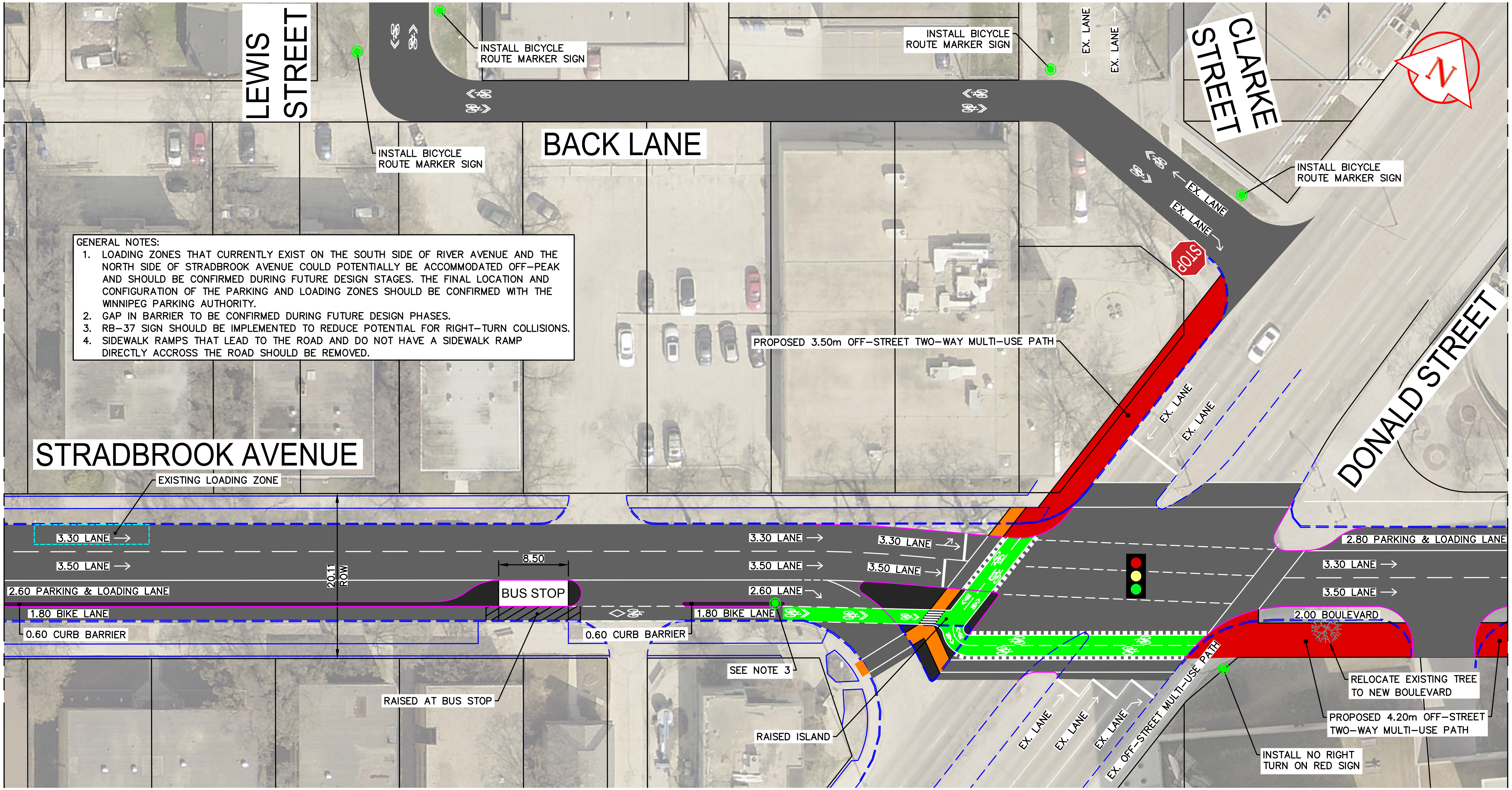
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/14/2019	Figure 7.2.4

Aug 02, 2019 - 10:41am P:\2017\17M-02210-00 - McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Stradbrook Ave_Nassau to Donald_Plan.dwg -tab:Figure 7.2.4



GENERAL NOTES:

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LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
- EXISTING SIDEWALK
- EXISTING CURB AND GUTTER
- EXISTING LOADING ZONE
- PROPOSED CURB (FOC)
- RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

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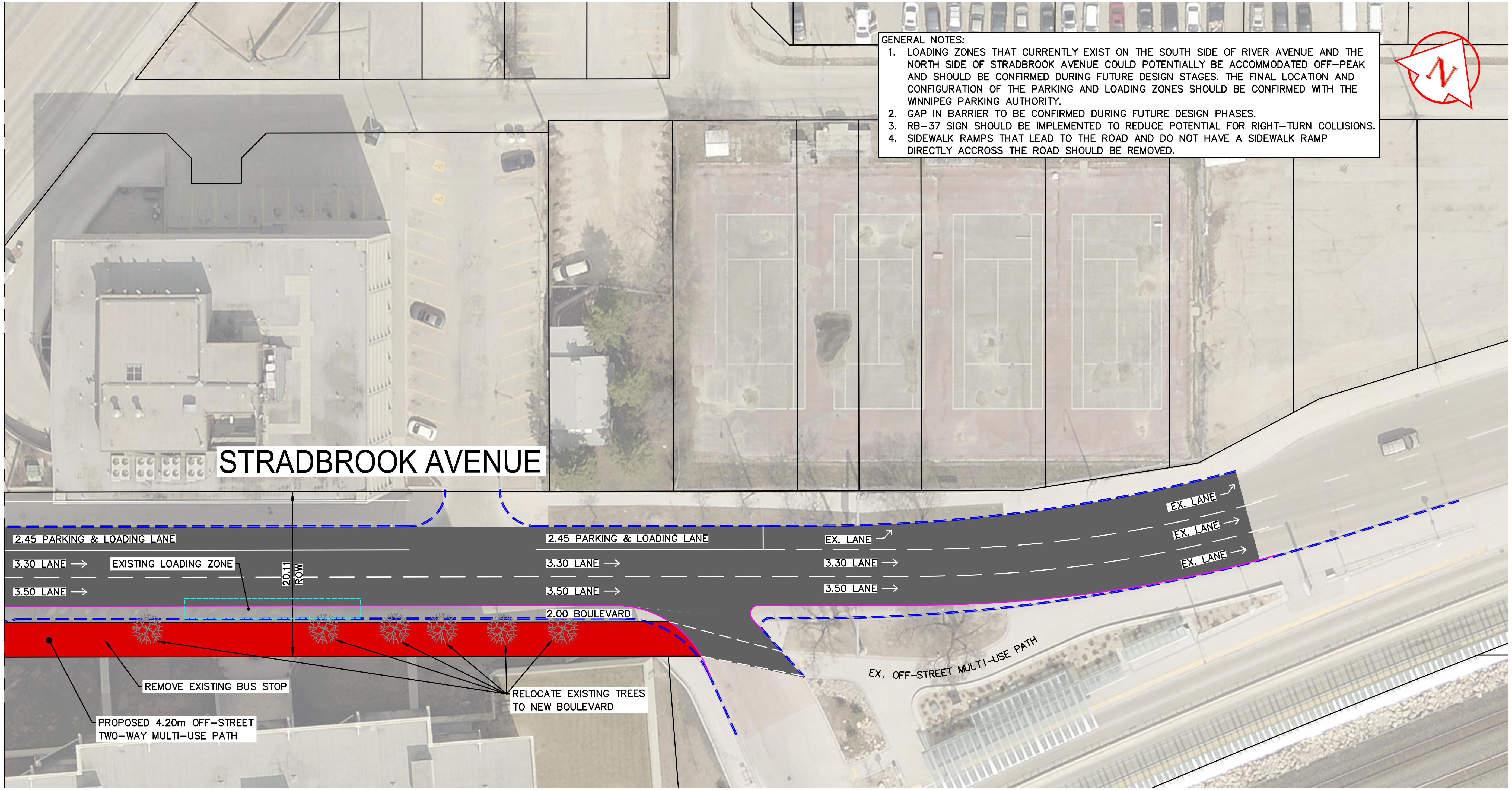
STRADBROOK AVENUE (NASSAU STREET TO HARKNESS STATION)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/14/2019	Figure 7.2.5

Aug 02, 2019 – 10:41am – McFadyen
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Stradbrook Ave_Nassau to Donald_Plan.dwg –tab:Figure 7.2.5

See Figure 7.2.5



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LEGEND
- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
- EXISTING SIDEWALK
- EXISTING CURB AND GUTTER
- EXISTING LOADING ZONE
- PROPOSED CURB (FOC)
- RB-37 (TURNING VEHICLES TO YIELD TO BICYCLES SIGN)

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STRADBROOK AVENUE (NASSAU STREET TO HARKNESS STATION)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/14/2019	Figure 7.2.6

Aug 02, 2019 – 10:42am
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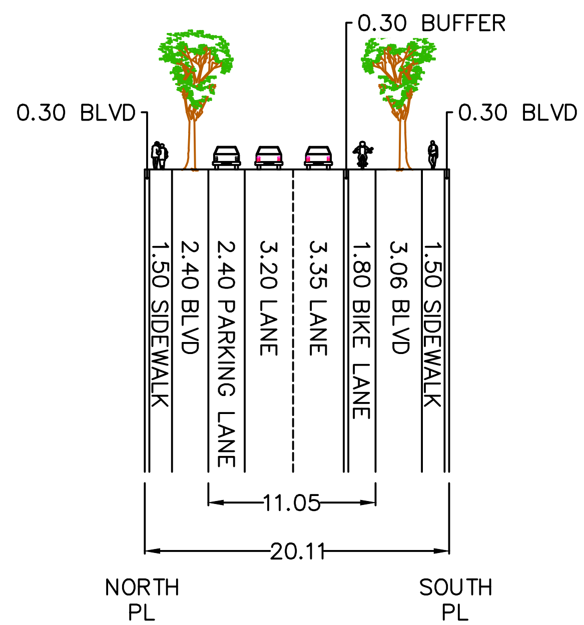
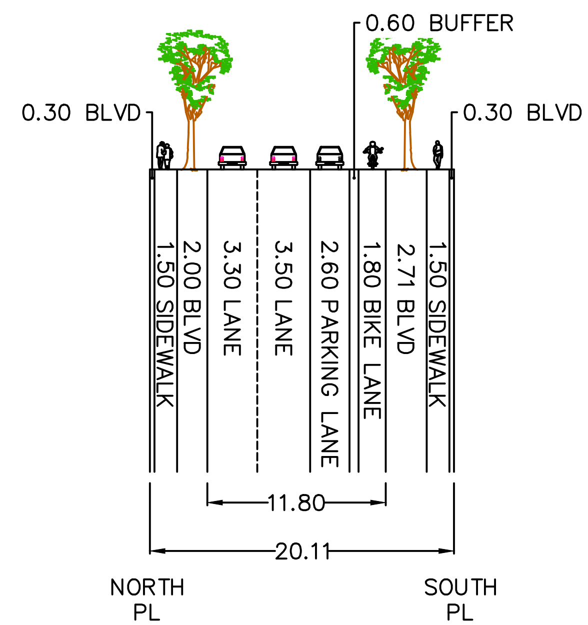
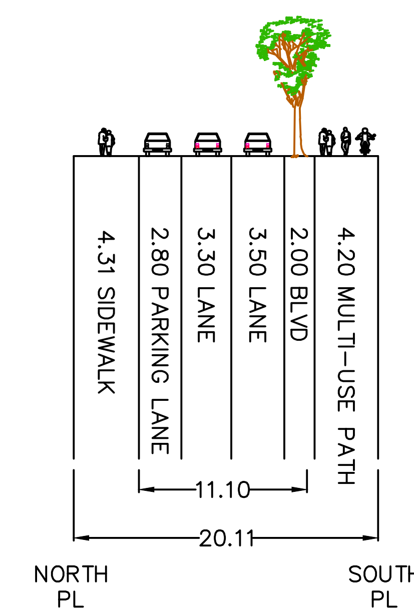


STRADBROOK AVENUE
(NASSAU ST. TO OSBORNE ST.)



STRADBROOK AVENUE
(OSBORNE ST. TO DONALD ST.)



STRADBROOK AVENUE
(DONALD ST. TO HARKNESS STATION)

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OSBORNE TO DOWNTOWN WALK BIKE BRIDGE CONNECTIONS
TYPICAL CROSS SECTIONS ON STRADBROOK AVENUE
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	8/28/2018	Figure 7.2.7

Aug 02, 2019 – 10:47am
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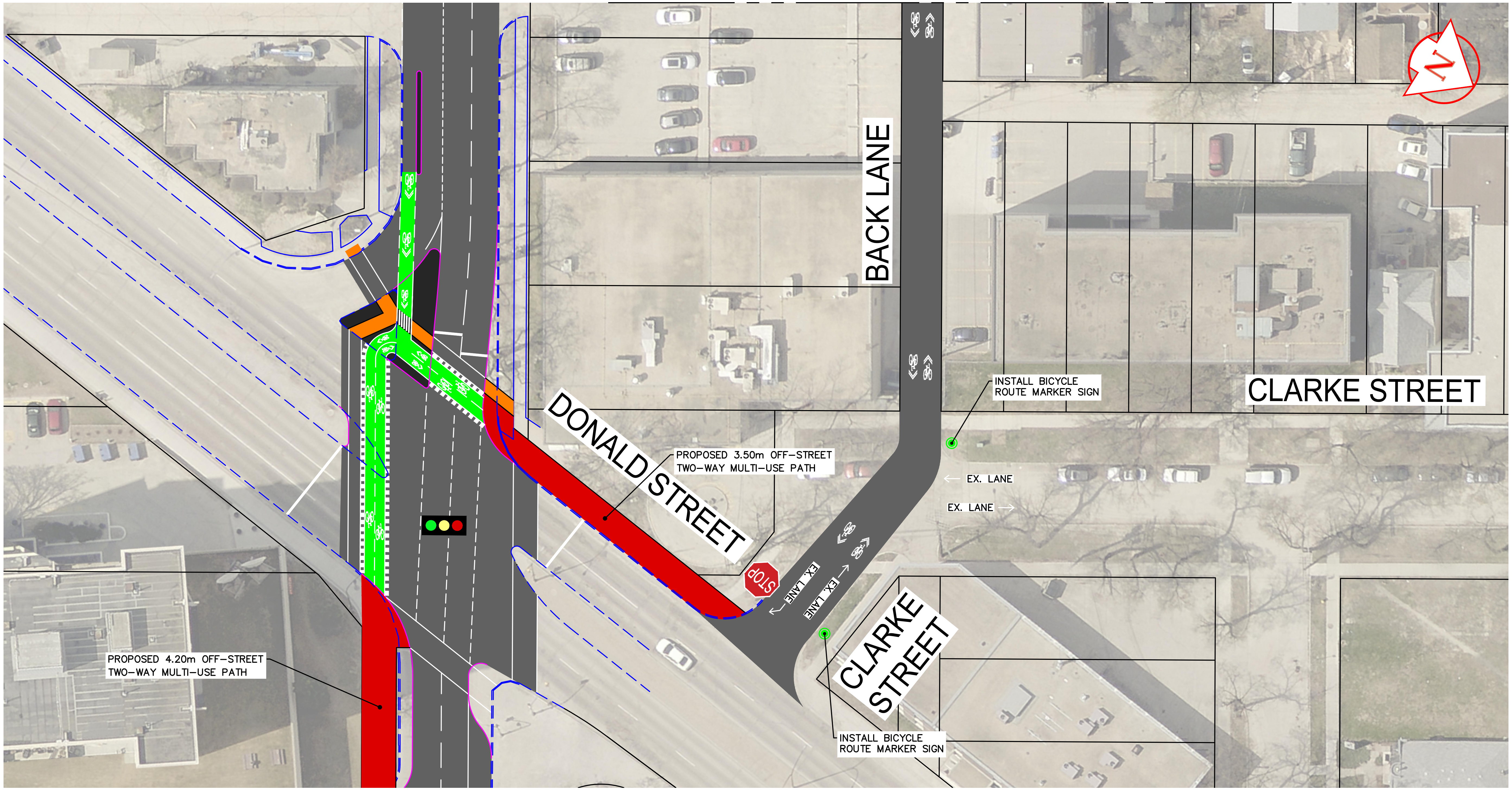
See Figure 7.3.2



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LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)

METRIC

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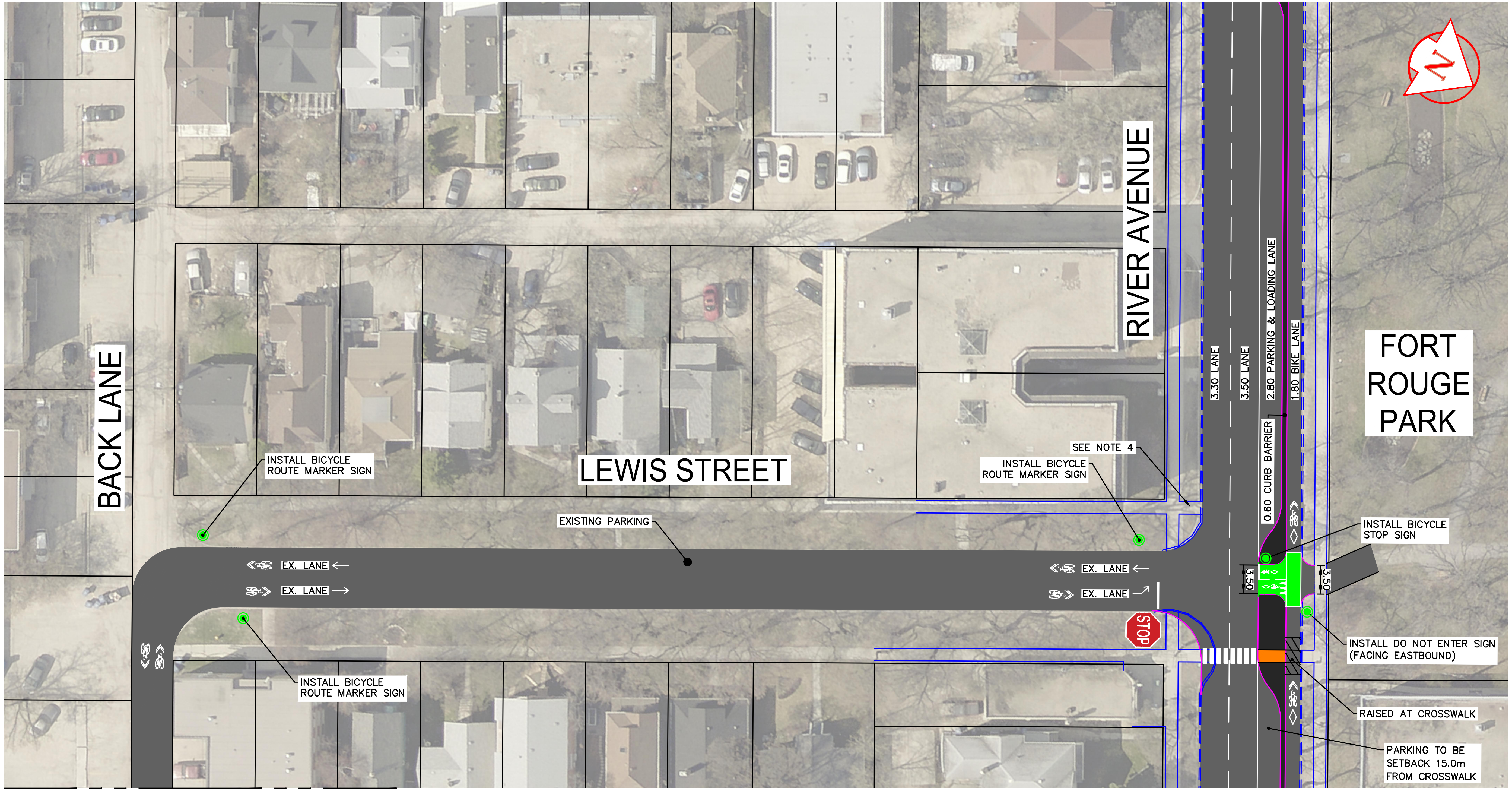
CLARKE ST., BACK LANE, LEWIS ST. (DONALD ST. TO RIVER AVE.)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/8/2019	Figure 7.3.1

Aug 02, 2019 – 10:09am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Clarke Street-Back Lane-Lewis Street_Donald to River_Plan.dwg –tab:Figure 7.3.1



See Figure 7.3.1

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS	STOP SIGN	EXISTING SIDEWALK
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION	PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
GREEN SURFACE TREATMENT	SCHOOL	PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN	RAISED PAVEMENT	PROPOSED CURB (FOC)

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CLARKE ST., BACK LANE, LEWIS ST. (DONALD ST. TO RIVER AVE.)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/8/2019	Figure 7.3.2

Aug 02, 2019 – 10:17am
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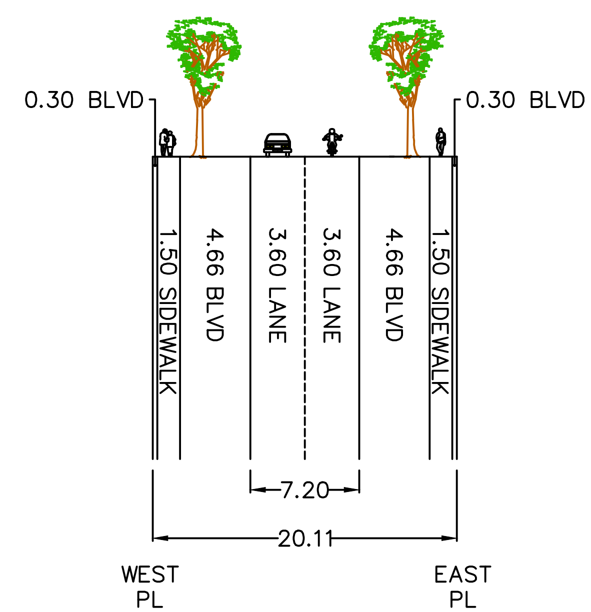

LEWIS STREET

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TYPICAL CROSS SECTION ON LEWIS STREET
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	8/28/2018	Figure 7.3.3

Aug 02, 2019 – 10:48am
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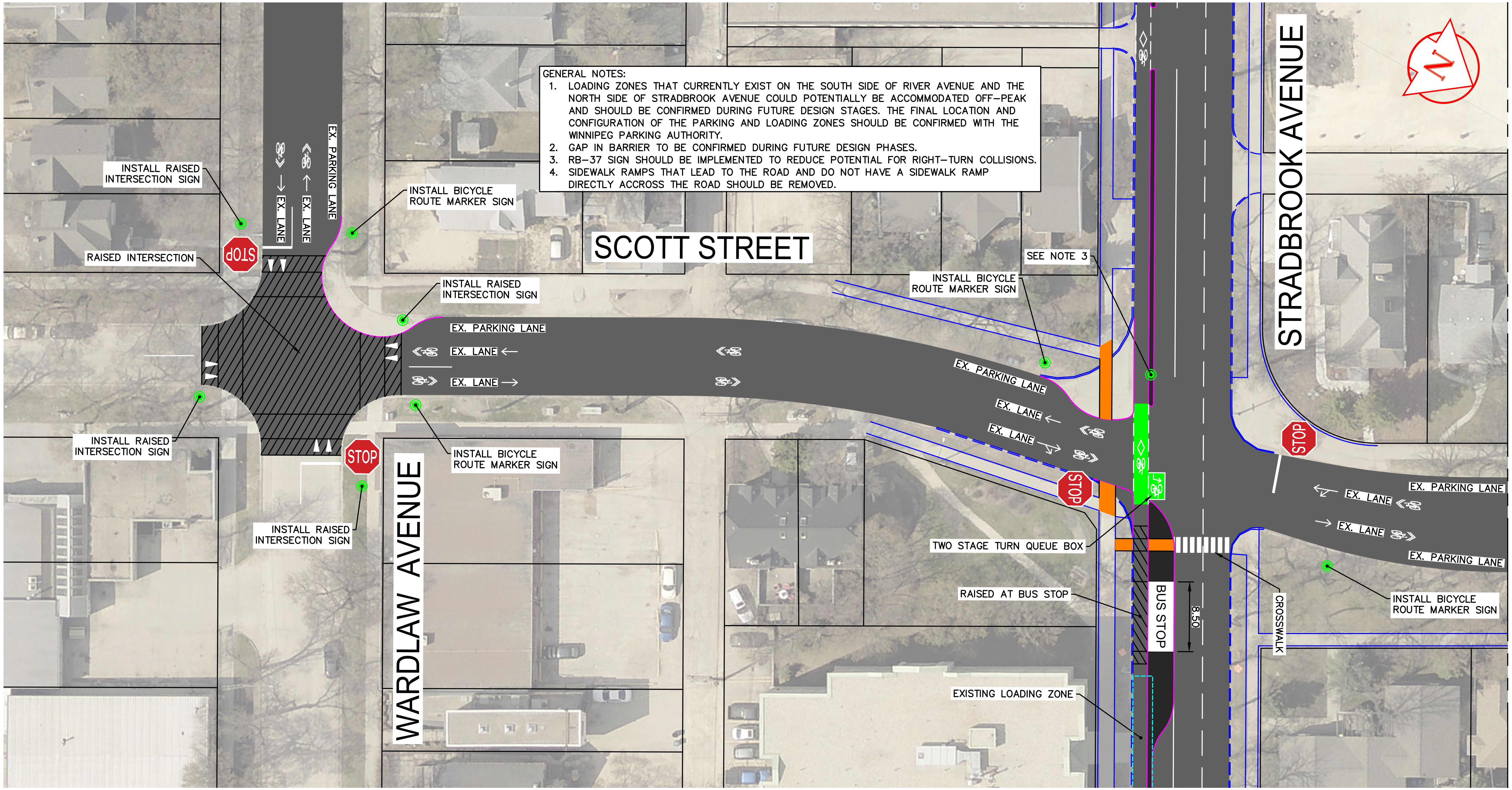

GENERAL NOTES:

1. LOADING ZONES THAT CURRENTLY EXIST ON THE SOUTH SIDE OF RIVER AVENUE AND THE NORTH SIDE OF STRADBROOK AVENUE COULD POTENTIALLY BE ACCOMMODATED OFF-PEAK AND SHOULD BE CONFIRMED DURING FUTURE DESIGN STAGES. THE FINAL LOCATION AND CONFIGURATION OF THE PARKING AND LOADING ZONES SHOULD BE CONFIRMED WITH THE WINNIPEG PARKING AUTHORITY.
2. GAP IN BARRIER TO BE CONFIRMED DURING FUTURE DESIGN PHASES.
3. RB-37 SIGN SHOULD BE IMPLEMENTED TO REDUCE POTENTIAL FOR RIGHT-TURN COLLISIONS.
4. SIDEWALK RAMPS THAT LEAD TO THE ROAD AND DO NOT HAVE A SIDEWALK RAMP DIRECTLY ACCROSS THE ROAD SHOULD BE REMOVED.

See Figure 7.4.2

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS	STOP SIGN	EXISTING SIDEWALK
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION	PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
GREEN SURFACE TREATMENT	SCHOOL	PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN	RAISED PAVEMENT	PROPOSED CURB (FOC)

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THE CITY OF WINNIPEG
OSBORNE TO DOWNTOWN WALK BIKE BRIDGE & CONNECTIONS
SCOTT STREET (WARDLAW AVENUE TO RIVER AVENUE)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/20/2019	Figure 7.4.1

Aug 02, 2019 – 10:32am
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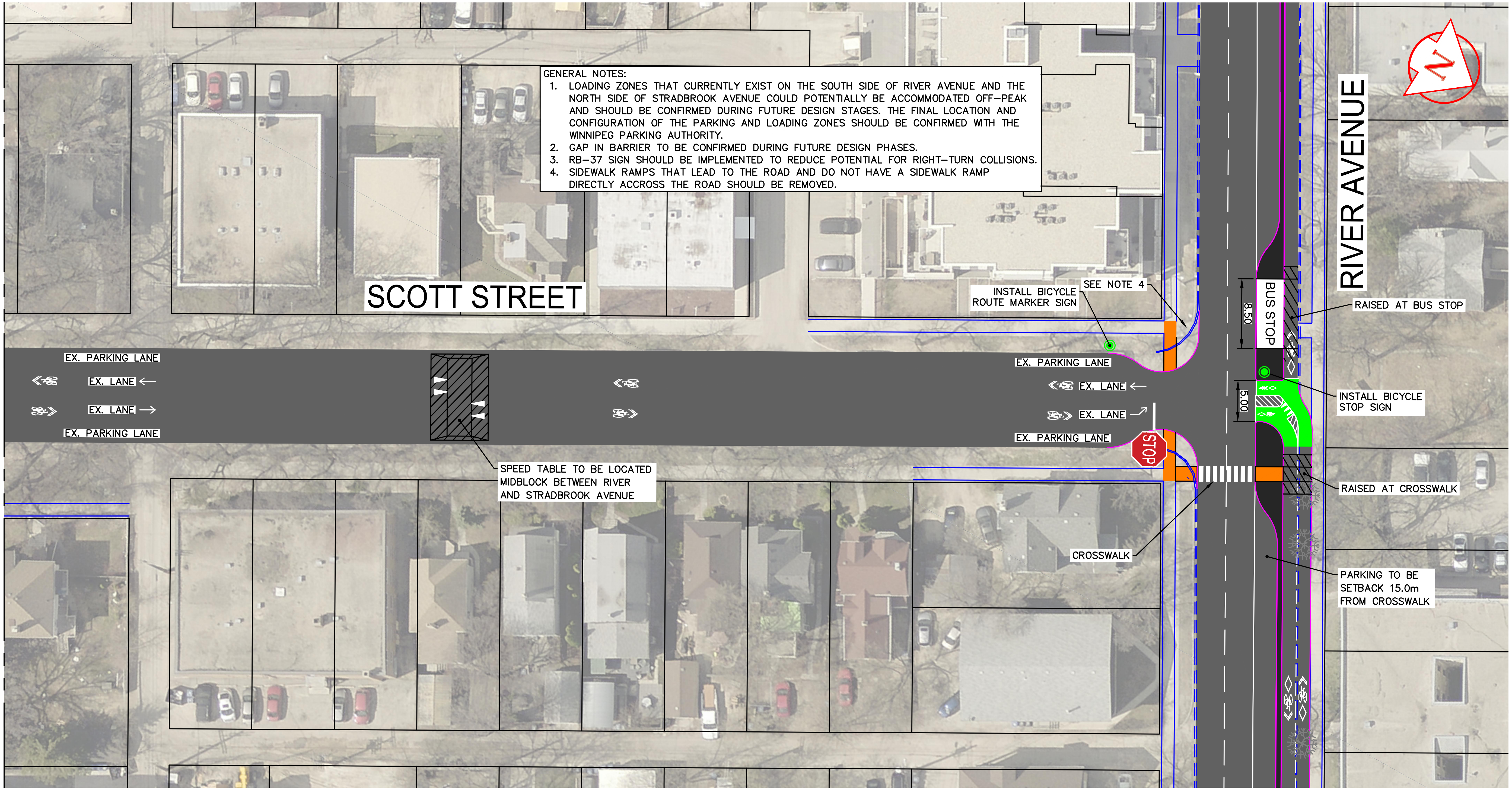

See Figure 7.4.1

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION
GREEN SURFACE TREATMENT	SCHOOL
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN
STOP SIGN	EXISTING SIDEWALK
PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
RAISED PAVEMENT	PROPOSED CURB (FOC)

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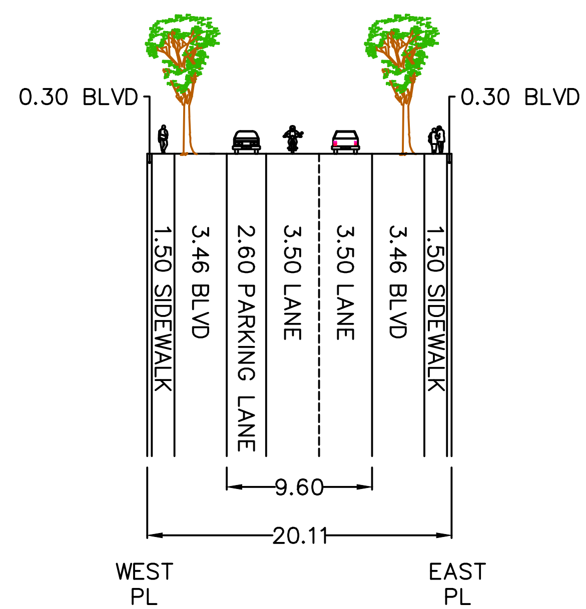
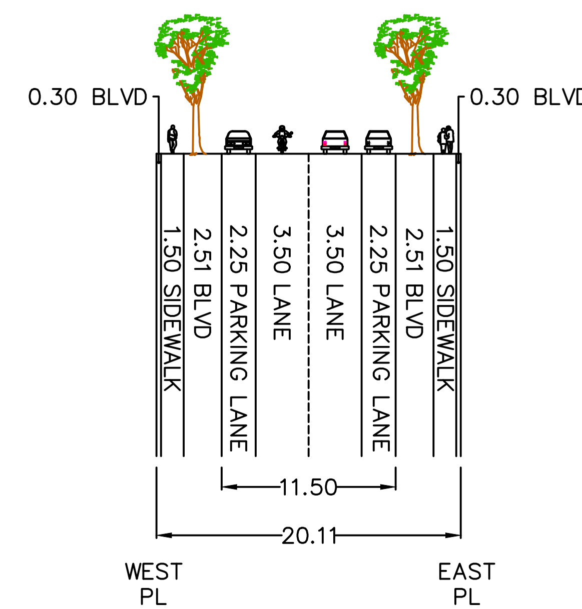
SCALE:	DATE:	DWG. No.
1:500	3/20/2019	Figure 7.4.2



SCOTT STREET
(WARDLAW AV. TO STRADBROOK AV.)



SCOTT STREET
(STRADBROOK AV. TO RIVER AV.)

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

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TYPICAL CROSS SECTIONS ON SCOTT STREET
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	8/28/2018	Figure 7.4.3

See Figure 7.5.2

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS	STOP SIGN	EXISTING SIDEWALK
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION	PROPOSED SIDEWALK	EXISTING CURB AND GUTTER
GREEN SURFACE TREATMENT	SCHOOL	PROPOSED OFF-STREET MUTI-USE PATH	EXISTING LOADING ZONE
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN	RAISED PAVEMENT	PROPOSED CURB (FOC)

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WARDLAW AVENUE (NASSAU STREET TO SCOTT STREET)
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/8/2019	Figure 7.5.1

Aug 02, 2019 – 10:43am
P:\2017\17M-02210-00 – McFadyen Ped Bridge PD\WSP Drawings\Functional Design\17M-02210-00 Wardlaw Ave_Nassau to Scott_Plan.dwg –tab:Figure 7.5.1

See Figure 7.5.1

See Figure 7.5.3

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
- RAISED PAVEMENT
- EXISTING SIDEWALK
- EXISTING CURB AND GUTTER
- EXISTING LOADING ZONE
- PROPOSED CURB (FOC)

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FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/8/2019	Figure 7.5.2

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See Figure 7.5.2

See Figure 7.5.4

NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

- SHARROW STENCIL
- BICYCLE AND DIAMOND STENCIL
- GREEN SURFACE TREATMENT
- BIKE ROUTE PAVED SURFACE
- PROPOSED SIGNS
- SIGNALIZED INTERSECTION
- SCHOOL
- PROPOSED MEDIAN
- STOP SIGN
- PROPOSED SIDEWALK
- PROPOSED OFF-STREET MUTI-USE PATH
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SCALE:	DATE:	DWG. No.
1:500	3/8/2019	Figure 7.5.3

Aug 02, 2019 – 10:45am
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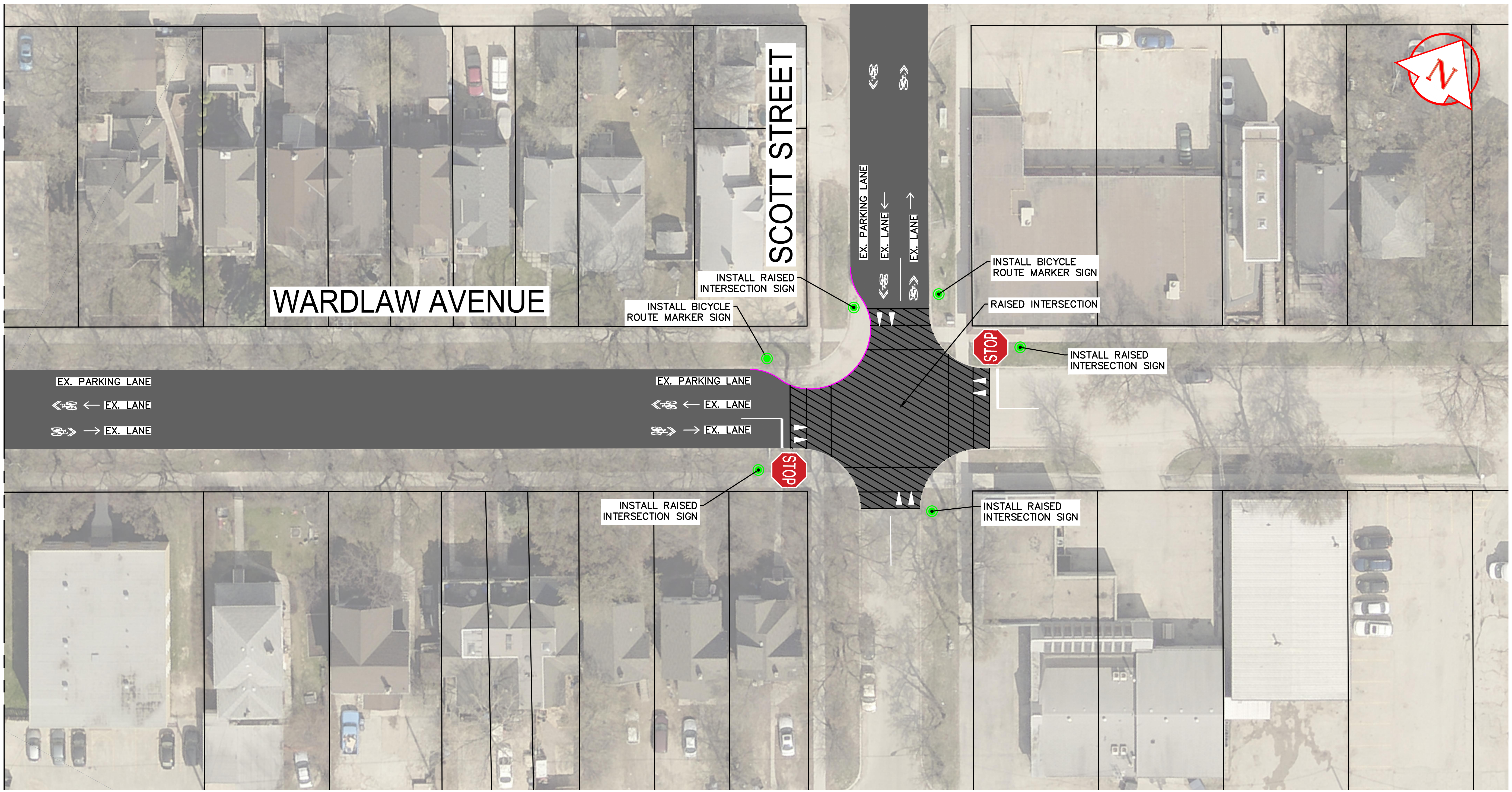
See Figure 7.5.3



NOTE: ALL DIMENSIONS ARE FACE OF CURB UNLESS OTHERWISE SPECIFIED.

LEGEND

SHARROW STENCIL	PROPOSED SIGNS	STOP SIGN
BICYCLE AND DIAMOND STENCIL	SIGNALIZED INTERSECTION	PROPOSED SIDEWALK
GREEN SURFACE TREATMENT	SCHOOL	PROPOSED OFF-STREET MUTI-USE PATH
BIKE ROUTE PAVED SURFACE	PROPOSED MEDIAN	RAISED PAVEMENT

EXISTING SIDEWALK
EXISTING CURB AND GUTTER
EXISTING LOADING ZONE
PROPOSED CURB (FOC)

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FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	3/8/2019	Figure 7.5.4

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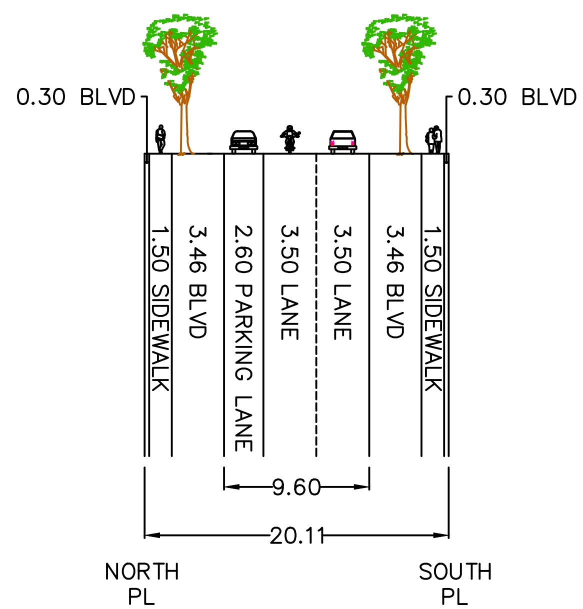
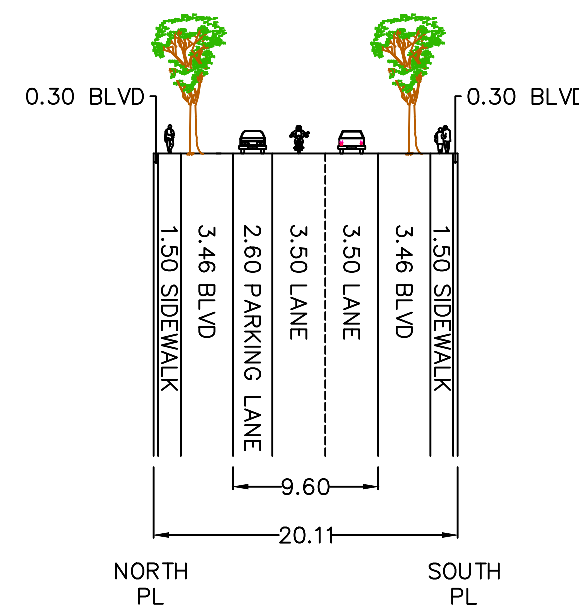


WARDLAW AVENUE
(NASSAU ST. TO OSBORNE ST.)



WARDLAW AVENUE
(OSBORNE ST. TO SCOTT ST.)

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TYPICAL CROSS SECTIONS ON WARDLAW AVENUE
FUNCTIONAL DESIGN STUDY

SCALE:	DATE:	DWG. No.
1:500	8/28/2018	Figure 7.5.5

7.3 INTERSECTIONS

RIVER AVENUE & STRADBROOK AVENUE AT NASSAU STREET

For the signalized intersections on River Avenue and Stradbrook Avenue at Nassau Street, it is recommended that a two-stage turn queue box be incorporated to provide a safe opportunity for cyclists to make a left-turn from River Avenue to Nassau Street and from Nassau Street to Stradbrook Avenue.

At River Avenue and Nassau Street, the two-stage turn queue box is located behind the north curb in front of the crosswalk. Due to space constraints, it is unlikely that it could be enhanced beyond a painted queue box as there is not enough room for protective elements.

At Stradbrook Avenue and Nassau Street, a curb bulb-out on Nassau Street (at the northwest corner) was added as an additional protective element to define the end of the parking lane and provide a space for the two-stage turn queue box. The queue box is located behind the west curb and in front of the crosswalk.

Figures 7.1.1 and **7.2.1** show the proposed intersection treatments for River Avenue and Stradbrook Avenue at Nassau Street.

RIVER AVENUE & STRADBROOK AVENUE AT OSBORNE STREET

For the signalized intersections on River Avenue and Stradbrook Avenue at Osborne Street, it is recommended that pavement markings (with green paint) that indicate the path for cyclists be added through the intersection. This treatment improves the safety of the intersection by increasing the visibility of the bicycle lane, identifying conflict areas and reinforcing that cyclists have priority in these conflict areas.

A RB-37 (Turning Vehicles Yield to Bicycles) sign should be added to both intersections to clarify that there is a continuous bicycle lane adjacent to the shared through / right-turn lane (on Stradbrook Avenue) or right-turn lane (on River Avenue). This treatment improves the safety of the intersection by notifying drivers of the conflict area and that they must yield to cyclists.

The MassDOT Separated Bike Lane Planning and Design Guide: Chapter 6, Signals was used to determine if right turn traffic volumes warrant bicycle-specific phasing on River Avenue and Stradbrook Avenue at Osborne Street. MassDOT's warrant for time-separated bicycle movements is 150 turning vehicles on one-way roads. The a.m. and p.m. peak hour right-turn volumes on River Avenue and Stradbrook Avenue at Osborne Street are less than 150 vehicles; therefore, bicycle-specific phasing is not warranted. Vehicles may find it difficult to find safe gaps to turn when pedestrian and cyclist volumes are high. Separating vehicle turning movements from the pedestrian and cyclist movement may reduce delay and improve safety for all users. WSP recommends that the traffic and bicycle volumes be monitored at these intersections and bicycle-specific phasing be considered when the MassDOT warrant is met or if pedestrian and cyclist volumes are observed to be high.

The City of Winnipeg's Traffic Signal Department provided the following guidance for determining the most appropriate bicycle specific phasing configuration:

- Leading Bicycle Interval (LBI): Bicycle green is displayed for a short duration (e.g. 4-6s) concurrent with pedestrian "walk" display as a leading interval to allow bicycles and pedestrians the opportunity to establish right-of-way in the intersection. The following items are considered when determining whether a LBI should be implemented:
  - Multiple vehicle movements share a single lane (e.g. through-right) which limits the benefit of a leading vehicle phase.
  - Impact of reducing vehicle capacity is tolerable.
  - Leading vehicle phase does not clear enough traffic to improve situation and reduce conflicts.
- Protected Vehicle Phase: Vehicle green and/or green arrow(s) are displayed followed by an amber/red clearance interval prior to the bicycle green being displayed. Alternatively, protected vehicle phasing can be lagging and follow after the bicycle phase is terminated. The following items are considered when determining whether a Protected Vehicle Phase should be implemented:

- Multiple vehicle movements do not share a single lane.
- Vehicular volumes are near capacity and reducing vehicle capacity is not tolerable.
- Leading vehicle phase clears enough traffic to improve situation and reduce conflicts.

A protected vehicle phase would be appropriate for River Avenue at Osborne Street since there is an exclusive right-turn lane and a LBI would be appropriate for Stradbrook Avenue at Osborne Street since there is a shared through/right-turn cut-off lane and the impact of reducing vehicle capacity is tolerable. However, the right-turn volumes for both intersections are low and do not meet the MassDOT warrant for time-separated bicycle movements (both are less than 150 vehicles / hour in the peak hours); therefore implementing a LBI or protected vehicle phase is not justified at this time.**Figures 7.1.2** and **7.2.2** show the proposed intersection treatments for River Avenue and Stradbrook Avenue at Osborne Street.

RIVER AVENUE & STRADBROOK AVENUE AT SCOTT STREET

The following recommendations are made for the intersections of River Avenue and Stradbrook Avenue at Scott Street:

- Crosswalks are recommended to be located on the east side of the intersection at River Avenue and the west side of the intersection at Stradbrook Avenue to improve safety by eliminating conflicts between pedestrians and vehicles turning left from Scott Street.
- The GM crosswalk system is recommended based on TAC's Pedestrian Crossing Control Guide. The traffic signals at Donald Street/River Avenue and Osborne Street/Stradbrook Avenue effectively meter traffic heading westbound on River Avenue and eastbound on Stradbrook Avenue and provide adequate gaps for pedestrians and cyclists crossing River Avenue and Stradbrook Avenue at Scott Street. These locations should be monitored to identify if gaps in traffic are no longer sufficient for cyclists and if additional traffic control is required. The GM crosswalk system should also be monitored and if it does not perform well, a higher-level treatment system, such as Rectangular Rapid Flashing Beacon (RRFB) crosswalk system, Over-Head Flashing (OF) crosswalk system or Traffic Signal (TS) system, could be implemented at this location to improve the performance and conspicuity of the crosswalk.
- Zebra pavement markings are recommended for the crosswalks to increase the visibility of the crossing.
- Curb bulb-outs are recommended on the southwest and southeast corners of Scott Street at River Avenue and on the southwest corner of Scott Street at Stradbrook Avenue. Curb bulb-outs will improve safety by decreasing the pedestrian crossing distance (pedestrian exposure) and reducing the turning movement speeds.
- A two-stage turn queue box is recommended at the intersection of Stradbrook Avenue and Scott Street to accommodate cyclists travelling eastbound to northbound. This treatment improves cyclist's ability to safely and comfortably make left-turns, provides a formal queueing space for cyclists and reduces turning conflicts between motorists and cyclists.
- A queue area and stop-sign control for cyclists travelling southbound on Scott Street at River Avenue is recommended. This treatment improves cyclist's ability to safely and comfortably assess gaps in traffic, provides a formal queueing space for cyclists and prevents conflicts arising from cyclists queuing in the bicycle lane or crosswalk.

Figures 7.1.4 and **7.2.4** show the proposed intersection treatments for River Avenue and Stradbrook Avenue at Scott Street.

RIVER AVENUE AT LEWIS STREET

The following recommendations are made for the River Avenue and Lewis Street intersection:

- The crosswalk is recommended to be located on the east side of the intersections at River Avenue to improve safety by eliminating conflicts between pedestrians and vehicles turning left from Lewis Street.
- The GM crosswalk system is recommended based on TAC's Pedestrian Crossing Control Guide. The intersection at Donald Street and River Avenue effectively meters traffic heading westbound on River Avenue and provides adequate gaps for pedestrians and cyclists crossing River Avenue at Lewis Street. The GM crosswalk system should be monitored and if the GM System does not perform well, a higher level treatment

system, such as RRFB crosswalk system or OF crosswalk system, could be implemented at this location to improve the performance and conspicuity of the crosswalk.

- Zebra pavement markings are recommended for the crosswalk to increase the visibility of the crossing.
- A queue area and stop-sign control for cyclists travelling southbound on Lewis Street at River Avenue is recommended. This treatment improves cyclist's ability to safely and comfortably assess gaps in traffic, provides a formal queueing space for cyclists and prevents conflicts arising from cyclists queuing in the bicycle lane or crosswalk.

RIVER AVENUE & STRADBROOK AVENUE AT DONALD STREET

For the signalized intersection on River Avenue at Donald Street, it is recommended that pavement markings (with green paint) that indicate the path for cyclists be added through the intersection and right-turn cut-off. This treatment improves the safety of the intersection by increasing the visibility of the bicycle lane, identifying conflict areas and reinforcing that cyclists have priority in these conflict areas.

For the signalized intersection on Stradbrook Avenue at Donald Street, it is recommended that a protected intersection concept be implemented on the south and west legs of the intersection to provide a safe opportunity for cyclists to connect to Fort Rouge Park via the proposed off-street path along Donald Street, neighbourhood greenway on Clarke Street, bicycle friendly back lane, and neighbourhood greenway on Lewis Street. This crossing also provides a connection to the existing off-street pathway on Donald Street. Protected intersections provide:

- A corner safety island which is a raised area that provides a protected place for pedestrians and cyclists to queue;
- Forward stop bars which mark the location for cyclists to stop during a red signal indication; and
- Setback and separated pedestrian and cyclist crossings to improve sightlines and minimize conflicts.

It is also recommended that the signalized intersection on Stradbrook Avenue at Donald Street include a curb bulb-out on the north side of Stradbrook Avenue at the east pedestrian crossing to reduce the pedestrian crossing distance (pedestrian exposure).

RIVER AVENUE AT HARKNESS AVENUE

For the signalized intersection on River Avenue at Harkness Street, it is recommended that the bicycle lane begin at the east leg of the intersection with a treatment similar to that shown in **Figure 7.6**. It is recommended that pavement markings (with green paint) that indicate the path for cyclists be added through the intersection. This treatment improves the safety of the intersection by increasing the visibility of the bicycle lane, identifying conflict areas and reinforcing that cyclists have priority in these conflict areas.

Figure 7.6: Proposed Treatment for East Leg of River Avenue and Harkness Avenue

SCOTT STREET AT WARDLAW AVENUE

The collision analysis (Section 2.6) revealed a high collision rate (3.42 incidents per million entering vehicles) for the intersection of Scott Street and Wardlaw Avenue between 2012 and 2015. Collision rates exceeding 1.5 incidents per million entering vehicles for a road link are often considered as warranting further investigation. A further analysis of the collisions revealed that most of the collisions (approximately 80%) were classified as "Intersection 90 Degree" or right-angle collisions. As a result, the recommended functional design includes a raised intersection with curb bulb-outs on the northwest corner of the intersection. The raised intersection will improve safety by slowing traffic through the intersection and the curb bulb-outs will improve pedestrian safety by reducing the pedestrian crossing distance (pedestrian exposure). Adequate signage and pavement markings should be provided on Scott Street and Wardlaw Avenue to make drivers aware of the raised intersection. This is particularly important on Scott Street since the existing two-way stop control will remain and traffic on Scott Street will not be required to stop at the intersection.

WARDLAW AVENUE AT OSBORNE STREET

The functional design for the intersection of Wardlaw Avenue and Osborne Street includes a full signal with a 0.6 metre wide raised median on Osborne Street that still allows east-west through movements for cyclists. Signage currently exists at this intersection to prevent vehicles from Wardlaw Avenue from making left-turn and through movements; therefore, the addition of the median would further formalize this restriction. The full signal would be actuated by cyclists or pedestrians wanting to cross Osborne Street. This treatment would improve safety for cyclists as they would have a dedicated signal phase to safely cross Osborne Street.

7.4 PARKING AND LOADING

Changes to the existing street cross-sections are recommended on both River Avenue and Stradbrook Avenue to accommodate the proposed bicycle lanes and will impact on-street parking and loading. A permanent parking and loading lane is recommended on the north side of River Avenue and on the south side of Stradbrook Avenue. The functional design requires a net loss of approximately 75 spaces on River Avenue (due to the south parking lane being removed) and 9 spaces on Stradbrook Avenue. This estimation assumes that the loading zones that currently exist on the north side of River Avenue and Stradbrook Avenue would be accommodated in the proposed parking/loading lanes.

Parking and loading could also be accommodated on the opposite side of River Avenue and Stradbrook Avenue during off-peak periods (e.g. midday, evenings, overnight, and weekends). Adding off-peak parking to the north side of Stradbrook Avenue between Osborne Street and Donald Street would result in a net gain of approximately 53 parking spaces on Stradbrook Avenue. It is recommended that at a minimum, off-peak loading be considered for River Avenue and Stradbrook Avenue. The traffic analysis showed minimal reduction in the overall level of service of the River Avenue and Stradbrook Avenue intersections with one travel lane on River Avenue between Osborne Street and Donald Street and one travel lane on Stradbrook Avenue between Nassau Street and Donald Street during off-peak periods. However, if a vehicle stalls in the single travel lane, traffic operations would be more significantly affected than if there were two travel lanes. If parking/loading is allowed on both sides of the street, there may be locations along a block where parking and loading would need to be prohibited to allow:

- Space for emergency service vehicles to stop; or
- Vehicles to pull into when an emergency vehicle is approaching from behind.

The final location and configuration of loading zones and parking spaces on both River Avenue and Stradbrook Avenue, as well as the off-peak periods for parking and loading on the opposite sides of River Avenue and Stradbrook Avenue, will need to be confirmed with the Winnipeg Parking Authority and the Winnipeg Fire and Paramedic Service during future design phases.

7.5 TRANSIT STOPS

The functional design includes two types of transit stops on River Avenue and Stradbrook Avenue:

1 West of Osborne Street and east of Donald Street on River Avenue, the bicycle lane is diverted behind the transit stops and is raised to the level of the sidewalk. Pedestrians would be required to cross the raised bicycle lane to access the transit stops. An example of this type of transit stop is shown in **Figure 7.7**.

2 Between Osborne Street and Donald Street on River Avenue and Stradbrook Avenue, transit stop islands would be located in the parking lane and bicycle lanes would be raised to the level of the sidewalk (as shown in **Figure 4.6**). Pedestrians would be required to cross the raised bicycle lane to access the transit stop.

Figure 7.7: Proposed Transit Stop Design on River Avenue West of Osborne Street

7.6 BICYCLE PARKING

Osborne Village is a hub for cyclist activity in Winnipeg and includes a variety of destinations where bicycle trips are a desired and convenient mode of transportation. Often a main concern for cyclists is finding a safe location to park and lock their bicycle. There are currently several bicycle racks located in front of businesses in the vicinity of the Osborne Street intersections with River Avenue and Stradbrook Avenue. It is recommended that additional bicycle parking be implemented in close proximity to Osborne Street and at Fort Rouge Park, as demand will likely increase. In addition, the City should work with the Osborne Village BIZ and other stakeholders in future design phases to identify additional locations for bicycle parking. There may also be the opportunity to create a cycle hub in the future, where bicycle parking, bicycle repair tools and cycling information is available to support the cyclist. An example of a cycle hub is shown in **Figure 7.8**.

Figure 7.8: Cycle Hub

Source: http://www.falco.co.uk/products/cycle-hub-design/

7.7 BICYCLE FRIENDLY BACK LANE

While back lanes are not commonly used as bikeways, they can bridge gaps in the cycling network if properly implemented. It is recommended that the back lane between Clarke Street and Lewis Street be revitalized through a Pilot Project to provide a safe and enjoyable experience for cyclists using the Clarke Street / Back Lane / Lewis Street connection to Fort Rouge Park. The Pilot Project should:

— Consider resurfacing the back lane to provide a smooth riding surface;

— Include wayfinding (route markers) and pavement markings (sharrows) so users of the facility know that this is a bicycle friendly route;

— Identify opportunities to improve sightlines for vehicles parking in the back lane;

— Consider waste collection services, such as bin placement and truck maneuvering (waste collection trucks should ideally not be required or permitted to reverse in the back lane);

— Provide adequate lighting and surveillance; and

— Identify other potential improvements such as public art to highlight the back lane as a bike friendly back lane for safety of cyclists and to enhance their c experience.

Some examples of bicycle friendly back lanes are provided in **Figure 7.9**.

Market Lane – Kitchener, Ontario

Tracy Street – Toronto, Ontario

Trolley Crescent – Toronto, Ontario

John Hirsch Place – Winnipeg, Manitoba

Figure 7.9: Bicycle Friendly Back Lane Examples

7.8 STREETSCAPE

TREE REMOVAL AND REPLACEMENT

Four trees have been identified to be removed and replaced to accommodate the westbound cycling connection on River Avenue from Scott Street to Fort Rouge Park and the bridge. These trees include one Linden, one Green Ash and Two American Elms. The Urban Forestry Branch has identified these trees are greater than 30 cm trunk diameter and normally are not approved for removal in accordance with the City's Tree Removal Guidelines. However, due to their condition and location, and as alternatives have been investigated but deemed to be less suitable, the City Forester is approving the removal of these trees with compensation of their appraised value at approximately $15,000. These funds would be used to plant new boulevard trees in proximity to the removed trees and throughout the neighbourhood at appropriate planting sites.

NEIGHBOURHOOD INTEGRATION

Because the enhanced cycle and pedestrian routes pass through stable and established neighbourhood, the streetscape should be aimed at seamless integration and continuity with the surroundings, rather than introducing a new look and feel. Where feasible, the work should address discontinuity in the sidewalks, lighting and tree canopy. Materials and fixtures should respond to and mirror or complement the existing conditions, though new tree plantings and must respect the diversity requirements set out in the City of Winnipeg *Acceptable Tree Species for Boulevard Plantings* while excluding species at-risk, such as Ash and Chokecherry. Additional planting may be advisable for screening, shade, and wind protection.

SIDEWALK WIDTH

The sidewalk width varies throughout the study area, and should be brought up to a minimum standard of 1.5 m, with 1.8 m preferred where feasible and where pedestrian volumes are highest and where children are likely to cycle. In all cases within the recommended network, cyclists and pedestrians are separated, except for the connection along Donald Street from Stradbrook Avenue to Clarke Street and the connection along Stradbrook Avenue from Donald Street to Harkness Station.

ACCESSIBILITY AND SAFETY

The pedestrian and cycling facilities were designed to meet the accessibility and safety needs of vulnerable populations including children, seniors, and people with disabilities through compliance with the *Winnipeg Accessibility Design Standards (2015)* and other best practices. The sidewalks do not include indicator strips, but generally are flanked by turf, which provides an effective contrast and tactile navigation cue for the visually impaired. Street crossings have curb ramps that incorporate detectable warning tiles, and signs and tree branches that intrude into the accessible path of travel will be identified and removed in subsequent phases of the project.

Creating a sense of security is a vital part of an effective cycling network. The recommended option goes through parts of Osborne Village which have generally good casual surveillance from neighbouring houses, reasonable territorial indicators (the sense of proprietorship that occurs in many established neighbourhoods), good natural access control (people enter the neighbourhoods and use the cycle/walk facilities for a reason) and are generally well kept, all of which bolster the sense of personal safety in a space. Little has to change, other than ensuring there is adequate lighting and clear sightlines in and out of the new facilities, and being careful not to compromise the natural behavioural controls that are in place within properly functioning communities.

WAYFINDING AND ROUTE MARKING

The recommended option includes several neighbourhood greenways, which can be difficult to distinguish from standard residential roads. In order to assist in wayfinding and channel cyclist traffic (less important for pedestrians) along the designated routes, clear and consistent route identification signs will be required.

7.9 COST ESTIMATE

A Class 4 cost estimate (-30% to +50%) was completed for the functional design of the cycling network in Osborne Village. A summary of the construction cost estimate is provided in **Table 7.1**. Costs for tree removal and replacements and traffic signals were provided by the City of Winnipeg. Details of the construction cost estimate can be found in **Appendix C**.

The following assumptions were made for the cost estimate:

- Concrete Pavement Widening Structure Thickness: concrete (200mm), base (75mm), 50 crushed (150mm), 100 crushed (450mm) = 875mm
- Asphalt Multi-Use Path Structure Thickness: asphalt (75mm), base (150mm), 50 crushed (300mm) = 525mm
- Asphalt Overlay Structure:
  - Asphalt Overlay has an average thickness of 80 mm over the entire project.
  - Asphalt is milled and replaced 300mm beyond the proposed curbs.
- Renewals:
  - No full/partial slab replacements are required.
  - No joint repairs are required.
  - 10% of all curbs to remain will require renewal.
- Land Drainage:
  - New catch basin installed at all existing low points blocked by proposed curb/median.
  - Catch basin lead length is an average of 10m over the entire project.

- Bus Stops:
  - Detectable warning tiles included as unit price per bus stop.
- Exclusions:
  - All signage. Including directional, warning, regulatory, etc.
  - Detectable warning tiles at locations other than bus stops.

Table 7.1: Functional Design Construction Cost Estimate

ITEM	COST [1]
River Avenue – Nassau Street to Main Street	$778,000
Stradbrook Avenue – Nassau Street to Harkness Avenue	$798,000
Wardlaw Avenue – Nassau Street to Scott Street, Scott Street – Wardlaw Avenue to River Avenue	$119,000
Lewis Street, Back Lane, Clarke Street – River Avenue to Donald Street	$29,000
Construction Cost (in 2018 dollars)	$1,724,000

[1] Costs are rounded to the nearest thousand.

The City of Winnipeg's Basis of Estimate template was also used to factor in construction cost escalations, engineering costs, utility costs, contingency costs, administrative costs and corporate interest. The Basis of Estimate is also included in **Appendix C**. The total project cost is estimated to be **$2,785,000** if constructed in the year 2021.

8 CONCLUSION AND RECOMMENDATIONS

In order to develop a functional design for the cycling network in Osborne Village to connect to the proposed pedestrian and cycling bridge over the Assiniboine River, initial analyses related to land use, walking, cycling, parking, loading, transit, traffic operations, collisions and utilities were completed. Following the initial analyses, options for the cycling network and the connection to Fort Rouge Park were developed and evaluated. The recommended options were designed to a functional level and a Class 4 cost estimate was completed. The following conclusions and recommendations are made:

- **River Avenue** – Construct a neighbourhood greenway from Main Street to Harkness Avenue, a one-way protected bicycle lane on the north side between Harkness Avenue and the west entrance to Fort Rouge Park, a two-way protected bicycle lane on the north side between the west entrance to Fort Rouge Park and Scott Street, and a one-way protected bicycle lane on the north side between Scott Street and Nassau Street. Parking is to be located adjacent to the bicycle lane. This route provides a safe and convenient connection to Main Street, Harkness Station (via the east sidewalk along Harkness Avenue), Fort Rouge Park (and the proposed pedestrian and cycling bridge connecting to downtown), the proposed neighbourhood greenway on Scott Street, Osborne Village commercial hub and the existing neighbourhood greenway on Nassau Street.
- **Stradbrook Avenue** – Construct a one-way protected bicycle lane on the south side between Nassau Street and Donald Street and a multi-use path between Donald Street and the access to Harkness Station. Parking is to be located adjacent to the bicycle lane. This route provides a safe and convenient connection to Harkness Station, the off-street path along Donald Street (which connects to Osborne Station), the proposed neighbourhood greenway on Scott Street, the Osborne Village commercial hub, and the existing neighbourhood greenway on Nassau Street.
- **Wardlaw Avenue** – Construct a neighbourhood greenway on Wardlaw Avenue to connect the neighbourhood greenway on Nassau Street to the proposed neighbourhood greenway on Scott Street. This low-stress route would complement the bicycle lanes on River Avenue and Stradbrook Avenue and provide direct access to businesses on Osborne Street.
- **Scott Street** – Construct a neighbourhood greenway from Wardlaw Avenue to River Avenue to provide a connection to the proposed one-way bicycle lanes on River Avenue and Stradbrook Avenue and Fort Rouge Park (and the proposed pedestrian and cycling bridge connecting to downtown).
- **Clarke Street, Back Lane, and Lewis Street** – Widen the off-street path along the west side of Donald Street (between Stradbrook Avenue and Clarke Street) and construct a neighbourhood greenway on Clarke Street, bicycle friendly back lane (between Clarke Street and Lewis Street) and neighbourhood greenway on Lewis Street. A pilot project would need to be implemented for the bicycle friendly back lane, as it is a relatively new concept in Winnipeg.
- **Intersections** – Several intersection treatments were recommended to improve cyclist safety at intersections. Some intersection treatments included green paint pavement markings to show the cyclist path, signage to indicate that drivers making right-turns must yield to cyclists; protective barriers; two-stage turn queue boxes; raised intersections; curb bulb-outs; bicycle forward stop bars; and protected intersection treatments. It is recommended that intersections be monitored to determine whether leading bicycle intervals or protected bicycle phases should be implemented. Leading bicycle intervals or protected bicycle phases should be considered if safety issues are observed or when vehicle, cyclist and pedestrian volumes justify the need for a signal phase to be exclusively dedicated to cyclists.
- **Parking and Loading** – Changes to the existing street cross-sections are recommended on both River Avenue and Stradbrook Avenue to accommodate the proposed bicycle lanes and will impact on-street parking and loading. A permanent parking and loading lane is recommended on the north side of River Avenue and on the south side of Stradbrook Avenue. The functional design results in a net loss of approximately 75 spaces on River Avenue (due to the south parking lane being removed) and 9 spaces on Stradbrook Avenue. This

estimation assumes that the loading zones that currently exist on the north side of River Avenue and Stradbrook Avenue would be accommodated in the proposed parking/loading lanes.

Parking and loading could also be accommodated on the opposite side of River Avenue and Stradbrook Avenue during off-peak periods (e.g. midday, evenings, overnight, and weekends). Adding off-peak parking to the north side of Stradbrook Avenue between Osborne Street and Donald Street would result in a net gain of approximately 53 parking spaces on Stradbrook Avenue. It is recommended that at a minimum, off-peak loading be considered for River Avenue and Stradbrook Avenue. The traffic analysis showed minimal reduction in the overall level of service of the River Avenue and Stradbrook Avenue intersections with one travel lane on River Avenue between Osborne Street and Donald Street and one travel lane on Stradbrook Avenue between Nassau Street and Donald Street during off-peak periods. However, if a vehicle stalls in the single travel lane, traffic operations would be more significantly affected than if there were two travel lanes. If parking/loading is allowed on both sides of the street, there may be locations along a block where parking and loading would need to be prohibited to allow space for an emergency services vehicle to stop or for vehicles to pull into when an emergency vehicle is approaching from behind.

The final location and configuration of loading zones and parking spaces on both River Avenue and Stradbrook Avenue, as well as the off-peak periods for parking and loading on the opposite sides of River Avenue and Stradbrook Avenue, will need to be confirmed with the Winnipeg Parking Authority and the Winnipeg Fire and Paramedic Service during future design phases.

- **Transit Stops** – Two types of transit stops were recommended. West of Osborne Street and east of Donald Street along River Avenue, the bicycle lane is diverted behind the transit stop and is raised to the level of the sidewalk. Between Osborne Street and Donald Street along Stradbrook Avenue and River Avenue, transit stop islands are located in the parking lane and pedestrians are required to cross a raised bicycle lane to access the transit stop.
- **Bicycle Parking** – There are currently several bicycle racks located in front of businesses in the vicinity of the Osborne Street intersections with River Avenue and Stradbrook Avenue. It is recommended that additional bicycle parking be implemented in close proximity to Osborne Street and at Fort Rouge Park, as demand will likely increase.
- **Cost Estimate** – A Class 4 cost estimate was completed for the functional design and the estimated total project cost for the recommended cycling network is **$2,785,000** if constructed in the year 2021.
- **Future Design Phases** – Complete a survey during future design phases to develop a profile and confirm geometry to optimize barrier widths, lane widths, and sidewalk widths. Confirm the locations and sizes of the on-street parking, loading zones and transit stops. Work with the Osborne Village BIZ and other stakeholders to identify additional locations for bicycle parking.

APPENDIX

A OSBORNE VILLAGE PARKING STUDY

OSBORNE VILLAGE PARKING STUDY

Prepared for:

Osborne Village BIZ and

Winnipeg Parking Authority

Submitted by:

MMM Group Limited

February 2011

5510002.161

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STANDARD LIMITATIONS

This report was prepared by MMM Group Limited (MMM) for the account of the Winnipeg Parking Authority and the Osborne Village BIZ (the Clients). The disclosure of any information contained in this report is the sole responsibility of the Clients. The material in this report reflects MMM's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. MMM accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report.

1.0 EXECUTIVE SUMMARY

Osborne Village is a mixed-use neighbourhood with retail, commercial, institutional, and residential land uses immediately south of downtown Winnipeg. Several bus routes (and the rapid transit corridor currently under construction) travel through this area as does Osborne Street, which handles a heavy volume of traffic into and out of the downtown.

Parking in the area is limited. On-street parking is heavily utilized by residents, since many of the older residences in the area do not have sufficient off-street parking. Retail in the area is reliant on the off-street parking as well. There are seven places of worship in the area that also generate parking demand on Sundays. There are some small parking lots in the area for customer parking (with time limits and restrictions on shared use) as well as small paid public lots run by Impark and by the Winnipeg Parking Authority.

A review of parking conditions on a Friday evening from 5:30 p.m. - 7:30 p.m. and on a Sunday from 11 a.m. to 2 p.m. indicated that while parking near the central area of Osborne Village is heavily utilized (greater than 85 percent utilization, which is generally considered "at practical capacity" for casual parking) during the Friday peak period, there were spots available on adjacent streets - parking utilization is not uniform throughout the area. Off-street, several lots are heavily utilized (the City's paid parking lot and the lot at Safeway), but many of the other off-street lots were underutilized.

Parking capacity in Osborne Village is generally adequate at present (albeit with some localized peak period issues) based on the field investigations undertaken as part of this study.

Turnover data was collected using Automated Licence Plate Recognition (ALPR) vehicles (the camera and GPS-equipped parking enforcement vehicles of the Winnipeg Parking Authority) on four streets within Osborne Village with and without parking restrictions in place. The data indicated that on all streets, parking turnover was occurring; the streets were not being heavily utilized for long-term parking.

An online survey was conducted to determine support for several options for improving parking conditions - approximately 45 percent of participants expressed support for the construction of additional parking in the area. Another concept, charging for on-street parking throughout the area to discourage long stays, met with a negative response - 60 percent of respondents did not support this concept. Fifty-eight percent of respondents supported the concept of improving signage and providing documentation to the public to assist with finding parking spaces in the area.

Policies regarding development and parking were reviewed. It is suggested that there is sufficient public and private capacity in the district to accommodate current and short-term parking needs, if the current supply is adequately managed, and if new development incorporates new parking capacity to service its own needs. The nature of future development, and the level of parking new development provides relative to its needs, will in part dictate the future adequacy of the parking supply and timing for the addition of new supply.

It is suggested that resources be engaged to manage shared parking arrangements between businesses and the public to make better use of existing off-street parking, and to create and maintain a parking inventory indicating parking utilization within the area for use by developers and the City, and to publicize parking opportunities in the area through signage and guidebooks or other publicity. The City would need to determine which agency/department would be most appropriate to coordinate joint parking arrangements.

It is recommended that new parking (either in a parkade or as part of a new development) not be constructed immediately; the existing supply still has capacity but there are issues with its use. The supply of parking will need to be increased at some point in the future as the area continues to intensify due to development. New projects would ideally address their own parking needs, especially for residential projects. However, this may not be feasible for all projects, especially for the redevelopment of existing buildings, and other mechanisms may be needed. A parking management plan can be prepared to identify how reductions in parking zoning requirements can be addressed. Some possible options include the construction of facilities funded through policies which have the capability of raising cash for seed funding, such as Cash-in-Lieu policies (as is done in other cities) or through a combination of joint ventures and debt financing.

It is further recommended that bicycle parking in the area be expanded using best practices for locating the parking, and designing both indoor and outdoor bicycle facilities within the Osborne Village area.

2.0 INTRODUCTION

2.1 Background

Osborne Village is a mixed-use neighbourhood with a mix of retail, commercial, institutional, and residential land uses (including pockets of high-density residential development). It is bisected by major north-south and east-west arterial roadways and has a high level of transit service due to its proximity to the downtown. That proximity also provides challenges due to high traffic levels accessing the downtown. However, the proximity to downtown also offers the opportunity for residents to have a lower auto ownership level, walk/cycle to destinations, or make use of transit. The mix of uses also allows for internal trips, many of which are likely walk/cycle trips, thereby potentially reducing the number of auto trips per household generated within the neighbourhood.

Some development within Osborne Village predates the automobile, and originally there was a streetcar line on Osborne Street – thus many of the original housing was designed without parking, or with very minimal space for parking. As a result, many current residents must park on the road.

The lack of space for off-street parking results in a high demand for on-street parking. This is in part due to resident parking, but also due to the Village's attractiveness as a destination for people coming to shop, eat, worship, and visit area residents. The BIZ is hoping to maintain and increase the area's attractiveness to people from all parts of Winnipeg and to visitors to the City.

The City of Winnipeg completed the Osborne Village Neighbourhood Plan, which was subsequently adopted as a statutory Secondary Plan by City Council (By-Law 2202006). One of the recommendations in that plan was that a parking study be prepared to determine parking needs and management options. The terms of reference were developed in cooperation with the Winnipeg Parking Authority (WPA), The Osborne Village BIZ, and the City of Winnipeg's Planning, Property and Development Department.

2.2 The Report

This study reviews existing conditions within Osborne Village in regards to parking, and looks at various concepts that could be applied to mitigate parking pressures. The report includes:

- A review of observed parking conditions in the area.

- A review of parking turnover on several streets in the area using data collected by a camera-equipped WPA parking enforcement vehicle.

- A review of data obtained from an on-line survey and two public information sessions.

2.3 Study Area

The Osborne Village study area, as defined for this study, is shown in **Figure 2.3**. The boundaries of the study area are described below:

- Assiniboine River forms the northern and western boundaries.

- The southern boundary is defined by Gertrude Avenue, and Jessie Avenue. Between these avenues, a division was made between residential and non-residential property, creating a zig-zag boundary.

- Donald Street forms the eastern border of the study area.

Throughout this report, the study area will be described as “Osborne Village”.

Figure 2.3 – Osborne Village Study Area Boundaries

Source: Osborne Village Neighbourhood Plan: Map 2.1 BOUNDARIES

2.4 Contributing Sources

Stakeholders were identified in conjunction with the study's Steering Committee. Stakeholders were then contacted during the course of the study. Their comments and insight were valuable in the creation of this report. These stakeholders include:

- Winnipeg Parking Authority
- Osborne Village BIZ
- Holy Rosary Church
- Crescent Fort Rouge United Church
- Gas Station Theatre
- Osborne Village Safeway
- Winnipeg Transit
- Bike to the Future
- Villa Cabrini
- City of Winnipeg Planning, Property and Development Department
- City of Winnipeg Public Works Department

3.0 CONSULTATION PROGRAM

Public consultation was an important component of this project, since making changes to parking will have an effect on both residents and visitors to the Osborne Village. The public was engaged through both an online survey and open houses.

3.1 Open Houses

Open Houses took place at the Osborne Village BIZ on June 23, 2010 and at the Osborne Village Canada Day street festival in Osborne Village on July 1, 2010. Staff from MMM attended both open houses. At the second open house, both staff from MMM and from the WPA attended.

Staff discussed parking issues with the public at both events. Copies of the survey were provided at the Canada Day open house.

A PDF poster was used to advertise the open houses which was distributed through the BIZ to area merchants.

Attendance was approximately ten people at the first open house, and approximately 30 people met with staff during the second open house.

3.2 Online Survey

An online survey was created to collect data from both residents and visitors to the Osborne Village area. The purpose of the survey was to collect data regarding the public's impression of parking in the area at present, and feedback related to three concepts for modifying parking in the area:

- Charging for on-street parking
- Creation of a parking structure within the area
- Improved signage to assist visitors find parking

The online survey was create through the use of the Survey Monkey website (http://www.surveymonkey.com). 513 responses were received during the time the survey was open (June 2, 2010 – August 16, 2010). The survey questions are included as Appendix C – Osborne Village Parking Study Survey.

Five paper copies of the survey were also provided to the public in paper form as a result of requests during the open houses. These entries were entered into the survey data table.

The survey was advertised on local online blogs with a public issues theme (ChrisD.ca and Progressive Winnipeg), using the BIZ's Facebook and e-mail mailing list, through Councillor Gerbrasi's e-mail mailing list, to an online mailing list of local gardeners, on the WPA's website, and publicized through local places of worship. Late in the process, the project was covered on July 15, 2010 by Canstar News, through their chain of local papers (The Herald, The Sou'Wester, etc.) which published a link to the story.

An Apple IPod MP3 player was a prize for completion of the survey – it was optional for survey participants to provide their contact information to be entered into a draw for the prize.

Data from the survey appears throughout this report. The full set of data is available in Excel spreadsheet form, and has been provided to the client.

3.2.1 Potential Duplicate Responses

Several of the responses had the same IP addresses. This was partially a result of several people using the same computer to do the survey (which would not be an issue) and partially a result of people attempting to retake the survey (either due to a mistake on their part or to subvert the effort of the survey).

- There were 42 instances of IP addresses appearing 2 times
- Five instances of IP addresses appearing 3 times
- One instance of an IP address appearing 4 times
- Two instances of an IP address appearing 10 times

Thus potentially 123/513 or almost 25 percent of the responses are potentially corrupted, however inspection of the results indicates that the actual number is fewer than this. For the purposes of this study, which were to find general "big picture" responses to issues, the repeated entries were not culled from the data, since it would be difficult to determine whether or not the responses were valid or invalid. While not a scientific survey, this does provide a "first cut" at determining the level of public support for various parking-related concepts.

4.0 EXISTING CONDITIONS IN OSBORNE VILLAGE[1]

4.1 Land Use

Figure 4.1 - Land Use shows the various land use types within Osborne Village.

The Osborne Village includes a variety of land uses.

4.1.1 Residential Land Use

Approximately 29 percent (67 acres) of land area in Osborne Village is made up of multiple-family residential buildings, ranging from smaller three to five-storey apartments to high-rise apartments. The majority of the area's high-rise buildings are clustered around the north end of Osborne Village, along the western section of Roslyn Road and Wellington Crescent, along the banks of the Assiniboine River, with more modest buildings lining River Avenue, Stradbrook Avenue, and Roslyn Road (east of Osborne Street). Approximately 16 percent (37 acres) of Osborne Village is single-family residential units, primarily in the southwest and east quadrants.

4.1.2 Commercial and Industrial Land Uses

Commercial land uses account for 12 percent (27 acres) of the area, and are a mix of business types. There is also a wide range of building ages with both old and new buildings.

The commercial uses can be divided into three distinct markets: Osborne Street, Donald Street, and development interspersed with residential uses on side streets.

- The Osborne Street component is a pedestrian-oriented neighbourhood main street, with an eclectic mix of retail and service uses.

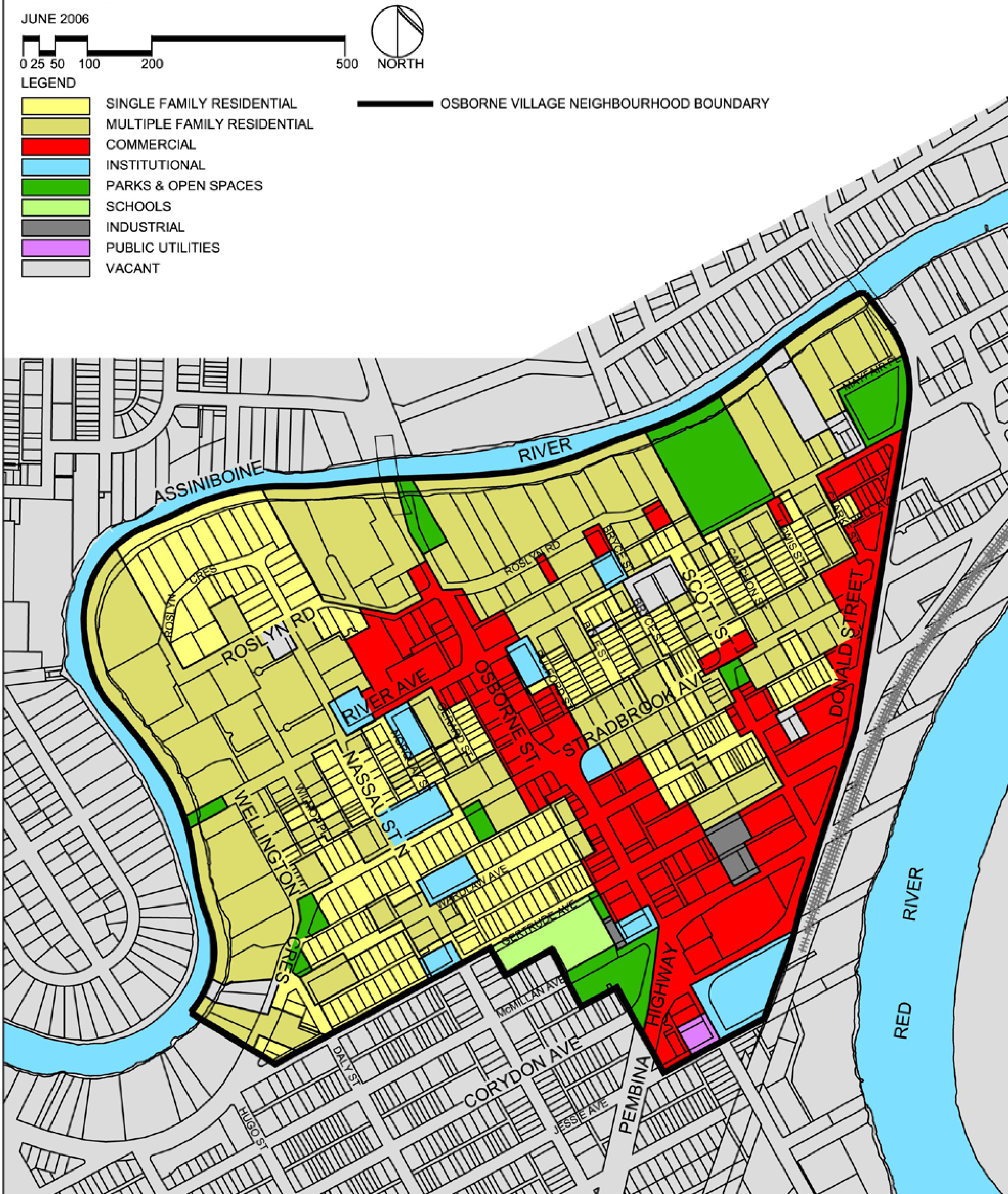
- The Donald Street component is auto-oriented, with uses such as a gas station, car wash, and some retailers and small-scale office development.

- Interspersed throughout Osborne Village is a local office and small-scale retail component made up of a variety of neighbourhood corner stores, small restaurants, and neighbourhood offices in converted residential buildings.

[1] Much of the information in this section appeared in section 2.5 of the Osborne Village Neighbourhood Plan.

Figure 4.1 – Land Use

Source: Osborne Village Neighbourhood Plan: Map 2.4 CURRENT LAND USE PATTERN



4.1.3 Institutional and Public Facilities

There are a variety of institutional and public facilities in Osborne Village. Seven places of worship are located in the area, which are considered local landmarks and character buildings. Other institutional uses include an elementary school, a community centre, a fire station, and several service-oriented groups. These land uses serve both the immediate Osborne Village neighbourhood and the surrounding area.

4.1.4 Parks and Open Space

Public parks and green spaces represent only 4.5 percent (10 acres) of the total area of Osborne Village. The area's parks and open space system consists of a number of small pocket parks, open space islands, as well as a small number of larger parks.

4.1.5 Vacant and Undeveloped Land

Raw land in Osborne Village is rare and most undeveloped lots are small. Due to the scarcity of vacant land, future development in Osborne Village will likely focus on redevelopment of existing sites and underdeveloped parcels.

4.2 Road Network

Figure 4.2 - Road Classification shows the hierarchy of road types within Osborne Village.

Osborne Village is a pedestrian-scaled neighbourhood, but Osborne Street is a major thoroughfare for vehicular movement between the southwestern parts of Winnipeg and the downtown and northern parts of the city.

The hierarchy of street types in Osborne Village, from highest-traffic volume and most regional-serving to lowest volume and most locally-serving are:

- Arterial Streets
- Residential Collector Streets
- Local Residential Streets
- Back Lanes

Figure 4.2 – Road Classification

Source: Osborne Village Neighbourhood Plan: Map 9.1 HIERARCHY OF STREETS

4.2.1 Arterial Streets

Arterial Streets carry large flows between regions of the city. Osborne Street, Donald Street, River Avenue, Stradbrook Avenue, and Wellington Crescent are all arterials. They carry traffic to, from, and through Osborne Village. They also have a second role; they accommodate vehicular and pedestrian circulation within the neighbourhood.

Osborne Street and Donald Street (with daily volumes of 34,400-42,100 vehicles per day (vpd) and 51,400 vpd, respectively) are considered **major arterials** and link the city's transportation network across the Assiniboine River. These streets also are vital components of Winnipeg's transit system, carrying high frequency and express bus routes.

The conflict that results when a road is both a high-volume traffic artery and is also a pedestrian-oriented street is apparent on Osborne Street. Large numbers of pedestrians use Osborne Street to walk into the downtown across the bridge, and Osborne Street also is the commercial heart of the Osborne Village area, and its large number of shops and services result in high pedestrian volumes. Osborne Street has multiple short blocks and a narrow width, which benefit pedestrians and make automobile movement slower through the Osborne Village area.

There are ongoing conflicts between the regional vehicular and local pedestrian functions on Osborne Street. During the winter and when it rains, because of the close proximity between sidewalk and traffic lanes, pedestrians and bus passengers are at risk of getting splashed by traffic. The lack of a buffer can also make pedestrians feel less safe than if there was greater separation between the sidewalk and travel lanes. Evening parking on Osborne Street creates a buffer, but support for the parking is mixed – some survey respondents like the parking, while others indicated that they believe that it retards vehicle movement along Osborne Street during the evening and should be eliminated.

Donald Street carries a higher volume of traffic than Osborne Street, but is less pedestrian-oriented than Osborne Street. The streetscape, land uses, road design, and fewer cross-streets means fewer disruptions for automobile travel, and at the same time makes the road less pedestrian-oriented.

River Avenue and Stradbrook Avenue, with volumes of approximately 7,500 – 10,000 vpd, and Wellington Crescent, with a daily volume of approximately 19,500 vpd, are **minor arterial roads**. These streets carry significant volumes, but lower than those on major arterials. They also carry fewer transit routes.

Lower volumes and wide right-of-ways make these roads more comfortable environments for pedestrians. The wide right-of-ways allow for landscaping between sidewalk and travel lanes, and parked cars create an additional buffer. Pedestrian crossing at unsignalized intersections are perceived as safe because of the lower volumes of traffic. While the mix of housing styles and landscaping along these streets creates an interesting environment for pedestrians, there is less commercial development, meaning that these roads are less of a “draw” for the public. This means less natural surveillance than a street would have with a wider mix of uses.

4.2.2 Residential Collectors, Local Residential Streets, and Back Lanes

Residential Collectors distribute traffic between local residential streets and arterials. Direct access to them by vehicles is limited, but is not forbidden. Back Lanes typically connect residential properties that face residential collectors (which cannot be directly accessed with driveways).

In Osborne Village, Scott Street (from Stradbrook Avenue to River Avenue), Roslyn Road (west of Osborne Street) and Nassau Street (between Roslyn Road and River Avenue) are considered residential collectors. The remaining portions of these streets are classified as local residential streets.

Local residential streets are not intended to carry large volumes of traffic between destinations; their purpose is to connect abutting properties to the road network. Traffic calming measures may be seen on local residential streets to dissuade motorists from using these streets to travel from one area to another at high speeds, an example of this is at Nassau Street and Gertrude Avenue, where bump-outs were constructed to slow down traffic.

Back lanes are common in Osborne Village – back lanes are often seen in older residential areas of Winnipeg. They provide an alternative access to the street running in front of a property, providing access to the service area at the rear of a building (such as parking or deliveries). Pedestrian traffic is common in back lanes as well; back lanes provide a way for pedestrians to short-cut through the area. Back lanes see the lowest amount of traffic of any road type; it is common for back lanes to see less than 400 vpd.

4.3 Parking in the Osborne Village Area

Figure 4.3.1 and 4.3.2 show available on-street and off-street parking within Osborne Village.

Figure 4.3.1: On-Street Parking Within Osborne Village

Figure 4.3.2: Off-Street Parking Within Osborne Village

4.3.1 On-street Parking

On-street parking is available on most streets within Osborne Village. On the higher classification streets which run east-west through the area, parking is generally only available on one side of the street, and is prohibited during peak periods to increase the capacity of the street.

Parking is permitted during the evening on Osborne Street within the Osborne Village.

On-street parking is prohibited on Donald Street.

On residential local streets, parking is generally unrestricted, but several streets within the Osborne Village area have permit parking in place, with enforced two hour parking maximums. Section 7.0 of this report reviews turnover of vehicles on streets with and without parking maximums in place.

4.3.2 Off-street Parking

There are two public lots within Osborne Village; the City-run lot on the corner of Osborne Street and Stradbrook Avenue, and the privately-run Impark lot on Gertrude Avenue. These lots charge for parking.

Many businesses along Osborne Street have private lots behind their businesses, offering free parking while customers shop or eat. Several of these lots are shared amongst nearby businesses. Some of the lots explicitly forbid use of the lot by customers of specific businesses.

There are also large parking lots at several offices and venues within the area, including the Racquet Club.

There are also private lots and parkades for the parking of tenants' vehicles at most of the multi-family developments within Osborne Village. These were not reviewed in the study, as access to this parking is restricted and therefore would not be considered available to the general public. Some lots, such as Lot "A" (which serves a business adjacent to the residential towers on Evergreen Place), were isolated from larger lots and data was collected.

5.0 COMPETING PARKING NEEDS

Many activities take place in Osborne Village, and automobile travel to and from these activities results in a need for parking. Parking demand is generated by:

- Residential parking (residents and their guests)
- Parking for Places of Worship
- Commercial parking (employees and customers)
- Entertainment uses
- Social service uses

This is not meant as an exhaustive list; there are many other activities that also contribute to parking issues in any area of the City.

5.1 Residential Parking

Osborne Village is an area of Winnipeg that is easily walkable, has good transit service and has a vibrant mix of shops and services in the commercial area along Osborne Street. This means the area is "locationally efficient" -- it is possible to live in this area without routinely requiring a car.

The majority of streets in Osborne Village feature residential development along the street. Housing in Osborne Village is a mixture of older homes, small (2-6 storey) multi-family buildings, and some larger residential towers in the northwest part of the community. Many of the older residential structures in the area were constructed with lower parking requirements (and some have no on-site parking), which results in residents and visitors for these buildings parking on the street.

Data from MMM's survey (Table 5.1.1) corresponds with data from the recent Origin-Destination study conducted for the City of Winnipeg (Table 5.1.2), indicating auto ownership within the Osborne Village is lower than for the City overall. Zero and one-car households are more common in Osborne Village.

Table 5.1.1: Household Vehicle Ownership in Winnipeg and Osborne Village

City of Winnipeg O-D Survey Data

Entire City of Winnipeg		
Total Number of Households:	265,000	100%
0 vehicle households:	12,600	4.8%
1 vehicle households:	113,500	42.8%
Osborne Village Area (traffic zones 4102, 4103 and 4210)		
Total Number of Households:	5,900	100%
0 vehicle households:	800	13.6%
1 vehicle households:	3,300	55.9%

Table 5.1.2: Household Vehicle Ownership in Osborne Village

MMM Online Survey (198 responses)

How many motorized vehicles does your household own?		
# of vehicles	**# of responses**	**percentage of responses**
0	37	18.7%
1	116	58.6%
2	38	19.2%
3	5	2.5%
4 or more	2	1.0%
TOTAL	**198**	**100%**

Table 5.1.3 cross-references the number of automobiles owned by Osborne Village households who completed the survey against the number of parking stalls available to that household. The yellow cells indicate situations where there are more vehicles than parking stalls available (meaning that off-street parking or some other arrangement for storing the additional vehicles is

required); 20 percent of respondents fell into this category. Forty-eight percent of respondents had the same number of spaces as cars, which means no surplus capacity for visitor's vehicles.

Table 5.1.3: Household Vehicle Ownership vs. Parking Stalls Available to Household in Osborne Village

MMM Online Survey (196 responses)

		Number of cars owned				
		0	**1**	**2**	**3**	**4 or more**
Parking Spaces Available	**0**	16	21	3	1	0
	1	12	73	10	1	0
	2	3	14	20	2	2
	3	0	3	2	1	0
	4 or more	5	5	2	0	0

Table 5.1.4 shows that approximately 83 percent of participants who indicated they were residents of the Osborne Village responded that their visitors had, or occasionally had, problems with parking.

Table 5.1.4: Difficulty in Parking for Visitors – MMM Online Survey (196 responses)

Is parking for visitors visiting your home a problem?		
Response	**# of responses**	**Percentage of responses**
Yes	75	38.3%
Occasionally	88	44.9%
No	33	16.8%
TOTAL	**196**	**100%**

5.2 Parking for Places of Worship

There are a number of places of worship in the area, illustrated on **Figure 5.2**: Location of Places of Worship in Osborne Village. Although many of the places of worship do provide some on-site parking, they also use on-street parking to fulfill part of their parking needs.

Many of the places of worship in the area are “gathered”; this means that they draw members from across the city as well as from the local area (meaning that attendees are more likely to drive) to attend.

The Holy Rosary Church indicated that it has arranged a “shared parking” agreement with the Safeway on River Avenue; the church makes use of the surface parking lot on Sunday mornings before the Safeway store opens. The service ends at the same time the Safeway opens and the vehicles belonging to attendees must vacate the lot (or become Safeway customers) as soon as possible once the services are over to free up space for shoppers.

Although most businesses in the area do not open before noon on Sunday, place of worship traffic leaves the area at the same time many businesses are opening around noon. This potentially creates conflict between the places of worship and retailers which both need the parking for their patrons.

Also, the places of worship in Osborne Village have services and activities during the rest of the week, and this conflicts with the parking needs of residents and commercial users.

To increase on-site parking would be very difficult for the places of worship as they would have to purchase adjacent land and redevelop it into parking. This would be impractical given the cost to the places of worship and it is also unlikely that the City would approve the demolition of existing development to replace it with a parking lot.

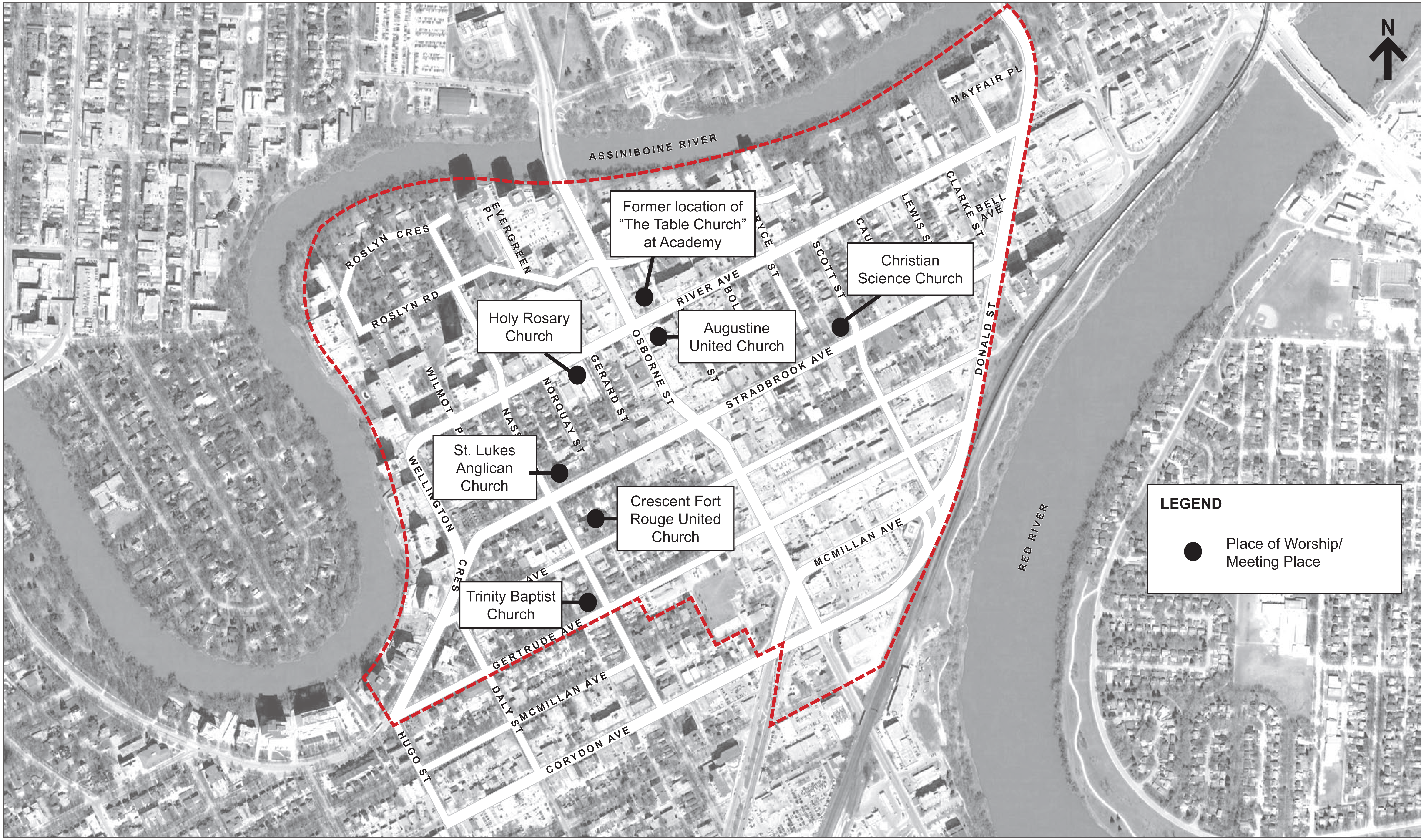


Figure 5.2: Location of Churches in Osborne Village

5.3 Commercial Parking

Commercial parking refers to both employee and customer parking for businesses in Osborne Village, either on-street or off-street.

The commercial area is mostly older building stock, with some newer development, up to four stories tall. Most of the commercial buildings are commercial-only, but some are also mixed-use buildings.

Most of the retail units are small streetfront-style developments which provide low levels of parking (based on the City's standard bylaw parking requirements), with the exception of some medium and large stand-alone developments, most notably the Safeway and Dollarama/Organza Market developments, which have surface parking lots which appear of sufficient size to meet the stores' needs.

Parking appears limited in Osborne Village. Unlike suburban locations where parking is easily found, many businesses in Osborne Village have limited (if any) parking and parking must be found on side streets behind Osborne Street, since parking is prohibited on Osborne Street itself during the day (limited parking is currently available in the evening), or off-street lots away from the individual developments.

Most of the off-street parking lots are regulated, with rules in place as to who is allowed to park (e.g., customers of specific businesses) and how long a vehicle may park in the lot. **Figure 5.3** shows signage at the private parking lot east of Osborne Street on Wardlaw Avenue, showing the restrictions in place at this lot; note that one business has been singled out by name as being prohibited from parking in this lot, while shared parking by the patrons of businesses is permitted. To enforce the rules in effect at these lots, towing companies are employed to remove violators, and one business has hired uniformed parking enforcement staff patrolling the lot to enforce parking restrictions.

Figure 5.3: Example of Parking Lot Restrictions

It was noted by participants in the survey and during the discussion with the BIZ that these restrictions tend to come about as a result of some businesses providing inadequate parking for their own customers, resulting in their customers parking in the lots of other businesses. This creates discord between businesses, since the businesses which are providing the parking potentially perceive the use of their lot by other businesses as unfair, or even that it will drive business away from their business because customers cannot find spaces to park.

The restrictions in place at these off-street lots are intended to ensure that customers of the businesses “approved” to use the lot can find parking spaces, but the restrictions prevent people from parking once and then making stops at multiple businesses within the area, because this would mean shoppers would have to continually move their vehicles from one lot to another in order not to be violating the rules of each lot. This could discourage customers from remaining in Osborne Village for an extended period, eliminating the likelihood of them making multiple stops at businesses, and detracts from the overall “friendliness” of the area. It also makes customers less likely to explore the area, which detracts from the vibrancy of the area.

Restrictions on parking encourage a high-turnover “get in and get out”-style visit, an approach that runs counter to how visitors may prefer to experience Osborne Village – many people want to linger in the area for a long period, as shown by the responses in Table 5.3.1.

Table 5.3.1 – Osborne Village Commercial Visit Preferences

MMM Online Survey (481 responses)

Which of the following options is most typical of how you approach a visit to Osborne Village?		
Visit only one destination, i.e., "Get in and get out"	94	20%
Stop at multiple destinations but concentrate on limiting time in the area.	143	30%
Go with the intention of spending several hours in the area without a fixed departure time.	244	50%
TOTAL	**481**	**100%**

5.3.1 Case Studies

Parking for three developments (Safeway, The Gas Station Theatre, and Villa Cabrini) within Osborne Village are outlined here:

5.3.1.1 Case Study: Safeway

The parking lot at Safeway is one of the larger lots in the area. During discussion with various stakeholders, it was evident that the policies in place at the Safeway lot are problematic to some people. MMM conducted a phone interview with Safeway management to discuss their lot operation:

- Enforcement came as a result of Safeway staff observing that many people were parking in their lot and going elsewhere within Osborne Village rather than shopping at the Safeway. Safeway hired Impark to patrol the lot.

- Impark patrols the lot from 11:00 a.m. – 6:00 p.m. on Sundays and 2:30 p.m. - 11:00 p.m. Wednesday to Saturday. (Safeway is open 7:00 a.m. to 11:00 p.m. Monday – Saturday, and 12:00 p.m. – 6 p.m. on Sundays).

- The lot is available to patrons of Safeway, Starbucks, Hakim Optical and the Liquor Store. Movie Village and Shopper's Drug Mart customers and employees cannot use this lot. Shopper's Drug Mart customers must use the nearby Shopper's Drug Mart lot. The Safeway reports that there is "not much" of an issue with Movie Village customers using the Safeway lot.

- On average Impark tows five vehicles a week and issues 10-15 tickets per week.
- Vehicles are towed when they are warned by an Impark employee that they cannot park there and ignore this request, or if they are parked in the lot for an excessive amount of time.

5.3.1.2 Case Study: Gas Station Theatre

The Gas Station theatre indicated that they have parking issues. The Gas Station Theatre has seating for 235, but does not have an off-street parking lot. Typically they direct patrons to look for parking on-street in the area during events. The manager of the Gas Station Theatre said that they formerly had an agreement with Villa Cabrini but that this had not been actively pursued in recent years. They would like to be able to partner with the operators of an off-street lot as a place for patrons to park their vehicles. The Gas Station Theatre indicated that people would like to be able to avoid the annoyance of finding a parking space when they come to an event.

The venue is in use 200 days per year (either set up of materials, rehearsals, or events) with 145 of those days being events for the public. Average attendance is approximately 100 patrons per event[2]. Auto occupancy is not known, since essentially all traffic to and from the theatre parks on adjacent streets in the Osborne Village.

5.3.1.3 Case Study: Villa Cabrini

Villa Cabrini is a mixed-use development in Osborne Village consisting of both an independent living retirement home as well as commercial units at street level. The residential component of Villa Cabrini consists of 123 one-bedroom self-contained apartment-style units.

Villa Cabrini was contacted in April 2010 to discuss parking. Villa Cabrini's parkade contains 76 parking stalls, with 35 dedicated visitor stalls. Stalls are used by caregivers, visitors, customers, and residents. The majority of residents do not own vehicles.

Formerly, parking in the Villa Cabrini parkade was available to the public through Impark. Impark is still involved in the management of the parkade, but does not offer public parking at present. Impark signage still exists at the site which suggests that public parking is available - this should be taken down if public parking is not available.

[2] E-mail correspondence with Gas Station Theatre, August 2010.

Figure 5.3.1.3: Impark Signage at Villa Cabrini

As noted above, the Gas Station Theatre indicated that in the past there had been an agreement with the Villa Cabrini for patron parking at the theatre to take place within the parkade, but records related to this have been lost; there is no documentation that such an agreement existed. At present, there is no use of the parkade by Gas Station Theatre customers.

5.4 Other Users

Residential, church, and commercial traffic are not the only generators of parking demand within the Osborne Village area.

5.4.1 Entertainment Parking

There are numerous restaurants and bars in the Osborne Village area. These result in long stays in the area compared to trips which are retail-only. They also may be coupled to retail trips – for example, someone may shop at several stores, and then stay in the area for dinner. Entertainment venues, such as the Gas Station Theatre, and concerts at the Osborne Village Inn attract audiences from all over the City, with many of these people driving into the area.

5.4.2 Social Services Parking

There are multiple social service agencies in the Osborne Village area, including:

- Osborne Village Resource Centre (career counselling, job search assistance services)

- Winnipeg Children's Access Agency (supervised visitation services for children and their families)
- Stradbrook Residential Services (addiction treatment center)

While social service uses are generally not large traffic or parking generators, they contribute towards on-street parking issues if their sites are limited in the amount of off-street parking they provide.

5.4.3 Outside Employment Parking

During discussions with stakeholders, it was suggested that some nearby employment centres in the downtown adjacent to Osborne Village were potentially contributing to a parking issue, with staff parking in the Osborne Village and walking to work in the downtown. Awareness of this as an issue was low amongst survey respondents, but it could be an issue that could be investigated further (such as through a survey of area workplaces or with license-plate surveys).

Workers parking in the Osborne Village and travelling elsewhere may become more significant once the rapid transit corridor is extended, with people parking in this area to travel to other locations in Winnipeg using the corridor.

6.0 PARKING UTILIZATION IN OSBORNE VILLAGE

To assess the current state of parking in the Osborne Village, MMM collected parking utilization data in the study area.

6.1 Details of Data Collection

Aerial photos and parking regulations from the City of Winnipeg were used to map and index the areas where data collection would take place.

The capacity of each lot and on-street length available for parking was estimated using aerial photos for the lots, as well as the distance measurement capabilities within Google Maps. For streets, both Google Maps and parking signage data from the City of Winnipeg were used to estimate the number of parking spaces (using a 7.0 m assumption for the length of each on-street space) to determine the parking capacity for these streets. Where possible, loading zones, fire hydrants, driveways, etc. were taken into account in estimating the parking capacity.

The Osborne Village study area was split up into three subareas. Tables were created of on-street and selected off-street parking lots where the public might expect to park (even if there were regulations indicating that parking was restricted to tenants of a particular business or employees only.) Residential lots (at multifamily buildings) were not included, since generally, it is not possible for the general public to park at these lots, and these would not be considered to be “open” to the public. Data was collected once per hour for each parking area, with six sets of utilization data collected.

6.1.1 Time Periods

Data was initially collected on the afternoon of Friday, April 23, 2010 (4:30 p.m.-7:30 p.m.) and midday (11:00 a.m. – 2:00 p.m.) on Sunday, April 25, 2010.

From discussion with the City stakeholder team, it was felt that these specific time periods would:

- Represent heavy commercial customer parking utilization in the area on a Friday afternoon.
- Capture interaction between Sunday morning church service and Sunday midday (starting at noon) retail activity. Because of the shorter shopping hours on a Sunday,

it was felt that a Sunday would be busier from a parking standpoint than a Saturday, as retail traffic would be spread out over a wider period on a Saturday.

Additional count data was collected for the southern area around “Confusion Corner” on Friday, June 18, 2010 (see section 5.2).

6.1.2 Methodology & Data Collection in Field

Three MMM staff members walked through each of the subareas repeatedly, recording observations on paper tables that were then loaded into Excel.

The weather at the time of the April study periods was warm at approximately 20-22°C. These conditions were appropriate for the survey as it meant that there would be a lot of visitor traffic to the area to enjoy restaurants and shopping, which might not have been as probable on a day with poor weather.

6.1.2.1 Data Collection in the Southern Portion of Study Area

The southern area is different to the central part of the Osborne Village as it is more “commercial strip”-style development rather than being pedestrian-oriented. Discussion with the Osborne Village BIZ suggested that this area was not considered to be a true part of the Osborne Village.

While these lots exhibited only moderate utilization, their location (bounded by heavily utilized roads) and removed from the rest of Osborne Village “strip” makes them less attractive to Osborne Village visitors; these lots are located on the edge of the Osborne Village “heart” to the north. This area is distinct from the rest of Osborne Village, being almost a separate entity, as it is divided from the rest of the area by the high-volume McMillan Avenue, and is unlikely to be considered a parking option for visitors to Osborne Village to the north.

6.2 Summary of Findings

A large amount of data was collected for the Osborne Village, and is included as **Appendix A**. A brief summary of the findings (with discussion) follows.

The references to occupancy are based on the following classification:

- **Low Occupancy:** Less than 50 percent of the stalls are occupied. This would mean that parking spaces would be easily found, since the majority of stalls would be unoccupied..

- **Medium Occupancy:** Between 50 and 85 percent of stalls are occupied.

- **High Occupancy:** Above 85 percent of stalls occupied. Eighty-five percent is generally considered a level where a lot is perceived as "full" when the majority of users are casual parkers – finding a space in a lot is difficult for users. In the case of reserved parking, a much higher occupancy level would be expected.

6.2.1 Off-Street Parking, Friday p.m.

Observed occupancy levels for off-street lots for late Friday afternoon/early evening are summarized in Table 6.2.1.

Table 6.2.1 – Off-street Parking Occupancy – Friday Afternoon

Lot Location	Time Period and Occupancy Level		
	4:30 p.m. – 5:30 p.m.	5:30 p.m. – 6:30 p.m.	6:30 p.m. – 7:30 p.m.
City's Stradbrook Meter Lot	high	moderate	high
Safeway lot	moderate	high	high
Shopper's Drug Mart Lot	moderate	low	moderate
Gord's Lot	moderate	no data	no data
Other Lots	low	low	low

At the beginning of the Friday peak period, most off-street parking lots are "low" in terms of utilization.

During the three-hour observation period on the Friday, the Safeway lot was highly utilized at all times. This may explain why it provides enforcement. This is a large lot that is centrally located in Osborne Village and theoretically could be used as parking for a large number of surrounding businesses, however users risk being ticketed, as noted earlier.

Safeway, being a large supermarket is a different type of business to the others in the area. It is likely that many in the area shop at Safeway on a frequent basis whereas other businesses may only serve a portion of the entire population on a much less regular basis. Shopping trips to supermarkets also often result in a large amount of items to carry home; unless one shops frequently and buys only a small number of bags of groceries, people must use their vehicles to carry the groceries home even if they live nearby.

The City's lot is also highly utilized. It is a small but highly-visible lot centrally located in Osborne Village. Unlike the Impark lot to the east which is behind a block of stores, the City lot can be seen from Osborne Street.

The Gord's lot, in the southeastern corner of Osborne Village serves a small cluster of businesses; it is also highly utilized.

Other lots in the area are not as highly utilized, even those near to the Safeway lot. For instance, the Shopper's Drug Mart lot saw high, moderate, and low utilization during the three-hour Friday observation period.

6.2.2 Off-Street Parking, Sunday Mid-day

Observed occupancy levels for off-street lots mid-day Sunday are summarized in Table 6.2.2.

Table 6.2.2 – Off-street Parking Occupancy – Sunday Mid-day

Lot Location	Time Period and Occupancy Level		
	11:00 a.m. – 12:00 p.m.	12:00 p.m. – 1:00 p.m.	1:00 p.m. – 2:00 p.m.
Safeway lot	moderate	low	moderate
Racquet Club lot	moderate	low	low
Multi-business lot north of Impark lot	moderate	low	low
Academy lot	high	moderate	low
Shopper's Drug Mart lot	low	moderate	low
City's Stradbrook lot	low	low	high
Real Estate Business lot near Residential Towers	low	moderate	low
Other lots	low	low	low

Between 11:00 a.m. and 12:00 p.m., attendees of the places of worship in the area park in the Safeway and Academy lots. Sunday brunches at area restaurants in the area also generates traffic on Sunday mornings, but other than restaurants, most businesses are closed on Sunday morning. Commercial activity increases in the early afternoon but off-street parking is low on Sundays at mid-day in Osborne Village.

6.2.3 On-Street Parking, Friday p.m.

Observed occupancy levels for on-street parking on Friday afternoon/early evening are summarized in Table 6.2.3.

Table 6.2.3 – On-Street Parking, Friday afternoon

Location	Time Period and Occupancy Level		
	4:30 p.m. – 5:30 p.m.	5:30 p.m. – 6:30 p.m.	6:30 p.m. – 7:30 p.m.
Short cul-de-sac streets parallel to Osborne Street (Gerard, Norquay, etc.)	high	high	high
River Avenue	high on the south side	high on the south side	
Wardlaw Avenue	moderate	moderate	high/moderate
Stradbrook Avenue	high between Nassau and Osborne	high between Nassau and Osborne	high
Gertrude Avenue	mixed (low, moderate, and high segments)	generally low occupancy	mixed (low, moderate, and high segments)

The most active activity area of Osborne Street in the Osborne Village is between River Avenue and Stradbrook Avenue -- there are a large number of restaurants and bars within this stretch of Osborne Street; as one moves north and south of this area, the occupancy for parking nearby drops off.

The northwest quadrant of Osborne Village's on-street parking is not heavily utilized, likely due to its distance from Osborne Village's commercial area.

The short residential cul-de-sac streets to the east and west of Osborne Village are always heavily utilized during the Friday period. They store the cars of adjacent residences, but customers of businesses in Osborne Village also wants to park on these streets; it is possible to cut through the east-west lane to walk to Osborne Street.

Parking space on the avenues became utilized later on during the Friday study period. Stradbrook and Wardlaw are closer to the centre of Osborne Village, so they filled up first. Gertrude Avenue is a longer walk from Osborne Village's central area so it is slower to fill with parked vehicles.

The boundary for considering a parking space "close" to Osborne Village's core appears to be:

- South: Stradbrook Avenue
- North: River Avenue
- East: Scott Street
- West: Nassau Street

Beyond these limits, on-street parking usage is primarily a result of residential occupancy.

6.2.4 On-Street Parking, Sunday Mid-day

Observed occupancy levels for on-street parking on Friday afternoon/early evening are summarized in Table 6.2.4.

Table 6.2.4 – On-Street Parking, Sunday Mid-day

Location	Time Period and Occupancy Level		
	11:00 a.m. – 12:00 p.m.	12:00 p.m. – 1:00 p.m.	1:00 p.m. – 2:00 p.m.
Short cul-de-sac streets parallel to Osborne Street (Gerard, Norquay, etc.)	Norquay, Gerard, Pulford, Bole, Bryce Scott = high Wellington, Wilmot, Nassau, Scott, Cauchon, Lewis, Clarke = moderate	Norquay, Gerard, Cauchon, Bryce = high, other locations = moderate	Bole and Clarke = high, others = moderate and low
River Avenue	high and moderate	high and low	mixed: high, low, and moderate
Wardlaw Avenue	high west of Osborne	high west of Osborne	high west of Osborne
Stradbrook Avenue	high and moderate	Moderate west of Osborne, high east of Osborne to Scott	moderate and low
Gertrude Avenue	high between Daley and Osborne	high between Daley and Osborne, moderate between Nassau and Osborne	moderate and low

The high occupancy of parking in the southwestern area is due to services at the places of worship in the area. The parking on-street opposite the Safeway is high because of the Holy Rosary Church (as is the parking in the Safeway lot).

Between noon and 1 p.m., areas around places of worship continue to have high parking occupancy, as some activities continue beyond the noon hour.

Also on Sundays, the amount of parking on the cul-de-sacs is much lower than on the Friday. This would appear to demonstrate that the heavy occupancy of parking on the Friday is more a result of customer traffic than of resident's cars.

7.0 TURNOVER DATA

Data on parking turnover (that is, how long people remain in a parking spot) was conducted on Wednesday June 16, 2010 using the Winnipeg Parking Authority's camera-equipment parking enforcement vehicles. These vehicles can collect license plate data and vehicle location as they drive through an area.

Data was collected for a sample number of streets to reflect vehicle availability. It was felt that this would provide a representative indication of parking usage in areas observed to be more heavily used by parkers.

Data was collected on the following streets, which were observed to have heavy parking occupancy in the Friday and Sunday data collection periods. Data was collected on June 16, 2010, mid-day between 11:00 a.m. and 5:00 p.m. at 30 minute intervals.

- Wardlaw Avenue, Daly Street to Osborne Street
- Stradbrook Avenue, between Nassau Street and Scott Street
- Pulford Street
- Gerard Street

Pulford Street and Gerard Street are short cul-de-sac streets, which run approximately north-south parallel to Osborne Street, each with space for approximately 13 parked vehicles. Pulford Street has a two-hour parking maximum, but residents can apply for parking passes to exclude themselves and their guests from this restriction.

Wardlaw Avenue and Stradbrook Avenue run approximately east-west perpendicular to Osborne Street. Two blocks of each were sampled, one on either side of Osborne Street. Stradbrook Avenue and Wardlaw Avenue each had capacity for approximately 50 vehicles.

7.1 Observations

Table 7.1 shows the percentage of vehicles that remained in a spot for various time intervals on each of the observed streets. Although the time limit was two hours, because the observation only took place at 30 minute intervals, it was not possible to identify whether or not a vehicle was in violation of a two-hour limit simply by capturing it in four consecutive periods, since the vehicle may have been parked exactly for two hours and thus not been in violation of the limitation. Vehicles parked in the area for two and a half hours are clearly in violation of the rule.

Table 7.1: Parking Turnover on Selected Osborne Village Streets

11:00 a.m. – 5:00 p.m., June 16, 2010

		Parking Interval		
		less than 30 minutes	30 minutes or greater and less than 2.5 hours	2.5 hours or more
Location	Wardlaw Avenue	36%	31%	33%
	Stradbrook Avenue	40%	32%	28%
	Pulford Street	31%	56%	13%
	Gerard Street	56%	35%	9%

On Pulford Street, the only street with parking restrictions, 13 percent of vehicles were observed parking for longer than two and a half hours. The license plates of the vehicles were cross-referenced by the WPA against a list of issued permits in the Crescentwood parking zone, and none of the vehicles observed parking for greater than two hours on Pulford Street had permits.

All streets exhibited examples of vehicles leaving and returning, which may be vehicles belonging to area residents or employees.

The long avenues (Wardlaw Avenue and Stradbrook Avenue) had larger percentages of vehicles parked for long periods (longer than two and a half hours), but all streets experienced high levels of turnover during the observation period.

The majority of parking on all four streets was less than two and a half hours. This would indicate that on these streets, the majority of traffic is visitor-type traffic which remains in the area only a short time rather than being resident or employee parking.

Therefore, a pay-for-parking on-street program may not change observed conditions, since high turnover is already taking place on area streets in Osborne Village. Had low levels of turnover been seen, that would serve as a rationale to use paid on-street parking as a way to encourage turnover.

8.0 PARKING FACTS AND PERCEPTIONS IN OSBORNE VILLAGE

The data on parking occupation and turnover in sections 6.0 and 7.0 indicate that during all periods there was parking available in the area, but that parking was utilized unevenly; some areas had very low occupancy, while those areas closer to Osborne Street had very high levels of occupancy – an unoccupied stall would be very difficult to find.

8.1 Perceived Problem

The online survey indicated that a high percentage of both residents and non-residents believed parking to be a problematic issue. As noted in section 5.1, survey participants indicated that parking was an issue for their visitors in the Osborne Village.

Table 8.1 shows that only approximately 35 percent of all survey respondents (residents and non-residents) thought there were no issues with parking in Osborne Village:

Table 8.1: MMM Survey: Response to Assertion of a Parking Problem in Osborne Village (349 responses)

Indicate your level of agreement or disagreement with the following statement:		
"Hard to find parking is a fact of life in the Osborne Village area, and does not need to be altered."		
Strongly Agree	35	10.0%
Agree	69	19.8%
Disagree	146	41.8%
Strongly Disagree	80	23%
N/A	19	5.4%
TOTAL	**349**	**100%**

Often when an area is said to have a “parking problem”, this means that people trying to park experience problems finding parking that has these attributes:

- Easy to find
- Is easy to pull into, and out of
- A large amount of vacant stalls at all times
- Is close to their destination
- Is free
- Has no restrictions on use (for example, it is not limited to customers of one business)

From MMM’s observations, although parking can be found in the Osborne Village area, it is in locations where all of these criteria are not met, and the parking goes underutilized. Specifically, parking is available, but it may not be close enough to the desired destinations within Osborne Village to be attractive to users. The parking that is available is less attractive because it requires users to walk further to access the centre of Osborne Village’s commercial area. Also, parking capacity exists in the Impark lot but is underutilized for multiple reasons (is not free, not directly visible from Osborne Street, site is unattractive).

The parking that is currently underutilized can be expected to become more attractive in the future as redevelopment takes place in the Osborne Village, because alternatives – that is, a parking space that does meet all of the above criteria – will be increasingly difficult to find. More remote no-cost parking may also become more attractive if the on-street parking in close proximity to Osborne Street becomes paid parking at some time in the future.

MMM was asked to look at how parking conditions in the Osborne Village might be altered. Several concepts were proposed during discussion between MMM and City staff, and these are discussed in the following sections.

Some of the conditions noted above are reasonable attributes that the City, the WPA, and any parking operator would agree are important (ease of use) whereas others may be more contentious – for instance, there is disagreement on whether or not parking should be free, or whether or not it should always be provided close to a destination.

9.0 STRATEGY NUMBER 1: CREATING NEW PARKING CAPACITY: NEW PARKADE

One option presented was to construct a new parkade either within or adjacent to Osborne Village, to provide a supply of additional off-street parking. Note that it is unlikely that any new parking supply would be required until parking occupancy is near or above 85 percent (the threshold of being considered fully utilized) during key times of the week. An initial step to improve availability may be to implement paid on-street parking in key areas.

Twenty-seven percent of people completing the survey were opposed to the concept, while 44 percent of survey responses indicated they would be in favour of the construction of a parkade.

There are a limited number of locations on private property within the Osborne Village where a new parkade could be constructed, such as the Impark parking lot on Gertrude Avenue, or behind the Blockbuster video store on Osborne Street. These are private properties and potentially would need to be purchased by the City if the new parking was to be owned by the WPA. Alternatively, a facility could be developed as a joint venture by the property owner and the WPA or another public sector body.

A parking area could be built stand-alone, as part of a mixed use development with retail, office, or residential uses as part of the parkade development. A parking structure could replace some of the surface lots in the Osborne Village, freeing up those lots for redevelopment. The City is currently developing guidelines for parking structures that may require that new facilities have a non-parking ground floor use. It is not yet confirmed whether this would apply only in the downtown or also apply to other areas such as Osborne Village as well.

Some respondents to the survey liked the idea of being able to park out of the elements in the winter, (rather than on-street as they do now) and not having to worry about parking on snow routes where they could be towed, since they could use the parkade instead. Respondents also indicated they would like to be able to direct their guests to the parkade, rather than have them search for available on-street spots.

Negative comments from the survey about a parkade included:

- Creation of a parkade would lead to increased crime.
- A parkade would be expensive to build and the money could be better used elsewhere (such as on alternative modes) rather than rewarding motorists for driving into the area.

- Parkades are a poor use of land compared to residential and commercial development. A parkade would deaden the surrounding area – It would be better to have an interesting use in a space rather than a storage place for cars.
- A parkade would be an eyesore.

The concept of using a levy on existing residents or businesses to fund the cost of a parkade was unpopular as it was felt that this would be an unfair burden on the businesses and residents of the area who have made the area successful to date. Such a levy could be a heavy burden for some businesses in the area.

If a parkade was created, reaction from the survey participants was that it would be underutilized unless it was free to use, as people would likely continue to look for on-street parking.

A single location for a parkade would be most useful to the area surrounding the parkade, but would potentially be unattractive if one's destination was more than a short walk away from the parkade. Thus the issue of parking being inconveniently located (which is a problem for some of the existing on-street parking) now would still apply.

9.1 Parkade "Look and Feel"

The look and feel of a parkade is extremely important and it would have to be incorporated into a mixed-use development. A parking structure can be made a more attractive feature in a community by ensuring that it is constructed of high-quality materials to make it fit into the existing architecture of an area. As shown on **Figure 9.1.1**, the Albert Street Parkade in the Exchange District of Winnipeg is an example of a parkade designed to fit architecturally into the surrounding area.

Figure 9.1.1: Albert Street Parkade, Downtown Winnipeg

Parkades can also be designed as part of a mixed-use project that makes the parkade just one of multiple parts of a project rather than the only purpose of a development.

Art can also be incorporated into parkades to make them more visually interesting. (The North Beach Parking Garage in San Francisco incorporates painted “fortunes” into the pavement in each stall so that each time you park in a different stall, you can read a different “fortune cookie”-type fortune, as shown in **Figure 9.1.2**). Strategies such as this that add a novelty aspect to parking, potentially encouraging people to make use of a new parkade.

Figure 9.1.2: “Parking Fortune” in a stall of San Francisco’s North Beach Parking Garage

If a new parkade is built, it would be desirable to have it designed to be aesthetically pleasing, as the City has required of some of the more recent facilities in the downtown.

At present, there is no requirement for private development to be bound by design standards where the necessary zoning is already in place. Ideally, a private developer constructing a parkade in Osborne Village would design the parkade in such a way that it would have a high quality look and feel. The City is in the process of developing design guidelines for parkades.

9.2 Ramifications of Creating New Parking

Any new parking, be it within a new parking structure, or as part of a new development in the area, could encourage additional vehicle trips to/from the area, adding pressure to the road system. However, not providing sufficient parking to at least meet minimum parking needs may discourage ongoing development/redevelopment in the area.

9.3 Cash-in-Lieu as a Funding Mechanism

The response to the use of a levy on Osborne Village development to fund the parkade was negative. An alternative strategy to funding the parkade may be to implement a cash-in-lieu policy – developers would have the option to contribute funds to a fund for development of parking facilities in the area rather than construct the amount of parking required under the bylaw[3] for an individual project. These funds would be pooled and the City takes on the responsibility of building the stalls, or accommodating the parking in some other way.

Winnipeg does not currently have a cash-in-lieu policy. Variances (relaxations) to parking requirements are granted on a case-by-case basis by the City of Winnipeg. The current City zoning by-law does offer the opportunity to prepare a parking management plan in support of a change to the parking requirement in the by-law.

9.3.1 Cash-in-Lieu vs. Transportation Levy

Cash-in-lieu policies are restricted to collecting money from new developments in lieu of constructing on-site parking for the purpose of funding future parking stall construction. This has been applied in other cities such as Calgary.

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[3] In an area like Osborne Village, where parking requirements will already be reduced, the number of stalls funded by cash-in-lieu contributions should be based on the reduced requirement under the bylaw.

A portion of funds collected from cash-in-lieu could be spent on other improvements in an area, such as landscaping or for alternate modes, such as for bicycle network infrastructure. If the monies collected can be directed towards other investment besides parking, then this is a transportation levy rather than cash-in-lieu, and would require a fund manager. The City does have experience with a transportation levy as one does currently exist in the Charleswood area. Cash-in-lieu funds are oftentimes managed by the Parking Authority.

9.3.2 Setting the "Fee Per Stall" Value

The fee per stall should be at least the *proforma* cost of building a surface stall in a suitably equipped parking lot. Note that construction costs for parking stalls can be significantly more than this – costs vary due to construction costs, which can fluctuate depending on site conditions, the size of the site, and other factors. If a parking structure is envisioned, a levy in the order of $25,000 per stall would be needed.

Note that the amount specified per stall in cash-in-lieu systems have to be monitored and revised regularly as the amount of money required to construct parking stalls continually changes. If the cash-in-lieu amounts per stall do not correspond closely with the actual costs of construction, then the pool of money collected over time (which may be only a few stalls worth of parking each year) may not keep up with the cost of construction, and parking may never be built or an insufficient amount of new stalls would be developed.

To avoid this pitfall, a cash-in-lieu fund should not be the sole source of funding for parking, instead defraying part of the costs when the parking is constructed. Alternatively, the City may consider constructing a parking structure in advance of obtaining all of the funding through cash-in-lieu and getting contributions from developers after the parking structure is open to allow the developers to make use of the parking capacity to support proposed developments. This could be considered "front-ending" the construction of parking.

9.3.3 Considerations of Cash-In-Lieu Programs

Other considerations to be aware of while managing cash-in-lieu programs:

- While waiting for the parking to be constructed, there would be additional pressure on the existing parking supply in the area – any development relying on cash-in-lieu may create an interim parking shortfall until such time as new parking supply is provided.

- A consideration with cash-in-lieu systems is that the monies raised may be inadequate to construct parking stalls if sufficient development does not occur in a short period of time, and construction may be deferred; in this case contributors may pressure the City to build spaces or request a refund if they do not believe that parking will be provided. Any system would need to ensure that the timeframe to provide new parking is clearly set out (a period of time or even clear identification that there is no limit). Alternatively, a "sunset clause" that specifies that if the funds are not spent by a specified date, contributions are returned can be included. This contributes to continuing stress on on-street parking if the parking is never constructed or is delayed for a significant period of time.

- Cash-in-lieu programs should be created with at least a basic concept of what the money will fund, be it a parking lot, or parking structure, with potential locations kept in mind. If this is not done, then it is difficult for developers or the City to plan ahead as to what will trigger the actual construction of the parking, or for developers to treat the program seriously and be prepared to contribute, particularly to a voluntary program.

9.3.4 Reuse of Existing Structures and Cash-in-Lieu

The City encourages existing buildings to be reused where possible, without requiring new parking to be constructed to support more intensive uses. This allows the buildings to be used without being altered to construct additional parking, which might make such re-uses difficult.

Over time, as more individual developments are approved, the demand on existing parking to supply these developments can create a parking shortfall in the area if additional supply is not part of the new developments.

The City should consider modifying rules related to the reuse of existing buildings to have developers specify details related to how parking will be provided, and what measures will be enacted to reduce the impact on the area's parking supply.

Cash-in-lieu costs with reuse projects may preclude the redevelopment; cash-in-lieu requirements may need to be relaxed/considered on a case-by-case basis when considering reuse projects, supported by a parking management plan.

9.4 Joint Ventures

Joint ventures, where multiple parties collaborate, such as the WPA and a private developer, or a parking operator and a private developer, or multiple developments, could develop parking in the area.

One way that this could come about would be if a developer wished to construct a building with a low parking supply consistent with a TOD area, but they provided parking to satisfy the City's bylaw needs. The developer could develop an agreement with the City where the developer would build to the bylaw requirements but not utilize all of the stalls; the "surplus" parking within the development would be leased to the City and made available as public parking.

Making parking within a private development open to the public would require special design to ensure that the public stalls were accessible without compromising the security of the private stalls.

The Villa Cabrini site in Osborne Village had public parking operated by Impark in the past; new development would operate in a similar way but possibly with the City being the parking operator. The WPA is currently not permitted to operate private lots, so special agreements would have to be put together to facilitate such a joint venture. Alternatively, the space within a development could be operated by a private parking operator.

9.5 Potential Parkade Concepts

Appendix B: Potential Parkade Concepts provides a brief overview of two potential sites for parkades within the Osborne Village, looking at the feasibility of a parkade at the existing Impark-managed lot on Gertrude Avenue and at the existing City Lot on Stradbrook Avenue.

10.0 STRATEGY NUMBER 2: IMPROVING USE OF EXISTING ON-STREET PARKING STALLS

Several ideas related to deriving more benefit from the existing supply of on-street parking spaces are outlined below. These measures would defer the need to construct additional parking within Osborne Village.

10.1 Using Parking Fees to "Create" On-street Parking Capacity in Osborne Village

Donald Shoup's book, "*The High Cost of Free Parking"* (2005), posits that:

> *In existing areas, where the occupancy of free on-street parking is near 100 percent, capacity can be "created" or "made available" by charging a small fee to park. Some people will find the fees onerous and stop parking in a location, making those stalls available to other motorists willing to pay to park there.*

Whereas a large fee could drive many users away (and create a high percentage of unoccupied parking) because few would choose to park at a location, a small fee could have the effect of reducing the amount of people parking on the street by a small amount. The key is to establish an appropriate fee to provide the appropriate available supply. A "practical capacity" of 85 percent occupancy is generally accepted as an appropriate upper limit before additional supply is considered in the case of non-reserved casual spaces, so that on any block, there is likely to be one spot out of eight available, which eliminates the need for motorists looking for parking to cruise the area, as a space will generally be vacant within a few blocks of any point.

Generally, it is understood that on-street parking close to the entrances of businesses should be used primarily for short-stay customers, whereas longer-stay parking can be located further from the businesses in lower-cost parking off-street. A longer walk may be less of an issue to a customer who is planning on staying in an area (like Osborne Village) for a longer period, however, trip purpose can also be an important factor in how far someone is willing to walk.

The rate to charge for parking could vary over the day based on the demand for parking, so as to always ensure that at least 15 percent of the stalls are vacant. The highest price should be charged during the anticipated peak parking demand period.

Modern "pay and display" machines, as seen in Winnipeg, are already capable of charging different rates at different times of the day, which makes this concept feasible. The "correct" prices to charge emerge as a result of attempting to create the targeted occupancy rate.

Higher fees during business hours make it relatively inexpensive for short duration visits, but longer stays become expensive, which would encourage people staying long periods to find a place to park off-street at a reduced rate rather than on-street, which is intended for high-turnover use. This of course implies that off-street parking is available.

Prices should be reviewed on an ongoing basis to determine whether or not they are producing the target occupancy rate by observing the occupancy of the parking area throughout the course of a day, a week, a month, etc. and comparing it with prior conditions (without the fees in place).

Rather than being priced at a rate that provides a high income, the price should be set at a level that achieves the goal of providing an occupancy rate of 85 percent. The purpose of these fees is not the same as "for-profit" private parking lots, but rather to manage the available high demand parking spaces.

- Parking rates could be calculated to encourage the use of on-street parking for high-turnover customers, and the use of lots for people who need to spend longer in the area.
- Reduced rates could be used for periods when there are a significant number of church attendees (e.g., Sunday morning).
- Special event rates could be used for performances at the Gas Station Theatre. Parking could be bundled into the cost of tickets, which would eliminate the difficulty theatre-goers have in finding parking close to show times in this area if a dedicated location was available.

10.1.1 Residents (and Their Visitors) Would Pay to Park On-Street

Under this option, area residents would be required to pay for on-street parking to discourage all-day occupation of these spaces, potentially making more spaces available for short-term casual use.

However, this is unlikely to be an acceptable policy to residents in the area, particularly when the housing has been designed without off-street parking as an alternative. Residents have been supportive of minimal charges (fee for a parking permit in areas with time restrictions), however, in this option a higher monthly fee is envisioned.

If a pay-for-on-street parking system went into practice in the Osborne Village, area residents, and their guests, it might be necessary to grant residents "immunity" from paying a parking fee each time they park, by means of low cost permits.[4] These would be similar to the permits that allow residents to be exempt from time-restricted parking on certain streets.

If there were a large number of these permits in use, then this would frustrate the purpose of charging for on-street parking, since a large number of permits would mean that most stalls would continue to be occupied by permit parkers who would not have an incentive to vacate the space, and it would require charging a higher price to achieve the goal of 15 percent of spaces being unoccupied. However, the number of issued permits for parking on streets within Osborne Village where time limits have been implemented suggests that residents are not parking vehicles on these streets for long periods during the day.

It is possible to abuse such systems. For instance, a placard-type system could be abused by residents if they were to begin selling the visitor permits to commuters or area employees to allow them to park for long periods for free on the street. The parking permit system would have to be carefully designed and the rules well enforced to ensure that the system would not be abused by users.

10.1.2 Reinvestment of Parking Fee Revenue

Revenue generated from parking fees in the area could then be invested within the area such as upgrading Osborne Village with new pedestrian amenities, improved landscaping, parking lot maintenance and enhancement, etc. as well as paying for patrolling the parking areas and setting aside funds for additional parking supply in the future.

The local reinvestment of the fees is important in making paying fees for parking, that was formerly free, less objectionable.

Several survey participants indicated they did not believe that the City would agree to reinvestment of the revenue back into the Osborne Village.

10.1.3 Spillover Due to Limited Application of a Paid Parking Area

A concern for the area surrounding Osborne Village as a result of paid on-street parking would be that of spillover. If people must begin paying for parking within a certain radius of the Osborne Village commercial area, then they may simply park outside the boundary of the pay-

[4] Parking experts like Donald Shoup recommend that all on-street parking users, including residents be charged to park on-street.

for-parking area for free. This means they will have to walk further, but would avoid paying parking charges. Spillover can become a sensitive issue, pitting one community against another.

A recommendation in permit parking literature is being able to clearly isolate areas where parking is an issue so that spillover effects are limited. The Osborne Village has natural borders on the north side (the Assiniboine River) with limited crossing points which make it unlikely that people will change their behaviour to start parking on the north side and walking across into the area to save on parking charges. However, the southern border of Osborne Village blurs into the Corydon Avenue neighbourhood, and so a joint strategy may be required to manage parking so as not to create conflict between the two neighbourhoods.

10.1.4 Possible Opposition

The use of fees for parking which formerly was free may garner some opposition. Arguments could include:

- The majority of automobile drivers expect to be able to park for free outside the downtown.
- Some retailers may be opposed to charging for parking, because they believe it will make customers stop shopping in the area and go somewhere else where parking is free.
- Potentially would replace low-margin businesses with higher-end businesses, (as a result of low-income customers avoiding the area because they cannot afford to park here) leading to allegations of gentrification.
- Some area residents may park all day even in a residential area with parking limits and may never have had a ticket. They may see getting a permit as a nuisance, especially since there is a fee associated with the permit.
- Some residents may attempt to sell their visitor permits to long-term parkers.
- Some retailers may object to their staff or their own parking being relocated away from their stores to low-turnover off-street parking areas because it is less convenient to them.
- People who think money spent on parking equipment could be spent on other City priorities.
- People who say that they will not make short trips now because they will have to pay.
- People who think it is a cash grab.

Responses to some of these arguments:

- Using fees may make some people vacate spaces, and should cut down on the extent of motorists who are driving around looking for parking.

- Free parking can cause other issues such as added drivers' time and fuel, and increases traffic volumes as a result of motorists "cruising" the area looking for available spots.

- The attractiveness of available convenient parking for shoppers and customers offsets the disadvantages of paid parking in areas that formerly had parking problems. While some customers may be lost from the area because they do not want to pay, new customers who previously avoided the area because of the parking issues may be drawn in.

- Free parking does not ensure success for retailers. Parking in itself is not an enabler, however a lack of parking can be a disabler in terms of the success of an area such as Osborne Village. A distinctive retail mix of businesses that people want to support, which is present in the Osborne Village is what ensures viability, rather than the cost of parking. Paid parking is not a problem if the area is supported by a mix of visitors, and customers willing and able to pay for parking. The concentration of destinations and attractions make these areas attractive in spite of fees for parking.

- If potential customers have a hard time finding parking, then that is another reason why they will go elsewhere, which may already be happening at the moment.

- Single-occupant motorists may begin to look for cost-sharing passengers (who may have formerly been single-occupant drivers) to carpool with which would have a positive impact on sustainable transportation within Winnipeg and could potentially increase the number of visitors to Osborne Village.

- Areas such as Osborne Village are not in direct competition with power centres or malls in suburban areas of Winnipeg that offer large amounts of free parking – they offer a different range of product and a different shopping experience.

It is generally not possible to obtain buy-in from all stakeholders, however, by identifying the range of options considered, and weighing the pluses and minuses of each, stakeholders may be able to buy-in to the concept.

10.1.5 Response from Survey Regarding Charging for Parking

The majority of survey participants (60 percent) opposed the parking fee concept while approximately 22 percent were in favor of the concept.

Based on the opposition to the concept as well as the observed turnover data from section 6.0, it does not appear that this option need be pursued in this area at present, given that turnover is already occurring on streets within Osborne Village.

It would appear that it would be very challenging to convince Osborne Village stakeholders to support a “pay for on-street parking” area based on the survey responses received.

10.2 Enhanced Enforcement of Existing Regulations

It has been noted by stakeholders that enforcement of existing parking restrictions within Osborne Village is limited; the area is not enforced on a regular basis by WPA. Enforcing parking regulations infrequently can give parking users the impression that parking enforcement is unpredictable. However, dedicated enforcement requires funding for increased staffing to enforce parking time limit regulations on a fair and consistent basis. This suggests that pay parking is required to fund enhanced enforcement efforts.

On-street parking turnover is important in ensuring an economically viable business district. Strong and consistent enforcement of restrictions will ensure that they are obeyed and that all-day parking does not occur in on-street spaces. However, turnover was observed to take place in Osborne Village, as noted in section 7.0, and thus additional enforcement may not increase the level of turnover.

10.3 Expand Hours of Time Restriction Enforcement on Parking

Several areas within Osborne Village are regulated with time limits, but enforcement does not take place throughout the entire day. Parking regulations, including paid parking, could be extended into the evening hours which would increase turnover.

While this should increase revenue and turnover, it may impact entertainment venues negatively, since it might discourage customers from lingering at a bar or restaurant if they had to be concerned about "feeding the meter". The additional enforcement costs could reduce any revenue generated,.

10.4 Review of Existing On-Street Loading Areas

It was noted in discussion with the City and the WPA that the WPA now has the ability to review the status of existing loading zones. There are many locations within the Osborne Village where loading zones exist; after a review of occupancy within the area infrequently used loading zones could be removed with the space instead used for on-street parking stalls. This would increase the amount of spaces available to users. It is likely that a smaller number of loading stalls (with on-street stalls shared amongst adjacent development) could accommodate loading on streets in the Osborne Village area. Loading zone times could also be adjusted, with all day loading zones changed to daytime weekday zones only, and available for parking at other times.

10.5 Leasing of On-street Parking Stalls to Development

A concept that has not been tried in Winnipeg would be to make it possible for development to lease on-street parking stalls from the City, which would make the on-street parking act like part of the private parking for their site. It would be reserved for use by the development and unavailable to the general public.

This might be a difficult concept for the public to support – It is typical to assume that the parking in front of their property is "theirs" even though it isn't from a legal standpoint – the City controls this space but does not place restrictions on who can use it. Even though leasing a space to a development is similar in nature to the idea of a parking meter on a stall, the concept will be new to the general public.

11.0 STRATEGY NUMBER 3: PARKING MANAGEMENT DISTRICT (PMD)

Investigate the feasibility of a parking management district for Osborne Village.

It was observed that a large number of stalls in existing private off-street parking lots was going unused during the observation periods.

"Shared Parking", where multiple businesses make use of the same parking stalls at different periods (rather than each business having to provide separate stalls) is a way to make more efficient use of parking stall capacity. For instance, if an office's parking lot only requires the stalls during business hours, then these stalls could be re-used by a different business, such as a restaurant in the evening, when the office does not require them.

Parking policies that have been created in the area are exclusionary, making it difficult for people to park once and make stops at multiple destinations.

Private lots in the area are going unused or are underutilized while on-street parking in the area is heavily utilized. These lots are vacant because they are intended for business use only, and are signed so that no other use is possible, even when these businesses are closed and the stalls are empty. The private public use lot is also underutilized, possibly in part due to its condition and in part that drivers are unaware of the lot.

The concept of making unused off-street parking available for public use when it is not being used was not included as a concept in the online survey, but suggestions to consider this type of approach were made repeatedly in the "open comments" section of the survey.[5]

A Parking Management District (PMD) with a Parking Management Authority (PMA) is one approach to develop a structure that could represent property owners, area businesses, residents and other area stakeholders to manage the parking supply (both on-street and in private lots) in the area, pooling the parking resources of the area to provide a supply of parking to customers and staff in a more efficient way that benefits the community. A similar concept, the Transportation Management Authority, or TMA, would have the same responsibilities but also would encourage transit usage and active mode use within the area. This could be hosted by the BIZ or a City department or as a new entity.

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[5] The fact that the public would like to see this in place shows that there is grassroots support for such an initiative; this may assist in convincing businesses to "sign-on" to take part in a shared parking plan.

While a PMA is not essential to the concept of shared parking, it would make the process more organized and would make the concept appear more "official". It would also eliminate the potential for agreements between businesses to be disputed in the future, as arrangements could be formalized and recorded by the PMA.

The concept of shared parking, which would allow these stalls to be reused during times when they would otherwise be unused, is well known in parking literature. If these stalls were made available by their owners during the times they were normally empty, this parking would become an additional supply of parking for Osborne Village.

As noted earlier, some businesses already have agreements amongst themselves. A PMA would be superior to individually-made agreements, since the agreements could be made formally, and there would be a neutral party involved, rather than the agreements being subject to being cancelled at any time, for instance if a change in ownership of a business resulted in the agreement being cancelled.

Note that large residential lots, such as those at the large multifamily towers in Osborne Village could be part of a PMD; PMDs are not limited to only commercial parking areas.

11.1 PMA Responsibilities/Functions

A PMA could be created for Osborne Village to manage parking throughout the Osborne Village:

- The PMA would provide parking brokerage services (sometimes called a parking bank) that would help businesses share, trade, lease, rent and sell parking facilities. For example. The PMA could match businesses with parking needs with nearby businesses with extra parking supply.

- The PMA should work with the City to create a Parking Inventory for the Osborne Village area that inventories current and future land uses, and their actual (rather than ITE rate) parking demand based on observations. (Contributing factors to lower parking requirements: non-auto modes to reduce parking requirements, parking turnover, auto ownership characteristics of residential, etc.). The PMA can collect this data on a regular basis and maintain the data so that it reflects current conditions.

This data can then be made available to consultants for use in Parking Management Plans for new development6.

- The PMA would monitor potential problems and evaluate the effectiveness of the program in meeting stakeholders' needs. This monitoring would be made easier through the use of the WPA's ALPR (camera enforcement) vehicles.

- A PMA could act as a negotiator/mediator between businesses as a result of past and potential parking transgressions. The PMA could work to develop solutions rather than have businesses at odds with one another due to parking.

Businesses would not be forced to participate if they were uncomfortable with the concept, but it is possible that once in place, staff and customers would encourage the management of reluctant businesses to take part as a show of support for the community.

The PMA would produce a map of where "shared parking" was available and what its timing restrictions were and incorporate it into the Access Guide, as described in Section 11.2. This information would also be posted at each site to make it clear when the parking was available for public use, since one lot could differ from another.

11.2 Benefits

Benefits to the area overall would include:

- A coordinated parking management strategy in the area that would be consistent and less confusing to users.

- Fewer parking regulations for visitors – more comfort with being able to shop in the area, particularly for first-time visitors.

- Reduced amount of traffic resulting from people having to move from one spot to another as they go from one destination to another in the area.

[6] See MTC's Parking Toolbox and Demand Model for an example of implementation of this type of inventory.

- In commercial areas, the most attractive spots could be assigned to customers, whereas off-street parking further from the centre of Osborne Village could be used by the staff of area businesses.

- The PMA could provide funding to lots so they could upgrade landscaping and maintenance to offer a consistent, high-quality parking experience.

- The PMA could patrol lots to ensure parking is being used as intended and to provide an enhanced security presence.

11.3 Participation

MMM met with members of Osborne Village BIZ and discussed the Parking Management District concept. As noted earlier, it was mentioned informally that the reason for many of the restrictions on lots is due to patrons of some businesses using the parking of other businesses.

It might be difficult to encourage participation amongst stakeholders to take part in a PMA; these stakeholders may argue that the proposed setup would not benefit them, particularly if their customers had to compete against non-customers for a limited number of stalls. Some property owners will not want to “lose control” of their parking, and may see any attempt to manage it as a restriction on their business.

In order for a shared pool of parking to be successful, there would need to be buy-in from the operators of the lots with large off-street parking areas that have surplus stalls.

Some parking areas are going to be more attractive than others for parking, and it will require co-operation between businesses. This may be difficult if there is a past history of problems regarding the sharing of parking resources.

Private off-street parking is an untapped resource that has some unused capacity, but it is unclear how much of this could be made available to the public; there is no requirement that a private site allow their parking to be used this way; it requires further study. Ideally, this would be a way to allow more parking to take place within the area. Area businesses have not yet been consulted in-depth on this topic - there is no reason for a development to suddenly allow access to their site, particularly if it is perceived as being a benefit to rival businesses.

11.4 Drawbacks and Limitations of Shared Parking

Unlike purpose-built parking, shared parking is not guaranteed to be available at all times. The business that is the primary user of the parking stalls may occasionally need to use it after hours, and would need to be able to reserve the right to use their own parking after hours. Thus the parking supply would not be equivalent to that of a purpose-built lot or parkade. This lack of a guarantee on parking availability might be off-putting to some users.

Having parking scattered throughout the neighbourhood might be seen as a problem for users unfamiliar with the concept; they would need to become familiar with the system initially (through the use of an Access Guide).

There would be a problem if the vehicles using the stalls after hours did not vacate the stalls when they were needed by the primary tenant. People would have to respect the system or enforcement would need to be increased.

11.5 Pilot Project

A pilot project could be used to test a PMD in the Osborne Village. The two lots on the east side of Osborne Street bounded by Gertrude Avenue and Wardlaw Avenue would offer approximately 140 stalls of parking for a pilot project. A staged startup of a PMA is based on the businesses who currently control the parking accepting the PMA practices. Some streets within the area might also be made pay-for-parking as well, while keeping other streets free.

A full project charter and plan would have to be created to outline the details of a PMD. The WPA could work to assist with setting up a PMD and PMA, but would likely need to allow the PMA to work independently from the WPA, possibly coordinated by the BIZ.

A PMA would need a source of funding to pay for the administration, paperwork, etc. – often PMAs are self-supporting if they collect revenue from charging for parking space use. If fees are not collected, an alternative source of funding would have to be found.

12.0 STRATEGY NUMBER 4: WAYFINDING SIGNAGE TO ASSIST IN FINDING PARKING

Clearly marked routes to on-street and off-street parking areas would reduce the amount of time and energy spent "cruising" the area looking for an available spot, reducing confusion and uncertainty for visitors. Signage for parking within Osborne Village is incomplete and confusing.

Signage could be created that would encourage cars to seek out underutilized parking areas for off-street (and potentially on-street parking) in the area. This could be signs that guide drivers to available lots, or at the upper end of guidance, by incorporating ITS (Intelligent Transportation System technology such as sensors and electronic numerical displays to indicate the number of available parking spaces or stalls at a lot or on-street). This signage would be located throughout the Osborne Village area to guide motorists as they enter the area towards available parking, allowing them to change routes to target available parking instead of circulating through the area hoping to find an available space. This type of guidance system should reduce the amount of travel within the area as drivers are directed to available spaces rather than circulating within the area in search of a space.

A wayfinding signage program could incorporate signage designed specifically for the area, similar to unique signage developed for parking in the downtown. The same signage system could then be used by publically or privately owned lots that offer parking to the general public.

12.1 Survey Feedback

This concept received majority support from the survey; 58 percent of survey participants were in favour of the concept, however, 14 percent were opposed.

- Several of those in favor of the idea thought it would be very useful.
- Some respondents said that this would make it easier to find parking and that was a bad thing.
- A few participants felt it would contribute to visual pollution in the area. The signs would have to be attractive and a good fit into the area; a design contest for designers to create a sign that is both clear to users and a good fit into the area was suggested.

- Several of the respondents opposed to the concept felt that this potentially would be “free advertising” for private parking operators (Impark), which they were opposed to. To best utilize available capacity, signage to make motorists aware of all parking that is available, including private lots, is recommended. True buy-in from Impark in the form of contribution to funding the signage and access guide was also suggested. Considering that Impark’s lot is a significant size and observed to be underutilized, it would be impractical to exclude Impark’s facility from the coverage.

- The electronic component of the signs, which would indicate available stalls, was unpopular with some participants. Some questioned how well these would work, as well as indicating that they felt that these types of signs were unattractive. Electronic signage would have to function during the winter, which might be an issue for outdoor parking, when individual stalls are poorly defined due to pavement markings being obscured by snow cover, and sensors might malfunction due to low temperatures.

12.2 Access Guide

In addition to signage, an “Access Guide” could also be useful to visitors and residents to Osborne Village, acting in tandem with the signage to make parking supply and availability clear.

- Several survey participants reported that they did not know that there was an Impark lot in the area.

- The majority of respondents indicated they were not familiar with the map of available parking that is available online at the BIZ website.

An “Access Guide” explaining parking options as well as other methods to travel to Osborne Village is recommended. This document would provide concise, customized information on how to reach Osborne Village through all modes, (such as listing transit routes, bicycle pathways and places to park bicycles) and would include information on parking. This could include listing the parking restrictions in each lot, which parking stalls were “shared”, etc.

This document would be something visitors to Osborne Village would want to retain and keep with them when travelling to the area, and could take the form of a booklet or small map. It could also be made available as a viewable and printable document on the BIZ website, and freely available throughout the Osborne Village, at businesses, churches, and at the BIZ office, as well as at other locations where tourist information is available, such as at the airport or at hotels. A version could also be set up which could be accessed online and by cellular phones or PDAs.

The existing map of where parking can be found in Osborne Village could be a starting point for this guide.

12.3 Recommendations

While an access guide and improved signage would make it easier to locate an existing parking space, signing strategies would not create additional capacity, but they would ensure that existing capacity was utilized more effectively.

The access guide should be implemented together with a wayfinding signage program. As parking conditions change in the area (for instance, if a new facility was built, or if a PMA came into operation), then the guide would need to be updated.

13.0 REDUCING PARKING DEMAND BY USING NON-AUTO TRAVEL MODES

Identify potential opportunities to reduce parking demand due to shift to other modes.

Identify the potential impact on future parking demand due to additional active transportation initiatives or rapid transit.

The Osborne Village already has a relatively strong existing multimodal transportation network. If visitors to Osborne Village were to increase their use of alternate modes to access the area, this would reduce the parking demand within the area. Further improvements to active transit networks are planned within Osborne Village, but it may take significant city-wide measures to alter existing traveler behavior from current levels, where auto use dominates.

13.1 Transit

Osborne Village is well-served by transit. Osborne Street is a transit corridor and contains a major transit hub at the intersection of Corydon Avenue, Pembina Highway, and Osborne Street.

The future Southwest Rapid Transit Corridor may contribute to an increase in on-street parking demand in the Osborne Village, since without park-and-ride lots in the area, transit users from outside the walking distance of Osborne Street and Harkness Street stations may park on adjacent streets near the bus stations and then ride the bus to their destinations. However, given the proximity to the downtown, this is anticipated to be a negligible amount.

As the Southwest Rapid Transit Corridor is expanded, more destinations will be accessible via the corridor however, and so any station along the corridor may be prone to park-and-ride behavior.

Once the rapid transit corridor is operational, this will shift some transit vehicles off of Osborne Street. Winnipeg Transit reports that all buses, apart from Routes 16 and 18 that currently use Osborne Street through the Osborne Village, will be rerouted onto the busway. The 16 and 18 routes will have their frequency increased to continue to provide service to area residents who had been using the express buses to travel between Osborne Village and downtown. The number of buses that will continue to use Osborne Street has not yet been determined by Winnipeg Transit.

Reducing transit traffic from Osborne Street will reduce traffic volumes slightly on Osborne Street.

13.2 Bicycle Parking in Osborne Village

There are a number of bicycle racks scattered throughout Osborne Village. Generally these are located on corners and are small portable steel racks, each capable of storing approximately four bicycles. Many of these racks appear to be sponsored by local businesses, as they contain advertising signage. **Figure 13.2** is an example of the type of bicycle racks common to Osborne Village.

Figure 13.2: Typical Bicycle Rack on Osborne Street

During observations in Osborne Village, most racks in the area were housing at least one bike at any given period, although these bike racks were sometimes hard to find, and sometimes poorly placed. As such, the existing usage of these bike racks is not necessarily representative of bicycle parking demand. There were also instances of bicycles being locked to poles and fences in the area where no bicycle parking existed. This was most noticeable on Canada Day when many bikes were observed locked to fences and poles.

The bicycle racks located at Safeway are a fairly good example of bicycle parking in the area, but improvements could still be made.

- There are no adjacent curb cuts for direct access to the racks from the roadway. The placement of the curb cuts creates pedestrian/cyclist conflicts.

- The “clothes hanger”-style design allows for a large number of bicycles to be stored in a small area.

- The racks are located far enough from the wall to allow the bicycle wheel to fit through. However, if they were located slightly further back from the wall, they could be accessed from both sides, which would increase the number of bicycles that could be stored.

- They are generally in well lit areas.

- They are in a high-pedestrian area, providing passive surveillance from passersby.

- The racks are secured to the pavement – some of the racks in the Osborne Village are portable, which means there is the potential for the rack and the bicycles attached to it to be stolen.

MMM contacted the group “Bike to the Future” for their thoughts regarding bicycle parking in the area. Bike to the Future recommends many small racks throughout the village to allow bicyclists to secure their bicycles close to their destination, a comment echoed by survey participants who agreed that increased quantities of bicycle parking were desirable.

It is recommended that bicycle parking be increased throughout the Osborne Village, locating the bicycle parking using best practices. It is also recommended that bicycle parking racks or lockers be made available to area businesses and residential properties[7], with installation using best practices.

A larger bike station (with repair facilities, valet parking in a secure area) is not recommended by “Bike to the Future” at this time since a bike station is intended for all-day storage of bicycles, which would be more appropriate for an area that is a large employment destination. However, residents in the area who might be unwilling to walk a bicycle into their apartments through the building, or frequent visitors to the area might also be willing to make use of a more secure centralized bicycle parking area.

During a stakeholder discussion with the Gas Station Theatre, it was suggested by the Gas Station Theatre management that the area outside the entrance would make a good location for a larger bicycle parking area incorporating a public art component. This is a good idea if it was provided in tandem with the other bicycle facility improvements -- it would give bicyclists a choice

[7] This could either be on a voluntary basis – that is, businesses or residential buildings could request that the parking be implemented, or potentially it could be mandated by the City. It is likely that the voluntary method would be appropriate for most circumstances.

between a centralized highly secure parking location at one or more locations in Osborne Village (which might be more desirable by residents and employees).

13.3 Travel Modes for Visitors to Osborne Village

Multiple factors contribute to make Osborne Village a place where people can live and work in the same area. Many of the shops and services necessary to residents are located within Osborne Village (such as a major pharmacy and grocery stores) and can be accessed on foot. Many jobs are also available nearby in downtown Winnipeg.

Improved public transit and active transportation initiatives (such as improving the bicycle racks) will have some impact on making it easier for residents to access destinations further away, and will make it possible for visitors from outside the area to access Osborne Village. For those visitors who may have been “put off” from using these modes by past experiences, small improvements in conditions might make these transit modes more appealing.

According to the survey, a large percentage of visitors to Osborne Village already make use of alternate modes for at least a portion of their trips to Osborne Village as shown in Table 13.3.

Table 13.3: MMM Survey: Mode Choice for Visitors to Osborne Village Commercial Area

When you go to the Osborne Village to shop, eat, visit people, etc., do you ever drive there?		
I always drive	148	51.4%
Sometimes I drive, sometimes I use other methods	112	38.9%
I never drive	28	9.7%
TOTAL	**288**	**100%**

Note: Non-resident respondents only; 288 responses.

13.4 Other Techniques to Reduce Automobile Usage

Other techniques to reduce car occupancy can also be considered within the Osborne Village.

Car share programs should be encouraged; there is already local support for car share or car co-op programs within the Osborne Village. These could be assisted by the WPA or developers providing locations for these cars to be stored on their property, either on-street or off-street.

Pedicab operations should also be encouraged in the Osborne Village. A pedicab is a three-wheeled bicycle, where a driver/operator rides in front with seating for two or three riders in a covered rear section similar to a rickshaw. They are used in urban areas in many cities, including New York City and Denver. Pedicabs were operated in the Exchange District a number of years ago. Where there is a dense area with a lot of destinations and a lot of people on foot, pedicabs can be very successful, providing an alternative to short trips by car or by foot. Storage of pedicabs could be incorporated into new development or public parking areas.

14.0 DEVELOPMENT POLICIES RELATED TO PARKING

MMM was asked to review specific current policies in the Osborne Village Neighbourhood Plan related to parking, specifically addressing how to ensure new development complies with these policies.

- Section 3.1.1.B.3 Providing pedestrian access at the street level, and locating parking, loading, and service entrances at the rear of buildings.
- Section 9.1.10 Parking Design and Function Policies.
- Section 9.2.1A Encourage above- and below-ground parking structures as alternatives to off-street surface parking areas.
- Section 9.1.10.A Require vehicular access to and egress from parking facilities via public lanes where they are available.
- Section 9.1.10.B Require parking structures and surface parking areas to be developed to a high standard of site design and enhancement.

14.1 Commentary on Policies

The sections noted above seek to hide parking, placing it where it is less conspicuous, inside rather than at-grade, reduce conflicts along streets by having parking access points off of laneways, and encourage high development standards.

The use of rear lanes for vehicle access reduces the number of conflict points on residential streets, and reduces the need for sidewalks to be broken up with driveway crossings. This makes the use of sidewalks more attractive to people and encourages smoother traffic flow on the road system.

Providing pedestrian access at the front of buildings and vehicle access at the rear of buildings puts “pedestrians first”, which encourages pedestrian and cycling trips to/from the building, as well as to making it easier for pedestrians to access transit. Reducing the number of driveways along streets also maximizes on-street parking opportunities.

Rear lanes are generally constructed to a lower standard (i.e., narrower pavement width) than residential streets, and therefore have a lower traffic capacity. For this reason, larger multi-family development should be assessed on a case-by-case basis.

Large developments which generate truck traffic (such as deliveries to retail uses) should be restricted from using lanes for access, as this traffic can be problematic for neighbouring residents. Typically lanes in older areas have not been designed to handle the turning movements of larger trucks, which may experience difficulty in manoeuvring in these areas. If a lane cannot be modified to serve these types of vehicles, then it is not reasonable to require trucks to use these areas.

Locating parking in structures occupies less land than surface parking, thereby freeing more land for development. It is understood that the City is developing guidelines for parking structures to minimize the aesthetics impact on the surrounding area in the downtown. Similar guidelines for areas like the Osborne Village, either a city-wide policy, or documentation in the context of the Osborne Village Neighbourhood Plan would be recommended.

Parking should be incorporated into a development in order to make it comfortable to use, and to make it fit into the building and the streetscape.

Developers of certain land uses, such as convenience stores, often wish to make it clear to customers driving by that there is parking available by locating it in front of their development. **Figure 14.1.1**. is an example of this type of parking environment in Osborne Village. While parking between a sidewalk and the front of a building can be landscaped to make it more attractive, parking-in-front layout reduces pedestrian accessibility from the sidewalk.

Figure 14.1.1: Parking at Commercial Plaza - Osborne Village

Figure 14.1.2 is an example of a landscaped front parking lot in Osborne Village; while this parking area is more attractive than the one in Figure 14.1.1, the parking lot still acts as a barrier between pedestrians and the businesses. If feasible, it is better to have buildings abutting the sidewalk so that pedestrians can look into storefronts and walk directly into the businesses.

Figure 14.1.2: Parking Lot on Northeast Corner of Stradbrook Avenue and Osborne Street

Overall, the current policies relating to parking for new development in Osborne Village are positive. While not every new development will be able to strictly follow these policies, they will guide developers towards creating development that improves or maintains walkability and ensures that the streetscape will not be dominated by vehicle parking areas.

14.2 Ensuring Compliance with Policy: Recommendations

To ensure new development complies with City policies such as the Neighbourhood Plan, policies need to incorporate 'shall' statements, and zoning requirements must incorporate objective standards that must be met to obtain approval.

New development that is planned that is not transit-oriented or without TDM measures in place are inappropriate for Osborne Village. The City should be ready to refuse development that does not comply with the vision and have a clear rationale that can be supported internally if the developer does not accept the City's decisions. Ensure that there is strong backing within the City to ensure that developers do not simply escalate files to senior management to short-circuit the review process and overturn the decision making authority of City staff.

We recommend that parking occupancy be monitored in new development so that the City can collect data on this and use it to assist future development both within Osborne Village but in other similar areas elsewhere in Winnipeg in developing appropriate parking supply levels. As well, if surplus parking is identified, the owner should be approached to discuss shared use of underutilized spaces.

14.3 Upgrading Look and Feel of Existing Parking Lots

Small parking lots are generally preferable to large lots, as small parking lots can avoid many of the aesthetic drawbacks of large parking lots; they do not create the unpleasant spaces or negatively impact walkability the way large lots do. Small lots are more able to retain a pedestrian character in an area, and can be less intrusive within the neighbourhood.

However, some of the existing small lots within Osborne Village are unattractive, as they were approved prior to current zoning laws being passed, and do not include landscaping elements, since these are a recent requirement of parking areas. The rules in place when a surface lot was zoned or given a conditional use permit would be the ones that still apply.

Some lots, such as the lot at the strip mall on Osborne Street and Stradbrook Avenue (Figure 14.1.2) already have strong landscaping features, but the majority do not. The City's current zoning bylaw incorporates features that make parking areas more attractive, so that a parking area feels equal in quality to the rest of the development in the area, rather than an undeveloped flat piece of real estate. As opportunities arise, lots could be upgraded to incorporate:

- Enhanced landscaping linked to number of stalls, number of drive aisles, etc.
- Defined and protected pedestrian routing.
- Demarcated stalls to appropriate sizes.
- Landscaped or fenced perimeter treatment.
- Paved surface, or an alternative that fulfills the intent of the paved requirement in the by-law.

Upgrading the treatment of existing parking lots that were approved in the past may be difficult. It would potentially require that existing permits be revoked, which would be a difficult process legally. The City should investigate how to repeal the grandfathering clause that exempts old surface lots from progressive new requirements, as the Winnipeg Charter says new zoning and design rules can't be retroactively applied to existing properties as it would be an undue infringement on property rights[8].

Rather than mandate these changes, voluntary upgrading of existing parking could be accomplished if the parking lot owner was willing to work with the BIZ and/or a PMA. Another “carrot” could be tax rebates to lot owners who invest in improvements and beautification of their lots.

[8] Online: Accessed December 9, 2010. http://www.winnipegfreepress.com/breakingnews/force-owners-to-fix-old-lots-developer-urges-111584129.html

15.0 PARKING REQUIREMENTS IN FUTURE OSBORNE VILLAGE DEVELOPMENTS

Osborne Village is in an Urban Infill Area. This allows parking to be supplied at lower rates than elsewhere in the City. Any new development is currently required to provide parking to accommodate its needs based on ratios laid out in the zoning by-law, ratios which are not unique to Osborne Village, but apply broadly to numerous central neighbourhoods in the City with strong transit service. This is outlined in part 171.2. of the Winnipeg Zoning By-law 200/2006.

The requirement to provide parking can be varied at a public hearing, or a developer can provide a Parking Management Plan in lieu of providing the required number of parking spaces. In the Parking Management Plan, a developer must identify the unique circumstances, arrangements or strategies that warrant the provision of less parking or no parking on site.

It would be beneficial to collect information on parking demand rates for the Osborne Village area to assess whether additional reductions in parking requirements are feasible. Proponents could provide this information as part of a Parking Management Plan if they choose to seek a relaxation of current by-law requirements.

Urban Infill areas also do not require change-of-uses in existing structures to provide adequate parking. This requirement is to encourage reuse of existing buildings, which is desirable, but contributes to use of on-street parking, which is heavily used. Proponents do have the option of submitting a Parking Management Plan, as identified in the current zoning by-law, to support changes to the City's parking requirements. That plan, in addition to strictly addressing parking, could also be used by a proponent to identify strategies that would mitigate a development's parking demand, such as TDM measures, enhance bike facilities, proximity to major transit service, etc. This would allow the City to track how the parking supply will be impacted and identify when mitigation measures are required in the future. Measures to reduce the requirement for on-street parking include TDM measures such as encouraging transit use, car share programs, etc. Paid on-street parking would also further reduce some of the demand and may reduce duration as well; it is expected that paid on-street parking in at least part of the study area, may become necessary if development continues in the area. Cash-in-lieu is also an appropriate measure to consider, but part of the rationale for reusing an existing structure may be to reduce costs, the cash-in-lieu charge on a development may in some cases preclude development, so this may need to be considered on a case-by-case basis. However, exempting some developments may be considered inequitable by other developments that contribute to the cash-in-lieu program.

Parking should be logically and carefully assessed to minimize the reliance on heavily utilized on-street parking. When buildings are being repurposed/redeveloped, and there is a parking shortfall, simply indicating that the building is TOD is not sufficient to allow a parking shortfall.

15.1 Reduced Parking Rates: Conditions for Successful Operation of Parking

A single standard for parking rates may not be appropriate throughout the area as there are distinct sub-areas within the study area with different conditions in terms of space for off-street parking, availability of on-street parking, etc. This would need to be considered for each proposed development when reviewing Parking Management Plans or requests for variances in supply. If a development has more parking available that may be needed, it also offers the City the opportunity to reach an agreement to make surplus spaces available to other users. The goal is to not have an over-supply for any single development, which can encourages higher automobile ownership levels. Reduced auto ownership occurs when the following interrelated conditions occur:

- The demographics of the residents and visitors to a development are such that they own fewer cars. Some demographic groups prefer to own fewer cars, and certain demographic groups are poor fits for TOD areas -- living in a TOD is no guarantee of non-auto mode use.
- The transportation network is strong so that it is practical for people to own fewer cars (strong transit serving many destinations with frequent service, strong active mode connections, etc.).
- Proximity to a transit station has an effect on transit occupancy; the closer to a station a residence or workplace is, the higher the transit occupancy.

If one of these conditions is not in place, then even if the building is constructed with a reduced parking supply, people may continue to own vehicles and find other places to park them, such as on-street.

Parking already is well utilized in Osborne Village on-street. New development should not result in further consumption of on-street parking spaces. It is therefore critical that new development and redevelopment in Osborne Village be designed to be self-sufficient which includes targeting new housing at an audience that owns fewer automobiles[9].

15.2 Parking as an Area-Wide Resource

To maximize the use of available parking stalls, parking for development within Osborne Village should be considered as an area-wide resource with each development contributing space towards rather than making each building independently supply parking. Parkades should be considered as reservoirs for parking -- where one development has an oversupply of parking, other development or the City should lease this space before constructing additional parking.

15.2.1 Off-site parking

If parking is a resource that is shared amongst development, then off-site parking may become necessary, where one development uses parking at another site. Considerations include:

- Encourage joint-use off-site agreements for joint use of parking through documentation.
- When using off-site parking in another development, the site using the parking should contribute towards maintenance and insurance of the parking stalls to assist the other development.

16.0 REVIEW OF OPTIONS

Develop parking options to address any identified issues and meet the forecast parking demand within the study area.

Review the impacts of the parking options and rank the options in terms of their effectiveness at addressing the existing parking issues and meeting current and future parking demand.

[9] TCRP Report 123: Understanding How Individuals Make Travel and Location Decisions: Implications for Public Transportation

It is difficult to estimate the future demand for parking in Osborne Village. At present, redevelopment pressure in the area is low, with only two or three projects being proposed per year in the area. These projects tend to be large residential infill projects, replacing low density housing in the area with larger residential and mixed-use developments. Generally, new residential projects in Winnipeg provide parking for tenants/owners, but this is not always the case for new development within Osborne Village.

The current supply of on-street and off-street parking is not yet at capacity on every street, but some streets do see up to 100 percent occupancy. As noted in previous sections, there are several options that could be considered to address parking demand. This section considers pros and cons of each option and makes recommendations regarding the pursuit of each option/strategy.

16.1 Status Quo / "Do Nothing" Alternative

Several survey participants indicated that they were happy with the current state of parking within Osborne Village and recommended that no changes be made.

Pros

- Some residents will see any measures taken as "interfering" with a successful area.
- Some members of the community will view this as supporting "pro-alternate mode" lifestyle of Osborne Village.
- No new construction costs.

Cons

- Increased complaints from people who are experiencing parking problems in the area, which could deter repeat visits to the area.
- May discourage new tenants from locating to the area.
- Existing tenants may leave the area if they perceive limited parking as being detrimental to their business. As the area becomes more intensely developed, more users will be competing for a limited supply of parking.

This is an undesirable option given there are some solutions that are easily implemented at low cost, and is not recommended.

16.2 Encourage Better Occupancy of Existing Parking with Wayfinding Signage and Access Guide

Pros

- Makes better use of an existing resource. Eco-friendly in that no new parking needs to be constructed.
- Reduces circulation through the area by vehicles seeking parking.
- Delay needs for additional parking capacity, potentially for a long period of time.
- Relatively inexpensive (particularly the Access Guide) compared to constructing new parking.
- Encourages businesses to work together to solve an issue.
- Doesn't discourage the use of other modes.
- Encourages use of off-street parking by commercial customers, freeing up the on-street parking for other users.

Cons

- May be seen as helping private parking companies such as Impark.
- Additional signage may be seen as unattractive in the area.
- Ongoing maintenance costs for upkeep and replacement signage and printing/distribution costs of guides.
- Electronic signage needs to be tested to ensure it is robust and works properly to be effective.

Signage should be designed to fit into the look/feel of Osborne Village. It is recommended that artists (potentially local to the area) and graphic designers be involved in developing Osborne Village-unique signage that both fits into the community and clearly communicates where parking is available. The same signage should be used for publically and privately owned facilities in the area.

While the City is generally responsible for signing within the public right-of-way, private parking providers should contribute towards the costs involved towards implementing parking signage at their facilities. Using the same signage at all lots will make finding a space available for casual use easier for the general public and benefits both the private and public sectors. This option should be the first one implemented as it is relatively easy to do.

16.3 Build New Parking to Increase the Supply

Pros

- Would create additional parking supply.
- May eliminate/reduce parking issues for residents and visitors to the area.
- Potentially can reduce the amount of parking that will need to be constructed for future development. TOD development may underestimate the parking a development will require, and this could act as a reserve supply.
- A parkade, as part of a new development would increase density and development compared to an at grade surface lot, allowing for redevelopment of surface lots.
- A parkade could be designed to be expandable; additional levels could be added if it needed to be expanded in the future.
- A parkade could be part of a mixed use development.

Cons

- May discourage existing residents from maintaining a car-free lifestyle.
- a parking-only parcel may not be the “best” use of land, making joint use facilities a better option.
- Mixed-use parkade projects sometimes have trouble finding appropriate tenants; space may be hard to lease.
- Will increase traffic on local roads, depending on location, as access availability.
- Expensive to implement in terms of construction and operation costs.
- If it competes with free on-street parking, it will be underutilized. However, it is unlikely that any new parking supply will be developed until on-street parking is metered and occupancy is above 85 percent (the threshold of being considered fully utilized) throughout the week.

- A parkade should be sized to maximize the potential to have it be economically in the long-term (i.e., use caution if considering oversizing a new facility).
- Limited number of suitable locations for space-efficient parkades in Osborne Village.
- May be opposed by some members of the community.

It is recommended that a parkade not be constructed in the short-term, and only considered as an alternative until after all other strategies to maximize the usefulness of the existing supply have been applied.

Banking land for a future parkade may be difficult, as limited land is available. If purchased, it could be developed as an interim surface lot.

The opportunity to incorporate parking capacity for the Osborne Village into a future transit-oriented development near the Harkness Street or Osborne Street stations should be investigated if a parkade is considered as part of a long-term plan. Incorporating parking as part of transit-oriented development may reduce some of the negative aspects associated with a purpose-built parkade.

16.4 Creation of PMA to Manage Parking Supply

Pros

- Creates parking capacity from more effective use of existing parking stock by means of "shared parking"; no new construction of parking is required to create the shared parking supply.
- Creates partnerships between businesses, residents, and visitors, creating a sense of "working together".
- Responsibilities could include facilitating ride-sharing/carpooling and other TDM strategies to reduce automobile reliance in area.
- PMA managed parking eliminates restrictions on who is permitted to park in a lot, making it possible for visitors to park once and go to multiple destinations in the Osborne Village.
- A PMA can generate useful information for use in other areas of Winnipeg regarding the success of such programs.

Cons

- Requires buy-in from area businesses and property owners (who currently control the off-street parking areas) to create the parking supply, and allow the PMA to manage their parking supply.
- May be difficult to implement given historical animosity between businesses related to non-customers using parking facilities.
- Creation of such a body will need co-operation from the City and private parking suppliers, who may see it as competition.
- Will need regulations and a charter to limit duties and powers, particularly if the PMA is allowed to (or restricted from being allowed to) charge fees for parking.
- Will need to be staffed with members who understand PMA concepts.
- Will need funds for signage to indicate restrictions on parking, which stalls are available for use, etc., and for enforcement (which could be provided by the WPA).
- May need to research liability and bylaw compatibility issues related to using business-use parking for non-business purposes by non-employees after hours.
- Some "parasitic" use may actually take place, with some users monopolizing the available supply of parking – users would need to be educated to respect the concept of shared parking.
- Some parking will always be underutilized given its distance from the centre of Osborne Village. It would be important to have a supply of attractive, suitably located parking under the control of the PMA.

Assuming the challenges to start-up could be overcome, specifically that there was a supply of parking made available by off-street lots willing to take part in a program and there was a management team in place to oversee the program, a PMA could work in Osborne Village.

A pilot program would be a recommended first step. The success of the program hinges on the ability of the PMA to successfully "sign up" parking lots to participate in the program and make their parking available.

16.5 On-Street Parking Fees

On-street parking fees have been introduced in a number of areas outside the downtown by the WPA in recent years (e.g., Selkirk Avenue commercial area, Tache Avenue near St. Boniface General Hospital, around Health Sciences Centre). The WPA has reported that this program has for the most part been considered successful and generally supported by stakeholders. Considerations for implementation are noted below.

Pros

- Typically results in increased turnover of stalls and available parking for people seeking short stay parking.
- Revenue stream could be used to upgrade amenities in the area (such as landscaping, bicycle racks, lockers) as well as support enhanced enforcement in the area.
- Creates capacity (available spaces) without new construction.
- Could be implemented in stages to continue to provide free on-street parking within portions of the area.
- Residents can be opted-out of system using permits.
- Charging for parking may encourage some motorists to carpool, take transit, walk, or bike.

Cons

- Unpopular with users, especially initially.
- Although it could encourage visitors who formerly could not find parking in the area to begin shopping in the area, could discourage some current customers to shop in the area if they are unwilling to pay for on-street parking.
- Concern that it would make the area uncompetitive with areas in Winnipeg where parking is generally free, potentially impacting the viability of all businesses in this area.
- Significant opposition to idea in online survey.

- Requires ongoing monitoring to ensure fees are having desired effect (creating 15 percent free space).

- Would require regular enforcement.

Although the “con” arguments can be addressed – see the VPTI “Parking Management Comprehensive Implementation Guide” (2010), as well as the WPA’s positive experiences elsewhere in the city, it may be difficult to gain support for this concept in the Osborne Village at the present time based on the survey results. On the other hand, the small sample size and nature of the survey, does not necessarily make it representative. Although it might seem that the pro-alternative mode mindset prevalent in Osborne Village would welcome a way to further reduce automobile dependency, there was a clear unwillingness to support this concept by survey participants.

This option is not recommended at this time given that the utilization survey suggests that on-street parking availability is not critical at this time in the area. However, near Osborne Street itself on-street parking is well used due to the commercial activity; this is where paid on-street parking should be considered first. On-street parking charges do not have to be applied throughout the area, but could be selectively used in areas with the highest demand or problems with persistent long-term parking durations. Timing to implement paid on-street parking should be based on occasional monitoring of on-street utilization and duration, and possibly requested from area businesses.

17.0 FURTHER STUDY

Identify additional research or analysis needs that are outside the scope of this study that may be desirable prior to implementing recommended strategies from this study.

It is recommended that a PMA be discussed with area businesses which control parking supply to determine level of support. Response from the survey indicates that members of the public would be in support of such measures but businesses may be reluctant to become involved or change their current parking management strategies. Analysis may be needed for interested businesses in the area to demonstrate how much of their parking they could contribute to shared parking based on their actual needs as part of the preliminary work for the PMA. (Use "Shared Parking" and real world data from their lots to determine how much of their parking goes unused).

As outlined in Section 11.1, a Parking Inventory should be generated for the Osborne Village area that inventories current and future land uses, and their actual (rather than ITE rate) parking demand based on observations. (Contributing factors to lower parking requirements: non-auto modes to reduce parking requirements, parking turnover, auto ownership characteristics of residential, etc.). This should be kept updated on a regular basis and maintained so that it reflects current conditions. This data can then be made available to consultants for use in Parking Management Plans for new development, so that local rates can be used when estimating the demand in a new development for example.

The City, the BIZ, and WPA should look for partnerships with developers for future TOD within the Osborne Village (particularly around the stations) as well as the Impark lot to determine if there are opportunities to create an increased parking supply (for use by the entire Osborne Village) as part of a future development.

18.0 CONCLUSIONS

MMM reviewed parking in Osborne Village area to observe current conditions related to parking, and to make recommendations about how parking should change in the area in the future.

18.1 Present Conditions

The parking demand in the area appears to be met at present, primarily by free on-street parking, however occupancy is not uniform – areas closest to the centre of Osborne Village have few on-street stalls available during peak periods, whereas other locations have many stalls available (but are a longer walk from the centre of the area and therefore less attractive to motorists).

Off-street parking throughout Osborne Village was underutilized during both the Friday and Sunday observation periods in several locations. This is for multiple reasons – some of it is unavailable to the public (being restricted to customer parking only) and some of it is unattractive due to a fee being charged for its use or in a location that is less visible to drivers looking for a parking space.

Parking turnover (as observed on four streets in Osborne Village) was taking place even where no parking restrictions were posted.

The public's perception of parking is complex and mixed and many people have strong opinions on the topic.

18.2 The Future

Question: Is there adequate parking within Osborne Village for future demand?

Question: How does one reconcile building additional capacity when there appears to be existing capacity?

A direct answer, such as "public parking will need to be increased by X stalls in year Y" is not possible at present. There is uncertainty as to how quickly the area will redevelop. It is assumed that the area will continue to intensify over time.

- Existing single story retail may be replaced by higher density multi-floor development as the existing building stock reaches the end of its useful life.
- Existing property in the area may also be redeveloped to house more intensive uses.

There is only a limited supply of existing on- and off-street parking in the area, and attempts to maximize the usefulness of the existing parking (wayfinding signage and shared parking arrangements through a PMA) are measures that will delay the need for additional parking.

The existing parking on-street is close to capacity, but there is parking available; it is not attractive since it requires users to walk a longer distance. On-street, drivers need to be encouraged to use the parking that is currently underutilized, such as along River Avenue, and towards the south end of the area.

At some point, if people are to continue to drive to/from the area, additional parking will be required.

18.3 Recommendations Summary

The following recommendations are offered.

1. New development should be designed to provide adequate parking on-site, designing it so that its users and visitors make use of on-site parking rather than on-street parking.

2. Redevelopment within existing sites is desirable although it can result in higher-intensity uses that bring more vehicles into the area, and the parking for these uses must then take place off-site if sufficient parking is not available. Parking Management Plans, along with cash-in-lieu where appropriate, can minimize the use of on-street parking.

3. The construction of new parking in the area (specifically a parking structure, be it stand-alone, or a parking structure as part of a mixed use development) is not recommended at present. The Osborne Village area has sufficient parking stalls at present (other than for peak demand periods such as Canada Day) which could be used more efficiently as a resource by both residents and commercial interests.

4. It is unlikely that any new parking supply will be developed until on-street parking is metered and occupancy is above 85 percent (the threshold of being considered fully utilized) throughout the week. Any new parking supply that would be constructed in the form of a parking structure would likely be paid parking.

5. A community-based PMA should be set up to optimize the use of available parking in this area; making the existing parking supply "work harder" for the community, while

monitoring and responding to the impact the changes in parking operation will have within the area on businesses and the public in Osborne Village. Before additional parking capacity is constructed, the existing parking supply should be made to work as efficiently as it can through these PMA and communications strategies. Create a PMA for the Osborne Village area. Begin with a pilot project to test the concept in the area.

6. Travel demand management strategies should also be investigated before constructing new parking; with these measures in place, once occupancy levels of 85 percent or higher are reached on a typical day, then new supply should be considered.

7. Charging for parking to increase turnover <u>is not recommended</u> in Osborne Village at this time given that turnover is already taking place. While the use of fees to create more available spots on some of the more heavily used streets is a sound concept, it does not appear necessary at present in this area given that parking is not "maxed out" throughout the area. Parking charges may be needed in the future to increase turnover as demand increases, or as a way of generating funds for new parking development or enhancement of existing spaces.

8. Improved wayfinding signage and access guides to make visitors aware of available parking should be implemented in the short-term. An Osborne Village unique parking sign is recommended that is used for both public and private casual parking areas.

9. Increase the amount of bicycle parking located and installed following best practices; work with local businesses and property owners to replace current bicycle parking with new equipment and to select locations for new facilities. The Gas Station Theatre's idea for a large scale bicycle facility should be pursued further as a partnership opportunity.

APPENDIX A – Parking Observations

Figure A-1: Friday PM
4:30-5:30

Figure A-2: Friday PM
5:30-6:30

Figure A-3: Friday PM
6:30-7:30

Figure A-4: Sunday Mid-day
11:00 - 12:00

Figure A-5: Sunday Mid-day
12:00 - 1:00

Figure A-6: Sunday Mid-day
1:00 - 2:00

Onstreet Parking Utilization

Cell	Location Description	Estimated Capacity	Number of Vehicles Observed						Percentage of Estimated Capacity					
			23-Apr-10			25-Apr-10			23-Apr-10			25-Apr-10		
			Friday Afternoon			Sunday Mid-Day			Friday p.m.			Sunday mid-day		
			4:30 - 5:30	5:30 - 6:30	6:30 - 7:30	11 - Noon	Noon - 1	1:00 - 2:00	4:30 - 5:30	5:30 - 6:30	6:30 - 7:30	11 - Noon	Noon - 1	1:00 - 2:00
1	North side of Roslyn Cres	21	5	7	9	9	8	9	24%	33%	43%	43%	38%	43%
2	North side of Roslyn Road	21	8	10	13	15	14	14	38%	48%	62%	71%	67%	67%
3	East side of Nassau St	12	1	1	6	7	6	5	8%	8%	50%	58%	50%	42%
3	North side of Rosyln Road (both sides of Evergreen Place)	18	7	12	13	16	16	14	39%	67%	72%	89%	89%	78%
3	West side of Evergreen Place	4	4	4	4	4	4	4	100%	100%	100%	100%	100%	100%
4	West side of Nassau St	18	11	15	6	15	12	11	61%	83%	33%	83%	67%	61%
4	West side of Wilmot Place	8	8	4	3	5	4	3	100%	50%	38%	63%	50%	38%
7	East side of Wellington Cres	12	11	10	6	8	8	9	92%	83%	50%	67%	67%	75%
7	south side of River Ave	5	5	2	3	1	2	2	100%	40%	60%	20%	40%	40%
7	West side of Wilmot Place	19	19	16	17	13	13	16	100%	84%	89%	68%	68%	84%
8	South side of River Avenue	10	6	6	8	9	6	5	60%	60%	80%	90%	60%	50%
8	West side of Nassau St	14	11	10	11	10	10	7	79%	71%	79%	71%	71%	50%
9	South side of River Avenue	8	0	7	8	8	9	1	0%	78%	78%	89%	100%	11%
9	West side of Norquay St	16	15	15	15	16	14	6	94%	94%	94%	100%	88%	38%
10	South side of River Avenue	9	0	7	8	8	9	1	0%	78%	78%	89%	100%	11%
10	West side of Gerard St	18	18	18	18	16	17	15	100%	100%	100%	89%	94%	83%
11	West side of Osborne, River Avenue to bicycle parking on south side of Carlos and Murphys (evening only)	15	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg
12	East side of Wellington Cres	5	4	3	5	2	1	1	80%	60%	100%	40%	20%	20%
12	North side of Stradbrook Ave	20	7	15	13	15	5	9	35%	75%	65%	75%	25%	45%
12	West side of Nassau St	6	2	5	2	5	4	4	33%	83%	33%	83%	67%	67%
13	North side of Stradbrook Ave	25	25	25	25	20	17	13	100%	100%	100%	80%	68%	52%
13	West side of Osborne, from bicycle parking to Stradbrook Ave. (evening only)	2	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg	no pkg
14	North side of Wardlaw Ave	29	20	24	23	30	30	29	69%	83%	79%	103%	103%	100%
14	west side of Nassau St	10	3	8	8	9	5	5	30%	80%	80%	90%	50%	50%
15	North side of Wardlaw Ave	36	28	30	35	36	35	27	78%	83%	97%	100%	97%	75%
15	south side of Stradbrook - evening only	28	no pkg	0	20	24	20	21	no pkg	0%	71%	86%	71%	75%
16	North side of Gertrude St	10	9	3	8	4	2	2	90%	30%	80%	40%	20%	20%
16	SE side of Wellington Cres - evening only	14	no pkg	0	1	1	1	2	no pkg	0%	7%	7%	7%	14%
16	west side of Daly St	8	4	5	3	3	4	7	50%	63%	38%	38%	50%	88%
17	North side of Gertrude St	24	12	10	11	24	23	18	50%	42%	46%	100%	96%	75%
18	east side of Nassau St	9	4	5	4	7	9	6	44%	56%	44%	78%	100%	67%
18	North side of Gertrude St	29	22	19	27	25	21	20	76%	66%	93%	86%	72%	69%
19	North side of McMillan St	6	4	4	4	0	1	1	67%	67%	67%	0%	17%	17%
22	North side of Roslyn Rd	31	20	25	29	23	25	26	65%	81%	94%	74%	81%	84%
23	North side of River Avenue	47	7	11	21	17	19	14	15%	23%	45%	36%	40%	30%
23	West side of Bryce St	10	10	9	10	10	10	6	100%	90%	100%	100%	100%	60%
24	North side of River Avenue between Bryce and Lewis	33	2	0	12	15	17	15	6%	0%	36%	45%	52%	45%
25	North and West side of Mayfair Place	18	no data	10	10	16	11	12	no data	56%	56%	89%	61%	67%
25	North side of River Avenue between Lewis and Mayfair Pl	15	6	4	7	7	8	7	40%	27%	47%	47%	53%	47%
26	North side of River Avenue	5	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%
27	South side of River Ave	6	0	4	4	5	5	4	0%	67%	67%	83%	83%	67%
27	West side of Pulford St	17	12	12	15	16	14	14	71%	71%	88%	94%	82%	82%
28	South side of River Ave	8	8	8	8	7	7	6	100%	100%	100%	88%	88%	75%
28	West side of Bole St	17	15	15	16	16	13	15	88%	88%	94%	94%	76%	88%
29	South side of River Ave	8	7	7	8	5	5	5	88%	88%	100%	63%	63%	63%
29	West side of Bryce St	17	16	17	16	16	16	14	94%	100%	94%	94%	94%	82%
30	South side of River Ave	10	9	10	10	7	5	4	90%	100%	100%	70%	50%	40%
30	West side of Scott St between River Ave and lane	18	13	15	19	14	12	12	72%	83%	106%	78%	67%	67%
31	East side of Scott Street between River Ave and lane	18	15	16	19	17	13	2	83%	89%	106%	94%	72%	11%
31	South side of River Ave	9	7	6	6	3	3	4	78%	67%	67%	33%	33%	44%
31	West side of Cauchon St	17	12	13	17	14	15	13	71%	76%	100%	82%	88%	76%
32	South side of River Ave	9	8	7	6	6	7	9	89%	78%	67%	67%	78%	100%
32	West side of Lewis St	17	14	16	16	12	10	11	82%	94%	94%	71%	59%	65%
33	South side of River Ave	9	8	4	7	7	9	8	89%	44%	78%	78%	100%	89%
33	West side of Clark St	15	12	11	12	12	12	15	80%	73%	80%	80%	80%	100%
34	North Side of Bell Avenue	8	0	3	2	4	4	3	0%	38%	25%	50%	50%	38%
36	North side of Stradbrook Ave	35	30	22	31	26	31	28	86%	63%	89%	74%	89%	80%
36	West side of Scott St between lane and Stradbrook Ave	5	2	5	4	4	1	3	40%	100%	80%	80%	20%	60%
37	East side of Scott Street between lane and Stradbrook Ave	6	5	3	4	3	3	0	83%	50%	67%	50%	50%	0%
37	North side of Stradbrook Ave	23	7	9	9	9	9	6	30%	39%	39%	39%	39%	26%
38	North side of Wardlaw Ave	39	22	31	24	19	22	26	56%	79%	62%	49%	56%	67%
38	West side of Scott St	8	3	7	5	7	6	4	38%	88%	63%	88%	75%	50%
39	North side of Wardlaw Avenue.	29	14	15	18	13	14	13	48%	52%	62%	45%	48%	45%
40	North side of Gertrude St (includes 90 degree parking)	36	11	16	16	11	17	18	31%	44%	44%	31%	47%	50%
40	West side of Scott St	9	7	5	7	4	6	2	78%	56%	78%	44%	67%	22%
41	East side of Scott St	6	3	4	3	0	2	3	50%	67%	50%	0%	33%	50%
41	North side of Gertrude St	6	4	6	6	5	4	6	67%	100%	100%	83%	67%	100%
42	North side of McMillan Ave (no stopping 3:30-5:30 pm)	20	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%
Total:		1073	582	646	734	715	685	615						

Parking Lot Utilization

Lot Identifier	Description	Estimated Lot Capacity	Number of Vehicles Observed						Percentage of Estimated Capacity					
			Friday Afternoon			Sunday Midday			Friday Afternoon			Sunday Midday		
			4:30 - 5:30	5:30 - 6:30	6:30-7:30	11-NOON	NOON-1	1:00 - 2:00 PM	4:30 - 5:30	5:30 - 6:30	6:30-7:30	11-NOON	NOON-1	1:00 - 2:00 PM
A	David Kramer Financial Services lot	31	20	23	22	0	21	19	65%	74%	71%	0%	68%	61%
B	Shopper's Drug Mart Lot	26	21	14	19	10	18	12	81%	54%	73%	38%	69%	46%
C	Safeway/Liquor Store Lot	141	101	123	129	109	77	99	72%	87%	91%	77%	55%	70%
D	Parking area on SW end of Pulford St	32	8	7	8	4	5	2	25%	22%	25%	13%	16%	6%
E	Lot on corner of Stradbrook and Osborne	22	21	18	21	5	13	21	95%	82%	95%	23%	59%	95%
F	Parking on NE corner of Osborne and Stradbrook	20	12	7	6	17	16	1	60%	35%	30%	85%	80%	5%
G	Parking behind Osborne Motor Inn	45	15	18	22	12	19	14	33%	40%	49%	27%	42%	31%
H	Parking off of Wardlaw Ave	58	18	30	34	39	37	35	31%	52%	59%	67%	64%	60%
I	Parking off of Gertrude Avenue	79	10	6	6	4	5	5	13%	8%	8%	5%	6%	6%
J	Lot on west side of Osborne between Gags Unlimited and Antique Mall.	32	13	12	no data	17	14	14	41%	38%	no data	53%	44%	44%
K	Parking behind Blockbuster	29	5	7	3	1	3	4	17%	24%	10%	3%	10%	14%
L	Northern Paint lot	27	5	2	2	0	2	2	19%	7%	7%	0%	7%	7%
N	L shaped parking on west and north side of Pure Nightclub	23	7	0	1	0	0	0	30%	0%	4%	0%	0%	0%
O	Lot between chiropractor and Burger King	22	4	7	11	no data	no data	no data	18%	32%	50%	no data	no data	no data
P	Large lot - Dollarama	155	85	73	64	no data	no data	no data	55%	47%	41%	no data	no data	no data
Q	Isolated lot for 360 McMillan Building (visible from McMillan Ave.)	27	3	2	0	no data	no data	no data	11%	7%	0%	no data	no data	no data
R	Parking cluster around Money Mart	10	4	3	3	no data	no data	no data	40%	30%	30%	no data	no data	no data
S	Masonic Temple Lot	135	6	4	4	no data	no data	no data	4%	3%	3%	no data	no data	no data
T	Parking beside Joy's Convenience	21	11	11	9	3	3	3	44%	44%	36%	12%	12%	12%
U	Parking beside Racquet club	30	12	13	12	21	16	7	40%	43%	40%	70%	53%	23%
V	Parking beside CGA offices	30	2	0	0	0	0	0	7%	0%	0%	0%	0%	0%
W	Parking on west side of Building Manitoba on Wardlaw Ave	32	10	6	4	1	4	5	31%	19%	13%	3%	13%	16%
X	Parking on east side of Building Manitoba / Domo Gas Bar area	20	6	2	1	1	1	9	30%	10%	5%	5%	5%	45%
Y	Parking on North side of Gertrude Ave (Gord's, Better than Nature, etc.)	54	43	no data	no data	24	25	32	80%	no data	no data	44%	46%	59%
Total:		849	271	252	231	140	145	131						

APPENDIX B – Potential Parkade Concepts

A brief review of two locations for potential parkades was completed. More detailed investigation as well as public engagement would be required before proceeding further. Of the two options proposed below, the Impark site appears to be the more favorable option for further analysis.

Impark Site

Figure B-1 is a photograph of site conditions at the lot managed by Impark on Gertrude Avenue east of Osborne Street. This lot had a very low occupancy rate during the Friday and Sunday observation periods. Some of the comments in the online survey indicated that visitors to Osborne Village (and even some area residents) were not familiar with this lot. Impark's lot is not visible from Osborne Street, so vehicles and pedestrians on Osborne Street may not know it is there.

The look and feel of the lot may also be causing people to avoid using the lot in favour of lots with higher-quality landscaping such as the City lot at Stradbrook Avenue and Osborne Street.

The large size of the Impark lot would make it a suitable location for a parkade. 5510002-SK003 shows a conceptual site view layout of a parkade that could be constructed at this location.

Figure B-1: Impark Lot

Design Considerations

The elongated shape of the site is favourable towards a Single-Helix Ramp (or Scissors Ramp) whereby parking bays are located off a continuous circulating ramp. Approximately 100 stalls could be provided per level.

Typically, the maximum ramp grade on a Single-Helix Ramp is 4.5 – 5 percent, which is generally sufficient for the driver or passengers to have full control over the car door. A grade of approximately 3.5 percent can be achieved on the site which is within the maximum limits.

To allow for two parallel aisles and four rows of parking, a minimum width of just over 38 m is generally required. This is consistent with other existing parkades in Winnipeg of a similar type (e.g., the St Boniface Hospital Parkade located at the southeast corner of Rinella Place and Tache Avenue). In order to achieve this width, extension onto the Gertrude Avenue right-of-way by approximately 1.5 m to 2 m will be necessary. Alternative options include relaxing the City's requirements on stall dimensions or allocating (and designing) the central parking stalls for small cars only.

Further consideration would need to be given to the set-back requirements to adjacent buildings, including the residential building to the east, and height restrictions.

This parkade option was assumed to not have any retail on ground level.

Vehicular access to the site would come from Gertrude Avenue.

Stradbrook City Lot / Basil's Site

The existing City paid parking lot at Stradbrook Avenue and the adjacent "Basil's" restaurant site was considered for a parkade in the past. Figure B-2 shows the City lot and the adjacent restaurant that would be demolished to make room for the proposed parkade. Drawing 5510002-SK002 shows a conceptual site view layout of a parkade at this location.

Figure B-2: Google Street View: Looking NW at corner of Osborne Street and Stradbrook Avenue

Design Considerations

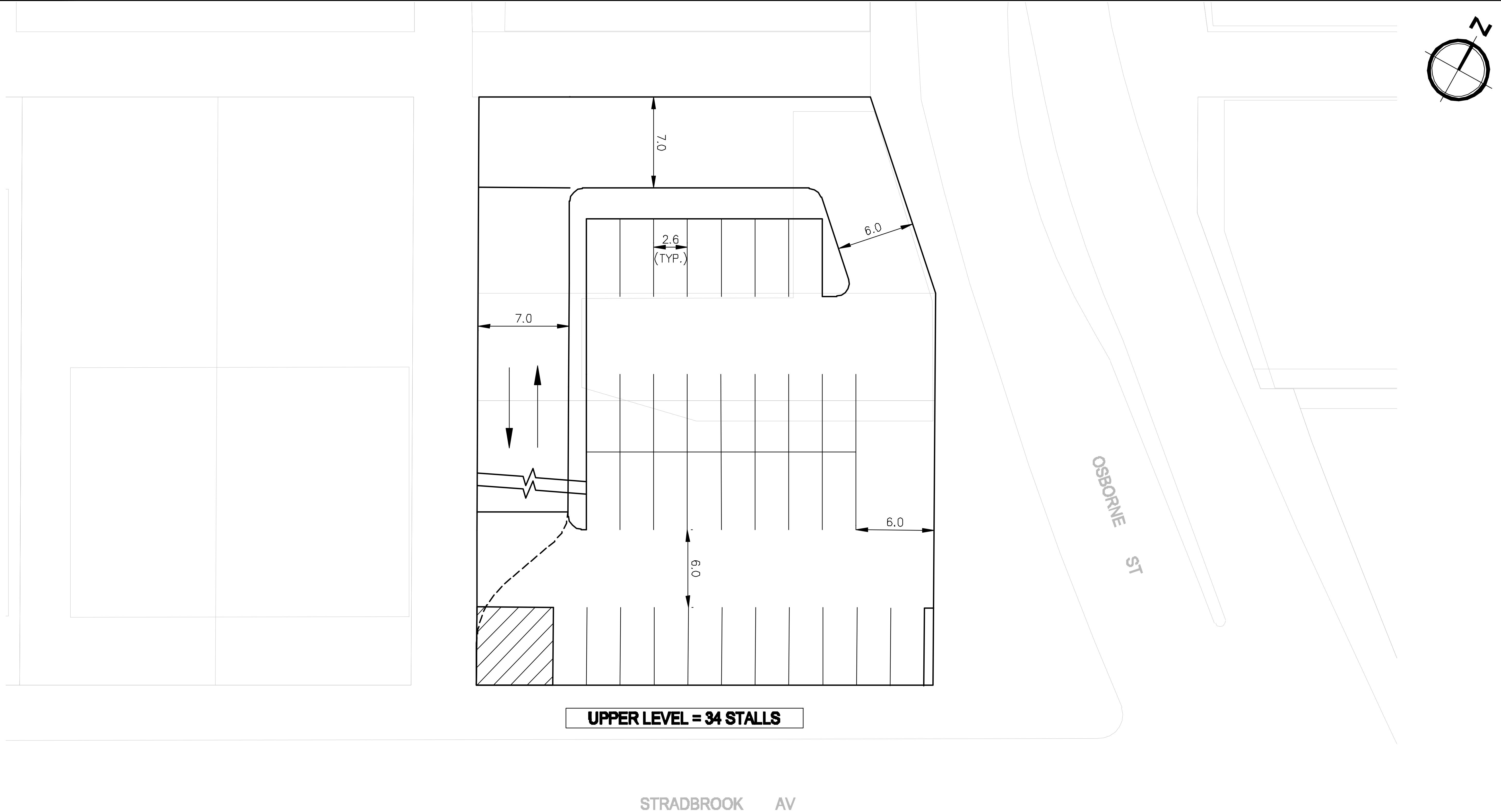
The combination of the site's size and shape makes it difficult to achieve an efficient parking layout. Assuming the parkade can be built to the property boundaries, each level would accommodate approximately 36 stalls.

Due to its prominent location (i.e., at the corner of Osborne Street and Stradbrook Avenue), the option provided has been based on retail on the ground level.

Planning policies and guidelines on height and character also require further consideration, both of which may make a parkade option on this site unviable, and open to public criticism.

Vehicular access to the site would be best located off the back-lane from Stradbrook Avenue.

Dec 09, 2010 – 11:46am
P:\5510001–5510099\5510002–000 Osborne Village Parking\MMM Dwgs\5510002_SK_002A–003 Osborne Village parking–101209.dwg –tab: SK–002A



NOTE:
These design documents are prepared solely for the use by the party with whom the design professional has entered into a contract and there are no representations of any kind made by the design professional to any party with whom the design professional has not entered into a contract.

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t. 204.943.3178
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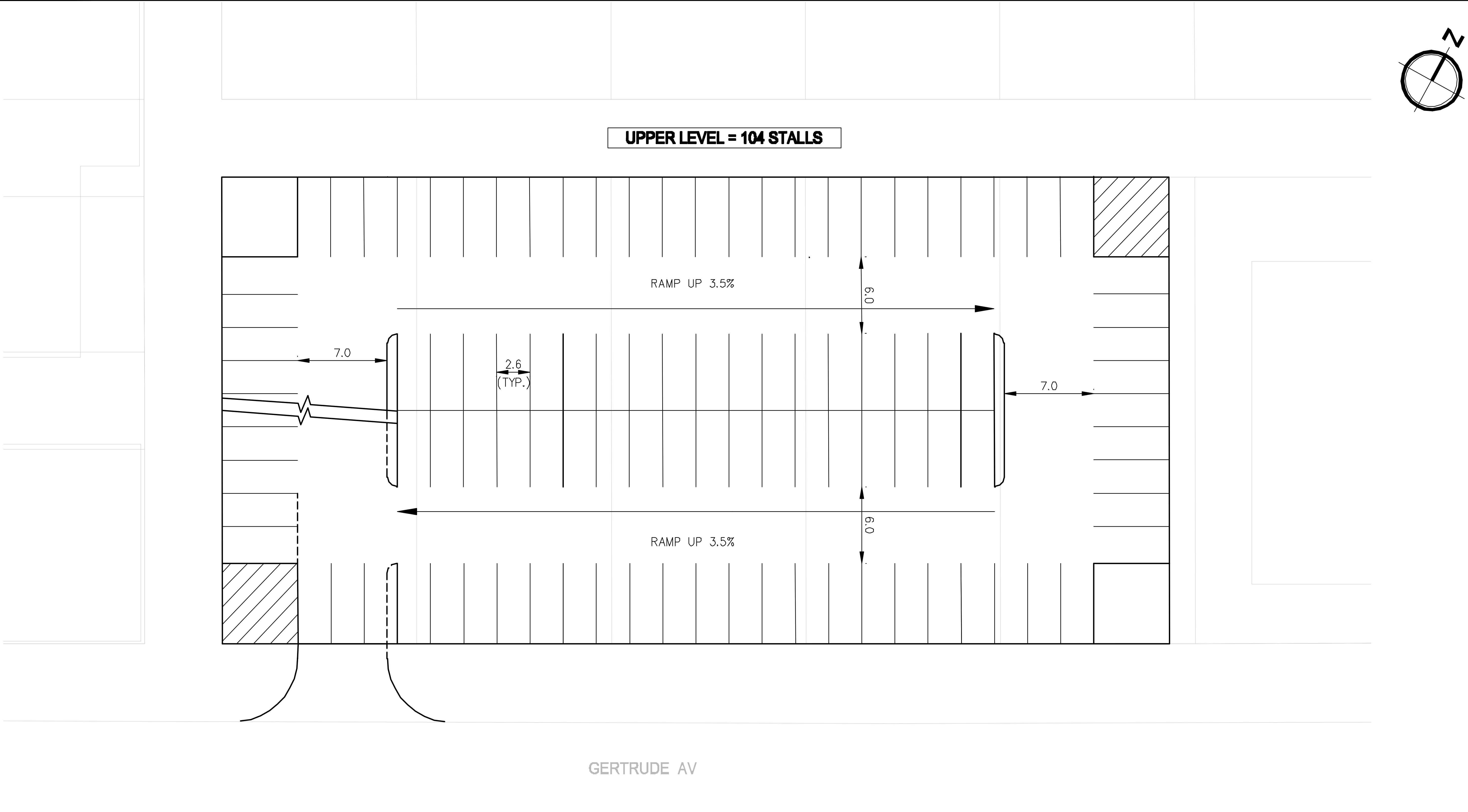
OSBORNE VILLAGE
CONCEPTUAL PARKADE
OPTION A

SCALE:	DATE:	DWG. No.
1:300	DEC. 09, 2010	5510002-SK-002

Dec 09, 2010 – 11:47am
P:\5510001–5510099\5510002–000 Osborne Village Parking\MMM Dwgs\5510002_SK_002A–003 Osborne Village parking–101209.dwg –tab:SK–003



NOTE:
These design documents are prepared solely for the use by the party with whom the design professional has entered into a contract and there are no representations of any kind made by the design professional to any party with whom the design professional has not entered into a contract.

MMM GROUP

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OSBORNE VILLAGE
CONCEPTUAL PARKADE
OPTION A

SCALE: 1:300
DATE: DEC. 09, 2010
DWG. No. 5510002-SK-003

This is a printout of the survey that was provided online at www.surveymonkey.com/s/OsborneVillage.

Osborne Village Parking Study

1. Introduction

The Winnipeg Parking Authority and Osborne Village BIZ are investigating the current parking situation within the Osborne Village area. This was a recommendation of the Osborne Village Neighbourhood Plan.

This study includes looking at the existing parking conditions within the Osborne Village area and proposing potential courses of action that may be taken related to the provision of parking in the area in the future.

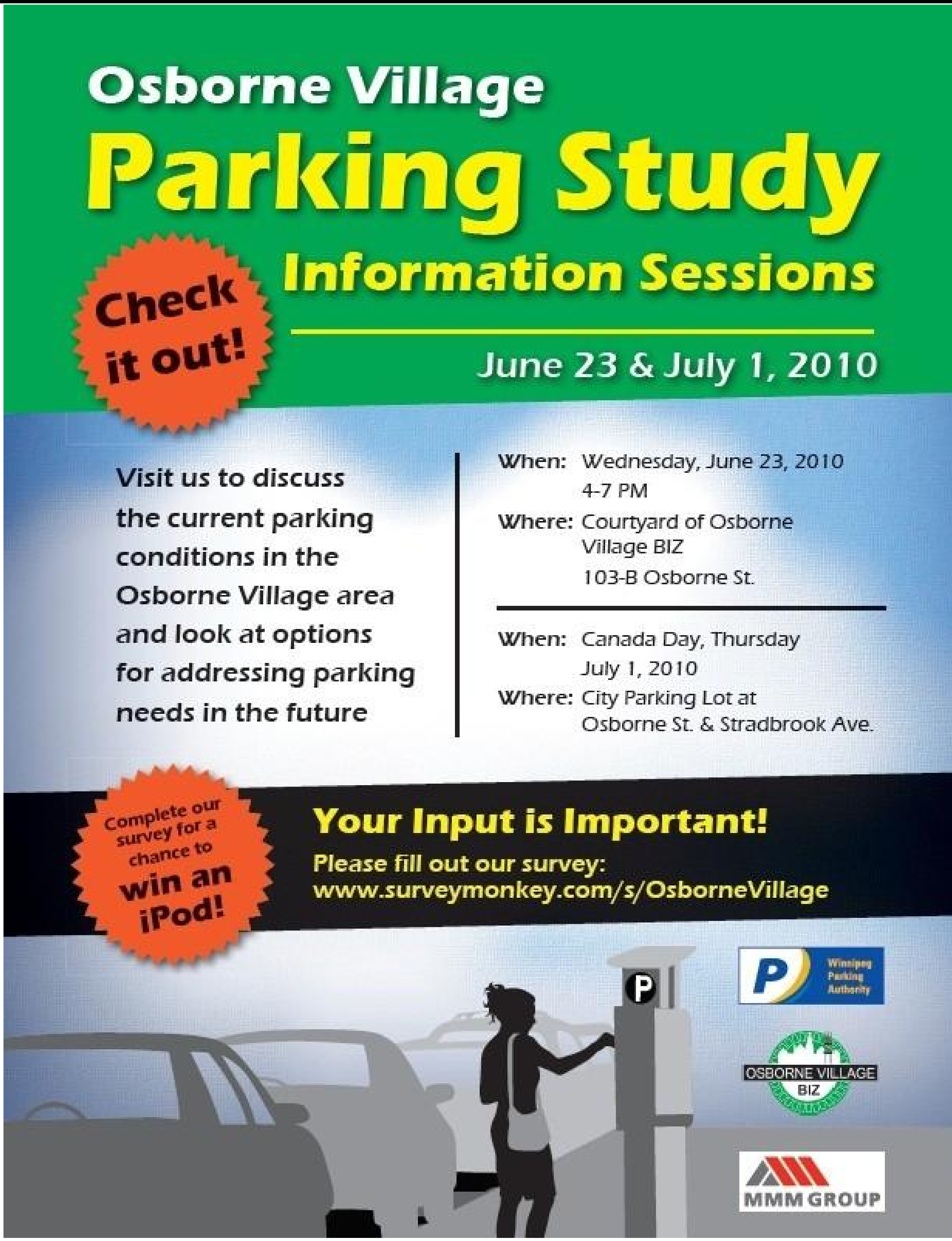
Stakeholder input is an important component of this project. This survey is seeking your observations as a resident of, an employee working in, or visitor to the Osborne Village area. (Perhaps you're even all three.)

The survey will ask some questions related to your observations of parking in the area at present, and will ask you to consider some proposed options for how the parking might be modified in the future.

At present, the options presented are still conceptual -– none of them has been selected as "the solution" at this point. We are in the process of gathering feedback from stakeholders regarding these options, which includes surveys like this one.

Everyone who completes the survey (and provides contact information) can enter to win an **iPod Shuffle**!

June 11, 2010 Update: We'll be holding information sessions later this month: See the details below.



Thank you for participating in the survey.

David Patman, P.Eng.

2. Live in Osborne Village Area?

*** 1. Do you live in the Osborne Village area?**

- ◯ Yes
- ◯ No

3. Living in Osborne Village

* 1. How many people age 16 and over live in your household?

- Prefer not to answer
- 1-2
- 2-4
- More than 4

2. What street do you live on within the Osborne Village area?

- Bell Ave
- Bole St
- Bryce St
- Bryce St
- Cauchon St
- Clark St
- Daly St
- Evergreen Place
- Gerard St
- Gertrude St
- Lewis St
- Mayfair Place
- McMillan Ave
- Nassau St
- Norquay St
- Osborne St
- Pulford St
- River Ave
- Roslyn Cres
- Roslyn Road
- Scott St
- Scott Street

- Stradbrook Ave
- Wardlaw Ave
- Wellington Cres
- Wilmot Place
- Live in the area, but would prefer not to answer

Other (please specify)

*** 3. How many motorized vehicles does your household own?**

- 0
- 1
- 2
- 3
- 4 or more

4. How many off-street parking spaces do you have at your home?

- 0
- 1
- 2
- 3
- 4 or more

Osborne Village Parking Study

5. If/when you park your vehicle on the street, what streets do you most often park on?

- [ ] I never park on the street
- [ ] Bell Ave
- [ ] Bole St
- [ ] Bryce St
- [ ] Bryce St
- [ ] Cauchon St
- [ ] Clark St
- [ ] Daly St
- [ ] Evergreen Place
- [ ] Gerard St
- [ ] Gertrude St
- [ ] Lewis St
- [ ] Mayfair Place
- [ ] McMillan St
- [ ] Nassau St
- [ ] Norquay St
- [ ] Osborne St
- [ ] Pulford St
- [ ] River Ave
- [ ] Roslyn Cres
- [ ] Roslyn Road
- [ ] Scott St
- [ ] Scott Street
- [ ] Stradbrook Ave
- [ ] Wardlaw Ave
- [ ] Wellington Cres
- [ ] Wilmot Place

Other (please specify)

6. Is parking for visitors visiting your home a problem?

- ◯ Yes
- ◯ Occasionally
- ◯ No

4. Workplace

* 1. Do you work in the Osborne Village area or nearby (such as on Corydon Avenue, in the downtown south of Broadway, etc.)?

- Yes
- No

5. Working in the Osborne Village Area

1. What is the name and address of the business you work at in the Osborne Village area (Osborne Village, downtown, Corydon Ave, etc.)?

* **2. How do you travel to work? (If you use different methods on different days, select the one you use the most. If you use two or more methods, such as walk and public transit, indicate the one that covers the longest portion of the trip.)**

- Public Transit
- Drive (Private Vehicles including motorcycles)
- Walk
- Bicycle
- Carpool

6. Drive to Work - Parking Location

1. If you drive to work in the Osborne Village area, where do you park? (select the most common locations you use)

- [ ] Bell Ave
- [ ] Bole St
- [ ] Bryce St
- [ ] Bryce St
- [ ] Cauchon St
- [ ] Clark St
- [ ] Daly St
- [ ] Evergreen Place
- [ ] Gerard St
- [ ] Gertrude St
- [ ] Lewis St
- [ ] Mayfair Place
- [ ] McMillan Ave
- [ ] Nassau St
- [ ] Norquay St
- [ ] Osborne St
- [ ] Pulford St
- [ ] River Ave
- [ ] Roslyn Cres
- [ ] Roslyn Road
- [ ] Scott St
- [ ] Scott Street
- [ ] Stradbrook Ave
- [ ] Wardlaw Ave
- [ ] Wellington Cres
- [ ] Wilmot Place
- [ ]

- [ ] Impark lot on Gertrude Street
- [ ] Parking lot behind Citi FM building
- [ ] Osborne Village Motor Inn lot
- [ ] City lot at Osborne Street and Stradbrook Avenue
- [ ] Parking lot at Gord's building
- [ ] Safeway parking lot

Other location (please specify)

7. Visiting the Osborne Village - Frequency

The next section deals with visiting the Osborne Village area to perform some activity, such as going shopping. In this survey, we're considering it a "visit" even if you're a resident of the area.

1. How often do you visit the Osborne Village (for any purpose -- visiting friends, going to church, shopping, eating, etc.)

- More than once a week
- Once a week
- Once a month
- Occasionally or infrequently
- Never

8. Visiting in the Osborne Village Area

1. When you visit the Osborne Village area, what do you typically do? (select one or more)

- [ ] Go to church
- [ ] Eat / Drink
- [ ] Shop
- [ ] Visit people
- [ ] Entertainment (e.g. Gas Station Theatre)

Other (please specify)

2. Which of the following options is most typical of how you approach a visit to the Osborne Village?

- ◯ Visit only one destination i.e., "get in and get out".
- ◯ Stop at multiple destinations but concentrate on limiting time in the area.
- ◯ Go on the possibility that you may spend several hours in the area without a fixed departure time.

*** 3. When you go to the Osborne Village area to shop, eat, visit people, etc., do you ever drive there?**

- ◯ I always drive
- ◯ Sometimes I drive, sometimes I use other methods
- ◯ I never drive

9. Parking in the Osborne Village Area

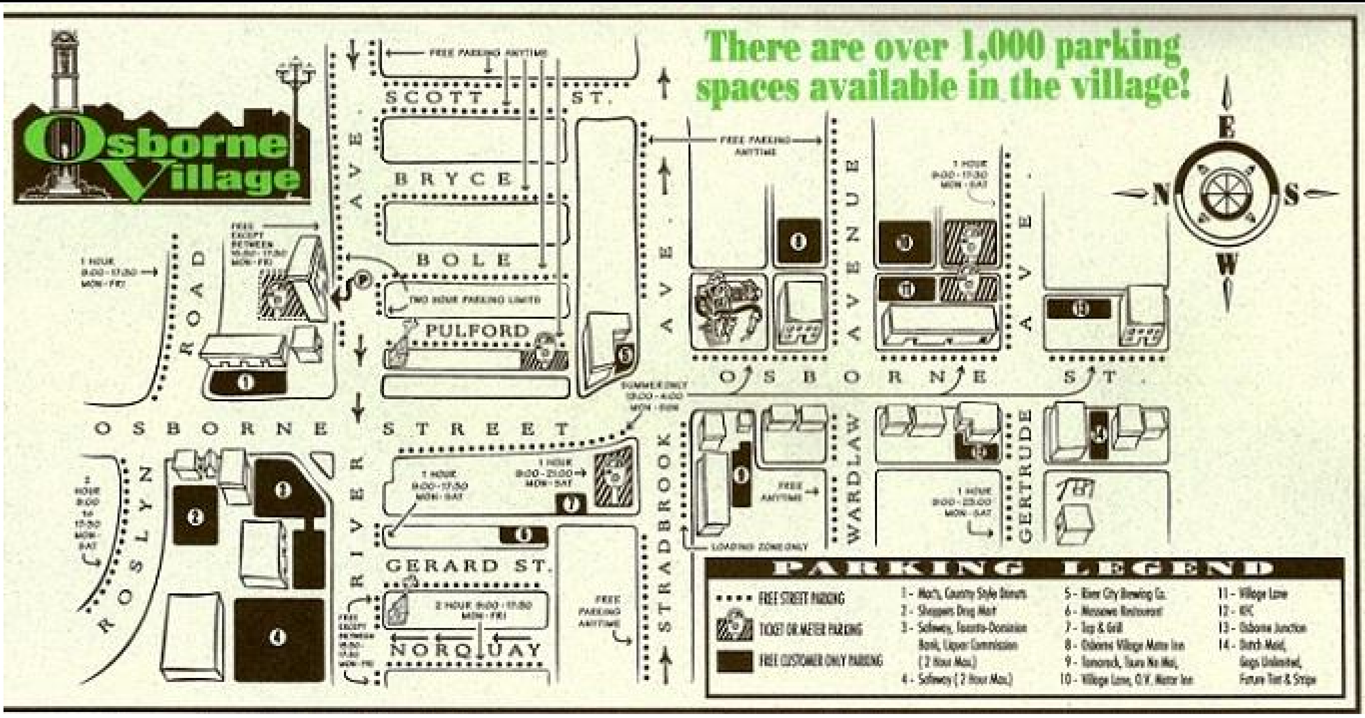
1. Where do you typically park when you are in the Osborne Village area?

- ☐ Bole St
- ☐ Gerard St
- ☐ Norquay St
- ☐ River Ave
- ☐ Pulford St
- ☐ Stradbrook Ave
- ☐ Wardlaw Ave
- ☐ Gertrude St
- ☐ Osborne St
- ☐ Impark lot on Gertrude Street
- ☐ Parking lot behind Citi FM building
- ☐ Osborne Village Motor Inn lot
- ☐ City lot at Osborne Street and Stradbrook Avenue
- ☐ Parking lot at Gord's building
- ☐ Safeway parking lot

Other (please specify)

2. Are you familiar with the map of available parking available on the Osborne Village BIZ website as seen below?

- ◯ Yes
- ◯ No



Osborne Village
There are over 1,000 parking spaces available in the village!
SCOTT ST.
BRYCE
BOLE
PULFORD
OSBORNE STREET
GERARD ST.
NORQUAY
RIVER AVE.
ROAD
ROSLYN
STRADBROOK
AVENUE
WARDLAW
GERTRUDE
AVE.
OSBORNE ST.
N
S
E
W
FREE PARKING ANYTIME
TWO HOUR PARKING LIMITS
LOADING ZONE ONLY
PARKING LEGEND
FREE STREET PARKING
TICKET OR METER PARKING
FREE CUSTOMER ONLY PARKING
1 - Mac's, Country Style Donuts
2 - Shoppers Drug Mart
3 - Safeway, Toronto-Dominion Bank, Liquor Commission (2 Hour Max.)
4 - Safeway (2 Hour Max.)
5 - River City Brewing Co.
6 - Mossowa Restaurant
7 - Tap & Grill
8 - Osborne Village Motor Inn
9 - Tamarack, Tsuru No Mai,
10 - Village Lane, O.V. Motor Inn
11 - Village Lane
12 - KFC
13 - Osborne Junction
14 - Dutch Maid, Gags Unlimited, Future Tint & Stripe

Osborne Village Parking Study

10. Current Parking Conditions in the Osborne Village Area

Read the following statements which are about parking conditions in the Osborne Village area.

1. Indicate your level of agreement or disagreement with the following statements:

	Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
Creating additional parking in the Osborne Village area would encourage more people to drive here.	◯	◯	◯	◯	◯
Creating additional parking in the Osborne Village area would encourage more people to visit.	◯	◯	◯	◯	◯
Difficulty in finding parking is turning people away from visiting the Osborne Village area.	◯	◯	◯	◯	◯
Hard-to-find parking is a fact-of-life in the Osborne Village area, and does not need to be altered.	◯	◯	◯	◯	◯
I can generally find on-street parking in the Osborne Village area.	◯	◯	◯	◯	◯
I feel safe parking my car in Osborne Village – my car will be safe and I will be safe walking through the area.	◯	◯	◯	◯	◯
I would like to be able to park once and walk to multiple destinations in this area.	◯	◯	◯	◯	◯
Improved active transport facilities such as more bicycle parking should be provided to encourage alternative modes of transport.	◯	◯	◯	◯	◯
People parking in the Osborne Village and walking to destinations outside the Osborne Village itself (such as to workplaces in the downtown) are a problem in the area.	◯	◯	◯	◯	◯
Some off-street lots restrict who can park there so that only patrons of certain businesses may use a lot. I do not like these restrictions.	◯	◯	◯	◯	◯
Sometimes I must park and walk a long distance to my destination in the Osborne Village area.	◯	◯	◯	◯	◯
Vehicles “cruising” the streets looking for parking are a problem in the Osborne Village area.	◯	◯	◯	◯	◯
Walking several blocks from my car to where I want to go is acceptable to me.	◯	◯	◯	◯	◯

11. Potential Parking Concepts for the Osborne Village Area

Here are some concepts that potentially could be implemented to alter parking conditions in the Osborne Village area. Remember, none of these ideas have been selected as the recommended option at this time -– please tell us what you think of these options.

12. Parking Concept #1 - Enhanced Signage

Signage could be created that would encourage cars to seek out underutilized parking areas in the area, such as the Impark parking lot on Gertrude Avenue east of Osborne Street. This signage would be located throughout the area to guide people as they enter the area towards public parking.

This signage could potentially incorporate electronic displays to indicate the number of available parking spaces or stalls. By directing people to available parking, this could reduce the amount of people driving through the area looking for a space.

Marketing of parking locations and the new signage (using print media, the Osborne BIZ's website and radio commercials) potentially could be part of a campaign to make Osborne Village visitors and users aware and familiar with the new signage.

1. Would you support this option being implemented within the Osborne Village area?

- Yes
- No
- Undecided
- Need more information

2. Please comment on this concept.

13. Parking Concept #2 - Fees for On-street Parking

Other cities in North America have experimented with using fees for on-street parking. Fees are set in such a way that they make some vehicles less likely to park on the street for long-term parking, encouraging high turnover at the on-street parking spaces. This frees up spaces for short-term parking meaning that it would be easier for vehicles passing by to find a place to park, which would reduce the need for vehicles to drive around the area looking for a space.

- On-street parking would no longer be free in the Osborne Village area.
- The cost to park could vary during the day with higher rates during peak periods of the day when more people are looking for parking. Potentially, during times of the day when the demand for parking is low, parking would remain free.
- Parking pay-and-display machines similar to those in downtown Winnipeg would be used.
- Revenue from the parking fees would fund local area improvements.
- Residents would be able to obtain permits (with an associated fee) to allow them and their visitors to avoid being charged for parking on-street.
- Paid on-street parking may encourage the use of alternative modes when visiting or travelling to work in the Osborne Village area.

1. Would you support this option being implemented within the Osborne Village area?

- ◯ Yes
- ◯ No
- ◯ Undecided
- ◯ Need more information

2. Please comment on this concept.

14. Parking Concept #3 - Parking Structure

A levy could be imposed on area development to fund a parking structure to supplement the existing parking supply within the Osborne Village area.

This levy potentially would be paid by new and existing commercial and/or residential development to create a supply of parking for visitors to the area.

The City potentially could contribute towards the levy as well.

The parking structure would either be a stand-alone parking structure, or designed to incorporate ground floor mixed-use to make it “fit” into the surrounding area, or would be constructed as part of a future development project within the Osborne Village area.

1. Would you support this option being implemented within the Osborne Village area?

- Yes
- No
- Undecided
- Need more information

2. Please comment on this concept.

15. Further comments

Do you have any general comments about parking in the Osborne Village area? Do you have any other potential ideas for improving parking within the area?

1. Please provide any additional comments regarding parking in the Osborne Village area.

5
6

16. iPod Shuffle draw

Thanks for taking part in the survey. Optionally, if you provide some demographic information, we will enter your name in a draw to win an iPod Shuffle.

1. Please fill this information to be entered to win an iPod Shuffle.

Name:

Address 1:

Address 2:

City/Town:

State/Province:

ZIP/Postal Code:

Country:

Email Address:

Phone Number (optional):

17. Thank you.

Thank you for participating in the survey.

Please pass along this survey to anyone you know who lives, works, or visits the Osborne Village area. The link to this survey is:

http://www.surveymonkey.com/s/OsborneVillage

Thanks again,

David Patman, P.Eng.

APPENDIX

B SYNCHRO REPORTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	845	420	45	0	2330	0	0	780	100
Future Volume (vph)	0	0	0	845	420	45	0	2330	0	0	780	100
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	0.99							0.96
Frt					0.989							0.850
Flt Protected				0.950	0.977							
Satd. Flow (prot)	0	0	0	1430	4398	0	0	3293	0	0	3357	1517
Flt Permitted				0.950	0.977							
Satd. Flow (perm)	0	0	0	*3600	4385	0	0	3293	0	0	3357	1454
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5							125
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		54.0			102.2			230.8			367.3	
Travel Time (s)		3.9			7.4			13.8			26.4	
Confl. Peds. (#/hr)				6		20						19
Peak Hour Factor	1.00	1.00	1.00	0.93	0.93	0.64	1.00	0.97	1.00	1.00	0.89	0.64
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	909	452	70	0	2402	0	0	876	156
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	0	0	454	977	0	0	2402	0	0	876	156
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				41.0	41.0			30.0			28.0	28.0
Total Split (s)				42.0	42.0			78.0			78.0	78.0
Total Split (%)				35.0%	35.0%			65.0%			65.0%	65.0%
Maximum Green (s)				36.0	36.0			73.0			73.0	73.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				10.0	10.0			7.0			7.0	7.0
Flash Dont Walk (s)				25.0	25.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				33.2	33.2			75.8			75.8	75.8
Actuated g/C Ratio				0.28	0.28			0.63			0.63	0.63
v/c Ratio				0.46	1.04dl			1.15			0.41	0.16
Control Delay				34.8	43.3			91.2			12.1	3.1
Queue Delay				2.7	0.0			0.0			0.0	0.0
Total Delay				37.6	43.3			91.2			12.1	3.1
LOS				D	D			F			B	A
Approach Delay					41.5			91.2			10.8	
Approach LOS					D			F			B	
Queue Length 50th (m)				98.9	82.5			~356.5			52.3	2.7
Queue Length 95th (m)				132.6	98.4			#400.1			66.5	4.2
Internal Link Dist (m)		30.0			78.2			206.8			343.3	
Turn Bay Length (m)				56.0								
Base Capacity (vph)				1080	1319			2080			2120	964
Starvation Cap Reductn				495	0			10			0	0
Spillback Cap Reductn				0	0			0			95	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.78	0.74			1.16			0.43	0.16

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 29 (24%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 59.5 Intersection LOS: E
Intersection Capacity Utilization 102.1% ICU Level of Service G
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

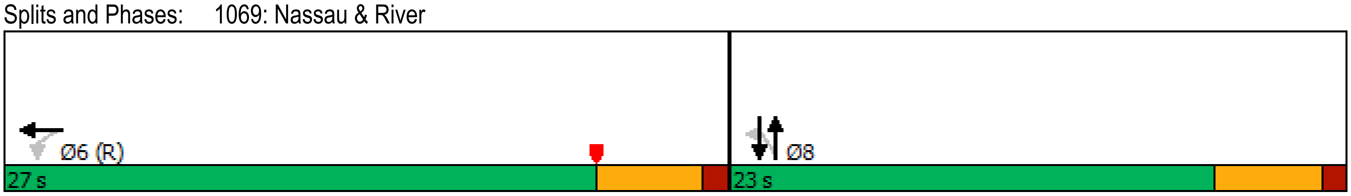
Splits and Phases: 1002: Donald & River

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	80	450	35	25	200	0	0	55	90
Future Volume (vph)	0	0	0	80	450	35	25	200	0	0	55	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991						0.916	
Flt Protected					0.993			0.995				
Satd. Flow (prot)	0	0	0	0	3336	0	0	1775	0	0	1634	0
Flt Permitted					0.993			0.959				
Satd. Flow (perm)	0	0	0	0	3336	0	0	1711	0	0	1634	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					17						95	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.8			29.8			113.5			44.4	
Travel Time (s)		11.6			2.1			8.2			3.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	84	474	37	26	211	0	0	58	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	595	0	0	237	0	0	153	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					6			8			8	
Permitted Phases				6			8					
Minimum Split (s)				22.0	22.0		23.0	23.0			23.0	
Total Split (s)				27.0	27.0		23.0	23.0			23.0	
Total Split (%)				54.0%	54.0%		46.0%	46.0%			46.0%	
Maximum Green (s)				22.0	22.0		18.0	18.0			18.0	
Yellow Time (s)				4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)				1.0	1.0		1.0	1.0			1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				10.0	10.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					22.0			18.0			18.0	
Actuated g/C Ratio					0.44			0.36			0.36	
v/c Ratio					0.40			0.39			0.24	
Control Delay					10.3			14.2			6.3	
Queue Delay					0.0			0.0			0.0	
Total Delay					10.3			14.2			6.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS					B			B			A	
Approach Delay					10.3			14.2			6.3	
Approach LOS					B			B			A	
Queue Length 50th (m)					17.1			15.1			3.3	
Queue Length 95th (m)					26.8			29.4			12.4	
Internal Link Dist (m)		136.8			5.8			89.5			20.4	
Turn Bay Length (m)												
Base Capacity (vph)					1477			615			649	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.40			0.39			0.24	

Intersection Summary		
Area Type:	Other	
Cycle Length: 50		
Actuated Cycle Length: 50		
Offset: 18 (36%), Referenced to phase 2: and 6:WBTL, Start of Yellow		
Natural Cycle: 45		
Control Type: Pretimed		
Maximum v/c Ratio: 0.40		
Intersection Signal Delay: 10.6		Intersection LOS: B
Intersection Capacity Utilization 50.7%		ICU Level of Service A
Analysis Period (min) 15		
Description: Nassau & River		

Splits and Phases: 1069: Nassau & River



Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Lane Configurations												
Traffic Volume (vph)	240	1535	5	0	1620	0	0	605	430	0	0	
Future Volume (vph)	240	1535	5	0	1620	0	0	605	430	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)		230.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Storage Lanes		1	0	0		1	0		0	0	0	
Taper Length (m)		7.5		7.5			7.5			7.5		
Lane Util. Factor	1.00	*1.00	0.91	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	
Frt								0.937				
Flt Protected	0.950	0.953										
Satd. Flow (prot)	1601	5101	0	0	3390	0	0	3072	0	0	0	
Flt Permitted	0.950	0.953										
Satd. Flow (perm)	1601	5101	0	0	3390	0	0	3072	0	0	0	
Right Turn on Red			Yes			Yes			No			
Satd. Flow (RTOR)		52										
Link Speed (k/h)		60			50			50		60		
Link Distance (m)		277.5			33.4			213.8		111.1		
Travel Time (s)		16.7			2.4			15.4		6.7		
Peak Hour Factor	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	0.92	1.00	1.00	
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	
Adj. Flow (vph)	240	1535	5	0	1780	0	0	637	467	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	1540	0	0	1780	0	0	1104	0	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	
Median Width(m)		14.8			0.0			0.0		0.0		
Link Offset(m)		0.0			0.0			0.0		0.0		
Crosswalk Width(m)		4.8			4.8			4.8		4.8		
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
Turning Speed (k/h)	24	24	60	24		14	24		60	24	14	
Turn Type	Perm	Prot			NA			NA				
Protected Phases		8			2			6				1
Permitted Phases	8				2			6				
Detector Phase	8	8			2			6				
Switch Phase												
Minimum Initial (s)	10.0	10.0			7.0			7.0				1.0
Minimum Split (s)	25.0	25.0			30.0			34.0				4.0
Total Split (s)	49.0	49.0			73.0			77.0				4.0
Total Split (%)	38.9%	38.9%			57.9%			61.1%				3%
Maximum Green (s)	43.0	43.0			67.0			71.0				1.0
Yellow Time (s)	4.0	4.0			4.0			4.0				3.0
All-Red Time (s)	2.0	2.0			2.0			2.0				0.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	6.0	6.0			6.0			6.0				
Lead/Lag					Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0			3.0				3.0
Recall Mode	C-Max	C-Max			Max			Max				Max

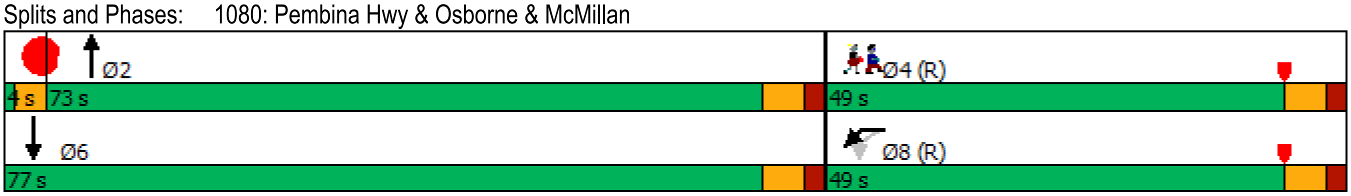
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	32.0
Total Split (s)	49.0
Total Split (%)	39%
Maximum Green (s)	43.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Walk Time (s)	7.0	7.0			7.0			7.0				
Flash Dont Walk (s)	12.0	12.0			17.0			21.0				
Pedestrian Calls (#/hr)	0	0			0			0				
Act Effct Green (s)	43.0	43.0			67.0			71.0				
Actuated g/C Ratio	0.34	0.34			0.53			0.56				
v/c Ratio	0.44	0.87			0.99			0.64				
Control Delay	35.3	43.8			41.3			35.7				
Queue Delay	0.0	11.9			16.0			0.4				
Total Delay	35.3	55.7			57.4			36.1				
LOS	D	E			E			D				
Approach Delay		53.0			57.4			36.1				
Approach LOS		D			E			D				
Queue Length 50th (m)	45.9	115.1			238.8			138.3				
Queue Length 95th (m)	69.7	133.4			#288.2			160.9				
Internal Link Dist (m)		253.5			9.4			189.8		87.1		
Turn Bay Length (m)	230.0	230.0										
Base Capacity (vph)	546	1775			1802			1731				
Starvation Cap Reductn	0	0			95			110				
Spillback Cap Reductn	0	243			0			206				
Storage Cap Reductn	0	0			0			0				
Reduced v/c Ratio	0.44	1.01			1.04			0.72				

Intersection Summary

Area Type: Other
Cycle Length: 126
Actuated Cycle Length: 126
Offset: 96 (76%), Referenced to phase 4:Ped and 8:WBL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 50.6 Intersection LOS: D
Intersection Capacity Utilization 88.2% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1080: Pembina Hwy & Osborne & McMillan



Lane Group	Ø4
Walk Time (s)	7.0
Flash Dont Walk (s)	19.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Future Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99	1.00	0.98						0.98			
Frt			0.850						0.850			
Flt Protected	0.950	0.994										
Satd. Flow (prot)	1543	3228	1517	0	0	0	0	3293	1517	0	3293	0
Flt Permitted	0.950	0.994										
Satd. Flow (perm)	1526	3224	1491	0	0	0	0	3293	1480	0	3293	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						115			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)	9		17						4			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.82	0.90	0.66	1.00	1.00	1.00	1.00	0.96	0.91	1.00	0.94	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%
Adj. Flow (vph)	354	511	30	0	0	0	0	2104	978	0	1527	0
Shared Lane Traffic (%)	21%											
Lane Group Flow (vph)	280	585	30	0	0	0	0	2104	978	0	1527	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	43.0	43.0						77.0	77.0		77.0	
Total Split (%)	35.8%	35.8%						64.2%	64.2%		64.2%	
Maximum Green (s)	37.0	37.0						72.0	72.0		72.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)	-1.5	-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)	4.5	4.5						3.5	3.5		3.5	
Lead/Lag												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	43.0
Total Split (%)	36%
Maximum Green (s)	37.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)	30.3	30.3	120.0					81.7	81.7		81.7	
Actuated g/C Ratio	0.25	0.25	1.00					0.68	0.68		0.68	
v/c Ratio	0.73	0.72	0.02					0.94	0.94		0.68	
Control Delay	51.8	45.7	0.0					27.9	33.5		20.5	
Queue Delay	0.0	0.0	0.0					44.8	0.0		0.2	
Total Delay	51.8	45.7	0.0					72.7	33.5		20.6	
LOS	D	D	A					E	C		C	
Approach Delay		46.1						60.3			20.6	
Approach LOS		D						E			C	
Queue Length 50th (m)	67.0	69.9	0.0					205.3	166.2		168.3	
Queue Length 95th (m)	80.4	81.6	0.0					#324.0	#312.9		203.5	
Internal Link Dist (m)		559.5			246.5			397.2			206.8	
Turn Bay Length (m)	45.0		30.0									
Base Capacity (vph)	489	1034	1491					2241	1044		2241	
Starvation Cap Reductn	0	0	0					0	0		150	
Spillback Cap Reductn	0	0	0					457	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.57	0.57	0.02					1.18	0.94		0.73	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 28 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 47.0 Intersection LOS: D
Intersection Capacity Utilization 102.1% ICU Level of Service G
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	15	45	30	40	55	1	1945	30	1	950	50
Future Volume (vph)	235	15	45	30	40	55	1	1945	30	1	950	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.91	0.91	0.91
Frt		0.979			0.934			0.997			0.992	
Flt Protected		0.963			0.990							
Satd. Flow (prot)	0	1682	0	0	1650	0	0	3380	0	0	4832	0
Flt Permitted		0.617			0.901			0.953			0.876	
Satd. Flow (perm)	0	1078	0	0	1502	0	0	3221	0	0	4233	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			11			3			12	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		178.6			206.5			130.5			284.5	
Travel Time (s)		12.9			14.9			9.4			20.5	
Peak Hour Factor	0.87	0.63	0.82	0.91	0.81	0.70	0.25	0.93	0.73	0.25	0.97	0.94
Adj. Flow (vph)	270	24	55	33	49	79	4	2091	41	4	979	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	349	0	0	161	0	0	2136	0	0	1036	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	37.0	37.0		37.0	37.0		32.0	32.0		32.0	32.0	
Total Split (s)	42.0	42.0		42.0	42.0		84.0	84.0		84.0	84.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	37.0	37.0		37.0	37.0		79.0	79.0		79.0	79.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Ped	Ped		Ped	Ped		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		37.0			37.0			79.0			79.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.29			0.29			0.63			0.63	
v/c Ratio		1.08			0.36			1.06			0.39	
Control Delay		115.8			35.4			46.3			11.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		115.8			35.4			46.3			11.7	
LOS		F			D			D			B	
Approach Delay		115.8			35.4			46.3			11.7	
Approach LOS		F			D			D			B	
Queue Length 50th (m)		~95.6			29.3			~313.0			42.9	
Queue Length 95th (m)		#79.0			43.0			#343.8			44.3	
Internal Link Dist (m)		154.6			182.5			106.5			260.5	
Turn Bay Length (m)												
Base Capacity (vph)		322			448			2020			2658	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.08			0.36			1.06			0.39	

Intersection Summary

Area Type: Other

Cycle Length: 126

Actuated Cycle Length: 126

Offset: 117 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 42.7 Intersection LOS: D

Intersection Capacity Utilization 91.0% ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1243: Osborne & Roslyn

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	80	400	65	0	1820	0	0	925	135
Future Volume (vph)	0	0	0	80	400	65	0	1820	0	0	925	135
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.97		0.81						0.86
Frt						0.850						0.850
Flt Protected				0.950								
Satd. Flow (prot)	0	0	0	1695	3390	1517	0	3390	0	0	3136	1403
Flt Permitted				0.950								
Satd. Flow (perm)	0	0	0	1652	3390	1224	0	3390	0	0	3136	1204
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)												51
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			693.6			192.4			130.5	
Travel Time (s)		15.6			49.9			13.9			9.4	
Confl. Peds. (#/hr)				17		122						49
Peak Hour Factor	1.00	1.00	1.00	0.85	0.92	0.95	0.33	0.88	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	94	435	68	0	2068	0	0	1005	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	94	435	68	0	2068	0	0	1005	167
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm		NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8		8						6
Detector Phase				8	8	8		2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0		10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0		24.0			19.0	19.0
Total Split (s)				30.0	30.0	30.0		92.0			92.0	92.0
Total Split (%)				23.8%	23.8%	23.8%		73.0%			73.0%	73.0%
Maximum Green (s)				25.0	25.0	25.0		87.0			87.0	87.0
Yellow Time (s)				4.0	4.0	4.0		4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0		1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)				5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	3%
Maximum Green (s)	1.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped		C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0		12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)				25.0	25.0	25.0		91.0			91.0	91.0
Actuated g/C Ratio				0.20	0.20	0.20		0.72			0.72	0.72
v/c Ratio				0.29	0.65	0.28		0.84			0.44	0.19
Control Delay				45.7	51.6	46.6		9.1			5.3	2.6
Queue Delay				0.0	0.0	0.0		7.4			0.0	0.0
Total Delay				45.7	51.6	46.6		16.5			5.3	2.6
LOS				D	D	D		B			A	A
Approach Delay					50.1			16.5			4.9	
Approach LOS					D			B			A	
Queue Length 50th (m)				20.0	52.6	14.5		66.3			24.1	2.3
Queue Length 95th (m)				33.6	70.2	28.4		m69.9			m27.9	m4.4
Internal Link Dist (m)		193.0			669.6			168.4			106.5	
Turn Bay Length (m)				30.0		30.0						
Base Capacity (vph)				327	672	242		2448			2264	883
Starvation Cap Reductn				0	0	0		358			169	0
Spillback Cap Reductn				0	0	0		355			0	0
Storage Cap Reductn				0	0	0		0			0	0
Reduced v/c Ratio				0.29	0.65	0.28		0.99			0.48	0.19

Intersection Summary

Area Type: Other
Cycle Length: 126
Actuated Cycle Length: 126
Offset: 111 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 18.2 Intersection LOS: B
Intersection Capacity Utilization 86.2% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1286: Osborne & River

Lane Group	Ø5
Vehicle Extension (s)	0.2
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	785	70	0	0	0	0	1420	95	110	870	0
Future Volume (vph)	330	785	70	0	0	0	0	1420	95	110	870	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.97	0.99							0.90			
Frt		0.989							0.850			
Flt Protected	0.950	0.998								0.950		
Satd. Flow (prot)	1388	3188	0	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.998								0.062		
Satd. Flow (perm)	1348	3185	0	0	0	0	0	3390	1368	111	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7							78			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	22		46						44	44		
Peak Hour Factor	0.81	0.88	0.93	1.00	1.00	1.00	1.00	0.96	0.81	0.77	0.95	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	407	892	75	0	0	0	0	1479	117	143	916	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	366	1008	0	0	0	0	0	1479	117	143	916	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6	6	
Minimum Split (s)	35.0	35.0						24.0	24.0	11.0	23.0	
Total Split (s)	47.0	47.0						64.0	64.0	15.0	79.0	
Total Split (%)	37.3%	37.3%						50.8%	50.8%	11.9%	62.7%	
Maximum Green (s)	41.0	41.0						59.0	59.0	9.0	74.0	
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0						12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0						0	0		0	

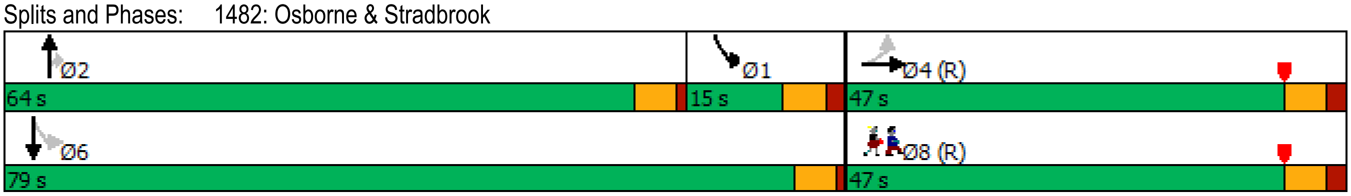
Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Minimum Split (s)	33.0
Total Split (s)	47.0
Total Split (%)	37%
Maximum Green (s)	41.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	41.0	41.0						59.0	59.0	73.0	74.0	
Actuated g/C Ratio	0.33	0.33						0.47	0.47	0.58	0.59	
v/c Ratio	0.84	0.97						0.93	0.17	0.81	0.46	
Control Delay	57.3	63.0						23.9	2.6	67.1	12.5	
Queue Delay	0.0	0.0						31.7	0.0	0.0	0.0	
Total Delay	57.3	63.0						55.6	2.6	67.1	12.5	
LOS	E	E						E	A	E	B	
Approach Delay		61.5						51.7			19.8	
Approach LOS		E						D			B	
Queue Length 50th (m)	92.0	134.0						207.0	4.8	20.8	34.2	
Queue Length 95th (m)	117.0	#173.1						#224.2	7.0	#35.6	51.3	
Internal Link Dist (m)		117.2			559.5			82.7			168.4	
Turn Bay Length (m)	55.0								40.0	25.0		
Base Capacity (vph)	438	1041						1587	682	177	1990	
Starvation Cap Reductn	0	0						202	0	0	0	
Spillback Cap Reductn	0	0						80	0	0	0	
Storage Cap Reductn	0	0						0	0	0	0	
Reduced v/c Ratio	0.84	0.97						1.07	0.17	0.81	0.46	

Intersection Summary

Area Type: Other
Cycle Length: 126
Actuated Cycle Length: 126
Offset: 18 (14%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 46.7 Intersection LOS: D
Intersection Capacity Utilization 86.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	45	5	980	695	15	0	0	0
Future Volume (vph)	0	0	0	0	45	5	980	695	15	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.95	1.00	1.00	1.00
Frt					0.985			0.997				
Flt Protected							0.950	0.983				
Satd. Flow (prot)	0	0	0	0	1758	0	1543	3183	0	0	0	0
Flt Permitted							0.950	0.983				
Satd. Flow (perm)	0	0	0	0	1758	0	1543	3183	0	0	0	0
Right Turn on Red			Yes			Yes	Yes		Yes			Yes
Satd. Flow (RTOR)					4		615	211				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		39.2			165.6			157.8			133.2	
Travel Time (s)		2.8			11.9			11.4			9.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	0.77	0.75	0.94	0.87	0.54	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	58	7	1043	799	28	0	0	0
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	0	0	0	0	65	0	615	1255	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			3.7			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type					NA		Prot	NA				
Protected Phases					8		6	2				
Permitted Phases												
Detector Phase					8		6	2				
Switch Phase												
Minimum Initial (s)					7.0		10.0	10.0				
Minimum Split (s)					24.0		16.0	22.0				
Total Split (s)					24.0		96.0	96.0				
Total Split (%)					20.0%		80.0%	80.0%				
Maximum Green (s)					19.0		90.0	90.0				
Yellow Time (s)					4.0		4.0	4.0				
All-Red Time (s)					1.0		2.0	2.0				
Lost Time Adjust (s)					-1.5		-1.5	-1.5				
Total Lost Time (s)					3.5		4.5	4.5				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0		3.0	3.0				
Recall Mode					None		C-Max	C-Max				
Walk Time (s)					7.0			7.0				
Flash Dont Walk (s)					12.0			9.0				
Pedestrian Calls (#/hr)					0			0				
Act Effct Green (s)					11.3		104.0	104.0				

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	24.0
Total Split (%)	20%
Maximum Green (s)	19.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio					0.09		0.87	0.87				
v/c Ratio					0.38		0.43	0.45				
Control Delay					53.8		1.2	2.2				
Queue Delay					0.0		0.3	0.2				
Total Delay					53.8		1.5	2.5				
LOS					D		A	A				
Approach Delay					53.8			2.2				
Approach LOS					D			A				
Queue Length 50th (m)					13.7		0.1	5.5				
Queue Length 95th (m)					22.6		13.6	54.1				
Internal Link Dist (m)		15.2			141.6			133.8			109.2	
Turn Bay Length (m)												
Base Capacity (vph)					303		1419	2786				
Starvation Cap Reductn					0		329	724				
Spillback Cap Reductn					0		12	26				
Storage Cap Reductn					0		0	0				
Reduced v/c Ratio					0.21		0.56	0.61				

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 44 (37%), Referenced to phase 2:NBT and 6:NBL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 3.9 Intersection LOS: A
Intersection Capacity Utilization 46.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1838: Harkness & River

Lane Group	Ø4
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

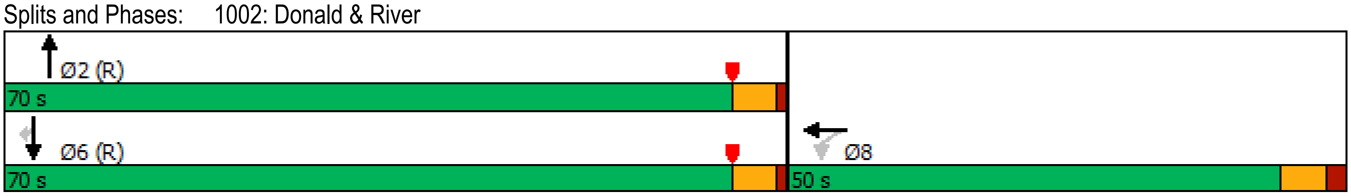
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	865	620	15	0	1535	0	0	1440	285
Future Volume (vph)	0	0	0	865	620	15	0	1535	0	0	1440	285
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	0.91	1.00	*1.00	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	1.00							0.96
Frt					0.997							0.850
Flt Protected				0.950	0.982							
Satd. Flow (prot)	0	0	0	1662	5199	0	0	3467	0	0	3357	1517
Flt Permitted				0.950	0.982							
Satd. Flow (perm)	0	0	0	*3600	5179	0	0	3467	0	0	3357	1452
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3							53
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		54.0			102.2			230.8			367.3	
Travel Time (s)		3.9			7.4			13.8			26.4	
Confl. Peds. (#/hr)				10		35						20
Peak Hour Factor	1.00	1.00	1.00	0.96	0.82	0.65	1.00	0.88	1.00	1.00	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	901	756	23	0	1744	0	0	1500	297
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	0	0	450	1230	0	0	1744	0	0	1500	297
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				41.0	41.0			30.0			28.0	28.0
Total Split (s)				50.0	50.0			70.0			70.0	70.0
Total Split (%)				41.7%	41.7%			58.3%			58.3%	58.3%
Maximum Green (s)				44.0	44.0			65.0			65.0	65.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				10.0	10.0			7.0			7.0	7.0
Flash Dont Walk (s)				25.0	25.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				38.1	38.1			70.9			70.9	70.9
Actuated g/C Ratio				0.32	0.32			0.59			0.59	0.59
v/c Ratio				0.39	0.86dl			0.85			0.76	0.34
Control Delay				36.3	43.3			21.7			22.2	12.2
Queue Delay				1.3	0.5			0.1			6.8	0.0
Total Delay				37.6	43.8			21.7			29.1	12.2
LOS				D	D			C			C	B
Approach Delay					42.2			21.7			26.3	
Approach LOS					D			C			C	
Queue Length 50th (m)				83.2	86.5			176.2			130.9	27.3
Queue Length 95th (m)				109.4	84.0			216.8			179.7	50.0
Internal Link Dist (m)		30.0			78.2			206.8			343.3	
Turn Bay Length (m)				56.0								
Base Capacity (vph)				1320	1900			2048			1984	879
Starvation Cap Reductn				635	280			9			0	0
Spillback Cap Reductn				0	0			0			442	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.66	0.76			0.86			0.97	0.34

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 29.9 Intersection LOS: C
Intersection Capacity Utilization 97.2% ICU Level of Service F
Analysis Period (min) 15
* User Entered Value
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 1002: Donald & River



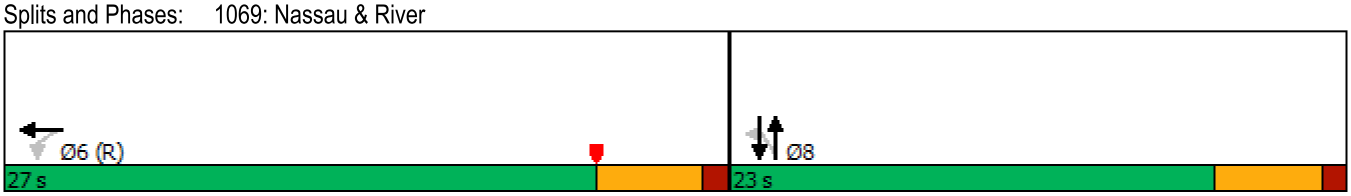
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	170	985	50	75	205	0	0	90	175
Future Volume (vph)	0	0	0	170	985	50	75	205	0	0	90	175
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994						0.911	
Flt Protected					0.993			0.987				
Satd. Flow (prot)	0	0	0	0	3346	0	0	1761	0	0	1626	0
Flt Permitted					0.993			0.839				
Satd. Flow (perm)	0	0	0	0	3346	0	0	1497	0	0	1626	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					11						46	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.8			29.8			113.5			44.4	
Travel Time (s)		11.6			2.1			8.2			3.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	179	1037	53	79	216	0	0	95	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1269	0	0	295	0	0	279	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					6			8			8	
Permitted Phases				6			8					
Minimum Split (s)				22.0	22.0		23.0	23.0			23.0	
Total Split (s)				27.0	27.0		23.0	23.0			23.0	
Total Split (%)				54.0%	54.0%		46.0%	46.0%			46.0%	
Maximum Green (s)				22.0	22.0		18.0	18.0			18.0	
Yellow Time (s)				4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)				1.0	1.0		1.0	1.0			1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				10.0	10.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					22.0			18.0			18.0	
Actuated g/C Ratio					0.44			0.36			0.36	
v/c Ratio					0.86			0.55			0.45	
Control Delay					20.6			17.5			13.0	
Queue Delay					0.0			0.0			0.0	
Total Delay					20.6			17.5			13.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS					C			B			B	
Approach Delay					20.6			17.5			13.0	
Approach LOS					C			B			B	
Queue Length 50th (m)					49.5			20.2			14.9	
Queue Length 95th (m)					#87.1			39.0			31.0	
Internal Link Dist (m)		136.8			5.8			89.5			20.4	
Turn Bay Length (m)												
Base Capacity (vph)					1478			538			614	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.86			0.55			0.45	

Intersection Summary

Area Type: Other
Cycle Length: 50
Actuated Cycle Length: 50
Offset: 16 (32%), Referenced to phase 2: and 6:WBTL, Start of Yellow
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.0 Intersection LOS: B
Intersection Capacity Utilization 80.2% ICU Level of Service D
Analysis Period (min) 15
Description: Nassau & River
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1069: Nassau & River



Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Lane Configurations												
Traffic Volume (vph)	540	2360	25	0	945	0	0	990	320	0	0	
Future Volume (vph)	540	2360	25	0	945	0	0	990	320	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)		230.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Storage Lanes		1	0	0		1	0		0	0	0	
Taper Length (m)		7.5		7.5			7.5			7.5		
Lane Util. Factor	1.00	*1.00	0.91	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	
Frt		0.998						0.962				
Flt Protected	0.950	0.953										
Satd. Flow (prot)	1601	5091	0	0	3390	0	0	3124	0	0	0	
Flt Permitted	0.950	0.953										
Satd. Flow (perm)	1601	5091	0	0	3390	0	0	3124	0	0	0	
Right Turn on Red			Yes			Yes			No			
Satd. Flow (RTOR)		73										
Link Speed (k/h)		60			50			50		60		
Link Distance (m)		277.5			33.4			213.8		111.1		
Travel Time (s)		16.7			2.4			15.4		6.7		
Peak Hour Factor	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	0.92	1.00	1.00	
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	
Adj. Flow (vph)	540	2360	25	0	1038	0	0	1042	348	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	540	2385	0	0	1038	0	0	1390	0	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	
Median Width(m)		14.8			0.0			0.0		0.0		
Link Offset(m)		0.0			0.0			0.0		0.0		
Crosswalk Width(m)		4.8			4.8			4.8		4.8		
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
Turning Speed (k/h)	24	24	60	24		14	24		60	24	14	
Turn Type	Perm	Prot			NA			NA				
Protected Phases		8			2			6				1
Permitted Phases	8				2			6				
Detector Phase	8	8			2			6				
Switch Phase												
Minimum Initial (s)	10.0	10.0			7.0			7.0				1.0
Minimum Split (s)	25.0	25.0			30.0			34.0				4.0
Total Split (s)	46.0	46.0			40.0			44.0				4.0
Total Split (%)	51.1%	51.1%			44.4%			48.9%				4%
Maximum Green (s)	40.0	40.0			34.0			38.0				1.0
Yellow Time (s)	4.0	4.0			4.0			4.0				3.0
All-Red Time (s)	2.0	2.0			2.0			2.0				0.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	6.0	6.0			6.0			6.0				
Lead/Lag					Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0			3.0				3.0
Recall Mode	C-Max	C-Max			Max			Max				Max

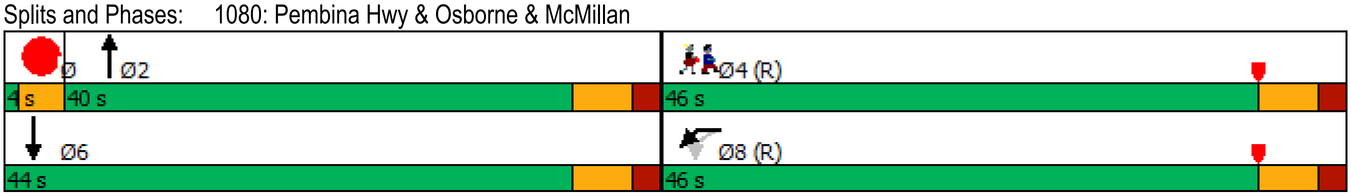
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	32.0
Total Split (s)	46.0
Total Split (%)	51%
Maximum Green (s)	40.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Walk Time (s)	7.0	7.0			7.0			7.0				
Flash Dont Walk (s)	12.0	12.0			17.0			21.0				
Pedestrian Calls (#/hr)	0	0			0			0				
Act Effct Green (s)	40.0	40.0			34.0			38.0				
Actuated g/C Ratio	0.44	0.44			0.38			0.42				
v/c Ratio	0.76	1.04			0.81			1.05				
Control Delay	29.4	53.9			29.6			56.6				
Queue Delay	57.3	26.8			18.6			19.2				
Total Delay	86.8	80.6			48.2			75.8				
LOS	F	F			D			E				
Approach Delay		81.8			48.2			75.8				
Approach LOS		F			D			E				
Queue Length 50th (m)	75.8	~147.0			94.2			~141.1				
Queue Length 95th (m)	116.8	#174.1			117.7			#176.7				
Internal Link Dist (m)		253.5			9.4			189.8		87.1		
Turn Bay Length (m)	230.0	230.0										
Base Capacity (vph)	711	2303			1280			1319				
Starvation Cap Reductn	0	0			261			0				
Spillback Cap Reductn	406	409			0			204				
Storage Cap Reductn	0	0			0			0				
Reduced v/c Ratio	1.77	1.26			1.02			1.25				

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 48 (53%), Referenced to phase 4:Ped and 8:WBL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 73.7 Intersection LOS: E
Intersection Capacity Utilization 97.6% ICU Level of Service F
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1080: Pembina Hwy & Osborne & McMillan



Lane Group	Ø4
Walk Time (s)	7.0
Flash Dont Walk (s)	19.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↑	↱					↑↑	↱		↑↑	
Traffic Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Future Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor			0.98						0.97			
Frt			0.850						0.850			
Flt Protected	0.950	0.998										
Satd. Flow (prot)	1543	3241	1517	0	0	0	0	3293	1517	0	3357	0
Flt Permitted	0.950	0.998										
Satd. Flow (perm)	1543	3241	1487	0	0	0	0	3293	1473	0	3357	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						67			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)			26						7			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.87	0.95	0.89	1.00	1.00	1.00	1.00	0.97	0.94	1.00	0.98	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	253	511	45	0	0	0	0	1397	931	0	2423	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	228	536	45	0	0	0	0	1397	931	0	2423	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						83.0	83.0		83.0	
Total Split (%)	30.8%	30.8%						69.2%	69.2%		69.2%	
Maximum Green (s)	31.0	31.0						78.0	78.0		78.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)	-1.5	-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)	4.5	4.5						3.5	3.5		3.5	
Lead/Lag												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	31%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)	27.4	27.4	120.0					84.6	84.6		84.6	
Actuated g/C Ratio	0.23	0.23	1.00					0.70	0.70		0.70	
v/c Ratio	0.65	0.73	0.03					0.60	0.88		1.02	
Control Delay	50.3	48.4	0.1					11.1	25.7		42.5	
Queue Delay	0.0	0.0	0.0					0.1	0.0		0.7	
Total Delay	50.3	48.4	0.1					11.2	25.7		43.2	
LOS	D	D	A					B	C		D	
Approach Delay		46.3						17.0			43.2	
Approach LOS		D						B			D	
Queue Length 50th (m)	53.8	64.5	0.0					79.1	143.1		~323.9	
Queue Length 95th (m)	75.4	80.0	0.0					114.0	#282.0		#377.8	
Internal Link Dist (m)		559.5			246.5			397.2			206.8	
Turn Bay Length (m)	45.0		30.0									
Base Capacity (vph)	417	877	1487					2321	1058		2366	
Starvation Cap Reductn	0	0	0					0	0		5	
Spillback Cap Reductn	0	0	0					143	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.55	0.61	0.03					0.64	0.88		1.03	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 87 (73%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 32.7 Intersection LOS: C
Intersection Capacity Utilization 97.2% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	50	45	10	70	45	0	855	50	0	1525	275
Future Volume (vph)	110	50	45	10	70	45	0	855	50	0	1525	275
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Frt		0.974			0.952			0.990			0.976	
Flt Protected		0.973			0.995							
Satd. Flow (prot)	0	1691	0	0	1690	0	0	3356	0	0	4754	0
Flt Permitted		0.675			0.955							
Satd. Flow (perm)	0	1173	0	0	1622	0	0	3356	0	0	4754	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			31			15			83	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		178.6			206.5			130.5			284.5	
Travel Time (s)		12.9			14.9			9.4			20.5	
Peak Hour Factor	0.76	0.72	0.88	0.55	0.70	0.68	0.50	0.93	0.75	0.50	0.95	0.88
Adj. Flow (vph)	145	69	51	18	100	66	0	919	67	0	1605	313
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	265	0	0	184	0	0	986	0	0	1918	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8			2			6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			10.0			10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0			32.0			32.0	
Total Split (s)	30.0	30.0		30.0	30.0			60.0			60.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%			66.7%			66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0			55.0			55.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0			1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Recall Mode	Ped	Ped		Ped	Ped			C-Max			C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			13.0			13.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		25.0			25.0			55.0			55.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.28			0.28			0.61			0.61	
v/c Ratio		0.79			0.39			0.48			0.65	
Control Delay		47.5			24.6			24.8			4.8	
Queue Delay		0.0			0.0			0.1			0.0	
Total Delay		47.5			24.6			24.9			4.8	
LOS		D			C			C			A	
Approach Delay		47.5			24.6			24.9			4.8	
Approach LOS		D			C			C			A	
Queue Length 50th (m)		40.4			21.1			74.7			14.9	
Queue Length 95th (m)		50.6			28.1			87.1			16.8	
Internal Link Dist (m)		154.6			182.5			106.5			260.5	
Turn Bay Length (m)												
Base Capacity (vph)		335			472			2056			2937	
Starvation Cap Reductn		0			0			138			0	
Spillback Cap Reductn		0			0			0			31	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.79			0.39			0.51			0.66	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 58 (64%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 15.2 Intersection LOS: B
Intersection Capacity Utilization 64.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1243: Osborne & Roslyn

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	705	55	0	895	0	0	1145	375
Future Volume (vph)	0	0	0	100	705	55	0	895	0	0	1145	375
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.98		0.86						0.90
Frt						0.850						0.850
Flt Protected				0.950								
Satd. Flow (prot)	0	0	0	1695	3390	1517	0	3390	0	0	3136	1403
Flt Permitted				0.950								
Satd. Flow (perm)	0	0	0	1664	3390	1303	0	3390	0	0	3136	1256
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)												61
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			693.6			192.4			130.5	
Travel Time (s)		15.6			49.9			13.9			9.4	
Confl. Peds. (#/hr)				17		122						49
Peak Hour Factor	1.00	1.00	1.00	0.75	0.92	0.68	0.69	0.82	1.00	1.00	0.98	0.89
Adj. Flow (vph)	0	0	0	133	766	81	0	1091	0	0	1168	421
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	133	766	81	0	1091	0	0	1168	421
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm		NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8		8						6
Detector Phase				8	8	8		2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0		10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0		24.0			19.0	19.0
Total Split (s)				30.0	30.0	30.0		56.0			56.0	56.0
Total Split (%)				33.3%	33.3%	33.3%		62.2%			62.2%	62.2%
Maximum Green (s)				25.0	25.0	25.0		51.0			51.0	51.0
Yellow Time (s)				4.0	4.0	4.0		4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0		1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)				5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	4%
Maximum Green (s)	1.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped		C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0		12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)				25.0	25.0	25.0		55.0			55.0	55.0
Actuated g/C Ratio				0.28	0.28	0.28		0.61			0.61	0.61
v/c Ratio				0.29	0.81	0.22		0.53			0.61	0.53
Control Delay				27.6	38.6	27.1		2.2			4.6	3.4
Queue Delay				0.0	0.0	0.0		0.0			0.4	0.6
Total Delay				27.6	38.6	27.1		2.2			5.1	4.0
LOS				C	D	C		A			A	A
Approach Delay					36.2			2.2			4.8	
Approach LOS					D			A			A	
Queue Length 50th (m)				18.0	64.8	10.8		8.6			18.1	0.7
Queue Length 95th (m)				26.7	#87.4	16.3		14.1			21.7	m1.5
Internal Link Dist (m)		193.0			669.6			168.4			106.5	
Turn Bay Length (m)				30.0		30.0						
Base Capacity (vph)				462	941	361		2071			1916	791
Starvation Cap Reductn				0	0	0		0			307	120
Spillback Cap Reductn				0	0	0		0			0	0
Storage Cap Reductn				0	0	0		0			0	0
Reduced v/c Ratio				0.29	0.81	0.22		0.53			0.73	0.63

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 75 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 12.4 Intersection LOS: B
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1286: Osborne & River

Lane Group	Ø5
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

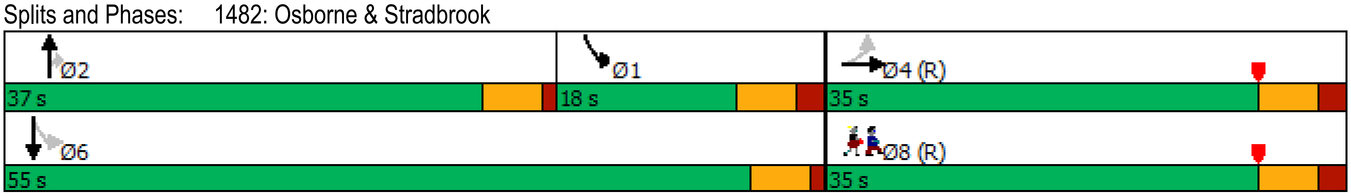
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Future Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.94	0.99							0.81	0.97		
Frt		0.977							0.850			
Flt Protected	0.950	0.999								0.950		
Satd. Flow (prot)	1388	3142	0	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.999								0.158		
Satd. Flow (perm)	1306	3139	0	0	0	0	0	3390	1228	275	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		23							109			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	64		49						128	128		
Peak Hour Factor	0.76	0.87	0.85	1.00	1.00	1.00	1.00	0.84	0.83	0.76	0.92	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	105	603	112	0	0	0	0	964	120	237	1201	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	94	726	0	0	0	0	0	964	120	237	1201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6	6	
Minimum Split (s)	35.0	35.0						24.0	24.0	11.0	23.0	
Total Split (s)	35.0	35.0						37.0	37.0	18.0	55.0	
Total Split (%)	38.9%	38.9%						41.1%	41.1%	20.0%	61.1%	
Maximum Green (s)	29.0	29.0						32.0	32.0	12.0	50.0	
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0						12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0						0	0		0	

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Minimum Split (s)	33.0
Total Split (s)	35.0
Total Split (%)	39%
Maximum Green (s)	29.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	29.0	29.0						32.0	32.0	49.0	50.0	
Actuated g/C Ratio	0.32	0.32						0.36	0.36	0.54	0.56	
v/c Ratio	0.22	0.71						0.80	0.24	0.70	0.64	
Control Delay	24.1	30.4						37.3	12.2	26.7	5.3	
Queue Delay	0.0	0.0						4.3	0.0	0.0	0.0	
Total Delay	24.1	30.4						41.6	12.2	26.7	5.3	
LOS	C	C						D	B	C	A	
Approach Delay		29.6						38.3			8.8	
Approach LOS		C						D			A	
Queue Length 50th (m)	12.9	58.1						92.8	11.4	19.1	17.3	
Queue Length 95th (m)	21.3	75.1						105.0	11.9	30.7	20.2	
Internal Link Dist (m)		117.2			559.5			82.7			168.4	
Turn Bay Length (m)	55.0								40.0	25.0		
Base Capacity (vph)	420	1027						1205	506	339	1883	
Starvation Cap Reductn	0	0						172	0	0	0	
Spillback Cap Reductn	0	0						0	0	0	0	
Storage Cap Reductn	0	0						0	0	0	0	
Reduced v/c Ratio	0.22	0.71						0.93	0.24	0.70	0.64	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 25 (28%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 72.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	65	3	890	540	10	0	0	0
Future Volume (vph)	0	0	0	0	65	3	890	540	10	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.95	1.00	1.00	1.00
Frt					0.991			0.998				
Flt Protected							0.950	0.978				
Satd. Flow (prot)	0	0	0	0	1768	0	1543	3170	0	0	0	0
Flt Permitted							0.950	0.978				
Satd. Flow (perm)	0	0	0	0	1768	0	1543	3170	0	0	0	0
Right Turn on Red			Yes			Yes	Yes		Yes			Yes
Satd. Flow (RTOR)					3		469	472				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		39.2			165.6			157.8			133.2	
Travel Time (s)		2.8			11.9			11.4			9.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	0.58	0.38	0.89	0.96	0.67	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	112	8	1000	563	15	0	0	0
Shared Lane Traffic (%)							48%					
Lane Group Flow (vph)	0	0	0	0	120	0	520	1058	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			3.7			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type					NA		Prot	NA				
Protected Phases					8		6	2				
Permitted Phases												
Detector Phase					8		6	2				
Switch Phase												
Minimum Initial (s)					7.0		10.0	10.0				
Minimum Split (s)					24.0		16.0	22.0				
Total Split (s)					24.0		96.0	96.0				
Total Split (%)					20.0%		80.0%	80.0%				
Maximum Green (s)					19.0		90.0	90.0				
Yellow Time (s)					4.0		4.0	4.0				
All-Red Time (s)					1.0		2.0	2.0				
Lost Time Adjust (s)					-1.5		-1.5	-1.5				
Total Lost Time (s)					3.5		4.5	4.5				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0		3.0	3.0				
Recall Mode					None		C-Max	C-Max				
Walk Time (s)					7.0			7.0				
Flash Dont Walk (s)					12.0			9.0				
Pedestrian Calls (#/hr)					0			0				
Act Effct Green (s)					14.7		97.3	97.3				

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	24.0
Total Split (%)	20%
Maximum Green (s)	19.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio					0.12		0.81	0.81				
v/c Ratio					0.55		0.39	0.40				
Control Delay					56.9		1.1	1.3				
Queue Delay					0.0		0.5	0.3				
Total Delay					56.9		1.7	1.6				
LOS					E		A	A				
Approach Delay					56.9			1.6				
Approach LOS					E			A				
Queue Length 50th (m)					26.3		0.0	0.0				
Queue Length 95th (m)					26.5		19.5	28.9				
Internal Link Dist (m)		15.2			141.6			133.8			109.2	
Turn Bay Length (m)												
Base Capacity (vph)					304		1339	2659				
Starvation Cap Reductn					0		424	888				
Spillback Cap Reductn					0		8	18				
Storage Cap Reductn					0		0	0				
Reduced v/c Ratio					0.39		0.57	0.60				

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 2:NBT and 6:NBL, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 5.5 Intersection LOS: A
Intersection Capacity Utilization 41.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1838: Harkness & River

Lane Group	Ø4
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	15	45	30	40	55	1	1945	30	1	950	50
Future Volume (vph)	235	15	45	30	40	55	1	1945	30	1	950	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.91	0.91	0.91
Frt		0.979			0.934			0.997			0.992	
Flt Protected		0.963			0.990							
Satd. Flow (prot)	0	1682	0	0	1650	0	0	3380	0	0	4832	0
Flt Permitted		0.617			0.901			0.953			0.876	
Satd. Flow (perm)	0	1078	0	0	1502	0	0	3221	0	0	4233	0
Right Turn on Red			Yes			Yes			No			No
Satd. Flow (RTOR)		7			25							
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		178.6			206.5			130.5			284.5	
Travel Time (s)		12.9			14.9			9.4			20.5	
Peak Hour Factor	0.87	0.63	0.82	0.91	0.81	0.70	0.25	0.93	0.73	0.25	0.97	0.94
Adj. Flow (vph)	270	24	55	33	49	79	4	2091	41	4	979	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	349	0	0	161	0	0	2136	0	0	1036	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0		10.0	10.0	

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	37.0	37.0		37.0	37.0		32.0	32.0		32.0	32.0	
Total Split (s)	37.0	37.0		37.0	37.0		84.0	84.0		84.0	84.0	
Total Split (%)	29.4%	29.4%		29.4%	29.4%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	32.0	32.0		32.0	32.0		79.0	79.0		79.0	79.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag	Lag	Lag		Lag	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Ped	Ped		Ped	Ped		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		37.0			37.0			79.0			79.0	
Actuated g/C Ratio		0.29			0.29			0.63			0.63	
v/c Ratio		1.09			0.35			1.06			0.39	
Control Delay		117.0			32.0			45.6			11.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		117.0			32.0			45.6			11.9	
LOS		F			C			D			B	
Approach Delay		117.0			32.0			45.6			11.9	
Approach LOS		F			C			D			B	
90th %ile Green (s)	37.0	37.0		37.0	37.0		79.0	79.0		79.0	79.0	
90th %ile Term Code	Max	Max		Hold	Hold		Coord	Coord		Coord	Coord	
70th %ile Green (s)	37.0	37.0		37.0	37.0		79.0	79.0		79.0	79.0	
70th %ile Term Code	Max	Max		Hold	Hold		Coord	Coord		Coord	Coord	
50th %ile Green (s)	37.0	37.0		37.0	37.0		79.0	79.0		79.0	79.0	
50th %ile Term Code	Max	Max		Hold	Hold		Coord	Coord		Coord	Coord	
30th %ile Green (s)	37.0	37.0		37.0	37.0		79.0	79.0		79.0	79.0	
30th %ile Term Code	Max	Max		Hold	Hold		Coord	Coord		Coord	Coord	
10th %ile Green (s)	37.0	37.0		37.0	37.0		79.0	79.0		79.0	79.0	
10th %ile Term Code	Max	Max		Hold	Hold		Coord	Coord		Coord	Coord	
Stops (vph)		240			82			1735			436	
Fuel Used(l)		37			7			133			46	
CO Emissions (g/hr)		687			137			2469			854	
NOx Emissions (g/hr)		133			26			477			165	
VOC Emissions (g/hr)		158			32			570			197	
Dilemma Vehicles (#)		0			0			0			0	
Queue Length 50th (m)		~95.9			26.4			~314.5			43.5	
Queue Length 95th (m)		#79.5			39.9			#344.0			44.7	
Internal Link Dist (m)		154.6			182.5			106.5			260.5	
Turn Bay Length (m)												
Base Capacity (vph)		321			458			2019			2654	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.09			0.35			1.06			0.39	

Lane Group	Ø3	Ø7
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Maximum Green (s)	1.0	1.0
Yellow Time (s)	4.0	4.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	0.0	0.0
90th %ile Term Code	Skip	Skip
70th %ile Green (s)	0.0	0.0
70th %ile Term Code	Skip	Skip
50th %ile Green (s)	0.0	0.0
50th %ile Term Code	Skip	Skip
30th %ile Green (s)	0.0	0.0
30th %ile Term Code	Skip	Skip
10th %ile Green (s)	0.0	0.0
10th %ile Term Code	Skip	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary	
Area Type: Other	
Cycle Length: 126	
Actuated Cycle Length: 126	
Offset: 117 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 42.3	Intersection LOS: D
Intersection Capacity Utilization 91.0%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1243: Osborne & Roslyn

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	50	45	10	70	45	0	855	50	0	1525	275
Future Volume (vph)	110	50	45	10	70	45	0	855	50	0	1525	275
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Frt		0.974			0.952			0.990			0.976	
Flt Protected		0.973			0.995							
Satd. Flow (prot)	0	1691	0	0	1690	0	0	3356	0	0	4754	0
Flt Permitted		0.675			0.955							
Satd. Flow (perm)	0	1173	0	0	1622	0	0	3356	0	0	4754	0
Right Turn on Red			Yes			Yes			No			No
Satd. Flow (RTOR)		12			29							
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		178.6			206.5			130.5			284.5	
Travel Time (s)		12.9			14.9			9.4			20.5	
Peak Hour Factor	0.76	0.72	0.88	0.55	0.70	0.68	0.50	0.93	0.75	0.50	0.95	0.88
Adj. Flow (vph)	145	69	51	18	100	66	0	919	67	0	1605	313
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	265	0	0	184	0	0	986	0	0	1918	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2			2			2	
Detector Template	Left	Thru		Left	Thru			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0			10.0			10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0			0.0			0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0			0.0			0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6			0.6			0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8			2			6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			10.0			10.0	

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	25.0	25.0		25.0	25.0			32.0			32.0	
Total Split (s)	25.0	25.0		25.0	25.0			60.0			60.0	
Total Split (%)	27.8%	27.8%		27.8%	27.8%			66.7%			66.7%	
Maximum Green (s)	20.0	20.0		20.0	20.0			55.0			55.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0			1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag	Lag	Lag		Lag	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Recall Mode	Ped	Ped		Ped	Ped			C-Max			C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0			13.0			13.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		25.0			25.0			55.0			55.0	
Actuated g/C Ratio		0.28			0.28			0.61			0.61	
v/c Ratio		0.79			0.39			0.48			0.66	
Control Delay		47.9			24.9			25.0			5.2	
Queue Delay		0.0			0.0			0.1			0.0	
Total Delay		47.9			24.9			25.1			5.2	
LOS		D			C			C			A	
Approach Delay		47.9			24.9			25.1			5.2	
Approach LOS		D			C			C			A	
90th %ile Green (s)	25.0	25.0		25.0	25.0			55.0			55.0	
90th %ile Term Code	Max	Max		Hold	Hold			Coord			Coord	
70th %ile Green (s)	25.0	25.0		25.0	25.0			55.0			55.0	
70th %ile Term Code	Max	Max		Hold	Hold			Coord			Coord	
50th %ile Green (s)	25.0	25.0		25.0	25.0			55.0			55.0	
50th %ile Term Code	Max	Max		Hold	Hold			Coord			Coord	
30th %ile Green (s)	25.0	25.0		25.0	25.0			55.0			55.0	
30th %ile Term Code	Max	Max		Hold	Hold			Coord			Coord	
10th %ile Green (s)	25.0	25.0		25.0	25.0			55.0			55.0	
10th %ile Term Code	Max	Max		Hold	Hold			Coord			Coord	
Stops (vph)		169			83			672			279	
Fuel Used(l)		15			7			44			62	
CO Emissions (g/hr)		276			125			813			1155	
NOx Emissions (g/hr)		53			24			157			223	
VOC Emissions (g/hr)		64			29			188			266	
Dilemma Vehicles (#)		0			0			0			0	
Queue Length 50th (m)		40.6			21.4			74.0			17.0	
Queue Length 95th (m)		50.8			28.4			87.1			19.0	
Internal Link Dist (m)		154.6			182.5			106.5			260.5	
Turn Bay Length (m)												
Base Capacity (vph)		334			471			2050			2905	
Starvation Cap Reductn		0			0			132			0	
Spillback Cap Reductn		0			0			0			32	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.79			0.39			0.51			0.67	

Lane Group	Ø3	Ø7
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	6%	6%
Maximum Green (s)	2.0	2.0
Yellow Time (s)	3.0	3.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	0.0	0.0
90th %ile Term Code	Skip	Skip
70th %ile Green (s)	0.0	0.0
70th %ile Term Code	Skip	Skip
50th %ile Green (s)	0.0	0.0
50th %ile Term Code	Skip	Skip
30th %ile Green (s)	0.0	0.0
30th %ile Term Code	Skip	Skip
10th %ile Green (s)	0.0	0.0
10th %ile Term Code	Skip	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 58 (64%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 64.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1243: Osborne & Roslyn

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	845	420	45	0	2330	0	0	780	100
Future Volume (vph)	0	0	0	845	420	45	0	2330	0	0	780	100
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	0.99							0.96
Frt					0.989							0.850
Flt Protected				0.950	0.978							
Satd. Flow (prot)	0	0	0	1513	3106	0	0	3293	0	0	3357	1517
Flt Permitted				0.950	0.978							
Satd. Flow (perm)	0	0	0	*3600	3097	0	0	3293	0	0	3357	1454
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5							117
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		747.5			141.2			230.8			367.3	
Travel Time (s)		53.8			10.2			13.8			26.4	
Confl. Peds. (#/hr)				6		20						19
Peak Hour Factor	1.00	1.00	1.00	0.93	0.93	0.64	1.00	0.97	1.00	1.00	0.89	0.64
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	909	452	70	0	2402	0	0	876	156
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	0	0	473	958	0	0	2402	0	0	876	156
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2			2			2	1
Detector Template				Left	Thru			Thru			Thru	Right
Leading Detector (m)				2.0	10.0			10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6			0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0			0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				41.0	41.0			30.0			28.0	28.0
Total Split (s)				41.0	41.0			79.0			79.0	79.0
Total Split (%)				34.2%	34.2%			65.8%			65.8%	65.8%
Maximum Green (s)				35.0	35.0			74.0			74.0	74.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				10.0	10.0			7.0			7.0	7.0
Flash Dont Walk (s)				25.0	25.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				35.0	35.0			74.0			74.0	74.0
Actuated g/C Ratio				0.29	0.29			0.62			0.62	0.62
v/c Ratio				0.45	1.06			1.18			0.42	0.17
Control Delay				34.3	85.1			102.3			12.7	3.4
Queue Delay				4.3	0.9			0.0			0.0	0.0
Total Delay				38.6	86.0			102.3			12.7	3.4
LOS				D	F			F			B	A
Approach Delay					70.3			102.3			11.3	
Approach LOS					E			F			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 29 (24%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 73.6	Intersection LOS: E
Intersection Capacity Utilization 105.0%	ICU Level of Service G
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 1002: Donald & River

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Future Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00	0.98						0.98			
Frt			0.850						0.850			
Flt Protected		0.980										
Satd. Flow (prot)	0	3322	1517	0	0	0	0	3293	1517	0	3293	0
Flt Permitted		0.980										
Satd. Flow (perm)	0	3308	1491	0	0	0	0	3293	1480	0	3293	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						74			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)	9		17						4			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.82	0.90	0.66	1.00	1.00	1.00	1.00	0.96	0.91	1.00	0.94	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%
Adj. Flow (vph)	354	511	30	0	0	0	0	2104	978	0	1527	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	865	30	0	0	0	0	2104	978	0	1527	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						83.0	83.0		83.0	
Total Split (%)	30.8%	30.8%						69.2%	69.2%		69.2%	
Maximum Green (s)	31.0	31.0						78.0	78.0		78.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)		-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)		4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)		32.5	120.0					79.5	79.5		79.5	
Actuated g/C Ratio		0.27	1.00					0.66	0.66		0.66	
v/c Ratio		0.97	0.02					0.96	0.97		0.70	
Control Delay		66.5	0.0					32.2	41.5		20.5	
Queue Delay		0.0	0.0					43.1	0.0		0.2	
Total Delay		66.5	0.0					75.3	41.5		20.7	
LOS		E	A					E	D		C	
Approach Delay		64.3						64.6			20.7	
Approach LOS		E						E			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 28 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 52.4	Intersection LOS: D
Intersection Capacity Utilization 105.0%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Detector 2 Extend (s)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	31%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	80	400	65	0	1820	0	0	925	135
Future Volume (vph)	0	0	0	80	400	65	0	1820	0	0	925	135
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor					1.00	0.81						0.86
Frt						0.850						0.850
Flt Protected					0.991							
Satd. Flow (prot)	0	0	0	0	3360	1517	0	3390	0	0	3136	1403
Flt Permitted					0.991							
Satd. Flow (perm)	0	0	0	0	3344	1224	0	3390	0	0	3136	1204
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)												51
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			747.5			192.4			130.5	
Travel Time (s)		15.6			53.8			13.9			9.4	
Confl. Peds. (#/hr)				17		122						49
Peak Hour Factor	1.00	1.00	1.00	0.85	0.92	0.95	0.33	0.88	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	94	435	68	0	2068	0	0	1005	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	529	68	0	2068	0	0	1005	167
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2	1		2			2	1
Detector Template				Left	Thru	Right		Thru			Thru	Right
Leading Detector (m)				2.0	10.0	2.0		10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6	2.0		0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA	Perm		NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8		8						6
Detector Phase				8	8	8		2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0		10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0		24.0			19.0	19.0
Total Split (s)				30.0	30.0	30.0		92.0			92.0	92.0
Total Split (%)				23.8%	23.8%	23.8%		73.0%			73.0%	73.0%
Maximum Green (s)				25.0	25.0	25.0		87.0			87.0	87.0
Yellow Time (s)				4.0	4.0	4.0		4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0		1.0			1.0	1.0
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped		C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0		12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)					25.0	25.0		91.0			91.0	91.0
Actuated g/C Ratio					0.20	0.20		0.72			0.72	0.72
v/c Ratio					0.80	0.28		0.84			0.44	0.19
Control Delay					58.2	46.6		7.1			5.3	2.7
Queue Delay					0.0	0.0		0.2			0.0	0.0
Total Delay					58.2	46.6		7.3			5.4	2.7
LOS					E	D		A			A	A
Approach Delay					56.9			7.3			5.0	
Approach LOS					E			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 126

Actuated Cycle Length: 126

Offset: 105 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 14.3 Intersection LOS: B

Intersection Capacity Utilization 86.2% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1286: Osborne & River

Lane Group	Ø5
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	3%
Maximum Green (s)	1.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	0.2
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

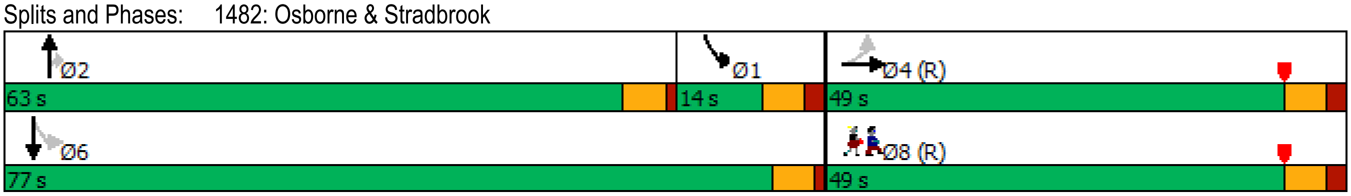
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	785	70	0	0	0	0	1420	95	110	870	0
Future Volume (vph)	330	785	70	0	0	0	0	1420	95	110	870	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.97	0.99							0.90			
Frt		0.989							0.850			
Flt Protected	0.950	0.998								0.950		
Satd. Flow (prot)	1388	3188	0	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.998								0.062		
Satd. Flow (perm)	1348	3185	0	0	0	0	0	3390	1368	111	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7							78			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	22		46						44	44		
Peak Hour Factor	0.81	0.88	0.93	1.00	1.00	1.00	1.00	0.96	0.81	0.77	0.95	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	407	892	75	0	0	0	0	1479	117	143	916	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	366	1008	0	0	0	0	0	1479	117	143	916	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6	6	
Minimum Split (s)	35.0	35.0						24.0	24.0	11.0	23.0	
Total Split (s)	49.0	49.0						63.0	63.0	14.0	77.0	
Total Split (%)	38.9%	38.9%						50.0%	50.0%	11.1%	61.1%	
Maximum Green (s)	43.0	43.0						58.0	58.0	8.0	72.0	
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0						12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0						0	0		0	

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Minimum Split (s)	33.0
Total Split (s)	49.0
Total Split (%)	39%
Maximum Green (s)	43.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	43.0	43.0						58.0	58.0	71.0	72.0	
Actuated g/C Ratio	0.34	0.34						0.46	0.46	0.56	0.57	
v/c Ratio	0.80	0.92						0.95	0.17	0.88	0.47	
Control Delay	51.9	54.2						28.5	5.2	76.2	10.0	
Queue Delay	0.0	0.0						37.6	0.0	0.0	0.0	
Total Delay	51.9	54.2						66.2	5.2	76.2	10.0	
LOS	D	D						E	A	E	A	
Approach Delay		53.6						61.7			18.9	
Approach LOS		D						E			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 126	
Actuated Cycle Length: 126	
Offset: 25 (20%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow	
Natural Cycle: 90	
Control Type: Pretimed	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 47.7	Intersection LOS: D
Intersection Capacity Utilization 86.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

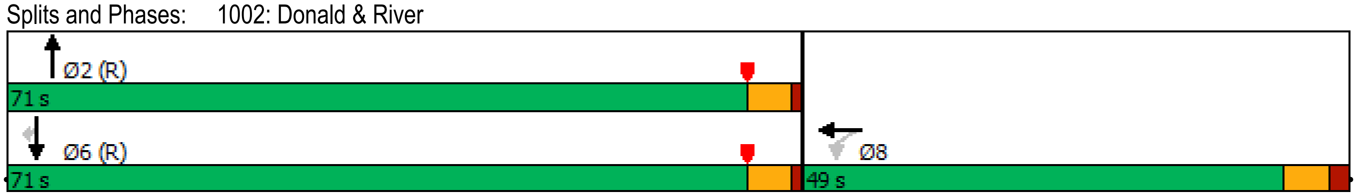
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	865	620	15	0	1535	0	0	1440	285
Future Volume (vph)	0	0	0	865	620	15	0	1535	0	0	1440	285
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	0.95	1.00	*1.00	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	1.00							0.96
Frt					0.997							0.850
Flt Protected				0.950	0.985							
Satd. Flow (prot)	0	0	0	1662	3480	0	0	3467	0	0	3357	1517
Flt Permitted				0.950	0.985							
Satd. Flow (perm)	0	0	0	*3600	3469	0	0	3467	0	0	3357	1452
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					2							49
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		747.5			141.2			230.8			367.3	
Travel Time (s)		53.8			10.2			13.8			26.4	
Confl. Peds. (#/hr)				10		35						20
Peak Hour Factor	1.00	1.00	1.00	0.96	0.82	0.65	1.00	0.88	1.00	1.00	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	901	756	23	0	1744	0	0	1500	297
Shared Lane Traffic (%)				39%								
Lane Group Flow (vph)	0	0	0	550	1130	0	0	1744	0	0	1500	297
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2			2			2	1
Detector Template				Left	Thru			Thru			Thru	Right
Leading Detector (m)				2.0	10.0			10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6			0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0			0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				41.0	41.0			30.0			28.0	28.0
Total Split (s)				49.0	49.0			71.0			71.0	71.0
Total Split (%)				40.8%	40.8%			59.2%			59.2%	59.2%
Maximum Green (s)				43.0	43.0			66.0			66.0	66.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				10.0	10.0			7.0			7.0	7.0
Flash Dont Walk (s)				25.0	25.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				42.3	42.3			66.7			66.7	66.7
Actuated g/C Ratio				0.35	0.35			0.56			0.56	0.56
v/c Ratio				0.43	0.92			0.91			0.80	0.36
Control Delay				35.1	54.6			24.8			25.9	13.7
Queue Delay				5.7	37.8			0.1			32.0	0.0
Total Delay				40.8	92.4			24.9			57.9	13.7
LOS				D	F			C			E	B
Approach Delay					75.5			24.9			50.6	
Approach LOS					E			C			D	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 50.0 Intersection LOS: D
Intersection Capacity Utilization 100.1% ICU Level of Service G
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1002: Donald & River



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Future Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor			0.98						0.97			
Frt			0.850						0.850			
Flt Protected		0.984										
Satd. Flow (prot)	0	3336	1517	0	0	0	0	3293	1517	0	3357	0
Flt Permitted		0.984										
Satd. Flow (perm)	0	3336	1487	0	0	0	0	3293	1473	0	3357	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						67			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)			26						7			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.87	0.95	0.89	1.00	1.00	1.00	1.00	0.97	0.94	1.00	0.98	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	253	511	45	0	0	0	0	1397	931	0	2423	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	764	45	0	0	0	0	1397	931	0	2423	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						83.0	83.0		83.0	
Total Split (%)	30.8%	30.8%						69.2%	69.2%		69.2%	
Maximum Green (s)	31.0	31.0						78.0	78.0		78.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)		-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)		4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)		31.5	120.0					80.5	80.5		80.5	
Actuated g/C Ratio		0.26	1.00					0.67	0.67		0.67	
v/c Ratio		0.87	0.03					0.63	0.92		1.08	
Control Delay		54.2	0.1					13.1	32.3		60.5	
Queue Delay		0.0	0.0					0.1	0.0		1.0	
Total Delay		54.2	0.1					13.2	32.3		61.5	
LOS		D	A					B	C		E	
Approach Delay		51.2						20.8			61.5	
Approach LOS		D						C			E	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 87 (73%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 43.0	Intersection LOS: D
Intersection Capacity Utilization 100.1%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Detector 2 Extend (s)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	31%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

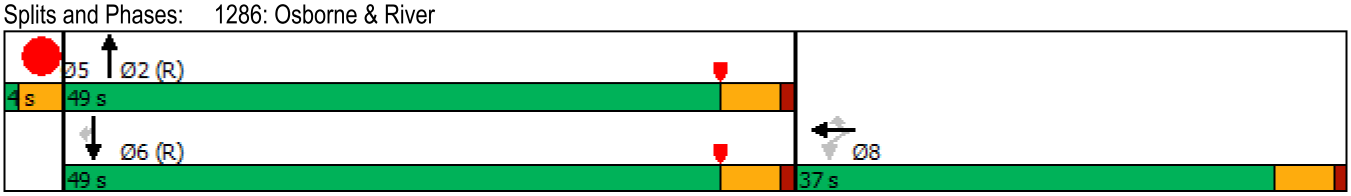
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑	↱		↑↑			↑↑	↱
Traffic Volume (vph)	0	0	0	100	705	55	0	895	0	0	1145	375
Future Volume (vph)	0	0	0	100	705	55	0	895	0	0	1145	375
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor					1.00	0.86						0.90
Frt						0.850						0.850
Flt Protected					0.993							
Satd. Flow (prot)	0	0	0	0	3366	1517	0	3390	0	0	3136	1403
Flt Permitted					0.993							
Satd. Flow (perm)	0	0	0	0	3357	1303	0	3390	0	0	3136	1256
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)												61
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			747.5			192.4			130.5	
Travel Time (s)		15.6			53.8			13.9			9.4	
Confl. Peds. (#/hr)				17		122						49
Peak Hour Factor	1.00	1.00	1.00	0.75	0.92	0.68	0.69	0.82	1.00	1.00	0.98	0.89
Adj. Flow (vph)	0	0	0	133	766	81	0	1091	0	0	1168	421
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	899	81	0	1091	0	0	1168	421
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2	1		2			2	1
Detector Template				Left	Thru	Right		Thru			Thru	Right
Leading Detector (m)				2.0	10.0	2.0		10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6	2.0		0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA	Perm		NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8		8						6
Detector Phase				8	8	8		2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0		10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0		24.0			19.0	19.0
Total Split (s)				37.0	37.0	37.0		49.0			49.0	49.0
Total Split (%)				41.1%	41.1%	41.1%		54.4%			54.4%	54.4%
Maximum Green (s)				32.0	32.0	32.0		44.0			44.0	44.0
Yellow Time (s)				4.0	4.0	4.0		4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0		1.0			1.0	1.0
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped		C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0		12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)					29.4	29.4		50.6			50.6	50.6
Actuated g/C Ratio					0.33	0.33		0.56			0.56	0.56
v/c Ratio					0.82	0.19		0.57			0.66	0.57
Control Delay					34.7	22.2		2.8			4.1	3.4
Queue Delay					0.0	0.0		0.0			0.1	0.1
Total Delay					34.7	22.2		2.8			4.2	3.5
LOS					C	C		A			A	A
Approach Delay					33.7			2.8			4.0	
Approach LOS					C			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 70 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 72.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1286: Osborne & River



Lane Group	Ø5
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	4%
Maximum Green (s)	1.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Future Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.94	0.99							0.81	0.98		
Frt		0.977							0.850			
Flt Protected	0.950	0.999								0.950		
Satd. Flow (prot)	1388	3142	0	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.999								0.151		
Satd. Flow (perm)	1306	3139	0	0	0	0	0	3390	1228	263	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		23							109			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	64		49						128	128		
Peak Hour Factor	0.76	0.87	0.85	1.00	1.00	1.00	1.00	0.84	0.83	0.76	0.92	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	105	603	112	0	0	0	0	964	120	237	1201	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	94	726	0	0	0	0	0	964	120	237	1201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6	6	
Minimum Split (s)	35.0	35.0						24.0	24.0	11.0	23.0	
Total Split (s)	36.0	36.0						36.0	36.0	18.0	54.0	
Total Split (%)	40.0%	40.0%						40.0%	40.0%	20.0%	60.0%	
Maximum Green (s)	30.0	30.0						31.0	31.0	12.0	49.0	
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0						12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0						0	0		0	

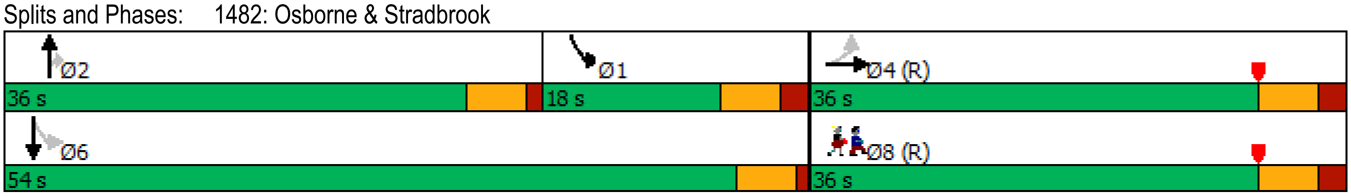
Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Minimum Split (s)	33.0
Total Split (s)	36.0
Total Split (%)	40%
Maximum Green (s)	30.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	30.0	30.0						31.0	31.0	48.0	49.0	
Actuated g/C Ratio	0.33	0.33						0.34	0.34	0.53	0.54	
v/c Ratio	0.22	0.68						0.83	0.24	0.72	0.65	
Control Delay	23.3	29.0						30.0	8.4	27.5	9.1	
Queue Delay	0.0	0.0						5.9	0.0	0.0	0.0	
Total Delay	23.3	29.0						35.9	8.4	27.5	9.1	
LOS	C	C						D	A	C	A	
Approach Delay		28.3						32.9			12.2	
Approach LOS		C						C			B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 14 (16%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 22.8 Intersection LOS: C
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	80	400	65	0	1820	0	0	925	135
Future Volume (vph)	0	0	0	80	400	65	0	1820	0	0	925	135
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor					0.99	0.77						0.86
Frt						0.850						0.850
Flt Protected					0.991							
Satd. Flow (prot)	0	0	0	0	3360	1517	0	3390	0	0	3136	1403
Flt Permitted					0.991							
Satd. Flow (perm)	0	0	0	0	3341	1172	0	3390	0	0	3136	1204
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						69						135
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			747.5			192.4			130.5	
Travel Time (s)		15.6			53.8			13.9			9.4	
Confl. Peds. (#/hr)				17		122						49
Peak Hour Factor	1.00	1.00	1.00	0.85	0.92	0.95	0.33	0.88	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	94	435	68	0	2068	0	0	1005	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	529	68	0	2068	0	0	1005	167
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2	1		2			2	1
Detector Template				Left	Thru	Right		Thru			Thru	Right
Leading Detector (m)				2.0	10.0	2.0		10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6	2.0		0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA	Perm		NA			NA	Perm
Protected Phases					11			2			6	
Permitted Phases				11		11						6
Detector Phase				11	11	11		2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0		10.0			10.0	10.0
Minimum Split (s)				26.0	26.0	26.0		24.0			19.0	19.0
Total Split (s)				27.0	27.0	27.0		90.0			90.0	90.0
Total Split (%)				21.4%	21.4%	21.4%		71.4%			71.4%	71.4%
Maximum Green (s)				22.0	22.0	22.0		85.0			85.0	85.0
Yellow Time (s)				4.0	4.0	4.0		4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0		1.0			1.0	1.0
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped		C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0	14.0		12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)					25.0	25.0		91.0			91.0	91.0
Actuated g/C Ratio					0.20	0.20		0.72			0.72	0.72
v/c Ratio					0.80	0.24		0.85			0.44	0.18
Control Delay					57.7	11.2		10.0			5.3	0.9
Queue Delay					0.0	0.0		7.5			0.0	0.0
Total Delay					57.7	11.3		17.5			5.4	0.9
LOS					E	B		B			A	A
Approach Delay					52.4			17.5			4.7	
Approach LOS					D			B			A	
90th %ile Green (s)				27.0	27.0	27.0		89.0			89.0	89.0
90th %ile Term Code				Max	Max	Max		Coord			Coord	Coord
70th %ile Green (s)				27.0	27.0	27.0		89.0			89.0	89.0
70th %ile Term Code				Max	Max	Max		Coord			Coord	Coord
50th %ile Green (s)				26.3	26.3	26.3		89.7			89.7	89.7
50th %ile Term Code				Gap	Gap	Gap		Coord			Coord	Coord
30th %ile Green (s)				23.9	23.9	23.9		92.1			92.1	92.1
30th %ile Term Code				Gap	Gap	Gap		Coord			Coord	Coord
10th %ile Green (s)				21.0	21.0	21.0		95.0			95.0	95.0
10th %ile Term Code				Ped	Ped	Ped		Coord			Coord	Coord
Stops (vph)					448	11		1153			215	2
Fuel Used(l)					65	5		73			20	2
CO Emissions (g/hr)					1217	101		1360			374	34
NOx Emissions (g/hr)					235	19		263			72	6
VOC Emissions (g/hr)					281	23		314			86	8
Dilemma Vehicles (#)					0	0		0			0	0
Queue Length 50th (m)					65.4	0.0		66.7			24.5	0.4
Queue Length 95th (m)					84.6	12.0		70.4			m28.7	m1.5
Internal Link Dist (m)		193.0			723.5			168.4			106.5	

Lane Group	Ø5	Ø8
Turn Type		
Protected Phases	5	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	4.0	5.0
Total Split (s)	4.0	5.0
Total Split (%)	3%	4%
Maximum Green (s)	1.0	2.0
Yellow Time (s)	3.0	3.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	0.2	3.0
Recall Mode	None	None
Walk Time (s)		0.0
Flash Dont Walk (s)		0.0
Pedestrian Calls (#/hr)		0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	0.0	0.0
90th %ile Term Code	Skip	Skip
70th %ile Green (s)	0.0	0.0
70th %ile Term Code	Skip	Skip
50th %ile Green (s)	0.0	0.0
50th %ile Term Code	Skip	Skip
30th %ile Green (s)	0.0	0.0
30th %ile Term Code	Skip	Skip
10th %ile Green (s)	0.0	0.0
10th %ile Term Code	Skip	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)						30.0						
Base Capacity (vph)					669	290		2447			2264	906
Starvation Cap Reductn					0	0		358			164	0
Spillback Cap Reductn					0	5		302			0	0
Storage Cap Reductn					0	0		0			0	0
Reduced v/c Ratio					0.79	0.24		0.99			0.48	0.18

Intersection Summary

Area Type: Other
Cycle Length: 126
Actuated Cycle Length: 126
Offset: 111 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 19.0 Intersection LOS: B
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1286: Osborne & River

Lane Group	Ø5	Ø8
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

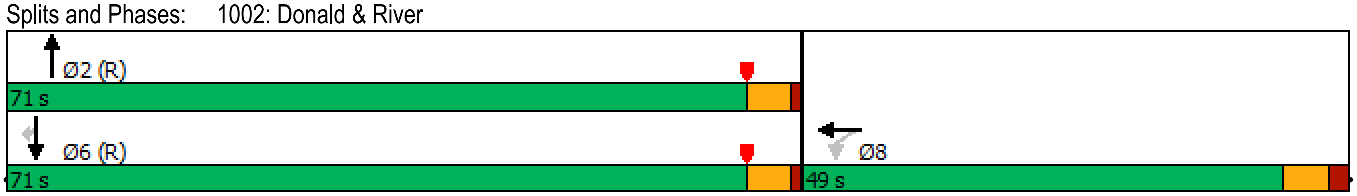
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	865	620	15	0	1535	0	0	1440	285
Future Volume (vph)	0	0	0	865	620	15	0	1535	0	0	1440	285
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	0.95	1.00	*1.00	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	1.00							0.96
Frt					0.997							0.850
Flt Protected				0.950	0.985							
Satd. Flow (prot)	0	0	0	1662	3480	0	0	3467	0	0	3357	1517
Flt Permitted				0.950	0.985							
Satd. Flow (perm)	0	0	0	*3600	3469	0	0	3467	0	0	3357	1452
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					2							49
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		747.5			141.2			230.8			367.3	
Travel Time (s)		53.8			10.2			13.8			26.4	
Confl. Peds. (#/hr)				10		35						20
Peak Hour Factor	1.00	1.00	1.00	0.96	0.82	0.65	1.00	0.88	1.00	1.00	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	901	756	23	0	1744	0	0	1500	297
Shared Lane Traffic (%)				39%								
Lane Group Flow (vph)	0	0	0	550	1130	0	0	1744	0	0	1500	297
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2			2			2	1
Detector Template				Left	Thru			Thru			Thru	Right
Leading Detector (m)				2.0	10.0			10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6			0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0			0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				41.0	41.0			30.0			28.0	28.0
Total Split (s)				49.0	49.0			71.0			71.0	71.0
Total Split (%)				40.8%	40.8%			59.2%			59.2%	59.2%
Maximum Green (s)				43.0	43.0			66.0			66.0	66.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				10.0	10.0			7.0			7.0	7.0
Flash Dont Walk (s)				25.0	25.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				42.3	42.3			66.7			66.7	66.7
Actuated g/C Ratio				0.35	0.35			0.56			0.56	0.56
v/c Ratio				0.43	0.92			0.91			0.80	0.36
Control Delay				30.2	48.8			26.7			25.9	13.7
Queue Delay				3.3	19.4			0.1			6.3	0.0
Total Delay				33.5	68.2			26.8			32.1	13.7
LOS				C	E			C			C	B
Approach Delay					56.9			26.8			29.1	
Approach LOS					E			C			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 106 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 37.2	Intersection LOS: D
Intersection Capacity Utilization 100.1%	ICU Level of Service G
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 1002: Donald & River



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Future Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor			0.98						0.97			
Frt			0.850						0.850			
Flt Protected		0.984										
Satd. Flow (prot)	0	3336	1517	0	0	0	0	3293	1517	0	3357	0
Flt Permitted		0.984										
Satd. Flow (perm)	0	3336	1487	0	0	0	0	3293	1473	0	3357	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						67			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)			26						7			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.87	0.95	0.89	1.00	1.00	1.00	1.00	0.97	0.94	1.00	0.98	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	253	511	45	0	0	0	0	1397	931	0	2423	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	764	45	0	0	0	0	1397	931	0	2423	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						83.0	83.0		83.0	
Total Split (%)	30.8%	30.8%						69.2%	69.2%		69.2%	
Maximum Green (s)	31.0	31.0						78.0	78.0		78.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)		-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)		4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)		31.5	120.0					80.5	80.5		80.5	
Actuated g/C Ratio		0.26	1.00					0.67	0.67		0.67	
v/c Ratio		0.87	0.03					0.63	0.92		1.08	
Control Delay		54.2	0.1					13.1	32.3		58.1	
Queue Delay		0.0	0.0					0.2	0.0		1.0	
Total Delay		54.2	0.1					13.3	32.3		59.2	
LOS		D	A					B	C		E	
Approach Delay		51.2						20.9			59.2	
Approach LOS		D						C			E	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 96 (80%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 42.0	Intersection LOS: D
Intersection Capacity Utilization 100.1%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Detector 2 Extend (s)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	31%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

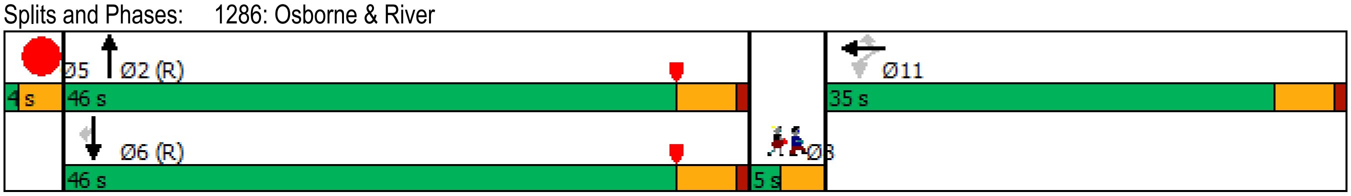
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	705	55	0	895	0	0	1145	375
Future Volume (vph)	0	0	0	100	705	55	0	895	0	0	1145	375
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor					1.00	0.86						0.90
Frt						0.850						0.850
Flt Protected					0.993							
Satd. Flow (prot)	0	0	0	0	3366	1517	0	3390	0	0	3136	1403
Flt Permitted					0.993							
Satd. Flow (perm)	0	0	0	0	3357	1303	0	3390	0	0	3136	1256
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)												115
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			747.5			192.4			130.5	
Travel Time (s)		15.6			53.8			13.9			9.4	
Confl. Peds. (#/hr)				17		122						49
Peak Hour Factor	1.00	1.00	1.00	0.75	0.92	0.68	0.69	0.82	1.00	1.00	0.98	0.89
Adj. Flow (vph)	0	0	0	133	766	81	0	1091	0	0	1168	421
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	899	81	0	1091	0	0	1168	421
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2	1		2			2	1
Detector Template				Left	Thru	Right		Thru			Thru	Right
Leading Detector (m)				2.0	10.0	2.0		10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6	2.0		0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0	0.0		0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA	Perm		NA			NA	Perm
Protected Phases					11			2			6	
Permitted Phases				11		11						6
Detector Phase				11	11	11		2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0		10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0		24.0			19.0	19.0
Total Split (s)				35.0	35.0	35.0		46.0			46.0	46.0
Total Split (%)				38.9%	38.9%	38.9%		51.1%			51.1%	51.1%
Maximum Green (s)				30.0	30.0	30.0		41.0			41.0	41.0
Yellow Time (s)				4.0	4.0	4.0		4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0		1.0			1.0	1.0
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped		C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0		12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)					28.5	28.5		41.0			41.0	41.0
Actuated g/C Ratio					0.32	0.32		0.46			0.46	0.46
v/c Ratio					0.85	0.20		0.71			0.82	0.66
Control Delay					37.2	23.3		5.5			9.6	4.9
Queue Delay					0.0	0.0		0.0			0.3	0.2
Total Delay					37.2	23.3		5.5			9.8	5.1
LOS					D	C		A			A	A
Approach Delay					36.1			5.5			8.6	
Approach LOS					D			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 38 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 15.0	Intersection LOS: B
Intersection Capacity Utilization 72.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1286: Osborne & River



Lane Group	Ø5	Ø8
Turn Type		
Protected Phases	5	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	4.0	5.0
Total Split (s)	4.0	5.0
Total Split (%)	4%	6%
Maximum Green (s)	1.0	2.0
Yellow Time (s)	3.0	3.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	Max	Max
Walk Time (s)		0.0
Flash Dont Walk (s)		0.0
Pedestrian Calls (#/hr)		0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Future Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.94	0.99							0.81			
Frt		0.977							0.850			
Flt Protected	0.950	0.999								0.950		
Satd. Flow (prot)	1388	3142	0	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.999								0.128		
Satd. Flow (perm)	1306	3139	0	0	0	0	0	3390	1228	228	3390	0
Right Turn on Red			No			Yes			Yes			No
Satd. Flow (RTOR)									145			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	64		49						128	128		
Peak Hour Factor	0.76	0.87	0.85	1.00	1.00	1.00	1.00	0.84	0.83	0.76	0.92	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	105	603	112	0	0	0	0	964	120	237	1201	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	94	726	0	0	0	0	0	964	120	237	1201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6	6	
Minimum Split (s)	35.0	35.0						24.0	24.0	11.0	23.0	
Total Split (s)	35.0	35.0						33.0	33.0	17.0	50.0	
Total Split (%)	38.9%	38.9%						36.7%	36.7%	18.9%	55.6%	
Maximum Green (s)	29.0	29.0						28.0	28.0	11.0	45.0	
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0	6.0	5.0	
Lead/Lag	Lag	Lag						Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0						12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0						0	0		0	

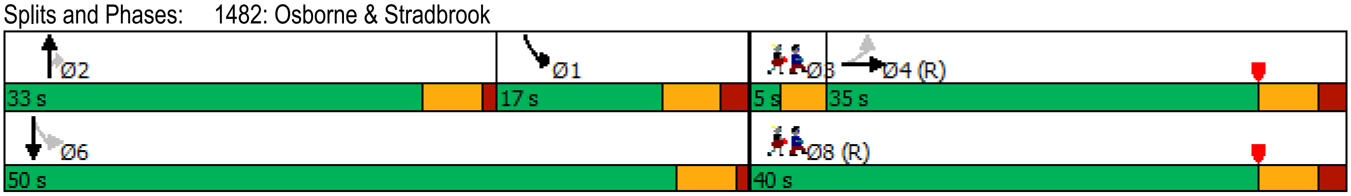
Lane Group	Ø3	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Turn Type		
Protected Phases	3	8
Permitted Phases		
Minimum Split (s)	5.0	33.0
Total Split (s)	5.0	40.0
Total Split (%)	6%	44%
Maximum Green (s)	2.0	34.0
Yellow Time (s)	3.0	4.0
All-Red Time (s)	0.0	2.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	
Lead-Lag Optimize?		
Walk Time (s)		7.0
Flash Dont Walk (s)		17.0
Pedestrian Calls (#/hr)		0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	29.0	29.0						28.0	28.0	44.0	45.0	
Actuated g/C Ratio	0.32	0.32						0.31	0.31	0.49	0.50	
v/c Ratio	0.22	0.72						0.91	0.25	0.82	0.71	
Control Delay	24.1	31.7						25.5	1.5	36.4	10.7	
Queue Delay	0.0	0.0						16.1	0.0	0.0	0.0	
Total Delay	24.1	31.7						41.7	1.5	36.4	10.7	
LOS	C	C						D	A	D	B	
Approach Delay		30.8						37.2			14.9	
Approach LOS		C						D			B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 80 (89%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 26.1 Intersection LOS: C
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø3	Ø8
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

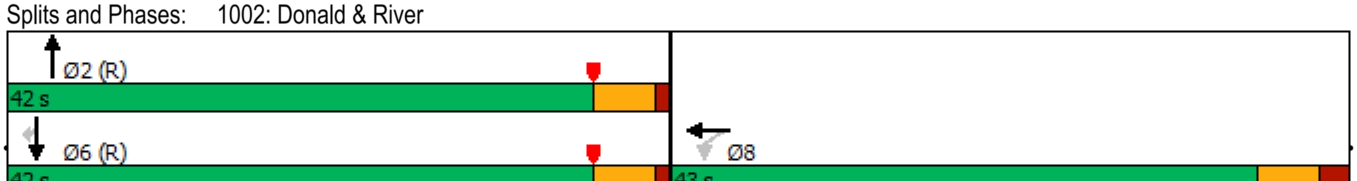
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	835	485	25	0	1330	0	0	1325	220
Future Volume (vph)	0	0	0	835	485	25	0	1330	0	0	1325	220
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	0.99							0.95
Frt					0.995							0.850
Flt Protected				0.950	0.978							
Satd. Flow (prot)	0	0	0	1430	4432	0	0	3293	0	0	3357	1517
Flt Permitted				0.950	0.978							
Satd. Flow (perm)	0	0	0	*3600	4414	0	0	3293	0	0	3357	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					7							134
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		54.0			102.2			230.8			367.3	
Travel Time (s)		3.9			7.4			13.8			26.4	
Confl. Peds. (#/hr)				13		70						32
Peak Hour Factor	1.00	1.00	1.00	0.89	0.88	0.69	1.00	0.85	1.00	1.00	0.89	0.88
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	938	551	36	0	1565	0	0	1489	250
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	0	0	469	1056	0	0	1565	0	0	1489	250
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2			2			2	1
Detector Template				Left	Thru			Thru			Thru	Right
Leading Detector (m)				2.0	10.0			10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0			0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6			0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0			0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0			0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				43.0	43.0			30.0			28.0	28.0
Total Split (s)				43.0	43.0			42.0			42.0	42.0
Total Split (%)				50.6%	50.6%			49.4%			49.4%	49.4%
Maximum Green (s)				37.0	37.0			37.0			37.0	37.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0			7.0			7.0	7.0
Flash Dont Walk (s)				30.0	30.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				29.6	29.6			44.4			44.4	44.4
Actuated g/C Ratio				0.35	0.35			0.52			0.52	0.52
v/c Ratio				0.37	0.85dl			0.91			0.85	0.31
Control Delay				20.9	25.5			27.7			25.1	7.4
Queue Delay				0.0	0.0			0.0			0.0	0.0
Total Delay				20.9	25.5			27.7			25.1	7.4
LOS				C	C			C			C	A
Approach Delay					24.1			27.7			22.6	
Approach LOS					C			C			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 37 (44%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 24.7	Intersection LOS: C
Intersection Capacity Utilization 90.0%	ICU Level of Service E
Analysis Period (min) 15	
* User Entered Value	
dl Defacto Left Lane. Recode with 1 though lane as a left lane.	

Splits and Phases: 1002: Donald & River



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	375	30	0	0	0	0	960	890	0	1715	0
Future Volume (vph)	130	375	30	0	0	0	0	960	890	0	1715	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98	1.00	0.98						0.97			
Frt			0.850						0.850			
Flt Protected	0.950	0.999										
Satd. Flow (prot)	1543	3244	1517	0	0	0	0	3293	1517	0	3293	0
Flt Permitted	0.950	0.999										
Satd. Flow (perm)	1510	3242	1480	0	0	0	0	3293	1474	0	3293	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103						156			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)	26		41						8			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	1.00	0.82	0.86	1.00	1.00	1.00	1.00	0.91	0.87	1.00	0.90	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%
Adj. Flow (vph)	130	457	35	0	0	0	0	1055	1023	0	1906	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	117	470	35	0	0	0	0	1055	1023	0	1906	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						48.0	48.0		48.0	
Total Split (%)	43.5%	43.5%						56.5%	56.5%		56.5%	
Maximum Green (s)	31.0	31.0						43.0	43.0		43.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0		0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)	21.7	21.7	85.0					52.3	52.3		52.3	
Actuated g/C Ratio	0.26	0.26	1.00					0.62	0.62		0.62	
v/c Ratio	0.30	0.57	0.02					0.52	1.06		0.94	
Control Delay	25.4	29.3	0.0					12.0	63.8		25.6	
Queue Delay	0.0	0.0	0.0					0.0	0.0		0.0	
Total Delay	25.4	29.3	0.0					12.0	63.8		25.6	
LOS	C	C	A					B	E		C	
Approach Delay		26.9						37.5			25.6	
Approach LOS		C						D			C	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 85

Offset: 50 (59%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

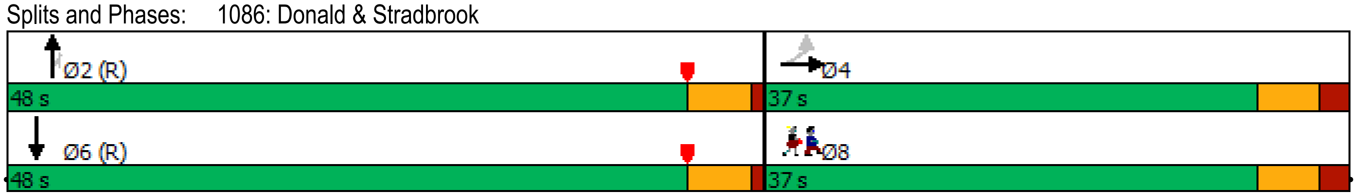
Maximum v/c Ratio: 1.06

Intersection Signal Delay: 31.2 Intersection LOS: C

Intersection Capacity Utilization 90.0% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1086: Donald & Stradbrook



Lane Group	Ø8
Detector 2 Extend (s)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	44%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

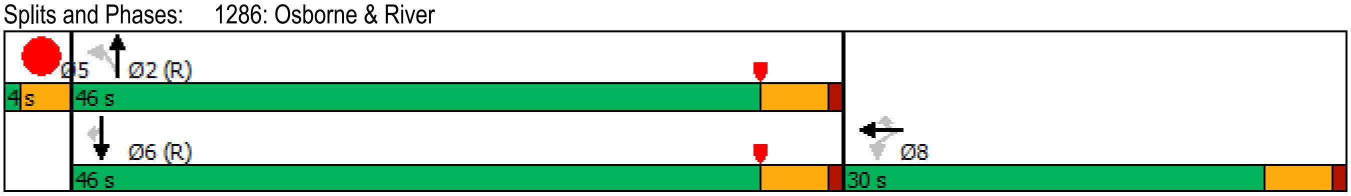
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	95	430	95	95	740	0	0	985	215
Future Volume (vph)	0	0	0	95	430	95	95	740	0	0	985	215
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.87		0.81		0.99				0.68
Frt						0.850						0.850
Flt Protected				0.950				0.993				
Satd. Flow (prot)	0	0	0	1695	3390	1517	0	3366	0	0	3136	1403
Flt Permitted				0.950				0.630				
Satd. Flow (perm)	0	0	0	1469	3390	1234	0	2124	0	0	3136	953
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						125						70
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			693.6			192.4			130.5	
Travel Time (s)		15.6			49.9			13.9			9.4	
Confl. Peds. (#/hr)				139		185	218					218
Peak Hour Factor	1.00	1.00	1.00	0.92	0.92	0.76	0.81	0.97	1.00	1.00	0.93	0.81
Adj. Flow (vph)	0	0	0	103	467	125	117	763	0	0	1059	265
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	103	467	125	0	880	0	0	1059	265
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors				1	2	1	1	2			2	1
Detector Template				Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8		8	2					6
Detector Phase				8	8	8	2	2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0	10.0	10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0	24.0	24.0			19.0	19.0
Total Split (s)				30.0	30.0	30.0	46.0	46.0			46.0	46.0
Total Split (%)				37.5%	37.5%	37.5%	57.5%	57.5%			57.5%	57.5%
Maximum Green (s)				25.0	25.0	25.0	41.0	41.0			41.0	41.0
Yellow Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)				5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped	C-Max	C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0	12.0	12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0	0	0			0	0
Act Effct Green (s)				25.0	25.0	25.0		45.0			45.0	45.0
Actuated g/C Ratio				0.31	0.31	0.31		0.56			0.56	0.56
v/c Ratio				0.22	0.44	0.27		0.74			0.60	0.47
Control Delay				22.0	23.5	5.8		9.7			4.8	3.5
Queue Delay				0.0	0.0	0.0		0.0			0.1	0.0
Total Delay				22.0	23.5	5.8		9.7			4.9	3.5
LOS				C	C	A		A			A	A
Approach Delay					20.1			9.7			4.6	
Approach LOS					C			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 44 (55%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 9.9	Intersection LOS: A
Intersection Capacity Utilization 86.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1286: Osborne & River



Lane Group	Ø5
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	5%
Maximum Green (s)	1.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	440	125	0	0	0	0	850	65	105	960	0
Future Volume (vph)	110	440	125	0	0	0	0	850	65	105	960	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.95	0.99							0.80	0.96		
Frt		0.965							0.850			
Flt Protected	0.950	0.999								0.950		
Satd. Flow (prot)	1388	3105	0	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.999								0.201		
Satd. Flow (perm)	1322	3102	0	0	0	0	0	3390	1221	346	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		51							123			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	58		29						148	148		
Peak Hour Factor	0.86	0.97	0.89	1.00	1.00	1.00	1.00	0.97	0.86	0.81	0.96	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	128	454	140	0	0	0	0	876	76	130	1000	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	115	607	0	0	0	0	0	876	76	130	1000	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6	6	
Minimum Split (s)	35.0	35.0						24.0	24.0	11.0	23.0	
Total Split (s)	35.0	35.0						33.0	33.0	12.0	45.0	
Total Split (%)	43.8%	43.8%						41.3%	41.3%	15.0%	56.3%	
Maximum Green (s)	29.0	29.0						28.0	28.0	6.0	40.0	
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0						12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0						0	0		0	

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Minimum Split (s)	33.0
Total Split (s)	35.0
Total Split (%)	44%
Maximum Green (s)	29.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	29.0	29.0						28.0	28.0	39.0	40.0	
Actuated g/C Ratio	0.36	0.36						0.35	0.35	0.49	0.50	
v/c Ratio	0.24	0.53						0.74	0.15	0.48	0.59	
Control Delay	19.5	20.2						15.4	1.8	20.3	12.3	
Queue Delay	0.0	0.0						1.0	0.0	0.0	0.0	
Total Delay	19.5	20.2						16.4	1.8	20.3	12.3	
LOS	B	C						B	A	C	B	
Approach Delay		20.1						15.2			13.2	
Approach LOS		C						B			B	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 70 (88%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow

Natural Cycle: 70

Control Type: Pretimed

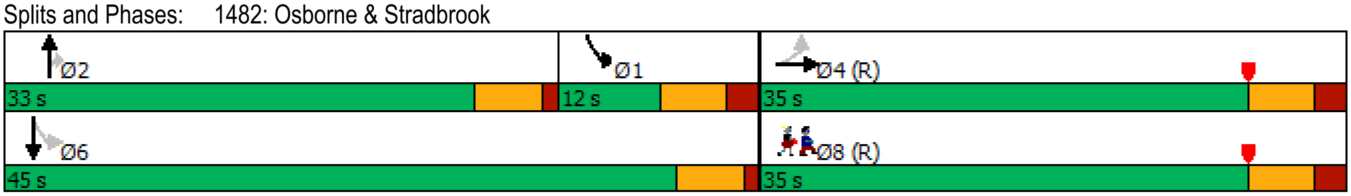
Maximum v/c Ratio: 0.74

Intersection Signal Delay: 15.7 Intersection LOS: B

Intersection Capacity Utilization 69.3% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	835	485	25	0	1330	0	0	1325	220
Future Volume (vph)	0	0	0	835	485	25	0	1330	0	0	1325	220
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	56.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	2		0	0		0	0		1
Taper Length (m)	7.5			12.0			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor				0.99	1.00							0.95
Frt					0.991							0.850
Flt Protected				0.950								
Satd. Flow (prot)	0	0	0	3225	1762	0	0	3293	0	0	3357	1517
Flt Permitted				0.950								
Satd. Flow (perm)	0	0	0	*3600	1762	0	0	3293	0	0	3357	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5							134
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		54.0			102.2			230.8			367.3	
Travel Time (s)		3.9			7.4			13.8			26.4	
Confl. Peds. (#/hr)				13		70						32
Peak Hour Factor	1.00	1.00	1.00	0.89	0.88	0.69	1.00	0.85	1.00	1.00	0.89	0.88
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	0	0	0	938	551	36	0	1565	0	0	1489	250
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	938	587	0	0	1565	0	0	1489	250
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA			NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8								6
Detector Phase				8	8			2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0			10.0			10.0	10.0
Minimum Split (s)				43.0	43.0			30.0			28.0	28.0
Total Split (s)				43.0	43.0			42.0			42.0	42.0
Total Split (%)				50.6%	50.6%			49.4%			49.4%	49.4%
Maximum Green (s)				37.0	37.0			37.0			37.0	37.0
Yellow Time (s)				4.0	4.0			4.0			4.0	4.0
All-Red Time (s)				2.0	2.0			1.0			1.0	1.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				6.0	6.0			5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Recall Mode				Min	Min			C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0			7.0			7.0	7.0
Flash Dont Walk (s)				30.0	30.0			18.0			16.0	16.0
Pedestrian Calls (#/hr)				16	16			0			0	0
Act Effct Green (s)				33.8	33.8			40.2			40.2	40.2
Actuated g/C Ratio				0.40	0.40			0.47			0.47	0.47
v/c Ratio				0.66	0.83			1.01			0.94	0.33
Control Delay				22.9	34.2			45.4			35.6	8.5
Queue Delay				0.0	0.0			0.0			0.0	0.0
Total Delay				22.9	34.2			45.4			35.6	8.5
LOS				C	C			D			D	A
Approach Delay					27.2			45.4			31.7	
Approach LOS					C			D			C	
Queue Length 50th (m)				58.8	78.5			~142.1			~123.8	11.0
Queue Length 95th (m)				75.0	113.5			#170.2			#173.3	25.7
Internal Link Dist (m)		30.0			78.2			206.8			343.3	
Turn Bay Length (m)				56.0								
Base Capacity (vph)				1567	769			1557			1587	754
Starvation Cap Reductn				0	0			0			0	0
Spillback Cap Reductn				0	0			0			0	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.60	0.76			1.01			0.94	0.33

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 85

Offset: 37 (44%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 34.7 Intersection LOS: C

Intersection Capacity Utilization 93.3% ICU Level of Service F

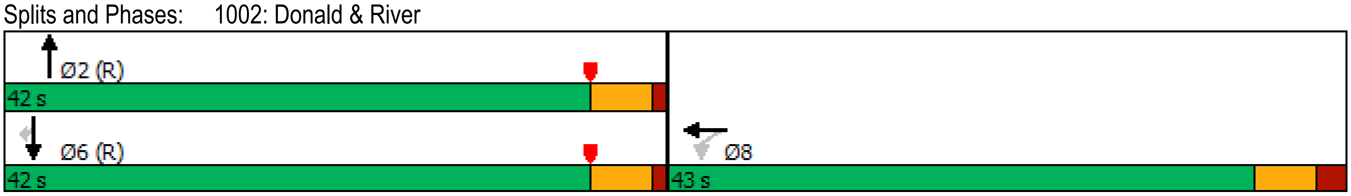
Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1002: Donald & River



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	375	30	0	0	0	0	960	890	0	1715	0
Future Volume (vph)	130	375	30	0	0	0	0	960	890	0	1715	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98	1.00							0.97			
Frt		0.989							0.850			
Flt Protected	0.950											
Satd. Flow (prot)	1695	1759	0	0	0	0	0	3293	1517	0	3293	0
Flt Permitted	0.950											
Satd. Flow (perm)	1659	1759	0	0	0	0	0	3293	1474	0	3293	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5							156			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)	26		41						8			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	1.00	0.82	0.86	1.00	1.00	1.00	1.00	0.91	0.87	1.00	0.90	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%
Adj. Flow (vph)	130	457	35	0	0	0	0	1055	1023	0	1906	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	492	0	0	0	0	0	1055	1023	0	1906	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4								2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						48.0	48.0		48.0	
Total Split (%)	43.5%	43.5%						56.5%	56.5%		56.5%	
Maximum Green (s)	31.0	31.0						43.0	43.0		43.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)	0.0	0.0						0.0	0.0		0.0	
Total Lost Time (s)	6.0	6.0						5.0	5.0		5.0	
Lead/Lag												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	44%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)	27.4	27.4						46.6	46.6		46.6	
Actuated g/C Ratio	0.32	0.32						0.55	0.55		0.55	
v/c Ratio	0.24	0.86						0.58	1.17		1.06	
Control Delay	21.3	42.6						15.2	106.9		52.8	
Queue Delay	0.0	0.0						0.0	0.0		0.0	
Total Delay	21.3	42.6						15.2	106.9		52.8	
LOS	C	D						B	F		D	
Approach Delay		38.1						60.4			52.8	
Approach LOS		D						E			D	
Queue Length 50th (m)	14.9	71.4						58.6	~192.2		~183.8	
Queue Length 95th (m)	26.7	90.9						82.0	#255.0		m#221.4	
Internal Link Dist (m)		559.5			246.5			397.2			206.8	
Turn Bay Length (m)	45.0											
Base Capacity (vph)	605	644						1804	878		1804	
Starvation Cap Reductn	0	0						0	0		0	
Spillback Cap Reductn	0	0						0	0		0	
Storage Cap Reductn	0	0						0	0		0	
Reduced v/c Ratio	0.21	0.76						0.58	1.17		1.06	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 85

Offset: 50 (59%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.17

Intersection Signal Delay: 54.2 Intersection LOS: D

Intersection Capacity Utilization 93.3% ICU Level of Service F

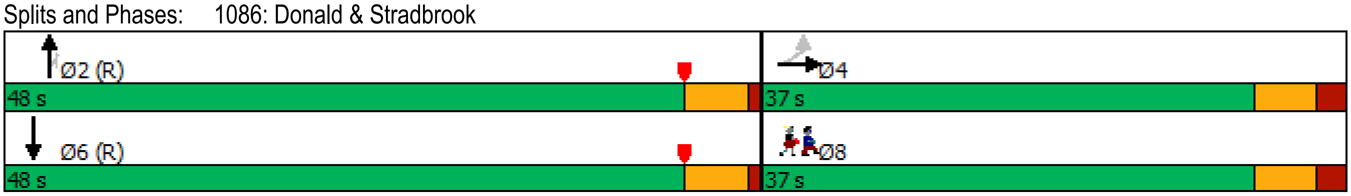
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Splits and Phases: 1086: Donald & Stradbrook



Lane Group	Ø8
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑	↱		↑↑			↑↑	↱
Traffic Volume (vph)	0	0	0	95	430	95	95	740	0	0	985	215
Future Volume (vph)	0	0	0	95	430	95	95	740	0	0	985	215
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Grade (%)		0%			0%			0%			15%	
Storage Length (m)	0.0		0.0	30.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor					0.98	0.81		0.99				0.68
Frt						0.850						0.850
Flt Protected					0.991			0.993				
Satd. Flow (prot)	0	0	0	0	3360	1517	0	3366	0	0	3136	1403
Flt Permitted					0.991			0.630				
Satd. Flow (perm)	0	0	0	0	3279	1234	0	2124	0	0	3136	953
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						125						70
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		217.0			73.9			192.4			130.5	
Travel Time (s)		15.6			5.3			13.9			9.4	
Confl. Peds. (#/hr)				139		185	218					218
Peak Hour Factor	1.00	1.00	1.00	0.92	0.92	0.76	0.81	0.97	1.00	1.00	0.93	0.81
Adj. Flow (vph)	0	0	0	103	467	125	117	763	0	0	1059	265
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	570	125	0	880	0	0	1059	265
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.17	1.17	1.17
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases				8		8	2					6
Detector Phase				8	8	8	2	2			6	6
Switch Phase												
Minimum Initial (s)				7.0	7.0	7.0	10.0	10.0			10.0	10.0
Minimum Split (s)				30.0	30.0	30.0	24.0	24.0			19.0	19.0
Total Split (s)				30.0	30.0	30.0	46.0	46.0			46.0	46.0
Total Split (%)				37.5%	37.5%	37.5%	57.5%	57.5%			57.5%	57.5%
Maximum Green (s)				25.0	25.0	25.0	41.0	41.0			41.0	41.0
Yellow Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	4.0
All-Red Time (s)				1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					5.0	5.0		5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												

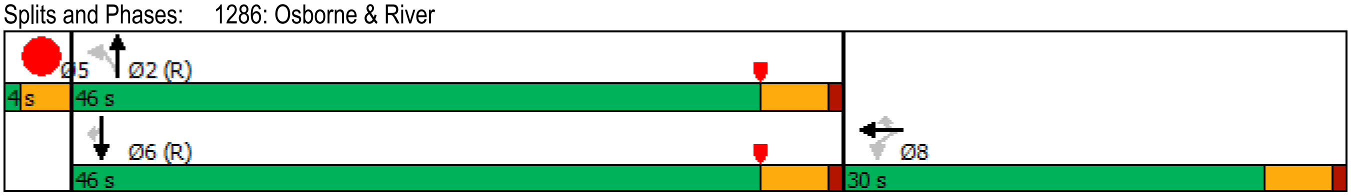
Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	5%
Maximum Green (s)	1.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode				Ped	Ped	Ped	C-Max	C-Max			C-Max	C-Max
Walk Time (s)				7.0	7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)				18.0	18.0	18.0	12.0	12.0			7.0	7.0
Pedestrian Calls (#/hr)				0	0	0	0	0			0	0
Act Effct Green (s)					25.0	25.0		45.0			45.0	45.0
Actuated g/C Ratio					0.31	0.31		0.56			0.56	0.56
v/c Ratio					0.56	0.27		0.74			0.60	0.47
Control Delay					25.4	5.8		9.4			4.3	2.8
Queue Delay					0.0	0.0		0.0			0.1	0.0
Total Delay					25.4	5.8		9.4			4.4	2.8
LOS					C	A		A			A	A
Approach Delay					21.9			9.4			4.0	
Approach LOS					C			A			A	
Queue Length 50th (m)					37.5	0.0		29.1			11.5	1.2
Queue Length 95th (m)					52.9	6.9		22.8			13.7	m2.4
Internal Link Dist (m)		193.0			49.9			168.4			106.5	
Turn Bay Length (m)						30.0						
Base Capacity (vph)					1024	471		1194			1764	566
Starvation Cap Reductn					0	0		0			92	0
Spillback Cap Reductn					0	0		0			0	0
Storage Cap Reductn					0	0		0			0	0
Reduced v/c Ratio					0.56	0.27		0.74			0.63	0.47

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 44 (55%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 10.0 Intersection LOS: A
Intersection Capacity Utilization 86.6% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1286: Osborne & River



Lane Group	Ø5
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

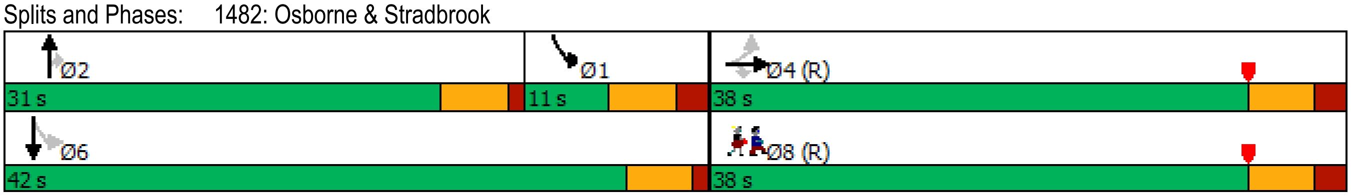
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	440	125	0	0	0	0	850	65	105	960	0
Future Volume (vph)	110	440	125	0	0	0	0	850	65	105	960	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		50.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.95	1.00	0.96						0.67	0.94		
Frt			0.850						0.850			
Flt Protected	0.950	0.999								0.950		
Satd. Flow (prot)	1449	1693	1517	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted	0.950	0.999								0.186		
Satd. Flow (perm)	1380	1691	1463	0	0	0	0	3390	1023	312	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			109						123			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	58		29						148	148		
Peak Hour Factor	0.86	0.97	0.89	1.00	1.00	1.00	1.00	0.97	0.86	0.81	0.96	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	128	454	140	0	0	0	0	876	76	130	1000	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	115	467	140	0	0	0	0	876	76	130	1000	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.21	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6	6	
Minimum Split (s)	35.0	35.0	35.0					24.0	24.0	11.0	23.0	
Total Split (s)	38.0	38.0	38.0					31.0	31.0	11.0	42.0	
Total Split (%)	47.5%	47.5%	47.5%					38.8%	38.8%	13.8%	52.5%	
Maximum Green (s)	32.0	32.0	32.0					26.0	26.0	5.0	37.0	
Yellow Time (s)	4.0	4.0	4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0					1.0	1.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0					5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0	22.0					12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	8
Permitted Phases	
Minimum Split (s)	33.0
Total Split (s)	38.0
Total Split (%)	48%
Maximum Green (s)	32.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	32.0	32.0	32.0					26.0	26.0	36.0	37.0	
Actuated g/C Ratio	0.40	0.40	0.40					0.32	0.32	0.45	0.46	
v/c Ratio	0.21	0.69	0.22					0.80	0.18	0.58	0.64	
Control Delay	17.0	26.4	6.0					10.9	1.2	28.4	15.7	
Queue Delay	0.0	0.0	0.0					1.2	0.0	0.0	0.0	
Total Delay	17.0	26.4	6.0					12.2	1.2	28.4	15.7	
LOS	B	C	A					B	A	C	B	
Approach Delay		20.9						11.3			17.1	
Approach LOS		C						B			B	
Queue Length 50th (m)	11.6	60.2	2.8					3.4	0.0	9.2	37.3	
Queue Length 95th (m)	21.8	94.9	12.9					39.4	0.0	17.6	55.2	
Internal Link Dist (m)		117.2			559.5			82.7			168.4	
Turn Bay Length (m)	55.0		50.0						40.0	25.0		
Base Capacity (vph)	552	676	650					1101	415	226	1567	
Starvation Cap Reductn	0	0	0					83	0	0	0	
Spillback Cap Reductn	0	0	0					0	0	0	0	
Storage Cap Reductn	0	0	0					0	0	0	0	
Reduced v/c Ratio	0.21	0.69	0.22					0.86	0.18	0.58	0.64	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 68 (85%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow	
Natural Cycle: 70	
Control Type: Pretimed	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 69.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Future Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		1.00	0.98						0.97			
Frt			0.850						0.850			
Flt Protected		0.980										
Satd. Flow (prot)	0	3322	1517	0	0	0	0	3293	1517	0	3293	0
Flt Permitted		0.980										
Satd. Flow (perm)	0	3308	1491	0	0	0	0	3293	1478	0	3293	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			109									
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)	9		17						4			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.82	0.90	0.66	1.00	1.00	1.00	1.00	0.96	0.91	1.00	0.94	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%
Adj. Flow (vph)	354	511	30	0	0	0	0	2104	978	0	1527	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	865	30	0	0	0	0	2104	978	0	1527	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8	Ø12
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						63.0	63.0		63.0	
Total Split (%)	30.8%	30.8%						52.5%	52.5%		52.5%	
Maximum Green (s)	31.0	31.0						58.0	58.0		58.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)		-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)		4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)		32.5	120.0					79.5	79.5		79.5	
Actuated g/C Ratio		0.27	1.00					0.66	0.66		0.66	
v/c Ratio		0.97	0.02					0.96	1.00		0.70	
Control Delay		24.7	0.0					32.2	49.7		8.4	
Queue Delay		0.0	0.0					43.8	0.0		0.2	
Total Delay		24.7	0.0					76.0	49.7		8.6	
LOS		C	A					E	D		A	
Approach Delay		23.9						67.6			8.6	
Approach LOS		C						E			A	
90th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
90th %ile Term Code	Max	Max						Coord	Coord		Coord	
70th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
70th %ile Term Code	Max	Max						Coord	Coord		Coord	
50th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
50th %ile Term Code	Max	Max						Coord	Coord		Coord	
30th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
30th %ile Term Code	Max	Max						Coord	Coord		Coord	
10th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
10th %ile Term Code	Max	Max						Coord	Coord		Coord	
Stops (vph)		518	0					1667	720		794	
Fuel Used(l)		67	1					178	90		64	
CO Emissions (g/hr)		1254	21					3305	1671		1184	
NOx Emissions (g/hr)		242	4					638	323		229	
VOC Emissions (g/hr)		289	5					762	385		273	
Dilemma Vehicles (#)		0	0					82	0		30	
Queue Length 50th (m)		68.0	0.0					223.3	210.9		107.6	
Queue Length 95th (m)		m49.4	m0.0					#302.8	#315.8		m119.9	

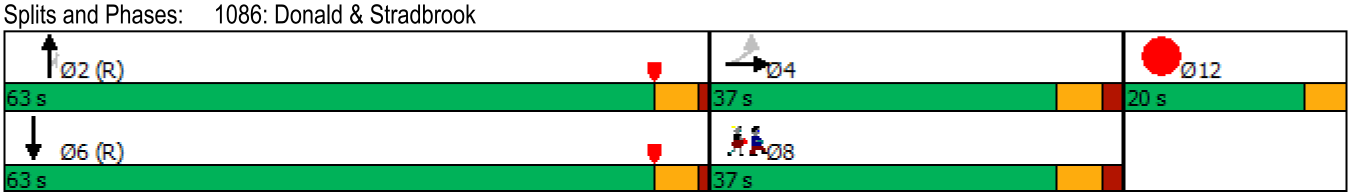
Lane Group	Ø8	Ø12
Detector 2 Extend (s)		
Turn Type		
Protected Phases	8	12
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	4.0
Minimum Split (s)	35.0	20.0
Total Split (s)	37.0	20.0
Total Split (%)	31%	17%
Maximum Green (s)	31.0	16.0
Yellow Time (s)	4.0	4.0
All-Red Time (s)	2.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)	7.0	5.0
Flash Dont Walk (s)	22.0	11.0
Pedestrian Calls (#/hr)	16	0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	31.0	0.0
90th %ile Term Code	Hold	Skip
70th %ile Green (s)	31.0	0.0
70th %ile Term Code	Hold	Skip
50th %ile Green (s)	31.0	0.0
50th %ile Term Code	Hold	Skip
30th %ile Green (s)	31.0	0.0
30th %ile Term Code	Hold	Skip
10th %ile Green (s)	31.0	0.0
10th %ile Term Code	Hold	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		559.5			246.5			397.2			206.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		895	1491					2181	979		2181	
Starvation Cap Reductn		0	0					0	0		153	
Spillback Cap Reductn		0	0					782	0		0	
Storage Cap Reductn		0	0					0	0		0	
Reduced v/c Ratio		0.97	0.02					1.50	1.00		0.75	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 44.2 Intersection LOS: D
Intersection Capacity Utilization 105.0% ICU Level of Service G
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1086: Donald & Stradbrook



Lane Group	Ø8	Ø12
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	785	70	0	0	0	0	1420	95	110	870	0
Future Volume (vph)	330	785	70	0	0	0	0	1420	95	110	870	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	0		1	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99	0.93						0.91			
Frt			0.850						0.850			
Flt Protected		0.985								0.950		
Satd. Flow (prot)	0	3339	1517	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted		0.985								0.089		
Satd. Flow (perm)	0	3311	1414	0	0	0	0	3390	1375	159	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			100						109			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	22		46						44	44		
Peak Hour Factor	0.81	0.88	0.93	1.00	1.00	1.00	1.00	0.96	0.81	0.77	0.95	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	407	892	75	0	0	0	0	1479	117	143	916	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1299	75	0	0	0	0	1479	117	143	916	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6	6	
Minimum Split (s)	35.0	35.0	35.0					24.0	24.0	11.0	23.0	
Total Split (s)	45.0	45.0	45.0					44.0	44.0	11.0	55.0	
Total Split (%)	37.5%	37.5%	37.5%					36.7%	36.7%	9.2%	45.8%	
Maximum Green (s)	39.0	39.0	39.0					39.0	39.0	5.0	50.0	
Yellow Time (s)	4.0	4.0	4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0					1.0	1.0	2.0	1.0	
Lost Time Adjust (s)		0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0					5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0	22.0					12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

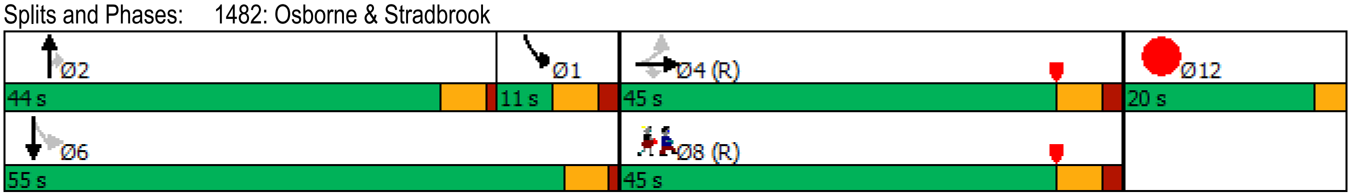
Lane Group	Ø8	Ø12
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Turn Type		
Protected Phases	8	12
Permitted Phases		
Minimum Split (s)	33.0	20.0
Total Split (s)	45.0	20.0
Total Split (%)	38%	17%
Maximum Green (s)	39.0	17.0
Yellow Time (s)	4.0	3.0
All-Red Time (s)	2.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Walk Time (s)	7.0	7.0
Flash Dont Walk (s)	17.0	10.0
Pedestrian Calls (#/hr)	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		39.0	39.0					39.0	39.0	49.0	50.0	
Actuated g/C Ratio		0.32	0.32					0.32	0.32	0.41	0.42	
v/c Ratio		1.21	0.14					1.34	0.23	1.12	0.65	
Control Delay		138.5	3.3					194.5	7.5	157.5	30.6	
Queue Delay		0.0	0.0					1.4	0.0	0.0	0.0	
Total Delay		138.5	3.3					195.9	7.5	157.5	30.6	
LOS		F	A					F	A	F	C	
Approach Delay		131.1						182.1			47.8	
Approach LOS		F						F			D	
Stops (vph)		928	5					1107	15	57	675	
Fuel Used(l)		171	2					252	2	17	52	
CO Emissions (g/hr)		3184	39					4682	34	309	959	
NOx Emissions (g/hr)		615	7					904	7	60	185	
VOC Emissions (g/hr)		734	9					1080	8	71	221	
Dilemma Vehicles (#)		0	0					0	0	0	0	
Queue Length 50th (m)		~196.2	0.0					~239.3	1.3	~25.0	89.3	
Queue Length 95th (m)		#229.7	6.2					#281.6	10.7	#48.8	111.2	
Internal Link Dist (m)		117.2			559.5			82.7			168.4	
Turn Bay Length (m)									40.0	25.0		
Base Capacity (vph)		1076	527					1101	520	128	1412	
Starvation Cap Reductn		0	0					269	0	0	0	
Spillback Cap Reductn		0	0					0	0	0	0	
Storage Cap Reductn		0	0					0	0	0	0	
Reduced v/c Ratio		1.21	0.14					1.78	0.23	1.12	0.65	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow
Natural Cycle: 150
Control Type: Pretimed
Maximum v/c Ratio: 1.34
Intersection Signal Delay: 129.4 Intersection LOS: F
Intersection Capacity Utilization 95.1% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8	Ø12
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Future Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor			0.98						0.97			
Frt			0.850						0.850			
Flt Protected		0.984										
Satd. Flow (prot)	0	3336	1517	0	0	0	0	3293	1517	0	3357	0
Flt Permitted		0.984										
Satd. Flow (perm)	0	3336	1487	0	0	0	0	3293	1470	0	3357	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			109									
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		583.5			270.5			421.2			230.8	
Travel Time (s)		42.0			19.5			25.3			13.8	
Confl. Peds. (#/hr)			26						7			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.87	0.95	0.89	1.00	1.00	1.00	1.00	0.97	0.94	1.00	0.98	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	253	511	45	0	0	0	0	1397	931	0	2423	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	764	45	0	0	0	0	1397	931	0	2423	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8	Ø12
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						63.0	63.0		63.0	
Total Split (%)	30.8%	30.8%						52.5%	52.5%		52.5%	
Maximum Green (s)	31.0	31.0						58.0	58.0		58.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)		-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)		4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)		31.5	120.0					80.5	80.5		80.5	
Actuated g/C Ratio		0.26	1.00					0.67	0.67		0.67	
v/c Ratio		0.87	0.03					0.63	0.95		1.08	
Control Delay		54.2	0.1					13.1	37.5		58.3	
Queue Delay		0.0	0.0					0.2	0.0		1.0	
Total Delay		54.2	0.1					13.3	37.5		59.3	
LOS		D	A					B	D		E	
Approach Delay		51.2						23.0			59.3	
Approach LOS		D						C			E	
90th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
90th %ile Term Code	Max	Max						Coord	Coord		Coord	
70th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
70th %ile Term Code	Max	Max						Coord	Coord		Coord	
50th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
50th %ile Term Code	Max	Max						Coord	Coord		Coord	
30th %ile Green (s)	30.8	30.8						78.2	78.2		78.2	
30th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
10th %ile Green (s)	26.2	26.2						82.8	82.8		82.8	
10th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
Stops (vph)		648	0					740	681		1484	
Fuel Used(l)		83	2					87	79		202	
CO Emissions (g/hr)		1546	41					1620	1474		3757	
NOx Emissions (g/hr)		298	8					313	285		725	
VOC Emissions (g/hr)		357	10					374	340		866	
Dilemma Vehicles (#)		0	0					56	0		84	
Queue Length 50th (m)		89.7	0.0					93.0	185.3		~335.2	
Queue Length 95th (m)		#115.2	0.0					114.0	#293.1		#378.3	

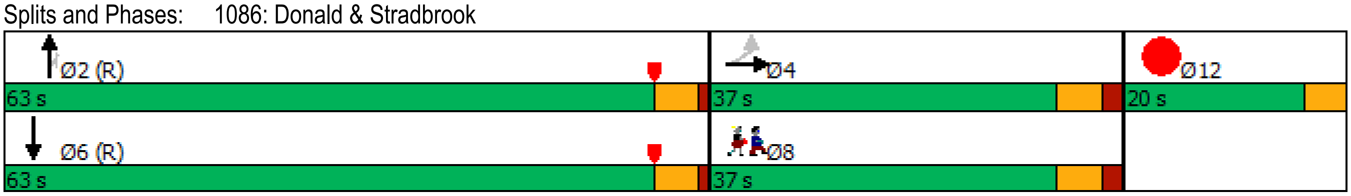
Lane Group	Ø8	Ø12
Detector 2 Extend (s)		
Turn Type		
Protected Phases	8	12
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	4.0
Minimum Split (s)	35.0	20.0
Total Split (s)	37.0	20.0
Total Split (%)	31%	17%
Maximum Green (s)	31.0	16.0
Yellow Time (s)	4.0	4.0
All-Red Time (s)	2.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)	7.0	5.0
Flash Dont Walk (s)	22.0	11.0
Pedestrian Calls (#/hr)	16	0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	31.0	0.0
90th %ile Term Code	Hold	Skip
70th %ile Green (s)	31.0	0.0
70th %ile Term Code	Hold	Skip
50th %ile Green (s)	31.0	0.0
50th %ile Term Code	Hold	Skip
30th %ile Green (s)	30.8	0.0
30th %ile Term Code	Hold	Skip
10th %ile Green (s)	26.2	0.0
10th %ile Term Code	Hold	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		559.5			246.5			397.2			206.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		903	1487					2209	985		2252	
Starvation Cap Reductn		0	0					0	0		5	
Spillback Cap Reductn		0	0					174	0		0	
Storage Cap Reductn		0	0					0	0		0	
Reduced v/c Ratio		0.85	0.03					0.69	0.95		1.08	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 42.9 Intersection LOS: D
Intersection Capacity Utilization 100.1% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1086: Donald & Stradbrook



Lane Group	Ø8	Ø12
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Future Volume (vph)	80	525	95	0	0	0	0	810	100	180	1105	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	0.0		0.0	0.0		40.0	25.0		0.0
Storage Lanes	0		1	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99	0.94						0.81	0.98		
Frt			0.850						0.850			
Flt Protected		0.993								0.950		
Satd. Flow (prot)	0	3366	1517	0	0	0	0	3390	1517	1695	3390	0
Flt Permitted		0.993								0.160		
Satd. Flow (perm)	0	3337	1431	0	0	0	0	3390	1228	279	3390	0
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			133						145			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		141.2			583.5			106.7			192.4	
Travel Time (s)		10.2			42.0			7.7			13.9	
Confl. Peds. (#/hr)	64		49						128	128		
Peak Hour Factor	0.76	0.87	0.85	1.00	1.00	1.00	1.00	0.84	0.83	0.76	0.92	1.00
Parking (#/hr)	0											
Adj. Flow (vph)	105	603	112	0	0	0	0	964	120	237	1201	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	708	112	0	0	0	0	964	120	237	1201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		-7.4			7.4			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6	6	
Minimum Split (s)	35.0	35.0	35.0					24.0	24.0	11.0	23.0	
Total Split (s)	35.0	35.0	35.0					24.0	24.0	11.0	35.0	
Total Split (%)	38.9%	38.9%	38.9%					26.7%	26.7%	12.2%	38.9%	
Maximum Green (s)	29.0	29.0	29.0					19.0	19.0	5.0	30.0	
Yellow Time (s)	4.0	4.0	4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0					1.0	1.0	2.0	1.0	
Lost Time Adjust (s)		0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0					5.0	5.0	6.0	5.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0	22.0					12.0	12.0		11.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

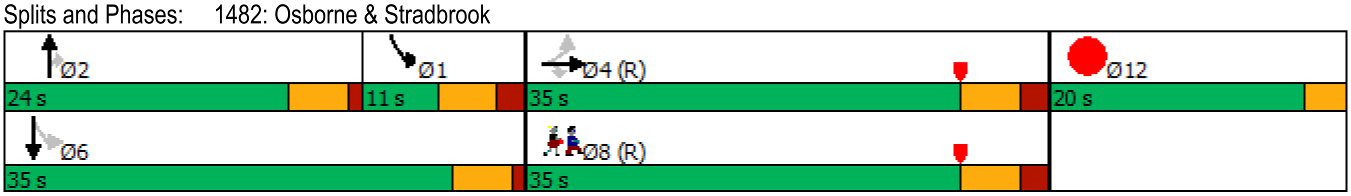
Lane Group	Ø8	Ø12
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Turn Type		
Protected Phases	8	12
Permitted Phases		
Minimum Split (s)	33.0	21.0
Total Split (s)	35.0	20.0
Total Split (%)	39%	22%
Maximum Green (s)	29.0	17.0
Yellow Time (s)	4.0	3.0
All-Red Time (s)	2.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Walk Time (s)	7.0	7.0
Flash Dont Walk (s)	17.0	10.0
Pedestrian Calls (#/hr)	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		29.0	29.0					19.0	19.0	29.0	30.0	
Actuated g/C Ratio		0.32	0.32					0.21	0.21	0.32	0.33	
v/c Ratio		0.66	0.20					1.35	0.32	1.41	1.06	
Control Delay		29.8	3.9					194.7	12.9	241.8	72.5	
Queue Delay		0.0	0.0					0.0	0.0	0.0	15.7	
Total Delay		29.8	3.9					194.7	12.9	241.8	88.2	
LOS		C	A					F	B	F	F	
Approach Delay		26.2						174.6			113.5	
Approach LOS		C						F			F	
Stops (vph)		502	9					665	47	140	733	
Fuel Used(l)		42	3					144	3	40	98	
CO Emissions (g/hr)		785	54					2688	57	743	1828	
NOx Emissions (g/hr)		152	10					519	11	143	353	
VOC Emissions (g/hr)		181	13					620	13	171	422	
Dilemma Vehicles (#)		0	0					0	0	0	0	
Queue Length 50th (m)		54.9	0.0					~120.2	8.9	~42.0	~115.1	
Queue Length 95th (m)		70.5	6.8					#143.5	21.2	#68.2	#156.8	
Internal Link Dist (m)		117.2			559.5			82.7			168.4	
Turn Bay Length (m)									40.0	25.0		
Base Capacity (vph)		1075	551					715	373	168	1130	
Starvation Cap Reductn		0	0					0	0	0	0	
Spillback Cap Reductn		0	8					0	0	0	174	
Storage Cap Reductn		0	0					0	0	0	0	
Reduced v/c Ratio		0.66	0.21					1.35	0.32	1.41	1.26	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:Ped, Start of Yellow
Natural Cycle: 105
Control Type: Pretimed
Maximum v/c Ratio: 1.41
Intersection Signal Delay: 111.9 Intersection LOS: F
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1482: Osborne & Stradbrook



Lane Group	Ø8	Ø12
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø4	Ø8
Lane Configurations			↑↑↑			↑↑		
Traffic Volume (vph)	0	0	2400	0	0	1620		
Future Volume (vph)	0	0	2400	0	0	1620		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95		
Frt								
Flt Protected								
Satd. Flow (prot)	0	0	5142	0	0	3579		
Flt Permitted								
Satd. Flow (perm)	0	0	5142	0	0	3579		
Right Turn on Red		Yes		Yes				
Satd. Flow (RTOR)								
Link Speed (k/h)	48		60			60		
Link Distance (m)	72.4		31.4			355.4		
Travel Time (s)	5.4		1.9			21.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	0	0	2609	0	0	1761		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	2609	0	0	1761		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Right	Left	Left		
Median Width(m)	0.0		0.0			0.0		
Link Offset(m)	0.0		0.0			0.0		
Crosswalk Width(m)	4.8		4.8			4.8		
Two way Left Turn Lane								
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99		
Turning Speed (k/h)	24	14		14	24			
Number of Detectors			2			2		
Detector Template			Thru			Thru		
Leading Detector (m)			10.0			10.0		
Trailing Detector (m)			0.0			0.0		
Detector 1 Position(m)			0.0			0.0		
Detector 1 Size(m)			0.6			0.6		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(m)			9.4			9.4		
Detector 2 Size(m)			0.6			0.6		
Detector 2 Type			Cl+Ex			Cl+Ex		
Detector 2 Channel								
Detector 2 Extend (s)			0.0			0.0		
Turn Type			NA			NA		
Protected Phases			2			6	4	8
Permitted Phases								
Detector Phase			2			6		
Switch Phase								
Minimum Initial (s)			4.0			4.0	4.0	4.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø4	Ø8
Minimum Split (s)			22.0			22.0	32.0	32.0
Total Split (s)			88.0			88.0	32.0	32.0
Total Split (%)			73.3%			73.3%	27%	27%
Maximum Green (s)			82.0			82.0	29.0	29.0
Yellow Time (s)			4.0			4.0	3.0	3.0
All-Red Time (s)			2.0			2.0	0.0	0.0
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			6.0		
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0			3.0	3.0	3.0
Recall Mode			C-Max			C-Max	None	None
Walk Time (s)			5.0			5.0	7.0	7.0
Flash Dont Walk (s)			11.0			11.0	22.0	22.0
Pedestrian Calls (#/hr)			0			0	50	0
Act Effct Green (s)			89.6			89.6		
Actuated g/C Ratio			0.75			0.75		
v/c Ratio			0.68			0.66		
Control Delay			11.6			3.1		
Queue Delay			0.0			0.0		
Total Delay			11.6			3.1		
LOS			B			A		
Approach Delay			11.6			3.1		
Approach LOS			B			A		
90th %ile Green (s)			82.0			82.0	29.0	29.0
90th %ile Term Code			Coord			Coord	Ped	Hold
70th %ile Green (s)			82.0			82.0	29.0	29.0
70th %ile Term Code			Coord			Coord	Ped	Hold
50th %ile Green (s)			82.0			82.0	29.0	29.0
50th %ile Term Code			Coord			Coord	Ped	Hold
30th %ile Green (s)			82.0			82.0	29.0	29.0
30th %ile Term Code			Coord			Coord	Ped	Hold
10th %ile Green (s)			114.0			114.0	0.0	0.0
10th %ile Term Code			Coord			Coord	Skip	Skip
Stops (vph)			1236			123		
Fuel Used(l)			68			58		
CO Emissions (g/hr)			1261			1077		
NOx Emissions (g/hr)			243			208		
VOC Emissions (g/hr)			291			248		
Dilemma Vehicles (#)			83			31		
Queue Length 50th (m)			131.2			20.3		
Queue Length 95th (m)			147.6			22.3		
Internal Link Dist (m)	48.4		7.4			331.4		
Turn Bay Length (m)								
Base Capacity (vph)			3839			2672		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			0.68			0.66		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 8.2	Intersection LOS: A
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Donald

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Lane Configurations												
Traffic Volume (vph)	240	1535	5	0	1620	0	0	605	430	0	0	
Future Volume (vph)	240	1535	5	0	1620	0	0	605	430	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)		230.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Storage Lanes		1	0	0		1	0		0	0	0	
Taper Length (m)		7.5		7.5			7.5			7.5		
Lane Util. Factor	1.00	*1.00	0.91	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	
Frt								0.937				
Flt Protected	0.950	0.953										
Satd. Flow (prot)	1601	5101	0	0	3390	0	0	3072	0	0	0	
Flt Permitted	0.950	0.953										
Satd. Flow (perm)	1601	5101	0	0	3390	0	0	3072	0	0	0	
Right Turn on Red			Yes			Yes			No			
Satd. Flow (RTOR)		52										
Link Speed (k/h)		60			50			50		60		
Link Distance (m)		277.5			33.4			213.8		111.1		
Travel Time (s)		16.7			2.4			15.4		6.7		
Peak Hour Factor	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	0.92	1.00	1.00	
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	
Adj. Flow (vph)	240	1535	5	0	1780	0	0	637	467	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	1540	0	0	1780	0	0	1104	0	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	
Median Width(m)		14.8			0.0			0.0		0.0		
Link Offset(m)		0.0			0.0			0.0		0.0		
Crosswalk Width(m)		4.8			4.8			4.8		4.8		
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
Turning Speed (k/h)	24	24	60	24		14	24		60	24	14	
Number of Detectors	2	2			2			2				
Detector Template												
Leading Detector (m)	15.2	15.2			15.2			15.2				
Trailing Detector (m)	0.0	0.0			0.0			0.0				
Detector 1 Position(m)	0.0	0.0			0.0			0.0				
Detector 1 Size(m)	1.8	1.8			1.8			1.8				
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0			0.0				
Detector 1 Queue (s)	0.0	0.0			0.0			0.0				
Detector 1 Delay (s)	0.0	0.0			0.0			0.0				
Detector 2 Position(m)	13.4	13.4			13.4			13.4				
Detector 2 Size(m)	1.8	1.8			1.8			1.8				
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0			0.0				
Turn Type	Perm	Prot			NA			NA				
Protected Phases		8			2			6				1

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Permitted Phases	8				2			6				
Detector Phase	8	8			2			6				
Switch Phase												
Minimum Initial (s)	10.0	10.0			7.0			7.0				1.0
Minimum Split (s)	25.0	25.0			30.0			34.0				4.0
Total Split (s)	49.0	49.0			73.0			77.0				4.0
Total Split (%)	38.9%	38.9%			57.9%			61.1%				3%
Maximum Green (s)	43.0	43.0			67.0			71.0				1.0
Yellow Time (s)	4.0	4.0			4.0			4.0				3.0
All-Red Time (s)	2.0	2.0			2.0			2.0				0.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	6.0	6.0			6.0			6.0				
Lead/Lag					Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0			3.0				3.0
Recall Mode	C-Max	C-Max			Max			Max				Max
Walk Time (s)	7.0	7.0			7.0			7.0				
Flash Dont Walk (s)	12.0	12.0			17.0			21.0				
Pedestrian Calls (#/hr)	0	0			0			0				
Act Effct Green (s)	43.0	43.0			67.0			71.0				
Actuated g/C Ratio	0.34	0.34			0.53			0.56				
v/c Ratio	0.44	0.87			0.99			0.64				
Control Delay	35.7	44.1			41.3			35.7				
Queue Delay	0.0	11.9			16.0			0.4				
Total Delay	35.7	56.0			57.4			36.1				
LOS	D	E			E			D				
Approach Delay		53.3			57.4			36.1				
Approach LOS		D			E			D				
90th %ile Green (s)	43.0	43.0			67.0			71.0				1.0
90th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
70th %ile Green (s)	43.0	43.0			67.0			71.0				1.0
70th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
50th %ile Green (s)	43.0	43.0			67.0			71.0				1.0
50th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
30th %ile Green (s)	43.0	43.0			67.0			71.0				1.0
30th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
10th %ile Green (s)	43.0	43.0			67.0			71.0				1.0
10th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
Stops (vph)	183	1350			1505			944				
Fuel Used(l)	18	133			90			71				
CO Emissions (g/hr)	340	2472			1681			1313				
NOx Emissions (g/hr)	66	477			324			254				
VOC Emissions (g/hr)	78	570			388			303				
Dilemma Vehicles (#)	0	0			0			0				
Queue Length 50th (m)	45.8	114.1			238.8			138.5				
Queue Length 95th (m)	m67.4	m130.1			#288.2			160.9				
Internal Link Dist (m)		253.5			9.4			189.8		87.1		
Turn Bay Length (m)	230.0	230.0										
Base Capacity (vph)	546	1775			1802			1731				

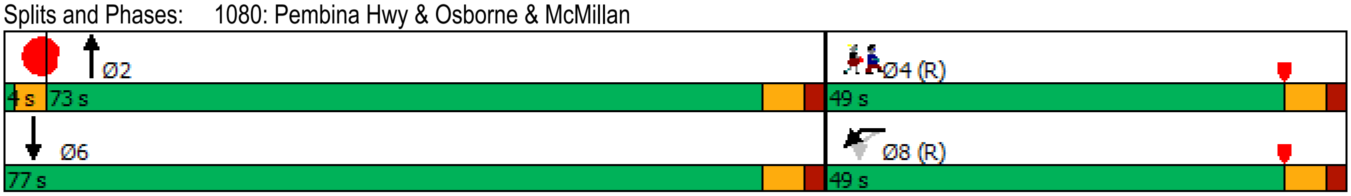
Lane Group	Ø4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	32.0
Total Split (s)	49.0
Total Split (%)	39%
Maximum Green (s)	43.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	7.0
Flash Dont Walk (s)	19.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	43.0
90th %ile Term Code	Coord
70th %ile Green (s)	43.0
70th %ile Term Code	Coord
50th %ile Green (s)	43.0
50th %ile Term Code	Coord
30th %ile Green (s)	43.0
30th %ile Term Code	Coord
10th %ile Green (s)	43.0
10th %ile Term Code	Coord
Stops (vph)	
Fuel Used(l)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Starvation Cap Reductn	0	0			95			110				
Spillback Cap Reductn	0	243			0			202				
Storage Cap Reductn	0	0			0			0				
Reduced v/c Ratio	0.44	1.01			1.04			0.72				

Intersection Summary

Area Type: Other
Cycle Length: 126
Actuated Cycle Length: 126
Offset: 96 (76%), Referenced to phase 4:Ped and 8:WBL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 50.8 Intersection LOS: D
Intersection Capacity Utilization 88.2% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1080: Pembina Hwy & Osborne & McMillan



Lane Group	Ø4
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Future Volume (vph)	290	460	20	0	0	0	0	2020	890	0	1435	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99	1.00	0.98						0.98			
Frt			0.850						0.850			
Flt Protected	0.950	0.994										
Satd. Flow (prot)	1543	3228	1517	0	0	0	0	3293	1517	0	3293	0
Flt Permitted	0.950	0.994										
Satd. Flow (perm)	1526	3224	1491	0	0	0	0	3293	1480	0	3293	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						74			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		259.7			270.5			355.4			230.8	
Travel Time (s)		18.7			19.5			21.3			13.8	
Confl. Peds. (#/hr)	9		17						4			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.82	0.90	0.66	1.00	1.00	1.00	1.00	0.96	0.91	1.00	0.94	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%
Adj. Flow (vph)	354	511	30	0	0	0	0	2104	978	0	1527	0
Shared Lane Traffic (%)	21%											
Lane Group Flow (vph)	280	585	30	0	0	0	0	2104	978	0	1527	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						83.0	83.0		83.0	
Total Split (%)	30.8%	30.8%						69.2%	69.2%		69.2%	
Maximum Green (s)	31.0	31.0						78.0	78.0		78.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)	-1.5	-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)	4.5	4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)	28.7	28.7	120.0					83.3	83.3		83.3	
Actuated g/C Ratio	0.24	0.24	1.00					0.69	0.69		0.69	
v/c Ratio	0.77	0.76	0.02					0.92	0.93		0.67	
Control Delay	56.9	49.1	0.0					19.6	27.8		12.1	
Queue Delay	0.0	0.0	0.0					45.5	0.0		0.2	
Total Delay	56.9	49.1	0.0					65.1	27.8		12.3	
LOS	E	D	A					E	C		B	
Approach Delay		49.9						53.2			12.3	
Approach LOS		D						D			B	
90th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
90th %ile Term Code	Max	Max						Coord	Coord		Coord	
70th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
70th %ile Term Code	Max	Max						Coord	Coord		Coord	
50th %ile Green (s)	27.9	27.9						81.1	81.1		81.1	
50th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
30th %ile Green (s)	25.2	25.2						83.8	83.8		83.8	
30th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
10th %ile Green (s)	20.7	20.7						88.3	88.3		88.3	
10th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
Stops (vph)	211	470	0					914	404		1011	
Fuel Used(l)	20	43	0					122	60		75	
CO Emissions (g/hr)	381	801	9					2274	1107		1390	
NOx Emissions (g/hr)	73	155	2					439	214		268	
VOC Emissions (g/hr)	88	185	2					524	255		321	
Dilemma Vehicles (#)	0	0	0					85	0		30	
Queue Length 50th (m)	67.3	70.1	0.0					84.8	74.8		125.8	
Queue Length 95th (m)	86.8	88.0	0.0					#297.8	#298.9		139.9	

Lane Group	Ø8
Detector 2 Extend (s)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	31%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	31.0
90th %ile Term Code	Hold
70th %ile Green (s)	31.0
70th %ile Term Code	Hold
50th %ile Green (s)	27.9
50th %ile Term Code	Hold
30th %ile Green (s)	25.2
30th %ile Term Code	Hold
10th %ile Green (s)	20.7
10th %ile Term Code	Hold
Stops (vph)	
Fuel Used(l)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (m)	
Queue Length 95th (m)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		235.7			246.5			331.4			206.8	
Turn Bay Length (m)	45.0		30.0									
Base Capacity (vph)	413	873	1491					2286	1050		2286	
Starvation Cap Reductn	0	0	0					0	0		170	
Spillback Cap Reductn	0	0	0					463	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.68	0.67	0.02					1.15	0.93		0.72	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 72 (60%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 41.3 Intersection LOS: D

Intersection Capacity Utilization 102.1% ICU Level of Service G

Analysis Period (min) 15

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

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø4	Ø8
Lane Configurations			↑↑↑			↑↑		
Traffic Volume (vph)	0	0	2020	0	0	2230		
Future Volume (vph)	0	0	2020	0	0	2230		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95		
Frt								
Flt Protected								
Satd. Flow (prot)	0	0	5142	0	0	3579		
Flt Permitted								
Satd. Flow (perm)	0	0	5142	0	0	3579		
Right Turn on Red		Yes		Yes				
Satd. Flow (RTOR)								
Link Speed (k/h)	48		60			60		
Link Distance (m)	72.4		31.4			355.4		
Travel Time (s)	5.4		1.9			21.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	0	0	2196	0	0	2424		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	2196	0	0	2424		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Right	Left	Left		
Median Width(m)	0.0		0.0			0.0		
Link Offset(m)	0.0		0.0			0.0		
Crosswalk Width(m)	4.8		4.8			4.8		
Two way Left Turn Lane								
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99		
Turning Speed (k/h)	24	14		14	24			
Number of Detectors			2			2		
Detector Template			Thru			Thru		
Leading Detector (m)			10.0			10.0		
Trailing Detector (m)			0.0			0.0		
Detector 1 Position(m)			0.0			0.0		
Detector 1 Size(m)			0.6			0.6		
Detector 1 Type			Cl+Ex			Cl+Ex		
Detector 1 Channel								
Detector 1 Extend (s)			0.0			0.0		
Detector 1 Queue (s)			0.0			0.0		
Detector 1 Delay (s)			0.0			0.0		
Detector 2 Position(m)			9.4			9.4		
Detector 2 Size(m)			0.6			0.6		
Detector 2 Type			Cl+Ex			Cl+Ex		
Detector 2 Channel								
Detector 2 Extend (s)			0.0			0.0		
Turn Type			NA			NA		
Protected Phases			2			6	4	8
Permitted Phases								
Detector Phase			2			6		
Switch Phase								
Minimum Initial (s)			4.0			4.0	4.0	4.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø4	Ø8
Minimum Split (s)			22.0			22.0	32.0	32.0
Total Split (s)			88.0			88.0	32.0	32.0
Total Split (%)			73.3%			73.3%	27%	27%
Maximum Green (s)			82.0			82.0	29.0	29.0
Yellow Time (s)			4.0			4.0	3.0	3.0
All-Red Time (s)			2.0			2.0	0.0	0.0
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			6.0		
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)			3.0			3.0	3.0	3.0
Recall Mode			C-Max			C-Max	None	None
Walk Time (s)			5.0			5.0	7.0	7.0
Flash Dont Walk (s)			11.0			11.0	22.0	22.0
Pedestrian Calls (#/hr)			0			0	50	0
Act Effct Green (s)			89.6			89.6		
Actuated g/C Ratio			0.75			0.75		
v/c Ratio			0.57			0.91		
Control Delay			9.7			15.1		
Queue Delay			0.0			0.0		
Total Delay			9.7			15.1		
LOS			A			B		
Approach Delay			9.7			15.1		
Approach LOS			A			B		
90th %ile Green (s)			82.0			82.0	29.0	29.0
90th %ile Term Code			Coord			Coord	Ped	Hold
70th %ile Green (s)			82.0			82.0	29.0	29.0
70th %ile Term Code			Coord			Coord	Ped	Hold
50th %ile Green (s)			82.0			82.0	29.0	29.0
50th %ile Term Code			Coord			Coord	Ped	Hold
30th %ile Green (s)			82.0			82.0	29.0	29.0
30th %ile Term Code			Coord			Coord	Ped	Hold
10th %ile Green (s)			114.0			114.0	0.0	0.0
10th %ile Term Code			Coord			Coord	Skip	Skip
Stops (vph)			888			778		
Fuel Used(l)			49			120		
CO Emissions (g/hr)			915			2229		
NOx Emissions (g/hr)			177			430		
VOC Emissions (g/hr)			211			514		
Dilemma Vehicles (#)			70			108		
Queue Length 50th (m)			95.0			122.2		
Queue Length 95th (m)			107.7			m127.2		
Internal Link Dist (m)	48.4		7.4			331.4		
Turn Bay Length (m)								
Base Capacity (vph)			3839			2672		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			0.57			0.91		

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 66.6%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 7: Donald

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Lane Configurations												
Traffic Volume (vph)	540	2360	25	0	945	0	0	990	320	0	0	
Future Volume (vph)	540	2360	25	0	945	0	0	990	320	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)		230.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Storage Lanes		1	0	0		1	0		0	0	0	
Taper Length (m)		7.5		7.5			7.5			7.5		
Lane Util. Factor	1.00	*1.00	0.91	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	
Frt		0.998						0.962				
Flt Protected	0.950	0.953										
Satd. Flow (prot)	1601	5091	0	0	3390	0	0	3124	0	0	0	
Flt Permitted	0.950	0.953										
Satd. Flow (perm)	1601	5091	0	0	3390	0	0	3124	0	0	0	
Right Turn on Red			Yes			Yes			No			
Satd. Flow (RTOR)		73										
Link Speed (k/h)		60			50			50		60		
Link Distance (m)		277.5			33.4			213.8		111.1		
Travel Time (s)		16.7			2.4			15.4		6.7		
Peak Hour Factor	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	0.92	1.00	1.00	
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	
Adj. Flow (vph)	540	2360	25	0	1038	0	0	1042	348	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	540	2385	0	0	1038	0	0	1390	0	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	
Median Width(m)		14.8			0.0			0.0		0.0		
Link Offset(m)		0.0			0.0			0.0		0.0		
Crosswalk Width(m)		4.8			4.8			4.8		4.8		
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
Turning Speed (k/h)	24	24	60	24		14	24		60	24	14	
Number of Detectors	2	2			2			2				
Detector Template												
Leading Detector (m)	15.2	15.2			15.2			15.2				
Trailing Detector (m)	0.0	0.0			0.0			0.0				
Detector 1 Position(m)	0.0	0.0			0.0			0.0				
Detector 1 Size(m)	1.8	1.8			1.8			1.8				
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0			0.0				
Detector 1 Queue (s)	0.0	0.0			0.0			0.0				
Detector 1 Delay (s)	0.0	0.0			0.0			0.0				
Detector 2 Position(m)	13.4	13.4			13.4			13.4				
Detector 2 Size(m)	1.8	1.8			1.8			1.8				
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0			0.0				
Turn Type	Perm	Prot			NA			NA				
Protected Phases		8			2			6				1

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4

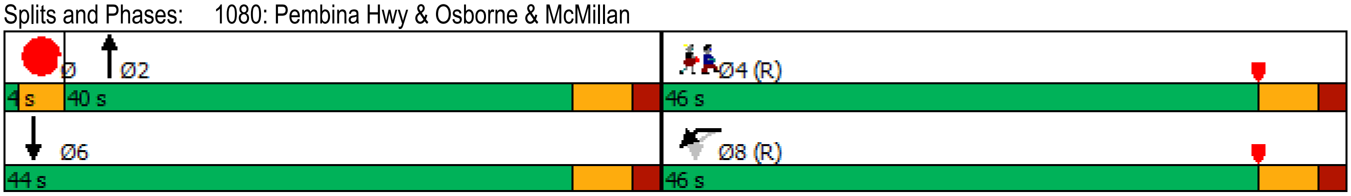
Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Permitted Phases	8				2			6				
Detector Phase	8	8			2			6				
Switch Phase												
Minimum Initial (s)	10.0	10.0			7.0			7.0				1.0
Minimum Split (s)	25.0	25.0			30.0			34.0				4.0
Total Split (s)	46.0	46.0			40.0			44.0				4.0
Total Split (%)	51.1%	51.1%			44.4%			48.9%				4%
Maximum Green (s)	40.0	40.0			34.0			38.0				1.0
Yellow Time (s)	4.0	4.0			4.0			4.0				3.0
All-Red Time (s)	2.0	2.0			2.0			2.0				0.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	6.0	6.0			6.0			6.0				
Lead/Lag					Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0			3.0				3.0
Recall Mode	C-Max	C-Max			Max			Max				Max
Walk Time (s)	7.0	7.0			7.0			7.0				
Flash Dont Walk (s)	12.0	12.0			17.0			21.0				
Pedestrian Calls (#/hr)	0	0			0			0				
Act Effct Green (s)	40.0	40.0			34.0			38.0				
Actuated g/C Ratio	0.44	0.44			0.38			0.42				
v/c Ratio	0.76	1.04			0.81			1.05				
Control Delay	30.0	54.4			29.6			56.6				
Queue Delay	57.3	26.8			18.6			19.2				
Total Delay	87.4	81.1			48.2			75.8				
LOS	F	F			D			E				
Approach Delay		82.3			48.2			75.8				
Approach LOS		F			D			E				
90th %ile Green (s)	40.0	40.0			34.0			38.0				1.0
90th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
70th %ile Green (s)	40.0	40.0			34.0			38.0				1.0
70th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
50th %ile Green (s)	40.0	40.0			34.0			38.0				1.0
50th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
30th %ile Green (s)	40.0	40.0			34.0			38.0				1.0
30th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
10th %ile Green (s)	40.0	40.0			34.0			38.0				1.0
10th %ile Term Code	Coord	Coord			MaxR			MaxR				MaxR
Stops (vph)	444	2032			879			1080				
Fuel Used(l)	40	223			44			108				
CO Emissions (g/hr)	741	4145			823			2006				
NOx Emissions (g/hr)	143	800			159			387				
VOC Emissions (g/hr)	171	956			190			463				
Dilemma Vehicles (#)	0	0			0			0				
Queue Length 50th (m)	76.5	~146.7			94.2			~141.2				
Queue Length 95th (m)	m115.0	m#173.0			117.7			#176.8				
Internal Link Dist (m)		253.5			9.4			189.8		87.1		
Turn Bay Length (m)	230.0	230.0										
Base Capacity (vph)	711	2303			1280			1319				

Lane Group	Ø4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	32.0
Total Split (s)	46.0
Total Split (%)	51%
Maximum Green (s)	40.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	7.0
Flash Dont Walk (s)	19.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	40.0
90th %ile Term Code	Coord
70th %ile Green (s)	40.0
70th %ile Term Code	Coord
50th %ile Green (s)	40.0
50th %ile Term Code	Coord
30th %ile Green (s)	40.0
30th %ile Term Code	Coord
10th %ile Green (s)	40.0
10th %ile Term Code	Coord
Stops (vph)	
Fuel Used(l)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Starvation Cap Reductn	0	0			261			0				
Spillback Cap Reductn	406	409			0			204				
Storage Cap Reductn	0	0			0			0				
Reduced v/c Ratio	1.77	1.26			1.02			1.25				

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 48 (53%), Referenced to phase 4:Ped and 8:WBL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 74.0 Intersection LOS: E
Intersection Capacity Utilization 97.6% ICU Level of Service F
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1080: Pembina Hwy & Osborne & McMillan



Lane Group	Ø4
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Future Volume (vph)	220	485	40	0	0	0	0	1355	875	0	2375	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor			0.98						0.97			
Frt			0.850						0.850			
Flt Protected	0.950	0.998										
Satd. Flow (prot)	1543	3241	1517	0	0	0	0	3293	1517	0	3357	0
Flt Permitted	0.950	0.998										
Satd. Flow (perm)	1543	3241	1487	0	0	0	0	3293	1473	0	3357	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73						67			
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		259.7			270.5			355.4			230.8	
Travel Time (s)		18.7			19.5			21.3			13.8	
Confl. Peds. (#/hr)			26						7			
Confl. Bikes (#/hr)									16			
Peak Hour Factor	0.87	0.95	0.89	1.00	1.00	1.00	1.00	0.97	0.94	1.00	0.98	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Adj. Flow (vph)	253	511	45	0	0	0	0	1397	931	0	2423	0
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	228	536	45	0	0	0	0	1397	931	0	2423	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1					2	1		2	
Detector Template	Left	Thru	Right					Thru	Right		Thru	
Leading Detector (m)	2.0	10.0	2.0					10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0					0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Free					NA	Perm		NA	
Protected Phases		4						2			6	
Permitted Phases	4		Free						2			
Detector Phase	4	4						2	2		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0						10.0	10.0		10.0	
Minimum Split (s)	37.0	37.0						26.0	26.0		26.0	
Total Split (s)	37.0	37.0						83.0	83.0		83.0	
Total Split (%)	30.8%	30.8%						69.2%	69.2%		69.2%	
Maximum Green (s)	31.0	31.0						78.0	78.0		78.0	
Yellow Time (s)	4.0	4.0						4.0	4.0		4.0	
All-Red Time (s)	2.0	2.0						1.0	1.0		1.0	
Lost Time Adjust (s)	-1.5	-1.5						-1.5	-1.5		-1.5	
Total Lost Time (s)	4.5	4.5						3.5	3.5		3.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0						3.0	3.0		3.0	
Recall Mode	None	None						C-Max	C-Max		C-Max	
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	
Flash Dont Walk (s)	24.0	24.0						14.0	14.0		14.0	
Pedestrian Calls (#/hr)	16	16						0	0		0	
Act Effct Green (s)	27.4	27.4	120.0					84.6	84.6		84.6	
Actuated g/C Ratio	0.23	0.23	1.00					0.70	0.70		0.70	
v/c Ratio	0.65	0.73	0.03					0.60	0.88		1.02	
Control Delay	50.3	48.4	0.1					4.6	19.1		37.1	
Queue Delay	0.0	0.0	0.0					0.1	0.0		0.7	
Total Delay	50.3	48.4	0.1					4.7	19.1		37.9	
LOS	D	D	A					A	B		D	
Approach Delay		46.3						10.5			37.9	
Approach LOS		D						B			D	
90th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
90th %ile Term Code	Max	Max						Coord	Coord		Coord	
70th %ile Green (s)	31.0	31.0						78.0	78.0		78.0	
70th %ile Term Code	Ped	Ped						Coord	Coord		Coord	
50th %ile Green (s)	25.8	25.8						83.2	83.2		83.2	
50th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
30th %ile Green (s)	22.6	22.6						86.4	86.4		86.4	
30th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
10th %ile Green (s)	19.1	19.1						89.9	89.9		89.9	
10th %ile Term Code	Gap	Gap						Coord	Coord		Coord	
Stops (vph)	175	454	0					191	391		1486	
Fuel Used(l)	16	42	1					53	52		163	
CO Emissions (g/hr)	306	773	18					982	976		3039	
NOx Emissions (g/hr)	59	149	4					190	188		587	
VOC Emissions (g/hr)	71	178	4					227	225		701	
Dilemma Vehicles (#)	0	0	0					56	0		87	
Queue Length 50th (m)	53.8	64.5	0.0					18.8	71.8		~192.3	
Queue Length 95th (m)	75.4	80.0	0.0					21.6	#142.7		#378.1	

Lane Group	Ø8
Detector 2 Extend (s)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	35.0
Total Split (s)	37.0
Total Split (%)	31%
Maximum Green (s)	31.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	22.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	31.0
90th %ile Term Code	Hold
70th %ile Green (s)	31.0
70th %ile Term Code	Hold
50th %ile Green (s)	25.8
50th %ile Term Code	Hold
30th %ile Green (s)	22.6
30th %ile Term Code	Hold
10th %ile Green (s)	19.1
10th %ile Term Code	Hold
Stops (vph)	
Fuel Used(l)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (m)	
Queue Length 95th (m)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		235.7			246.5			331.4			206.8	
Turn Bay Length (m)	45.0		30.0									
Base Capacity (vph)	417	877	1487					2321	1058		2366	
Starvation Cap Reductn	0	0	0					0	0		5	
Spillback Cap Reductn	0	0	0					137	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.55	0.61	0.03					0.64	0.88		1.03	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 91 (76%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 27.6 Intersection LOS: C
Intersection Capacity Utilization 97.2% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1086: Donald & Stradbrook

Lane Group	Ø8
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Lane Configurations												
Traffic Volume (vph)	240	1535	5	0	1620	0	0	605	430	0	0	
Future Volume (vph)	240	1535	5	0	1620	0	0	605	430	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)		230.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Storage Lanes		1	0	0		1	0		0	0	0	
Taper Length (m)		7.5		7.5			7.5			7.5		
Lane Util. Factor	1.00	*1.00	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	
Frt								0.937				
Flt Protected	0.950	0.953										
Satd. Flow (prot)	1601	3401	0	0	3390	0	0	3072	0	0	0	
Flt Permitted	0.950	0.953										
Satd. Flow (perm)	1601	3401	0	0	3390	0	0	3072	0	0	0	
Right Turn on Red			Yes			Yes			No			
Satd. Flow (RTOR)		87										
Link Speed (k/h)		60			50			50		60		
Link Distance (m)		277.5			33.4			213.8		111.1		
Travel Time (s)		16.7			2.4			15.4		6.7		
Peak Hour Factor	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	0.92	1.00	1.00	
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	
Adj. Flow (vph)	240	1535	5	0	1780	0	0	637	467	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	1540	0	0	1780	0	0	1104	0	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	
Median Width(m)		11.1			0.0			0.0		0.0		
Link Offset(m)		0.0			0.0			0.0		0.0		
Crosswalk Width(m)		4.8			4.8			4.8		4.8		
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
Turning Speed (k/h)	24	24	60	24		14	24		60	24	14	
Number of Detectors	2	2			2			2				
Detector Template												
Leading Detector (m)	15.2	15.2			15.2			15.2				
Trailing Detector (m)	0.0	0.0			0.0			0.0				
Detector 1 Position(m)	0.0	0.0			0.0			0.0				
Detector 1 Size(m)	1.8	1.8			1.8			1.8				
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0			0.0				
Detector 1 Queue (s)	0.0	0.0			0.0			0.0				
Detector 1 Delay (s)	0.0	0.0			0.0			0.0				
Detector 2 Position(m)	13.4	13.4			13.4			13.4				
Detector 2 Size(m)	1.8	1.8			1.8			1.8				
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0			0.0				
Turn Type	Perm	Prot			NA			NA				
Protected Phases		8			2			6				1

Lane Group	Ø4	Ø12
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	4	12

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Permitted Phases	8				2			6				
Detector Phase	8	8			2			6				
Switch Phase												
Minimum Initial (s)	10.0	10.0			7.0			7.0				1.0
Minimum Split (s)	25.0	25.0			30.0			34.0				4.0
Total Split (s)	48.0	48.0			54.0			58.0				4.0
Total Split (%)	38.1%	38.1%			42.9%			46.0%				3%
Maximum Green (s)	42.0	42.0			48.0			52.0				1.0
Yellow Time (s)	4.0	4.0			4.0			4.0				3.0
All-Red Time (s)	2.0	2.0			2.0			2.0				0.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	6.0	6.0			6.0			6.0				
Lead/Lag					Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0			3.0				3.0
Recall Mode	C-Max	C-Max			Max			Max				Max
Walk Time (s)	7.0	7.0			7.0			7.0				
Flash Dont Walk (s)	12.0	12.0			17.0			21.0				
Pedestrian Calls (#/hr)	0	0			0			0				
Act Effct Green (s)	42.0	42.0			48.0			72.0				
Actuated g/C Ratio	0.33	0.33			0.38			0.57				
v/c Ratio	0.45	1.29			1.38			0.63				
Control Delay	36.3	172.0			209.1			21.2				
Queue Delay	68.3	0.0			1.9			0.1				
Total Delay	104.6	172.0			210.9			21.2				
LOS	F	F			F			C				
Approach Delay		162.9			210.9			21.2				
Approach LOS		F			F			C				
90th %ile Green (s)	42.0	42.0			48.0			72.0				21.0
90th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
70th %ile Green (s)	42.0	42.0			48.0			72.0				21.0
70th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
50th %ile Green (s)	42.0	42.0			48.0			72.0				21.0
50th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
30th %ile Green (s)	42.0	42.0			48.0			72.0				21.0
30th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
10th %ile Green (s)	42.0	42.0			48.0			72.0				21.0
10th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
Stops (vph)	185	1169			1262			599				
Fuel Used(l)	18	279			294			51				
CO Emissions (g/hr)	343	5183			5469			954				
NOx Emissions (g/hr)	66	1000			1056			184				
VOC Emissions (g/hr)	79	1196			1261			220				
Dilemma Vehicles (#)	0	0			0			0				
Queue Length 50th (m)	46.6	~237.0			~313.7			85.5				
Queue Length 95th (m)	70.5	#278.1			#356.8			98.6				
Internal Link Dist (m)		253.5			9.4			189.8		87.1		
Turn Bay Length (m)	230.0	230.0										
Base Capacity (vph)	533	1191			1291			1755				

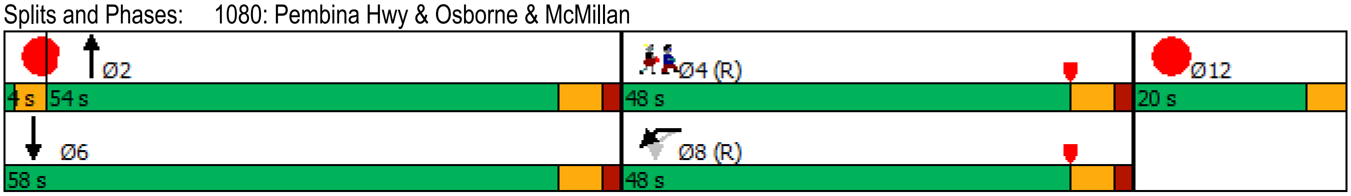
Lane Group	Ø4	Ø12
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	4.0
Minimum Split (s)	32.0	20.0
Total Split (s)	48.0	20.0
Total Split (%)	38%	16%
Maximum Green (s)	42.0	16.0
Yellow Time (s)	4.0	4.0
All-Red Time (s)	2.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	None
Walk Time (s)	7.0	5.0
Flash Dont Walk (s)	19.0	11.0
Pedestrian Calls (#/hr)	0	0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	42.0	0.0
90th %ile Term Code	Coord	Skip
70th %ile Green (s)	42.0	0.0
70th %ile Term Code	Coord	Skip
50th %ile Green (s)	42.0	0.0
50th %ile Term Code	Coord	Skip
30th %ile Green (s)	42.0	0.0
30th %ile Term Code	Coord	Skip
10th %ile Green (s)	42.0	0.0
10th %ile Term Code	Coord	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Starvation Cap Reductn	0	0			430			0				
Spillback Cap Reductn	373	0			0			63				
Storage Cap Reductn	0	0			0			0				
Reduced v/c Ratio	1.50	1.29			2.07			0.65				

Intersection Summary

Area Type: Other
Cycle Length: 126
Actuated Cycle Length: 126
Offset: 0 (0%), Referenced to phase 4:Ped and 8:WBL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 147.7 Intersection LOS: F
Intersection Capacity Utilization 103.7% ICU Level of Service G
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1080: Pembina Hwy & Osborne & McMillan



Lane Group	Ø4	Ø12
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Lane Configurations												
Traffic Volume (vph)	540	2360	25	0	945	0	0	990	320	0	0	
Future Volume (vph)	540	2360	25	0	945	0	0	990	320	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)		230.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Storage Lanes		1	0	0		1	0		0	0	0	
Taper Length (m)		7.5		7.5			7.5			7.5		
Lane Util. Factor	1.00	*1.00	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	
Frt		0.998						0.962				
Flt Protected	0.950	0.953										
Satd. Flow (prot)	1601	3394	0	0	3390	0	0	3124	0	0	0	
Flt Permitted	0.950	0.953										
Satd. Flow (perm)	1601	3394	0	0	3390	0	0	3124	0	0	0	
Right Turn on Red			Yes			Yes			No			
Satd. Flow (RTOR)		121										
Link Speed (k/h)		60			50			50		60		
Link Distance (m)		277.5			33.4			213.8		111.1		
Travel Time (s)		16.7			2.4			15.4		6.7		
Peak Hour Factor	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	0.92	1.00	1.00	
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	
Adj. Flow (vph)	540	2360	25	0	1038	0	0	1042	348	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	540	2385	0	0	1038	0	0	1390	0	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	
Median Width(m)		11.1			0.0			0.0		0.0		
Link Offset(m)		0.0			0.0			0.0		0.0		
Crosswalk Width(m)		4.8			4.8			4.8		4.8		
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
Turning Speed (k/h)	24	24	60	24		14	24		60	24	14	
Number of Detectors	2	2			2			2				
Detector Template												
Leading Detector (m)	15.2	15.2			15.2			15.2				
Trailing Detector (m)	0.0	0.0			0.0			0.0				
Detector 1 Position(m)	0.0	0.0			0.0			0.0				
Detector 1 Size(m)	1.8	1.8			1.8			1.8				
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0			0.0				
Detector 1 Queue (s)	0.0	0.0			0.0			0.0				
Detector 1 Delay (s)	0.0	0.0			0.0			0.0				
Detector 2 Position(m)	13.4	13.4			13.4			13.4				
Detector 2 Size(m)	1.8	1.8			1.8			1.8				
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0			0.0				
Turn Type	Perm	Prot			NA			NA				
Protected Phases		8			2			6				1

Lane Group	Ø4	Ø12
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	4	12

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Permitted Phases	8				2			6				
Detector Phase	8	8			2			6				
Switch Phase												
Minimum Initial (s)	10.0	10.0			7.0			7.0				1.0
Minimum Split (s)	25.0	25.0			30.0			34.0				4.0
Total Split (s)	35.0	35.0			31.0			35.0				4.0
Total Split (%)	38.9%	38.9%			34.4%			38.9%				4%
Maximum Green (s)	29.0	29.0			25.0			29.0				1.0
Yellow Time (s)	4.0	4.0			4.0			4.0				3.0
All-Red Time (s)	2.0	2.0			2.0			2.0				0.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	6.0	6.0			6.0			6.0				
Lead/Lag					Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0			3.0				3.0
Recall Mode	C-Max	C-Max			Max			Max				Max
Walk Time (s)	7.0	7.0			7.0			7.0				
Flash Dont Walk (s)	12.0	12.0			17.0			21.0				
Pedestrian Calls (#/hr)	0	0			0			0				
Act Effct Green (s)	29.0	29.0			25.0			49.0				
Actuated g/C Ratio	0.32	0.32			0.28			0.54				
v/c Ratio	1.05	2.03			1.10			0.82				
Control Delay	84.9	488.0			99.5			39.1				
Queue Delay	0.0	1.9			1.8			52.0				
Total Delay	84.9	489.9			101.4			91.1				
LOS	F	F			F			F				
Approach Delay		415.1			101.4			91.1				
Approach LOS		F			F			F				
90th %ile Green (s)	29.0	29.0			25.0			49.0				21.0
90th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
70th %ile Green (s)	29.0	29.0			25.0			49.0				21.0
70th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
50th %ile Green (s)	29.0	29.0			25.0			49.0				21.0
50th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
30th %ile Green (s)	29.0	29.0			25.0			49.0				21.0
30th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
10th %ile Green (s)	29.0	29.0			25.0			49.0				21.0
10th %ile Term Code	Coord	Coord			MaxR			Hold				MaxR
Stops (vph)	450	1603			794			1237				
Fuel Used(l)	63	1005			93			94				
CO Emissions (g/hr)	1168	18692			1733			1743				
NOx Emissions (g/hr)	225	3608			334			336				
VOC Emissions (g/hr)	269	4311			400			402				
Dilemma Vehicles (#)	0	0			0			0				
Queue Length 50th (m)	~102.5	~323.7			~106.6			132.1				
Queue Length 95th (m)	#162.1	#364.4			#146.2			142.7				
Internal Link Dist (m)		253.5			9.4			189.8		87.1		
Turn Bay Length (m)	230.0	230.0										
Base Capacity (vph)	515	1175			941			1700				

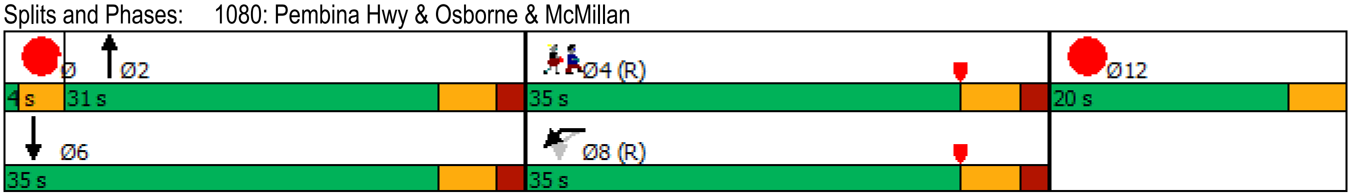
Lane Group	Ø4	Ø12
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	4.0
Minimum Split (s)	32.0	20.0
Total Split (s)	35.0	20.0
Total Split (%)	39%	22%
Maximum Green (s)	29.0	16.0
Yellow Time (s)	4.0	4.0
All-Red Time (s)	2.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	C-Max	None
Walk Time (s)	7.0	5.0
Flash Dont Walk (s)	19.0	11.0
Pedestrian Calls (#/hr)	0	0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
90th %ile Green (s)	29.0	0.0
90th %ile Term Code	Coord	Skip
70th %ile Green (s)	29.0	0.0
70th %ile Term Code	Coord	Skip
50th %ile Green (s)	29.0	0.0
50th %ile Term Code	Coord	Skip
30th %ile Green (s)	29.0	0.0
30th %ile Term Code	Coord	Skip
10th %ile Green (s)	29.0	0.0
10th %ile Term Code	Coord	Skip
Stops (vph)		
Fuel Used(l)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	Ø1
Starvation Cap Reductn	0	0			258			0				
Spillback Cap Reductn	0	373			0			1108				
Storage Cap Reductn	0	0			0			0				
Reduced v/c Ratio	1.05	2.97			1.52			2.35				

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:Ped and 8:WBL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.03
Intersection Signal Delay: 270.2 Intersection LOS: F
Intersection Capacity Utilization 121.6% ICU Level of Service H
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1080: Pembina Hwy & Osborne & McMillan



Lane Group	Ø4	Ø12
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

APPENDIX

C CYCLING NETWORK COST ESTIMATE

Basis of Estimate Cost Detail

Investment: Osborne Village Cycling Network

Estimate Date: July 31, 2019

Class of Estimate: 4

($ thousands)		Estimate Year	Year Project Work Undertaken								% of Project Work Undertaken						Check
Cost Escalation / Construction Inflation			3%	3%	3%												
Estimate Detail	% of Const.	2018	2019	2020	2021				Total		2019	2020	2021	0	0	0	Total %
Construction Costs																	
River Avenue - Nassau Street to Main Street	45%	$778	$0	$0	$850	$0	$0	$0	$850				100%				100%
Stradbrook Avenue - Nassau Street to Harkness Avenue	46%	$798	$0	$0	$873	$0	$0	$0	$873				100%				100%
Wardlaw Avenue - Nassau Street to Scott Street, Scott Street - Wardlaw Avenue to River Avenue	7%	$119	$0	$0	$131	$0	$0	$0	$131				100%				100%
Lewis Street, Back Lane, Clark Street - River Avenue to Donald Street	2%	$29	$0	$0	$32	$0	$0	$0	$32				100%				100%
	0%		$0	$0	$0	$0	$0	$0	$0								0%
	0%		$0	$0	$0	$0	$0	$0	$0								0%
Sub-total	100%	**$1,724**	**$0**	**$0**	**$1,886**	**$0**	**$0**	**$0**	**$1,886**								
Engineering Costs	% of Const																
Preliminary Design	2%	$34.48	$0	$37	$0	$0	$0	$0	$37			100%					100%
Detailed Design	4%	$68.97	$0	$74	$0	$0	$0	$0	$74			100%					100%
Contract Administration	5%	$86.21	$0	$0	$95	$0	$0	$0	$95				100%				100%
Post-Construction Services	1%	$17.24	$0	$0	$19	$0	$0	$0	$19				100%				100%
Sub-total	12%	**$207**	**$0**	**$111**	**$114**	**$0**	**$0**	**$0**	**$225**								
Construction & Engineering Sub-total		**$1,931**															
Utility Costs	% C&E																
Hydro	0%		$0	$0	$0	$0	$0	$0	$0								0%
Communication - MTS	0%		$0	$0	$0	$0	$0	$0	$0								0%
Communication - Shaw	0%		$0	$0	$0	$0	$0	$0	$0								0%
General Utilities	5%	$100	$0	$0	$110	$0	$0	$0	$110				100%				100%
Sub-total	5%	**$100**	**$0**	**$0**	**$110**	**$0**	**$0**	**$0**	**$110**								
Other Costs	% C&E																
Land Acquisition	0%		$0	$0	$0	$0	$0	$0	$0								0%
	0%		$0	$0	$0	$0	$0	$0	$0								0%
	0%		$0	$0	$0	$0	$0	$0	$0								0%
	0%		$0	$0	$0	$0	$0	$0	$0								0%
	0%		$0	$0	$0	$0	$0	$0	$0								0%
Sub-total	0%	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**								
Project Costs before Contingencies Sub-total		**$2,031**	**$0**	**$111**	**$2,110**	**$0**	**$0**	**$0**	**$2,221**								
Contingencies Costs	% Proj Cost																
Commercial	4%	$77	$0	$0	$85	$0	$0	$0	$85				100%				100%
Environmental	0%	$0	$0	$0	$0	$0	$0	$0	$0				100%				100%
Reputational	0%	$0	$0	$0	$0	$0	$0	$0	$0				100%				100%
Technical	8%	$154	$0	$0	$169	$0	$0	$0	$169				100%				100%
Construction Delay/Variances	5%	$97	$0	$0	$106	$0	$0	$0	$106				100%				100%
Geotechnical Unknowns	2%	$39	$0	$0	$43	$0	$0	$0	$43				100%				100%
Unknown - Others	1%	$19	$0	$0	$22	$0	$0	$0	$22				100%				100%
Sub-total	20%	**$386**	**$0**	**$0**	**$425**	**$0**	**$0**	**$0**	**$425**	19%							
										% increase from base							
Project Sub-total before Charges		**$2,417**	**$0**	**$111**	**$2,535**	**$0**	**$0**	**$0**	**$2,646**	109%							
Summary of Interest and Admin Overhead Charges																	
Overhead / Admin Charges	**3.25%**	$79	$0	$4	$82	$0	$0	$0	$86								
Corporate Interest	**2.00%**	$48	$0	$2	$51	$0	$0	$0	$53								
										% increase over base							
Total Project Cost		**$2,544**	**$0**	**$117**	**$2,668**	**$0**	**$0**	**$0**	**$2,785**	109%							

Administrative Overhead Charges Detail

									Total								
Total Project Costs		$2,417	$0	$111	$2,535	$0	$0	$0	$2,646								
3rd Party Share of Project Costs		$0	$0	$0	$0	$0	$0	$0	$0								0%
City's Share of Project Costs		$2,417	$0	$111	$2,535	$0	$0	$0	$2,646								
Overhead & Administrative Charges																	
Departmental	2.00%	$48	$0	$2	$51	$0	$0	$0	$53								
Corporate Admin (max $100,000)	1.25%	$30	$0	$1	$32	$0	$0	$0	$33								
Research (SMIR) (Const only)	0.00%	$0	$0	$0	$0	$0	$0	$0	$0								
Overhead & Admin Charges Sub-total	3.25%	**$79**	**$0**	**$4**	**$82**	**$0**	**$0**	**$0**	**$86**	3.25%							

Financing Charges

Corporate Interest	2.00%	$48	$0	$2	$51	$0	$0	$0	$53

Operating Budget Impact Detail

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Salaries and Benefits										
Materials, Parts and Supplies										
Other										
Total Operating Impact	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
A	***River Avenue - Nassau Street to Main Street***					
	EARTH AND BASE WORKS					
A.1	Excavation	CW 3110-R19	m³	285	$25.00	$7,125.00
A.2	Sub-Grade Compaction	CW 3110-R19	m²	325	$1.25	$406.25
A.3	Crushed Sub-base Material	CW 3110-R19				
i)	50 mm		tonne	110	$30.00	$3,300.00
ii)	100 mm		tonne	335	$25.00	$8,375.00
A.4	Supplying and Placing Base Course Material	CW 3110-R19	m³	25	$80.00	$2,000.00
A.5	Separation Geotextile Fabric	CW 3130-R4	m²	325	$2.75	$893.75
	ROADWORKS - RENEWALS/REMOVALS					
A.6	Pavement Removal	CW 3110-R19				
i)	Asphalt Pavement		m²	2990	$7.00	$20,930.00
A.7	Miscellaneous Concrete Slab Removal	CW 3235-R9				
A.8	Concrete Curb Renewal	CW 3240-R10				
i)	Barrier (Dowelled)	SD-205, SD-206A				
a)	3 m to 30 m		m	120	$95.00	$11,400.00
A.9	Planing of Pavement	CW 3450-R6				
i)	50 - 100 mm Depth (Asphalt)		m²	3755	$5.00	$18,775.00
	ROADWORKS - NEW CONSTRUCTION					
A.10	Concrete Pavements, Median Slabs, Bull-noses, and Safety Medians	CW 3310-R17				
i)	Construction of Monolithic Concrete Median Slabs	SD-226A	m²	765	$100.00	$76,500.00
A.11	Concrete Curbs, Curb and Gutter, and Splash Strips	CW 3310-R17				
i)	Construction of Barrier (Dowelled)	SD-205	m	2005	$85.00	$170,425.00
A.12	Construction of Asphaltic Concrete Pavements	CW 3410-R11				
i)	Tie-ins and Approaches					

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
a)	Type IA		tonne	585	$190.00	$111,150.00
	JOINT AND CRACK SEALING					
A.13	Reflective Crack Maintenance	CW 3250-R7	m	1630	$5.00	$8,150.00
	ASSOCIATED DRAINAGE AND UNDERGROUND WORKS					
A.14	Catch Basin	CW 2130-R12				
i)	SD-024, 1800 mm deep		each	14	$5,500.00	$77,000.00
A.15	Drainage Connection Pipe	CW 2130-R12	m	140	$400.00	$56,000.00
A.16	Frames & Covers	CW3210-R8				
i)	AP-011 - Barrier Curb and Gutter Frame		each	14	$900.00	$12,600.00
ii)	AP-012 - Barrier Curb and Gutter Cover		each	14	$650.00	$9,100.00
A.17	Connecting to Existing Manhole	CW 2130-R12				
i)	Catch Basin Lead		each	14	$2,500.00	$35,000.00
	MISCELLANEOUS					
A.18	Detectable Tiles at Bus Stops		each	3	$3,500.00	$10,500.00
A.19	Green Paint		m²	343	$125.00	$42,875.00
A.20	Traffic Signals - Osborne St. & River Ave.		each	1	$45,000.00	$45,000.00
A.21	Traffic Signals - River Ave. & Harkness Ave.		each	1	$35,000.00	$35,000.00
A.22	Assessed Value of Trees to be Removed		LS	1	$15,000.00	$15,000.00
A	***River Avenue - Nassau Street to Main Street***				Subtotal:	$777,505.00

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
B	***Stradbrook Avenue - Nassau Street to Harkness Avenue***					
	EARTH AND BASE WORKS					
B.1	Excavation	CW 3110-R19	m³	355	$25.00	$8,875.00
B.2	Sub-Grade Compaction	CW 3110-R19	m²	610	$1.25	$762.50
B.3	Crushed Sub-base Material	CW 3110-R19				
i)	50 mm		tonne	385	$30.00	$11,550.00
ii)	100 mm		tonne	100	$25.00	$2,500.00
B.4	Supplying and Placing Base Course Material	CW 3110-R19	m³	85	$80.00	$6,800.00
B.5	Separation Geotextile Fabric	CW 3130-R4	m²	610	$2.75	$1,677.50
	ROADWORKS - RENEWALS/REMOVALS					
B.6	Pavement Removal	CW 3110-R19				
i)	Asphalt Pavement		m²	2180	$7.00	$15,260.00
B.7	Miscellaneous Concrete Slab Removal	CW 3235-R9				
B.8	Concrete Curb Renewal	CW 3240-R10				
i)	Barrier (Dowelled)	SD-205, SD-206A				
a)	3 m to 30 m		m	100	$95.00	$9,500.00
B.9	Planing of Pavement	CW 3450-R6				
i)	50 - 100 mm Depth (Asphalt)		m²	3070	$5.00	$15,350.00
	ROADWORKS - NEW CONSTRUCTION					
B.10	Concrete Pavements, Median Slabs, Bull-noses, and Safety Medians	CW 3310-R17				
i)	Construction of Monolithic Concrete Median Slabs	SD-226A	m²	890	$100.00	$89,000.00
B.11	Concrete Curbs, Curb and Gutter, and Splash Strips	CW 3310-R17				
i)	Construction of Barrier (Dowelled)	SD-205	m	1835	$85.00	$155,975.00
B.12	Construction of Asphaltic Concrete Pavements	CW 3410-R11				
i)	Tie-ins and Approaches					
a)	Type IA		tonne	520	$190.00	$98,800.00
	JOINT AND CRACK SEALING					
B.13	Reflective Crack Maintenance	CW 3250-R7	m	1360	$5.00	$6,800.00
	ASSOCIATED DRAINAGE AND UNDERGROUND WORKS					

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
B.14	Catch Basin	CW 2130-R12				
i)	SD-024, 1800 mm deep		each	8	$5,500.00	$44,000.00
B.15	Drainage Connection Pipe	CW 2130-R12	m	80	$400.00	$32,000.00
B.16	Frames & Covers	CW3210-R8				
i)	AP-011 - Barrier Curb and Gutter Frame		each	8	$900.00	$7,200.00
ii)	AP-012 - Barrier Curb and Gutter Cover		each	8	$650.00	$5,200.00
B.17	Connecting to Existing Manhole	CW 2130-R12				
i)	Catch Basin Lead		each	8	$2,500.00	$20,000.00
	MISCELLANEOUS					
B.18	Detectable Tiles at Bus Stops		each	3	$3,500.00	$10,500.00
B.19	Green Paint		m²	171	$125.00	$21,375.00
B.20	Traffic Signals - Nassau St. N. & Stradbrook Ave.		each	1	$40,000.00	$40,000.00
B.21	Traffic Signals - Osborne St. & Stradbrook Ave.		each	1	$90,000.00	$90,000.00
B.22	Traffic Signals - Donald St. and Stradbrook Ave.		each	1	$100,000.00	$100,000.00
B.23	Assessed Value of Trees to be Removed		LS	1	$5,200.00	$5,200.00
B	***Stradbrook Avenue - Nassau Street to Harkness Avenue***				Subtotal:	$798,325.00

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
C	***Wardlaw Avenue - Nassau Street to Scott Street, Scott Street - Wardlaw Avenue to River Avenue***					
	ROADWORKS - NEW CONSTRUCTION					
C.1	Concrete Pavements, Median Slabs, Bull-noses, and Safety Medians	CW 3310-R17				
i)	Construction of Monolithic Concrete Median Slabs	SD-226A	m²	40	$100.00	$4,000.00
C.2	Concrete Curbs, Curb and Gutter, and Splash Strips	CW 3310-R17				
i)	Construction of Barrier (^ mm ht, Dowelled)	SD-205	m	25	$85.00	$2,125.00
	MISCELLANEOUS					
C.3	Green Paint		m²	105	$125.00	$13,125.00
C.4	Traffic Signals - Osborne St. & Wardlaw Ave.		each	1	$100,000.00	$100,000.00
C	***Wardlaw Avenue - Nassau Street to Scott Street, Scott Street - Wardlaw Avenue to River Avenue***				Subtotal:	$119,250.00

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
D	***Lewis Street, Back Lane, Clark Street - River Avenue to Donald Street***					
	EARTH AND BASE WORKS					
D.1	Excavation	CW 3110-R19	m³	65	$25.00	$1,625.00
D.2	Sub-Grade Compaction	CW 3110-R19	m²	130	$1.25	$162.50
D.3	Crushed Sub-base Material	CW 3110-R19				
i)	50 mm		tonne	90	$30.00	$2,700.00
D.4	Supplying and Placing Base Course Material	CW 3110-R19	m³	20	$80.00	$1,600.00
D.5	Separation Geotextile Fabric	CW 3130-R4	m²	130	$2.75	$357.50
	ROADWORKS - RENEWALS/REMOVALS					
D.6	Pavement Removal	CW 3110-R19				
i)	Asphalt Pavement		m²	630	$7.00	$4,410.00
D.7	Construction of Asphaltic Concrete Overlay	CW 3410-R11				
i)	Main Line Paving					
a)	Type IA		tonne	125	$95.00	$11,875.00
	ROADWORKS - NEW CONSTRUCTION					
D.8	Construction of Asphaltic Concrete Pavements	CW 3410-R11				
i)	Tie-ins and Approaches					
a)	Type IA		tonne	25	$190.00	$4,750.00
	JOINT AND CRACK SEALING					
D.9	Reflective Crack Maintenance	CW 3250-R7	m	325	$5.00	$1,625.00
D	***Lewis Street, Back Lane, Clark Street - River Avenue to Donald Street***				Subtotal:	$29,105.00

UNIT PRICES

ITEM	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
	SUMMARY					
A	**River Avenue - Nassau Street to Main Street**				Subtotal:	$777,505.00
B	**Stradbrook Avenue - Nassau Street to Harkness Avenue**				Subtotal:	$798,325.00
C	**Wardlaw Avenue - Nassau Street to Scott Street, Scott Street - Wardlaw Avenue to River Avenue**				Subtotal:	$119,250.00
D	**Lewis Street, Back Lane, Clark Street - River Avenue to Donald Street**				Subtotal:	$29,105.00

TOTAL BID PRICE (GST extra) (in figures) $1,724,185.00