

From: [Emily Killin \(VPA\)](#)
To: [amendments](#)
Subject: FW: Bannockburn Growth Plan - submission
Date: Tuesday, 1 December 2020 12:37:48 PM
Attachments: [image002.png](#)
[Growth Plan Submission.pdf](#)
[V180196REP002F01.pdf](#)

Hi Lydia, please register.

From: [REDACTED]
Sent: Monday, 30 November 2020 4:54 PM
To: Emily Killin (VPA) <Emily.Killin@vpa.vic.gov.au>; [REDACTED]
Subject: Bannockburn Growth Plan - submission

Hi Emily, [REDACTED]

Please find attached our late submission on this matter. I apologise for the lateness of the submission; no excuses I simply had in mind that it was this Monday.

Hopefully this does not cause difficulties. Please contact me if you would like to discuss.

Thanks

Kind Regards

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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Bannockburn Growth Plan

On behalf of



Introduction

1. This submission is made on behalf of [REDACTED]. [REDACTED] is a residential property developer with a long history of delivery on Bannockburn.
2. [REDACTED] has significant interest in land identified in the Bannockburn Growth Plan (**BGP**) as North West Growth Area (**NWGA**).
3. [REDACTED] supports Council and the VPA in their acknowledgement of the growth needs of Bannockburn, and of the associated need for planning to support such growth. [REDACTED] also supports the broad intent and application of the BGP, however seeks some refinement and clarification.
4. In relation to the **NWGA**
 - a. A Development Plan has previously been approved. This Development Plan was informed by typical technical assessments, including traffic, heritage, stormwater, and ecology. The original Development Plan was amended by Council to cater for changing needs in relation to the delivery of the school and recreational precinct.
 - b. Whilst the application of the Development Plan to land to which no Development Plan Overlay applies seems in error, and the technical reports and assessment are now some years 10 years old, it is submitted that the form and direction of the Development Plan provides a reasonable indication of the direction of future planning in this area, as it was based on extensive technical input and review.
 - c. In addition to the planning work outlined above, BH have a Planning Scheme Amendment prepared, after significant ongoing liaison with Council management and officers. Previous correspondence with Council advises that

consideration of this PSA could be considered at the time of BGP exhibition, assuming consistency with the BGP principles.

5. [REDACTED] considers the proposed PSA is consistent with the BGP principles and on that basis will lodge the proposed PSA in the near future.
6. It is welcomed that the BGP;
 - a. identifies the nomination of the NWGA as preceding the BGP
 - b. nominates progressing the NWGA as a short-term priority
 - c. Identifies through exclusion of the NWGA from the investigation area, that the investigations and planning processes have been undertaken, or are underway in relation to this area.
7. On that basis, elements of this submission seek to ensure clarity in relation to some of the Action Items to ensure the short-term objectives of delivery of the NWGA are compromised by dependence on other processes.
8. The submission is structured to respond to the same structure and headings as the BGP.

GROWTH AREAS

9. The NWGA is identified as being previously included in the settlement boundary and therefore not part of the Growth Plan Investigation Area. It is considered important and relevant to make this distinction and to also recognise it when reviewing the findings of the various investigations.
10. It is important to note that the BGP reaffirms the status of the NWGA as within the settlement boundaries and suitable for urban development.



NORTH WEST DEVELOPMENT PLAN AREA

Precinct outcomes

11. The second dot point under 'Precinct Outcomes' states that to improve connectivity over Bruce's Creek, development should Provide a bridge on Milton Street and shared path crossing points over Bruce's Creek to allow access to the Bannockburn P-12 College, the Recreation Precinct and the Bannockburn Town Centre.
12. The bridge has been referenced in a number of policies, approvals and strategies over time, including the BGP. It is submitted these references have been based on a 'desktop' approach using traffic and the proximity to services.
13. In recent times, the nature of Bruce's Creek, particularly the slope and stability of the creek valley, have brought into question the ability to deliver previously identified outcomes, such as paths and open space opportunities.
14. It is considered such limitations may also apply to the provision of a bridge and that these should be considered. Whilst a bridge on Milton Street appears desirable from a range of perspectives, there are questions around this issue which have not been fully addressed. These questions include;
 - a. The nature and extent of the bridge;
 - b. The impact of a bridge, potentially with a 300m span, on the Bruce's Creek corridor from a range of perspectives including landscape values and cultural heritage.
 - c. The cost of a bridge and whether such a cost is sustainable and justified.
 - d. Consideration of alternatives.
15. ■■■ is currently undertaking review into a number of these matters (see Appendix A). This review reveals the bridge is not a necessary element of development in this area; that is, there are alternatives which meet the traffic requirements of development.

Requested Changes



16. That the BGP identify that a number of factors need to be taken into consideration in determining the need for a bridge and the impacts of a bridge, and on this basis, ensure references in the BGP to a bridge being delivered are flexible and open to alternative solutions. This direction should also apply to references under the **TRANSPORT AND MOVEMENT** heading

FUTURE GROWTH OPTIONS

Future Growth Options – South

17. The sixth dot point refers to the NWGA bringing forward infrastructure. It is not clear what this infrastructure is or whether it is referenced elsewhere. This makes it impossible to make a meaningful submission on this point.

Requested Changes

18. That the nature of this infrastructure be identified and opportunity to then review this issue be provided.

HOUSING AND COMMUNITY INFRASTRUCTURE

Housing diversity and typology

19. Reference is made to encouraging low density housing at the interface of residential and farming zoned land to allow for appropriate transition and land use conflict.

20. It is submitted that this reference is problematic as



- a. there is no guidance as to what 'low density housing' means in this context however one clear interpretation is housing subject to the Low-Density Residential Zone, or lots of similar densities.
- b. The density of lots may be one solution to the issues identified, however there may be other measures which may be more appropriate for each circumstance.

Requested Changes

21. That the reference be re-worded to identify that there may be potential for issues of transition and land-use conflict and that appropriate interface measure be ,considered and adopted where necessary.

Housing & Community infrastructure actions

22. The reference to the implementation of a Development Plan and associated Section 173 agreements for infrastructure delivery in the short term is welcomed and supported
23. The references to ongoing work by Council and the VPA on neighbourhood character, community infrastructure and social and affordable housing is also welcomed and supported however it should be clear that the delivery of this work should not constrain the progress of rezoning and development in the NWGA.
24. That is, Action Item 1.2 is proponent led, is expected to be, and can be, delivered in the short term. Action Items 1.4 – 1.9 are not proponent led and are expected to be delivered either in the short/medium term or are ongoing. They will therefore lag behind Item 1.2.



25. It is submitted that the issues raised in Action Items 1.4 - 1.9 are capable of being properly incorporated into Action Item 1.2 where relevant, and that there needs to be no dependence between these items.

Requested Changes

26. That the BGP make clear reference that Action Item 1.2 is not dependent on Action Items 1.4 – 1.9.

ECONOMY AND EMPLOYMENT

Industrial land

27. References are made to expanding the land available for industrial uses south of the NWGA, and whilst references are made to protecting amenity they are generic and not specific.

28. Given the historic, current and ongoing nomination of the NWGA for urban development, any proposal or direction for industrial development in the vicinity should be very clear that appropriate separation distances will need to be considered as part of any rezoning of the proposed industrial land.

Requested Changes

29. That the BGP make clear reference to appropriate separation distances from the NWGA and others be a key consideration of any rezoning of the proposed industrial land.

Future retail



30. The BGP indicates that at a detailed planning stage, neighbourhood activity centres should be investigated in the NWGA. Action Item 2.2 consolidates this direction.
31. No reference can be found in the [REDACTED] report to such an approach, and no reference can be found in the [REDACTED] report which would support such an approach.
32. Retail opportunities in residential zones are very limited so any investigation, if necessary, would need to take place prior to rezoning and would need to direct what specific retail uses are desirable, and where.
33. In the absence of any clear direction in the [REDACTED] assessment supporting such an outcome, or identifying a need for retail in this context, the recommended approach seems redundant and may compromise the ability to proceed with the NWGA in the short term.

Requested Changes

34. That the BGP remove references to retail in the NWGA or limits such directions to retail which is capable of being delivered in a residential zone.

ENVIRONMENT AND WATER

Environment and Water Actions

35. It is assumed the Action Items 3.1 - 3.12 are intended to be applied to and inform areas other than the NWGA for reasons of timing; on a similar basis to the concerns outlined elsewhere in this submission.
36. This does not appear to be explicit however and it is important from BH's perspective that independence of the NWGA proposal from these actions is clear and explicit.



Requested Changes

That the BGP make clear reference that Action Item 1.2 is not dependent on Action Items 3.1 – 3.12.

TRANSPORT AND MOVEMENT

Requested Changes

As per Requested change No.15.

SUMMARY

[REDACTED] welcomes and supports the Bannockburn Growth Plan and seeks minor modification in matters largely related to process. In relation to the issue of the bridge, [REDACTED] seeks simply to ensure that there are opportunities for alternatives, should delivery of the bridge compromise other planning and delivery outcomes, given little is known about practical delivery of this asset.



APPENDIX 1 – [REDACTED] ASSESSMENT

[REDACTED]

[REDACTED]

[REDACTED]

Bannockburn Residential Rezoning Assessment

Traffic Modelling Report

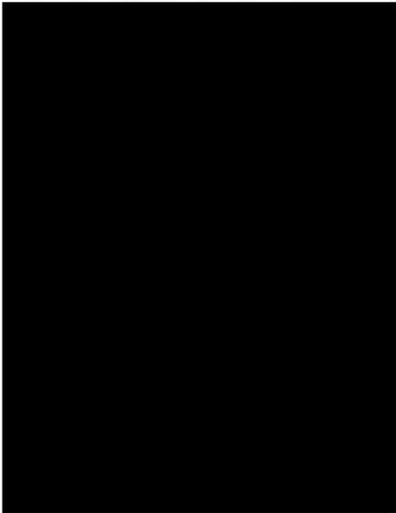
V180196

Prepared for
Golden Plains Shire

30 November 2020



Contact Information



Document Information

Prepared for Golden Plains Shire
Project Name Traffic Modelling Report



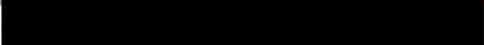
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F01	30/11/2020	Final		

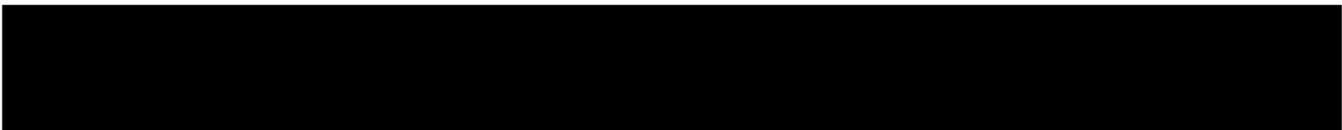


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1 Traffic Impact Assessment Overview

1.1 Introduction

██████ has been commissioned by ████████████████████ to undertake a traffic impact assessment for the parcel of land west of Bruce's Creek for the rezoning of the land at Bannockburn-Shelford Road, Bannockburn from Farming Zone to General Residential Zone. The traffic impact assessment has assumed there will be not bridge connection between the proposed land parcel and the existing Milton Road roundabout located to the north-east of the subject site.

A key element in determining potential future road network requirements due to future residential development is gaining an understanding of future traffic flows and intersection performance resulting from this development on the existing road network.

██████ has developed a first principles spreadsheet model to estimate these future traffic flows and intersection turning movements for analysis using the SIDRA intersection modelling software. This intersection modelling has allowed us to determine the threshold at which the parcel can be developed under two scenarios which include:

- > One primary north-south connector road extending northward from Bannockburn-Shelford Road, with no bridge over Bruce Creek; and
- > The above scenario with a secondary north-south connector road extending northward from Bannockburn-Shelford Road located approximately 800m east of the primary connector road.

1.2 Assessment of Existing Traffic Volumes

Existing conditions traffic data was sourced from various sources to inform the excel traffic model for the abovementioned area. These sources included ████████ collected turning movement counts.

1.3 Modelling Assumptions

The following assumptions were used in regard to the future development scenario:

1. 100% of the developable area has been has been fully developed.
2. No changes to the existing road network have occurred between the time the existing conditions were surveyed and the analysis was undertaken.
3. The traffic generation rates taken from the RMS Guide to Traffic Generating Developments do not change between the time this analysis was undertaken and the land is fully developed.
4. Traffic volumes on Bannockburn Shelford Road have not increased since intersection count surveys were undertaken in 2017.
5. The land will be developed into low density residential.
6. Traffic generated by the site has not been assessed on existing infrastructure further east of the site.

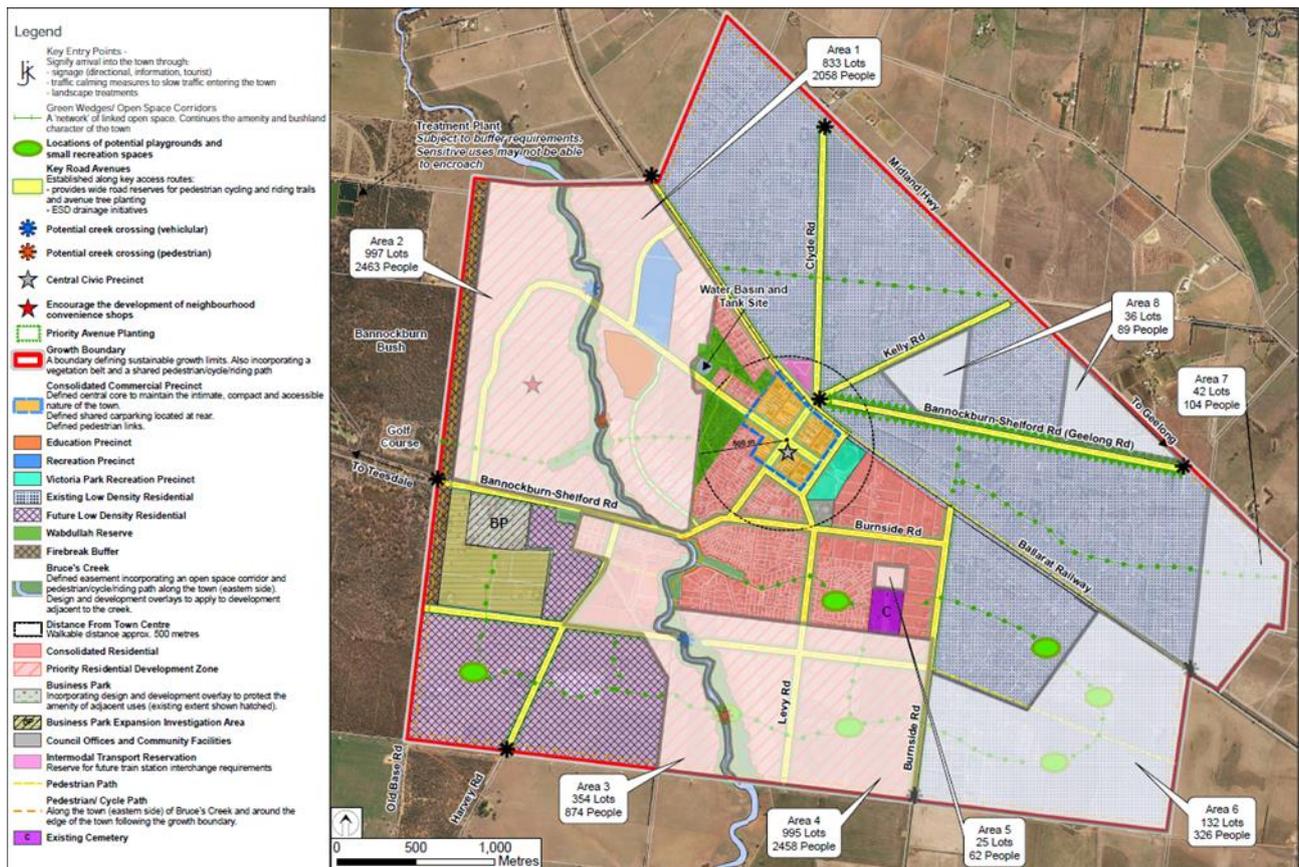
2 Land Use Inputs and Zoning

Precinct demographic data for the Bannockburn Growth Area was sourced from the Bannockburn Town Centre Investment Strategy and Bannockburn Urban Design Framework in relation to the ultimate development scenario.

2.1 Residential Land Use

Bannockburn Urban Design Framework sets out areas within Bannockburn Growth Area for high, medium and low density suburbs to accommodate future population growth within Bannockburn. The capacity of Bannockburn's future population and growth locations are illustrated and summarised in below.

Figure 2-1 Bannockburn future population and growth locations



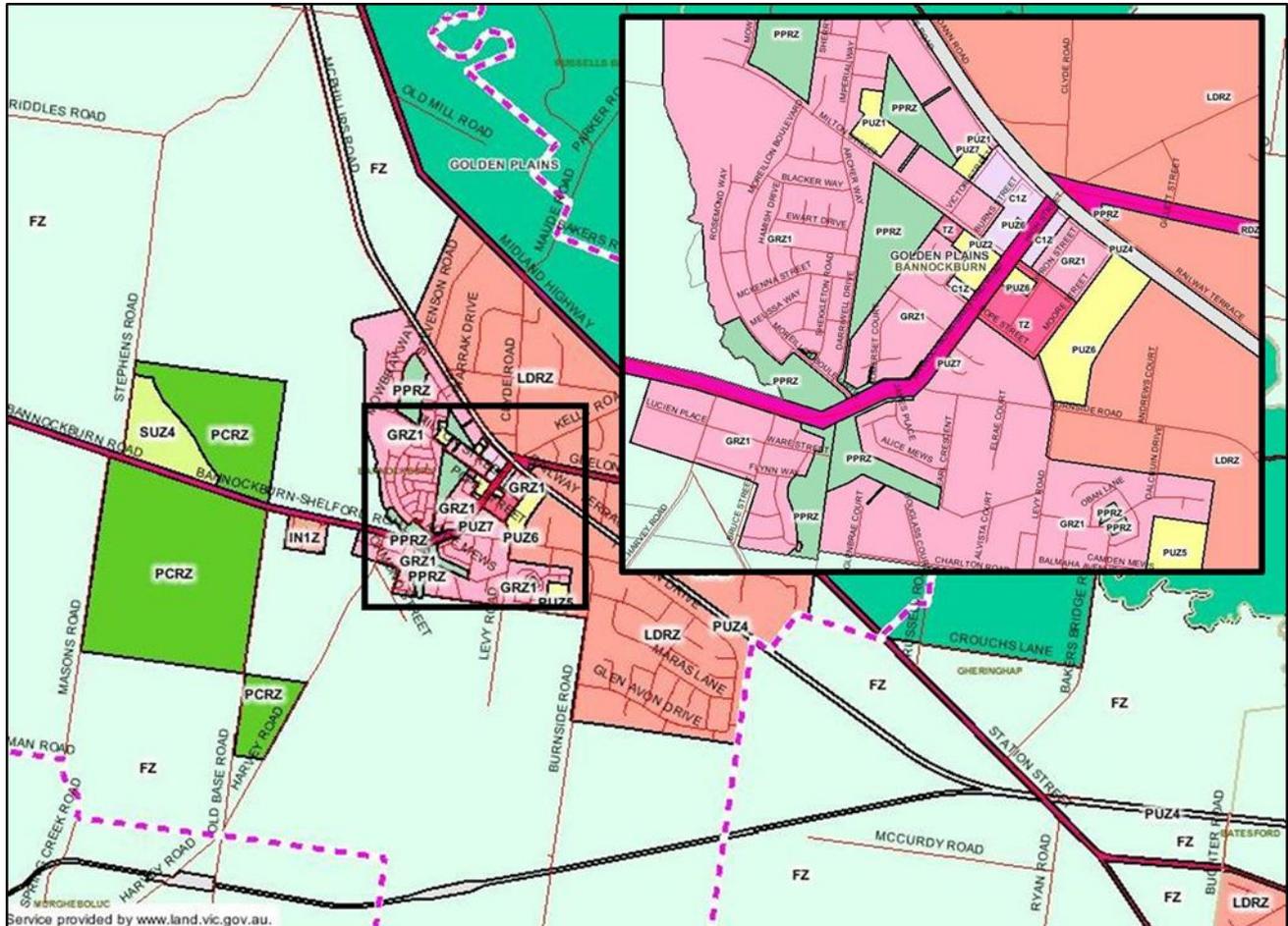
The subject site is located to the west of the town of Bannockburn within Area 2 as described in the Bannockburn Urban Design Framework, as shown in Figure 2-1. The subject site has a total area of approximately 140 hectares, with a sole road frontage to Bannockburn-Shelford Road to the south, and the eastern boundary being defined by Bruce Creek.

Land surrounding the subject site is generally residential to the east, industrial to the south, recreational to the west and farmland to the north. The site is currently undeveloped farmland.

2.1.2 Planning Zones

Figure 2-2 shows the current planning scheme zones for the site within the Golden Plains Planning Scheme. It can be seen that the site lies within a Farming Zone, surrounded by Farming Zone to the north and south, Public Park/Conservation & Recreation the west, General Residential to the east. A parcel of Industrial land is found to the south of the site. It is proposed to rezone this land to General Residential.

Figure 2-2 Existing Land Uses Zones



Source: www.land.vic.gov.au

2.1.3 Bannockburn Transport Strategies

The Bannockburn Transport Strategy (BTS) was prepared for Council by [REDACTED] to address current and future road network and traffic management issues within the study area. This will be achieved by ensuring the street network caters for demand whilst ensuring the environment around the central retail and activity area is safe and vibrant. The BTS aim was to ensure car parking around the town centre is managed appropriately to support the retail and commercial areas, and that demand can continue to be met into the future by addressing the existing and future sustainable transport demands, including integrated walking and cycling networks throughout the study area.

The development of this strategy considered all appropriate State, regional and local transport and planning policy, with a particular emphasis on the Bannockburn Urban Design Framework (BUDF) and Bannockburn Town Centre Investment Strategy (BTCIS).

The transport infrastructure recommendations surrounding the subject site as part of the BTS are shown in Figure 2-3, including:

A key road circulating from the extension of Milton Street to Bannockburn-Shefford Road;

A roundabout at the intersection of this key road with Bannockburn-Shefford Road, aligned to the west of the Industrial Business Park (immediately south of the subject area);

A roundabout at the intersection of Harvey Road with Bannockburn-Shefford Road,

- A channelized intersection at the intersection of the eastern connector/ access street;
- A vehicular creek crossing at the Milton Street extension;
- A pedestrian/cycle path associated with the sub arterial and connector street network.

Figure 2-3 Excerpt from Bannockburn Transport Strategy (Road Recommendations)



As part of this assessment [REDACTED] has undertaken intersection analysis to determine the development thresholds for several intersection layouts to determine when upgrades are required due to development. Intersection types include:

- > “Stop” control;
- > Roundabout control; and
- > Signalised intersection control.

Cardno has assumed no bridge will be constructed as part of this analysis.

Further analysis is shown in the subsequent sections.

3 Assessment of the Bannockburn Rezoning Area Traffic Generation Rates

3.1 Overview

The Bannockburn Rezoning Area assessment involved applying traffic generation rates to the proposed residential rezoning and distributing the trips onto Bannockburn-Shelford Road through proposed primary and secondary connector roads, extending north. The following subsections discuss the adopted traffic generation rates and the traffic distribution methodology.

3.2 Adopted Traffic Generation Rates

The adopted traffic generation rates for the residential rezoning have been sourced from rates taken from the New South Wales Roads and Maritime Services (RMS) "Guide to Traffic Generating Developments" document. The rates adopted for the development area is outlined in the following subsections.

3.2.1 Residential Dwellings

The RMS guide suggests an average peak hour trip rate of 0.78 trips per dwelling and a maximum of 0.9 trips per dwelling in regional areas for low density residential in the PM peak hour and 0.71 trips and a maximum 0.85 in the AM peak hour. To determine a trip rate per dwelling to be used within the Bannockburn Rezoning Area for future growth, an assessment was made on developments within the RMS guide which had attributes similar to the Bannockburn Growth Area. The below table shows the size and location of the developments assessed within the RMS "Guide to Traffic Generating Developments".

Table 3-1 Assessed low density residential developments taken from RMS "Guide to Traffic Generating Developments"

Location	Goonellabah	Calare	Glenfield Park
No. of Dwellings	556	697	554
Population	1378	2037	1391
Peak vehicle trips Per Dwelling	0.8	0.97	0.87

Based on the above traffic generation assessment [REDACTED] has adopted a traffic generation rate of 0.85 trips per dwelling in the AM peak hour and 0.9 trips per dwelling in the PM peak hour. [REDACTED] has adopted the maximum traffic generation rate for the AM and PM peak periods due to Bannockburn having limited access to public and active transport and high car dependency.

During the intersection analysis, each scenario's dwelling count was modified up or down by 100 dwellings until the intersection/s thresholds were reached. Table 3-2 illustrates the traffic generation for the AM and PM peaks for the associated dwelling count in the residential rezoning area utilising the rates adopted above.

Table 3-2 Area 2 Traffic Generation by Dwelling Number

Number of Dwellings	AM Peak (0.85 trips per dwelling)	PM Peak (0.9 trips per dwelling)
3000	2550	2700
2500	2125	2250
2000	1700	1800
1500	1275	1350
1000	850	900
500	425	450

4 Traffic Generation and Distribution

The following analysis is based on the two (2) following scenarios:

1. One primary north-south connector road extending northward from Bannockburn-Shelford Road, with no bridge over Bruce Creek; and
2. The above scenario with a secondary north-south connector road extending northward from Bannockburn-Shelford Road located approximately 800m east of the primary connector road.

Scenario 1 analyses the intersection as a 'Stop' intersection, a roundabout and a signalised intersection. Scenario 2 analyses the secondary connector road intersection as a 'Stop' intersection with a right hand turn ban for outbound movements which have been redistributed to perform a right hand out movement at the western primary connector road which is networked with all three of the above intersection types.

4.1 Development Traffic Generation

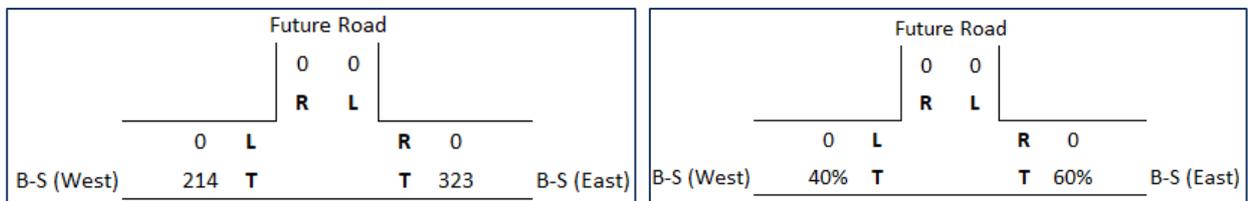
The traffic generation and distribution are based on the existing volumes gathered at the Bannockburn-Shelford Road and Harvey Road intersection, as surveyed during [REDACTED] Bannockburn Transport Study report [REDACTED]. These have been sourced from the Bannockburn Urban Design Framework and the Town Centre Investment Strategy.

In both scenarios, the first intersection located to the west of Harvey Road experiences the current existing traffic conditions and distribution.

Figure 4-1 Existing Traffic Volumes & Distribution (AM) – Bannockburn-Shelford Road west of Harvey Road



Figure 4-2 Existing Traffic Volumes & Distribution (PM) – Bannockburn-Shelford Road west of Harvey Road



Using this above distribution, the residential rezoning area was assumed to have 1,000 dwellings based on the Bannockburn Urban Design Framework as a base case, and distributed into and out of the primary connector road was assumed to be the following:

- > 20% arriving, 80% departing, 65% eastbound traffic and 35% westbound traffic in the AM peak; and
- > 60% arriving, 40% departing, 40% eastbound traffic and 60% westbound traffic in the PM peak.

For scenario 2 it has been assumed 60% of vehicles will utilise the primary connector road and 40% the secondary connector road noting that right hand outbound turn movements from the secondary connector have been included in the right hand outbound turn movements for the primary connector road.

Scenario 1 has all residential traffic completing turning movements at the proposed intersection, and hence do not affect the through values. Scenario 2 has residential traffic intending to go straight through either intersection, and therefore the residential distribution has been superimposed onto the existing through volumes. The resulting traffic volumes and distribution for both scenarios (using the base case 1,000 dwellings and traffic generation shown in Section 3 above) are shown in Figure 4-1 to Figure 4-6.

Figure 4-3 Scenario 1 – Future Traffic Volumes & Distribution (AM)

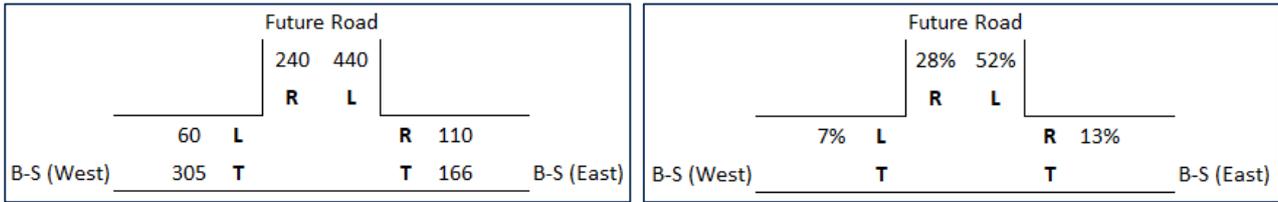


Figure 4-4 Scenario 1 – Future Traffic Volumes & Distribution (PM)

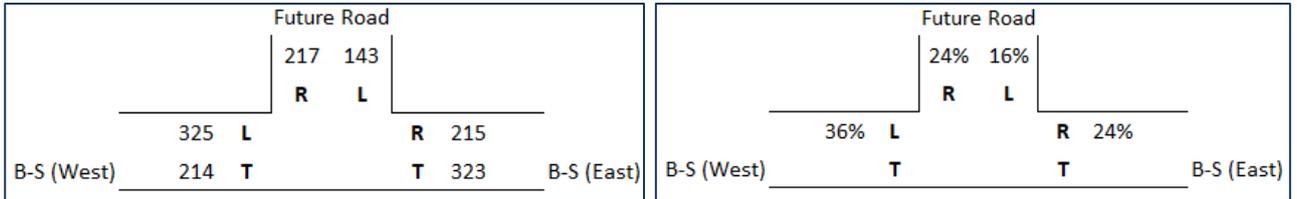


Figure 4-5 Scenario 2 – Future Traffic Volumes & Distribution (AM)

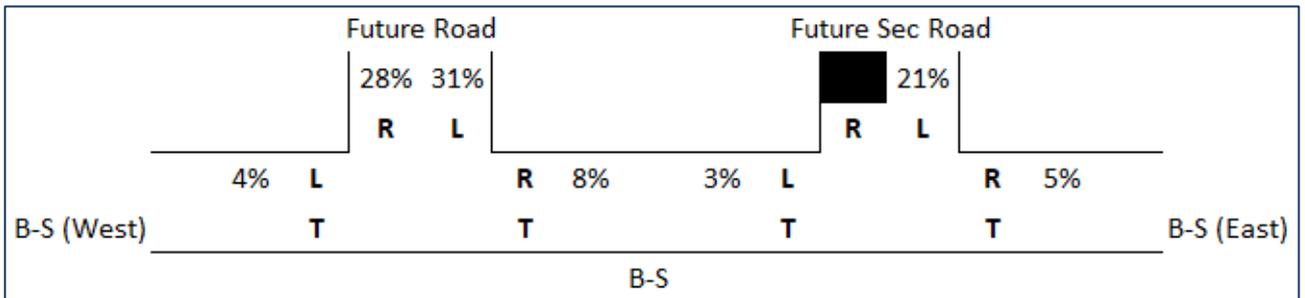
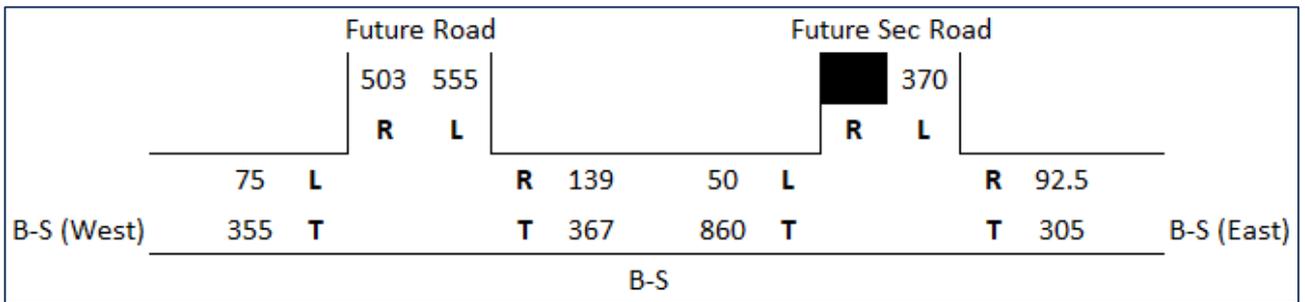
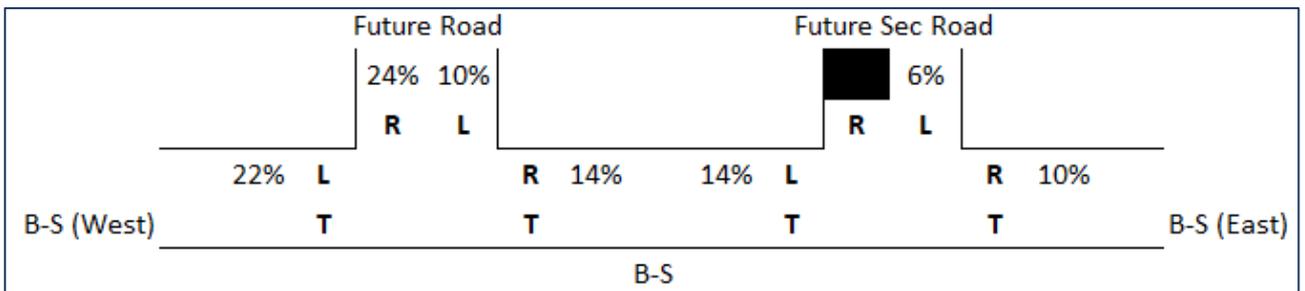
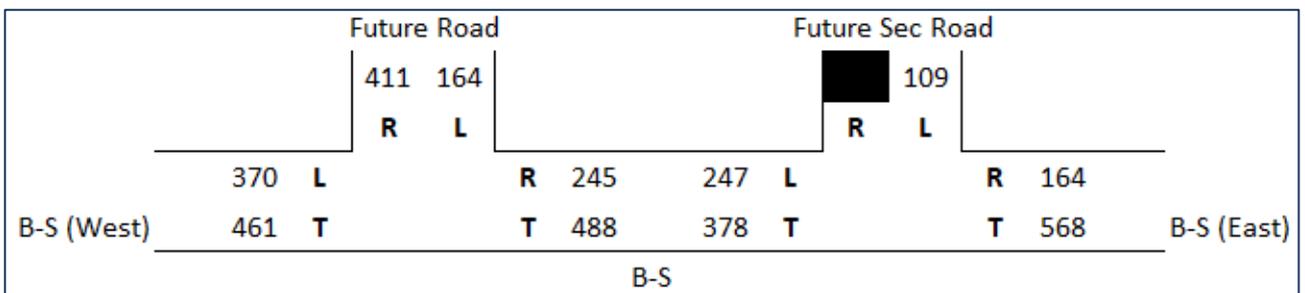


Figure 4-6 Scenario 2 – Future Traffic Volumes & Distribution (PM)



The secondary connector road has been proposed to be left-out only, as the thresholds of the networked intersections were severely affected with a right-out movement since it is a 'Stop' intersection and requires right-out movements to give way to both east and westbound through movements and right turn in movements.

5 Intersection Analysis

5.1 Background

The operation of both proposed scenarios within the study area have been analysed using SIDRA Intersection. As discussed, the intersections have been analysed to understand the maximum number of dwellings that each scenario would be able accommodate in terms of its traffic generation.

The SIDRA computer package, originally developed by the Australian Road Research Board, provides information about the capacity of an intersection in terms of a range of parameters, as described below:

Degree of Saturation (D.O.S.) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown in Table 1-1.

Table 1-1 Degrees of Saturation for Intersection Types

Rating	Level of Service	Signals	Roundabouts	Sign Control
Excellent	A	$x < 0.60$	$x < 0.60$	$x < 0.60$
Very Good	B	$0.61 < x < 0.70$	$0.61 < x < 0.70$	$0.61 < x < 0.70$
Good	C	$0.71 < x < 0.90$	$0.71 < x < 0.85$	$0.71 < x < 0.80$
Fair	D	$0.91 < x < 0.95$	$0.86 < x < 0.95$	$0.81 < x < 0.90$
Poor	E	$0.96 < x < 1.00$	$0.96 < x < 1.00$	$0.91 < x < 1.00$
Very Poor	F	$x > 1.01$	$x > 1.01$	$x > 1.01$

It is considered acceptable for some critical movements in an intersection to operate in the range of 0.9 to 1.0 during the high peak periods, reflecting actual conditions in a significant proportion of suburban signalised intersections.

The **95th Percentile (95th)ile Queue** represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and

Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

5.2 Analysis and Results Summary

The results of the SIDRA Intersection analysis are summarised in the following tables, showing the degree of saturation, 95th percentile queue and average delay of each intersection in each scenario under the traffic volumes gathered using the preceding generation and distribution.

Full details of the modelling and proposed upgrades are provided in Appendix A.

5.2.1 Scenario 1

Table 5-1 Scenario 1 – ‘Stop’ Sign Control Thresholds – Primary Connector Road

Approach	Movement	AM Peak (1,300 dwellings)				PM Peak (900 dwellings)			
		DOS	Delay (s)	95th th ile Queue (m)	LOS	DOS	Delay (s)	95th th ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.09	0.0	0.0	A	0.18	0.0	0.0	A
	Right	0.16	7.7	4.6	A	0.24	8.7	7.4	A
New Connector Road (N)	Left	0.70	14.8	56.9	B	0.14	9.5	3.9	A
	Right	0.90	43.0	79.0	E	0.85	50.9	47.0	E
Bannockburn-Shelford Rd (W)	Left	0.04	5.6	0.0	A	0.16	5.6	0.0	A
	Through	0.17	0.0	0.0	A	0.12	0.0	0.0	A

Table 5-2 Scenario 1 – Roundabout Thresholds – Primary Connector Road

Approach	Movement	AM Peak (2,500 dwellings)				PM Peak (2,400 dwellings)			
		DOS	Delay (s)	95 th %ile Queue (m)	LOS	DOS	Delay (s)	95 th %ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.50	10.9	30.6	B	0.83	14.6	98.0	B
	Right	0.50	14.0	30.6	B	0.83	21.7	98.0	C
New Connector Road (N)	Left	1.04	62.3	458.0	E	0.36	6.1	17.9	A
	Right	0.71	14.8	60.4	B	0.47	10.0	27.1	B
Bannockburn-Shelford Rd (W)	Left	0.19	6.5	7.8	A	1.00	50.5	271.6	E
	Through	0.31	6.2	15.4	A	0.48	12.9	24.9	B

Table 5-3 Scenario 1 – Signalised Thresholds – Primary Connector Road

Approach	Movement	AM Peak (1,600 dwellings)				PM Peak (1,500 dwellings)			
		DOS	Delay (s)	95 th %ile Queue (m)	LOS	DOS	Delay (s)	95 th %ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.36	14.1	21.1	B	0.29	6.3	34.3	A
	Right	0.81	29.0	29.7	C	0.88	41.5	96.2	D
New Connector Road (N)	Left	0.87	26.1	128.4	C	0.60	30.5	44.2	C
	Right	0.48	14.1	39.5	B	0.91	44.2	89.7	D
Bannockburn-Shelford Rd (W)	Left	0.21	19.1	11.4	B	0.45	12.7	57.5	B
	Through	0.66	16.2	44.1	B	0.19	5.8	21.2	A

5.2.2 Scenario 2

In Scenario 2, the threshold was reached on one particular intersection. For each network, the queues extending between the analysed intersections did not exceed the approximate distance between intersections.

In the case of the ‘Stop’ sign control, the diverting of the right turning vehicles at the secondary connector road to the primary connector road meant that the capacity of the primary connector road’s right turn lane was the critical point. However, this arrangement reached a higher threshold than having a right-out at the secondary connector road.

Table 5-4 Scenario 2 – ‘Stop’ Sign Control Thresholds – Primary Connector Road

Approach	Movement	AM Peak (1,100 dwellings)				PM Peak (800 dwellings)			
		DOS	Delay (s)	95 th %ile Queue (m)	LOS	DOS	Delay (s)	95 th %ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.15	0.0	0.0	A	0.21	0.0	0.0	A
	Right	0.08	7.5	2.2	A	0.12	8.2	3.6	A
New Connector Road (N)	Left	0.37	11.4	13.9	B	0.09	10.2	2.3	B
	Right	0.82	37.1	54.1	E	0.79	46.5	38.1	E
Bannockburn-Shelford Rd (W)	Left	0.02	5.6	0.0	A	0.09	5.6	0.0	A
	Through	0.18	0.0	0.0	A	0.17	0.0	0.0	A

Table 5-5 Scenario 2 – ‘Stop’ Sign Control Thresholds – Secondary Connector Road

Approach	Movement	AM Peak (1,100 dwellings)				PM Peak (800 dwellings)			
		DOS	Delay (s)	95 th ile Queue (m)	LOS	DOS	Delay (s)	95 th ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.13	0.0	0.0	A	0.23	0.0	0.0	A
	Right	0.07	9.6	2.0	A	0.08	7.5	2.1	A
Secondary Connector Road (N)	Left	0.38	15.4	12.6	C	0.06	9.9	1.4	A
Bannockburn-Shelford Rd (W)	Left	0.01	5.6	0.0	A	0.06	5.6	0.0	A
	Through	0.32	0.0	0.0	A	0.15	0.0	0.0	A

The AM peak for the roundabout network behaved similarly to the ‘Stop’ controlled network. However, the PM peak experienced its threshold at the primary connector road, with the critical leg being the eastern approach on Bannockburn-Shelford Road. This is due to the redirected right-turns from the secondary connector road. In the same manner as the ‘Stop’ controlled networks, the removal of the right-turn from the secondary connector road improved the overall thresholds.

Table 5-6 Scenario 2 – Roundabout Thresholds – Primary Connector Road

Approach	Movement	AM Peak (1,800 dwellings)				PM Peak (2,600 dwellings)			
		DOS	Delay (s)	95 th ile Queue (m)	LOS	DOS	Delay (s)	95 th ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.42	8.1	21.5	A	0.99	38.2	244.3	D
	Right	0.42	11.5	21.5	B	0.99	53.2	244.3	E
New Connector Road (N)	Left	0.48	6.8	23.1	A	0.41	10.6	19.9	B
	Right	0.46	11.0	21.5	B	0.74	18.7	68.8	B
Bannockburn-Shelford Rd (W)	Left	0.11	5.7	4.4	A	0.57	7.8	37.0	A
	Through	0.27	5.2	13.1	A	0.59	8.0	41.8	A

Table 5-7 Scenario 2 – Roundabout Thresholds – Secondary Connector Road

Approach	Movement	AM Peak (1,800 dwellings)				PM Peak (2,600 dwellings)			
		DOS	Delay (s)	95 th ile Queue (m)	LOS	DOS	Delay (s)	95 th ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.16	0.0	0.0	A	0.36	0.0	0.0	A
	Right	0.17	12.7	4.5	B	0.41	13.2	14.8	B
Secondary Connector Road (N)	Left	0.92	44.2	70.0	E	0.22	11.7	6.1	B
Bannockburn-Shelford Rd (W)	Left	0.02	5.6	0.0	A	0.19	5.6	0.0	A
	Through	0.42	0.1	0.0	A	0.24	0.0	0.0	A

The signalised networks behaved in the same manner as the roundabout networks, however the AM peak has a great threshold, while the PM peak has a significantly less threshold.

Table 5-8 Scenario 2 – Signalised Thresholds – Primary Connector Road

Approach	Movement	AM Peak (2,000 dwellings)				PM Peak (1,900 dwellings)			
		DOS	Delay (s)	95 th ile Queue (m)	LOS	DOS	Delay (s)	95 th ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.83	16.9	48.0	B	0.62	10.1	57.8	B
	Right	0.60	22.3	15.6	C	0.90	35.3	50.5	D
New Connector Road (N)	Left	0.80	19.2	64.8	B	0.33	18.7	19.7	B
	Right	0.73	16.8	52.2	B	0.83	26.4	69.5	C
Bannockburn-Shelford Rd (W)	Left	0.17	16.2	6.6	B	0.49	14.9	39.6	B
	Through	0.82	16.5	46.5	B	0.59	9.8	53.5	A

Table 5-9 Scenario 2 – Signalised Thresholds – Secondary Connector Road

Approach	Movement	AM Peak (2,000 dwellings)				PM Peak (1,900 dwellings)			
		DOS	Delay (s)	95 th ile Queue (m)	LOS	DOS	Delay (s)	95 th ile Queue (m)	LOS
Bannockburn-Shelford Rd (E)	Through	0.16	0.0	0.0	A	0.31	0.0	0.0	A
	Right	0.18	12.4	5.0	B	0.22	9.2	6.8	A
Secondary Connector Road (N)	Left	0.93	48.9	93.0	E	0.14	10.7	4.1	B
Bannockburn-Shelford Rd (W)	Left	0.03	5.6	0.0	A	0.14	5.6	0.0	A
	Through	0.45	0.1	0.0	A	0.20	0.0	0.0	A

5.2.3 Summary

The thresholds achieved by the above SIDRA analysis can be summarised in the below table.

Table 5-10 Intersection Type Thresholds for Scenarios 1 & 2

Intersection Type	Peak Hour	Scenario 1 Threshold (No. Dwellings)	Scenario 2 Threshold (No. Dwellings)
Stop	AM	1,300	1,100
	PM	900	800
Roundabout	AM	2,500	1,800
	PM	2,400	2,600
Signals	AM	1,700	2,000
	PM	1,500	1,900

Therefore, the preceding analysis indicates that to allow for greater intersection capacity for vehicles accessing Bannockburn Shelford Road from the proposed Area 2 residential rezoning is to implement a single two-lane roundabout providing access to one (1) primary connector road, ending to the north where the start of the proposed bridge would be located.

Should Council require additional access points into the residential rezoning area it is recommended to implement a signalised intersection providing access to the primary connector road and a “Stop” control intersection with a ban on outbound right hand turn movements providing access to a secondary connector road east of the primary connector road.

Whilst the development aims to construct approximately 1,000 dwellings based on the Bannockburn Growth Strategy, the above intersection arrangements can operate within capacity with construction of up to 2,400 dwellings.

APPENDIX

A

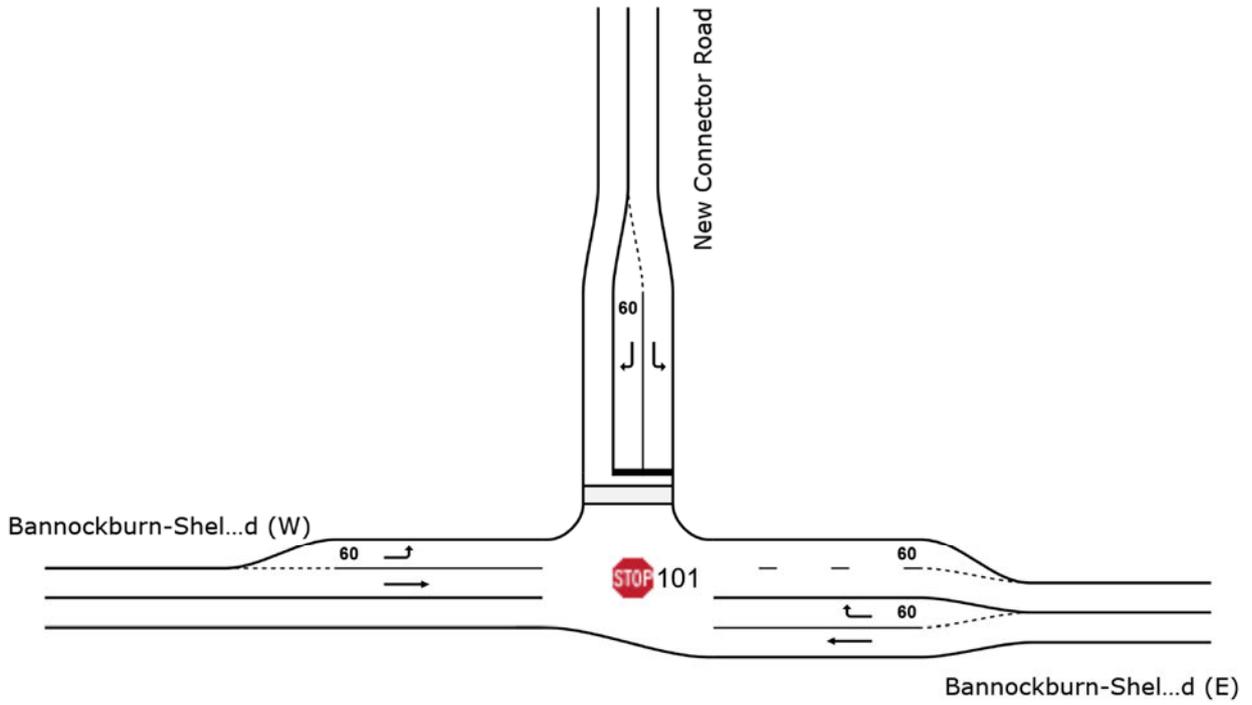
SIDRA OUTPUTS



SITE LAYOUT

 Site: 101 [S1 - Ban-SheRdConRd - Stop - AM]

New Site
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

 Site: 101 [S1 - Ban-SheRdConRd - Stop - AM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bannockburn-Shelford (E)												
5	T1	166	8.0	0.090	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	143	5.0	0.155	7.7	LOS A	0.6	4.6	0.47	0.69	0.47	51.8
Approach		309	6.6	0.155	3.6	NA	0.6	4.6	0.22	0.32	0.22	55.9
North: New Connector Road												
7	L2	572	5.0	0.703	14.8	LOS B	7.8	56.9	0.70	1.18	1.24	48.1
9	R2	312	5.0	0.891	43.0	LOS E	10.8	79.0	0.94	1.69	3.25	35.1
Approach		884	5.0	0.891	24.7	LOS C	10.8	79.0	0.79	1.36	1.95	42.5
West: Bannockburn-Shelford (W)												
10	L2	78	5.0	0.043	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	305	8.0	0.165	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		383	7.4	0.165	1.2	NA	0.0	0.0	0.00	0.12	0.00	58.5
All Vehicles		1576	5.9	0.891	14.9	NA	10.8	79.0	0.48	0.85	1.14	48.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

 Site: 101 [S1 - Ban-SheRdConRd - Stop - PM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bannockburn-Shelford (E)												
5	T1	323	8.0	0.176	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	194	5.0	0.241	8.7	LOSA	1.0	7.4	0.56	0.78	0.56	51.1
Approach		517	6.9	0.241	3.3	NA	1.0	7.4	0.21	0.29	0.21	56.3
North: New Connector Road												
7	L2	129	5.0	0.141	9.5	LOSA	0.5	3.9	0.35	0.90	0.35	51.1
9	R2	195	5.0	0.838	49.8	LOS E	6.4	47.0	0.95	1.44	2.57	32.9
Approach		324	5.0	0.838	33.8	LOS D	6.4	47.0	0.71	1.22	1.69	38.4
West: Bannockburn-Shelford (W)												
10	L2	292	5.0	0.163	5.6	LOSA	0.0	0.0	0.00	0.57	0.00	53.4
11	T1	214	8.0	0.115	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach		506	6.3	0.163	3.2	NA	0.0	0.0	0.00	0.33	0.00	56.0
All Vehicles		1347	6.2	0.838	10.6	NA	6.4	47.0	0.25	0.53	0.49	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

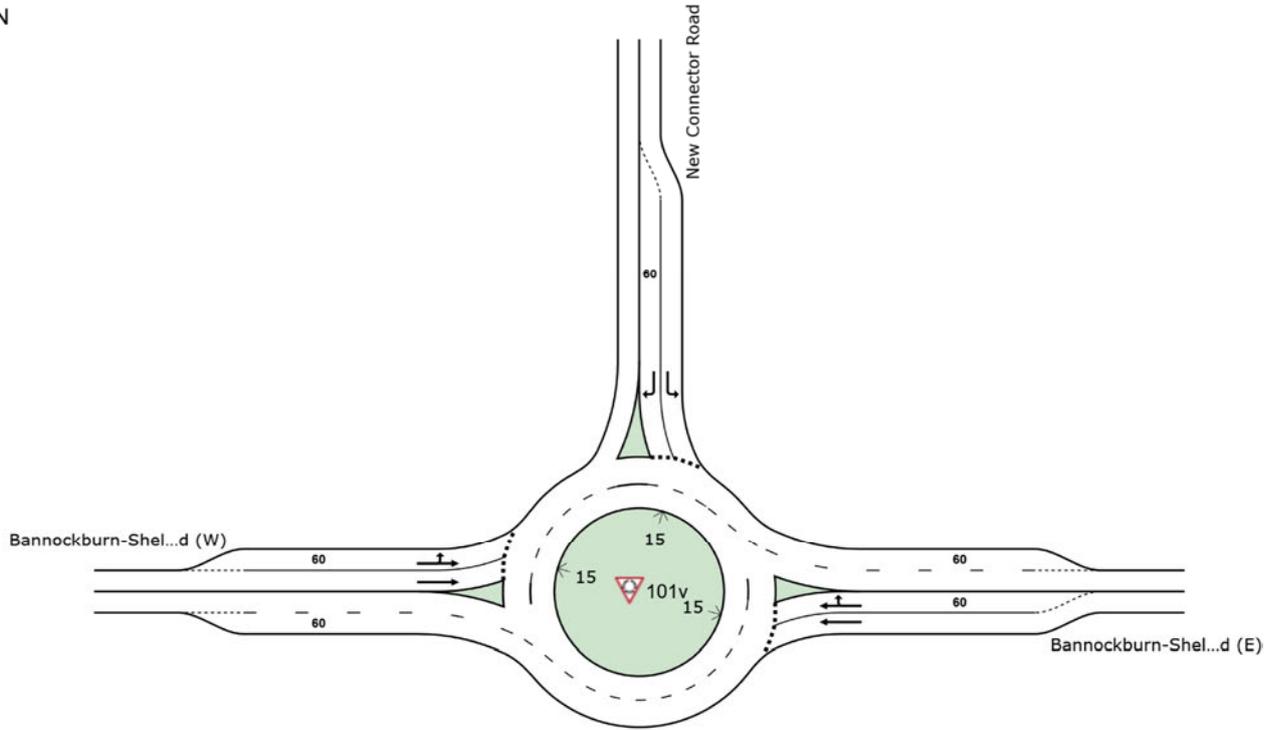
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



SITE LAYOUT

 Site: 101v [S1 - Ban-SheRdConRd - RA - AM]

New Site
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

 Site: 101v [S1 - Ban-SheRdConRd - RA - AM]

New Site
 Site Category: (None)
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bannockburn-Shelford (E)												
5	T1	166	8.0	0.500	10.9	LOS B	4.2	30.6	0.81	0.90	0.86	50.0
6	R2	275	5.0	0.500	14.0	LOS B	4.2	30.6	0.87	0.94	0.97	49.4
Approach		441	6.1	0.500	12.8	LOS B	4.2	30.6	0.85	0.92	0.93	49.6
North: New Connector Road												
7	L2	1101	5.0	1.038	62.3	LOS E	62.7	458.0	1.00	2.12	3.66	29.2
9	R2	599	5.0	0.710	14.8	LOS B	8.3	60.4	0.85	0.91	1.04	48.3
Approach		1700	5.0	1.038	45.6	LOS D	62.7	458.0	0.95	1.69	2.74	34.0
West: Bannockburn-Shelford (W)												
10	L2	150	5.0	0.186	6.5	LOS A	1.1	7.8	0.54	0.64	0.54	52.9
11	T1	305	8.0	0.309	6.2	LOS A	2.1	15.4	0.57	0.61	0.57	53.3
Approach		455	7.0	0.309	6.3	LOS A	2.1	15.4	0.56	0.62	0.56	53.2
All Vehicles		2596	5.5	1.038	33.1	LOS C	62.7	458.0	0.86	1.37	2.05	38.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

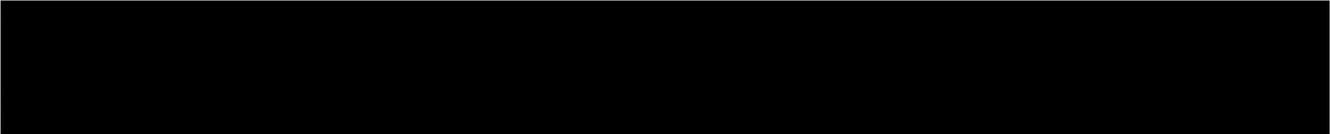
Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

 Site: 101v [S1 - Ban-SheRdConRd - RA - PM]

New Site
 Site Category: (None)
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bannockburn-Shelford (E)												
5	T1	323	8.0	0.825	14.6	LOS B	13.3	98.0	0.88	1.04	1.19	47.6
6	R2	516	5.0	0.825	21.7	LOS C	13.3	98.0	1.00	1.22	1.61	44.8
Approach		839	6.2	0.825	19.0	LOS B	13.3	98.0	0.95	1.15	1.45	45.9
North: New Connector Road												
7	L2	344	5.0	0.359	6.1	LOS A	2.5	17.9	0.55	0.63	0.55	52.9
9	R2	520	5.0	0.468	10.0	LOS B	3.7	27.1	0.59	0.68	0.59	50.9
Approach		864	5.0	0.468	8.5	LOS A	3.7	27.1	0.57	0.66	0.57	51.6
West: Bannockburn-Shelford (W)												
10	L2	780	5.0	0.997	50.5	LOS E	37.2	271.6	1.00	1.96	3.30	32.3
11	T1	214	8.0	0.478	12.9	LOS B	3.3	24.9	0.83	0.96	0.96	49.6
Approach		994	5.6	0.997	42.4	LOS D	37.2	271.6	0.96	1.74	2.79	35.0
All Vehicles		2697	5.6	0.997	24.2	LOS C	37.2	271.6	0.84	1.21	1.66	42.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

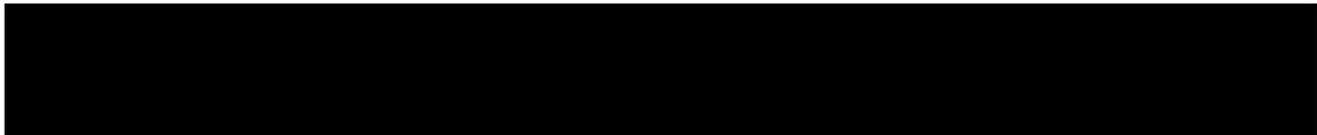
Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

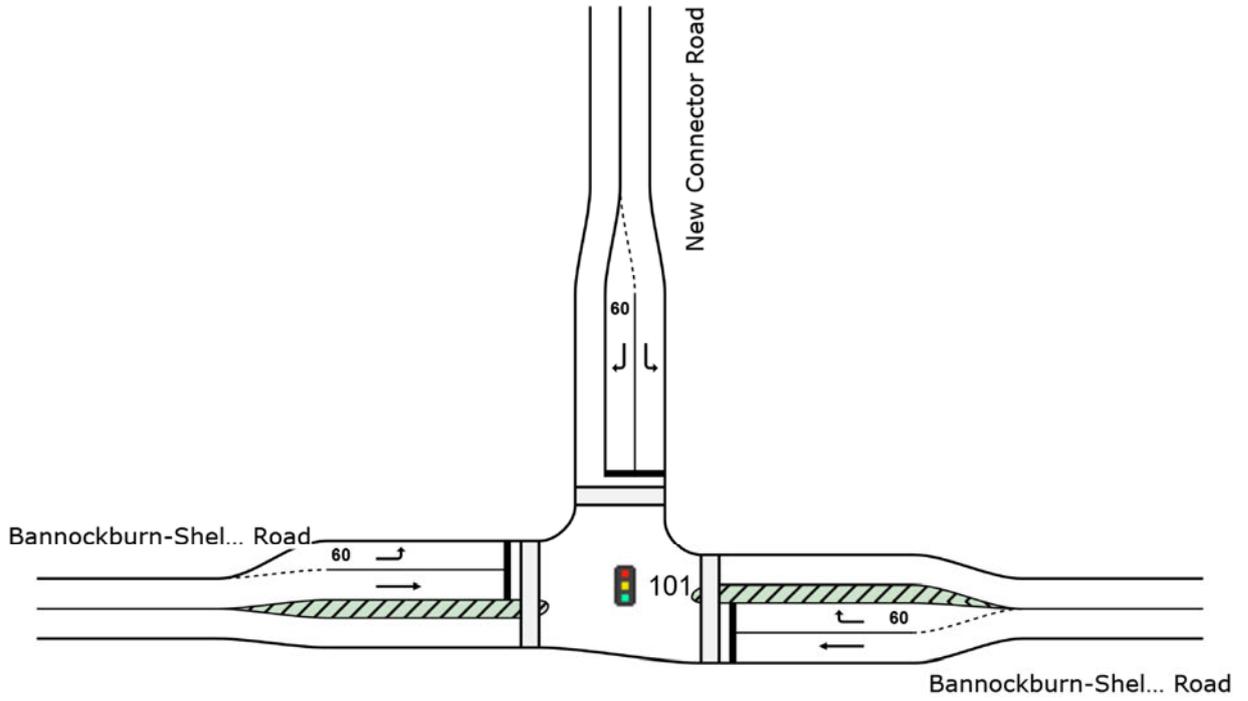
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



SITE LAYOUT

 **Site: 101 [S1 - Ban-SheRdConRd - Signals - PM]**

New Site
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

 Site: 101 [S1 - Ban-SheRdConRd - Signals - AM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bannockburn-Shelford Road												
5	T1	166	8.0	0.358	14.1	LOS B	2.8	21.1	0.87	0.70	0.87	48.7
6	R2	176	5.0	0.806	29.0	LOS C	4.1	29.7	1.00	0.97	1.51	39.6
Approach		342	6.5	0.806	21.8	LOS C	4.1	29.7	0.93	0.84	1.20	43.6
North: New Connector Road												
7	L2	705	5.0	0.874	26.1	LOS C	17.6	128.4	0.97	1.05	1.39	41.1
9	R2	383	5.0	0.475	14.1	LOS B	5.4	39.5	0.74	0.79	0.74	47.3
Approach		1088	5.0	0.874	21.9	LOS C	17.6	128.4	0.89	0.96	1.16	43.1
West: Bannockburn-Shelford Road												
10	L2	96	5.0	0.214	19.1	LOS B	1.6	11.4	0.83	0.74	0.83	44.6
11	T1	305	8.0	0.658	16.2	LOS B	5.9	44.1	0.95	0.84	1.05	47.4
Approach		401	7.3	0.658	16.9	LOS B	5.9	44.1	0.92	0.82	1.00	46.7
All Vehicles		1831	5.8	0.874	20.7	LOS C	17.6	128.4	0.91	0.91	1.13	43.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

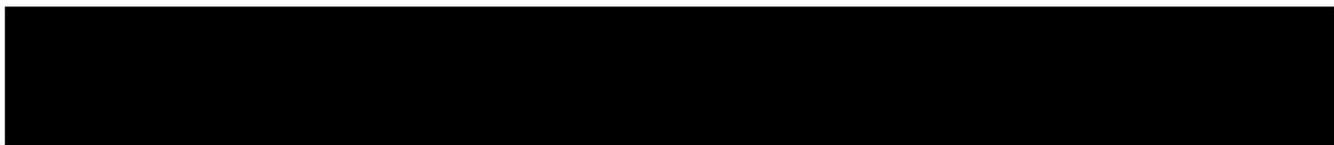
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85	
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85	
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85	
All Pedestrians		158	14.5	LOS B			0.85	0.85	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



PHASING SUMMARY

 **Site: 101 [S1 - Ban-SheRdConRd - Signals - AM]**

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B

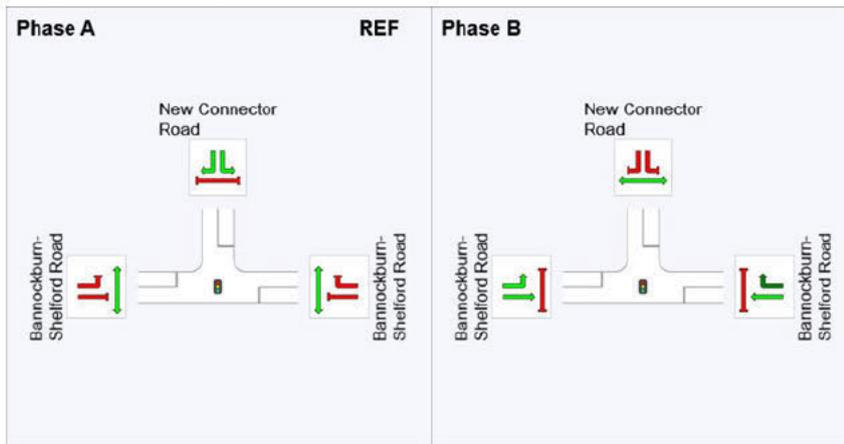
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	24
Green Time (sec)	18	10
Phase Time (sec)	24	16
Phase Split	60%	40%

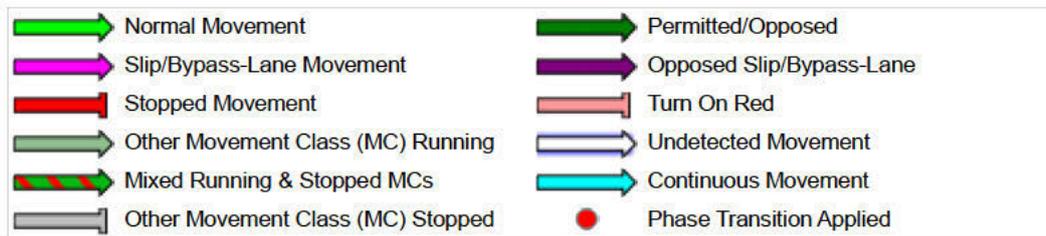
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

 Site: 101 [S1 - Ban-SheRdConRd - Signals - PM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bannockburn-Shelford Road												
5	T1	323	8.0	0.290	6.3	LOS A	4.6	34.3	0.52	0.44	0.52	54.4
6	R2	323	5.0	0.883	41.5	LOS D	13.2	96.2	0.97	1.09	1.54	34.9
Approach		646	6.5	0.883	23.9	LOS C	13.2	96.2	0.74	0.77	1.03	42.5
North: New Connector Road												
7	L2	215	5.0	0.599	30.5	LOS C	6.1	44.2	0.96	0.82	0.98	39.2
9	R2	325	5.0	0.906	44.2	LOS D	12.3	89.7	1.00	1.07	1.59	34.0
Approach		540	5.0	0.906	38.7	LOS D	12.3	89.7	0.98	0.97	1.35	35.9
West: Bannockburn-Shelford Road												
10	L2	487	5.0	0.453	12.7	LOS B	7.9	57.5	0.59	0.76	0.59	48.4
11	T1	214	8.0	0.192	5.8	LOS A	2.8	21.2	0.48	0.40	0.48	54.7
Approach		701	5.9	0.453	10.6	LOS B	7.9	57.5	0.56	0.65	0.56	50.2
All Vehicles		1887	5.9	0.906	23.2	LOS C	13.2	96.2	0.74	0.78	0.94	42.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

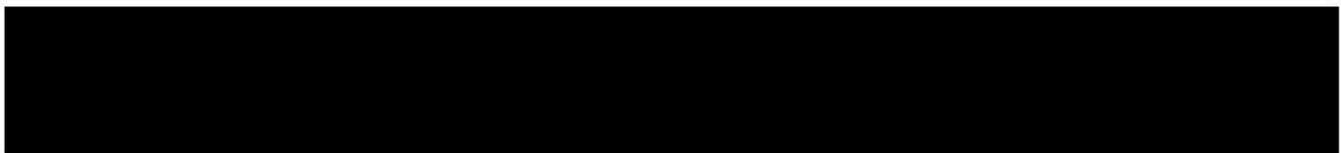
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
All Pedestrians		158	24.4	LOS C			0.90	0.90	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



PHASING SUMMARY

 **Site: 101 [S1 - Ban-SheRdConRd - Signals - PM]**

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B

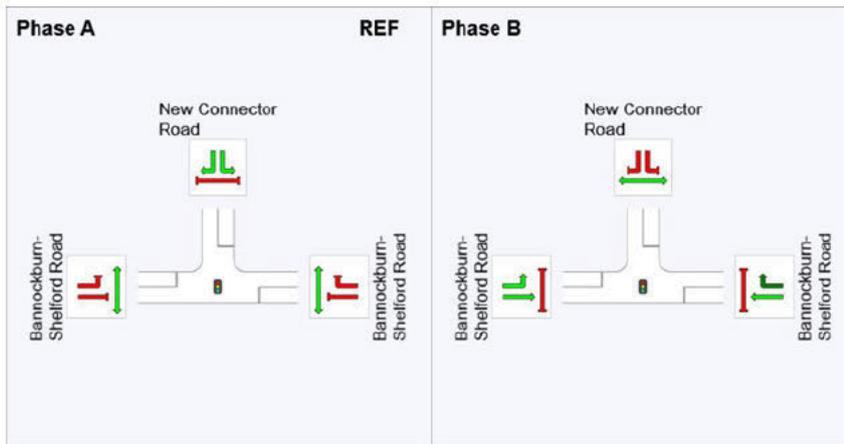
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	18
Green Time (sec)	12	36
Phase Time (sec)	18	42
Phase Split	30%	70%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

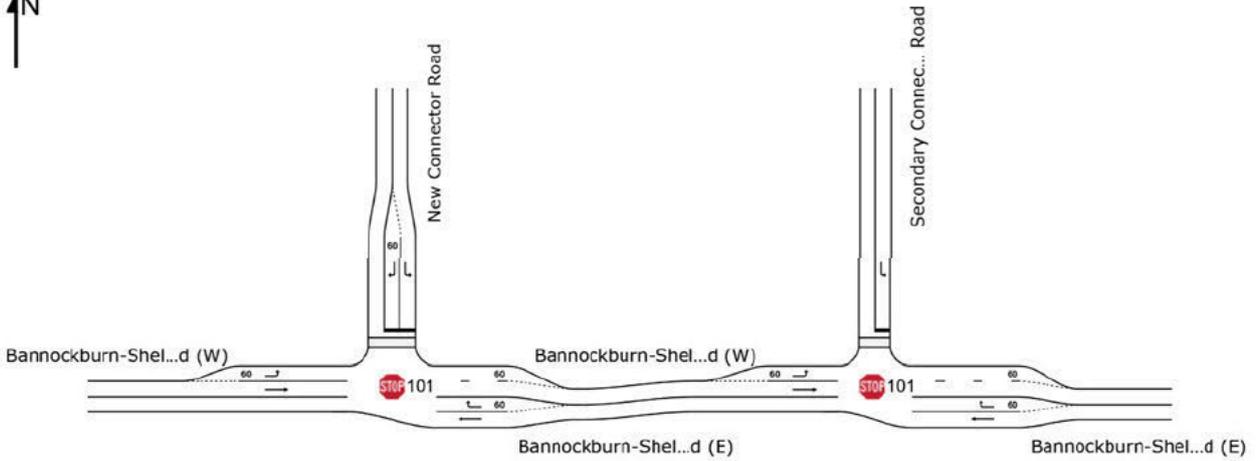
VAR: Variable Phase



NETWORK LAYOUT

Network: N101 [Stop-Stop - AM]

New Network
 Network Category: (None)



SITES IN NETWORK		
Site ID	CCG ID	Site Name
101	NA	S2 - Ban-SheRdPriConRd - Stop - AM
101	NA	S2 - Ban-SheRdSecConRd - Stop Network - AM



MOVEMENT SUMMARY

 Site: 101 [S2 - Ban-SheRdPriConRd - Stop - AM]

 Network: N101 [Stop-Stop - AM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance				
East: Bannockburn-Shelford (E)														
5	T1	271	8.0	271	8.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	73	5.0	73	5.0	0.078	7.5	LOS A	0.3	2.2	0.44	0.66	0.44	52.0
Approach		344	7.4	344	7.4	0.147	1.6	NA	0.3	2.2	0.09	0.14	0.09	58.1
North: New Connector Road														
7	L2	291	5.0	291	5.0	0.371	11.4	LOS B	1.9	13.9	0.52	0.99	0.61	45.2
9	R2	264	5.0	264	5.0	0.822	37.1	LOS E	7.4	54.1	0.92	1.47	2.51	37.2
Approach		555	5.0	555	5.0	0.822	23.6	LOS C	7.4	54.1	0.71	1.22	1.52	39.7
West: Bannockburn-Shelford (W)														
10	L2	40	5.0	40	5.0	0.022	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	331	8.0	331	8.0	0.179	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		371	7.7	371	7.7	0.179	0.6	NA	0.0	0.0	0.00	0.06	0.00	58.6
All Vehicles		1270	6.4	1270	6.4	0.822	10.9	NA	7.4	54.1	0.34	0.59	0.69	48.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
 Vehicle movement LOS values are based on average delay per movement.

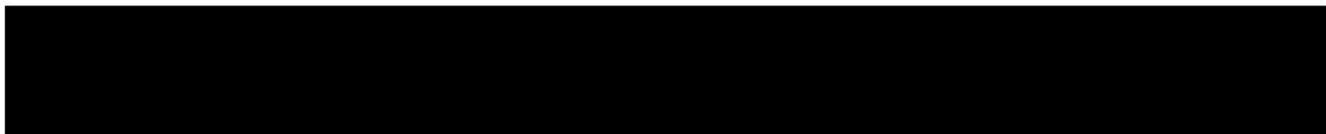
Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

 Site: 101 [S2 - Ban-SheRdSecConRd - Stop Network - AM]  Network: N101 [Stop-Stop - AM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance m				
East: Bannockburn-Shelford (E)														
5	T1	239	8.0	239	8.0	0.130	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	48	5.0	48	5.0	0.074	9.6	LOS A	0.3	2.0	0.57	0.78	0.57	50.3
Approach		287	7.5	287	7.5	0.130	1.6	NA	0.3	2.0	0.10	0.13	0.10	56.8
North: Secondary Connector Road														
7	L2	194	5.0	194	5.0	0.380	15.4	LOS C	1.7	12.6	0.68	1.07	0.89	47.7
Approach		194	5.0	194	5.0	0.380	15.4	LOS C	1.7	12.6	0.68	1.07	0.89	47.7
West: Bannockburn-Shelford (W)														
10	L2	26	5.0	26	5.0	0.014	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	596	8.0	596	8.0	0.322	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		622	7.9	622	7.9	0.322	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1103	7.3	1103	7.3	0.380	3.3	NA	1.7	12.6	0.14	0.24	0.18	56.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

STOP Site: 101 [S2 - Ban-SheRdPriConRd - Stop - PM]

Network: N101 [Stop-Stop - PM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance m			km/h	
East: Bannockburn-Shelford (E)														
5	T1	392	8.0	392	8.0	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	103	5.0	103	5.0	0.124	8.2	LOS A	0.5	3.6	0.51	0.72	0.51	51.4
Approach		495	7.4	495	7.4	0.213	1.7	NA	0.5	3.6	0.11	0.15	0.11	57.9
North: New Connector Road														
7	L2	69	5.0	69	5.0	0.086	10.2	LOS B	0.3	2.3	0.42	0.91	0.42	46.3
9	R2	173	5.0	173	5.0	0.790	46.5	LOS E	5.2	38.1	0.94	1.34	2.21	33.9
Approach		242	5.0	242	5.0	0.790	36.2	LOS E	5.2	38.1	0.79	1.22	1.70	35.5
West: Bannockburn-Shelford (W)														
10	L2	156	5.0	156	5.0	0.087	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	318	8.0	318	8.0	0.172	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		474	7.0	474	7.0	0.172	1.9	NA	0.0	0.0	0.00	0.19	0.00	56.5
All Vehicles		1211	6.8	1211	6.8	0.790	8.7	NA	5.2	38.1	0.20	0.38	0.38	51.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
 Vehicle movement LOS values are based on average delay per movement.

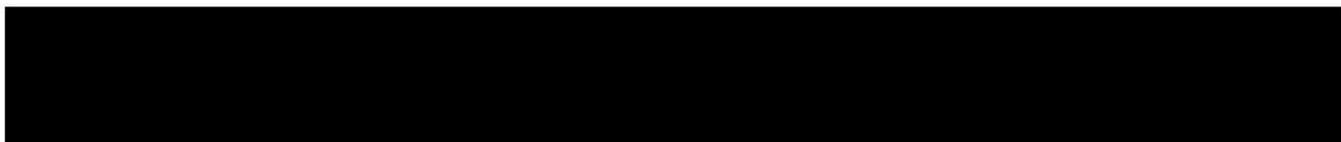
Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



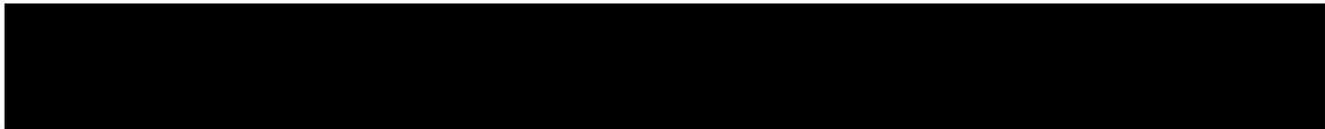
MOVEMENT SUMMARY

STOP Site: 101 [S2 - Ban-SheRdSecConRd - Stop Network - PM] **Network: N101 [Stop-Stop - PM]**

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance				
East: Bannockburn-Shelford (E)														
5	T1	426	8.0	426	8.0	0.232	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	69	5.0	69	5.0	0.075	7.5	LOS A	0.3	2.1	0.45	0.66	0.45	51.7
Approach		495	7.6	495	7.6	0.232	1.1	NA	0.3	2.1	0.06	0.09	0.06	57.7
North: Secondary Connector Road														
7	L2	46	5.0	46	5.0	0.055	9.9	LOS A	0.2	1.4	0.38	0.89	0.38	50.9
Approach		46	5.0	46	5.0	0.055	9.9	LOS A	0.2	1.4	0.38	0.89	0.38	50.9
West: Bannockburn-Shelford (W)														
10	L2	104	5.0	104	5.0	0.058	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	283	8.0	283	8.0	0.153	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		387	7.2	387	7.2	0.153	1.5	NA	0.0	0.0	0.00	0.15	0.00	58.0
All Vehicles		928	7.3	928	7.3	0.232	1.7	NA	0.3	2.1	0.05	0.16	0.05	57.4

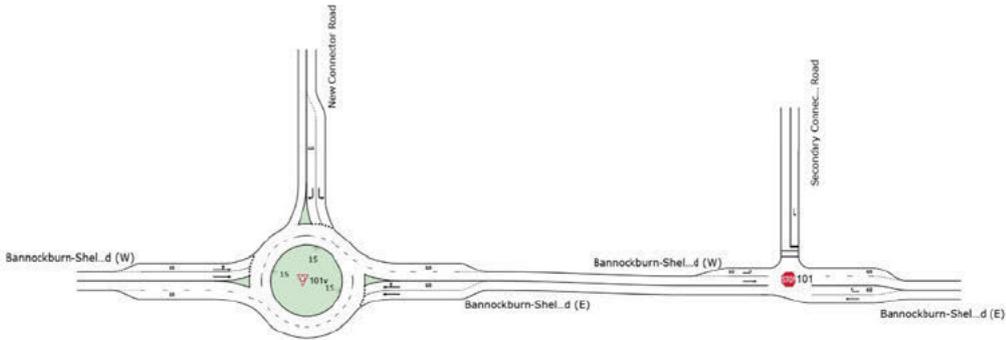
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



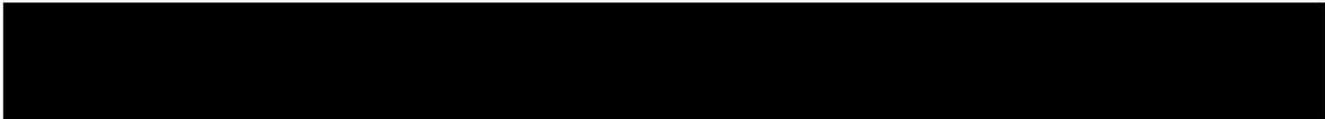
NETWORK LAYOUT

Network: N101 [RA-Stop - AM]

New Network
 Network Category: (None)



SITES IN NETWORK		
Site ID	CCG ID	Site Name
101v	NA	S2 - Ban-SheRdPriConRd - RA - AM
101	NA	S2 - Ban-SheRdSecConRd - RA Network - AM



MOVEMENT SUMMARY

Site: 101v [S2 - Ban-SheRdPriConRd - RA - AM]

Network: N101 [RA-Stop - AM]

New Site
 Site Category: (None)
 Roundabout

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance				
East: Bannockburn-Shelford (E)														
5	T1	339	8.0	339	8.0	0.418	8.1	LOS A	2.9	21.5	0.70	0.76	0.70	52.0
6	R2	119	5.0	119	5.0	0.418	11.5	LOS B	2.9	21.5	0.71	0.76	0.71	51.8
Approach		458	7.2	458	7.2	0.418	9.0	LOS A	2.9	21.5	0.70	0.76	0.70	52.0
North: New Connector Road														
7	L2	476	5.0	476	5.0	0.476	6.8	LOS A	3.2	23.1	0.64	0.72	0.64	49.0
9	R2	431	5.0	431	5.0	0.458	11.0	LOS B	3.0	21.5	0.63	0.77	0.63	50.7
Approach		907	5.0	907	5.0	0.476	8.8	LOS A	3.2	23.1	0.64	0.74	0.64	50.1
West: Bannockburn-Shelford (W)														
10	L2	65	5.0	65	5.0	0.113	5.7	LOS A	0.6	4.4	0.37	0.53	0.37	53.3
11	T1	348	8.0	348	8.0	0.268	5.2	LOS A	1.8	13.1	0.37	0.48	0.37	49.9
Approach		413	7.5	413	7.5	0.268	5.3	LOS A	1.8	13.1	0.37	0.49	0.37	50.7
All Vehicles		1778	6.2	1778	6.2	0.476	8.0	LOS A	3.2	23.1	0.59	0.69	0.59	50.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

 Site: 101 [S2 - Ban-SheRdSecConRd - RA Network - AM]

 Network: N101 [RA-Stop - AM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance				
East: Bannockburn-Shelford (E)														
5	T1	285	8.0	285	8.0	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	79	5.0	79	5.0	0.174	12.7	LOS B	0.6	4.5	0.72	0.88	0.72	48.2
Approach		364	7.3	364	7.3	0.174	2.8	NA	0.6	4.5	0.16	0.19	0.16	55.2
North: Secondary Connector Road														
7	L2	317	5.0	317	5.0	0.915	44.2	LOS E	9.6	70.0	0.97	1.72	3.60	34.8
Approach		317	5.0	317	5.0	0.915	44.2	LOS E	9.6	70.0	0.97	1.72	3.60	34.8
West: Bannockburn-Shelford (W)														
10	L2	43	5.0	43	5.0	0.024	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	781	8.0	781	8.0	0.421	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		824	7.8	824	7.8	0.421	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.5
All Vehicles		1505	7.1	1505	7.1	0.915	10.2	NA	9.6	70.0	0.24	0.43	0.80	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

Site: 101v [S2 - Ban-SheRdPriConRd - RA - PM]

Network: N101 [RA-Stop - PM]

New Site
 Site Category: (None)
 Roundabout

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance				
East: Bannockburn-Shelford (E)														
5	T1	548	8.0	548	8.0	0.988	38.2	LOS D	33.0	244.3	0.95	1.62	2.49	36.6
6	R2	336	5.0	336	5.0	0.988	53.2	LOS E	33.0	244.3	1.00	1.92	3.20	32.8
Approach		884	6.9	884	6.9	0.988	43.9	LOS D	33.0	244.3	0.97	1.73	2.76	35.1
North: New Connector Road														
7	L2	224	5.0	224	5.0	0.414	10.6	LOS B	2.7	19.9	0.80	0.91	0.86	44.7
9	R2	563	5.0	563	5.0	0.740	18.7	LOS B	9.4	68.8	0.99	1.12	1.39	46.0
Approach		787	5.0	787	5.0	0.740	16.4	LOS B	9.4	68.8	0.93	1.06	1.24	45.8
West: Bannockburn-Shelford (W)														
10	L2	507	5.0	507	5.0	0.565	7.8	LOS A	5.1	37.0	0.78	0.79	0.83	51.9
11	T1	552	8.0	552	8.0	0.589	8.0	LOS A	5.6	41.8	0.79	0.77	0.85	46.9
Approach		1059	6.6	1059	6.6	0.589	7.9	LOS A	5.6	41.8	0.79	0.78	0.84	50.0
All Vehicles		2730	6.2	2730	6.2	0.988	22.0	LOS C	33.0	244.3	0.89	1.17	1.58	42.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

 Site: 101 [S2 - Ban-SheRdSecConRd - RA Network - PM]

 Network: N101 [RA-Stop - PM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance				
East: Bannockburn-Shelford (E)														
5	T1	659	8.0	659	8.0	0.359	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	224	5.0	224	5.0	0.405	13.2	LOS B	2.0	14.8	0.72	0.97	0.98	47.9
Approach		883	7.2	883	7.2	0.405	3.4	NA	2.0	14.8	0.18	0.24	0.25	54.4
North: Secondary Connector Road														
7	L2	149	5.0	149	5.0	0.223	11.7	LOS B	0.8	6.1	0.53	0.99	0.53	49.9
Approach		149	5.0	149	5.0	0.223	11.7	LOS B	0.8	6.1	0.53	0.99	0.53	49.9
West: Bannockburn-Shelford (W)														
10	L2	338	5.0	338	5.0	0.188	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	53.4
11	T1	438	8.0	438	8.0	0.236	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		776	6.7	776	6.7	0.236	2.5	NA	0.0	0.0	0.00	0.25	0.00	56.9
All Vehicles		1808	6.8	1808	6.8	0.405	3.7	NA	2.0	14.8	0.13	0.31	0.17	55.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

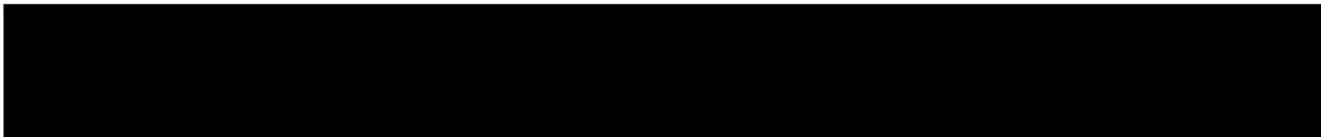
Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

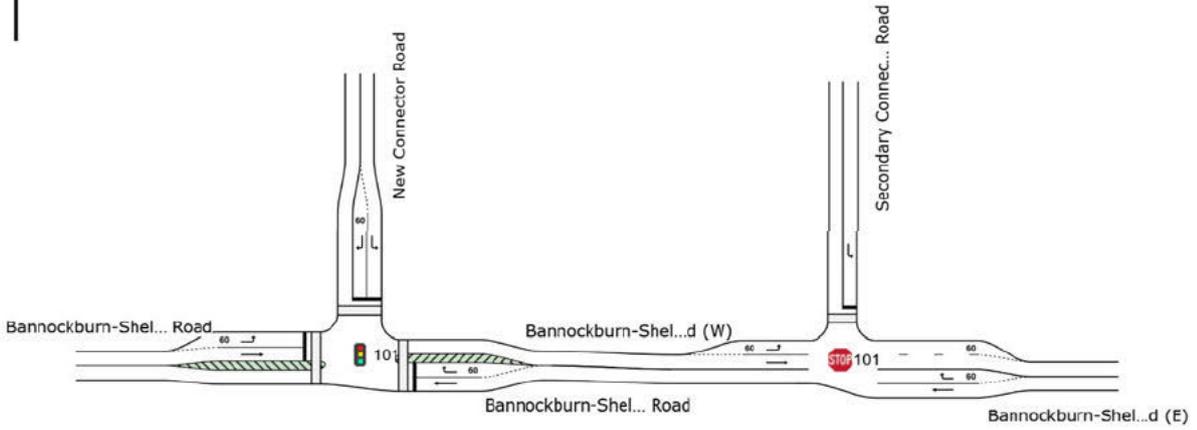
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



NETWORK LAYOUT

Network: N101 [Signals-Stop - AM]

New Network
 Network Category: (None)



SITES IN NETWORK		
Site ID	CCG ID	Site Name
101	NA	S2 - Ban-SheRdPriConRd - Signals - AM
101	NA	S2 - Ban-SheRdSecConRd - Signals Network - AM



MOVEMENT SUMMARY

Site: 101 [S2 - Ban-SheRdPriConRd - Signals - AM]

Network: N101 [Signals-Stop - AM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 30 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance m				
East: Bannockburn-Shelford Road														
5	T1	358	8.0	358	8.0	0.828	16.9	LOS B	6.4	48.0	1.00	1.05	1.52	46.9
6	R2	132	5.0	132	5.0	0.601	22.3	LOS C	2.1	15.6	1.00	0.80	1.15	42.7
Approach		490	7.2	490	7.2	0.828	18.4	LOS B	6.4	48.0	1.00	0.98	1.42	45.7
North: New Connector Road														
7	L2	528	5.0	528	5.0	0.803	19.2	LOS B	8.9	64.8	0.96	0.99	1.30	37.1
9	R2	479	5.0	479	5.0	0.728	16.8	LOS B	7.1	52.2	0.92	0.91	1.11	45.7
Approach		1007	5.0	1007	5.0	0.803	18.0	LOS B	8.9	64.8	0.94	0.96	1.21	42.2
West: Bannockburn-Shelford Road														
10	L2	72	5.0	72	5.0	0.172	16.2	LOS B	0.9	6.6	0.83	0.73	0.83	46.2
11	T1	353	8.0	353	8.0	0.816	16.5	LOS B	6.2	46.5	1.00	1.03	1.48	39.1
Approach		425	7.5	425	7.5	0.816	16.4	LOS B	6.2	46.5	0.97	0.98	1.37	40.9
All Vehicles		1922	6.1	1922	6.1	0.828	17.8	LOS B	8.9	64.8	0.96	0.97	1.30	43.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P2	East Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P3	North Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P4	West Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
All Pedestrians		158	9.6	LOS A			0.80	0.80	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 101 [S2 - Ban-SheRdPriConRd - Signals - AM]

Network: N101 [Signals-Stop - AM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 30 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B

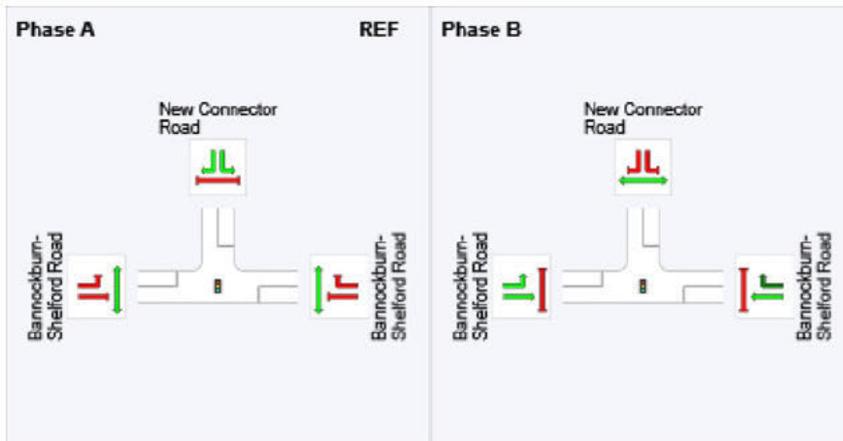
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	17
Green Time (sec)	11	7
Phase Time (sec)	17	13
Phase Split	57%	43%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

MOVEMENT SUMMARY

STOP Site: 101 [S2 - Ban-SheRdSecConRd - Signals Network - AM]

Network: N101 [Signals-Stop - AM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance	m			km/h
East: Bannockburn-Shelford (E)														
5	T1	298	8.0	298	8.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	88	5.0	88	5.0	0.177	12.4	LOS B	0.7	5.0	0.69	0.87	0.69	48.4
Approach		386	7.3	386	7.3	0.177	2.8	NA	0.7	5.0	0.16	0.20	0.16	55.1
North: Secondary Connector Road														
7	L2	352	5.0	352	5.0	0.929	48.9	LOS E	12.7	93.0	0.97	1.87	3.98	33.4
Approach		352	5.0	352	5.0	0.929	48.9	LOS E	12.7	93.0	0.97	1.87	3.98	33.4
West: Bannockburn-Shelford (W)														
10	L2	48	5.0	48	5.0	0.027	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	833	8.0	833	8.0	0.449	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		881	7.8	881	7.8	0.449	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.5
All Vehicles		1619	7.1	1619	7.1	0.929	11.5	NA	12.7	93.0	0.25	0.47	0.90	49.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

Site: 101 [S2 - Ban-SheRdPriConRd - Signals - PM]

Network: N101 [Signals-Stop - PM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance m				
East: Bannockburn-Shelford Road														
5	T1	488	8.0	488	8.0	0.619	10.1	LOS B	7.7	57.8	0.83	0.72	0.83	51.5
6	R2	245	5.0	245	5.0	0.895	35.3	LOS D	6.9	50.5	1.00	1.18	1.89	37.1
Approach		733	7.0	733	7.0	0.895	18.5	LOS B	7.7	57.8	0.89	0.87	1.19	45.6
North: New Connector Road														
7	L2	164	5.0	164	5.0	0.333	18.7	LOS B	2.7	19.7	0.84	0.77	0.84	37.4
9	R2	411	5.0	411	5.0	0.833	26.4	LOS C	9.5	69.5	1.00	1.01	1.40	40.8
Approach		575	5.0	575	5.0	0.833	24.2	LOS C	9.5	69.5	0.95	0.94	1.24	40.2
West: Bannockburn-Shelford Road														
10	L2	370	5.0	370	5.0	0.485	14.9	LOS B	5.4	39.6	0.77	0.79	0.77	47.0
11	T1	461	8.0	461	8.0	0.585	9.8	LOS A	7.2	53.5	0.82	0.71	0.82	45.5
Approach		831	6.7	831	6.7	0.585	12.1	LOS B	7.2	53.5	0.80	0.74	0.80	46.4
All Vehicles		2139	6.3	2139	6.3	0.895	17.5	LOS B	9.5	69.5	0.87	0.84	1.05	44.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

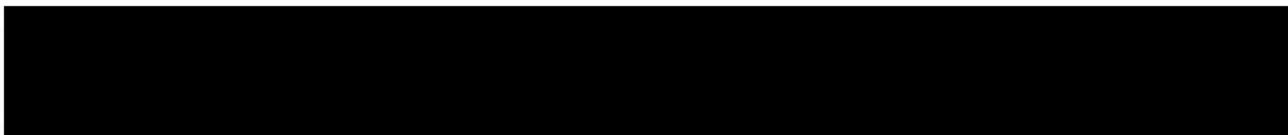
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85	
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85	
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85	
All Pedestrians		158	14.5	LOS B			0.85	0.85	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



PHASING SUMMARY

Site: 101 [S2 - Ban-SheRdPriConRd - Signals - PM]

Network: N101 [Signals-Stop - PM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B

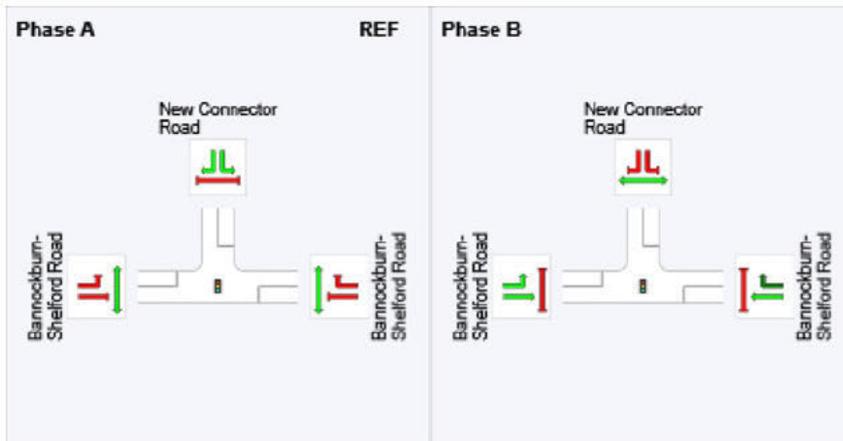
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	17
Green Time (sec)	11	17
Phase Time (sec)	17	23
Phase Split	43%	58%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

MOVEMENT SUMMARY

STOP Site: 101 [S2 - Ban-SheRdSecConRd - Signals Network - PM]

Network: N101 [Signals-Stop - PM]

New Site
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance	m			km/h
East: Bannockburn-Shelford (E)														
5	T1	568	8.0	568	8.0	0.308	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	164	5.0	164	5.0	0.219	9.2	LOS A	0.9	6.8	0.58	0.80	0.58	50.5
Approach		732	7.3	732	7.3	0.308	2.1	NA	0.9	6.8	0.13	0.18	0.13	56.1
North: Secondary Connector Road														
7	L2	109	5.0	109	5.0	0.142	10.7	LOS B	0.6	4.1	0.47	0.92	0.47	50.5
Approach		109	5.0	109	5.0	0.142	10.7	LOS B	0.6	4.1	0.47	0.92	0.47	50.5
West: Bannockburn-Shelford (W)														
10	L2	247	5.0	247	5.0	0.138	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	53.4
11	T1	378	8.0	378	8.0	0.204	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		625	6.8	625	6.8	0.204	2.2	NA	0.0	0.0	0.00	0.23	0.00	57.2
All Vehicles		1466	6.9	1466	6.9	0.308	2.8	NA	0.9	6.8	0.10	0.25	0.10	56.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Gap-Acceptance Capacity: SIDRA Standard (Akçel k M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

