South Australian Jockey Club Incorporated

MORPHETTVILLE RACECOURSE DPA

SUPPLEMENTARY TRAFFIC ASSESSMENT CITY OF MARION ROAD NETWORK

November 2017

15-0440

Traffic • Parking • Transport

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DOCUMENT ISSUE

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CONTENTS

1.0 INTRODUCTION

This report is supplementary to the traffic impact assessment associated with the Morphettville Racecourse Development Plan Amendment (DPA). It has been prepared to inform the City of Marion in relation to the potential additional traffic which may utilise the local road network when accessing the subject land. MFY has previously undertaken a detailed traffic study of the DPA and its impact on the arterial road network in accordance with the scope identified by the Department of Planning, Transport and Infrastructure (DPTI).

This assessment, concentrates on the residential street network bound by Marion Road, Morphett Road, Bray Street and Anzac Highway, plus reviews the potential impact on the Park Terrace/Bray Street intersection. This is consistent with the information requested by Council.

The residential component of the DPA land applicable to this assessment is that proposed to be zoned residential to the north and north-east corner of the DPA land. This report has reviewed the potential volume associated with the residential development and considers the distribution and access routes likely to be adopted in the adjacent road network traffic that has been forecast as part of the DPA.

2.0 EXISTING SITUATION

2.1 SUBJECT SITE

The subject site is considered to be the area of the land subject to the DPA which will be accessed via Park Terrace. This portion of the land to be rezoned is located north-east of the Morphettville Racecourse. The site is currently occupied by Magic Millions and the former TAFE SA site and an underutilised area of the racecourse. It is bound by the Glenelg Tram Line to the north, Park Terrace to the east and the Racecourse to the south and west, as illustrated in Figure 1.

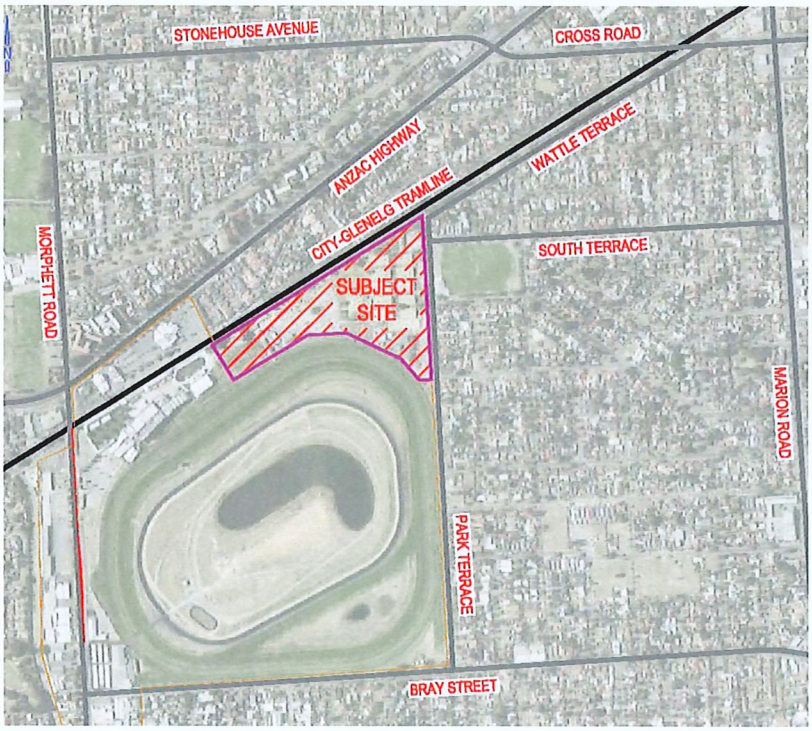

Figure 1: Locality Plan

Access to the subject site is available via two crossovers on Park Terrace. The southern crossover is located adjacent Tennyson Avenue and the northern crossover is located adjacent Wattle Terrace. Both these accesses permit all movements.

2.2 ROAD NETWORK

Park Terrace is a collector road which extends along the eastern boundary of Morphettville Racecourse, between Wattle Terrace and Bray Street. It has residential properties along its eastern side.

Bray Street is a major collector road which provides a connection between Morphett Road and Marion Road. It is signalised at both ends and intersects with Park Terrace approximately mid-block along its length.

Wattle Terrace is a residential street located to the south of the tram line. It extends from Park Terrace to Cross Road but only entry movements are permitted at the Wattle Terrace/Cross Road intersection. Wattle Terrace has residential properties along its southern side.

Stradbroke Avenue and Milton Avenue provide a relatively direct connection between Park Terrace and Marion Road. Milton Avenue intersects Park Terrace at a roundabout which is located adjacent the subject land.

The residential area to the east of the subject site is predominantly grid like in nature with a number of linkages between Marion Road and Park Terrace. The majority of intersections with Marion Road allow all movements and are treated with channelised turn lanes. The Hawker Avenue/Marion Road intersection is signalised but only entry movements are permitted at this location.

Existing traffic volumes on the adjacent road network have been identified from traffic surveys undertaken by DPTI, MFY and the City of Marion. Figure 2 identifies the daily traffic volumes on the road network.

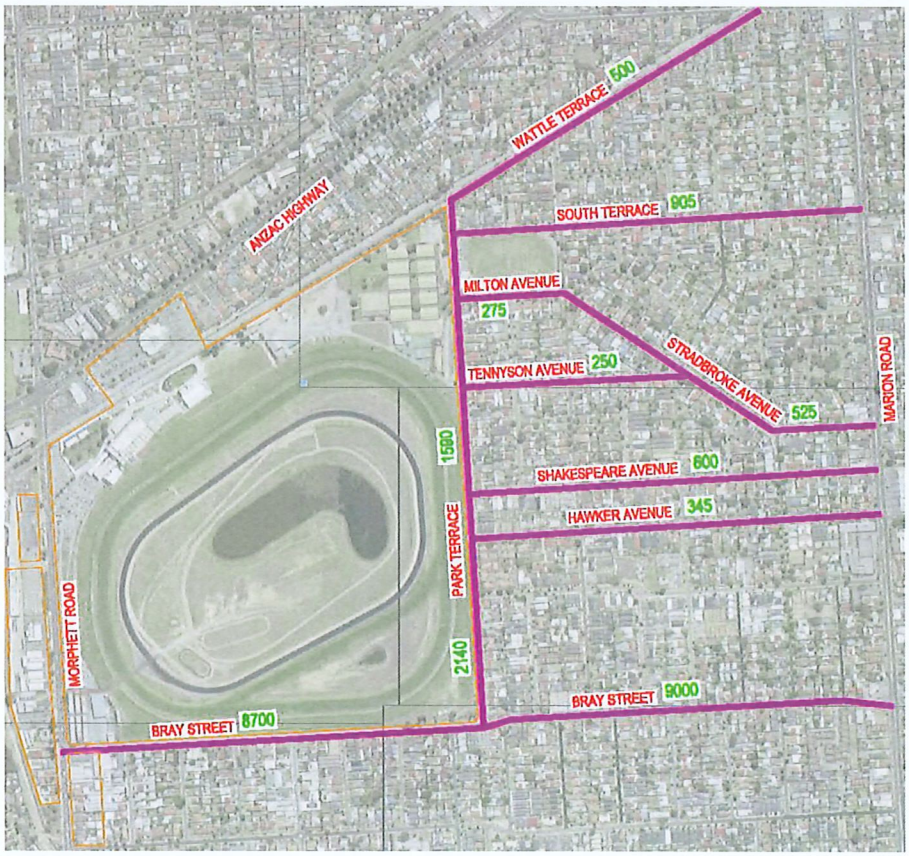

Figure 2: Existing AADT volumes

It is noted that the volumes identified in Figure 2 would include traffic associated with the existing land uses in the subject site.

3.0 POTENTIAL DEVELOPMENT

The statement of intent which was prepared in relation to the subject DPA included a draft master plan which was used to inform potential development opportunities on the land. While it does not represent a development proposal, it provides direction in respect to what opportunities could be considered for development in respect to the proposed land use.

This concept illustrates that the the following potential residential development could be considered on the subject site:

- high density residential buildings comprising 191 units ;
- medium density residential buildings comprising 190 dwellings;
- low density residential buildings comprising 87 dwellings;
- 114 detached dwellings; and
- 43 dwellings in affordable residential development.

Access to the site would ideally be located utilising the roundabout constructed at the intersection of Milton Avenue and Park Terrace. This would provide for access mid-block along the Park Terrace frontage to the subject land and utilise the existing traffic control to facilitate safe movements to and from the development area.

Land ownership may, however, control the staging of any development and, therefore, influence possible access outcomes for the development site(s). An opportunity to create roads at the existing access locations is also available. This would create a four-way intersection with the Tennyson Avenue/Park Terrace intersection which could be treated with a roundabout. Figure 3 illustrates potential access arrangements for the subject area.

Figure 3: Potential access arrangements

4.0 TRAFFIC ASSESSMENT

4.1 FORECAST TRAFFIC GENERATION

Table 1 represents the traffic generation rates anticipated for the potential land uses within the proposed development. These rates were endorsed by DPTI for the DPA traffic impact assessment.

Table 1: Traffic Generation Rates

Development Type	Trip Generation Rates	
	Peak hour	Daily trips per dwelling
High Rise Residential	0.5	5
Medium Rise Residential	0.5	5
Low Rise Residential	0.65	6.5
Affordable Housing	0.2	2
Detached Housing	0.8	8

Accordingly, the proposed development will generate traffic in the order of 3,125 vehicle trips per day or 310 vehicles during the am and pm peak hours.

4.2 ROAD NETWORK ANALYSIS

The following traffic distribution to and from the proposed development has been adopted for this assessment. This is consistent with the distribution negotiated with DPTI for the DPA traffic assessment:

- 25% to/from the north;
- 15% to/from the east;
- 25% to/from the south; and
- 35% to/from the west.

Considering the varying restrictions at the road intersections that provide access to the site (such as the entry only access at the Wattle Terrace/Cross Road intersection), a more detailed origin-destination type of distribution was constructed. The distribution diagram for the proposed development is provided in Appendix A.

It is identified that approximately 55% of the traffic generated by the subject development will use Bray Street to access the proposed development. The remaining traffic will be distributed to the arterial roads via the local street network. Figure 4 illustrates the anticipated daily traffic volumes on the adjacent local road network.

Figure 4: proposed daily volumes at the road network (increase in daily volumes)

The above volumes do not consider the reduction in existing volumes, which will be realised by the closure of existing facilities on the subject site. Accordingly, the increased volume will be lower than forecast.

The forecast increase in traffic volumes will not impact the role of the roads within the existing road hierarchy in that:

- Bray Street will operate as the major collector road (sub arterial) and will have a daily traffic volume in excess of 10,000 vehicles per day (vpd);
- Park Terrace will continue to be a collector road with a daily traffic volume of between 3,000 and 6,000 vpd; and
- the residential streets will all continue to have traffic volumes of less than 2,000 vpd.

4.3 INTERSECTION ANALYSIS

SIDRA Intersection 6.1 software has been used to analyse the potential impact at the signalised intersections of Bray Street with Morphett Road and Marion Road in addition to the Park Terrace/Bray Street intersection. The analyses have been undertaken for the morning and afternoon peak hours.

When distributing the traffic volumes during the peak hours, the following movement split of traffic entering/exiting the subject site has been adopted:

- 20% in and 80% out in the am peak; and
- 70% in and 30% out in the pm peak.

The following sections summarise the analysis and the detailed SIDRA outputs are provided in Appendix B.

4.3.1 BRAY STREET/PARK TERRACE

Figure 5 identifies the estimated peak hour traffic volumes generated by the proposed development at the Bray Street/Park Terrace intersection.

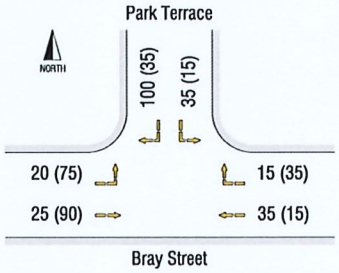

Figure 5: Development volumes at the Bray Street/Park Terrace intersection for the peak hours [am(pm)]

Table 2 summarises the SIDRA analysis of the Bray Street/Park Terrace intersection.

Table 2: Performance indicators of critical movements for the Park Terrace/Bray Street intersection

Scenario	Right Turn from Bray Street to Park Terrace			Right Turn from Park Terrace to Bray Street		
	Average Delay (s)	Queue Distance (m)	LOS	Average Delay (s)	Queue Distance (m)	LOS
Existing	8.9 (7.4)	1 (1)	A(A)	11.2 (12.0)	3 (7)	A(A)
Existing + Development	9.6 (8.9)	3 (5)	A(A)	15.2 (16.9)	14 (15)	A(A)

The results indicate that drivers accessing the subject site using Bray Street/Park Terrace intersection will experience minimal increases to existing delays and queue lengths. Further, the intersection will continue to operate well within capacity post development.

4.3.2 BRAY STREET/MORPHETT ROAD

Figure 6 identifies the estimated peak hour traffic volumes generated by the proposed development at the Bray Street/Morphett Road intersection.

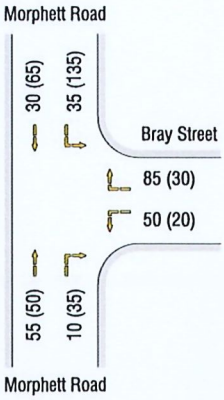

Figure 6: Development volumes at the Bray Street/Morphett Road intersection for the peak hours [am(pm)]

Table 3 summarises the SIDRA analysis of the Bray Street/Morphett Road intersection.

Table 3: Performance indicators for the Morphett Road/Bray Street intersection

Scenario	am (pm)		
	Degree of Saturation	Level of Service (worst movement)	Average Delay (sec)
Existing	0.64 (0.73)	C (C)	20.7 (23.2)
Existing plus development	0.84 (0.85)	C (D)	29.9 (28.6)

Table 3 highlights that the Bray Street/Morphett Road intersection will continue to operate within capacity with drivers experiencing minimal increase in delays. More importantly the maximum queue length observed on Bray Street will not cross the Ellis Avenue intersection.

While there will be a decrease in the level of service, LOS D is an appropriate desired level of service for the intersection operation and the changes to delays will not be significant.

4.3.3 BRAY STREET/MARION ROAD/RAGLAN AVENUE

Figure 7 identifies the estimated peak hour traffic volumes generated by the proposed development at the Bray Street/Marion Road/Raglan Avenue intersection.

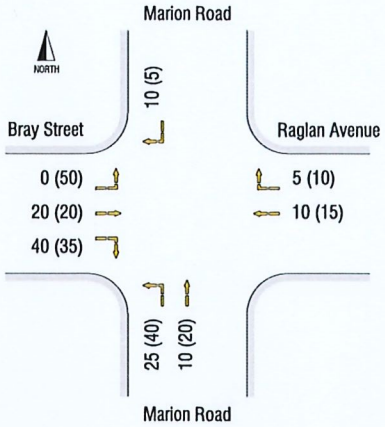

Figure 7: Development volumes at the Bray Street/Marion Road/Raglan Avenue intersection for the peak hours [am(pm)]

Table 4 summarises the SIDRA analysis of the Bray Street/Marion Road intersection.

Table 4: Performance indicators for the Marion Road/Bray Street/Raglan Avenue intersection

Scenario	am (pm)		
	Degree of Saturation	Level of Service (worst movement)	Average Delay (sec)
Existing	0.98 (0.99)	F (F)	57.4 (42.1)
Existing plus development	0.97 (0.97)	F (F)	61.2 (52.8)

SIDRA analysis indicates that the existing Marion Road/Bray Street/Raglan Avenue intersection is operating close to capacity and that the additional traffic volumes will have limited impact on the operation.

The analysis also identifies that the impact on Bray Street will be limited in that the average delays experienced by drivers on Bray Street at the intersection will:

- increase by approximately 10 seconds during the am peak; and
- remain the same during the pm peak.

5.0 SUMMARY

The Morphettville Racecourse DPA seeks to rezone land to the west, north and north-east of the existing racecourse which will facilitate residential development on that land. Such development could include, amongst other uses, residential dwellings in the northern portion, with access via Park Terrace. This report provides additional information for the City of Marion, in respect to the potential impact on Council's roads to the east of the subject land.

The traffic assessment identified that the traffic will be dispersed between the residential streets, with approximately half of the traffic forecast to be distributed to Bray Street, Park Terrace, both of which are collector roads. The increase in traffic volumes will not vary the status of the existing road hierarchy and the anticipated volumes will still be consistent with the nature of the existing road network.

Intersection analysis identified that the additional traffic volumes generated by the development will be accommodated at existing intersections, without creating substantial changes to queues and delays for drivers.

APPENDIX A

TRAFFIC DISTRIBUTION DIAGRAM

DISCLAIMER

THESE ARE CONCEPT PLANS ONLY AND NOT INTENDED TO BE USED FOR CONSTRUCTION.
MFY P/L DOES NOT REPRESENT THAT THE PLANS ARE IN ANY WAY SUITABLE FOR USE FOR CONSTRUCTION PURPOSES AND DOES NOT GIVE CONSENT TO THEIR USE FOR CONSTRUCTION PURPOSES.
ANY PARTY USING THE PLANS FOR CONSTRUCTION DOES SO AT THE PARTY'S OWN RISK AND WITHOUT THE CONSENT OF MFY P/L

Morphettville Racecourse DPA

Traffic Distribution

Residential

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Client:	South Australian Jockey Club Incorporated	**Date:**	10.11.2015	**Paper Size:**	A3

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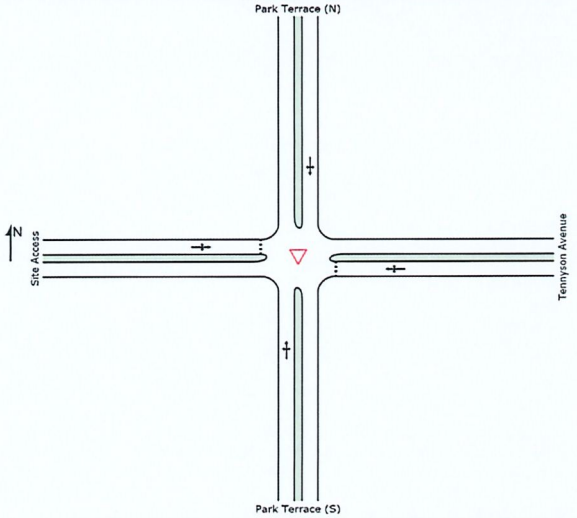
APPENDIX B

SIDRA ANALYSIS

INTERSECTION LAYOUT



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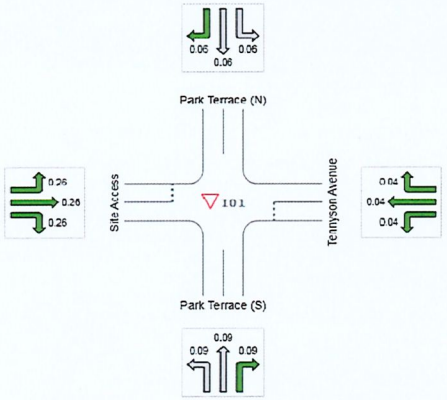

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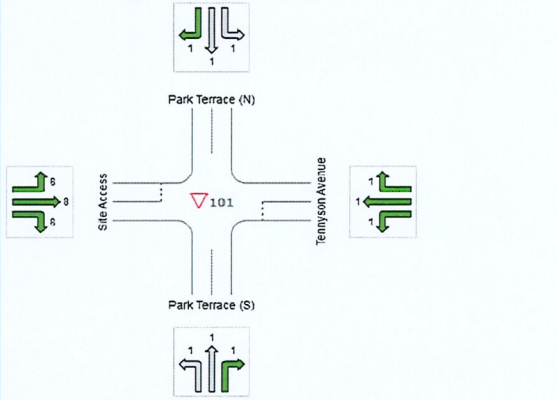

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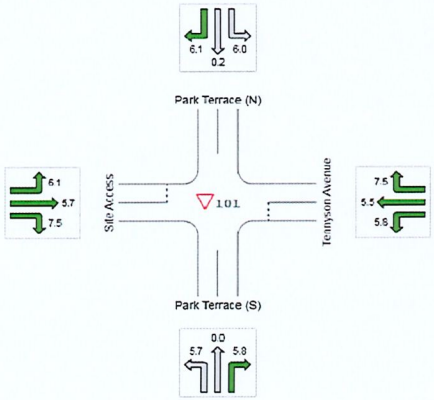

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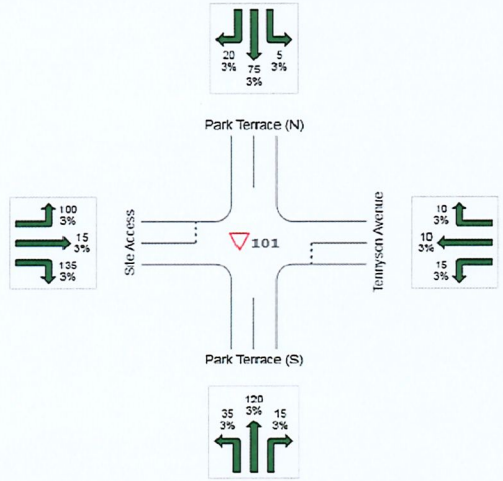

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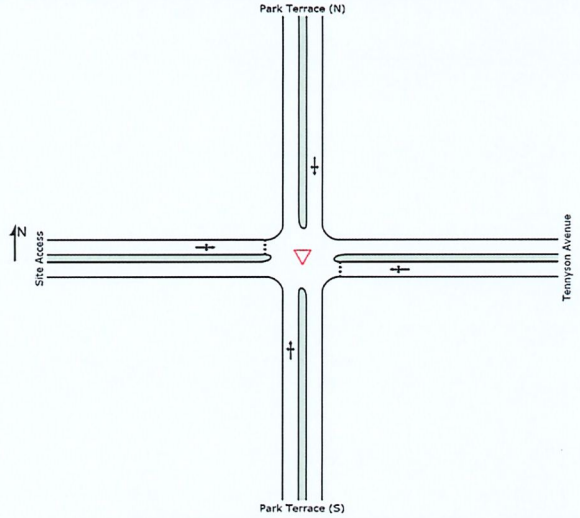
PROJECT NAME:	MORPHETTVILLE RACECOURSE DPA

INTERSECTION:	PARK TERRACE / PROPOSED ACCESS / TENNYSON AVENUE
SCENARIO:	EXISTING AM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



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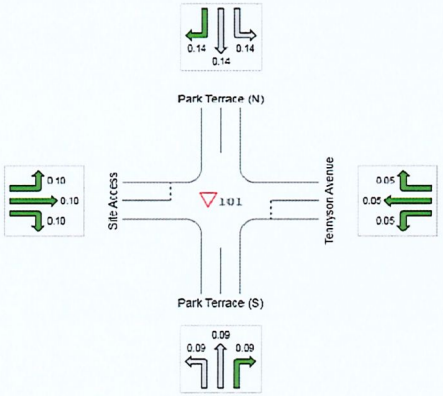

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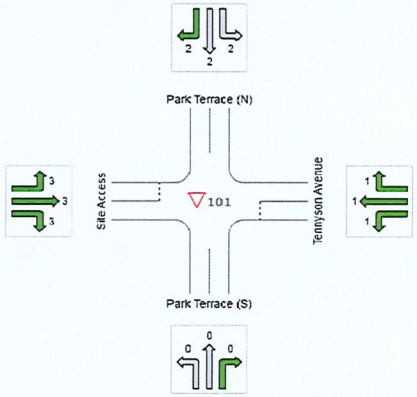

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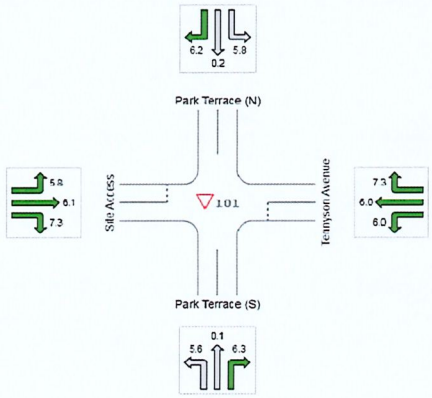

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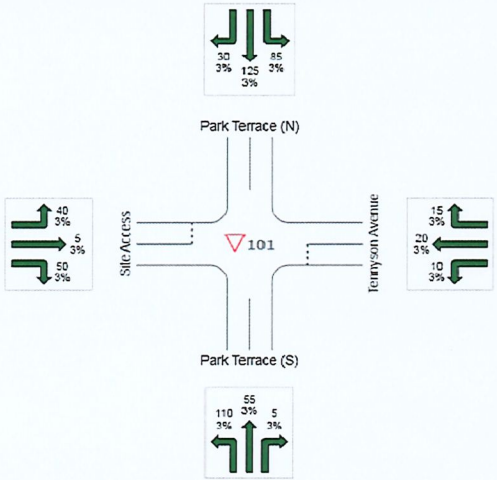

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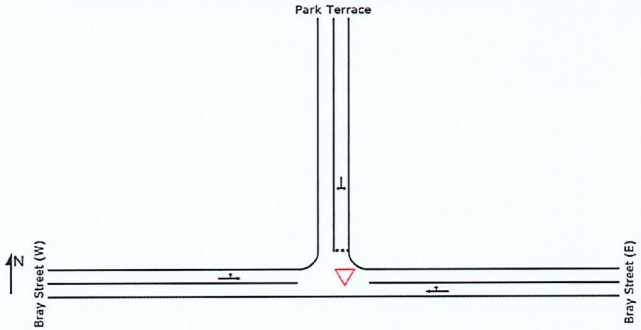

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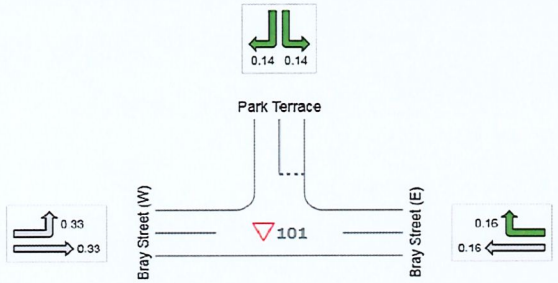

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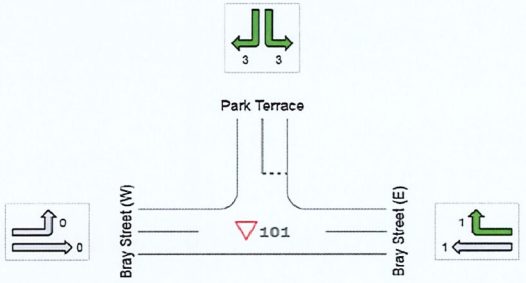

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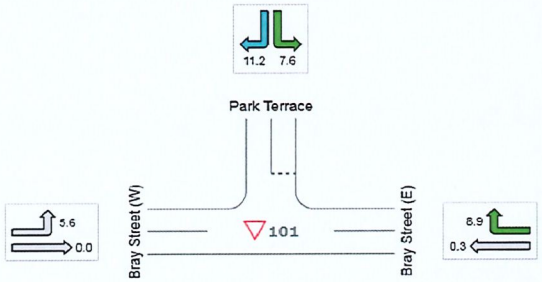

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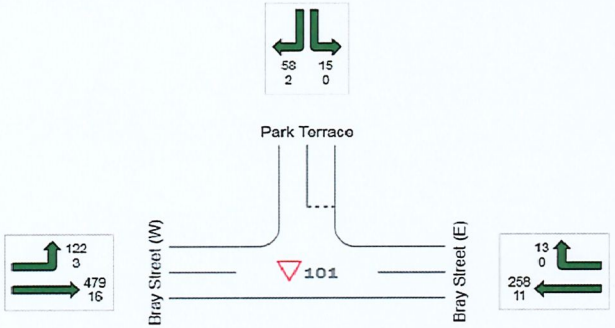

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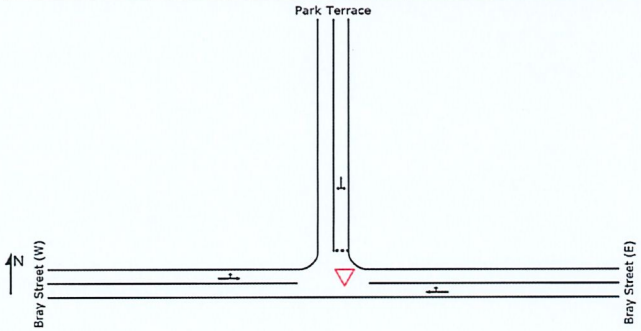
SCENARIO:	EXISTING AM PEAK

INTERSECTION LAYOUT



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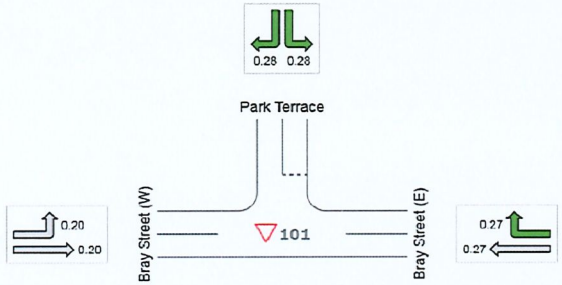

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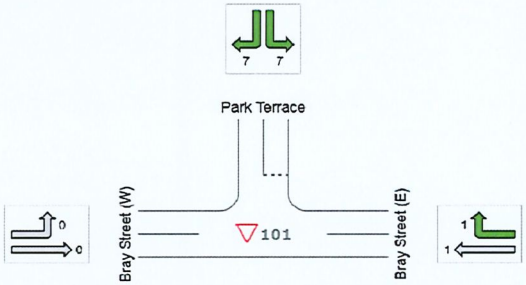

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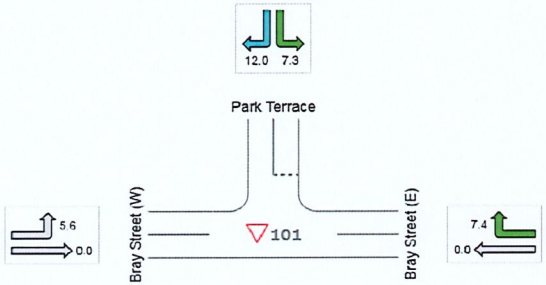

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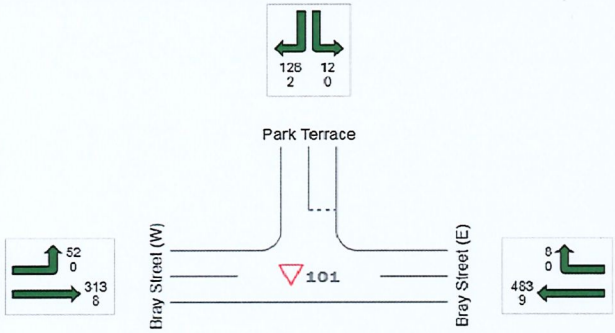

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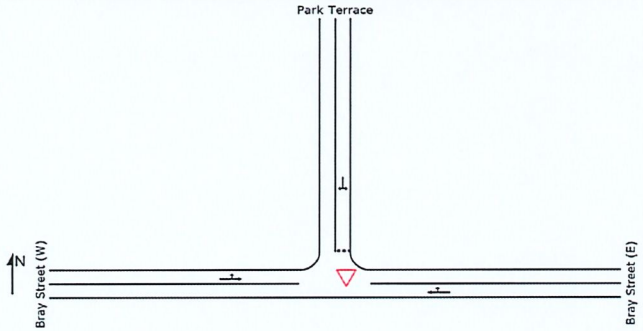

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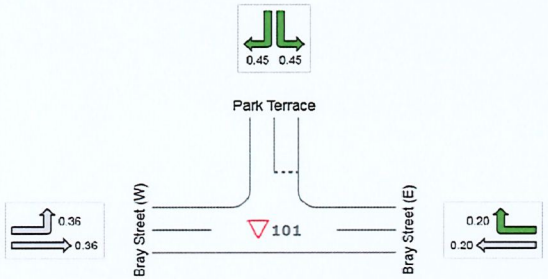

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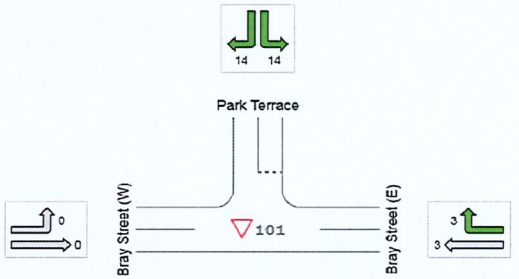
[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

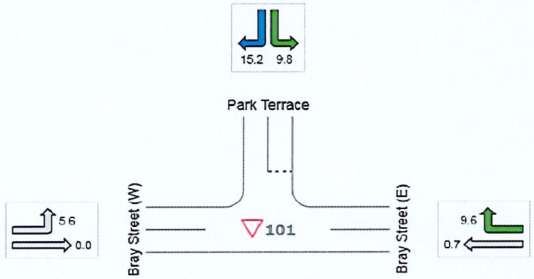
95%ile QUEUE DISTANCE (metres)



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

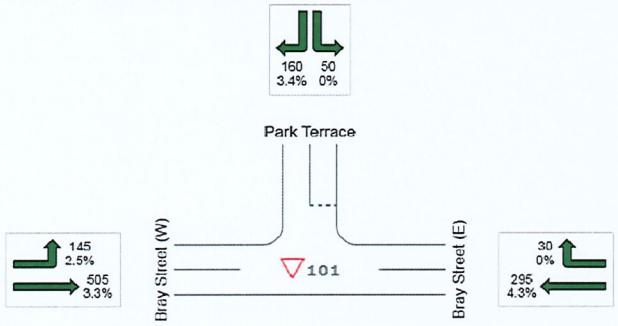
DELAY (CONTROL) & LEVEL OF SERVICE



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

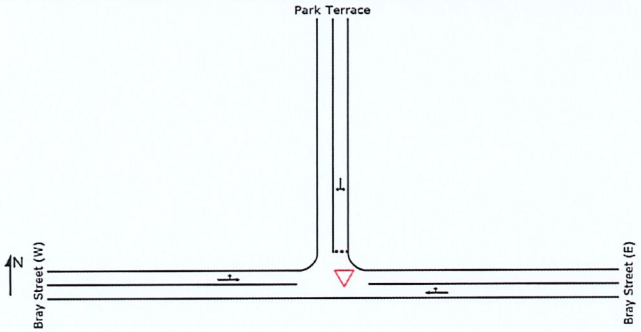
INPUT VOLUMES



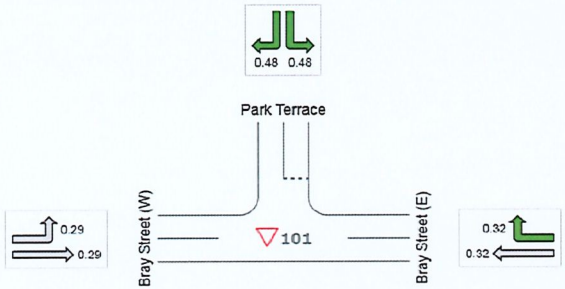
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE RACECOURSE DPA

INTERSECTION:	BRAY STREET/PARK TERRACE
SCENARIO:	EXISTING AM PEAK + DEVLOPMENT VOLUMES

INTERSECTION LAYOUT



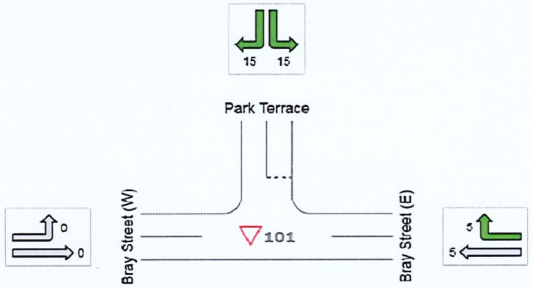
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

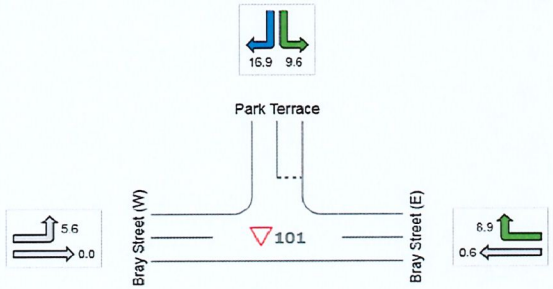
95%ile QUEUE DISTANCE (metres)



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

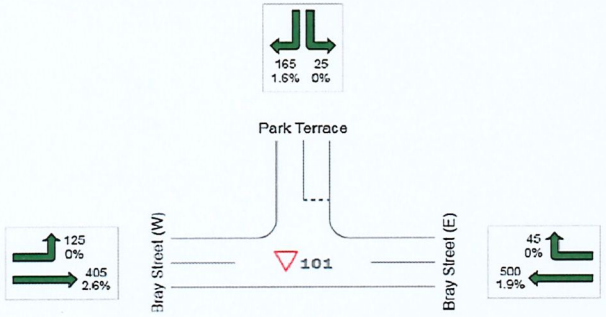
DELAY (CONTROL) & LEVEL OF SERVICE



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

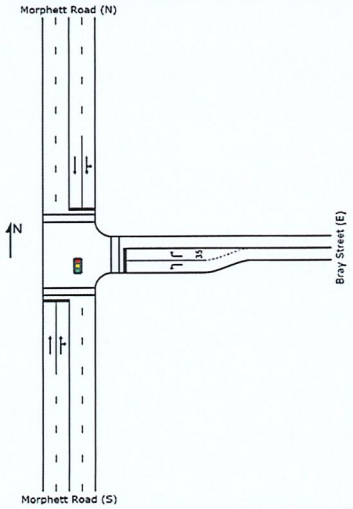
INPUT VOLUMES



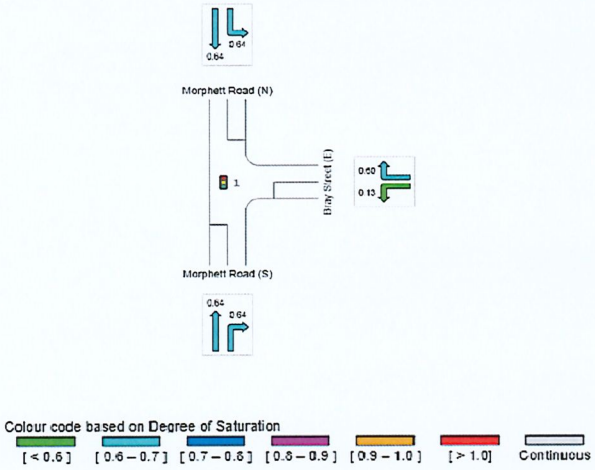
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE RACECOURSE DPA

INTERSECTION:	BRAY STREET/PARK TERRACE
SCENARIO:	EXISTING PM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



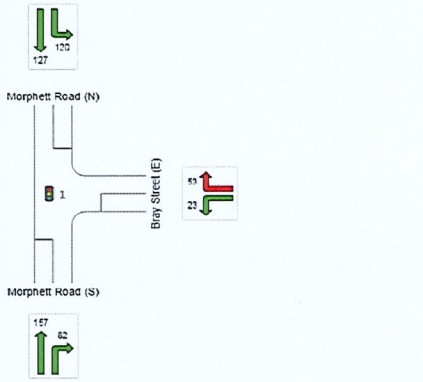
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



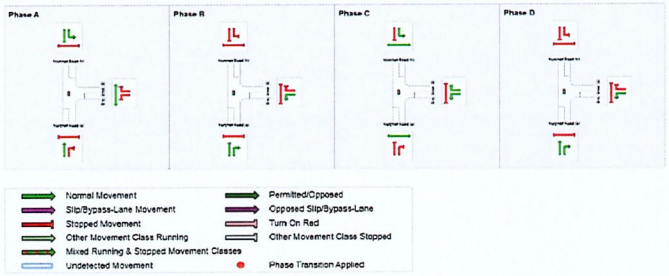
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

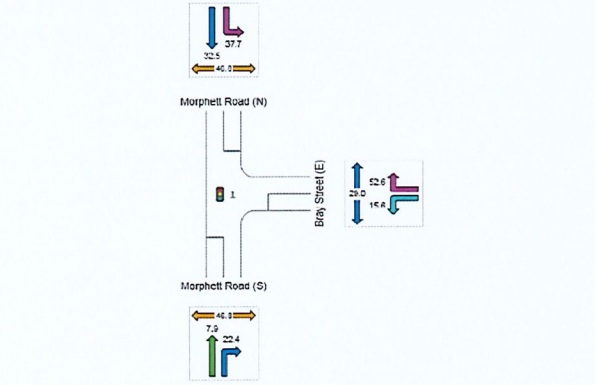
PHASING SUMMARY

Phase Timing Results

Phase	A	B	C	D
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	39	68	88
Green Time (sec)	34	23	14	12
Yellow Time (sec)	4	4	3	3
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	40	29	19	17
Phase Split	35 %	25 %	16 %	15 %



DELAY (CONTROL) & LEVEL OF SERVICE

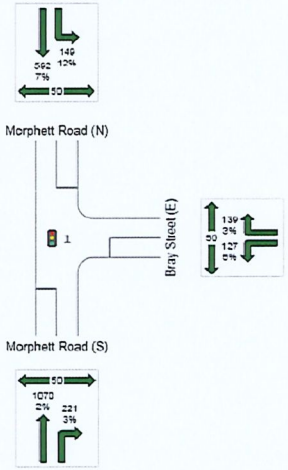


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

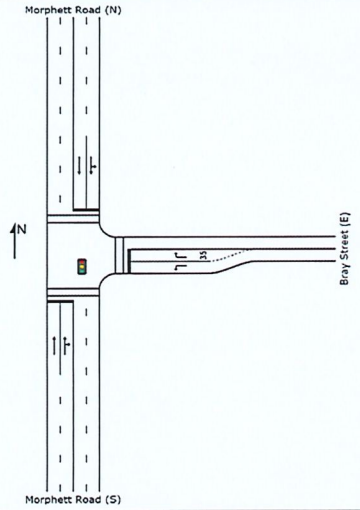
INPUT VOLUMES



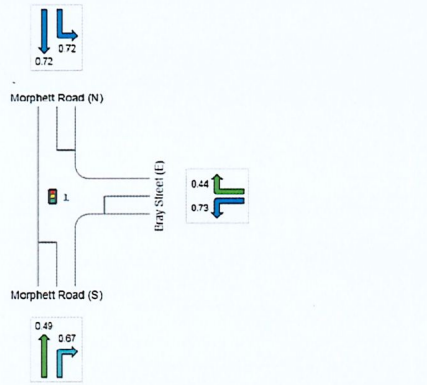
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MORPHETT ROAD/BRAY STREET
SCENARIO:	EXISTING AM PEAK

INTERSECTION LAYOUT



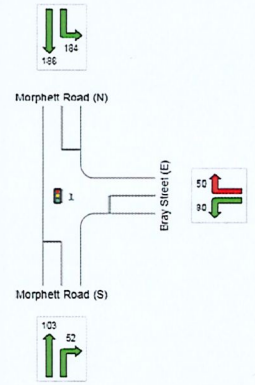
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



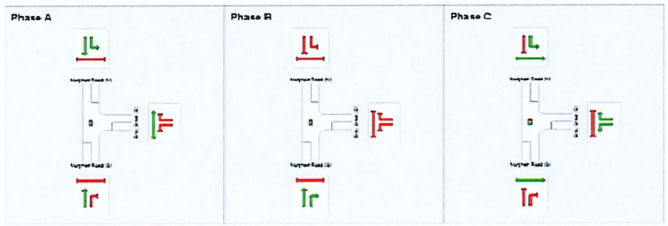
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

PHASING SUMMARY

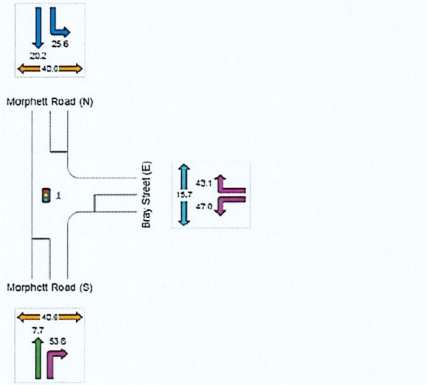
Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	56	74
Green Time (sec)	51	12	20
Yellow Time (sec)	4	4	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	57	18	25
Phase Split	57 %	18 %	25 %



Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

DELAY (CONTROL) & LEVEL OF SERVICE

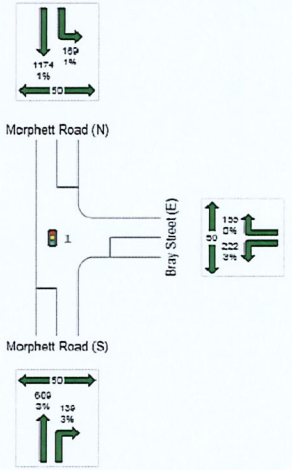


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

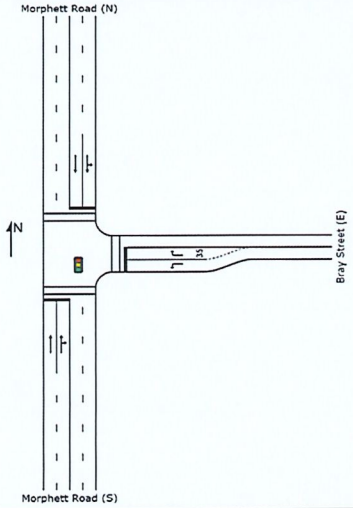
INPUT VOLUMES



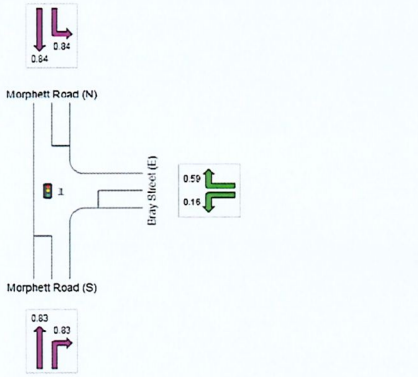
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MORPHETT ROAD/BRAY STREET
SCENARIO:	EXISTING PM PEAK

INTERSECTION LAYOUT



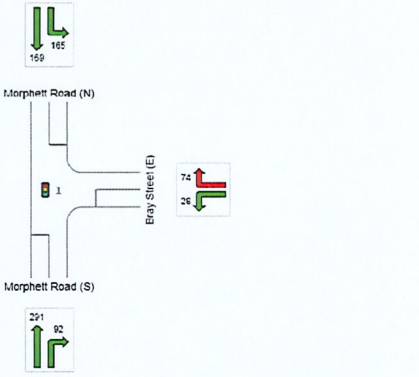
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



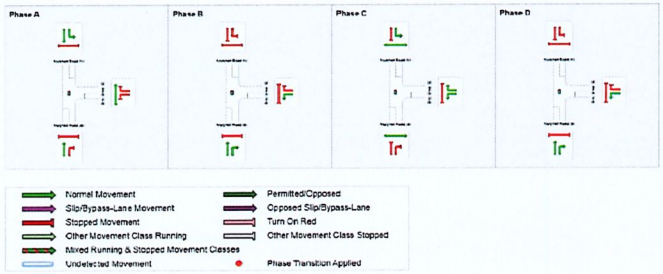
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

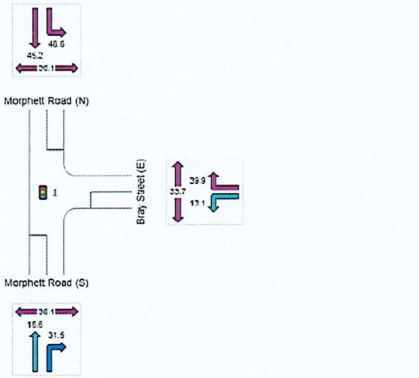
PHASING SUMMARY

Phase Timing Results

Phase	A	B	C	D
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	33	53	67
Green Time (sec)	26	14	26	13
Yellow Time (sec)	4	4	3	3
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	34	20	33	18
Phase Split	32 %	19 %	31 %	17 %



DELAY (CONTROL) & LEVEL OF SERVICE

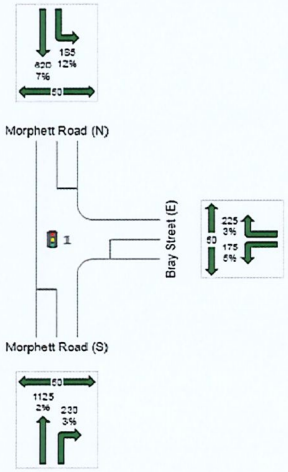


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

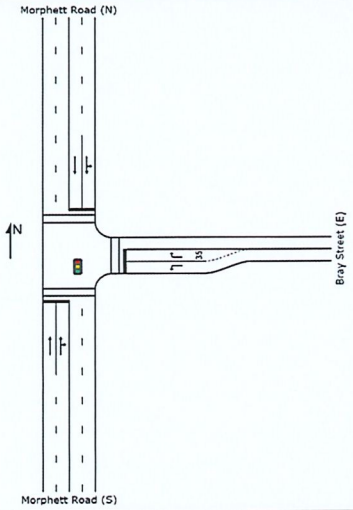
INPUT VOLUMES



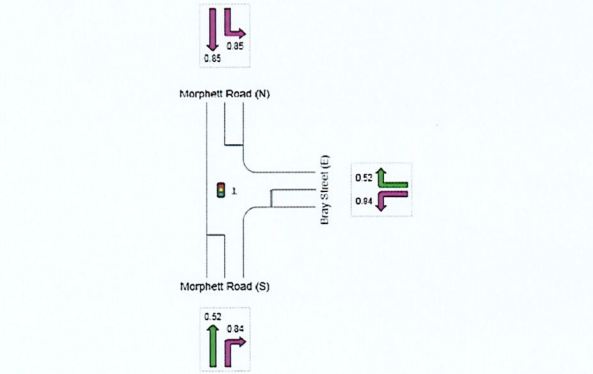
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MORPHETT ROAD/BRAY STREET
SCENARIO:	EXISTING AM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



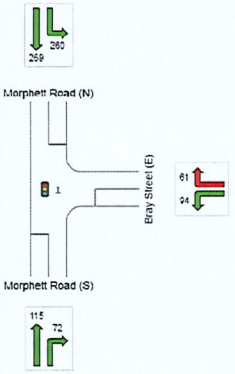
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



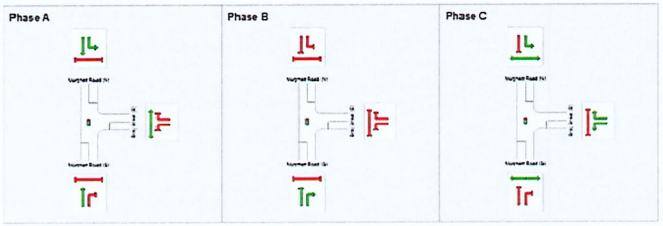
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

PHASING SUMMARY

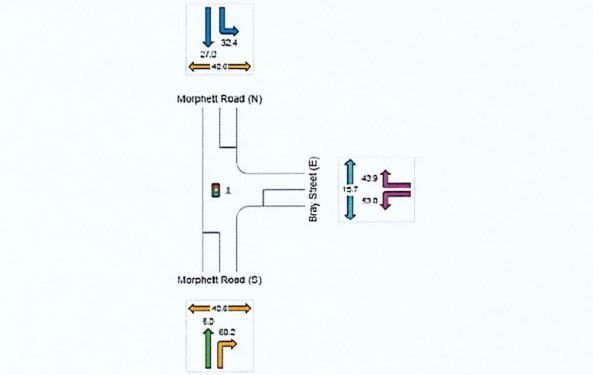
Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	56	74
Green Time (sec)	51	12	20
Yellow Time (sec)	4	4	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	57	18	25
Phase Split	57 %	18 %	25 %



Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

DELAY (CONTROL) & LEVEL OF SERVICE

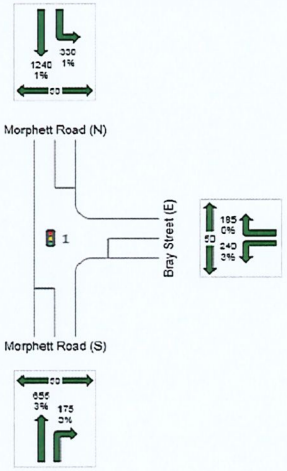


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

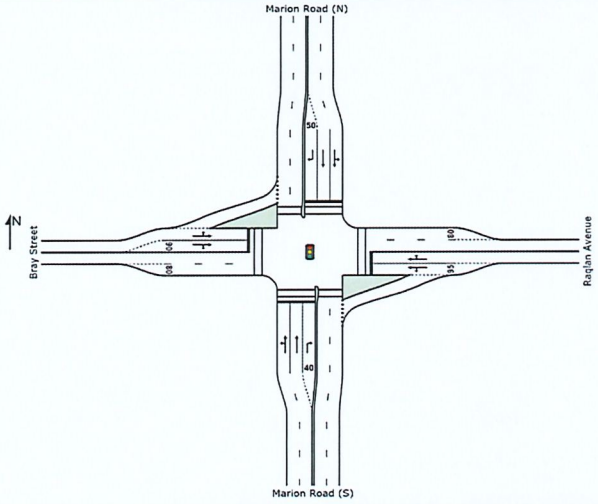
INPUT VOLUMES



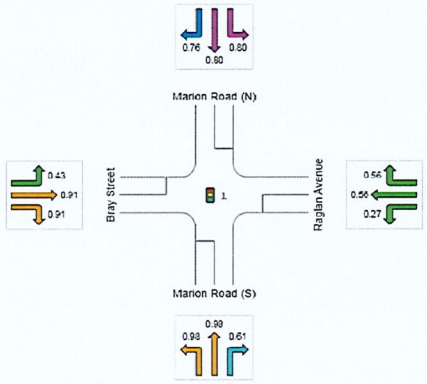
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MORPHETT ROAD/BRAY STREET
SCENARIO:	EXISTING PM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



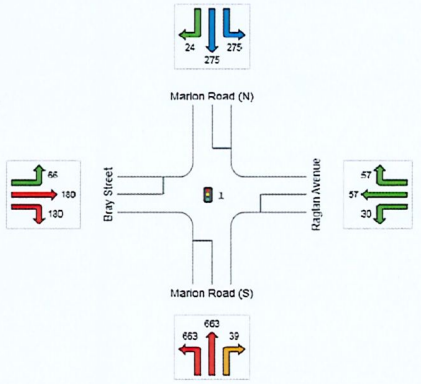
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



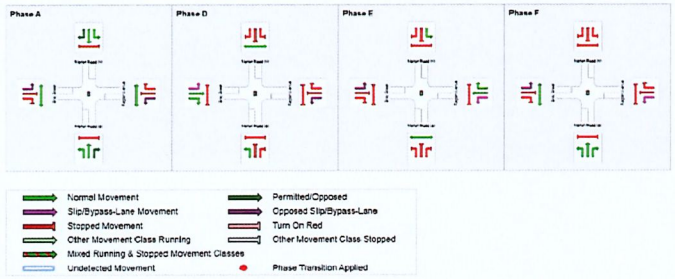
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

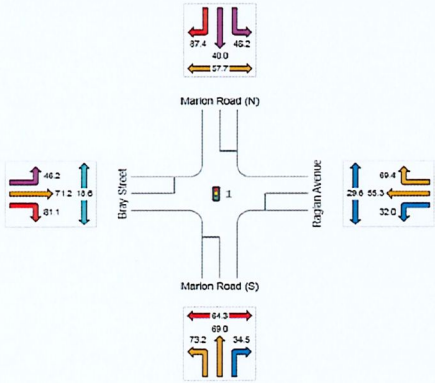
PHASING SUMMARY

Phase Timing Results

Phase	A	D	E	F
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	65	97	120
Green Time (sec)	59	26	16	13
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	3	3	2
Phase Time (sec)	65	33	23	19
Phase Split	46 %	24 %	16 %	14 %



DELAY (CONTROL) & LEVEL OF SERVICE

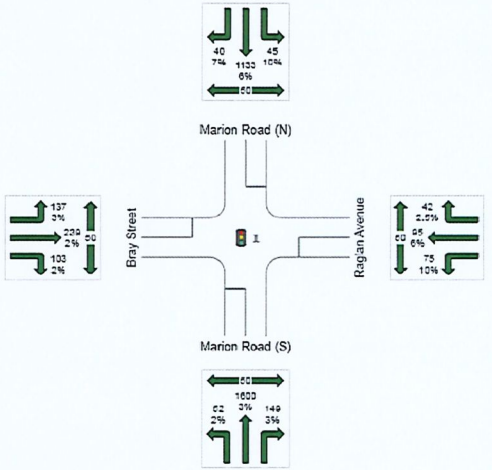


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

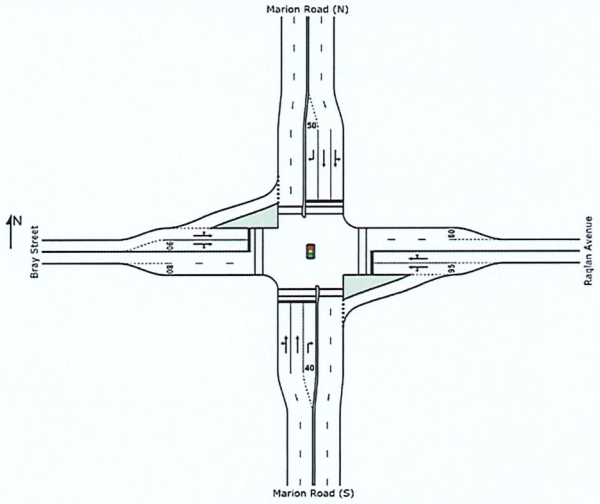
INPUT VOLUMES



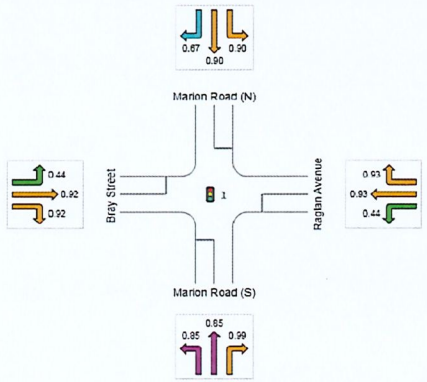
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/BRAY STREET/RAGLAN AVENUE
SCENARIO:	EXISTING AM PEAK

INTERSECTION LAYOUT



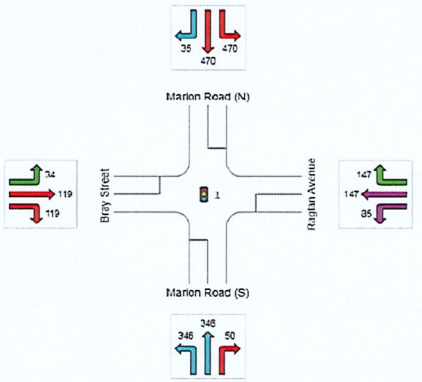
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



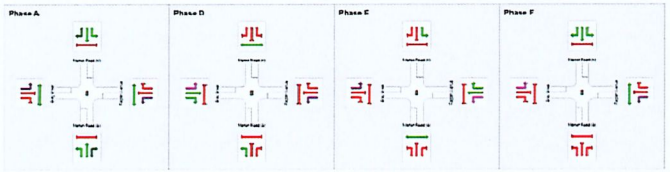
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

PHASING SUMMARY

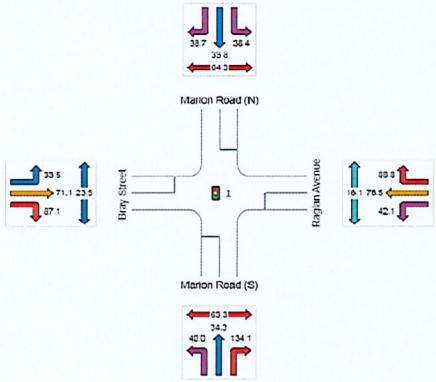
Phase Timing Results

Phase	A	D	E	F
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	75	98	125
Green Time (sec)	69	17	20	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	3	3	2
Phase Time (sec)	75	24	27	14
Phase Split	54 %	17 %	19 %	10 %



Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

DELAY (CONTROL) & LEVEL OF SERVICE

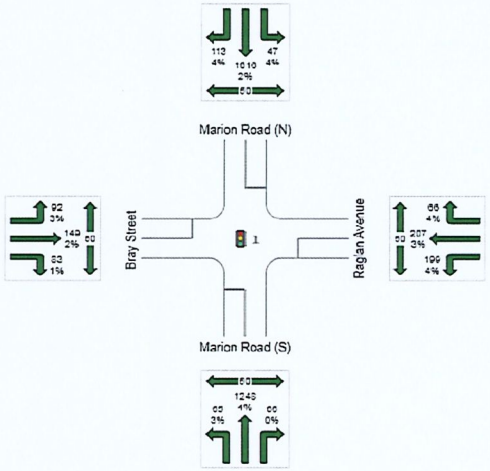


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

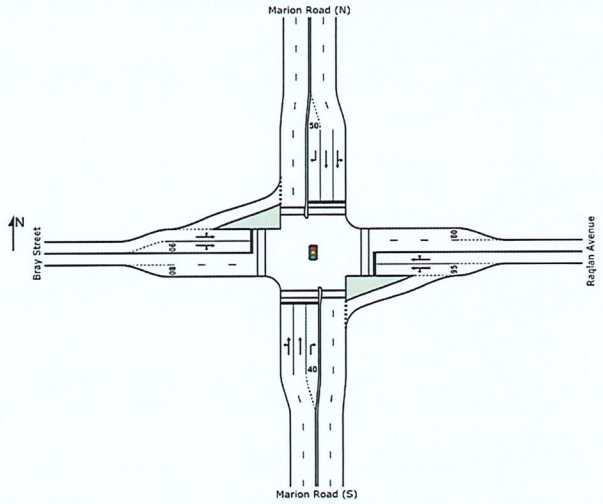
INPUT VOLUMES



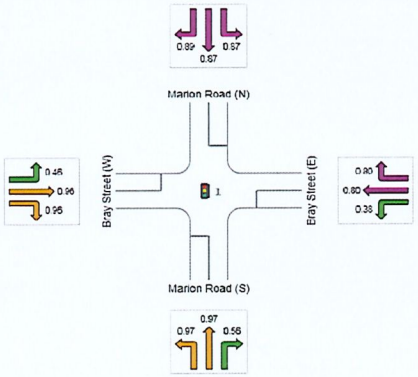
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/BRAY STREET/RAGLAN AVENUE
SCENARIO:	EXISTING PM PEAK

INTERSECTION LAYOUT



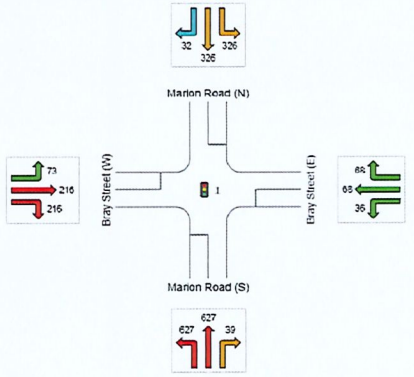
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



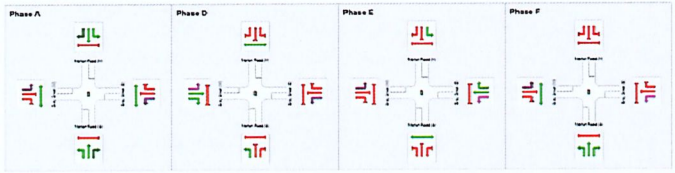
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

PHASING SUMMARY

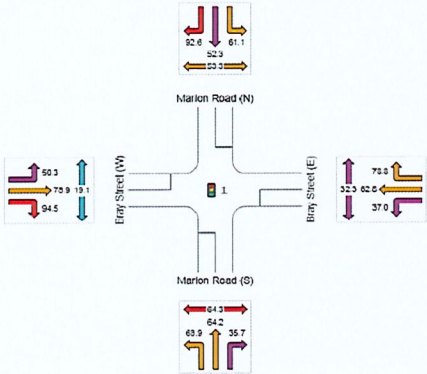
Phase Timing Results

Phase	A	D	E	F
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	61	98	117
Green Time (sec)	55	31	12	18
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	3	3	2
Phase Time (sec)	61	38	19	22
Phase Split	44 %	27 %	14 %	16 %



Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

DELAY (CONTROL) & LEVEL OF SERVICE

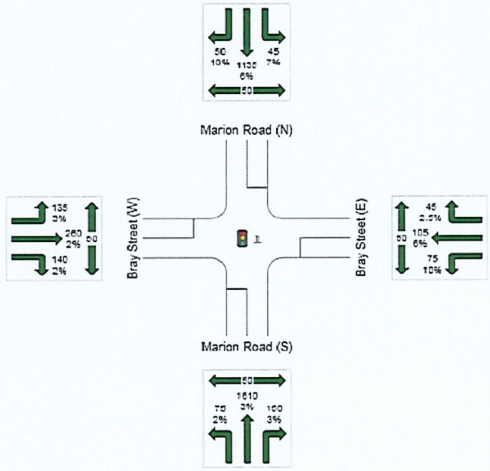


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

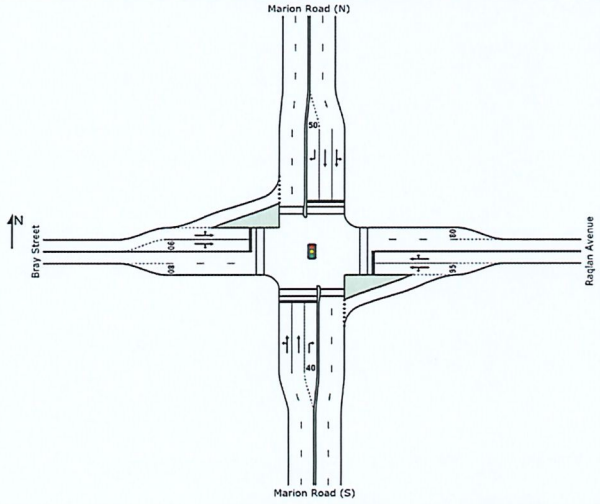
INPUT VOLUMES



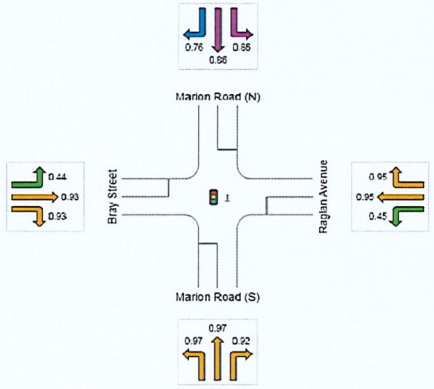
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/BRAY STREET/RAGLAN AVENUE
SCENARIO:	EXISTING AM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



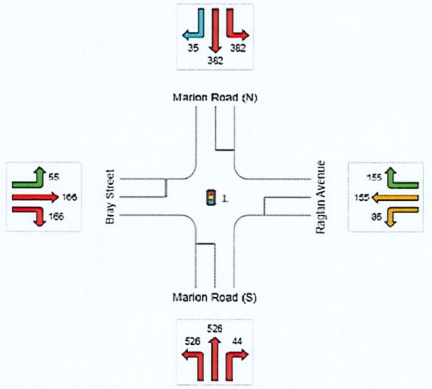
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

95%ile QUEUE DISTANCE (metres)



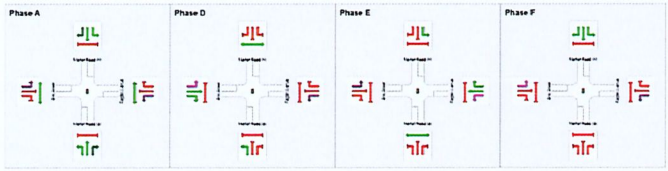
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

PHASING SUMMARY

Phase Timing Results

Phase	A	D	E	F
Reference Phase	Yes	No	No	No
Phase Change Time (sec)	0	69	90	125
Green Time (sec)	63	23	29	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	3	3	2
Phase Time (sec)	69	30	37	14
Phase Split	49 %	21 %	19 %	10 %



Normal Movement
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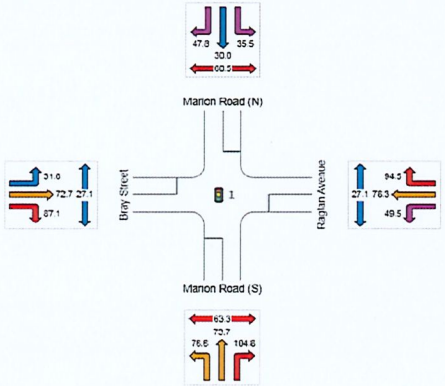
Other Movement Class Stopped
Phase Transition Applied

DELAY (CONTROL) & LEVEL OF SERVICE

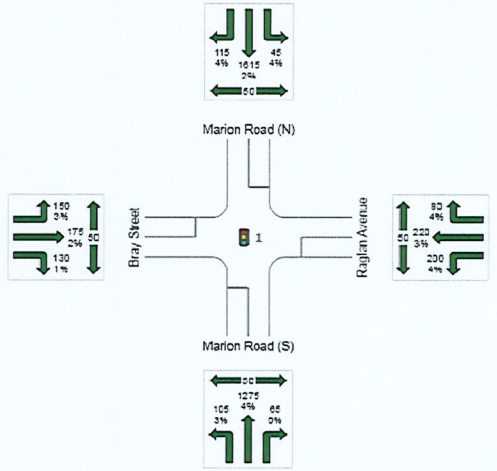


Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

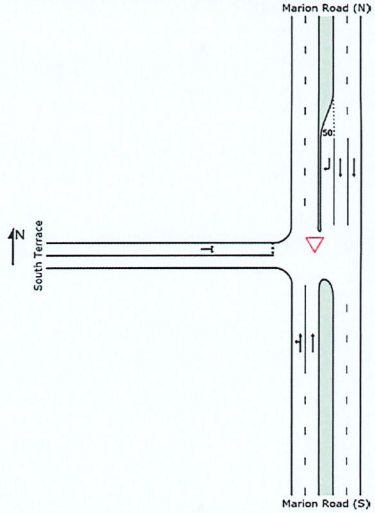
INPUT VOLUMES



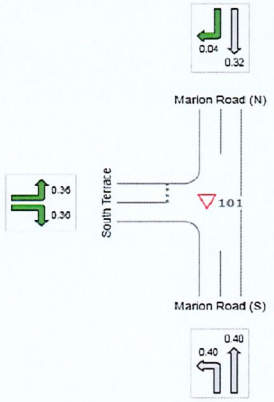
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/BRAY STREET/RAGLAN AVENUE
SCENARIO:	EXISTING PM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



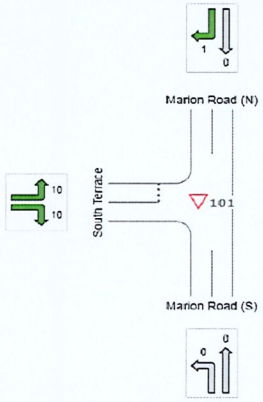
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

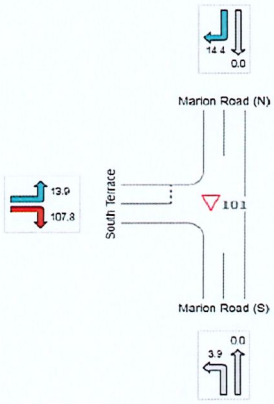
95%ile QUEUE DISTANCE (metres)



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

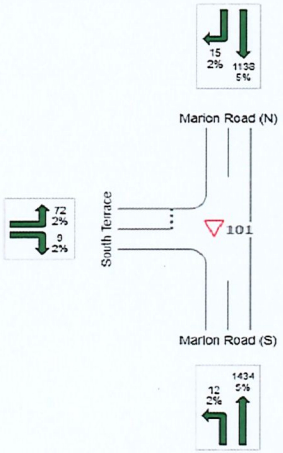
DELAY (CONTROL) & LEVEL OF SERVICE



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

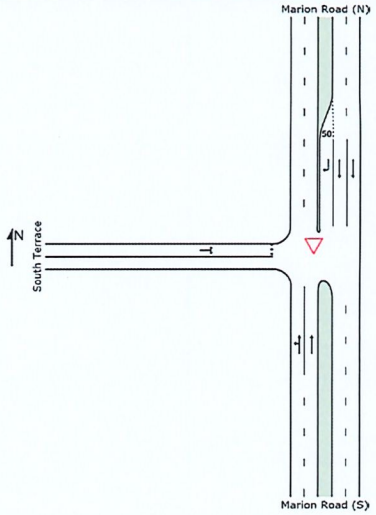
INPUT VOLUMES



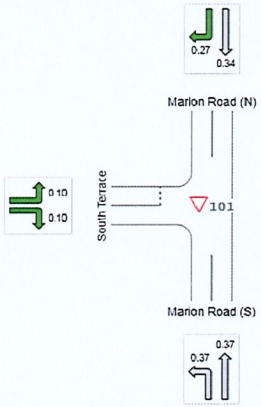
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/SOUTH TERRACE
SCENARIO:	EXISTING AM PEAK

INTERSECTION LAYOUT



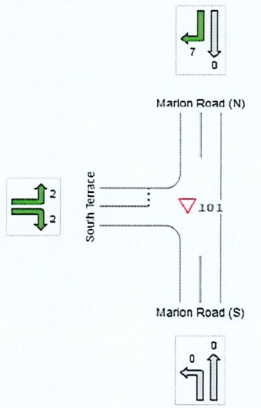
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

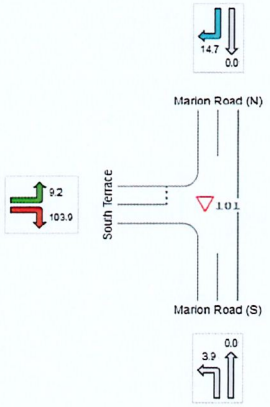
95%ile QUEUE DISTANCE (metres)



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

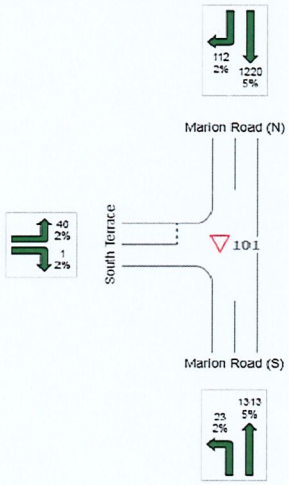
DELAY (CONTROL) & LEVEL OF SERVICE



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

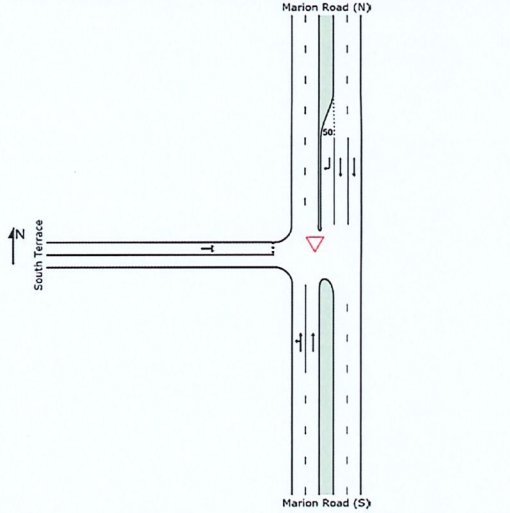
INPUT VOLUMES



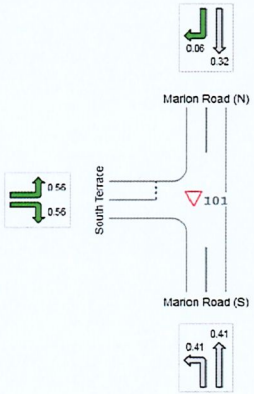
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/SOUTH TERRACE
SCENARIO:	EXISTING PM PEAK

INTERSECTION LAYOUT



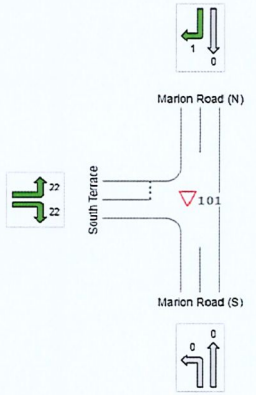
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

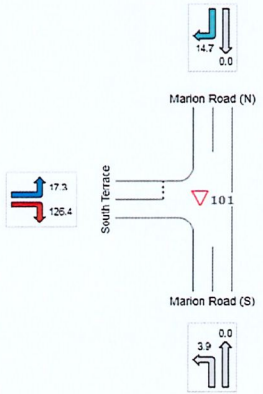
95%ile QUEUE DISTANCE (metres)



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

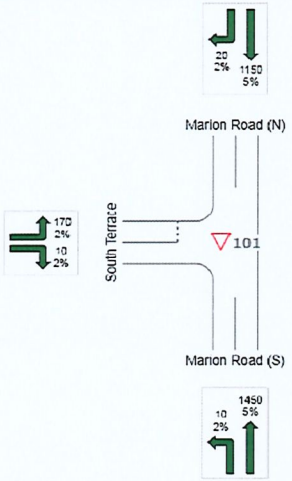
DELAY (CONTROL) & LEVEL OF SERVICE



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

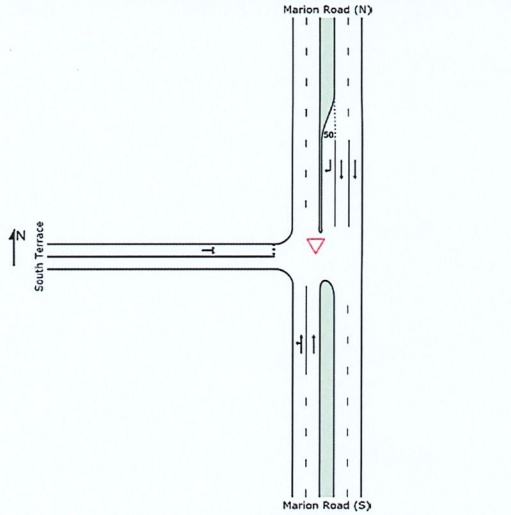
INPUT VOLUMES



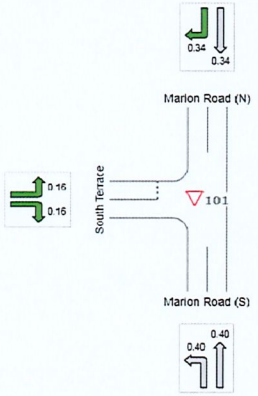
JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/SOUTH TERRACE
SCENARIO:	EXISTING AM PEAK + DEVELOPMENT VOLUMES

INTERSECTION LAYOUT



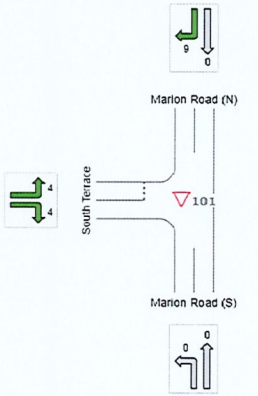
DEGREE OF SATURATION



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

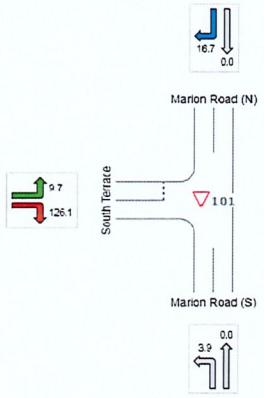
95%ile QUEUE DISTANCE (metres)



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

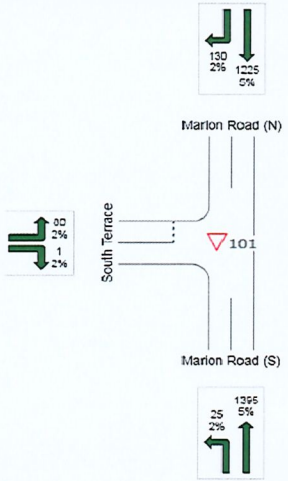
DELAY (CONTROL) & LEVEL OF SERVICE



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F Continuous

INPUT VOLUMES



JOB NUMBER:	15-0440
PROJECT NAME:	MORPHETTVILLE DPA

INTERSECTION:	MARION ROAD/SOUTH TERRACE
SCENARIO:	EXISTING PM PEAK + DEVELOPMENT VOLUMES